

CHEMICAL ABSTRACTS

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1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Chemical Engineering Memoranda. I. and II. Drying and calcining plant. C. H. BUTCHER. *Ind. Chemist* 3, 554 6(1927); 4, 47-8(1928).—B. gives detailed sample calcs. for a drier heated by flue gases or hot air. The calcs. are unusually complete, but no new methods are involved. W. L. BADGER

The building of containers for severe service. T. McLEAN JASPER. *Ind. Eng. Chem.* 20, 466-70(1928).—A description of the precautions to be observed in designing containers to operate under high pressure and temp. T. S. CARSWELL

A new pipet. H. NORMAN RIDYARD. *J. Chem. Soc.* 1928, 749-50.—This instrument is capable of measuring the vol. of H_2O to $\pm 0.02\%$ and that of C_6H_6 to $\pm 0.1\%$, being of 1.5-2.5-cc. capacity. The outlet of a tapering bulb, serving as the body of the pipet, is drawn out to a fine capillary. The other end merges into another fine capillary which is bent, expanding here into a small bulb and then contracting into a slightly larger capillary, and finally enters a bulb of about 2 cc. diam. This bulb has 2 outlets, 1 for emptying and the other to which to attach a vacuum line. The pipet is filled by attaching a suction and closing the other outlet with a finger. J. B.

A modified weighing pipet. GRAHAM EDGAR. *Ind. Eng. Chem.* 20, 158(1928).

E. J. C.

A micro-calorimeter. S. G. LIPSETT, F. M. G. JOHNSON AND O. MAASS. *J. Am. Chem. Soc.* 50, 1030-3(1928).—A calorimeter (of 1 cal. heat capacity) is detailed for measuring heats of soln., 4 cc. of solvent being used. The calorimeter is cylindrical, a drum contg. the solute being set inside and then surrounded with the solvent. On rotation, the solvent and solute mix and the heat change is measured. The deviation from the mean of 6 measurements of the heat of soln. of NaCl was never greater than 0.26%. J. BALOZIAN

An improved glass manometer. FARRINGTON DANIELS. *J. Am. Chem. Soc.* 50, 1115-7(1928).—The description of a glass manometer is given in which a known air pressure is balanced against an unknown gas pressure through a glass diaphragm. The point of balance is obtained electrically by a Pt contact fused to the diaphragm. Readings may be obtained accurate to 0.2 mm., the 0 point being independent of the temp., over a wide range, and pressure, until the total pressure is lower than 10 mm. Advantages are claimed over other devices. J. BALOZIAN

An improved quartz-fiber manometer. A. O. BECKMAN. *J. Optical Soc. Am.* 16, 276-7(1928). E. H.

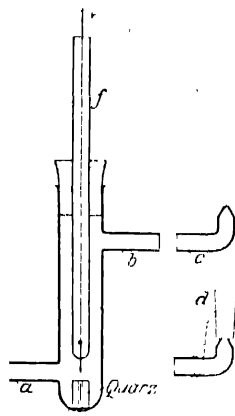
Most favorable dimensions of a resistance thermometer. A. MICHELS AND P. GEELS. *Verslag Akad. Wetenschappen Amsterdam* 36, 1342-8(1927).—For maximal wire length of a resistance thermometer the thickness d for optimal sensitivity is detd. by the condition $R = G$ for an aperiodic galvanometer and Rt_{metal} for a const. field galvanometer. (R is thermometer resistance, G total external resistance.) B. J. C. VAN DER HOEVEN

Ring-shaped capillary electrometer. G. KOMOVSKII. *Trans. Karpov Inst. Chem.* 1926, No. 5, 39-42.—K. proposes the adoption of an electrometer of his own invention which consists of a ring-shaped app. with communicating vessels turning around an immovable axis. Its sensibility is 0.01 millimeters per 1.10^{-3} v.; the sensibility of the app. can be changed to a very considerable extent either by revolving the electrometer around the axis or by inclining it. A complete description and drawings are given. BERNARD NELSON

Design of fractionating columns. D. B. KEYS, ROY SOURUP AND W. A. NICHOLS, JR. *Ind. Eng. Chem.* 20, 464-6(1928).—The no. of theoretical plates at infinite reflux is graphically detd. from the equil. curve, and is multiplied by an empirical factor of 2 or 3 to give the no. of plates practically required. T. S. CARSWELL

The fulgurator as an atomizer of salt solutions for flame spectra. Photography of its spark spectrum. WILHELM HIRSCHL. *Z. Physik* 47:147-50(1928).—The De-

lachanel-Marmet fulgurator has been modified as indicated in the figure. For spark spectroscopy it is used as the ordinary app. For flame spectroscopy, *b* is placed in front of a Bunsen burner; the spark pulverizes the soln. and the mist is pulled into the flame by the draft produced by the burner. Another method consists in passing hydrogen through *a* and burning it in *c* (which is first connected to *b*). Or, illuminating gas can be substituted for H if the quartz or hard-glass tube *d* is fitted on to *c* to act as a Bunsen burner. This app. is particularly suitable for quant. work; the amt. of salt consumed is readily obtained by weighing the fulgurator before and after its use.



A. L. HENNE

Preliminary communication on the applicability of the "acidimeter" according to Dr. Trénel. G. LAUFER. *Z. Pflanzenernähr. Dungung* B6, 486-9(1927); cf. *C. A.* 19, 927.—The claims made for the acidimeter by Trénel were tested and the results are given.

E. F. SNYDER

Apparatus for determining viscosity under varying conditions. EDWARD MASTERS and A. E. GODDARD. *Ber.* 61B, 586-91(1928).—The viscometer described consists of a 0.02-0.03-cm. capillary, 20 cm. long, with a mm. scale at the lower end. At the upper end is a pear-shaped vessel whose vol. is accurately known, and which can be replaced by vessels of different size depending upon the quantity of liquid available and its viscosity. The liquid can drain out of the vessel either under its own wt. or under pressure supplied from

a very much larger chamber. By use of Scarpa's methods of calcn., errors due to displaced air and surface tension can be ignored, and the app. makes it unnecessary to consider changes in velocity of the moving liquid.

H. S.

Electromagnetic vacuum cut-off. J. H. HUBBEN. *J. Am. Chem. Soc.* 50, 1117-8 (1928).—A Hg cut-off is described, suitable for high vacuums, in which the Hg level in an arm of a U-tube is varied by a soft Fe plug and an elec. winding, acting as a solenoid. When the Hg level is below the outlet of an inner tube the app. may be evacuated, when above, the chamber and the pump are disconnected. The vapor pressure of the Hg may be reduced by so designing the app. that it may be immersed in liquid air.

J. BALOZIAN

Light filters for the isolation of narrow spectral regions. L. A. JONES. *J. Optical Soc. Am.* 16, 259-71(1928).

R. H.

A cutting burner for cast iron. I. C. FRITZ. *Gas u. Wasserfach* 70, 1048-9(1927).—A special type of oxy-acetylene cutting burner for cast iron has been devised with a heating burner on either side of the cutting burner. This burner will cut cast iron up to 6 in. thick satisfactorily.

R. W. RYAN

Oxygen-cutting technic. ANON. *Apparatebau* 40, 80 1(1928); 4 cuts.—The Weberwerke-Siegen app. is described.

J. H. MOORE

Utilization of waste heat from large gas engines, industrial furnaces and gas generators. ANON. *Apparatebau* 40, 73-9(1928); 17 cuts.—Descriptions of app., with plans and elevations.

J. H. MOORE

Absorption of light by a reversing apparatus of the reversing type and thermostat for same (Brit. pat. 273,175) $\frac{1}{t_1} = \frac{1}{t_2}$ vacuum distillation in the laboratory (McDowell) 2.

Colorimeter. R. E. KLETT. U. S. 1,667,478, April 24.

Apparatus for comparing the color of liquids by reflected and transmitted light. H. A. ELLIS. U. S. 1,667,249, April 24.

Crucible furnace with two crucibles one above the other. J. D. PATON and A. WOOD. Brit. 273,457, June 3, 1926.

Combined furnace and gas producer suitable for use with steam boilers. T. R. WOLLASTON. Brit. 274,286, Aug. 3, 1926.

Regenerative furnaces. D. B. JONES and F. C. SWARTZ. U. S. 1,667,319, April 24.

Continuously operated tunnel furnace suitable for cementation of steel articles in boxes. BRITISH FURNACES, LTD. and E. W. SMITH. Brit. 274,003, March 23, 1927.

Holder for radiation pyrometers, etc. T. H. NORTON. U. S. 1,667,355, April 24.

Pyrometer for measuring the temperature of gases. KAISER-WILHELM-INSTITUT FÜR EISENFORSCHUNG. Brit. 274,440, July 16, 1926.

Temperature alarm operated by expansion of gases. L. J. J. B. CHENEAU. Brit. 273,764, July 3, 1926.

Electrical safety control for burners having gas-ignition pilots. F. FISCHER and A. F. VAN PELT. U. S. 1,666,331, April 17.

Removing gases from electric discharge tubes. ELECTRICITE INDUSTRIELLE ET DOMESTIQUE. Brit. 273,726, July 3, 1926. In order to remove gas from tubes and from their electrodes, a chloride such as Hg_2Cl_2 is enclosed in a receptacle communicating with the tube to be evacuated so that gas is absorbed by particles of chloride which are removed by a pump. A rare gas such as neon, for use as a filling, is admitted and purified by C produced by combustion of Landes pine or sea pine and contained in a vessel cooled by solid CO_2 and EtCl .

Gas separator suitable for separating gases from liquids. J. F. BORDEN. U. S. 1,666,139, April 24.

Heat-exchange apparatus for heating air or other gases. J. W. YOUNG and METROPOLITAN-VICKERS ELECTRICAL CO., LTD. Brit. 273,886, June 16, 1926.

Apparatus for purifying and sterilizing water or other liquids or gases by filtration with active carbon. J. N. A. SAUER. U. S. 1,667,439, April 24.

Rotary filter. H. S. HOLE SHAW, R. C. B. STILLMAN and J. A. PICKARD. U. S. 1,666,381, April 17.

Continuous rotary vacuum filter. R. O. BOYKIN. U. S. 1,666,279, April 17.

Filter for sludges or other liquids. E. J. SWEETLAND. U. S. 1,666,515, April 17.

Apparatus for aerating and screening sewage or other liquids. F. B. CHAPPELL. U. S. 1,666,164, April 17.

Pressure filtration system for removing portions of filter cake in successive stages. J. F. WAIT. U. S. 1,667,465, April 24.

Apparatus for admixing with water proportioned quantities of substances in powdered form. W. BOBY and W. BOBY & CO., LTD. Brit. 273,442, May 10, 1926.

Bubble tower for absorptions or fractionations. C. M. ALEXANDER. U. S. 1,667,136, April 24.

Acetylene generator. R. M. EVLETH. U. S. 1,667,346, April 24.

Acetylene generator. G. WRIGHT and PENNY & PORTER (ENGINEERS), LTD. Brit. 273,784, March 30, 1926.

Apparatus for aerated milk, cream or other liquids. D. SWEENEY. Brit. 273,835, April 14, 1926.

Ring oven (with revolving hearth) for heating pulverulent or granular materials. L. HONIGMANN and F. BARTLING. U. S. 1,666,656, April 17.

Tubular coil heat-exchange apparatus. H. HILLIER. Brit. 273,450, May 26, 1926.

Device for charging material (of thick or solid character) into high-pressure reaction vessels. I. G. FARBERNIND. AKT.-GES. Brit. 274,122, July 10, 1926.

Lining iron pipes with copper for heat-exchange apparatus, etc. SILLER & RODENKIRCHEN GES. Brit. 274,015, Jan. 13, 1927. Mech. features.

Glow cathode for electron tubes. E. FRIEDERICH. U. S. 1,667,471, April 24. A cathode is formed with a metal wire such as W contg. a small proportion of C and carrying a coating contg. a carbide of a metal such as Th capable of high electron emission.

Vacuum electric discharge tubes. NAAMLOOZE VENNOOTSCHAP PHILIPS' GLOELAMPENFABRIEKEN. Brit. 274,233, April 30, 1926. Oxide cathodes are made by coating a core of W or Mo (or other highly refractory metal or alloy not forming an alloy with alk. earth metals) with a film of Cu or other readily oxidized metal of relatively low volatilizing temp., oxidizing the film (partially or wholly), bringing it into contact with an alk. earth metal such as Ba condensed from Ba vapor, and further heating to effect oxidation of the alk. earth metal by O from the Cu oxide with or without additional supply of O. The Cu or other metal thus used is finally evapd. by addnl. heating.

Thermocouple pyrometer for measuring the temperature of flowing gas. SIEMENS & HALSKE AKT.-GES. Brit. 274,096, July 8, 1926.

Thermoelectric couple. W. A. DARRATH. U. S. 1,667,142, April 24. Two metals of granular form such as German silver and Sb, Zn or Al are interlocked with an insulating support such as asbestos or bakelite.

Thermionic valves. F. MEYER and H. J. SPANNER. Brit. 274,027, July 10, 1926. Cores or coatings for cathodes comprise a metal which yields an amphoteric oxide such as Co, Ni or their alloys with Al or Zr. Cores of noble metal such as Pt or Pt-Ir or of W or Mo may be coated by electrolytic or mech. processes or by heating in an atm. of Co or Ni carbonyl. Alk. earth metals also may be assocd. with the coatings. Cf. C. A. 22, 1710.

Thermostat. J. E. BOLLING. U. S. 1,666,192, April 17.

Thermostat. R. F. MASSA. U. S. reissue 16,940, April 24. Original pat. 1,146, 637 was issued July 13, 1915.

Bimetallic thermostat. H. J. LLOYD. Brit. 274,267, July 2, 1926.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

H. A. Lorentz. A. D. FOKKER. *Physica* 8, 1-4(1928).—Obituary.

B. J. C. VAN DER HOEVEN

Lorentz' work. A. D. FOKKER. *Physica* 8, 4-13(1928).—A short review.

B. J. C. VAN DER HOEVEN

Friedrich Raschig. E. ERLÉNBACH. *Chem. App.* 15, 61(1928).—Obituary with portrait.

J. H. MOORE

Tatiana Alfredowna Gencke. A. G. BERGMAN. *J. Russ. Phys.-Chem. Soc. Chem. Pt.* 59, 1-4(1927).—An obituary.

E. J. C.

Marcelin Berthelot (1827-1907). One hundredth anniversary of his birthday. J. ZAWADZKI. *Przemysł Chem.* 12, 1-18(1928).—Biographical. Statistics of B's publications are given.

A. C. ZACHIN

Thomas Green Clemson, LL.D., the chemist. R. N. BRACKETT. *J. Chem. Education* 5, 433-44(1928).—Biography with portrait.

E. H.

Emerson and chemistry. II. Emerson's message upon the humanization of chemistry. C. A. BROWNE. *J. Chem. Education* 5, 391-403(1928); cf. *C. A.* 22, 1503.

E. H.

Chemistry at New York University. A retrospect. W. H. NICHOLS. *J. Chem. Education* 5, 418-51(1928). The Nichols Chemistry Building at University Heights

A. E. HULL. *Ibid.* 451-4. Recent developments at Washington Square College. W. C. McTAVISH. *Ibid.* 455-6. The future. JAMES KENDALL. *Ibid.* 457-8.

E. H.

The teaching of chemistry in a high-school coöperative industrial course. H. R. WILSON. *J. Chem. Education* 5, 425-32(1928).

E. H.

Chemistry in war and chemistry in peace. ARNALDO PIUTTI. *Atti II congresso naz. chim. applicata* 1926, 182-205. —An address.

C. C. DAVIS

Precision measurements in the L-series of the new element 75, rhenium. INA WENNERLOF. *Z. Physik* 47, 422-5(1928).—On a prepn. contg. 5% Re and 92% Mo, obtained in the work of I. and W. Noddack (*C. A.* 21, 1570), accurate wave-length measurements were made for the 3 strongest x-ray lines of Re with the following results: L_{α_1} 1429.88, L_{β_1} 1236.04, L_{β_2} 1204.1 x-units. These values are in good agreement with those obtained by interpolation from the $\sqrt{\nu}/R$ values of neighboring elements, and leave no doubt as to the actual presence of element 75.

F. A. JENKINS

Florentium. II. LUIGI ROLLA AND LORENZO FERNANDES. *Z. anorg. allgem. Chem.* 169, 319-20(1928).—See *C. A.* 22, 1504.

A. FLEISCHER

Chemical composition of the interior of the earth and the moon. S. MOHOROVIČIĆ. *Archiv. Hem. Farm.* 1, 95-104(1927).—From seismological, petrological and astronomical-geodetic considerations it is concluded that the earth consists mainly of Fe, Mg, Si and O, while the moon contains in addn. relatively more Al and Ca. The rigidity of the earth is a little more than 3 times as great as that of the moon. Venus and Mercury probably possess a similar compn. to the earth while that of Mars is closer to that of the moon. The planetoids are similar in compn. to meteorites, while the planets more distant from the sun probably resemble the fixed stars in compn., this being unknown.

B. C. A.

Radioactivity and the temperature of the interior of the earth and the moon. S. MOHOROVIČIĆ. *Archiv. Hem. Farm.* 1, 226-36(1927).—From a consideration of the thickness of the Sial granite substratum and its radioactivity, thermal cond. and elasticity, it is concluded that at a depth of 50 km. the rocks of the moon exist only in the liquid state, while at 70 km. only the gaseous phase can exist. In the earth, a temp. high enough to liquefy rocks (2500°) is attained at a depth of 50 to 60 km. below high mountains.

B. C. A.

Determining composition by specific gravity. L. O. HOWARD. *Eng. Mining J.* 125, 617(1928).—A simple formula is derived which permits a very rapid detn. of % by wt. or by vol. by water displacement. Application is also possible to the compn. of certain alloys having quite different sp. grs. and very low mutual soly. A table shows the closeness of the calcd. results to the assumed.

W. H. BOYNTON

The ice point of the thermometer scale. A. MICHELS AND F. COETJER. *Proc. Acad. Sci. Amsterdam* 30, 1017-20(1927).—See C. A. 22, 1524. • E. H.

Fundamental frequencies, interatomic forces and molecular properties. J. R. BATES AND D. H. ANDREWS. *Proc. Nat. Acad. Sci.* 14, 124-30(1928).—From the fundamental equations for the frequency of vibration of atoms in mols., for harmonic and anharmonic oscillators from the theories of vibrational quantum states, relations are derived connecting the energy necessary to dissociate a normal mol., the force const. and the amplitudes of vibration. These relations are used in calcg. data available in the literature to a comparative basis. A great similarity of all non polar linkages is shown by the close agreement of the values for "displacement for association." It is also shown that relations do exist between the fundamental frequency and the force of binding in non-polar mols. and such properties as heats of linkage, b. ps and directive influence.

ARTHUR FLEISCHER

Valence. W. A. NOYES. *Proc. Am. Phil. Soc.* 66, 287-308(1927); cf. C. A. 22, 724.—This article contains more historical material than the previous one.

W. ALBERT NOYES, JR.

The basis of the firmness of attachment in chemical combinations. FRIEDRICH EBEL AND EGON BRETSCHNE. *Helv. Chim. Acta* 11, 281-300(1928).—A study of the relation of the firmness of attachments in chem. combination to the degree of dissociation and the reactivity of the mol.

J. S. REICHERT

Symbols for electronic bonds. J. A. CRANSTON. *Chemistry & Industry* 47, 208-11(1928).—As a remedy for the existing confusion the dotted dash— proposed by Mann Smith (C. A. 21, 3324) is recommended. "It enables all the types of electronic bonds so far recognized by chemists to be graphically represented in a consistent way" and gives much useful information readily. Examples are given. AUSTIN M. PATTERSON

Röntgenometric examination of highly polymerized organic substances. EMIL ORT. *Helv. Chim. Acta* 11, 300-23(1928).—A comprehensive study of the Debye Scherrer diagram of the *poly-oxymethylenes*. The axial ratios, a b c, are 1.72 1:1.55. The axes are: a = 7.79, b = 4.53, c = 7.02 Å. U. The elementary parallelepiped is rhombic, base-centered and pseudohexagonal. The building unit is (CH₂O)₄. The C atoms are in a straight line in the direction of the c-axis. One H atom appears after each four C atoms. The C atoms and O atoms all lie in the same plane. The remaining H atoms are located perpendicular and symmetrical to this plane. Macroscopically the crystals are rhombic-holohedric and pseudohexagonal. The röntgenometric examn. of poly-oxymethylene diacetates gave variable space lattice constns; this was due probably to mixed crystals.

J. S. REICHERT

Molecular structures of methane. J. K. MORSE. *Proc. Nat. Acad. Sci.* 14, 166-71(1928).—The cube is a convenient method of representation of the C atom in combination. The center of the cube is the C nucleus, while the corners represent "electron positions," 4 of which are occupied by the carbon 1s electrons. The remaining 4 electrons are supplied by the atoms in combination with the C. The distance from the C nucleus to an "electron position" was calcd. to be 0.77 Å. U. for the diamond structure and 0.75 Å. U. for the graphite. For CH₄, two types of mol. are possible depending upon the position of the cube about the C cube. Since there are 8 "H positions" in the outer cube and only 4 H atoms to take them, the possibility of "dynamic isomers" is present. These may be distinguished by their moments of inertia. These calcd. for the different forms agree with the moments of inertia calcd. from exptl. data on infra-red absorption bands of CH₄.

ARTHUR FLEISCHER

Inner crystal structure of some native metals. H. C. H. CARPENTER AND S. TAMURA. *Bull. Inst. Mining Met.* 282, 1-22(1928).—Preliminary investigations were made of Cu, Ag, Au, Sb, Bi, Pt and Fe, all native, to ascertain native forms, distinguishing features from ordinary manufd. forms and whether native forms were primary or metamorphic structures. Cu has a metamorphic form due to atomic rearrangement; Ag apparently was pptd. from aq. solns.; and Au possesses a secondary structure. Native Sb resembles the laminated concentric structure of electrodeposited Zn on a cathode, Bi shows a very coarse crystalline structure, many characteristic lamellae being present, resembling cast Bi plastically deformed. Pt possesses apparently a primary structure, resembling a metal or oxide crystd. very slowly from the melt. Meteoric Fe largely preserves its primary cryst. structure and shows Widmanstätten figures, cohenite crystals and Neumann bands. Metals and alloys with an irregular at. arrangement are unstable. By rearrangement of the atoms they tend to pass into a more stable condition, thus producing an internal structure similar to manufd. metals recrystd. by annealing. 34 photomicrographs are added.

S. L. B. ETHERTON

Crystal structures of the isomorphous sulfates of potassium, ammonium, rubidium

and cesium. A. Ogg. *Phil. Mag.* [7], 5, 354-67 (1928).--The structure is based on a simple orthorhombic lattice having 4 mols. per unit cell and the space-group is V_{16} . The positions of the atoms in the structures have been detd. An explanation of the characteristic twinning of these crystals is given. GEORGE CLOCKLER

Crystal measurements on a few products of Knoll A.-G. H. STEINMETZ. *Chem.-Ztg.* 52, 102 (1928). Pentamethylenetetrazole (cardiazole), monoclinic prisms, a, b, c 1.8171 1.15690, β 120°15', n_D 1.617. Pentamethylenetetrazole, monoclinic prisms, a, b, c 1.6155 1.24725, β 95°2', doubly refractive, n_D 1.59. Crystallizes from H_2O or aq. media as monohydrate, monoclinic prisms, a, b, c 0.5368 1.05043, β 95°52'. Dihydromorphinone HCl (Dilandid), rhombic, a, b, c 0.7511 0.491. F. D. S.

Apparent relation between the rate of change of the electrical resistance at fusion and the crystal lattice of metallic elements. H. PERLITZ. *Phil. Mag.* [7], 2, 1148-52 (1926). *Science Abstracts* 30A, 320. The structure and the elec. resistance undergo an abrupt change when a metallic element is heated to its m. p. Since melting of a metal means a complete collapse of the crystal lattice formed by the atoms of the metallic elements in the solid state, it was thought probable that a relationship exists between the discontinuity of the elec. resistance at fusion and the crystal lattice of metallic elements. The available data were examined and out of 49 elements, 12 elements are in favor of the statement that the rate of change of the elec. resistance at fusion is related to the crystal lattice, and 6 elements leave the question in doubt, while in one case considerable divergence was found. H. G.

Mixed crystals. II. Mixed-crystal formation of barium sulfate and potassium permanganate. H. G. GRIMM and G. WAGNER. *Z. physik. Chem.* 132, 131-48 (1928); cf. C. 19, 1511. By mixing solns. of K_2SO_4 and $Ba(NO_3)_2$ each contg. equiv. quantities of $KMnO_4$, G. and W. have pptd. mixed crystals of $BaSO_4$, $KMnO_4$ at 50° contg. up to 60 mol. % $KMnO_4$. Qual. the concn. of $KMnO_4$ in the crystals and in the soln. are directly proportional. They are prepd. for analysis by washing (1) with Me_2CO until the washings are but faintly pink, (2) 3 times with anhyd. Et_2O and then dried in a vacuum at 110-120°. Crystals contg. more than 40% $KMnO_4$ decompose spontaneously and react vigorously with Me_2CO ; those with less $KMnO_4$ are attacked by water, thus making reproduction of washed crystals very poor. Crystals which have been extensively washed with water are very inert towards HCl, HNO_3 , and H_2SO_4 . The rate of soln. in concd. H_2SO_4 increases with increase in $KMnO_4$. When exposed to light the surfaces of the crystals become coated with oxides of Mn. Qual. expts. indicate that $SrSO_4$, $BaSeO_4$, $SrSeO_4$, $BaCrO_4$ and KBF_4 form mixed crystals with $KMnO_4$; also $BaSO_4$, KIO_3 can be prepd. E. R. SCHIERZ

The supraconductive state of gray tin. W. J. DE HAAS, G. J. SIZOO and J. VOOGD. *Verslag Akad. Wetenschappen Amsterdam* 36, 1227-9 (1927).--White tin becomes supraconductive at 3.8 abs. Gray tin, pressed into rods, has a positive resistance down to 1.2° abs. No persistent currents could be induced in the metal grains by magnetic fields. From the lower d. of gray tin as compared with white tin, it appears that Kamerlingh Onnes' rule "loose at. bonds favor supraconductivity" does not generally hold. B. J. C. VAN DER HOEVEN

Viscosity of metals.-Bismuth. G. SUBRAHMANYAM. *Nature* 120, 770 (1927).--The coeff. of viscosity of Bi at 237° is computed from known data to be 13.71×10^8 poises. B. C. A.

The coefficient of expansion of bromoform. ALBERT SHERMAN and JACK SHERMAN. *J. Am. Chem. Soc.* 50, 1118-20 (1928).--The coeffs. of expansion of bromoform (m. 77.0°) were detd. from ds., at temps. ranging from 9° to 50°, by means of a Pyrex pycnometer. An empirical equation is derived for the variation of sp. vol. with temp., values calcd. from this agreeing with the exptl. to 3 units in the last place. J. B.

The fundamental pressure coefficient of helium. W. H. KERSOM and MISS H. VAN DER HORST. *Proc. Acad. Sci. Amsterdam* 30, 970-9 (1927).--See C. A. 22, 1069. E. H.

The freezing point and density of pure hydrogen peroxide. A. C. CUTHBERTSON, G. L. MATHESON and O. MAASS. *J. Am. Chem. Soc.* 50, 1120-1 (1928).--The f. p. of H_2O_2 is detd. as -0.89°; the cooling bath temp. was maintained 0.1° below the f. p. By the method described for measuring the d. at 0°, detd. as 1.4649, the decompn. occurring in the dilatometer is a min. In concd. aq. solns. contg. up to 5% H_2O , the ds. are accurately expressed by the equation $D = 0.9486 + 0.005163 A$, where A is the % by wt. of H_2O_2 . J. BALOZIAN

Molecular velocities, states of excitation and the probability of transition into a degenerate gas. I. E. PERSICO. *Atti accad. Lincei* [6], 7, 137-41 (1928).--A mathematical analysis of the way in which the law of distribution of velocities, the law of

division into various states of excitation and the laws of the probability of transition are modified in a monatomic degenerate gas as a result of their mutual dependence established by the Pauli principle. Since Fermi (*C. A.* **20**, 2265) assumed 3 degrees of freedom, and since in the present work another degree of freedom is assumed, viz., the internal condition or state of excitation of the mols., the distribution of velocities must differ from those calculated by F. Conversely the distribution of the mols. in various states of excitation and the probability of passage from one to another by the Pauli-Fermi hypothesis is influenced by the distribution of the velocities of translation. Likewise the Einstein formula for the probability of transition must be modified. C. C. D.

Gaseous solutions. MERLE RANDALL and BENJAMIN SOSNICK. *J. Am. Chem. Soc.* **50**, 967-80 (1928).—Deviations of gaseous mixts. from the generalized Raoult law are similar but smaller than those of liquids of like polarity. It is shown graphically by using A and ethylene mixts., that they increase with total pressure. Calcn. of the fugacities of pure supercooled vapors are impossible for pressures above the max. in the P - T isotherm. From considerations of gaseous solns. it is seen that Lewis and Randall's rule holds above the crit. points of vapors and for a limited range below these points. For a given pressure, values of the activity function show how the fugacity of a gas depends upon the chem. nature of the added gases, and are a means of predicting the probable effect for other temps., pressures and gases. Tables and graphs of the variation of the activity function with pressure are given for NH_3 , H_2O vapor and CO_2 in mixts. with N_2 or H_2 at various temps. J. BALOZIAN

The boundary condition "concentration equals zero" in diffusion problems. W. DE GROOT. *Physica* **8**, 23-34 (1928).—A mathematical paper. B. J. C. v. D. H.

The melting curve of helium and the heat theorem of Nernst. W. H. Keesom. *Proc. Acad. Sci. Amsterdam* **30**, 952-6 (1927).—See *C. A.* **21**, 2582. E. H.

The melting-point line of helium and Nernst's theorem of heat. J. J. VAN LAAR. *Proc. Acad. Sci. Amsterdam* **30**, 955 (1928).—See *C. A.* **22**, 1069. E. H.

Vacuum distillation in the laboratory. F. H. McDOWELL. *Chemistry & Industry* **47**, 241 (1928).—The const. vacuum app. of Wade and Merriman (cf. *C. A.* **5**, 2992) is described, a test tube inside of a filter tube being used as receiver. Following the distn. with frequent detns. of n a 3-g. fraction of ngaiol (cf. *C. A.* **20**, 186) b_{20} 191-2° was shown to contain an isomer b_{20} 188-90°. M. advocates n as of more value than the b . p. as a standard of purity on small samples. FOSTER DEE SNELL

The effect of intensive drying on the vapor pressure and vapor density of ammonium chloride. W. H. RODEBUSH and J. C. MICHALEK. *Proc. Nat. Acad. Sci.* **14**, 131-2 (1928).—Intensive drying causes no change in the vapor pressure, but complete dissociation of NH_4Cl . Smits (cf. *C. A.* **21**, 3506) found a lowering of vapor pressure and a vapor density equal to NH_4Cl or higher. Intensive drying produces an extraordinary retardation in the rate of evapn. and condensation, and several hrs. were required for equil. to be established. Thermodynamic consideration of Smits' data shows that the dissociation of dry NH_4Cl in the vapor state is an exothermic reaction. ARTHUR FLEISCHER

Vapor tensions of liquid ethylene. C. A. CROMMELIN and H. G. WATTS. *Proc. Acad. Sci. Amsterdam* **30**, 1057-8 (1927).—See *C. A.* **22**, 1509. E. H.

Preliminary isotherms of ethylene. C. A. CROMMELIN and H. G. WATTS. *Proc. Acad. Sci. Amsterdam* **30**, 1059-61 (1927).—See *C. A.* **22**, 1508. E. H.

The rectilinear diameter of ethylene. E. MATHIAS, C. A. CROMMELIN and H. G. WATTS. *Proc. Acad. Sci. Amsterdam* **30**, 1054-6 (1927).—See *C. A.* **22**, 1066. E. H.

Condensation of liquids in the vesicular state. M. PAULY. *Rev. gén. colloïdes* **5**, 745-8 (1927).—When a substance, liquid at ordinary temp., is vaporized and then diluted with a large vol. of gas, there is formed, by condensation, a finely divided residue through the gas. This residue, said to be in the vesicular state, is difficult to break up; it is possible to do so with shock app. when the particles are large, if they are very fine, use is made of their elec. charge. The condensation of H_2SO_4 is difficult to obtain; the presence of H_2O aids in breaking up the state but it is never possible to arrive at complete condensation by mech. means. The Cottrell method is very effective, giving 80 to 90% recovery. E. G. VANDEN BOSCH

Contribution to the study of the vitreous state and the expansion of glasses. MICHAEL O. SAMSOEN. *Ann. phys.* **9**, 35-127 (1928).—Measurements of linear expansion with a Chevenard dilatometer (*C. A.* **20**, 1539) and Chevenard and Portevin, (*C. A.* **19**, 3467) and of cubical expansion of various amorphous solids show that the phenomenon of "amorphous expansion" is common to all amorphous substances and that it is due to an increase in the coeff. of expansion, and not to the change of dimensions at the transition point which is characteristic of allotropic transformations. These measurements were made on the following substances in the amorphous state: Pryex and other glasses,

Na silicates, enamels composed of B_2O_3 and Na_2O and of B_2O_3 and PbO , $NaPO_3$, B_2O_3 , pitch, rosins, gum lac, cane sugar and polymerized acrolein, glycerol, and $Na_2S_2O_3 \cdot 5H_2O$. A glass which was not annealed did not show this increase of expansion. The change of sp. heat which accompanies the transformation has been measured for glycerol and B_2O_3 . The coeff. of expansion before transformation, temp. of transformation, and coeff. of expansion after transformation have been detd. and their variation as a function of the chem. compn. established for glasses composed of SiO_2 and Na_2O , SiO_2 and B_2O_3 , Na_2O and B_2O_3 , B_2O_3 and PbO , silicoborates of Na and a group of industrial glasses. Conclusion: All amorphous substances undergo a transformation characterized by a discontinuity in their phys. properties. The transformation temp. is detd. by the viscosity of the substance, and for temps. below this point, the substance is in a true solid amorphous state. In this state the mols. are immobile, and crystn. is impossible below the transformation temp.

R. J. HAVIGHURST

Capillary rise of liquids in wide tubes. C. H. BOSANQUET. *Phil. Mag.* [7], 5, 296-301 (1928). --The equation for the form of a liquid surface at rest in a circular tube under the influence of capillary forces is treated and tables are given of appropriate quantities necessary to solve it.

GEORGE GLOCKLER

Molecular orientation at surfaces of solids. II. The work of adhesion of the saturated fatty acids for water. A. H. NUTZ. *J. Phys. Chem.* 32, 620-30 (1928); cf. *C. A.* 22, 1510. --When work of adhesion of fatty acids is plotted against the no. of C atoms, the adhesional work shows a marked min. in the neighborhood of 12-14 C atoms, beyond which there is a very pronounced increase. The alternation of various phys. properties for odd and even acids is markedly illustrated in the work of adhesion. Even and β odd acids lie on a single smooth curve, the α -odd modifications showing alternating higher values. Alternation of two sets of values for α - and β -odd acids are attributed to differences in crystal structure. The general trend of the curve, for adhesional work against the no. of C atoms is considered as partly due to the general nature of the adhesional energy-temp. relations and partly to the mech. effects of the length of the C chain.

R. J. HAVIGHURST

Liquid wires and their surface films. W. B. PIETENPOL AND H. A. MILEY. *Phys. Rev.* 30, 697-704 (1927). A wire of low-m.p. metal (Pb, Sn, Zn, Bi) can be made to glow when freely suspended and heated in air or O. This has been shown to be due to the formation of an oxide film of sufficient tensile strength to permit the molten metal to be sustained even though its m. p. is much lower than the glowing temp. Wires with clean surfaces when heated in N_2 break at the m. p. of the metal. Expts. with sulfide, bromide and chloride films reveal 3 facts: if there is not a firm coat at the m. p. of the metal the wire breaks at that temp.; if the m. p. of the coat is between the m. p. of the metal and the glowing temp., then the wire breaks at the m. p. of the coat; if the m. p. of the film is above the glowing point the wire can be made to glow when freely suspended. The suspension of molten metals by their oxide films affords a unique method of measuring the temp. coeffs. of resistance of low-m.p. metals through the solid and liquid states.

BERNARD LEWIS

Studies of the surface layer. VI. Differences of potential on the border between air and solutions of some benzene derivatives. A. FRUMKIN, A. DONDOS AND R. KUL'VARSKII. *Trans. Karlov Inst. Chem.* 1926, No. 5, 17-33; (cf. *C. A.* 20, 2604-5). --The purpose of the present investigation was to find the mechanism of orientation of mols. of simple aromatic compds. on the surface of water. Since the adsorbed quantity of these compds. is almost proportional to the magnitude of the positive charge of external air, the magnitude of the lowering of surface tensions and the differences of potential on the border air-soln. of aromatic compds. of various concns. were studied. The capillary curves of these compds. can be expressed by means of Shishkovskii's reaction so modified as to take into account the existence in the surface layer of forces of mutual attraction. The adsorption of aromatic compds. is less than that of corresponding aliphatic compds. having the same no. of C atoms. As a rule, the introduction of the Me group increases the adsorption, but the effect depends on the position of the Me group. Compds. having in the kernel 1 polar group (phenol, cresols, anisole, nitrobenzene, aniline, methyl- and dimethylaniline, toluidines) communicate a positive charge to the surface of water, but the charge is less than in the aliphatic compds., and it still decreases if there is an accumulation in the kernel of several polar groups; in the latter case it even becomes negative (dihydroxybenzenes, *m*- and *p*-nitrophenols). Compds. substituted in the lateral chain (benzoic acid, Me benzoic ester, benzyl alc., benzylamine) produce effects similar to those of corresponding aliphatic compds. Compds. of which the mols. occupy in the surface layer less room than the corresponding isomeric compds. give more positive (less negative) effects; thus *p*-cresol and *p*-toluidine

give a more positive charge to the surface than the *o*-compds., and *p*-dihydroxybenzene and *p*-nitrophenol give a more negative charge to the surface than the *o*-compds. However, this difference in value of the charge is too great to be accounted by the change of the degree of orientation of mols alone.

BERNARD NELSON

Transverse electrocapillary effect. T. TAKEUCHI and H. AKASHI. *Proc. Phys.-Math. Soc. Japan* **8**, 192 4(1926); *Science Abstracts* **30A**, 541-2. (In English.)—The effective surface tension at the boundary of 2 liquids is reduced by the contact p. d. This effect can be increased, diminished or revised by an appropriate applied e. m. f. An alternating e. m. f. is applied between 2 drops of electrolytes on the surface of Hg, and the drops vibrate in the period of the alternations, expanding and contracting under the influence of the varying surface tension.

H. G.

Adsorption of iodine by calcium fluoride. J. H. DE BOER. *Verslag Akad. Wetenschappen Amsterdam* **37**, 237-45(1928).—The app. used is an elec. bulb fitted with a sealed side arm. CaF_2 is spread on the filament and vaporized. It builds a thin transparent coat on the glass wall. The side arm contg. I crystals is cooled with liquid air. By regulating the temp. of the bulb, it is possible to regulate the vapor pressure of I, and thus to det. the quantity of I adsorbed at a definite pressure. The absorption spectrum shows a max. at about 2950 Å. U., which indicates that the I adsorbed is more polarized than in KI_3 solns.

A. L. HENNE

Adsorption in concentrated solutions and adsorption of liquids. I. Shape of the adsorption curves. II. Tentative direct determination of the adsorption of a pure liquid or a solution. RAYMOND DELOY. *Bull. soc. chim. Belg.* **37**, 63-87(1928).—I. recalls the influence of the solvent adsorption and of the vol. change of the soln. on the shape of the adsorption curves of dissolved compds. and emphasizes the importance of these phenomena in the detn. of the adsorption law. He gives 2 new examples of adsorption in concd. soln., in which the apparent adsorption curve shows a falling branch (adsorption of the brown pigment of a proteic hydrolyzate by fossil SiO_2 ; AcOH and H_2O in the presence of activated vegetal carbon black). The detn. of the true adsorption law will probably be rendered possible by studying filtration through adsorbent columns, a few detns. have been carried with water through kieselguhr. A. L. H.

The adsorption of strong electrolytes on pure ash-free charcoal. I. M. KOLTHOFF. *Z. Elektrochem. angew. physik. Chem.* **33**, 497-501(1927); cf. *C. A.* **22**, 339.—Salts of the capillary active acids and inactive bases are adsorbed hydrolytically, if the acid is not oriented in the adsorption layer. The acid is adsorbed and an equiv. amt. of strong base stays in soln. If the acid is oriented then the adsorption is mol. and hydrolytic. With the salts of the active bases and active acids there is mainly a mol. adsorption, but if the base has a strongly polar group while the acid is non-polar, there is a limited hydrolytic adsorption. The capillary activity of water-air is similar to that of water-charcoal.

E. SCHRÖTTE

An examination of Patrick's theory of adsorption. S. J. GREGG. *J. Phys. Chem.* **32**, 616-9(1928); cf. *C. A.* **14**, 1776.—Based on adsorption measurements on silica gels, Patrick has proposed the formula $V = K(p\sigma)^{1/n}/p_0$, where V is the amt. of substance adsorbed expressed as vol. of liquid air per g. adsorbent; K and $1/n$ are consts. for a given adsorbent, no matter what the temp. or the substance adsorbed; σ is the surface tension, p is the equil. pressure, and p_0 the vapor pressure of the adsorbed substance. An examn. of Patrick's data shows little doubt that the Patrick formula and the theory upon which it is based are unsatisfactory. The presence in it of the surface-tension factor, β , is shown to be unjustified, even the entirely empirical quantity $1/T$, securing for the formula a closer agreement with exptl. data. Even when so amended, however, the formula can be regarded only as a purely empirical relationship, which does not provide a basis for a theory of adsorption.

R. L. DODGE

The structure of the oil drops and the mercury drops investigated by Millikan and Matlauch. S. N. RAY. *Kolloid-Z.* **44**, 186-8(1928).—Mathematical discussion. R. considers the influence of atm. pressure changes on the shape of the drops of oil or Hg.

A. L. HENNE

Formation of colloidal gold and platinum in phosphoric acid. ADOLF MÜLLER, FRANZ URBACH and FRITZ BLANK. *Kolloid-Z.* **44**, 185-6(1928).— H_3PO_4 purified by several recrystns. is heated in a Au or a Pt crucible, HPO_3 is obtained; it is colored purple or brown by colloidal Au or Pt. After 2 years, there was no tendency toward sedimentation. The preps. show a strong Tyndall effect, but no Brownian effect, because of the too high viscosity of the medium.

A. L. HENNE

Chemical method for preparing carbon hydrosol. EUGEN CHIRNOAGA. *J. Chem. Soc.* **1928**, 298-301.—*C hydrosol* is prepd. by rapidly stirring a small quantity of charcoal in NaClO soln. (concn. immaterial) at 25°. NaCl must be removed from time to time

by dialysis, and the colloidal soln. finally obtained is dialyzed until free from electrolytes. It reacts neutral to the usual reagents, and can be evapd. at 100° without change, the residue passing into colloidal solns on addn. of water. The sol particles are negatively charged (moving toward + electrode with a velocity of 70×10^{-6} cm./sec. under a gradient of 1 v./cm.), the negative charge being probably due to the adsorption of Cl⁻ and possibly OH⁻ ions. Ultramicroscopic examn. indicated an av. particle radius of 60 $\mu\mu$. H. STORTZ.

Purification of alcohol for preparation of alcoholic potassium hydroxide. SOL KICZALES. *Ind. Eng. Chem.* **20**, 485, 193 (1928).—A brief note. R. J. C.

The transformation of vanadium pentoxide sols. W. REINDERS AND G. VAN DER LEE. *Rec. trav. chim.* **47**, 193-231 (1928). The content of mol. dissolved vanadic acid in V₂O₅ sols reaches a max. a short time after prepn. and then decreases slowly. The change in cond. of the sol with time runs parallel to the content of mol. dissolved vanadic acid. An extended investigation was made of the effect on the aging of the sol of the method of prepn., the concn., and the addn. of such substances as NH₃, vanadate, vanadic acid, acetic acid, NaCl and gelatin. The aging was found to consist of a slow growth of very small crystals into larger ones. HARRY B. WEISER.

Viscosity and the cataphoretic potential of casein sols. B. J. HOFWERDA. *Rec. trav. chim.* **47**, 248-61 (1928).—Casein peptized by NaOH and Ca(OH)₂ gives sols which obey Poiseuille's law. The viscosity at 25° reaches a max. at $p_H = 11.6-11.7$, for the so-called Ca caseinate sols and at $p_H = 11.1$ for the Na caseinate sols. This max. is independent of the casein concn. The influence of neutral salts on the viscosity of the sols is explained as due to an electro-viscous effect. Measurements of the cataphoretic potential show that there is a variation in the hydration of the sol particles corresponding with the variation of p_H . Hence the max. in the viscosity curve cannot be explained by assuming that only the charging effect of the OH ions comes into play. H. B. W.

The complete solution of Fourier's partial differential equation for a given limiting value and its special application to colloid chemical problems. E. L. LEDEFER. *Kolloid-Z.* **44**, 108-20 (1928).—The Fourier partial differential equation has been applied to several specific colloid problems. Having derived the equation for various limiting values of the consts. employed, L. tabulates values for convenience. He then applies the equation to heat, cond., diffusion and swelling and shrinking. For the latter he studies the change in moisture content of a pure soap and obtains data in very close agreement with values calcd. from the equation. L. expects to apply the formula to coagulation and sedimentation of colloids and similar problems. R. H. L.

The "adaptation phenomenon" on coagulation of an arsenic sulfide sol in the presence of barium chloride. VA. N. KRESTINSKA AND V. S. YAKOVLEV. *Kolloid-Z.* **44**, 141-8 (1928).—The adaptation phenomenon of an As₂S₃ sol in the presence of BaCl₂ depends on the rate of addn. of the electrolyte and the slower the addn., the greater becomes the concn. of the point of coagulation. An irreversible hydrolysis of As₂S₃ to H₃AsO₃ takes place. This is explained by an outer layer of H₂S in the micelle giving a negative charge to it. BaCl₂ gives Ba⁺, which reacts with H₂S and H₃AsO₃ to give slightly dissoed. or slightly sol salts. Hydrolysis is, therefore, more complete on gradually adding BaCl₂. HCl does not accelerate hydrolysis and the adaptation phenomenon is not observed on coagulation. Also in *J. Russ. Phys.-Chem. Soc.* **60**, 295-310 (1928). RAYMOND H. LAMBERT.

Influence of the hydrogen-ion concentration on the coagulation index of iron oxide sol. H. FREUNDLICH AND G. LINDAU. *Kolloid-Z.* **44**, 198-202 (1928).—Fe₂O₃ sol was prepd. by Graham's method. Its coagulation by means of NaCl is studied as a function of the p_H . NaOAc and AcOH have been used as buffers to maintain the p_H const. For a const. concn. of buffer, the coagulation index increases with the p_H . For a low p_H , the index is practically proportional to the H-ion concn. If the buffer concn. is modified, the coagulation indexes for NaCl decrease with the buffer concn., for a const. p_H . The process must be interpreted as an antagonism between the Cl and the acetate ions. A. L. HENNE.

Action of ammonium hydroxide on the flocculation of sols by electrolytes. P. C. L. THORNE, A. R. KENNEDY AND A. H. HOLLOWAY. *Kolloid-Z.* **44**, 190-8 (1928).—NH₄OH in small concn. stabilizes neg. sols of varied constitution against pptn. by electrolytes. A high concn. favors their pptn. The protective action parallels a decrease of the coagulation velocity. NH₄OH does not act chemically on the particles, but acts by adsorption on their surface. It reacts the same on suspensions and on sols, i. e., it is easily adsorbed on the suspensions, thus protecting them against pptn. by electrolytes. A. L. HENNE.

The kinetics of peptization. A. V. BUZAGH. *Kolloid-Z.* **44**, 156-62 (1928); cf.

C. A. 22, 1018. The peptization of many colloids is shown to be of an autocatalytic character. Such results are given for $\text{Fe}(\text{OH})_3$ peptized by HCl , humic acid by NaOH , Berlin blue with $\text{K}_2\text{C}_2\text{O}_4$ and $\text{Al}(\text{OH})_3$ with HCl . The inferred rate formula is given for peptization and is shown to hold at several concns. of peptizing agent. It shows a reaction of the first order. The viscosity of the sol under similar conditions passes through a max. with time, then falling to a limiting value showing that peptization first passes through a stage of swelling. R. H. LAMBERT.

Constitution of clay-mud. H. CHATLEY. *Proc. Inst. Civil Eng. (London)* 1927, No. 52, 3-15. The characteristic phys. properties of clay as compared with wet sand of similar compn., considerable tensile strength and apparent cohesion, also its impenetrability to water, are the consequence of the fineness of the particles which renders mol. forces important. The properties are best shown when there is a sufficiency of colloid particles to cover and cement the larger ones. Tezagh's theory of clay structure is discussed. C. has investigated quantitatively the settling of clay particles from fresh-water suspension by addn. of sea salt, a phenomenon due to the neutralization of the charges on the colloid particles by the adsorption of oppositely charged ions. Sea salt was 10 times as effective as NaCl in producing coagulation, this being due to the effect of bivalent Ca and Mg ions. Alum is more than 10 times as effective as salt. There is an optimum concn. of electrolyte for a given colloid concn., as reversal of the charge takes place with an excess. B. C. A.

Isoelectric point of silk fibroin. W. S. DENHAM AND W. BRASH. *J. Text. Inst. (special issue)* 18, 520-1T (1927). For samples of China and Italian silks, the results of expts. with Cu acetate, AgNO_3 and K chromate place the isoelec. point between p_{H} 3.6 and p_{H} 4.0, the value 3.8 being accepted, although the possibility of the existence of more than one point or of a broad isoelec. range, is not excluded. The p_{H} values were detd. colorimetrically. No conspicuous difference is shown between the values for China and Italian silks or between those for mulberry and tussah fibroin. The isoelec. point for sericin of raw silk is about p_{H} 4. A considerable increase in the quantity of base fixed by fibroin from 0.02 N solns. of Na or CaCl_2 is shown when the p_{H} of the solns. is greater than 5, negligible quantities being absorbed near the isoelec. point. B. C. A.

Solubility in a mixture of solvents. I. Solubility of picric acid. F. ANGELSCU AND D. DUMITRESCU. *Z. physik. Chem.* 132, 217-31 (1928). The soly. of picric acid has been detd. in a mixt. of 2 org. solvents. The curves are of various forms. For systems in which ether or benzene is one component a max. occurs. This would indicate chem. union with the solvent. For H_2O as one component negative curves are obtained showing greater dissociation of the acid. CHCl_3 and CCl_4 give intermediate curves. The change in soly. can be calcd. from the formula $S_t - S_o = K C^p$, in which K and p are consts., S_t = S_o is the soly. lowering and C the concn. of solvent added to 100 g. of the other solvent. This formula applies to all curves irrespective of their shape. R. H. L.

Lecture-table demonstration of osmotic pressure. J. W. RAMSEY AND R. N. MAXSON. *J. Chem. Education* 5, 476-7 (1928). R. H.

Osmosis of ternary liquids. I. Experimental part. F. A. H. SCHREINEMAKERS AND B. C. VAN BALEN-WALTER. *Verslag Akad. Wetenschappen Amsterdam* 37, 20-30 (1928). An aq. soln. of NaCl is sepd. from a Na_2CO_3 soln. by means of a membrane (parchment, bladder) and allowed to diffuse. The kinetics of the osmotic process are recorded. II. Experimental part. *Ibid.* 341-50. In the same kind of expts. as in part I, but with a membrane of colloidal or of colloidal and $\text{Cu-Fe}(\text{CN})_6$ investigations were carried out with aq. solns. of $\text{Na}_2\text{S}_2\text{O}_8$ and BaSO_4 . A. J. HENNE.

Osmosis of ternary liquids. General considerations. IV. F. A. H. SCHREINEMAKERS. *Verslag Akad. Wetenschappen Amsterdam* 36, 1218-26 (1927), cf. C. A. 22, 1508.—A continuation of the series of theoretical papers on this subject. B. J. C. v. D. H.

The effect on miscibility of binary liquid systems on the addition of a third substance. CARL WAGNER. *Z. physik. Chem.* 132, 273-94 (1928).—A theoretical paper on the effect of adding a material to a binary liquid system. Equations derived from thermodynamic relations show the type of curve obtained and its change on addn. of the third component. The miscibility is lowered if the soly. of the third material is lower than the additive relation would require and the soly. curve is then convex. If the soly. is greater a concave curve is obtained. Exptl. data show that the theory gives only qual. results. The field strength about a dissolved mol. in a mixt. is believed to be greater than required from the additive law, thus causing deviations observed. R. H. LAMBERT.

Chemical studies on organic coloring matters. III. Effects of some inorganic compounds on the viscosity of Orange GG. TAKU UEMURA AND SADAHIRO HACHIYA. *J. Chem. Soc. Japan* 48, 6-16 (1927).—U. and H. measured the abs. viscosities and sp.

viscosities of mixts. of aq. solns. of Orange GG of const. concn. and aq. solns. of Na_2SO_4 , Na_3PO_4 , Na_2HCO_3 and H_2SO_4 , varying their mixing ratio, and obtained the following results: (1) Both abs. viscosity and sp. viscosity are linear functions of the mixing ratio; (2) abs. viscosity is inversely proportional to the temp.; (3) there is no definite relation between the sp. gr. and the time of flow through the capillary of the viscometer; (4) the relation between sp. viscosity and temp. is linear, while the relation between abs. viscosity and temp. is not linear.

S. KUNISAWA

Conductometric and cryoscopic studies of salts of dimethylpyrone and acetic and chloroacetic acids in benzene. MARK RABINOVICH. *Z. physikal. Chem.* **132**, 83-100 (1928).—In order to furnish further data (cf. *C. A.* **20**, 1751) for the theory of electrolytic dissociation R. has measured the cond. of AcOH , mono- (I), di- (II) and trichloroacetic acids in C_6H_6 (dried over CaCl_2 and Na) in the presence of varying amts. of dimethylpyrone (DP) (dried over P_2O_5) at 25° and found that it exceeds the value obtained for these acids alone in C_6H_6 ($K_{25} < 1 \times 10^{-12}$) and increases in the order $\text{I} < \text{II} < \text{III}$ as in H_2O . The ratio of acid to C_6H_6 was approx. 1.5. The max. ($K \times 10^6$) (I) = 6.60; (II) = 87.8; (III) = 435 corresponds with the max. concn. of (DP) $_2$ S (S = mol of acid). The consens. of the various mol. complexes present were detd. cryoscopically with a Beckmann app. The conductivities of the pure acids are greater than their conductivities in C_6H_6 solns. In C_6H_6 soln. the cond. varies as the assocn. $\text{I} > \text{II} > \text{III}$. R. believes that DP plays the same role in C_6H_6 as H_2O does in aq. solns., forming oxonium salts which dissociate and conduct the current. The opinion is expressed that electrolytic dissociation is detd. by intramol. dissociation, and that reaction with the solvent, solvation or autosolvation so influences the mol. that the intramol. ions dissociate. Cond. and cryoscopic data and graphs are given.

E. R. SCHERZ

Electrical conductance of nickel sulfate solution and ionic conductance of nickel. KWANJI MURATA. *Bull. Chem. Soc. Japan* **3**, 47-53 (1928).—The conductances of aq. solns. of NiSO_4 have been measured at 25° and 18° . If the consens. are 1, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, 0.0005, 0.0002, 0.0001 resp., the equiv. conductances are, 29.091, 35.222, 43.585, 50.755, 59.160, 72.254, 82.69, 93.16, 105.49, 113.05, 118.66, 124.14, 126.90, at 25° and 25.066, 30.370, 37.595, 43.833, 51.008, 62.02, 70.89, 79.48, 89.94, 96.31, 101.00, 105.37, 108.70 at 18° . From these values, M. calcs. $\lambda_0 = 113.6$, $\lambda_{1/2}\text{Ni}^{++} = 45.1$, $\lambda_{1/2}\text{Ni}^{++} = 45.1$ at 18° and $\lambda_0 = 133.0$, $\lambda_{1/2}\text{Ni}^{++} = 53.0$ -54.2 at 25° . The relative viscosity of a 0.05 *M* soln. is 1.0209 at 18° and 1.0175 at 25° . The degree of ionization of the same soln. is $\alpha_{18} = 0.3883$ and $\alpha_{25} = 0.3939$.

A. L. HENNE

Viscosity and ion speed of dilute salt solutions. FRED BOND AND J. D. ROBERTS. *Col. School of Mines Mag.* **17**, No. 1, 3-14 (1927).—At a cyanide mill the substitution of $\text{Ca}(\text{CN})_2$ for NaCN caused a reduction in the extn. of Ag. The work was undertaken to det. the effect due to the viscosity and the cond. The viscosities of a number of solns. were detd. Cond. measurements were carried out in the same solns. The rate of reaction varies with the viscosity.

L. D. R.

The calculation of electrolytic dissociation from electrical conductivity. W. NERNST. *Sitzb. preuss. Akad. Wiss.* **1928**, 4-8.—The degree of assocn. of strong binary electrolytes is negligible at 0.001 *N* concn. and the equiv. cond. ratio $\lambda/\lambda_{0.001}$ for such salts affords a better comparison of their degrees of dissociation than the λ/λ_∞ formula of Arrhenius.

E. R. SMITH

The hydrogen-ion concentration of aqueous iodine solutions. H. M. DAWSON. *J. Chem. Soc.* **1928**, 259-63.—It is shown how the p_{H} values of aq. solns. which contain iodine and iodide can be calcd. from a consideration of the equil. involved in the interaction of I_2 , I^- and H_2O . The calcs. show that for a fixed concn. of I_2 the H-ion concn. decreases with increase in the amt. of I^- and for solns. with a fixed ratio of (I^-)/(I_2) it increases with diln.

E. R. SMITH

Influence of the isoelectric point of asparagine on its hydrolysis by acids and by alkalis. DENTS BACH. *Bull. sci. pharmacol.* **35**, 93-107 (1928).—Ordinary and *l*-asparagine possess acid and amine functions for which the dissociation constants are $K_a = 1.4 \times 10^{-9}$ and 1.5×10^{-12} , resp. They also have an amide function for which the particular dissociation const. has not been detd. The isoelec. point is p_{H} 4.3-4.4. The hydrolyses of the amide, acid and alkali functions of asparagine are carried out by aid of various buffers in solns. having a p_{H} range from 0.9 to 9.6 and at temps. from 100° to 127° , the amt. of NH_3 formed per hr. measuring the extent of the hydrolysis. The min. of NH_3 for each of 6 temps. ranging from 100° to 127° was at p_{H} 4.6. The relations of these findings to the nutrition of certain fungi are discussed.

L. W. RIGGS

Ion partition coefficient. PERIK LARSSON. *Svensk Kem. Tids.* **39**, 122-30 (1927); cf. *C. A.* **21**, 3309.—The ion partition coeffs., P_{B} and P_{A} of a compd. BA between 2 solvents are given by $P_{\text{B}} + P_{\text{A}} = 2 \log (h_1/h_2) - 0.4 l_1^{-3} + 4 l_2^{-3}$, in which h_1 and h_2 are

the solubilities in the resp. solvents. P_A for H_2O and $EtOH$ has been previously detd. as 2.1. The solubilities in mols. per l. of the Ag salts of the following acids in H_2O and $EtOH$, resp., at 25° are. $AcOH$ 0.067, 0.00113, $EtCO_2H$ 0.050, 0.00085; $BzOH$ 0.0114, 0.00035; $PhCH_2CO_2H$ 0.0145, 0.0018; $PhCH_2CH_2CO_2H$ 0.0042, 0.00026; $PhOCH_2CO_2H$ 0.015, 0.00036; $Ph_2C(OH)CO_2H$ 0.0036, 0.00051; $C_{10}H_7CO_2H$ 0.0060, 0.0016; $Ph_3CCH_2CO_2H$ 0.00037, 0.000117, $P_B + P_A = 2.1$ (i. e. P_A) for these anions are. resp : 1.7, 1.6, 1.1, 0.2, 0.4, 1.3, -0.1, -0.5 and -1.2. A. R. ROSE

The activity coefficient of nitric acid in water. E. ABEL, O. REDLICH and B. v. LENGVEL. *Z. physik. Chem.* **132**, 189-207(1928).—The activity coeffs. of HNO_3 in H_2O soln. have been detd. by the f-p. method. The app. contg. a special stirring mechanism is described; temps. can be measured to 0.0002° . The range of concns. studied was from 0.005 to 4.0 M and 40 concns. were measured. The osmotic coeff., j , is calcd. from the Debye-Hückel theory and results are compared with others from the literature. The activity coeff. passes through a min. with concn. R. H. LAMBERT

Strong electrolytes. J. A. V. BUTLER. *Nature* **121**, 500(1928).—While the equations of Hückel (*C. A.* **19**, 1649) are capable of representing the activity coeffs. of salts in concd. solns. using const. evaluated from the data themselves, it is doubted if these const. have the postulated relation with the dielectric const. lowerings actually produced by electrolytes (*C. A.* **20**, 1162). A modification of Debye's equation is proposed, which leads, however, to a differential equation the solution of which B. has been unable to obtain. F. A. JENKINS

Buffer action. VI. Phase buffer action. KARL KLINKE. *Helv. Chim. Acta* **10**, 627-42(1927); cf. Moser, *C. A.* **21**, 2279.—If one of the constituents of a buffer is only slightly sol. the usual equations for buffer action are modified because of the requirement of const. soly. product. This modification is developed mathematically and illustrated (data in graphs) for the titration of glycolic acid with $Ca(OH)_2$. The case where one constituent is a slightly sol. gas is illustrated by the reaction $Ca(OH)_2 + CO_2$. F. R. B

The thermal decomposition of hydrogen peroxide in aqueous solutions. B. H. WILLIAMS. *Trans. Faraday Soc.* **24**, 245-55(1928).—In glass and SiO_2 reaction vessels, the thermal decompn. of pure H_2O_2 solns. is a zero-order reaction, for the first portion of the decompn., for all initial concns. in a glass surface, and above a limiting concn. in the SiO_2 surface; the decompn. is due to adsorption of the H_2O_2 mols. on the walls of the reaction vessel, and to adsorption of the H_2O_2 mols. on the surface of the dust present in soln. An upper limit to the magnitude of the decompn. due to adsorption by the dust has been detd. by using a wax vessel. The critical increment of the decompn. of this process is 9000 cal. The adsorption of the H_2O_2 mols. on the SiO_2 surface is directly proportional to the concn. of the H_2O_2 in the bulk of the soln., below a limiting concn. of 1.7%. Between 1.7% and 5%, the adsorption on the SiO_2 surface is independent of the concn. of the H_2O_2 in the bulk of the soln. This is accounted for by the assumption that the surface of the SiO_2 is satd. with a unimol. film of adsorbed H_2O_2 . This implies that the SiO_2 surface possesses a certain no. of *preformed* active points. The critical increment of the decompn., due to adsorption on the SiO_2 surface alone, is 17,000 cal. For higher concns. (above 5%) in the bulk of the soln., other factors are brought into play, such as secondary adsorption films. On the glass surface, any one decompn. is, for its first portion, a zero-order reaction, which changes into one of a unimol. nature, as the concn. of the H_2O_2 in the bulk decreases. This is due to the fact that the effective catalytic area of the glass surface and dust surface is satd. with adsorbed H_2O_2 mols. for the first period of the reaction; any mol. suffering decompn. is immediately replaced by other mols. from the bulk of the soln. As the concn. of the H_2O_2 in the bulk decreases, a point is reached when the mols. suffering decompn. are no longer immediately replaced by mols. from the bulk, and now the concn. of the adsorbed H_2O_2 mols. becomes proportional to the concn. of the H_2O_2 in the bulk. The critical increment of the process involving adsorption on the glass surface alone is 23,000 cal. The initial activity of the glass surface is proportional to the initial concn. of the H_2O_2 soln. This is accounted for on the assumption that the H_2O_2 creates centers of activity on the glass surface; the active points, when once formed, remain active throughout any one decompn. There is, therefore, a sharp contrast between the glass surface and the SiO_2 surface in regard to active points. A. L. HENNE

Decomposition of carbon monoxide by reduced copper below 400° . A. STROPOR. *Bul. chim. soc. română științe* **29**, 79-82(1926).—Asbestos satd. with $CuSO_4$ soln. was treated with 50% KOH , washed, dried at 120° and reduced by CO at 200° to 210° to const. wt. In a 50-mm. layer (11-mm. tube) for a gas stream of 200 cc. CO per hr. further reduction was effected and decompn. of CO at temp. up to 360° . From the

wt. changes of the catalyzer and the CO_2 caught in the gases follow values for x the CO_2 from CuO reduction and y the CO_2 from CO decompn. The figures obtained were: from 200° to 210° per 100 cc. gas 4.37 cc. CO_2 , $x/y = 5/72$, from 250° to 260° 1.40 cc. CO_2 , $x/y = 2.04$; from 300° to 310° 1.77 cc. CO_2 , $x/y = 1.80$, from 350° to 360° 2.34 cc. CO_2 , $x/y = 3.63$. In 3 other expts. it was found that the total quantity of CO_2 from CO decomposed from 200° to 360° is const. for the same quantity of catalyzer. The results with pure CuSO_4 (in the former expts. it contained 0.99% FeSO_4) were largely the same.

B. J. C. VAN DER HOEVEN

Decomposition of diacetone alcohol by weaker bases. GÖSTA ÅKERLÖF. *J. Am. Chem. Soc.* **50**, 733-44.—The decompn. velocity of diacetone alc. in solns. of weak bases contg. NaCl or Na_2SO_4 was measured at 25° . The ionization consts. for the bases: methylamine, dimethylamine, trimethylamine, ethylamine, diethylamine and triethylamine are probably more accurate than previous published values. The activity coeffs. of the weaker bases as electrolytes in salt solns. cannot be calcd. on the assumption that a weak base has the same proportionality factor between activity of base and reaction velocity as a strong one. A correction factor has been calcd., and the activity coeffs. decrease in dil. salt solns. to the same extent as for weak acids in the same salt solns.

JAMES M. BELL

Decomposition of triethylsulfonium bromide in mixed solvents. R. F. CORRAN. *Trans. Faraday Soc.* **23**, 605-14 (1927).—The velocity coeffs. of the unimol. decompn. of triethylsulfonium bromide have been detd. at 80° and 90° in mixts. of benzyl alc. with toluene and glycerol, resp. In general the reaction in org. solvents reaches practical completion, but in the mixts. containing glycerol an equil. was obtained and a correction for it applied to the velocity coeffs. in these mixts. The results show that the rate of decompn. is increased by toluene and decreased by glycerol. Both solvents, however, cause a fall in the apparent crit. increments of activation as calcd. from the temp. coeffs. This indicates anomalous behavior on the part of the glycerol. The absorption spectra of the salt in various mixts. have been detd. for the short infra-red region by the methods of Taylor and Lewis (*C. J.* **16**, 2263), the radiomicrometer being replaced by a thermopile and Moll galvanometer. With the benzyl alc.-toluene mixts. there is a shift in the position of the band head which is in satisfactory agreement with the alteration in the observed crit. increment. For the glycerol mixts. the head of the band shifts towards the shorter wave lengths, which is opposite to that calcd. from the crit. increments, but in the direction to be expected from the effect of glycerol on the velocity coeff. Therefore the band head probably gives the true crit. increment. No explanation of the anomaly can be given. Investigations on the velocity of decompn. in practically dust-free propyl alc. solns. indicate that the dust ordinarily present has no appreciable influence. (Cf. Rice, *C. A.* **20**, 3374.)

B. C. A.

Reactivity of glucose in presence of hydrochloric acid. I. E. A. MOELWYN-HUGHES. *Trans. Faraday Soc.* (advance proof) Feb. 1928.—An increase in rotation of N HCl solns. contg. 10, 20, 30, 40 and 50 g. glucose in 100 cc. occurs to the extent of 4.51% for the first soln. and 20.84% for the last soln. This increase is due to the partial conversion of glucose into diglucose and water—a condensation already demonstrated. Furthermore, the reaction is of the first order—a result not in agreement with the accepted mechanism. This is a pseudo-unimol. change, since the concn. of one of the reactants, normal glucose, far exceeds that of the other, active glucose. On this basis and from the velocity consts. at 60° and 70° the crit. increment of the process is calcd. as 33,500 cals., a value somewhat higher than that for the inversion of sucrose, or the hydrolysis of maltose or of amygdalin.

JAMES M. BELL

Kinetics of the hydrolysis of certain glucosides (salicin, arbutin and phlorhizin). E. A. MOELWYN-HUGHES. *Trans. Faraday Soc.* (advance proof) Feb. 1928.—The rates of hydrolysis of these glucosides by means of HCl have been detd. at 60° and 70° . A comparison of velocity consts. and crit. increments of certain disaccharides, trisaccharides, and glucosides shows that the crit. increment of the reaction is a more significant quantity than velocity itself in that it lends itself more readily to comparative treatment. The mean value of the crit. increment for 3 fructoses (sucrose, raffinose and melezitose) is 25,700 cals., for 3 glucosides (maltose, salicin and arbutin) is 31,600 cals. and for lactose is 27,100 cals. The exptl. value of the crit. increment seems to be detd. largely by the nature of the link ruptured and is apparently independent of the stereochem. (α or β) character of the bond. The crit. increment for phlorhizin (23,100 cals.) is abnormally low. This glucoside is exceptional also in the sp. rotation of the parent glucose and in its physiol. action.

JAMES M. BELL

Constant of mass action. R. D. KLEEMAN. *Phil. Mag.* [7], **5**, 263-71 (1928).—When the law of mass action is derived as has been done heretofore by means of a cyclic

process, it has not been considered that certain mol. species (HI for instance) would dissociate after having passed through a semipermeable membrane. K. takes the view that this situation must be taken into account and proposes a derivation of the mass law which yields the equil. const. in general as a function of such quantities as the vol. of the mixt., its temp., the masses of the constituents, etc. GEORGE GLOCKLER

Quantum theory of quasi-unimolecular reactions. O. K. RICE. *Proc. Nat. Acad. Sci.* 14, 113-8(1928); cf. *C. A.* 21, 3149 and following abstract.—The author discusses the modifications required by quantization in the general equation for the reaction rate of gaseous reactions which are unimolecular at high pressures but which deviate from the unimolecular at low pressures. It is shown how to evaluate the necessary quantities in terms of the thermal properties of the decomposing molecule. W. W.

Theory of the decomposition of azomethane. O. K. RICE. *Proc. Nat. Acad. Sci.* 14, 118-24(1928).—The mathematical theory previously developed (cf. preceding abstract) is applied to the case of azomethane. The chain reaction described by Christiansen and Kramers is not important for the thermal case. The evidence is strongly in favor of the view that in the decomposition of azomethane activation is produced by collisions. The chance of reaction of an activated mol. depends upon the energy in about the same way that one would expect if the reaction is due to energy becoming localized in a particular place in the mol. ARTHUR FLEISCHER

The mechanism of chemical reactions. H. S. TAYLOR. *Proc. Am. Phil. Soc.* 65, 90-8(1926); *Science Abstracts* 30A, 346; cf. *C. A.* 20, 546; 21, 678.—Evidence is brought forward for the view that a no. of reduction processes depend on the intervention of H atoms, especially reactions conducted in the presence of excited Hg vapor. The evidence includes the production of H_2O_2 from mixts. of H and O; also the observed ratio between the no. of mols. reacting and the quanta absorbed at least 20 mols. of H disappear per quantum at a frequency corresponding to $\lambda = 2536.7 \text{ \AA}$. Further evidence is supplied by expts. which show the sensitization of the reaction between H and ethylene by the thermal decomposition of metallic alkyls. H. G.

Hydrolysis of the peptide (—CO.NH—) linking. A. I. ESCOLME and W. C. M. LEWIS. *Trans. Faraday Soc.* 23, 651-60(1927).—The rate of hydrolysis of acetylglycine at 60° and 70°, and of benzoylglycine at 80° and 90°, by HCl of different concns. has been detd. in aq. solns., and also in solvents consisting of mixts. of water with glycerol, propyl alc. and KCl, resp. In all cases the reaction is unimolecular. Under all conditions the same crit. increment of activation has been obtained for both amino acids, namely, 22,000 g.-cal. No quant. statement of the mechanism of the process involved has been found possible, but the results suggest that the activity of the H ion and of the water are important factors, except where a strong electrolyte, such as KCl, is present, when the activity theory becomes inapplicable. The results also suggest that the activity of the substituted amino acid, which should logically enter into any "activity" theory of chem. change, cannot differ much from the ordinary vol. concn. With the object of getting further information on this point, soly. detns. of acetylglycine and benzoylglycine in mixts. of water, glycerol and HCl have been made. The addn. of glycerol, however, diminishes the soly. of acetylglycine, while it increases that of benzoylglycine. B. C. A.

Electrochemically prepared perphosphates. FR. FICHTER and ERNST GUTZWILLER. *Helv. Chim. Acta* 11, 323-37(1928).—The electrolysis of a soln. contg. KH_2PO_4 and KF gives a mixt. of $K_4P_2O_8$ and K_3HPO_4 , thus: $2K_2HPO_4 + F_2 = K_4P_2O_8 + 2HF$; $K_4P_2O_8 + H_2O = K_2HPO_4 + K_2HPO_4$. A procedure is given whereby the formation of the unstable mono-perphosphate is retarded and an 80% yield of $K_4P_2O_8$ is obtained. Rb_2HPO_4 gives $Rb_4P_2O_8$, which is difficult to purify. $(NH_4)_2HPO_4$ gives a 97% yield of $(NH_4)_4P_2O_8$, which is unstable because of the oxidation of the NH_4 ion by the P_2O_8 ion. $K_4P_2O_8$ with $BaCl_2$, $ZrSO_4$ and $Pb(NO_3)_2$ gives $Ba_4P_2O_8$, $Zn_4P_2O_8$ and $Pb_4P_2O_8$, resp. $MgSO_4$ (or magnesia mixture) does not ppt. $K_4P_2O_8$. This reaction may be used to sep. phosphate from perphosphates. The oxidizing action of $K_4P_2O_8$ is accelerated by the addn. of $MnSO_4$, Fe^{++} , Ni and Pb salts; and particularly by $AgNO_3$. J. S. REICHERT

Effect of water on reactions in the solid state. BERNWARD GARRE. *Zement* 16, 658-60(1927); cf. *C. A.* 22, 520.—Inorg. compds. in powd. form were mixed with varied amts. of water and formed into pellets $0.7 \times 1 \text{ cm.}$ under 500 kg. pressure. SiO_2 pellets when heated to 900° showed increased strength with increased water content of the batch. Similar results were obtained from $CaCO_3$, $Al(OH)_3$ and Al_2O_3 . H. F. K.

Oxidation of stannous hydroxide in sodium carbonate solution by means of air. SUSUMU MIYAMOTO. *Bull. Chem. Soc. Japan* 3, 43-7(1928); cf. *Bull. Chem. Soc. Japan* 2, 155(1927).—The oxidation velocity of $Sn(OH)_2$ suspended in Na_2CO_3 solns. of various

concn. by means of air is independent of the quantity. The effect of the concn. of Na_2CO_3 is small. Temp. has little effect. Na_2SnO_2 oxidizes rapidly, $\text{Sn}(\text{OH})_2$ very slowly. • • • A. L. HENNE

Reduction of carbon dioxide. HANS KAUTSKY. *Naturwissenschaften* **16**, 204 (1928).—A preliminary note. Efforts were made to obtain reduction of CO_2 by chemosynthetic or photochem means as a parallel to the biol. CO_2 reduction process. By absorption on permutoid aminosiloxenes, e. g., $\text{Si}_6\text{O}_8(\text{NH}_2)_8$ carbaminosiloxenes were formed, colored, fluorescent and oxidizable by air. Reduction of the CO_2 is effected by slow oxidation (addn. of small quantities of O_2 during several days at room temp.) of the Si-Si bonds in the boundary space, HCN was formed, O_2 being taken up by the Si compds. No CO_2 reduction was obtained without O_2 addn., unless the substance was irradiated with visible light. B. J. C. VAN DER HORVEN

The dissociation pressure of cupric metaborate. N. PARRAVANO AND G. MALQUORI. *Z. physik. Chem.* **130**, 167-9 (1927).—The pressure of O_2 in equil. with cupric metaborate at different temps is: 725°, 47 mm Hg, 800°, 107, 837°, 172; 860°, 237, 885°, 360, 900°, 462, 950°, 757. For these data $\log P$ is a linear function of $\log T$. The dissociation pressure of cupric metaborate is much greater than that of CuO at the same temp. This study was suggested by the change in color from the blue to reddish yellow of fusions of $\text{CuO} + \text{B}_2\text{O}_3$ between 700° and 900°. R. H. LOMBARD

Equilibrium (polarization) composition of the liquid salt phase and the liquid alloy phase in a system composed of equiatomic quantities of sodium, potassium and iodine. H. F. SILL. *J. Phys. Chem.* **32**, 466-70.—When equiv quantities of KI and metallic Na, or of NaI and metallic K are brought to equil. at 700° the metal phase has the composition $\text{Na K} = 10:1$. Comparison with the results of Jellinek and Czerwinski (*C. A.* **18**, 2693) and of Jellinek and Tomoff (*C. A.* **19**, 1084) shows that the combined effect of replacing I by Cl and of dissolving the alkali metal in Pb was to reduce the equil. at ratio to 3:4:1. Comparison with the results of Smith and Ball (*C. A.* **11**, 416) shows that the further substitution of Pb by Hg and the introduction of the solvent water reduces the ratio to 1:5:1. JAMES M. BELL

Thermodynamic equilibria and reciprocal action in the new gas theory. W. BOTHE. *Z. Physik* **46**, 327-34 (1928).—The law of mass action is derived in such a way that it may apply to mixts. of the Bose-Einstein and Fermi gases. The law of reciprocal action of mols., atoms and electrons in such mixts is discussed. R. H. L.

The efflorescence of sodium sulfite. D. N. TARASSENKOV. *Z. anorg. allgem. Chem.* **169**, 407-12 (1928).—The vapor pressure of the system Na sulfite heptahydrate, Na_2SO_3 and water was measured by the static van Bemmelen method at 15° and by the tensimeter from 0° to 30°. The measurements at 15° by the 2 methods agree. The vapor pressure at this temp. is 9.3 mm. If the humidity of the atm. is below this value at this temp. Na sulfite heptahydrate will effloresce. A. FLEISCHER

The influence of pressure on the reaction velocity and the function of the medium. A. L. TH. MOESVELD AND WILHELMINA A. T. DE MEESTER. *Proc. Acad. Sci. Amsterdam* **30**, 1039-53 (1927).—See *C. A.* **22**, 1084. F. H.

Catalysis under reduced pressures. VICTOR GRIGNARD. *Bull. soc. chim. Belg.* **37**, 41-62 (1928).—A summary of the question, based chiefly on the work of Grignard, Escourrou and Mingasson. The following points are emphasized: reduction of ethylenic alics.; hydrogenation of nitriles into aldimines; reduction of acid chlorides; mechanism of the hydrogenation of α -ethylenic ketones and of phenols, mechanism of the catalytic dehydrogenation of alics. A. L. HENNE

New vanadium catalyst for sulfuric acid. L. F. NICKELL. *Chem. Met. Eng.* **35**, 153 (1928).—Patented catalysts consisting of complex V silicates, with or without inert diluents, have shown activities closely paralleling those of the best Pt catalysts. Furthermore, the V catalysts are not poisoned by such substances as As or HCl. It is believed that within the next decade the use of Pt catalysts for H_2SO_4 will be entirely abandoned, and the use of V catalysts completely established in their stead. R. L. DODGE

Catalytic actions. E. K. RIDEAL. *Chem. Reviews* **5**, 67-84 (1928).—A crit. discussion of various opinions that have recently been expressed with respect to the mechanism of some simple catalytic reactions. The reactions include contact hydrogenation and dehydrogenation, homogeneous oxonium and OH^- ion catalysts and oxidative gas-phase reactions. R. L. DODGE

Researches on gaseous catalysis by means of the metals of the platinum group. L. DUPARC, P. WENGER AND CH. UFFER. *Helv. Chim. Acta* **11**, 337-48 (1928).—A study of the oxidation of NH_3 with Rh, Pd and Ir catalysts, and the reduction of N_2O and NO with Pd and Ir catalysts. Neither catalyst gave NH_3 in the reduction of the

oxides of N, but only N_2 and H_2O . Gaseous catalysis is therefore not phys. but chem. and implies the momentary fixation of one of the reacting gases by the catalyst. If the phenomenon were simple occlusion, the combination of N_2 with both O_2 and H_2 should be realized with the same catalyst. J. S. REICHERT

The reaction of organic halogen compounds with copper in the presence of pyridine. P. KARRER, W. WEHRLI, E. BIEDERMANN AND M. DALLA VEDOVA. *Helv. Chim. Acta* 11, 233-9(1928).—Reaction between Cu and many org. halogen compds. is greatly facilitated by the addn. of dry pyridine, the reaction in such cases often becoming violent. The catalytic effect is considered due probably to the soly. of the Cu halide in pyridine and the formation of a complex salt. The reaction is limited for preparative purposes by the no. of Cu pyridine complexes usually occurring together, the difficulty of sepn. and possible resin formation. The reactions of Cu in the presence of pyridine on toluenesulfonyl chloride, phthalyl chloride and hippuric acid were studied. A possible mechanism of the reaction is suggested. R. K. WORNER

Conductivity and catalytic action of trinitro-*m*-cresol in ethyl alcohol solutions. HEINRICH GOLDSCHMIDT, ERLING MARUM AND LIEF THOMAS. *Z. physik. Chem.* 132, 257-72(1928).—The conductivities of the Na and aniline salts of trinitro-*m*-cresol in abs. and ordinary EtOH are measured, from which λ_∞ for the cresol salt is calcd. The same is done for the free cresol itself and the degree of disson. and the affinity const. are calcd. therefrom. Trinitro-*m*-cresol is used as a catalyzer for the esterification of phenylacetic acid, acetic acid, butyric acid and isovaleric acid in abs. and in aq. EtOH. The rate const. K_4 for the H-ion concn. is larger than when picric acid is used as the catalyzer and it also appears not to depend on the concn. of the cresol. The rate of esterification with cresol catalyzer is exceptionally large for acetic and phenylacetic acids, is small for butyric acid and very small for isovaleric acid. R. H. LAMBERT

Catalytic reduction of nitro-organic compounds in the liquid system. O. W. BROWN, G. ETZEL AND C. O. HENKE. *J. Phys. Chem.* 32, 631-5(1928).—Nitrobenzene, α -nitronaphthalene, *p*-nitrotoluene, *o*-nitrophenol, *p*-nitrophenol, and dinitrotoluene were reduced with H gas at 15 to 47 atms. pressure. The reductions were catalyzed by reduced, powdered NiO (from $Ni(NO_3)_2$). The static method was used. The effects of variations in pressure, temp., time of reduction, kind of solvent and amt. of catalyst were studied. Quant. reduction of the nitro compds. to amines was obtained at 215° and 34 atm.; 0.52 g. catalyst per g. nitro compd. was the optimum catalyst ratio. C_6H_6 and CH_3OH were the best solvents. Ethylene glycol was a poorer solvent. R. L. DODGE

Effect of thermometric lag in fractional distillation. W. R. ORMANDY AND E. C. CRAVEN. *J. Inst. Petroleum Tech.* 14, 94-105(1928).—Hg-thermometer vapor-temp. observations are always liable to be in error, and the use of a thermocouple is greatly to be preferred in distns. of any importance. Lags occur at turning points in a distn. and may obscure indications of small amts. of components. In the case of nearly pure liquids the slow rise in temp. during distn. does not necessarily indicate impurities. The cold neck of a flask or column increases the initial lag. The total lag of a thermometer may be expressed as the sum of two terms and it appears that the initial lag of the Hg thermometer depends on the layer of condensed liquid around the bulb, the last slow rise depends more on the heating of the stem than upon the passage of heat into the bulb. Methanol, benzene, heptane, toluene, ether-isopropyl alcohol, benzene-toluene and petroleum spirit were used. S. L. B. ETHERTON

Heat transfer from a hot body in a moving liquid. JOH. SMEKEL. *Z. tech. Physik* 9, 49-57(1928).—A mathematical paper. B. J. C. VAN DER HOEVEN

A method for accurate determination of the specific heats of salt solutions up to 80°; including results for potassium nitrate and chloride solutions. F. T. GUCKER, JR. *J. Am. Chem. Soc.* 50, 1005-16(1928).—The app. used is a modification of the "twin calorimeter" of Joule and Pfaudler (see Richards and Gucker, *C. A.* 19, 2593); it is described in detail. An improved method for its standardization is given, it no longer being necessary to det. its heat capacity or the sensitivity of the thermal galvanometer system. The sp. heats of KCl and KNO_3 are detd. at 20°, 50° and 80°, and are nearly const. over this range. The results are accurate to at least 0.5 per mille. Zwicky's theory (*Physik. Z.* 27, 271(1926)) accounting for the abnormally low heat capacities of electrolytic solns. is not confirmed. J. B. LOZIAN

The accurate measurement of the specific heats of solid substances between 0° and 1625°. II. The specific heats of platinum and tungsten. F. M. JAEGER AND F. ROSENBOHM. *Proc. Acad. Sci. Amsterdam* 30, 1069-88(1927).—See *C. A.* 22, 1087. E. H.

Emissivity methods of determination of thermal conduction of metals. H. GREG-

ORY AND C. T. ARCHER. *Phil. Mag.* [7], 3, 931-44(1927).—Crit. discussion of development of emissivity methods for detg. thermal cond. of metal, where Newton's law of cooling holds, the wires being heated electrically. GEORGE GLOCKLER

A contribution to the thermodynamics of mixtures. V. FISCHER. *Z. Physik* 46, 427-43(1928).—A general relation is derived for various kinds of concn. and equil. limitations for a mixt. of two or three constituents. The expression for heat content and entropy are also derived. Application is made to the system Au-Cu. R. H. L.

Method of measuring radiant heat emitted during gaseous explosions. C. H. JOHNSON. *Phil. Mag.* [7], 5, 301-22(1928).—In a gaseous explosion, it is very important to discriminate between the emission of radiant energy from the wave-front and that from the hot products of combustion, a point to which little consideration seems to have been given by other investigators. In order to attain the desired result, a long narrow explosion vessel was used in which the rapid cooling of the burnt gases behind the wave reduced to almost negligible proportions the amount of radiation received from that source. A simple method for the calibration of a linear thermopile, necessarily placed at some distance from the bomb, is described. The effect of water, and incidentally of other catalysts, upon the emission of infra-red radiation from the wave-front in explosions of CO and O₂ has proved to be of considerable magnitude. In particular, an additional 7% of the gross heat of combustion was radiated from a dried gas mixt., in excess of that emitted in the presence of 1.9% of water vapor. In future, therefore, no theory designed to explain the action of water in promoting spread of flame through CO-O₂ mixts. can be considered complete that does not include the hitherto unrecognized radiation factor. GEORGE GLOCKLER

The principle of the unattainability of zero absolute. F. SIMON. *Z. Physik* 41, 806-9(1927); *Science Abstracts* 30A, 583.—It is postulated that an arrested system, such as a supercooled liquid, soln. or metastable crystal condition, for which there is still an entropy change at zero abs., cannot be employed for the attainment of zero abs. This is illustrated by data for H₂, which indicate that the temp. coeff. of the melting pressure disappears at zero abs. Similar relations apply to the entropies of amorphous glass and supercooled glycerol previously considered. (Cf. *C. A.* 21, 1217.) According to the theorem of the unattainability of zero abs. the entropy differences of all the states of a system between which a reversible transition can occur disappear at the lowest temps. H. G.

Mercury and its compounds in ancient times. E. R. CALEY. *J. Chem. Education* 5, 419-24(1928). E. H.

Mercury as electrolyte. GEORG NEIDL. *Z. tech. Physik* 9, 76-7(1928).—Expts. are described in which the solution tendency of Hg in water causes Hg drops to revolve between electrodes and to give a boiling effect. B. J. C. VAN DER HOEVEN

The measurement of the conductance of electrolytes. I. An experimental and theoretical study of principles of design of the Wheatstone bridge for use with alternating currents and an improved form of direct-reading alternating-current bridge. GRINNELL JONES AND R. C. JOSEPHS. *J. Am. Chem. Soc.* 50, 1049-92(1928).—A new form of Wheatstone bridge is designed and built, using audio frequencies of 500-2400 cycles per sec. Sources of error in standard bridges have been found exptly. and eliminated in the new app., making it more precise, sensitive (to 1 p.p.m.) and convenient. Some of the new features claimed for it are: (1) a correct method of grounding; (2) use with either a.c. or d.c., changing from one to the other by throwing 2 switches; (3) direct reading; and (4) resistance adjustment to 0.001 ohm in the resistance instead of the ratio arms. Two new resistance boxes are built and described. J. B.

The conductivities of dilute germanium, gallium, silver and copper amalgams. A. L. JOHNS AND E. J. EVANS. *Phil. Mag.* [7], 5, 271-89(1928).—Amalgams of 0.01 and 0.1% by wt. were measured at various temps. The resistivities for various concns. are given in tables as also the temp. coeffs. GEORGE GLOCKLER

The constitution of solid electrolytes. III. Studies with cuprous bromide. (From researches conducted with FRITZ LEOPOLD.) J. N. FRERES. *Ber.* 61B, 377-92(1928); cf. *C. A.* 21, 2093.—CuBr is a true mixed conductor, with only the Cu ion concerned either in electronic or ionic conduction. Between 200° and 330° the character of the conduction changes gradually from pure metallic to pure electrolytic. Increase in electrolytic cond. may be brought about through increase of surface in the conductor, through long-continued electrolysis, and through discharge of Ag and Pb ions from their salts by CuBr. These observations are in good agreement with the hypothesis of functional differentiation of the ions in the lattice. R. J. HAVIGHURST

Haber's glass cell. W. S. HUGHES. *J. Chem. Soc.* 1928, 491-506.—The method of making and using the glass-cell electrode is explained. The glass should be nearly

free from K_2O , Al_2O_3 and borates. A glass contg. 72% SiO_2 , 8% CaO and 20% Na_2O proved satisfactory. The bulb should be blown rapidly to avoid devitrification. The behavior of the cell is best explained by the hypothesis that the H -ion concn. is held relatively const. within the glass phase by the buffer action of the Na acid silicate in the glass. The following dissoc. consts. were detd. by measuring the p_H of $1/2$ neutralized buffer mixts.: H_2AsO_4 , $K_1 = 8.3 \times 10^{-8}$; H_2CrO_4 , $K_2 = 1.0 \times 10^{-7}$; H_2AsO_4 , $K_1 = 6 \times 10^{-10}$; HN_3 , $K = 2.56 \times 10^{-5}$; $H_2N.NH_3OH$, $K = 1.4 \times 10^{-8}$. Detn. of the H -ion activity of $CuSO_4$ solns. showed that the hydrolysis of $CuSO_4$ is a slow reaction at ordinary temp. The p_H of an iodide-iodate mixt. was found to be about 6.9 after $1/3$ of the iodate was decomposed by the addn. of HCl . E. R. SMITH

Silver nitrate concentration cells in acetonitrile and benzonitrile. F. K. V. KOCH. *J. Chem. Soc.* 1928, 524-7.—The usual formula for the e. m. f. of a concn. cell was found to apply to solns. of $AgNO_3$ in acetonitrile and benzonitrile. The cation transference number of 0.1 N $AgNO_3$ in benzonitrile was detd. to be 0.396. E. R. SMITH

The dependence of electrochemical processes on pressure. HANS ERLÉNMEYER. *Helv. Chim. Acta* 11, 348-54 (1928).—Numerous electrolytic processes (both oxidation and reduction), which proceed in a normal manner under atm. pressure, become irregular and are retarded when the electrolysis takes place under N_2 pressure, e. g., K fumarate, $K_2S_2O_8$, $KHSO_4$ and $AcOH$. This is attributed to poorer agitation by the gases escaping from the electrolyte under pressure. The electrolysis of a mixt. of $Cu(NO_3)_2$ and HNO_3 is a rhythmic periodic process under atm. pressure but becomes steady under a N_2 pressure of 1000 atm. The electrolysis of Na_2S , which takes place without gas formation and depends only on the rate of diffusion of sulfide ion, shows the periodic variations independent of the pressure. Data are given for the resistance of 1.05 N H_2SO_4 , for the potential of a Cu anode, and for the passivity of a Ni anode. J. S. REICHERT

Chemical-electrical measurement of water. ANGELO BARBAGELATA. *Proc. Am. Soc. Civil Eng.* 54, 789-802 (1928); *Elettrotecnica* Feb. 15, 1926.—A method of measurement of the distribution of salt by cond. between fixed electrodes as a measure of rate of flow is described. The change in cond. between normal and salt water is measured by a Wheatstone bridge previously calibrated. Irregular distribution of the salt and air bubbles may be overcome. The method requires only a knowledge of the total amt. of salt introduced and time for mixing as values may be plotted and the flow calcd. from the consts. of the app. Corrections for temp. are important. Results check current meter and bulk measurements closely. A detn. can be made in 30 min. under conditions unsuited to other methods. FOSTER DEE SNELL

The solution tension of silver in solvents other than water. F. K. V. KOCH. *J. Chem. Soc.* 1928, 269-80.—E. m. f. measurements were made on cells of the type $Ag|AgNO_3(aq.)|AgNO_3(non-aq.)|Ag$. The non-aq. solvents were acetonitrile, benzonitrile, phenyl acetonitrile, ethyl cyanoacetate, pyridine, aniline, acetone, $MeOH$ and $EtOH$. Solns. of 3 concns. (approx. 0.1 N , 0.01 N and 0.001 N) were used in H_2O and in the non-aq. solvents except those in pyridine (0.01 N , 0.002 N , 0.001 N , 0.0005 N , aniline (0.01 N , 0.002 N) and acetone ($N/90$, $N/540$, $N/1000$). The sp. conductivities of all the solvents and solns. were detd. The e. m. f. values support the view that the electrolytic soln. tension of a metal varies with the solvent but shows no relation at all between the soln. tension and the dielec. const. of the solvent. Sp. attractive forces between metal ion and solvent mol. are assumed to explain the observed effects. Mols. contg. groups of an ammoniacal or nitrile character have a greater affinity for the Ag ion than those contg. OH or ketone groups. The results are tabulated. E. R. S.

The electromotive force and solvents of reversible cells. TAKEKO YOSHIDA. *J. Chem. Soc. Japan* 48, 435-41 (1927).—The e. m. f. of a cell is independent of the solvents of a reversible cell when the solvents have no relation to the cell reaction. By using the cell, $Cd(amalgam)|CdI_2(solid\ and\ satd.\ soln.)|Hg_2I_2|Hg$, the following e. m. f.'s were detd. for the solvents water, methanol, propyl alc. and acetone. For H_2O , $E = 0.41885 + 0.0003568(t - 30) + 0.0000008(t - 30)^2$; $MeOH$, $E = 0.41903 + 0.0003548(t - 30) - 0.0000029(t - 30)^2$; $EtOH$, $E = 0.41919 + 0.0003663(t - 30) - 0.0000012(t - 30)^2$; $PrOH$, $E = 0.41947 + 0.0003596(t - 30) - 0.0000065(t - 30)^2$; Me_2CO , $E = 0.41866 + 0.0003621(t - 27.5) - 0.0000011(t - 27.5)^2$. The temp. coeffs. of the cell at 30° are: For H_2O , $dE/dT = 0.0003568$ v.; $MeOH$, $dE/dT = 0.0003548$ v.; $EtOH$, $dE/dT = 0.0003663$ v.; $PrOH$, $dE/dT = 0.0003596$ v.; Me_2CO , $dE/dT = 0.0003679$ v. From the value E and $(dE/dT)_{30^\circ}$, the ΔF and ΔH from Gibbs-Helmholtz equation $\Delta H = nF(TdE/dT - E)$, are: For H_2O , $-\Delta H = 14,338$ cal., $-\Delta F$ (cal.) = 19,329; for $MeOH$; $-\Delta H = 14,375$, $-\Delta F = 19,337$; for $EtOH$; $-\Delta H = 14,221$, $-\Delta F = 19,345$; for $PrOH$ $-\Delta H = 14,328$, $-\Delta F = 19,358$; for Me_2CO ; $-\Delta H = 14,215$, $-\Delta F = 19,361$. T. SAITO

The calomel and silver chloride electrodes in acid and neutral solutions. The activity coefficient of aqueous hydrochloric acid and the single potential of the decimolal calomel electrode. MERLE RANDALL AND LEONA E. YOUNG. *J. Am. Chem. Soc.* **50**, 989-1004 (1928).—Dil. HCl reacts with Hg in the presence of air, forming HgCl, this causing an error in the e. m. f. of the H₂, Hg-HgCl cell. Detns. are made at 25° of the potentials of the Ag-AgCl, Hg-HgCl and H₂ electrodes in varying HCl concns, after freeing the HgCl, Hg and acid used of air. The activity coeff. of HCl is detd. from f. p., vapor pressure and e. m. f. (at 25°) measurements, and at 25° from the activity coeff. at the f. p. The potentials of various standard electrodes are recalcd. J. BALOZIAN

The electrolytic reduction potentials of organic compounds. III. Reduction potentials of nicotinic acid. MASUZO SHIKATA AND ISAMU TACHE. *Bull. Agr. Chem. Soc. Japan* **3**, 95-6 (1927).—In acidic or neutral salt soln. the observed reduction potentials shows agreement with calcd. values and it is assumed that the first stage of the reduction process consists in the reduction of the carbonyl group of nicotinic acid to aldehyde. The sec. stage is the reduction of the pyridine ring. Reduction in excess alkali does not take place. No products have so far been isolated. E. G. V. B.

An example of anode passivity. C. R. HARDY. *Chemistry & Industry* **47**, 214 (1928), cf Evans, *C. A.* **21**, 2836.—The screening effect of Fe(OH)₂ in the electrode of the alk. accumulator is probably much greater than of FeSO₄ in Muller's expt., but insufficient to cause more than a slight passivity. With unduly prolonged discharge, passivity is more pronounced. When the Fe(OH)₂ is reduced to Fe by charging, passivity may remain, although H₂ produced at the plate is considered to remove most of it. The condition is partially avoided by the use of extremely fine Fe powder and Hg or other catalyst. Passivity manifests itself as smaller capacity, lower voltage with a drop in the middle of the curve, poor capacity at high rates of discharge, and excess of hydrated compds. of Fe₂O₃ in the plates. FOSTER DEE SNELL

The valve effect of silicon electrodes. AUDUBERT. *Recherches et inventions* **9**, 93 108 (1928), cf *C. A.* **22**, 533.—The advantages of Si electrodes over metallic electrodes for current-rectifying valves are briefly discussed. The effects of c d, temp, self induction, frequency and chem. compn. were investigated, the method used is described and the results obtained are given in tabular and graphical forms. A. P.-C

Measuring differences of potential by means of dropping electrodes. A. FRUMKIN AND A. DONDI. *Trans. Karpon Inst. Chem.* **1926**, No. 5, 34-8. "The Hg dropping electrode used for measuring the adsorption difference of potential on the boundary Hg/soln. can also be applied to measuring the difference of potentials on the boundary air/soln. The latter measurement can be made by means of Kenrick's app. if the water electrode is replaced in this app. by a Hg dropping electrode. If the dissolved substances are not too volatile, the results obtained by this method are in fair agreement with those obtained by Kenrick's method." BERNARD NELSON

Measurements of contact potential between metals in vacuo. GÜNTHER MÖNCH. *Z. Physik* **47**, 522-41 (1928).—Description of 2 new methods for detg. the contact potential between 2 metals in a high vacuum. The expts. have been carried out with Cu and Ni. A. J. HENNE

The electrolysis of benzoic acid. EMIL BAUR AND EMIL MÜLLER. *Z. Elektrochem. angew. physik. Chem.* **34**, 98-103 (1928).—In the electrolytic reduction of benzoic acid (I) in aq. alc.—H₂SO₄ soln. a Pb cathode being used, the cathode gas contains benzene, CO₂, a small quantity of CO, and traces of formaldehyde, and the cathode liquid contains Δ²-cyclohexenone as the predominating aromatic product, the cathode being coated with C. In the electrolytic oxidation of I, the anode gas contains benzene, CO₂ and some CO, which are apparently formed through the intermediate formation of benzoyl peroxide. FREDERICK C. HAHN

The electrodeposition of indium with the dropping-mercury cathode. SEISU TAKAGI. *J. Chem. Soc.* **1928**, 301-6.—The electrodeposition of In at the dropping Hg cathode from solns. of InCl₃ in 0.1 N HCl proceeds reversibly in accordance with the Nernst equation. The normal deposition potential of the In ion in these solns. is -0.500 v. referred to the N calomel electrode and depends on the concn. of the HCl, being more negative the higher the concn. The method can be applied to the detection and estm. of In in metallic Zn and Ga. For this purpose the metals should be dissolved in HCl and the free acid concn. should be 0.1 N. The min. concn. of InCl₃ which can be detd. in this manner is 10⁻⁶ mols./l. The deposition potential of Ga cannot be detd. in acid soln. E. R. SMITH

The electrolysis of anhydrous formic acid. EMIL BAUR. *Helv. Chim. Acta* **11**, 372-5 (1928).—The electrolysis of anhyd. HCOOH gives CO₂ with traces of O₂ and CO at the anode. The reactions are formulated as follows: 2HCOO⁻ + 2 F = (HCO)₂O₂

(formyl peroxide); $(\text{HCO})_2\text{O}_2 = \text{HCOOH} + \text{CO}_2$; $2(\text{HCO})_2\text{O}_2 = 2(\text{HCO})_2\text{O} + \text{O}_2$; $(\text{HCO})_2\text{O} = \text{H}_2\text{O} + 2\text{CO}$. The formyl peroxide was detd. quantitatively. Oxalic acid and glyoxal were absent. Formaldehyde was produced at the cathode. J. S. R.

Temperature variation of the elasticity of Rochelle salt. E. P. HARRISON. *Nature* 120, 770(1927).—Attention is directed to the analogy between piezo electric phenomena and the reciprocal relations between strain and magnetic properties shown by ferro-magnetic metals. B. C. A.

The vibrating crystals. KLAUS SIXTUS. *Z. tech. Physik* 9, 70-4(1928).—Static characteristic curves (v vs. c . d.) are given and the influence of contact pressure, pole direction, c . d. and air pressure studied of the system zincite ore-steel point. An equation $P_{\text{max}} = \frac{1}{2} \sqrt{AR_0/\alpha}$ for P the contact potential, A the reciprocal heat resistance of the surrounding crystal surface, R_0 the elec. resistance of the contact at 0° , α its temp. coeff., represents the data well, confirming the thermoelec. theory of this phenomenon. From the falling characteristic of the contact resistance follows its ability to generate vibrations. Several oscillograms are shown. B. J. C. v. d. H.

Thermoelectric phenomena with thin metallic films. T. TERADA, S. TANAKA AND S. KUSABA. *Proc. Imp. Acad. Tokyo* 3, 200-3(1927).—A preliminary account of the thermoelec. effects produced by local heating of thin films of Ag, Bi, Sb, deposited chemically or by sputtering, on glass. When the image of a 300-c.p. filament lamp is focused on such films, voltages of the order of 10^{-7} v. were observed with Ag and of 10^{-6} v. with Bi and Sb. B. C. A.

Electrical phenomena in a billionth of a second. W. ROGOWSKI. *Naturwissenschaften* 16, 161-9(1928).—A lecture on the methods of R. (cf. *Arch. Elektrotechnik* 18, 479(1927)) for photographing elec. potential variations in extremely short lapses of time; the resolving power for details in the potential-time curves goes as low as 10^{-9} sec. The app. consists mainly of a vacuum (0.01 mm. Hg) discharge tube (30,000 v., 1 mm. opening in anode) with a photographic plate inside the tube as target. One variable magnetic field serves to move the electron stream over the plate with time (time coordinate), another field perpendicular to the first one is actuated by the potential to be examd. (potential coordinate). Several remarkable photographs are shown of various elec. phenomena: breakdown of elec. insulation, traveling waves in long circuits, immediately after closing, etc. B. J. C. VAN DER HORVEN

Low-voltage arcs. G. MIERDEL. *Physik Z.* 28, 344-60(1927); *Science Abstracts* 30A, 652.—M. collects and summarizes the results of numerous workers on low-voltage arcs. The various theories that have been put forward to explain the observed phenomena are then considered and the possible methods of ionization in the discharge chamber are fully discussed. It appears that since such effects as thermal or photoelec. emission, impact of pos. ions, or secondary collisions do not afford a satisfactory explanation of the phenomena of low-voltage arcs, it is necessary to assume that all normal arcs of this type and non-oscillatory must possess a cathode fall of potential of the same order of magnitude as the excitation potential of the gas in question, and that the field in the other part of the discharge is directed in opposition, so that the measured p . d. between the electrodes is less than the excitation potential. The explanation of the abnormal low-voltage arc is somewhat different. Again by assuming freedom from oscillation, it appears probable that the ionization of the atom can in this case take place in 2 stages, complete ionization by electron impacts following excitation due to absorption of resonance radiation. The theory advanced gives an explanation of all the effects observed with low-voltage arcs, including the decrease of min. potential with increased cathode temp. and with increased pressure. H. G. ●

Limits of the state of ionization and conductivity of the upper atmosphere by the Hessian cosmic radiation. H. BENNDORF. *Physik. Z.* 27, 686-92(1926); *Science Abstracts* 30A, 312.—Expressions are developed to det. the no. of ions per cc. and the cond. at any height in the atm. in terms of the measured values at the earth's surface. Consideration is given to the dependence of ionization, mobility of the ions and the cond. on the d. of the air and also to the effect of temp. changes. Taking a mass absorption coeff. between the limits 2.2×10^{-3} and 4.5×10^{-3} cm.²/g. for the cosmic radiation, the ionization and cond. produced by it at different heights are tabulated. Three sep. regions are considered: (1) in the lowest the neg. elec. carriers are the normal ions; (2) in the next they are partly normal ions and partly electrons; and (3) electrons only. The differences existing in these regions are discussed. The cond. (for d. c.) at a height of 100 km. acquires a value 10^{10} times that at the earth's surface, the air at this height conducting as well as dry earth. At 70-80 km. (Heaviside layer) a rapid increase of cond. occurs, while the calcd. and observed values at 9 km. agree very well. This provides an explanation of the presence of strong ionization in the

air and also of the large values found at night from expts. on the propagation of elec. waves. (See also *Z. Hochfrequenztechn.* 27, 66-73(1926).) H. G.

Theory of the electrical breakdown in gases at atmospheric pressure. L. B. LOEB. *J. Franklin Inst.* 205, 305-21(1928).—Townsend's theory of the elec. break-down of gases is discussed in the light of recent criticism and is found to be adequate except for one serious discrepancy. β , the no. of pairs of ions produced, according to the theory, by impact of positive ions with the gas mols. per cm. of gas cannot have this significance at the assumed fields at which air at atm. pressure breaks down, and in inert gases at low pressure, as the ions cannot acquire at these fields the ionizing energy. The theory would be applicable if fields about 10 times as great as those calcd. for a uniform potential drop between the electrodes before sparking, and it is shown that, because of the development of space charges by the difference in velocity between ions and electrons, such fields are possible under the conditions of spark discharge expts. The existence of these fields requires a finite spark lag interval of about 10^{-4} seconds, as yet not definitely observed. W. WEST

Alternating currents in rarefied oxygen in the same circuit. P. J. KIRKBY. *Phil. Mag.* [7], 2, 913-44(1926). *Science Abstracts* 30A, 313-4.—The phenomena described in this paper are an extension of the effects of which an account was previously given [cf. *Phil. Mag.* 15, 559-69(1908)]. In that paper the question is raised whether the elec. discontinuities at about 0.8 mm. were connected with the discontinuity in conforming to Boyle's law in O at the pressure 0.7 mm., described by C. Bohr and confirmed by other physicists, although Rayleigh, with the most careful investigation and with Bohr's result in his mind, entirely failed to discover any such departure from Boyle's law in the neighborhood of 0.7 mm. The results established in the present paper, however, show that the abrupt changes of current are not discontinuities in the strict sense of the word, but sudden shifts from one to the other 2 possible modes of conduction of electricity through the O at certain pressures and with certain orders of current assocd. with those pressures. Both these modes are regular and continuous with continuity of pressure, but the one is const. and the other is liable to modification by the past treatment of the gas. If these are assocd. with different mol. states, one of those mol. states, that of the ordinary currents, might conform to Boyle's law consistently, but not necessarily the other. H. G.

Variation of the specific inductive capacity of fluids in intense electric fields. L. CAGNIARD. *Compt. rend.* 185, 1195-7(1927).—Herweg's calcs. of elec. induction (*C. A.* 15, 467) are extended to include the effect of electrostriction, and it is shown that for an isothermal transformation there is an increase in the dielec. const. The calcs. do not apply to liquid dielectrics and do not afford evidence for or against the existence of dipoles. B. C. A.

Variation of dielectric constants of some gases with temperature and pressure. MAGDALENE FORRÖ. *Z. Physik* 47, 430-45(1928).—Measurements of the dielec. const. of H_2 , N_2 , air, CO and CO_2 were made at different temps. by a heterodyne method to find if the consts. of the Debye equation $(\epsilon - 1)/(\epsilon + 2)(T/d) = aT + b$ change with pressure. For H_2 , N_2 and air, a , the measure of the optical contribution to the dielec. const., is constant, and b , the permanent dipole contribution, is 0. For CO, b has a value varying with pressure at const. temp., with a temp. coeff. indicating a dipole moment of 0.108×10^{-18} at 1 atm. to 0.147×10^{-18} at 6 atm. The variation of b with density can be expressed equally well by a linear and by a quadratic equation. For CO_2 , the variation of b with density is given by a quadratic formula. The dipole moment of CO_2 varies from 0.192×10^{-18} at 1 atm. to 0.217×10^{-18} at 6.53 atm. W. WEST

Temperature changes of the dielectric constants of liquid helium. Preliminary measurements. M. WOLYKE AND W. H. KESOM. *Verslag. Akad. Wetenschappen* 36, 1209-17(1927).—Small capacity changes of the He condenser were detd. by a compensation method with a microcondenser (accurate to 8.7×10^{-4} cm.) consisting of brass cylinder with adjustable iron core, amber-insulated. High-frequency circuits were used for adjustment of the condenser, the final accuracy being 0.003% of the capacity change. The value of C_0 for the empty condenser was 174 cm. at the He b. p. The results of the 2 series of measurements between $T = 1.75^\circ$ abs. and 2.64° (4.21° abs. is b. p. of He) gave values for the const. K between 1.0566 and 1.0590; $(K - 1)/(K + 2)$ was between 0.1320 and 0.1283. A probable discontinuity around 2.3° abs. was found. B. J. C. VAN DER HOEVEN

The effect of electrostatic fields upon the dielectric constants. F. KAUTZSCH. *Physik. Z.* 29, 105-17(1928).—K describes in detail various methods and the app. finally used for his measurements. The liquids used and found suitable for the work were Et_2O , $CHCl_3$, chlorobenzene, CS_2 and hexane. The dielec. consts. of $CHCl_3$ and ether in-

creased with increase in the strength of the field. At the higher field strengths the dielec. consts. were smaller than those calcd. by the Debye theory. The mol. moments calcd. from the data for ether, CHCl_3 and chlorobenzene are resp., 12.07, 10.26 and 6.45×10^{-19} . A. FLEISCHER

Relation between the temperature and the dielectric constant of gases and vapors. I. Method and results in carbon dioxide and air. H. A. STUART. *Z. Physik* 47, 457-78 (1928).—The dielec. const. of CO_2 and air is measured at temps. ranging from 0 to 180° . The limit of accuracy of $\epsilon - 1$ is 2%. From the values obtained it is calcd. that the elec. moment of CO_2 equals 0. Air shows a slight increase of the mol. polarization by increasing temp.; this is analogous to the increases of the mol. refraction with the temp. The absence of elec. moment shows that the 3 atoms of the CO_2 mol. are located on a straight line; the same result could also be derived from electrostriction measurements. A. L. HENNE

The dielectric constant of liquid bromine. ANNE I. ANDERSON. *Proc. Phys. Soc. (London)* 40, 62-70 (1928).—A redetn. of the dielec. const. of liquid Br gave 3.12 at 15° and at a frequency of 187,000 per sec. with a temp. coeff. of -0.00191 referred to 0° . The app. and method consisted of 2 generators of high-frequency oscillations which produced a heterodyne note in a third detector circuit operating a loud speaker. The Br condenser is described. By applying the dipole theory of Debye and Gans to the results, a value of 0.40×10^{-18} is deduced for the elec. moment of the mol. Br_2 . The elec. cond. was 9.6×10^{-10} ohm $^{-1}$ cm. $^{-1}$ at 0° with a temp. coeff. of -0.0188 per degree. The actual resistance of Br_2 was 5.46×10^6 ohms at 0° . H. M. McLAUGHLIN

Application of the Debye dipolar theory to binary mixtures of liquids. J. W. WILLIAMS. *Physik. Z.* 29, 174-81 (1928).—W. measures the dielec. const. of a series of compds. dissolved in CCl_4 , CS_2 , C_6H_{14} or C_6H_6 . No polarization was detected with C_6H_6 , CCl_4 , CS_2 , C_6H_{14} , SnI_4 , $p\text{-Me}_2\text{C}_6\text{H}_4$ and $p\text{-(NO}_2)_2\text{C}_6\text{H}_4$. I, C_{10}H_8 , 1,3,5-(NO_2) $_3\text{C}_6\text{H}_3$ are doubtful. The following values of $\mu \times 10^{-18}$ have been detd.: in C_6H_6 : MePh, 0.52; $o\text{-Me}_2\text{C}_6\text{H}_4$, 0.52; PhNO $_2$, 3.90; $o\text{-(NO}_2)_2\text{C}_6\text{H}_4$, 6.05; $m\text{-(NO}_2)_2\text{C}_6\text{H}_4$, 3.81; $o\text{-NO}_2\text{MeC}_6\text{H}_4$, 3.75; $m\text{-NO}_2\text{MeC}_6\text{H}_4$, 4.20; $p\text{-NO}_2\text{MeC}_6\text{H}_4$, 4.50; PhCO $_2\text{H}$, 1.00; PhOH, 1.70; ClPh, 1.55; CHCl_3 , 1.10; Et $_2\text{O}$, 1.22; AgClO $_4$, 4.70. In CCl_4 : MePh, 0.40; CHCl_3 , 1.15; Et $_2\text{O}$, 1.24; MeOAc, 1.67; EtOAc, 1.74; Me $_2\text{CO}$, 2.70; EtOH, 1.63; iso-AmOH, 1.85. In CS_2 : NO $_2\text{Ph}$, 3.89; PhOH, 1.63; ClPh, 1.52. In C_6H_{14} : NO $_2\text{Ph}$, 3.89; ClPh, 1.55. Within the exptl. error, the mol. polarization of a substance is independent of the solvent providing the latter is not dipolar. A final discussion emphasized the theoretical importance of this kind of measurements. A. L. HENNE

Absolute measurement at high frequency of the dielectric constants of liquids. R. DARBORD. *Compt. rend.* 185, 1193-5 (1927).—The new type of condenser described for the measurement of ϵ by the Wheatstone-bridge method consists of a cylindrical vessel divided into an upper and a lower portion, the latter contg. 2 shaped horizontal armatures, one of which is fixed, while the other rotates inside it. If c_1 and c_2 are the capacities of the empty lower portion for the 2 extreme positions of the armatures, and ϵc_1 and ϵc_2 are the corresponding capacities after the addn. of the liquid, then $\epsilon = (\epsilon c_2 - \epsilon c_1)/(c_2 - c_1)$. If the armatures are fixed, the instrument must be standardized against a liquid of known ϵ . The app. avoids the influence of dispersion of the lines of force, and may be used with liquids for the vapors of which ϵ is nearly unity. B. C. A.

Magnetic properties of single crystals of zinc and cadmium. J. C. McLENNAN, RICHARD RUDY and ELIZABETH COHEN. *Nature* 121, 351 (1928).—Single crystals of Zn and Cd, prepd. by Bridgman's method, were suspended vertically from one arm of a balance so that the lower end hung between the poles of an electromagnet. Weighings were taken in the presence and absence of a known magnetic field, at intervals of 15° as the crystal was rotated through 360° about a vertical axis. Fields up to 12,000 gauss were used. The susceptibility of Zn is -0.183×10^{-6} in a direction parallel to the principal axis of the crystal and -0.147×10^{-6} perpendicular to it. The corresponding values for Cd are -0.276×10^{-6} and 0.169×10^{-6} . W. W. STIFLER

Magnetic properties of thin films of electrolytic iron. E. P. T. TYNDALL. *Phys. Rev.* 30, 681-91 (1927).—Films of Fe are made by electrodeposition on brass tubes. The thickness ranges from 26.5 to 102 millimicrons. Magnetization curves and hysteresis cycles are obtained by a magnetometric method. The films show increasing magnetic hardness with decreasing thickness. In a 150-gauss field the max. intensity of magnetization reached is 1480 units for a thickness of 50 millimicrons. Thicker and thinner films are slightly less completely satd. The coercive force, from $H_{\text{max.}} = 150$, is related to the thickness as follows: $H_c = 5 \times 10^4/(89\theta + 2260)$, where θ is the thickness in millimicrons. The theory of McKeehan is found adequate to explain the

observed magnetic properties, which are traced to the constraint placed on the films by the cathode on which they are deposited. The films when demagnetized must be in a state of tension.

BERNARD LEWIS

Passivity and protective oxide films. ULICK R. EVANS. *Nature* **121**, 351-2 (1928).—From the work of Kruger and Nahring it is stated (*Nature* **121**, 222) that oxide films thicker than 10^{-7} cm. are not present on the surface of a passive metal. E. discusses the factors which det. the thickness of protective films and considers the x-ray method unsuitable for a study of surface layers. With freshly abraded Fe in the presence of penetrating anions, the film thickness may exceed 4×10^{-6} cm. "Air-passivity" is a property of the pure metal.

J. E. SNYDER

The relation of specific heat to ferromagnetism. J. R. ASHWORTH. *Nature* **121**, 323(1928).—The sp. heat of Fe, Ni and Co increases with temp. up to the crit. temp. at which point an abrupt decrease occurs. The relations between the several quantities involved are given by the equations. $m \cdot a \cdot C_\theta = 5 \cdot n \cdot a \cdot \Delta C$; $n \cdot \Delta C \cdot J \cdot \rho = 278 \cdot R' \cdot I_0$; $\theta/I_0 = q \cdot 8/27$; and $\rho \cdot R_{\text{an}} = R' \cdot I_0$, where $m \cdot a$ and $n \cdot a$ are mol. wts., C_θ is sp. heat at crit. temp. θ , ΔC is decrease in sp. heat, I_0 is max. intensity of magnetization, R' is reciprocal of Curie const., J is Joule's equiv., ρ is density, R_{an} is the gas const., and q is an integer. For Fe, Co, Ni and Fe₃O₄ the values of q are 2, 3, 4 and 6, resp. A specimen of Heusler alloy satisfied these relations quantitatively. For it $q = 5$.

W. W. STIFLER

The temperature dependence of remanent magnetism. HERMANN GEWECKE. *Z. tech. Physik* **9**, 57-60(1928).—The magnetism of a steel rod will decrease on heating, however repeated heating and cooling between 100° and 150° causes the magnetism to assume final const. values depending on the temp. only. For 16 differently treated steel rods (1 to 6 mm diam., 250 to 300 mm. length) these reversible changes were studied. The value of α from $\varphi_k = \varphi_{15}[1 + \alpha(t - 15)]$ varied from -12.2×10^{-4} (cast steel rod, not hardened) to $+7.9 \times 10^{-4}$ (spring steel rod, cold drawn). Mech. hardening of the material seems to give a high positive α which may be reduced to zero or negative values by annealing at temps. around 1000°. Chrome steel had low negative values for α .

B. J. C. VAN DER HORVEN

Energy stages of atoms and molecules and their relation to chemical combination. J. FRANCK. *Ber* **61B**, 445-50(1928).—An address on the mechanism of energy changes in atoms and mols. from the standpoint of the quantum theory. The line spectra of atoms and the band spectra of mols. are interpreted, and the processes involved in such phenomena as ionization and fluorescence are explained. The application of these concepts to chem. reactions in gases is discussed.

H. STOERTZ

The relativistic quantum theories of ideal gases. FERENCZ JÜTTNER. *Z. Physik* **47**, 543-66(1928).—Mathematical discussion based chiefly on the Bose-Einstein and the Fermi-Dirac statistics.

A. L. HENNE

Mechanical theories in physics and chemistry. A. KORN. *Physik. Z.* **27**, 801-3 (1926); *Science Abstracts* **30A**, 253-4.—On a mech. theory an electromagnetic field can be produced only by oscillations of extraordinarily short period and of considerable inertia, such that the particles always retain their elec. mass; that would be without analog in classical mechanics and would lead to the quantum theory. The oscillating particles would not radiate, nor would the electrons in their stable orbits, except when disturbed; this view would accord with Bohr's, except that radiation would be caused by slight deviations from the orbit, not by jumps from one orbit to another, and that the stable orbits would not depend upon quantum relations. The restricting forces maintaining the orbits could for spectra (x-ray and others) be Coulomb forces; but these forces could not hold the nucleus particles together. K. suggests a nucleus consisting of particles a , b , c , the a appearing gravitational with respect to the outer field, the b and c elec.; there would be repulsion between all the particles of the same kind, whether a , b or c , but attraction between the a and either b and c , and this attraction must be qualified by an absorption factor by virtue of which the attraction would turn into repulsion at greater distance. On these lines stable constellations are possible for all the atoms.

H. G.

Highly dilute flames. I. H. BEUTLER AND M. POLANGI. *Z. Physik* **47**, 379-406 (1928).—The "highly dilute flames" are produced by the interaction of Na vapor and Cl₂ or I₂. The gases are introduced from opposite ends of the reaction tube at a pressure of 10^{-3} mm. Analysis of the distribution of the reaction products pptd. on the walls allows an estn. of the reaction velocity, which is very great. The luminous zone, emitting the D lines at an intensity which may reach several candle power, is displaced 5 or 6 cm. towards the Na side of the zone of pptn. The displacement is greater in the I flame than in the Cl. This fact, and the absence from the Cl flame of a secondary

zone of pptn. present in the I flame shows at. Cl reacts with Na vapor more readily than at. I. The displacement of the luminescent and pptn. zones shows that the primary reaction, assumed $\text{Na} + \text{I}_2 = \text{NaI} + \text{I}$ is not luminescent; the light emission must be due to reactions $\text{Na} + \text{I} = \text{NaI} + 68.7 \text{ cal.}$ or $\text{Na}_2 + \text{I} = \text{NaI} + \text{Na} + 54 \text{ cal.}$ The light yield, about $1/_{200}$ to $1/_{500}$ of that if every elementary process in the secondary reaction caused the emission of 1 quantum, falls on increasing the temp. of the Na vapor, suggesting that the luminescent reaction is between $\text{Na}_2 + \text{I}$, since the Na concn. falls off with temp. Thermodynamic calcs. of the heat of disson. of the alkali halides at zero abs. lead to values for NaCl 93.4 cal., for NaBr 85.8 cal., for NaI 68.7 cal., in agreement with the band spectra data. W. WEST

Further studies on light-scattering in liquids at high temperatures. S. R. RAO. *Indian J. Physics* 2, 179-93(1928).--Measurements similar to those previously described (*C. A.* 22, 1091) have been made for C_6H_{18} , CCl_4 , EtOAc , C_6H_6 , $\text{C}_6\text{H}_5\text{Cl}$ and PhMe. Results are analogous to those previously found. Curves for paraffin hydrocarbons show a progressive change with increase in length of mol. Values for anisotropy of MeOAc are greater than for EtOAc and those for Et formate are higher than for EtOAc. PhMe resembles C_6H_6 while $\text{C}_6\text{H}_5\text{Cl}$ differs from both. In all cases anisotropy increases with temp. and tends toward the value for the vapor. W. ALBERT NOYES, JR.

Valency. VIII. Extinction coefficients and molecular conductivities of Vernon's isomeric α - and β -dimethyltelluronium salts. Molecular structure of quadrivalent tellurium compounds. T. M. LOWRY, ROSE A. GOLDSTEIN AND F. L. GILBERT. *J. Chem. Soc.* 1928, 307-21; cf. *C. A.* 14, 1815, 2918; 15, 2413.—Vernon's specimens of the isomeric dimethyltelluronium halides are used for measurements of extinction coeffs. in abs. alc, the absorption curves being plotted. Both the α - and β -diiodides give the characteristic twin maxima obtained in the absorption spectra of CH_3I . The α - and β -dichlorides exhibit only a general absorption of moderate intensity, but the dibromides show a well-marked "step out." The mol. extinction coeff. of the α -dibromide remains almost const. at $\log \epsilon = 3.7$ over a range of 200 Å. U. from 2600 to 2800 Å. U., while the coeff. of the β -compd. is almost const. at $\log \epsilon = 4.0$ over a similar range. The

α tetraiodide, TeMe_2I_4 , also shows 2 maxima and is given the formula: $[\text{TeMe}_2]\text{I}_3$. Measurements of mol cond show that the dihalides do not behave as binary or ternary electrolytes, but attain values which exceed 500, indicating that 1 halogen atom is

hydrolyzed and the other forms a halogen ion $[\text{TeMe}_2\text{Cl}]\text{Cl} + \text{H}_2\text{O} \rightleftharpoons [\text{TeMe}_2\text{OH}]\text{Cl} + \text{HCl}$. The hydroxy halides thus produced are not hydrolyzed to any large extent, giving cond. in the neighborhood of 100. The free bases exhibit cond. of the same order as that of a weak base like NH_3 . A discussion of the mol. structure of these compds. is given, and the following formulas are assigned to them: for the hydroxy halides $[\text{TeMe}_2\text{OH}]\text{X}$; for the dihalides $[\text{TeMe}_2\text{X}]\text{X}$; for the bases $[\text{TeMe}_2\text{OH}]\text{OH}$.

H. STOERTZ

Extinction coefficients of mixtures of uranyl nitrate and organic acids in the ultra-violet, as experimental evidence in favor of the formation of unstable intermediate compounds. JNANENDRA CHANDRA GHOSH AND BHUPENDRA NATH MITTER. *Quart. J. Indian Chem. Soc.* 4, 353-66(1928).—Extinction coeffs. of mixt. of uranyl nitrate and formic, acetic, propionic, succinic, glycolic and mandelic acids were measured with the aid of rotating sector photometer (Adam Hilger) and quartz spectrograph. The coeffs. were higher for the mixts than for the separate substances. It was assumed that the mass law held, and where U is 1 mol. of the nitrate, A 1 mol. of org. acid, yielding M , 1 mol. of the complex intermediate compd. with concn. x . By using the equations $(U_1 - x_1)(A_1 - x_1) = Kx_1$ and $E_1\lambda = E_0\lambda(U_1 - x_1) + E_M\lambda(A_1 - x_1) + E_M\lambda(x_1)l$, where l is the length of the soln. tube. For 2 dilns. the 4 unknowns x_1, x_2, K and $E_M\lambda$ were detd. $E\lambda'$ for any other wave length can be calcd. once K is known. This theory explains in most cases the exptl. data of coeffs. of mixts., assuming equil. and a definite value for mol. extinction coeff. for each wave length for the intermediate complex. In a homologous series K diminishes with each addnl. CH_2 in a definite ratio, increases 12 times as a H of CH_3 is replaced by COOH , and in the case of monobasic acids, replacement of H of CH_2 by OH increases K 2.5 times. C. E. P. J.

Quartz. R. E. GIBBS. *Science Progress* 22, 613-29(1928).—A review of the different modifications of SiO_2 , their resp. crystalline structure and physical properties.

JOSEPH S. HEPBURN

Oxidation-reduction reactions (HALL) 7. The production of anisotropy of surfaces (ZOCHEK, COPER) 3. Specific heat of iron (OBERHOPFER, GROSSE) 9.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

- Recent advances in science: Physics. L. F. BATES. *Science Progress* 22, 574-8 (1928).—Review of recent work on helides of Hg and on the electron. J. S. H.
- The thermodynamic equilibrium concentration of cosmic matter. P. JORDAN. *Z. Physik* 41, 711-7(1927); *Science Abstracts* 30A, 582-3.—Stern recently (cf. *C. A.* 20, 549) obtained an expression for the thermic equil. concn. of matter, under the assumption that, according to an idea investigated by Eddington, pos. and neg. electrons are annihilated by opposite sides neutralizing and are transported in radiation energy, or, conversely, can be formed by radiation from thermodynamic considerations. The considerations of Stern and Lenz are investigated from the standpoint of the Einstein and Fermi gas theory. The probability laws for the elementary processes in the transformation of matter in radiation is also dealt with. H. G.
- An atomic model for the chemist. VIII. FLORENCE LANGWORTHY. *Chem. News* 136, 209-12(1928); cf. *C. A.* 22, 1721. E. H.
- Direct evidence of atom building. R. A. MILLIKAN AND G. H. CAMERON. *Science* 67, 401-2(1928).—Expts. in high mountain lakes, and with self-recording electrosopes in sounding balloons, show that cosmic rays consist of bands of definite frequency. Four of these are found, extending over a spectral range of 3 octaves. Einstein's equation ($E = Mc^2$) predicts an absorption coeff. of 0.305 for the radiation produced in the formation of a He nucleus from 4 protons and 2 electrons, and this is within a few percent of the absorption coeff. observed for the most conspicuous band. The other 3 bands are similarly interpreted as resulting from the formation of the nuclei of O and N, of Si and Mg and of Fe. The abundance of these elements in meteorites, and their occurrence in astronomical spectra, as well as the fact that other nuclear changes are inadequate to account for radiation of such high frequency, are cited in support of the interpretation. F. A. JENKINS
- Properties of atoms and ionization potentials. LUIGI ROLLA. *Atti II congresso naz. chim. pura applicata* 1926, 104-19.—See *C. A.* 21, 358, 699. C. C. DAVIS
- The structure of the fluorine spectrum (FI). T. L. DE BRUIN. *Proc. Acad. Sci. Amsterdam* 30, 944-51(1927).—See *C. A.* 21, 1757. E. H.
- Recombination of carriers in gases. J. SCHEMEL. *Ann. Physik* 85, 137-88(1928).—The recombination coeff. α , of the equation $dn/dt = -\alpha n^2$, where n is the no. of carriers per unit vol. for a homogeneous distribution, is, for the ions produced by the Po α -rays in air at N. T. P., 1.7×10^{-10} cm. 3 sec.⁻¹; this value is 20% lower in well-dried and filtered air, and decreases slightly with diminishing pressure. α increases with temp., at first quickly, then more slowly. Recombination takes place in N₂ much as in air, but in N₂ satn. in an elec. field is attained more quickly. The abnormality of the coeff. for short exposures is attributed to the formation of discrete columns of ions which slowly increase in vol. W. WEST
- Purification of gas by ionization by collision. W. DEUTSCH. *Z. tech. Physik* 7, 12, 623-30(1926); *Science Abstracts* 30B, 305-6; cf. *C. A.* 20, 150.—An arrangement

is here described by means of which it is possible to measure in the ultra-microscope the satn. of single particles in ionization by collision, whereby it is shown that the limiting potential to which the particles are charged is approx. const. A series of illustrations is given which illustrate the industrial importance of the procedure. H. G.

Relativity fine-structure of helium. F. PASCHEN. *Ann. Physik* 82, 689-96 (1927); *Science Abstracts* 30A, 633.—Photometric investigation of the spectrum of He excited by d. c. shows that the He⁺ line 4686 abs. wave length corresponds exactly with the theoretical value. Also the sepn. of the components leads to the exactly correct value $\Delta\nu_H = 0.365 \text{ cm}^{-1}$. Thus the conclusions of Leo (who ascribed a component to He bands) are unfounded. H. G.

Notes on the structure of the manganese spectrum. M. A. CATALÁN. *Anales soc. españ. fís. quím.* 26, 67-74 (1928).—A résumé and rearrangement of existing data. E. M. SYMMES

Non-combining terms in the new quantum theory. I. E. WIGNER. *Z. Physik* 40, 492-500 (1926); *Science Abstracts* 30A, 462.—Using the methods of Schrödinger's wave mechanics, it is shown that in a system with 3 electrons the terms fall into several groups, the members of different groups not combining. One of these groups is shown to satisfy Pauli's rule, and for the other the equil. distribution is given by the Bose-Einstein statistics. H. G.

Model of the triatomic molecule of water and carbon dioxide. F. J. v. WISNIEWSKI. *Z. Physik* 47, 567-88 (1928).—W. adopts for the triatomic mols. a model consisting of 3 ions and 3 electrons. The 3 positive ions are located on a straight line. They are in a position such that the distances between the central and the external ions are equal, at least in first approximation. The mol. revolves as a whole around the axis passing through the ions. The electron paths are perpendicular to the same axis. The consts. of such a mol. are calcd., and the results are applied to the H₂O and the CO₂ mols. A. L. HENNE

Thermally excited quantum emission in solid bodies. F. SIMON. *Sitzb. preuss. Akad. Wiss.* 1926, 477-87; *Science Abstracts* 30A, 498.—Consideration has been given to the changes of sp. heat with temp. of a series of monotonic, regular cryst. substances, and it is shown that their atoms are capable of existing in two states so little different that the distribution taking place in the homogeneous system occurs at very low temps. The energy difference of the two states, on the nature of which nothing definite can be said yet, is of the order of magnitude of 1% of the lattice energy. The substance dealt with are gray Sn, Si, diamond, Na, K, Fe, Ni and Co. For the diamond, confirmation is provided by optical measurements on absorption, while the Grüneisen formula of the proportionality of thermal expansion and sp. heat for isotropic substances provides an independent measure of the point of abnormal increase of sp. heat. For the alkali metals support is provided by values of elec. resistance and by the Lindemann melting-point formula. Finally, several conclusions regarding the phys. and chem. behavior of these substances are discussed. H. G.

Secondary emission from molybdenum due to bombardment by high-speed positive ions of the alkali metals. W. J. JACKSON. *Phys. Rev.* 30, 473-8 (1927).—Work has been extended to measurements on secondary emission from Mo due to the bombardment of positive ions of Na⁺, Rb⁺ and Cs⁺ following the method used for K⁺ and described in a previous paper (*C. A.* 21, 206). Confirmatory evidence is obtained that heat treatment in general reduced the secondary emission. With degassed targets the following results were obtained: Na⁺ ions showed a positive-ion reflection of 3 or 4% independent of the speed of the impacting ion and electron emission of about 2% of 1000 v. Expts. with Rb⁺ indicated a reflection of positive ions of less than 2% and no electron emission within the exptl. error. Cs⁺ gave a secondary emission of about 9% at 1000 v. The relatively large secondary emission from an untreated target as compared with a well-degassed metal may be due to the fact that the min. distance of the electron from the metal surface is greater in the former than in the latter case; also, if secondary emission is due to local high temps. arising from positive-ion bombardment there would be more rapid dissipation of energy by the target surface than by the gas mols. BERNARD LEWIS

Absorption of ultra-sonic waves by hydrogen and carbon dioxide. T. P. ABELLO. *Proc. Nat. Acad. Sci.* 13, 699-701 (1927).—An ultra-sonic beam, generated by a piezo-electric crystal, was passed through a mixt. of air and CO₂ (or H). The energy of the emergent beam was measured by the pressure it exerted on a torsion vane. B. C. A.

The Zeeman effect and Stark effect of hydrogen in wave mechanics; the force equation and the virial theorem in wave mechanics. A. E. RUARK. *Phys. Rev.* 31, 533-8 (1928).—The Zeeman levels of hydrogenic atoms are detd. by a new and simple

method, neglecting terms in H^2 . The frequency of the Larmor precession is $L = L_0(1 + E/mc^2)$. L_0 is the frequency of precession obtained by Newtonian mechanics and E the energy of the atoms. The formula for the first-order Stark effect and for the Paschen-Back effect can be obtained by similar methods. An extension of Ehrenfest's (*Z. Physik* 45, 455(1927)) law of motion for a particle is proved. It is applicable to any conservative system. From it, a theorem of wave mechanics analogous to the virial theorem is obtained.

BERNARD LEWIS

Anomalous groups in the periodic system of elements. F. FERMI. *Nature* 121, 502(1928).—By considering the electrons in a heavy atom as forming an atm. of completely degenerated gas, formulas have been derived giving the density of electrons and the potential as a function of the distance r from the nucleus. The method is extended to calc the no. of electrons having a given azimuthal quantum no., k , in order to arrive at an interpretation of the anomalous groups in the periodic table. The theory predicts that electrons with $k = 4$ will exist in the normal state only for atoms with at no $z \geq 55$. This agrees with the empirical result that the rare earth group, which corresponds to the bonding of electrons in 4_f orbits, begins at $z = 58$ (Ce). Similarly, according to the theory, electrons with $k = 3$ should appear first at $z = 21$, and the bonding of 3_d electrons is known to begin with the first long period ($z = 21$, Sc).

F. A. JENKINS

The laws of radioactive decompositions. V. A. SOKOLOV. *Z. Physik* 45, 409-15 (1927). There is a connection between the decompn. const. and the no. of radioelements in the decompn. series. Those elements which deviate from this relation have several of the same properties. There exists also a relation between the decompn. const. of the β radiators and the position of the radioelements in the decompn. series.

MARIE FARNSWORTH

Heating effects of thorium and radium products. S. W. WATSON AND M. C. HENDERSON. *Proc. Roy. Soc. (London)* A118, 318-34(1928). The heat evolution of 5 combinations was measured by a resistance thermometer method. Agreement within 2% of the Hess and Lawson rate of emission of α particles from Ra (3.72×10^{10} per g. per sec.) was obtained.

L. D. ROBERTS

The radium standard solution. W. BOTHE. *Z. Physik* 46, 896-9(1928).—Standard Ra solns. were tested with an instrument to measure Rn and results obtained are in good agreement with expected values. Solns kept for nearly 7 yrs. showed the same results as fresh solns.

R. H. LAMBERT

Yields of atom disintegration by α -rays. W. BOTHE AND H. FRANZ. *Naturwissenschaften* 16, 204-5(1928); cf. *C. A.* 21, 3152.—The large differences in yield between expts. of Rutherford and Chadwick and of Kirsch and Petterson caused the authors to repeat this work. With a Po prepn. as α -ray source, a Geiger counter as debris indicator, the "backward" radiation was examd. (by Al absorption) as emitted by a thick layer of irradiated substance (Be, C, Al or Fe) under an angle of 130° with the incident rays. Never more than 2 H particles were found per million incident α -particles (K. and P. found 17-40). From special expts it was learned that at least $1/3$ of the H particles were captured on the counter. For the "forward" radiation was found for Al and Mg around one H per million α , for (CN) and B resp., 9 and 12 H (10 cm. air absorption). For B the absorption curve shows peaks, i. e., two separate H-ray groups of 20 and 32 cm. max. range, possible isotope effect. For air or A filling of the counter instead of H₂, stronger effects were observed (K radiation of the substances).

B. J. C. VAN DER HOEVEN

Studies on the action of radioactive radiation on the dielectric constant. GEORGES GUEBEN. *Bull. sci. acad. roy. Belg.* 13, 509-23(1927). It is shown that the irradiation of dielec. plates by γ -rays causes no variation in the dielec. const., at least it is less than $1/1000$ of the value.

L. D. ROBERTS

Study of the action of radioactive radiation on the dielectric constant of dielectrics. G. GUEBEN. *Compt. rend.* 186, 861-3(1928).—This is a report of the exptl. results given in the preceding abstr.

L. D. R.

Preparation of radiothorium. D. K. YOVANOVITCH. *Archiv. Hem. Farm.* 1, 89-94 (1927).—A prepn. extremely rich in radiothorium is obtained by repeated pptn. with concd. HCl from concd. solns. of mesothorium-1. This prepn. is freed from traces of Ba, mesothorium-1 and Ra by fractional crystn.

B. C. A.

Calorimetric method for determination of the coefficient of absorption of radium β -rays. D. K. YOVANOVITCH. *Archiv. Hem. Farm.* 1, 206-12(1927).—The heat changes accompanying the absorption by Al, Cu or Pb of the α - and β -radiation of Ra are resp., 129.0 and 13.4 g.-cal./hr.; the coeff. of absorption of β -rays is 51.02.

B. C. A.

Studies on the radioactivity of some sources of mineral water and of potable water

of Transylvania. GH. A. DIMA. *Bull. sec. sci. acad. Roumaine* 11, 53 5(1928).—Radon has been detd. in a large no. of springs, and Ra has been found and detd. in several. I. D. R.

Stellar temperature and ionization. E. A. MILNE. *Nature* 118, 738-40(1926); *Science Abstracts* 30A, 270.—A recapitulation of recent astrophys. advances. Saha's theory is described and the temp. scale derived by Payne from considerations of absorption line maxima and ionization equilibria. A very recent development of promise is the method devised by Yu where the continuous absorption assocd. with the limit of the Balmer series is measured on the same spectrum plate as the color-temp., these 2 quantities together enabling the abs. magnitude to be detd. H. G.

The refraction quotients of the deBroglie waves of the electron. OTTO KLEMPERER. *Z. Physik* 47, 417-21(1928).—According to the equation $v_p v_k = c^2$, where v_k is the mass velocity and v_p the phase velocity of the free electron, there must be a sudden increase in v_p when an electron penetrates matter from a vacuum, and therefore there must be for the electron an angle α of total reflection such that $n = \sin \alpha$, n being the refractive index for the phase waves. Some previously not understood measurements of Wehnelt and Schmidt can be interpreted in terms of this phenomenon by the introduction of an inner elec. potential in insulators. W. WEST

The theory of thermic emission and the reflection of electrons on metals. LOTHAR NORDHEIM. *Z. Physik* 46, 833-55(1928).—On the assumption that an electron in a metal is gaseous the Richardson-Dushman formula may be applied to the electron glow. The const. has the same value as that derived from the Fermi-Dirac statistics except for a factor involving the wt. of a quantum state and an av. reflection coeff. for the electron at the surface. The latter is calcd. from quantum mechanics. This consideration necessitates a large potential drop at the surface layer. The factor approaches 1 for a metal with a clear surface. This agrees with observed data. It also gives a qual. agreement for the influence of a monomol. surface layer. RAYMOND H. LAMBERT

The mobilities of gaseous ions in hydrogen sulfide-hydrogen mixtures. L. B. LOEB and L. DUSAULT. *Proc. Nat. Acad. Sci.* 14, 192-9(1928); cf. C. A. 21, 3504.—By the method previously described the mobilities of ions of H_2S and H_2S-H_2 mixts. were measured at varying pressures. The new abs. mobilities for H_2S were found to be: the positive ions 0.71 and the negative ions 0.69 cm./sec. per volt/cm. The pressure law does not seem to hold for the positive ions as it does for the negative. The data do not agree with the Alexievsky theory of the decrease in cluster size at low pressures. On some occasions H_2S at low pressure showed unmistakable signs of the presence of free electrons. The negative and positive mobilities of H_2 were tremendously lowered by traces of H_2S . ARTHUR FLEISCHER

Diffusion coefficients of gas ions in flames in their dependence on temperature. HANNS BÜCKERT. *Ann. Physik* 85, 63-80(1928).—The diffusion coeffs. of both + and - ions from flames of H in air, coal gas in air, and CO in air, are almost independent of the temp. of the diffusion space up to a certain value, 50° for H; then suddenly increase regularly with temp. The coeff. diminishes rapidly with the age of the ions. The small values at low temp. point to the existence of large ionic complexes which break down to smaller and more mobile ions at higher temps. For the CO flame the increase with temp. is much smaller than for H and CO flames, indicating the comparative stability of the ionic complexes from this flame. W. WEST

Effect of catalysts on the speed of flame, infra-red emission and ionization during the combustion of carbon monoxide and oxygen. W. E. GARNER AND C. H. JOHNSON. *J. Chem. Soc.* 1928, 280-98; cf. C. A. 21, 1059.—Measurements are made of the rate of emission, the duration and magnitude of ionization, and speed of flame for CO and O mixts. to which catalysts have been added. H and H-contg. substances such as $EtNO_3$, $EtBr$, EtI and $CHCl_3$ act similarly to H_2O in promoting an increased speed of flame and in reducing the emission of radiant energy. CCl_4 and NO_2 have an opposite effect. The persistence of ionization after the passage of flame is discussed and an explanation alternative to "after burning" is suggested, in which the retarded neutralization is assumed to be connected with the emission of "residual" infra-red radiation. H. STOERTZ

Impacts of the second kind, excitation and reunion in the glow discharge. RUDOLF FRERICHs. *Ann. Physik* 85, 362-79(1928).—Mixts. of a noble gas (A, Ne) with a small quantity of metal vapor (Al, Mg, Zn, Cd, Cu) were studied in a glow discharge between tube electrodes. The noble gas is primarily excited and transfers the energy of excitation of its first (metastable) excitation stage quant. to the metal by collisions of the second kind, the metal being excited to a definite stage. In the cathode glow

the energy is transferred mostly to ions. In the positive, column, the transfer is mainly to atoms. •In a side tube outside of the discharge proper, the energy transfer is only to normal atoms or eventually to excited metastable atoms. J. E. SNYDER

Recombination of ions and electrons. J. FRANCK. *Z. Physik* **47**, 509-16; *J. Franklin Inst.* **205**, 473-9(1928).—The hypothesis is made that during an ionization process it is possible that an electron can be recovered by an ion before it has had time enough to escape the influence sphere of the atom. Such a recombination makes it possible to explain the excitation function in the range of high electronic speed. An attempt is made to explain the observation made by Langmuir of a Maxwellian velocity distribution of cathodic rays in highly ionized gases on the assumption of ternary impacts occurring between positive ions, primary and secondary electrons.

A. I. HENNE
The photo-effect in salts exposed to light. N. GUDRIS AND I. KULIKOVA. *Z. Physik* **45**, 801-7(1927).—Halogen salts were exposed to light from various metal sparks. The limit of the wave lengths effective for the photo-effect was detd. for NaCl, NaBr, KCl, KBr, KI and RbI. It is established that former exposure displaces the effective wave length, the displacement being different for different salts. A series of observations was carried out on NaCl exposed to γ - and Rontgen rays. Naturally and electrically colored NaCl was also studied. MARIE FARNSWORTH

Detection of protons in metals. ALFRED COEHN. *Naturwissenschaften* **16**, 183-4(1928).—A Pd wire 6 cm. long was charged in a center loop with H_2 by electrolysis; several V-shaped bends dipping in 0.1 N H_2SO_4 at regular distances from the center could be used to measure the local (oxygen) potential of the wire against a normal electrode by quadrant electrometer. The H_2 absorbed in the center will diffuse through the wire towards both ends; however, on applying a potential such as to give a one-amp. d. c. current through the length of the wire (0.015 v./cm. potential drop) it was found that the H_2 reached the V bends on the cathodic side earlier than those on the upstream side of the center. Between corresponding places on both sides of the center the p. d. after 55 to 60 hrs. was 0.1 to 0.15 v., decreasing again subsequently in consequence of continued diffusion. Without d. c. applied no such differences were found. It is, therefore, shown that at least part of the H_2 is present in the Pd as H^+ ions. B. J. C. v. d. H.

The action of positive ions in an independent gas discharge. F. M. PENNING. *Physica* **8**, 13-23(1928).—The expts. recently described (*C. A.* **22**, 1097) were continued. By including a few more retarding and filtering elements in the low-pressure side of the discharge tube the ion speed (Ne ions) was cut down to 10 v. Even at that speed the no. of electrons (α) liberated from the Ag or Fe target by 100 striking ions was found to be more than 3. For 30 v. speed it was 3.5. In a different type of discharge tube with magnetic field to direct the electron stream α was found to be larger than 4 for ion speed smaller than 7 v. It is most probable that a value of α of the same magnitude holds for zero speed. B. J. C. VAN DER HOEVEN

The saturation of a photoelectric primary current in crystals. WERNER FLECHSIG. *Z. Physik* **46**, 788-97(1928).—A study has been made of crystals having a low optical refraction, i. e., rock salt. The satn. tension depends on the thickness of the crystal, Ohm's law being approached with increase in thickness. The satl. photoelec. primary current is obtained when all the light from freed electrons reaches the electrode. For rock salt, satisfactory results for the satd. current can result only with crystals about 0.1 mm. thick.

R. H. LAMBERT
A further investigation of synthetic galena detector and a new theory of crystal rectifiers. W. OGAWA, T. NEMOTO AND S. KANEKO. *Researches Electrotech. Lab., Tokyo*, No. 196, 77 pp.(1927); (in English); cf. *C. A.* **21**, 1928.—By a metallographic investigation, the activating effect of Ag in synthetic galena crystals is fully explained. A new theory is proposed from the following results. (1) Argentiferous synthetic galena shows a better sensitivity with a needle of an electropositive metal than with a noble metal, while in zincite the case is quite contrary. (2) I. c. characteristic curves were plotted for galenas of various Ag contents, with various metallic needles and of different contact pressures. From these curves, it was manifested that an improvement of sensitivity does not necessarily depend upon an increase of current in the direction of rectified current but a decrease of current in the opposite direction may bring the same result. With regard to synthetic galenas, an improvement of sensitivity by a different metallic needle may be ascribed to an increase of current in the rectifying direction but those by variations of Ag content in galenas and of contact pressure must be attributed to the decrease of current in the opposite direction, the abs. value of current in the rectifying direction also being decreased. (3) With argentiferous synthetic galena, a sharper needle point gives a better sensitivity, but with zincite

it is not necessarily so. (4) The crystals in common use as detectors may be arranged in a series of a definite order relating to the direction of the rectified current as in the Voltaic series, argentiferous synthetic galena and zincite being the both extremities. (5) A remarkable rectification by a couple composed of two broken pieces cut from one and the same galena crystal was observed, the direction of the rectified current always being from a flat surface to a sharp point. Also specific resistance and thermoelec. power of synthetic galenas were detd. and many numerical data are given.

W. OGAWA

The general theory of magnetic properties of matter. B. CABRERA. *Anales soc. españ. fis. quim.* 26, 50-66(1928).—In a previous article (*Anales soc. españ. fis. quim.* 24, 293) there was given a theory of paramagnetism assuming that the magnetic axis of the atom can take different orientations at the instant of reorganization following shock. It also tacitly assumed that the time during which the disturbances produced by the shock develop is infinitely small in relation to the av. life of each state of the atom. The value of E_1 is large, and the agreement of theory with exptl. results for the Fe and rare earth groups shows that this condition is brought about in these cases. For the Pd and Pt groups the value of E_1 is certainly very small and the thermic variation of X does not follow the Curie-Weiss law. For these substances the no. of atoms taking part in the appreciable magnetization is only a fraction of the no. which could be drawn from the mass. If account is taken of the fact that the probability of a fluctuation of energy comprised between ϵ_1 and $\epsilon_1 + d\epsilon$ for an element of infinitely small vol. is given by $e^{-(E+d)/kT}$, we immediately have $N_1 = N(1 - e^{-(E_1/kT)})$, which adds to the Curie-Weiss law the temp. function in parenthesis. Orientation of the magnetic axes of atoms is not the general effect which the magnetic field produces. There is also an elastic deformation of the electron system, appreciable in the case where X is small, which can be divided into (a) a variation of velocity of electrons in their orbits, which is the interpretation of diamagnetism and (b) a change of orientation of the magnetic axes of orbits without variation in velocity of electrons, which produces a paramagnetic effect. Both parts of the deformation are independent of T , detg. X in const. terms, positive or negative, depending upon whether a or b is the predominating effect. The second is empirically the most general, but it could be expected that the first is produced with electrons which take part in chem. linkages whose orbits should be more sensitive to external effects.

E. M. SYMMES

Soft x-ray emission and absorption spectra with tangential grating. JEAN THIBAUD. *Nature* 121, 321-2(1928).—Recent work of T. on the photography of soft x-ray emission spectra with a glass grating used at a grazing angle is summarized. A continuous spectrum lying between 15 and 250 A. U. has now been obtained, an x-ray tube run with an electronic current of 100 milliamp. being used as a source. The K absorption edges of O, N and C are recorded on this background, arising from traces of these elements in the vacuum spectrograph. The edges are without structure, and have the following wave lengths: C 43.5 A. U., N₂ 31.1, O₂ 23.5. These agree with previous results by the ionization method. The reproductions given of these spectra are the first examples of photographic records of absorption in this spectral region.

F. A. JENKINS

X-ray spectra of long wave length. T. H. OSGOOD. *Phys. Rev.* 30, 567-73(1927).—The paper describes a photographic method of obtaining x-ray spectra of long wave length, based on the exptl. fact that x-rays are totally reflected from a mirror (or grating) provided the angle of incidence is sufficiently large. Details are given of a *vacuum spectrograph* employing an x-ray tube as a source of radiation in conjunction with a two-meter concave grating. About 15 lines have been measured between 40 and 200 A. U. As it has not been possible to obtain a pure spectrum of any one element, the interpretation of these lines is a matter of considerable uncertainty. Nearly half of them appear to be due to Sr and Ba deposited on the anticathode from the oxide-coated filament of the x-ray tube. The method is applicable to all wave lengths greater than about 20 A. U.

BERNARD LEWIS

Dispersion and scattering of x-rays. H. KALLMANN AND H. MARK. *Ann. Physik* 82, 585-604(1927); *Science Abstracts* 30A, 636-7.—On the assumption of a continuous succession of resonances in the region of the x-ray absorption spectrum a calcn. is made of the elec. moment of an atom-electron under the influence of incident radiation, making use of the theoretical quantum dispersion law. The const. of the absorption law found empirically is now shown to agree with the theoretical deductions. A formula for the scattering of x-rays in gases, amorphous substances and crystals is discussed. The anomalous dispersion of crystals in the neighborhood of the crit. region is calcd. and shown to be in qual. agreement with experience.

H. G.

Absorption of x-rays from $\lambda = 0.08$ to 4.0 A. U. S. J. M. ALLEN. *Phys. Rev.* **28**, 907-22(1926); *Science Abstracts* **30A**, 575.—The mass-absorption coeffs. of a no. of elements from C to U for homogeneous x-rays ($\lambda = 0.709$ to 1.933 A. U.) have been measured. Combined with previous observations by A. (cf. *C. A.* **20**, 1942), the present results give a series of absorption coeffs. from $\lambda = 0.08$ to $\lambda = 4$ A. U. Over the complete range of wave lengths the absorption coeff. of Al appears to be accurately represented by the formula $\mu/\rho = (13.9 \text{ or } 14.0)\lambda^{2.92} + (0.14 \text{ to } 0.18)$. It is considered that the N^4/A law is only approx., a more accurate expression being $\tau/\rho = C\lambda^3 N^4/A$, in which C is a const. The effect of impurities in various absorbing elements has been ascertained. H. G.

Molecular spectrum of hydrogen. H. KONEN AND FINKELNBURG. *Naturwissenschaften* **16**, 184(1928).—Measurements of the mol. H_2 spectrum with a dispersion of 2 A. U. per mm. are announced. B. J. C. VAN DER HOEVEN

The origin of the nebulae lines. W. GROTRIAN. *Naturwissenschaften* **16**, 177-82, 193-7(1928).—A review, discussing mainly Fowler's and Bowen's work.

B. J. C. VAN DER HOEVEN
Diffraction of deBroglie waves by a crystal lattice. E. E. WITMER AND L. ROSENFELD. *Naturwissenschaften* **16**, 149(1928).—On the basis of energy and impulse rules it has been deduced that for photoelectrons liberated inside a crystal lattice diffractive phenomena are to be expected completely analogous to those found for electron waves by Davisson and Gerner (*C. A.* **22**, 350). It is proposed to irradiate a metallic monocrystal by soft x rays (300 A. U.) and to det. the directions of the photoelectrons.

B. J. C. VAN DER HOEVEN
The hydrogen molecule. O. W. RICHARDSON. *Nature* **121**, 320(1928).—The supposed identification of the 2^3P level of the visible H_2 bands with the "C" level of the far ultra violet bands is incorrect. That the 2^1S level is the same as the "B" level is fairly certain. However, R. finds that the $2^1S - m^1P$ bands may appear in emission without a trace of the $1^1S - B$ ultra-violet bands. The non-occurrence of the transition $B \rightarrow 1^1S$ indicates that H_2 mols. in the B state tend to give up their energy by dissoeg. other H_2 mols. with which they collide. The new value, 14, suggested by Birge for the mol. const. B_0 in the 2^1S state gives satisfactory agreement. The spectroscopic results on H_2 are now in essential accord with the calculus of the new mechanics and with the theory of sp. heats. Many important lines in the secondary spectrum are still unexplained. F. A. JENKINS

The alkaline earth halide spectra and their origin. O. H. WALTERS AND S. BARRATT. *Proc. Roy. Soc. (London)* **A118**, 120-37(1928).—The absorption spectra of alk. earth halide vapors were observed in the visible and ultra-violet. The conditions under which the bands can be excited prove that they originate from mols. contg. both alk. earth and halogen atoms. The point upon which no exptl. evidence had previously borne is whether these mols. are those of normal halides such as $CaCl_2$, or of a subhalide such as $CaCl$, or possibly Ca_2Cl_2 . The present observations eliminate 2 of these possibilities and show that the bands have their origin in subhalide mols. of the type MX , where M stands for an alk. earth and X for a halogen atom. Such mols. exist in a vapor state at 1000° in equil. with the metal and the normal salts. Approx. wave lengths of the bands ascribed to CaF , $CaCl$, $CaBr$, CaI , SrF , $SrCl$, $SrBr$, SrI , BaF , $BaCl$, $BaBr$, BaI , MgF , $MgCl$, $MgBr$ and MgI are tabulated. A band of CaF at 5292 A. U., when examd. in emission with larger dispersion, exhibited fine structure which appeared in absorption only at reduced pressures. W. F. MEGGERS

Applications of spectroscopy to molecular problems. W. E. CURTIS. *Proc. Univ. Durham Phil. Soc.* **7**, 165-7(1927).—C. discusses briefly the main features of band spectra and their relation to mol. structure. R. L. HERSHEY

Intensities in the hydrogen spectral series. F. G. SLACK. *Phys. Rev.* **31**, 527-32 (1928).—The abs. intensities of the components of the most important lines of the first 6 series in the spectrum of the H atom as computed on the basis of wave mechanics are tabulated. The components are summed to give the total line intensities per atom in the initial state. The probability coeffs. for the components and lines are also tabulated. The results of comparison between expt. and theory are briefly discussed and an expt. for giving values more directly comparable with the calcd. values is suggested. BERNARD LEWIS

Certain multiplets in the spectra of Cb III and Cb IV. R. C. GIBBS AND H. E. WHITE. *Phys. Rev.* **31**, 520-6(1928).—By applying the irregular-doublet law to the data already known for the triad of multiplets 3DF , $^3DD'$ and 3DP , ($ds-dp$) in the two electron systems of Sr I and Yt II, and the corresponding multiplets for Zr III and Cb IV have been identified. Similarly the triads of multiplets $^3F'D'$, $^3F'F$ and $^3F'G'$

(d^2S-d^2p) in the three-electron system of Yt I and Zr II have been extended to Cb III and the stronger lines of 'F'G' multiplet of Mo IV. In passing successively from element to element in both of these iso-electronic systems, the shift in the frequency of the radiated lines for each of these multiplets is approx. const. BERNARD LEWIS

Series spectra of potassium and calcium. I. S. BOWEN. *Phys. Rev.* **31**, 497-502 (1928).—Several of the strongest extreme ultra-violet lines in the K_{III} , K_{IV} , Ca_{IV} and Ca_V spectra are given their series designation. In K_{II} several lines are identified in addn. to those found by de Bruin (*C. A.* **21**, 857). The abs. values of the terms of K_{II} are detd., thus fixing the ionization potential at 31.7 v. 137 lines are classified in Ca_{III} and the term values of the levels involved are calcd. These correspond to an ionization potential of 51 v. BERNARD LEWIS

A new type of secondary radiation. C. V. RAMAN AND K. S. KRISHNAN. *Nature* **121**, 501-2 (1928).—Expts. on the scattering of visible light when an intense beam is passed through a pure dust-free liquid or vapor show that the scattered light of the original wave length is accompanied by a small quantity of scattered light of lower frequency. The existence of the modified radiation was detected by a method using complementary color-filters, and also spectroscopically. About 60 liquids and a few vapors (ether, amylene) show the effect to a greater or less degree. Since the modified light is extremely faint, and is polarized almost as much as the ordinary scattered light, R. and K. doubt if it can be explained as fluorescence. They interpret the phenomenon as similar to the Compton effect. F. A. JENKINS

Examples of the Zeeman effect at intermediate strengths of magnetic field. K. DARWIN. *Proc. Roy. Soc. (London)* **A118**, 264-85 (1928).—Until recently the frequencies and intensities of the lines in the standard Zeeman effect could be calcd. only for strong or weak magnetic fields. New formulas by C. G. Darwin (*Proc. Roy. Soc. (London)* **A115**, 1 (1927)) permit the calcn. at any intermediate field, they are now applied to 3 cases, $s-p$ and $p-d$ doublets and $s-p$ triplets. W. F. MEGGERS

The analysis of the absorption spectrum of cobalt chloride in concentrated hydrochloric acid. W. R. BRODE. *Proc. Roy. Soc. (London)* **A118**, 286-95 (1928).—The absorption spectrum of $CoCl_2$ in concd. HCl as a solvent was detd. between the wave length limits 7500 Å. U. and 4400 Å. U. The principal absorption band consists of at least 7 component bands; a const. frequency difference (12.28 fresnels) exists between adjacent bands; the frequencies of the component bands are integral multiples (35 to 41) of this const. frequency difference; and the intensities of the odd-numbered bands are greater than those of the next higher even-numbered band. W. F. MEGGERS

Absorption spectra of formaldehyde in solution. S. A. SCHOU. *Compt. rend.* **186**, 690-2 (1928).—A soln. of monomol. CH_2O is produced in hexane cooled to -70° and absorption spectrograms are made of the soln. in a quartz tube of variable thickness. The spectrum consists of a series of at least 17 bands, each 10 to 40 Å. U. wide, distributed between 3542 and 2750 Å. U., the max. being at 2935.0 Å. U. W. F. M. M.

The infra-red absorption spectra of acetylene, ethylene and ethane. AARON LEVIN AND C. F. MEYER. *J. Optical Soc. Am.* **16**, 137-64 (1928).—The spectra of C_2H_2 , C_2H_4 and C_2H_6 in the region between 2μ and 15μ are investigated with echelette gratings and vacuum thermocouple. Each gas shows a more or less characteristic type of structure for its vibrational-rotational bands. The 3 main absorption regions of acetylene, 13.7μ , 7.5μ and 3.0μ , are resolved into individual lines which are alternately intense and faint. The mol. moment of inertia, $I = 2.4 \times 10^{-39}$ g.-sq. cm., is computed from the spacing of the fine structure; this value is in good agreement with that derived from the classical theory on the assumption of a linear mol. model. For C_2H_4 , 7 regions of absorption are investigated but only 2 of these have been resolved into individual lines. Three principal regions of absorption in C_2H_6 reveal bands, each consisting of a single succession of absorption max. but the spacing of these max. is different for each of the bands. W. F. MEGGERS

The near infra-red absorption bands of some hydrocarbons. JAMES BARNES AND W. H. FULWEILER. *J. Am. Chem. Soc.* **50**, 1033-5 (1928).—The near infra-red absorption spectra of liquid pentane, decane and tetradecane were photographed with grating and prism spectrographs (cf. *C. A.* **22**, 730); each consisted of a doublet and a singlet series of bands. The frequencies of the doublet series of the paraffins were lower than the frequencies of the corresponding series of the benzenes. The frequency difference for the paraffin doublet band at 0.92μ was 7×10^{12} sec. $^{-1}$, while for the band at 0.75μ it was 8×10^{12} sec. $^{-1}$. The 0.874μ band of benzene and the 0.877μ band of toluene were also found to be close doublets with a frequency difference of 3×10^{12} sec. $^{-1}$. W. F. MEGGERS

Residual rays from mixed crystals. F. KRÜGER, O. REINKOBER AND R. KOCH-

HOLM. *Ann. Physik* **85**, 110-28(1928).—The residual rays of mixed crystals of NaCl + KCl, KCl + RbCl and KCl + TlCl, detd. by the reflection method, with the use of the micro-radiometer and wire grating, show only one max., lying between those of the pure components. The position of the max. is displaced between the frequencies of the pure components linearly with the concn. The reflecting surfaces were prepd. by subjecting the finely powdered material from a fusion to a pressure of 8000 to 10,000 atms., and polishing the resulting plates, a treatment without effect on the max. of the pure substances. Mechanical mixts. subjected to the same pressure treatment showed the max. of the components, and as a mixed crystal aged, decompn. was shown by the gradual appearance of the characteristic frequencies of the components. W. WEST

Spectrographic study of cyanamide. Ultra-violet absorption spectra of cyanamide, dipropylcyanamide and dipropylcarbodiimide. A. FRANSSEN. *Bull. soc. chim.* **43**, 177-93(1928); cf. *C. A.* **11**, 2461; **21**, 1407.—Dipropylcyanamide (I) in C_6H_6 and in Et_2O shows no absorption band in the ultra-violet. Dipropylcarbodiimide (II) in Et_2O shows an absorption band with a max. at $\lambda = 2599$ and $\nu = 1154.11^{12}$. ϵ , the mol absorption coeff., is 14.73. A specially prepd. soln. of cyanamide (III) in Et_2O gave an absorption band with a max. at $\lambda = 1180.10^{12}$. The value of ϵ was 62. The absorption curves of III in Et_2O and $EtOH$ show discontinuities which indicate changes in the structure of III with variations in the concn. of the solns. These changes cannot be interpreted as due to progressive polymerization of III, since solns. of III in Et_2O were kept for several weeks without any pptn. of dicyanodiamide. Evidently in solns. of III in the neutral org. solvents used by F. there is an equil. between the two forms $N \equiv CNH_2$ and $HN=C=NH$. This equil. varies with the concn. of the solns., the proportion of the $HN=C=NH$ form increasing with the dilm. L. K.

The characteristic infra-red frequencies of binary oxides (BeO , MgO , CaO , ZnO). STYLLÉ TOLKSDORF. *Z. physik. Chem.* **132**, 161-84(1928).—A method is developed for studying the infra-red absorption of powders in thin layers. Transmission spectra of BeO , MgO , CaO and ZnO were studied. MgO showed a fundamental frequency corresponding to 14.2μ and overtones at two and four times this frequency were observed. CaO showed a fundamental frequency corresponding to 22.05μ and the first overtone only was observed. BeO and ZnO (hexagonal structure) showed by over- and combination tones that three fundamental frequencies exist. The optically detd. values of $h\nu/k$ (h = Planck's const., ν = fundamental frequency, k = Boltzmann's const.) are in agreement with values calcd. from data on m. p., compressibility and sp. heats. Reflection measurements were less satisfactory but showed only fundamental frequencies without overtones.

Color change in crystals at low temperature. I. OBREIMOV AND W. J. DE HAAS. *Verslag Akad. Wetenschappen Amsterdam* **37**, 31-4(1928).— $K_2Cr_2O_7$, I and azobenzene crystals placed in a quartz container were cooled to $20^\circ K$. I becomes red, the two others yellow. Their absorption spectra were photographed. At low temp. very sharp lines appear, these were measured and recorded. W. ALBERT NOYES, JR.

The relative intensities of the D-lines. W. LOCHTE-HOLTGREVEN. *Z. Physik* **47**, 362-78(1928).—By Wood's method of stimulating fluorescence in Na vapor by only one of the D-lines, the increase in intensity of the other component in the resonance spectrum under the action of impacts with mols. of a foreign gas is quantitatively detd. A new form of Na arc lamp is used as the primary source. With addns. of A or Ne + He, the theoretical intensity ratio ($I_D/I_1 = 2$) is reached at a pressure of 8-12 mm. With N_2 and H_2 , which have a strong quenching effect on the fluorescence, the theoretical ratio is not reached. The curve for the quenching of the secondary resonance radiation by A is measured. This makes it possible to distinguish between impacts which cause a transition to the normal state without radiation and those which put the atom in the neighboring P level, and to compare the relative frequency of their occurrence under the conditions used. Impacts with Na or K atoms are about 200 times as efficient in causing the transition between the components of the 2P level as are impacts with noble gas atoms.

Spectrum of ionized sodium. K. MAJUMDAR. *Nature* **121**, 423(1928).—The irregular doublet law is used to identify several of the terms in the Na II spectrum. Those found belong to singlet and triplet systems, and have a spacing roughly double that of the corresponding Ne terms. The ionization potential of Na^+ is estd. as 47 v., and a radiation potential as 32.8 v. These agree with Mohler's values from crit. potential measurements. F. A. JENKINS

The nebular spectrum. J. C. McLENNAN AND RICHARD RUEDY. *Nature* **121**, 319(1928).—The importance of temp. conditions in nebulae for the appearance of the forbidden nebular lines $\lambda\lambda 5007, 4959$ of O^{++} in the spectra is emphasized. The

fact that these lines are stronger in planetary than in diffuse nebulae is taken as indicating that the O is present in the form of a mol. or mol. ion, and not as the at. ion. The emission of the forbidden lines then takes place in the act of dissociation of the mol. This indicates that there is also the possibility of the absorption of these lines.

F. A. JENKINS

Nebulium and hydrogen in new stars. B. P. GERASIMOVICH. *Nature* 121, 422 (1928).—The calcs. of Pike (C. A. 22, 1532), based on Saha's equation and on the coexistence of H and O^{++} in new stars required by spectroscopic evidence, gave a density of the order of 10^{-7} g./cc. This is much too high to account for the forbidden transitions which take place in O^{++} ions, and G. explains the result as due to the inapplicability of Saha's formula to a system not in thermodynamic equil. A more general ionization formula gives a density of the order of 10^{-17} g./cc., in approx. agreement with the conclusions of Elvey (*Nature* 121, 12(1928)).

F. A. JENKINS

The origin of the nebulium spectrum. MEGHNAD SAHA. *Nature* 121, 418(1928).—The lower spectroscopic terms of C, Si, Ge and Pb are due to electron configurations similar to those which give the terms of the O^{III} spectrum. Bowen (C. A. 22, 23) concluded that certain nebular lines represent forbidden transitions in the O^{++} ion and S. finds that lines resulting from similar transitions in Pb occur in the spectrum of the heavy Pb arc. Under the same conditions the corresponding lines of C, Si and Ge should appear. The violation of the selection rule $\Delta k = \pm 1$ appears in this case to be due to strong elec. fields. Such fields are probably present in nebulae and Wolf-Rayet stars, on account of the high state of ionization, and may explain the occurrence of forbidden transitions in the spectra of these bodies.

F. A. JENKINS

Ultra-violet radiation in industry. A. A. KING. *Chemistry and Industry* 47, 301-5 (1928).—Impurities to the extent of less than 0.0001% affect the ultra-violet absorption spectra of CCl_4 . A very small amt. of org. matter on the quartz arc-tube will greatly reduce the efficiency of the lamp. To obtain max. penetration, the substance to be irradiated should be a moving film free of dust and spray. A revolving plate-glass table in which the substance is fed at the center of overflow at the periphery is the best app. In making the *Gutzeit test for As*, stains which are invisible to the naked eye become strikingly visible under ultra-violet radiation, and the technic of making this test is described in detail.

T. S. CARSWELL

The rotational distortion of multiplet electronic states in band spectra. E. C. KEMBLE. *Phys. Rev.* 30, 387-99(1927).—Hund's (cf. C. A. 20, 2283) theoretical interpretation of the contracting multiplet type of band spectra for diatomic mols. is thrown into quantum form for the doublet case and also for the extreme components of higher multiplicities. The discussion is based on the conventional Bohr theory. The theory is applied to the ultra-violet doublet OH bands and is shown to be in approx. agreement with the data. These bands are interpreted as of the $^3S \rightarrow ^3P$ type with the 3P doublet inverted.

BERNARD LEWIS

Analysis of a rectilinear vibration of ultra-violet light. G. BRUHAT and M. PAUTHENIER. *Rev. d'optique* 6, 163-84(1927); *Science Abstracts* 30A, 689-90.—Light from a Hg arc passes through a special form of double spectroscop to get the max. purity in the radiation. All optical parts are of quartz or fluorspar. A parallel beam of light traverses an analyzer and a polarizer with the substances to be tested placed between them. Finally the light is focused on a photographic plate. Special precautions are taken to eliminate stray radiations. A series of records is obtained on the photographic plate for successive positions of the analyzer equally spaced on either side of the central position. The results are examd. with a Fabry-Buisson microphotometer, and the direction of vibration of the light tested is found with great accuracy. By an elec. arrangement the successive exposures are made automatically. Many possible sources of error are examd. and the means employed to eliminate them explained. An accuracy up to a few seconds in angle is possible. Where the polarimeter vessel is closed at its ends by quartz plates of the same thickness, it is necessary to pay special attention to parallelism, good optical definition of the surfaces and the mean ray perpendicular to the surfaces. It is best to work at a little below the normal exposure of the photographic plate, towards the region of under-exposure.

H. G.

Proposed experiment on resonance radiation and derivation of the formula for the Doppler shift of scattered or of resonance radiation. A. E. RUARK. *Phil. Mag.* [7], 3, 1051-6(1927); *Science Abstracts* 30A, 693.—When light of wave length 2536 \AA . U. from a Hg resonance lamp is allowed to fall on a bulb containing Hg vapor heated above 275° , the effects observed depend to a marked degree on the density of the Hg vapor (cf. C. A. 17, 493). It is suggested that our knowledge of resonance and scattering will be increased by studying the space distribution of the light sent out by the Hg vapor.

Different vapor pressures should be used and the incident beam polarized in various planes, as well as unpolarized. Further, the polarization of the emitted light should be studied in the neighborhood of the regularly reflected beam. Schrödinger's formula for the Doppler shift of the radiation from a moving atom is extended to obtain a formula for the shift in scattered radiation. H. G.

Continuous spectra in hydrogen. G. HERZBERG. *Physik Z.* **8**, 727-8(1927).—The continuous limit of the Balmer series, hitherto observed in emission only in solar prominences etc., has been produced in the lab. with the aid of the electrodeless ring discharge. The continuous spectrum observed by Stark with canal rays is not the continuous limit in question. The work of Oldenburg (*C. A.* **21**, 1226) on the ordinary H continuum and the many-lined spectrum is in general confirmed. Various hypotheses for the origin of the continuum have been suggested (cf. Schüler and Wolf, *C. A.* **20**, 2285; Blackett and Franck, *C. A.* **20**, 1027), but these are regarded as erroneous. The emission of the continuous spectrum is in some way connected with the decompn. of the H_2^+ ion, possibly as follows, $H_2^+ + H_2 = H_3^+ + H$ (Dorsch and Kallmann, *C. A.* **21**, 3823). B. C. A.

Radiation and absorption on Schrödinger's theory. J. C. SLATER. *Proc. Nat. Acad. Sci.* **13**, 7-12(1927); *Science Abstracts* **30A**, 488.—Radiation and absorption of light by atoms are treated analytically by replacing the atoms by a set of oscillators, as previously described (cf. *C. A.* **19**, 1985). The analysis is developed on the lines Schrödinger's wave mechanics (*Ann. Physik* **81**, 109-39(1926)). H. G.

The influence of an electric field on the absorption spectrum of rubidium. A. ARSENYEVA. *Z. Physik* **45**, 851(1927).—An elec. field causes a spreading and flattening of the reflection and absorption maxima. The change of the absorption lines 667 μ and 691 693 μ is directly visible on the photographic plate. Further study is planned. MARIE FARNSWORTH

Absorption and scattering of mercury vapor for the line 2536. J. Z. ZIHLINSKI. *Phys. Rev.* **31**, 539-68(1928).—A beam from a Hg arc is passed through a vessel filled with Hg vapor at 16.2° and excites in it resonance radiation of wave length λ 2536. The absorption coeff. is 1 cm⁻¹ and is not changed measurably by the admission of air up to 4-mm. pressure, although resonance radiation is strongly quenched by the air. In vacuum the scattering coeff. is equal to the absorption coeff. within the limits of exptl. error. This proves the assumption first made by Wood that in vacuum there is no true absorption but that the whole loss of energy is due to scattering. For higher pressures the scattering coeff. diminishes. BERNARD LEWIS

The shape and intensities of infra-red absorption lines. D. M. DENNISON. *Phys. Rev.* **31**, 503-19(1928).—An expression for the shape of an infra-red absorption line is developed on the basis that the principal factor in the broadening of a line is the limitation of the length of a wave train a mol. may absorb due to its perturbation by thermal collisions. In applying this result to the analysis of observed infra-red spectra allowance must be made for the low spectrometer resolution due largely to the wide slits employed. Two expressions are developed holding for all but very weak lines, which relate the area under the absorption lines *Abs.*, the min. value of the transmission T_{min} and the true intensity α with the slit width a , the cell length l and the mol. const. $Abs. = [5.412\alpha a\sigma^2]^{1/2}/[\pi h m]^{1/4}$, $Abs. = -2.42 a \log_{10} T_{min}$. It is shown that these formulas are capable of interpreting the absorption line of the infra-red spectrum of HCl observed by Paton (*Phys. Rev.* **15**, 541(1920)) and yield a value of 10.8×10^{-8} cm. for σ . The meaning of σ , the distance to which 2 mols. may approach without altering each others phases, is discussed and a correction to the absorption area formula for faint lines is deduced. In connection with a consideration of the absorption measurements of HCl by Kemble and Bourgin (cf. *C. A.* **20**, 2790), a computation of the effective moving charge of the mol. yields a value $e = (0.199) 4.77 \times 10^{-10}$ E.S.U. BERNARD LEWIS

The atomic spectral lines associated with the band fluorescence of alkali metals. J. C. MCLENNAN AND RICHARD RUEDY. *Nature* **121**, 500-1(1928).—The fluorescence of Na vapor upon illumination with the blue-green part of the solar spectrum shows the at. D-lines as well as the blue-green band system. Since the incident radiation does not contain the wave lengths 589 and 330 μ , it cannot excite the at. lines directly. Their occurrence must be due to optical dissocn. of the excited mols. The abnormal width of the D-lines under these conditions is due to the Doppler effect, since the mols. dissocd. by a quantum having an energy greater than the sum of the dissocn. energy and the at. resonance potential may possess considerable translational energy. F. A. JENKINS

The structure of the band spectra of helium. IV. W. E. CURTIS. *Proc. Roy.*

Soc. (London) A118, 157-69(1928).—Details are given of 3 new bands which have the same final electronic state ($2P$) as the 3 which were first investigated (*C. A.* 16, 2077; 17, 2535; 19, 2912), their relationships and interpretation are discussed in terms of vibrational transitions and electronic levels. The rotational terms have been accurately evaluated for all 6 bands. New evidence is presented which favors the view that the He and H_2 mols. are structurally similar. W. F. MEGGERS

The distribution of intensity in the band spectrum of helium: the band at $\lambda 4650$. W. H. J. CHILDS. *Proc. Roy. Soc. (London) A118*, 296-317(1928).—Preliminary measurements of the intensity distribution in the first of the main series of He bands at 4650 A. U. are made by photographic photometry. The predicted distribution is of the correct type, but agreement with observation is by no means complete. Notably the P and R' branches are much stronger, relative to the Q branch, than the theory indicates. W. F. MEGGERS

The arc spectrum of carbon. A. FOWLER AND E. W. H. SELWYN. *Proc. Roy. Soc. (London) A118*, 34-51(1928).—In the region extending from the red to 2000 A. U. in the ultra-violet the ordinary C arc shows only a single line, 2478 A. U. However, other lines attributable to C have been observed in spectra of vacuum tubes contg. a mixt. of C compds. and He, and many of these appear with great intensity at the negative pole in high-current arcs between C electrodes. Nearly 100 lines ranging in wave length from 1260 A. U. to 10,119 A. U. are thus ascribed to the C I spectrum and about half of these are now classified as combinations between terms belonging to a singlet system or to a triplet system. The deepest term is a triplet P_0 , the value of which is estd. at 91,017, corresponding to an ionization potential of 11.2 v. Comparisons are made with the spectra of N^+ and O^{+1} , the atoms of which are similarly constituted, but differ in nuclear charge. W. F. MEGGERS

The shifting of residual rays into the visible spectral region. GEORG JOOS. *Physik. Z.* 29, 117-8(1928).—A certain analogy of ordinary band spectra and the absorption and emission spectra of crystals which at low temps. give lines of considerable sharpness is pointed out. In the band spectra of mols the elementary change in energy may consist of 3 parts, rotational, vibrational and electronic. Whereas the rotational bands are usually outside of the observable range some information concerning them may be deduced from the other bands. Similarly the grating vibrations of crystals give rise to the so-called residual rays which fall in about the same region in the far infra-red as the rotational bands, but if an electron jump is superposed upon the residual rays, the radiation phenomena are displaced to a more accessible region. Thus, the absorption spectrum of Cr K selenate and of homologous Cr double salts of alum type have been photographed and a line series up to 11 members with almost const. sepn. of 43 cm^{-1} has been found. Interpreting this line series as the superposition of grating vibrations upon an electron, and perhaps also a mol. vibration, one arrives at a wave length of $1/\lambda_0$ cm. or 232μ for the residual rays. W. F. MEGGERS

Excitation of gases to luminescence by α -rays. H. GREINACHER. *Z. Physik* 47, 344-56(1928).—The intensity of the light produced by the passage of α -rays through air, CO_2 , O_2 and H_2 is unaffected when an elec. field is applied so as to prevent recombination of the ions; the spectra, therefore, cannot be emitted in recombination, but must be due to primary excitation by the α particles or to a reaction luminescence. In H_2 , the band spectrum at 120 to 100μ , or the continuous spectrum from 330 to 195μ is probably produced. W. WEST

The after-glow of nitrogen and oxygen and the influence of walls thereupon. GERHARD HERZBERG. *Z. Physik* 46, 878-95(1928).—A study was made of the ring discharge effect in mixts. of O and N at various pressures. Especially the after-glow of N and to some extent that of O can be removed, unless some of the other gas be present, if the quartz tube used be thoroughly baked out before the expt. is started. The walls of the tube have a distinct catalytic effect, producing atomic H, which merely purifies N by attacking O. The after-glow of both N and O can again be obtained if once removed by introducing traces of H. Fluorescence and phosphorescence of quartz and glass are believed to be combined in this phenomenon. R. H. L.

Anomalous dispersion in the phosphorescence of alkali halides. M. A. BREDIG. *Z. Physik* 46, 899(1928); cf. *C. A.* 22, 731.—A correction; four light quanta instead of one are stored up for each quadrivalent Bi atom. R. H. LAMBERT

Fluorescence of mercury vapor. R. W. WOOD AND V. VOSS. *Nature* 121, 418-9 (1928).—Previous expts. by W. indicated that Hg vapor fluoresces in the light of the Al spark only when distg. New expts. show that the effect depends on the removal of traces of impurity by the stream of distg. vapor. A bulb which does not fluoresce because of small quantities of water vapor will do so after treatment with a high-fre-

quency electrodeless discharge All the brighter arc lines are present in the fluorescence, and their intensity increases with the square of that of the exciting light, showing that they result from a two-stage absorption. Superheating the vapor greatly enhances the intensity of the arc lines and of the ultra-violet band, but destroys the blue-green band fluorescence.

F. A. JENKINS

The origin of luminescence effects of phosphorus. A. PETRIKALN. *Naturwissenschaften* 16, 205(1928).—Excitation of P_2O_3 vapor by different means showed a band spectrum identical in all details with the one occurring during oxidation of P or of P_2O_3 . It has been partly classified. Contrary to previous results (C. A. 18, 1787) the luminescence spectrum of P is therefore ascribed to P_2O_3 . Excitation of P_2O_3 at temps up to 380° gives only an O spectrum. The band group at 3270 Å. U. (Timelcus and Purcell, C. A. 21, 2435) only appears in impure P_2O_3 .

B. J. C. VAN DER HOEVEN

The light sensitivity of dyes. II. A. STEIGMANN. *Kolloid-Z.* 44, 173-5(1928).—The new theory of optical sensitizing in which the sensitizer itself is not used up in the sensitizing process is contradictory to the hydrogenation and dehydrogenation theory which appears to be founded on facts. The latter is quite analogous to the CO_2 assimilation hypothesis, in which chlorophyll is reduced by a photochemical activated-hydrogen process. A review is given on the effect observed when ergosterol is subjected to ultra-violet light. The process is explained as due to activated H. A study is to be made on protein systems in ultra-violet light in the presence of dyes.

R. H. L.

Photolysis of hydrogen iodide solution in hexane and in water. F. WARBURG AND W. RUMP. *Z. Physik* 47, 305-22(1928).—Measurements were made on stirred solns., in an atm. of CO_2 , at wave lengths 207, 222 and $282m\mu$, the absorbed radiation being measured by the bolometer, and the chem. changes by titration. The Einstein law holds for hexane solns. of HI, the quantum efficiency varying between 1, at low concns. of HI, and 2, at high concns., and ϕ , the no. of mols. decomposed per calorie of absorbed radiation, increasing with increasing wave lengths approx. as required, though rather more quickly. The same explanation is suggested as for the gaseous reaction, primary decompn. of the HI mol. into its atoms, followed by the reaction $H + HI = I + H_2$, and the lower quantum efficiency at small concns. is attributed to deactivating collisions of the H atoms with solvent mols. In aq. solns. ϕ diminishes rapidly with increasing wave lengths, and with diminishing concn. to 0 at 0.01 N, while for hexane solns., it varies only slightly with concn. The true photolyte is undissoc. HI, which apparently exists at high concns. in water, and the diminution of ϕ with concn. is to be attributed to disson., the I^- ion being unaffected by the wave lengths used. The true ϕ values for aq. solns. are, therefore, higher than those measured on the assumption of complete photochem. effectiveness of all of the energy absorbed by HI. At $207m\mu$ the apparent quantum efficiency for aq. solns. 7.5 N exceeds 2; it is suggested that an activated HI mol. may react with several consecutive normal mols., $2HI = H_2 + I_2$. Data are given on the absorption coeff. of hexane in the ultra-violet, and photographs of the absorption spectra of HI, I_2 and mixts. of HI and I_2 in aq. soln.

W. WEST

Studies in photochemical reactions. I. The effect of the dielectric constant of the medium on the equilibrium constant. K. G. MATHUR, R. S. GUPTA AND S. S. BHATNAGAR. *Indian J. Physics* 2, 243-55(1928).—Winther (C. A. 20, 545) suggested a possible relation between velocity const. of photochem. reactions and dielec. const. The bromination of cinnamic acid was studied in seven solvents and the change of o-nitrobenzaldehyde into o-nitrosobenzoic acid was studied in 5 solvents. No relationship between velocity and dielec. const. is obvious.

W. ALBERT NOYES, JR.

The mechanism of the photochemical dissociation of hydrogen iodide. K. F. BONHOEFFER AND I. FARKAS. *Z. physik. Chem.* 132, 235-56(1928).—The HI mol. is dissociated by light into atoms in one step. Fluorescence expts. at low pressures show that less than $1/1000$ of the absorbed energy is reradiated. In agreement with Lewis (C. A. 21, 1760), the equivalence law is obeyed at low pressures. H and I atoms may be shown to be formed by their high adsorption on the quartz walls. The reaction $HI + I_2$ seems to limit the HI decompn.

W. ALBERT NOYES, JR.

Contribution to the photochemistry of the halogens. Action of bromine on the nitrile of α -phenylcinnamic acid. A. BERTHOUD AND G. NICOLET. *J. chim. phys.* 25, 40-64(1928); cf. C. A. 21, 3898.—A study was made of the reaction between Br and α -phenylcinnamic acid (designated by A) both in the dark and in the light. The action $A + Br_2 \rightleftharpoons ABr_2$ is reversible as stated by Bauer and Moser (C. A. 1, 1407) and Plotnikov (*Lehrb. Photochemie* 250(1920)). Both reactions are much slower in the dark than was believed by Bauer and Moser, since the latter did not work in total darkness. The photochem. equil. is independent of the intensity of light and is detd.

by the empirical equation $([A] + m[ABr_2][Br_2])/[ABr_2] = K$, which becomes $[A]/[Br_2]/[ABr_2] = K$, when the nitrile is in great excess. The velocity of addition of Br is expressed by the equations $d[ABr_2]/dt = k_1 I_0^{1/2} [Br_2]^{1/2}$, when the absorption is slight and $d[ABr_2]/dt = k_1 I_0^{1/2} [Br_2]$ when there is complete absorption. The decompn. is expressed by the equation $-d[ABr_2]/dt = k_2 I_0^{1/2} [ABr_2][Br_2]^{1/2}/[A]$ when there is slight absorption and $-d[ABr_2]/dt = k_2 I_0^{1/2} [ABr_2]/[A]$ when the absorption is complete. The photochem. decompn. of ABr_2 takes place only in the presence of Br, which acts as a sensitizer. The mechanism of the sensitizing action is discussed.

HARRY B. WEISER

Contribution to the study of the halogens. Action of bromine on ethyl alcohol. A. BERTHOUD AND J. BÉRANECK. *J. chim. phys.* 25, 28–39 (1928); cf. *C. A.* 21, 2227.—The velocity of oxidation of EtOH by Br in the dark is proportional to the product of the concns. of the two substances. HBr retards the action less than was observed by Bugarszki (*Z. physik. Chem.* 38, 561 (1901); 48, 63 (1904); *C. A.* 4, 1407). Under the action of light and when the absorption is slight, the velocity increases a little more rapidly than the square root of the luminous intensity and of the Br concn. The order of the reaction with respect to the EtOH is not const. KBr retards the action. The quantum yield is lower than the value calculated from the law of equivalence. From the results it is concluded that light dissociates the mols. of Br_2 and that there is formed an intermediate compd. C_2H_5O by the action of an atom of Br on a mol. of EtOH. It is suggested further that the C_2H_5O may react with a mol. of Br thus: $C_2H_5O + Br_2 \rightarrow C_2H_5O + HBr + Br$, $2Br \rightarrow Br_2$ or with an atom of Br thus: $C_2H_5O + Br \rightarrow C_2H_5O + HBr$; but neither hypothesis alone is sufficient to account for the observed facts.

HARRY B. WEISER

Some additional facts on experiments dealing with photochemical yields with complex light. V. M. PADOA AND NERINA VITA. *Gazz. chim. ital.* 58, 3–6 (1928); cf. *C. A.* 21, 2104.—The reasons advanced by Berthoud and Béraneck (*C. A.* 21, 2227) are not sufficient to explain the yields obtained by P. and V. (*C. A.* 18, 2647; 20, 3647) in the bromination of cinnamic acid, for these yields vary with the order of exposure and with the solvent and are the same for light filtered through solns. as for unfiltered light. Furthermore in new expts. on the oxidation of III, in which the exposures were of such duration that the same concn. of I was obtained, the yields were proportional to the sq. roots of the intensity, but when the times of exposure to the different intensities were the same the yields were proportional to the intensities. The Berthoud law is not of general application, because if the intensity I is divided into n parts, the sum of n photochem. actions of intensity I/n and the action of intensity I are related, thus: $[n\sqrt{(I/n)}]/I = \sqrt{(n/I)}$. When n approaches infinity, the expression also becomes infinitely great, so that the diminution of intensity would increase the photochem. yield to an infinite degree. A study of the photochem. reaction: $Fe_2(C_2O_4)_3 \rightarrow 2FeC_2O_4 + 2CO_2$, in which equal yields were obtained with very different intensities, the proportionality between the chem. action and the intensity still held true. Together the expts. of B. and B. and of P. and V. show that the sum of the actions of the component lights differs from, and is in general greater than, the action of resultant complex light, not only when the intensities vary but when the frequencies vary.

C. C. DAVIS

The Weigert effect in photochloride exhibiting anisotropy. H. ZOCHER AND K. COPER. *Z. physik. Chem.* 132, 302–12 (1928).—A method is described whereby the Weigert effect can be measured for photochloride free from a binding agent. Other light-sensitive materials such as asphalt, $K_2Cr_2O_7$ in gelatin, $TiCl_3$ and $CuBr$ were studied. $AuCl_3$ was found to be insensitive to light. Dichroism and double refraction for photochloride without a binder exposed to red, green and white light are graphically described. Photochloride in gelatin was studied in like manner. The results for the Ag without a binding medium is qual. the same as anisotropic Ag in an emulsion. The trend of double refraction is about the same as that of a dye with the same curve for dichroism.

RAYMOND H. LAMBERT

The production of optical activity by circular light. H. ZOCHER AND K. COPER. *Z. physik. Chem.* 132, 313–9 (1928).—Circular polarized light has been used to produce optical activity in photochlorides. Specially prepd. photochloride is necessary in order to have it not too light-sensitive for study. A description is given of the method for obtaining circularly polarized light and its action on photochloride is analogous to linear anisotropy by the Weigert effect. White and red circular light was used and both dichroism and optical activity were obtained.

R. H. LAMBERT

The production of anisotropy of surfaces. H. ZOCHER AND K. COPER. *Z. physik. Chem.* 132, 295–302 (1928).—A discussion is given of the various forms of anisotropy.

Anisotropy produced by rubbing glass surfaces is a property of the pure surface and can only be removed by etching away the surface. Nearly all solid substances can be made anisotropic at the surface merely by rubbing. Other dyes as well as methylene blue and anisotropic melts of *p*-azoxyanisole and phenetole show this property. A fresh fracture of glass shows anisotropism which is polar with respect to the direction of fracture. The Weigert effect exhibits no influence on glass surfaces. R. H. L.

Radiochemistry and photoelectricity. R. AUDUBERT. *J. chim. phys.* **24**, 357-69 (1927). The uncertainty involved in the application of the formula $Q = h(\nu' - \nu)$, where Q is the energy change, ν and ν' are the frequencies for the direct and reverse reactions, and h is the product of Planck's const. and Avogadro's no., may be avoided by taking as ν and ν' the threshold frequencies. This formula has been examined by means of e. m. f. measurements with a cell consisting of a soln. of an electrolyte into which dip 2 electrodes, one kept dark and the other illuminated (cf. *C. A.* **18**, 788). The threshold frequencies are obtained by assuming a linear form for the e. m. f.-frequency curve, and extrapolating to zero e. m. f. With ferric salts, the e. m. f. due to the light is pos., i. e., the illuminated electrode behaves as anode. For FeSO_4 , the observed e. m. f. is pos. for p_H below 1.8, and neg. for higher p_H . This effect is apparently due to the action of the light on the H ions bound electrostatically on the surface of the electrode, the true e. m. f. for ferrous salts always being neg. In this way, the value $-30,000$ g.-cal. is obtained for the energy of the reaction $2\text{Fe}^{++} + 2\text{H}^+ = 2\text{Fe}^{+++} + \text{H}_2$, in good agreement with the value obtained from e. m. f. detns. with the cell $\text{Pt}|\text{acid soln.}|\text{KCl}_{\text{sat}}|\text{Pt}|\text{ferrous salt}|\text{Pt}$. Similar expts. with NaI solns. give $-26,000$ g.-cal. for the heat of the reaction $3\text{I}^- = \text{I}_3^- + 2\text{e}^-$, while e. m. f. detns. with the cell $\text{Pt}|\text{NaI}|\text{KCl}_{\text{sat}}|\text{NaI}|\text{Pt}$ give $-27,800$ g.-cal. B. C. A.

The fulgurator as an atomizer of salt solutions for flame spectra (HIRSCHEL) **1**.

BROGLIE, MAURICE DE, and BROGLIE, LOUIS DE: **Introduction à la physique des rayons X et des rayons gamma.** Paris: Gauthier Villars et Cie 201 pp. F 50

HERZ, RICHARD: **Röntgenstrahlen** (physik. technik und anwendungen). Berlin, and Leipzig: W. de Gruyter & Co. 136 pp

4 - ELECTROCHEMISTRY

COLIN G. FINK

Formation of ozone by electric discharge in presence of foreign gases. A. PINKUS AND A. JULIARD. *J. chim. phys.* **24**, 370-90 (1927).—When O is subjected to the silent discharge, the fraction which is ozonized is, for a given rate of flow of the gases, nearly the same for all pressures between 300 and 600 mm., this being a max. value. Under comparable conditions of pressure and rate of flow, H and, to a less extent, Si tetrafluoride reduce the yield of O_3 . If the rate of flow is high and the voltage is small, the presence of N may cause the yield to be better than with pure O under comparable conditions. With increase in the voltage and decrease in the rate of flow, however, the optimum amt. of N diminishes, probably because in these circumstances more oxides of N are formed, and these exert a greater destructive action on the O_3 , according to the equations $2\text{NO} + \text{O}_3 = \text{N}_2\text{O}_5$, and $2\text{NO}_2 + \text{O}_3 = \text{N}_2\text{O}_5 + \text{O}_2$. B. C. A.

• **"Knowles" plant for electrolysis of water.** Q. SESTINI. *Giorn. chim. ind. applicata* **9**, 318-20 (1927), *Brit. Chem. Abstracts* **1927B**, 785.—A short description of the construction of this cell, in which 15% NaOH is used as electrolyte and which is said to deliver 99.5% O and 99.8% H_2 . Operating characteristics are given for a cell consuming 4500 amps. at 2.5 v. C. A. DAVIS

Electrochemical preparation of Scheele's green. B. P. BRUNS. *Ukrainskii khim. Zhurnal* **2**, Tech. Pt. 143-54 (1926).—When a 5-10% Na_2SO_4 soln. satd. with As_2O_3 was electrolyzed, a Cu anode being used, a compd. was obtained very similar to Scheele's green in color and compn. The best product was obtained when electrolysis was carried out at 80°. Current d. and deposition of Cu_2O on the anode influence the yield. Schweinfurt green can be similarly obtained by adding Na acetate to the electrolyte. B. C. A.

• **Electrolytic recovery of zinc from pyrites calcination residues rich or poor in copper.** H. PAWECK AND H. WENZL. *Z. angew. Chem.* **40**, 1106-12 (1927).—In the Kellner process (Austr. pat. 5484 of 1901) the residues are treated with SO_2 , giving a soln. of Zn, Cu and Fe bisulfites, from which ZnSO_4 is pptd. by boiling out of contact with air. The

ZnSO_3 is collected on a filter, and converted into sulfate by air oxidation, its soln. being freed from Fe by treatment with bleaching powder and ZnO , and is then further converted into ZnCl_2 with NaCl . The soln. of ZnCl_2 is finally electrolyzed. This process is modified by Paweck in that the ZnSO_3 is converted into sulfate by the calcd. quantity of warm 10% H_2SO_4 , and the resulting soln. is electrolyzed in a Paweck diaphragm cell. These processes apply, however, only in the absence of appreciable quantities of Cu, ZnSO_3 being obtained free from Cu only when the soln. contains less than 0.3% Cu and more than 1.6% Zn. The yield of ZnSO_3 increases with increasing concn. of bisulfite, and attains 75% with a concn. of 6.5% Zn. With residues rich in Cu the pptn. of ZnSO_3 is interfered with, and the Cu must first be removed by heating the bisulfite soln. to 75°, when the Cu is pptd. as sulfide, the Zn remaining in soln. Traces of CuSO_4 in the soln. are removed by adding Zn, and the remaining sulfites of Fe and Zn are oxidized by adding bleaching powder and blowing in air. Addn. of Zn dust rich in oxide ppts. $\text{Fe}(\text{OH})_3$, and the clear ZnSO_4 soln. is electrolyzed, with a Pb anode and steel cathode. With residues rich in Zn and poor in Cu the ZnSO_3 is converted into ZnSO_4 by addn. of the anolyte (contg. 10–12% of H_2SO_4) from a previous electrolysis of ZnSO_4 . B. C. A.

Electroplating on aluminum and its alloys. H. K. WORK. *Trans. Am. Electrochem. Soc.* 53 (preprint) 24 pp. (1928).—Ten reasons for the difficulty of plating on Al are listed and some are briefly discussed. A group of the most commonly used Al alloys was used for plating tests. Deposits were tested for adhesion and for corrosion resistance. Cleaning procedures included employment of: org. solvents, mixed alkali cleaners, acid cleaners and dil. and concd. mixed acids, passive dips and mech. cleaners. Plating on a roughened surface is most practicable, as plating on a smooth Al surface has doubtful value unless heat treated. Several etching solns. are listed, none of which is generally applicable. A dip is described for commercially pure Al which simultaneously roughens the Al surface and forms an immersion layer on the surface. A dip that attacks one constituent of the eutectic network is best for alloys contg. one. Successful electroplating of strong alloys is possible if the alloy is given the usual heat treatment accorded these alloys to develop strength. Al plating improves the appearance and increases resistance to abrasion. Numerous photomicrographs and exp't data are given. W. H. BOYNTON

Theory of electrolytic deposition of chromium from chromic acid solutions. V. SHISHKIN AND HELEN GERNET. *Z. Elektrochem. angew. physik. Chem.* 34, 57–62 (1928).—The electrolysis of CrO_3 solns. in which the relation $\text{Cr}^{\text{III}}:\text{Cr}^{\text{VI}} = 1:35$ is studied. A bright deposit is obtained at a c. d. of 10 amp./sq. dm. at about 45°. At temps. around 10°, the deposit is thick and scaly, consisting chiefly of brown oxide. As the temp. rises to 20–30°, the deposit becomes dull and shows knobby growths under the microscope, while at 65° the dull deposit again appears. As the temp. rises the current efficiency falls. At 45°, if the c. d. becomes too high, (30 amp./sq. dm.) the deposit becomes dull and defective, although at this value of current, rotating the cathode at 200 r. p. m. gives a bright, uniform deposit. Increasing SO_4 concn. makes it possible to obtain a bright deposit at lower temp. and higher c. d. With 28 g. Na_2SO_4 per l. (250 g. $\text{CrO}_3/\text{l.}$) a bright deposit is obtained at 25° and 14 amp./sq. dm. The theory is advanced that the formation of a bright deposit is accompanied first by the deposition on the cathode of a colloidal hydroxide, preventing direct contact of CrO_3 . H. S.

Electrolytic precipitation of iron from aluminum salts. L. WASILEWSKI AND S. MANTEL. *Przemysl Chem.* 12, 48–52 (1928).—The electrolytic pptn. of Fe on Cu or Fe cathodes from a soln. of NH_4 alum is not successful. The high overvoltage for H_2 on a Hg cathode and the immediate dissolution in it of deposited Fe makes it possible to decrease the Fe content of such a soln. to 0.003 g. Fe_2O_3 per 100 g. Al_2O_3 . Expts. performed at cathodic current densities of 150 and 300 amp. per square m. showed a current efficiency with respect to Fe of 18.9%, where the Fe content had to be decreased to the required max. of 0.01%. This yield was independent of the Fe content of the Hg up to 1%. Fe deposited electrolytically on a Hg cathode dissolves in it even when the soln. contains the cations of Fe only, and probably forms a colloidal soln. with it. A. C. ZACHLEN

Study of the variation of the resistance of thin strips of platinum as a function of their thickness and the influence of oxygen compounds on such resistances. ANDRÉ FÉRY. *J. phys. radium* 9, 38–48 (1928).—By electrodeposition metallic deposits of varying thickness can be obtained. The thickness, a , (in millimicrons) can be calcd. by measuring the optical density D , from the relationship $a = 63.4 D$. The resistance of the deposit, ρ (in ohms per cm.), is given by the expression $\log(10^3 \rho) = 5.7 - 0.0156a$. With a thickness of about 380μ the deposits assume the resistance of the metal. Ad-

sorption of H_2O , SO_2 or MeOH increases considerably the resistance of Pt deposits. It is suggested that the deposit is not homogeneous. Thin deposits (between 11 and 600 at. diams.) may not have the same structure as the compact crystal.

E. G. VANDENBOSCHE

Electrolytic oxidation of *p*-toluic acid in alkaline solution. A. J. ALLMAND AND A. PUTTICK. *Trans. Faraday Soc.* **23**, 641-50(1927).—An attempt has been made to increase the efficiency of the electrolytic process for the oxidation of *p*-toluic acid in alk. soln. to terephthalic acid by the superposition of an a. c. on the d. c. With d. c. alone the highest current efficiency, 16%, is obtained at a Pt anode with a current d. of 4 amp./sq. dm. in 2*N* KOH containing 0.25*N* K *p*-toluate. Discolored solns. are obtained when the free alkali concn. is decreased, and the yield is lowered when either alkali or salt concn. is increased, or the c. d. is increased or decreased. With superposed a. c., whether of frequency 50 or 500, or of high or low c. d., no improvement in efficiency is effected, and with currents of low frequency, or with large currents of high frequency, the efficiency is definitely lowered. There are 3 anodic processes, (1) evolution of unutilized O , (2) oxidation of *p*-toluic acid to terephthalic acid, (3) complete oxidation of *p*-toluic acid with formation of CO and CO_2 . The action of the a. c. is to favor (1) and (3) more than (2). Anode potential measurements have been made, and it is impossible to trace any connection between these and the different terephthalic acid yields.

B. C. A.

The hydroelectric resources of Sicily in the hydroelectric program of Italy. EMILIO VISMARA. *Atti II congresso naz. chim. pura applicata 1926*, 206-14. C. C. DAVIS

Chemical raw materials for dry-cell industry. A. D. CAMP. *Chem. Met. Eng.* **35**, 154-5(1928).—Tables show the approx. quantities and values of the raw materials required for a plant with an annual production of 48,000,000 miniature cells for flashlight and radio B and C batteries, and 1,500,000 cells of the no. 6 type. A discussion of the grades and quality of depolarizer, graphite, NH_4Cl , ZnCl_2 and other paste materials is included.

H. STOERTZ

Electrodeposition of rubber (Brit. pat. 273,662) **30**. **Extracting metal** (Can. pat. 276,705) **9**. **Anthraquinone derivatives** (Brit. pat. 274,226) **10**.

Electric batteries. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Brit. 273,651, July 2, 1926. Depolarizing material is compressed around a C rod and before insertion in the container of a battery is directly encased in a substance such as a base of fecula, starch, gum or a cellulose deriv. reduced to a powder capable without heating of gelatinizing the electrolyte with which it is subsequently impregnated.

Dry cell electric battery. J. W. CARPENTER, E. S. BACON and EDISON SWAN Electric Co., LTD. Brit. 273,837, April 14, 1926. Structural features.

Dry cell electric battery. G. W. HEISE and H. H. THOMPSON. U. S. 1,667,317, April 24. Structural features.

Dry cell electric battery. NATIONAL CARBON Co. Brit.*274,313, Oct. 4, 1926. Structural features.

Storage battery. ELA ELEKTRISCHE GRUBENLAMPEN- UND ACCUMULATOREN GES. Brit. 274,347, Dec. 20, 1926. Structural features.

Storage battery. W. HADDON and J. M. BURNETT. Brit. 274,208, April 19, 1926. Pasted grids are coated with rubber latex which is made porous by mixing it with a sol. salt such as MgSO_4 or $(\text{NH}_4)_2\text{CO}_3$ or by mixing it with water so that coagulation takes place on application of heat or acid. Alk. sulfides may also be added to produce partial vulcanization when the plate is dried.

Storage battery. R. R. OPPENHEIM. U. S. 1,667,435, April 24. Powd. electrode material is mixed with charcoal treated with rubber or other finely divided porous material rendered impermeable to liquids but having a high absorption power for gases.

Storage batteries of the nickel-alkaline type. J. L. WOODBRIDGE. U. S. 1,668,762, April 17. Electrodes in the form of metal sheets are used with annular separators which fit into openings in the electrodes. The separators may be formed of glass and their axes extend parallel to the planes of the electrodes.

Electrolytic cell for producing caustic soda from brine. H. I. ALLEN and D. B. AYERST. Brit. 273,672, July 3, 1926.

Selenium cells and associated apparatus for controlling various apparatus. F. TRINCHERO. Brit. 273,952, Nov. 22, 1926.

Molded ebonite battery boxes. A. FRASER. Brit. 273,358, Feb. 17, 1926. Mech. features.

Apparatus for electrodeposition of metals. H. C. HARRISON. Brit. 274,405, Jan. 5, 1926. In effecting electrodeposition of metal at high c. ds. on a moving cathode, the electrolyte is caused to flow through the cell in 2 sep. streams of different velocities, one flowing at high velocity through a closed tunnel and the other being open to atm. pressure; the streams are subsequently commingled. The cathode ribbon may be prepd. by coating with Na sulfide and the cathode walls may comprise C granules bonded by cement or by a phenolic condensation product. Various other structural features are described.

Electrodeposition of metal laminae. W. A. F. PFANHAUSER. Brit. 274,426, July 14, 1926. Metal laminae of uniform thickness such as Ni for use in flake form in elec. batteries or as a catalyst are deposited on an endless band which passes repeatedly through a plating bath and then through a second bath in which a sepg. layer is deposited. The sepg. layer may be of Cu, wax or rubber.

Electrodeposition of chromium. W. M. PHILLIPS. Brit. 273,659, June 30, 1926. An anode of ferrous metal such as Fe or steel is used which may be shaped to conform to the shape of the article being plated and may form the cell itself. The electrolyte may comprise chromic acid of at least 97% purity together with not more than 12.5 g. per l. of Cr sulfate, with or without small quantities of H_2BO_3 or a borate. With this electrolyte the Fe is not corroded.

Electrolytic production of aluminum. SOC. ITALIANA DI ELETTROCHIMICA. Brit. 274,108, July 8, 1926. $Al(OH)_3$ is supplied to an electrolytic furnace for the production of Al, after agglomeration by compression or by use of a binder such as gelatin, glue or other colloids or acids or salts and drying.

Electroplating apparatus. F. P. GREEN. U. S. 1,667,515, April 24.

Apparatus for electroplating printing plates, etc., with chromium. W. S. EATON. Brit. 273,629, May 2, 1927.

Preparing and electroplating absorbent nonconductive materials. A. BIDDLE. Brit. 273,664, July 3, 1926. Materials such as wood, paper, leaves and textile fabrics are prepd. for electroplating with metals by coating them with an aq. dispersion of an irreversible colloid such as natural rubber latex, applying a film of finely divided cond. material such as graphite, Cu, bronze, Ag or Sb and dehydrating the coating. Substances such as clay, ZnO , Na silicate or casein may be added to the latex to give it the desired consistency. Electrodes for receiving detachable metal deposits may be formed from plastic colloidal preps. in which are admixed clay, wood pulp, fiber or pulverized cork or asbestors, with or without softening oils, waxes or resins. An anode to receive a rubber deposit from latex may comprise a conductor provided with a coating of irreversible colloid in aq. dispersion contg. $NaHCO_3$ or $(NH_4)_2CO_3$ which is afterward heated to liberate gas and render the mass porous.

Cadmium plating. C. M. HOFF. Can. 276,468, Dec. 20, 1927. A compn. for use for the prepn. of a Cd plating bath consists of a dry mixt. of $Cd(OH)_2$ and $(NH_4)_2SO_4$. Cf. C. A. 21, 862.

Alarm or cut-out device for preventing overheating in electrical apparatus. M. BUCHHOLZ. Brit. 273,701, July 1, 1926.

Luminescent fuse plug for electric circuits. L. F. MILLER. U. S. 1,666,339, April 17. A substance such as sulfide of Zn or Cd is used which renders the plug luminescent for some time after it is "blown."

Electric cut-out fuses. SIEMENS-SCHUCKERTWERKE GES. Brit. 273,322, June 25, 1926. Arcing discharges which tend to occur when a fuse blows out are suppressed by introducing into the path of the discharge a substance which effects absorption of electrons or ions. I_2O_5 may be used with a Ag wire. Halogen compds. of Si and B nitride also may be used.

Luminous indicators for electric switches, etc. C. H. HOLMWOOD. Brit. 274,358, Jan. 22, 1927. A layer of Ra bromide or other luminant is placed under a lens or disk in the knob of a tumbler switch or like device.

Temperature control for electric ovens. S. HALL. U. S. 1,667,595, April 24. An electron discharge tube is assocd. with the control devices.

Electric annealing furnace. AKT.-GES. BROWN, BOVERIE, ET CIE. Brit. 273,320, June 23, 1926.

Electric induction furnace. E. F. NORTHRUP. Brit. 274,007, April 26, 1927.

Electric induction furnace (adapted to work under pressure or vacuum). E. F. NORTHRUP. Brit. 274,008, April 26, 1927.

5—PHOTOGRAPHY

C. E. K. MIES

Photochemical studies. X. Photographic fog. A. REYCHLER. *Bull. soc. chim. Belg.* **37**, 33-9(1928); cf. *C. A.* **21**, 2440.—The fog which is often found after development of unexposed films may be greatly reduced by treatment of the plate, before exposure, with a weakly acid soln. of an oxidizing agent. Suitable solns. are 0.01-0.03% KMnO_4 , 0.2-0.5% CrO_3 or 0.0005-0.001% $\text{K}_3\text{Fe}(\text{CN})_6$ in 0.025 N H_2SO_4 . Of these $\text{K}_3\text{Fe}(\text{CN})_6$ is the most effective antifogging agent. The oxidizing soln. is allowed to act 3 min. and then the action is stopped by treatment with slightly acidified 2.5% Na_2SO_3 soln. HgCl_2 , also, may be used as the oxidizing agent, but in this case no reducing agent is used. After about 10 sec. the plate is dried over H_2SO_4 .

A. L. HENNE.

Photographic silver halide emulsions. W. DIETERLE, O. MATTHIES and J. REITSTÖTTER. U. S. 1,667,589, April 24. Substances extractable from proteins by electro dialysis are added during emulsion manuf. to produce high-speed emulsions free from fog. Cf. *C. A.* **22**, 1109.

Pictures in color. W. V. D. KELLEY. U. S. 1,667,477, April 24. In producing color pictures upon a support having a sensitive coating including strata of different speeds, a color selection print is first printed, developed and bleached in the faster stratum, a complementary print is then printed and developed in the slower stratum, and both are fixed.

Color photography. W. LANGGUTH and C. HUMMEL. Brit. 274,129, July 9, 1926. In producing tri-color photographs by printing 3 color-record negatives successively in register on the same support with the aid of light-sensitive dye components, the support is sensitized in succession for the green-blue, green-yellow and purple components, and each of these is printed while the support is still moist under the corresponding negative in a printing frame having a cooling device. As azo dye components it is stated that there may be used. (1) salts of dianisoletetrazodisulfonic acid and 1,8-aminonaphthol-2,4-disulfonic acid for the green-blue component; (2) salts of methylbenzidinetetrazodisulfonic acid and acetoacetic acid or an ester or anilide derived therefrom for the green-yellow component; and (3) salts of anisidinediazosulfonic acid and hydroxynaphthoic acid or its derivs. for the purple component.

Photographic transfer process for imitating grains of different kinds of wood, etc. E. M. TALENT. Brit. 274,030, July 10, 1926.

Photographic printing material. T. RODY. Brit. 274,075, July 7, 1926. A carrier for the sensitized layer consists of a velour-like material produced by applying fine white wool dust or other suitable vegetable or animal dust to a backing such as paper by use of an adhesive.

Photochemical printing surfaces. HAMBURGER FREMDENBLATT BROSCHEK & CO. Brit. 274,407, July 15, 1926. Composite diapositives of text and picture illustrations after being varnished as described in Brit. 264,131 (*C. A.* **22**, 34) are covered with a thin sheet of cellophane so that the diapositives may be used before the varnish is dry.

Photomechanical printing surfaces. K. H. SCHWIMMER and H. PAWECK. Brit. 273,688, June 30, 1926. A gelatino-Ag layer on glass or film, carrying a negative, positive or half-tone image, is soaked in water or other suitable liquid, the relief thus produced is rendered conductive, e. g., with graphite, and a Cu coating is deposited by a galvano-plastic process and this may be transferred and removed from the glass or film after the usual "setting-up" for the press.

Photomechanical printing surfaces. E. MÜLLER. Brit. 274,422, July 14, 1926. A screen negative for photolithographic printing is made by exposing a sensitive plate through a screen placed at such a distance from the plate that the graining consists of black nuclei fading toward the edges; the negative is retouched, e. g., by use of mat varnish and graphite, and its front surface is locally etched with a dil. etching agent mixed with a viscous or gummy substance to prevent spreading.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

The most recent progress in inorganic chemistry. GIOVANNI CANNERI. *Giorn. chim. ind. applicata* 10, 12-7(1928).—The review deals with studies on new elements, on the transmutation of elements, and on mol. structure by the use of x-rays. Sixty references are included.

C. C. DAVIS

Observations on the rare earths. XXVII. 1. Fractional precipitation of the cerium group earths by electrolysis. 2. Solubility of rare earth oxalates in nitric acid. J. W. NECKERS AND H. C. KREMERS. *J. Am. Chem. Soc.* 50, 950-4(1928).—An attempt to sep. (1) La from Pr, (2) a mixt. of all the Ce earths in the presence of a small quantity of the Y metals, (3) the same as 2, excepting that 5% NaCl is added (this increasing the cond. three-fold without effecting the efficiency of sepn.) and (4) the Pr and Nd chlorides in the presence of 5% NaCl. La can be sepd. from Pr and other Ce metals by this method, but further sepn. are not possible with it. The solubilities of La, Pr, Nd, Sm, Dy and Y oxalates are detd., at 90°, in 1.25, 2.50 and 5.00 N HNO₃ alone, and also on addn. of 5% oxalic acid. At this temp. no definite satn. point is reached in 5 N HNO₃. XXVIII. The separation of cerium. *Ibid* 955-8.—Ce(NO₃)₃ and Ce₂(SO₄)₃ are electrolytically oxidized, at the anode, to 90% completion without pptn. In the presence of the phosphate ion 99% oxidation and pptn. take place. By oxidizing with slightly acid KMnO₄, Ce is 100% pptd. by a sol. phosphate, thus giving complete sepn. from other rare earths (Th excepted). The phosphate method of sepn. possesses certain advantages over the other methods used in Ce manuf. XXIX. The preparation and properties of some anhydrous rare earth chlorides. J. H. KLEINHEKSEL AND H. C. KREMERS. *Ibid* 959-67.—The chlorides (III) of La, Ce, Pr, Nd, Sm, Dy, Y, Ho and Tm are dehydrated by heating their 6-hydrates in the presence of dry HCl at ordinary (gives slow dehydration) and reduced (rapid) pressures. Their m. ps. (by the cooling-curve method), ds. (by an air displacement method) at 25°, and p_H values at varying concns. of aq. solns. (with a potentiometer and H electrode) are detd.

J. BALOZIAN

Formation of carbides in the systems: metal-carbon-oxygen. G. MEYER AND F. E. C. SCHEFFER. *Rec. trav. chim.* 47, 401-5(1928)(French); cf. C. A. 21, 3011.—The theoretical considerations of the first article are augmented. The knowledge of the values of the heats of formation of the different equilibria helps to det. to which one of the 4 types of P-T diagrams a certain system belongs. The system Ni-C-O is taken as an example to prove the conclusions.

E. SCHOTTE

The systems: Cd(NO₃)₂-HNO₃-H₂O, Zn(NO₃)₂-HNO₃-H₂O and Mg(NO₃)₂-HNO₃-H₂O at 20°. G. MALQUORI. *Atti accad. Lincei* [6], 7, 146-8(1928).—For the systems: Zn(NO₃)₂-HNO₃-H₂O and Mg(NO₃)₂-HNO₃-H₂O, the soly. curves extend to satd. solns. of Zn(NO₃)₂·4H₂O and Mg(NO₃)₂·6H₂O in HNO₃ (d. 1.52), while for the system Cd(NO₃)₂-HNO₃-H₂O the soly. curve extends over the entire field of concns. Cd(NO₃)₂·4H₂O, Cd(NO₃)₂·2H₂O, Zn(NO₃)₂·6H₂O, Zn(NO₃)₂·4H₂O and Mg(NO₃)₂·6H₂O can exist in equil. with aq. HNO₃ up to concns. of 52.95, 60.01, 34.45, 59.21 and 49.12% HNO₃, resp. Cd(NO₃)₂·4H₂O can be completely dehydrated at ordinary temps. by HNO₃ (d. 1.52), but under the same conditions Zn(NO₃)₂·6H₂O loses only 2 mols. of H₂O, and Mg(NO₃)₂·6H₂O remains unaltered.

C. C. DAVIS

The system: mercuric iodide, potassium iodide, water. (Miss) M. PERNOT. *Compt. rend.* 185, 950-3(1927).—The results obtained via Schreinemakers at 20°, 34° and 80° are given in a diagram. They show the existence of a single cryst. compd., HgI₂·KI·H₂O, which was studied by Pavlov (*J. Russ. Chem. Soc.* 32, 732(1900)) and indicated by Dunningham (C. A. 8, 1532). Dunningham also concluded there is a salt HgI₂·KI; but his observations were not sufficiently numerous nor accurate to justify his conclusions. HgI₂·KI·3/2H₂O, which was prepd. by Bonsdorf (*Ann. chim. phys.* [2], 34, 146(1827)), Boullay (*Ann. chim. phys.* [2], 34, 343(1827)) and Berthemot (*J. pharm. chim.* [2], 14, 185(1828)) and indicated by Clayton (*Chem. News* 70, 102(1894)) and François (*Compt. rend.* 129, 959(1899)) is probably HgI₂·KI·H₂O, from which H₂O was incompletely sepd. HgI₂·2KI·2H₂O is probably only a mixt. of HgI₂·KI·H₂O with KI and H₂O.

A. PAPINEAU-COUTURE

The molecular volume of water in crystalline hydrates. II. Constitution of some sulfates. 6. Notes on the law of additivity of volumes. E. MOLES AND M. CRESPI. *Anales soc. españ. fis. quim.* 25, 549-66(1927); cf. C. A. 22, 704.—The method of dehydrating sulfates of Mn, Fe, Co, Ni, Cu and Zn was altered and their densities were detd. before and after dehydration. Study of the mol. vol. of H₂O confirms the existence

of anion and cation hydrates. According to the predictions of Werner the constitution of these sulfates would be $[X(OH)_6](SO_4.OH_2)$, but it was found that the mol. of H_2O of the anion is more strongly held. The $SO_4.OH_2$ group is stable at temps. above 200° and was maintained intact in double salts of the schoenite type. These double sulfates should conform to the compn. $[X(OH)_6.X_2SO_4](SO_4.OH_2)$, where the central atom has a coordination no. of 6. The existence of neutral mols. as connectors is not new; known data on compds. of Zn and Mg confirm this. Violet Cr sulfate, Cr alum, Cr tetrasulfate, gray-blue Cr chloride and green Cr sulfate in varying degrees of hydration were prepd. in a high state of purity. The ds. of these compds. (17 in all) were detd., for the most part for the first time. The mol. vol. of the H_2O shows that in all these sulfates the $SO_4.OH_2$ group is maintained, as with sulfates of bivalent metals. From analysis after dehydration and mol. vols. the violet sulfate is $[Cr(OH)_6]_{1/2}(SO_4.OH_2) \cdot (SO_4.OH_2) + 2H_2O$, violet alum $[Cr(OH)_6.KSO_4](SO_4.OH_2) + 6H_2O$, tetrasulfate $H[Cr(1H_2O)_6](SO_4.OH_2)$; green sulfate $[Cr(OH)_2]_4(SO_4.OH_2)_3$. The identity of the tetrasulfate with the free acid of alum, assumed by Weinland, does not appear plausible.

E. M. SYMMES

Reaction between arsenite and permanganate in sulfuric acid solution. JOSEF HOLUBA *Z. anorg. allgem. Chem.* **168**, 361-8(1928).—The following equations are given for the reduction of permanganate by means of arsenite: (1) $2(MnO_4)^- + AsO_3^{---} = MnO_4^- + AsO_4^{---} + 4H^+ + MnO_4^- + Mn^{++} + 2H_2O$; (3) $Mn^{+++} + 2AsO_4^{---} = [Mn(AsO_4)_2]^{---}$; (4) $2Mn^{+++} = Mn^{++} + Mn^{++++}$; (5) $MnO_4^- + 4Mn^{++} + 8H^+ = 5Mn^{+++} + 4H_2O$, (6) $Mn^{++++} + 4H_2O = Mn(OH)_4 + 4H^+$, (7) $2(Mn^{+++} + H_2O + AsO_3^{---} = Mn^{++} + AsO_4^{---} + 2H^+)$; (8) $2Mn^{+++} + H_2O + AsO_3^{---} = 2Mn^{++} + AsO_4^{---} + 2H^+$. The conditions which govern the emphasis or suppression of the individual steps are discussed. H_2SO_4 adds cause a displacement of (3) and (6) from the right to the left and an acceleration of (7). The acid anion favors (5) and almost entirely prevents the formation of MnO_2 ions. Addition of Mn^{++} causes (4) to go from the left to the right and suppresses (8), while (7) is accelerated. All Mn salts in soln. are of a complex nature. H. STOERTZ

The preparation and constitution of soluble bismuth sodium citrate, and of the intermediate products. W. F. VON OETTINGEN, Y. ISHIKAWA AND TORALD SOLLMANN. *J. Pharmacol.* **31**, 353-60(1927).—There are 3 stages in the formation of Bi citrate, prepd. by adding Na citrate to Bi nitrate in glacial AcOH. They are: (1) formation of insol. normal Bi citrate, which dissolves in excess; (2) formation of a sol. intermediate compd., $NaCl \cdot Bi \cdot ClNa_2$, which hydrolyzes to give (3) H_2C_2BiO ; this seps from the soln. on standing. When NaOH is added drop by drop to a suspension of monobismuthyl citrate, there is obtained $NaCl(BiO)_2$, having 63.4% Bi, and 4% Na (theoretical 63.0% Bi and 3.5% Na). The p_H of the final soln., and the amt. of alc. used for final pptn. are important in obtaining a pure product. C. RIEGEL

Ethylenediamine compounds of thallium. III. Halides. WALTER HIBBER AND FRITZ SONNEKALB *Ber.* **61B**, 555-7(1928).—By addition of H_2O solns. of $C_2H_4(NH_2)_2$ to solns. of Tl halides, compds. of the type $TlCl_3 \cdot 3C_2H_4(NH_2)_2 \cdot 3H_2O$ are formed, in which 1, 2 or 3 mols. of the diamine combine with 1 mol. of TlX_3 . These are very stable cryst. compds., hydrolyzed in H_2O by great diln. and heat and pptd. by NH_4OH . In the prepn. it is generally necessary to add alc. to aid in crystg. out the salt. The compd. $TlH_3 \cdot C_2H_4(NH_2)_2$ is pptd. by addition of KI to a soln. of $TlCl_3 \cdot 3en \cdot 3H_2O$ as a brick-red to bronze-colored, non-hygroscopic powder, sol. in alc., $C_2H_5NO_2$ and hot $C_2H_5Br_2$. The color varies with conditions of crystn. Tl is detd. in these compds. by pptn. as hydroxide with NH_4OH , soln. in HNO_3 and final weighing as TlI. H. STOERTZ

Reaction between chromic acid and iodide induced by ferrous salts. CARL WAGNER AND WILHELM PREISS. *Z. anorg. allgem. Chem.* **168**, 265-78(1928).—In the presence of Fe^{II} , CrO_3 reacts with iodides to liberate I, 2 equiv. of I being formed as a max. for every equiv. of Fe^{II} oxidized. Cr^V is assumed as an intermediate product, and expts. are conducted to test this assumption. An excess of KCl is maintained in the soln. to exclude any effect of variation in degree of disson. and the presence of Fe^{III} suppresses the tendency of Cr^V to decompose into Cr^{VI} and Cr^{III} . The reactions proceed as follows: $Cr^{VI} + Fe^{II} = Cr^V + Fe^{III}$; $Cr^V + 2Fe^{II} = Cr^{III} + 2Fe^{III}$; $Cr^V + I^- \rightarrow Cr^{III} + IOH$; $IOH + H^+ + I^- \rightarrow I_2 + H_2O$. The action of an AcOH soln. of pyridine-oxytetrachlorochromate, $CrOCl_3 \cdot C_5H_5N \cdot HCl$, in liberating I from KI solns. is further indication of Cr^V . In H_2O soln., decompn. into Cr^{VI} and Cr^{III} is very rapid. H. STOERTZ

Ferric acetate. ALFONS KRAUSE. *Z. anorg. allgem. Chem.* **169**, 273-92(1928); *Bull. intern. acad. Polonoise* **1927A**, 237-72.—The system ferric hydroxide gel, con-

taining 7.5% Fe_2O_3 , acetic acid and water was studied at 20° . The curve obtained by plotting the ratio of acetate to iron in the gel against the normality of the acetic acid has 2 max. and one sharp min. The beginning of the curve represents a chem. reaction on the surface of the gel particles without change in their size. The remainder is a periodic adsorption curve in which the phenomena of adsorption, absorption and peptization occur. The peptization of the gel starts at 0.035 N and is complete at 0.153 N or a p_H range of 3.2–2.8. Above 1.185 N there is a decrease in the quantity of Fe in the hydrosol; above 1.58 the quantity is const. The color of the sol increases with increasing normality, changing from a yellow to a brick-red above 1.58 N . Up to 1.58 the dry residues of the sol are glassy; above this point cryst. residues corresponding to the mono-, di- and triacetates are obtained. The sol residue of the soln. at 0.069 N contains the least acetic acid; residues from other sols are unstable in the air and lose AcOH . The isoelec. point of ferric acetate is at p_H 3.05 or 0.069 N acetic acid. The dissoen. const. of the acetoferic base is of the order of 10^{-18} . A. F.

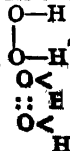
Compounds of hydrazine with metallic sulfites and nitrites. PRIYADARANJAN RAY AND BIJOY KALI GOSWAMI. *Z. anorg. allgem. Chem.* 168, 329–38(1928).—Metallic sulfites react in the presence of excess H_2SO_3 with N_2H_4 solns. (dil. or concd.) to form compds. of the type: $(\text{MSO}_3)_x \cdot x\text{N}_2\text{H}_4$. These react further with SO_2 to form more complex compds. such as $\text{CoSO}_3 \cdot (\text{N}_2\text{H}_4)_2 \cdot \text{SO}_3 \cdot 2\text{H}_2\text{O}$. The following compds. are prepd. With Mn: $\text{MnSO}_3 \cdot \text{N}_2\text{H}_4 \cdot \text{H}_2\text{SO}_3$, acid to litmus, slightly sol. in H_2O , stable on boiling, and pptd. by NH_4OH as $\text{Mn}(\text{OH})_2$. With Co: From the normal sulfite $5\text{CoSO}_3 \cdot 9\text{N}_2\text{H}_4 \cdot 6\text{H}_2\text{O}$ (A), a light red powder, neutral to litmus, slightly sol. in H_2O , decompd. by boiling to $\text{Co}(\text{OH})_2$. From the bisulfite was obtained, on careful drying of the product $\text{CoSO}_3 \cdot 2\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ (B), red, cryst., alk. to litmus, decompd. on boiling to $\text{Co}(\text{OH})_2$. On treating A with SO_2 and pptn. with alc., $2\text{CoSO}_3 \cdot \text{N}_2\text{H}_4 \cdot 3\text{H}_2\text{O}$ is formed, cryst., neutral to litmus, stable on boiling. B, treated with SO_2 , gives a red cryst. product, $\text{CoSO}_3 \cdot (\text{N}_2\text{H}_4)_2 \cdot \text{SO}_3 \cdot 2\text{H}_2\text{O}$, very sol. in H_2O , sol. in NH_4OH . If B is repeatedly evapd. to dryness with H_2SO_3 , $\text{CoSO}_3 \cdot \text{N}_2\text{H}_4 \cdot \text{H}_2\text{SO}_3 \cdot \frac{1}{2}\text{H}_2\text{O}$ is formed, red, cryst., acid to litmus, sol. in H_2SO_3 , sol. in NH_4OH . With Ni: From the carbonate treated with SO_2 and N_2H_4 was obtained, $\text{NiSO}_3 \cdot 3\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$, rose colored, alk. to litmus, insol. in H_2O , decomposed violently by concd. HNO_3 . The bisulfite gives $\text{NiSO}_3 \cdot 2\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ (C), blue, alk. to litmus, slightly sol. in H_2O . On treating C with SO_2 , $4\text{NiSO}_3 \cdot 3\text{N}_2\text{H}_4 \cdot 7\text{H}_2\text{O}$ is obtained, green, cryst., neutral to litmus, insol. in H_2O . With Zn: The bisulfite gives $\text{ZnSO}_3 \cdot 2\text{N}_2\text{H}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (D), white, alk. to litmus, slightly sol. in H_2O , sol. in NaOH . D, treated with SO_2 , yields $\text{ZnSO}_3 \cdot \text{N}_2\text{H}_4 \cdot \text{H}_2\text{SO}_3$, acid to litmus, sol. in NaOH . With Cd: From CdCO_3 treated with SO_2 and then with N_2H_4 was obtained $\text{CdSO}_3 \cdot \text{N}_2\text{H}_4$ (E), alk. to litmus, insol. in H_2O , sol. in dil. NH_4OH . E, treated with SO_2 , gives $\text{CdSO}_3 \cdot \text{N}_2\text{H}_4 \cdot \text{H}_2\text{SO}_3$, acid to litmus, sol. in dil. NH_4OH . N_2H_4 forms similar compds. with the nitrites of Co, Ni and Cd, but not with Zn and Mn. The following are described: $2\text{Co}(\text{NO}_2)_2 \cdot 3\text{N}_2\text{H}_4$, dull red; $\text{Ni}(\text{NO}_2)_2 \cdot 2\text{N}_2\text{H}_4$, blue violet; $\text{Cd}(\text{NO}_2)_2 \cdot 2\text{N}_2\text{H}_4$, white. These decompose with detonation on heating, and explode when treated with concd. H_2SO_4 or HNO_3 . Dil. acid gives N_2 and N_2O . They are all alk. to litmus.

H. STOERTZ

Studies on hydrogen cyanide. I. Mercuric methyl cyanide and the alleged isomerides of hydrogen cyanide. J. E. COATES, L. E. HINKEL AND T. H. ANGEL. *J. Chem. Soc.* 1928, 540–3.—Enklaar's expts., claiming the isolation of the isomerides of which HCN is thought to consist, are repeated. Thus, $\text{C}_2\text{H}_3\text{NHg}$ is prepd. from CH_3HgI_2 (5 g.) in abs. alc. (25 cc.) shaken with AgCN (2.1 g.) as white crystals, m. 85° (not sharp), Enklaar's value being about 60° . After purification with boiling Et_2O and light petroleum (b. 40 – 60°) it melts sharply at 93° . Et_2O or MeOH may be used instead of abs. alc. No evidence is obtained for the existence of a form melting at 60° . $\text{C}_2\text{H}_3\text{NHg}$ suffers no change in m. p. on standing and dil. H_2SO_4 liberates HCN , contrary to Enklaar.

J. BALOZIAN

A new theory on the structure of hydrogen dioxide and the mechanism of its reactions. P. N. RAIKOW. *Z. anorg. allgem. Chem.* 168, 297–304(1928).—R. proposes the theory that H_2O_2 is an allotropic mixt. of 2 tautomers: the symmetrical compd.



which he calls "hydrogen pseudo peroxide," and the unsymmetrical compd.

which he calls "hydrogen peroxide." The mixt. is called hydrogen dioxide, and consists

principally of the pseudo compd, with only a very small amt. of the peroxide. This

explains the vigorous reducing action, written as follows

$$\begin{array}{c} \text{O} - \text{H} \\ | \quad | \\ \text{O} - \text{H} \end{array} + \text{O} \begin{array}{c} \diagup \text{Ag} \text{O} \\ \diagdown \text{Ag} \text{O} \end{array} = \text{O} = \text{O} +$$

$\text{H}_2\text{O} + 2\text{Ag}$, and the mild oxidizing action

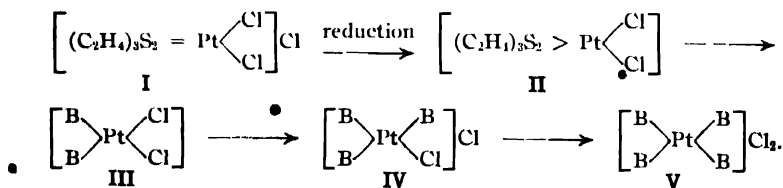
$$\text{H} \begin{array}{c} \diagup \text{O} \\ \diagdown \text{H} \end{array} + \begin{array}{c} \text{H} - \text{I} \\ | \quad | \\ \text{O} < + \text{H} - \text{I} \end{array} = 2\text{H}_2\text{O} + \text{I}_2$$

Spontaneous decompn. of H_2O_2 is due to interaction of these 2 forms, as follows

$\begin{array}{c} \text{O} - \text{H} \\ | \quad | \\ \text{O} - \text{H} \end{array} + \begin{array}{c} \text{H} \\ | \\ \text{O} < \end{array} > \begin{array}{c} \text{H} \text{O} \\ | \quad | \\ \text{H} \text{O} \end{array} = \text{O} = \text{O} + 2\text{H}_2\text{O}$ It proceeds slowly because of the small amt. of the peroxide.

H. STÖERTZ

Varying valency of platinum with respect to mercaptanic radicals. VI. P. C. RAY, K. C. BOSE-RAY AND N. B. ADHIKARI *Quart J Indian Chem. Soc* **4**, 467-75(1928), cf. *C. A.* **21**, 2855.—A series of complex compds obtained by the action of NH_3 and amine bases on $\text{PtCl}_2(\text{C}_2\text{H}_5)_2\text{S}_2$ (previously described) include (a) $\text{PtCl}_2 \cdot 4\text{NH}_3$, (b) $\text{PtCl}_2 \cdot 4\text{C}_2\text{H}_5\text{CH}_2\text{NH}_2$; (c) $\text{PtCl}_2 \cdot 2\text{C}_2\text{H}_4(\text{NH}_2)_2$; $\text{Pt}_2\text{Cl}_6 \cdot 3\text{C}_2\text{H}_4(\text{NH}_2)_2$, $(\text{C}_2\text{H}_5)_2\text{S}_2$ and $\text{PtCl}_2(\text{C}_2\text{H}_5)_2\text{S}_2$; (d) $\text{PtCl}_2 \cdot 4\text{C}_6\text{H}_5\text{N}$; $\text{PtCl}_2 \cdot 4\text{C}_6\text{H}_5\text{N}$, (e) $\text{PtCl}_2 \cdot 2\text{C}_6\text{H}_5\text{N} \cdot \text{N}(\text{CH}_3)_2$; (f) $\text{PtCl}_2 \cdot 3\text{C}_6\text{H}_{11}\text{N}$; (g) $\text{PtCl}_2 \cdot (\text{C}_2\text{H}_5)_2\text{S}_2$, (h) $\text{PtCl}_2 \cdot 2(\text{C}_2\text{H}_5)_2\text{NH}$, $\text{PtCl}(\text{C}_2\text{H}_5)_2$; $\text{NHCH}_2\text{COCH}_3$; (i) $\text{Pt}_2\text{Cl}_6 \cdot 4\text{C}_6\text{H}_4(\text{NH}_2)_2$. a, formed by reaction with NH_3 , is hygroscopic and does not melt at 200° . Its mol. cond. gives a value intermediate between ternary and quaternary electrolytes. b may be expressed as a Werner type. It m. 195° . Ethylenediamine yields 3 compds (c) The first is a Werner type, the second is a mol. compd. and the third can be expressed either way. Pyridine yields 3 compds. (d), the first being a mol. compd and the others of the Werner type. Cond. measurements showed the second to be a ternary electrolyte. It turns yellow at 140° , but does not melt. PhNMe_2 yields e, which may be regarded as a mol. compd. of the type $\text{AgCl} \cdot \text{NH}_3$. The probable constitution of f, due to the action of piperidine, was suggested but not established. Tripropylamine yields g, which may be represented on the Werner model. Et_2NH gives h, the first of which is a Werner type and the second may be so represented. The compd. i due to the action of phenylenediamine has been isolated. The reactions with the bases support the assumption that 1 of the 3 Cl atoms is more reactive than the others. If the parent substance is represented by formula I the mechanism of the reaction in most cases is



Examples of each type have been described.

C. E. P. JEFFREYS

Hydroxylaminomolybdates and molybdicomolybdic complexes. Action of hydroxylamine on paramolybdates. G. CANNORI, *Gazz. chim. ital.* **57**, 872-80(1927).—The great tendency of MoO_3 to form compds with weak acids or with oxides of weak bases indicated the possibility of prepg. compds. of MoO_3 with lower oxides of Mo, i. e., with its own partial reduction products. Among numerous reducing agents, NH_2OH was chosen as best suited for the partial reduction and establishment of an equil. between Mo^{IV} and Mo^{V} (cf. Heide and Hoffmann, *Z. anorg. allgem. Chem.* **12**, 277(1896)). In the reaction between NH_2OH and paramolybdates, red liquids are formed which on heating ppt. orange-colored powders and these dissolve, evolving gas and giving brown-red solns. from which the NH_4 salt crystallizes. H. and H. did not, however, investigate the initial stage of the reaction before reduction. Moreover Kohlschütter and Hoffmann (*Ann.* **307**, 314(1899)) obtained from alk. solns. of $(\text{NH}_4)_2\text{MoO}_4$ and NH_2OH

products considered to be salts of hydroxylaminomolybdic acids, HONH_2 presumably acting as an acid. In the present work, the reaction was studied more systematically and under different conditions from those of K. and H. When NH_2OH is added to dil. paramolybdate solns., the soln. turns red and when cooled yellow microcryst. ppts. sep. On heating these decomp. with evolution of gas and, if excess NH_2OH is present, reduction continues to Mo blue. These yellow molybdicomolybdates do not give the reactions of Mo^{V} and their compn. corresponds to $\text{R}_2\text{O} \cdot 4\text{MoO}_3 \cdot 4\text{NH}_2\text{OH}$ or $\text{R}_2\text{Mo}_4\text{O}_{13} \cdot 4\text{NH}_2\text{OH}$. When the red soln. is heated, gas is evolved, and when evapd. a dark red cryst. substance seps., aq. solns. of which are orange-yellow, and ppt. Ag from NH_3 - AgNO_3 , reduce ferric Fe and give an intense red with acidic KSCN. The formula of the salts is $\text{Mo}_2\text{O}_5 \cdot 4\text{MoO}_3 \cdot 2\text{R}_2\text{O} \cdot x\text{H}_2\text{O}$, where R is NH_4 , K or Na. A discussion of their constitution leads to the conclusion that based on the Werner classification they

are molybdico pentaoxomolybdates: $\left[\text{Mo}_2 \begin{smallmatrix} \text{Os} \\ (\text{Mo}_2\text{O}_7)_2 \end{smallmatrix} \right] \text{R}_4 \cdot x\text{H}_2\text{O}$. The following hydroxylaminomolybdates were prepd. by adding aq. ClNH_2OH to the hot aq. alk. molybdate, heating on the water bath and washing the ppt. successively with water, EtOH and Et₂O: *NH₄ tetrahydroxylaminomolybdate* $4\text{MoO}_3 \cdot 4(\text{NH}_2\text{OH})(\text{NH}_4)_2\text{O}$, yellow; *K hydroxylaminomolybdate* $4\text{MoO}_3 \cdot 4\text{NH}_2\text{OH} \cdot \text{K}_2\text{O}$, yellow; *N hydroxylaminomolybdate* $4\text{MoO}_3 \cdot 4\text{NH}_2\text{OH} \cdot \text{Na}_2\text{O}$, yellow; *guanidine tetrahydroxylaminomolybdate* $4\text{MoO}_3 \cdot 4\text{NH}_2\text{OH} \cdot (\text{CN} \cdot \text{H}_2)_2\text{O}$, yellow. The following molybdicomolybdates were prepd. by prolonged heating on the water bath of the reaction mixts until N and N oxides were no longer evolved, concg. in vacuo and allowing to crystallize: *NH₄ molybdicomolybdate* $\text{Mo}_2\text{O}_5 \cdot 4\text{MoO}_3 \cdot 2(\text{NH}_4)_2\text{O} \cdot 8\text{H}_2\text{O}$, red, gives red solns. in water; *Na molybdicomolybdate* $\text{Mo}_2\text{O}_5 \cdot 4\text{MoO}_3 \cdot \text{Na}_2\text{O} \cdot 10\text{H}_2\text{O}$, brick-red; *K molybdicomolybdate* $\text{Mo}_2\text{O}_5 \cdot 4\text{MoO}_3 \cdot 2\text{K}_2\text{O} \cdot 5\text{H}_2\text{O}$, red, gives orange-red solns. in water.

C. C. DAVIS

Perphosphoric acids and perphosphates. SYED HUSAIN AND J. R. PARTINGTON. *Trans. Faraday Soc.* **24**, 235–45 (1928).—Perphosphoric acids are not obtained by the action of 30% H_2O_2 at 0° on POCl_3 . Most of the alk. and alk. earth phosphates react with H_2O_2 , giving definite compds. contg. H_2O_2 of crystn. Primary Li, NH_4 , Ca and Sr phosphates and the Tl phosphates, however, do not react with H_2O_2 . K_3PO_4 decomposes it. Apparently there is no relationship between H_2O of crystn. and H_2O_2 of crystn. There seems to be some relation between the basicity of the phosphates and the formation of compds. contg. H_2O_2 of crystn. Acid-reacting phosphates (primary phosphates) do not react with H_2O_2 or give very unstable compds. Slightly acid-reacting phosphates, like secondary, or alk. earth phosphates give unstable compds. Alk. phosphates, secondary phosphates or pyrophosphates of alkalis give rather stable compds., while strongly alk. phosphates decompose H_2O_2 . Electrolysis of H_3PO_4 or of phosphates of Li, Na and Tl does not give rise to perphosphates while secondary phosphates of K, Rb, Cs and NH_4 produce on electrolysis 2 perphosphates in soln. (H_3PO_4 and $\text{H}_4\text{P}_2\text{O}_8$). Electrolysis was carried out with a low anodic and a high cathodic c. d., at a low temp., in the presence of a little K_2CrO_4 to prevent cathodic reduction. With Rb and Cs, perphosphates may be obtained even without the addn. of fluoride; K and NH_4 do not give perphosphates even with such addn. NH_4 perphosphates can be obtained in soln. with a current efficiency of over 57% by using a 4 mol. soln. of $(\text{NH}_4)_2\text{HPO}_4$, contg. 3 mols. NH_4F and 0.32 g. $(\text{NH}_4)_2\text{CrO}_4$ per l. at 0° with an anodic c. d. of about 0.0146 amp./sq. cm. The current efficiency for production of perphosphate by electrolysis of alkali phosphate without the addn. of fluoride shows a relation to the at. vol. of the metal. H, Li and Na do not give rise to perphosphates. K produces perphosphates only in the presence of fluoride. Rb gives a current efficiency of 12.32% and Cs 22.33%. A comparison between the products obtained by electrolysis, and the ones obtained with H_2O_2 shows that only the former are true perphosphates.

A. L. HENNE

A new induced reaction. The oxidation of potassium nitrite with iodine, induced by sodium thiosulfate. A. BERTHOUD AND W. BERGER. *Helv. Chim. Acta* **11**, 364–8 (1928).—In a soln. of $\text{Na}_2\text{S}_2\text{O}_3$ and KNO_2 quant. results are obtained when the $\text{Na}_2\text{S}_2\text{O}_3$ is titrated with I_2 . On the contrary, if a soln. of KNO_2 and I_2 is titrated with $\text{Na}_2\text{S}_2\text{O}_3$ the quant. relation no longer exists. With increasing concns. of KNO_2 ($N/64$ to $4N$) and with decreasing concns. of $\text{Na}_2\text{S}_2\text{O}_3$ (0.05 to 0.0025N) the percent of theoretically required $\text{Na}_2\text{S}_2\text{O}_3$ decreases from 95.9 to 49.9. With the addn. of HOAc ($N/48$ to $N/3$) this effect becomes less pronounced as the H-ion concn. is increased. This phenomenon is attributed to a reaction between I and KNO_2 induced by $\text{Na}_2\text{S}_2\text{O}_3$ as follows: (a) $\text{Na}_2\text{S}_2\text{O}_3 + \text{I}_2 \longrightarrow \text{Na}_2\text{SO}_3 + \text{NaI} + \text{I}$; (b) $2\text{Na}_2\text{S}_2\text{O}_3 \longrightarrow \text{Na}_2\text{S}_2\text{O}_4$; (c) $2\text{I} + \text{H}_2\text{O} \longrightarrow \text{HIO} + \text{HI}$; (d) $\text{HIO} + \text{HI} \longrightarrow \text{I}_2 + \text{H}_2\text{O}$; (e) $\text{HIO} + \text{KNO}_2 \longrightarrow \text{KNO}_3 + \text{HI}$. When the concn. of KNO_2 is high (d) is negligible compared to (e). When

the concn. of $\text{Na}_2\text{S}_2\text{O}_3$ is high, as when a soln. of I_2 is dropped into a soln. of $\text{Na}_2\text{S}_2\text{O}_3$, (e) becomes negligible as compared to (d) and the at. I resulting from (a) can react with new mols. of $\text{Na}_2\text{S}_2\text{O}_3$ thus, $\text{Na}_2\text{S}_2\text{O}_3 + \text{I} \rightarrow \text{Na}_2\text{SO}_3 + \text{NaI}$. J. S. R.

Selenium oxyfluoride. E. B. R. PRIDEAUX AND C. B. COX. *J. Chem. Soc.* 1928, 739-45; cf. *C. A.* 21, 2231.— SeOF_2 (I) is prepd. as described in the preceding study; the $\text{SeO}_2 + \text{HF}$ (II) mixt. by distg. HF on SeO_2 . To analyze, solns. of these compds. are titrated to the end point, p-nitrophenol being used, with 0.1 N alkali; slightly more than $\frac{2}{3}$ the vol. of alkali used of 0.1 N AgNO_3 is added, the pptn. is completed with further alkali (until the soln. turns yellow); the mixt. is filtered and the titration is completed on the filtrate and washings with phenolphthalein as an indicator. Densities are detd. in specially constructed Monel metal tubes, of 0.5-cc. capacity, that of I being detd. as 2.67 and II as 2.57. The b. p. of I is detd. as 124° , in a similarly constructed tube by Smith and Menzies method (*Z. physik. Chem.* 75, 494 (1911)) with a bromonaphthalene bath. The m. p. of I is detd. as 4.6° , with a pentane thermometer the bulb of which is sheathed in Pt foil, a cooling bath of an alc. and CO_2 mixt. being employed and heating curves being taken. The b. p. and m. p. of II are indefinite. Red P is ignited by I, probably forming phosphoryl chloride, while P reacts more violently with II, the intensity of reaction decreasing with increase in the HF content of II. J. BALOZIAN

The constitution of silver subfluoride. E. BRODY AND TH. MILLNER. *Z. anorg. allgem. Chem.* 168, 349-55 (1928).—The authors advance the theory that Ag_2F is formed by the insertion of a negative F ion into the distended Ag lattice, rather than by the insertion of a neutral Ag atom into the distended AgF lattice. This is supported by energy calcs., which give for heat of formation in the first case +27.1 kg.-cal. and in the second -24.5 kg.-cal. Metallic appearance and high elec. cond. are also in agreement with this theory. From 27.1 k.-cal. as the heat of disson., the temp. of disson. T_D is calcd. to be 1200° abs. and the F tension 0.1 mm. at 600° abs. and 10.0 mm. at 800° abs. H. STOBRTZ

Trimethylplatinum acetylacetonate, a volatile platinum compound. R. C. MENZIES. *J. Chem. Soc.* 1928, 565-6.—The double decompn. between Ti (I) salts and halides is used to prep. a new Pt compd. Thus trimethylplatinum acetylacetonate $\text{Me}_3\text{Pt}(\text{O} \begin{array}{c} \text{CMe} \\ \diagup \\ \text{CH} \\ \diagdown \\ \text{O.Me} \end{array})_3$ (2.4 g. in 2 crops; yield 70%) is obtained from a warm C_6H_6 soln.

of 3-methylplatinic iodide (3.7 g.) and Ti (I) acetylacetonate (3.03 g.), refluxed, the Ti formed filtered, the filtrate evapd. to dryness and crystd. from hexane. When heated in a capillary tube it decomposes at 200° without melting, but in larger app. it sublimes at 160° . Under proper conditions Pt is deposited from the compd. as a mirror. Ferric acetylacetonate and 3-methylplatinic iodide are also prepd. J. BALOZIAN

Tungstates of cerous cerium and sodium. G. CAROBBI AND G. YANCRODDI. *Gazz. chim. ital.* 58, 45-52 (1928).—There have been no hydrated *Nuceros tungstates* heretofore described. Various proportions of $\text{Ce}_2(\text{WO}_4)_3$ were agitated with Na_2WO_4 soln. at 25° until equil. was reached (15-20 days), filtered and the solids were dried and analyzed. Three compds. were identified: (1) $\text{Ce}_2(\text{WO}_4)_3 \cdot 5\text{Na}_2\text{WO}_4 \cdot 11\text{H}_2\text{O}$, (2) $\text{Ce}_2(\text{WO}_4)_3 \cdot 3\text{Na}_2\text{WO}_4 \cdot 16\text{H}_2\text{O}$ and (3) $\text{Ce}_2(\text{WO}_4)_3 \cdot 5\text{Na}_2\text{WO}_4 \cdot 23\text{H}_2\text{O}$. At 25° (1) is stable in contact with solns. contg. 4-15% Na_2WO_4 and 0-60% $\text{Ce}_2(\text{WO}_4)_3$, (2) with solns. contg. 15-27.65% Na_2WO_4 and 0-4% $\text{Ce}_2(\text{WO}_4)_3$ and (3) with solns. contg. a min. of 27.65% Na_2WO_4 and a max. of 0.22-0.0% $\text{Ce}_2(\text{WO}_4)_3$. The crystals were too small to study crystallographically. (1) is gray-yellow, (2) is light yellow and (3) is yellow. They lost no H_2O of crystn. when exposed in the air for 4 months. A systematic study was made of the dehydration of the 3 compds. when exposed to air, over CaCl_2 and over H_2SO_4 at different temps. The results, tabulated in complete detail, show that the H_2O of crystn. is not evolved at a const. velocity, probably because other hydrates are formed. C. C. DAVIS

Molybdates of lanthanum and sodium. G. CAROBBI. *Gazz. chim. ital.* 58, 53-6 (1928).—The expts. were carried out in a similar way to those with $\text{Ce}_2(\text{WO}_4)_3$ and Na_2WO_4 complexes (cf. preceding abstr.), different proportions of $\text{La}_2(\text{MoO}_4)_3$ being brought to equil. with aq. Na_2MoO_4 at 25° . Such work is of potential value because it may lead to methods for the sepn. of rare earth elements. Two compds. were identified: (1) $\text{La}_2(\text{MoO}_4)_3 \cdot 2\text{Na}_2\text{MoO}_4 \cdot 2\text{H}_2\text{O}$, stable in contact with solns. contg. a max. of 11.50% Na_2MoO_4 and (2) $\text{La}_2(\text{MoO}_4)_3 \cdot 2\text{Na}_2\text{MoO}_4 \cdot 3\text{H}_2\text{O}$, stable in contact with solns. contg. 11.0-25.20% Na_2MoO_4 . Both compds. were microcryst. and had a yellowish tinge. C. C. DAVIS

Vanadovanadates. G. CANNERI. *Gazz. chim. ital.* 58, 6-25(1928).—Though Prandtl (*Ber.* 38, 657(1905)) showed that a chem. reaction takes place when V_2O_5 is fused with alk. carbonates or phosphates and definite compds. are formed, he was unable to explain the mechanism of the reduction. This suggested a study of the intimate nature of the reaction, as a means to which the proportions of the components and the character of the alk. component were varied. The proportion of O evolved is independent of whether an alk. carbonate, phosphate, borate, silicate, arseniate, etc. is used, and O is evolved with Ti compds., but not from V_2O_5 and alk. earth oxides. By varying the proportions of V_2O_5 and alk. compd., it was found that for each mixt. there is a proportion for which the vol. of O is a max. In the system of V_2O_5 - Na_2O , the evolution of O increases rapidly to a max. at 5% Na_2O and then decreases so that O is no longer evolved when the concn. of Na_2O is 32%. In the systems V_2O_5 - K_2O and V_2O_5 - Ti_2O_3 , the max. evolution is at 8% K_2O and 7% Ti_2O_3 , resp., and it is no longer evolved at 20% K_2O and at 14% Ti_2O_3 , resp. Diagrams of state of the systems V_2O_5 - Na_2O , V_2O_5 - K_2O , V_2O_5 - Li_2O and V_2O_5 - Ti_2O_3 are given. They show that in each case 3 definite compds. are formed, corresponding to the meta-, pyro- and orthovanadate. The following m. ps. were obtained. V_2O_5 675°, $NaVO_3$ 630°, $Na_2V_2O_7$ 632°, Na_3VO_4 850°, KVO_3 495°, $K_2V_2O_7$ 910°, K_3VO_4 > 1000°, $LiVO_3$ 618°, $Li_2V_2O_7$ > 900°, $TiVO_3$ 391°, $Ti_2V_2O_7$ 416°, Ti_3VO_4 555°. The formation of vanadovanadates with accompanying reduction and evolution of O probably depends upon the appearance of secondary bonds in the complex formed, which weakens the bonds which hold the O to the pentavalent metal. The O is liberated ($V_2O_5 \rightleftharpoons V_2O_4 + O$) during the interval of temp. between the upper limit of stability of the vanadovanadate and the solidification of the fused mass. A new method of prepn. of pure vanadovanadates consists of the fusion of alk. vanadites with metavanadates, under which conditions no oxidation or other complication takes place. By this method the products contain a relatively high proportion of base. The following cryst. vanadovanadates were prepd., the last two by the new method: $5V_2O_5 \cdot V_2O_4 \cdot Na_2O$, steel-blue; $4V_2O_5 \cdot V_2O_4 \cdot Na_2O$, steel-blue; $4V_2O_5 \cdot V_2O_4 \cdot 2Na_2O$, black; $5V_2O_5 \cdot V_2O_4 \cdot 3Na_2O$, black; $5V_2O_5 \cdot V_2O_4 \cdot K_2O$, steel-blue; $4V_2O_5 \cdot V_2O_4 \cdot K_2O$, steel-blue; $4V_2O_5 \cdot V_2O_4 \cdot 2K_2O$, iridescent brown; $V_2O_5 \cdot V_2O_4 \cdot Na_2O$, lustrous black; $V_2O_5 \cdot V_2O_4 \cdot K_2O$, black. C. C. DAVIS

7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Potentiometric titration of electrolytes. MILLE L. DE BROUCKERE. *Bull. soc. chim. Belg.* 37, 103-7(1928).—In an e. m. f. series like $Cd|CdSO_4||K_2SO_4|xCdSO_4|Cd$, where $CdSO_4$ represents a soln. of known concentration, it is possible to det. the unknown concn. x , by simply dilg. with water until the e. m. f. becomes 0. A. L. H.

Laboratory scheme of instruction in qualitative analysis. DOMENICO SCRUTO. *Notiz. chim.-ind.* 3, 6-9(1928).—The new method is for the qual. analysis of substances sol. in water or in acids and has been adopted for instruction at the Royal Commercial Institute of Catania. The reactions are for the most part well known, but the sepn. of the cations and anions is novel. The cations are first sepd. into 4 groups, based on the behavior of their aq. salts towards aq. NaOH: (1) those which do not give ppts. with aq. NaOH (Li, NH_4 , As (alk. arsenates or arsenites), K, Na); (2) those which give with aq. NaOH white ppts. which are sol. in excess aq. NaOH (Pb, Al, Zn, Sb, Sn); (3) those which give with aq. NaOH white ppts. insol. in excess NaOH (Bi, Cd, Mg, Ca, Ba, Sr), and (4) those which give with aq. NaOH colored ppts. whether or not sol. in excess NaOH (Cr, Ag, Hg, Cu, Fe, Ni, Co, Mn). Among the anions, the acetate, NO_2 , and NO_3 ions are first identified, after which the soln. is divided into 3 parts, which are tested for: (1) H_2S , $H_2S_2O_8$ and H_2SO_3 ; (2) H_2CO_3 , H_3PO_4 and H_2SO_4 and (3) HCl, HBr and HI. These tests are influenced by the cations, for when certain cations are present, the absence of certain anions is according to the scheme of analysis assured beforehand. After sepn. of the cations and of the anions into the groups described above, the sepn. and identification involves, for the most part, standard reactions, the details of which are given in complete form, with explanation of the chemistry involved. C. C. DAVIS

Titration of alumina as phosphate. A. LEBJUN. *Bull. soc. chim. Belg.* 37, 110-4(1928).—The titration of Al_2O_3 by pptn. as $AlPO_4$ always gives too high results when more than the theoretical amt. of phosphate is used. The gravimetric method according to Blum (C. A. 10, 1970) or Muravlev and Krassnovskii (C. A. 21, 572) is much better. A. L. HENNY

The analysis of acid-resisting bronzes, antimonial lead and babbitt. R. F. SMITH. *Pulp Paper Mag. Can.* **26**, 106-7, 389-90(1928).—The methods used in the lab. of the Hoyt Metal Co. of Canada, Ltd., are briefly described. A. PAPINEAU-COUTURE

Determination of free alkali in hypo-halogenite solutions. E. RUPP AND F. LEWY. *Z. anal. Chem.* **73**, 283(1928). When NaClO or NaBrO is treated with H_2O_2 , Na halide, O_2 and water are formed. Any free alkali can then be titrated with acid, methyl orange being used as indicator. If the excess of H_2O_2 bleaches the indicator, heat the soln. to boiling to decompose Na_2O_2 , cool, add fresh indicator and titrate.

W. T. H.

The potentiometric determination of copper as cupric ferrocyanide. ERICH MÜLLER AND S. TAKEGAMI. *Z. anal. Chem.* **73**, 284-8(1928).—In attempting to det. Cu by titration with $\text{Li}_4\text{Fe}(\text{CN})_6$, some interesting curves were obtained when the e. m. f. was plotted against the vol. of Li soln. added. The inflection points of the curves were not sharply enough defined to make it seem probable that this titration will ever be of practical value. The ppt. of $\text{Cu}_2\text{Fe}(\text{CN})_6$ tends to form a solid soln. with excess ferrocyanide.

W. T. H.

Determination of azides. D. A. COPEMAN. *J. S. African Chem. Inst.* **10**, 18-22 (1927).—Existing methods are reviewed and 2 satisfactory methods described. In the first method, Na azide is treated with H_2SO_4 and the resulting HN_3 is distilled over into a definite vol. of standard NaOH . The decrease in alkali is found by titration with standard acid, using phenolphthalein as indicator. In the second method a soln. of ceric NH_4 nitrate is allowed to act on the azide and the resulting N is collected in a nitrometer. Both methods yield results of great accuracy.

B. C. A.

Gravimetric and volumetric micro-determination of bismuth. R. STREIBINGER AND W. ZINS. *Mikrochem.* **5**, 166-92(1927). The nitrate soln. is evaporated to dryness, the residue dissolved in 0.1-0.15 cc. of 3N HNO_3 and 2-2.5 cc. of water, and the soln. treated with KI, added a small crystal at a time until the liquid above the black ppt. of BiI_3 appears yellow. A further 2.5 cc. of water is added and the mixt. is heated slowly on the water bath until the black ppt. is converted into copper colored, glistening crystals of BiOI . Another 5 cc. of water is added and heating is continued until the ppt. settles and the supernatant liquid is colorless, the soln. is treated with 2-2.5 cc. of 1% Na acetate soln., cooled, and filtered and the ppt. is washed with cold water, then with alc., dried at 105° and weighed as BiOI . Alternatively, the dried ppt. may be heated in a current of air or O and the liberated I collected in KI and titrated with $\text{Na}_2\text{S}_2\text{O}_3$.

B. C. A.

Determination of small quantities of carbon monoxide in air. N. KOMAR. *Ukrainski Khim. Zhurnal* **2**, Tech. Pt. 165-78(1926).—Froboese's method (cf. *C. A.* **9**, 1287), hitherto used only for small quantities of CO_2 , has been found very satisfactory for detg. minute quantities (up to 0.01% by vol.) of the gas in air.

B. C. A.

Determination of the chlorine value of effluents. H. BACH AND K. GLASER. *Z. angew. Chem.* **40**, 1115-6(1927).—Chloramine is used instead of KClO as a source of Cl. Its 0.1 N soln. is stable if kept in a dark bottle. To the filtered effluent, contg. a small quantity of 10% NaOH (to fix any CO_2 and so prevent the liberation of Cl from the chloramine), is added a known vol. of 0.1 N chloramine soln. and the mixt. is gently boiled under specified conditions. A small quantity of 10% KI is added, then concd. HCl , and, after some minutes, starch-Zn soln., and the I is titrated with 0.1 N thio sulfate. A blank expt. must be made. A comparison of this method with the KMnO_4 and biochem. O-absorption methods shows no general agreement in the results.

B. C. A.

Loss of chlorine during ashing. W. v. BRUCHHAUSEN. *Z. Untersuch. Lebensm.* **54**, 485-7(1927).—Detn. of Cl in the ash of carbohydrate materials is impracticable, because of loss of Cl during incineration, even in presence of Na_2CO_3 , methods based on extrn. are more reliable.

WILLIAM J. HUSA

Some experiences in the determination of very small quantities of iodides. J. T. DUNN. *Analyst* **53**, 211-2(1928).—For detg. I^- in iodized salt, a modification of the method used by Hunter (*C. A.* **4**, 431) and later by Brubaker and others (*C. A.* **20**, 3052-3) was found most satisfactory. Dissolve 50 g. of salt in 250 cc. of water, add a few drops of NaClO reagent and 1-5 cc. of 40% H_3PO_4 . Boil for a few min. to expel all Cl_2 , cool, add 1-2 cc. of 1% KI soln. and titrate with $\text{Na}_2\text{S}_2\text{O}_3$. The NaClO oxidizes I^- to IO_3^- . The soln. must be acid when boiled to remove Cl_2 and a blank must be run on all reagents used.

W. T. H.

Theoretical notes on sample taking. JOSEF MIKA. *Z. anal. Chem.* **73**, 257-64 (1928).—A mathematical discussion of the problems involved in getting a representative

sample. It is shown that even a mg. of a sample ground finely in an agate mortar may be representative but in sampling material such as coal, the error due to improper sampling is often greater than has been supposed and to avoid this error larger quantities from the original shipment should be taken. W. T. H.

Determination of antimony in bronze, brass and other alloys. S. A. CHERNIKOV. *Z. anal. Chem.* **73**, 265-70(1928).—When a fresh ppt. of SnO_2 and Sb_2O_3 is digested together with the filter paper in hot concd. H_2SO_4 , the Sb is obtained in the tervalent condition and the Sn in the quadrivalent state. Considerable experimentation with the method showed that it was possible to treat ignited SnO_2 and Sb_2O_3 in a similar manner; they are heated with 20 cc. of concd. H_2SO_4 and 0.5 g. of cane sugar in a 250-cc. Erlenmeyer flask until all the C is oxidized (6-10 hrs.) and finally the temp. is raised till the acid begins to boil. In these expts. it was found that some Sb_2O_3 is always lost by volatilization when the ppt. is ignited, together with the filter, in a porcelain crucible unless a considerable excess of SnO_2 is present. If five times as much Sn as Sb is present, there is no loss of Sb to be feared. The following procedure is suggested for the analysis of bronze, or brass. Treat 1 g. of the alloy with HNO_3 and filter off the oxidic residue after the usual boiling and evap. Ignite and weigh to get the sum of SnO_2 , Sb_2O_3 together with traces of P_2O_5 , etc. Transfer the oxides to a 250-cc Erlenmeyer flask, add 0.5 g. of cane sugar and heat with 20 cc. of concd. H_2SO_4 as explained above. Finally, cool, dil. with 50 cc. of cold water and titrate the Sb with 0.1 N KBrO_3 . To the titrated soln. add 5 cc. of 50% tartaric acid, NaOH till alk. and a little Na_2S soln. Exam the ppt. for traces of Cu, Fe, etc. Det. Sn by difference. W. T. H.

Quantitative precipitations at extreme concentrations. V. NJEGOVAN AND V. MARJANOVIC. *Z. anal. Chem.* **73**, 271-9(1928).—Acting on the hypothesis that the purest precipitates are obtained when the crystals are small and that fine ppts. are formed either when the soln. is extremely dil. or highly concd., the expt. was tried of pptg. BaSO_4 in precisely the opposite manner to that which has previously been attempted. The results thus obtained were quite satisfactory although, as might be expected, some trouble was encountered when other substances were present. To lessen the error in such cases, treatment of the ppt. with strong HCl proved effective. According to the directions recommended, good results can be obtained in the presence of Mg, Fe, Na, NH_4 and Mg, although the last-mentioned cation proved prone to adsorption. In the presence of phosphate the results are too high and Ca causes too low results; in this respect the behavior of Ca is exceptional. Doubtless the method could be modified so that satisfactory results could be obtained even in the presence of Ca, for there is a compensation of errors involved in the procedure. The method is as follows: Evap. the soln. contg. 0.2-0.3 g. of SO_4^{--} to dryness, moisten the residue with 5 cc. of 10% HCl and add 1 cc. of cold, satd. BaCl_2 soln. Stir up the paste well, dil. with 50 cc. of hot water and heat on the water bath for 30 min. Decant through a Gooch crucible contg. a heavy felt of asbestos, add 1 cc. of concd. HCl to the ppt. left in the casserole, stir well, add 50 cc. of hot water and heat 10 min. on the water bath. Filter and wash with cold water till free from chloride. Dry and ignite within another crucible, using a Méker or Teclu burner. W. T. H.

A new and rapid method for determining cadmium. G. SPACU AND J. DICK. *Z. anal. Chem.* **73**, 279-83(1928).—If a soln. contg. Cd^{++} and CNS^- is treated with pyridine in the cold, a finely crystalline, white ppt. of $[\text{CdPy}_3](\text{SCN})_2$ is obtained which is not very stable in the air. At the boiling temp. a much more stable ppt. is obtained, corresponding to the formula, $[\text{CdPy}_2](\text{SCN})_2$, which can be weighed after drying in a vacuum for 10 min. The procedure is as follows: To 50-100 cc. of soln. contg. Cd^{++} , NH_4Cl or NH_4OAc , add 0.5-1.0 g. of solid NH_4CNS , heat to boiling and add 1 cc. of pyridine. Stir, allow to cool and filter into a filtering crucible. Wash 4 times with a soln. obtained by taking 73 cc. of water, 25 cc. of 95% alc., 2 cc. of pyridine and 0.1 g. NH_4CNS , then once or twice with 10% pyridine in abs. alc. and finally with 15 cc. of ether contg. 3 drops of pyridine. Place in a vacuum desiccator and weigh after 10 min. drying in a vacuum. Some 20 detns. of solns. contg. 0.2-0.8 g. of $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O}$ all showed excellent agreement with the theoretical % of Cd. W. T. H.

Estimation of cadmium in aluminum alloys. N. F. BUDGEN. *Metal Ind. (London)* **32**, 297(1928).—Attempts to det. Cd by weighing the CdS ppt. and by electrolyzing in H_2SO_4 soln. showed that the latter method gives more accurate results. W. T. H.

Pertinent and practical observations on the theory of sampling. T. T. READ. *Eng. Mining J.* **125**, 574-8(1928).—The importance of D. W. Brunton's work (*Trans. Am. Inst. Mining Eng.* **25**, 826(1896)) is pointed out. The comments made are indeed pertinent, practical and sometimes facetious. W. T. H.

The reaction of hexamethylene upon salt solutions of elements of the third group

and a new method for the quantitative separation of iron from manganese, zinc, nickel and cobalt. PRIYADARANJAN RAY AND A. K. CHATTOPADHYA. *Z. anorg. allgem. Chem.* **109**, 99-112(1928).—Kobayashi (C. A. **15**, 1114) showed that $(\text{CH}_3)_4\text{N}_4$ could be used advantageously for sepg. Fe^{+++} from Mn^{++} . This substance, although a very weak base, hydrolyzes as follows in the presence of H^+ : $(\text{CH}_3)_4\text{N}_4 + 6\text{H}_2\text{O} + 4\text{H}^+ \rightarrow 6\text{CH}_3\text{OH} + 4\text{NH}_4^+$. It has, therefore, the same effect as NaAcO or BaCO_3 in causing pptn of $\text{Fe}(\text{OH})_3$, $\text{Al}(\text{OH})_3$, etc. To the soln. contg. 60-150 mg. of Fe add 1 g. of NH_4Cl , unless sufficient acid is present to furnish this quantity on neutralization, and at a vol. of 125-500 cc., add pure $(\text{NH}_4)_2\text{CO}_3$ soln. until nearly neutral. Heat to gentle boiling and slowly add 10% $(\text{CH}_3)_4\text{N}_4$ until pptn. of $\text{Fe}(\text{OH})_3$ is complete. Under these conditions all of the $\text{Fe}(\text{OH})_3$ is pptd. without contamination by Mn , Zn , Co or Ni . A similar treatment will probably serve to sep. Al , Ti , Zr , etc., from these bivalent cations but the method is unsatisfactory with Cr^{+++} . W. T. H.

The exact determination of the equivalence point in potentiometric titrations. I. M. KOLTHOFF. *Rec. trav. chim.* **47**, 397-400(1928).—Hahn and Frommer (C. A. **21**, 2626) have criticised K.'s method of detg. the end point but K. points out that the proposed new method is impractical. Moreover, the points criticised by H. and F. refer to mistakes that would not be made by any one familiar with the subject. A new method is here suggested for detg. end points in cases where the e. m. f. curve has only a slight slope near the end point. From the exptl. data obtained during titration, it is possible to compute the equil. const. of the reaction and from this the magnitude of the inflection potential. The exptl. data show the end point within about 2 drops in a titration like that of AgNO_3 with $\text{Na}_2\text{C}_2\text{O}_4$. From this the e. m. f. at the equivalence point can be computed. Thus in titrating 50 cc. of 0.2 *N* AgNO_3 with 0.2 *N* ($= 0.1 M$) oxalate it would be found that the end point comes at approx. 50 cc. of oxalate. When 45 cc. of oxalate was added, $E_1 = +0.300$ v. and at 55 cc., $E_2 = +0.131$ v. At 25° , $(E_1 - E_2)/0.059 = \log_{10} \text{Ag}_1/\text{Ag}_2$, but from the approx. end point, it is known that about 5.0 ml. of 0.2 *N* AgNO_3 remains dissolved in 95 cc. of soln. when E_1 was measured, therefore $\text{Ag}_1^+ = (5 \times 0.2)/95 = 1.05 \times 10^{-2}$. Substituting this value in the above equation, one finds that $\text{Ag}_2^+ = 1.44 \times 10^{-5}$. This is the concn. of Ag^+ after an excess of 5.0 cc. of oxalate has been added. It remains dissolved in 105 cc. of soln. The oxalate concn. is then $(5 \times 0.1)/105 = 4.8 \times 10^{-3}$ mols. per l. From these 2 values the soly. product of $\text{Ag}_2\text{C}_2\text{O}_4$ is $[\text{Ag}^+]^2[\text{C}_2\text{O}_4] = (1.44 \times 10^{-5})^2 \times 4.8 \times 10^{-3} = 10^{-12}$. At the end point, the concn. of Ag^+ is $[\text{Ag}^+]_e = \sqrt{2 \times 10^{-12}}$ for if *x* mol. of $\text{Ag}_2\text{C}_2\text{O}_4$ are present in a satd. soln. which is completely ionized into $2 \times$ mol. of Ag^+ and *x* mol. of $\text{C}_2\text{O}_4^{--}$, the soly. product is $4x^3 = 10^{-12}$, $x = \sqrt[3]{10^{-12}}/4$ and $2x = \sqrt[3]{2 \times 10^{-12}}$. The e. m. f. at the equivalence point is $E_2 = E_1 - 0.059 \log_{10} [\text{Ag}^+]_1/[\text{Ag}^+]_e = 0.187$ v. W. T. H.

The action of sodium hydroxide on carbon disulfide. J. G. WERLDENBURG. *Rec. trav. chim.* **47**, 496-512(1928).—Considerable doubt exists as to exactly what happens when CS_2 dissolves in NaOH soln. From the conflicting statements in the literature, the presence of NaOH , Na_2CO_3 , Na_2CSO_2 , Na_2CS_3 , Na_2S , Na_2S_x and $\text{Na}_2\text{S}_2\text{O}_3$ might be expected but qual. tests show that the last 3 substances are not present in freshly prepared solns. Apparently the reaction proceeds as follows: (1) $\text{CS}_2 + 2 \text{NaOH} = \text{Na}_2\text{CS}_2\text{O} + \text{H}_2\text{O}$. Then the $\text{Na}_2\text{CS}_2\text{O}$ decomposes into (2) $3 \text{Na}_2\text{CS}_2\text{O} = 2 \text{Na}_2\text{CS}_3 + \text{Na}_2\text{CO}_3$. A scheme of analysis is outlined for the detn. of NaOH , Na_2CO_3 , $\text{Na}_2\text{CS}_2(\text{O})$ and Na_2CS_3 . In one sample the total alkali is detd. by boiling with a slight excess of HCl and titrating the excess with NaOH and using phenolphthalein or methyl red as indicator. In a second portion the total sulfur is detd. after oxidation with perhydrol in NaOH soln., either by weighing as BaSO_4 or by titrating with NaOH after adding an excess of acid and boiling off CO_2 . The third step consists in neutralizing a fresh portion of soln. with phenolphthalein as indicator and then titrating with standard I_2 soln. The fourth step is to neutralize to phenolphthalein in the presence of BaCl_2 (which leaves BaCO_3 pptd.), then to titrate with I_2 and finally with acid till BaCN_3 is dissolved. The fifth step is to neutralize with acid with methyl red as indicator. The last step is to titrate with I_2 in acid soln. From analyses made in this way, the conclusion is drawn that the quantity of Na_2CSO_2 present is practically zero and the carbonate content corresponds to the assumption that the essential reaction is $3 \text{CS}_2 + 6 \text{NaOH} = \text{Na}_2\text{CO}_3 + 2 \text{Na}_2\text{CS}_3 + 3 \text{H}_2\text{O}$. W. T. H. •

Rapid potentiometric determination of lead and cadmium in the same solution. F. MULLER AND W. PRÉGE. *Z. anal. Chem.* **72**, 195-200(1927).—Of the neutral nitrate soln., take an aliquot part and titrate both the Pb and the Cd with 0.1 *N* $\text{Na}_4\text{Fe}(\text{CN})_6$ soln. Have the soln. at 75° and titrate with an opposed e. m. f. of 0.18 v. until the

galvanometer shows no current. In another portion, ppt. the Pb as PbSO_4 by adding Na_2SO_4 and alc. and then titrate the Cd alone with ferrocyanide at 60° and an opposed e. m. f. of 0.2 v. W. T. H.

Volumetric determination of bismuth. H. KUBINA AND J. PLICHTA. *Z. anal. Chem.* 72, 201-7(1928).—To the cold soln. contg. 0.2 g. of dissolved Bi, add 0.1 g. of Al powder and 40 cc. of 3 N KOH soln. Shake gently for 20 min. to ppt. all the Bi. Finally heat the liquid to boiling, until the excess Al is all dissolved, filter and wash by decantation with hot water. Dissolve the ppt. in 15 cc. of 20% FeCl_3 in 3 N HCl. Titrate the resulting ferrous salt with KMnO_4 after adding the usual quantities of MnCl_2 and H_3PO_4 . Good results can also be obtained by pptg. the Bi with Cu in an atm. of CO_2 and titrating the resulting Cu_2Cl_2 with KBrO_3 . W. T. H.

Analysis of nitroglycerin waste acid. A. S. WEBB. *J. S. African Chem. Inst.* 10, 13-4(1927).— H_2SO_4 and HNO_3 are detd. by titration methods, total N in the nitrometer, and the org. matter by oxidation and subsequent titration with KI and $\text{Na}_2\text{S}_2\text{O}_3$. The method of calcg. results is given. B. C. A.

Microchemical detection of rubidium. E. S. BURKSER AND S. G. RUBIN. *Ukrainskii Khim. Zhurnal* 2, 355-64(1926); *Mikrochem.* 5, 137-45(1927).—A soln. of a Ru salt in concd. HI yields with equal vols. of a 14% soln. of AgI in the same acid and of a 4.5% soln. of Au in I and HI black, hexagonal crystals of $3\text{AuI} \cdot \text{AuI}_3 \cdot 4\text{RbI} \cdot \text{AgI}$ when the Rb is in excess, and of $3\text{AuI} \cdot \text{AuI}_3 \cdot 3\text{RbI} \cdot 2\text{AgI}$ when an excess of the reagents is used. The formation of these black crystals forms a delicate test for Rb in the presence of K or NH_4 salts, as little as $1-3 \times 10^{-8}$ g. of Rb in one drop of a soln. on a microscope slide giving a detectable reaction; Cs interferes, as it gives a similar reaction, but the crystals have a pronounced tendency to collect into stellar aggregates. The method is far more delicate than the corresponding tests using chlorides or bromides of Au and Ag. The AuI_3 soln. is made by allowing fine filings of gold to remain for 1 week in contact with I, HI (d 1.5), and a little ether and the Ag soln. by dissolving freshly pptd. and washed AgI in HI. B. C. A.

Oxidation-reduction reactions. W. T. HALL. *Science* 67, 315-6(1928).—It is pointed out that the third edition of Douglas and Prescott's "Qualitative Analysis" published in 1880 contained a chapter on oxidation-reduction written by Otis Coe Johnson on the basis of a theory of *negative bonds*. In this way J. anticipated very closely the present theory of electron transfer now used as a basis for writing equations of oxidation and reduction. W. T. H.

Separation and determination of metals with the aid of 8-hydroxyquinoline. VI. Determination of bismuth. R. BERG. *Z. anal. Chem.* 72, 177-9(1927); cf. C. A. 21, 3850.—In AcOH or ammoniacal tartrate solns. Bi gives an orange-yellow, cryst. ppt. of $\text{Bi}(\text{C}_9\text{H}_6\text{ON})_3 \cdot \text{H}_2\text{O}$ in which form it can be weighed after drying at 105° . After long heating at $130-140^\circ$ the ppt. becomes anhyd. The soln. in which pptn. takes place must be free from Cl^- and should be at $60-70^\circ$ when the reagent is added. A satd. soln. of 8-quinolinol in acetone or in alc. should be used as precipitant. The ppt. can also be titrated bromometrically. W. T. H.

Rapid potentiometric determination of silver and zinc in the same solution. E. MÜLLER AND H. HEYTSCHL. *Z. anal. Chem.* 72, 188-93(1927).—First the Ag is titrated with 0.1 N KBr soln., Ag and the calomel cell being used as electrodes, and with an opposed e. m. f. of 0.176 v. Then, without removing the AgBr ppt., the Zn is titrated with $\text{K}_4\text{Fe}(\text{CN})_6$ and an opposed e. m. f. of 0.31 v. W. T. H.

Systematic qualitative analysis of cations without the use of hydrogen sulfide or its derivatives. O. MACCHIA. *Z. anal. Chem.* 72, 180-5(1927).—See C. A. 22, 559. H. G.

Quantitative analysis by means of a thermobalance. IV. ICHIRO NOSHIDA. *J. Chem. Soc. Japan* 48, 520-6(1927).—The most suitable temps. for heating ppts. obtained in the detn. of Be, Zn and Cd were detd. by a thermobalance as follows: $\text{Be}(\text{OH})_2 \rightarrow \text{BeO}$, 950° ; basic Be carbonate $\rightarrow \text{BeO}$, 350° ; ZnNH_4PO_4 , weighed as such, $<200^\circ$; $\text{ZnNH}_4\text{PO}_4 \rightarrow \text{Zn}_3\text{P}_2\text{O}_7$, 550° ; basic Zn carbonate $\rightarrow \text{ZnO}$, 450° ; $\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O} \rightarrow \text{ZnO}$, 350° ; $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O} \rightarrow \text{ZnO}$, 950° ; $\text{CdNH}_4\text{PO}_4 \rightarrow \text{Cd}_3\text{P}_2\text{O}_7$, 550° ; basic Cd carbonate $\rightarrow \text{CdO}$, 400° ; $\text{Cd}(\text{NO}_3)_2 \cdot \text{H}_2\text{O} \rightarrow \text{CdO}$, 550° ; $3\text{CdSO}_4 \cdot 8\text{H}_2\text{O} \rightarrow \text{CdSO}_4$, $210-820^\circ$. T. SAITO

Quantitative spectrum analysis. F. TWYMAN AND D. M. SMITH. *Am. Inst. Mining Eng. Tech. Pub. No.* 79, 27 pp.(1928); cf. C. A. 21, 2234. W. T. H.

The analytical study of nitrous acid. J. V. DUBSKÝ AND A. OKAČ. *Spisy vydané přírodovědeckou Fakultou Masarykovy Univ.* No. 83, 3-82(1927).—The tests for HNO_2 usually depend upon diazotizing and coupling with another nitrogenous org. substance whereby a color is produced. Reactions have been chosen for the most part, which

cause the formation of a color in a colorless soln., but quite recently tests have been proposed whereby HNO_2 after diazotizing is made to react with another colored substance, whereby a change in color is produced. Thus a change from red to blue or yellow to red is just as characteristic as the formation of a yellow or red color from a colorless soln. The behavior of HNO_2 in concns. of 10^{-4} – 10^{-7} , after diazotizing with 23 amines, was tested against some 600 different substances; the stability of the color formed and the sensitiveness of the test were noted. W. T. H.

Direct oxidimetric determination of perchlorate in the presence of large quantities of chlorate and chloride. EUGEN SPITALSKII AND S. JOFA. *Z. anorg. allgem. Chem.* **169**, 309–18(1928).—By means of SO_2 , HClO_4 is reduced to chloride, whereas HClO_4 is unaffected. The HClO_4 can then be reduced by TiCl_3 and the excess titrated with KMnO_4 . The presence of a little chromate or considerable chloride does not affect the results seriously. With 0.05–0.1 g. of KClO_4 the results were accurate within 2 mg. in all cases. Sat. the soln. at a vol. of about 100 ml. with SO_2 to reduce the HClO_4 . Expel the excess SO_2 by boiling or heating while passing air through the soln., add 20–60 cc. of 7 N H_2SO_4 and dil. to 400 cc. Expel air by passing CO_2 through the soln. for 15 min., add a measured vol. of standard TiCl_3 and titrate the excess with KMnO_4 . W. T. H.

Titration by Fajans' method. II. Determination of the mercurous and bromide ions. R. BURNSTEIN. *Z. anorg. allgem. Chem.* **168**, 325–6(1928); cf. *C. A.* **21**, 3173.—Excellent results were obtained in the titration of KBr with HgNO_3 in the presence of Na alizarinsulfonate as indicator. At the end point a change of yellow to reddish violet takes place. W. T. H.

Osmium. II. Determination of osmium. E. FRITZMANN. *Z. anorg. allgem. Chem.* **169**, 356–64(1928).—The element Os is usually sep'd from other elements by taking advantage of the volatility of OsO_4 , and the OsO_4 is usually adsorbed in an alk. soln. Afterwards the soln. can be treated with a suitable reducing agent and the Os weighed as metal or an iodometric titration can take place. Some substances, such as certain sulfidic mixts. are extremely hard to oxidize and it was found necessary to develop a suitable rapid method for use in such cases. Introduce enough of the substance to yield about 0.1 g. of Os into a 100–150 cc. long-necked Wurtz distg. flask in such a way that none of the powder adheres to the sides of the flask. Connect the flask to a condenser and to 2 receivers, using ground-glass connections. As the first receiver use a long-necked 250-cc. distg. flask contg. 3 drops of a nearly satd. soln. of NaOH and have the bulb under cold, running water. Connect this flask with a gas-wash bottle contg. 50 cc. of 1% NaOH soln. The top of the first distg. flask should be fitted by a ground-glass connection to a 75-cc. separatory funnel. After introducing the sample, make all connections air-tight and add from the funnel 10 cc. of water, 50 cc. of concd. H_2SO_4 , and 5 cc. of 10% CrO_3 soln. Heat so that there is a slow distn. After this has proceeded for 10 min. add 5 cc. more of the CrO_3 soln. and after the same period add 2 more portions of this soln. while constantly distg. Finally add 5 cc. of water and continue until 5 drops of distillate will give no red color when added to 2 drops of 5% $\text{CS}(\text{NH}_2)_2$ soln. mixed with an equal vol. of 6 N HCl . Transfer the alk. soln. in the receivers to a wide-mouthed Erlenmeyer flask, dil. to 250 cc., heat to 85–90° for 15 min., add 6 N HCl until the odor of H_2S is apparent and add 1 g. of NH_4Cl . If any CrO_3 distd. over it is well to add 5–10 drops of 30% formalin soln. with the $\text{CS}(\text{NH}_2)_2$. Heat 15 min. longer to coagulate the OsS_4 ppt., filter into a Gooch crucible, wash 10 min. with hot water without letting the ppt. drain dry at any time and finally with 2–3 portions of alc. Dry at 70° for 15 min., ignite in H_2 and weigh as metallic Os. W. T. H.

The potentiometric determination of gold. ERICH MÜLLER AND FRITZ WEISBROD. *Z. anorg. allgem. Chem.* **169**, 394–8(1928); cf. *C. A.* **21**, 35.—Further data are given concerning the titration of AuCl_3 with FeSO_4 . The effect of HNO_3 was studied and of various other cations. With HNO_3 the titration curve is higher and the second break, upon which the titration depends, is less abrupt but addn. of K_2SO_4 and alc. prevents this disturbance to a considerable degree. Cu, Hg and Pb do not interfere but the method is useless when considerable Pd or Pt is present. The titration with TiCl_3 is unsatisfactory in dil. solns. W. T. H.

Determination of small amounts of carbon monoxide in air. G. M. EDALL. *Ind. Eng. Chem.* **20**, 275(1928).—For the detn. of small concns. of CO in air, with an app. modeled after Graham's portable type, it was found necessary to use very pure I_2O_5 and to run a blank with pure air. Under these conditions the I_2O_5 method is more sensitive than has been generally known. W. T. H.

Detection of chromium, manganese, mercury, silver and gold by the spot-test

method. N. A. TANANAEV AND IV. TANANAEV. *Z. anorg. allgem. Chem.* **170**, 113–27 (1928).—The cations of inorg. chemicals can be divided into two groups—those which are not pptd. from a soln. by adding an excess of $(\text{NH}_4)_2\text{S}$ and those which are pptd. thereby either as sulfides or hydroxides. In the latter group which includes Al, Cr, Fe, Co, Ni, Zn, Mn, Hg, Pb, Ag, Bi, Cd and Cu, the ions of Al, Zn and Cd alone are always present in a single state of oxidation Cr^{+++} , Fe^{++} , Co^{++} , Ni^{++} , Mn^{++} , Hg^+ and Pb^{++} are susceptible to oxidation, preferably in alk. solns. The ions Fe^{+++} , Ag^+ , Bi^{+++} , Hg^{++} and Cu^{++} , on the other hand, can be reduced or act as oxidizing agents. It is of interest, therefore, to ascertain to what extent these oxidizable and these reducible ions can react with one another. In this respect the p_H value of the soln. exerts considerable effect. The ions Fe^{++} and Hg^+ can be oxidized in acid as well as in alk. soln. The Bi^{+++} ion, even in strongly alk. solns., is not reduced by any of the above-mentioned ions and the Cu^{++} ion only under certain conditions, usually when cyanide or iodide is present. The tests here described resulted from a study of the extent to which the oxidizable and reducible ions react together to give characteristic reaction in the presence of NaOH or of NH_4OH . **Chromium.**—An interesting test for Cr consists in treating the soln. of Cr^{+++} with AgNO_3 ; CrO_4^{--} and metallic Ag are formed in the presence of NaOH but less readily when NH_4OH replaces NaOH. Treatment with satd. NH_4NO_3 soln. dissolves the Ag and then reddish Ag_2CrO_4 is seen. With benzidine soln. a blue color is obtained; as little as 0.002 mg. of Cr^{+++} in a drop of 0.03 cc. can be detected. **Cobalt, nickel and lead.**—Under the same conditions as in the Cr test, the ions of Co^{++} , Ni^{++} and Pb^{++} react with Ag^+ and the resulting black spot consists of Ag, $\text{Co}(\text{OH})_2$, $\text{Ni}(\text{OH})_2$ and H_2PbO_3 , of which only the Ag dissolves in satd. NH_4NO_3 soln. The test is particularly sensitive with Co but is not sufficiently characteristic. It fails in the presence of NH_4OH . **Manganese.**—The test for Mn is like that of Co, Ni and Pb but is extremely sensitive; 0.0007 mg. of Mn can be detected in a single drop of soln. The reduction takes place even with ammoniacal Ag soln., which is not true for Co^{++} , Ni^{++} and Pb^{++} . **Silver.**—The reverse of the Mn test serves to detect 0.002 mg. of Ag in one drop. **Mercury.**—If a drop of 6 N HCl is placed on a piece of blotting paper, then a drop of soln. to be tested, followed by a small drop of HCl, a white ppt. of Hg_2Cl_2 will be obtained which blackens on exposure to NH_3 . In the absence of Ag^+ and Hg^+ , a spot test for Hg^{++} can be obtained by producing a spot of the soln. on blotting paper, adding a drop of satd. $\text{Mn}(\text{NO}_3)_2$ soln. and one of NaOH. This test is less characteristic than that with SnCl_2 and aniline previously described (*C. A.* **19**, 1108). **Copper.**—A sensitive spot test depends upon the formation of Cu_2I_2 by treatment with KI, removal of the liberated I_2 with 0.1 N Na_2HASO_3 soln. and treatment with a soln. of AgI in KI. The black deposit of Ag is obtained with 0.006 mg. Cu in 0.025 cc. Fe^{+++} alone interferes with the test but it can be washed away from the spot before adding $\text{Ag}(\text{NH}_3)_2^+$, leaving insol. Cu_2I_2 . Special directions are also given for the detection of both Hg^+ and Ag^+ when present together, for the detection of Mn^{++} and Ag^+ when both are present and for Cr^{+++} and Hg^{++} in the presence of one another.

W. T. H.

The use of manganese in the assay of fine gold. A. O. WATKINS. *Chem. Eng. Mining Rev.* **20**, 165–66 (1928).—In assaying Au bullion contg. no Cu it is customary to add some to the charge for cupellation. The presence of the Cu ensures an even edge to the fillet and prevents spouting when the button cools. But the presence of Cu causes slight losses and it has been recommended to use instead of pure Cu a eutectic alloy of 71.8% Ag and 28.2% Cu. If now about 0.025 g. of Mn is added the results are still better. This will cause a black stain on the top edge of the cupel.

W. T. H.

Volumetric estimation of carbon and carbon dioxide in rock products by electrical incandescence. W. J. PIRR. *Chem. Eng. Mining Rev.* **20**, 167–70 (1928).—The method applies to the detn. of C and H in org. material as well as to the detn. of CO_2 in rocks. The substance, together with suitable oxidizers such as CuO and PbCrO_4 when necessary, is placed in a transparent quartz tube 160 mm. long and 29 mm. in diam. The top of the tube is closed by a rubber stopper carrying three tubes. The middle tube is of Ni and at its lower end, which reaches nearly to the bottom of the quartz tube, there is fused to it a resistance wire of Pt or Ni-Cr. Another tube reaches well into the quartz tube and serves for the introduction of O_2 or air. The other tube reaches just below the lower edge of the rubber stopper and serves for the exit of O_2 , CO_2 , H_2O and N_2 in case air is used. To carry out the detn. the substance is mixed with catalyst and promptly heated to about 950° by the resistance coil and a Bunsen flame at the bottom of the tube. The CO_2 and H_2O are adsorbed in the usual manner but it is recommended to use $\text{Ba}(\text{OH})_2$ for the former. After the absorption, the excess reagent is titrated

with acid with phenolphthalein as indicator and then the BaCO_3 is titrated with methyl orange. The app. is recommended for the detn. of humus in soil. When it is desired to distinguish between the C of a carbonate and that of org. matter, the former can be detd. by absorbing the CO_2 evolved on treatment with acid, and the total C in the app. described. W. T. H.

Separation of the platinum metals. ANON. *Chem. Eng. Mining Rev.* 20, 142-3, 170-1 (1928).—The following method is based on a study of the various characteristic reactions of the 6 Pt metals and appears to be easier to carry out than most sepn. in this group. It was tested with a mixt. of the 6 metals with an av. content of about 0.3 g. each (except with Os, of which less was used). The results were accurate within less than 10 mg. in every case. To 100 cc. of the chloride soln., add 7-8 cc. of concd. HCl and ppt. Pd as bright-yellow $\text{Pd}(\text{C}_4\text{H}_7\text{O}_2)_2$ by adding a 1% soln. of dimethylglyoxime in alc. Filter, wash with cold water contg. a little HCl, dry at 105° and ignite first in air and finally in H_2 . Weigh as Pd. To the filtrate add a 2% soln. of furil dioxime and 10% of alc. Boil 30 min. to ppt. reddish brown $\text{Pt}(\text{C}_{10}\text{H}_7\text{O}_4\text{N}_2)_2$. Filter, wash with water contg. a little alc., dry, ignite as with the Pd ppt. and weigh as Pt. Evap. the filtrate from the furil dioxime pptn. to $\frac{1}{3}$ of its vol. and for each 100 cc. of soln. add 5 cc. of concd. HCl and 5 g. of NaClO_3 . Boil to oxidize the org. matter and continue heating till the excess Cl_2 is removed. To the soln. add an equal vol. of alc. and, while boiling, add portions of satd. KNO_3 soln. until alk. to litmus; the Rh is pptd. as pale yellow $\text{K}_2\text{Rh}(\text{NO}_3)_6$. Filter, wash with 50% alc. and use the filtrate for detg. Ru, Os and Ir. Dissolve the ppt. in aqua regia, evap. off the excess acid and reduce the RhCl_3 with Mg or Zn. Filter, wash with dil. HCl and weigh the Rh after heating in H_2 . Evap. the filtrate from the $\text{K}_2\text{Rh}(\text{NO}_3)_6$ pptn. until no more nitrous fumes are evolved, add 10 cc. concd. HCl for 100 cc. of soln. and evap. till solids begin to sep. Dil. with 2-3 times as much water, make alk. with NaOH and add alc. till about 33% is present by vol. Filter off the black $\text{Ru}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ and wash with dil. alc. Use the filtrate for the Os and Ir detns. Dissolve the Ru_2O_3 ppt. in hot, dil. HCl and ppt. Rh with Mg or Zn. Wash the ppt. with water and weigh after ignition in H_2 . Evap. the filtrate from the Ru_2O_3 pptn. till the alc. is all removed and ppt. both Os and Ir with Zn dust. Wash the ppt. with very dil. HCl. Take the ppt. and filter paper and treat with fresh NaClO until all the Ir is dissolved, leaving the Os behind. Filter off the black Os, wash, dry, ignite in H_2 and weigh as Os. To the orange soln. obtained by dissolving the Ir in NaClO soln., add HCl and Zn, filter off the Ir and weigh as such after the usual treatment, preferably drying at 190° in an oven before heating in H_2 . W. T. H.

Determination of silica by means of ultra-filtration in decomposable silicates. HEINRICH HARDT. *Zement* 16, 678-82 (1927).—Instead of evap. the HCl soln. to dryness, the evapn. is stopped when there is gel formation of H_2SiO_3 . Lumps are broken up with a stirring rod, 10-20 cc. of water and an equal vol. of alc. are added and the mixt. is heated carefully, then dild. and filtered, an "ultra" filter being used. The dehydration is claimed to be complete and the method appears to be nearly as rapid and fully as accurate as the conventional procedure. H. F. K.

A new method of preparing a colloidal gold solution. Detection and determination of very small quantities of gold. D. NIDER. *Kolloid-Z.* 44, 139-40 (1928).—A very delicate test for dissolved Au is obtained by adding $\text{K}_2\text{HgI}_4 + \text{KI}$ to the alk. Au soln. 1 mg. per l. can be detected in this manner. The test can be used for the colorimetric detn. of small quantities of Au and is better than the SnCl_2 . R. H. LAMBERT

The preparation and preservation of standard potassium permanganate solution. TAKIO KATO. *J. Chem. Soc. Japan* 48, 408-10 (1927).—Detn. of the strengths of 20 solns. of KMnO_4 prepd. under various conditions, and kept for a year, showed that the following method gives the most stable soln. Boil the soln. of commercial KMnO_4 in ordinary distd. water, let stand one day and filter through asbestos into a steam-washed bottle, which is covered with black paper. S. KUNISAWA

Uses of amalgams in volumetric analysis. XII. Potentiometric titration of molybdenum, iron, titanium, uranium and vanadium by means of metallic electrodes. TAMAKI NAKAZONO. *J. Chem. Soc. Japan* 48, 17-26 (1927).—Two kinds of the electrodes, (A) Pt-Ir and Pt and (B) Pt-Ir and Hg-plated Cu, were found better than any other tried. In using (A), the e. m. f. rises only at the end point, but falls again promptly, while with (B) the variation of e. m. f. can be observed at every stage of titration, and no sudden depression of voltage takes place after the end point has passed. The conditions of potentiometric titration for each of the above elements when titrated with KMnO_4 , KBrO_3 , Br_2 or Fe^{+++} were investigated, and the differential titration of solns. contg. 2 elements with these reagents was also accomplished successfully. XIII.

The determination of tungsten. *Ibid* 76-7.—Cd-amalgam reduces sexivalent W to the quadrivalent condition in 4-6 N HCl soln. By oxidizing the latter with a standard soln. of Fe^{+++} alum, W can be detd. T. IRE

Identification of inks and investigation of documents for legal purposes. E. ALCOBILLA Y AGUADO. *Quim. Ind.* 5, 1-4(1928). MARY JACOBSEN

Comparative study of the use of animal charcoal and of activated alumina in toxicology. G. SENSI AND C. DE ROSA. *Ann. chim. applicata* 18, 3-18(1928).—The expts. were suggested by work of Kohn-Abrest (*Traité de Toxicologie* II, 93(1924)) where it was shown that Al_2O_3 adsorbs alkaloids from alc. soln. Preliminary tests were made to det. the relative decolorizing power of animal charcoal and activated Al_2O_3 for dil. alc. litmus and for caramel soln. Animal charcoal adsorbed both more rapidly and to a greater extent than Al_2O_3 . On the other hand Al_2O_3 adsorbed more solids from a filtered alc. ext. of minced organs than did animal charcoal. Nine alkaloids were then tested, in each the alkaloid being mixed with minced organ, which was analyzed while fresh and after putrefaction. The analyses were carried out by the general methods of Stass, Otto and Ogier. The results show that activated Al_2O_3 gives excellent results as an agent for the purification of dil. alc. liquids from the extn. of toxicological samples analyzed by the Stass-Otto-Ogier method. Compared with animal charcoal it has certain advantages, notably its ease of prepn. of a uniform quality at a low cost in the lab., and the simpler technic involved in its use. With some alkaloids, such as morphine and heroine, it gives better results than does animal charcoal, while with others, such as quinine, cinchonine, strychnine and brucine, it is the equal of animal charcoal as a purifying agent. In no case was it found to be inferior to animal charcoal. The results of the expts. with the individual alkaloids are tabulated in detail, with a detailed description of the technic employed for each. C. C. DAVIS

Elementary organic analysis for carbon and hydrogen without the use of catalysts. IVAN MAREK. *Archiv. Hem. Farm.* 1, 188-94(1927).—An app. for the detn. of C and H in org. substances is described, in which combustion takes place in a current of pure O. B. C. A.

Microchemical detection of volatile aldehydes and ketones. C. GRIEBEL AND F. WEISS. *Mikrochem.* 5, 146-60(1927).—The paper deals with the identification of aldehydes and ketones such as those present in fruits and essences, by the microchem. examn. of derived semicarbazones, *o*-, *m*- or *p*-nitrophenylhydrazones, or *m*- or *p*-nitrobenzhydrazones. B. C. A.

Color tests for ethyl alcohol. I. AD. EKKERT. *Pharm. Zentralh.* 69, 198(1928).—By dissolving 0.01 g. of resorcinol in 2 cc. EtOH and adding 1 cc. of concd. H_2SO_4 , the contact zone develops a very faint rose ring, but on mixing the liquids merely a pale rose develops even on boiling. If, however, only a little alc. and a relatively large amt. of H_2SO_4 is used, the resulting liquid becomes highly colored. By dissolving 0.01 g. of resorcinol in 1 drop EtOH and adding 0.5 cc. concd. H_2SO_4 , the liquid becomes on warming rose to ruby-red and blood-red, while a few drops of alc. cause the warmed liquid to yield a deep blood-red color. 0.1 to 0.05 cc. of a mixt. of 0.1 cc. EtOH and 5 cc. H_2O with 0.01 g. resorcinol and 1 cc. concd. H_2SO_4 gives on warming a rose-red to faint rose color. This reaction is fairly delicate. W. O. E.

The determination of polysaccharides. C. O. APPLEMAN, W. E. LOOMIS, T. G. PHILLIPS, W. E. TOTTINGHAM AND J. J. WILLAMAN. *Plant Physiology* 2, 91-7(1927).—Report of the comm. on methods of the Am. Soc. of Plant Physiologists, consisting of a discussion of methods available for detg. cellulose, starch, hemicelluloses, pentosans, galactan and mannan, insulin and pectins. An extensive bibliography is given. WALTER THOMAS

Determination of sulfur in organic substances. IVAN MAREK. *Archiv. Hem. Farm.* 1, 194-9(1927).—S is detd. by the combustion of org. substances in a current of moist O and absorption of the acid gases produced in 2% H_2O_2 . H_2SO_4 is then detd. gravimetrically or volumetrically. B. C. A.

Detection of As by Na hypophosphate solution (JOACHIMOGLU, ZELTNER) 17. **Se oxyfluoride** (PRIDEAUX, COX) 6. **Detection of Ca in Al salts** *via* D. A.-B. 6 (BRAUSE) 17. **Ultra-violet radiation in industry** (KING) 3.

HAMPSHIRE, CHARLES H.: **Volumetric Analysis for Students of Pharmaceutical and General Chemistry.** 4th ed. revised. London: J. & A. Churchill. 7s. 6d. Reviewed in *Chem. News* 136, 190(1928).

8--MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIKER

Specific gravities of minerals: an index of some recent determinations. I. J. SPENCER. *Mineralog. Mag.* 21, 337-65(1927).—2277 specific gravities of minerals collected from various sources are arranged in tables in increasing order from 1.03 (retinite) to 19 (Pt). Nearly $\frac{1}{4}$ of the entire no. fall between 2.0 and 4.0. An alphabetical list of minerals, with both the min. and max. recorded values, is also given.

W. F. HUNT

- **Rhombic sulfur isolated from volcanoes.** F. RANFALDI. *Mem. accad. Lincei* [vi], 2, 206-318(1927). A comprehensive comparative survey of existing crystallographic data referring to the rhombic S produced by volcanic eruption. B. C. A.

Catalytic action in the oxidation of sulfides and arsenides. FERGA CARMICHAEL. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 47-53, cf. C. A. 21, 39. The methods of the previous study were used but with the addn. of the catalysts Pt black, pyrite or MnO_2 , and the agitation was prolonged to 15 days at 18°. Chalcocite, pyrrhotite and nickeliferous pyrrhotite did not oxidize more rapidly because of the presence of the catalysts. Polydymite after agitation for 50 days gave 11.4% of elementary S which was sepd. from the residue by CS_2 . The insol. decompn. product of the oxidation of polydymite was chiefly Fe hydroxide. The small quantity of chalcopyrite in the polydymite was almost completely oxidized and the reaction was accelerated by the presence of Pt black and retarded by pyrite and MnO_2 . The oxidation of rammelsbergite was increased by each of the catalysts, but more by Pt black than by pyrite or MnO_2 . In this test the As_2O_3 of the rammelsbergite did not seem to poison the Pt black catalyst.

I. W. RIGGS

Mineralographic examination of cohenite from Ovifak, Greenland. ELLIS THOMSON. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 41-3.—Cohenite, sepd. from native Fe by HCl, appears as a residue consisting of Fe 78.12, S 16.40, insol. 3.86, sum 98.38%, which corresponds roughly to Fe_3S . Etching tests show that this residue is not homogeneous. The specimen studied appears to consist of cohenite, native Fe and troilite in addn. to several non-metallic constituents which were not detd.

I. W. RIGGS

Notice of an occurrence of niccolite and ullmannite at the Settlingstones mine, Fourstones, Northumberland; and of serpierite at Ross Island mine, Killarney, Kerry County Ireland. ARTHUR RUSSELL. *Mineralog. Mag.* 21, 383-7(1927).—Niccolite and ullmannite were found assocd with sphalerite and galena in a witherite vein in the Settlingstones mine. The niccolite has a finely cryst. structure and tendency to form spherical aggregates. Ullmannite is present in small quantities forming fringes around the niccolite and more rarely as minute cubes in the groundmass of the witherite. The occurrence of the rare hydrated basic sulfate of Cu, Zn and Ca (serpierite) is reported from the old Cu mine, Ross Island. It forms small greenish blue spherical tufts composed of minute crystals, flattened parallel to (001) and elongated parallel to a ; biaxial, —, with $Bx_a \perp (001)$, $n = 1.59$.

W. F. HUNT

Canadian localities for chalmersite. ELLIS THOMSON. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 44-6.—Samples of chalmersite from Cold Lake, northern Manitoba and from Raglan Township, Renfrew County, Ont. are described.

I. W. RIGGS

• **β -Quartz twins from some Cornish localities.** JULIEN DRUGMAN. *Mineralog. Mag.* 21, 366-82(1927).— β -Quartz twins from 3 Cornish localities showed Esterel twinning (1011) about twice as often as twinning according to the Verespatak law (1122). Less frequent twinning was observed on (3032), (2021), (2131) and (2133). The Sardinian law, twin plane (1012) was not found.

W. F. HUNT

Thermomagnetic study of certain iron minerals. J. HUGGETT AND G. CHANDRON. *Compt. rend.* 186, 694-6(1928).—Tests were made on specimens of magnetite, hematite and several similar minerals for temps. up to approx. 900°. The results are given as a series of curves. These differ for the different minerals but each shows a decided break at about 570°.

W. W. STIFLER

History of witherite. G. FOWLES. *Chem. News* 135, 309-10(1927).—Witherite, discovered by Withering and described by him (*Phil. Trans.* 74, 293(1784)) as a compd. of "terra ponderosa" (BaO) and "fixed air" (CO_2), was obtained from a lead mine at Alston Moor, Cumberland, whereas the origin of the specimen is variously described in the literature as Scotland and Lancashire. Withering's investigations on this "terra ponderosa aërata" are briefly described.

B. C. A.

Reëxamination of bytownite and huronite. T. L. WALKER AND A. L. PARSONS. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 5-11.—Analysis of a sample of bytownite (Ottawa) collected by Thomson about 1836 shows it to be a crushed and granulated anorthosite. A sample was ground to pass a 40-mesh sieve, and after treatment with a magnet to remove magnetite and HCl to remove calcite the powder was analyzed by Rickaby with the following results: SiO_2 54.30, Al_2O_3 27.49, Fe_2O_3 1.27, CaO 10.21, MgO 0.50, Na_2O 4.77, K_2O 0.84, H_2O 0.79, sum 100.17%; sp. gr. 2.70. The original specimen of huronite which Thomson reported from near Lake Huron, on analysis by Rickaby, gave: SiO_2 46.70, Al_2O_3 31.60, Fe_2O_3 1.41, FeO 0.57, CaO 6.90, MgO 0.64, MnO 0.05, K_2O 6.96, Na_2O 1.45, H_2O 3.63, CO_2 0.40, sum 100.31%; sp. gr. 2.832. It consists of about 75% muscovite and some zoisite. It resembles closely in appearance and compn. the huronite found on the road between Elk Lake and Gowganda, Ont. L. W. RIGGS

Beryl and associated minerals from Lyndoch Township, Renfrew County, Ont. T. L. WALKER AND A. L. PARSONS. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 12-4.—Analysis of pure material by Rickaby gave: SiO_2 64.40, Al_2O_3 18.08, Fe_2O_3 0.97, BaO 14.38, CaO 0.18, MgO 0.33, MnO 0.04, K_2O 0.18, Li_2O 0.18, Na_2O 0.35, H_2O 1.08, sum 100.17%; sp. gr. 2.726. This corresponds best with Penfield's formula for beryl. The assocd. minerals were microcline, albite, tourmaline, garnet, quartz and magnetite. L. W. RIGGS

South African occurrences of willemite. Fluorescence of willemite and some other zinc minerals in ultra-violet rays. L. J. SPENCER. *Mineralog. Mag.* 21, 388-96 (1927).—The various occurrences of willemite are reviewed, especially those of south Africa. The latter include Broken Hill, near the Sable Antelope mine, Mumbwa and near Lusaka, all in northern Rhodesia. Willemite was also found at Guchab, Otawi, South West Africa. While the willemite from New Jersey showed a green fluorescence under ultra-violet rays, specimens from Altenberg, Belgium, and from a no. of south African localities and from Durango, Mexico, were not affected. Others fluoresced in shades of yellow and bluish purple. Other Zn minerals that responded to the ultra-violet treatment were: coarsely cryst. mamillated smithsonite, hydrozincite, hemimorphite, hopeite, parahopeite, black sphalerite and certain diamonds. Fluorescence in ultra-violet rays is not a const. property of a mineral species but depends upon some impurity present in the mineral. W. F. HUNT

Crystals of cornetite and their refractive index. ALFRED SCHOEP. *Natuurw. Tijdschrift* 9, 125-8 (1927).—Crystals of cornetite occurring on a brown sandstone from Katanga, max. size 0.5×0.1 mm., were found to have $a:b:c = 0.9844:1:0.7679$, in agreement with Cesaro (*C. A.* 17, 2096). The 221 and 110 planes were most prominent; 100 was also found. For the ns was found $\alpha = 1.765 \pm 0.003$, β between 1.79 and 1.80, γ between 1.83 and 1.84. B. J. C. VAN DER HORVEN

Yellow incrustation of the Vesuvian lava of (the eruption of) 1631. F. ZAMBONINI AND G. CAROBBI. *Rend. accad. sci. Napoli* [iii], 32, 124 (1926).—The "vesubium" thought by Scacchi to be present in lava from the Vesuvian eruption of 1631 is V. "Vesbina" has the compn. $(\text{Cu,Pb})_2(\text{VO}_4)_2 \cdot 5\text{H}_2\text{O}$, in which Pb is also partly replaced by rare-earth metals, including La, Ce, Nd, Yt and Er. "Vesbina" was formed by the action of water on the cooling lava. B. C. A.

Dehydration of gypsum. A. L. PARSONS. *Univ. Toronto Studies, Geol. Series, Contribution to Canadian Mineralogy* No. 24, 1927, 24-7.—Three samples of gypsum from different Canadian localities were heated, without previous grinding, for 22-hr. periods, the first period at 84° , the second at 95° and the others at 105° , 115° , 128° , 135° , 145° and 165° . Less than 1% of the water remains after the heating at 115° . The optical characters and the % of H_2O are recorded in all stages in the manuf. of plaster of Paris; these show that it is not a definite chem. compd., but an intimate mixt. of bassanite and gypsum in proportions varying between 3 of bassanite to 1 of gypsum to 2 of bassanite to 1 of gypsum. So far as observed $2\text{CaSO}_4 \cdot \text{H}_2\text{O}$ is prepd. only by wet methods. L. W. RIGGS

Canadian minerals—tremolite, clinohumite, stromeyerite, natron and hexahydrite. T. L. WALKER AND A. L. PARSONS. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 15-24.—The analyses quoted in this paper are by Rickaby. The optical const. of tremolite crystals from Faraday, Ont. are recorded and the analysis gave: SiO_2 57.36, TiO_2 0.14, Al_2O_3 1.04, Fe_2O_3 0.21, FeO 0.72, CaO 12.41, MgO 25.22, Na_2O 1.49, K_2O 0.47, H_2O 0.44, sum 99.50%; sp. gr. 2.96. Clinohumite from Chaffey's Locks has a yellow color with vitreous luster. Analysis gave: SiO_2 37.42, TiO_2 1.14, Fe_2O_3 0.46, FeO 1.27, MgO 56.32, MnO 0.10, H_2O 0.56, F 5.04, sum 102.31, less O equiv. (2.12) 100.19%; sp. gr. 3.17. Stromeyerite from

Cobalt and Gowganda, Ont. has a blue color and the compn.: Cu 31.00, Ag 53.31, S 16.02, sum 100.33%; sp. gr. 6.26. Natron from Clinton, B. C. was white and chalk-like on the surface but vitreous within. Analysis gave: Na_2O 21.23, CO_2 15.46, H_2O 63.59, sum 100.28%; sp. gr. 1.34, which shows nearly pure natron. Hexahydrate samples from Oroville, Washington, were collected with reference to the most pronounced dehydration. Analysis gave: MgO 17.88, $(\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3)$ 0.10, SO_3 34.64, H_2O 47.32, insol. 0.03, sum 99.97%; sp. gr. 1.71. Five other analyses of samples from the locality, which is partly in U. S. and partly in Canada, show that these deposits may be epsomite, hexahydrate or a mixt. of the two.

L. W. RIGGS

Molybdenite in Lacorne and Malartic Townships, Quebec. WM. GERRIE. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 37-40.—The molybdenite veins occur in a contact zone of fine-grained granite and biotite schist of sedimentary origin. It is mostly disseminated in the muscovite, less frequently in quartz and feldspar. Analysis of a concd. sample of ore gave Mo 58.0, S 30.1, insol. 3.88, sum 100.98%. The outlook for profitable mining of this deposit is good.

L. W. RIGGS

Geological distribution of petroleum. I. OMURA. *J. Fuel Soc. Japan* 7, 24-30 (1928).—The distribution of petroleum in the world according to geological periods is reviewed and discussed.

NAO UYHI

Flood waters of Bradford pool and relation to oil production. P. D. TORREY. *Oil & Gas J.* 26, No. 40, 155, 157-8, 161-2 (1928); cf. *C. A.* 22, 863.—A representative analysis of the connate water (natural salt water) from the Bradford field is compared with a mean of 77 analyses of sea water. Chem. changes in concn. of salts from sea water to connate water are discussed.

M. B. HART

Origin of the High Peak sand and clay products. A. SCOTT. *Trans. Ceram. Soc. (Eng.)* 26, 255-60 (1927).—The silicification of limestone beds probably gave rise to these deposits, now practically free from CaCO_3 and MgCO_3 .

H. F. K.

A puzzolan from S. Paoli near Rome. A. GOLDBERG. *Tonind. Ztg.* 52, 103-4 (1928).—This material is quite similar to trass.

F. O. A.

Contact action of pegmatite on schist. G. M. SCHWARTZ AND R. J. LEONARD. *Bull. Geol. Soc. Am.* 38, 635-44 (1927).—The contact effect of the pegmatite on the quartz mica schist is abrupt and may be noted ordinarily for a distance of 7 or 8 feet. The contact zone consists of a granular rock in which the original schistosity has been destroyed. The biotite and muscovite of the schist have disappeared and plagioclase, orthoclase and microcline are developed. Apatite and tourmaline likewise increase toward the contact.

W. F. HUNT

Contact phenomena of the nepheline syenites of Port Coldwell, Ont. T. L. WALKER AND A. L. PARSONS. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 28-32.—Three groups of rock along the line of contact are (1) nepheline syenite composed of anorthoclase, green hornblende, non-pleochroic aegirine and decomn. products of sodalite or nepheline. (2) Country rock which contains orthoclase, plagioclase, hornblende and lesser amts. of diopside, pleochroic titanite, fluorite and magnetite. (3) The dark central part of the dike contains hornblende and plagioclase, biotite and scattered crystals of orthoclase.

L. W. RIGGS

Influence of hot natural brines on dolomitization. T. L. WALKER AND WM. GERRIE. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 33-6.—Various calcareous animal materials (shells, etc.) were ground to 100 or 60-100 mesh and weighed amts. thereof were agitated in bottles of sea water from 14 to 36 days. The water was varied as follows: (1) normal sea water at 18°, (2) sea water concd. to $\frac{1}{2}$ its vol., (3) sea water concd. to $\frac{1}{7}$ its vol. and (4) normal sea water at 97° but without agitation. In the last test on powders from 5 different animals the powders gained from 2.7 to 12.6 times the original wt. of Mg. In expts. 1-3 the absorption of Mg by the powders was irregular. The bearing of these results on dolomitization is considered.

L. W. RIGGS

Sedimentation of tufa and of calcareous travertines. SILVESTRE PRAT. *Compt. rend. soc. biol.* 97, 1762-4 (1927).—A study of the water in streams and canals in the region about Prague indicates a wide variation in the CO_2 content at the springs and at successive points down stream. Measured by p_{H} values the figures ranged from 7.0-7.4 at the springs to 8.0-8.3 in the lower levels. As the CO_2 content diminished CaCO_3 was deposited. The deposition of diatoms and algae and the growth of other aquatic vegetation had some relation to the p_{H} and perhaps to the velocity of the water.

L. W. RIGGS

Weathering of Cheviot granite under the peat. S. J. TOMKIEFF. *Proc. Univ.*

Durham Phil. Soc. 7, 233-43 (1928).—The outer crust of granite boulders from beneath a layer of peat was about $\frac{1}{8}$ in. thick, and was sepd. from the inner weathered portion by a thin layer of secondary enrichment of Fe oxides. *The outer crust was white and consisted of quartz and white mica, no kaolin being present. Chem. analysis of the white crust gave: SiO_2 70.67, Al_2O_3 20.57, Fe_2O_3 0.29, MgO 0.31, CaO 1.16, Na_2O 1.31, K_2O 3.02, $\text{H}_2\text{O} +$ (and volatiles) 1.78, $\text{H}_2\text{O} -$ 0.57, sum 99.68%; sp. gr. 2.597; porosity 18.5%. The sp. gr. of the inner unweathered portion of the boulder was 2.649, porosity 0.20%. Arranging the constituents in the order of their relative losses by weathering gives: Fe_2O_3 (FeO) 94.0, MgO 69.5, CaO 47.5, Na_2O 30.1, K_2O 27.2, Al_2O_3 16.75 and SiO_2 14.25%. The selective leaching of various oxides can be accounted for by the nature of the percolating solns. coming from the overlying peat. The probable changes in the mineral compn. during weathering are discussed and illustrated by many calcs. L. W. RIGGS

The transformations of iron in nature (STARKEY, HALVORSON) 11C. Quartz (GIBBS) 2.

BEHREND, FRITZ, AND BERG, GEORG: *Chemische Geologie*. Stuttgart: Ferdinand Enke. 595 pp. Bound, M. 40.40. Reviewed in *Econ. Geol.* 23, 226 (1928).

BRALY, M. A.: *Determination et étude des minerais*. Paris, 1927; E. Veneziani et Cie. 320 pp. 110 francs. Reviewed in *Rev. chim. ind.* 37, 62 (1928).

LINDGREN, WALDEMAR: *Mineral Deposits*. 3rd ed., revised. New York: McGraw-Hill Book Co. 1049 pp. \$7. Reviewed in *Econ. Geol.* 23, 221 (1928).

WINCHELL, A. N.: *Optic and Microscopic Characters of Artificial Minerals*. Supplement to Part II of "Optical Mineralogy." Madison, Wis.: Univ. of Wisconsin. Reviewed in *Econ. Geol.* 23, 228 (1928).

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST AND R. H. ABORN

Some old reduction places for bog ore in Norway. ROLF FALCK-MUUS. *Norsk. Geol. Tids.* 9, 358-67 (1927).—The slags usually consist of magnetite and fayalite. Some have solidified outside the hearth and have the shape of flat pieces with worm-like figures on the surface or of lumps which evidently have been formed from drippings gathering under a slag hole. One type which has solidified within the hearth is very porous and is also filled with half-blurred impressions of charcoal. These pieces contain olivine. Some have ophitic structure, others contain crystals of olivine imbedded in a groundmass of reduced Fe, magnetite, small olivine crystals and a dark isotropic substance, probably a basic glass. Besides these Fe slags there are also a large number of thinner slightly curved pieces looking like fragments of clay pots. They are glassy on their concave side and have the appearance of burnt tile on their convex side. They are remainings of the clay linings of the hearth. On the basis of microscopic examn. of the mineral associations of the slags it may be concluded that the temp. along the inside walls of the hearth has been fairly const., somewhat above 1100° . The ore has been bog ore. All the occurrences are situated above the "marine limit," i. e., the shore lines of the deepest submersion of the country in the Quaternary time. The only fuel used was charcoal. The construction of the hearths may be inferred from the form and constitution of the slags. The hearth was a small pot, 46-8 cm. wide at the top (the crib) and about 27 cm. deep. It was provided with a slag hole and was worked with artificial draft. Remains of the blow holes have been found. Fragments of loop iron (bloom iron) found in tombs from the Viking age show that bog Fe was "blown" about the year 900 A. D. A hone (for needles) found at one of the places in question fixes the time of working for this place at about the same time. There was probably work going on at these places throughout the period from about 800 to about 1570 A. D. C. A. ROBAX

The manufacture of pig iron in Natal. J. E. HOLGATE. *J. Chem. Met. Mining Soc. S. Africa* 28, 155-72 (1928).—H. discusses fully the raw materials, coke and fluxes used and the operation of the blast-furnace plant at New Castle. Natal spruit dolomite contg. 2.60% MnO was a useful flux, which almost eliminated the addn. of extra Mn to the furnace burden. Prestwick raw carbonate ore can be smelted with a coke consumption not exceeding 1750 lbs. (795 kg.) per ton (909 kg.). The principles of carbonate ore smelting are discussed. Pig and slag analyses and furnace data are

tabulated. Future costs and the general economic considerations governing the pig iron industry in Natal are touched upon and a brief discussion of the paper is given.

W. H. BOYNTON

Cyaniding at Midas, Nevada. MILO CARLSTON. *Eng. Mining J.* **125**, 532-3 (1928).—The construction and operation of the new 75-ton (68,175-kg.) plant of the Gold Circle Consolidated Mines Co. is outlined and a flow sheet and costs are given.

W. H. BOYNTON

Manufacture of steel for the new Ford. J. B. NEALEY. *Blast Furnace Steel Plant* **16**, 487-8 (1928).—The Ford steel plant is described with illustrations.

E. H.

Blast-furnace operation abroad. F. H. WILLCOX. *Blast Furnace Steel Plant* **16**, 492-4, 497 (1928).

E. H.

The value of metal science to technics. R. SCHENCK. *Z. Metallkunde* **20**, 93-103 (1928).—A review of the development of metal science, and a discussion of equilibrium diagrams, crystal structure and methods of examination.

H. STÖBERTZ

Research laboratory—American Steel Foundries. W. C. HAMILTON. *Trans. Am. Foundrymen's Assn.* **1928** (preprint), No. 28-7, 105-18.

E. H.

Specific heat of iron. P. OBKRÖFFER AND W. GROSSE. *Stahl u. Eisen* **47**, 576-82 (1927).—From measurements of the sp. heat of electrolytic Fe between 0° and 1590° the transformation points have been found to be: A2 ($\alpha - \beta$), 785°; A3 ($\beta - \gamma$), 906° and A4 ($\gamma - \delta$), 1401°; and the m. p. 1528°. The absorption of heat on heating the metal is 6.765 g.-cal./g. at A3, 2.531 g.-cal./g. at A4 and 64.38 g.-cal./g. at the m. p. The curve showing total heat-temp. is convex to the temp. axis up to the A2 point, and this fact, coupled with the absence of any heat effect at this temp., shows that the A2 transformation is proceeding regularly throughout the range 0-785°, and is not of an allotropic nature. The total heat-temp. curves for the β - and δ -ranges are portions of the same straight line, showing that the at configuration of both forms is the same. The curve for γ has a smaller slope towards the temp. axis than that for β and δ . The mean sp. heat of pure Fe rises from 0.1107 between 0° and 100° to 0.1628 between 0° and 780°, at which figure it remains const. to 900°, when there is a sharp rise to a max. of 0.1724 at 0-906°, followed by a slow fall to 0.1632 at 0-1400°. The mean sp. heat between 0° and the m. p. is 0.2071. Calorimetric researches with a transformer Fe contg. 4% Si show that this alloy does not undergo the A3 transformation on heating. The true sp. heat rises rapidly from 0.118 at 100° to 0.248 at 750° (A2 point), then falls abruptly to 0.185 between 755° and 1476°. Between 1476° and 1488°, which is the melting range of this alloy, a heat absorption of 26.209 g.-cal./g. takes place; the sp. heat of the molten alloy is 0.141.

B. C. A.

The manufacture of low-carbon semisteel. III. M. HORIKIRI. *Repts. Imp. Ind. Research Inst., Osaka, Japan* **8**, No. 12, 1-156 (1928); cf. *C. A.* **20**, 2647, 3433, 21, 1621.—The properties and the structure of all classes of low-C semisteel used in the industry have been studied from the standpoint of practical industrial application. When 30% of soft steel scrap is introduced, the C content could be reduced to 2.9-3.1% by controlling the condition of the molten soln. and by using a tapping temp. of 1300°. A casting having a tensile strength of 3000 kg. per sq. cm. is thus obtained. In a similar way, when 70% of soft steel is introduced the C content could be reduced to 2.3-2.8% while the tapping temp. is raised to 1360-1400°. A casting of 3500-3700 kg. per sq. cm. tensile strength is obtainable under these conditions. Cylinder liner, piston and other high-class castings were prepd. by using the above ratio. An addn. of 2.5-3% Si to the low-C semisteel enhances the quality of the castings. In addn. to Si, 1.5-2.0% Mn is beneficial in desulfurization and increased tensile strength. The manuf. of low-C semisteel castings with a C content of about 2.6% and having a remarkably fine structure has been easily accomplished in a cupola. In this case, the temp. of the molten soln. has a great influence on the absorption of C, but temp. alone is not an absolute controlling factor. Using a high temp. without prolonged heating is recommended.

*NAO UVEI

[Production of steel by] carbonizing scrap iron. R. HENNECKE. *Stahl u. Eisen* **47**, 777-80 (1927).—Good quality steel may be produced by melting scrap iron and steel without addn. of cast-iron scrap or raw pig iron. The scrap is briquetted together with 1-2% of carbonaceous material, as free as possible from S, the briquets being melted with 3% of limestone in an acid-lined open-hearth furnace. When the charge has melted down and the evolution of gas has almost ceased 1% of fluorspar and a further 3% of limestone are added in 2 portions to assist in the removal of S. Finally the steel is deoxidized in the ladle by the addn. of 5-7 kg. of 80% ferromanganese per ton of steel. The output of steel per hour is about 5.8-5.9 tons per 20 sq. m. of hearth. Cost data compare favorably with those of the usual process.

B. C. A.

A Röntgen study of the structure of carbon steel. N. SELYAKOV, G. KURDUMOV AND N. GOODZOV. *Z. Physik* 45, 384-408(1927); cf. *C. A.* 21, 1790.—A centered tetragonal structure is established for C steel which is a little different from that of α -Fe. The parameter ratio of the centered structure increases, for equal hardness conditions, with increasing C content. The parameter ratio increases, for the same C content, with the elevation of the temp. of hardening. The structure is explained as a solid soln. of C in α -Fe. The mechanism of the hardening of C steel can be described as the process of the maintaining of a transition form between the γ - and α -structures.

MARIE FARNSWORTH

Standardization of heat treatments of airplane steels. L. GAZZANIGA. *Technique moderne* 20, 191-4(1928).—The advantages of standardizing heat treatments of steels used in airplane construction are briefly outlined, and suggested standard treatments are tabulated for the various grades of steel used in that industry. A. P.-C.

Low-manganese steels gain favor. JEROME STRAUSS. *Iron Age* 121, 864-6 (1928).—The phys. properties of steels contg. 0.3-0.5% C and 1-2% Mn were tested. These steels may be heat-treated to obtain properties comparable with those of the more expensive alloy steels. Charts show comparative phys. properties of these Mn steels with various alloy steels and indicate that Mn steels are more closely related to the other structural steels than to C steels. Neither moderately high P (0.078%) nor moderately high S (0.103%) adversely affects the strength and toughness of Mn steels. Cutting tests show that high-S Mn steel is less damaging to roughing tools than lower-S steels. Hardening and machining qualities are favorable. Heavier sections of cast steels contg. 1.5% Mn or more may show appreciable segregation and coarse dendritic formation.

W. H. BOYNTON

Creep in five steels at different temperatures. H. J. FRENCH, H. C. CROSS AND A. A. PETERSON. *Bur. Standards, Tech. Paper No. 362*, 235-67; cf. *C. A.* 20, 32, 2643.—Creep tests in which elongation of steels is observed as a function of time under a fixed load were made and correlated with short-time tension tests at corresponding temps. within the range 20-730°. Low-C, high-Cr, Cr-Mo structural, high-speed, high-Cr and high-Ni austenitic steels were used. Creep charts enable the approx. detn. of the stress permitting life of different durations with different total elongations. Correlation of creep tests with short-time tension tests gives somewhat higher values than the long-time tests, but the proportional limit was in the range of stresses which could be sustained for long periods with small amounts of deformation. As the temp. of the test increases a tendency for the proportional limit to become higher than the allowable creep stresses develops. The Cr-Ni steel and the Cr steel show the best resistance to atm. oxidation, but the Cr-Ni steel showed the best load-carrying ability in the range 595-730°. The Cr-Mo steel was not structurally stable at 650° and oxidation was accompanied by decarburization and grain growth.

ALBERT THOMAS FELLOWS

The A-B-C of corrosion-resisting steels. F. R. PALMER. *Chem. Met. Eng.* 35, 149(1928).—The author divides stainless steels into three groups: Group A contg. Cr less than 14% and C less than 0.40%, Group B Cr more than 16% and C less than 0.40%, and Group C steels contg. enough Cr and Ni to make steel austenitic and non-magnetic. Heat treatment, toughness, grain growth, hot and cold working qualities, machineability, corrosion resistance, etc., are tabulated for each class of steels.

A. W. COFFMAN

A systematic view of stainless steels. F. R. PALMER. *Iron Age* 121, 729-30 (1928).—See preceding abstract.

A. W. COFFMAN

Effect of silicon, nickel, chromium and tungsten on the hardening of tool steel? W. HAUFFE. *Stahl u. Eisen* 47, 1365-73(1927).—The no. of annealings at temps. between 780° and 1030° followed by quenchings in water at 0° before hardness cracks begin to appear in a hypereutectoid steel (1.2% C) to which varying amts. of Si, Mn, Ni, Cr and W have been added, has been detd., and the results are reproduced in graphical form, together with the corresponding vol. changes. With increasing Si content, the tendency to fracture on repeated hardening is increased at the higher temps. but high-S steels may be annealed up to 930° and quenched in oil without showing hardness cracks. Mn decreases the hardening range of hypereutectoid steels very considerably, so that, by hardening at the usual temps., there is a tendency towards the production of cracks after quenching. Hypereutectoid steels with a sufficiently high Mn and Si content behave like plain C steels when hardened at 780°, and better than the plain steel when hardened at 830°. Up to 1% Cr decreases the tendency of high-C steels to crack during hardening; with 1-2% Cr these steels become extremely hard without, however, losing their toughness, and hardness cracks may be avoided by quenching from 930° in oil. Ni has scarcely any action on the hardening prop-

erties of hypereutectoid steel, and the action of W is uncertain owing to the sepn. of carbide during annealing. B. C. A.

Tensile properties of boiler plates at temperatures between 20° and 600°. G. URBANCZYK. *Stahl u. Eisen* 47, 1128-35(1927).—The mech. properties between 20° and 600° of 4 typical boiler-plate steels have been detd. after annealing for 1 hr. at 920° and cooling slowly. The elastic limit remains constant up to 220° and then falls slowly with rise of temp., the tensile strength increases slowly to a max. at about 275° and then falls rapidly, and the elongation decreases slowly to a min. at 250-275°, then increases slowly. The impact strength reaches its max. at 120° and a min. at 500-600°. Tables showing the compn. and variation of the mech. properties with the temp. are given together with graphs for all the steels tested. B. C. A.

Metallographic investigation of metallic material [boiler tube]. F. HANAMAN. *Archiv. Hém. Farm.* 1, 236-42(1927) —Metallographic examn. of a burst steel boiler tube shows that it must have been heated at least to 850° and then quenched with steam, thereby causing the formation of martensite; on reheating at 750° it returns to its original homogeneous structure. B. C. A.

A modern plant for the heat treatment of miscellaneous steel castings. A. W. LORENZ. *Trans. Am. Foundrymen's Assocn.* 1928 (preprint), No. 28-10, 141-52. E. H.

Transverse surface cracks in rails. H. VITHAUX. *Rev. métal.* 24, 485-95, 601-18, 671-82(1927).—A detailed description is given of exhaustive tests carried out at the Cie des Forges de Chatillon, Commentry et Neuves-Maisons to det. the causes and mechanism of the formation of surface cracks of rails in service and the means of preventing or reducing their formation. Transverse surface cracks are caused by the slipping of the wheels on rails the surface of which has previously become hardened, either by air cooling after it has been heated by friction or by cold-working by the action of the wheels; under the effect of the tension produced by the slipping of the wheels the non-ductile surface layer of the rail breaks. Such cracks can form in steels of any compn. or quality; they form more easily and rapidly become large in hard steel the surface of which has been self-hardened by intense slipping of the wheels but they also form in mild steel (tensile strength 40-45 kg.) and render rails made from such steel extremely brittle if they have not been heat-treated. Micrographic examn. of cracked rails shows that segregation and inclusions facilitate the propagation of the cracks; but these defects also develop in very homogeneous steels of good quality. Though the formation of cracks cannot be entirely prevented by the use of steel which is very pure and sufficiently mild not to harden under the action of the slipping, the danger from the cracks can be very greatly reduced by suitable heat treatment of the finished rails, so that even the cracked rails can safely stand much more severe operating conditions than those to which they are subject at present. The method of treatment at present in use at the Neuves-Maisons rail mill (*C. A.* 20, 2642) allows of obtaining, in any type of steel, the modification in texture required to prevent the propagation of cracks and to render the latter practically harmless. A. PAPINEAU-COUTURE

Minute shrinkage cavities in some cast alloys of heterogeneous structure. W. A. COWAN. *J. Inst. Metals* (advance copy) No 451, 6 pp.(March, 1928).—Minute cavities in certain heterogeneous alloys are attributed to shrinkage, the final solidification of a low f.-p. component when entirely surrounded by other components already solidified being the cause. Some Sn-Cu-Sb alloys are shown to contain these cavities when small percentages of Pb are present and to be practically free from cavities with no Pb content. The main component, of the alloys described, is a solid soln. of Sb in Sn solidifying at 237° and the low f.-p. component is the eutectic mixt. with Pb, solidifying at 183°. Photomicrographs are shown. Cf. *C. A.* 13, 2501. J. W. B.

The behavior of metals and alloys during hot-forging. W. L. KENT. *J. Inst. Metals* (advance copy) No. 462, 18 pp.(March, 1928).—Small cylindrical specimens of Sn, Pb, Zn, Al, Cu and brass (70:30 and 60:40) were forged with a standard blow of 50 ft.-lb. at temps. up to the m. ps., and the mechanism of hot-forging was investigated by measurement of the degree of compression produced and by comparison of the Brinell hardness values so obtained. The following conclusions are drawn: (1) Although the forging test does not measure the malleability of a metal or alloy, it will indicate the relative forgeability at different temps. and also the liability for cracking to occur during the operation. A combination of the forging test and the notched-bar impact test gives the best approximation to the working properties. (2) Work at elevated temps. induces some strain hardening. With Cu this decreases progressively but very slightly up to 550°; with Al the decrease is probably greater. Rapid recrystn. aids hot-forging through the resultant softening. In some cases (Al) the inherent softness of the metal at high temps. aids hot-forging in the absence of

rapid recrystn. (4) The forgeability of 70:30 brass increases but little up to 750°, but that of 60:40 brass increases steadily between 400° and 600° and then very rapidly to the melting point. The presence of Pb caused cracking from 350° upwards but in 60:40 brass the cracks disappeared at 700° and the material contg. Pb produced a better forging than the pure alloy.

ROBERT F. MEHL

Heat treatment of aluminum and its light alloys. ROBERT J. ANDERSON. *Fuels & Furnaces* 6, 315-8(1928).—The theoretical considerations detg. the heat treatment of Al alloys are given and the time-temp. treatment for annealing wrought Al and Al alloys are considered. In mass annealing the time is 2-8 hrs., depending on the quantity of material, and the temp. is 350-450°. A thermocouple in the load is desirable. Small grain size is produced by annealing at the lowest feasible temp. and for the shortest time. "Flash" annealing is produced by passing small loads through a furnace at a rate exposing the alloy to a temp. of 375-450° for from 5 to 20 min. Hardenable alloys of the duralumin type are not heated above 350°. Non-hardenable Al alloys may be heated to 450°. *Ibid* 483-4.—Permanent growth in Al alloys is produced on heating to 260°. On cooling to ordinary temps. the casting will be measurably larger; a 4" casting may increase 0.004" in diam. Heating to 425° followed by slow cooling confers permanent growth on an Al casting and removes all internal strains. Recently self-hardening alloys have been produced which mature by remaining in air at ordinary temp.

J. W. SHIPLEY

Light metals and alloys, aluminum-magnesium. MISS M. G. LORENTZ, *et al.* *Bureau of Standards, Circ. No. 346*, 403 pp.(1927).—The author covers the available information on Al, taking up commercial Al, its production and applications, its metallography giving photomicrographs; its chem. and phys. properties, as well as its technology. The constitution, technology and properties of Al alloys of As, Sb, Bi, Be, B, Cd, Ca, Ce, Co, Cr, Cu, Ge, Au, Fe, Pb, Li, Mg, Mn, Mo, Ni, P, Pt, K, Se, Si, Ag, Na, Ta, Te, Th, Sn, Ti, V and Zn are considered. Mg is also reviewed from the standpoint of properties, metallurgy and technology, while the alloys of Mg with Al, Cu, Cd, Zn and Ni are discussed. An appendix giving the definitions of phys. terms and a bibliography are included.

A. W. COFFMAN

The thermal and electrical conductivity of some aluminum alloys and bronzes. EZER GRIFFITHS AND F. H. SCHOFIELD. *J. Inst. Metals* (advance copy) No. 457, 36 pp.(March, 1928); *Engineering* 125, 301-3(1928).—Two groups of alloys were investigated: (1) those rich in Al, with Ni, Mg, Fe, Zn, Si, Mn or Ag as second or third constituents (22 in number); (2) those rich in Cu, with Sn, Zn, Pb, Mn or Al (7 in number). The Al alloys were found to possess a thermal cond. of roughly 70 to 80% that of pure Al, whereas the bronzes range from 10 to 20% of the value for Cu. In contrast to the pure metals the alloys all give considerable increase of thermal cond. with temp. A minute amt. of P in bronze produces a marked lowering in thermal cond. The ratio of thermal to elec. cond. in the range 80° to 300° obeys Lorentz's law with the exception of the Al alloy contg. 13% Si.

ROBERT F. MEHL

Oxidation of chromium-nickel alloys at high temperatures. W. ROHN. *Elektrotech. Z.* 48, 227-30, 317-20(1927); *Science Abstracts* 30B, 349.—Detn. of the resistance of Cr-Ni wires is not a satisfactory method of estg. the extent to which the surface of the metal has been oxidized. E. g., a hard-drawn wire is increased in resistance about 9% by being heated *in vacuo* to 1000° and allowed to cool. If the resistance method is to be used, the wire must first be heated to a temp. higher than that at which the oxidation is to be investigated, in order to stabilize its structure and therefore the sp. resistance of the metal itself. The method used by the author consists in weighing the scale which flakes off a spiral of wire (a) when it cools suddenly to room temp., (b) when the wire is stretched. The wire is then re-wound as a spiral, and the test is repeated until the total amt. of scale collected after each period of heating becomes practically constant. The stretching of the wire is analogous to, but more severe than, the stress to which heating elements are exposed in service by differences between the thermal expansion of the wire, its supports, etc. In the second part of the paper data are given comparing the performance of various alloys at different temps. and showing the enormous differences between wires of the same compn. but different manuf.

H. G.

Widmanstätten structure of iron alloys. ALBERT SAUVEUR. *Proc. Am. Phil. Soc.* 66, 267-80(1928).—A review of recent expts. and theories concerning the hardening of steels by rapid cooling. Jeffries' "slip interference" theory of the source of hardness and Benedicks' "supersaturated soln." theory are discussed. Photomicrographs are used to illustrate the structures of various alloys of Fe.

WILLIAM F. BERT

The constitution of the alloys of magnesium and zinc. R. CHADWICK. *J. Inst.*

Metals, 1928 (advance copy) No. 449, 14 pp. — An investigation of the equil. diagram of the Mg-Zn system, for all compns. down to 340° and for some compns. to 250°. Both thermal and micrographical methods were used. The metals form two intermetallic compds., $MgZn_2$ and $MgZn_{13}$, and all 4 phases, Mg, $MgZn_2$, $MgZn_{13}$ and Zn, have been shown to form solid soln. There is no great change in the liquidus, but the solidus has been completely modified. A new solid soln., beta, has been found corresponding closely to the compd. $MgZn_{13}$. $MgZn_2$ forms a wide range of solid solns., which probably undergo complex changes at low temp. A summary is given of a method of analysis in which the Mg and Zn are pptd. sep. as phosphates from the soln. of mixed chlorides. Cf. C. A. 20, 2653.

J. W. BOECK

The alloys of sodium-potassium-mercury-cadmium. ERNST JÄNECKE. *Z. Metallkunde* 20, 113-7 (1928). — The system Na-K-Hg is thoroughly examd. and constitutional diagrams are shown. In the binary system K-Hg, the following compds. are found: KHg, bronze colored (m. 178°), KHg_4 and KHg_8 . They have characteristic crystal form and are easily identified. In the system Na-Hg, the compds. Na_3Hg , NaHg (copper-red, m. 217°), $NaHl_2$ and $NaHg_4$ are identified. In the mixt. Na-K-NaHg-KHg, the double compd. $NaKHg$ (m. 188°) is isolated and crystal as blue, glistening, hexagonal prisms. In the system Na-Cd-Hg, the compds. $NaCd_2$ (m. 385°), $NaCd_4$ (m. p. probably 360°), and $NaCdHg$ are found. In the system Na-K-Cd-Hg, the compd. KCd , (needle-like crystals, m. p. over 550°) is indicated. It reacts only weakly with cold H_2O , dil. H_2SO_4 and HNO_3 , but vigorously with warm HNO_3 .

H. STÖBERTZ

Studies on the tin-bismuth and tin-cadmium alloys in the solid state under special equilibrium conditions at different temperatures. M. LE BLANC, M. NAUMANN and D. TSCHESNO. *Ber. Verhand. sächs. Akad. Wiss. Leipzig Math.-Phys. Klasse* 79, 71 (1927). — As a criterion for the existence of perfect equil. conditions the authors take the exact coincidence of cond. curves on heating and cooling. By the elec. cond. and thermoelectric force measurements as well as by the use of microscopic methods there is shown the presence of a solid soln. of Sn in Bi of 3.5 at. % by elec. measurements and of 1.5 at. % by microscopic examn. On the tin side of the system there is present a compd. ($BiSn_2$) which dissociates at room temp. This forms with the excess tin a solid soln. In the Sn-Cd system below 130° the compd. $CdSn_4$ exists at 20 at. % Cd and forms with excess Cd a heterogeneous system. With excess Sn it forms a homogeneous phase at 2.5 at. % Cd. With increasing temp. the compd. breaks down and the homogeneous phase increases from 2.5 at. % Cd at 130° to 7.5% Cd at 175°.

A. W. COFFMAN

The alloys of zirconium. I. T. E. ALLIBONE and C. SYKES. *J. Inst. Metals* (advance copy) No. 458, 14 pp. (March, 1928). — A series of Zr alloys was prepd. *in vacuo* in an induction furnace (which is described). The structures of the Cu-Zr alloys up to 35% Zr, Ni-Zr alloys up to 55% Zr, Fe-Zr alloys up to 30% Zr were detd. In each case the system is eutectiferous, and intermetallic compds. are formed. In the Cu-Zr system the compd. Cu_2Zr is formed, in the Ni-Zr system two compds., probably Ni_3Zr and Ni_4Zr . The solid solv. of Zr in the pure metals Cu, Ni and Fe is in each case less than 0.5%. The hardness, tensile strength and ductility of certain of the alloys are recorded.

ROBERT F. MEHL

Quenching and tempering of brass, bronze and "aluminum-bronze." TSUTOMU MATSUDA. *J. Inst. Metals* (advance copy) No. 463, 42 pp. (March, 1928). — The effect of quenching and tempering on the microstructure, elec. resistance, Brinell hardness, tensile and impact properties of brass, bronze and "aluminum-bronze" was examd. The rate of cooling from high temps. exerts a profound influence on hardness and microstructure. The temper-hardening of brass, bronze and "aluminum-bronze" was investigated and it was confirmed that Cu alloys contg. proper amts. of the second metal may be hardened by suitable heat treatment. The nature of this temper-hardening was investigated by means of microscopic and dilatometric tests and elec. resistance measurements, and it is concluded that the hardening is accompanied by the separation of the α -phase from β - or γ -, or the decompn. of the β - or γ -phase into eutectoid, or both these changes, and is probably caused by the straining of the space lattice produced by these structural changes.

ROBERT F. MEHL

Report on cutting temperatures. Their effect on tools and on materials subjected to work. E. G. HERBERT. *Proc. Inst. Mech. Eng.* 1927, No. 4, 863-908. — By means of a pendulum hardness tester or "hot hardness" tester, tool steel, quenched in oil from 1300°, was found to possess the greatest hardness within the desirable cutting range, viz., 300-600°. Secondary heat treatment of steel hardened by quenching from 1300° showed that reheating to 575° produced a tool with the highest hot hardness and also

the greatest range of hot hardness. It is suggested that the merit of tool steels be appraised by making hot hardness tests on the hot tools immediately after removing them from the furnace in which they have received their heat treatment. A suitable furnace and the pendulum testing device are pictured and described. It is recalled that the resistance a material offers to cutting does not depend upon the original hardness but on the hardness induced by the tool. The induced hardness depends upon the work-hardening capacity of the metal and this latter property is shown to vary considerably with the temp. There is ground for believing that press work on sheet metals can be facilitated by working them at a temp. at which their work-hardening capacity is at a minimum. Strain etching of single crystals and crystal aggregates of Al and Fe showed that the change in work-hardening capacity with temp. is due to a crystn. phenomenon and can proceed both in the presence and absence of grain boundaries.

WILLIAM F. EHRET

Deformation of crystals of β -brass. G. I. TAYLOR. *Proc. Roy. Soc. (London)* **A118**, 1-24 (1928).— β -Brass, which is similar in crystal structure to α -Fe, behaves somewhat like α -Fe when distorted. In both metals distortion results in slip along planes which are not parallel to a definite crystallographic plane. In β -brass, however, with certain orientations of the crystal axes, slip does occur on the {110} plane. Which of these types of distortion will occur in β -brass is shown to depend upon the variation in resistance to shear which occurs as the plane of slip rotates about the direction of slip. This variation is calcd. from exptl. results and it is shown that resistance to shear is least when the plane of slip coincides with a crystal plane of type {110}. In β -brass, resistance to slipping in one direction on a given plane of slip is not the same as that offered in the opposite direction. This is to be expected from the crystallographic symmetry, but is not observed in α -Fe.

WILLIAM F. EHRET

The influence of dissolved gases on the soundness of 70:30 brass ingots. G. I. BAILEY. *J. Inst. Metals* **1928** (advance copy) No. 455, 12 pp.—The object was to det. whether unsoundness could be produced in 70:30 brass by treating the molten metal with N, H and SO₂ before pouring. The degree of unsoundness was detd. by d. measurements, ingots treated with N being taken as gas-free standard. Comparative tests were made on 5% Sn bronze and 70:30 brass with 4 different rates of solidification. It is concluded that whatever the conditions of casting, 70:30 brass is not liable to unsoundness caused by gases. A brief résumé of previous work done is included (cf. C. A. 4, 1951; 14, 3213; 21, 553, 555, 1953). Also in *Metal Ind. (London)* **32**, 351-2 (1928).

J. W. BOECK

Season-cracking of small-arms cartridge cases during manufacture. F. S. GRIMSTON. *J. Inst. Metals* (advance copy) No. 454, 24 pp. (March, 1928); *Engineering* **125**, 304-6.—A short history of the failure of small-arms cartridge cases in India during the past 21 yrs. is given, together with a description of expts. which led to the discovery of the probable cause. Season cracking takes place during the interval between a drawing operation and the subsequent anneal under certain conditions. The conditions are: the existence of differential stresses caused by tools of wrong design, and storage in this condition in contact with soap suds which have become contaminated with dil. H₂SO₄. A method is given of detg. the tension in the outer walls of the cases by measuring the contraction which takes place after removal of the inner supporting metal (cf. C. A. 16, 3293, 3863).

J. W. BOECK

The deterioration of lead-cable sheathing by cracking, and its prevention. S. BECKINSALE AND H. WATERHOUSE. *J. Inst. Metals* (advance copy) No. 459, 25 pp. (March, 1928); *Engineering* **125**, 299-300, 334-6 (1928).—The conditions under which Pb cable sheathing fail are outlined. Exptl. results described indicate that the defect is a fatigue type of failure produced by small alternating stresses, and that the failure is intercrystalline. Addn. of other metals to Pb raises the fatigue limit and so increases its resistance to this type of failure. It was found that Cd hardens Pb to a greater extent than Sb or Sn (which are sometimes alloyed with Pb for cable sheathing). The most satisfactory method of raising the fatigue limit is to use binary or ternary alloys of Pb contg. Sn, Sb or Cd. The fatigue limit is raised to more than 3 times that of pure Pb by the addn. of 0.5% Cd, while similar increases can be obtained by using ternary alloys contg. Cd and either Sn or Sb. The ternary alloys are permanent in compn. during melting and resistant to oxidation at elevated temps. to a greater degree than the binary alloys, and also possess good corrosion-resisting properties. The binary and ternary alloys investigated (Pb + 0.5% Cd, Pb + 0.25% Cd + 1.5% Sn, Pb + 0.25% Cd + 0.5% Sb) show age-hardening.

ROBERT F. MEHL

A contribution to the knowledge of the structure of cold-rolled metals. F. WYER

AND W. SCHMIDT. *Mit. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* **9**, 265-72 (1927).—See C. A. **22**, 589.

The ball hardness and the cold-working of soft metals and eutectics. F. HARGREAVES. *J. Inst. Metals* (advance copy) No. **461**, 27 pp. (March, 1928).—It is shown for a no. of soft metals (Sn, Sb, Cd, Zn, Bi, Cu, Al) and eutectics (Pb-Sn, Sn-Cd, Sn-Zn, Cd-Zn, Sn-Pb-Bi) that the relation between diam. of impression and duration of loading is given by the equation $d = ct^s$, where d = diam. of impression, t = duration of loading, and s and c are factors (which vary in certain ways). The equation is applied to the investigation of the work-softening of eutectics. Except for eutectics, it is suggested that factor s is a measure of the rate of spontaneous annealing. The effect of temp. of testing is found to be very important, and it is suggested that ball hardness results should be expressed as in the following example: Sn (6.35 mm./40.7 kg./30 sec./15°), Brinell hardness no. = 5.3, s = 0.050.

Historical note on density changes caused by the cold-working of metals. HUGH O'NEILL. *J. Inst. Metals* (advance copy) No. **450**, 3 pp. (March, 1928).—A discussion as to priority for the observation that its d . decreases when a metal is cold-worked.

Effect of rolling on single crystals of aluminum. S. TANAKA. *Mem. Coll. Sci., Kyōto Imp. Univ.* **10**, 303-9 (1927).—Single crystals of Al, in the form of plates 1 mm thick, were rolled to varying degrees, and the orientations of the small crystals produced by the destruction were investigated by x-ray methods. Three types of fibrous structures were observed. In the first type the fiber axes correspond with the [110] direction, and most of the (001) planes are nearly parallel to the rolled surface. The max. deviation from this orientation, which is produced by rotation of the crystals about the fiber axis, is about 26°. The second type has an orientation of the microcrystals such that the fiber axis corresponds with the [112] direction, and the (110) planes coincide with the rolled surface; the max. deviation from this orientation is about 28°. In the third type, the [111] direction and the (110) planes are nearly parallel to the fiber axes and the rolled surface, resp.; the deviation is here about 10°. Another arrangement similar to the third type but with the (112) plane parallel to the surface may exist, but the proof is incomplete. No simple relation could be traced between the initial orientation of the single crystal, the direction of rolling and the final state of the fibrous structure.

Volume change in certain type metals during solidification. YOSHIOHARU MATUYAMA. *Science Repts. Tōhoku Imp. Univ.* [1], **17**, 1-25 (1928).—The vol. change in pure Sb and certain type metals is measured by means of a thermobalance. Sb shows a vol. expansion of 0.95% during solidification, while the type metals all contract, the following results being obtained. An alloy contg. 85% Pb, 15% Sb —2.39%; monotype metal (76% Pb, 16% Sb, 8% Sn) —2.06%; linotype metal (79% Pb, 16% Sb, 5% Sn) —2.06%; stereotype metal (83.75% Pb, 11.75% Sb, 4% Sn, 0.5% Cu) —2.04%; electrotpe metal (92% Pb, 4% Sb, 4% Sn) —2.61%; a high-class type metal contg. 50% Pb, 25% Sb, 25% Sn —1.24%; a type metal actually in use —2.35%; an alloy contg. 90% Sn, 10% Zn —2.64%. From the data obtained the d . of the metals above their m. p. is calcd. The high-class type metal gives for d . at 180° —8.679, stereotype metal at 193° —10.345, monotype metal at 200° —9.922, linotype metal at 190° —10.031, electrotpe metal at 190° —10.834, type metal actually in use at 205° —10.284 and for 85% Pb, 15% Sb at 218° —10.362.

The dilatometric study of light metals. MAX HAAS. *J. Inst. Metals* (advance copy) No. **460**, 16 pp. (March, 1928).—An improved form of the Oberhoffer-Esser dilatometer (*Z. Feinmechanik Präzision* **34**, 229-33 (1926)) is described. Measurements on pure Al gave a smooth curve indicating that there is no allotropic change up to 610°. Differential dilatometric curves are given for pure Al, *alumin* (modified eutectic Al-Si), Al-Cu alloys (up to 4.8% Cu with about 0.5% Si and 0.5% Fe), and *duralumin*. These show (for the alloys) the structural changes which accompany change in temp.

Note on the composition of old Roman lead. W. A. COWAN. *J. Inst. Metals* (advance copy) No. **452**, 2 pp. (March, 1928).—Analysis is given of a specimen of Pb pipe found in Rome, dating from A.D. 79, showing it to be of similar compn. to that found in England (cf. C. A. **21**, 1954).

Noble metal thermocouples of high electromotive force. O. FEUSSNER. *Elektrotech. Z.* **48**, 535-7 (1927); *Science Abstracts* **30B**, 449. —Thermocouples consisting of constantan and Cu, Fe or nichrome have a high e. m. f., but the latter is not the same for different "melts" of the alloy; also, such couples are restricted to comparatively low temps. (under 1000°). Au and Ag alloys with Pd and Pt have thermoelectric properties

similar to those of constantan. The Ag alloys are not suitable for use at high temps. The curves for the solid and liquid states of Pd-Au alloys lie much closer together than those of Pt-Au alloys; hence it is easier to obtain homogeneous Pd-Au alloys. Also, allowing for the difference in ds., the cost of Pd is about half that of an equal vol. of Pt. The cost of noble-metal couples is justified by their reproducibility and the fact that small wires can be used at temps. up to 1200°; their high e. m. f. makes possible the use of high-resistance galvanometers. There is no difficulty in obtaining Au of a sufficiently high degree of purity and constancy of elec. properties. Pd contains Pt as an impurity, but F. proposes the use of an alloy contg. a definite percentage of Pt. Values of e. m. f. and cost comparisons are given for a Pt/Pt-Rh couple and for a couple consisting of an alloy of Au, Pd and Pt against an alloy of Pt with Rh or Ir and Pd. The actual compns. of these alloys are not stated. H. G.

The pickling of wire with sulfuric acid. ETTORE FERRARI. *Met. italiana* 20, 8-10(1928).—The conditions described by Falck (*Met. italiana* 1927, No. 11) for pickling wire are not the best. In particular the high temp. is objectionable for several reasons. Experience at the Fiat plant at Avigliana has shown that particularly good results are obtained with 20% H_2SO_4 (1:7 of 66° Bé.) and 0.25-0.5 l of Vogel ext. per 1000 l. of bath at 35-40°. Under these conditions 4 batches per hr. can be pickled, with great economy of acid, min. attack of the Fe and with hygienic advantages. This process is in use at many Italian wire plants. A representative plant consumes 1.5 kg. of 66° Bé. H_2SO_4 and 0.0044 l. of Vogel prepn. per 100 kg. of metal pickled. The use of 10% H_2SO_4 at 40-50° has certain advantages, for the consumption of acid is no greater, that of Vogel prepn. is much less and the process is more easily controlled. C. C. DAVIS

The resistance of metals to corrosion. KRAUSE. *Apparatebau* 40, 61-4(1928).—Notes are given on the resistance to oxidation, acids, etc. J. H. MOORE

Corrosion of aluminum. W. GUERTLER. *Z. Metallkunde* 20, 104-12(1928).—A general discussion of the factors which tend to produce corrosion in Al. Si is harmful unless the metal is heated to 400° and quickly cooled, which causes the Si to sep. in a highly dispersed condition. Si in the surface layer does not prevent the formation of a continuous oxide skin, since it oxidizes in the same manner as Al. Fe forms Al_2Fe , a brittle and coarsely cryst. substance and a good starting point for corrosive action when it occurs in the surface. Cu and Zn are generally not harmful. Al is attacked by alkalis and chlorides, lime and cement, but resists attack by natural waters, milk, wine, beer, etc. Methods of heat treating, casting, pickling, etc., are suggested. H. STOERTZ

Anomaly in the annealing of copper and brasses after cold hardening. P. NICOLAU. *Compt. rend.* 186, 696-9(1928).—When annealed Cu is first cold-hardened to various degrees (5-66%) and then annealed by immersion for 10 min. in a salt bath at increasing temps., the curves obtained by plotting Brinell hardness (or the diameter of the test mark) against annealing temp. exhibit, beyond the so-called "germination" zone, a systematic anomaly marked by a min. hardness (or max. of the diameter of the test mark). The phenomenon is not clearly apparent by micrographic examn. The anomaly is not so marked in the case of 72-28 and 67-33 brasses, being marked merely by an inflection of the hardness curves. Though in practice it is advisable, for the sake of safety, to anneal at a temp. in the region of the anomaly, the internal tensions revealed by immersion in 0.15% aq. $HgCl_2$ disappear at an appreciably lower annealing temp., corresponding exactly to the inflection point of the curve in the "germination" zone proper. A. PAPINEAU-COUTURE

Note in reference to platinum-tungsten welding. J. H. HIBBEN. *J. Am. Chem. Soc.* 50, 1118(1928).—Pt can be welded to W by cleaning the latter with $NaNO_3$, burning several coats of Pt into it from a soln. of lavender oil and $PtCl_4$, coating the Pt with borax and welding with an oxidizing flame. Au may be welded to W by cleaning the latter with $NaNO_3$, covering with borax and plunging, while hot, into a molten Au bead. J. BALOZIAN

Arc welding with methanol. H. MÜNTER. *A. E. G. Mitt.* No. 6, 241-4(1927); *Science Abstracts* 30B, 502.—A new method of arc welding is described in which an atm. of vaporized methanol is created round the arc. The methanol is forced under pressure from a nozzle in the electrode, and immediately vaporizes. Above 700° it decomposes into H and CO_2 , which have been found to have an advantageous effect on the weld. Photographs of welds done by this process are shown and compared with those done by ordinary arc welding and oxyacetylene welding. H. G.

An example of Roman copper "soldering" and welding from Uriconium. J. N. FRIEND AND W. E. THORNEYCROFT. *J. Inst. Metals* (advance copy) No. 453, 2 pp.

(March, 1928) --A Roman iron ferrule from Uriconium was examd. and micrographs were given. It was evidently made by welding two small pieces of iron into a strip, bending it over and "soldering" (brazing) the two ends with Cu. J. W. BOECK

Pigments for iron and steel primers (FASIG, PURDY) 26.

Briquetting iron ore, etc. A. CARLSON. U. S. 1,666,618, April 17. Fe ore or other material contg. Fe compds. capable of reduction are treated in finely divided condition with a small proportion of separately burnt lime, the mixt. is pressed into briquets and the briquets are hardened by high-pressure steam.

Treating sulfide ores. METALLBANK UND METALLURGISCHE GES. AKT.-GES. Brit. 273,976, Jan. 21, 1927. In roasting and sintering fine or sludgy sulfide ores, the fine material is mixed with broken up agglomerate of the same ore, of granular size, and the mixt. is blast roasted. Air or waste gases may be passed through the ore during the roasting.

Extracting metal. F. W. HALE and C. G. FINK. Can. 276,705, Dec. 27, 1927. Zn and S are extl. by decompg. ZnS by Br dissolved in a soln. of a halogen salt and depositing the Zn therefrom, the Br being regenerated by electrolysis.

Metallurgical briquet. W. B. RUNYAN. U. S. 1,666,312, April 17. Ore such as that of Fe is mixed with ground coke, "silicon sand" and lime. The sand and lime are used in approx. equal quantities and in sufficient proportion to hold the carbonaceous material together. Ferro Mn may be added.

Protection of the surface of baths of easily oxidizable metals. G. MICHEL. Can. 276,520, Dec. 20, 1927. The surfaces of the baths of easily oxidizable metals, such as Mg, are protected by covering with a layer of the fluoride of the metal and covering the crust so formed with S. Cf. C. A. 22, 1658.

Extracting gold from sea water with antimony sulfide or other metallic sulfides. B. STOKES. Brit. 273,346, Dec. 23, 1925.

Apparatus for refining molten metals by joint action of centrifugal force and of gas under pressure. N. N. JAROTZKY. Brit. 273,788, April 1, 1926.

Sectional mold for casting continuous steel ingots. M. DOUTEUR. Brit. 273,311, June 22, 1926.

Ingot mold. E. GATHMANN. U. S. 1,667,289, April 24.

Mold with compression walls for forming large castings without cracking. C. VANZETTI. U. S. 1,667,642, April 24.

Apparatus for casting brass, bronze, iron, aluminum or other metals of relatively high melting point. M. C. VALLS and J. S. ESTELLER. Brit. 273,984, Feb. 2, 1927.

Pit furnace for heating metal ingots. G. KEHREN. Brit. 273,671, June 30, 1926.

Reversible regenerative metallurgical furnace. B. TALBOT. Brit. 273,779, March 5, 1926.

Cast iron. R. KRUPP AKT.-GES. Brit. 274,035, July 9, 1926. Non-magnetic or weakly magnetic cast irons contain Mn 6-12, and Si 3-7% or C about 3, Mn 3-8, Si 1-5 and Ni up to 4%.

Pig iron. F. WUST. Brit. 274,438, July 17, 1926. In purifying pig Fe produced in a coke blast furnace, the molten Fe is run into a rotary tubular furnace provided in one of its heads with a tap-hole and a slag produced from lime and Fe ore is added. The furnace is then rotated and as soon as the slag ceases to act the furnace is stopped, the slag is tapped and a fresh slag is produced on the Fe. After further rotation and completion of the purification, the Fe is tapped and the slag left for use with the next charge of Fe.

Pig iron. K. STOBRAWA. U. S. 1,666,428, April 17. In preheating pig Fe in a highly heated flat hearth mixer, pig Fe high in C is supplied and a sep. supply of low-C scrap Fe is preheated as closely as possible to the m. p. by a source of heat sep. from that of the mixer; an immediate carburization of the low-C scrap Fe and a lower m. p. is thus effected and the percentage of Mn in the pig Fe to be treated is maintained substantially const. and the percentage of Si, C and P is reduced.

Iron and steel. E. PIWOWARSKY and P. OBERHOFFER. Brit. 274,419, July 15, 1926. In the production of high-grade Fe and steel as described in Brit. 267,939 (C. A. 22, 1129) a material having less than 1.5% C is produced in the cupola furnace, in one operation and this material may then be treated in the fire-hearth of the furnace and may be cast into blocks or other shapes.

Steel. R. A. HADFIELD. Brit. 273,855, April 29, 1926. To avoid porosity of ingots a melt of normally finished steel is tested by pouring a sample into a small mold

of green sand or other material and, if the sample indicates a rising instead of piping, is treated with a deoxidant such as Al or ferro-Si, to give the steel a "settling nature."

Restoring elasticity in steel. G. L. KELLEY. U. S. 1,667,476, April 24. In restoring elasticity in steel locking rings of automobile wheels, the blank stock is cold-worked to produce the rings and they are then heated to 90–425° for 30–0.5 min.

Alloy for bearings. I. R. VALENTINE. U. S. 1,667,641, April 24. Cu 70 and Pb 25 parts are used with a hardening metal such as Sn 5 parts, and a small proportion of As.

Ferrous alloys. INTERNATIONAL NICKEL CO. Brit. 273,523, Aug. 27, 1926. Ni or a Ni alloy, previous to its addn. to ferrous metal, is united with a substance or substances which will lower the m. p. of the Ni or its alloy and will have no deleterious action on the ferrous metal. C, Si and Al may be added as may also small proportions of P, and Cr, Mn, Cu, W, Mo and S.

Magnetic alloys. G. W. ELMEN. Brit. 274,136, July 12, 1926. A single magnetic element such as Ni may be used with Mo 1–6% so that the initial permeability of the product is substantially greater than that of the magnetic element alone. Very small quantities of Fe, Co and other elements may be present as impurities. Annealing may be effected by heating for about 1 hr at 1100° and then cooling slowly; this may be followed by reheating to about 600° and cooling quickly; or the material may be heated to 1100°, cooled slowly to 600° and then cooled quickly.

Magnesium-silicon-aluminum alloy. W. SCHMIDT. Can. 276,461, Dec. 20, 1927. An alloy contains 4% Si and 6% Al, and shows in its structure a voluminous segregation of particles of Mg silicide.

Silver alloy. A. PETIT. Can. 276,493, Dec. 20, 1927. A Ag alloy contains approx. the following parts by wt: Ag 35–50, Ni 12–10, Cu 38–30, Zn and Cd 15–10. Methods of prepg. the alloy are specified.

Treating aluminum and its alloys to prevent corrosion. A. PACZ. Brit. 273,956, Nov. 27, 1926. See U. S. 1,638,273 (C. A. 21, 3180).

Treating silica precipitates to obtain metal values, etc. R. H. STEVENS, G. C. NORRIS and W. N. WATSON. Brit. 274,297, Aug. 23, 1926. Bulky or gelatinous ppts. of silica, with or without ferric Fe or alumina, obtained by neutralizing solns. of Zn, Cu or V with basic substances such as ZnO, lime or limestone, are converted to granular form by agitating them with an excess of the basic substance at a temp. of 40–65° (preferably 55°). Metal values are recovered from the granular ppt. by passing it in the form of a filter cake through a series of washing chambers in which it is treated with acid liquors. The method is especially applicable to solns. produced by leaching ores.

Magnetic material. J. W. ELMEN. Brit. 273,638, June 30, 1926. A material with negligible variation in permeability and negligible hysteresis loss over a wide range of flux densities may contain Co 5–80, Ni 10–81 and Fe 10–45% with or without small quantities of Cr, Mn or other metals to increase the specific resistance or workability; e. g., Ni 45, Co 25, Fe 30 and Mn 0.5 parts.

Magnetizable materials. A. F. BANDUR. U. S. 1,666,191, April 17. In order to improve the magnetic characteristics of materials as Ni-Fe alloys used as loading material, the material is locally flash-heated to a high temp. and cooled so that a rapid loss of heat occurs from a temp. not below 500°.

Wire for windings or wireless transformers, etc. NAAMLLOOZE VENNOOTSCHAP PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 274,079, July 12, 1926. The core of enamelled wire is made of a highly refractory metal such as Mo, W or Ta or their alloys.

Flexible metal walls. F. K. BEZZENBERGER. U. S. 1,667,303, April 24. In making flexible deeply corrugated tubular metal walls such as those of thermostat bellows a tube of Fe or other soft ductile metal is formed into a corrugated tube and the metal of the tube is then combined with a material such as C capable of increasing the elastic limit and tensile strength.

Rolls for rolling mills. M. PETERS. Brit. 273,575, Dec. 10, 1926. Rolls for pilger-mills are forged from ingots cast from a steel alloy contg. Cr 1.5–2.2, W 1–1.65% and which may also contain Mn 0.4–2%, Si 0.015–0.2% and C 0.6–0.8%. The P and S are below 0.03%.

Annealing ferrous metals. F. KRUPP AKT.-GES. Brit. 274,016, July 7, 1926. Low-C irons or steels are rendered more resistant to various liquids, vapors and gases by quenching them at temps. above 650° (varying somewhat with different alloys). The quenched steel may be drawn at temps. not exceeding 750°.

Arc welding in an atmosphere of helium to obtain ductile welds. H. M. HOBART. Brit. 273,706, June 29, 1926.

Chromium-plated torch tip for welding-torches or similar devices. G. I. JONES. U. S. 1,606,387, April 17.

Welding rail joints. C. STENFELD. Brit. 273,326, June 28, 1926. The metal in a welded joint is subjected to a heat treatment after welding to transform its coarse-grained into a fine-grained structure. The joint is preferably first elec. heated above the highest crit. point, quenched by oil or water sprays, reheated and cooled in air, warm oil or water.

10—ORGANIC CHEMISTRY

CHAS. A. ROULLER AND CLARENCE J. WEST

Recent advances in science: Organic chemistry. J. N. F. DAY. *Science Progress* 22, 578-83 (1928).—Review of recent work on polymethylene and heterocyclic compds.

JOSEPH S. HÖPPBURN

New investigations in the field of organic chemistry. F. UNGER. *Arch. Pharm.* 266, 244-69 (1928).—A review.

W. O. F.

The measurement of reaction velocities in organic chemistry. C. F. VAN DUIN (*Chem. Weekblad* 25, 202-5 (1928)).—The various factors which should be considered when the velocity of an org. reaction is to be measured are discussed, viz.: (1) The reaction chosen should be such that it is possible to explain its course, the influence of substituents, etc., by means of existing theories. (2) The course of the reaction should be detd. experimentally, it being insufficient to det. the order of the reaction by calcul. from the exptl. figures according to various equations. (3) Side reactions should be avoided as far as possible and, if present, it must be shown that they do not play an important role. (4) The substances to be used should be pure: cryst. products should be recrystd. until a const. m. or setting p. is obtained, the last recrystn. being made from the solvent in which the reaction is to be measured. Liquid products should be purified by means of a cryst. deriv. from which the substance can be obtained in a simple way. (5) The independence of the velocity of reaction of the surface area of the reaction vessel must be controlled. (6) With various solvents it should be shown that the same reaction occurs in the solvents used and that the extent of possible side reactions does not vary appreciably with the various solvents. (7) The influence of electrolytic dissocn. should be considered, because not only the velocity of the reaction with the undissociated substance will in general be different from that with the corresponding ion but also the products of the reaction may be different in the two cases. (8) It is emphasized that the phenomenon of cation catalysis occurs far more frequently in org. chemistry than is generally supposed; a method is given for the detection of this phenomenon and for ensuring that it is quant. the same with the various products to be compared.

C. F. VAN DUIN

The slow combustion of the hydrocarbons. STANISLAS LANDA. *Compt. rend.* 186, 589-91 (1928).—L. experimentally demonstrates the probable correctness of Bonnes' theory of the formation of hydroxylated mols. in the slow combustion of hydrocarbons (*C. A.* 1, 550). A sample of white paraffin m. 51° is subjected to slow combustion at 280-300° according to the method of Schulz (*C. A.* 7, 1603). The products identified were EtCHO, Me₂CO, MeQH, EtOH, PrCHO, MeCOEt, C₆H₁₃CHO, C₇H₁₅CHO, C₈H₁₇CHO, C₉H₁₉CHO and C₁₀H₂₁CHO. The formation of these products is taken as a clear indication of the hydroxyl process of oxidation.

D. H. POWERS

Synthesis of higher hydrocarbons from water gas. D. F. SMITH, J. D. DAVIS AND D. A. REYNOLDS. *Ind. Eng. Chem.* 20, 462-4 (1928).—A study was made of the efficiency of different catalysts in producing liquid hydrocarbons from water gas at atm. pressure. Under the best conditions, with Co-Cu-Mn catalyst, 66 g. of oil were produced per cu. m. water gas.

T. S. CARSWELL

Properties of conjugated compounds. IV. Formation of isomeric additive dibromides from butadiene. E. H. FARMER, C. D. LAWRENCE AND J. F. THORPE. *J. Chem. Soc.* 1928, 729-39; cf. *C. A.* 22, 941.—Although the proportion of the 2 isomers (1,2- and 1,4-Br₂ compds.) obtained during bromination shows great constancy under given exptl. conditions, it varies widely with the solvent employed; the % of 1,4-Br₂ compd. obtained in CHCl₃ was 63; in C₆H₆, 38.4; in AcOH, 70; in CS₂, 65.9. The liquid dibromide isomerizes slowly even at room temp.; the change became appreciable in 3-4 days; at higher temps. isomerization was more rapid and at 100° conversion to the extent of about 80% could be effected in a few min. The solid form, stable at room temp., likewise suffers isomerization at higher temps.; there was no indication of a 3rd isomer, the *cis*-1,4-dibromobutene of Griner. The equil. mixt. at 100° con-

tained about 80% solid and 20% liquid isomer. Specimens of the pure liquid dibromide in C_2H_4 or $CHCl_3$ at -15° suffered only slight change, amounting to not more than a few %. The change under similar conditions with $AcOH$ was rather greater but still small. The introduction of small quantities of HBr into solns. of the pure liquid dibromide appeared to have in every case a definite accelerating effect but this was not marked, amounting in $CHCl_3$ to only 8% conversion. Both the 1,2- and 1,4-di-Br compds. liberate I from KI in glacial $AcOH$ at room temp. C. J. WEST

Addition of gaseous hydrogen chloride and hydrogen bromide to ethylene and propylene under the influence of catalysts. J. P. WIBAUT, J. J. DIEKMANN AND A. J. RUTGERS. *Rec. trav. chim.* 47, 477-95(1928); cf. C. A. 19, 1804; *Dutch patent* 12,788; *German patent* 445,981; U. S. A. patent 1,591,151.—The thermochem. data on the addn. of H halides to C_2H_4 and propylene of Thomsen (*Thermochem. Untersuch.* 4, 372) and Berthelot (*Ann. chim. phys.* [5], 23, 238(1881)) are not in agreement with one another, it only being certain that these reactions are exothermic and thus it is to be expected that they can be carried out at room temp. or at slightly elevated temp. providing a suitable catalyst be used. For the reaction between gaseous HCl and C_2H_4 $BiCl_3$ on *asbestos* appeared to be an excellent catalyst, catalysts of lower activity being $FeCl_3$, $VdCl_3$ and $AlCl_3$, while $SbCl_3$ and $BaCl_2$ show no catalytic action. The addn. of gaseous HCl to propylene proceeds much more quickly in the presence of catalysts than the reaction between C_2H_4 and gaseous HCl , $BiCl_3$ and $SbCl_3$ being active catalysts and iso- $PrCl$ being formed. It is to be emphasized that $SbCl_3$, which does not show any catalytic activity with C_2H_4 , is an active catalyst with propylene. For the addn. of gaseous HBr to C_2H_4 and propylene $BiBr_3$ and $SbBr_3$ were found to be active catalysts. For the large amount of details communicated as well as for the expts. on the prepn. of $EtCl$ from gaseous mixts. with low C_2H_4 content reference is made to the original paper. C. F. VAN DUIN

Cryoscopic evidence of compound formation in mixtures of organic liquids. W. M. MADGIN, J. B. PEEL AND H. V. A. BRISCOE. *J. Chem. Soc.* 1928, 707-11.—An attempt was made to apply the f.-p. test for compd. formation in such a manner that the result is obtained directly and without any calcn.; the liquids studied were dissolved separately in a given solvent to give solns. having the same depression of the f. p.; these solns. were then mixed and the depression was detd. for the mixed solns.; C_6H_6 , $PhNO_2$ and $CHBr_3$ were used as solvents. The data prove that compds. are formed in soln. by $o\text{-}ClC_6H_4OH$ with C_6H_5N , $PhNH_2$ or Et_2O ; by $CHCl_3$ with Et_2O or Me_2CO and by $CHBr_3$ with Me_2CO . $PhNO_2$ is less effective than C_6H_6 in causing dissocn. of some of these compds. but the opposite is also true in some cases. The reported results also confirm the earlier view that a rise of temp. on mixing is evidence of compd. formation. C. J. WEST

Liberation of hydrogen from carbon compounds. III. The interaction of monatomic alcohols and esters with fused caustic alkalis. H. SHIPLEY FRY AND EARL OTTO. *J. Am. Chem. Soc.* 50, 1122-31(1928); cf. C. A. 20, 1588.—With $MeOH$, further evidence has been adduced through duplicate series of runs extending over a wide range of temp. ($250\text{--}450^\circ$), confirming certain intermediate reactions assumed to occur according to the proposed type equation $RH_n + n MOH \rightarrow R(OM)_n + n H_2$ ($M = Na$ or K). In the investigation of the behavior of other monatomic alcs. and simple esters at temps. between 450° and 550° , data have been obtained which, within the limits of exptl. error necessarily entailed in the methods employed, substantiate the occurrence of the reactions predicted in conformity with the following equations, originally developed by applying the type reactions, $RH_n + n MOH \rightarrow R(OM)_n + n H_2$ and $RM_e_n + n MOH \rightarrow R(OM)_n + n CH_4$, to the mols. of the compds. investigated. In every instance oxidation of the C compd. by the fused caustic alkalis yielded carbonates, H and CH_4 . $MeOH + 2NaOH \rightarrow Na_2CO_3 + 3H_2$; $EtOH + 2NaOH \rightarrow Na_2CO_3 + 2H_2 + CH_4$; $PrOH + 6NaOH \rightarrow Na_2CO_3 + Na_4CO_3 + 5H_2 + CH_4$; $iso\text{-}PrOH + 2NaOH \rightarrow Na_2CO_3 + H_2 + 2CH_4$. $Me_2COH + 2NaOH \rightarrow Na_2CO_3 + 3CH_4$; $HCO_2Me + 4NaOH \rightarrow 2Na_2CO_3 + 4H_2$; $AcOMe + 4NaOH \rightarrow 2Na_2CO_3 + 3H_2 + CH_4$. The following compds. resisted the action of the fused caustic alkalis: NH_3 , $MeNH_2$, Me_2NH , Me_3N , Me_2O , Et_2O . IV. Interaction of glycol and glycerol with fused caustic alkalis. H. S. FRY AND ELSE L. SCHULZE. *Ibid* 1131-8.—The apparently contradictory results of Buisine and of Nef have been explained by showing that the various oxidation products obtained are dependent upon the quantities of alkalis used, the temps. employed, time of heating and the homogeneity of the reaction mixts. As the temp. is increased, fused alkalis being present in large excess, further oxidation occurs and fewer intermediate products are obtained; at sufficiently high temps. complete oxidation to carbonates with the

liberation of H is effected. Under the special method of investigating the oxidizing action of fused NaOH and KOH upon glycol and glycerol, which permits their slow addn. to a homogeneous reaction mixt. with const. temp. control, quant. data have been obtained which indicate the occurrence of the following reactions: complete oxidation of glycol at 350° to carbonates with liberation of H; partial oxidation of glycerol at 350° to carbonates with the liberation of H and CH₄, while complete oxidation to carbonates with the liberation of H is promoted by raising the temp. to 450°. At 450° about 20% of the glycerol was oxidized according to the reaction $C_3H_8O_3 + 6NaOH \rightarrow 3Na_2CO_3 + 7H_2$ and 78% according to the reaction $C_3H_8O_3 + 4NaOH \rightarrow 2Na_2CO_3 + 3H_2 + CH_4 + H_2O$. V. Interaction of dextrose, levulose, sucrose and cellulose with fused caustic alkalis. H. S. FRY AND EARL OTTO *Ibid* 1138-44.—Both dextrose and levulose, 90-95% of the quantities used, were oxidized to carbonates with the liberation of CH₄ and H; 90% or more of the quantities reacting is oxidized in conformity to the equation $C_6H_{12}O_6 + 8NaOH \rightarrow 4Na_2CO_3 + 2H_2O + 2CH_4 + 4H_2$, while the balance reacts according to the equation $C_6H_{12}O_6 + 12NaOH \rightarrow 6Na_2CO_3 + 12H_2$. Under identical conditions sucrose underwent carbonization to such an extent that the possibility of verifying any proposed equations for reactions occurring was precluded. Cellulose was completely oxidized, about 95% of the quantity reacting in conformity with the equation $C_6H_{10}O_5 + 14NaOH \rightarrow 5Na_2CO_3 + Na_4CO_3 + 12H_2$, while the remaining 5% reacted according to the equation $C_6H_{10}O_5 + 8NaOH \rightarrow 4Na_2CO_3 + H_2O + 2CH_4 + 4H_2$. C. J. WEST

Chlorine dioxide explosion. R. C. WAGNER. *J. Am. Chem. Soc.* **50**, 1233-4 (1928).—A warning of possible danger of explosion in the use of Milas's reaction of oxidizing primary alcs. by means of chlorate and dil. H₂SO₄ in the presence of V₂O₅; care should be taken to keep the temp. at 75-80° during and also following any addn. of fresh acid. C. J. WEST

Catalytic oxidation of ethyl alcohol. G. FESTER AND G. BERRAZ. *Anales asocn. quim. Argentina* **15**, 210-5 (1927).—V₂O₅, Ag₂VO₄ and Cu₂(VO₄)₂ deposited on SiO₂, Ag₂VO₄ on fuller's earth, and ZnO, heated to about 360°, catalyzed the oxidation of EtOH and air, producing AcH, AcOH and CO₂. Above 360° mostly CO₂ is formed. Under optimum conditions V₂O₅ gives 9-13% AcH and 2-5% CO₂; ZnO 10.7% AcH and 4.8% CO₂. E. M. SYMMES

Allyl hexoate and octoate. VENANCIO DEULOFEU. *J. Chem. Soc.* **1928**, 528.—CH₂:CHCH₂I (30 g.) and 42 g. Ag hexoate, boiled 2 hrs., give 75% of allyl hexoate, b. 186-8°; allyl octoate (71% yield), b. 225-30°. C. J. WEST

Preparation of aliphatic and aromatic sulfones with sodium hypochlorite. A. E. WOOD AND E. G. TRAVIS. *J. Am. Chem. Soc.* **50**, 1226-8 (1928).—With NaOCl solns. of low alkyl. (about 0.2% of free NaOH) Et₂S and Pr₂S were readily and completely converted to the corresponding sulfones; Bu₂S, Ph₂S and (PhC₂)₂S were less readily converted to the corresponding sulfones; and heptyl sulfide was the least reactive, being converted principally to the sulfoxide. C. J. WEST

Oxidation of sulfides by benzoylhydroperoxide. I. L. N. LEWIN. *J. prakt. Chem.* **118**, 282-6 (1928).—From expts. with S(CH₂Cl)₂, S(CH₂CH₂Cl)₂, Ph₂S and S(CH₂Ph)₂, it is concluded that sulfides are quant. oxidized to sulfones by BzO₂H. C. J. WEST

Formation of primary amines from Grignard reagents and chloroamine. G. H. COLEMAN AND C. R. HAUSER. *J. Am. Chem. Soc.* **50**, 1193-6 (1928).—Chloroamine reacts with Grignard reagents to form primary amines and NH₃. The yields of amines are greatest with the chlorides and least with the iodides. C. J. WEST

Competitive interaction of alkyl and aryl halides with magnesium. H. WM. RUDD AND E. E. TURNER. *J. Chem. Soc.* **1928**, 686-91.—A mixt. of 2 different halogen derivs. was allowed to react with 1 atom of Mg and the product analyzed after complete soln. of the metal had occurred. The slight difference in surface area and condition between 1 sample and another introduces no material error. The following relative reactivities were found (the no. given is the first term in the ratio x:1): Br:I: Me, 2.5; Et, 0.8; Pr, 1.3; Bu, 0.4; Br:Cl: Et, 3.2, Pr, 4.3; Bu, 9.9; I:Cl: Me, 2.7; Et, 2.5; Pr, 1.3; Bu, 1.2. PhBr-PhI, 52% Br in the product; o-MeC₆H₄Br-o-MeC₆H₄I, 94%; m-series, 88; p-series, 84; BuBr-PhCH₂Cl, 73% Br. C. J. WEST

The condensing properties of mixed magnesium alcoholates. V. GRIGNARD AND M. FLUCHAIRE. *Ann. chim.* **9**, 5-54 (1928).—G. and M. study the action of mixed Mg alcoholates on aldehydes and ketones and suggest a mechanism for the formation of the products obtained. It is suggested that the alcoholate condenses with the aldehyde or ketone to form a hemiacetal and this product condenses further in 4 ways. $RCH_2CHO + R'OMgCl \rightleftharpoons RCH_2CH(OR')OMgCl$ (I). I can react with itself, splitting

out 2 R'OMgCl, and the resulting product with the wandering of an H atom forms $\text{RCO}_2\text{CH}_2\text{R}$. In this reaction the catalyst is regenerated. I may condense with a mol. of RCH_2CHO , splitting our R'OH and yielding an aldol or ketol. In this reaction the catalyst is not regenerated. A 3rd mechanism of I is $\text{RCH}_2\text{CH}(\text{OCH}_2\text{C}_2\text{H}_5)\text{OMgBr} \rightarrow \text{RCH}_2\text{CH}_2\text{OMgBr} + \text{C}_2\text{H}_5\text{CHO}$, a reaction which is carried out in ether, resulting in the reduction of the original aldehyde. Finally, I may lose a mol. of alc. to give an unsatd. compd.: $\text{RCH}_2\text{CR}'(\text{OR}')\text{OMgBr} \rightarrow \text{R}'\text{OH} + \text{RCH} = \text{CR}'\text{OMgBr}$. It was found that pure Mg alcoholate was without catalytic effect, and it is probable that the double compd. of $\text{Mg}(\text{OR})_2\text{MgI}_2$ would have still less effect. The following method was used for prepg. the mixed alcoholates: $(\text{RO})_2\text{Mg} + \text{MgI}_2 \rightarrow 2\text{ROMgI}$. Ethylidene-acetone (II) was obtained in 45% yield by adding over 5 hrs. a mixt. of AcH and 0.5 the Me_2CO to the remaining Me_2CO in Et_2O shaken vigorously with 12% NaOH. Propylidene-acetone (III) (50%), b. 136.7° , d_4^{20} 0.8601, n_D^{20} 1.447, M. R. 30.31, was prepd. in the same manner as II, and at the same time 4-hexanol-2-one, b. 83° , d_4^{20} 0.9639, n_D^{20} 1.4353, was formed. Butylidene-acetone (60%) and heptylidene-acetone (70%) were prepd. similarly. Butylidene-acetone and mesityl oxide were reduced with an active Ni catalyst prepd. according to the method of Tanaka (C. A. 18, 2259) under 6 atm. of H_2 pressure with agitation, giving pure iso-BuCOMe (IV) (90%). BuCOMe (V) (80%) was obtained by the oxidation of BuCH(OH)Me with CrO_3 . Aldehyde condensation was carried out by treating 0.1 mol. of BuOMgI (VI) in 30 g. Et_2O with 0.5 mol. of AcH. After 2.5 hrs. ice and dil. HCl were added and the product was extd. with Et_2O and shown to contain 38% of a mixt. of AcOEt and AcOBu, 14% aldol, 19% high-boiling polymers. PrCHO with EtOMgI gave $\text{C}_3\text{H}_7\text{CO}_2\text{Bu}$, butyraldol and 2-ethyl-1,3-hexanediol butyrate (VII), b. $148-9^\circ$, b_{760} 255° , d_4^{20} 0.9473, n_D^{20} 1.4452, R. M. 60.72. VII boiled with alc. KOH gave PrCH(OH)CHEtCH₂OH, b. $133-4^\circ$, b. 116° , d_4^{20} 0.9367, n_D^{20} 1.4535. VI with BzH in Et_2O after 5 days gives 45% condensation consisting of BzOCH₂Ph (VIII) and 10% benzyl oxide. Furfural condenses in the presence of VI to the extent of 10% in 4 days, forming furfurylic alc. b. $75-6^\circ$, d_4^{20} 1.1359, n_D^{20} 1.4940, R. M. 25.12; and furfurylidene-butyraldehyde, b. $234-5^\circ$, b. $114-5^\circ$, d_4^{20} 1.061, n_D^{20} 1.5668, R. M. 46.18. BzH condensed with Me_2CO in Et_2O with VI to the extent of 60% within 19 hrs. Benzylidene-acetone, dibenzylidene-acetone and VIII, were isolated. In condensing ketones, the rate is generally directly proportional to the concns. of the mixed Mg alcoholate. Me_2CO (3 mols.) in Et_2O (100 g.) with $\frac{1}{3}$ mol. BuOMgBr (IX) after 3 hrs. reflux gives 20% diacetone alc. Refluxing 20 hrs gives a mixt. of 2,6-dimethyl-5-heptene-2,4-dione, b. $95-6^\circ$, d_4^{20} 0.9432, n_D^{20} 1.4577, M. R. 45.11, phorone and isophorone. 140 hrs. reflux shows little change in yield as the alcoholate is used up. MeCOEt with VI gives a better yield (82%) than with IX (75%) of 3-methyl-3,5-heptanone (X), b. 85° , d_4^{20} 0.9315, n_D^{20} 1.4367, M. R. 40.48. X heated with a trace of I_2 gives 3-methyl-3,5-heptenone, b. 167° ; semicarbazone, m. 115° . MeCOPr with XI in Et_2O gives 4-methyl-4,6-nonanolone, b. 110° , d_4^{20} 0.9076, n_D^{20} 1.4424, M. R. 50.18. On heating with $(\text{CO}_2\text{H})_2$ this product gives 4-methyl-4,6-nonenone, b. 90° , b_{760} 202° ; oxime, b. 130° . V gives 5-methyl-5,7-undecanolone, b. 110° , d_4^{20} 0.8975, n_D^{20} 1.4445, M. R. 59.26. Dehydrating gives 5-methyl-5,7-undecenone, b. 120° , d_4^{20} 0.8472, n_D^{20} 1.4541, M. R. 58.18; oxime, b. $140-50^\circ$. IV condenses with difficulty, giving a low yield of 2,4,8-trimethyl-4,6-nonanolone (XI), b. 99° , d_4^{20} 0.8962, n_D^{20} 1.4427, M. R. 59.13. Dehydration gives the expected ketone. MeCOAm (XII), after 5 days gives on vacuum distn. only the dehydration product, 6-methyl-6,8-tridecenone, b. 115° , d_4^{20} 0.8510, n_D^{20} 1.4592, M. R. 66.39; oxime, b. 165° . Oxidation with O_3 gives XII but no amylglyoxal was characterized. Et_2CO with IX gives a low yield of 4-methyl-3-ethyl-3,5-heptanolone, b. 105° , which on dehydration yields the ketone, b. 92° . Pr₂CO after 12 days gives a very small quantity of the dehydration product 5-ethyl-4-propyl-4,6-nonenone, b. 224° , d_4^{20} 0.8506, n_D^{20} 1.4569, M. R. 67.22. II in Et_2O with IX for 0.25 hr. gives the dehydration product 4-methyl-2,4,7-nonatrien-6-one, b. 102° , d_4^{20} 0.9187, n_D^{20} 1.4871, M. R. 46.97. III with IX for 10 min. gives the dehydrated ketone 5-methyl-3,5,8-undecatrien-7-one, b. 120° , d_4^{20} 0.9103, n_D^{20} 1.4899, M. R. 56.54. A small quantity of 3-methyl-4,3-heptenol, b. 62° , d_4^{20} 0.8477, n_D^{20} 1.4421, M. R. 39.96, is also formed. IV is heated with IX in Et_2O for 70 hrs. and then BzCl added and the mixt. refluxed 0.5 hr.; the resulting oil is the benzoate of XI, b. 123° , d_4^{20} 0.9706, n_D^{20}

1.4898. M. R. 60.74. Sapon gives IV and BzOH. Comparing the condensing activity of the different alcohols on PrCHO in 0.5 hr. BuOMgCl gives 65% condensation, IX 71%, IV 80%. In considering condensation products BuOMgCl gives 35% PrCO₂Bu, 11% butyraldol, 19% butyrate of the ethylhexanediol; IV gives 22, 8 and 50%, resp. Under the same conditions MeOMgI condenses to the extent of 18%, PrOMgI 78%, iso-AmOMgI 84% and PhCH₂OMgI 81%. The nature of the alc. affects the rate; iso-PrOMgI condensed to the extent of 70% in 0.5 hr., PrOMgI 78%, Me₂EtOMgI 77% and iso-AmOMgI 84%. D. H. POWERS

Action of bromine on formaldehyde. F. F. C. SCHEFFER AND N. B. VAN WENT. *Rec. trav. chim.* 47, 406-14 (1928). (French.)—The mechanism of the reaction of Br₂ on HCHO is as follows: $\text{HCHO} + \text{Br}_2 + \text{H}_2\text{O} \xrightarrow{k_1} \text{HCO}_2\text{H} + 2\text{H}^+ + 2\text{Br}^-$; $\text{HCO}_2\text{H} \rightleftharpoons \text{HCOO}^- + \text{H}^+$; $\text{HCOO}^- + \text{Br}_2 \xrightarrow{k_2} \text{CO}_2 + \text{H}^+ + 2\text{Br}^-$; $K_{\text{HCO}_2\text{H}} = 2.14 \times 10^{-4}$ (25°); $k_2 = 1.0 \times 10^4 k_1$ (25°) E. SCHOTTE

A reaction between acetone and ammonia. H. HOCK AND H. STUHLMANN. *Ber.* 61B, 470 2 (1928).—When equimol. quantities of Me₂CO and anhyd. liquid NH₃ are mixed at -65° or lower, the mixt. soon becomes strikingly opalescent and distinctly more viscous; then it warms up to 20-2° in the course of a few min., the opalescence and viscosity disappearing at the same time, and on cooling again to about -50° there sep. after a time 10-35% of well-formed colorless crystals, melting about -41°, of the compn. Me₂CO.NH₃ and decomp. a few degrees above the m. p. into their components. Their most probable structure is Me₂C(OH)NH₂. C. A. R.

Possibility of ring-chain valency tautomerism and of a type of mobile hydrogen tautomerism analogous to the Wagner-Meerwein rearrangement. I. Some derivatives of phorone. C. K. INGOLD AND C. WM. SHOPPE. *J. Chem. Soc.* 1928, 365-410.—Using the term "conjugation" in a general sense to connote the yoking together of centers of unsatn., not only when they are contiguous, but also when sep., the change

$\text{R}_2\text{C} \begin{array}{c} \diagup \text{C}=\text{C} \\ \diagdown \text{C}=\text{C} \end{array} \rightleftharpoons \text{R}_2\text{C} \begin{array}{c} \diagup \text{C}-\text{C} \\ \diagdown \text{C}-\text{C} \end{array} \parallel$ implies conjugation through space and suggests the possibility of a similar conjugation between double bonds situated at a distance in

open-chain olefinic compds. Thus a reaction such as $\text{X}_2\text{C} \begin{array}{c} \diagup \text{C}:\text{C} \\ \diagdown \text{C}:\text{C} \end{array} \rightleftharpoons \text{X}_2\text{C} \begin{array}{c} \diagup \text{C}=\text{C} \\ \diagdown \text{C}=\text{C} \end{array}$ appears possible, and, if it were reversible it could appropriately be described as an instance of "ring-chain valency tautomerism." Possible compds. for this study are the phorone

derivs; on passing through the series $\text{C} \begin{array}{c} \diagup \text{C}:\text{C} \\ \diagdown \text{C}:\text{C} \end{array} \rightarrow \text{C} \begin{array}{c} \diagup \text{C}:\text{C} \\ \diagdown \text{C}:\text{C} \end{array} \rightarrow \text{C} \begin{array}{c} \diagup \text{C}=\text{C} \\ \diagdown \text{C}=\text{C} \end{array}$, where

the center member is a general expression representing a gradation of intermediate states, one would expect to observe diminishing color, decreasing refractivity, decreasing parachor, diminishing unsatn., an increasing tendency to react in the last form and a decreasing tendency to react in the 1st form. Phorone itself is undoubtedly mainly of the 1st type. An approach towards the satd. condition is observed in passing to the di-Br deriv. For the extensive discussion of the structure of the following compds. the reader is referred to the original. In the prepn of α, α -dibromophorone (1,4-dibromo-2,2,3,3-tetramethyl-(0,1,2)-dicyclopentanone) (I) the phorone tetrabromide must be perfectly pure. Reduction of I with H₂ and red P gives 3,3,4,4-tetramethylcyclopentanone, m. 130°. 1-Bromo-2,2,3,3-tetramethyl-(0,1,2)-dicyclopentan-4-ol-5-one, m. 116°, yields a Bz deriv., m., 92°; a *d*-bromocamphorsulfonyl deriv., m. 150°; a *Me* deriv., n_D^{20-21} 1.5131-1.5147, d_4^{17} 1.3203, d_4^{20} 1.3159, d_4^{21} 1.3162, b_x 95°, b_{14} 120°, b_{20} 130°, b_{26} 133°; *p*-bromobenzyl deriv., m. 65°; *p*-nitrobenzyl deriv., m. 111°; with 50% EtOH-KCN there results the 1-CN deriv., whose *Ac* deriv., b_{15-16} 120°, d_4^{20} 1.0190, n_D^{20} 1.4549. 2,2,3,3-Tetramethyl-(0,1,2)-dicyclopentan-4-ol-5-one (II) yields a *Me* deriv., b_{18} 108-12°, n_D^{20} 1.4687 (in 1 expt., the product solidified and m. 37°); *p*-bromobenzyl deriv., m. 86°. 3,3,4,4-Tetramethylcyclopentanone (III) gives a dipiperonylidene deriv., yellow, m. 125°; with iso-AmNO₂ in EtOH-HCl there is formed the α, α' -dioximino deriv. (1,3-dioxime of 4,4,5,5-tetramethylcyclopentanetriene), pale yellow, m. 223° (decompn.); hydrolysis with HCl in the presence of HCHO gives a N-free oil, which with NH₂OH.AcOH gives a 1,2,3-trioxime, m. 168-9° and gives a strong purple color with FeCl₃. III gives an oxime, m. 107°; HCl salt, m. 119°. Reduction of the oxime with Na-Hg in EtOH gives 3,3,4,4-tetramethylcyclopentylamine (IV), m. 100-2°; picrate, bright yellow, m. 255° (decompn.); chloroaurate, orange-yellow, m. 230° (decompn.); HCl salt, deli-

quescent, m. 308° (decompn.); *Ac deriv.*, m. 95°. **II** and $\text{NH}_2\text{OH} \cdot \text{HCl}$ give the α -oxime, m. 96°, which crystals with H_2O , m. 75°; *HCl salt*, m. 174–5° (crysts. with 1CCl_4); *Bz deriv.*, m. 134–5°; the α -oxime treated with HCl in cold Et_2O gives the *HCl salt*, m. 69–70°, of the β -oxime, m. 114–5°; this 2nd oxime is sometimes obtained directly from **II**; on boiling with H_2O , the β -oxime is converted into the hydrate of the α -oxime. The β -*HCl salt*, treated with HCl in boiling Et_2O , gives the *lactam* of δ -amino- α -keto- β , β -, γ -tetramethylvaleric acid, m. 113°. α , α , β , β -Tetramethylglutaric anhydride, m. 184°; NH_3 gives the *imide*, m. 200–2°. **II** or the α -oxime, heated with an excess of $\text{NH}_2\text{OH} \cdot \text{HCl}$ and AcONa , gives the *dioxime* of 3,3,4,4-tetramethylcyclopentane-1,2-dione, m. 211°; with NH_3 this gives a *frazan*, $\text{C}_8\text{H}_{14}\text{ON}_2$, m. 209°. **II** and o - $\text{C}_6\text{H}_4(\text{NH}_2)_2$ give a golden yellow *condensation product*, $\text{C}_{18}\text{H}_{18}\text{N}_2$, m. 100°. **II** *semicarbazone*, m. 211–3° (decompn.); *anil*, m. 104°; *p*-dimethylaminoanil, yellow, m. 90°. Reduction of the α -oxime, m. 96°, gives **IV**. Reduction of the *Ac deriv.* of **II** with Zn and AcOH gives the 5-*Ac deriv.*, b_{18} 127°, of 2,2,3,3-tetramethylcyclopentanone, b_{18} 100°, m. 119°; *semicarbazone*, m. 222° (decompn.); *oxime*, m. 101–2° (*HCl salt*, m. 125°); reduction of the oxime gives 2,2,3,3-tetramethylcyclopentylamine, whose *picrate*, yellow, m. 242–3° (decompn.); *Ac deriv.*, m. 115°. The *Bz deriv.* of **II** and $\text{NH}_2\text{OH} \cdot \text{HCl}$ give a γ -oxime, m. 115°; heating with NOCl in CHCl_3 at 100° gives the *lactam*(?) of δ -amino- α -keto- γ , γ -dimethylisohexanoic acid, m. 200°. Reduction of the γ -oxime gives 5-hydroxy-2,2,3,3-tetramethylcyclopentylamine, analyzed as the *picrate*, yellow, m. 220–1°. The action of AmNO_2 and MeONa on 3,3,4,4-tetramethylcyclopentanone gives the γ -oxime(?); under certain conditions there results a δ -oxime, m. 172°, whose monohydrate, m. 83°; it gives a red color with FeCl_3 , a blue-green ppt. with $\text{Cu}(\text{OAc})_2$ and reduces Fehling soln. Reduction of the *Me deriv.* of **II** gives 5-methoxy-2,2,3,3-tetramethylcyclopentanone, b_{18} 88–90°, n_D^{18} 1.4580. The *p*-bromobenzyl deriv. of **II** yields an *oxime*, m. 175°; *HCl salt*, m. 133° (decompn.); *Ac deriv.*, m. 84°, which is reduced to a compd., m. 161–2°, to which no simple formula can be assigned, and 2-hydroxy-3,3,4,4-tetramethylcyclopentylamine, whose *picrate*, m. 215° (decompn.). The action of oxidizing agents on several of these compds. is discussed. 1-Chloro-2,2,3,3-tetramethyl-(0,1,2)-dicyclopentan-4-ol-5-one, m. 116° (*Ac deriv.*, m. 47°); 1,1-dichloro-2,2,3,3-tetramethylcyclopentanedione, orange, m. 187°; 1-chloro-1-bromo deriv., orange, m. 178°.

C. J. WEST

The reduction of α -eleostearic acid; 10,12-linoleic acid and 11-oleic acid. J. BÖRSEKEN AND J. V. KRIMPEN. *Verslag Akad. Wetenschappen Amsterdam* 37, 66–8 (1928).— α -Eleostearic acid, $\text{Me}(\text{CH}_2)_7\text{CH}:\text{CHCH}:\text{CHCH}:\text{CH}(\text{CH}_2)_7\text{CO}_2\text{H}$, m. 46°, b . 169–70.5°, n_D^{15} 1.5043–1.5086, has been esterified; the *Et* ester has been distd. in a cathodic vacuum and hydrogenated with only 1 mol. H_2 . The resulting ester has a mol. refraction = 96.87, indicating an exaltation of 1.59 due to 1 pair of conjugated double bonds. The free acid, m. 28.5°, n_D^{70} 1.4639, obtained therefrom, has 2 double bonds, in the 10,11- and 12,13-positions, this being ascertained by ozonization. A further reduction gives an 11-ethylenic acid, m. 52–3°, which seems to be identical with vaccinic acid (cf Bertram, *C. A.* 21, 2391).

A. L. HENNE

Walden inversion. **XI**. Oxidation of secondary mercaptans to corresponding sulfonic acids and the Walden inversion in the series of secondary carbinols. P. A. LEVENE AND L. A. MIKESKA. *J. Biol. Chem.* 75, 587–605 (1927); cf. *C. A.* 21, 52, 72; 22, 58.—From a study of the changes in the optical rotations in passing from the thiols to the SO_3H acids corresponding to a given sec. carbinol, the following conclusions seem to be justified: Halogenation of simple aliphatic sec. alcs. as well as of benzyl- and phenylcarbinols proceeds without Walden inversion; in methyl-, ethyl- and cyclohexylphenylcarbinols only SOCl_2 brings about the inversion; in PrPhCHOH , iso- PrPhCHOH , BuPhCHOH and $\text{Me}(\text{C}_{10}\text{H}_7)\text{CHOH}$, halogenation always proceeds with a Walden inversion. *l*- PrMeCHOH ($[\alpha]_D^{20}$ –9.06°) and const.-boiling HBr , refluxed 0.5 hr., give *d*-propylmethylbromomethane, b . 115–8°, ($[\alpha]_D^{20}$ 9.14° (Et_2O); with SOCl_2 the carbinol gives the compd. $\text{C}_{10}\text{H}_{20}\text{O}_2\text{S}$, b . 113–9°, ($[\alpha]_D^{20}$ 5.58°. *d*- PrMeCHOH ($[\alpha]_D^{20}$ 6.8°) and 3 mols. EtOH-KHS , boiled 3 hrs., gives *l*-propylmethylmercaptomethane, b . 112°, ($[\alpha]_D^{20}$ –4.66° (Et_2O); oxidation with $\text{Ba}(\text{MnO}_4)_2$ gives *l*-pentane-2-sulfonic acid, whose *Ba salt* has ($[\alpha]_D^{20}$ –2.51° (–3.25° for acid). *l*-Cyclohexylphenylcarbinol ($[\alpha]_D^{20}$ –21.4°) and SOCl_2 give a *chloride*, b . 105–7°, ($[\alpha]_D^{20}$ –29.4° (I), and with PCl_5 a *chloride*, b . 112–3°, ($[\alpha]_D^{20}$ –3.43°. I and KHS give a *mercapto deriv.*, which decompd. in a high vacuum, ($[\alpha]_D^{20}$ 27.7°; oxidation with KMnO_4 gives cyclohexylphenylmethanesulfonic acid, whose *K salt* has ($[\alpha]_D^{20}$ 4.10° (free acid, 4.79°). *d*- $\text{Me}(\text{C}_{10}\text{H}_7)\text{CHOH}$,

with $[\alpha]_D^{20}$ 11.06°, gives with SOCl_2 a chloride, m at room temp., $[\alpha]_D^{20}$ -36.4°; a *l*-carbinol, with $[\alpha]_D^{20}$ -35.2°, gives with PCl_5 a chloride with $[\alpha]_D^{20}$ 5.42°. A chloride with $[\alpha]_D^{20}$ -12.1° and KHS yields a mercapto deriv., having $[\alpha]_D^{20}$ 9.2°; α -1-naphthylethane sulfonic acid, $[\alpha]_D^{20}$ -66.9° (K salt, -53.6°). *d*-Cyclohexylmethylcarbinol, with $[\alpha]_D^{20}$ 7.40°, gives with PCl_5 a chloride, b_{16} 70-72°, $[\alpha]_D^{20}$ -5.02°; the mercapto deriv. has $[\alpha]_D^{20}$ -3.60° and the sulfonic acid, $[\alpha]_D^{20}$ 9.1° (K salt, 6.4°). *d*-Cyclohexylethylcarbinol, $[\alpha]_D^{20}$ 8.95°, with PCl_5 gives a chloride, b_{16} 88-93°, $[\alpha]_D^{20}$ -1.20°; SOCl_2 gives a product with $[\alpha]_D^{20}$ -2.97°; the mercapto deriv. b_{16} 95-100° and has $[\alpha]_D^{20}$ 0.64°; the sulfonic acid has $[\alpha]_D^{20}$ 2.97° (Ba salt, 1.79°).

C. J. WEST

Preparation of butadiene. S. F. BIRCH. *Ind. Eng. Chem.* **20**, 474 (1928).—The liquid hydrocarbon produced in the prepn. of oil gas was fractionated, and the uncondensed vapors were passed into Br_2 . The bromides were recrystd when butadiene tetrabromide (I), m. 117°, was obtained. Treatment of I with Zn dust yielded butadiene.

T. S. CARSWELL

Optical resolution of bromosulfoacetate acid. H. J. BACKER AND H. W. MOOK. *Rec. trav. chim.* **47**, 464-70 (1928).—Like chlorosulfoacetic acid (C. A. **19**, 1128) bromosulfoacetic acid (C. A. **19**, 2637) can be resolved into the optical components by means of the so-called "method of cold crystn." of the salts of this acid with several alkaloids, the *d*-rotatory component being obtained with strychnine and cinchonidine and the *l*-rotatory one with brucine, quinine and yohimbine. By means of strychnine the *d*-acid is obtained optically pure after 1 crystn., 15.3 g. of Ba bromosulfoacetate ($1.5 \text{ H}_2\text{O}$) in 1 l. of water being mixed with 26.9 g. of strychnine in 1 l. of water, acidified with 6-7 cc. of AcOH . The next day 7 g. (20%) of the optically pure normal strychnine salt of the *d*-acid, $\text{C}_2\text{H}_5\text{O}_6\text{BrS} \cdot 2\text{C}_{21}\text{H}_{22}\text{O}_2\text{N}_2 \cdot 4\text{H}_2\text{O}$, had crystd. from the soln. Ammonium salt.—(M) 11°, 15.5°, 20.0°, 24.0°, 28.0° for the lines 6560, 5890, 5460, 5160, 4860, resp. The optically active components racemizing very quickly in the presence of OH ions, an optically active Ba salt of the *d*-acid could not be prepd by decompn. of the strychnine salt with $\text{Ba}(\text{OH})_2$, while by means of BaI_2 an optically active Ba salt was obtained, which, however, was not optically pure, but contained about 20% of the *l*-acid. For the acid itself the following rotations were found: (M) 22.7°, 32.5°, 40.4°, 48.0°, 56.3° for the same lines as above. In order to prep. the *l*-acid by means of brucine it is recommended to sep first a part of the *d*-acid by means of the strychnine salt in the way described above and to use the mother liquor for the prepn. of the *l*-acid. For this purpose 1 l. of the mother liquor is decompd with NH_3 , the strychnine filtered off and 15 g. of brucine in 1 l. of water, acidified with AcOH , added to the soln. of the NH_4 salt. After 3 hours 1.5 g. (10%) of the optically pure brucine salt of the *l*-acid, $\text{C}_2\text{H}_5\text{O}_6\text{BrS} \cdot 2\text{C}_{23}\text{H}_{26}\text{O}_4\text{N}_2 \cdot 4\text{H}_2\text{O}$, had crystd.; this yields a *l*-rotatory NH_4 salt and free acid which show the same optical rotation as the *d*-acid, mentioned above. The *d*-acid can also be prepd in an optically pure condition by the so-called "method of hot crystn." of the brucine salt (cf. Erdmann, *Ber.* **13**, 2180 (1880); Tanret, *Bull. soc. chim.* [3], **15**, 352 (1896); Pope and Peachy, *Proc. Chem. Soc.* **16**, 42, 116 (1900); Mills and Bain, *C. A.* **5**, 479; Werner, *C. A.* **7**, 947; Leuchs and Wutke, *C. A.* **7**, 3330; Leuchs, *C. A.* **15**, 3112), thus making it possible to obtain both the *d*- and the *l*-acid by means of the same alkaloid. At room temp. the optically active substances described in this paper only racemize slowly, the racemization being enormously accelerated by HO ions.

C. F. VAN DUIN

• **Method for the preparation of partially acylated chloronitrotrimethyleneglycols.** ERICH SCHMIDT, GUSTAV RUTZ AND MAX TRÉNEL. *Ber.* **61B**, 472-7 (1928).—The method is based on the condensation of aldehydes with NO_2 compds. having at least one H atom on the C atom carrying the NO_2 group: $\text{O}_2\text{NCHClCH}_2\text{O}_2\text{CR}$ (I) + $\text{HCHO} = \text{HOCH}_2\text{CCl}(\text{NO}_2)\text{CH}_2\text{O}_2\text{CR}$ (II). Attempts to extend the method to the homologs of I met with difficulties, to be reported on later, and the condensation of I with higher aldehydes gave unsatisfactory results even with AcH . Further acylation of the II gives mixed esters. The II, considerably more viscous than the diesters, are high-boiling, colorless liquids, almost odorless when pure, except the mono- and diacetates, which solidify to a radiating mass. On long standing they partially decomp. For the condensation, which takes place only in alk. soln., the choice of the alkali is a decisive factor; its alkyl must be sufficient to rearrange the NO_2 compd. into the aci-form but it must not saponify either the original I or the II. The Na salts of the acid RCO_2H corresponding to each particular ester proved to be the best condensing agents, when, e. g., in prepg. the propionate NaOAc was used, the product was contaminated with the acetate (II, $\text{R} = \text{Me}$). A 6- to 8-fold excess of monomol. or only

little polymerized HCHO should be used; those esters which undergo disturbing side reactions under the influence of the aq. salt can be protected to a great extent by the use of Et₂O solns.: the salts of the higher acids should be employed in concd. aq. soln. *β-Chloro-β-nitroethanol esters*: acetate (89% from O₂NCHClCH₂OH and AcCl in CH₂Cl₂), b₉ 89–90°, d₄²⁰ 1.3580, n_D²⁰ 1.4429; *propionate* (87%), b₈ 95–6°, d₄²⁰ 1.2941, n_D²⁰ 1.4428; *butyrate* (91%), b₉ 107°, d₄²⁰ 1.2379, n_D²⁰ 1.4418; *isovalerate*, b₁₁ 111–3°, d₄²⁰ 1.1891, n_D²⁰ 1.4414. *Chloronitrotrimethyleneglycol monoesters*: *Acetate* (71%), b_{9.02} 107–8°, b₁₀ 146 7°, d₄²⁰ 1.4066, n_D²⁰ 1.4650 (*diacetate*, obtained from the monoacetate in 90% yield, b₁₀ 139 40°, d₄²⁰ 1.3400, n_D²⁰ 1.4513); *propionate* (69%), b_{9.2} 118–9°, d₄²⁰ 1.3436, n_D²⁰ 1.4613; *butyrate* (68%), b_{9.2} 117 8°, d₄²⁰ 1.2921, n_D²⁰ 1.4611; *isovalerate* (72%), b_{9.15} 117 8°, d₄²⁰ 1.2448, n_D²⁰ 1.4600. *Mixed esters*: *acetate propionate* (88%), b_{9.12} 98 9°, d₄²⁰ 1.2898, n_D²⁰ 1.4492; *acetate butyrate* (89%), b_{9.05} 106–7°, d₄²⁰ 1.2499, n_D²⁰ 1.4490; *acetate isovalerate* (86%), b_{9.07} 117 8°, d₄²⁰ 1.2129, n_D²⁰ 1.4476. C. A. R.

The composition of ivy-seed oil. ALPH. STEIGER AND J. VAN LOON. *Rec. trav. chim.* **47**, 471–6 (1928).—According to Palazzo and Tamburello (C. A. **9**, 1476), ivy-seed oil contains an oleic acid, the const. and some derivs. of which agree with those of petroselinic acid, investigated previously by S. and V. L. (C. A. **21**, 3474). The constitution of the solid oleic acid obtained from ivy-seed oil not having been investigated by P. and T., the authors prepd ivy-seed oil in the way described previously (*loc. cit.*) (yield 20%), d₄¹⁶ 0.9151, acid value 11.0, sapon. value 181.1, ester no. 170.1, glycerol as C₃H₂ 4%, I value (Wijs) 102.2, Reichert-Meißl no. 1.0, setting point 13.8, n_D⁴⁰ 1.4670; unsaponifiable matter 6.6%, fatty acids 89%, b. p. of the fatty acids 190–220°/10 mm; mean mol. wt. of the fatty acids 281.9, showing that the mixt. consists mainly of acids contg. 18 C atoms. For the sepn. into solid and liquid fatty acids by Twitchell's method the latter had to be modified (cf. the original paper), 67% solid and 33% liquid fatty acids being found. The quantity of higher satd. fatty acids could not be estimated according to Bertram's method (C. A. **20**, 1145; **21**, 2391, 2994; *Chem. Weekblad* **24**, 141 (1927)) but was calcd. to be 5.1% from Kaufmann's thiocyanate-iodine value (cf. C. A. **20**, 2256) which amounted to 85.4. These higher satd. acids chiefly consist of palmitic acid. On recrystn. of the solid fatty acids from 96% alc. at 0° was obtained petroselinic acid. This result was confirmed by ozonization, lauric and adipic acids being formed. On bromination of the liquid acids in ether and recrystn. of the bromides, thus obtained from petroleum ether (b. p. 40–60°) at –10°, linolic acid tetrabromide, m. 114.5°, was obtained, while linolenic acid hexabromide was absent. Further the presence of 9,10-oleic acid was demonstrated by conversion into elaidic acid (cf. C. A. **21**, 3474) while the quantity of linolic acid, which can be calcd. from the I value (Wijs) of 97.2 and the rhodanometric value (Kaufmann) of 85.4, was found to be 13.1% of the mixt. of fatty acids. It is still to be remarked that the compn. of the acids from ivy-seed oil closely resembles that of the acids from parsley-seed oil. C. F. VAN DUIN

A triple spiran (preliminary communication). P. PFEIFFER AND P. BACKES. *Ber.* **61B**, 434 5 (1928).—In view of the more recent rontgenological studies and conceptions as to the cryst. structure of pentaerythritol (I) P. and B. have undertaken a spatial study of I from chem. points of view (cf. Orthner, C. A. **22**, 1327). I was condensed with Et cyclohexanone-4-carboxylate to the triple spiran Et(O₂CCH(CH₂CH₂)₂C(OCH₂)₂C(CH₂O)₂C(CH₂CH₂)₂CHCO₂Et (II). According to the tetrahedral theory, such a compd. cannot exist in *cis-trans* isomeric forms but the acid should be resolvable with optically active bases. As a matter of fact, only 1 compd. is formed in the condensation; attempts to resolve it into active components are to be made. II (0.5 g. from 0.2 g. I and 5 times the calcd. quantity of the ester cautiously warmed until a clear soln. results), m. 139.5–40.5°. C. A. R.

Formation of lactic acid from sugar by the action of alkalis. W. WINDISCH, P. KOLBACH AND H. RUCKDESCHEL. *Wochschr. Brau.* **44**, 405–10, 417–22, 429–34, 441–6 (1927).—The substances formed are polysaccharides, resinous matters, saccharinic acids, *dl*-lactic acid, dihydroxybutyric acid. A thorough study was made of the formation of lactic acid by treating invert sugar, cane sugar, dextrose and levulose with NaOH, KOH, Ba(OH)₂ and Na₂CO₃. About 48–52% of the wt. of sugar can be converted to lactic acid in 6–8 days with 10% invert sugar and 2.5 N NaOH at 25°. The same quantity was produced in 30 hrs. at 40°, in 3 hrs. at 60°, and in 0.5 hr. at 120–80°. At a given temp. the conversion was proportional to alkali concn. when between 1.25 N and 5 N. Other substances formed were resins sol. in ether. Ba(OH)₂ and sucrose

gave 60% of the sugar as lactic acid if heated to 200°. Dextrose, while giving the same yield, is not converted as rapidly as levulose. Na_2CO_3 is only about 0.02 as active as hydroxides in decomp. sugars and a larger % of resins is found.

C. N. FREY

A new base from beef muscle and its constitution. WILHELM LINNEWEH. *Z. physiol. Chem.* **175**, 91-6(1928)—In attempting to isolate γ -butyrobetaine from Liebig meat ext. a new base, *crotonbetaine*, $\text{C}_7\text{H}_{13}\text{NO}_2$, was isolated as the *chloroaurate*, m. 215-7°, from the carnotine fraction. The yield was 150 mg. per kg. meat ext. The *HCl* salt, which is hygroscopic, is optically inactive. The *ester chloroplatinate*, m. 223-5° (decompn.). A double bond is present, as shown by the decolorization of KMnO_4 in the cold and by hydrogenation to γ -butyrobetaine, but its location has not been detd. The formula of the new base is either $\text{Me}_3\text{N} \cdot \text{CH}_2 \cdot \text{CH} : \text{CH} \cdot \text{CO} \cdot \text{O}$ or



A. W. DOX

Racemization. VI. Action of alkali on peptides and ketopiperazines. P. A. LEVENE AND R. E. STEIGER. *J. Biol. Chem.* **76**, 299-318(1928); cf. *C. A.* **21**, 97. Alkali causes no racemization of ketopiperazines contg. a tertiary asym. C atom which has no mobile H atom attached to it. "Thus the exptl. results are as expected on the assumption (expressed in previous articles) that the racemization of the amino acids in the ketopiperazines is brought about by a tautomeric change (enolization) involving the asym. C atom." The resistance towards the hydrolytic action of H and OH ions of ketopiperazines contg. a tertiary asym. C atom is approx. 10 times that of those contg. an asym. C atom with a mobile H atom attached. The results on other peptides and ketopiperazines amplified those obtained in previous expts. *Glycyl-d-isovaline* $[\alpha]_D^{27}$ 1.7°. *Glycyl-d-isovaline anhydride*, m. 269-70°, $[\alpha]_D^{27}$ 25° in $\text{C}_6\text{H}_5\text{N}$. *Glycyl-l-phenylmethylaminoacetic acid*, $[\alpha]_D^{27}$ -82.8°. *Glycyl-d-phenylmethylaminoacetic anhydride* m. 297-8°, $[\alpha]_D^{28}$ 9.3° in $\text{C}_6\text{H}_5\text{N}$. The deamination of isovaline is considerably slower than that of the common amino acids as it gives correct amino-N figures only after prolonged action of HNO_2 in Van Slyke's app.

A. P. LOTHROP

A racemization phenomenon with derivatives of amino acids. P. KARRER AND M. DALLA VEDOVA. *Helv. Chim. Acta* **11**, 368(1928).—*N-Benzoyl-l-leucine* and *N-Benzoyl-d-alanine*, when converted into the acid chloride with PCl_5 , undergo complete racemization. The change is complete in about 1 hr. at 0°.

J. S. REICHERT

Acetoacetic ester condensation. M. C. FRANKLIN AND W. F. SHORT. *J. Chem. Soc.* **1928**, 591-5.—Scheibler and Ziegner (*C. A.* **16**, 3067) state that the reaction product of Na or NaNH_2 upon AcOEt is $\text{AcCH}_2\text{C}(\text{ONa})(\text{OEt})_2$. According to S. and Friese (*C. A.* **20**, 403) this product reacts with BzH to give $\text{PhCH}:\text{CHCO}_2\text{Et}$, whereas $\text{AcCHNaCO}_2\text{Et}$ does not react with BzH . In repeating this work, the final product of the reaction is obtained in about 60% yield (S. and Z. report 94%) and contains both AcONa and AcONHNa . When the dry product is heated it begins to decomp. at 130° with distn. of a small quantity of EtOH , AcOEt and a trace of Me_2CO . On the other hand it reacts with EtI below 100° to form $\text{AcCHEtCO}_2\text{Et}$, together with AcOEt . Condensation with PhCH_2Cl gives $\text{Ac}(\text{PhCH}_2)\text{CHCO}_2\text{Et}$, $\text{Ac}(\text{PhCH}_2)_2\text{CCO}_2\text{Et}$, $\text{AcCO}_2\text{CH}_2\text{Ph}$ and, if NaNH_2 is used for the prepn. of the Na deriv., AcNHCH_2Ph . These results point to the conclusion that the Na product is very easily transformed into $\text{AcCHNaCO}_2\text{Et}$ even if this substance is not already present in it. The formation of ketene acetal and the ability of the Na product to condense with BzH constitute the only evidence available at present in favor of the structure assigned to it by S. The ketene acetal formation may be due to a secondary reaction. It will be shown later that $\text{AcCHNaCO}_2\text{Et}$ reacts with BzH with considerable violence.

C. J. WEST

α -Isopropylglutaconic acid. KALVOI VENKATAKRISHNA HARIHARAN, KOTTIAZATH NARAYANA MONON AND J. L. SIMONSEN. *J. Chem. Soc.* **1928**, 431-8.—Among the oxidation products of *d*- Δ^3 -carene with KMnO_4 was an acid, $\text{C}_8\text{H}_{12}\text{O}_4$, which was probably *cis*-homocarmonic acid, but might be either α - or β -isopropylglutaconic acid. Synthesis of these acids shows them to be different from the acid from carene. Et sodiodicarboxylglutaconate and iso-PrI give only Et trimesate. The bromination of α -isopropylglutaryl chloride (the acid was prepd from Et α -cyano- α -isopropylglutarate, b_m 195°) does not proceed smoothly and a Br ester of const. b. p. and correct compn. could not be isolated; the main product of the reaction was an acid ester, which gives on hydrolysis the lactone of γ -hydroxy- β -methylpentane- γ,ϵ -dicarboxylic acid. Et α -isopropylacetonedicarboxylate, from the K deriv. and iso-PrI, b_m 142-3°; FeCl_3 gives a deep red color. The free acid decomp. 153° and gradually on keeping. Re-

duction of the ester with Na-Hg in dil EtOH gives *Et β-hydroxy-α-isopropylglutarate*, b_{10} 145–6°; PCl_5 gives the β -Cl deriv., which gives with PhNEt_2 *Et α-isopropylglutamate*, b_{10} 148–50°. Hydrolysis and treatment with AcCl give *cis-α-isopropylglutamic acid*, m. 101°, and the *trans-acid*, m. 132°. The *Me ester* of caronic acid, m. 108–10°, on reduction with Na and EtOH, gives the lactone of δ -hydroxy- β , β -dimethylvaleric acid, b_{10} 137°, b_{100} 232–5°.

C. J. WEST

Action of bromine water on certain olefinic acids. JOHN READ AND WM. G. REID. *J. Chem. Soc.* 1928, 745–9.—With maleic acid, 89.3% of the reacting Br was converted into bromohydrin and HBr in a 0.05 *N* aq. soln., under the conditions adopted; the proportion fell to 81.9% in a 0.10 *N* soln. and to 62.5% in a 0.33 *N* soln. The Na salt, in aq. solns. of equiv. concns., decolorized Br-water with several hundred times the rapidity of free maleic acid; at the same time, the proportions of bromohydrin were distinctly enhanced and the graph connecting these proportions with the corresponding concns. became practically rectilinear over the range of concns. examd. Interaction between fumaric acid and Br-water was exceedingly slow; the Na salt, however, brought about decolorization with approx. half the speed of Na maleate and furnished proportions of bromohydrin slightly higher than those afforded by the latter salt. Free itaconic acid gave closely similar results. Coumarin underwent bromination in the C_6H_5 nucleus when treated with Br-water. Oleic acid also reacts with Br-water, but only 51.5% of the Br was effective in forming bromohydrin at the ordinary temp., in an approx. 0.1 *N* mixt. contg. some KBr.

C. J. WEST

Further data on the rotatory dispersion of alkyl aspartates. F. P. MAZZA. *Atti accad. Lincei* [6], 7, 148–50(1928); cf. *C. A.* 21, 1798.—A discussion of recent work by Pagliarulo (cf. *C. A.* 21, 2462; 22, 945). It is shown that in various ways the technic was not the best and that accordingly the data are not precise. Where they differ from similar expts. and conclusions of M., they are erroneous and they do not put in doubt any of the data or conclusions of M.

C. C. DAVIS

The rotation-dispersion of tartaric acid. FRIEDRICH BÜRKE. *Helv. Chim. Acta* 11, 369(1928)—Values calcd. for the mol. rotation of *tartaric acid* from an exponential formula proposed by B. correspond with experimentally detd. values.

J. S. R

Reactions and derivatives of iron carbonyl. WALTER HIEBER AND FRITZ SONNEKALB. *Ber.* 61B, 558–65(1928).— N_2H_4 reacts with $\text{Fe}(\text{CO})_5$ to form a blood-red soln. of sirupy consistency, which contains traces of colorless prismatic crystals, identified as semicarbazide. Treatment of the sirup with acid causes evolution of CO and H, and extn. of the product with Et_2O yields the tetracarbonyl, $\text{Fe}(\text{CO})_4$. If a soln. of $\text{C}_2\text{H}_5(\text{NH}_2)_2$ in pyridine reacts upon $\text{Fe}(\text{CO})_5$ for 4–5 hrs. at 80°, the substance $\text{Fe}(\text{CO})_4.2\text{en}$ is formed; brick-red, long, monoclinic or triclinic crystals, stable and insol. in the usual org. solvents, decompd. by H_2O . Only 60% is obtained, diamine and pyridine-contg. substances also being formed. Treatment with dil. acid and extn. with Et_2O , with careful exclusion of O, yields a deep brown-red cryst. substance, $\text{Fe}(\text{CO})_5.\text{en}.3\text{H}_2\text{O}$, Fe^+ salts and $\text{Fe}(\text{CO})_4$ being also produced. Treatment with concd. acid yields cyclic C compds. of the type of hydroxylated polyquinones. H. STÖRZ

The acetolysis of mannanocellulose. The production of tetramannohololide and pentamannohololide. GABRIEL BERTRAND AND JULES LABARRE. *Bull. soc. chim.* 43, 311–21(1928).—See *C. A.* 22, 1141.

E. H.

Cyclopentane derivatives with one lateral chain: Tertiary alcohols, ethylenic hydrocarbons and saturated hydrocarbons. G. CHAVANNE AND P. BECKER. *Bull. soc. chim. Belg.* 36, 591–604(1927).—Cyclopentanone has been treated with Et-, Pr- and BuMgBr. The corresponding tertiary alcs. have been obtained (60–75% yield) with a little cyclopentanol as impurity. The formation of the ethylenic compd. is realized by passage over Al_2O_3 at 300°, by heating at 120–30° with dry $\text{Al}_2(\text{SO}_4)_3$ or at 130–40° with $p\text{-MeC}_6\text{H}_4\text{SO}_3\text{H}$. In each case, the double linkage is located in the ring as shown by the products of oxidation. The corresponding satd. compds. were obtained by catalytic hydrogenation in the presence of Pt black and AcOH. *1-Ethyl-1-cyclopentanol*, b_{760} 154.5–5.2°, d_4^{25} 0.9225, $n_D^{11.5}$ 1.4556, $n_D^{11.5}$ 1.4578, $n_D^{11.5}$ 1.4633, $n_D^{11.5}$ 1.4679, $n_D^{18.0}$ 1.4524, $n_D^{18.0}$ 1.4545, $n_D^{18.0}$ 1.4601, $n_D^{18.0}$ 1.4646, its allophanate, m. 169°; *1-ethyl-1-cyclopentene*, b_{760} 106.5–107°, d_4^{25} 0.8941, d_4^{20} 0.8000, $n_D^{21.5}$ 1.4402, $n_D^{21.5}$ 1.4429, $n_D^{21.5}$ 1.4497, m. –123.3°; *ethylcyclopentane*, b_{760} 103–103.2°, $d_4^{14.0}$ 0.7711, $d_4^{14.0}$ 0.7669, m. –137.9°, $n_D^{18.0}$ 1.4179, $n_D^{19.1}$ 1.4201, $n_D^{18.0}$ 1.4253, critical soln. temp. in PhNH_3 , 38.7°; *1-propyl-1-cyclopentanol*, b_{760} 175.2–5.7°, d_4^{25} 0.9083, d_4^{20} 0.9044 \pm 0.0005, n_D^{20} 1.4515, n_D^{20} 1.4540, n_D^{20} 1.4595, its allophanate, m. 178°; *1-propyl-1-cyclopentene*, b_{760}

131.5-2.5°, m. -100.3°, d_4^{20} 0.8056, d_4^{20} 0.8015, n_D^{20} 1.4423, n_D^{20} 1.4450, n_D^{20} 1.4516, n_D^{20} 1.4574; *propylcyclopentane*, b_{760} 131.3-1.5°, m. -120.3°, n_D^{19} 1.4245, n_D^{20} 1.4266, n_D^{19} 1.4319, d_4^{14} 0.7814, d_4^{20} 0.7772, critical soln temp in PhNH_2 , 45.0°; *1-butyl-1-cyclopentanol*, b_{760} 195.4-5.9°, d_4^{14} 0.9022, d_4^{19} 0.8989, n_D^{19} 1.4539, n_D^{19} 1.4562, n_D^{19} 1.4618, n_D^{19} 1.4663, its allophanate, m. 181°; *1-butyl-1-cyclopentene*, b_{760} 157.5-158°, d_4^{17} 0.8101, n_D^{21} 1.4461, n_D^{21} 1.4488, n_D^{21} 1.4554, n_D^{21} 1.4610 m 95.75°; butylecyclopentane, b_{760} 156.8° \pm 0.1°, d_4^{14} 0.7887, d_4^{20} 0.7848, n_D^{20} 1.4292, n_D^{20} 1.4314, n_D^{20} 1.4366, m -108.2°, critical soln. temp in PhNH_2 , 50.5° A. L. HENNE

Formation of guanidino compounds by the action of guanidine on amino acid esters.
II. Formation of creatinine from sarcosine ethyl ester and guanidine or cyanamide, and of *dl*-5-*p*-hydroxybenzyl-2-imino-4-ketotetrahydroimidazole (*dl*- β -hydroxyphenyl- α -guanidinopropionic acid) from *dl*-tyrosine ethyl ester and guanidine. F. M. ARBER, H. ALDEN AND HANS SICKEL. *Z. physiol. Chem.* **175**, 68-74 (1928); cf. *C. A.* **22**, 1330. - Sarcosine Et ester at -15° reacts with guanidine to form NH₂ and 65% creatinine, with a sudden rise of temp to 20°. A similar reaction occurs between sarcosine ester and CNNH₂, but here the yield is only 29%. In this reaction, in contrast to that between glycine ester and CNNH₂, the addn. of a small quantity of guanidine decreases the yield of creatinine. The mechanism of the reaction may be explained by assuming the formation of a tetraammonomethane deriv. as an intermediate, which then splits off NH₃, or by a thermal decompn. of the guanidine into NH₃ and CNNH₂, which then adds the ester amine. A similar condensation occurs between *dl* tyrosine ester and guanidine, with formation of NH₃ and 27% *dl*-5-*p*-hydroxybenzyl-2-imino-4-ketotetrahydroimidazole, which m 257° and decomps 263°. A. W. DOX

Benzalcreatinine and related compounds. B. H. NICOLLET AND E. D. CAMPBELL. *J. Am. Chem. Soc.* **50**, 1155-60 (1928). Creatine (5 g.), 1 g. BzH, 15 g. fused AcONa, 50 cc. AcOH and 15 cc. Ac₂O, refluxed 1 hr., give 80% of *N*-acetyl-5-benzalcreatinine, m 208.9°, hydrolysis gives 5-benzalcreatinine (I), yellow, m 214° (decomps); *di*-HCl salt, bright yellow. Reduction gives 66% of 5-benzylcreatinine (II), m 282°, hydrolysis gives *N*-methylphenylalanine. Partial hydrolysis gives 1-methyl-5-benzylhydantoin, m 106°. 1-Methyl-5-benzylhydantoin (III), light yellow, m 193-4°, from the Ac deriv. of I. I, MeI and NaOH give *N*-methyl-5-benzalcreatinine, light yellow, m 129°. Hydrolysis gives III nearly quant. C. J. WEST

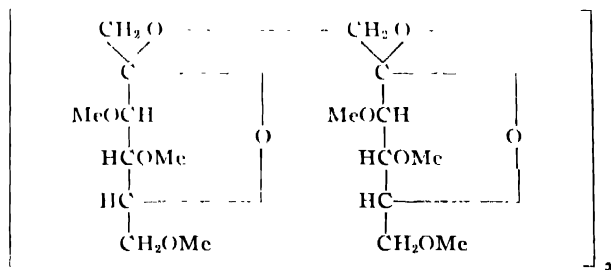
Derivatives of γ -xylose. A study of xylosemonoacetone and its conversion into 2,3,5-trimethyl- γ -xylonolactone. W. N. HAWORTH AND C. R. PORTER. *J. Chem. Soc.* **1928**, 611-8. -The cryst. xylosemonoacetone of Svanberg (*C. A.* **18**, 972) gave on methylation a di-Me deriv. with $[\alpha]_{D}^{20}$ 46.6°, n_D^{16} 1.4455, hydrolysis with 2.7% HBr, followed by oxidation with Br at 75°, gives dimethyl- γ -xylonolactone, b_{100} 105-6°, n_D^{16} 1.4643, $[\alpha]_{D}^{21}$ 81.5° (after 3 min), 85.1° (after 1 day), 83.2° (2 days), 66.0° (7 days), 54.5° (14 days), 44.1° (21 days), 39.6° (40 days), 39° (49 days); the phenyl hydrazide, m 94.5°. Further methylation gives the tri-Me deriv., b_{100} 84°, n_D^{16} 1.4472, whose phenylhydrazide, m 89-90°, is identical with that prepd from the lactone obtained by the oxidation of trimethyl- γ -xylose. The rate of hydrolysis of the lactone was studied by the polarimetric method and the rate of conversion of the free trimethyl xylonic acid into the lactone was similarly studied; these results confirm the butylenic oxide structure of the lactone. The di-Me deriv. is also a γ -lactone and it thus follows that the dimethylxylose is a butylene oxide or γ -sugar. From this it is also argued that the non-reducing xylosemonoacetone also contained a butylene oxide ring. Whether the same oxide-ring structure applies to xylosediacetone is a case for further argument but it is believed that such is the case. C. J. WEST

The structure of tetramethyl- γ -methylmannoside. P. A. LÉVEQUE AND G. M. MEYER. *J. Biol. Chem.* **76**, 809-12 (1928).—Oxidation of 3 g. of tetramethyl- γ -mannose gave 0.3 g. of β -tetramethylmannonic lactone identical in every respect with the product obtained on methylation of mannonic lactone (*C. A.* **21**, 3891). Tetramethyl- γ -methylmannoside, therefore, at least in part consists of a <1,4> mannoside. It is not as yet, however, absolutely certain that the structure of the unmethylated γ -mannoside is identical with that of the methylated γ -Me mannoside nor that the tetramethyl- γ -mannoside is not a mixt. of several ring isomers. A. P. LOTHROP

Dynamic isomerism. XXVI. Consecutive changes in the mutarotation of galactose. G. F. SMITH AND T. M. LOWRY. *J. Chem. Soc.* **1928**, 666-85. This work originated in an attempt to establish a standard value for the velocity coeff. of galactose; the

results thus far indicate that the mutarotation data for galactose cannot be interpreted on a 2-sugar scheme but can be expressed by a 3-sugar scheme; a 3rd sugar must therefore be formed in substantial quantities in soln.; this sugar must be related unsymmetrically to the α - and β -sugars, in rotation or in velocity of formation and reversion, or in both; since the mutarotation of β -galactose proceeds only very slowly during the first few min. and gives rise to inflected curves, the initial product of change must have a similar rotation to the β -sugar. The initial rotatory power of α - and β -galactose were selected as $[\alpha]_{461}^{20}$ 172.5° and 63.5° and of the equil. mixt. 94°. Tables are given of the mutarotation of α - and β -galactose. The equil. concns. deduced from the velocity coeffs. of the 3-sugar scheme are α 28.9%, β 59.5%, μ 12.0%. C. J. WEST

Polysaccharides. I. Structure of inulin. W. N. HAWORTH AND ABRAHAM LEARNER. *J. Chem. Soc.* 1928, 619-25.—Repeated methylation of inulin with Me_2SO , and 35% NaOH and then with MeI finally gives a tri-Me deriv., m. 138-40°, $[\alpha]_{\text{D}}^{20}$ -50.2° (CHCl_3 , c 1.61), does not reduce Fehling soln. Hydrolysis of 5 g. with 250 cc. 70% EtOH contg 2.5 g. (CO_2H)₂ by heating 10 hrs. gives 3,4,6-trimethyl- γ -fructose (I), faintly yellow, $b_{\text{D},20}$ 115°, n_{D}^{15} 1.4675, $[\alpha]_{\text{D}}^{20}$ 27.7° (CHCl_3 , c 1.57); the phenylosazone crystals with H_2O , yellow, m. 80-2°; the anhyd. form m. 137.8°. Oxidation of I with HNO_3 gives a trimethylsuccinic acid, whose ester is pale yellow, $b_{\text{D},18}$ 132-40°, n_{D}^{15} 1.4529, $[\alpha]_{\text{D}}^{16}$ 27.1°, reduces Fehling soln. actively; further methylation gives a product $b_{\text{D},1}$ 115-30°, n_{D}^{15} 1.4453, $[\alpha]_{\text{D}}^{16}$ 2° (approx., H_2O , c 1.2); with NH_3 this gives the amide of tetramethyl- γ -fructose. Oxidation with KMnO_4 gives *d*-trimethyl- γ -arabonolactone. Trimethylinulin thus has the formula



C. J. WEST

Cyclotelluropentane. G. T. MORGAN AND HENRY BURGESS. *J. Chem. Soc.* 1928, 321-9. -Te does not react readily with $\text{C}_8\text{H}_{10}\text{I}_2$ or $\text{C}_8\text{H}_{10}\text{Br}_2$; Al_2Te_3 and the halide, heated at 135-165° (the I_2 compd. reacts the most readily, the Cl_2 the least), give a mixt. of 3 types of products: *Cyclotelluripentane 1,1-dichloride*, m. 106-7° (which, however, is not formed directly from the chloride and Al_2Te_3), results by the thermal disson of I and the action of Cl upon the products or by the direct addn. of Cl to I; Na_2CrO_7 gives a yellow *dichromate*. *1-e-Chloroamylcyclotelluripentane 1-chloride* (I), m. 149-51°; heated, it gives V and $\text{C}_8\text{H}_{10}\text{Cl}_2$; Na_2CrO_7 gives a yellow, oily ppt., darkening on exposure to light. *Pentamethylene- α,ϵ -biscyclotelluripentane 1,1'-dichloride*, decomps 224.5°; the *1,1'-dichromate*, daffodil-yellow, decomps. 193°, is very sensitive to light. *Cyclotelluripentane 1,1-dibromide* (II), pale greenish yellow, m. 105-7°, results from the direct action of Al_2Te_3 upon $\text{C}_8\text{H}_{10}\text{Br}_2$ but is more conveniently prepd by the action of Br in CCl_4 upon the thermal decompn. products of III or IV (90% yields); II is hydrolyzed by H_2O , but no cryst. product sep'd on cooling. *1-e-Bromoamylcyclotelluripentane-1-bromide* (III), m. 143.5°, resolidifies at 147°; it gives an immediate ppt with AgNO_3 . *Pentamethylene- α,ϵ -biscyclotelluripentane 1,1'-dibromide* (IV), crystals with H_2O , decomps. 223-4°; in CHCl_3 Br and IV give a *1,1'-bisperbromide*, crystals with H_2O , m. 102-4°; it decomps. in aq. Me_2CO , giving a lachrymatory vapor. Ag. K metabisulfite transforms II into *cyclotelluropentane* (V), lemon-yellow oil, $b_{\text{D},12}$ 82-3°, $b_{\text{D},12}$ 44-5°, which is rapidly oxidized in the air, reacts violently with fuming HNO_3 and with H_2O_2 gives the *1,1-dioxide*, amorphous, explodes on rapid heating, liberates Cl_2 from HCl , decolorizes warm acid KMnO_4 and decomps. violently on treatment with concd. HNO_3 or H_2SO_4 . *Cyclotelluripentane diiodide*, deep red prisms with purple-blue reflex or highly refractive, slender orange prisms, m. 135-6°; light transforms the orange form into the dark red form in 2 days. The purple crystals become orange at 105°. *1-e-Iodoamylcyclotelluripentane 1-iodide*, m. 135-6°, remelts 197-8°. *Penta-*

methylene- α,ϵ -biscycloelluripentane 1,1'-diiodide, brownish yellow, m. 216–7° (decompn.). The complex bromides, III and IV, have only slight bactericidal action, whereas II and V are considerably more potent and give approx. the same bactericidal coeff. with *B. coli*, a result that indicates that in these cases the active agent is the 1,1-dihydroxide; this value is considerably less than the coeffs. obtained with the 3,5-dione series, but, unlike the latter, it is far less affected in serum. C. J. WEST

Oxidation by permanganate in alkaline medium. R. CORNUBERT AND H. LEBIHAN. *Bull. soc. chim.* 43, 248–55 (1928).—C. has pointed out (cf. C. A. 17, 1454) that oxidation of α -methylallylcyclohexanone (I) by alk. KMnO_4 gives rise to products varying with the nature of the alkali used. This work has been repeated, the alkalies used being NaOH, KOH and soda lime. It was found that the differences mentioned previously were due to secondary reactions occurring in the course of the distn. and that the nature of the alkali does not affect the oxidation process. Whatever alkali was used, the only neutral product was a glycol, obtained either in cryst. form, m. 103° (39.5–100° given previously) or in viscous form. The viscous form was contaminated with a small amt. of the ethylene oxide (II), formed by dehydration of the glycol by heat. II was found to polymerize readily under various conditions. Since I is a mixt. of 2, possibly 3, ketones, the viscous glycol was no doubt a mixt. of different glycols. LOUISE KELLEY

α,α' -Dimethylcyclohexanones. R. CORNUBERT. *Compt. rend.* 186, 585–6 (1928).—In the course of purifying α -methylcyclohexanone (I), 2 oximes were sepd.: the A form, m. 119°, and the B form, m. 64–5°. These oximes were reconverted into 2 forms of I: an A form (II), b_{41} 85°, d_{18} 0.914, n_D^{18} 1.4486 and M. R. 36.9, with a B form (III), b_{41} 80.5°, d_{18} 0.911, n_D^{18} 1.4482 and M. R. 37.0. The oxime of III is readily hydrolyzed at 30° and the oxime of II at 60°. BzH and HCl with II give a tetrahydropyronic deriv. (IV), m. 197–8°, while with III is formed an isomer of IV, m. 175°, b_{20} 271° and contg. a small quantity of a substance, m. 216°. The relative % of the A and B isomers formed varies widely with the conditions used. This class of ketones gives frequent rearrangement products and serves to explain the differences in m. p. of the oximes and semicarbazones observed by different authors. D. H. POWERS

Alkylation of α -cyano- β -alkylacrylic esters and of α -phenyl- β -alkylacrylonitriles. J. A. McRAE AND R. H. F. MANSKE. *J. Chem. Soc.* 1928, 484–91.— $(\text{CH}_2)_3\text{C}:\text{C}(\text{CN})\text{CO}_2\text{Et}$ (I) (Harding, Haworth and Perkin, C. A. 3, 887; Lapworth and McRae, C. A. 16, 4197) reacts with phenacyl bromide or MeI in the presence of EtONa , giving derivs. of the type $\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}:\text{CCR}(\text{CN})\text{CO}_2\text{Et}$ (II); this was thought

by H., H. and P. to furnish fairly conclusive evidence of the validity of structure II ($\text{R} = \text{H}$), which they assigned to the substance, but the products of decompn. were shown by L. and M. to support the formula I. Other reactions of this ester were found to be in agreement with this structure and it was pointed out that the formation of alkyl derivs. (II) can be explained on the basis of the structure I. Further studies are now reported on the Bu and Et derivs. of I in order to establish conclusively the structure II as that of these alkyl derivs. and at the same time to ascertain the behavior of these substances towards these reagents with which the parent α,β -unsatd. substances give characteristic results. The Na deriv. of I from 19.3 g. ester and 2.3 g. Na in 50 cc. EtOH, boiled with 23 g. BuI for 2 hrs., gives 15 g. *Et* α -butyl- Δ^1 -cyclohexenylcyanoacetate (III), b_{18} 163–4°; III absorbs Br readily but eventually HBr was liberated; HCN could not be added. The α -Et deriv. (IV), b_{22} 168°. The decompn. of the ozonide of III gives the half aldehyde of adipic acid and $\text{NCCBuCO}_2\text{Et}$ (isolated as adipic acid and $\text{BuCH}(\text{CO}_2\text{H})_2$ in 77 and 79% yields). From the ozonization of IV only adipic acid was isolated. *Et* α -cyano- α -butyl- Δ^8 -nonenoate, b_{11} 154–6° (11% yield); the decompn. of the ozonide gives $\text{C}_6\text{H}_{11}\text{CHO}$, HCO_2H and $\text{BuCH}(\text{CO}_2\text{H})_2$. $\text{C}_6\text{H}_{11}:\text{C}:\text{CPhCN}$ does not react with BuBr and EtBr in the presence of EtONa . With KCN in EtOH there results 1-cyanocyclohexylphenylacetonitrile, begins to decomp. above 264°. $\text{C}_6\text{H}_{11}\text{CHO}$ (30 g.) slowly added to 40 g. PhCH_2CN and 6.1 g. Na in 200 cc. EtOH at -10° gives 41 g. α -phenyl- β -hexylacrylonitrile, b_{13} 168–70°; attempts to add HCN with subsequent hydrolysis gave in 1 expt. a product consisting largely of $\text{C}_6\text{H}_{11}\text{CH}(\text{CO}_2\text{H})\text{CHPhCO}_2\text{H}$; in another expt., an acid, $\text{C}_{11}\text{H}_{20}\text{O}_4$, m. 170°, was obtained. C. J. WEST

Some derivatives of the cyclooctane series. MARCEL GODCHOT AND MLLÉ. *CAH. CHIM.* *Compt. rend.* 185, 1202–3 (1927).—Cyclooctanone (I), obtained from Th azelaate by the method of Ruzicka and Brugger, b. 197–8°, m. 29–30°; semicarbazone, m. 167°. Oxidation of I with CrO_3 gives suberic acid, m. 140°; diamide m. 216°; di-

anilide, m. 187°. Reduction of I gives cyclooctanol, $\text{CH}_2(\text{CH}_2)_6\text{CHOH}$ (II), b_m 106–8°, m. 14–5°, d₄¹⁷ 0.9663, n_D¹⁷ 1.4844 (phenylurethan m. 62°); and a compd. m. 84–5°, probably azelalyl pinacol, C₁₆H₂₆O₄. Dehydration of II with *o*-C₆H₄(CO)₂O gives cyclooctene, $\text{CH}_2(\text{CH}_2)_6\text{CH}:\text{CH}$ (III). b. 143–4°, d₄¹⁷ 0.8487, n_D¹⁷ 1.4683. In

the residues from the distn. of II is a very small quantity of a solid, probably (C₈H₁₄)_n. Distn. of the reaction product of I and MeMgI gives Δ¹-methylcyclooctene, $\text{CH}_2(\text{CH}_2)_6\text{CH}:\text{CMe}$, b. about 158–60°, d₄¹⁶ 0.8515, n_D¹⁶ 1.4673; nitrosochloride, m.

107–8°, the nitrosochloride of III being a liquid

MARGARET W. MCPHERSON

Alkaline hydrolysis of ω-bromo- and ω-chloronitrostyrenes. A. T. DANN, ALF HOWARD AND WM. DAVIES. *J. Chem. Soc.* 1928, 605–11.—The problem of the transmission of the influence of 1 group in a styrene throughout the mol. has been attacked by comparing the activating effects of the NO₂ group in the different positions in the nucleus on the ω-halogen atoms; the reaction involved was that of aq. KOH and the halogen derivs. at different temps. In the *trans*-ω-bromostyrenes, the *o*-NO₂ compd. is extraordinarily reactive; at the temps. investigated, 14–42°, the *p*- is more reactive than the *m*-NO₂ compd.; the ratios of the conversion in 2 expts., in which only a small % conversion was obtained, are resp. 1.26 and 1.23 to 1; the order of activity of the Br atom is *o* > *p* > unsubstituted > *m*. The *cis*-*p*-NO₂ is far more reactive than the *trans*-*p*-NO₂ compd. and the unsubstituted compd., m. –2.5°, which contains much of the *cis*-form, is more reactive than the mixt., m. 2.2°, which is richer in the *trans*-form. For the ω-chlorostyrenes the order of activity of the halogen atom is, at about 4°, *p* > *o* > *m* > unsubstituted and at 81° *p* and *o* > unsubstituted > *m*. This inversion of the order for the *m*-NO₂ and the unsubstituted compds. may be due to the more reactive, geometrically isomeric ω-chlorostyrene being produced at high temps., whereas the *trans*-*m*-NO₂ deriv. may remain in the *trans*-form. It is also possible that 2 reactions occur simultaneously between the alkali and the NO₂ and unsubstituted styrenes. A similar phenomenon is noticeable, though to a less extent, in the *m*- and *p*-nitro-ω-bromostyrenes, where the increase in temp. from 17° to 24° increases the activity of the *p*- far more than that of the *m*-isomer. ω-Chloro-*m*-nitrostyrene, yellow, m. 83°; *p*-NO₂ deriv., very pale yellow, m. 128°. C. J. WEST

Comparative reactivities of some chloro-, bromo- and iodonitrobenzenes. ALBERT BREWIN AND E. E. TURNER. *J. Chem. Soc.* 1928, 332–4.—With the reactivity of *p*-ClC₆H₄NO₂ towards piperidine as 1, the following reactivities were found: *o*-ClC₆H₄NO₂, 36.3; *o*-BrC₆H₄NO₂, 43.5; *o*-IC₆H₄NO₂, 17.9; *p*-BrC₆H₄NO₂, 2.38; *p*-IC₆H₄NO₂, 2.24; 2,5-Cl₂C₆H₃NO₂, 55.9; 2,5-Br₂C₆H₃NO₂, 56.0; 2,4-(O₂N)₂C₆H₃Cl, 56.9; 2,4-(O₂N)₂C₆H₃Br, 56.4; 2,4-(O₂N)₂C₆H₃I, 34.4; 4,3-Cl(O₂N)C₆H₃CN, 56.1; 4,3-Br(O₂N)C₆H₃CN, 55.1. In competitive expts. with pairs of 1-halogeno-2,4-dinitrobenzenes and piperidine in C₆H₆ at 15° for 60 hrs., the following mol. ratio of piperidine salts in the mixt. was obtained: Cl:Br, 1.75:1; Br:I, 1:2.22; I:Cl, 1:6.83; with the *o*-NO₂ compds. (8 hrs. in boiling C₆H₆), Cl:Br, 0.6:1; Br:I, 1.5:1; I:Cl, 1:5.4.

C. J. WEST

Nitration with nitrogen tetroxide. M. BATTEGAY. *Bull. soc. chim.* 43, 109–34 (1928).—A discussion of the work done on the action of N₂O₄ as an agent for the nitration of aromatic compds. Numerous references to the literature are given. B. considers that in N₂O₄ there may exist simultaneously the 2 forms O₂N.NO₂ and O₂N.O.NO₂.

LOUISE KELLEY

The action of nitric acid and mercury on aromatic hydrocarbons and their derivatives. F. BLÜCHTA AND K. PÁTEK. *Z. ges. Schiess-Sprengstoffw.* 22, 314–7 (1927).—With both C₆H₆ and C₇H₈ and with their mono-nitro compds., HNO₃ in the presence of Hg (2% of the acid used), causes both oxidation and nitration of the benzene nucleus. The nitrating reaction is appreciably accelerated. These effects are the results of an increased activation of the nucleus on its regeneration in nascent state from the intermediate aryl-Hg compd. (e. g., PhHgNO₂). Hot 60% HNO₃ alone has no effect on PhNO₂; with 2% Hg, 6% C₆H₅(NO₂)₂ is produced. C₇H₈ heated with HNO₃ and Hg yields C₇H₇NO₂, trinitro-*m*-cresol and *p*-O₂NC₆H₄CO₂H (not HO(O₂N)C₆H₃CO₂H as claimed by Wolfenstein and Bötters (C. A. 7, 1508). Oxidation occurs only in the *m*-position. The *p*-O₂NC₆H₄CO₂H results from oxidation of the *p*-O₂NC₆H₄Me—a secondary reaction. The results obtained with a weak mixed acid are similar to those with HNO₃ alone; hence it is concluded that H₂SO₄ has no effect on the reaction.

C. G. STORM

Laws of aromatic substitution. VI. Quantitative method for the rapid determination of isomeric nitro derivatives of laterally substituted toluenes. BERNHARD FLUR-SCHUEIM and E. L. HOLMES. *J. Chem. Soc.* 1928, 448-53; cf. *C. A.* 20, 2835.—After a discussion of the oxidation methods (KMnO_4 and dil. HNO_3), a new method is proposed which consists in boiling the acids with 10% HCl until soln. results then adding TiCl_4 until, after 10 min. boiling, the soln. is still colored; any non- NH_2 acids are removed by Et_2O , the Et_2O is removed by air and $\text{Br}\cdot\text{H}_2\text{O}$ added and allowed to stand 24 hrs. at room temp. The solid consists of 2,4,6- $\text{Br}_3\text{C}_6\text{H}_3\text{NH}_2$. The acid mother liquor is freed from Br by air, twice extl. with Et_2O and the exts. are shaken with NaHCO_3 , from which 2,4,6,3- $\text{Br}_3(\text{H}_2\text{N})\text{C}_6\text{HCO}_2\text{H}$ is obtained. • Examples are given. **VII. Constitution and substitution of phenylnitromethane and some of its derivatives.** *Ibid.* 453-83.—Contrary to the statement of Baker and Ingold (*C. A.* 21, 73), the exptl. observations published by F. (*J. prakt. Chem.* 66, 321 (1902)) have been found to be correct throughout. PhC(CN)NOBr (I) yields, on brief treatment with HNO_3 (d. 1.48) and subse-

quent oxidation by the usual methods, practically only BzOH and $p\text{-O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ (II); the II—amounting usually to 34-8% of the wt. of the total acids—arises essentially from the migration of the NO_2 group during the oxidation. The occurrence of this migration, which can be prevented by prior treatment with alkali, has been quant. proved. *m*-Nitration can occur under various conditions, as stated by B. and L., but it does not take place appreciably under the conditions, nor even approx. in the proportions, recorded by these authors. The complex changes occurring on prolonged exposure of I to HNO_3 (d. 1.48) have been quant. elucidated. The main change—the migration of Br into the m -position—occurs to the extent of 54% in 10 days and the rate of formation of the *m*- BrC_6H_4 compd. is independent of the concn. The following (primary) NO_2 derivs. are formed directly by nitration of the compds. named: I (in HNO_3 , d. 1.52), 92-3% of the *m*- NO_2 deriv. and 8-7% of the corresponding *p* and *o*- NO_2 compds. PhC(CN)NOOH (in HNO_3 , d. 1.48), more than 99% of the *p*- NO_2 deriv. BzCN (in HNO_3 , d. 1.52), 87.6% of the *m*- NO_2 deriv. and 12.4% of *o* and *p*- NO_2 derivs. *m*- $\text{BrC}_6\text{H}_4\text{CO}_2\text{H}$ (in HNO_3 , d. 1.48), 96% of *o* and *p*- NO_2 derivs. and 4% of the *m*- NO_2 derivs. The transfer of Br from the side chain of I to the *m*-position in the nucleus was quant. established by detg. the Br content of the acids obtained by oxidation, by isolating from these acids a large proportion of pure *m*- $\text{BrC}_6\text{H}_4\text{CO}_2\text{H}$ and of 2,4,6- $\text{Br}_3\text{C}_6\text{H}_3\text{NH}_2$ from the nitrated product after oxidation, reduction and bromination. The rate of transfer is independent of concn. and is not affected by the addn. of a substance contg. a *m*-directing group. The migration of Br , though slow, is the main change that occurs in HNO_3 of d. 1.48: after 75 min. less than 3 mol. % has migrated; after 10 days, 54 mol. %. Further changes are shown in charts, for which the original should be consulted. In concd. H_2SO_4 I passes through the following changes: $\text{PhC(CN)(NO)OSO}_3\text{H}$, BzCN , BzCO_2H , BzOH , the *m*- NO_2 deriv. shows analogous reactions; BzC(NOONa)CN also finally gives BzOH . I, on dry heating, gives Br , NO , BzCN (92 mol. %) and $p\text{-O}_2\text{NC}_6\text{H}_4\text{CN}$ (8 mol. %); the *m*- NO_2 deriv. gives $m\text{-O}_2\text{NC}_6\text{H}_4\text{CN}$ (93.5 mol. %) and a brominated mixt. The rearrangement by heating with an oxidizing agent in H_2O (KMnO_4 , HNO_3 , 1.125) is also described. • The results of the nuclear and lateral changes during migration, expressed as mol. %, are given in tabular form. I has been found to be a hypobromite, with an O bridge, in accordance with Willstätter and Hottenroth's formula for *tert.* bromonitro compds. Hypobromite reactions of I and its *m*- NO_2 deriv. are reported. The new compd.: *m*-nitrophenylbromocyanonitromethane, m. 70-70.5°, is reported. The reader must consult the original for the mass of exptl. detail regarding the nitrations and the rearrangements by heating and in aq. oxidizing solns.

C. J. WEST

Mechanism of activation of halogen atoms by a nitro group present in the same aromatic nucleus. ALBERT BREWIN and E. E. TURNER. *J. Chem. Soc.* 1928, 334-7.—Theoretical discussion. The activating effect of the NO_2 group probably depends upon the presence of the O·N group contg. apolar O.

C. J. WEST

Nitration of mixed *m*-dihalogenobenzenes. H. A. MAYES and E. E. TURNER. *J. Chem. Soc.* 1928, 691-7.—1-Chloro-3-iodo-6-nitrobenzene (I), m. 63°; 1-*Br* deriv. (II), m. 76-6.5°; 1-bromo-3-iodo-4,6-dinitrobenzene, m. 125-7°. F.-p. curves are given for 3,6- $\text{Br}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{Cl}$ (III) and the 4- NO_2 deriv. (IV); for I and the 4- NO_2 deriv. (V); and for II and the 4- NO_2 deriv. (VI). Nitration of *m*- $\text{ClC}_6\text{H}_4\text{Br}$ gives 37% III and 61.9% IV, with probably 1% of the 2- NO_2 deriv.; of *m*- $\text{ClC}_6\text{H}_4\text{I}$, 35.2% I and 62.9% V, with probably 2% of the 2- NO_2 deriv.; of *m*- $\text{BrC}_6\text{H}_4\text{I}$, 51.6% II and 45.6%

VI, with probably 3% of the 2-NO₂ deriv. The nitrations were carried out with HNO₃ of d. 1.5 at -5°. C. J. WEST

Nature of the alternating effect in carbon chains. XXIII. Anomalous orientation by halogens and its bearings on the problem of the ortho-para ratio in aromatic substitution. C. K. INGOLD AND C. C. N. VASS. *J. Chem. Soc.* **1928**, 417-25; cf. *C. A.* **22**, 948. — *m*-FC₆H₄NHAc (10 g.) in 30 g. KHCO₃ in 200 cc. H₂O, treated with stirring with 32 g. of bleaching powder, gives about 4.5 g. of the 4-*Cl* deriv., m. 115°; 0.1 g. of the 6-*Cl* deriv. (possibly the 2-*Cl* deriv.), m. 143°; and 0.4 g. of the 4,6-*Cl*₂ deriv., (possibly the 2,6-*Cl*₂ deriv.), m. 124°. Hydrolysis with 20% HCl for 24 hrs. gives 3-fluoro-4-chloroaniline, b. 226°, m. 61-2°; through the diazo reaction this gives 3-fluoro-4-chloronitrobenzene, pale yellow, b₂₄ 114-6°, m. 63-4°; the isomeric 4,3-FCIC₆H₃NO₂, m. 41.5°; the *m*-*p*. curve of the 2 isomers, which shows an eutectic at 22.1° and 59.5% of the 4,3-isomer, is given. The nitration product of *o*-FC₆H₄Cl is essentially a mixt. of these 2 isomers and from an analysis of the product it follows that orientation by F/orientation by Cl = 78.68/21.32%. **XXIV. The directive action in aromatic substitution of certain groups containing triple linkings.** J. WM. BAKER, K. E. COOPER AND C. K. INGOLD. *Ibid* 426-31. — Nitration of PhC≡CCO₂H gives 7.7% of the *m*- and 27% of the *o*-NO₂ deriv.; the Et ester gives 6.1% *m*- and 36% of the *o*-NO₂ deriv. Nitration of PhCN at 0° gives 81% of the *m*-NO₂ deriv., while PhCH₂CH₂CH₂NO₂ gives only 14% (16.5% *o*- and 69% *p*-NO₂ derivs.) C. J. WEST

Preparation and properties of hexanitrodiethyldiphenylurea. LOUIS DESVERGNES. *Rev. chim. ind.* **37**, 41-2 (1928). — Dissolve 27 g. (0.2 mol.) diethyldiphenylurea in 100 g. of 100% H₂SO₄, pour into 110 g. of 80% HNO₃ (keeping the temp. below 25°), let stand 2 hrs., heat 2 hrs. on a boiling water bath, cool, filter the orange-yellow crystals (m. 176-7°) on cotton wool, wash with cold water, dry and recrystallize from 80% HNO₃. This gives 24% of the theoretical yield of [EtNC₆H₄(NO₂)₃]₂CO, m. 248° (Maugenne block), N 20.91% (calcd. 20.81%), soly. (in g. per 100 g. of solvent at 25.5°) in EtOAc 0.839, Me₂CO 1.055, abs. EtOH 0.029, MeOH 0.067, C₆H₆ 0.054, CHCl₃ 0.339, anhyd Et₂O 0.024, C₂H₅N 12.638 (with decompn.), CS₂ 0.007, CCl₄ 0.028, C₇H₈ 0.031. On hydrolysis with 70% H₂SO₄ it gives fine golden yellow needles of *trinitroethylaniline*, m. 178.5°, which cannot therefore be the 2,4,6-deriv., m. 84°. The following are the reactions which probably take place in prep. the hexanitro product: (EtNPh)₂CO + 6HNO₃ = [EtNC₆H₄(NO₂)₃]₂CO + 6H₂O; [EtNC₆H₄(NO₂)₃]₂CO + H₂O = 2EtNHC₆H₄(NO₂)₃ + CO₂; EtNHC₆H₄(NO₂)₃ + 30HNO₃ = HOC₆H₄(NO₂)₃ + 4CO₂ + N₂ + 30NO₂ + 20H₂O. A. PAPINEAU-COUTURE

Nitration of benzylaniline. JOSEPH REILLY, J. J. MOORE AND P. J. DRUMM. *J. Chem. Soc.* **1928**, 563-4. — HNO₃ (d 1.5) added to PhCH₂NHPh gives the *nitrate*, m. 142° (decompn.). Nitration of PhCH₂NHPh with HNO₃-H₂SO₄ at -3° gives the 3-*nitro* deriv., deep orange, m. 84.5-5°, and a little of the 4-*NO*₂ deriv. *Benzophenyl-3-nitrobenzylamide*, m. 103°. C. J. WEST

Chlorination of anilides. II. The decomposition of *N*-chloroacetanilide by heat. A. E. BRADFELD. *J. Chem. Soc.* **1928**, 351-2; cf. *C. A.* **21**, 2669. — PhNHCl heated in sealed tubes at 100° gives the following products: *o*-ClC₆H₄NH₂, 18.2, 16.5%; *p*-ClC₆H₄NH₂, 41.0, 50.7%; 2,4-Cl₂C₆H₃NH₂, 6.3, 4%; PhNH₂, 6.3, —%. The formation of 2,4-Cl₂C₆H₃NH₂ indicates that, contrary to the opinion of Porter and Wilbur (*C. A.* **21**, 3313), Cl appears during the reaction, as in aq. AcOH solns. C. J. WEST

The reaction between the ethylenic linkage and organomagnesium halides. HENRY GILMAN AND J. H. MCGILMUPHY. *Rec. trav. chim.* **47**, 418-22 (1928). — Previously Gilman and his co-workers have shown that a few organomagnesium halides do not add to a wide variety of ethylenic and acetylenic hydrocarbons (*C. A.* **17**, 1422; **19**, 977; **20**, 1049). In contradiction with this statement was the work of Rupe and Burgin (*C. A.* **4**, 1042) on the addn. of cinnamylmagnesium chloride and bromide to the ethylenic linkage of the cinnamyl group, but recently Gilman and Harris have shown that R. and B.'s mechanism of reaction is probably incorrect, PhCMgCl:CHMe being formed in the reaction between PhCH=CHCH₂Cl and Mg and not PhCH=CHCH₂MgCl (*C. A.* **21**, 2676). In the present paper again several reactions between organomagnesium halides and ethylenic or acetylenic hydrocarbons are dealt with, particularly PhCH₂MgCl being chosen because Rupe has presumably proved that PhCH₂MgCl adds to the ethylenic linkage of citronellal and shows a great tendency to add in the 1,2-position of double bonds (*C. A.* **8**, 914) and further CH₂=CHCH₂MgBr and Ph₃CMgCl because of their structural resemblance to PhCH₂MgCl. In the expts. with PhCH₂MgCl comparative results were obtained by comparing the yield of PhCH₂CO₂H obtained after heating with the ethylenic compd. with the yield of this acid obtained from an aliquot part of PhCH₂MgCl that had not been heated with the ethylenic

compd. With other organomagnesium halides partly the same method was used, partly the ethylenic compd. being recovered as quant. as possible from the reaction mixt. In this way it could be shown that in the following systems a reaction does not take place: PhCH_2MgCl with ethylene, amylene, styrene, $\text{Ph}_2\text{C}:\text{CH}_2$ and $(\text{CH}:\text{CH}:\text{Ph})_2$; $\text{CH}_2:\text{CHCH}_2\text{MgBr}$ with amylene and $\text{Ph}_2\text{C}:\text{CH}_2$; Ph_2CMgCl with $\text{CPh}_2:\text{CH}_2$, styrene and $(\text{C}:\text{CPh})_2$; $p\text{-ClC}_6\text{H}_4\text{MgBr}$ with $\text{CPh}_2:\text{CH}_2$, amylene and $\text{Ph}:\text{CCH}$.

C. F. VAN DUIN

Extension of Witt's color theory on coordination chemical grounds. W. DILTHEY AND R. WIZINGER. *J. prakt. Chem.* 118, 321-48(1928).—A theoretical discussion which cannot be satisfactorily abstracted.

C. J. WEST

Phenol and cresol, especially *m*-cresol, derivatives of phosphorus trichloride and phosphorus thiocloride. WALTER BROECKER. *J. prakt. Chem.* 118, 287-94(1928).— PCl_3 (70 g.) and 54 g. *m*- $\text{MeC}_6\text{H}_4\text{OH}$, warmed until the evolution of HCl ceases, give 3 compds.: *m*-cresylphosphorus dichloride, $\text{MeC}_6\text{H}_4\text{OPCl}_2$, b_p 114°; *di*-[*m*-cresyl]phosphorus chloride, b_p 198°; a small quantity of the *tri*-*m*-cresyl deriv., $\text{P}(\text{OC}_6\text{H}_4\text{Me})_3$, b_p 248-50°. Heating 12.5 g. $\text{MeC}_6\text{H}_4\text{POCl}_2$ with 2 g. S at 200° gives the *thio* deriv., $\text{MeC}_6\text{H}_4\text{OPSCl}_2$, b_p 138°; similarly were prepd. (*m*- $\text{MeC}_6\text{H}_4\text{O}$) $_2\text{PSCl}$, b_p 218°, m 33-4°, and (*m*- $\text{MeC}_6\text{H}_4\text{O}$) $_3\text{PS}$, b_p 270-2°, m 40-1°.

C. J. WEST

The reaction of Houben. L. BERT. *Compt. rend.* 186, 587-8(1928).—When EtMgBr (I) was condensed with *p*-iso- $\text{PrC}_6\text{H}_4\text{CH}_2\text{Cl}$ (II), in PhMe (III), instead of the expected hydrocarbon a new substance $\text{C}_{17}\text{H}_{20}$, was obtained. The formation of this compd. is believed to be due to the initial condensation of I and II to give *p*- $\text{PrC}_6\text{H}_4\text{CHMe}_2$ (IV), and MgBrCl , followed by a condensation of II and III, splitting out HCl with MgBrCl acting like AlCl_3 . To check this theory, I and II were condensed in cyclohexane (V) or petroleum ether. In these cases about 50% IV was obtained and no $\text{C}_{17}\text{H}_{20}$ formed. It is further shown that PhCH_2Cl (VI) in V with EtMgBr , PrMgBr and BuMgBr gives PhPr (70%), PhBu (26%) and PhAm (47%). In condensing I with VI the following reaction probably occurs: $\text{EtMgBr} + 2\text{PhCH}_2\text{Cl} \rightarrow \text{C}_2\text{H}_5 + \text{PhCH}_2\text{CH}_2\text{Ph} + \text{MgBrCl} + \text{HCl}$; $\text{EtMgBr} + \text{HCl} \rightarrow \text{C}_2\text{H}_6 + \text{MgBrCl}$.

D. H. POWERS

Organic selenium compounds. Some derivatives of aromatic seleno-ethers. D. G. FOSTER AND S. F. BROWN. *J. Am. Chem. Soc.* 50, 1182-8(1928).— PhSeH and the alkyl halide with NaOH give the following seleno ethers: *Et*, b_p 214-6° (72% yield); *iso*- C_4H_9 , b_p 105° (86.5% yield); *Ph*, b_p 303° (24%). *Diphenylselenium oxide*, m 106-8°, results from Ph_2SeCl_2 and NaOH or from $\text{Ph}_2\text{SeO} \cdot \text{HNO}_3$ and Na_2CO_3 . The action of HNO_3 on the ethers gives selenoxide hydromitrates: *Me*, m 97° (64% yield); *Ph*, m 97° (77% yield); the *Et* and C_4H_9 derivs. are oils. With Na_2CO_3 , CO_2 is evolved and oils are formed which are probably selenoxides but they decomp. too easily to be purified. With concd. HCl there result dichlorides (PhSeCl_2R), which are also obtained by the action of KMnO_4 and HCl on the ethers; *Me*, m 122° (decompn.); *Et*, m 64-5°; C_4H_9 , m 80°; *Ph*, m 142° (decompn.); these compds. were also prepd. by the direct action of Cl on the ethers (*Me*, *Ph*). A mechanism for the production of the dichlorides is proposed.

C. J. WEST

Antimony. II. Derivatives of tri-*p*-tolylstibine. A. E. GODDARD AND V. E. YARSLY. *J. Chem. Soc.* 1928, 719-23; cf. *C. A.* 18, 53.—Heating (*p*- MeC_6H_4) $_3\text{SbCl}_2$ at 5-7 mm. and 60-5° gave *p*- $\text{MeC}_6\text{H}_4\text{Cl}$ and at 160-200° *di*-*p*-tolylchlorostibine, solid; the *Br* deriv., pale cream, m above 290°; the *I* deriv., m 233°; the yields are almost quant. (*p*- MeC_6H_4) $_3\text{Sb}$ in MeOH contg. HCl , boiled on the water bath in a current of CO_2 , dissolves after 15 min., further boiling for 1.25 hr. gives *di*-*p*-tolylstibinic acid, amorphous, sinters 230°, m 260°; this is also obtained by oxidizing with alk. H_2O_2 , in which process there also results *di*-*p*-tolylstibine trichloride, m 141-2°. *p*- $\text{MeC}_6\text{H}_4\text{SbO}_2\text{H}_2$ is best prepd. through the diazo reaction from *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ and Sb_2O_3 . (*p*- MeC_6H_4) $_3\text{Sb}$ on nitration with fuming acid gives the dinitrate of the *tri*-*m*- NO_2 deriv., light cream, m 182° (decompn.); on hydrolysis with H_2PO_3 in EtOH , there results the oxide, m 225°. Reduction of the dinitrate gives *tri*-*m*-aminotri-*p*-tolylstibine, pinkish gray, m 92°; the diazo compd. with KI gives the *tri*-*m*-*I* deriv., reddish brown, m 146°.

C. J. WEST

Some properties and reactions of β -chloroethyl, β -cyanoethyl and β -carbethoxyethyl toluene-*p*-sulfonates, including an extension of the Friedel-Crafts reaction. G. R. CLAUDIO AND ERIC WALTON. *J. Chem. Soc.* 1928, 723-9.—*p*- $\text{MeC}_6\text{H}_4\text{SO}_3\text{Cl}$ (180 g.), 100 g. $\text{HQC}_6\text{H}_4\text{CN}$ and 150 cc. $\text{C}_6\text{H}_5\text{Me}_2$, refluxed 3.5 hrs., give 25 g. NH_4 toluene-*p*-sulfonate, m 320-5°, and 146 g. (65%) of β -cyanoethyl toluene-*p*-sulfonate (I), b_p 187-9°, m 64°; with $\text{EtOH} \cdot \text{HCl}$ at room temp. this gives 81% of γ -amino- γ -ethoxypropyl toluene-*p*-sulfonate- HCl , m 101°, fairly stable in air, hydrolyzed by H_2O at 70°

to β -carbethoxyethyl toluene-*p*-sulfonate (II), $b_{0.3}$ 187–9°. I, m - $C_6H_4(OH)_2$ and $ZnCl_2$ give 7-hydroxy-3,4-dihydrocoumarin. I and anhyd. K_2CO_3 , heated at 80–120°, give 75% of $CH_3:CHCN$; II gives nearly quant. $CH_3:CHCO_2Et$. p - $MeC_6H_4SO_2OCH_2CH_2Cl$ (III) and K phthalimide, heated 3 hrs. at 200°, give 86% of phthal- β -chloroethyl-imide. With C_6H_6 and $AlCl_3$, III gives $(PhCH_2)_3$. I, C_6H_6 and $AlCl_3$ give 72% of $PhCH_2CH_2CN$, while II gives 74% of $PhCH_2CH_2CO_2Et$. p - $MeC_6H_4SO_2Et$, C_6H_6 and $AlCl_3$ give 64% of $PhEt$, $PhCH_2CH_2CN$ in concd. $EtOH-HCl$ gives 76% of γ -imino- γ -ethoxy- β -phenylpropane- HCl , m. 130°; hydrolysis with H_2O gives 95% of $PhCH_2CH_2CO_2Et$. $CH_3:CHCN$ in $EtOH-HCl$ gives 65% of α -chloro- γ -imino- γ -ethoxypropane- HCl , m. 109°.

C. J. WEST

Condensation reactions of chloral with substituted phenols. F. D. CHATTAWAY AND FERNANDO CALVET Y PRATS. *Anales soc. españ. fis. quim.* 26, 75–91 (1928); cf. *C. A.* 21, 1980. —*p*-Aminophenol condenses with chloral in the presence of strong H_2SO_4 , giving anhydro-5-amino-2- β , β , β -trichloro- α -hydroxyethoxy-1- β , β , β -trichloro- α -hydroxyethylbenzene. *p*-Tolylazophenol and *p*-nitro-*m*-cresol act similarly with chloral, giving anhydro-5-*p*-tolylazo-2- β , β , β -trichloro- α -hydroxyethoxy-1- β , β , β -trichloro- α -hydroxyethylbenzene and anhydro-5-nitro-4-methyl-2- β , β , β -trichloro- α -hydroxyethoxy-1- β , β , β -trichloro- α -hydroxyethylbenzene, the latter showing that a substituent in the *m*-position to the OH group does not prevent the reaction occurring in a normal way. Substituents in the *o*-position interfere with the reaction. *p*-Nitro-*o*-cresol, 5-nitrosalicylic acid and 2,4-dinitrophenol do not condense with chloral in the presence of strong H_2SO_4 , probably because of steric hindrance of *o*-substituents which prevent addn. to the OH group, possibly preceding entrance of the $-CH(OH)CCl_3$ group into the C_6H_5 ring. When the *p*-position of the phenolic group is unoccupied the chloral residue attaches to the C_6H_5 nucleus at the free position, thus *m*- $HOC_6H_4CO_2H$, on subsequent elimination of 1 mol. of H_2O , gives 5-hydroxytrichloromethyl phthalide. Salicylic acid and *p*- and *m*-nitrophenols, where the *p*-position is unoccupied, condense with chloral by the probable introduction of the $-CH(OH)CCl_3$ group into the free position, but the resinous products thus obtained have not yet been crystd.

E. M. SYMMES

Lead subacetate solution ("Goulard's extract") and its reaction with phenols. C. S. GIBSON AND ERNEST MATTHEWS. *J. Chem. Soc.* 1928, 596–602. —If Goulard's ext. is prep'd. according to the 1914 Brit. Pharm., it is possible to prove that the compn. of the solute is $Pb(OH)_2.Pb(OAc)_2$ or $Pb(OH)(OAc)$. If, instead of taking approx. equiv. proportions of PbO and $Pb(OAc)_2$, 3 times the amt. of PbO is taken, the compn. of the solute is $2Pb(OH).Pb(OAc)_2$. The formation of ppts. with phenols is apparently general; their compn. appears to be $Pb(OR)_2.Pb(OH)OAc$. The $PhOH$ compd., $C_{14}H_{11}O_5Pb_2$, is microcryst. and begins to melt at about 80° and then chars, leaving a deposit of Pb and some PbO ; it is sol. with decompn. in warm aq. $NaOH$ and is not pptd. upon acidification with HNO_3 ; the soln. in dil. $AcOH$ gives an immediate yellow ppt. with K_2CrO_4 ; it is sparingly sol. in C_6H_6 but decomp. when the soln. is heated. The o - $O_2NC_6H_4OH$ compd., $C_{14}H_{13}O_5N_2Pb_2$, yellow, changes from yellow to red at 120–30° and explodes on further heating, leaving a deposit of Pb . The reverse color change can be brought about by rubbing. The o - BrC_6H_4OH compd., $C_{14}H_{13}O_5Br_2Pb_2$, begins to m. 255° and later chars.

C. J. WEST

Preparation of *p*-iodoanisole. F. F. BLICKER AND F. D. SMITH. *J. Am. Chem. Soc.* 50, 1229–31 (1928). —Modifications of Brenans's method for the prepn. of *p*- IC_6H_4OMe ($PhOMe$, HgO and I in $EtOH$) consists of the use of about 0.5 the amt. of I , the use of CCl_4 as a solvent and a temp. of 50–60°; the yield is 73%; at room temp. the yield was 57%. The H_2O is removed by a stream of air; when this is not done, $Hg(IO_3)_2$ is formed. PbO or CaO cannot replace the HgO . KI and p - $MeOC_6H_4N_3X$ give 75–80% of *p*- IC_6H_4OMe .

C. J. WEST

Sulfur derivatives of aromatic methyl ethers. H. H. HODGSON AND F. WM. HANDLEY. *J. Chem. Soc.* 1928, 625–8. —2,2'-Diamino-5,5'-dimethoxydiphenyl disulfide, pale yellow, m. 76°; di-*Ac* deriv., m. 202–3°; HCl salt, needles; HNO_3 gives 5-methoxybenzene 2,1-diazosulfide, m. 80°. The 4,4'-diamino deriv., m. 88°; di-*Ac* deriv., m. 136°; HCl salt, needles. 2,2'-Dinitro-5,5'-dimethoxydiphenyl sulfide, yellow, m. 151°; 4,4'-dinitro deriv., m. 154°; the corresponding sulfones, m. 182° and 245–6°, resp. 2-Nitro-5-methoxyphenyl *Me* sulfone, m. 122°; 4-nitro deriv., m. 130°. 5-Chloro-5-methoxythioanisole, m. 41°; 4-*Cl* deriv., m. 36°. Color reactions are given for concd. H_2SO_4 , oleum (20%) and $ClSO_3H$.

C. J. WEST

Action of aminosulfonic acid on unsaturated compounds. A. QUINTO. *Atti accad. Lincei* [6], 7, 141–6 (1928); cf. *C. A.* 22, 1764. — H_2NSO_3H (10 g.) heated 4–6 hrs. at 140–50° with anethole (25 g.), the excess anethole decanted, washed repeatedly

with Et_2O , dissolved in a little hot water, the remaining anethole and resin removed by extr. with Et_2O and the aq. residue evapd., yields 20 g. of NH_4 anetholesulfonate, m. $235-40^\circ$ (decompn.). The yield depends upon the fineness of the $\text{H}_2\text{NSO}_3\text{H}$. *K anetholesulfonate*. *Na salt*. *Ba salt*, mother-of-pearl aspect, treated in water with dil. H_2SO_4 yields the *acid*, hygroscopic, m. around 70° , decolorizes aq. KMnO_4 and reduces $\text{NH}_3\text{-AgNO}_3$. The dry Na salt and PCl_5 when heated gently, poured into ice water, and the ppt. recrystd. from C_6H_6 , yields 100% of anetholesulfonyl chloride, yellow, has a characteristic odor, m. 63.5° . Boiled with alc. NH_3 and the product recrystd. from EtOH , it yields the *acid amide*, m. 156° . The aq. K. salt (5 g.) made slightly alk. with KOH , boiled, aq. KMnO_4 (about 8 g.) added until permanently pink, filtered, the filtrate concd., acidified with HCl , the ppt. extd. with Et_2O , and the ext. evapd., yields 2.5 g. of anisic acid, while the aq. liquor contains AcOH , KCl and K_2SO_4 . The same products are obtained by oxidizing at room temp. Though the formula of anetholesulfonic acid might be either $\text{MeOC}_6\text{H}_4\text{CH}(\text{Me})\text{SO}_3\text{H}$ or $\text{MeOC}_6\text{H}_4\text{C}(\text{SO}_3\text{H})\text{CH}_3$, it is considered that the former is the more probable one. The NH_4 salt is probably formed by the addn. of H_2NSO_3 to $\text{MeOC}_6\text{H}_4\text{CH}(\text{Me})\text{SO}_3\text{H}$, thus $\text{MeOC}_6\text{H}_4\text{CH}(\text{OH})\text{CH}(\text{SO}_3\text{NH}_2)\text{Me}$, the latter then losing H_2O and hydrating again to $\text{MeOC}_6\text{H}_4\text{CH}(\text{SO}_3\text{NH}_2)\text{CH}_3$. This reaction is essentially the same as that with simple phenols, e. g., anisole. The expts. are being continued with phenols with an allyl chain and with unsatd. hydrocarbons. C. C. DAVIS

Wandering of the acyl group in acetyldimethylpyrogallol. F. MAUTHNER. *J. prakt. Chem.* **118**, 314-20 (1928).—2,6-(MeO) $_2\text{C}_6\text{H}_3\text{OAc}$ and ZnCl_2 , warmed 3 hrs. at 120° , give 4,2,3-MeO(HO) $_2\text{C}_6\text{H}_2\text{Ac}$, m. $132-3^\circ$ (di-Ac deriv., m. $146-8^\circ$, *p*-nitrophenylhydrazones, does not m. 260° ; semicarbazone, m. $229-30^\circ$ (decompn.)). The rearrangement also takes place at room temp. C. J. WEST

Nitrosation of phenols. V. Preparation of an *o*-nitrosophenol. H. H. HODGSON AND J. S. WIGNALL. *J. Chem. Soc.* **1928**, 329-32, cf. *C. A.* **22**, 62. 5,3-Cl(HO) $\text{C}_6\text{H}_3\text{OMe}$ with HNO_2 gives the 4-*NO* deriv., deep green, m. 132° (decompn.); concd. H_2SO_4 gives a Bordeaux-red color. Oxidation with $\text{K}_2\text{Fe}(\text{CN})_6$ gives the 4- NO_2 deriv., light golden, m. 105° , identical with the compd. obtained by nitrating 5,3-Cl(HO) $\text{C}_6\text{H}_3\text{OMe}$ (small yield). Me_2SO_4 gives 5-chloro-4-nitroresorcinol di-Me ether (I), light yellow, m. 123° . 3,5,2-Cl $_2$ (O_2N) $\text{C}_6\text{H}_2\text{OMe}$ and MeONa give 5-chloro-2-nitroresorcinol di-Me ether, m. 171° ; 3,5,4-Cl $_2$ (O_2N) $\text{C}_6\text{H}_2\text{OMe}$ and MeONa give I. 5,3-Cl(MeO) $\text{C}_6\text{H}_3\text{NH}_2$ and Me_2SO_4 give 5-chloro-3-methoxydimethylaniline, oil; HNO_2 gives a 4-*NO* deriv., green, decomp. 155° ; concd. H_2SO_4 gives a deep cherry-red color; 10% aq. KOH completely decomp. the compd. C. J. WEST

Rearrangement of benzyl phenyl ether. W. F. SHORT. *J. Chem. Soc.* **1928**, 528.— PhOCH_2Ph , heated to 225° with ZnCl_2 or to 180° in a stream of HCl , gives a mixt. of PhOH , *o*- $\text{HOC}_6\text{H}_4\text{CH}_2\text{Ph}$, *p*- $\text{HOC}_6\text{H}_4\text{CH}_2\text{Ph}$ and high-boiling products. It is probable that the reaction follows a course similar to the Hofmann rearrangement of alkyanilines C. J. WEST

A new general synthetic method for the preparation of arylaliphatic aldehydes. L. BERT. *Compt. rend.* **186**, 699-700 (1928); cf. *C. A.* **22**, 1335.—Mg derivs. of $\text{RC}_6\text{H}_4(\text{CH}_2)_n\text{Cl}$ and $\text{HC}(\text{OMe})_3$ or $\text{HC}(\text{OEt})_3$ give acetals of $\text{RC}_6\text{H}_4(\text{CH}_2)_n\text{CHO}$ (I). The acetals give on boiling with HCl excellent yields of I. This method is easier and cheaper than the method of Braun and Kruber (*C. A.* **6**, 1160). Bert prepd. the following compds., all new except the first 4—homologs of PhCH_2CHO : *p*-Me- and *p*-iso- $\text{PrC}_6\text{H}_4\text{CH}_2\text{CHO}$ (II), 2,4,5-Me $_3\text{C}_6\text{H}_3\text{CH}_2\text{CHO}$, 2,5-Me(Me_2CH) $\text{C}_6\text{H}_3\text{CH}_2\text{CHO}$, *p*-Et $\text{C}_6\text{H}_4\text{CH}_2\text{CHO}$ (III), 2,4-Me $_2\text{C}_6\text{H}_3\text{CH}_2\text{CHO}$ (III), 2,5-Me $_2\text{C}_6\text{H}_3\text{CH}_2\text{CHO}$ (IV); homologs of $\text{Ph}(\text{CH}_2)_2\text{CHO}$: *o*-Me- and *p*-Me $\text{C}_6\text{H}_4(\text{CH}_2)_2\text{CHO}$ (V and VI), 2,4-Me $_2\text{C}_6\text{H}_3(\text{CH}_2)_2\text{CHO}$ (VII), 2,5-Me $_2\text{C}_6\text{H}_3(\text{CH}_2)_2\text{CHO}$ (VIII), *p*-iso- $\text{PrC}_6\text{H}_4(\text{CH}_2)_2\text{CHO}$ (IX) and 2,5-Me(Me_2CH) $\text{C}_6\text{H}_3(\text{CH}_2)_2\text{CHO}$ (X); homologs of $\text{Ph}(\text{CH}_2)_3\text{CHO}$: *p*-Me $\text{C}_6\text{H}_4(\text{CH}_2)_3\text{CHO}$ (XI), 2,4-Me $_2\text{C}_6\text{H}_3(\text{CH}_2)_3\text{CHO}$ (XII), 1,4-Me $_2\text{C}_6\text{H}_3(\text{CH}_2)_3\text{CHO}$ (XIII) and *p*-iso- $\text{PrC}_6\text{H}_4(\text{CH}_2)_3\text{CHO}$ (XIV). Following are the consts.: II b_{13} 108° , d_4^{15} 1.009, n_D^{15} 1.537, semicarbazone, m. 175° ; III b_{13} 136° , d_4^{15} 0.996, n_D^{15} 1.529, semicarbazone, m. 164° ; IV, b_{12} $105-6^\circ$, d_4^{15} 1.004, n_D^{15} 1.531, semicarbazone, m. 183° ; V, b_{13} 120° , d_4^{15} 0.998, n_D^{15} 1.522, semicarbazone, m. 153° ; VI b_{13} 122° , d_4^{14} 0.999, n_D^{14} 1.525, semicarbazone, m. 174° ; VII b_{14} $135-6^\circ$, d_4^{16} 0.994, n_D^{16} 1.525, semicarbazone, m. 188° ; VIII b_{13} $133-4^\circ$, d_4^{15} 0.989, n_D^{15} 1.523, semicarbazone, m. 182° ; IX b_{13} 136° , semicarbazone, m. 158° ; X b_{17} 150° , d_4^{17} 0.974, n_D^{17} 1.518, semicarbazone, m. 149° ; XI b_{13} 124° , d_4^{11} 1.011, n_D^{14} 1.527, semicarbazone, m. 124° ; XII b_{13} $137-8^\circ$, d_4^{10} 1.001, n_D^{10} 1.529, semicarbazone, m.

135°; **XIII** b_{18} 139°, d_4^{12} 0.987, n_D^{12} 1.532, semicarbazone, m. 184°; **XIV** b_{12} 132°, semicarbazone, m. 144°.

MARGARET W. MCPHERSON

Nitration of benzaldoxime and some of its derivatives. O. L. BRADY and R. E. M. MILLER. *J. Chem. Soc.* 1928, 337–42.—The nitration of PhCH:NHOH with a mixt. of 120 g. fuming HNO_3 (10% SO_3) and 12 cc. HNO_3 (d. 1.42) gives 30% of the *m*- NO_2 deriv.; the poor yield is due to the difficulty of suppressing hydrolysis and oxidation leading to the formation of acid. Treatment of *o*-methylbenzaldoxime with a mixt. of fuming H_2SO_4 and fuming HNO_3 at room temp. gives about 10% of the *m*- NO_2 deriv. *N*-Methylbenzaldoxime also gives the *m*- NO_2 deriv. α -*p*- $\text{MeOC}_6\text{H}_4\text{CH:NHOH}$ gives the 3- NO_2 deriv., as does the *O*-Me ether *O*-Methyl-3,5-dinitro-4-methoxybenzaldoxime, m. 129°. α -3,4-(CH_2O) $\text{C}_6\text{H}_3\text{CH:NHOH}$ and its *O*-Me ether give the 6- NO_2 deriv. α ,3,4-MeO(HO) $\text{C}_6\text{H}_3\text{CH:NHOH}$ gives the 5- NO_2 deriv. (almost quant. yield).

C. J. WEST

Condensation of methyl isobutyl ketone with benzaldehyde. C. V. GHEORGHIU and B. ARWENTIEW. *J. prakt. Chem.* 118, 295–302 (1928).— $\text{MeCOCH}_2\text{CHMe}_2$ (24 g.) and 25 g. BzH in 170 cc. EtOH, condensed with 18 cc. 10% NaOH for 48 hrs., give 58% of α -benzalmethyl isobutyl ketone (I), light yellow with aromatic odor, b_{32} 179–83°, b. 260° (partial decompn.), d_4^{18} 1.09781, n_D^{18} 1.5570; dibromide, m. 101°; semicarbazone, m. 167°; oxime, m. 141–2°. The constitution of I is established by its oxidation with KMnO_4 to BzOH and $\text{Me}_2\text{CHCH}_2\text{CO}_2\text{H}$. With NaNO_2 in AcOH I gives oximido-benzoylmethylisopropylglyoxime hyperoxide, yellowish red, m. 182° (decompn.). Condensation with HCl gives the same product, but it is difficult to remove the last traces of Cl.

C. J. WEST

Preparation of larger amounts of vanillin from sulfite waste liquors. KARL KÜRSCHNER. *J. prakt. Chem.* 118, 238–62 (1928).—Details are given of the method of and app. for heating sulfite waste liquor with KOH in the presence of a stream of air, whereby from a liquor contg. 82.5% dry org. matter and 47% lignin, 20.1% of vanillin may be obtained.

C. J. WEST

Union of benzoylacetonitrile with organic bases in the presence of salicylaldehyde. II. PANCHAPAKESA KRISHNAMURTI. *J. Chem. Soc.* 1928, 415–7; cf. *C. A.* 21, 2002.— BzCH_2CN (1 mol.) and 1 mol. *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ in abs. EtOH contg. 2–3 drops *o*- $\text{HOC}_6\text{H}_4\text{CHO}$ and 1–2 drops piperidine, heated 8 hrs, give 50% of a compd., $\text{C}_{16}\text{H}_{16}\text{ON}_2$, pale yellow, m. 182°; *HCl* salt, m. 194–5°; *di*-Bz deriv., pale yellow, m. 166°; isonitroso deriv., bright orange, m. 158° (Ag salt, light pink). Similarly, PhNH_2 gives 40% of the compd. $\text{C}_{15}\text{H}_{14}\text{ON}_2$, light yellow, m. 163°; *HCl* salt, m. 94–6°; *di*-Bz deriv., pale yellow, m. 168°; isonitroso deriv., blood-red, m. 182° (decompn.). The *m*-4-xyldine compd., $\text{C}_{17}\text{H}_{18}\text{ON}_2$, m. 145–6° (20% yield); Bz deriv., m. 153°; isonitroso deriv., yellow, m. 150–1°. *o*- and *m*- $\text{MeC}_6\text{H}_4\text{NH}_2$ did not react under these conditions. C. J. W.

Optically active derivatives of phenylaminoacetic acid. ALEX. MCKENZIE and NELLIE WALKER. *J. Chem. Soc.* 1928, 646–52.— $\text{C}_6\text{H}_5(\text{CO})_2\text{O}$ and *l*- $\text{H}_2\text{NCHPhCO}_2\text{H}$, heated 2.5 hrs. at 160–70°, give the *dl*-phthalimido acid, which is resolved by morphine, *l*- α -phthalimidophenylacetic acid, m. 192–3°, $[\alpha]_D^{15}$ -51.9° (Me_2CO , *c* 3.5385), $[\alpha]_D^{17}$ -20.3° (MeOH , *c* 4.588), $[\alpha]_D^{12}$ -24.7° (MeOH , *c* 2.251). SOCl_2 gives an optically active acid chloride (C_6H_5 , *l*, *c* 3.33, α_D -4.68°) but with AlCl_3 and C_6H_6 this gives *dl*-desylphthalimide. Hydrolysis of the *l*-acid with KOH apparently gives the dicarboxylic acid, $\text{HO}_2\text{CC}_6\text{H}_4\text{CONHCHPhCO}_2\text{H}$, m. 177–9°, $[\alpha]_D^{19}$ 101.8° (Me_2CO , *c* 1.2525). The resolution of *dl*-desylphthalamic acid by means of morphine gives *l*-desylphthalamic acid, m. 155–7°, $[\alpha]_D^{18}$ -159.1° (Me_2CO , *c* 2.545), but hydrolysis with concd. HCl gives an impure desylamine-HCl. *dl*-Desylamine-HCl was therefore resolved by means of *l*-mandelic acid, *l*- γ,γ,γ -trichloro- β -hydroxybutyric acid and also the corresponding *d*-acid; *d*-desylamine-HCl, decomp. 230°, $[\alpha]_D^{15}$ 223.2° (EtOH, *c* 2.538). With HNO_2 this gives a mixt. of *dl*- and *d*-PhCH(OH)COPh. When the free base, which is very unstable, was liberated from the *d*-HCl salt, the sign of rotation was unaltered. Its optical activity in EtOH was evanescent at the ordinary temp., a result attributed to racemization rather than to decompn.

C. J. WEST

Phenylethylmalonic methyl ester. A new method of synthesis. MARY M. RISING and TSON-WU ZEE. *J. Am. Chem. Soc.* 50, 1208–13 (1928); cf. *C. A.* 21, 906.—The method starts with PhCH_2CN , which is transformed into PhEtCHCN by NaNH_2 and EtI (87.4% yield); with MeOH and HCl this yields 76.9% of *Me imido- α -phenylbutyrate-HCl*, m. 92°; hydrolysis gives 90.3% of PhEtCHCO $_2$ Me, m. 77–8°, which gives with Na in Et $_2$ O the α -Na deriv., which was isolated in the solid state; this is decompd. by H_2O and all acids into the ester; with ClCO_2Me there results 84.7% of

PhEtC(CO₂Me)₂; the over-all yield of PhEtC(CO₂Me)₂ from PhCH₂CN is 43.1%.
C. J. WEST

Addition of bromine to ethylenic compounds in non-hydroxylic solvents. D. M. WILLIAMS AND T. C. JAMES. *J. Chem. Soc.* 1928, 343-7.—The study of the addn. of Br to unsatd. acids and their derivs. in dry CHCl₃ and CCl₄ in the dark indicates that there are 3 classes: (a) Those to which Br is added with considerable rapidity, the addn. being accompanied by substitution and the formation of HBr; the bimol. velocity coeff. steadily decreases as the reaction proceeds (*trans*- and *cis*-o-MeOC₆H₄-CH:CHCO₂H, PhCH:CHCH:CHCO₂H and Me ester, PhCH:CHCH:CPhCO₂H, furfurylacrylic acid, oleic acid, elaidic acid). (b) Those to which Br adds on slowly but with a measurable and increasing velocity, exhibiting a preliminary inhibition period (PhCH:CHCO₂H and Me ester, MeCH:CHCO₂H and PhCH:CHCH:C(CO₂Me)₂). (c) Those to which no measurable addn. takes place under the conditions investigated (maleic anhydride, coumarin, α -phenylcinnamionitrile). The positions of the double bond, especially in the α -position to the CO₂H group, and of substituent groups in close proximity to the double bond have an important effect on the rate of addn. but these are not the deciding factors. The rapidity of addn. to substances of class (a) is due to preliminary substitution with the formation of HBr in small quantities; HBr is found to be an effective catalyst for the addn. reaction; HCl and H₂O produce similar effects to HBr, although not of the same degree. In each case with compds. of class (b), the inhibition period disappears and the reaction becomes bimol. The catalysts do not bring about a reaction with substances of class (c). C. J. W.

Bromination of *m*-methoxycinnamic acid. HERBERT DAVIES AND WM. DAVIES. *J. Chem. Soc.* 1928, 602-5.—Bauer and Vogel (C. A. 8, 1092) found that *m*-MeOC₆H₄-CH:CHCO₂H and 1 mol. Br in AcOH give a compd., m. 186°, to which they assigned the formula *m*-MeOC₆H₄CH:CHCO₂H; at room temp., 10 g. of the acid and 1 mol. Br in 200 cc. AcOH give, after 10 days, 4 g. 6-Br deriv., m. 189°, oxidized by KMnO₄ to 6,3-Br(MeO)C₆H₃CO₂H. The Br acid was also synthesized from 6,3-Br(MeO)C₆H₃CHO and CH₂(CO₂H) in C₆H₅N. No definite products could be obtained from the mother liquor, though it probably contained the dibromide. The same 6-Br acid was obtained by bromination of *m*-MeOC₆H₄CH:C(CO₂H)₂, followed by hydrolysis and heating at 180°. The action of 2 mols. Br upon *m*-MeOC₆H₄CH:CHCO₂H gives a complex mixt., from which, after oxidation, 4(2),6,3-Br₂(MeO)C₆H₃CO₂H can be isolated. 4(2),6-Dibromo-3-methoxycinnamic acid, m. 234°. These reactions are abnormal, for bromination of cinnamic acids usually affects the double bond in the side chain, producing dibromides. C. J. WEST

Isomerism of the oximes. XXXIII. Oximes of opianic acid and of phthalic anhydride. O. L. BRADY, L. C. BAKER, R. F. GOLDSTEIN AND SAMUEL HARRIS. *J. Chem. Soc.* 1928, 529-39; cf. C. A. 22, 950.—Opianic oxime (I) exists in only 1 form and behaves in a similar manner to α -aldoximes. With Ac₂O I gives the anhydride (II), but the action of 2,4-(O₂N)₂C₆H₃Cl on the Na salt of I gives 2,4-dinitrophenyl-opianic oxime, bright yellow, m. 146°. The action of alkalis on II gives 2,5,6-NC(MeO)₃C₆H₂CO₂H, which compd. is regarded as the intermediate stage in the change of II to hemipinimide. Opianic acid and MeNH.OH.HCl in aq. KOH give *N*-methyl-opianic oxime, m. 180.5° (decompn.); refluxing with H₂O for 3 hrs. gives a small amt. of *N*-methylhemipinimide but the main product is apparently the sol. MeNH₂ H salt of hemipinic acid; by heating above 180° for 10 min., the imide was obtained. Heating opianic acid and MeNH.OH.HCl in 80% EtOH for 3 hrs. also gives the imide. *K* hemipinimide and MeI give the *N*-Me deriv. Opianic acid and H₂NOMe.HCl in NaOH give *O*-methyl-opianic oxime, m. 112°; this also results from the oxime and Me₂SO₄. The absorption spectra of these compds. are given; the curves for I and its *N*- and *O*-Me ethers are normal, but the curve for the II differs widely from those usually obtained for acylated oximes and suggests a relationship between the anhydride and hemipinimide which is not borne out by their chem. properties. The 2 forms, white and yellow, of phthaloxime have been reinvestigated. Both forms m. and decomp. at the same temp. and both yield series of derivs. in which the characteristic difference in color persists. The red Na salt of phthaloxime with MeI or Me₂SO₄ gives the yellow *O*-Me ether, while the Na salt from the white oxime gives the colorless *O*-Me ether. Hydrolysis of the white *O*-Me deriv. gives C₆H₄(CO₂H)₂ and H₂NOMe. C₆H₄(CO)₂O and MeNH.OH.HCl give *N*-methylphthaloxime, m. 121-2°; a yellow form could not be found. From a study of the absorption spectra it is felt that the phthaloximes exhibit a special type of isomerism for which an explanation has still to be found. Small yields of *o*-H₂NC₆H₄CO₂H are obtained from both the white and yellow oximes by using a high temp. and AmOH-KOH. C. J. WEST

Constitution of Indian turpentine from *Pinus longifolia*, Roxb. IV. P. PARAMESWARAN PILLAY AND J. L. SIMONSEN. *J. Chem. Soc.* 1928, 359-64; cf. C. A. 18, 247.—Oxidation of *d*- Δ^1 -carene with H_2O_2 in $AcOH$ gives *d*-carene- β -glycol (I), b_{100} 147-50°, m. 90-1°, crystg. with $1H_2O$, optically inactive in $EtOH$ and $CHCl_3$; with CrO_3 it undergoes complete degradation, no trace of a HO ketone being observed. The *H* phthalate, m. 191-2°. The filtrate from I gives a product, b_{100} 155-7°, having the compn. of I. Heating 60 g. I with 200 cc. 5% H_2SO_4 48 hrs. on the H_2O bath gives 10.5 g. b_{100} 101-20°, consisting essentially of *p*-cymene, and 13 g. b_{100} 140-60°, from which *l*-carene oxide is isolated, though not pure; 2 fractions b_{100} 150-3° and 155-9° and had d_{30}^{20} 0.961, 0.9794, n_D^{30} 1.4740, 1.4768, $[\alpha]_D^{30}$ —, —39.16°; after standing several months, it gave a small quantity of a semicarbazone, $C_{11}H_{19}ON_3$, m. 193-3.5°; with $C_6H_5(CO)_2O$ it gives the *H* phthalate of I. The oxide is remarkably stable and does not undergo hydration even when shaken with H_2SO_4 for some days. The oxidation product of the oxide with $KMnO_4$ in Me_2CO is a complex mixt. of acids showing no tendency to crystallize. A small quantity of a semicarbazone, $C_{10}H_{17}O_2N_3$, decomps. 165-6° was obtained, but the corresponding keto acid did not crystallize; $NaOBr$ gave $CHBr_3$, indicating the Ac group. The action of $HOCl$ upon *d*- Δ^1 -carene gives hydroxychlorocarane, b_{100} 90-3°, d_{30}^{20} 1.0123, n_D^{30} 1.4992, and impure dichlorodihydroxy-methylisopropylcyclohexane, b_{100} 110-3°, d_{30}^{20} 1.0821, n_D^{30} 1.5060, probably a mixt. of isomers.

C. J. WEST

Products of the addition of chlorine and bromine to pinene and their dechlorination. I. L. KONDAKOV. *Ber.* 61B, 479-81(1928).—In connection with the paper of Aschan (C. A. 22, 1346), K. calls attention to one of his own published in 1905 (*Chem.-Ztg.* 29, 1225) and many others since then in *Parfumerie mod.*, *Caoutchouc et guttapercha* and *Bull. soc. chim.* in 1923-25.

C. A. R.

Reaction of caryophyllene. D. T. GIBSON. *J. Chem. Soc.* 1928, 750-1.—A soln. of N_3CHCO_2Et in caryophyllene (b_{100} 124°, n_D^{15} 1.5012), gradually added to an excess of caryophyllene at 180-200° in the presence of finely divided Cu gives a cyclopropane ester, b_{100} 130-60°; the ester is hydrolyzed by 10% KOH , giving the cyclopropane acid, $C_{16}H_{26}CO_2H$, m. 165° [α]₄₄₀ —40° ($EtOH$, *c* 1); the acid is stable to Br in $CHCl_3$ and is only very slowly attacked by boiling acid $KMnO_4$. The mother liquor contains a resinous acid, which is the sole product when a more concd. alkali is used in the hydrolysis. The use of this reaction is shown in its application to supa oil. C. J. W.

Oxidation of reactive methylene groups. WILHELM TREIBS AND HARRY SCHMIDT. *Ber.* 61B, 459-65(1928).—Semmler and his collaborators had found that in cedrene, gurjunene and α -pinene the CH_2 group adjacent to a double bond is oxidized to CO or C(OH) by CrO_3 - $AcOH$ and Schroeter converted tetralin into tetralone in the same way. T. and S. undertook to det. how generally applicable the method is and in repeating Semmler's expts. found that the yields are small; moreover, CrO_3 is sufficiently sol. in $AcOH$ only on the addn. of H_2O . Accordingly, T. and S. used CrO_3 in Ac_2O , in which up to 30% CrO_3 can be dissolved; the presence of H_2O , which may be a disturbing factor in some cases, is thus avoided and the H_2O formed in the reaction is removed from the field of action, and furthermore sensitive alcs. are acetylated at the moment of formation and protected from further oxidation. The substance to be oxidized can be dild. with any desired quantity of a solvent stable towards CrO_3 , such as CCl_4 . Although a considerable excess of CrO_3 was used, a part of the material always remained unchanged and a part further oxidized through the alcs. and ketones. α -Pinene gave verbenol and verbenone; dipentene yielded carveol and carvone; cyclohexene formed cyclohexenol and an unsatd. ketone; tetralin was oxidized to tetralone and the corresponding alc.; from terpineol was obtained an unsatd. glycol. Of the terpenes with a semicyclic double bond, sabinene and sabinol yielded cuminaldehyde, isopropylcyclohexenone and cymene; camphene gave camphenilone, camphenilene-aldehyde and camphenilanic acid; α -fenchene gave fenchocamphorone, fenchenilene-aldehyde and fenchenilanic acid; β -pinene (nopinene) formed an unsatd. acid $C_{10}H_{16}O_2$ and an aldehyde smelling of cuminal, together with ketones of a verbenone-like odor and the corresponding alcs. Octylene yielded caprylic acid and an aldehyde $C_{10}H_{16}O_2$ (probably a ketoaldehyde), together with unsatd. alcs. α -Phellandrene gave cuminaldehyde, unsatd. alcs., $C_{11}H_{18}O$ and some cymene. These results show that the observations of Semmler and of Schroeter are a general property of a CH_2 group adjacent to a double bond in a ring while a semicyclic methene union has got the same influence on an adjacent CH_2 group but is itself very reactive.

C. A. R.

2-Aminofluorenone. ALFRED ECKERT AND ERNST LANGBECKER. *J. prakt. Chem.* 118, 263-81(1928).—Upon oxidation of the nitration product of 2-acetaminofluorene

and hydrolysis there are obtained 2 products, 1 sol. in dil. HCl, bluish black, sinters at 279° (the Ac deriv. does not m. 300°) and the residue, 2-amino-3-nitrofluorenone (I), deep violet-red, m. 269° (Ac deriv., red, m. 245-6°); the structure of the latter follows from the removal of the NH₂ group, giving 3-nitrofluorenone, m. 210°. Reduction gives 3-aminofluorenone, m. 158-9° (Ac deriv., m. 215°). Reduction of I gives 2,3-diaminofluorenone, reddish brown, m. 185° (quinoxaline deriv., reddish yellow, m. 209°). Nitration of 2-aminofluorenone gives principally the 7-NO₂ deriv.; the Ac deriv. behaves similarly. Nitration of the 2-carbethoxyamino (reddish yellow, m. 167-8°) or 2-BzNH deriv. gives principally the 3-NO₂ deriv. 2-Carbethoxyamino-3-nitrofluorenone, reddish yellow, m. 204°, the di-NO₂ deriv., a lighter color, m. 256-7°. Nitration of the 2-NH₂ deriv. in concd. H₂SO₄ also gives the 7-NO₂ deriv. 2-Hydroxy-7-nitrofluorenone, red, m. 298-9°. 2-Aminofluorene in AcOH and Br give a tri-Br deriv. (II), pale rose, m. 198°, the corresponding fluorenone, red, m. 279°; a Br could not be replaced by MeO. Through the diazo reaction there is obtained a tribromofluorenone, yellow, m. 267-8°, the II₂ deriv., yellow, m. 303°, results through the diazo reaction from II. 2-Methoxyfluorene and Br give a tri-Br deriv., m. 188°, the fluorenone, light yellow, m. 265-6°. The mother liquor contains a dibromo-2-methoxyfluorene, m. 121°. Nitration of 2-methoxyfluorene gives a mixt. of 2 NO₂ derivs. The mixt., yellow, m. 217°, and the NH₂ deriv. m. 146-7°.

C. J. WEST

Introduction of the triphenylmethyl group into phenols. D. R. BOYD AND D. V. N. HARDY. *J. Chem. Soc.* 1928, 630-8.---Heating Ph₃COH and PhOH to boiling for 1 hr gives 97% of 4-HOC₆H₄CPh₃, m. 282°. Gently boiling 4 g. Ph₃COH and 5 g. 4-HOC₆H₄CO₂Me for 1 hr. and hydrolysis with HI-AcOH gives 1.9 g. 4-hydroxytetraphenylmethane-3-carboxylic acid, m. 232°; heating above the m. p. gives 4-HOC₆H₄CPh₃; Ac deriv., m. 210°; boiling with Br in AcOH gives the 5-Br deriv., m. 239°; these compds. are insol. in aq. alkalis. HNO₃ in AcOH gives the 5-NO₂ deriv., light yellow, m. 226°, which is readily sol. in dil. NaOH. Ph₃COPCl₂ and PhOH, heated at 120°, give 87% of 4-HOC₆H₄CPh₃; with *m*-MeC₆H₄OH there results 4(2),2(4)-HOMEc₆H₄CPh₃ and Ph₃CH, *p*-MeC₆H₄OH gives Ph₃CH and a small amt. of the *ds-p*-tolyl ester of triphenylmethylphosphorous acid, m. 179-80°. 4-Acetoxy-3-methyltetraphenylmethane, m. 150°. *o*-MeC₆H₄OMe (9 g.) and 6 g. Ph₃COH in 60 cc. AcOH and 12 g. H₂SO₄ give 8.56 g. 4-methoxy-3-methyltetraphenylmethane, m. 165°, also prepd. by direct methylation of the 4-IIO deriv.; Br in AcOH gives the 3-Br deriv., m. 180°. A study of the stability of various 4-HOC₆H₄CPh₃ derivs. towards H₂SO₄ and HI-AcOH is reported; the stability is altered markedly by the presence of substituent groups; the influence of a substituent is dependent both on its chem. nature and on its position in the mol.

C. J. WEST

Action of sodium triphenylmethyl upon trimethymethoxyammonium iodide and of triphenylmethyl halides upon trimethylamine. L. W. JONES AND M. W. SEYMOUR. *J. Am. Chem. Soc.* 50, 1150-4 (1928).---Ph₃CNa and Me₃N(OMe)I probably give as the primary product Me₃N(OMe)CPh₃, which decomps. into Me₃N, Ph₃CH and HCHO, which react to give Ph₃CCH₂OH. All attempts to add Ph₃C halides to Me₃N or MeI to Ph₃CNMe₂ were unsuccessful.

C. J. WEST

Basic triphenylmethane dyes. K. BRAND (I) WITH A. MODERSOHN; (II) WITH GERTRUD SCHUCK. *J. prakt. Chem.* 118, 97-122, 123-137 (1928).---Further evidence that the color changes observed when solns. of crystal violet or malachite green are gradually acidified are due to progressive conversion of the Me₂N groups into non-auxochromic dimethylammonium ions, is furnished by the study of the corresponding methylated quaternary salts. The Me ether of (Me₂NC₆H₄)₂COH yields with 1 mol. Me₂SO₄ a monomethosulfate, m. 234-6°, decomps. from 227°; the corresponding MeI deriv. is hydrolyzed by boiling dil. AcOH to iodine green; with 2 mols. of Me₂SO₄, there results a mixt. of products from which was obtained on 1 occasion an impure dimethiodide, which, after hydrolysis and removal of a little iodine green, gave a yellow aq. and an orange HCl soln.; with 3 mols. Me₂SO₄, a trimethosulfate, m. 223-4° (decompn.). The corresponding trimethoperchlorate, m. 303-4° (decompn.), is hydrolyzed by dil. acid to the colorless substance (I), C(C₆H₄NMe₂ClO₄)₂OH, m. 291-2° (decompn.), which gives with concd. mineral acids carbonium salts similar in color and stability to those of Ph₃COH. When the Me ether (II) of (Me₂NC₆H₄)₂PhCOH is successively treated with Me₂SO₄ (1 mol.) and NaClO₄, it affords a methoperchlorate, m. 167-8°, which is converted by boiling HClO₄ into the orange-red compd. (III), PhC(C₆H₄NMe₂)₂ClO₄·ClO₄·H₂O, m. 253-4° (decompn.). This is hydrolyzed by H₂O to the colorless methoperchlorate of (Me₂NC₆H₄)₂PhCOH. The dimethoperchlorate, m. 295-6°, of II, is hydrolyzed by dil. acid to the dimethoperchlorate (IV), m. 287-8°, of (Me₂NC₆H₄)₂PhCOH, which gives halochromic solns. similar to those of Ph₃COH. The methosulfate,

decomps. 246° , and the *methoperchlorate* (V), m. $217-8^{\circ}$ (decompn.), of (*p*-Me₂NC₆H₄)-Ph₂COH give yellow solns. in concd. mineral acids, which are decolorized by H₂O. The carbinol is converted by (CO₂H)₂ into a mixt. of the colorless oxalate with an orange salt (VI) and by boiling MeOH into its *Me ether*, m. $90-1^{\circ}$, which forms a *methosulfate*, m. $159-64^{\circ}$, and a *methoperchlorate*, m. 274° . The ordinary Zeisel method is not applicable to Ph₂CH derivs. contg. 2 or more Me₂N groups since the latter also yields MeI under these conditions. Correct results are, however, obtained by heating the substances with HI at 100° . Although iodine green gives no ppt. with neutral AgNO₃, it is quant. converted by NaClO₄ into the corresponding *diperchlorate*. Cond. measurements with iodine green, tetramethyldiaminotriphenylmethane-MeI, crystal violet and I, III, IV and V above indicate that in each case all the acid radicals are ionogenic. Accordingly, formulas of polyacid salts of Ph₂CH dyes included within the coordination complex are probably incorrect. The above carbonium salts fall into 4 groups of decreasing stability, containing 3, 2, 1 and 0 Me₂N groups. The colors violet, green, orange-red and orange-yellow, are independent of the no. of Me₂N groups present and are similar to those for the corresponding polyacids of crystal violet. C. J. WEST

Dioximes. XLVI. G. PONZIO AND C. CERRINA. *Gazz. chim. ital.* **58**, 26-35 (1928); cf. C. A. **22**, 578. The present work deals with the action of NH₄OH on diacylglyoxime peroxides and describes a new series of dioximes, viz., *acylaminoglyoximes*, of the general type RCOC(:NOH)C(:NOH)NH₂. These exist in 2 forms, of which that with the higher m. p. is obtained by heating with dil. AcOH the form with the lower m. p. They are dehydrogenated in acid soln. to the corresponding peroxides, which with SnCl₂ lose O and can be regarded as furoxans: RCOC(:NOH)C(:NOH)NH₂ → RCOC.N.O.N(:O).CNH₂ → RCOC.N.O.N:C.NH₂. This dehydrogenation can-

not be effected with the usual reagents for dioximes with no NH₂ group, but is readily accomplished with Br water and represents a *new method of prepn. of peroxides*. Dibenzoylglyoxime peroxide (I) (cf. C. A. **21**, 1099; **22**, 578) (10 g.) added slowly with cooling to 6 N NH₄OH (35 cc.), let stand 24 hrs., filtered, the filtrate acidified with dil. H₂SO₄, refiltered, satd. aq. AcONa added, filtered, washed with water and purified by resoln. in dil. H₂SO₄ and pptn. with AcOH or by resoln. in NH₄OH and pptn. by AcOH, gives 7 g. of *α-benzoylaminoglyoxime monohydrate*, BzC(:NOH)C(:NOH)-NH₂.H₂O (II), straw-color, m. 127° (decompn.), gives an intense wine-red color with aq. FeCl₃; its solns. in NH₄OH, KOH and NaOH are yellow; it gives in NH₄OH with AgNO₃ a *Ag salt*, C₆H₅O₂N₃Ag, yellow, explodes around 130° ; it ppts. in dil. EtOH with Ni(OAc)₂ a *Ni deriv.*, yellowish, decompd. by dil. AcOH, and in dil. EtOH with Cu(OAc)₂ a *Cu deriv.*, dark green, stable toward dil. AcOH. In 10% NaOH, II forms with BzCl a *di-Bz deriv.* BzC(:NOBz)C(:NOBz)NH₂, m. $158-9^{\circ}$. Heated with 15% AcOH for some hrs. on a water bath, II isomerizes to *β-benzoylaminoglyoxime*, BzC(:NOH)C(:NOH)NH₂ (III), m. 187° (decompn.), which is purified by addn. of dil. NaOH, filtration, addn. of dil. AcOH to the filtrate, and recrystn. from boiling water, its solns. in NH₄OH, KOH and NaOH are yellow; it gives a brown-red color with aq. FeCl₃, with Ni(OAc)₂ ppts. a *Ni deriv.*, yellowish, and with Cu(OAc)₂ ppts. a *Cu deriv.*, dark green. Heated with 2 N NH₄OH on the water bath, III is gradually transformed to Bz(C₂N₂O)NH₂. BzCl added to III in 20% NaOH gives a *di-Bz deriv.*, BzC(:NOBz)C(:NOBz)NH₂, m. 198° . Br water (Cl, CrO₃ and KMnO₄ are less desirable) added to II in 10% H₂SO₄ and the ppt. recrystd. from EtOH, yields *benzoylaminoglyoxime peroxide*, Bz(C₂N₂O₂)NH₂ (IV), golden yellow, m. 145° (decompn.). SnCl₂ (5 g.) in glacial AcOH (40 g.) and HCl (4 g. of d. 1.19) heated gently with IV (1.5 g.) in glacial AcOH (20 cc.) and dild. with water ppts. *benzoylaminofurazan*, Bz(C₂N₂O)NH₂ (V), m. 135° , also prepd. by treating I with cold Ac₂O or by heating for some hrs. on the water bath either II or III with 2 N NH₄OH; heated with BzCl it forms a *Bz deriv.*, Bz(C₂N₂O)NHBz, m. $139-40^{\circ}$, hydrolyzed by dil. HCl. The compd. obtained by Holleman by treating I with NH₄OH (cf. *Rec. trav. chim.* **6**, 78 (1887); **11**, 265(1892)) and regarded by him and by Boeseken (*Rec. trav. chim.* **16**, 297(1897)) and by B. and van Lennep (C. A. **6**, 2745) as another compd. was really V. With the method for prepg. II was prepd. from di-*p*-tolylglyoxime *α-p-tolylaminoglyoxime monohydrate* (VI), straw-color, m. 114° (decompn.), gives a wine-red color with aq. FeCl₃, gives with Ni(OAc)₂ a *Ni deriv.*, yellowish, decompd. by dil. AcOH, and with Cu(OAc)₂ a *Cu deriv.*, dark green, stable toward dil. AcOH. Heated as before with 15% AcOH, VI forms *β-p-tolylaminoglyoxime*, m. 188° (decompn.), gives yellow solns. in NH₄OH and alk. hydroxides. Br water and VI yield *p-tolylaminoglyoxime peroxide*, yellow, m. 145° (decompn.), reduced by SnCl₂ to *p-tolylaminofurazan*, m. 165° . The latter is also formed by heating VI with 2 N NH₄OH and crystg. from C₆H₆.

It is the compd. obtained by Boeseken (*loc. cit.*) but considered to be 3-*p*-toluyl-5-aminoazoxime. *p*-Anisoylamino-furazan, m. 144°, is the compd. prepd. by Böeseken and regarded as 3-*p*-anisoyl-5-aminoazoxime. C. C. DAVIS

Relative ease of formation of rings. II. JULIUS V. BRAUN. *Ber.* 61B, 441-3 (1928); cf. *C. A.* 22, 1153; Leuchs, *C. A.* 22, 1352.—Like L., v. B. has found that when ring closure is effected (with 1 mol. AlCl_3 in CS_2) in $\text{PhCH}_2\text{CH}_2\text{CH}(\text{CH}_2\text{Ph})\text{COCl}$ (yellow oil, b_{15} 198-202°), a 6-, not a 5-membered ring is formed, the product (yellow oil, b_{15} 220-5° and soon solidifying (yield, 60%); *oxime*, m. 119°), being *ac*- β -benzyl-tetralone, since the product of its reduction by Clemmensen's method, *ac*- β -benzyl-tetralin, b. 194-5°, gives C_{10}H_8 when its vapors are passed in a CO_2 atm. over PbO heated to dark redness. Similarly, *benzylsuccinyl chloride*, light yellow oil, $b_{0.5}$ 115-7° (in the vacuum of a H_2O pump it decomps. slightly), with AlCl_3 gives 60-5% (if not more than 10 g. of the chloride is used at 1 time) of 1-tetralone-3-carboxylic acid, m. 144°, b_{15} 218-20°, also formed from benzylsuccinic anhydride and AlCl_3 ; *Et ester*, b_{15} 175-7°; *semicarbazone*, m. 264°. Reduction of the acid gives *ac*- β -tetralincarboxylic acid, b_{15} 168-70°, m. 97°. C. A. R.

Action of chlorosulfonic acid on α - and β -naphthylamines. A. CORBELLINI *Giorn. chim. ind. applicata* 9, 355-7 (1927); *Brit. Chem. Abstracts* 1927A, 1179.— α and β -Naphthylamine sulfates are sulfonated by ClSO_3H , the chief products being those obtained by the use of other sulfonating agents. Thus with the α -compd. the main products are the 4- and 5- SO_3H acids, which are also formed by the action of fuming H_2SO_4 , whereas β - $\text{C}_{10}\text{H}_7\text{NH}_2$ gives the 5- and 8- SO_3H acids in proportions similar to those formed by the action of either H_2SO_4 or fuming H_2SO_4 . C. C. DAVIS

Identification of organomagnesium halides by crystalline derivatives prepared from α -naphthyl isocyanate. HENRY GILMAN AND MARGARET FURRY. *J. Am. Chem. Soc.* 50, 1214-6 (1928).—Reactive organometallic compds. may be conveniently identified by the formation of α -naphthalides from α - $\text{C}_{10}\text{H}_7\text{NCO}$. The following new α -naphthalides were obtained from the proper RMgX : *hexahydrobenzo*, m. 188°; *phenylaceto*, m. 166°; *cinnamyl*, m. 217°; *p-tolu*, m. 173°; α -*naphtho*, m. 236°. If an excess of the Grignard reagent is used, the formation of the sparingly sol. urea is avoided. C. J. WEST

Polymerization of indene, cinnamalfuorene and some derivatives of indene. G. S. WHITBY AND MORRIS KATZ. *J. Am. Chem. Soc.* 50, 1160-71 (1928).—Indene is converted into high polymers by the catalytic action of SbCl_5 and SnCl_4 ; the products are heterogeneous. The highest polymer isolated was represented by a fraction with a mol. wt. corresponding to $(\text{C}_9\text{H}_8)_{20}$. The polymeric products obtained by heating indene are lower, the higher the temp. used. These products, too, are heterogeneous. There is a clear relationship between the m. p. and mol. wt. of polymers of indene. All of the polyindenes, no matter what their mol. wt., contain 1 double bond per mol. Conclusion: The polymerization of indene proceeds step-wise by the addn., involving the wandering of H, of successive mols. of the monomer, leading to products of the formula $\text{CH}_2\text{C}_6\text{H}_4\text{CH}_2\text{CH}-\left[\text{CH}_2\text{C}_6\text{H}_4\text{CH}_2\text{CH}-\right]_n\text{C}_6\text{H}_4\text{CH}_2\text{CH}$. Cinnamal-

fuorene yields high polymers when treated with SbCl_5 or SnCl_4 , the products being mixts. Heating at 240-50° also causes it to polymerize. Cinnamalindene and benzalindene also can be polymerized by heat and by catalysts. Hydroxybenzylbenzalindene can be polymerized by SbCl_5 . C. J. WEST

Synthesis of meso-alkyl and meso-arylanthracene derivatives. III. EDWARD DE BARRY BARNETT AND J. W. COOK. *J. Chem. Soc.* 1928, 566-72; cf. *C. A.* 21, 3191.— PhCH_2MgCl and 1,5-dichloro-9-benzylantrone (I) give 1,5-dichloro-9,10-dibenzyl-9,10-dihydroanthranol, m. 197°; I and PhMgBr give 1,5-dichloro-10-phenyl-9-benzyl-9,10-dihydro-10-anthranol, m. 167°. The dehydration or the product from MeMgI by heating 1-3 hrs. with AcOH contg. a little HCl or H_2SO_4 gives 1,5-dichloro-9-benzyl-10-methylene-9,10-dihydroanthracene, m. 123°; the 10-benzylidene deriv., m. 158°. The glacial AcOH soln. of the crude dihydroanthranol obtained from Me_2CHMgBr kept overnight at the ordinary temp. after a little HCl had been added gives the yellow 1,5-dichloro-9-benzyl-10-isopropylantracene, m. 138°, which exhibits a green fluorescence in soln. By the action of Grignard solns. on 9,9-diphenyl- and 9,9-dibenzylantrone there were obtained: 9,9-Diphenyl-10-methylene-9,10-dihydroanthracene, m. 192°; 10-benzylidene deriv., m. 254-5°. 9,9-diphenyl-10-benzyl-9,10-dihydro-10-anthranol, m. 228-30°; 10-Me deriv., m. 175°. 10-Phenyl-9,9-dibenzyl-9,10-dihydro-10-anthranol, m. 189°; 9,9,10-tribenzyl-9,10-dihydroanthranol, hygroscopic, m. 140°. 9,10-Dibenzylantracene, m. 245°. 1,5-Dichloroanthrone, PhCH_2Cl and KOH boiled 2 hrs. give 1,5-dichloro-9-benzylantrone, m. 169°; EtOH-KOH gives a red soln., but the compd. cannot

be methylated and is recovered after heating 12 hrs. with Ac_2O and picoline bases. The compd. is recovered unchanged after boiling with HI and red P in AcOH of with Zn and NH_4OH but Zn and $\text{EtOH}\cdot\text{NH}_3$ give 1,5-dichloro-9-benzyl-9,10-dihydro-10-anthranol, m. 179°. 1-Chloro-10,10-dibenzylanthrone, m. 233°, from 1-chloro-9-anthrone, PhCH_2Cl and KOH; with PhMgBr it gives 1-chloro-9-phenyl-10,10-dibenzyl-9,10-dihydro-9-anthranol, m. 260°. The isomeric 1-chloro-10-anthrone gave only resinous products, as did 2-chloro-9-anthrone.

C. J. WEST

Correction regarding methylanthracenes. E. BÖRNSTEIN. *Ber.* 61B, 443(1928).—In B.'s paper on the Fritzsche reagent (*C. A.* 21, 1115), the symbols α and β as applied to the isomeric methylanthracenes on p. 2812, lines 11 and 12 from the bottom, and p. 2814, lines 6 and 8 from the bottom, should be interchanged.

C. A. R.

Stereochemistry of tervalent nitrogen. J. G. JACKSON AND JAMES KENNER. *J. Chem. Soc.* 1928, 573–81.—At the present time the evidence in favor of a non-planar configuration of compds. of tervalent N is to be seen in the dipolarity of the NH_3 mol., which confers on it the capacity of participation in metal-ammine formation; the existence of quinuclidine; a difference in the readiness with which the 2 forms of 4,5-dimethoxy-4,5-dihydroglyoxalone are converted into 5-methoxy-4,5-diphenylisoglyoxalone; and the isomerism of methylisopelletierine with *dl*-methylconhydrinone. Apart from the last instance, the search for isomers demanded by a non-planar configuration has been unsuccessful and it would therefore appear that in general the non-planar readily passes into a planar form, from which the original or its enantiomorph may be regenerated or else that the normal configuration is plane. Preliminary studies were made on β -phenylglutaric acid which, with H_2SO_4 at 150°, gives 1-ketohydrindene-3-acetic acid, m. 151°; semicarbazone, m. 268° (decompn.); *Me* ester, m. 65° (semicarbazone, m. 152°; 2-isonitroso deriv., m. 167° (decompn.)); *Et* ester, b₁₅ 194–200° (semicarbazone, m. 131–2°; 2-isonitroso deriv., m. 193° (decompn.)). β -Phenylglutaryl chloride, b₁₅ 170–90°, m. 46°; with AlCl_3 it gives the above acid, but if impure petroleum ether is used, there results some ω -3-hydrindonylaceto phenone, yellow, m. 78°; disemicarbazone, m. 233° (decompn.); dioxime, crystals with 1.5 H_2O , m. 179°. Detailed directions are given for the prepn. of anthranilodiacetic acid, from which on heating with NaOH at 150° there results indoxylacetic acid; Me_2SO_4 gives the *O*-*Me* deriv., m. 141–2°, crystals with 1 H_2O . In the fusion of Na indoxylacetate with NaNH_2 there is formed a small quantity of the compd. $\text{C}_{17}\text{H}_{15}\text{O}_2\text{N}_2$, m. 163°.

C. J. WEST

Molecular symmetry of acetonilpyrrole. S. B. HENDRICKS. *J. Am. Chem. Soc.* 50, 1205–8(1928).—Laue and spectrum photographs have been obtained and analyzed from crystals of acetonilpyrrole. The unit of structure contg. 4 $\text{C}_{12}\text{H}_{10}\text{N}_4$ mols. has the dimensions $a_0 = b_0 = 10.09$ A. U., $c_0 = 23.85$ A. U. The space group is 4C-2 or 4C-4, the mols. being in the general positions and thus not necessarily having an element of symmetry. The mol. wt. is twice that corresponding to the previously assigned formula. A detn. of the mol. wt. by a differential vapor pressure method gave a value in agreement with the formula $\text{C}_{24}\text{H}_{20}\text{N}_4$.

C. J. WEST

Derivatives of 1,3-dithiolan and of 1,3-dithian. J. C. A. CHIVERS AND SAMUEL SMILES. *J. Chem. Soc.* 1928, 697–702.—Benzyl disulfide and deoxybenzoin, boiled with AcOK in EtOH for $\frac{1}{2}$ hrs., give the mercaptol of benzil, isolated as the dioxide, $\text{C}_{15}\text{H}_{14}\text{O}_2\text{S}_2$, m. 167°; with $\text{CH}_2(\text{CO}_2\text{Et})_2$ it gives, after hydrolysis, $\text{PhCH}_2\text{SCH}_2\text{CO}_2\text{H}$. Ethane- α,β -di-*p*-toluenethiolsulfonate and deoxybenzoin, condensed by AcOK in EtOH, give 2-benzoyl-2-phenyl-1,3-dithiolan; with $\text{CH}_2(\text{CO}_2\text{Et})_2$ there results, after hydrolysis, 1,3-dithiolan-2-carboxylic acid, m. 90° (dibromide, rapidly decomps.; the diiodide is more stable but still could not be purified), and a small quantity of ethylenedithiolacetic acid, m. 107°. Propane- α,γ -di-*p*-toluenethiolsulfonate, m. 65–7°; with deoxybenzoin it gives 2-benzoyl-2-phenyl-1,3-dithian, m. 99–100°, and with $\text{CH}_2(\text{CO}_2\text{Et})_2$, 1,3-dithian-2-carboxylic acid, m. 115–6° (*di-I* deriv.). Pentane- α,ϵ -di-*p*-toluenethiolsulfonate is a liquid, which could not be analyzed; with $\text{CH}_2(\text{CO}_2\text{Et})_2$ and hydrolysis, there results pentane- α,ϵ -dithiolacetic acid, m. 91–2°.

C. J. WEST

Pseudo bases and their salts in the isoxazole series. E. P. KOHLER AND A. H. BLATT. *J. Am. Chem. Soc.* 50, 1217–26(1928).—Triphenylisoxazole (10 g.) and 30 g. Me_2SO_4 , heated until soln. results and then treated with HCl and then with FeCl_3 , gives the FeCl_3 double salt, $\text{C}_{27}\text{H}_{18}\text{ONFeCl}_4$, S-yellow, m. 162°. 2-Methyl-3,4-diphenylisoxazolone and PhMgBr in Et_2O , stirred 1 hr. at room temp. and then boiled until the dark green oil changes to a yellow powder and finally decompd. with HBr , give α,β -diphenylbenzalacetophenone; from the aq. layer there seps. the bromide, $\text{C}_{20}\text{H}_{18}\text{ONBr}$, yellow, which loses MeBr at comparatively low temps. and then m. 209–10°; perbromide, orange, m. 152°; if the MeOH filtrates from the perbromide are dild. with Et_2O , there seps. a colorless bromide, $\text{C}_{22}\text{H}_{18}\text{ONBr}$, which decomps. at

comparatively low temps. and turns yellow in the light; the solubilities of the yellow and white bromides appear to be the same and both form the same FeCl_3 salt and the same perbromide. *Picrate*, yellow, m. 174° . When 5% Na in MeOH is added to the yellow bromide there results the *Me ether*, $\text{PhC}:\text{CPh}:\text{O NMe}.\text{CPhOMe}$, m. 135° (de-

compn.), the HCl soln. with FeCl_3 gives the above Fe salt, m. 162° ; the *Et ether*, m. 118° . The pseudo base is an oil that rapidly changes to other substances. The anhydro compd., $\text{PhCBz}:\text{CPhN}:\text{CH}_2$, results in about 50% yield in the formation of the pseudo base, it m. $140-1^\circ$ and rapidly turns yellow in the air; acids are incapable of regenerating the salts from the anhydro compd. With PhMgBr it gives the compd. $\text{PhCBz}:\text{CPhNHCH}_2\text{Ph}$, m. 134° , whose constitution is established by hydrolysis and the action of O_2 . MeOH gives the compd. $\text{PhCBz}:\text{CPhNHCH}_2\text{OMe}$, m. 104° . The *picric acid addn. product*, yellow, m. 184° . C. J. WEST

Condensation of certain β -ketonic esters with *o*-hydroxymonostyryl ketones. ROWLAND HILL. *J. Chem. Soc.* 1928, 256-9.—2-Hydroxystyryl Me ketone (5 g.) (I), 7.5 g. $\text{AcCHMeCO}_2\text{Et}$ and EtONa (from 1.7 g. Na) give 3.5 g. 4-acetonyl 2,3-dimethyl-1,4-benzopyran, m. 141° ; similarly 2-hydroxystyryl Ph ketone (II) gives the 4-phenacyl deriv., m. 179° . I and $\text{AcCHPhCO}_2\text{Et}$ give 4-acetonyl-3-phenyl-2-methyl-1,4-benzopyran, m. $186-7^\circ$, while II gives the 4-phenacyl deriv., m. $219-21^\circ$. No evidence of a reaction was discovered with $\text{EtO}_2\text{CCOCH}_2\text{CO}_2\text{Et}$, $\text{NCCCH}_2\text{CO}_2\text{Et}$ or $\text{CH}_2(\text{CO}_2\text{Et})_2$. II and $\text{CH}_2(\text{CO}_2\text{Et})_2$ after 10 weeks in EtOH-EtONa gave only coumarin- α -carboxylic acid, from the decompn. product of II (*o*- $\text{HO}:\text{C}_6\text{H}_4\text{CHO}$). C. J. WEST

Behavior of dixanthylene on heating. A. SCHONBERG AND O. SCHÜTZ. *Ber.* 61B, 478-9 (1928).—According to Wizinger (*C. A.* 21, 2893) the color changes of bianthrone (I) on heating depend on the C O groups. Now, dixanthylene (II), which is I in which the C O groups are replaced by O, shows similar color phenomena; the crystals, faintly yellow at room temp., are entirely colorless in liquid air and green at 280° and the melt is dark blue-green, the soln. in boiling *o*- $\text{C}_6\text{H}_4(\text{CO}_2\text{Me})_2$ (282°) is deep blue-green and on cooling the now yellow, somewhat fluorescent soln. deposits unchanged II. Surely the similar behavior of I and II must result from the same cause, which does not agree with W.'s hypothesis. C. A. R.

Hydrogenation of cyclic compounds under pressure in presence of osmium and other catalysts. V. S. SADIKOV AND A. K. MIKHAILOV. *J. Chem. Soc.* 1928, 438-48.—Comparative measurements are reported of the effect of Pt, Pd, Ir and Os, on the hydrogenation of $\text{C}_8\text{H}_7\text{N}$ and quinoline under pressure; the Ipat'ev app. was used and readings are reported for every 15 min. Pt (20% on asbestos) at 320° causes rapid hydrogenation of quinoline, which quickly slackens because of fatigue of the catalyst; the absorption proceeds discontinuously, the curve showing undulations. Pd (20% on asbestos) produces a more uniform and extensive hydrogenation of quinoline; after a short induction period (15 min.), at the optimal temp., absorption starts and soon attains a max. of 5 atm. in 15 min., followed by oscillations from 3 to 2 atm. in 15 min. The powerful catalytic effect of Os, which is effective in a concn. of only 1% on asbestos, is due to the ease of formation of its oxide in contact with the air, or when exposed to the action of H_2O_2 . For 20% Os-asbestos at 300° , a rate of 10.8 atm./hr. (5.6 atm./hr. in a 2nd expt.) was found, the addn. of only 1% CeO_2 caused considerable initial acceleration and increased intensity. Although CeO_2 , when distributed over asbestos to the extent of 20%, will facilitate the hydrogenation of quinoline, giving as much as 88% of the tetrahydro deriv., yet, in the absence of any catalyzing metal, it is incapable of hydrogenating $\text{C}_8\text{H}_7\text{N}$, C_{10}H_8 or C_6H_6 ; similarly it is unable to effect further reduction of tetrahydro- and hexahydroquinoline, whereas this is easily effected on the addn. of Os or Ni. Thus, although Os and Ce jointly produce intense hydrogenation, neither of these alone is capable of giving such an effect. C_6H_6 is not so readily hydrogenated as $\text{C}_8\text{H}_7\text{N}$ with 20% Os on asbestos, the max. in the 1st case being 8 atm. and in the 2nd, 19 atm.; however in the course of the 1st run (4.75 hrs.) in each case an almost equal no. of atms. is absorbed per hr. The addn. of 1% CeO_2 is followed by a marked lowering of the rate of hydrogenation of $\text{C}_8\text{H}_7\text{N}$. These results support the assumption that the activity of the catalyst depends upon some sort of assocn. with the substance undergoing hydrogenation. They also give convincing evidence of the discontinuous character of the activity of the catalyst, which is most clearly exhibited when the easily oxidizable Os is used in presence of CeO_2 as a promoter. Oscillations of activity are evidently closely allied with the cooperation of O, which regenerates the catalyst; the latter, during the process of hydrogenation, experiences a fatigue which is inherent in the nature of the catalytic process. C. J. WEST

• **By-products in the pressure hydrogenation of pyridine.** V. S. SADIKOV AND A. K.

MIKHAILOV. *Ber.* 61B, 421-7(1928).—It has been shown (*C. A.* 21, 3364) that C_6H_5N can be reduced under pressure by the Ipat'ev method if, instead of NiO, Pd or Ir or Os on asbestos is used as the catalyst. Piperidine is obtained in yields of up to 70%; a part of the C_6H_5N is decompd. with loss of NH_3 and another part forms high-boiling hydrogenated by-products of alkaloidal nature. Two such by-products were isolated in the hydrogenation with 20% Os-asbestos a compd. $C_9H_{11}N$ (I), probably *N*-methyl- β -propylpiperidine (*N*-methylconiine), and α, α' -dimethyl- β -propyl-*N, N'*-dipiperidyl (II), $C_{15}H_{30}N_2$. I (yield, 7%), b. 195-200°, d. 0.8415, mol. wt. 151, gives with $K_4Fe(CN)_6$ in acids a bluish H_2O -insol. compd. (III) whose compn., however (Fe 11.99-12.02, N 24.70%) agrees better with the formula $(C_8H_{17}N)_2 \cdot H_4Fe(CN)_6$ than with $2I \cdot H_4Fe(CN)_6$; presumably, the *N*-Me group is split off and 2 of the resulting residues combine through their N atoms to *N*- β' -conyl- β -coniine, which then yields III. Picrate of I, m. 106-7°. When evapd. with an excess of HCl I gives a propylpiperidine-HCl, m. 200°, very sol. in and partly decompd. by H_2O . With MeI I gives a methiodide, probably $2I \cdot MeI$, m. 81°. The formation of I probably results from the decompn. of a C_8H_9N ring into NH_3 , Me and Pr in the hydrogenation and subsequent alkylation of a 2nd ring by the split products. II (yield, 11%), b. 295-300°, d. 0.9088, mol. wt. 232, hydroferrocyanide, $II \cdot H_4Fe(CN)_6$; methiodide, $II \cdot 2MeI$, m. 269-70°. Evapn. of II with HCl gives a compd. $C_{13}H_{26}N_2 \cdot 2HCl$ (IV), m. 258°. From II and picric acid was obtained a substance with C 47.06, H 5.32, N 10.53%, mol. wt. (Rast) 632-739, but on attempting to regenerate II from it by treating with NaOH and distg. with steam, decompn. took place and the small quantity of volatile product gave a HCl salt, m. 157°, with 25.20% Cl (calcd. for IV, 25.17%), which yielded a picrate with a m. p. (191°) different from that of the original picrate. Addn. of 1% CeO_2 to the 20% Os catalyst accelerates the hydrogenation to an unusual extent and gives 34-60% piperidine, 55.80% I and 9-10% II; there can hardly be any doubt that II is formed from I and that its yield depends on the length of heating. If the hydrogenation is carried out in an autoclave provided with a side tube which can be cooled during the heating so that the easily volatile products are protected from further hydrogenation (*C. A.* 22, 1336) the relative yields of the various products are different; 106 g. C_6H_5N heated 36 hrs at 280° with 14 g. of the Os-Ce catalyst (previously used 5 times and reactivated every time with H_2O_2) gave 80.64% piperidine, 3.30% I and 10.20% II; in another expt. where the heating was continued 77 hrs. the yields of I and II were 8.9 and 49.30%, resp. C. A. R.

α -Dimethylaminopyridine and its derivatives. A. F. CHICHBABIN AND I. L. KNUNTANZ. *Ber.* 61B, 427-34(1928).— α - $C_6H_4NNMe_2$ (I) can be obtained quite smoothly in 40-50% yield by treating the Na deriv. of α - $C_6H_4NNH_2$ with Me_2SO_4 , converting the $C_6H_4NNH_2$ and C_6H_4NNHMe in the resulting mixt. into their Ac derivs. with Ac_2O and sepg. the I by fractional distn. I differs from $PhNMe_2$ especially in that it forms no NO deriv. with HNO_3 . Neither does it couple to azo dyes with diazo compds. On the other hand, it is easily nitrated, the 1st product, which can be obtained in 90% yield, being β' -nitro- α -dimethylaminopyridine (II). The most careful search failed to reveal the presence of an isomer. Further nitration gives a dinitro compd. (III), presumably the β, β' -deriv. Reduction of II with Sn and HCl (*C. A.* 21, 1986) gives up to 80% of the β' -amino deriv. (IV), which forms a di-HCl salt quite stable in the air but the free base changes very readily in the air, especially in soln.; it can form diazo compds. with the properties of aromatic diazo compds. and coupling with phenols and amines to azo dyes. With KI the diazotized IV readily yields β' -iodo- α -dimethylaminopyridine (V) and with HBr by the Sandmeyer method the analogous Br deriv. (VI), which is also formed along with the β, β' -di-Br deriv. (VII) by direct bromination of I and is identical with that obtained by methylation of α, β' - $C_6H_3N(NH_2)(NH_2)Br$. Attempts to prep. α, α' - $C_6H_3N(NH_2)NMe_2$ by amination of I with $NaNH_2$ led to the formation of α, α' - $C_6H_3N(NH_2)_2$; probably there is first formed α - $C_6H_4NNH_2$ which then with a 2nd mol. of $NaNH_2$ gives the Na salt of the $C_6H_3N(NH_2)_2$; considerable Me_2NH is formed in the reaction. II, yellow, m. 154-5°. III, m. 125-6°. IV, m. 55-6°, sol. in concd. H_2SO_4 with violet color; di-HCl salt, m. 225-6°; $SnCl_2$ compd., m. 148-50°. V, m. 55°. VI, m. 42-3°, has a strong characteristic odor. VII picrate, m. 185-6°. C. A. R.

Friedel and Crafts' reaction in the pyridine series. C. M. JEPHCOTT. *J. Am. Chem. Soc.* 50, 1189-92(1928).— $C_6H_4(CO)_2O$ with $AlCl_3$ and various addn. compds. of C_6H_5N and of quinoline showed no reaction between the $C_6H_4(CO)_2O$ and the addn. compds. Quinolinic anhydride with $AlCl_3$ and $C_{10}H_8$, acenaphthene and Ph_2 , resp., gave only the corresponding picolinic acid derivs. and no benzoylpicolinic acid except in the case of Ph_2 ; β -naphthoylpicolinic acid (1,2)(I), m. 145°; Me ester, m. 80-2°;

HCl salt, m. 172-3°; *hydrate*, m. 109°. α -Naphthoylpicolinic acid (1,2), m. 155°; *HCl salt*, m. 179-80°; *Me ester*, m. 100-1°. 4-Acenaphthoylpicolinic acid (1,2), m. 168-9°; *HCl salt*, m. 175°; *Me ester*, m. 113-4°; *hydrate*, m. 121°. *p*-Phenylbenzoylpicolinic acid (1,2), m. 170-1°. *Me* quinolinate with SOCl_2 and then with C_6H_5 and AlCl_3 gives benzoylnicotinic acid (II), m. 285°; *Me ester*, m. 87°. Benzoylpicolinyl chloride, C_6H_5 and AlCl_3 give dibenzoylpyridine (1,2), m. 186-7°; the *tolylbenzoyl deriv.*, m. 190-3°. *p*-Tolylpyridophthalide, m. 144°, results by reducing *p*-tolylpicolinic acid with Zn in NH_4OH . Reduction of I gives β -naphthoylpyridophthalide, m. 127°, while II gives the lactone of β -carboxyhydroxy- α -pyridylphenylcarbinol, m. 128°. Phenylpyridophthalide with C_6H_5 and AlCl_3 gives diphenylmethylpicolinic acid (1,2), m. 153°; *Me ester*, m. 109°; *phenyltolyl deriv.*, m. 161°. Heating diphenylmethylpicolinic acid at 170° gives β -pyridyldiphenylmethane, m. 78-9°.

C. J. WEST

Quinoline derivatives. VII. Derivatives of 2-phenyl-4-aminoquinoline. HANNS JOHN AND E. WÜNSCHE. *J. prakt. Chem.* 118, 303-10 (1928); cf. *C. A.* 21, 914.—2-Phenyl-4-chloroquinoline (I), m. 64°, results through the diazo reaction from the 2-amino deriv. in concd. HCl . I (0.6 g.) and 8 cc. of a 5% EtOH soln. of $(\text{Me}_2\text{CHCH}_2\text{CH}_2)_2\text{NH}$ at 150-60° for 8 hrs. give 0.35 g. of the 4-diisoomylamino deriv., m. 61°; 4-anilino deriv., m. 182°; 4-*p*-toluidino deriv., m. 173°; 4-*m*-xylylidino deriv., m. 151° (*picrate*, m. 237°); 4-*ps*-cumidino deriv., m. 188°; 4- α -Naphthylamino deriv., m. 177-8° (*picrate*, m. 246°); 4- β -naphthylamino deriv., m. 185° (*picrate*, m. 219°); 4-benzylamino deriv., m. 147° (*picrate*, m. 241°); 4-hydrazino deriv., m. 143° (*Ac deriv.*, m. 184-5°), condensation product with BzH , $\text{C}_{22}\text{H}_{17}\text{N}_3$, yellow, m. 151°, whose *picrate*, yellow, m. 256° (decompn.); the condensation product with PhAc , pale green-yellow, m. 195-6° (*picrate*, yellow, m. 112°). Di-[2-phenyl-4-quinolyl]amine, from I and the 2-NH₂ deriv., 3 hrs. at 250°, m. 253.5°. Qual. descriptions of the HCl salt, sulfate, HgCl_2 salt, chromate and ferrocyanide and the reaction with I-KI are given for most of these derivs.

C. J. WEST

Some arsenical derivatives of quinoline. S. BERLINGOZZI. *Ann. chim. applicata* 18, 31-6 (1928).—The combination of hydroxyquinoline with diazo compds. (cf. B., *C. A.* 21, 2474) suggested the prepn. of analogous compds. from arsenic acid. The products have the compn. *p*-(HO)₂OAsC₆H₄N:N(C₆H₄N)(OH)R and are not readily sol. in org. solvents, so that they must be purified through their alk. salts. Such compds. are of interest because of their potential therapeutic value. NaNO_2 (1.1 g.) in water (20 cc.) added slowly with agitation to *p*-H₂NC₆H₄AsO(OH)₂ (4 g.) in ice-cold *N* HCl (78 cc.), let stand 15 min., poured into 2-methyl-4-hydroxyquinoline (2.4 g.) in *N* KOH (95 cc.), let stand 0.5 hr., acidified with AcOH , satd. with NaCl , filtered, washed with cold water, and the ppt. purified by soln. in *N* KOH , acidification with AcOH , and recrystn. from boiling EtOH , yields 2-methyl-3-azo-4-hydroxyquinoline-*p*-phenylarsonic acid, brown, does not m. below 300°, gives an intense ruby-red with concd. H_2SO_4 . In the same way 8-hydroxyquinoline yields 5-azo-8-hydroxyquinoline-*p*-phenylarsonic acid, chocolate, has properties like the preceding deriv. Similarly 2-phenyl-3-hydroxyquinoline yields 2-phenyl-4-azo-3-hydroxy-*p*-phenylarsonic acid, carmine-red, has similar properties to the preceding derivs., except that concd. H_2SO_4 forms a brilliant red with violet-blue by reflection. 2-Methyl-3-hydroxyquinoline yields 2-methyl-4-azo-3-hydroxy-*p*-phenylarsonic acid, blood-red, gives a brown color with concd. H_2SO_4 .

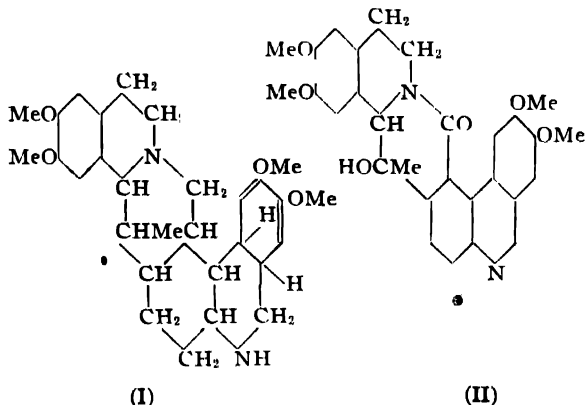
C. C. DAVIS

Acridines. IV. Preparation of hydroxyacridines and different 5-position acridine derivatives. H. JENSEN AND F. RETHWISCH. *J. Am. Chem. Soc.* 50, 1144-50 (1928), cf. *C. A.* 21, 1815.—In the prepn. of the following acridine derivs. *o*-H₂NC₆H₄CHO, a slight excess of the corresponding halogen deriv. of C_6H_5 , Cu powder and Na_2CO_3 in PhNO_2 were refluxed for 3 hrs. at 220°; the hydrolysis to the HO deriv. was effected by HI and traces of red P. 3(7)-Ethoxyacridine, yellow, m. 99° (*picrate*, yellow, does not m. 250°; 1(9)-MeO deriv., light yellow, m. 130-1° (*picrate*, orange-red, decomp. 250°); 1(9)-HO deriv., yellow, m. 116.5° (*picrate*, red m. 216°); 5-methylacridine, slightly yellow, m. 114° (*picrate*, yellow, m. 213-4°); 5,3(7)-dimethylacridine, cream, m. 90° (*picrate*, yellow, darkens 215°, m. 225°); 3(7)-nitro-5-methyl deriv., brown-yellow, does not m. 300°; 1(9)-nitro-5-phenyl deriv., yellow, m. 189-90°; 3(7)-ethoxy-5-phenylacridine, yellow, m. 105-7°. The condensation product, $\text{C}_{14}\text{H}_{11}\text{O}_2\text{N}$, of *o*-H₂NC₆H₄CHO and *o*-BzC₆H₄OMe, light yellow, m. 99°. 2-Acetyl-4'-nitrodiphenylamine, yellow, m. 152°. 2,5-Cl(O₂N)₂C₆H₃Ac and PhNH_2 give the compd. $\text{C}_{14}\text{H}_{11}\text{O}_2\text{N}$, light yellow, m. 125°. Et acridine-5-carboxylate, yellow, m. 78° (*picrate*, yellow, m. 226°; *HCl salt*, yellow, m. 250°); *Me ester*, slightly yellow, m. 126.5-7.5° (*picrate*, yellow, m. 229-30°; *HCl salt*, yellow, does not m. 250°).

C. J. WEST

Synthesis in the phenazine series. HAMILTON MCCOMBIE, H. A. SCARBOROUGH AND WM. A. WATERS. *J. Chem. Soc.* 1928, 353-9.—1-Methylphenazine (I), pale yellow, m. 108°, results in small yields from 2,3-(H₂N)₂C₆H₃Me and *o*-C₆H₄O₂ in Et₂O or by reducing 2-nitro-2'-methyldiphenylamine (orange-yellow, m. 76°; in 10% yield from *o*-ClC₆H₄NO₂, *o*-MeC₆H₄NH₂ and AcONa 20 hrs. at 220-40°) with SnCl₂ and HCl to the 2-amino deriv., m. 64°, which is heated with 4 times its wt. of PbO at 200-40°; the chloroplatinate of I, orange, decomps. above 200°. 2-Chlorophenazine, yellow, m. 139°, results by heating 4-ClC₆H₄(2-H₂NC₆H₄)NH with PbO. 4'-Bromo-2-nitrodiphenylamine, red, m. 167° (10-20% yield from *o*-ClC₆H₄NO₂, *p*-BrC₆H₄NH₂ and AcONa) the 2-NH₂ deriv., m. 128°, gives on heating with PbO 2-bromophenazine, yellow, m. 150°. 2-Nitro-4'-methoxydiphenylamine, orange-red prisms, m. 89°, *a*:*b*:*c* = 1.008:1:-0.799, *n* 1.73-1.74 for red light; other crystallographic data are given. The 2-NH₂ deriv., m. 78°, gives with PbO 2-methoxyphenazine, yellow, m. 126°; chloroplatinate, orange, gradually decomps. above 250°. 2-Nitro-2'-methoxydiphenylamine, red, m. 83°; the 2-NH₂ deriv., m. 58°; heating with PbO gave only phenazine; other methods of ring closure gave no trace of a phenazine deriv. Since 2-methoxyphenazine is not identical with hemipyocyanine, a hydrolysis product of pyocyanine, 1 possible formula for this compd. is eliminated. The yield of the phenazine derivs. is always of the order of 5%, so that a suitable synthesis has as yet not been developed. 2,2'-H₂NC₆H₄-(HO₂CC₆H₄)NH, m. 204°, yields a HCl salt, needles, decomps. about 240°; the free acid, heated 1 hr. at 250°, gives 4-aminoacridone(?), m. 255°; concd. H₂SO₄ appears to give a similar substance. C. J. WESS

Alkaloids of ipecacuanha. H. STAUB. *Helv. Chim. Acta* 10, 826-37(1927); cf. Späth and Leithe, *C. A.* 21, 1816; Brindley and Pyman, *C. A.* 21, 2698.—Emetine-HBr, C₂₉H₄₀O₄N₂·2HBr (cf. Carr and Pyman, *C. A.* 8, 3418), becomes yellow at 210° and m. 248° to an orange liquid. Oxidation of emetine with Br (cf. Carr and Pyman, *C. A.* 8, 3418) yields dehydroemetine bromide, C₂₉H₃₈O₄N₂Br (methiodide, +5H₂O, m. 199° after sintering at 174°), which crystallizes with 2, 3, or 6H₂O, according to the solvent used for crystn., and is anhyd. from acetone. Careful oxidation of dehydroemetine bromide with alk. KMnO₄ yields hydroxyketodehydroemetine, C₂₉H₂₈O₆N₂, m. above 305°, a "substance D," C₂₉H₃₄O₁₀N₂, decomps. 244° after darkening at 220°, and *m*-hemipinimide.



Formula I is suggested for emetine and II for hydroxyketodehydroemetine. B. C. A.

Condensation of certain aldehydes with ketones of the morphine group. J. M. GULLAND. *J. Chem. Soc.* 1928, 702-6.—Dihydrocodeinone (2 g.) and 8-aminopiperonal (1.1 g.) with Na (1 g.) in EtOH give 2.2 g. dianhydro-6-aminopiperonal-dihydrocodeinone, m. 270-71.5°, which gives a colorless soln. (without fluorescence) in concd. H₂SO₄; this behavior, with other examples previously reported, would indicate that the quinuclidine bases of this type, in which the attached groups form the larger part of the mol., do not necessarily yield fluorescent solns. Methiodide, pale yellow, which becomes orange at 200°, decomps. about 260°. BzH and hydroxydihydrothebainone in EtOH-KOH give the benzylidene deriv., yellow, m. 188°; attempts to prep. a quinoline deriv. by condensing with 6-aminopiperonal were fruitless. Thebainone and BzH give a benzylidene deriv. (I), canary-yellow, m. 233°; EtOH-FeCl₃ gives a brilliant green color; concd. HCl or H₂SO₄ gives a deep red color, discharged on diln. with H₂O; methiodide,

yellow, m. 195–7° (decompn.). *Piperonylidenebainone*, yellow, m. 176°; concd. HCl or H₂SO₄ gives a deep reddish purple soln. Reduction of I with H and PdCl₂ gives a mixt. of *benzylidenebainone A*, m. 229°, which seps. first from EtOH; Na salt, orange; concd. HCl gives an orange halochromic color; H₂SO₄, a bright red; *semicarbazone*, m. 155–60°; the *B isomer*, m. 179°, seps. as plates or as needles with 0.5 EtOH; both forms show the same halochromic forms as the *A isomer*; *semicarbazone*, m. 140–5°; *oxime*, m. 152°. *Benzylidenebainol*, faintly yellow, m. 100–2°; concd. H₂SO₄ gives an orange-red, concd. HCl a yellow color, discharged on addn. of H₂O.

C. J. WEST

Synthetic experiments on the aporphine alkaloids. I. Synthesis of 5,6-dimethoxyaporphine. J. M. GULLAND AND R. D. HAWORTH. *J. Chem. Soc.* 1928, 581–91. *o*-O₂NC₆H₄COCl (from 45 g. acid) and 45 g. veratrylethylamine in 250 cc. C₆H₆ give a buff-colored ppt., which, decompd. with 10% NaOH, gives 73 g. 2'-nitrophenylaceto-β-3,4-dimethoxyphenylethylamide, m. 112°; concd. H₂SO₄ sulfonates the amide, giving an orange soln. completely miscible with H₂O; with PCl₅ in CHCl₃ at room temp. after 24 hrs., 4 g. amide gives 3.5 g. 2'-nitro-6,7-dimethoxy-1-benzyl-3,4-dihydroisoquinoline, orange, m. 132°; HCl salt, pale yellow, m. 228° (decompn.); Ac₂O gives a pale yellow soln.; methiodide, pale S-yellow, m. 208°. NH₄OH gives a deep red soln. and an Et₂O-sol., red, amorphous solid; alk. fusion gives *m*-O₂NC₆H₄Me and 6,7-dimethoxy-2-methyl-3,4-dihydroisoquinoline, reduction in MeOH with Zn and 10% H₂SO₄ gives 2-[4',5'-dimethoxy-2'-β-methylaminoethyl]phenylindole, crystg. with 1EtOH, m. 85° and then 132°; it does not give the carbylamine reaction but shows characteristic indole reactions; HCl salt, crystg. with 1EtOH, melts about 105°, resolidifies and then melts at an indefinite temp., *mono-Ac deriv.*, m. 138°. With HCl and NaNO₂ the base gives the 3-oximino deriv., m. 178°; dil. HCl gives a strawberry-colored soln., NaOH a pale yellow soln.; PhOH and concd. H₂SO₄ give a yellow color but the characteristic NO reaction is absent. The above methiodide with Zn and HCl gives 2'-amino-6,7-dimethoxy-1-benzyl-2-methyltetrahydroisoquinoline (I), oily; di-HCl salt, m. 243–4° (decompn.); the diazo soln., pale orange, gives with β-C₁₀H₇OH a crimson-yellow dye, *mono-Ac deriv.*, m. 153–4°; from the mother liquor of the above base there sepd. the di-HCl salt, m. 186° (decompn.), of 2-[4',5'-dimethoxy-2'-β-methylaminoethyl]phenyl-dihydroindole, oily, it gives no color with a pine shaving or with *p*-Me₂NC₆H₄CHO, the nitrosamine is a light brown oil. The base I is converted into 5,6-dimethoxyaporphine, m. 136–7°, by diazotizing it in 2 N H₂SO₄ and adding Cu powder or by diazotizing it in a mixt. of MeOH and 2 N H₂SO₄ and heating the soln. on the H₂O bath; the yield is only 10–15% of the theory, the chief by products being the dilaisanosine deriv and the phenolic base, the former predominating in the 1st method, the latter in the 2nd. The base gives a colorless soln. in concd. H₂SO₄, a pinkish purple color with Erdmann's reagent, a deep bluish purple with Frohde's reagent, and a green color, rapidly turning brown, with Mandelin's reagent. HCl salt, m. 258° decompn.; methiodide, m. 223°.

C. J. WEST

Stereoisomerism in polycyclic systems. IV. Two stereoisomerides of 2,3,4,5,11,13-hexahydroquinindene. WM H. PERKIN, JR. AND S. G. P. PLANT. *J. Chem. Soc.* 1928, 639–46; cf. C. A. 22, 780. The reduction of 2,3-dihydroquinindene with Sn and HCl by boiling on the steam bath for 5 hrs gives a mixt. of 2,3,4,5,12,13-hexahydroquinindene(A) (I) and (B) (II) in the ratio of 1:3; these are sepd. through the 5-Bz deriv.; the 5-Bz deriv. of I seps. from EtOH and m. 174°, recrystn. of the 2nd crop from Me₂CO gives the 5-Bz deriv. of II, m. 161°. Hydrolysis of these derivs gives I, m. 67° (5-Ac deriv., m. 102°, *picrate*, yellow, m. 193°), and II, m. 72–84° (5-Ac deriv., m. 87°; *picrate*, orange, m. 158°). The electrolytic reduction gives II and I in the ratio of 12:1. Considerations of strain and of the relative amts. of the 2 forms produced lead to no certain indication as to which is the *cis*- and which the *trans*-modification.

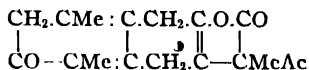
C. J. WEST

Purification of brucine. FELIX SAUNDERS. *J. Am. Chem. Soc.* 50, 2331 (1928). The soln. of brucine-HCl is treated with 20% of its vol. of EtOH and the soln. made definitely alk. with NH₄OH; pptn. is complete in 1 week.

C. J. WEST

Oxidation of santonin. II. On the rotatory power of some oxidation products of santonin. S. S. MEDVEDEV AND E. N. ALEKSEVA. *Trans. Karpov Inst. Chem.* 1926, No. 5, 57–61; cf. C. A. 21, 2476.—Santoninic acid must be considered as a product of partial dehydration, i. e., as dehydrosantoninic acid. To prove the similarity of structure and configuration of santoninic, santonin and santonin acids their optical powers have been compared. It has been found, as could be expected in case their configuration is similar, that the rotatory powers increase in the following order: santoninic → santonin → santonin acid. The actual figures obtained (in alc.) were as follows:

Santoninic acid $[\alpha]_D -26.5^\circ$, santonic acid -70.0° , santenonic acid -125.5° . The concn. of the solns. had almost no influence on the rotation figures. Santenonic acid, on being heated *in vacuo*, loses 2 mols. of water and becomes an unsatd. lactone $C_{11}H_{16}O_3$, santonene, $[\alpha]_D -280.9^\circ$. Santonene has been acetylated; the optical activity of the product is -1507° in alc. and -1500° in $CHCl_3$, for the line D of the Na flame. This extremely high optical activity, which is the 2nd greatest among all known org. compds., shows that acetylsantonene must have the formula



where, in the lactone ring, an at. group is present which enhances optical activity.

BERNARD NELSON

Saponins and allied compounds. XX. Ursolic acid. 2. The action of acetic anhydride on ursolic acid. A. W. VAN DER HAAR. *Rec. trav. chim.* **47**, 585-90 (1928); cf. *C. A.* **22**, 424.—Studies previously carried out by II. on the action of Ac_2O on CO_2H acids have shown (*C. A.* **22**, 1342) that mixed anhydrides are not formed but that compds. are obtained consisting of the anhydride of the CO_2H acid with 1 mol. of Ac_2O of crystn. With the sapogenin of sugar beets, $C_{30}H_{48}(OH)CO_2H$, the same result was obtained, the OH group being acetylated at the same time (*C. A.* **22**, 424). Therefore the expts. carried out previously with ursolic acid (*C. A.* **18**, 2511), which has the same formula $C_{30}H_{48}(OH)CO_2H$, as the sapogenin from sugar beets, were repeated and it was found that this acid was converted by means of Ac_2O into *diacetylursolic anhydride* contg. 1 mol. of Ac_2O of crystn., $\alpha_D^{16} 62.5^\circ$. This compd. m. $200-1^\circ$ in the Ac_2O of crystn., which evaps. at higher temps. with formation of *diacetylursolic anhydride*, m. 320.2° . On boiling a soln. of diacetylursolic anhydride with 1 mol. of Ac_2O of crystn. in alc. *acetylursolic acid*, m. $279-80^\circ$, is obtained. In connection with this result the facts communicated in (*C. A.* **18**, 2511; **19**, 73, 74) are to be corrected and to be replaced by those obtained in this investigation.

C. F. VAN DUIN

Bromoporphyrin I and tetramethylhematoporphyrin iron salt. II. HANS FISCHER AND GEORG HUMMEL. *Z. physiol. Chem.* **175**, 75-90 (1928).—Bromination of tetramethylhematoporphyrin Fe salt in $CHCl_3$ gives the Fe salt of the same bromoporphyrin I that is obtained by treating hematoporphyrin in AcOH with Br. The reaction consists in a breaking off of the hydroxyvinyl group and substitution of Br on both side chain and pyrrole nucleus. Oxidation of this brominated Fe salt with CrO_3 yields bromocitraconimide, m. 178° . Removal of the Fe by heating with HBr-AcOH gives bromoporphyrin I; this was further identified by prepn. of its Me ester, which showed no depression of m. p. when mixed with the known substance. The same substance was obtained by treatment of the brominated Fe salt with HI and red P and esterification of the product, and by treatment with cold concd. H_2SO_4 and subsequent esterification. The ester forms a complex Fe salt when treated with KBr, $Fe(OAc)_3$ and AcOH, and this is identical with the ester obtained by bromination of the tetramethylhematoporphyrin Fe salt. Oxidation of the ester in H_2SO_4 by CrO_3 gives bromocitraconimide and hemateic acid. Bromoporphyrin I is remarkably stable. It withstands 3 hrs. heating at 140° with 5% KOH, 3 hrs. at 180° with 5% KOMe in MeOH and 2 hrs. at 180° with HBr-AcOH. Bromination of tetramethylhematoporphyrin in AcOH yields a cryst. perbromide, which rapidly loses Br but not completely, as shown by formation of $BrCH_2Ac$ when treated with MeAc, the final product being the ester of bromoporphyrin I. Tetramethylhematoporphyrin may be obtained by addn. of MeOH to hemin by means of HCl as well as H_2SO_4 but in smaller yield. Protoporphyrin reacts much less readily with MeOH-HCl than does hemin, indicating a difference in their resp. side chains. Oxidation of protoporphyrin by alk. $KMnO_4$ gave evidence of the formation of a new porphyrin.

A. W. DOX

Halogeinated proteins. IX. Chloroovoprotein. ALB. J. J. VANDEVLEDE. *Rec. trav. chim.* **47**, 458-63 (1928); cf. *C. A.* **22**, 88.—*Chloroovoprotein* with 10.06% N and 17.5% Cl was obtained as a gray powder, almost entirely sol. in water and in alkalies, by the prolonged action of Cl in CCl_4 on ovoprotein, the max. wt., 24.1 g. from 20 g. of ovoprotein, being reached only after 9 months. The action of water, KOH soln. and EtOH on this substance at room temp. has been studied. On treating 2 g. chloroovoprotein with 20 cc. water, after one day 11.5% and after 15 days 6.5% has not dissolved, the insol. part showing the same compn., N 12.6% and Cl 10.3%, in both cases. The soln. contains after 1 day 0.0172 g. organically combined Cl but after 15 days all the Cl is present in the ionogenic state. Two g. of chloroovoprotein on treatment with 20 cc. N KOH dissolves completely in the course of 1 day; on addn. of 25 cc. N AcOH

a ppt. of 0.7 g. is obtained after 1 day and of 0.5 g. after 15 days. Both ppts. show again the same compn., N 13.0% and Cl 10.1%, the soln. in both cases contg. all the Cl in the ionogenic state. With 2 g. of chloroövoalbumin and 20 cc. EtOH 0.80 and 0.88 g. dissolve after 1 and 15 days, resp., the residues showing the same compn., N 12.0% and Cl 11.7%. After 1 day the soln. contains 0.1412 g., of ionogenic Cl and 0.0696 g. organically combined Cl, these figures being 0.1667 and 0.0523 g., resp. after 15 days. A comparison with the bromoövoalbumin described previously (C. A. 18, 2134) shows that chloro- and bromoövoalbumin have the same compn. Attempts to prep. a chloropeptone corresponding to the bromopeptone, already described (C. A. 18, 2501) were unsuccessful, the absorption of the Cl being slow and the substance becoming sticky so that the contact with the Cl becomes much impeded. Three halogenated caseins were obtained by the action of Cl, Br and I on casein from centrifuge milk, the compn. of these substances being: chlorocasein, N 12.2%, Cl 11.6%; bromocasein N 12.1%, Br 21.3%; iodocasein, N 12.14%, I 19.8%. It is still to be remarked that all the halogenated proteins obtained by the action of halogens in CCl_4 on dry, powd. proteins contain more halogen than those obtained by wet treatment.

C. F. VAN DUIN

Sterol group. II. Formation of ψ -cholestene and cholestenone by the dry distillation of cholesterol. I. M. HEILBRON AND W. A. SEXTON. *J. Chem. Soc.* 1928, 347-51; cf. C. A. 22, 1362.—The dry distn. of cholesterol at atm. pressure gives, in addn. to H_2O and a complex mixt. of low-boiling hydrocarbons, cholestenone and ψ -cholestene. The formation of the latter is the result of 2 distinct reactions: dehydration of part of the cholesterol to cholesterilene and dehydrogenation of a further part to cholestenone, the H evolved in the latter reaction being utilized for the hydrogenation of the cholesterilene. The 2nd reaction takes place more readily than the 1st.

C. J. WEST

The colloidal and elastic properties of poly vinyl acetate (WHITBY, *et al.*) 30. Some derivatives of β,γ -dimethylbutadiene (MACALLUM, WHITBY) 30. A new tetramethylbutadiene (MACALLUM, WHITBY) 30. Spectrographic study of cyanamide. Ultra-violet absorption spectra of cyanamide, dipropylcyanamide and dipropylcarbodiimide (FRANSEN) 3. Pb carbonate and acetate (Brit. pat. 273,660) 18. Catalysis under reduced pressures (GRIGNARD) 2. Decomposition of diacetone alcohol by weaker bases (ÄKERLÖF) 2. Electrolysis of anhydrous formic acid (BAUR) 2.

Organic arsenic compounds. A. BINZ and C. RÄTH. U. S. 1,667,237, April 24. See Brit. 255,839 (C. A. 21, 2907).

Condensation product of olefins with hydrocarbons of the naphthalene series. R. MICHEL. U. S. 1,667,214, April 24. Olefins such as C_2H_4 , or a gas contg. C_2H_4 and its homologs are caused to react upon C_{10}H_8 , tetrahydronaphthalene or other hydrocarbons of the C_{10}H_8 series, in the presence of AlCl_3 or other catalytically active metal halide, under pressure and at temps. above 50° (suitably about 100 – 200°). The products formed are of an oily nature and may be used as motor fuels or as intermediates.

Stable diazo preparations. I. G. FARBERNIND. A.-G. Brit. 273,352, Jan. 25, 1926. Aromatic diazo compds. which have been sepd. in solid form (except *o*-diazophenol aryl and alkyl ethers and the neutral 1,5-naphthalenedisulfonic acid diazonium salts of unsulfonated substituted aromatic amines) are mixed with metal salts of aryl-sulfonic acids. The metal salts of benzenemono- and disulfonic acids, naphthalene di- and polysulfonic acids, benzylsulfonic acid and tetrahydronaphthalenesulfonic acid are especially suitable. Cu or Al salts or alkali chromates also may be added. Several examples are given.

Catalyzer for methanol synthesis. T. E. LEFORT. Can. 276,300, Dec. 13, 1927. The catalyzer consists of a finely ground mixt. of Zn and Bi_2O_3 in the proportion of 3 mols. Zn to 1 mol. Bi_2O_3 .

Acetic acid and anhydride. HOLZVERKOHLUNGS-INDUSTRIE AKT.-GES. Brit. 274,076, July 6, 1926. In the prepn. of concd. HOAc or Ac_2O from aq. HOAc, the latter is esterified, *e. g.*, with EtOH, and the vapor of the ester is subjected to a high temp. ("such as 50 – 700° ") to produce HOAc and an unsatd. hydrocarbon such as C_2H_4 while avoiding the presence of Fe and Fe oxide. Catalysts may be used such as Cu, Ag, Ag phosphate and phosphates of alkali or of bivalent or trivalent metals.

Concentrating acetic acid or similar acids. SOC. ANON. DES DISTILLERIES DES DEUX-SEVRES. Brit. 273,744, July 1, 1926. Aq. acid solns. are extd. with an acetic

acid ester or mixts. of such esters and the ext. is distd. to sep. first an aq. ester, then the rest of the ester and finally the anhyd. acid; a 10% HOAc soln. may be treated with EtOAc or a 5% butyric acid soln. may be treated with butyl acetate.

Acetaldehyde and acetic acid from ethyl alcohol. S. GOLDSCHMIDT. U. S. 1,666,447, April 17. Ag is used as catalyst in oxidizing EtOH with air at temps. of 380–440°.

Ketene, acetic acid and acetic anhydride. H. DREYFUS. Brit. 273,822, June 26, 1925. Ketene is produced by subjecting AcH vapor to a high temp., preferably in the presence of a dehydrogenating catalyst such as Ni, Cu or Zn at 150–300° and at atm. pressure, although temps. up to 500° and pressures of 5–50 atm. may be employed, especially if a catalyst is not used. The ketene may be collected in the gaseous state and used in acetylation processes such as in the manuf. of cellulose acetate, or may be used to form HOAc or Ac₂O. The AcH used as starting material may be obtained as described in Brit. 273,810 (following abstr.) and the H necessary for that method may be that evolved in the ketene-forming reaction.

Recovering waste acetic acid. H. DREYFUS. Brit. 273,810, June 26, 1925. Waste or dil. HOAc such as is obtained in the manuf. of cellulose acetate is subjected to reduction to produce AcH, which is sep'd., and may be converted into glacial HOAc or other conc'd. or anhyd. products. The reduction may be effected by gases contg. H, with or without CO, in the presence of catalysts such as Ni, Fe, Zn, Sn, Pb, Ag, Pt, Pd and Cu and materials such as pumice, glass wool and NaCl also may be used. A temp. of 250–300° is suitable when Ni and H are used, but a temp. of 400° is used with glass wool.

Reduction of arsonic acids. A. BINZ. U. S. 1,667,238, April 24. 2-Hydroxy-5-pyridinearsonic acid or other arsonic acids which do not condense with addn. products of sulfoxylic acid are treated with such addn. products, e. g., with Na acetone sulfoxylate, to effect their reduction, e. g., to produce 2,6-dihydroxy-3,5-arsenopyridine.

Alkyl ethers of 3'-nitro-4'-hydroxy-*o*-benzoylbenzoic acid. I. GUBELMANN, H. J. WEILAND and O. STALLMANN. Brit. 273,342, June 28, 1926. 3'-Nitro-4'-halogen-*o*-benzoylbenzoic acid or its alkali salts is treated with an aliphatic alc. such as MeOH or EtOH in the presence of NaOH or other alk. substance and after heating for some time the reaction mass may be treated with HCl and fractionally distd.

Formic acid. G. H. BUCHANAN and J. L. OSBORNE. U. S. 1,666,437, April 17. Formic acid is added to Ca formate or other alk. earth formate and NaCl, and an acid such as H₂SO₄ is added which is capable of effecting decompn.; the formic acid liberated is then distd. and collected. The preliminary addn. of formic acid to the reaction mixt. serves to facilitate mixing and permits return of dil. formic acid for concn.

Sulfonic acids. J. THOMAS, H. A. E. DRESCHER and SCOTTISH DYES, LTD. Brit. 273,347, Dec. 24, 1925. Halogen-2-benzoylbenzoic acids (other than 3'-nitro-4'-halogen-2-benzoylbenzoic acids) are treated in the form of their salts with a sulfite or bisulfite at temps. above 100° to effect replacement of the halogen by the sulfonic group; if the parent material contains more than one halogen atom only part of the halogen may be replaced. Several examples are given.

Ketonecarboxylic acids. I. G. FARBENIND. A.-G. Brit. 273,321, June 24, 1926. Maleic anhydride is condensed with hydrocarbons such as C₁₀H₈, acenaphthene, 1-methylnaphthalene, α - or β -naphthol, anthracene or like compds. having free peri-positions, in the presence of acid condensing agents such as AlCl₃, Na Al chloride or FeCl₃, suitably in the presence of a solvent such as PhNO₂. There are first formed, especially with a solvent of low b. p., open-chain carboxylic acids, which on further condensation yield cyclic ketonecarboxylic acids.

Cyclic ketones. I. G. FARBENIND. A.-G. Brit. 274,095, July 8, 1926. The process of Brit. 273,321 (cf. preceding abstract) is modified by replacing the maleic anhydride by dicarboxylic anhydrides derived from it by addn. at the double bond of H or other substance such as Cl, Br, HCl or HBr. Open-chain ketonecarboxylic acids may be produced as intermediate products. Several examples are given.

Naphthalene-1,4,5,8-tetracarboxylic acid. I. G. FARBENIND. A.-G. Brit. 274,103, July 9, 1926. Naphthalene-1,4,5,8-tetracarboxylic acid is made by oxidizing the cyclic ketonic compds. which may be produced as described in Brit. 274,095 (preceding abstr.) from acenaphthene and a dicarboxylic anhydride derived from maleic anhydride by addn. at the double bond. The oxidation may be effected in an acid or alk. medium with a dichromate or permanganate.

Anthraquinonyl- α -ketones. I. G. FARBENIND. A.-G. Brit. 273,774, July 5, 1926. Anthraquinonyl- α -ketones are made by oxidation of benzanthrone having an alkyl, carboxyl, or nitrile group in the Bz-1 or Bz-2 position or having alkyl groups in both the Bz-1 and Bz-2 positions. Chromic acid together with glacial HOAc may be used

for the oxidation. Examples are given for the production of 1-acetylanthraquinone, anthraquinonyl methyl diketone and similar products Cf. C. A. 22, 1595, 1783.

Condensation products of alkylphenols with ketones. CHEMISCHE FABRIK AUF AKTIEN, VORM. F. SCHERING. Brit. 273,684, June 29, 1926. Alkylphenols are condensed with ketones in the presence of a condensing agent such as HCl at a temp. below 100° (suitably at 30–40° for 2 days with *m*- or *p*-cresol and acetone) to form polymerized products which are capable of acylation.

Aminophenol derivatives. CHEMISCHE FABRIK GRÜNAU LANDSHOFF & MEYER AKT.-GES. Brit. 274,175, April 10, 1926. *N*-Monoalkyl-*p*-aminophenols are made by hydrolyzing *O*-alkyl-*N*-alkylacyl-*p*-aminophenols with H₂SO₄ under conditions of time, temp. and strength and quantity of acid which prevent formation of sulfonated derivs. Methylphenacetin may be heated with 6 equivs of 50% H₂SO₄ for 3 hrs. at 139° or with 3 equivs. of 70% acid for 4.5 hrs. at 146°.

Phenol derivatives. CHEMISCHE FABRIK AUF AKTIEN VORM. F. SCHERING. Brit. 274,439, July 14, 1926. Alkylphenols and cyclohexanols are obtained by catalytic hydrogenation; e. g., *p*-dihydroxydiphenylmethane yields *p*-ethylphenol and phenol by hydrogenation under pressure, with a Ni catalyst contg. Bi, while with a Ni catalyst contg. Mn 4-ethylcyclohexanol and cyclohexanol are obtained; similarly, *p*-dihydroxydiphenylmethane gives either *p*-cresol and phenol or 4-methylcyclohexanol and cyclohexanol; *p*-dihydroxytriphenylmethane yields *p*-benzylphenol and phenol with a Ni catalyst contg. Bi Cf. C. A. 21, 2704.

Reducing phenol with hydrogen. A. IRINYI. Brit. 273,493, July 8, 1926. Reaction between phenol vapor and a reducing gas such as H at a high temp. (suitably 750°) for producing C₆H₆ is effected by heating the gasified phenol and the reaction gas separately to the required temp., and then bringing them together. An app. is described.

Hydrogenating phenolic compounds. CHEMISCHE FABRIK AUF AKTIEN VORM. F. SCHERING. Brit. 273,685, June 29, 1926. Alkylisopropylphenols or the corresponding cyclohexanols are obtained by treating alkylisopropylphenols with H₂, preferably at an elevated temp. and under pressure. Examples are given of the manuf. of thymol, menthol, 4-methyl-6-isopropylphenol and 4-methyl-6-isopropylcyclohexanol. The alkylisopropylphenols may be made by the process of Brit. 273,686 (following abstract).

Alkylisopropylphenols, etc. CHEMISCHE FABRIK AUF AKTIEN VORM. F. SCHERING. Brit. 273,686, June 29, 1926. Condensation products of alkylphenols and ketones (which may be made by the process described in Brit. 273,684) are heated to 280–320° to effect depolymerization. Examples are given of the production of dimethylcoumarans and 3-methyl-6-isopropylphenol.

Alkyl derivatives of diphenolisatin. A. BLANKART. U. S. 1,667,239, April 24. Diphenolisatin is treated with Me₂SO₄ or other alkylating agents to obtain products which crystallize, are neutral, insol. in water, alkali and acids but readily sol. in usual org. solvents.

Amines. BRITISH DYESTUFFS CORPORATION, LTD., R. W. EVERATT and F. H. RODD. Brit. 273,923, Aug. 25, 1926. Dialkyl aromatic amines are sepd from monoalkyl aromatic amines by treating the mixt with phosgene in the presence of water to convert the monoalkyl amine into urea chloride; an alkali is added to neutralize any amine hydrochlorides formed when the proportion of monoalkyl amine in the mixt is as much as 25–30%.

Chlorinated aromatic amines. T. VOLTZ. U. S. 1,667,336, April 24. In the manuf. of tetrachloroaniline or other chlorinated aromatic amines, a hydroaromatic C₆H₅ deriv. contg. N in the form of a ketimino group and having in the same hydroaromatic nucleus most of the H atoms substituted by Cl, e. g., hexachlorochloroketiminotetrahydrobenzene, is treated with a reducing agent such as Na₂S in MeOH at a moderate temp. and while so far as possible excluding water and strong acids.

Alkylene diguanidines. M. HEYN. Brit. 274,259, June 18, 1926. See Can. 276,107 (C. A. 22, 1595).

Alkali fusion. V. R. KOKATNUR. U. S. 1,667,480, April 24. In effecting substantially anhyd. fusions such as production of indanthrene blue R, an inert hydrocarbon diluent such as kerosene is used and the quantity of alkali employed is not more than about twice the quantity theoretically required for the reaction.

Aldol and crotonaldehyde. O. SILBERRAD. Brit. 273,776, Nov. 15, 1926. Aldol is made by gradual addn. of AcH to a Ba(OH)₂ sludge while cooling; the reaction product is neutralized by oxalic, acetic or other "weak" acid and the aldol may be dist. off and converted into crotonaldehyde.

Paraformaldehyde. E. KUSS. U. S. 1,666,708, April 17. MeOH substantially

free from water is catalytically oxidized to CH_2O by an O-contg. gas, the reaction gases are cooled so as to condense a mixt. of CH_2O and water vapor and the resulting liquid is concd. by means of the uncondensed gases and the concd. soln. is allowed to solidify.

Thymol. E. K. NELSON. U. S. 1,666,342, April 17. California laurel oil is distd. and the vapors are passed through a tube heated to 280° ; thymol is sepd. from the distillate by a soln. of caustic alkali.

Diacylisoithiocarbamide S-alkyl ethers. H. SCHOTTÉ. U. S. 1,667,053, April 24. An acyl chloride such as benzoyl chloride, *p*-nitrobenzoyl chloride or acetyl chloride is caused to react on the soln. of a salt of a S-alkylisoithiocarbamide in a weak org. base such as pyridine. Dibenzoyl-S-ethylisoithiocarbamide, m. $111-12^\circ$, is insol. in water and is difficultly sol. in alc. and more easily sol. in ether. The corresponding dinitrobenzoate melts (with foaming) at about 216° . The diacetate is an oily substance. S-methyl- and S,N-dimethylisoithiocarbamide hydroiodide may also be used as starting materials for obtaining analogous derivs. which may serve as intermediates for the production of *pharmaceutical* and other *preps.*

Anthraquinone derivatives. BRITISH DYE STUFFS CORPORATION, LTD., A. SHEPHERDSON and A. J. HAILWOOD. Brit. 274,226, April 26, 1926. 1-Nitroanthraquinone-8 sulfonic acid is reduced in neutral or alk. soln. with less reducing agent (e. g., Na sulfide, Zn dust and NH_4Cl or glucose) than would be required for reduction to the amino compd. The product, probably 1-hydroxylaminoanthraquinone-8-sulfonic acid, yields indanthronedisulfonic acid on heating with alkali. The sulfonic groups can be split off from the indanthronedisulfonic acid, e. g., by electrolytic reduction in a divided cell as described in Brit. 273,043 (C. A. 22, 1736); as the disulfonic acid is first reduced to the leuco compd. the latter may be prepd. by reduction with hyposulfite prior to the electrolytic reduction. Various details are given.

Homologs of naphthalene. I. G. FARBENIND. A.-G. Brit. 273,665, June 30, 1926. The process described in Brit. 265,601 (C. A. 22, 433) is modified by substituting for C_2H_4 olefins or gases contg. olefins such as oil gas or gas from cracking operations. The product may be used as a *motor fuel*. The olefins may be absorbed with C_{10}H_8 in successive stages as the homologs of C_2H_4 react more easily than C_2H_4 itself.

Condensation product of naphthalene or its derivatives. R. MICHEL. Can. 276,270, Dec. 13, 1928. A condensation product of C_{10}H_8 or of hydrogenated naphthalene is manufd. by heating together C_{10}H_8 or its hydrogenated deriv. and Al_2Cl_6 under pressure at a temp. not below 50° , and distg. the mixt.

Imino-1-hydroxy-2-naphthoquinones. R. LANTZ and A. WAHL. U. S. 1,666,241, April 17. These compds. are produced by oxidizing 1,2,4-aminonaphtholsulfonic acid in the presence of primary aromatic amines such as aniline, *o*-toluidine, *o*-anisidine, *p*-chloroaniline or *p*-phenylenediamine.

1-Phenyl-3-methyl-5-pyrazolone. I. G. FARBENIND. A.-G. Brit. 274,366, Feb. 5, 1927. 1-Phenyl-3-methyl-5-pyrazolidone is treated, in aq. acid soln., with O or an O-contg. gas in the presence of a heavy-metal salt such as Cu chloride, which may be assoc. with FeCl_3 .

Ozonides. A. S. RAMAGE. Brit. 273,832, April 13, 1926. Olefinic material is treated with ozone or ozonized air, preferably at temps. $30-40^\circ$ below the b. p. to obtain various products suitable for use as turpentine substitutes, motor fuels, substitutes for linseed oil in paints or resin substitutes. An app. is described.

Vinyl acetate. E. BAUM, H. DEUTSCH, W. O. HERRMANN and M. MUGDAN. U. S. 1,666,482, April 17. C_2H_2 and HOAc vapor are brought into contact with metal salts such as Cd acetate at temps. above the b. p. of the HOAc.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Artificial albumin cells. L. A. HERRERA. *Atti accad. Lincei* [6], 7, 32-5 (1928).—The appearance in Colpoids prepd. from ovalbumin of granular strings which on standing approach protoplasm in certain respects (cf. *Rend. accad. Lincei* [6], 4, 343 (1926)) suggested the treatment of ovalbumin with various reagents to det. whether further imitations of cellular protoplasms could be obtained. By allowing grains of ovalbumin to fall from a considerable height (e. g., 3.8 mm.) through a sieve on to fuming HNO_3 , concd. H_2SO_4 or concd. HCl, cells are formed which macroscopically and micro-

scopically have a reticular structure. This structure depends upon an emulsion of the acid with the ovalbumin. With concd. H_2SO_4 , the structural units after washing, dyeing and mounting resembled microscopic amebas, with vacuoles and very fine granular pseudopods and with nucleated cells. No movement was evident. A cellular membrane of hexagonal structure is formed by compressing egg albumin and 50% H_2SO_4 , letting stand, washing, staining, treating with xylene and mounting. The cells with no visible nuclei and the vacuoles compose a structure closely resembling plant tissue, particularly that of *Pelargonium inquinans*. With the Duchartre technic evidence of chromosomes was obtained. C. C. DAVIS

Plant proteases. X. The mode of action of yeast polypeptidase. WOLFGANG GRASSMANN and HANNS DYCKERHOFF. *Z. physiol. Chem.* 175, 18-37(1928).—A simpler method for prep. polypeptidase free from dipeptidase, without recourse to the adsorption procedure, consists in autolyzing the yeast in the presence of NH_4OH , pptg. with $AcOH$, dissolving the ppt. in NH_4OH and removing the protein degradation products by dialysis against running water. • Polypeptidase withstands this NH_4OH treatment while the dipeptidase is completely destroyed. Expts. with the tripeptides, leucylglycylglycine and glycylglycylleucine show that the amino acid carrying the free NH_2 group is split off quant., leaving the residual dipeptide intact, whereupon the hydrolysis comes to an abrupt standstill. This highly sp. enzymic action contrasts sharply with partial alk. hydrolysis which in each case yields 2 amino acids and 2 dipeptides. Peptide derivs with a substituted NH_2 group are not attacked by the enzyme. Neither benzoyldiglycylglycine nor β -naphthalenesulfonylglycyltyrosine showed any cleavage. The 2 tetrapeptides, leucylglycylglycine and triglycylglycine, behave in a similar manner, splitting off the terminal amino acid, leucine and glycine, resp. With leucylglycylglycine the hydrolysis stops with the splitting off of leucine, and the failure of the enzyme to effect further cleavage of the residual tripeptide is due merely to the strongly inhibitory action of the liberated leucine. The reaction does not consist in a cleavage of the tetrapeptide into 2 dipeptides as was previously supposed. The enzyme has less affinity for glycine polypeptides than for those contg. also leucine, and the former are therefore much less susceptible to the inhibitory action of leucine. Glycine polypeptides are more resistant to enzymic hydrolysis, although less resistant to alk. hydrolysis as shown by Abderhalden. A. W. DOX

Cozymase in ripening plant organs. HANS V. EULER and SVEN STEFFENBURG. *Z. physiol. Chem.* 175, 38-51(1928).—In a no. of higher fungi, e. g., *Armillaria melleus*, *Hygrophorus chlorophanus*, *Clavaria cristata*, *Polyporus ungulatus*, *Lactarius rufus*, as well as in leaves of green plants, e. g., *Vicia faba*, *Vaccinium vitis idaea*, cozymase was demonstrated, by means of the micro-fermentation method with washed dried yeast, as an indispensable factor in the anaerobic part of the carbohydrate respiration. In addn. to cozymase, a substance or group of substances occurs which inhibits the action of the zymase system. It is thermostable and dialyzable through collodion, and thus sharply distinguishable from the inhibitory substance of carbohydrate degradation in muscle. In the flesh of the apple the cozymase content is extremely low or else the cozymase action is suppressed by inhibitory substances of this nature. Since the tissue respire vigorously and consumes O , a valid assumption is that the respiration depends less on sugars than on other substances such as plant acids. A. W. DOX

Mutase. HANS V. EULER and EDV. BRUNIS. *Z. physiol. Chem.* 175, 52-67(1928).—For the prep. of aldehyde-mutase from liver press juice, pptn. by $EtOH$ is unsuitable because of its tendency to destroy the enzyme. Fractional pptn. by $MeAc$, however, yields an enzyme of about twice the initial purity. Adsorption on $Al(OH)_3$ does not occur at pH 6.6 or 8.5, and kaolin and $UO_2(NO_3)_2$ are likewise unsatisfactory adsorbents. Liver ext. causes dismutation of aldehydes (Cannizzaro reaction) and also decolorization of methylene blue. The 2 reactions might be attributed to the same enzyme if it is assumed that the donor action of the zymophosphate in the methylene blue reduction gives rise to a cleavage product which undergoes dismutation in the same manner as an aldehyde or an intramol. rearrangement. Conversely, a dismutation product might have the property of reducing methylene blue. However, the 2 reactions show no parallelism even in the presence of excess of cozymase and H-donors. No evidence is adduced in support of the identity of aldehyde-mutase and redoxase, but on the other hand the expts. do not disprove their possible identity. The presence of cozymase is required for both reactions. A. W. DOX

Condensation of sugars with proteins. S. P. L. SØRENSEN and L. L. LØRBER. *Wochschr. Brau.* 44, 484(1927).—Condensation of sugars and proteins does not occur in uncoagulated egg albumin, but with coagulated albumin there was evidence of condensation. C. N. FREY

A new test for ergothioneine upon which is based a method for its estimation in simple solution and in blood filtrates. GEORGE HUNTER. *Biochem. J.* 22, 4-10 (1928).—The test depends upon the use of diazotized sulfanilic acid with the development of a red color. It can be applied quantitatively. BENJAMIN HARROW

Isolation of a second sterol from yeast-fat. IDA SMEDLEY-MACLEAN. *Biochem. J.* 22, 22-6 (1928).—The author has isolated a white sterol, which she calls *zymosterol*, m. 108-9°, and having the formula, $C_{27}H_{46}O$. It is dextro-rotatory. The *zymosterol* is closely related to ergosterol. BENJAMIN HARROW

Structure and enzyme reaction. III. The system polysaccharide-amylase-protein. S. J. PRZYLECKI AND HEDWIGA NIEDZWIECKA. *Biochem. J.* 22, 34-42 (1928); cf. *C. A.* 22, 248.—The velocity of reaction in the system polysaccharide-amylase-protein gel is regulated by the concn. of unadsorbed substrate. Uncoagulated egg white present as a sol in this system does not retard hydrolysis. Retardation of reaction depends upon the state of dispersion of the adsorbed enzyme. Adsorption of amylase upon protein does not affect its activity, while the action of alcs. is confined to elution of the polysaccharide. These results are identical with those obtained with charcoal as the adsorbent (see *C. A.* 22, 248). Starch and glycogen, present in cells in small quantities, are mainly adsorbed upon proteins, which are present to the extent of 10% in the cell fluid. The concn. of these polysaccharides in the solvent is probably less than 20% of their total amt. BENJAMIN HARROW

Biological significance of the unsaponifiable matter of oils. III. Fish-liver oils. H. J. CHANNON. *Biochem. J.* 22, 51-9 (1928).—In the liver oils of the Selachii, the higher the percentage of unsaponifiable matter in a given oil, the lower is the percentage of sterol in that fraction. Outside of the Squalidae family, squalene was not detected in the oils studied. See *C. A.* 20, 2506. BENJAMIN HARROW

Note on the unsaponifiable matter from the stomach oil of *Scymnorhinus lichia*. F. D. KAMM. *Biochem. J.* 22, 77-9 (1928).—In the unsapon. matter there was found squalene 1000 g. and residue 45 g., the two together representing 50.6% of the original oil. BENJAMIN HARROW

Studies on xanthine oxidase. X. The action of light. FREDERICK BERNHEIM AND MALCOLM DIXON. *Biochem. J.* 22, 113-24 (1928).—Light accelerates the reduction of methylene blue by the xanthine oxidase, but only if traces of oxygen are present. Preliminary exposures of the oxidase soln. or the methylene blue to light and oxygen produces an acceleration of the reaction if the exposure is for a short period, and a destruction of the enzyme if exposed for longer periods. Small quantities of H_2O_2 accelerate the reactions and larger quantities cause destruction of the enzyme. B. H.

Urinary proteins not originating in blood. W. A. THOMAS, K. W. SCHLEGEL AND EDMUND ANDREWS. *Arch. Internal Med.* 41, 445-8 (1928); cf. *C. A.* 19, 108.—Artificial uremia was produced in dogs by injecting hypertonic salt solns. into animals made acid by the absorption of autogenous edema fluid. Protein-contg. urine was also produced by etherization. In both series the urine contained in the early stages a foreign protein; after a short time serum proteins also appeared in the urine. For the differentiation Hektoen and Welker's immunological method was used. MARY JACOBSEN

Tonomeiotic action of proteins and theory of the action of tonomeiotic substances generally. ENR. BOTTAZZI. *Arch. sci. biol.* (Italy) 10, 456-501 (1927).—A discussion of results published by B. and others, with 76 references. Proteins, soaps, saponins, etc. lower the surface tension of the solvent only when present in mol. dispersion (true soln.). The surface activity occasionally observed in hydrosols is attributable to a content in molecularly dispersed substance. Only the undissoc. mols. are surface-active; the ions are not at all or only slightly active. The max. surface activity of proteins is coincident with the isoelec. point and may serve for the detection of the latter. The higher surface activity of undissoc. mols. as compared with the ions is a result of their lower degree of hydration and consequently lower affinity for the solvent (Haftdruck), which favors their accumulation on the surface of the soln. M. J.

The phenol origin of melanins. PIETRO SACCARDI. *Biochim. terap. sper.* 15, 17-25 (1928); cf. *C. A.* 20, 2176, 3302 and *Arch. farmacol. sper. sci. affini* 1926, 3302.—Animal melanins seem to be derived from pyrrole rather than from tyrosine (I) or hydroxytyrosine (II). The subcutaneous injection of a satd. slightly alk. soln. of either I or II into rabbits resulted in a positive diazo reaction of the urine and a red discoloration on exposure to air, but unlike pathol. melanuria or injections of pyrrole or natural melanins it did not cause the appearance of Thormaelen's reaction or a brown color and ppt. with air or oxidizing agents. Nor did these compds. or tyrosine black (prepd. with potato tyrosinase) cause trichodermia around the site of injection. According to Galleraui the spectrophotometric curve of the oxidation product of *sepia melanin*

with peracetic acid stands between that of pyrrole black and sepia melanin but does not in the least resemble the melanins of I or II. Pyrrole black resembles the natural melanins more closely with regard to N content and its phys. properties, especially its low soly. in water and acids. Other statements in favor of the tyrosine theory are discussed and dismissed. Neither the decomn. products of pyrrole black nor those of tyrosine black have been obtained from natural melanins. Raper's hypothesis of pyrrole formation from I over 5-6-hydroxyindole is made improbable by Gallerani's findings. Possibly the red oxidation products of adrenaline and I are of a dihydroxyindole nature and I never goes beyond this stage in the organism. The resemblance of the spectrophotometric curves of adrenaline and pyrrole melanins suggests that melanin is formed in the body from commonly occurring substances by a rather simple process.

MARY JACOBSEN

Porphyrins. A. A. HIJMAN VAN DEN BERGH AND MISS HIJMAN. *Verslag Akad. Wetenschappen Amsterdam* **36**, 1096-102 (1927), cf. Bommer, *Klin. Wochschr.* No. **36**, (1927).—The soft pasty scrapings from the teeth and tongue a few hrs. after a meal of bread and milk were dissolved in glacial AcOH-AcOEt (1:4) and shaken out with 5% HCl. The HCl ext. gave a red fluorescence in filtered ultra-violet light and the spectrum of *coproporphyrin* (I) and not that of the porphyrin formed from blood pigment by bacteria *in vitro* or found in intestinal bleeding. Tooth and tongue scrapings and tartar invariably gave this reaction regardless of the nature of the diet. The intensity was the same near the gum margin and at the distal end. Red fluorescence was observed once in the tartar of horses. I can, therefore, not be derived from the blood pigments or the chlorophyll of the food or from blood oozing from the gums. Microscopically the scrapings contained no food elements but consisted of a dense mesh of threads (*Leptothrix*?) in which granules (spores?) and bacteria were embedded. Of the 5 bacterial and 12 mold strains cultured from the scrapings only 1 mold showed red fluorescence but the substance was not extractable with 5% HCl. The I content of the saliva is relatively high but insufficient to be considered as the only source. Both milk and bread contain I. The content may be increased by incubation in the presence of each other. A further increase is caused by extn. of the incubated mixt. with AcOH-AcOEt, and HCl. The latter fact suggests that the reactions taking place in the mouth and on extn. are similar. It seems improbable that the I content of bread is attributable to the few surviving yeast cells, although considerable quantities of I were recovered from baker's yeast after 48 hrs. incubation with tap water. A moderate fluorescence of the mixt. was observed after 72 hrs., indicating a decrease of I on further autolysis. The fate of oral I in the digestive tract deserves further investigation, especially with a view to the errors which it may cause in the detection of occult blood by Snapper's method.

MARY JACOBSEN

The behavior of sodium and barium amalgam electrodes in solutions of certain amphoteric substances. P. L. KIRK AND C. L. A. SCHMIDT. *J. Biol. Chem.* **76**, 115-36 (1928); cf. Greenberg, *C. A.* **21**, 2910.—Although the behavior of Na and Ba electrodes is abnormal, definite and reproducible results can be obtained in dil. amalgam solns. Measurements on the Na salts of 3 amino acids [glycine and glutamic and aspartic acids (mono- and di-Na salts)] gave the same type of curve as NaCl, indicating that they all behave as strong electrolytes. Similar results were obtained with Ba salts. Na caseinate apparently behaves as a strong electrolyte with the casein ion, affecting the ionic strength as if it were univalent within the range of alky. studied. Ba caseinate is abnormal in its behavior and the results suggest the possibility of the formation of a complex.

A. P. LOTHROP

A spectrophotometric study of certain equilibria involving the oxidation of hemoglobin to methemoglobin. J. B. CONANT AND N. D. SCOTT. *J. Biol. Chem.* **76**, 207-22 (1928); cf. *C. A.* **20**, 3462.—The reversibility of the hemoglobin-methemoglobin system has been rigorously proven by a method independent of the use of electrodes or an electrochem. cell, namely the spectrophotometric method. Dctn. of the approx. value of n in the electrochem. equations by a spectrophotometric study of the reaction between hemoglobin and 1-naphthol-2-sulfonate-indophenol gave results similar to those obtained by a gasometric study of the reaction between carboxyhemoglobin and $K_4Fe(CN)_6$ in pure CO. The value for n is not that predicted on the basis of a simple reaction and a mol. wt. of 16,700 (1 Fe atom) or 66,000 (4 Fe atoms). The exact value cannot be stated but is probably approx. 2. A discussion of the anomaly will be presented later.

A. P. LOTHROP

Amylase in the blood serum and urine of various animals. G. LO MONACO AND R. MICALE. *Boll. soc. ital. biol. sper.* **2**, 215-8 (1927).—The amylase content in the blood serum and urine of the pig, dog, rabbit, chicken and bovine was detd. The amt.

varied for each individual animal; there was no relation between the amt. of amylase in the serum and that in the urine.

PETER MASUCCI

The reticular-endothelial system. G. DI GUGLIELMO. *Boll. soc. ital. biol. sper.* 2, 937-64(1927).—A review of the prevalent methods of research and the general lines of investigation in the study of the reticular-endothelial (R. E.) system. The conditions which govern the phenomenon of granule formation in the cells of the R. E. system are discussed under (a) properties of substances injected, (b) method of introduction, (c) time elapsed between injection and sectioning, (d) species of animal, (e) the physiologic and pathologic condition of the cells. Intra-vitam staining and phagocytosis are explained in terms of colloid chemistry. The anatomy and functional activity of the R. E. system are elaborated under (1) metabolism of fats and lipoids, (2) metabolism of iron, (3) biligeneses, (4) protein metabolism and (5) blood metabolism. P. M.

The survival of human leucocytes. C. FORTI. *Boll. soc. ital. biol. sper.* 2, 982-4 (1927).—Samples of leucocytes taken from 3 individuals were placed at various temps. and examd. at various intervals of time. At low temp. the leucocytes retained their amoeboid movement longer, e. g., samples kept between 0° and 4° showed that more than half of the leucocytes were still active after 39 days, whereas 2 samples kept at 37° showed no movement at the end of 10 days.

PETER MASUCCI

The manifold influence of potassium cyanide on living cells. M. S. RESNITSCHENKO. *Biochem. Z.* 191, 345-54(1927).—Protoplasm reacts to cyanide in several ways. At first there is a phase of increased O₂ consumption, the "paradoxical phase," followed soon by a diminution. After this rapid decrease the oxidation remains unaltered over a long period of time. The preliminary increase in oxidation is directly proportional to the KCN concn. and the subsequent lowering is inversely proportional to the concn.

S. MORGULIS

Ultra-violet and extinction. H. T. MARSHALL. *Am. Nat.* 62, 165-86(1928).—M. suggests some of the causes which may produce deficiencies in ultra-violet radiations in geological time. The possible effects of ultra-violet deficiency on animal life are discussed with special reference to extinction during certain geologic eras. L. W. R.

Biogeochemical studies. II. Maximum velocity of the transmission of life in the biospheres. V. VERNADSKII. *Bull. Acad. Sci. Union Rep. Soviet Social* 1927, 241-54. (In French).—In a previous paper it was demonstrated from energy considerations of bacteria that *v* [vitesse de la transmission de la vie] is about equal to the velocity of sound in air. The subject is further developed on the basis of size of bacteria, Brownian movements and bacterial respiration and metabolism. (Cf. following abstr.)

L. W. RIGGS

The bacteriophage and the velocity of transmission of life in the biosphere. V. VERNADSKII. *Rev. gen. sci.* 39, 136-42(1928); cf. preceding abstr.—The dimensions and inherent forces of atoms, electrons, bacteria and bacteriophages form the basis of a dynamic study. The velocity of transmission of life through the agency of the bacteriophage is greater than the velocity of sound in air.

L. W. RIGGS

Denaturation of proteins. IV. Effect of denaturation on antigenic properties of egg albumin. HSIEN WU, CARL TENBROECK AND CHIEN PIEN LI. *Chinese J. Physiol.* 1, 277-96(1927); cf. *C. A.* 22, 437.—The antigenic power of egg albumin is much decreased by denaturation. The original specificity of the albumin is destroyed and a new specificity is created when albumin is denatured. Some denatured albumins retain a trace of the original specificity. Egg albumin denatured by heat, alc., acid or alkali are closely related immunologically. **V. Factors controlling coagulation of proteins by shaking.** HSIEN WU AND S. M. LING. *Ibid* 407-30.—Unlike coagulation by heat or alc., mech. coagulation is not separable into 2 stages, denaturation and agglutination. The size of the bottle influences the rate of coagulation; thus with bottles of the same shape coagulation was more rapid in a 250-cc. bottle than in a 125-cc. or 500-cc. Foams had little or no effect. The rate of mech. coagulation is decreased by surface active substances and increased by salts and nonelectrolytes which have no marked influence on surface tension. The influence of these added substances is greater on hemoglobin than on egg albumin. The *p_H* for max. coagulation of egg albumin is 4.8, the isoelec. point of this protein. Those of oxyhemoglobin and methemoglobin in salt-free sols. lie between 6.7 and 6.8, but the point is shifted to the alk. side by the addn. of salt. In buffered sols. the amt. of coagulation is a linear function of time and is independent of the concn. of the protein. The temp. coeff. of coagulation for egg albumin between 25° and 38° is only 1.09 for 10°. Egg albumin and hemoglobin coagulated by shaking cannot revert to the natural protein. Coagulated hemoglobin dissolved in dil. alkali gave no spectrum of hemoglobin and on reduction with sulfite gave the spectrum of hemochromogen. There was no evidence of the liberation of non-protein substances as a result of mech. coagulation.

Serum proteins and conalbumins are not coagulated by shaking. The process of coagulation may be pictured as follows. The surface of the soln. is covered by a layer of denatured protein. By shaking, this layer is "rolled up" and removed, and a new layer of denatured albumin is formed. The thickness of the layer on the surface has been estd. and found to correspond to that of a monomolecular layer. **Separation of ovalbumin from conalbumin.** *Ibid* 431-4.—Ovalbumin is coagulated by shaking, while conalbumin is not. Conalbumin constitutes about 0.1 of the total albumin of egg white. **VI. Effect of denaturation on the digestibility of ovalbumin by pepsin and trypsin.** KUO-HAO LIN, HSIEN WU AND TUNG-TOU CHEN. *Ibid* 2, 107-30(1928).—The relative rates of digestion by pepsin and by trypsin of crystd. egg albumin and of the same protein denatured by dil. acid, dil. alkali, heating in the presence of small amts. of acid or alkali, by alc. and by shaking, were detd. over a range of acidity so as to include the max. point in each case. Natural and denatured ovalbumins were digested by pepsin or trypsin at different rates and at different optimal acidities. The digestibility of natural albumin by pepsin is the same as that of most of the denatured albumins studied. This is interpreted to mean that denaturation does not affect those linkages in the protein mol. which are attacked by pepsin. The rate of digestion of natural albumin by trypsin is exceeded by those of all denatured albumins studied. It is therefore probable that the fundamental process of denaturation is of the same nature as some of the early changes in tryptic digestion.

Protoplasm and glutathione. A. GIROUD. *Compt. rend. soc. biol.* **98**, 376-7 (1928).

Relations between the nucleolus, chondriome and glutathione. PH. JOYE-LAVERGNE. *Compt. rend. soc. biol.* **98**, 567-9(1928).

Oxido-reduction potential of mammalian cells. E. AUBEL, E. AUBERTIN AND P. MAURIAC. *Compt. rend. soc. biol.* **98**, 589-92(1928).—Liver, kidney and muscle cells of the guinea pig, rabbit and dog have the same r_H , which is a function, within certain limits, of the O content of the medium. It varies from an r_H of 11 to 12 in anaerobiosis to an r_H of 20 in aerobiosis. This last value is the same as that found by Needham for eggs of the sea urchin, and by Rapkine and Wurmser in the salivary glands of Chironomes.

The proteoclastic activity of flour (CAIRUE, BAILLY) **12**. A new base from beef muscle (LINNEWER) **10**. Bromoporphyrin I and tetramethylhematoporphyrin iron salt (FISCHER, HUMMEL) **10**.

CHOAY, ANDRÉ: **La sécrétion interne du pancréas et l'insuline.** Paris: Masson et Cie. 570 pp. 8s. 4d. Reviewed in *Physiol. Abstracts* **12**, 251(1927).

JACOT, M.: **Glycogène, adrenaline et insuline.** Paris: Masson et Cie. 211 pp. F. 33. Reviewed in *Physiol. Abstracts* **12**, 251(1927).

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Micro-determination of chlorides in biological liquids and organs. F. TSCHOPP. *Mikrochem.* **5**, 161-5(1927).—For liquids, 1 cc. is treated with 10 cc. of 0.02 N AgNO₃ soln., 1 cc. of 15% trichloroacetic acid soln. (to coagulate the protein), and 1 cc. of HNO₃ (d 1.4) and the mixt. is diluted to 25 cc. After 30 min. the liquid is filtered through a dry paper and the excess of Ag in 20 cc. of the filtrate is titrated with 0.02 N KI, 1 cc. of fuming HNO₃ and 3 cc. of starch soln. being used as indicator. For solids, 1 g. is heated with 10 cc. of the AgNO₃ soln., 5 cc. of HNO₃ and 2 cc. of "perhydrol" in a micro-Kjeldahl app. until dissoln. is complete, and, after diln. to 25 cc., 20 cc. of the filtrate are titrated as before.

Determination of the different fat fractions of feces. G. GUASSARDO. *Pediatrics, Rivista* **35**, 1106(1927).—G.'s method (not described) permits the detn. of neutral fat, fat, free fatty acids, alkali and alkali-Fe soaps. Feces are used directly. M. J.

The detection of yeast by the yeast-gum reaction in the presence of hydrolytic decomposition products of animal protein and animal organs. H. KRAUT. *Z. Untersuch. Lebensm.* **54**, 446-9(1927).—Details are given for the detection of yeast gum in the presence of animal decompn. products. The therapeutic prepn. "Eatan" contains no yeast ext.

The detection of urobilin in organic fluids with special reference to blood serum. C. GIORDANO AND L. GRIVA. *Boll. soc. ital. biol. sper.* **2**, 734-6(1927).—A new method

WILLIAM J. HUSA

has been devised for detecting urobilin in blood serum; the simplicity and sensitivity make it adaptable for clinical uses. Collodion membranes allow urobilin to pass through but retain bilirubin and proteins. Dil. 5 cc. blood with 5 cc. distd. H_2O . Dialyze the soln. in a Bechold ultrafiltration app., using a collodion membrane and a pressure of 53–60 mm. Hg. The dialyzate contains urobilin, which can be detd. by any appropriate method. PETER MASUCCI

The technic of the biological protein differentiation procedure. A. BRÜNING AND B. KRAFT. *Z. Untersuch. Lebensm.* **54**, 347–52(1927).—B. and K. describe a semi-micro method for the precipitin reaction. WILLIAM J. HUSA

Crystalline urease. II. J. B. SUMNER AND D. B. HAND. *J. Biol. Chem.* **76**, 149–62(1928), cf. *C. A.* **20**, 3704.—An improved method for the detn. of urease activity is described. Convincing evidence that the urease is identical with the octahedral protein crystals and not an adsorbed impurity is furnished by the increase in activity on recrystn. and by the small and variable amts. of urease carried down in the crystn. of concanavalin B from an alc. ext. of jack-bean meal. In 1 expt. a suspension of washed crystals of concanavalin B had a urease activity of 1600 units per g. as compared with 129,000 units in a recrystd. urease prepn. Samples of jack-bean meal vary decidedly in urease content and crystals can only be obtained from the poor samples of meal at present available by acidifying the Me_2CO ext. with $AcOH$. Urease obtained by this procedure is comparatively impure. $KI.HgI_2$ is very potent in causing inactivation of urease and also effectively prevents the formation of the octahedral crystals. Traces of Pb in H_2O distd. through a block-tin condenser are responsible for the destructive action on urease which occurs when a urease soln. is highly dild. as H_2O distd. from glass is not destructive and H_2S renders the H_2O harmless. Gum arabic and egg albumin protect the cryst. urease completely from this destructive action. Gum arabic is the only substance which has been found to give 100% protection over several hrs. and no protector tested yielded a urease strength greater than that of the cryst. urease alone. A. P. L.

Pepsin cleavage. S. P. L. SØRENSEN AND LYDIA KATSCHIONI-WALTER. *Z. physiol. Chem.* **174**, 251–75(1928).—In peptic digestion of proteins CO_2H groups are liberated in excess of NH_2 groups according to Steudel, and in equal proportions according to Waldschmidt-Leitz. By the careful elimination of possible errors in such detns. S. and K.-W. find the ratio 1:1 for CO_2H and NH_2 liberated in peptic digestion of casein, gelatin and gliadin. Detn. of CO_2H was performed by formol titration and by Willstätter's titration in alc. soln. and detn. of NH_2 by the Van Slyke method and by Linderstrøm-Lang's titration in $MeAc$ soln. with naphthyl red as indicator. In each case the 2 methods gave results in close agreement. This evidence supports the view that peptic digestion, like tryptic and ereptic digestion, consists in the breaking of acid-amide linkages in the protein mol. **Comment on the indicator question.** K. LINDERSTRØM-LANG. *Ibid* 275–7.—In the titration of NH_2 groups by 0.1 $N HCl$ in the presence of $MeAc$, the naphthyl red indicator can be replaced by Lund's 2,4,2',4',2''-pentamethoxytriphenylcarbinol, which has a color change from colorless to reddish violet and an intensity equiv. to that of phenolphthalein. Where no control is used the new indicator is even preferable to naphthyl red. A. W. DOX

Contribution to the investigations on blood-stains. P. KARPOV. *Bull. Univ. Asie Centrale* No. **16**, 152–3(1927).—To ext. blood-stains for chem. examn., Taraneck's reagent (a physiol. $NaCl$ soln. contg. 0.25% Na_2CO_3) and Grigoriev's reagent (20% alc. contg. 0.1% Na_2CO_3) are recommended. The latter is suitable on materials such as Fe_2O_3 chalk, etc. K. modifies the VanDeen test as follows. The blood-contg. soln. is mixed with 1–3 drops of tincture of guaiac and 1 drop of ozonized turpentine. It is then shaken with $AmOH$, which becomes blue. For the microscopical detection of blood, the Bokarius method of forming hemin and hemochromogen crystals is best. K. obtained the best halogenhematin crystals with blood in $AcOH$ soln. in the presence of either the halogens or their compds., $CHCl_3$, CHI_3 . The formation of hemochromogen crystals was modified by using a soln. of Na_2S with pyridine as a reducing agent instead of $(NH_4)_2S$. Crystals by this method are formed more quickly and are more stable. By using Na_2SO_4 the crystals have better form and are colored darker. R. C. E.

Preserving specimens of animals and plants. F. HOCHSTETTER and G. SCHMEIDEL. *Brit.* **274**, 314, Oct. 4, 1926. Specimens are dehydrated with alc., soaked in C_6H_6 or other suitable hydrocarbon solvent and then impregnated with molten paraffin which is allowed to solidify in the tissues. A fixing soln. such as alc. and $CHCl_3$ with or without $HOAc$, or CH_2O , or phenolic substances may also be used.

C—BACTERIOLOGY

A. K. BALIS

Growth of molds on cobaltamine salts. K. KINOSHITA. *Acta Phytochim.* 3, 31-50(1927).—Cultures of *Aspergillus niger*, *A. oryzae*, and *Penicillium glaucum* have been made using various cobaltamine salts as the source of N; the N content in each case was adjusted to a const. value. In all cases growth was very much less than for the control expts. in which NH_4NO_3 and KNO_3 were used. In the few salts which produced appreciable growth the mycellium contained a high percentage of Co. During growth under these conditions *A. oryzae* converts 33% of the sucrose of the culture soln. into kojic acid; *A. niger* under the same conditions produces large amts. of acid. It is concluded that these effects are due to the lack of easily assimilated N, since *A. niger* when grown in a culture soln. with only small amts. of NH_4NO_3 produces citric, malic, succinic, tartaric and oxalic acids. B. C. A.

Metabolism of *Aspergillus oryzae*. I. I. H. TAMIYA. *Acta Phytochim.* 3, 51-173 (1927).—The conditions for the growth of *A. oryzae* have been investigated with regard to the p_H of the culture medium, and to the rate of acid formation by the mold. The accumulation of kojic acid in the culture medium (detd. by colorimetric titration with FeCl_3) increased the p_H but slightly; the observed increase is therefore due to the removal of the cations of the medium by the mold. When NH_4NO_3 is used as the source of N the NH_4 ions are consumed more rapidly than the NO_3 ions; at a certain p_H (3.4) the latter begin to be consumed with a corresponding reduction in acidity. Growth can take place in cultures of this mold between the limits of p_H 2.1 and 8.6, and is a max. at 3.5 and 7.0. At the min., p_H 5.5, the formation of kojic acid is maximal. Free org. acids inhibit the growth of the organism, although their salts accelerate growth: oxalic, citric and kojic acids are most active, then follow tartaric, lactic, acetic and formic acids. The kojic acid formation is rapidly diminished by the addn. of oxalic, citric, formic, HCl and HNO_3 acids, while H_2SO_4 produces a slight increase; the production is also increased by the addn. of tartaric acid at a low p_H , and by the addn. of phosphoric, lactic and pyruvic acids in a medium with a p_H corresponding with the so-called isoelectric point of plasma protein, 5-6. B. C. A.

Studies on the transformations of iron in nature. II. The importance of micro-organisms in the solution and precipitation of iron. R. I. STARKEY AND H. O. HALVORSON. *Soil Science* 24, 381-402(1927); cf. *C A* 22, 1742.—The pptn. of Fe from soln. is not wholly dependent upon the so-called "iron bacteria" (i. e., those which utilize ferrous Fe as a source of energy), but can be effected by a large no. of organisms acting in a variety of ways. Organisms which decompose org. compds. of Fe and therefore produce more Fe ions, and also organisms which change the environment, as by producing alkali or increasing the O₂ pressure, also are important factors. The pptn. of ferric Fe does not necessarily indicate that it has been recently oxidized, and oxidation of Fe may or may not result in pptn. of ferric Fe, depending upon other conditions. R. BRADFELD

The occurrence of vitamin D (bios) in fermentation vinegar. ALEXANDER JANKE AND HANS LACROIT. *Biochem. Z.* 190, 67-74(1927).—The term vitamin D is used in the sense of Funk's original designation. The addn. of concentrates from fermentation vinegar to mineral nutritive solns. stimulates the growth of yeast. In expts. with single-cell cultures the acceleration was 20 times as compared to control expts. In great amts., however, the concentrates have an inhibitory effect and at 5% suspend germination entirely. The substance affecting growth is not injured by 2 hrs.' heating in an autoclave at 2 atm. It is adsorbable on fuller's earth, and can be leached out by a 1% NH_4OH . The ash either from the concentrate or from the NH_3 soln. of the adsorbate is inactive. The concentrate added directly to distd. water cannot serve to promote multiplication of yeast but must be used in conjunction with a nutritive soln. Apparently these growth-stimulating substances come from metabolizing acetic acid bacteria. Acetic acid prepd. by chem. methods shares none of these properties with the fermentation acetic acid. S. MORGULIS

The effect of *Bacterium lactis aerogenes* and *Bacterium coli* on hexosemonophosphoric acid. NAOMI KAGEURA. *Biochem. Z.* 190, 181-7(1927).—Both Na and Ca salts of hexosemonophosphate under practically anaerobic conditions yield considerable amts. of lactic acid when acted on by *B. lactis* or *coli*. S. MORGULIS

The antiseptic effect of phenol and of *p*-chlorophenol in solvents of different dielectric constants. W. E. ENGELHARDT. *Biochem. Z.* 190, 217-25(1927).—In phenols no connection was found between their disinfecting action and the dielec. const. of the solvent, but the antiseptic power of *p*-chlorophenol appears only in solvents of high

dielec. const. This is attributed to the greater dissociation of the *p*-chlorophenol. The facts further show that the antiseptic power of dissociable substances is a function of the degree of dissociation.

Phytochemical reduction accomplished with the aid of bacteria. S. MORGULIS
CARL NEUBERG
AND ERNST SIMON. *Biochem. Z.* 190, 226-31(1927).—The reduction by bacteria of *p*-xyloquinone to *p*-xylohydroquinone and of isovaleraldehyde to amyl alcohol has been explicitly demonstrated.

The effect of mercurochrome-220 soluble on the growth of *Bacillus pyocyaneus*. S. MORGULIS
I. S. WRIGHT. *Arch. Surg.* 15, 958-61(1927).—Mercurochrome has little effect on *B. pyocyaneus* in blood or agar even when exposed to large amts. for many hours. It is very effective under like conditions. Both mercurochrome and I destroy *Staph. aureus* under similar conditions.

The influence of osmotic pressure on the typhoid-colon group of bacteria with special reference to agglutination. JOHN T. MYERS
TRAUGATT WAHLFEIL. *Centr. Bakt. Parasitenk. I Abt.* 105, 15-32(1927).—Hypertonic NaCl solns. are more harmful to the colon than to the typhoid bacillus. Colloids such as normal of immune serum, or the split products of egg albumin, at an optimum concn. will protect bacteria against hypertonic NaCl or urea solns. Immune serum is the most effective. The protective effect is greater at a distance from the isolec. point.

The requirements of the influenza bacillus in anaerobic cultures, with special reference to the "X" and "V" factors. JOHN T. MYERS
ILONA KOPP. *Centr. Bakt. Parasitenk. I Abt.* 105, 54-6(1927).—The influenza bacillus can grow under anaerobic conditions without hemoglobin. The "X" factor is necessary in anaerobic cultures to protect against the injurious effects of O.

Study of microbial proteolysis by a new method. JOHN T. MYERS
J. WEISSFEILER. *Centr. Bakt. Parasitenk. I Abt.* 105, 275-81(1928).—The best medium for proteolytic studies is coagulated horse serum or egg white plus isotonic BaCl₂ soln. It is simple, uniform and gives comparable results.

Lipoid culture media for bacteria. JOHN T. MYERS
L. SURÁNYI. *Centr. Bakt. Parasitenk. I Abt.* 105, 303-5(1928); cf. *C. A.* 22, 1610.—Gonococci as well as other fragile organisms will grow even when freshly isolated, on plain agar without human protein, if cholesterol or lecithin is added. Whether the lipid serves as a food or produces the requisite physiochem. conditions is unknown.

A new method for determining the colon count in water. JOHN T. MYERS
L. V. WIKULLU. *Centr. Bakt. Parasitenk. I Abt.* 104, 460-3(1927).—To each 100 cc. of melted agar add: 0.1 g. of *m*-phenylenediamine sulfate, previously dissolved and kept in 3 cc. water, several hrs or until it assumed a yellowish brown color, then neutralized with 0.5 cc. of *N*/1 NaOH; 1 g. lactose; 1 g. KNO₃ and 10 cc. of a 1% soln. of metachrome yellow R. D. (Grübler). Adjust the *p*_H between 6.4 and 6.8. Gram-positive but not Gram-negative organisms are inhibited. Colon colonies produce a brown color. The fermentation of lactose produces acid, the nitrate is reduced to nitrate and Bismarck brown is produced.

New indigenous (Hannover) varieties of *Rhizopus* capable of fermenting sugars. JOHN T. MYERS
WALTER NILL. *Centr. Bakt. Parasitenk. II Abt.* 72, 21-38(1927).—Three varieties of *Rhizopus* were isolated from grain and meal. They differ morphologically from known species. They fermented sugars very actively. *Rhizopus* 1 produced acetaldehyde as well as alc. The fermentation of galactose and mannose wks weak, and that of glucose, fructose, saccharose and maltose strong, while inulin and lactose were not attacked.

The predominating microbial flora of the pulp storage vats in potato starch plants in Holland. A contribution to the knowledge of lactic acid bacteria. JOHN T. MYERS
B. ELEMA. *Centr. Bakt. Parasitenk. II Abt.* 72, 66-101(1927).

The metabolic activities of the bacteria of sewage-irrigated fields at low temperatures. JOHN T. MYERS
L. RUBENTSCHIK. *Centr. Bakt. Parasitenk. II Abt.* 72, 101-28(1927).—Aerobic and anaerobic putrefaction urea fermentation, denitrification and the first stage of nitrification, can occur at temps. between 0° and 3°. At such temps. the rate is slow. The temp. coeff. is lower than predicted by the van't Hoff rule. A no. of pure cultures were isolated from fields and described as to rate of growth, pigment production, gelatin liquefaction, milk peptonization, urea destruction, formation of NH₃, H₂S, the reduction of N₂O₃ to N₂O, and decolorization of methylene blue.

The varieties of *Citromyces* and the formation of citric acid. JOHN T. MYERS
C. WEHMER. *Centr. Bakt. Parasitenk. II Abt.* 73, 161-2(1928).

An obligate halophilic thiosulfuric acid bacterium. JOHN T. MYERS
A. A. SASLAWSKY. *Centr. Bakt. Parasitenk. II Abt.* 72, 236-42(1927).—An organism was isolated from the black

slime of the Liman estuary which could oxidize the S compds. in the slime, such as H_2S , sulfides and thiosulfates. It was an obligate halophile, being active only in the presence of 2.0 to 22.0% NaCl. In Beijerinck's medium the oxidation of thiosulfates is incomplete
JOHN T. MYERS

Can bacteria reduce phosphates? F. LIEBERT. *Centr. Bakt. Parasitenk. II Abt.* 72, 369-74(1927). - Thermochem. data indicate that bacteria cannot derive energy from the reduction of phosphates, in the presence of mannitol. Contrary to the findings of Rudakov, qual reactions failed to detect the products of phosphate reduction.
JOHN T. MYERS

Quantitative investigations on the difference between the growth of bacteria and fungi, and the concentration of several neutral salts. WILHELM ESTAR. *Centr. Bakt. Parasitenk. II Abt.* 72, 411-43(1927). - Different organisms are affected quite differently by varying concns of neutral salts. No correlating principles were found. J. T. M.

Nitrogen fixation and the conclusions to be drawn from the morphology of the nodule bacteria. HEINRICH PFEIFFER. *Centr. Bakt. Parasitenk. II Abt.* 73, 28-57(1928). - In plants inoculated with *B. radicola*, the root nodules are more numerous but smaller than in uninoculated plants. Disappearance of the hunger stage and the beginning of N assimilation on the part of the plant are not synchronous. The formation of toxic substances seems to cause degeneration in the nodules, but no relationship appears between toxin formation and slowing of growth with bacteroid formation.
JOHN T. MYERS

The nitrite test as applied to bacterial cultures. G. I. WALLACE AND S. L. NEAVE. *J. Bact.* 14, 377-84(1927). - In high nitrite concns the color resulting in the standard nitrite test is destroyed by destruction of the amino group of the naphthylamine. High nitrite concns are favored by peptones contg S and small quantities of NO_2 escape detection in the presence of H_2S . Dimethyl α -naphthylamine gives a stable reagent of high sensitivity and produces a permanent NO_2 color; hence it is better than α -naphthylamine.
JOHN T. MYERS

The China blue-aurin cellulose medium for the physiological study of cellulose destroyers. J. R. SANBORN. *J. Bact.* 14, 395-7(1927). - One and 5 tenths percent agar is dissolved in the following pptd raw cotton, 500 cc, nutrient medium (cf. C. A. 20, 3480), China blue-aurin indicator (equal parts of 0.5% aq. China blue and 1% rosolic acid in alc.). Organisms which decomp cellulose with acid production form a blue zone around the colony.
JOHN T. MYERS

A comparative study of six different strains of the organism commonly concerned in large-scale production of butyl alcohol and acetone by the biological process. E. R. WEYER AND L. F. RETTGER. *J. Bact.* 14, 399-424(1927). No qual differences in physiol. properties were noted in the 6 strains. The organism is powerfully diastatic, saccharolytic and proteolytic. All the common and most of the rare sugars are sources of available C. A complex source of N such as proteins or peptones is necessary. NH_4 salts will not support growth, nor will simple amino acids. The organism is quite susceptible to ordinary antiseptics, but not to butyl resorcinol.
JOHN T. MYERS

Microbial thermogenesis. II. Heat production in moist organic materials with special reference to the part played by microorganisms. L. H. JAMES, LEO F. RETTGER AND CHARLES THOM. *J. Bact.* 15, 117-41(1928). - Moistened corn meal and cracked corn heated to 62° when aerated with O_2 . Oats and wheat heated to a less extent under the same conditions. Hay heated to 60°, and stable manure to about 73°. The total N content in the corn remained practically const during the period of heat production. NH_4 increased, indicating that the loss of org. N was appreciable, though the NH_4 was not removed from the flask. There was a marked loss in dry wt. during the heat production, about 75% of which was accounted for by loss in carbohydrate. J. T. M.

Antiseptic and infertilizing actions of some essences of mint, and of their principal constituents. A. MOREL, A. ROCHAIX AND L. SEVELINGE. *Compt. rend. soc. biol.* 98, 47-9(1928); cf. C. A. 21, 3646. - Eleven preps or constituents of peppermint essence were tested for their antiseptic action by contact and by the action of their vapors on the bacillus of Eberth, staphylococcus, *Proteus vulgaris* and *Proteus* X19, and for their infertilizing action by contact on the same organisms. The actions are not pronounced but are more marked against *Proteus* than against the other organisms. Crystd. menthol (Codex) is somewhat more active than the other products. Terpenes extd. from Japan essence are least active. Ketonic constituents of mint are weak in antiseptic action. Menthone has little infertilizing action but pulegone and piperitone have the strongest infertilizing action of any of the substances examd.
L. W. RIGGS

D—BOTANY

THOMAS G. PHILLIPS

The alleged ephedrine action of two California species of Ephedra. B. E. READ AND C. T. FENG. *Proc. Soc. Exptl. Biol. Med.* **24**, 819-21 (1927).—The chem. assay and testing, as compared with known exts. of specimens of Peking Ephedra contg. ephedrine, showed absolutely no ephedrine in the sample of *E. californica* Wats, nor was there anything more than possibly an exceedingly small trace in *E. nevadensis*, Wats. Both species gave no rise in blood pressure as did the preps. from Peking Ephedra. The results formerly obtained with infusions of Ephedra were probably due to the presence of simple colloids, and certainly not to basic substances related to ephedrine, unless there is exceedingly great seasonal variation in the alkaloidal content of this plant. C. V. B.

Inhibiting effect of acetates and acetic acid on living cells of Nitella. M. IRWIN. *Proc. Soc. Exptl. Biol. Med.* **24**, 935-6 (1927).—Some of these expts seem to indicate that though a decrease in rate of penetration of a basic dye into the vacuole may take place at the same time the p_H value of the sap is decreased, such results do not necessarily discredit the theory that a basic dye enters the vacuole much more readily in form of free base than in the form of salt. If one assumes that the inhibiting effect of acetic acid on the protoplasm exceeds the accelerating effect on the vacuolar sap, and that the rate of penetration of dye into the vacuole is controlled in this case by the diffusion of dye in the form of free base from protoplasm into the vacuole, then a decrease in the p_H value or some other alteration in the protoplasm corresponding to a decrease in the p_H value of the sap might bring about a decrease in the rate of penetration of the dye into the vacuole. C. V. B.

Systematics of the genus Rhamnus with special reference to the occurrence of emodin. FRITZ HEPELER. *Arch. Pharm.* **266**, 152-73 (1928).—The treatment is largely botanical with consideration of the factors affecting ecological restrictions and systematic relationship. W. O. E.

The constituents of Typha angustata Bory et Chaub. MASAO FUKUDA. *Bull. Chem. Soc. Japan* **3**, 53-6 (1928).—The pollen of *Typha angustata* has been extd. with hot alc., evapd. and extd. with petroleum ether. The petroleum ether-sol. fraction was characterized as palmitic acid. The insol. part gives the flavone reaction with Mg and HCl, and reduces Fehling soln. after hydrolysis with H_2SO_4 , indicating the presence of a flavone glucoside. A treatment of the insol. part with boiling H_2O , then with $(AcO)_2Pb$ failed to give a crystalline glucoside; the amorphous mass obtained was hydrolyzed with H_2SO_4 ; the ppt. washed with H_2O seems to be isorhamnetin; *d*-glucose was detected in the filtrate. Synthetic isorhamnetin has been prepd. by Robinson's method (C. A. **21**, 93). Its Ac deriv. is identical with the deriv. of the above hydrolyzed product. A. I. HENNE

The general presence of sodium in plants. GABRIEL BERTRAND AND MME. M. ROSENBLATT. *Bull. soc. chim.* **43**, 368-71 (1928).—See C. A. **22**, 1176. E. H.

Genesis of starch in cereals. The sugars of the leaves and stems of rice. H. BELVAL. *Compt. rend.* **186**, 781-3 (1928); cf. C. A. **16**, 3316; **17**, 1270, 3041, 3693; **20**, 2348.—Plants were collected at intervals of 16 to 33 days, beginning June 16 and ending Nov. 8. The leaf blades (A) were analyzed separately from the sheath and stems (B). The rotatory power before hydrolysis remained nearly const. at $+60^\circ$ in (A), but increased from $+34^\circ$ to $+50^\circ$ in (B). The rotatory power after hydrolysis generally gained slightly in (A) from -17° to -19° or -20° , but remained about const. in (B) at -18° . Reducing sugars increased from 0.13 to 0.24 in (A), and from 0.12 to 0.50 in (B). Sucrose gained in (A) from 1.03 to 1.42 and in (B) from 0.30 to 1.79. The increase was generally steady except that the figures for Aug. 4 were less than those for July 19. These variations appear to be largely dependent on the water content of the vegetable tissue. L. W. RIGGS

A new plant containing maltose, Schizopepon fargesii Gagnepain. H. COLIN AND R. FRANQUET. *Compt. rend.* **186**, 890-1 (1928); cf. Bridel, C. A. **19**, 843; Gillot, C. A. **19**, 2064.—This climbing plant of the order Cucurbitaceae is known under the incorrect name *Actinostemma paniculatum* Maxim. It is of Chinese origin and is remarkable for its roset-shaped tubers which contain large reserves of starch and reducing sugars. The adult tubers in Oct. contained hexose 0.13, sucrose 0.14, maltose 6.87 and starch 12.64%. By Dec. the hexose content of the tubers was 4.33, sucrose 2.37, maltose 2.96% and starch 8.08. In the following March during germination the hexose content was 1.05, sucrose a trace, maltose 0 and starch 1.35%. L. W. RIGGS

Liberation of free iodine in marine algae. PIERRE DANGEARD. *Compt. rend.* **186**,

892-4(1928).—Several species of *Fucus*, *Laminaria* and certain other marine algae give an immediate blue color when placed in contact with starch paper. Other species give the blue color only after some hrs. of contact. The sharpness of this test varies with the age of the plants and season of the year. The production of I is attributed to a special activity of the peripheric cortical cells. L. W. RIGGS

Flora of the thermal monosulfated waters of Baréges. PIERRE FOURMONT. *Compt. rend. soc. biol.* 98, 588-9(1928); cf. Robine and Dejussieu, *C. A.* 22, 1816. L. W. RIGGS

Biochemical differences between sexes in mucors. IV. Enzymes which act upon carbohydrates and their derivatives. SOPHIA SATINA AND A. F. BLAKESLEE. *Proc. Nat. Acad. Sci.* 14, 229-35(1928); cf. *C. A.* 21, 2015.—Comparative tests were made with 24 (+) and (—) *Mucor* races (included in 10 species and 8 genera) to det. the possibility of a given carbohydrase being present in one sex and not in the other. No such qual. differences between the sexes were discovered. Trehalase, maltase and emulsin were present in all the tested species; amylase and glycogenase in all except one. Lactase was found in races of 4 species and sucrose and inulase were found in races of 2 species only. Among the species tested, *Cunninghamella* appeared to contain the greatest no. of carbohydrases. Species of the genus *Mucor* and *Parasitella* contained the fewest. In addn. to glucose used as control, the relative value for *Mucor* development of 10 carbohydrates and their derivs., including di- and polysaccharides, glucosides and a carbohydrate alc., can be shown approx. by the following order: trehalose, maltose, salicin, amygdalin, starch, glycogen, mannitol, lactose, sucrose and inulin. Amygdalin, however, yields HCN and ultimately kills the fungus. L. W. RIGGS

Relation of boron to the growth of the tomato plant. F. S. JOHNSTON AND W. H. DORE. *Science* 67, 324-5(1928).—The appearance of the plants as well as actual measurements and analyses show that B is abs. essential to the normal growth of the tomato plant. Plants grown without sufficient B fail to remove sugar from their leaves, develop a purplish color in the leaves and show an extreme brittleness in the leaf petiole. The results obtained by Brechley and Warrington (cf. *C. A.* 21, 1475) in growing the bean in solns. deficient in B are to some extent confirmed by these tests. L. W. RIGGS

The plant species in cultivated pasture land. MARTIN ELLINGBÖ. *Meldinger Norges Landbruks.* 6, 1-151(1926).—Chem. analyses are given of a great number of different plants. C. A. ROBAK

Nitrogenous metabolism of *Pyrus malus* L. I. Influence of temperature of desiccation on water-soluble nitrogenous constituents and separation of water-soluble protein from non-protein constituents. WALTER THOMAS. *Plant Physiology* 2, 55-66(1927).—Desiccation in ventilated ovens at 50°, 60° and 70° resulted in relatively small decreases in the sol. cytoplasmic proteins, but increases in the non-protein constituents. From the effect of temp. on both coagulation and proteolysis, a temp. of 60° appears to be the optimum for the desiccation of the tissues of this species. The method of direct extn. with water (*C. A.* 18, 2184) produced less disturbance in the protein and non-protein fractions due to post-mortem changes, than methods involving the use of cytolytic agents (*C. A.* 17, 791). Colloidal Fe(OH)₃ in these expts. proved superior to the reagents in general use for the sepn. of the simple and conjugate proteins from their hydrolytic products. It gave a sharp sepn. of proteins from their decompn products including the proteoses; moreover, no absorption of amino acids occurred.

II. The distribution of nitrogen in the insoluble cytoplasmic proteins. *Ibid* 67-70.—The distribution of N in samples of leaves from apple trees taken at (1) the early period of bud formation, (2) the stage of active max. growth and (3) the period of chlorophyll degeneration, as detd. by the Van Slyke method (*C. A.* 9, 3263), showed that little (if any) qual. change in the nature of the insol. leaf proteins occurred during development. The results are consistent with the idea that a single protein and not a mixt. of several exist in the leaves of this species. The bearing of these results on the carbohydrate-N relations of plants is pointed out.

Does the pea plant fix atmospheric nitrogen? DEAN BURK. *Plant Physiology* 2, 83-90(1927); cf. *C. A.* 19, 1290.—The Dwarf variety of *Pisum sativum* when grown in culture solns. with and without nitrate, and under sterile conditions up to the time of planting, showed upon statistical treatment of the data a small loss of N. This loss is due, in part, to excretion of N into the culture soln. It is concluded that the plants lost enough N to hide any evidence of fixation. WALTER THOMAS

The action of ethylene in accelerating the blanching of celery. W. B. MACK. *Plant Physiology* 2, 103(1927).—Preliminary studies showed that treatment of celery with ethylene in various concns. increased the respiration and hastened both blanching and the breakdown of the plant tissues. In the presence of very high concns. of CO₂ no blanching occurred under treatment with ethylene. WALTER THOMAS

The hydrocyanic acid question. **XXI. Alkaloid- and hydrocyanic acid-bearing plants, a parallel.** L. ROSENTHALER. *Pharm. Acta Helv.* 2, 207-10(1927); cf. G. A. 21, 2051.—Of about 400 HCN-bearing plants, none contains alkaloids; as a rule, HCN and alkaloids seem to exclude each other. This suggests for both a common origin, mainly connected with protein metabolism. In the chem. synthesis of protein from amino acids by the plant, any excess of amino acid is converted into substances harmless to metabolism. It depends on the plant system, *i. e.*, heredity, whether HCN compds. or alkaloids are produced. Thus, *e. g.*, phenylalanine can be converted either into ephedrine or into $BzH.HCN$. Other analogies are seen in the seasonal formation and subsequent disappearance of HCN compds. of alkaloids during biol. processes in the plant, *e. g.*, budding, and the ripening or germinating of seeds. The behavior of both classes of plants towards nitrogenous plant food also shows analogy. Parallel to alkaloids as waste products, HCN was noted in fallen leaves of *Sambucus nigra* L. (0.012% HCN); fallen cherry laurel leaves are devoid of HCN. S. WALDBOTT

Effect of delayed harvesting on quality of wheat (BRACKEN, BAILEY) 12. The determination of polysaccharides (APPLEMAN, *et al.*) 7.

BALLARD, C. W.: *The Elements of Vegetable Histology*. 2nd ed. London: Chapman & Hall. 289 pp. 16s., net. Reviewed in *Analyst* 53, 186(1928).

II.—NUTRITION

PHILIP B. HAWK

Scientific investigation of vitamins. STREUDER. *Pharm. Monatsh.* 9, 59-61(1928).—An address. W. O. F.

The effect of different forms of diet on the ketone body and sugar content in diabetes mellitus. O. PUCSKO. *Wiener Arch. inn. Med.* 15, 123-30(1928).—The effect of various diets on the ketone body content of the blood and urine in diabetics was studied. The older diabetic diets rich in protein but poor in carbohydrates were followed by higher ketone body content in blood and urine than the newer diets in which both carbohydrates and proteins are restricted and fat is added to give the necessary calory value. Vegetable protein caused a transitory rise in ketone bodies in the blood but on continued use brought the ketone body content to a lower level than animal protein. Restriction of calories, independent of the nature of the diet, had a favorable effect on the metabolism of diabetics. HARRIET F. HOLMES

Some aspects of recent research in nutrition. F. E. CORRIE. *Fertiliser, Feeding Stuffs and Farm Supplies J.* 13, 173-4(1928).—A general discussion. K. D. J.

The amount of vitamin A in different varieties of Batatas. B. C. P. JANSEN AND W. F. DONATH. *Mededeel. Dienst Volksgezondheid Nederland. Indië* 17, 120-5(1928).—In accordance with the conclusions drawn from testing maize and other foods, it has also been proved that the yellow and orange varieties of *Batatas* are rich in vitamin A, whereas the white variety contains little or none. The amt. of protein in all the tested kinds of batata was very small, ranging from 0.5 to 1.6%. J. A. KENNEDY

Vitamins in canned foods. E. F. KOHMAN, W. H. EDDY AND NELLIE HALLIDAY. *Ind. Eng. Chem.* 20, 202-4(1928).—Strawberries, like tomatoes, are a rich source of vitamin C. The daily feeding required for protection against scurvy and normal growth of the guinea pig is between 2 and 3 g. Commercially canned strawberries considerably over a yr. after canning have a vitamin C content similar to that of raw strawberries. Since strawberries contain considerable O, it is indicated that the exhaust plays an important part in making it possible to can them with no apparent loss in vitamin C. Strawberries are only one-fortieth as rich in vitamin A and about $1/4$ as rich in vitamin B as tomatoes. J. A. KENNEDY

The amount of vitamin A in Indian fruits. B. C. P. JANSEN AND W. F. DONATH. *Mededeel. Dienst Volksgezondheid Nederland. Indië* 17, 126-37(1928).—Lacking in vitamin A were mangosteen, ramboetan, doekoe, pineapple, custard-apple, djamboe bol, djerok nipis and white doerian. Considerable amts. of the vitamin are present in nangka and djerok delima. Djamboe monjet, djerok manis, djerok garoet, yellow doerian, ripe mango, green (unripe) mango, kebembem and palm oil (stoneless) contain less of this vitamin. J. A. KENNEDY

MCCOLLUM, ELMER VERNER, AND SIMMONDS, NINA: *The Newer Knowledge of Nutrition—the Use of Foods for the Preservation of Vitality and Health*. 3rd ed., rewritten. New York: The Macmillan Co. 675 pp.

F—PHYSIOLOGY

R. K. MARSHALL, JR

Inorganic constituents of the blood plasma of dogs after removal of the hypophysis. P. MAZZOCCO. *Rev. soc. argentina biol.* **3**, 213-6(1927).—The content of NaCl, inorg. P, Ca, Mg, K and Na in the plasma of dogs from which the hypophysis has been removed is normal. B. C. A.

The amount of the metabolism as a function of the height. Study of the biometric theory. GEORGES THISSIER. *Ann. physiol. physicochim. biol.* **4**, 1-23(1928).

H. J. DEUEL, JR.

The reciprocal relation of gastric processes and the reaction of the blood. I. Normal acidity. G. HOLLER AND J. BLOCH. *Wiener klin. Wochschr.* **40**, 1221-3(1927).—Cl index is defined as 100 HCl/NaCl. For the normal stomach this index is 40 to 50 after a test meal of water and 50 to 65 after a test meal of 200 cc. of 1% caffeine. Blood Cl falls during digestion and in a post-absorptive state varies between 320 and 370 mg. %o. The blood is slightly more alk. during digestion; the shift in acid-base equilibrium is slight because of the well-buffered character of the system. **II. Investigations of secretory activity of the stomach in pathological conditions.** *Ibid* 1247-9.—Cl index, p_{H} , blood BICCO_3 and free HCl were detd. after test meals of 200 cc. of 1% caffeine soln. in cases of duodenal ulcer, subacute gastroenteritis, lues, pernicious anemia and in secondary anemia associated with chronic pancreatitis. **III. The pathogenesis and therapy of gastric and duodenal ulcer.** *Ibid* 1249-51.—Alkali therapy relieves symptoms but has no etiological value. Gastric hyperacidity and blood acidosis are believed to be secondary to a deep-seated alteration of the secreting mechanism of the stomach. D. B. DILL.

The question of the occurrence of a lactacidogen-like substance in glands. II. F. KRAUSE. *Z. physiol. Chem.* **173**, 235-44(1928).—In the functioning parotid gland of the dog no more H_3PO_4 is present than in the resting gland. On the contrary, a distinct decrease was invariably observed, amounting to as much as 15%. The lactic acid content, however, remains const. If the decrease in H_3PO_4 is only an apparent decrease due to the greater blood circulation in the functioning gland, then the unchanged lactic acid content represents an actual increase. Attempts to prep. hexosemonophosphoric acid from pancreas and salivary glands by the Embden-Zimmermann method were unsuccessful. Muscle pulp has the power of splitting off H_3PO_4 from the filtrate of the resting gland, after pptg. with $\text{HgCl}_2\text{-HCl}$ and neutralizing. The amt. may be as much as 50% of the total P present. Glandular pulp, but not muscle pulp, is known to split off H_3PO_4 from nucleic acid. The precursor of the H_3PO_4 in the gland must therefore be something else than nucleic acid. Whether or not the substance is a hexosephosphoric acid remains undecided in view of the failure to isolate such a substance from the gland. A. W. DOX.

Normal deposition of minerals in the bones of dairy calves. J. H. KRUGER AND S. I. BECHDEL. *J. Dairy Sci.* **11**, 24-34(1928).—Green bone analyses of ribs, femurs, humeri and frontal bones of 7 Holstein male calves (90, 120, 150 and 3 at 180 days old) are given. The P and Ca content remained about const. Water decreased and fat, ash and org. matter increased with the age of the bone. The ratio of ash to org. matter is a good rachitic index of bone condition. RUSSELL C. ERM.

The composition of human milk. G. D. ELDON. *Analyst* **53**, 78-82(1928).—The analysis of 529 samples taken from 86 women shows that the compn. of human milk depends so much upon the stage of lactation that av. figures can be of little value. For the first week of lactation, the milk averages 2.86% fat and 9.01% of solids-not-fat. Then, during the first month, the fat increases to 3.58% and the solids-not-fat decreases to 8.58%. Later the milk becomes a trifle more watery. Early in lactation, the I value of the fat is 35.9 the Reichert value is 3.4, the Polenski value is 1.9 and the Kirschner value is 2.0. W. T. H.

Muscular activity in man from the engineering aspect. A. V. HILL. *Science Progress* **22**, 630-40(1928).—A discussion of the biochemistry and biophysics of muscular activity. JOSEPH S. HEPBURN.

Alterations of the sexual hormone content in the blood of woman. H. HIRSCH. *Arch. Gynäkol.* **133**, 173-81(1928).—The content in sexual hormone in the blood of the mature non-pregnant woman shows cyclic alterations. The hormone content begins to rise in the middle of the intermenstrual period, increases until the last day before menstruation and decreases rapidly after the onset of menstruation. In pregnancy the hormone remains present in the blood and increases until the end of pregnancy. In the puerperium it gradually falls and after the 13th day is no longer to be found in

the blood. The concn. of the hormone is 3-6 times as great in the menstrual as in the circulating blood. Menstruation is a result of the fall in hormone content of the blood brought about by change in the function of the corpus luteum. HARRIET F. HOLMES

Conditions of activity in endocrine glands. XXII. Adrenaline secretion on exposure to cold, together with a possible explanation of hibernation. S. W. BRITTON. *Am. J. Physiol.* **84**, 119-31(1928); cf. *C. A.* **21**, 1671.—In cats with the adrenal glands intact and which had been made hypoglycemic by insulin, exposure to cold resulted in shivering and a rise of blood sugar to normal or above. After destruction of adrenal medulla and treatment with insulin exposure to cold did not cause a return to the normal blood sugar level nor shivering. The bearing of these facts on hibernation is discussed.

J. F. LYMAN

The thyroid gland and the sensitivity of animals to insulin. S. W. BRITTON AND W. K. MYERS. *Am. J. Physiol.* **84**, 132-40(1928).—After removal of the thyroid (parathyroids intact) cats were hypersensitive to insulin for a period of 10 to 20 days followed by complete recovery of the normal resistance. Ablation of adrenal medulla in a thyroidless animal resulted in an extreme and persistent reduction of the normal ability to withstand insulin. After thyroid removal, and during the period of increased sensitivity to insulin, posterior pituitary ext. was very effective in abolishing insulin convulsions. Adrenaline rapidly relieved insulin shock in thyro-medulliadrenalectomized animals. Depression of glycogen storage was not demonstrable.

J. F. LYMAN

Medulliadrenal secretion and carbohydrate metabolism. S. W. BRITTON, E. M. K. GEILING AND H. O. CALVERY. *Am. J. Physiol.* **84**, 141-56(1928).—In the absence of the normal adrenaline secretion the organism suffers a severe and persistent lowered ability to counteract the effects of small quantities of insulin.

J. F. LYMAN

Blood and cerebrospinal fluid changes after intravenous injection of hypertonic solutions. J. M. KINSMAN, R. G. SPURLING AND F. JELSMA. *Am. J. Physiol.* **84**, 165-75(1928).—After the intravenous injection of hypertonic NaCl or glucose solns. there was an immediate fall in the sp. gr. of the whole blood and serum due to the transfer of water from the tissues into the blood. There was a temporary rise in the cerebrospinal fluid pressure which was followed by a consistent fall, varying in degree with the amt. and hypertonicity of the solns. injected.

J. F. LYMAN

The influence of cerebral blood flow on respiration. I. The respiratory responses to changes in cerebral blood flow. C. F. SCHMIDT. *Am. J. Physiol.* **84**, 202-22(1928).—The cerebral blood vessels are under chem. control. They are dilated by CO_2 , anoxemia, acid, heat and cerebral anemia and constricted by excess O_2 , alkali and cold. **II. The gaseous metabolism in the brain.** *Ibid* 223-41.—The apparent O_2 consumption of the brain varied directly with respiratory activity except during CO_2 inhalation. **III. The interplay of factors concerned in the regulation of respiration.** *Ibid* 242-59.—The chief function of the entire respiratory mechanism is the maintenance within the center of a const. concn. of stimulant material, the nature of which cannot be detd. at present.

J. F. LYMAN

The influence of the vagus on the islets of Langerhans. III. Vagotomy. G. A. CLARK. *J. Physiol.* **64**, 229-32(1927); cf. *C. A.* **20**, 3496.—Cutting the right vagus above or below the diaphragm in cats under amnytal anesthesia produced an immediate fall in blood sugar, probably due to the removal of tonic inhibitory impulses which control insulin secretion.

J. F. LYMAN

The internal secretions of the ovary. V. The estrus-inhibiting function of the corpus luteum. A. S. PARKES AND C. W. BELLERBY. *J. Physiol.* **64**, 233-45(1927); cf. *C. A.* **21**, 2140.—An estrus-inhibiting ext. was obtained from solid corpora lutea as follows: the fresh tissues (usually about 200 g.) were ground with anhyd. Na_2SO_4 and then let stand not over 24 hrs. in ether. The filtered ext. was evapd. *in vacuo* and the oil obtained either injected as such or emulsified in 0.5% NaHCO_3 soln. The effective amt. of oil was about 0.2 cc. per day per mouse. The active substance is unstable and is best prepd. fresh each day from the ether soln., which itself rather rapidly loses activity.

J. F. LYMAN

Histochemical findings in the renal gland with particular reference to sodium chloride. A. DEFRISE. *Boll. soc. ital. biol. sper.* **2**, 521-5(1927).—D. made a histochemical study on the distribution and behavior of NaCl in the renal gland of *Mus musculus albus*. He used a modified Leschke technic; the pptd. AgCl in the tissues was reduced by an acid solution of AgNO_3 . A detailed histological picture is given followed by a long theory on renal function.

PETER MASUCCI

The digestive function of the glands of the pigeon's crop. II. F. DULZERRO. *Boll. soc. ital. biol. sper.* **2**, 575-7(1927).—The glands of the pigeon's crop contain only two digestive enzymes, both able to act on carbohydrates, one an amylase and the other

a sucrase. The function of the crop glands appears to be analogous to the salivary glands. **PETER MASUCCI**

The presence of lipoids among the normal constituents of the enteric secretion. A. CLEMENTI. *Boll. soc. ital. biol. sper.* 2, 584-6(1927).—Lipoids are const. components of the enteric secretion of dogs; they are a normal product of the secretory activity of the glandular cells of the small intestine. A part, at least, of the lipoids found in feces by numerous authors is of intestinal secretory origin. **PETER MASUCCI**

The action of carbon dioxide and oxygen on the general and coronary blood vessels. F. PESERICO. *Boll. soc. ital. biol. sper.* 2, 609-11(1927).—P. compared the action of O_2 and CO_2 of the blood on the coronary circle and the isolated leg of the same animal. He was able to confirm the results of Hilton and Eicholtz, namely, that the coronary vessels react more intensely to anoxemia than to hypercapnia. **PETER MASUCCI**

Loosely bound copper and iron in blood serum. OTTO WARBURG AND H. A. KREBS. *Biochem. Z.* 190, 143-9(1927); cf. *C. A.* 21, 3640, 3941.—By "loosely bound" Cu and Fe are understood such elements which can be detd. by the cysteine method without previous ashing. The total Cu content of 4 diff sera before and after ashing was 7.1×10^{-3} and 6.9×10^{-3} mg., resp. It follows, therefore, that the loosely bound Cu represents the total Cu of serum. The av. human serum contains 1.7×10^{-3} mg Cu and 0.7×10^{-3} mg. Fe (loosely bound). Intravenous injections of Cu rapidly disappear. When 0.5 mg. Cu as $CuSO_4$ was injected into the caudal vein of 160-g. rats the Cu of the serum returned to the normal level in 6 hrs. **S. MORGULIS**

The amount of fibrinogen and its relation to the lability of plasma. K. SAMSON. *Biochem. Z.* 191, 320-33(1927).—Frequently there is a parallelism between the sedimentation reaction and the amt. of fibrinogen. The significance of cases where this parallelism is missing is pointed out. **S. MORGULIS**

Index of refraction of the vitreous humor of the chick embryo. KUMATARO GONDO. *J. Biochem. (Japan)* 8, 85-95(1927).—The vitreous humor of the chick embryo does not change from the sixth incubation day to the adult condition (av. 1.3449). On the contrary, the n of the blood increases during embryonic development. **S. M.**

The bilirubin formation in the surviving normal spleen. LUTAKA KOMORI AND CHUJI IWAO. *J. Biochem. (Japan)* 8, 195-204(1927).—Perfusion of the spleen with defibrinated, partly laked blood for 2-4 hrs. allows one to demonstrate bile pigment and bilirubin formation in the perfusion fluid. Bacteria play no part in this reaction. **S. MORGULIS**

Uric acid formation. GYATARO NAITO AND TOKIO NISHIOKA. *J. Biochem. (Japan)* 8, 225-33(1927).—The oral administration of urea causes an increased uric acid excretion in man. This increase is attributed to an accelerated synthesis since the discontinuance of the administration results in the immediate return to the normal value. **S. MORGULIS**

The nitrogen metabolism of eunuchs. T. C. SHEN AND K. H. LIN. *Chinese J. Physiol.* 1, 109-22(1927).—The detns. were made by standard methods. There was no appreciable difference between the N excretion in the urine of eunuchs and that of normal man. Only 1 eunuch in a series of 9 had creatine in the urine. This does not confirm the idea that creatinuria is characteristic of eunuchs castrated before puberty. One eunuch showed considerable variations of daily creatinine output, which is contrary to Folin's law of constancy of urinary creatinine. Cf. following abstr. **L. W. RIGGS**

Creatinuria and castration. TSUN CHIE SHEN. *Chinese J. Physiol.* 1, 363-6(1927); cf. preceding abstr.—Expts. with dogs and albino rats failed to show any relationship between creatine metabolism and the male genital glands. **L. W. R.**

Changes in the blood constituents accompanying gastric secretion. II. Blood volume (hemoglobin, oxygen capacity, relative volume and total solids). TSANG GI NI AND AN CHANG LIU. *Chinese J. Physiol.* 1, 199-212(1927); cf. *C. A.* 20, 1838.—Prolonged gastric secretion, induced by repeated injections of histamine, is accompanied by an increase in the percentage of hemoglobin, O capacity and relative cell vol. of the blood, when much of the secretion is lost (collected) and not reabsorbed. In normal animals there may be no change, any alteration in blood vol. being attributable either to the effect of histamine alone or to delays in reabsorption of secreted juice. Thus there is no exact parallel between blood vol. and gastric secretion. In general there was a decrease of blood vol. when the loss of gastric juice was excessive. Under normal conditions of gastric secretion in the intact animal, it is supposed that a movement of water occurs in a circle, blood, stomach, intestine, blood at such a rate that the blood vol. and proportions are but little changed. After gastric secretion over a long period

accompanied by external loss, the balance between the rate of loss and rate of income from the tissues will det. the blood vol. L. W. RIGGS

Role of the platelets in blood clotting. C. A. MILLS. *Chinese J. Physiol.* 1, 235-44(1927); cf. C. A. 20, 2698-9; 21, 596, 2479.—Expts. with dog blood indicate that mammalian blood platelets contain active tissue fibrinogen and free cephalin. They do not contain prothrombin or thrombin. It is the tissue fibrinogen content of the platelets that accounts for their ability to cause clot retraction. By their content of tissue fibrinogen and free cephalin, blood platelets are brought into line with cellular cytoplasm in all parts of the body. The platelets initiate clotting by liberating tissue fibrinogen, and stimulate the later phases of clotting by supplying active cephalin. **Influence of electric current and peptone on blood platelets and the onset of clotting.** *Ibid* 245-8.—Passage of an elec. current through blood plasma contg. platelets accelerates clotting whether the blood be freshly drawn, or citrated and recalcified. With platelet-free plasma no such effect is seen. Witte peptone, dissolved in 0.9% NaCl, markedly retards clotting of freshly drawn blood, or of citrated and recalcified blood or plasma, so long as platelet are present. Peptone is without such effect when platelets are absent. Peptone is without effect after the platelets have disintegrated in plasma, or when tissue fibrinogen is added to platelet-free plasma. The elec. current acts by hastening platelet disintegration, and the inhibitory effect of peptone *in vitro* is an inhibition of platelet disintegration. The clotting properties of pure blood and of pure plasma. *Ibid* 249-62.—Expts. were made with the blood or plasma of the dog, goose and chicken. Pure platelet-free plasma of the goose is spontaneously coagulable, although clotting is very much delayed. Clotting of such plasma is mildly accelerated by contact with glass, more so by diln. with water, rise in temp., addn. of AcOH or CaCl₂, and most of all by addn. of tissue fibrinogen. Diln. with saline has little or no effect. The stimulation of clotting by CaCl₂ addn. does not indicate a deficiency of Ca in the plasma, since it clots equally with tissue fibrinogen, with or without addnl. CaCl₂. Thrombin clots such pure plasma in the same fashion as it does citrated or oxalated plasma. It is held that the fibrinogen of such plasma is in the same state as in the circulating blood. Either tissue fibrinogen or thrombin, when sufficiently active, will clot pure plasma *in vitro* and *in vivo*. The pure plasma contains an abundance of prothrombin and also free cephalin and antithrombin. It, therefore, contains everything necessary for thrombin clotting. On cooling pure citrated dog plasma, platelet-free, a ppt. was obtained which also contained the same clotting factors as were found in the plasma. Although plasma is shown to be spontaneously coagulable, it is held that all physiol. clotting is initiated by tissue fibrinogen. In pure blood this comes from platelet disintegration, while in blood escaping through a wound an addnl. supply is obtained from the tissue juices and injured cells. The stability of circulating blood is not due to the presence of any inhibitory substance, but to a mol. association of the clotting factors which prevents their reaction. Any step which leads to their dissociation leads to an acceleration of clotting. L. W. RIGGS

Variations in the coagulability of the blood after food ingestion. C. A. MILLS AND H. NECHLEO. *Chinese J. Physiol.* 2, 19-24(1928).—Tests with man and dogs show that the coagulability of the blood increases after meals. This is not due to the presence of food in the digestive tract, since carbohydrate and fat foods are without effect. Nor can it be due to the larger lymphatic return to the blood during absorption, since the absorption of fat, as shown by milky serum, produces no change. Of the foodstuffs, protein alone appears able to shorten the clotting time. Since similar effects on the blood coagulability are caused by violent exercise, it is suggested that blood changes are intimately associated with changes in the body metabolism. **Relation of blood coagulability to body metabolism and to the specific dynamic action of food.** *Ibid* 25-32.—Protein food alone, or in mixed meals, causes a marked shortening in the blood clotting time and a const. rise in metabolism, that is, exerts a notable sp. dynamic action. Glycocol, which is known to possess the highest sp. dynamic action of all amino acids, affects the clotting time of the blood in the same manner as does a protein meal. It is not the increase of the combustion processes of the body which affects the clotting time, but some as yet unknown factor, possibly connected with amino acids. L. W. R.

Significance of the threshold of excretion of the mineral phosphates. L. BRULL. *Compt. rend. soc. biol.* 98, 325-7(1928); cf. C. A. 22, 272.—The threshold of excretion of mineral phosphates, and its variations are the renal expression of the relative proportion of filterable and non-filterable phosphates in the plasma. L. W. RIGGS

Nature of the sugar materials of the blood. H. BERRY. *Compt. rend. soc. biol.* 98, 431-3(1928). L. W. RIGGS

Suprarenal glands and glutathione. LÉON BINET AND A. GIROUD. *Compt. rend.*

soc. biol. **98**, 434(1928). —The nitroprussiate reaction with dogs and guinea pigs showed that the cortical zone of the suprarenal glands was much richer in glutathione. In the young guinea pig it was the most internal part of the cortical zone which gave the most intense reaction for glutathione. L. W. RIGGS

Absorption of animal fats by the pleura. SERHAN I. BRATIANO AND CONSTANCE S. BRATIANU. *Compt. rend. soc. biol.* **98**, 461-2(1928); cf. Binet and Verne, *C. A.* **19**, 3542, **20**, 451, 1862 —From 2 to 3 cc. of rabbit fat or pork fat at the m. p. was aseptically injected into the pleural cavity of 19 rabbits, and the animals were killed from 8 hrs. to 19 days after the injection. The fats were rapidly absorbed without apparent injury. The results are described histologically. L. W. RIGGS

Relations between the internal and external secretions of the pancreas. EDUARDO COELHO AND J. C. OLIVEIRA. *Compt. rend. soc. biol.* **98**, 477-9(1928) — Although the results of observations with 20 subjects were contradictory, it was concluded that in general the excitation of the external secretion of the pancreas causes simultaneously an increase in the internal secretion, that is, a state of hyperinsulinemia represented by a diminution of sugar in the blood. L. W. RIGGS

Glutathione and keratin. A. GIROUD AND H. BULLIARD. *Compt. rend. soc. biol.* **98**, 500(1928) — This histologic study indicates that the development of keratin is preceded by an accumulation of glutathione, and the disappearance of the accumulated glutathione corresponds with the appearance of the horny substance. Perhaps the glutathione is the source of the S groups which are fixed in the keratin. L. W. R.

Role of the suprarenal capsules in thermoregulation. X. CHAIKOVITCH, V. ARNOVITZ, JEVITCH AND (MLLE.) M. VICHNITZ. *Compt. rend. soc. biol.* **98**, 511-3(1928) — Intracardiac injections of milk in normal rabbits and in rabbits with the suprarenals partly or entirely removed indicated that the suprarenals have an influence on the heat regulation of the body. L. W. RIGGS

Ammonia and real acidity of the urine. MICHEL POLONOVSKI AND PAUL BOULANGER. *Compt. rend. soc. biol.* **98**, 522-4(1928) — A discussion of Hasselbalch's formula is given. L. W. RIGGS

Influence of mineralization on the osmotic pressure of albumin in the blood and on the albumin-globulin quotient. I. BLUM, P. GRABAR AND J. WEILL. *Compt. rend. soc. biol.* **98**, 530-2(1928), cf. *C. A.* **22**, 1799 — The variations of the osmotic pressure of the albumins in the blood are conditioned by the changes in the Na and Cl content of the plasma. The ratio albumin/globulin is equally influenced by the presence of these elements. While the osmotic pressure and albumin/globulin ratio are coordinated and conditioned by the same cause, they are not dependent on each other. L. W. R.

Urethan hyperglucemia in rabbits deprived of suprarenals. HIROSHI TACHI AND SOZO HIRAYAMA. *Tôhoku J. Exptl. Med.* **10**, 190-7(1928), cf. *C. A.* **20**, 3041; **21**, 766, 777 — Long-standing suprarenalectomized, also doubly splanchnectomized, rabbits react to urethan by a practically equal increase of the blood sugar concn. L. W. R.

Fate of infused sugar with special reference to the absorption of sugar by tissue cells. IV. **Total carbon content in muscle tissue after intravenous injection of glucose.** TOSHIO KUROKAWA. *Tôhoku J. Exptl. Med.* **10**, 198-208(1928), cf. *C. A.* **21**, 954, **22**, 1617 — After repeated injection of hypertonic sugar soln the muscles of rabbits gain in dry matter. This is partly by loss of tissue juices which are reduced by the hypertonic sugar, and partly by the taking up of the infused sugar by the tissues. This is proved by the presence of the tissues of the sugar in a modified form, the decrease in the H₂O content, the increase in total C and the increase of the C/N ratio. Insulin appears to have no influence in the muscle absorption of infused sugar. V. **Does the modified sugar combine with the tissue albumins?** *Ibid.* 209-14 — The absorbed sugar is not combined with tissue albumins, but is readily extd. by water. L. W. R.

Physiological and pharmacological behavior of surviving red and white muscle from the rabbit at different temperatures. TOHORU KITANO. *Arch. exptl. Path. Pharmacol.* **127**, 69-92(1927) — At lower temps. (18-19°) the period of contraction of rabbit muscle, both red and white, is considerably prolonged, and as the temp. is elevated to the normal (39°) this period is shortened. The contraction curve of white muscle at 18-19° is the same as that of the red muscle at 39°. At lower temps. the elastic properties of muscle are diminished, the plastic are intensified. Acetylcholine is inert, upon both red and white muscle at low or high temps., while veratrine is inactive upon white muscle at low temps., although its typical effect becomes more and more marked as the temp. is elevated. Alcohol, chloral hydrate, salicylamide, and urethan manifest their narcotizing effect much more intensely at the higher than at lower temps. In its initial reversible stage the contraction of muscle by narcotics is independent of the effect of the narcotics upon irritability. K. paralysis is favored by low temps. with both types

of muscle. Apparently all of these effects are assocd. with a reduction in permeability consequent to cooling and an increase in permeability attendant upon warming.

G. H. S.

Localization of the diuresis center. GYULA MIHES AND HANS MOLITOR. *Arch. expl. Path. Pharmacol.* **127**, 319-34(1928).—The regulation of the water metabolism of rabbits or dogs can be impaired or destroyed by damage to particular areas of the hypothalamus with an electric cautery. Animals so treated show a decreased urine elimination, and in them hypophysis ext. does not inhibit and caffeine does not increase diuresis.

G. H. S.

Fate of blood sugar in the toad's kidney. MAKOTO HOSoya. *Proc. Imp. Acad. (Japan)* **3**, 632-4(1927).—The threshold for blood sugar is in the glomerular capsule and sugar in excess in the blood above the threshold appears in the urine only through the glomerulus.

C. J. WEST

G—PATHOLOGY

H. GIDION WELLS

The biochemical race-index of the Egyptians. A. T. SHOUSA. *J. Egyptian Med. Assoc.* **11**, 4 11(1928).—The macroscopic (test tube) agglutination method was used. On a total of 417 Egyptians, 24.2% were found to belong to Gr. I (Jansky); 32.6% to Gr. II, 29.2% to Gr. III, and 13.9% to Gr. IV (Jansky). This gives a racial index of 1.07.

J. A. KENNEDY

Toxin and anatoxin of diphtheria. V. KULIKOV AND P. SMIRNOV. *Ann. Inst. Pasteur* **41**, 1166 74(1927).—See C. A. **22**, 808.

H. G.

The acidosis of pregnancy, its regulation and its connection with carbohydrate-fat metabolism. H. R. SCHMIDT AND T. WINGEN. *Arch. Gynakol.* **133**, 127 42(1928).—In pregnancy, particularly in the last half, the organism shows a great need for carbohydrates. As the carbohydrates of the food and the glycogen reserve of the liver are not always sufficient to meet this need, there is an increased movement of fat to the liver where it is converted to glycogen. As this conversion does not always take place smoothly, acid intermediate products are formed and enter the blood stream. In the blood, in an effort to maintain a const. H-ion concn., these acid substances are neutralized by alkalies and other buffer substances. As part of the blood alkali is diverted to neutralize these stronger acid products, there is less alkali reserve available for the CO₂, and so the CO₂-binding power is decreased as shown by a decrease in alveolar CO₂ tension. This whole process varies greatly according to the degree in which carbohydrate is lacking and may not occur if the carbohydrate metabolism is sufficient.

H. F. H.

The alcohol extract reaction of Lüttge and v. Mertz. H. RUPP. *Arch. Gynakol.* **133**, 143-9(1928). One hundred and eighty sera were treated with alc. ext. of carcinoma of the uterus and placenta, according to the original method of Lüttge and v. Mertz. One hundred sera were from pregnant women, 28 from cases of carcinoma of the uterus, 5 from cases in which carcinoma of the uterus had been treated by operations or irradiation, and the other sera were normal or from women with other diseases. The gravid sera gave a positive reaction with placenta ext. in 94% of the cases and with carcinoma ext. in 65%. The carcinoma sera gave a positive reaction with carcinoma ext. in 89% and with placenta ext. in 64% of the cases. Sera from febrile and inflammatory conditions also tended to give positive reactions. While the reaction is not specific, it may be used to advantage in some cases, for instance, to indicate whether there is a recurrence of carcinoma after operation or irradiation.

HARRIET F. HOLMES

Serological studies in the group of the spore-bearing anaerobes. I. The qualitative analysis of the bacterial antigens of *B. edematis maligni* (vibrio septique) and *B. tetani*. A. FELIX AND M. ROBERTSON. *Brit. J. Exptl. Path.* **9**, 6-18(1928).—The existence of two kinds of antigen, stable and labile, in *B. edematis maligni* and *B. tetani* has been demonstrated by agglutination, agglutinin-absorption and immunization. The phys. and chem. properties of the two kinds of antigen are analogous to those known in aerobic species which possess the double type of antigen. Purely stabilotropic immune sera have strong complement-binding properties. Immune sera which contain both labilotropic and stabilotropic agglutinins do not develop a stronger complement-binding action than immune sera with an equal content of stabilotropic agglutinins; it does not alter the degree of complement-fixation whether labile agglutinins, even in very great quantities, are present or not. Immune sera which contain both labile and stable agglutinins lose entirely their power of binding complement if the stable agglutinins are removed (by absorption with bacilli heated to 100°) in spite of the fact that the content of labile agglutinins remains completely unchanged.

H. F. H.

The relation of basal metabolism to the endocrine function of the testicle. W. LOEWENSTEIN AND O. SCHWARZ. *Wiener Arch. inn. Med.*, 15, 95-122(1928).—Detn. of basal metabolism is not at present of value in the diagnosis of a disturbance of function of the testicle or for the biologic analysis of sexual derangement. HARRIET F. HOLMES

Analysis of the mechanism of hyperallantoinuria following puncture of the fourth ventricle. ANGEL ESTABLER Y COSTA AND CHARLES KAYSER. *Compt. rend.* 186, 535-7(1928); cf. *C. A.* 22, 1391, and following abstr. L. W. RIGGS

Hyperallantoinuria in the polyurias of diabetes insipidus in man. ANGEL ESTABLER Y COSTA. *Compt. rend.* 186, 650-2(1928).—The allantoin was detd. by a modification of the Wiechowski procedure whereby the Hg compd. was decompd. by H_2S and $1/2$ of the resulting liquid served for the detn. of urea by the xanthhydrol method and the other half was hydrolyzed by HCl for 2 hrs. in the autoclave under 5 atm. when all of the N of urea and 92% of the N of allantoin are transformed into NH_3 . Polyuria in 2 healthy subjects, caused by simple ingestion of water was accompanied by an increase of 104 and 336%, resp., of allantoin in 24 hrs. In a subject with cirrhosis of the liver, caused by injections of novasurol, the allantoin increased from 21.2 to 292 mg. per 24 hrs. In a case of diabetes insipidus the vol. of urine was 7470 cc and the allantoin reached 452 mg. in 24 hrs. or 2160% as compared with a normal excretion of 20 mg. Cf. preceding abstr. L. W. RIGGS

Glutathione content of sarcoma and of normal tissues. J. LECLOUX, R. VIVARIO AND J. FIRKET. *Compt. rend. soc. biol.* 97, 1823-5(1927).—Sarcomatous tissue contains more glutathione than other tissues, except the liver, spleen and kidneys, which in general contain 2-3 times as much glutathione as sarcoma. The necrotic central part of a sarcoma contains on the av. about $1/2$ as much glutathione as the peripheral portion. The glutathione content seems to have some relation to the degree of cellular activity. L. W. RIGGS

Evolution of albuminuria in experimental nephritis by uranium nitrate in the dog. MARCEL GARNIER, E. SCHULMANN AND J. MAREK. *Compt. rend. soc. biol.* 98, 285-7(1928).—Uranium albuminuria is evolved separately from other phenomena detd. by the nephritis. It precedes the other phenomena, decreasing as it progresses. For doses of uranium nitrate less than lethal, the albuminuria is directly proportional to the quantity injected. For doses 5 to 15 times the lethal quantity the albuminuria is, on the contrary, less accentuated and of short duration. L. W. RIGGS

Secretion of adrenaline in the course of shock caused by the intravenous injection of peptone. A. TOURNADE AND H. HERMANN. *Compt. rend. soc. biol.* 98, 342-3(1928).—By the method of suprarenal-jugular venous anastomosis of 2 dogs it appears that after an injection of Witte peptone the secretion of adrenaline passes into 2 inverse phases: it is at first impeded and after 1 to 6 min. is intensified. L. W. RIGGS

Alkaline reserve and calcemia in pellagra. L. BALLIF AND I. GHERSCOVICI. *Compt. rend. soc. biol.* 98, 393-5(1928).—In 47 grave cases of pellagra the alk. reserve was below 65, the mean normal figure, in 22 cases it was below 50, in 5 cases below 40 and in 6 cases it was above 65. The diminution of urinary pH was parallel with these figures. Administration of 10 g. of $NaHCO_3$ in acute cases had little effect on the alk. reserve or urinary pH . In 10 cases the Ca was above normal. L. W. RIGGS

Calcium and magnesium content of the brain of hyperthyroidized animals. C. I. PARHON AND M. KAHANE. *Compt. rend. soc. biol.* 98, 403-4(1928).—The Ca and Mg have a slight tendency to diminish in the brains of 4 species of hyperthyroidized lab. animals examd. as compared with controls. There was no parallelism in the variations of Ca and Mg. L. W. RIGGS

Cholesterolemia in chronic nephritis. I. GAVRILA AND C. BERARIU. *Compt. rend. soc. biol.* 98, 415-6(1928).—In most cases of chronic nephritis there is a cholesterolemia. No relation appears to exist between the cholesterolemia and azotemia, chloruremia or the level of arterial pressure. L. W. RIGGS

Importance of a determination of chlorides in the cerebrospinal fluid in the diagnosis of tuberculous meningitis. MARCEL LÉVY-BRUHL AND YVONNE GARREAU. *Compt. rend. soc. biol.* 98, 487-9(1928).—The Cl content is lowered, generally below 6.3 g. in tuberculous meningitis. The normal figure ranges from 7.3 to 7.4 and in non-tuberculous meningitic affections is from 6.5 to 7.0. L. W. RIGGS

Hypoglycemia in scleroderma. W. T. LONGCOPE. *J. Am. Med. Assoc.* 90, 1-7(1928).—The metabolism in 8 cases was studied with reference to the function of glands of internal secretion. Attacks of mental confusion and delirium occurred after short periods of fasting. These attacks were associated with hypoglycemia. In other cases of generalized scleroderma the blood sugar as well as other chem. constituents of the blood did not deviate from the normal. In 3 cases the basal metabolic rate tended

to fall below normal and the administration of thyroid was followed by symptomatic improvement. L. W. RIGGS

Calcium content of the blood serum in connection with senile cataract and the causes of senile cataract. B. PELLÁTHY AND I. PELLÁTHY. *Magyar Orvosi Arch.* 29, 32-6(1928).—In a study of 48 cases of senile cataract the blood Ca was within the limits observed in normal controls. The suggestion of a hypofunction of the parathyroids occurring with senile cataract was not confirmed. L. W. RIGGS

Carbon dioxide tension in tissues in relation to cancerous cells. J. C. MOTTRAM. *Nature* 121, 420-1(1928).—Abnormal cell division not only follows irradiation, but has been observed under other abnormal conditions, among them high concns. of CO_2 . L. W. RIGGS

Mechanism of hyperglucemia caused by venesection. HIROSHI TACHI. *Tôhoku J. Exptl. Med.* 10, 96-176(1928); cf. *C. A.* 20, 2699.—The withdrawal of about $\frac{1}{7}$ of the blood of rabbits caused no appreciable change in the sugar concn. of the blood or urine, but the withdrawal of about $\frac{1}{4}$ of the total blood was followed by an increase in the sugar content of blood and urine. The total amt. of blood withdrawn at one time or by repeated venesections at short intervals detcs. the hyperglucemia. The same results follow whether the blood is drawn from artery or vein. The intensity of the hyperglucemia is greater in winter and spring than during the remainder of the year. Severing the splanchnics on both sides retards the appearance of the hyperglucemia. L. W. RIGGS

H—PHARMACOLOGY

A. N. RICHARDS

Relative toxicity of halogen derivatives of chaulmoogra. B. F. READ. *Chinese J. Physiol.* 1, 345-54(1927).—The satd. dihalogeno-ethyl esters of chaulmoogra have a lethal dose similar to that of the unsatd. Et esters. The diiodoester produces albuminuria, but the dibromoethyl ester, in contrast to chaulmoogra esters, does not produce emesis, local irritation or hypersensitivity and suggests further investigation as a therapeutic in leprosy. These halogen-substituted esters produce a large increase in the urinary neutral S content and no appreciable increase in the urinary ethereal sulfate content. B. C. A

Treatment of pulmonary tuberculosis with metal salts according to Walbum. Cadmium. N. LUNDE. *Z. Tuberk.* 48, 285-98(1927).—Metal salts cause an increased formation of antitoxin as well as bacteriolysins in the body, this being especially true of Cd. The optimal dose is variable for the individual and, therefore, the use of small doses is essential with a careful study of the temp. and reactions on the part of the glandular system, the pleura or peritoneum as well as weight control. H. J. CORPER

New medicants and nutrients in the treatment of tuberculosis for the year 1926. GEORG SCHRODER. *Z. Tuberk.* 48, 316-24(1927). H. J. CORPER

Pharmacological researches on the intravenous injection of sodium permanganate. L. SABBATANI. *Atti accad. Lincei* [6], 7, 113-4(1928).—When NaMnO_4 is injected directly in the vein of the rabbit, it acts immediately on the plasma, on the blood cells and on the vascular endotheliu. The greater part is fixed by the red corpuscles, depriving them of their oxidizing power, and causing immediate hemolysis, hemoglobinemia, hemoglobinuria and anemia, all in degrees more or less proportional to the dose. NaMnO_4 is also reduced to MnO_2 , which behaves in the ordinary manner of colloidal MnO_2 . This second action is not evident in small doses, but with larger doses it becomes proportionately greater, and lethal doses of NaMnO_4 owe their action chiefly to the slower but general toxic action of MnO_2 . The min. lethal dose of NaMnO_4 and of MnO_2 is in each case about 0.00023 g.-mol. per kg. of rabbit. The hemolytic action *in vitro* of NaMnO_4 was confirmed; 1 washed red corpuscle of the rabbit required 7.9×10^{-10} g.-mol. of NaMnO_4 for hemolysis and 3540×10^{-10} g.-mol. for complete "mineralization." Also in *Boll. soc. ital. biol. sper.* 2, 1042-3(1927). C. C. DAVIS

Action of formaldehyde on the vegetative nervous system. J. GAUTRELET AND OLIMPIA VECHIN. *Ann. physiol. physicochim. biol.* 4, 129-80(1928). H. J. D., JR.

Medicinal action of *Capsella bursa pastoris*, and also of its parasites *Cystopus candidus* and *Peronospora parasitica*. W. HARSTEN. *Arch. Pharm.* 266, 133-51(1928).—An exptl. study showing among other results that the parasite *Cystopus candidus* is transferable from *Capsella bursa pastoris* to many other crucifers, as *Brassica napus*, *Sisymbrium sinapistrum*, *Cheiranthus cheiri*, etc. An ext. from the dried healthy *Capsella bursa pastoris* exerts a strong action on the uterus of a virgin guinea pig. The action of the ext. from the infected drug is no stronger than that produced by healthy shepherd's purse. Thus it is seen that the fungi *Cystopus candidus* and *Peronospora parasitica*

lica exert no specific action on the uterus. This action on the uterus is not alone due to the K content of *Capsella*. The expressed juice of the fresh green plant produces a contractive effect on the uterus, not greater, however, than that produced by the dried drug. The aq. exts. of lung-free *Arabis alba* and *Thlaspi arvense* are likewise able to induce contraction in the longitudinal musculature of the uterus, although in less degree than that produced by *Capsella* exts. W O E

Sugar substitutes and insulin substitutes in the treatment of diabetes mellitus. P. WOLFF. *Arch. Pharm.* **206**, 233-41 (1928). A discussion including a bibliography of the subject. W O E

The active constituent of glukhorment. II. HEDWIG LANGECKER. *Klin. Wochschr.* **7**, 159-61 (1928), cf. Dale and Dudley, *C. A.* **22**, 1621.—The active constituent of glukhorment is synthalin. The nitrate and carbonate of synthalin (or glukhorment) are sol. in H₂O, are cryst. and can be used for isolation and identification. The m. ps. of a number of synthalin salts are: nitrate 147-9°, carbonate 184-5°, sulfate 279-83° and chloride 205°. The sulfate is not very sol., the chloride is sol. and the acetate readily sol. in water. MILTON HANKE

The reaction to oils and fats in the lung. H. PINKERTON. *Arch. Path. Lab. Med.* **5**, 380-410 (1928).—Free fatty acids derived from certain animal oils produce caseation necrosis in the lung tissue. The degree of damage and resulting fibrosis produced by an oil in the lung depends largely on the amount of free fatty acid originally present and on the rapidity with which hydrolysis progresses. The almost complete lack of reaction to the neutral vegetable oils in the lung is probably due to the absence of enzyme capable of hydrolyzing the oil. The simple neutral vegetable oils (such as poppy and sesame oil) appear to be most suitable for introduction into the lungs for röntgenologic purposes. Cod-liver oil and rabbit fat undergo a change in the lungs and become acid-fast. They also become sol. in the ordinary fat solvents. This, as well as the similar action of K₂Cr₂O₇ on certain fats, is probably due to oxidation. HARRIET F. HOLMES

The influence of insulin on the ketone body content of the blood in diabetes mellitus. O. PUCSKO. *Wiener Arch. inn. Med.* **15**, 131-40 (1928). A study was made of the effect of subcutaneous and intravenous injections of insulin on the ketone body content in the blood and urine of diabetics. After subcutaneous injection of insulin a fall in ketone bodies was noted in the blood 1.5 hrs. after the injection. The maximal fall is after 4-6 hrs. while there was no further action after 40 hrs. After intravenous injection of insulin the acetone and β hydroxybutyric acid reach the lowest point in 1/2 hour, but the action is not long continued. There is a certain correlation between the ketone body content of blood and urine in that an increased ketone body content of the urine is preceded by an increased ketone body content of the blood. HARRIET F. HOLMES

Sublingual absorption of drugs. Morphine. DAVID DAVIS and DAVID AYMAN. *Arch. Internal Med.* **41**, 231-3 (1928).—No appreciable absorption took place in 7 healthy subjects when 10-15 mg. morphine H₂SO₄ was left under the tongue for 10 min. It may be concluded that drugs generally are hardly absorbed by the sublingual mucosa. MARY JACOBSEN

Chemical changes in the blood in mercuric chloride poisoning. Mechanism and significance of hypochloremia. H. M. TRUSLER, W. S. FISHER and C. L. RICHARDSON. *Arch. Internal Med.* **41**, 231-43 (1928).—Intravenous injection of HgCl₂ (dogs) causes hypochloremia through loss of NaCl in vomiting. The latter results in gastric tetany in spite of the concurrent relative acidosis. Tetany is, therefore, not caused by alkalosis. Restoration of the blood NaCl level relieves and prevents tetany without otherwise affecting the course of poisoning. NaCl, 2% intravenously, may be of value by forcing excretion from the kidney. MARY JACOBSEN

The influence of alkalies on the secretion and composition of gastric juice. III. The effect of sodium bicarbonate on the response to histamine. T. E. BOYD. *Arch. Internal Med.* **41**, 244-8 (1928), cf. *C. A.* **19**, 1885.—The response to histamine (Pavlov pouch dogs) is not altered by up to 1 g./kg. of 2.5% NaHCO₃, but is reduced by 1 g. of a 5% soln. (probably through dehydration) and definitely diminished by 2 g./kg. regardless of the water allowance. The response of the gastric mucosa to histamine is not diminished by 1 hr.'s treatment with 2.5 and 5% NaHCO₃. MARY JACOBSEN

Synthalin—its use in the treatment of diabetes. A. I. RINGER, S. BILOON, M. M. HARRIS and A. LANDY. *Arch. Internal Med.* **41**, 453-71 (1928).—Synthalin was given in 2 mild, 1 moderately severe and 1 severe case of diabetes. The sugar output was reduced, the ketonuria subsided. The N excretion was reduced, probably because of the protein-sparing effect of utilized carbohydrate. The effect on the blood sugar was variable, a definite decrease was obtained in 1 case. In rabbits hypoglycemia was produced by 0.1 g. administered orally or 25 mg. administered subcutaneously and relieved

by dextrose. The disadvantages of synthalin are: slow action and side-effects (nausea, vomiting, diarrhea) in certain patients who, however, may develop tolerance. M. J.

Specific action of "Tasch," an antitubercular medicament, on the guinea pig. A. SARTORY, R. SARTORY AND J. MEYER. *Bull. sci. pharmacol.* **35**, 161-9(1928).—"Tasch" is an abbreviation for "tuberculin-antibody-Scheitlin," a proprietary substance which according to Scheitlin contains a small quantity of Koch tuberculin, antituberculous serum obtained by a modified Behring technic and $1,2,3\text{-C}_6\text{H}_3\text{SO}_3\text{H.OH.OCH}_3$. The medicament is absorbed in the intestines, and when administered in intermittent doses causes thermic reactions somewhat analogous to those characteristic of the tuberculin test. L. W. RIGGS

Effect of ephedrine on the nasal mucous membranes. TSE KING AND CHUB-YUNG PAK. *Chinese J. Physiol.* **1**, 445-54(1927).—Changes in the vol. of the nasal cavity in dogs after treatment with ephedrine as compared with other drugs was studied by Tschalussow's nasal plethysmograph method, and by a newly devised method for local application. Intravenous injection of ephedrine caused a strong and sustained constriction of the nasal vessels and a large increase in the vol. of the nasal cavity. This effect lasts much longer than that obtained with adrenaline. Local application of ephedrine solns. caused a marked vasoconstriction of the nasal mucous membranes lasting more than 1 hr. In this respect ephedrine has a stronger and more lasting effect than cocaine. Ephedrine is absorbed easily and quickly from the nasal mucous membranes. Large repeated doses of ephedrine should not be given. The addn. of 0.5% K_2SO_4 to remove any reflex irritation in hypersensitive cases, in no way interferes with the effectiveness of a 2% soln. of ephedrine. Such a mixt. was more efficient than a 5% soln. of cocaine. L. W. RIGGS

Comparative study of the blood-pressor action of ephedrine, pseudoephedrine and adrenaline. CHUB-YUNG PAK AND B. E. READ. *Chinese J. Physiol.* **2**, 1-18(1928).—Expts. with cats and dogs led to the following results. The 3 chemically allied substances, ephedrine, pseudoephedrine and adrenaline, are similar in their pressor effects but differ in the mechanism of their action. The pressor action of ephedrine is attributed both to the stimulation of the sympathetic constrictor endings and the smooth muscles of blood vessels, as it persists after ergotoxine, though the rise in blood pressure is much less than before ergotoxine. Also, the pressor action is neither sensitized nor completely abolished by cocaine. The pressor action of pseudoephedrine is chiefly musculotropic as it still causes a marked rise of blood pressure after ergotoxine and there is complete abolition of its pressor action by cocaine. L. W. RIGGS

Perfusion experiments with pseudoephedrine and ephedrine. CHUB-YUNG PAK AND B. E. READ. *Chinese J. Physiol.* **2**, 97-106(1928). The perfusion of the leg vessels or heart of frogs or toads gave the following results: Peripheral dilatation of the vessels by pseudoephedrine is demonstrable with a concn. of 0.5%. Concns. of 0.005% show this effect only after prolonged action. Low concn. of pseudoephedrine always gives a long preliminary decrease in venous flow, but a mixt. of pseudoephedrine and ephedrine in the natural proportion of 1 to 4 parts shows an increase of several hundred %. Perfusion of the toad's heart demonstrates the stimulating effect of pseudoephedrine upon the muscle. The depressing effect of 0.005% ephedrine was confirmed. Their combined action showed that while pseudoephedrine may increase the rate of ephedrine, indicating some added stimulation to the accelerator nerve, changes in the amplitude are not sufficiently clear to assume simple summation of their muscular effects. The general conclusion is that their combined action is greater than an additive effect. L. W. RIGGS

Biologic estimation of the quantities of cardioactive glucosides fixed by the frog heart. E. ROTHLIN AND TH. OLIVARO. *Compt. rend.* **186**, 901-2(1928).—Tests were made with 3 preps. of squill "scillarène A," a cryst. glucoside $\text{C}_{36}\text{H}_{52}\text{O}_{13}$, "scillarène B," an amorphous complex contg. probably a mixt. of 2 glucosides, and a natural glucosidic complex which is indicated by "Sq. 1005." The min. quantities of these substances necessary to arrest the isolated heart of *Rana temporaria* were 1 in 900,000, 1 in 1,300,000 and 1 in 1,000,000, resp. On this basis the wts. would be 0.55, 0.38 and 0.50 mg., resp. But the quantities of the drug adsorbed during the tests were 0.265, 0.435 and 0.315 mg., resp. These differences of absorption by the heart of the 3 preps. are attributed to the different physico-chem. properties of the preps. With 0.5 to 3 cc. of liquid, intoxication of the heart depends more on the concn. than on the abs. quantity of glucoside present. L. W. RIGGS

Influence of the administration of thyroïdin on experimental tuberculosis. A. HANNS. *Compt. rend. soc. biol.* **97**, 1717(1927).—The administration of thyroïdin was without influence on the evolution of exptl. tuberculosis in guinea pigs. L. W. R.

Irradiated ergosterol in experimental tetany. C. I. URECHIA AND G. POPOVICIU. *Compt. rend. soc. biol.* **98**, 405-7(1928).—Irradiated ergosterol gave no results in parathyropectomy tetany, nor did it influence the abnormalities of Ca and P metabolism in any const. fashion or prolong life. L. W. RIGGS

Anti-infection action of an extract of bottom yeast, lipoids and ergosterin. ALB. BENOIT. *Compt. rend. soc. biol.* **98**, 525-6(1928). L. W. RIGGS

Action of strontium on veratrine contracture. E. MILHERIO. *Compt. rend. soc. biol.* **98**, 548-9(1928); cf. C. A. **22**, 270, 272.—Expts. were made by immersing the gastrocnemius muscle of the frog in the soln. to be tested. Sr acts definitely on veratrine contracture, its action varying somewhat inversely with the concn. of the veratrine L. W. RIGGS

Mechanism of the rigor produced by monobromoacetic acid. MIGUEL OZORIO DE ALMEIDA AND THALES MARTINS. *Compt. rend. soc. biol.* **98**, 629-30(1928); cf. C. A. **22**, 1799.—The perfusion of muscles with solns contg. $\text{CH}_2\text{BrCO}_2\text{H}$ in sufficient concn causes rigor without contractions. The acid remains fixed in the muscles and is not removed by prolonged washing. Previous exercise of the muscles promotes the appearance of the rigidity. **Action of sucrose on the appearance of rigor by monobromoacetic acid.** *Ibid* 634-6 —The presence of sucrose hastens and increases the rigor produced by $\text{CH}_2\text{BrCO}_2\text{H}$. L. W. RIGGS

Hematopoietic effect of nuclear extractives in experimental anemia and in human anemia. OLOF LARSELL, N. W. JONES, B. I. PHILLIPS AND H. T. NOKES. *J. Am. Med. Assoc.* **90**, 75-8(1928); cf. C. A. **21**, 3974.—Nucleoprotein from beef liver serves as a hematopoietic stimulant. There is some evidence that nucleoprotein administered with Na salts of nucleic acids has a more marked effect in hematopoietic stimulation than either of these substances alone. L. W. RIGGS

The effects of anesthetics on hepatic function. S. M. ROSENTHAL AND WESLEY BOURNE. *J. Am. Med. Assoc.* **90**, 377-9(1928).—Brief periods of CHCl_3 anesthesia produce immediate and delayed toxic effects on the liver; 30 min. of CHCl_3 anesthesia causes injury that requires 8 days for functional recovery. Disturbance of function could be shown with the bromosulfalein test long after pigment metabolism had returned to normal. Et_2O produces a transitory impairment of function. Recovery is usually complete in 24 hrs. N_2O and C_2H_4 administered through a mask produced no disturbance, but given in a closed chamber with poor oxygenation caused immediate and delayed toxic effects on the liver. Cyanosis in itself increases the toxicity of anesthetics on the liver. C_2H_4 would seem to be the anesthetic of choice for operation in severe liver disease. L. W. RIGGS

Influence on the metabolism of striped muscle by the direct action of insulin. (A study of the mechanism of action of insulin.) KOTARO KIMURA AND HIROJI TAKAHASHI. *Tôhoku J. Exptl. Med.* **10**, 215-47(1928) —Expts. were made with the dog gastrocnemius *in situ*, with arteries and veins ligated so that the blood through a single artery and vein could be studied before and after the injection of insulin into the artery. Insulin lowers the O consumption of the muscle and diminishes the sugar content of the blood circulating through the muscle. This disappearance of sugar from the blood is without any oxidative process, but is through the arrest of cell activity by the direct action of the insulin on the muscle cells. Insulin increases the hemoglobin content of the blood while it diminishes the serum globulin and vol. of the corpuscles. The changes in serum-NaCl content are irregular. Insulin has a similar but less pronounced action upon muscles with a degenerated or cut-off nerve supply. L. W. RIGGS

The curative action of hydnocarpates and iodides in leprosy. LEONARD ROGERS. *Lancet* 1928, I, 73-4. F. B. SEIBERT

The effect of intravenous and intramuscular inoculations of novasurol in rabbits. P. LAZARUS-BARLOW. *Lancet*, 1928, I, 127-8. F. B. SEIBERT

Jonathan Pereira (1804-1853). L. H. BOARDMAN. *Pharm. J* **119**, 554-5(1927).—A biography of this English pharmacologist. S. WALDBOTT

I—ZOOLOGY

R. A. GORTNER

The molecular concentration of the blood of some fresh water mollusks. Role of carbonates. MARCEL DUVAL. *Ann. physiol. physicochim. biol.* **4**, 27-43(1928); cf. C. A. **22**, 1193.—The blood concn. of fresh water mollusks is considerably greater than that of the water. With the *Anodonta* it has a value of $\Delta = -0.10^\circ$ to -0.13° while with 2 gasteropoda (*Lymnaea* and *Planorbis*) it amounts to $\Delta = -0.21^\circ$ to 0.25° . The blood NaCl varied in the *Anodonta* between 0.1 and 0.065% in most cases but was found

as low as 0.0088%. The blood NaCl in the *Lymnee* was between 0.167 and 0.225% and in the *Planorbe* between 0.160 and 0.184%. The blood of the fresh water mollusks contains a very large amt. of bicarbonates, much greater than that found in marine animals. The CO₂ content per 100 cc. blood was *Anodonte*, 29-34 vol. %; *Lymnee*, 45-58 vol. %; and *Planorbe*, 55-78 vol. %. While in the marine invertebrates the Cl content may comprise almost 90% of the mol. concn. of the blood and the CO₂ does not exceed 1.5%, in the fresh water mollusks the CO₂ content may be greater than that of the chlorides. The relative amts. were as follows: *Anodonte*, Cl (32-42%), CO₂ (39-50%); *Lymnee*, Cl (51-57%), CO₂ (36-46%); and *Planorbe*, Cl (44-53%), CO₂ (46-59%). The Cl and CO₂ accounts for almost the total salt concn. of the blood. The increase of saline in the outside medium causes an increase in the mol. concn. of the blood but this rise is augmented at a slower rate than in the external medium. When the external medium reaches a certain concn., the blood becomes isotonic with it and further increase in the external medium results in a like increase in the blood concn.

H. J. DEUEL, JR.

The relation between (a) external hydrogen ion concentration and (b) thallium salts, and the rate of amphibian metamorphosis. J. BILEHRADSKY, J. S. HUXLEY and F. R. CURTIS. *Biochem. J.* 22, 63-6(1928).—There is no antagonism between thallium and the metamorphic action either of iodine or thyroid. BENJAMIN HARROW.

Digestion in the cockroach. III. Digestion of proteins and fats. V. B. WIGGLESWORTH. *Biochem. J.* 22, 150-61(1928); cf. *C. A.* 22, 461. A trypsin, an erepsin and a lipase are present, and pepsin is absent. BENJAMIN HARROW.

12—FOODS

F. C. BLANCK AND H. A. LEPPER

The preservation of food. LOUIS GERSHENFELD. *Am. J. Pharm.* 100, 201-32 (1928).—A popular lecture. W. G. GAESSLER.

Impurities in coloring matters used in food. E. F. ARMSTRONG, et al. *Analyst* 53, 217-8(1928).—Pending the enactment of a legal limit, it is recommended that a pure color used in foodstuffs should not contain more than 5 parts of As₂O₃ per million. Colors used at not more than 3-fold diln. should not contain more than 3 parts per million. Colors dild. to a greater extent may contain 1 4 parts of As₂O₃ per million. W. T. H.

The chemical analysis of nutritive preparations. ERNST KOMM AND RUDOLF MÜLLER. *Z. Untersuch. Lebensm.* 55, 53-9(1928).—Detailed analytical data are given on the nutritive prepn. "Provita." WILLIAM J. HUSA.

The official closing of samples. F. SPRINKMEYER. *Z. Untersuch. Lebensm.* 55, 65-8(1928).—A discussion of the closure and selling of samples taken for testing. WILLIAM J. HUSA.

The differential baking test. I. E. WERNER AND RALPH S. HERMAN. *The Northwestern Miller* 5, 1216(1928).—The authors describe a method which they have used successfully in judging the stability of a flour. Two loaves are made identically the same, except that in the dough mix in one of them there is added 1 mg. of KBrO₃. This small quantity of an oxidizing agent produces differences in the finished loaf that to the trained expert signifies certain inherent qualities in the flour. L. H. BAILEY.

Standard experimental baking test. M. J. BLISH. *Cereal Chemistry* 5, 158-61 (1928).—This report is the outcome of the March meeting of the Committee on Standardization of the Experimental Baking Test of the American Association of Cereal Chemists. A basic formula is given as well as a description of the mixing, fermentation, molding and panning, proof and baking. Additional and supplementary procedure is given. Specifications are given for the special equipment needed. A method for recording and reporting results is being prepd. L. H. BAILEY.

Influence of size and shape of pan on the baking test. J. P. LEWIS AND W. O. WHITCOMB. *Cereal Chemistry* 5, 146-58(1928).—The shape of the pan exerts a marked influence on the size and quality of the loaf in both strong and weak flours. The proof period varies with different types of pans. It does not correspond closely with volume or height of loaf or quality of bread. The deeper produce the taller but not the larger loaves. Area of top of pan has a closer relationship to the size of the loaf than has any other dimension. The deep type of pan produces a smaller loaf of somewhat poorer quality than the shallow type. Hence a flour that will produce a good loaf in a deep pan can be depended upon to perform well in the bakeshop where the shallow type of pan is used. The testing lab. pan should of necessity be of a different type from that

of the commercial bakeshop. It seems desirable that some uniform type of pan be adopted for laboratory tests. L. H. BAILEY

The different chemical components of the crust and of the soft part of wheat bread of Rome. LUIGI SETTIMI. *Ann. chim. applicata* **18**, 19-31(1928).—Analysis of carbohydrates, proteins, fats, lipoids, P substances and inorg. substances in flours and in the crust and soft part of breads prep'd. from the flours lead to certain general conclusions. The carbohydrates and proteins, the chief components, differ in chem. compn. in the crust and in the soft part. In bread-making, more than 50% of the starch is transformed into sol. starch, dextrin, maltose and glucose, rendering it easier for the organism to complete the change into glucose, the final assimilative product. More starch is transformed in the crust than in the soft part and therefore the crust is the more digestible part. In bread-making, part of the proteins are transformed into albumoses and peptones, and since they are intermediate products between proteins and assimilative amino acids, bread-making renders more easily digestible the proteins of the flour. In the crust these changes are more extensive than in the soft part, so that here again the crust has a higher nutritive value than the soft part. The fats and phytosterols in flour are not altered during the bread-making. The phosphatides in the crust and soft part are in smaller quantity than in the flour. The crust contains less NaCl than does the soft part; otherwise the more components are the same. C. C. D.

1927—Cake flour report of the American Institute of Baking. C. B. MORISON. *The Journal* **1**, No. 1, 16-9(1927) — Results are given of the examn. of 36 samples of cake flour. The flour came from 10 states. The opinions of com. cake bakers of these flours are given in the report. L. H. BAILEY

Testing flour by the iodine absorption method. N. A. TROPIMUK. *Die Muehle; Am. Miller* **56**, 56(1928); cf. *C. A.* **21**, 969.—To 5 g. flour, add, while shaking, gradually 200 cc. of water. Shake for 3 min., and filter after it has been exposed to room temp. for 1/2 hr. Then mix 50 cc. of the filtrate with 2 cc. of starch paste (0.5%) which has been kept sterile, and titrate with a 0.01 N I soln. in KI, until the blue coloring has been maintained for about 20 min. The quantity of I absorbed is given in cc. 0.1 N I soln. for 100 g. of dry-flour substance. For potatoes it was 0, rice 70, millet 70, wheat 109, barley 131, rye 165, oats 178, buckwheat 230, beans 703, peas 798. The figures vary some with different grades of the same kind of flour but there is always a distinct difference between the kinds of flour from those seeds with 2 lobes and those with one lobe, the former having a very high and the latter a lower I consumption. **Differentiating flours by the rapidity of sedimentation.** T. puts 1 g. flour in a test tube of 2-3 cm. diam., mixes it with 5 cc. water, and shakes the soln. once more after a further addn. of 7 cc. water. Ten cc. of this soln. is brought with the use of a pipet into a graduated cylinder (graduated in mm.), of 9.5 mm. diam. and 150-60 mm. high. The rapidity of sedimentation is then observed. It is most rapid in potato flour, less rapid in millet and rice flour, and slower in buckwheat, wheat, barley, oat, rye and bean flour. This difference enables one to prove the addns. of at least 10% of rye flour, 15% of oat flour and 20% of barley flour to wheat flour. L. H. BAILEY

A study of the proteoclastic activity of flour. ANDREW CAIRUS AND C. H. BAILEY. *Cereal Chemistry* **5**, 79-104(1928) — Eight chem. methods for measuring progressive proteolysis in flour suspensions were studied. Two of the methods, (1) pptn. of protein with $\text{CCl}_3\text{CO}_2\text{H}$, and (2) detn. of total water-sol. N appeared to be of limited value. The SnCl_4 pptn. method was somewhat cumbersome and the results of replicate detns. were more variable than with the $\text{Cu}(\text{OH})_2$ and tungstate methods. The last 2 methods, while somewhat laborious, appeared to give acceptable results. Foreman's titration method is rapid, which proved to be best suited for the measurement of proteolysis in flour. Detn. of amino N by the Van Slyke method was useful but somewhat more laborious than the Sørensen method. The extent of proteolysis which occurs when suspensions of high-grade flour milled from sound wheat are digested for 48 hrs. at 37° is slight when measured in terms of the amino N which appears in the digest. Ash content as a measure of the degree of refinement or grade of flour is positively correlated with the rate of proteolysis. The coeff. of correlation of ash content with amino N was $+0.84$ P. E. ± 0.0195 . In general, no relation between proteolytic activity of flour and wheat variety or region in which wheat was produced could be discerned. Sprouted wheat flour evidences a very high proteoclastic activity, but the presence of 1, 2 or 3% of such flour milled from wheat sprouted under careful control, in mixt. with flour milled from sound wheat, modified the rate of proteolysis to an inappreciable extent. Decreases in the viscosity of incubated flour suspensions are associated with increases in the proteoclastic activity of the flour used in prepg. the suspensions. Because of the difficulties inherent in the viscosity detn. as a precise measure-

ment, this method will require further study and standardization before it will be acceptable as a basis for distinguishing small variations in the proteoclastic activity of different flour samples. It is difficult to det. the significance of the small variations in the activity of flour proteases as these are registered in the baking properties of dough. In highly refined or patent flours milled from sound wheat, it is probable that the total effect of proteolysis on the baking strength in the course of ordinary fermentation is small. With low-grade flours the effect may be appreciable, and the same is doubtless true of flours milled from sprouted grain when the percentage of sprouted kernels in the wheat mixt is large. A prepn which exhibited protease activity was obtained from an ext. of patent flour when the ppt resulting from the addn. of saffranine was collected and digested with a suitable protein prepn. This is believed to demonstrate the presence of protease in flour.

L. H. BAILEY

Wheat and flour studies. XIV. Factors influencing the viscosity of flour-water suspensions. 3. Effect of small quantities of carbon dioxide in water used for the extraction of electrolytes. ARNOLD H. JOHNSON AND B. L. HERRINGTON. *Cereal Chemistry* 5, 105-15 (1928); cf. *C. A.* 22, 1196.—Viscosities of acidulated flour-water suspensions extd. with water contg. CO₂ were higher than those of similar suspensions extd. with neutral distd. water. Differences in viscosity between such suspensions increased as the quantities of the respective waters used for extn. increased. No greater quantities of electrolytes were extd. with CO₂-contg. water than with neutral water. Differences in H-ion concn. existed between the exts. obtained with CO₂-contg. water and those obtained with neutral water, but these differences did not afford a satisfactory explanation for the differences in viscosity which result. Greater quantities of protein were extd. when non-aerated water was used than when aerated water was used. As the removal of the protein effected higher viscosities, it appears that certain of the proteins of wheat flour operated to depress the viscosity of acidulated suspensions in which they were present.

L. H. BAILEY

Testing of New Zealand-grown wheats. II. Quality of flours. F. J. A. BROGAN. *New Zealand J. Agr.* 35, 289-94 (1927).—Analyses of a no. of varieties of New Zealand wheats are tabulated.

K. D. JACOB

Effect of delayed harvesting on quality of wheat. A. F. BRACKEN AND C. H. BAILEY. *Cereal Chemistry* 5, 128-45 (1928).—The study of wt., vol. and d. of Kanred wheat harvested at ten day intervals after ripening shows that the wt. of a kernel does not change when dried to a uniform moisture content after wetting, but that the decreased wt. to a measured vol. is due to an increased vol. of the kernel. These detns. also tend to bring out the fact that high d. is associated with high protein content, and the wheat with low density and low protein content showed a greater increase in vol. after being wet than wheat of higher protein content and higher d. The opaqueness of grain which had been wet was observed to be due to air spaces developed through the cracking of the kernel, and this condition in turn explains the reason for the increase in vol. Cracking would also allow for lines of weakness in the wheat which make it difficult to thresh such grain without a high percentage of broken kernels. Titratable acidity and H-ion concn. showed no change as a result of delayed harvesting. The diastatic activity for both the whole wheat meal and the flour was the same within reasonable limits of variation for the whole series of cuttings. Microscopic study of starch grains, in addition, gave no indication of diastatic activity. Through a measurement of the epithelial cells of several wheat kernels, no increase in length was observed; thus the possibility of diastatic or proteoclastic activity is partly precluded. If any deterioration were indicated as a result of prolonged harvesting it would be expressed in a greater soly of the protein material. Detns. of total N, water-sol. N Sn-non-precipitable and Cu nonprecipitable N gave no indication of this sort of change. The baking studies, the final criterion on the problem, gave proof that wheat which had remained unharvested in the field for 50 days after ripe, subjected to alternate wetting and drying showed no indication of deterioration as detd. by loaf vol. and loaf texture. Dark hard wheat of the Turkey Red type does not deteriorate in quality upon standing uncut in the field when subjected to alternate wetting and drying in spite of the fact that the grains bleach and lose weight per measured volume.

L. H. BAILEY

Effect of severe weathering on certain properties of wheat. W. O. WHITCOMB AND A. H. JOHNSON. *Cereal Chemistry* 5, 117-28 (1928).—The grade of wheat was lowered and the color impaired by exposure to weather in all cases considered. More damaged kernels occurred in wheats subjected to alternate freezing and thawing than in wheats subjected to continuous cold, the quantity increasing as the exposure progressed. Dark kernels, test wt. per bu., and wt. per kernel all decreased as weathering progressed. Germination was lowered to a greater degree by weathering than was

any other factor considered. The protein content remained practically const. after the initial reduction, which took place during the first two months of weathering. The ash of wheats decreased during weathering while that of flours milled from them increased. The H-ion concns. of flours milled from weathered wheats were the same as those of flours milled from normal wheats. The loaf vol. of bread produced from wheats exposed to different degrees of weathering showed no significant variation. The first sample threshed produced bread of large loaf vol. but the protein content of the wheat was correspondingly high. The color and texture of bread produced from weathered wheat in 1925 was equal to that from normal wheat, while in 1926 it was slightly inferior. The quality of the gluten produced from weathered wheat was equal to that from normal wheat as judged by the protein gluten ratio, the phys. properties of gluten, and the viscosity test. The proteoclastic activity of flour milled from weathered wheat was the same as that milled from normal wheat, as detd. by either the formal titration or the Van Slyke amino nitrogen method.

L. H. BAILEY

The nutritive value of maize and its various preparations in Java. B. C. P. JANSEN AND W. F. DONATH. *Mededeel. Dienst Volksgezondheid Nederland. Indië* 17, 92-119 (1928).—The compn. and nutritive value of a number of kinds of maize were examd. The compn. did not vary much. The anti-beriberi vitamin % was also about the same in order to compensate for the vitamin deficiency of one part of washed polished rice in expts. with pigeons, one or two parts of the different kinds of maize were needed, sometimes a little more. Yellow or colored maize contains much more vitamin A than the white variety. The nutritive values of the different maize preps. appeared to be very different. Various methods of prepn. for use as food are considered.

J. A. KENNEDY

Determination of salt in margarine. D. W. STUART. *Analyst* 53, 212-3 (1928). Melt 3 g. in a 150-cc. Erlenmeyer flask and add 10 cc. of acetone and a few drops of chromate indicator. Titrate with 0.1 N AgNO₃.

W. T. H.

Use of Janus green in the reductase test for milk. A. R. TANKARD. *Analyst* 53, 213 (1928).—In the account of Soep's comparative tests for the substitution of Janus green for methylene blue (cf. C. A. 22, 1810) the order of classification by Christian sen appears to have been reversed. A comparison of the 2 tests with 35 samples of milk shows that there is little choice between the tests with respect to bacterial quality of milk. Bacterial count made on milk showing reduction in either test usually gives lower values than is indicated by the scales used, although such milk is invariably unsatisfactory.

W. T. H.

The hygienic evaluation of the biological properties of milk. M. A. DYCHINO AND O. M. BRISKIN. *Z. Untersuch. Lebensm.* 54, 438-46 (1927).—The heating of milk in the usual manner for the purpose of reducing its bacterial content injures its biological properties (by destruction of catalase, reductase, peroxidase, etc.) and injures its quality. The process, widely used in Russia, of heating to 60-70° causes fusion of the fat globules into larger drops of higher fat content but does not essentially alter the chem. or biological properties of the milk, this process is similar to the American process of gentle pasteurization for 1/2 hr. at 60-70°.

WILLIAM J. HUSA

Action of cold on the fats of milk. G. QUAGLIARIELLO. *Atti accad. Lincei* [6], 7, 75-8 (1928).—When milk (not homogenized) is cooled to 10° and then warmed, the surface tension is lowered (cf. C. A. 11, 3345 and Burri and Nussbaumer, C. A. 4, 625). The fat globules contain a preponderance of insol. triglycerides of higher fatty acids intimately mixed with a small proportion of triglycerides of lower fatty acids which are somewhat sol. in water. When the temp. is lowered, the former solidify and contract so that the latter pass into the interglobular liquid. When the milk is warm again the triglycerides of the higher acids fuse, but those of the lower acids which passed into soln. remain dissolved, and lower the surface tension. To verify this explanation, the surface tension and the triglycerides of the lower fatty acids in normal milk and in milk previously chilled to 0°, from both of which most of the fat had been removed by centrifuging, were detd. The analyses show such an increase in the glycerides of the lower acids after the chilling process that there is no doubt that the lowered surface tension is a result of the dissolution of these fats from the original fat globules. This is also supported by the fact that when the 2 samples were centrifuged, the normal milk gave a yellow homogeneous compact solid mass, whereas from the previously chilled milk there sepd. 2 layers, a yellow liquid fat layer and a white solid fat layer.

C. C. DAVIS

An indicator paper for the study of the acids of milk. A. TAPERNOUX. *Compt. rend. soc. biol.* 98, No. 9, Séance Feb. 20, Lyon, 621-2 (1928).—A paper was prepd. by washing filter paper to neutrality and satg. it with an aq.-alc. soln. of methyl red 1 to 1000. The prepd. paper has a yellow color and must be protected from acid or alk.

vapors. Its color change is comprised between p_H 4.4 and 6.2. In fresh milk of the cow its color does not change unless the acidity exceeds 20 to 21 (Dornic). In more acid milk the color changes to orange or orange red. L. W. RIGGS

Is the fat-free dry substance of decisive importance for detection of a diluted milk? C. E. KLAMER. *Z. Untersuch. Lebensm.* 55, 45-7(1928).—K. concludes that the detn. of f-p. lowering in milk is the final criterion as to the presence of added water.

WILLIAM J. HUSA

Investigations on the skimming of milk, with a special view to the testing of the efficiency of different separators. R. MORK. *Meldinger Norges Landbruks.* 7, 1-60 (1927).—Eighty-four tests have been made with 6 diff. types of separators. For detg. the fat content, sp. gr. and viscosity the usual methods were employed. For detg. the medium vol. of the fat globules and the no. of globules per cu. mm. various methods were tried, as well as the direct measurement of a great no. of globules and the counting of the globules in a fixed vol. The fat content in skim milk appeared to be unsuitable for characterizing the skimming process, since great variations were obtained in the results under const. skimming conditions when various kinds of milk of different characteristics were used. The variations found in sp. gr. and viscosity of the milk plasma could have only a small influence on the skimming process. A marked relation was found between high numbers of fat globules in the whole milk and high fat contents in the skim milk, however with several important exceptions. The av. vol. of the fat globules in skim milk is fairly const. for the same separator and the same skimming conditions regardless of the whole milk used. Milk from cows in the last stage of lactation giving a fat content in the skim milk of 0.360% and that from cows in the first stage of lactation giving a fat content of 0.090% under the same conditions showed the same av. vol. of globules in the skim milk. The method of measuring the fat globules sufficed for differentiating clearly very small differences in skimming efficiency.

C. A. ROBAK

The milk cows having diseases of the udder. J. KRENN. *Z. Untersuch. Lebensm.* 55, 47-9(1928).—The milk of cows having diseases of the udder resembles diluted milk in some respects, but the high content of chlorides indicates its pathol. nature.

WILLIAM J. HUSA

Fat losses in buttermilk. W. B. COMBS. *World's Butter Review* 2, No. 3, 9-10, 20(1928).—The fat content of buttermilk varies seasonally; it is greatest in the spring. When cream is churned soon after pasteurizing without giving the fat globules time to solidify, fat losses are great. Sepg. buttermilk pays only when the fat content exceeds 0.6% by the BuOH test. The Mojonner (Rose-Gottlieb) fat estn. agrees fairly well with the BuOH but is decidedly higher than Babcock on buttermilk. F. L. S.-J.

Study of bakery products containing butter. C. BAUMANN. *Z. Untersuch. Lebensm.* 54, 487-8(1927).—Analytical data are given on 38 samples of bakery products.

WILLIAM J. HUSA

Fresh and cold-storage eggs. C. BIDAULT. *Rev. hyg. med.* 50, 178-85(1928).—The use of an atm. of 94-95% N in cold-storage rooms held at 0° is displacing other methods in France. In eggs from 2 to 10 days after laying at ordinary temps., the ovalbumin crystd. readily; from 11 to 20 days it crystd. irregularly, while after 20 days it could not be made to crystallize at all. This period coincided with the loss of germ-inative power in the eggs. In cold-storage eggs held 9 months at 0-0.2° at a humidity of 85-90, very few ovalbumin crystals were observed while after 11 months none was found. Many of the eggs also contained viable bacteria. The point is emphasized that if freshly laid eggs are used to put in cold storage, a good, edible product will result. C. R. F. •

The determination of lecithin phosphoric acid in egg liquors. J. GROSSFELD. *Z. Untersuch. Lebensm.* 54, 450-62(1927).—Details are given of a simplified procedure for the detn. of lecithin H_3PO_4 in egg cognac and similar products. W. J. H.

The heat effects in ripening fruit. GEORG HOFBAUER. *Mitt. staatl. tech. Versuchsanst. (Wien)*, 16, 119-23(1927).—The sp. heat of green bananas as detd. in a small specially constructed calorimeter was 0.72 (0.72 cal. to raise the temp. of 1 kg. 1°). The heat elimination of the fruit during ripening was studied with a single bunch in the small calorimeter and with large amts. in the storage rooms. In the latter case, the heat elimination was detd. by measurement of the temp. of the ingoing and outgoing air, the rate of air circulation and the temp. of the fruit. By the first method the heat output per kg. bananas per hr. was on an av. 0.32 cal. and by the second procedure it was found to be on an av. 0.28 cal. H. J. DRUEL, JR.

Preservation of whole fruit with sulfur dioxide. J. M. ARTHUR AND M. S. BENJAMIN. *Agr. Gaz. N. S. Wales* 38, 873-5(1927).—Uncooked, whole grapes and plums were preserved in good condition for 3 months by bottling in 0.08% solns. of SO_2 . The

natural flavors were retained but a certain amt. of bleaching of the natural colors resulted, and a slight acidity was developed. In most cases these undesirable properties could be partly eliminated by cooking the fruit after the bottles were opened.

Analysis of "fruit and apple" preserves. C. F. MUTTELET *J. pharm. chim.* **7**, 109-13 (1928) — Replv to Lasausse (*C. A.* **22**, 828). LASAUSSE *Ibid.* 175 6. Rejoinder S. WALDROTT

A calorimeter for the determination of the heat developed by fruit. EZER GRIFFITHS *Proc. Phys. Soc. London* **40**, 46 53 (1928). — A calorimeter is described for measuring the heat evolved by apples during the senescence stage. A differential arrangement was used in which one container was filled with apples and the other with dummy apples of the same thermal capacity made of thin-walled glass spheres filled with moistened glass wool. The containers were enclosed in a metal box thermally insulated and set up in a const. temp. room. The differential resistance thermometers were composed of 2 sets of 8 glass tubes which were uniformly distributed throughout the space occupied by the apples and by the dummies. Each tube contained 10 yds of Ni wire uniformly wound along the full length of the tube and the 8 tubes of each set were connected in series to form 1 thermometer. The 2 thermometers were connected to a slide wire bridge on which 1 cm. movement along the wire corresponded to a difference of 0.003° between the thermometers. Air circulation was controlled to maintain at will an atm. contg. 2 to 10% CO₂ around the apples. The moisture content was detd. by a dew point app. and a correction applied for the heat absorbed in evapg. water from the apples. At 20° sound apples generated heat at the rate of 0.012 cal./sec./kg. of apples.

H. M. McLAUGHLIN

Contribution to the colloid chemistry of fruit juices. A study on the conditions for the making of jelly from apple juice. JOHS LINDEMAN, *Meldinger Norges Landbruks* **7**, 157 297 (1927). — Samples of apple juice were prepd. from 3 kinds of apples by cutting the fruit in 4-6 pieces, placing 1 kg. in a covered glass without addn. of H₂O, placing on a water bath, heating to boiling and keeping the water boiling for 1.5 hrs., pressing in a fruit press and filtering. The clear juice was poured into bottles, covered with cotton-wool and sterilized. The yield of juice per kg. differs considerably with the point of time of the sampling and with the kinds of apples. The acidity was detd. by measuring the H-ion concn. either electrometrically by means of the quinhydrone electrode or in a colorimeter. In order to get a colorless juice for colorimetric detns. the sample was placed in a Schleicher & Schull parchment case 8 cm. long by 2.5 cm. in diam., this in turn being placed in a narrow beaker with distd. H₂O at the same level as the sample. After 24 hrs. the H-ion concn. in the dialyzate was practically the same as in the original sample. The acidity decreases during the ripening period and also during storage of unripe fruits. It is not influenced by an addn. of 0.5-2.0 vol. of H₂O. Even after acidulating the sample with some HCl the *p*_H is only very little influenced by a small addn. of H₂O. It is not influenced by heating on a water bath or by addn. of sugar. The *p*_H of the jelly is like that of the juice from which it is made. The total amt. of reducing sugar was detd. in all the samples. No direct detn. was made of the pectin content. The power of jelly formation was detd. in the following way. 10 cc. of the juice was poured into small test tubes and a measured amt. of sugar was added and dissolved by stirring with a glass rod. The tubes were placed for 30 min. in a boiling water bath and then without the glass rods for 24 hrs. in a water bath of 18°. Then it was observed if there had been formed a jelly or not. A great number of tests were made for detg. the influence of numerous different factors upon the power of jelly formation, the general principle being to det. the least quantity of sugar required under the test conditions for obtaining a jelly. The results are given in tables. An app. similar to that described by S. E. Sheppard and S. S. Sweet (*C. A.* **17**, 2205) for detg. the elasticity of jellies was worked out. A definite relation of the elasticity to the *p*_H of the jelly was observed with an optimum between *p*_H = 1.8 and 2.2. Generally a small addn. of acid reduces the amt. of sugar required. Since HCl is cheaper and much more efficient than citric acid the use of HCl is recommended, the more so because the taste of HCl cannot be detected, which is not completely true of the citric acid.

C. A. ROBAK

A few experimental considerations on the utilization of the soy bean for human nutrition. ROMOLO VENTURI, *Biochem. terap. sper.* **14**, 393-9 (1927); cf. *C. A.* **22**, 1197. — The soy bean does not possess the lauded advantages as a wheat substitute. It requires for cultivation the same conditions as wheat but gives lower yields. The flour can be used for bread only after a costly extn. of the oils. The extd. flour contains a prolamine, the enzymic decompn. products of which impart to the bread a disagree-

able odor and taste. The absence of polysaccharides precludes leavening, but secondary fermentations are caused by yeast. The higher protein content hardly makes up for the lower carbohydrate content as compared with wheat, the loss in calories being 1000 per kg. The economic future of the soy bean lies in a different field: The oil is excellent for soap making. The flour which is practically free from carbohydrates and rich in globulins which do not form purine bases is a valuable raw material for therapeutic foods, especially diabetic bread. The straw has a higher nutritive value than cereal straw. Its mixt. with the extn. residue of the flour is superior to hay. The milk has a high nutritive value and may replace the flour potion for calves and pigs. For analytical and agricultural details see the original.

MARY JACOBSEN

Remarks on the note of Venturi on the utilization of the soy bean as human food. V. DUCCHESCHI. *Biochim. terap. sper.* **14**, 400-2(1927); cf. *C. A.* **22**, 1197.—The main purpose of soy-bean cultivation is a saving of the high cost of importation from the East. It is to be raised mainly in the colonies in land not yet under cultivation. The cultivation in Italy is still in the exptl. stage and does not warrant definite conclusions. All cultures suffer from a deficiency in *B. radicicola*, which is responsible for the low yield, the lowered protein content and the consumption of N fertilizer. The selection of proper seed will do away with all these difficulties. In spite of the extn. costs soy flour is cheaper than wheat flour because the oil fetches a high price on the food market. The caloric value is 4880 when calcd. for the extd. flour, that of wheat is 4454. The chief protein of soy flour is not a phosphoprotein. Neither the presence of a prolamine nor the disagreeable odor or taste has been confirmed by other authors. The nutritive value of the milk has been exaggerated by V.

MARY JACOBSEN

The separation of honey. J. FIEBE. *Z. Untersuch. Lebensm.* **55**, 64-5(1928).—A further report is made on the compn. of the white layer on honey (cf. *C. A.* **21**, 462).

WILLIAM J. HUSA

The p_H of honey and artificial honey. J. FIEBE AND W. KORDATZKI. *Z. Untersuch. Lebensm.* **55**, 59-63(1928).—The p_H of honey ranges from 3.8 to 4.3, the usual figure being 3.9, while for artificial honey it ranges from 3 to 4, the usual figure being 3.2.

WILLIAM J. HUSA

The loss of mineral matter of potatoes by the usual culinary preparation. RAGNAR BERG. *Z. Untersuch. Lebensm.* **54**, 314(1927).—Comments on the article by Griebel and Miermeister (*C. A.* **21**, 2341).

WILLIAM J. HUSA

Determination of vaseline oil in coffee. D. MAROTTA AND M. E. ALESSANDRINI. *Ann. chim. applicata* **18**, 37-9(1928).—The method is claimed to be the first reliable one for detg. the quantities of oil (0.5% or less) ordinarily found in com. products. Ext. 3 times 100 g. of the roasted coffee with 70-80-cc. portions of petr. ether (b. 60-70°), filter, wash with petr. ether, evap., add 1 g. of powdered NaOH, and 10-15 cc. of 30% H_2O_2 in 2-cc. portions, cooling to prevent frothing but finally warming, add 50 cc. of alc. KOH (12 g. KOH per 100 cc.), reflux for 1.5 hrs. (agitating), add 50 cc. of water, ext. with Et_2O , wash the Et_2O ext. with water until no longer alk., add a little anhyd. Na_2SO_4 , let stand 1 hr., filter, wash the residue with anhyd. Et_2O , evap., add 5-10 cc. of glacial AcOH to the oil, heat 15 min. on the water bath, introduce in a measuring tube, agitate, warm 15 min. at 60-70°, let stand, read the vol. of vaseline oil within 0.05 cc., adding a correction factor of 0.1 cc. With the d. of vaseline oil, the % in the coffee is calcd.

C. C. DAVIS

The detection and determination of *p*-hydroxymethyl benzoate in foods. F. WEISS. *Z. Untersuch. Lebensm.* **55**, 24-31(1928). *p*-Hydroxymethyl benzoate is sold under the names of "solbrol" and "mpagin" as a preservative for foods, oils and pharmaceuticals. It may be completely shaken out from fat-free foods and in amts. sufficient for detection from fatty foods. A part of the ester may also be sepd. from fats and oils by steam distn. The phenol group may be detected by Millon's reagent and the CH_2 group by a CH_2OH reaction.

WILLIAM J. HUSA

The keeping qualities of sausage made from frozen meat. OSKAR ACKLIN. *Z. Untersuch. Lebensm.* **55**, 31-44(1928).—Comparative expts. were made on the keeping qualities of sausage made from frozen meat and from fresh meat, the sausage being stored at an av. temp. of 15° and av. relative humidity of 60%. Tests of O_2 consumption, methylene blue reduction, condition of the sausage fat, etc., yielded no fundamental differences.

WILLIAM J. HUSA

● **Horseradish and horseradish products.** KONRAD AMBERGER AND KARL HEPP. *Z. Untersuch. Lebensm.* **54**, 435-8(1927).—Analytical data are given on various samples of horseradish and horseradish products.

WILLIAM J. HUSA

The occurrence of starch in hazelnuts. C. GRIEBEL. *Z. Untersuch. Lebensm.* **54**, 477-81(1927).—Although hazelnuts are ordinarily considered as free from starch, the

presence of sparsely occurring starch grains is demonstrated; larger amts. occur in nuts which are not fully ripened. WILLIAM J. HUSA

The determination of stone cells in cacao products. E. ALPERS. *Z. Untersuch. Lebensm.* **54**, 462-6(1927).—The stone cells in cacao products are deformed and broken up by grinding, consequently in drawing conclusions from the no. of stone cells it must be remembered that the observed no. of stone cells is dependent on the fineness to which the cacao product has been ground. WILLIAM J. HUSA

Paper wrappers and their effect upon physical and chemical properties of horticultural products. H. C. BROWN Mich. Agr. Expt. Sta., *Tech. Bull.* **87**, 1-29(1928).—Waxed papers are effective in reducing moisture loss or increase. They limit ventilation and encourage spoilage of perishable products at high temps. Parchment and so-called whalehide papers were highly resistant to disintegration in water and are suitable for use in contact with ice as in lining lettuce, celery and spinach crates. Both parchment and whalehide papers admit air through the pores for ventilation of the fruits or vegetables yet they protect against excessive moisture losses. Depression of the f. p. by the cryoscope and detn. of total sol. solids by the refractometer afforded a rapid measure of quality and checked fairly closely the chem. analyses. Total sugars in sweet corn and peas but not grapes were quickly reduced in quantity at high temps. Papers did not prevent this loss, the only remedy found being low-temp. storage at 0°. High temps. change the sugar in peas first to an acid-hydrolyzable substance, then to starch. In sweet corn there was no intermediate stage in the transformation of the sugar. Waxed papers or high humidity did not affect the p_H or acidity of tomatoes. High humidity caused poor color and flavor. Paraffin-coated tomatoes developed no red color. Vine-ripened tomatoes were always superior in quality to others. Both sunlight and ultra-violet light passed freely through Celoglass, Vitrex, Flex-o-glass and waxed papers, to a limited extent through parchment, but was wholly excluded by whalehide papers. A bibliography of 29 references is appended. C. R. FELLERS

The digestibility of the mineral matter of feeding stuffs. W. L. DAVIES. *Fertiliser, Feeding Stuffs and Farm Supplies J.* **12**, 831-3(1927).—The importance of the inorg. constituents of feeding stuffs is discussed with particular reference to their effect on the nutrition of animals under various conditions. K. D. JACOB

Apparent digestibility as affected by length of trial and by certain variations in the ration. B. H. SCHNEIDER AND H. B. ELLENBERGER. Vt. Agr. Expt. Sta., *Bull.* **270**, 1-48(1927).—Av. coeffs. of digestibility should not be used to compute digestible nutrients when comparing rations dissimilar in quantity, in make-up or in proportions of the various nutrients if a high degree of accuracy is desired. All feeding trials should be accompanied by digestion trials. With milking cows, digestion trials should not be less than 8 days in length nor less than 20 days under conditions found in maintenance trials wherein the quantity of feces is small. C. R. FELLERS

The milk production value of feeding-stuffs made from fish. IV. Herring meal. H. ISAACHSEN AND O. ULVÆSLI. *Meldinger Norges Landbruks.* **6**, 369-404(1926).—Herring meal (which in Norway is never called fish meal) is produced chiefly in 2 varieties (A) with low content of NaCl, made from whole slightly salted herring by boiling, pressing, drying and grinding, (B) rich in NaCl, principally obtained from rather strongly salted herring but usually with some addn. of herring waste from the canning factories and salting works. Feeding expts. were carried out with both kinds, of the av. compn. (A) 91.6% dry matter, 12.5% ash, 64.9 crude protein, 57.8 digestible pure protein, 11.3% fat, calcd. feed value 0.69 kg. to 1 feed unit (f. u.), (B) 90.4% dry matter, 21.9% ash, 63.6 crude protein, 43.4 digestible pure protein, 11.4% fat, calcd. feed value 0.83 kg. to 1 f. u. (by 1 f. u. is understood the production value in milk of 1 kg. standard barley when the need for pure protein is satisfied in the ration. The net energy of 1 f. u. is about 1900 cal.). The feeding expts. with (A) were carried out during 2 years with 18-19 pairs of milking cows in group expt., i. e., after a preliminary period identical for both groups one of the test groups was given fodder with herring meal instead of the earthen cake of the first period, while the other group still received earthen cake. The av. value of the meal was found to be 0.715 kg. to 1 f. u. The fat content of the milk was irregularly affected in the various test animals, but as an av. the meal reduced the fat content by 0.11%, an amt. which does not much exceed the error limit. The digestibility was detd. with 4 sheep, the av. coeffs. being for org. matter 91, protein 88, fat 99. Similar expts. were carried out with (B), on 16-18 pairs of milking cows, the av. production value of the meal being detd. to 0.82 kg. to 1 f. u. The fat content of the milk was not affected by the herring meal. The digestibility was detd. with 2 sheep, the coeffs. being for org. matter 91, protein 90, fat 98. **V. Fish meal.** *Ibid* **7**, 77-95(1927).—Norwegian fish meal is made from the air-dried heads and spinal col-

umns of cod (waste in klip-fish production). Tests were carried out in 2 series (1) with 10 pairs of milking cows, 2 groups of 10 each (2) with 16 pairs. After a preliminary period identical for both groups one of the test groups was given fish meal instead of the cotton cake of the first period, while the other group still received cotton cake. In a subsequent 3rd period the test animals were all given the same food with cotton cake. The fish meal used in the first expt. (I) was of an atypical compn. with a far too low content of proteins and too high contents of fat and ash, most likely having been adulterated with liver meal and bone meal. It contained (av. of 8 samples) 88.5% dry matter, 40.5 protein, 37.9 digestible protein, 5.2 fat, 39.1 ash, 5.9 NaCl. The second lot (II) was of normal compn. contg. as an av. of 10 samples 98.6% dry matter, 56.3 protein, 53.4 digestible protein, 1.6 fat, 29.7 ash, 1.9 NaCl. The production value of (I) was found to be 1.1 kg. to 1 f. u., a figure considered too high by the authors. The value of (II) was 1.15 kg. to 1 f. u. On the basis of the production values of the 2 lots of meal as found by the expts. and the coeffs. of digestibility detd. by the authors by sep. expts. they have calcd. the value at 110 for (I) and 86 for (II), the first figure being considered too high. The percentage of fat in the milk was not affected by the fish meal diet. The digestibility of (II) was detd. with 4 sheep in 8 exptl. periods. The results were somewhat varying, but on the basis of the best agreeing periods the coeff. of 90 for protein and 95 for fat may be regarded as suitable av. figures. C. A. ROBAX

Effect of feeding cacao meal to milking cows. R. D. APLIN AND H. B. ELLENBERGER. Vt. Agr. Expt. Sta., *Bull.* 272, 1-20 (1927).—The apparent digestibility of all classes of nutrients in cacao meal except fat was unusually low. Cacao meal in the rations of milking cows promptly increased the fat test but also reduced the milk yield so that the gain in fat production was small. The theobromine content was mainly responsible for the increased fat test and lowered milk yield. The caffeine content produced no noticeable effect on either fat test or milk yield. Cacao meal fed to dairy cows increased the m. p. of the butter fat from 1.75 to 4.9° and produced a firmer body. C. R. FELLERS

Feeding cacao meal to hogs. R. D. APLIN. Vt. Agr. Expt. Sta., *Bull.* 271, 1-10 (1927).—Cacao meal is not a suitable ingredient of hog or pig rations. It is unpalatable, causes litters of weak, undersized pigs when fed to pregnant sows, fails to produce economical gains and exerts a toxic effect on young pigs. C. R. FELLERS

Enamels containing Sb (BECK, SCHMIDT) 19. The determination of polysaccharides (APFELMAN, *et al.*) 7. The action of ethylene in accelerating the blanching of celery (MACK) 11D. Apparatus for aerating milk or cream (Brit. pat. 273,835) 1.

SMITH, ERNEST ELLSWORTH: **Aluminum Compounds in Food.** Including digest on the influence of aluminum compounds on the nutrition and health of man. New York: P. B. Hoeber, Inc. 378 pp. \$7, net.

Foods. E. H. MILES and G. REILLY. Brit. 274,051, July 8, 1926. Juice of "dietetic vegetable material" such as lettuce or cabbage is mixed with that of "preservative vegetable material" such as carrots, parsnips or beets, the mixed juices are heated until hydrolyzation of the sucrose is well advanced and concn. is then effected. The heating does not exceed 1 hr. at 80°. Cf. C. A. 21, 3094. •

Preserving foods with calcium iodate. C. T. J. VAUTIN and W. G. WHIFFEN. Brit. 274,164, April 6, 1926. An alk. earth iodate, preferably Ca iodate, is used for preserving milk, cream, butter, margarine, eggs, fish, meat, fruit preserves or other foods by direct application as a soln. or powder or by satg. wrapping or packing material with the iodate. NaCl may be added to iodate solns. to facilitate forming more concd. solns.

Preserving eggs, etc. S. FOWLER and E. EDSEER. Brit. 274,200, April 16, 1926. A liquid preferably consisting of a soln. of wool fat or other cholesterol-contg. wax in C_2HCl_3 or other volatile solvent which renders the soln. non-inflammable is used for coating the shells of eggs. Preservation of other materials such as cheese, apples, flowers and leaves is also mentioned.

Preserving vegetable materials. J. B. BUTLER and J. J. DRUMM. U. S. 1,666,551, April 17. Peas, spinach or other vegetable materials are impregnated with a soln. of Na_2HPO_4 of a pH between 7.0 and 8.3, which serves to preserve the natural green color in canning.

Malted milk products. L. A. THOMPSON. U. S. 1,666,633, April 17. In forming "nuggets" of flavored malted milk, with pores or voids within the "nuggets," a binder

such as gum tragacanth is used and the "nuggets" may be tumbled with a dry flavoring powder to cause it to permeate the pores and coat their walls. The product is readily sol. and suitable for prepg. beverages.

Treating ingredients of jams and jellies with ultra-violet rays for sterilizing them and increasing their food value. D. MCKINLAY. Brit. 273,578, Dec. 14, 1926.

Mayonnaise. A. K. EPSTEIN and M. C. REYNOLDS. U. S. 1,664,775, April 3. An inert gas such as CO₂ or N₂ is dispersed in an emulsion including edible oils and egg material at normal temp., in excess of the quantity of gas which is sol. in the material.

Ice crystals. S. C. CARNEY. U. S. 1,664,850, April 3. Ice particles, which may carry flavoring exts. or other substances for making beverages, are exposed to CO₂ under pressure and formed into a compressed mass.

13 GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Boundaries between fair and unfair competition in the field of patents, commodities, samples and trade-marks. HEINRICH GOLDBECK. *Chem. App.* 15, 77 8(1928).

J. H. MOORE

A rapid method of drying laboratory preparations. MAURICE HYMAN. *J. Soc. Chem. Ind.* 47, 86T(1928). The prepn. is collected on a Buchner funnel, over the top of which is placed a closely fitting filter funnel, through which warm, dry air is aspirated.

T. S. CARSWELL

Heat transfer for oils and water in pipes. F. H. MORRIS and W. G. WHITMAN. *Ind. Eng. Chem.* 20, 234-40(1928).—The basic equation has been shown to be $hD/k = \phi(Du/\nu) \psi(cz/k)$, where h is the liquid film coeff., D = pipe diam., k = thermal cond. of liquid, u = av. velocity of liquid, ρ = density of liquid, ν = viscosity of liquid, c = sp. heat of liquid. Most of the past work has been on water and has shown that the last term may be neglected. A term for end turbulence has often been added. M. and W. worked on a single piece of 1/2" standard iron pipe (inside diam. 0.62 in.) in a jacket 10 ft. 1.5 m. long. Only one length was used, so corrections for end turbulence could not be detd. The inside pipe extended about 1 ft. outside the jacket at each end, to eliminate the effect of end turbulence. Full data are given for 118 expts. These covered values of u from 0.9 to 20, of z from 0.5 to 110, of h from 40 to 1500 and included both heating and cooling. For heating, $\psi(cz/k)$ was found to be $(cz/k)^{0.37}$. For cooling approx. the same value was obtained, though the results are less consistent. A plot is given of $Du^{1/2}$ vs. $(hD/k) / (cz/k)^{0.4}$ for heating, from which the value of h can be detd., since all the other values are known. A similar plot for cooling shows that the value of h may be taken as 75% of that for heating. All the properties of the fluid are taken at the mean temp. of the mass of the fluid, instead of at the temp. of the stagnant film as in previous work.

W. L. BADGER

Removal of rust from pipe systems by an acid solvent. F. N. SPELLER, E. L. CHAPPELL and R. P. RUSSELL. *Trans. Am. Inst. Chem. Eng.* 19, 165-71(1927). A description of the initial applications of a new method of removing rust and other substances from pipe systems. It is probably equally applicable to the removal of rust from condensers, boilers, heaters and other fabricated systems. It is accomplished by dissolving the rust in acid rendered inert toward the metal by the addn. of inhibitors. The problem includes the retardation of further corrosion as well as the removal of accumulated corrosion products. When the dissolved O₂ is removed from hot water, corrosion ceases and previously accumulated products loosen and are removed. Solvent renewal is often necessary to prevent stoppage. Strong HCl plus an inhibitor to protect the steel is used. The rate of attack of solvent is about 10 times as great on wrought iron as on steel and about 20 times as great on malleable iron as on steel, but causes no injury due to the inhibitor. Soln. is necessary; not just loosening. The general plan of cleaning operation is illustrated by diagram. Rust removal required about 5-6 hrs. with the acid strength employed.

W. H. BOYNTON

Chemistry of the chemical warfare agents and of protection against them. C. B. WOOD. *Military Surgeon* (reprint) March, 1928, 322-38.—A lecture dealing with the ordinary chem. warfare gases and methods of protection against them. C. J. W.

Ultra violet radiation in industry (KING) 3.

BRÄUER, A., and D'ANS, J.: Fortschritte in der anorganisch-chemischen Industrie.

Vol. 3, 1924-7, Sect. 1. Berlin: Julius Springer. M. 36. Reviewed in *Chem. News* 136, 207; *Chem. Met. Eng.* 35, 239 (1928).

THIORMANN, K.: *Destillieren und Rektifizieren*. Leipzig: Otto Spanner. 144 pp. M. 12. Reviewed in *Chem. News* 136, 206; *Chem. Met. Eng.* 35, 239 (1928).

The Chemical Trade Directory, 1928. London: Bandon and Morris. 5s., net. Reviewed in *Chem. Trade J.* 82, 343 (1928).

Liquid composition. D. B. MACDONALD. Can. 276,584, Dec. 27, 1927. A heating and refrigerating liquid compn. consists of 50-65 parts H₂O and 35-50 parts of a mixt. of 12 glycols, including ethylene, propylene and butylene glycols.

Emulsions. I. G. FARBENIND A.-G. Brit. 273,757, July 2, 1926. Clear aq solns. or emulsions are prepd. by treating cyclohexanol or other org. substances insol. or difficultly sol. in water with water and a sulfonic acid or sulfonic acid salt (NH₄ salts being especially suitable). Materials which may be thus treated include hydrocarbons, insol. alcs, ketones and esters.

Emulsifying bituminous substances or oils. J. H. DISNEY and J. C. KERNOT. Brit. 274,142, Jan. 15, 1926. An emulsifying agent suitable for use with coal tar, pitch or with mineral, vegetable or other oils is prepd. by mixing resin or other saponifiable material with glue or gelatin derived from raw material by washing and treating with dil. alk. and acid solns. as described in Brit. 235,635 (*C. A.* 20, 1003). The liquid resin obtained in the treatment of wood pulp by the sulfite process may be used. The jelly produced may be dried if desired and prepd. for use when desired by adding water contg. KOH or other alkali.

Varying the boiling point of two-phase, liquid-vapor temperature-regulating systems by varying the composition of reflux condensate. C. E. ANDREWS. U. S. 1,666,251, April 17.

Separating air and water vapor or other gases. C. LOURENS. U. S. 1,667,426, April 24. The gases are passed through a series of containers contg. active C and the last of the series is cooled more than the first. (The application on which this pat. was granted was filed Nov. 14, 1922).

Exothermic reactions. I. G. FARBENIND, A.-G. Brit. 274,048, July 10, 1926. Reactions such as production of CaCl₂ or other solid products by reaction between solids and gases are carried out in the presence of solid inert material to prevent fusion of the reaction products. The reactions may be carried out continuously in a shaft furnace.

Treating steam to reduce or prevent corrosion. R. W. BAILEY. U. S. 1,666,523, April 17. Steam used for generating power and which changes from a superheated to a satd. condition is treated with an inert liquid diluent such as water or an alkali soln. which is injected into the steam on the high-pressure side of the zone of change from superheated to satd. conditions. An app. is described.

Absorption refrigerating apparatus of the reversing type and thermostat for same. P. M. LEROY. Brit. 273,315, June 23, 1926.

Mixing ingredients of cement of other pulverulent materials. M. VOGEL-JORGENSEN. Brit. 273,768, July 2, 1926. Different pulverulent materials or batches of material which are to be mixed, e. g., different batches of raw cement meal, are separately homogenized by agitation with air, and are then mixed to give a final product of desired compn. and the mixt. is further homogenized.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Newport's (England) new water supply scheme. ANON. *Munic. Eng. Sanit. Record* 80, 363 (1927).

The importance of proper sampling in water analysis. WILHELM PLAHL. *Z. Untersuch. Lebensm.* 55, 68-70 (1928).—A discussion. C. H. BADGER

Preparation of pure water without distillation: electroösmosis. PAUL PATIN. *Chimie et industrie* 19, 205-13 (1928).—A description is given of the construction and operation of a lab. app. and of a com. app. for the electroösmotic purification of water. A product equal in purity to ordinary distd. water, or even to redistd. water, is obtained at much lower cost than by distn. WILLIAM J. HUSA

New chlorine preparations for the sterilization of drinking water. W. E. HILGERS. *Gesundh. Ing.* 51, 177-84 (1928).—Various Cl preps. were tested with respect to their A. PAPINEAU-COUTURE

power to sterilize water. "Kaporit," calcium hypochlorite contg. 60-75% of active Cl, was first tested. Using a sample made by infecting pure water with a filtered culture of bacteria a reduction from 55,290 per cc. to 0 per cc. was obtained with 0.2 mg. Cl and 20 minutes' reaction time and other results were equally as good. Another Cl prepn. under the name "Jergichlor" which is NaClO was tried. The results obtained were quite satisfactory. Cl water was used in the form of an ampoule under the name "Aquapuro" with good results. Still another Cl prepn. is the chloramine tablet. These are suitable for sterilization in the field where the water is fairly clear. With a high org. content the action is greatly retarded. Sterilization with these tablets is slower than with Cl water. (The results of these tests are given in various tables.) The efficiency of the various Cl prepn. is a function of the quality of the water, the total number of bacteria, the miscibility in water and the stability or rate of evolution of chlorine. Control of a drinking water by detn. of free Cl is not sufficient but bacteriological detns should also accompany it.

WAYNE L. DENMAN

A colorimetric method for the determination of iron in water. P. LEHMANN AND A. REUSS. *Z. Untersuch. Lebensm.* **54**, 374-6(1927).—A method for detn. of Fe in water is based on the formation of $\text{Fe}(\text{CNS})_3$.

WILLIAM J. HUSA

Iron and manganese in water. HEINRICH THIELE. *Gas. u. Wasserfach* **71**, 289-90(1928).—The occurrence of Fe and Mn in water and their removal are discussed. The removal of iron and manganese by filtration is facilitated by certain organisms such as *Leptothrix*, *Crenothrix*, *Galionella*, etc. If sufficient air is not available to oxidize the iron or manganese, oxidizing agents must be added, such as MnO_2 pptd. on the filtering material or mixed with it. Fe and Mn can also be removed by active charcoal.

R. W. RYAN

A stable standard scale for the determination of nitrites in waters. R. DANET. *J. pharm. chim.* **7**, 113-4(1928).—Dissolve 0.1 g. fuchsin S in 1 l. of H_2O , and put into 4 10-cc tubes, resp., 0.3 cc., 0.6, 0.9, 1.2 cc. of this soln., fill up to 10 cc. with camphorated H_2O contg. 1% AcOH and seal with paraffined corks. To det. nitrites in H_2O mix in a similar 10-cc. tube 10 cc. H_2O , 1 cc. each of solns. of $\text{C}_6\text{H}_4(\text{NH}_2)\text{SO}_3\text{H}$ and $\text{C}_{10}\text{H}_7\text{NH}_2$, allow to stand 20-30 min. and compare with the standards, observing transversely. The 4 tubes correspond closely to H_2O contg., resp., 0.5 mg., 1.0, 1.5, 2 mg. of NaNO_2 per l.

S. WALDBOTT

Volumetric determination of sulfate in water. A. BAHRDT. *Chem.-Ztg.* **52**, 163-4(1928); cf. *C. A.* **21**, 1506.—Polemical.

FOSTER DEE SNELL

Volumetric determination of sulfate in water. M. KEHREN AND H. STOMMEL. *Chem.-Ztg.* **52**, 164(1928); cf. *C. A.* **22**, 654.—Polemical.

FOSTER DEE SNELL

Utilization of heat for the preparation of boiler feed water. H. BALCKE. *Gesundh. Ing.* **51**, 209-16(1928).—Tests were carried out with Fe plates suspended in water solns. of various salts. These detns. were made in a small boiler which is illustrated. The formation of scale due to the various salts which cause hardness in water is shown in a series of photomicrographs. The first series of pictures is the result of expt. with water whose sulfate concn. is 3 times its carbonate concn. and to which Fe and silicates have been added. The test pieces first showed a deposit of rhombohedral needles of CaCO_3 . By further evapn. MgCO_3 seps. With continued scale formation CaSO_4 is deposited in blunt broken up needle or broad lamellar forms. If the CaCO_3 is deposited in large aunts the deposition of CaSiO_3 takes place at the same time. The boiler tubes become coated with a thin layer which is impervious to the transfer of heat. If the amt. of CaCO_3 is slight pure silicates sepd. in roset and pisiform formations. Photomicrographs of O and CO_2 corrosion are shown. With O the action is local and considerable pitting takes place. With CO_2 the metal appears to become porous and white deposits of CaCO_3 are visible. Cl in small quantities is harmless but in high concns. it is very active. These test show that a feed water should be free of scale-forming constituents and dissolved O. Since most plants return their condensate as feed water it is highly advantageous to use distd. water for replacing the loss within the plants. Various evapg. and heat exchanging systems for this purpose are shown and described.

WAYNE L. DENMAN

Occurrence of living organisms in water mains. R. KOLKOWITZ. *Gas u. Wasserfach* **71**, 268-9(1928).—A growth of algae and protozoa was found in a curved pipe near the outlet of a centrifugal pump handling river water at a pressure of 10 atm. Alternate compression and release of pressure appeared to have no injurious effect. R. W. R.

Purification of waste water from lignite-distillation plants. DIETRICH WITT AND FRITZ SCHUSTER. *Gas u. Wasserfach* **71**, 241 4(1928).—Attempts were made to purify a tarry turbid effluent from a lignite-distn. plant, which contained 0.06% $\text{C}_6\text{H}_5\text{OH}$, 49 g. H_2S , per cu. m. and required 3600 mg. KMnO_4 per l.; by aerating, adding $\text{Ca}(\text{OH})_2$

and filtering, adding ground clinker, lignite and alum, and peat and alum, with or without electrolysis in each case. The two latter methods, without electrolysis, gave clear nearly odorless effluents after 5 and 3 days, resp. The method of purification finally adopted was to pass the water over low-temp. (Schwelkok) coke to remove H_2S , then acidify slightly with flue gases, and pass the water over a fresh filter composed of washed coke. The latter filter is used as the pre-filter as soon as it becomes ineffective. For this water 4.6% coke was used and a rate of 1 g. water per g. of coke per hour was maintained on the second filter. The effluent had only a very slight odor, gave only a slight turbidity with Br water, required only 475 mg. $KMnO_4$ per liter and remained colorless even after standing in air.

R. W. RYAN

Local developments at Llandudno (Wales). W. T. WARD. *Munic. Eng. Sanit. Record* 80, 511-2(1927).—Roads, sewerage, water supply, etc., are described. The water supply, derived from 2 natural lakes, capacity 156,000,000 gal. is of excellent quality, and contains less than 1 degree of hardness. The water in all the lakes in this district is pure and soft and is used without filtration.

C. H. BADGER

New sewerage and sewage disposal works at Bushey (England). ANON. *Munic. Eng. Sanit. Record* 80, 512(1927).—Improvement and alterations and the treatment of sewage are described. Accommodation is provided for 4 months' sludge. The digested sludge is drawn off periodically and is ploughed into the land or put on the sludge drying beds.

C. H. BADGER

Birmingham (England) drainage board jubilee. Opening of new extensions. ANON. *Munic. Eng. Sanit. Record* 80, 353(1927).—Mention is made of a 150-b. h. p. engine run with gas generated from sewage sludge by the agency of microorganisms. The bio-aeration plant employs activated sludge to give partial treatment to 7,500,000 gal. sewage per day, permitting the treated fluid to be applied to the bacteria beds at double the ordinary rate. This is the first large-scale plant employing activated sludge as an auxiliary to final treatment in the bacteria beds.

C. H. BADGER

Some Doncaster (England) developments. F. OSCAR KIRBY. *Munic. Eng. Sanit. Record* 80, 443(1927).—Sewage which now gravitates on to 100 acres of land without treatment will be screened and treated, dispensing with the use of the land. An incinerator and salvage plant for refuse disposal will do away with 2 refuse tips.

C. H. BADGER

Swindon's (England) sewage disposal works. ANON. *Munic. Eng. Sanit. Record* 80, 403(1927).—Lime and copperas are used as precipitants in the proportion of 5 parts per 100,000.

C. H. BADGER

Southerly sewage treatment works, Cleveland, Ohio. G. B. GASCOIGNE. *Ohio Conference on Sewage Treatment, First Ann. Rept. 1927*, 11-2.—Works designed to serve 280,000 people at 125 gal. per capita provide bar screens, grit chambers, Imhoff tanks, dosing tanks, trickling filters and settling tanks with final discharge to the Cuyahoga River. Sludge goes from the settling tanks to Imhoff tanks or drying beds and from the Imhoff tanks to drying beds. Final waste is to be buried or stored on waste land. Complete treatment is necessary as the river has a minimum flow of less than 50 cu. ft. per sec.

FOSTER DEE SNEEL

Contribution to the economic operation of sewage treatment plants of the two-storied type. *Preuss. Gesundh. Ing.* 51, 186-7(1928).—Treatment plants of the two-storied type are divided into 2 classes. (1) those in which the settling compartment lies on the free water surface, and (2) those in which it lies below the water surface. Plants of the second class are considered to be the best. In the first class the cross section of the settling space varies with the quantity of sewage treated while in the second class the area is const. for all quantities of sewage. The coeff. of friction increase faster with increasing area in those of the second class. An example of the first class is the "Emscher" basin while a typical representative of the second class is the "OMS" basin.

WAYNE L. DENMAN

House refuse problem: storage, collection and disposal. T. DOUGLAS. *Munic. Eng. Sanit. Record* 80, 428, 454(1927).—General discussion.

C. H. BADGER

The purification of swimming bath water. Inspection of installation at Hornsey Baths (England). ANON. *Munic. Eng. Sanit. Record* 80, 478(1927).—The purification plant includes centrifugal pumps, filters, aerator, heater, etc. $Al_2(SO_4)_3$, soda and Cl are used. The soda is added to prevent the water from becoming acid. The plant which cost £6500 is said to be the largest and most modern of its kind in the country. Water can be used 18 to 24 months.

C. H. BADGER

Germicidal properties of the mixture of kerosene and coconut oil. ZACARIAS DE JESUS. *Philippine Agr.* 16, 521-9(1928).—Coconut oil as prep. in the Philippines becomes increasingly germicidal with age. A mixt. of equal vols. of kerosene and co-

conut oil has a higher germicidal power than either one separately or mixts. in other proportions. A. L. MEHRING

Tunnery and leather factory sewage and its purification (SCHULZE-FOSTER) 29. Apparatus for aerating and screening sewage (U. S. pat. 1,666,164) 1. Apparatus for purifying and sterilizing water (U. S. pat. 1,667,439) 1.

KLONKA, II.: *Handbuch der biologischen Arbeits-Methoden*. No. 252 *Untersuchung und Wertbestimmung von Mineralwässern und Mineralquellen*. Edited by Emil Abderhalden. Berlin: Urban and Schwarzenberg. M. 11. Reviewed in *Am. J. Pharm.* 100, 194(1928).

Apparatus for softening water with base-exchange material. H. J. MAGRATH. *Brit.* 273,348, Jan. 2, 1926.

Heat-exchange system and apparatus for distilling water. J. S. FORBES. U. S. 1,666,777, April 17.

"Boiler compound." W. M. NEELEY. U. S. 1,667,670, April 24. Water glass 2, NaOH 3, tannic acid 2, Na_2CO_3 6 and water 87%.

Preventing deposition of boiler scale by use of alternating electric currents. E. HAASZ. *Brit.* 274,061, July 6, 1926.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Recent advances in science: *Pedology*. G. W. ROBINSON. *Science Progress* 22, 597-604(1928).—Review of recent work on soils and their chemistry. J. S. H.

The mechanical analysis of tropical soils. J. CHARLTON. *Agr. Research Inst. Pusa, Bull.* 172, 9 pp.(1927).—Addn. of varying quantities of H_2O_2 to destroy org. matter did not increase the amt. of clay as detd. in tropical paddy soils by the NH_3 -extn. method. With non-paddy soils definitely higher results were obtained when H_2O_2 was used in detg. the clay fractions when the soils were shaken for 4 hrs. With heavy tropical soils higher percentages of clay were found when the samples were shaken for 24 hrs., instead of 4 hrs., and the use of H_2O_2 was not necessary when the detns. were made at 25°. Practically complete dispersion of 20 g. samples of soil was obtained in 24 hrs. with 5 to 20 cc. of NH_4OH (d. 0.88) per l. of soil- H_2O mixt. Hyperol, a solid compd. of H_2O_2 and urea, was slightly more efficient than H_2O_2 alone for obtaining max. dispersion of clay and losses of SiO_2 and Fe_2O_3 by soln were smaller when the former was used. K. D. JACOB

Practical value of soil experiments. HELLMERS. *Z. Pflanzenernähr. Düngung Bodenkd.* 6B, 366-73(1927).—A discussion of the necessity of more than one type of expt. to characterize a soil and its requirements for fertilizer. P. R. DAWSON

Changes in reaction with the aging of soil samples. B. AARNIO AND A. SALMINEN. *Trans. 2nd Comm. Internat. Soc. Soil Sci.* 1927B, 30-3.—Detns. of the p_{H} value of soils must be made with fresh field samples. Drying of soils in the lab. largely increases their active acidity. This is particularly the case with soils rich in humus. B. C. A.

Phosphate in the soil solution as affected by reaction and cation concentrations. I. J. H. TRAKLE. *Soil Science* 25, 143-62(1928).—Fe phosphate is least sol. under acid conditions corresponding to p_{H} 3. Under less acid conditions $\text{Fe}(\text{OH})_3$ is pptd. at the expense of FePO_4 with the liberation of PO_4 ions. Mn and Al phosphates are least sol. under slightly acid conditions. Ca phosphate is insol. under alk. conditions. The main factors in the depression of the soly. of Ca phosphate are: (1) the Ca ion and (2) excess Ca ion in the presence of OH ion. OH ion alone probably causes the formation of a basic PO_4 with the liberation of some PO_4 ions. Comparison of the soly. of various PO_4 ions in pure solns. with the concns. found in the soil soln. suggests that the chem. properties of the compds. account for the behavior of soil PO_4 . Adsorption of PO_4 is unimportant, if it occurs at all in soils. Ca is the base most important in controlling the PO_4 -ion concn., in neutral soils of the type studied. Org. forms of P may constitute an important part of the total P of the displaced soln. from certain soils, but not from others. E. F. SNYDER

Preliminary report on some experiments regarding the determination of the acidity and the lime requirement of soils. JOHS. LINDEMAN. *Meldinger Norges Landbruks.* 6, 302-12(1926).—The measuring of the H-ion concn. of soils by means of the quinhydrone

electrode generally gives accurate results in accordance with results obtained with the H electrode. The results are not reliable in liquids contg. Fe in the form of ions or even as hydroxide. A series of detns. with the quinhydrone electrode in colloidal solns. of Fe hydroxide gave results wholly different from the actual values. Some expts. with an Sb electrode described by I. M. Kolthoff and B. D. Hartong, (*C. A.* 19, 1388) show that this electrode is well suited for H-ion detn. in soils and gives accurate results particularly within the intervals of p_H 2.0–6.5 and 9.0–12.0. The relation of the H-ion concn. to the amt. of water present in or added to the sample is illustrated by a series of expts. C. A. RODAK

Soil acidity. S. ODÉN. *Trans. 2nd Comm. Internat. Soc. Soil Sci.* 1927B, 10–29.—The action of acids on clay consists of the neutralization of OH ions on the surface of the particles, together with the aggregation of particles, whereby part of the surface becomes protected from the action of the acid, and finally direct dissoln. of mineral particles. The rate and extent of these 3 processes are largely dependent on the H-ion concn. of the fluid and on the phys. conditions of the mixt. With high H-ion concn. the coagulating effect predominates and at low concns. neutralization is the main effect. The complete neutralization of OH ions is not instantaneous, and this is assumed to be due to the platied or spongy nature of the clay-particle surface and to the consequent lapse of time required for the diffusion of neutralizing ions to the interior. B. C. A.

The nature of base exchange and soil acidity. H. W. KERR. *J. Am. Soc. Agron.* 20, 309–35(1928).—It seemed reasonable to believe that the great speed of the exchange reactions of soils could also be explained as due to the open structure or colloidal nature of the exchange complex involved, and on this purely chem. basis a mass action equation for the heterogeneous equil. was formulated. The org. matter of soils possessed a high base exchange capacity. Evidence was adduced in support of the presence of zeolitic materials in the soil. From the natural and artificial zeolites tested the free aluminosilicic acids were prepd. These were colloidal in nature. The H-ion concns. of the suspensions were approx. proportional to the amts. of solid material in suspension. Thus, acids need not be in true soln. in order to give rise to acid p_H values when detns. are made electrometrically. The effect of the soil-water ratio, differences between the p_H values for suspensions and filtrates, and many other difficulties are cleared up. All these studies emphasize the fact that the difference between the chem. behavior of materials in the colloidal state and those in true soln. is one of degree only and not of kind. E. F. SNYDER

Portable calomel electrode for the determination of p_H values in the field. P. KAMERMAN. *J. S. African Chem. Inst.* 10, 32–5(1927).—In the portable calomel electrode described, special devices to prevent the contact of the calomel with the Pt are detailed. Trials showed that the instrument was reliable for the detn. of the p_H value of soils, and gave results within 0.1 of those obtained by using a standard instrument. B. C. A.

The p_H value of some Texas soils and its relation to the incidence of certain woody plant species. A. H. BERKMAN. *Soil Science* 25, 133–42(1928).—In general the results obtained in this investigation seem to indicate that the soil reaction exerts a selective influence on plant species, but more data taken at different seasons of the year and over a period of years are necessary before definite conclusions can be drawn. E. F. SNYDER

The volume weight of soils as a physical characteristic of the soil profile. A. F. LEBEDEV. *Soil Science* 25, 207–11(1928).—The wt. of a unit of soil with an undisturbed structure, dried at 105–110°, is the vol. wt. of the soil. A method is described for detg. the vol. wts. as they occur in the soil profile. A thin steel tube with slots is inserted in the soil without turning. When this is withdrawn and the excess of soil cut away a thin undisturbed section may be accurately obtained. Working diagrams are given. Vol. wts. of 2 Russian soils are given, showing variations at 5-cm. intervals to a depth of 200 cm. Max. vol. wt. variations are about 30 and 45%. Vol. wts. are of importance in tracing the translocation of soil material in the profile and should be considered in estg. nutrient resources. M. S. ANDERSON

The effect of dehydration of soils upon their colloid constituents. I. J. L. STEENKAMP. *Soil Science* 25, 163–82(1928).—It would appear that dehydration can produce 2 effects: namely, an increase in the unsatd. clay acids, and an increase in the exchangeable bases present. This latter effect will tend to counteract the effect of the former. E. F. SNYDER

Ordinary presence of barium and probably strontium in arable soil. GABRIEL BERTRAND AND L. SILBERSTEIN. *Bull. soc. chim.* 43, 372–4(1928).—See *C. A.* 22, 1425. E. H.

Crop variation. IV. Experimental determination of the value of top dressings with cereals. T. EDEN AND R. A. FISHER. *J. Agr. Sci.* 17, 548-62(1927).—Carefully controlled field expts. were conducted to compare the effect on the yield of winter oats of single and double applications of equiv. amts. of N in the form of $(\text{NH}_4)_2\text{SO}_4$ and NH_4Cl , at 2 different dates (March 15th and June 5th). The results indicated that a significant response in the yield of grain was limited to the quantity of N top-dressing, the effects of kind and time of application being negligible. The advantage shown by double dressing in yield of straw was confined to the early application; no differences in the effects of sulfate and chloride were noted. P. R. DAWSON

Comparative investigations on the content of root-soluble nutrients (phosphorus pentoxide and potassium oxide) in the surface soil and subsoil of various soil-types. M. KLING AND O. ENGELS. *Z. Pflanzenernahr. Dungung Bodenk.* 7B, 127-39(1928).—Data are presented on the results of detns. of P_2O_5 and K_2O by the Neubauer method on a wide variety of soils. With some exceptions, the subsoil in general contains less of these nutrients than the surface soil. The relationship between the contents of the 2 levels is, however, very variable. Detns. made on the surface soil furnish no indication of the subsoil content. Of the soils studied approx. 75.5% were to be classed as deficient in P_2O_5 , and about 29.9% as deficient in K_2O , 8 mg. and 24 mg., resp., per 100 g. of soil being taken as limiting values. P. R. DAWSON

Accumulation of nitrogen in grass lands in India. H. E. ANNETT AND A. R. P. AYER. *J. India* 22, 382(1927).—The N content of surface and subsoils in cultivated fields was lower than that in adjacent soils that were overgrown with grass but which were formerly under cultivation. K. D. JACOB

Production of available phosphates from Isume phosphorite. I. G. ROZIDESTVENSKI. *Ukrainskii Khim. Zhurnal* 2, 179-94(1926).—In order to convert the H_3PO_4 present in Isume phosphorite into a form easily assimilable by a method other than conversion into a superphosphate, the material was treated with portions of a soln of 1% H_2SO_4 and N HCl . Lime was extd. each time, first in smaller, then in larger, quantities; H_3PO_4 was similarly extd., the amt. present in each extn. depending on the concn. of H_2SO_4 . Further replacement of the HCl by various salts (e. g., NaCl , KCl or MgCl_2) showed that the amt. of lime extd. depended on the nature of the salt used in the solvent. Vegetational expts. indicated that treatment of the phosphorite with a mixt. contg. 0.5 N H_2SO_4 , 0.15 N NaCl and 0.1 N MgCl_2 gave the best increase (36.6%) in the crop of barley. B. C. A.

Fixation of nitrogen by *Bacterium aerogenes* and related species. C. E. SKINNER. *Soil Science* 25, 195-205(1928).—Of 23 strains of *B. aerogenes*, isolated from soil, flour, and water, only 2 or possibly 3 were found which fixed atm. N, when grown in routine N-free media. Other strains, although they grew luxuriantly, did so without fixing any N detected by conventional methods. Some strains of *B. radiobacter* were found which did not fix N. *B. cloacae* was found in soil more frequently than *B. aerogenes* but none of the former fixed N. M. S. ANDERSON

***Actinomyces acidophilus* N. Sp. —a group of actinomycetes isolated from the soil.** H. L. JENSEN. *Soil Science* 25, 225-33(1928).—Four strains of *Acidophilus actinomycetes* were isolated from 3 humus soils whose pH values varied from 3.4 to 4.1. They represent a new species group, to which the name *Actinomyces acidophilus* is given. They are morphologically typical actinomycetes, but are sharply differentiated from all other actinomycetes by their ability to live only in acid media. M. S. ANDERSON

A new soil sampler. A. KOPP. *Soil Science* 25, 237(1928).—A soil sampler is described which will remove a core to a depth of 1 m. undisturbed. M. S. A.

Soil bacteria that decompose certain aromatic compounds. P. H. H. GRAY AND H. G. THORNTON. *Centr. Bakt. Parasitenk. II Abt.* 73, 74-96(1928).—Many types of soil bacteria were isolated that can decompose the aromatic compds., phenol, *m*-cresol and naphthalene which are used as soil sterilizing agents. Several of them can also utilize one or more of the following: *o*-cresol, *p*-cresol, phloroglucinol and resorcinol. One organism can utilize toluene. Pure cultures of the bacteria use these compds. as sole sources of energy in mineral salt media contg. inorg. N. Organisms without spores grew in media contg. 0.1% phenol but were killed by 0.2%. The bacteria are widely distributed in Great Britain, and have been found in soil from Norway, the Tyrol and South Atlantic Islands. They rarely occur in unfertilized soil. The organisms of this type fall into 7 genera and 25 species. When soil is treated with phenol, an increased bacterial population ensues, composed largely of *Mycobacterium sphaeroides* n. sp., which decomposes phenol in pure culture. JOHN T. MYERS

The presence of *Thiobacillus thiooxidans* in Danish soil. H. L. JENSEN. *Centr. Bakt. Parasitenk. II Abt.* 72, 242-6(1927). JOHN T. MYERS

The influence of calcium cyanamide on the bacterial life in the soil. JOSEF KUHN AND OTTO DRECKSEL. *Z. Pflanzenernähr. Düngung Bodenk.* **7B**, 105-18(1928).—Expts. demonstrate that CaCN_2 has a specific stimulating effect on soil bacteria. This effect is not a consequence of the formation of free HCN nor is it due to the CaO content. It is to be ascribed to the action of CaCN_2 as a chem. mixt. whereby the principal constituents exert a reciprocal effect. The favorable effect upon bacteria is lessened by acidity, but is favored by a neutral condition or alkali of the soil. P. R. DAWSON

Corn variety and fertilizer experiments. W. B. ROGERS AND J. D. WARNER. S. Car. Agr. Expt. Sta., *Bull.* **248**, 1-38(1928).—Expts. conducted on 7 types of soil showed superphosphate had but little effect upon the yield of corn. The amt. of NH_3 largely detd. the yield. Only light sandy soils responded at all to applications of potash. C. R. FELLERS

Experiments with fertilizers in combating wheat smut. W. STRAIB. *Fortschritte Landw.* **3**, 110-4(1928).—In expts. on dusting winter wheat seed, 20 g. of CaCN_2 per kg. of seed afforded complete protection against smut; even 5 g. caused appreciable reduction in infection. Superphosphate also showed a marked effect, but the results with lime dust were contradictory. With spring wheat the results were less favorable. However, under German agricultural conditions,* the use of such fertilizer materials as protective dusts is not economical as compared with other more effective dusting agents. P. R. DAWSON

Effect of lime on the availability of phosphorus in superphosphate. H. C. HARRIS. *J. Am. Soc. Agron.* **20**, 381-93(1928).—Mixing lime and superphosphate before applying them to the soil is not detrimental to the yields of most kinds of plants but may be to some. E. F. SNYDER

Experiments on the influence of potash, with varying nitrogen supply, on the yield and quality of barley in 1926. H. WIESSMANN AND K. BURGER. *Z. Pflanzenernähr. Düngung Bodenk.* **6B**, 408-17(1927).—Applications of K proved profitable where moderate supplies of N were available in the soil. Heavy applications of $(\text{NH}_4)_2\text{SO}_4$ were not profitable, either alone or in conjunction with K fertilizers. Neither N nor K fertilizers appeared to influence the protein content of the grain. P. R. DAWSON

Stimulation experiments (with plants). J. H. ABERSON. *Z. Pflanzenernähr. Düngung Bodenk.* **6B**, 405-7(1927).—In a series of plot expts. with oats, peas and beets no stimulating effects were observed where small quantities of Mg and Mn compds were applied in conjunction with balanced inorg. fertilizers. P. R. DAWSON

Experiments with stimulating substances (on plants). E. HASELHOFF AND W. ELBERT. *Landw. Vers. Sta.* **106**, 285-322(1927).—A summary of the results shows that the chem. stimulants employed in general have not exerted an action furthering the growth of plants or increasing the yields. E. F. SNYDER

Blossom color and nitrogen fertilization. M. v. WRANGELL AND H. v. BRONSART. *Naturwissenschaften* **16**, 169-72(1928).—No appreciable effect of N fertilization on flower color was noticeable; the increased green shade of leaves (intense metabolism) merely causes an apparent contrast effect. B. J. C. VAN DER HOEVEN

Sulfur. Its use in horticulture. THEODORE PARKER. *Fertiliser, Feeding Stuffs and Farm Supplies J.* **13**, 225-7(1928).—The fungicidal toxicity of lime S sprays diminishes as the polysulfides decompose and free S is deposited. S is toxic to fungi not only through actual contact but also through volatile vapor phases. Adhesion to leaf surfaces and floating capacity are directly dependent on the fineness of the S. In a series of tests the best results in these respects were obtained with specially prepd. dusting sulfurs, 91 to 93% of which would pass a 300-mesh sieve. K. D. JACOB

The blackberry pest. Chemical investigations. E. F. NORTHCROFT. *New Zealand J. Agr.* **35**, 369-82(1927).—Expts. were made with many solid, gaseous and liquid poisons for the control of blackberry bushes. The best results were obtained by spraying with 1.5% solns. of Na_3AsO_3 and As_2O_3 , resp., the former being more efficient. The Na_3AsO_3 content of soils around sprayed bushes was reduced from 0.68 to 0.04% in 1 year by natural leaching and draining. One part of As_2O_3 to 0.8 part of NaOH was the best ratio for the control of both the young shoots and the woody older growths of bushes. K. D. JACOB

Experimental potato trials. J. T. RAMSAY. *J. Dept. Agr. Victoria* **26**, 8-14(1928).—Treatment with 10% soln. of NaNO_3 prior to planting, had no effect on the yield of potatoes grown on soil high in N. K. D. JACOB

Spraying versus dusting to control potato-leaf hopper in commercial potato fields in Wisconsin. J. F. DUDLEY, JR., AND C. L. FLUKE, JR. *Wis. Agr. Expt. Sta., Research Bull.* **82**, 1-16(1928).—A 4-yr. expt. showed the av. yield of all the check plots was 136.4 bu. per acre as against 163.1 for the dusted and 167.9 for the sprayed plots.

The Bordeaux mixt. used for spraying consisted of 4 lb. CuSO_4 , 5 lb. Ca(OH)_2 and 50 gal. H_2O and Cu-lime dust contained 20-25% monohydrated CuSO_4 mixed with hydrated lime and filler. The cost of dusting was very slightly more than spraying but dusting was more rapid and convenient. C. R. FELLERS

Seed treatments for the control of seedling blight in cereals. P. M. SIMMONDS AND G. A. SCOTT. *Sci. Agr.* 8, 502-11(1928).—Greenhouse expts. were carried out to det. the value of seed treatments of cereals against natural soil infection and artificial inoculations with *Fusarium culmorum* and *Helminthosporium sativum*. Semesan, ger-misan, uspulun and Dupont No. 12, all mercurial preps., showed a distinct protective influence to the seedlings while CH_2O and S were unsatisfactory. C. R. FELLERS

Preventing insect damage to stored seed grain. W. P. FLINT AND J. C. FRANKEN-FELD. *J. Econ. Entomol.* 21, 143-7(1928).—A mixt. of 0.5 fluid oz. crude creosote and 1 lb. Ca(OH)_2 when mixed with wheat in the proportion of 0.25 oz. per lb. of seed gave almost complete protection from insect damage. CaSiF_6 was equally effective but is poisonous to higher animals. C. H. RICHARDSON

Organic mercury compounds for the control of insects in stored seeds. J. L. HORSFALL. *J. Econ. Entomol.* 21, 147-50(1928).—Several com. org. Hg compds, which are now used to control seed-borne fungi, are effective in preventing damage to beans by bean weevils and to corn by the Angoumois grain moth. C. H. R.

The preparation of a special light sodium fluosilicate and its use as a boll-weevil poison. H. W. WALKER. *J. Econ. Entomol.* 21, 156-64(1928).— Na_2SiF_6 of the same d. as Ca arsenate and contg. not less than 80% Na_2SiF_6 is obtained as a by-product of the manuf. of acid phosphate. Its toxicity to the Mexican boll weevil equals that of Ca arsenate but it does not adhere so well to the cotton plant under field conditions. The addn. of an adhesive (starch, glue, cascien, sirup, etc.) will probably remedy this defect. The material causes no economic damage to the cotton plant. C. H. R.

The preparation of special calcium arsenates containing less than 40% arsenic as arsenic pentoxide and their use as boll weevil poisons. H. W. WALKER. *J. Econ. Entomol.* 21, 165-73(1928).—A specially prepd. Ca arsenate contg. 20% As as As_2O_5 was about as effective as com. Ca arsenate contg. 40% As as As_2O_5 in the control of the Mexican boll weevil. It is prepd. by heating As_2O_3 and pptd. chalk in the presence of excess air at 650° for 15-60 min. The effective content of As as As_2O_5 in this prepn. is 10-20%. Ca arsenate contg. any desired % of As as As_2O_5 up to 57.6% (theoretical for $\text{Ca}_3(\text{AsO}_4)_2$) can be prepd. by this method. Other arsenates may also be obtained by using carbonates, and in some cases sulfates, of the desired base. This special Ca arsenate does not injure the cotton plant. C. H. RICHARDSON

A preliminary report on the toxic value of fluosilicates and arsenicals as tested on the plum curculio. O. I. SNAPP. *J. Econ. Entomol.* 21, 175-8(1928).—The order of toxicity of a no. of compds was: $\text{Na}_2\text{SiF}_6 > \text{PbHAsO}_4 > \text{Ba arsenate} > \text{Ca}_3(\text{AsO}_4)_2 > \text{Zn arsenate} > \text{Mg arsenate} > \text{Mn arsenate} > \text{Al arsenate} > \text{Na}_2\text{SiF}_6 + \text{lime} > \text{scorodite (native Fe arsenate)}$. Na_2SiF_6 was very toxic to peach foliage and fruit; $\text{PbHAsO}_4 + \text{lime}$ was the safest to use under these conditions. C. H. RICHARDSON

Some notes on the Mexican bean beetle problem. N. F. HOWARD. *J. Econ. Entomol.* 21, 178-82(1928).—Mg arsenate or Ca arsenate and lime are superior to Na_2SiF_6 for the control of this insect. The As residues on beans treated with the arsenical mentioned are too small to offer a menace to human health. C. H. R.

Some observations upon the biology and control of the potato leafhopper. D. M. DELONG. *J. Econ. Entomol.* 21, 183-8(1928).—Most satisfactory results were obtained with Ca(CN)_2 applied as a dust and a pyrethrum ext. applied in a spray. C. H. R.

Notes on amyl salicylate as an attractant to the tobacco hornworm moth. A. C. MORGAN AND S. C. LYON. *J. Econ. Entomol.* 21, 189-91(1928).—Amyl salicylate and amyl benzoate are very attractive to these moths. C. H. R.

Chemical dust seed treatments for dent corn. J. R. HOLBERT, C. S. REDDY AND BENJAMIN KOEHLER. *U. S. Dept. Agr. Circ.* 34, 1-5(1928).—Expts. are reported showing increases in acre yield resulting from the treatment of well-selected but untested seed, from 1 to 3.4 bu. per acre, the mean increases being from 2.1 to 5.4 bu. per acre. The treatment by dust is designed primarily to kill certain seed-borne parasites without injuring the seed. Hg is the toxic agent in these dusts, one of which contains 4% of hydroxymercurinitrophenol sulfate, another 12% of hydroxymercuricresol and a third consists of 3.5% metallic Hg. These dusts are poisonous and the use of dust masks while dusting seed is recommended. C. R. FELLERS

Treatments against grape worms; arsenical products—dusts. P. VIALA AND P. MARSAIS. *Rev. vit.* 68, 217-9(1928).—A summary of the properties of various As preps., with suggestions as to concns. to be used, precautions, etc. P. R. D.

Chlorosis. G. KUHNHOLTZ-LORDAT. *Prog. agr.* vii. 89, 310-2(1928).—A description and discussion of the several "forms" of chlorosis, due to lime, Mn, Fe, S, lack of N and climatic conditions. P. R. DAYSON

Some preliminary notes on the use of sodium arsenite dust and spray in the control of the Mormon cricket (*Anabrus simplex* Halde) and the lesser migratory grasshopper (*Melanoplus atlantis* Riley). R. L. SHOTWELL and F. T. COWAN. *J. Econ. Entomol.* 21, 222-30(1928).— Na_3AsO_3 as a dust or a spray has great possibilities for the control of these insects. C. H. R.

The relative toxicities of arsenicals and fluorine compounds to various organisms. S. MARCOVITCH. *J. Econ. Entomol.* 21, 108-14(1928).—Larvae of the mosquito, *Culex quinquefasciatus*, were used to study the speed of toxic action of a no. of compds. The results are expressed by the equation, $K = (1/t) \log (1/\text{concn.})$, in which t is the survival time and K a const. expressing toxicity numerically. The K value for Na_2SiF_6 is 32.1; for Na_2AsO_3 9.6; for Na_2AsO_4 3.5; and for NaF 3.0. The following order of toxicity was obtained for another series of compds: $\text{Na}_2\text{SiF}_6 > \text{PbF}_2 > \text{Cu}(\text{CuO} \cdot \text{As}_2\text{O}_3)_2, (\text{C}_4\text{H}_7\text{O}_2)_2 > \text{BaF}_2 > \text{PbHAsO}_4 > \text{CuF}_2 > \text{Ca arsenate} > \text{SrF}_2 > \text{CaF}_2$. Na_2SiF_6 was more toxic than Na_2AsO_3 to grasshoppers, *Melanoplus femur-rubrum*, and cutworms, *Feltia ducens*. For some other invertebrates (*Lumbricus terrestris*, *Paramecium caudatum*, *Euglena* sp.) the order of toxicity for 3 compds was: $\text{Na}_2\text{SiF}_6 > \text{NaF} > \text{Na}_2\text{AsO}_3$. The min. fatal dose for rabbits by mouth was: NaF , 0.5 g. per kg.; Na_2SiF_6 , 0.12 g. per kg.; K_2AsO_3 , 14 mg. per kg. The toxic doses for man are, therefore, NaF 30 g., Na_2SiF_6 7.2 g. and K_2AsO_3 0.84. The effect of the daily administration of small doses is discussed. C. H. RICHARDSON

Testing commercial insecticides. L. HASEMAN. *J. Econ. Entomol.* 21, 115-7(1928). C. H. R.

Fish oil as an adhesive in control of the grape-berry and codling moths. H. L. DOZIER. *J. Econ. Entomol.* 21, 121-5(1928).—Fish oil has great possibilities as an adhesive in spray mixts contg. Pb arsenate, Bordeaux mixt. and dry lime-sulfur. It is not recommended for the late sprays. C. H. R.

Analyses of sprayed apples for lead and arsenic. A. HARTZELL and F. WILCOXON. *J. Econ. Entomol.* 21, 125-30(1928).—After spraying apple trees with 5 applications of Pb arsenate (4 lbs to 150 gals. water) in 1927, the following values in mg. per kg. fruit were obtained. Pb 0.155 to 1.80, av. 0.912; As as As_2O_3 , 0.042 to 0.193, av. 0.099. Compared with the results reported for 1926 (cf. Hartzell and Wilcoxon, *C. A.* 21, 3251) the As residue was smaller, correlated with a heavier rainfall. The ratio, Pb:As found in 1927, was considerably higher than expected from the compn. of the Pb arsenate used. This is probably due to the action of atm. agencies upon the Pb arsenate, resulting in more As than of Pb being dissolved and washed away. C. H. R.

Results of three years' work with dust sprays in Missouri. K. C. SULLIVAN. *J. Econ. Entomol.* 21, 131-4(1928).—Dusts consisting of S and Pb arsenate, of lime, Cu and Pb arsenate, and a Cu dust were tested in comparison with liquid sprays on apple trees infested with codling moth, brown rot and apple scab. The cost of dusts is greater than that of sprays, but labor costs favor the dusts. Because of inferior adherent qualities, dusts require twice as many applications as sprays. Dusts failed to control apple diseases as well as sprays. They may be economically employed, however, as supplements for sprays in codling-moth control. C. H. RICHARDSON

Fumigation tests with certain chlorides. R. C. ROARK and R. T. COTTON. *J. Econ. Entomol.* 21, 135-42(1928).—Twenty-one aliphatic chlorides were tested against insects which attack stored products. A mixt. of 3 vols. $(\text{CH}_2\text{Cl})_2$ and 1 vol. CCl_4 was most promising as a general fumigant. Although more toxic than $(\text{CH}_2\text{Cl})_2$, Me_2CCl requires a larger proportion of CCl_4 to render the mixt. free of fire hazard, and it tends to break down and attack metals. C_2HCl_3 is non-inflammable and fairly toxic at temps. above 26° . Expts. showed that none of the compds. used seriously affected the germination of wheat at the concns. employed. C. H. RICHARDSON

The constitution and the properties of some of the most used antiperonosporic agents. U. PRATOLONGO and M. P. ALLAN. *Giorn. chim. ind. applicata* 10, 3-7(1928).—A preliminary note. The constitution of Bordeaux mixt. has never been known exactly. The reactions described by Pickering (*C. A.* 2, 963) and by Wöber (*C. A.* 15, 2954) were confirmed when aq. $\text{Ca}(\text{OH})_2$ was first added to aq. CuSO_4 , but with excess $\text{Ca}(\text{OH})_2$ no decapic compd. could be identified, and expts. indicated that the solid phase was of the compn. described by Wöber. The soly. of $\text{CuSO}_4 \cdot 3\text{Cu}(\text{OH})_2$ in water at room temp. was 0.75 mg. (of Cu) per l., the satd. soln. having p_H 6.8. In water contg. CO_2 (1 atm. pressure) the soly. was 100 mg. (of Cu) per l. with p_H 4.4. When the aq. soln. was acidified by H_2SO_4 to p_H 5.8 and 3.6, the soly. became 50 and 250 mg. (of Cu),

resp., per 1. The soly. of $[\text{CuSO}_4 \cdot 4\text{Cu}(\text{OH})_2] \cdot 3\text{Ca}(\text{OH})_2$ in water at room temp. was 0.75 mg. (of Cu) per 1., the satd. solu. having p_H 7.0. In water contg. CO_2 (atm. pressure) the soly. was 100 mg. (of Cu) per 1. with p_H 4.4. When the aq. soln. was acidified by H_2SO_4 to p_H 6.0 and 4.6, the soly. became 50 and 150 mg. (of Cu) per 1. The compn. of Caffaro paste and of Caffaro powder, much used in Italy, are $3\text{CuO} \cdot \text{CuCl}_2$ and $3\text{CuO} \cdot \text{CaCl}_2 \cdot 4\text{H}_2\text{O}$. The former is therefore identical with the mineral atacamite. The soly. of each depends to a large extent upon the p_H value and therefore upon the presence of CO_2 . In water or in water satd. with air the soly. of $3\text{CuO} \cdot \text{CuCl}_2$ was only 1 mg. (Cu) per 1., but in water contg. CO_2 (1 atm.) it was 25 mg. (Cu) per 1. In water acidified with H_2SO_4 to p_H 6.4, 5.8 and 4.4, it was 12.5, 75 and 100 mg. (Cu), resp., per 1. In water at 20° , whether or not satd. with air, the soly. of $3\text{CuO} \cdot \text{CaCl}_2 \cdot 4\text{H}_2\text{O}$ was less than 1 mg. (Cu) per 1., but in water contg. CO_2 (1 atm.) it became 123 mg. (Cu) per 1. In water acidified to p_H 5.4 and 4.4, it was 25 and 175 mg. (Cu), resp., per 1. The constitution assigned by Fraipont to his important product, i. e., $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$, was confirmed. In water at 20° its soly. was less than 0.1 mg. (Cu) per 1., but in water contg. CO_2 (1 atm.) it became 12.5 mg. (Cu) per 1. In water acidified to p_H 6 and 3.8, the soly. was 25 and 250 mg. (Cu), resp., per 1. The soly. data on the 5 compds. are shown in detail in tabular and graphical form. Soly. under different conditions of acidity (CO_2) is of great importance in relation to the efficacy of the compds. as antiperonosporic agents. The soly. of none of these compds. is such as to render them caustic toward plant tissue. The soly. is, however, great enough to make them efficacious without being so great that they are soon removed by rain. A comparison of the soly. of these compds. and the quantity present in fodder with the conditions of acidity prevailing during digestion and the av. tolerance of domestic animals for Cu (5-10 mg per day for months) indicates that fodder from leaves treated with any of the compds. is practically harmless.

C. C. DAVIS

Volumetric estimation of C and CO_2 in rock products (Pirr) 7.

16-- THE FERMENTATION INDUSTRIES

C. N. FREY

Transformation of the α -bitter acid of hops in boiling in aqueous solutions of various reactions and the nature of the products formed. W. WINDISCH, P. KOLBACH AND R. SCHLEICHER. *Wochschr. Brau.* **44**, 453-9, 473-8, 485-90, 497-502 (1927).—The decoupling of humulone when boiled in acid and alk. solns. was studied. The formation of hard resin insol. in petroleum ether or hexane is an oxidation product. This product is not formed when air is excluded. The transformation of humulone to soft resins takes place when air is not present. The reaction is monomol. The product is an intermediate in the conversion of humulone to humulinic acid by boiling with alkali. The soft resin may consist of 2 substances.

C. N. FREY

The action of iodine on yeast. W. WINDISCH. *Wochschr. Brau.* **44**, 516-7 (1927).—The behavior of I with yeast follows the Arndt-Schulz law.* The protoplasm may be stimulated by small addns. but is destroyed by large ones. I stimulates only the velocity of reproduction and does not affect the assimilation of yeast, which may account for the high tolerance for I.

C. N. FREY

- Influence of storage temperature of yeast under water on fermentation, reproduction and acid formation in wort.** F. STOCKHAUSEN AND F. WINDISCH. *Wochschr. Brau.* **44**, 478-81 (1927).—A bottom yeast was kept 3 days under H_2O at 1° , 4° , 7° and 18° . The yeasts were then fermented at 13 - 15° . The lower storage temp. gave more vigorous fermentation and reproduction during the first days in the vat. After 9 days, the end of fermentation, all were alike.

C. N. FREY

Fixation of intermediate products of alcoholic and lactic fermentation. S. KOSTYCHEV AND S. SOLDATENKOV. *Wochschr. Brau.* **44**, 414-5 (1927).—Semicarbazide when added to fermenting sugar solns. forms methylglyoxal-disemicarbazone, indicating that methylglyoxal is an intermediate product. When added to a lactic fermentation a larger amt. of pyruvic acid semicarbazone is formed, showing that pyruvic acid may also be an intermediate product.

C. N. FREY

The mechanism of vinegar fermentation. CURT LUKOW. *Centr. Bakt. Parasitenk. II Abt.* **72**, 39-66 (1927).—A concise but quite complete review of the subject.

JOHN T. MYERS

The citric acid content of grape musts and wines. A. HREIDUSCHKA AND C. PYRIKL.

Z. Untersuch. Lebensm. **54**, 466-73 (1927).—Data are given on the citric acid content of various samples of grape musts and wines. WILLIAM J. HUSA

The carbonyl number of wines. H. STRACHE AND A. BRANDL. *Z. Untersuch. Lebensm.* **55**, 50-3 (1928).—A measure of the amt. of compds. contg. the carbonyl group is obtained for wines by application of the reaction of such compds. with phenylhydrazine. WILLIAM J. HUSA

The occurrence of vanillin in wine distillate spirits and blended spirits. G. REIF. *Z. Untersuch. Lebensm.* **54**, 90-101 (1927).—Compds. exist in wine distillate which give the same color reactions as vanillin. Therefore the only sure way of detection and detn. of vanillin in wine distillates is to use a method in which vanillin is finally isolated by sublimation. In wine distillate phenolic substances are present in amt. proportional to the depth of the brown color. Vanillin in wine distillates comes from the wood of the wine casks, the amts per l. being as follows. wine distillates 0.2 mg., spirits 0.1 mg., blended spirit none, except in one case, in which 0.05 mg. was found.

WILLIAM J. HUSA

A comparative study of six different strains of the organism commonly concerned in large-scale production of butyl alcohol and acetone (WEYER, RETTGER) 11C.

Apparatus for vinegar manufacture. F. NOLDIN. Brit. 274,328, Nov. 1, 1926.

Beer. HANSEKA AKT.-GES. and L. NATHAN. Brit. 274,225, April 26, 1926. Fermentation is effected in 2 stages at temps of 3-6° and of 10-25°, resp. Other details are specified and an app. is described.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Determination of ephedrine mixtures by the biuret reaction. C. T. FENG. *Chinese J. Physiol.* **1**, 397-406 (1927).—The ether-sol. violet pigment obtained by performing the biuret reaction on solns. of ephedrine and ψ -ephedrine has been adapted as the basis of a colorimetric method for the detn. of these 2 substances. The method is extended to the detn. of the relative proportions of mixts. of the 2 alkaloids in soln. since it has been found that together they give less color than the same amt. of either of them when present alone. Examn. of the residue left by evapn. of the ethereal soln. of the violet pigment leads to the differentiation of ephedrine in soln. from ψ -ephedrine; the former leaves a gelatinous residue, the latter rhombic, violet crystals. B. C. A.

The preparation of a solution of sulfur in oil for injection. H. W. VAN URK. *Pharm. Weekblad* **65**, 310-3 (1928).—For the treatment of dementia paralytica by intramuscular injection of S, a sterile soln. of 1% S in olive oil should be preferable to the colloidal S preps. which contain protein. A. W. DOX

Examination of oleum caryophyllorum. H. W. VAN URK. *Pharm. Weekblad* **65**, 345-9 (1928).—A sample of oil of cloves which failed to give the usual cryst. sepn. of a Na deriv. of eugenol when treated with an equal vol. NaOH gave with $\frac{1}{6}$ vol. NaOH a sepn. of crystals m. 90-2° which had a vanillin odor and showed the vanillin reaction with phloroglucinol and HCl. A. W. DOX

The essential oil from *Agathis australis* (Kauri pine). J. R. HOSKING. *Rec. trav. chim.* **47**, 578-84 (1928).—On distn. with water the leaves of *Agathis australis* yield 0.16% of an essential oil when collected in Dec. and Jan. and 0.05% when collected in June. The oil obtained in Dec. and Jan. showed the following consts.: d_4^{25} 0.9340, n_D^{25} 1.4952, $[\alpha]_{D_4}^{25}$ 24.41°, acid no. 0.39, ester no. 3.9, ester no. of the acetylated oil 15.9. On treatment with 2% NaOH a trace of a phenolic substance and 3% of resin were obtained and with NaHSO₃ 0.2% of citronellal, identified as α -citronellyl- β -naphthochinonic acid, m. 223°. On distn. of the oil the following fractions were collected: (1) 155-8° (762 mm.), 60.6%; (2) 158-61° (762 mm.), 4%; (3) 161-6° (762 mm.), 0.5%; (4) 65-90° (11 mm.), 2.6%; (5) 90-120° (11 mm.), 0.7%; (6) 120-39° (11 mm.), 8.7%; (7) 139-70° (11 mm.), 1.0%; (8) 170-90° (11 mm.), 14.1%; (9) 170-90° (1 mm.) 1.2%; (10) > 190° (1 mm.), 3%. Fraction 1 consists of d - α -pinene, d_4^{25} 0.8582, n_D^{25} 1.4634, $[\alpha]_{D_4}^{25}$ 13.28°; nitrosochloride, m. 114°; pinenenitrolbenzylamine, m. 122°; the fractions 2 and 3 contain d -camphene which was converted into isoborneol, m. 204°. In fraction 4 the presence of dipentene (tetrabromide, m. 120°), d -limonene (tetrabromide m. 106°) and of cineole (oxidation to cineolic acid, m. 195°) could be demonstrated. The

higher-boiling parts of the fractions 5 and 6 were added to fraction 7; the lower-boiling fractions consist of *d-borneol*, m. 200°, and of *bornyl acetate*. Fraction 7 was refractionated several times, finally 2 fractions being obtained, viz., (a) b_9 125-6°, d_4^{25} 0.9131, n_D^{25} 1.5014, $[\alpha]_{5461}^{25}$ -35.25°; (b) b_9 127-9°, d_4^{25} 0.9137, n_D^{25} 1.5062, $[\alpha]_{5461}^{25}$ -38.45°. Both these fractions on dehydrogenation with S (cf. *Helv. Chim. Acta* 4, 505 (1921)) gave *cadalene* and on treatment with HCl were converted into *cadinene-di-HCl*, m. 119°. The fractions 8 and 9 were refractionated several times over Na and thus yielded a viscous, blue oil, consisting of a *diterpene* $C_{20}H_{32}$, b_{10} 184-6°, b_1 140-2°, d_4^{20} 0.9686, n_D^{20} 1.5244, n_D^{25} 1.5208, $[\alpha]_{5461}^{25}$ -1.11°. On treatment with HCl in AcOH a *HCl salt* $C_{20}H_{33}Cl$, m. 110-1°, was obtained, which with a 10% alc. KOH soln. yielded a diterpene, called *kaurene*, m. 57-8°, which was converted quant. into the *HCl salt* m. 110-1°, mentioned above, by means of HCl. From the original viscous oil, b_{10} 184-6° the hydrocarbon also crystallizes on cooling to -15° while from the mother liquors of the prepn. of *kaurene-HCl* only the same HCl salt in a somewhat less pure state could be obtained. Fraction 10 on redistn. yielded 8 g. of impure *kaurene*, the residue consisting of a resinous mass which was not investigated further. H. thus concludes that the essential oil of *Agathis australis* (Dec and Jan.) contains 64% *d- α -pinene*, 13% *kaurene*, 7% *l-cadinene*, 3.2% *d-borneol*, 1.4% *bornyl acetate*, 1.0% *dipentene* + *d-limonene*, 0.7% *d-camphene*, 0.6% *cineole*, 0.2% *citronellal* and 3% *resin*. The oil obtained from the leaves, collected in June, in a yield of 0.05% contains 75% *d-pinene*, 6% *kaurene* and 3.5% *l-cadinene*. C. F. VAN DUIN

Preparation and stability of iodine tincture. P. BOHRISCH. *Apoth. Ztg.* 43, 436-40 (1928).—An exptl. study showing that the official Ger. method cannot be relied upon to yield correct values, the latter being invariably too high. To rectify such failure it will be necessary to modify the official method by adding 0.2 g. $MnSO_4$, or by recourse to some more dependable method, as, e. g., the procedures of Berg, Matthies and Brause, v. Bruchhausen and Stempel, Herzog and Schulze with modification of Runge. In detg. free I the addn. of KI is unnecessary. The stability of the official Ger. prepn. is excellent. So far as true results are concerned KBr may be substituted for KI; furthermore, the stability remains equally satisfactory when 70% alc. is used instead of the prescribed 90%. Finally, the prepn. keeps best in completely filled containers of brown glass. W. O. E.

Pharmacognostic studies of official German drugs. A. v. LINGELSHEIM. *Arch. Pharm.* 266, 218-31 (1928).—The drugs specifically studied and discussed are aloe, benzoin, crocus, jugsans, colombo, ononis, fenugreek, jesityry. W. O. E.

Stability of benzaldehyde cyanohydrin. G. BÜMMING. *Arch. Pharm.* 266, 231-2 (1928).—Since it has been shown that the HCN content of Bz HCN decreases with the lapse of time, the suggestion is made that only moderate quantities of the H_2O contg. it be prepd. at any one time. W. O. E.

Hydroferro- and hydroferricyanides of the alkaloids. II. W. M. CUMMING AND D. G. BROWN. *J. Soc. Chem. Ind.* 47, 84-6T (1928); cf. *C. A.* 19, 977.—Prior to microscopical examn. it is advisable to keep the pptd. salts in contact with the mother liquor as frequently they assume the cryst. form after a time. In order to make the tests more sensitive, a small micro-filter was designed applicable to filtering a drop of the reacting medium. As before, only a selection of the photomicrographs is given in this paper. Among the alkaloids examd. were sparteine, cinchonidine, hydrastine, nicotine, pilocarpine, piperine, codeine, morphine, narceine, ecgonine, caffeine and theobromine. W. O. E.

Constituents of some Indian essential oils. XXIII. Essential oil from the fruits of Piper cubeba Linn. B. S. RAO, V. P. SHINTRE AND J. L. SIMONSEN. *J. Soc. Chem. Ind.* 47, 92-4T (1928).—Steam distn. of the fruits gave a 7.4% yield of oil having the following compn.: *d-sabinene* 33, *d- Δ^4 -carene* and 1,4-cineole 12, *d- Δ^1 -terpinen-4-ol* and other alcs. 11, sesquiterpenes mainly *l-cadinene* 14, sesquiterpene alcs. 17, unidentified 13%. W. O. E.

Adsorption and its importance in medicine. ERICH HERRMANN. *Pharm. Monatsh.* 9, 59 (1928).—The differences in conception of absorption and adsorption are discussed, notably as related to the medicinal application of adsorbents. W. O. E.

Alkaloid from false angostura bark. J. TRÖGER. *Pharm. Zentralh.* 69, 209-17 (1928).—In examg. the ext. of an undetd. (false) angostura bark there was isolated a new amphiprotic base, $C_{21}H_{25}N_2O_3$, m. 167°, apparently isomeric with yohimbine and quebrachine. The perchlorate, $C_{21}H_{24}N_2O_3 \cdot HClO_4$; methiodide, $C_{21}H_{26}N_2O_3 \cdot CH_3I$ (still solid at 255°); ethiodide, m. about 275°, were prepd. W. O. E.

Liquor aluminii acetici D.A.-B. 6. H. MATTHES. *Pharm. Ztg.* 73, 422(1928).—A critical commentary on the official Ger. method of prepn. W. O. E.

Detection of arsenic by sodium hypophosphite solution. G. JOACHIMOGLU AND J. ZELTNER. *Pharm. Ztg.* 73, 422(1928).—It is shown that in As-free tablets contg. starch or sugar the Na hypophosphite test may lead to the conclusion that As is present, because of the dark color produced by the reagent. In order to avoid any uncertainty in the matter, the tablets should first be ashed prior to application of the test.

W. O. E.

Small apparatus for the preparation of aqua recentior destillata. E. RUPP. *Apoth. Ztg.* 43, 420-1(1928).—The entire app. consist essentially of an Erlenmeyer flask as distg. flask, a short vertical Allihn condenser, the lower delivery end carrying a glass hood large enough to project over the neck of the receiving bottle. The connecting one-piece still head has at the condenser end a bulbous exit to fit into the upper end of the condenser, thus dispensing with any cork connection, while the receiving end consists of an elongated spray trap (lower end cylindrical and contracted to a small opening and having 3 vertical slits for entry of vapors) partially filled with short glass beads of thin tubing. Connection of spray trap with distg. flask is effected by a suitable perforated stopper.

W. O. E.

Simple device for filling ampuls. E. BENOIT. *Pharm. Ztg.* 73, 439-40(1928).

W. O. E.

Lukutates. ANON. *Pharm. Ztg.* 73, 453-4(1928).—A further discussion relative to the fruit entering into the composition of this product. W. O. E.

Liquor aluminii acetici D.A.-B. 6. OTTO SCHMATOLLA. *Pharm. Ztg.* 73, 455(1928).—Polemical with respect to a recent paper by Matthes on the same subject.

W. O. E.

Detection of calcium in aluminum salts via D.A.-B. 6. GUSTAV. BRAUSE. *Pharm. Ztg.* 73, 454-5(1928).—A critical commentary. W. O. E.

Preserving action of nipagin and its homologs on pharmaceutical preparations. E. BÖHM AND H. JEGLIŃSKI. *Pharm. Ztg.* 73, 480-1(1928).—A study has been made of the relative antiseptic values of nipagin (Me *p*-hydroxybenzoate), Me nipagin, microbin, boric acid, thymol, Na benzoate, benzoic and salicylic acids as applied to pharmaceutical sirups, malt exts., succus liquiritiae and ungt. glycerini.

W. O. E.

Essential oil from the leaves of *Caesalpinia sappan* L. P. VAN ROMBURGH. *Proc. Acad. Sci. Amsterdam* 30, 840-3(1927).—The oil obtained in a 0.25% yield in 1902 showed d_{20}^{20} 0.841 (compared with d_{20}^{20} 0.825 for a sample distd. some 6 yrs. earlier), and $[\alpha]_D^{20}$ 76° in a 20-cm. tube. While the product had the odor of phellandrene, its low *d*. raised some doubt as to that substance being the principal ingredient. About 1/3 of the oil distd. at 65-70°/20 mm. and had d_{20}^{20} 0.813. A 2nd distn. over Na did not change the boiling pt. materially, the *d*. remaining the same, $[\alpha]_D^{20}$ being 59°59' in a 10-cm. tube, and n_D^{20} 1.473. The fraction was designated "hydrocarbon Caes" and had the compn. C₁₀H₁₆. Like phellandrene it gave a cryst. nitrite, m. 112°, thus agreeing with the melting point of *d*- α -phellandrene. Indications point also to the presence of a 2nd hydrocarbon, possibly oscimene.

W. O. E.

The content of ethereal oils in Middle Asiatic plants. M. I. KURBATOV. *Bull. Univ. Asie Centrale (Tachkent)* 1927, 217-37.—The ethereal oils of 45 plants, native to Central Asia, were studied with the view of prepg. them in large quantities and using them in perfume manuf. Detailed tabular results are given. RUSSELL C. ERS

Methods of extracting volatile oils from plant material and the production of such oils in the United States. A. F. STEVENS. U. S. Dept. of Agr., *Tech. Bull.* 16, 1-35 (1928).—A full description of the methods of oil extn. are given under the heads, volatile solvents, warm liquid fats, cold solid fats, expression and steam distn. The design and construction of stills and their operation are discussed together with a description of the methods used commercially in the U. S. for the production of the following oils: turpentine, safflower, wintergreen, sweet birch, witch-hazel, erigeron, eucalyptus, pennyroyal, peppermint, spearmint, Japanese peppermint, American wormseed, wormwood, tansy, dill, lemon, orange, apricot, bitter almond, cedarwood and hop. C. R. F.

The alkaloids of *Ceanothus americanus*. II. A. H. CLARK. *Am. J. Pharm.* 100, 240-2(1928); cf. C. A. 20, 1688.—The alkaloid is slow to ext. with org. solvents. The fatty material extd. with petroleum ether absorbs I; it had a sapon. value of 136 for one lot and 155 for another. A non-alkaloidal substance, m. 175°, was obtained along with this fat. Numerous lots of crude alkaloid have been obtained by simple extn. with alc. and also by continuous extn. in C.'s app. (C. A. 21, 1725). In both cases this was done with and without previous extn. with petroleum ether. Exts. were obtained from the alk. (drug moistened with lime, Na₂CO₃, NaOH, NH₄OH, etc.) drug

by percolation or continuous extn. with alc. and also acetone. No marked improvement in the yield or quality of the alkaloid was secured. No marked progress has been made in the study of the alkaloids. A very pure "gallo-tannic" acid was obtained. It is insol. in ordinary org. solvents, sparingly in cold H₂O but very sol. in hot H₂O. It crystallized from hot H₂O in needle-like crystals, m. above 220° (decompn.). This substance reduced Fehling soln., AgNO₃, Au and Pt solns. and gives a ppt. with I soln. and phosphomolybdic acid, the latter accompanied with a deep blue color. It ppts. Pb(OAc)₂ soln., the mixt. becoming red upon addition of NaOH soln. FeCl₃ gives a beautiful purple color, very permanent and becoming more intense upon standing.

W. G. GAESSLER

Tests for impurities in ether. Part I. Test for peroxides. G. MIDDLETON AND F. C. HYMAS. *Analyst* 53, 201-9(1928).—The following tests for ether peroxide and for H₂O₂ were studied and in this list each method is less sensitive than those mentioned before it. UO₂(NO₃)₂ test, CrO₃ test, Ce(NO₃)₃ test, Fe[Fe(CN)₆] test, Fe(OH)₂ test, Tollens Ag(NH₃)₂⁺ test, alk. KMnO₄ test, Co(OH)₂ test, H₃VO₄ test, *o*-tolidine-peroxidase test, K₂CdI₄ test, Ti⁺⁺⁺ test, K₂CdI₄ and starch test, KI test, KI and AcOH test, Stannous reduced phenolphthalein test, leucomechylgreen test, KI and starch test and the Fe(CNS)₂ test. The first test mentioned requires the presence of 20 parts per million of H₂O₂ and over 170 parts of ether peroxide, the last-mentioned test requires only 0.02 part per million of ether peroxide. The technic of the Fe(CNS)₂ test is improved and it is recommended for official adoption. A colorimetric limit to the permissible quantity of peroxide is also proposed.

W. T. H.

Determination of carvone in dill oil. J. REILLY AND F. J. DRUMM. *Analyst* 53, 209-11(1928).—A new method for the evaluation of carvone in dill oil depends upon the formation of its semicarbazone. To a cooled soln. of 6 g. semicarbazide hydrochloride in 15 cc. of water, add a soln. of 19 g. oil in 120 cc. of alc. and 6 g. of fused NaOAc in 10 cc. of hot water. After 24 hrs. dil. to 840 cc. with water, allow to stand for a short time, filter off the ppt. and dry in a vacuum over H₂SO₄. About 97% of the theoretical yield is obtained. Results obtained by this method agree with those obtained by the neutral sulfite method and are about 1% lower than those obtained by oxime titration.

W. T. H.

Reports of the essential oil sub-committee to the standing committee on uniformity of analytical methods. JOHN ALLEN, *et al.* *Analyst* 53, 214-6(1928); cf. C. A. 21, 4019.—Details are given for the *detn. of the acetylizable constituents in essential oils* with respect to the method of acetylation and the method of effecting the hydrolysis and for the *detn. of phenols in essential oils*.

W. T. H.

The behavior of ψ -cocaine bitartrate (psicaine) and cocaine hydrochloride toward a few reagents. MARIA FERRARIS. *Boll. chim. farm.* 66, 577-80(1927).—Psicaine is pptd. by most alkaloid reagents with the exception of HgCl₂. Unlike cocaine-HCl it does not react with KI, KOH, borax, Na₂AsO₄, KMnO₄, ZnSO₄, Cu salts, protargol and AgNO₃. It gives a copious ppt. with Pb acetate, turns slightly yellow when triturated with HgCl and gives only a faint BzOI₂ odor with alc. and KOH. The C₁₄H₁₆O₆ reactions may also be used for the differentiation.

MARY JACOBSEN

The determination of the solubility of digitoxin. KARAM SAMAN. *J. Egyptian Med. Assocn.* 11, 16-21(1928).—Frogs were pithed and the hearts perfused *in situ*. The quantity of perfused liquid was estd. by the use of Condon's magnet tipper controlled by direct measurement. A known amt. of the recrystd. digitoxin was dissolved in the least possible quantity of alc. and then dild. to the required vol. with Ringer soln. Digitoxin in satd. soln. arrests the frog heart within limits of time and vol. fixed at 5-25 min. and 20-100 cc. In the case of the time curve the soly. of digitoxin at 18.5° was 1/122,000 and in the case of the vol. curve it was 1/121,000.

J. A. KENNEDY

Content of stramonium in alkaloids. W. PLOSKI. *Bull. intern. acad. Polonaise* 1927B, 397-401.—Five series of expts. in which *Datura stramonium* J. v. *inermis* was grown without fertilizer, with K and P, and with K, P and N, the latter as NH₄NO₃ in 3 concns., proved that the fertilizer has no influence on the percentage of alkaloid calcd. on the dry matter in leaves, stems or roots.

L. W. RIGGS

Limits of determination of alkaloids in codex preparations. R. DEBREULLE. *Bull. sci. pharmacol.* 35, 169-74(1928).—The general procedure was to add to a measured quantity of the alkaloidal prepn. 5 to 10 cc. of 1% HCl and a measured amt. of neutral K iodomercurate (Mayer), agitate and after a few min. of contact filter. On a further addn. of K iodomercurate to the filtrate a ppt. should form. In this manner 18 alkaloidal preps. of the Codex were tested and coeffs. of pptn. were detd.

L. W. RIGGS

Digitine of Nativelle. P. BOURCET AND G. DUGUÉ. *Bull. sci. pharmacol.* 35, 175-6(1928); cf. C. A. 22, 1652.

L. W. RIGGS

Comparison of Ephedra equisetina and Ephedra sinica and their seasonal content of ephedrine. CHIH-TUNG FENG AND B. E. READ. *Chinese J. Physiol.* **2**, 87-96 (1928).—Assays of *E. equisetina* and *E. sinica* show 1.75 and 1.32%, resp., as the alkaloidal content, also the former contains greater relative and greater abs. amts. of ephedrine than the latter. Monthly assays show a progressive increase in the content of ephedrine in these 2 species, so that from spring to autumn there is an increase of about 200%. This supports the old Chinese custom of collecting this drug in the autumn. L. W. R.

Sclareol, the principal constituent of the absolute essence of clary sage. Y. VOLMAR AND A. JERMSTAD. *Compt. rend.* **186**, 783-5 (1928); cf. *C. A.* **22**, 1827.—This fraction of the abs. essence of *Salvia sclarea* L. is sep'd. from boiling petroleic ether as colorless cryst. needles, odorless and tasteless, m. 104-105°, boiling without decomn. at 182° under 1 mm., insol. in water and alkalies, sol. in the usual org. solvents, formula $C_{34}H_{52}O_4$, α_D^{20} in abs. alc soln. -6.12°. Sclareol is a polyatomic, non-sat'd. tertiary alc resembling the phytosterols and cholesterol. In $CHCl_3$ soln it gives a cherry red color with CCl_3CO_2H , a red color with conc'd H_2SO_4 and a green color with a mixt. of Ac_2O and conc'd. H_2SO_4 . Its soln. in anhyd. acetone when oxidized by permanganate gives (1) a non-acid substance m. 97°, formula $C_{17}H_{30}O_2$. This substance in air and light quickly changes to a resinous mass. (2) A cryst. acid, m. 160.5°, insol. in H_2O , sol. in org. solvents, inactive to polarized light, formula $C_{45}H_{76}O_7 \cdot CO_2H$, name *sclareolic acid*. Oxidation of sclareol by CrO_3 yields a different substance from sclareolic acid, which is non-acid, cryst., m. 125°, formula $C_{18}H_{30}O_2$. L. W. RIGGS

Variations in the alkaloidal content of the lupine under the influence of fertilizers. ALBERT GUILLAUME. *Compt. rend.* **186**, 888-90 (1928).—Expts. were made with *Lupinus mutabilis* without fertilizers (control), and with $MgSiO_3$, $MnSO_4$, KCl , NH_4 phosphate and $MgCO_3$ taken singly and with a complete fertilizer. The plants were collected while in flower. The increase in alkaloidal content was not parallel to the increase in vegetable tissue and therefore is not a function of plant growth. $MgSiO_3$ had slight effect and is not to be considered a fertilizer. K increased the wt. of vegetable tissue but decreased the alkaloidal content. Plants grown in an atm. contg. more CO_2 than air, but not exceeding 6%, showed no particular changes in alkaloidal content. If instead of calcg. the alkaloid as a percentage of dry wt., it is reckoned as wt. per stalk, the increase caused by $MgCO_3$ alone and by a complete fertilizer are, resp., 3.1 and 7.0 times that of the control. L. W. RIGGS

Quinine sulfate and its storage. C. EDWARD SAGE. *Pharm. J.* **119**, 264-5 (1927).—On exposing the salt $(C_{20}H_{24}N_2O_2)_2 \cdot H_2SO_4 \cdot 7.5H_2O$ (Brit. Pharm.) or $7H_2O$ (U. S. P.) to air, its quinine content increases on account of loss of H_2O which ceases when $2H_2O$ (4.6%) is reached. The anhyd. salt absorbs H_2O to the same limit. Still, as the manuf. of a stable salt of definite compn. is difficult, the purchase of the fresh salt for immediate use is recommended. S. WALDBOTT

Synthalin. A. W. EDWARDS. *Pharm. J.* **119**, 293-4 (1927).—A survey of the history of synthalin and its pharmacological action. Cf. *C. A.* **21**, 772, 1307, 3084, 2332, etc. S. WALDBOTT

Biochemistry and pharmacy, a scheme of biochemical training for pharmacists. FRANK WOKES. *Pharm. J.* **119**, 307-9, 331-2 (1927).—A synoptical outline and suggestions for such a course. S. WALDBOTT

A colorimetric estimation of coal-tar disinfectants. J. RAE. *Pharm. J.* **119**, 332 (1927).—The method, based on the reaction between HNO_2 and phenols, renders distn. unnecessary. Mix in a test glass an aq. soln. (1 in 200) of cresol disinfectant 1 cc., $NaNO_2$ (10% soln.) 1 cc., dil. H_2SO_4 (Brit. Pharm.) 1 cc.; allow to react for 15 min. agitating occasionally; add 5 cc., KOH soln.; then 50 cc. H_2O ; mix and filter off 50 cc. into a Nessler tube. Compare the color with that of a standard, i. e., a 1 in 1000 aq. soln. of *o*- or *p*-cresol. Treat 1 cc. in the same manner as the dil. disinfectant, using (without filtering) 50 cc. for comparison of color. Each cc. is equiv. to 0.4% of cresols in the original undil. disinfectant. S. WALDBOTT

The ephedrine content of Chinese Ephedra. B. E. READ AND C. T. FENG. *Pharm. J.* **119**, 356-7 (1927); cf. *C. A.* **21**, 3424.—No ephedrine (A) is contained in the root of "ma huang" (Fujii, *J. Oriental Medicine* **4**, 6 (1925)). The berries are non-poisonous, contg. but a negligible trace of a basic substance (< 0.017% by titration, < 0.0041% by the biuret color test). Blood-pressure tests also showed absence of a potent substance in ext. of the berries, while ext. of "ma huang" (B) contg. the equiv. of 1 mg. of $HCl-A$, had as strong an effect as that of 1 mg. of pure $HCl-A$. A graph is given of the results. Sep. assays of the entire stems, nodes and internodes of B gave: total alkaloids by titration, resp., 1.255, 0.413, 1.321%; parts of A per 1000 by biuret test: 848, 800, 850; parts of pseudo-A per 1000: 152, 200, 150. Since pseudo-A dilates

blood vessels while *A* causes contraction, the larger quantity of pseudo-*A* occurring in the nodes explains the Chinese preference of the internodes, for fear of the diaphoretic effect of *B*. S. WALDBOTT

Thomas Anderson Henry, Hanbury Medallist. ANON. *Pharm. J.* 119, 375-6 (1927).—Biography, with portrait, and list of publications. S. WALDBOTT

The contribution of the Pharmaceutical Society (of Great Britain) to education and research. T. A. HENRY. *Pharm. J.* 119, 378-82; *Chemist and Druggist* 107, 461-4 (1927).—An address. S. WALDBOTT

A further note on *extractum belladonnae liquidum*, *Brit. Pharm.* J. H. FRANKLIN. *Pharm. J.* 119, 395(1927); F. J. TODD. *Ibid* 450; cf. T., C. A. 21, 4023.—F.'s contention (cf. C. A. 21, 3424) that 100 parts of drug could be completely exhausted with the *Brit. Pharm.* menstruum upon collecting 85 fluid parts of percolate is confirmed in a new extn. of 100 lbs. of belladonna root. In the 1st 34 fluid parts, 92.6%, in a total of 80 fluid parts, 96.7% of the total alkaloids was recovered. The low results obtained by T. were probably caused by too rapid percolation. S. WALDBOTT

The extraction of ergot. I. Liquid extract of ergot. W. H. LINNELL and DOROTHY G. RANDLE. *Pharm. J.* 119, 423-7(1927).—By varying the conditions in the prepn. of 28 different exts., a method of prepn. was sought, which would insure the presence of the active principle as detd. by the Broom and Clark test (C. A. 17, 3749). Distd. H_2O and EtOH of different strengths are inefficient as extractive media. The addn. of $Ca(OH)_2$ does not increase the activity of the prepn., but the addn. of citric and tartaric acids greatly increases the efficiency of the extn. To prep. exts. of ergot stronger than 1 in 2 is unnecessary. A 50 or 60% alc. medium acidified totally with not less than 0.5% tartaric acid is advised, the prepn. of a "weak percolate" with unacidified menstruum is not necessary. Of the methods of extn. adopted by 9 pharmacopeias, only those of the U. S. P. and the Netherlands *Pharm.* yield fairly active preps. A new method of prepn. will be recommended pending conclusions as to the stability or keeping qualities of the exts. prepd. S. WALDBOTT

The centenary of E. Merck, Darmstadt. ANON. *Pharm. J.* 119, 430-1(1927).—An historical and descriptive account of the development of the firm. S. WALDBOTT

Mercuric potassium iodide tablets. "ANALYST." *Pharm. J.* 119, 450; R. J. STRATTON. *Ibid* 479; J. C. PENMAN and J. HOOD. *Ibid* 576; A. J. JONES. *Ibid* 479(1927); cf. C. A. 14, 2049.—Confusion is caused by the lack of a uniform definition of the ratio 1:1000 (8.75 grains per pint of H_2O) of these tablets. Logically, as is the case with most com. samples, 8.75 grains should refer to the wt. of the (sol.) salt $HgI_2 \cdot 2KI$ (4); the *Brit. Pharm. Codex* 1923 refers 8.75 grains to HgI_2 , and again, this wt. has been assigned to the (insol.) salt $HgI_2 \cdot KI \cdot 1.5H_2O$, by others to the anhyd. salt. By legal requirement (Great Britain), the actual quantity of *A* or of HgI_2 in the tablet must be stated on the label. S. WALDBOTT

British Pharmacopeia, 1914; further notes and criticisms. J. H. FRANKLIN. *Pharm. J.* 119, 454-5(1927); cf. C. A. 21, 1522.—*Liquor bismuthi et ammonii citratis* develops a thick fungus growth on standing; a preservative should be added. In *spiritus ammoniac aromaticus*, a simpler mode of adjustment to vol. is suggested, as well as some latitude to allow for slight losses of NH_3 or NH_4HCO_3 . The EtOH content of *vinum aurantii* should be from 14 to 15.4% by vol. for better preservation. S. W.

Analysis of jalap. H. E. DALE. *Pharm. J.* 119, 516-7(1927).—Put into a Wilkie extn. bulb (a 150-cc. separator bulb with tap cut off and the end drawn out into a tube plugged with cotton) 10 g. of powd. jalap and 50 cc. cold EtOH. Close with a cork and set the app. in a water oven together with a vessel to collect the percolate. Continue percolation until the percolate is no longer pptd. by H_2O . Make up the vol. to 100 cc. with EtOH, filter and evap. 50 cc. in a beaker to dryness on a water bath. Free the resin from EtOH completely by heat, then put the beaker into H_2O at 65° and add 15 cc. H_2O at 65°. Stir well for 2 min., put the beaker into cold H_2O , filter the washings, repeat, washing the resin with 15, 15, 15 cc. H_2O at 65°, cool and decant upon the filter. Dissolve the resin in 15 cc. EtOH, pour the soln. upon the filter, collect in a tared beaker. Transfer the resin completely from the beaker with hot EtOH, 10, 10, 5 cc., finally wash the filter paper with EtOH, evap., dry and weigh. The method yields concordant results and permits the judging of the resin content of jalap. S. WALDBOTT

The Harrison Memorial Lecture. F. S. PECK. *Pharm. J.* 119, 518-22(1927).—"The Educative Value of Harrison's Work in Pharmacy." Cf. C. A. 13, 247, 3280. S. WALDBOTT

The constituents of crude drugs. IV. Alkaloids. J. E. DRIVER and G. E.

TREASE. *Pharm. J.* 119, 545-8(1927); cf. *C. A.* 21, 4023.—The phys. and chem. properties and known structural formulas of the alkaloids of hemlock, Solanaceae, coca, cinchona, *Strychnos*, opium, ergot and the xanthine bases are reviewed. A table summarizes the botanical origin and percentage limits of the main alkaloidal constituents of 37 drugs. V. **Tannins and related substances.** *Ibid* 120, 148-9(1928).—A concise review of the properties, chem. compn. and classification of the various tannins and phenolic derivs., with a table of the botanical origin and percentage of tannic and phenolic constituents of 11 tannin-bearing drugs. S. WALDBOTT

The structure of common synthetic drugs. ANON. *Pharm. J.* 119, 550-2(1927).—The chem. origin, structure and physiol. functions of certain *antiseptics*, e. g., iodol, chloramine-T, aspirin, malachite green, of *narcotics*, e. g., chloritone, sulfonal, cocaine, of *antipyretics*, e. g., antipyrine, and of *organo-metallic compds.* are concisely stated. S. WALDBOTT

The new chemical research laboratory of the School of Pharmacy of the Pharmaceutical Society. W. H. LINNELL. *Pharm. J.* 119, 555-6(1927).—An illustrated descriptive account. S. WALDBOTT

Determination of morphine when present in small quantities. HARRY BRINDLE. *Pharm. J.* 119, 608-9(1927).—The Nicholls method (*C. A.* 17, 850) also adopted by Caines (*C. A.* 21, 4022) is recommended in preference to the Brit. Pharm. method. However, any free KOH or $\text{Ca}(\text{OH})_2$ present must be neutralized before the NH_3 is added. In the presence of KOH, only 10-14% of added morphine (*A*) was recovered; when KOH was neutralized, 96.4% of *A* was recovered in 3 extns. To det. pure *A* in quantities > 0.02 g., titrate with 0.02 *N* H_2SO_4 and back with 0.02 *N* KOH (methyl red). If *A* is < 0.02 g., use the colorimetric KIO_3 method (Georges, *Analyst* 31, 265 (1906)). Since a very slight variation in the concn. of the reagents considerably affects the color intensity, prepn. of the standard color and the solns. of *A* under identical conditions is important. Take of the sample to be tested a quantity contg. about 2 mg. of *A*, add 1 cc. of *N* H_2SO_4 , then H_2O to definite vol. (10 cc. to 20 cc.). Add 1 cc. of satd. KIO_3 soln., after 5 min. add 0.5 cc. strong NH_3 soln. Allow to stand for 5 min., then compare the color with that of a standard soln. of *A* prepd. in exactly the same way, using the same concns. of KIO_3 , H_2SO_4 and NH_3 . The colorimetric method is accurate to 5%, also the volumetric method when only 0.01 g. of *A* is taken. Its sensitivity increases with the quantity of *A* taken. S. WALDBOTT

The emetine reaction of ipecacuanha preparations. ÁRPÁD WOLLMANN. *Pharm. Acta Helv.* 3, 1-3(1928).—To 4 drops of tincture of ipecac add 10 drops of concd. HCl and 1 drop of 3% H_2O_2 (v. Mikó); at 60-70° an orange-yellow color is produced, indicating about 0.2 mg. alkaloid. To apply the test to powd. ipecac (*A*), Dover's powder (*B*), infusion of ipecac (*C*) and sirup of ipecac (*D*), put into a test tube, resp., 0.03 g., 0.3 g., 3 cc and 3 cc., add 1 drop 0.2 *N* NH_3 , 5 cc. Et_2O , shake for 2 min., remove 2.5 cc. of the clear Et_2O soln. into another test tube, evap., add 10 drops of concd. HCl, 1 drop 3% H_2O_2 and warm gently, as before. In *A* and *B*, a min. of 0.3 mg. of alkaloids, in *C* and *D*, a min. of 0.36 mg. is indicated. S. WALDBOTT

The parent plant of Natal aloe. R. MARLOTH. *Pharm. Acta Helv.* 3, 10-11(1928).—The parent plant of Natal aloe, no longer in commerce, was found to be *Aloe candelabrum* Berger (*Notizblatt, Bot. Garten, Dahlem*, 1906, 246). A photograph of the plant growing at Durban (Natal) is shown. S. WALDBOTT

Determination of tannin substance by means of chromed hide powder; its possible application to medicinal tannins (FRANÇOIS) 29. Alkaloids of ipecacuanha (STAUB) 10. Diacetylthiocarbamide *S*-alkyl ethers (U. S. pat. 1,667,053) 10. Preparation, purification and analysis of pyrogenous oils (HUERRE) 22.

Pharmaceutical compounds, etc. I. G. FARBERIND. A.-G. Brit. 274,058, July 8, 1926. Aminohydroxy compds. or polyamines of the aromatic series or their substitution products are converted into more strongly basic polyamino derivs. by the introduction of further amino groups which are joined to the aromatic amino groups by aliphatic, hydroaromatic, carbocyclic or heterocyclic residues; the latter may contain free or etherified OH groups and the C chain may be interrupted by O or S atoms. Aminohydroxy and polyamino compds. may also be condensed with halogenalkylamines or with the corresponding amino-alkyl esters of inorg. or org. acids, or the basic residues may be introduced by means of phthalimide compds. Compds. may be produced which are useful in combating blood parasites. Numerous examples are given.

Therapeutic amino metal mercapto compounds. W. SCHOELLER, A. FELDT, M. GEHRKE and E. BORGWARDT. U. S. 1,667,052, April 24. Na 4-amino-2-auro-

mercaptobenzene-1-sulfonate is treated in aq. soln. with phosgene, until no further diazo reaction occurs, to form the urea of the 4-amino-2-auriomercaptobenzene-1-sulfonic acid (the Na salt of which may be formed and pptd. with alc.). By this and similar processes there are obtained products which may be used as therapeutic agents in combating spirochetes. Au and Ag compds. of these products may be employed.

Phthalamic acid esters and anesthetics produced from them. A. CHESNAIS. Brit. 273,765, July 3, 1926. Phthalamic acid esters are prepd. by adding aq. NH_3 to phthalic anhydride, treating with alkali or alk. earth hydroxide to form a phthalamate and esterifying with an alc. in the presence of H_2SO_4 . Me, Et, Pr, iso-Pr, Am, iso-Am and benzyl esters are mentioned. Anesthetics are produced by reaction of these esters with derivs. of *p*-aminobenzoic acid such as *p*-aminobenzoyldiethylaminoethanol.

Attenuating bacteria or their toxins. E. LILLY & Co. Brit. 273,349, Jan. 4, 1926. Cultures such as those of streptococci or staphylococci, living or dead, or a toxin such as that of diphtheria or scarlet fever is attenuated or detoxified by treatment *in vitro* with a surface-tension depressant such as a 20% soln. of Na ricinoleate. The products may be used as therapeutic agents or for the production of anti-toxic serums.

Disinfectants. BRITISH DYE STUFFS CORPORATION, LTD., T. H. FAIRBROTHER and A. RENSHAW. Brit. 274,187, April 14, 1926. A block composed of auramine (or any other salt of aminotetramethyldiaminodiphenylmethane) and plaster of Paris, diatomite or a volatile solid such as C_{10}H_8 (with or without addn. of NaCl) is placed in water used for flushing urinals, etc.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Some unexplored sources of sulfuric acid. E. T. ELLIS. *Dyer, Calico Printer* 59, No. 698, 73(1928).—Sources of H_2SO_4 suggested are calcination of FeSO_4 , oxidation of SO_2 by means of HIO_3 and reaction of K_2SO_4 with B_2O_3 . CHAS. E. MULLIN

Formation of sulfur dioxide by burning sulfur. ANON. *Svensk. Pappers-Tid.* 31, 173-7(1928).—The quality of the gas depends on the construction and operation of the S furnaces and coolers. The use of an automatic rotary burner is described in detail.

W. SEGERBLOM

A new process for the manufacture of zinc oxide. JEAN BERTHONNEAU. *Rev. gén. caoutchouc* 1928, No. 38, 7-8.—The new Cornillat process (cf. French Patent 632,235) burns metallic Zn but does away with retorts and allows intermittent production without deterioration of the furnaces. Its advantages are the simple and economical equipment, the use of liquid fuel, a higher yield, a product as fine as C black and the negligible cost of upkeep. The equipment consists of a metal rotary furnace, an oxidation flue of refractory brick and an ordinary condensation chamber equipped with fine gauze and externally air-cooled. A mazout flame is directed into the furnace and when a sufficient temp. has been reached Zn is added and the jet of burning mazout is projected on to the Zn bath. By rotating the Zn bath, the Zn is in permanent contact with the incandescent walls of the furnace. The Zn vapor is carried very rapidly through the oxidation flue, direct contact of flame and Zn vapor and the rapid movement of the vapors making the product extraordinarily fine. The furnace is charged each 2 hrs. and meantime requires no supervision. Each furnace produces about 2 tons of ZnO per day. The ZnO has a light grayish cast due to C from the mazout. C. C. D.

Chromic oxide and its recovery from waste products. A. HUTIN. *Cuir tech.* 17, 139-40(1928).—Methods of prepn. and the value of Cr pigments are briefly outlined. It is suggested that spent chrome liquors be utilized in the production of Cr_2O_3 .

J. G. NIEDERCORN

Composition of bleaching powder. C. T. KINGZETT. *J. Chem. Soc.* 1928, 528.—The formula $\text{Ca}(\text{ClO})_2 \cdot 4\text{H}_2\text{O}$ represents only the compn. of the substance as sepd. in a more or less wet condition, by rapidly drying between sheets of filter paper. H. S.

The use of plaster of Paris and allied substances for dental models. C. S. GIBSON AND W. H. SODEAU. *Brit. Dental J.* (reprint) 6 pp. Dec., 1927. H. J. DEUEL, JR.

Ignition point of activated charcoals (SWIENTOSLAWSKI, ROGA) 22.

Phosphoric acid. INGENUIN HECHENBLEIKNER. U. S. 1,667,549, April 24. Phosphate rock is ground in H_3PO_4 with addns. of dil. H_2PO_4 sufficient to provide a substantially continuous overflow of acid and fluid product of the grinding, and the overflow is treated with H_2SO_4 . An app. is described.

Stabilizing hydrocyanic acid. H. LEHRCKE. Can. 276,027, Dec. 6, 1927. Liquid HCN is stabilized by adding to it small quantities of salts or other acid products, such as org. halogen compds., which are capable of hydrolysis or ionization under certain conditions.

Hydrogen sulfide. H. H. SMITH. U. S. 1,667,272, April 24. Steam and a restricted quantity of air are passed through a mixt. comprising sulfides of Fe or Cu or other S-bearing material and C, to obtain a gas consisting largely of H_2S . An app is described.

Ammonia synthesis. W. GAUS and W. WILD. U. S. 1,666,694, April 17. In prep. gases for the catalytic synthesis of NH_3 , a producer is operated by use of incandescent fuel and steam and with 2 kinds of oxygenated air, one contg. less and the other more O than atm. air, and both derived from rectification of liquid air, while controlling their proportions so as to give a gas mixt. contg. one vol. of N for each 3 vols. of H and CO together; the producer can thus be continuously operated without intercalating heating periods; the gas mixt. from the producer is treated, e. g., passed with steam over Fe oxide or $Ca(OH)_2$, to substitute H for the CO and to remove CO_2 .

Ammonia synthesis. A. T. LARSON. U. S. 1,667,322, April 24. A catalyst is prep. by forming particles from an intimate mixt. of Fe oxide, K_2O and MgO and treating the particles with a H-contg. gas at 300–700°. U. S. 1,667,323 specifies a similar process in which a mixt. of Fe oxide and oxides of Mg and Na may be used.

Ammonia synthesis. Soc. d'ÉTUDES MINIÈRES ET INDUSTRIELLES. Brit. 274,023, July 6, 1926. The temp. for the process described in Brit. 253,540 (C. A. 21, 2536) is reduced to 250–450° when the Al_2O_3 , MgO or CaO of the catalytic mixt. is replaced by a halide, oxyhalide, oxide, ferrocyanide, or ferricyanide of an alkali or alk. earth metal. Li_3NH_2 or a Li imide also may be used.

Ammonia synthesis. F. UHDE. Brit. 273,735, July 2, 1926. Catalysts are used comprising Fe, Al, C and N and an alkali metal or alkali metal compd., preferably a compd. of K such as the cyanide or ferrocyanide. A soln. of $Al_2(SO_4)_3$ or $AlCl_3$ may be mixed with a soln. of $K_4FeC_6N_6$ and the mixt. evapd. to dryness *in vacuo* and then heated with H, with or without N, preferably under pressure at 300–450°. The NH_3 synthesis may be effected at about 400° under 100 atm. pressure.

Catalytic oxidation of ammonia. I. W. CIDERBERG. U. S. 1,666,958, April 24. In forming N oxides, a mixt. of NH_3 and O is passed over a catalyst heated to a reaction temp. and one face of the reaction zone is cooled so that a high-temp. gradient is formed between the catalyst and the cooled face. Cf. C. A. 21, 303.

Catalytic oxidation of ammonia. N. CARO and A. FRANK. Brit. 273,718, June 29, 1926. In producing highly concd. HNO_3 by catalytic oxidation of NH_3 with air or O, the heat of reaction is absorbed by arranging in advance of the catalyst a layer of water or other liquid through which the reaction mixt. is bubbled. Various details and modifications are described.

Oxidizing ammonia. N. CARO and A. R. FRANK. Brit. 274,099, July 8, 1926. Elementary H is added to the mixt. of NH_3 and air or O and oxidation may be effected under pressure as described in Brit. 273,718 (cf. preceding abstract).

Alkaline earth metal sulfides. T. LICHTENBERGER and K. FLOR. U. S. 1,667,423, April 24. An alk. earth sulfate is dissolved in molten alk. earth metal salts such as CaF_2 and alkali fluorides which are fusible without water and which do not decomp. alk. earth metal sulfates when molten; coke is added to effect reduction to sulfide and the materials are sepd. by sedimentation of the sulfide produced.

Alumina. H. SPECKETER. Can. 276,643, Dec. 20, 1927. Bauxite is dissolved in an acid, and the soln. is filtered off from the insol. silicic and titanic acids and evapd. The remaining salts are heated to such a temp. that they are decompd. into oxides and acids. The oxides, freed from silicic acid, are heated with C in a suitable furnace up to their decompn. into Al_2O_3 and metallic Fe.

Ammonium chloride. J. W. MOORE, W. G. POLACK and CASTNER-KELLNER ALKALI CO., LTD. Brit. 274,263, June 25, 1926. Synthetic NH_3 is treated with a mixt. of HCl and H obtained by the direct combination of H and Cl, the H being in excess. Cf. C. A. 22, 1831.

Separating borax from mixed salts. G. B. BURNHAM. U. S. 1,666,733, April 17. Mixed salts which contain borax together with salts of greater soly. are caused to move countercurrent to a lixiviating liquid such as "brackish water."

• **Calcium arsenate.** W. C. PIVER. U. S. 1,667,490, April 24. CaO is first hydrated to produce a dry hydrated powder without excess water, the hydrated product is then agitated and arsenic acid of a suitable sp. gr. is added in only such quantity and at such a rate that the heat of the resulting reaction drives off excess water present, including

the water of hydration, to produce Ca arsenate in dry powder form. U. S. 1,667,491 specifies the use of an excess of CaO in both stages of the process.

Calcium sulfate masses. R. SCHÖNHÖFER. Can. 276,227, Dec. 13, 1927. Self-setting CaSO_4 masses are produced by wet-grinding unburnt CaSO_4 material, drying, and grinding it to powder.

Light-weight gypsum products. C. K. ROOS and M. G. ALLISON. U. S. 1,666,180, April 17. For the purpose of increasing the bulk and decreasing the weight of products such as calcined gypsum, the gaging water for each 100 parts of material carries 2.3 parts of Na silicate soln.

Chromates and aluminates. I. G. FARBENIND. A.-G. Brit. 273,666, July 1, 1926. Chrome ore is heated with bauxite or other aluminiferous material in the presence of alkali carbonates or mixts. forming such carbonates at decompn. temp. On lixiviating the product a soln. of chromates and aluminates is obtained. Caustic alkali may be used instead of carbonate and lime may be added.

Copper sulfate and nickel. E. BREUNING. Brit. 274,064, July 10, 1926. Metal sheets formed of alternate layers of Cu and Ni are treated with an aq. soln. of a ferric salt such as $\text{Fe}_2(\text{SO}_4)_3$ to dissolve the Cu as sulfate and leave the Ni unattacked. The treatment may be at a temp. of 80° and in the presence of air, O, persulfates and O carriers such as ceric sulfate.

Ferrous sulfate. II. C. STEWART. U. S. 1,667,693, April 24. A stream of FeSO_4 soln. of $35\text{--}40^\circ \text{Bé.}$ is treated with a transverse stream of air to effect atomization and crystn. of the FeSO_4 . An app. is described.

Ferric sulfate. B. HART, HARRIS, HART & Co., LTD., and REFINERS, LTD. Brit. 273,883, June 12, 1926. Ferruginous wastes such as oxidized Fe borings resulting from the manuf. of aniline are treated with H_2SO_4 first in sufficient quantity to render the Fe sol. and then with addnl. H_2SO_4 and an oxidizing agent such as HNO_3 or a nitrate or MnO_2 .

Lead carbonate and acetate. R. DALOZE. Brit. 273,660, July 3, 1926. Crude Pb sulfate and an excess of Ca acetate or other alk. earth acetate are mixed and the insol. matter is sepd. and the clear soln. thus obtained is treated with a base such as $\text{Ca}(\text{OH})_2$ to form tribasic Pb acetate in soln. By use of CO_2 , this is decompd. to produce Pb carbonate. The Ca acetate is regenerated.

Sodium hypochlorite. M. P. APPLEBY and C. CARTER. Brit. 274,197, April 16, 1926. A dry stable prepn. of NaOCl is obtained by admixt. of a strong soln. or the melted crystals of the NaOCl with anhyd. or partially or completely dehydrated salts of definitely alk. character, which are either capable of forming stable hydrates or of producing by reaction with NaOCl Na salts which will form stable hydrates, *e. g.*, Na metaborate or K_3PO_4 . Brit. 274,198 specifies the use of Na_3PO_4 or compds. which will form it such as Na_2HPO_4 and NaOH.

Separating sodium stannate from sodium arsenate and antimonate. H. HARRIS. Brit. 273,440, May 7, 1926. Mixts. of Na stannate and Na arsenate, with or without Na antimonate, are treated without heating, with NaOH soln. of such strength as to dissolve only the Na stannate, the soln. is sepd. and the residue is treated for the recovery of pure Na arsenate.

Washing and bleaching powders containing persalts. G. LERSCHIK. Brit. 273,711, July 5, 1926. Quant. liberation of O from persalts is obtained by the use of catalysts such as Mn sulfate or lactate or Mn K sulfate or of tyrosinase (which may be obtained from potato skins).

Treating materials containing lead and zinc. W. H. CORBOULD. Brit. 273,420, April 13, 1926. Material contg. oxides of Pb and Zn is treated with HOAc to dissolve the Pb and Zn, the Pb is pptd. as sulfate and the Zn acetate and HOAc soln. is treated for sepn. of the Zn and recovery of the acid for further use. Numerous details and modifications are given.

Precipitation of metal hydroxides. O. LEDERER, W. STANSZAK and H. KASSLER. Can. 276,338, Dec. 20, 1927. Metal hydroxides, free from Fe, are pptd. from metal salt solns. contg. Fe, by allowing basic substances to react with such metal salt solns. in the presence of H_2S , a slightly acid reaction being maintained during the pptn.

Activating carbon. VEREIN FÜR CHEMISCHE INDUSTRIE AKT.-GES. Brit. 273,683, July 3, 1926. The process described in Brit. 259,616 (C. A. 21, 3430) is modified by starting with C in the form of dust which is then made into press-cakes with a binder such as wood tar and the press-cakes are then coked and the material is activated.

Activated carbon. NAAMLOOZE VENNOOTSCHAP ALGEMEENE NORIT MAATSCHAPPIJ. Brit. 273,761, July 3, 1926. In activating carbonaceous material with gases such as superheated steam, CO_2 , air, Cl, SO_2 or combustion or generator gases, vertical retorts

are used of elongated cross-section with the major dimension at least double the minor dimension. Coarse raw material may be mixed with fine material being activated.

Separating hafnium and zirconium. A. E. VAN ARKEL and J. H. DE BOER. U. S. 1,666,800, April 17. A mixt. of Hf and Zr compds. such as the orthophosphates is treated with Hf and the resulting complex compds. are subjected to fractional crystn. Cf. C. A. 22, 1219.

Separating hafnium and zirconium. J. H. DE BOER. U. S. 1,666,811, April 17. A soln. is formed from the action of cond. H_2SO_4 on a mixt. of phosphates of Hf and Zr; at least one other salt of Hf and Zr is added to the soln. and the latter is subjected to pptn., *e. g.*, by adding water. Cf. C. A. 22, 1219.

Separation of hafnium and zirconium. J. H. DE BOER. Can. 275,696, Nov. 22, 1927. A mixt. of Hf and Zr phosphates is introduced into a medium contg. HF and is subjected to fractional decompn. by the addn. of boric acid or other boron compd. The mixt. of Hf and Zr phosphates thereby pptd. is richer in Hf than the original mixt.

Separating hafnium and zirconium. D. COSTER and G. VON HEYBESY. U. S. 1,666,440, April 17. Oxychlorides or other halogen compds. of Hf and Zr are subjected to fractional crystn., *e. g.*, from a soln. in HCl . Cf. C. A. 22, 1220.

Separation of a mixture of hafnium and zirconium. NAAMLÖÖZE VENNOOTSCHAP PHILIPS GLOEILAMPENFABRIEKEN. Dutch 17,742, Feb. 15, 1928. The mixt. in the form of the phosphate soln. contg. free HF is fractionally pptd. by addn. of H_2SO_4 , H_3BO_3 or other B compds., Al, Sn, Mo, W, Cr, Cb, V, Ta or Be salts or SiO_2 sol. Part of the soln. pptd. by alkali to give ZrO_2 may also be used for pptn. of the rest.

Sulfur from alkaline earth sulfates. SALZWERK HEILBRONN AKT.-GES., T. LICHTENBERGER and K. FLOR. Brit. 273,841, April 16, 1926. In a process of obtaining S from alk. earth sulfates as described in Brit. 251,942 (C. A. 21, 1526), the NaCl used as a flux is replaced by other alkali or alk. earth salts which fuse without liberating water and which when fused have no decomp. action on alk. earth sulfates. Alkali metal sulfates or fluorides may be used.

Detergents and bleaching agents. T. BENCKISER, A. REIMANN and A. REIMANN (trading as J. A. BENCKISER) and F. DRAISBACH. Brit. 273,414, April 7, 1926. Soap powders contg. perborate or similar persalts, with or without soda, are also mixed with NH_4 phosphate or a neutral or acid pyrophosphate or an alkali to increase their stability and retard the liberation of O in the washing and bleaching bath.

Stencil sheets. S. HORII. Brit. 274,241, May 25, 1926. See U. S. 1,664,033 (C. A. 22, 1660).

Transfer sheets. W. F. GRUPE. U. S. 1,667,689, April 24. Sheets for heat impression transfers are formed of glassine paper coated with a mixt. of powd. Al or other metal powder and an aldehyde and phenol condensation product.

Colloidal emulsion. R. WHITTELSEY. Can. 276,438, Dec. 20, 1927. An emulsion specified consists of a non-aq. soln. of an org. colloid and a liquid substantially free from dissolved materials.

Water-repellant substance. G. J. MANSON. Can. 276,392, Dec. 20, 1927. An aq. emulsion contains wax coated with a ppt. formed from 2 H_2O -sol. electrolytes.

Treatment of condensation products of urea or its derivatives. K. RIPPER. Can. 276,324, Dec. 13, 1927. A molding compn. consists of condensation products resulting from the reaction of a urea and CH_2O brought to a fine state of division and incorporated with substances capable of exercising a swelling action.

Gramophone records. F. G. MITCHELL. Brit. 273,716, June 30, 1926. A disk is cut from a sheet of celluloid or the like and is treated with a solvent such as MeOH, acetone, AmOAc or EtOH, an alc. camphor soln. or mixts. of these. After 15–30 sec. a coating of finely powd. thermoplastic material which may be formed of a mixt. of pipe clay, shellac, rotten stone, barytes, C black and resin is applied and the disk is dried either at about 50° for $\frac{1}{2}$ –1 hr. or at about 22° for 2–4 days. The disks are impressed with the record by use of heated matrices.

Solution for use in hydraulic brake system of automobiles. W. G. CALKINS. U. S. 1,66,6871, April 17. Castor oil 50 and BuOH 50 parts are used together.

Dressing composition for brake bands. E. J. SCHELLING. U. S. 1,667,222, April 24. Castor oil 95 and lard oil 5%.

Coating core strands with pulp fibers. J. S. LITTLE. U. S. 1,666,214, April 17. A core such as an elec. conductor is subjected to a liquid contg. pulp, *e. g.*, wood, jute, cotton or asbestos pulp, in the presence of soap so that a coating of felted fibers is produced which is of uniform character.

Translucent projection screen. H. PADAIN. Brit. 273,849, April 22, 1926. A "base" which may be paper, parchment or a fine cotton or linen fabric is treated with

solns. of Na silicate of successively increasing concns. Yellow or other dyes may be added to the soln. as may also sugar, molasses, cellulose, glycerol, casein or castor oil or these substances, or some of them, may be separately applied to the screen. Crude rubber may be added to roughen the surface.

Fire-extinguishing composition. POLBO FEUERLÖSCH APPARATE GES. Brit. 273,713, June 30, 1926. MeBr 60, CCl₄ 35 and ethylene bromide (or a similar substance which is stated to prevent formation of phosgene) 5%.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Recent progress in the glass industry. W. E. S. TURNER. *Glass* 4, 186(1927) - Production statistics are given. W. RISING

Glass-works practice. T. C. MOORSHEAD. *Glass* 4, 280(1927). - A description of the modern method of manufg. glass. W. RISING

The glass industry of Czechoslovakia. THEODORE WOLFRAM. *Ceram. Ind.* 9, 542(1927). - A description is given of the historical development of the industry giving present status, number of plants, their products, number of employees per plant and their estimated output. W. RISING

The use of cullet in glass manufacture. J. CURRIE. *Glass* 4, 243(1927). - Some modern machines, especially the Westlake, have a tendency to produce too much cullet. The careless and indiscriminate use of cullet in the batch will only result in the formation of greater amounts of cullet from bad ware. For best results the proper ratio of cullet to batch should always be maintained and the cullet should be broken to a suitable state of fineness and thoroughly mixed with the batch. W. RISING

The flow of glass in tanks. D. J. McSWINEY. *Glass Ind.* 8, 255-8(1927); cf. C. A. 21, 3720. H. P. HOOD

Some notes on the annealing of glass. H. V. E. RENN. *Glass* 4, 428, 470(1927). W. RISING

The analysis of a simple soda-lime-magnesia-silica glass, and some pitfalls to be avoided. VIOLET DIMBLEBY. *Glass* 4, 374(1927). W. RISING

The devitrification of glasses. IV-B. K. TABATA. *Researches Electrotech. Lab., Tokyo* No. 211, 6 pp (1927). (In English) - The same method of surface devitrification by heat as described in the previous papers (C. A. 21, 1170, 2054) has been applied to the series of glasses having comps. of 1.0 R₂O, 0.5 MgO, γ SiO₂, 1.0 R₂O, 0.75 MgO, γ SiO₂, 1.0 R₂O, 1.0 MgO, γ SiO₂, 1.0 R₂O, 1.5 MgO, γ SiO₂ and 1.0 R₂O, 2.0 MgO, γ SiO₂. The results show that MgO in these glasses is present as MgO·2SiO₂, and that MgO·2SiO₂ does not dissolve SiO₂. W. OGAWA

The weathering of glasses. II. K. TABATA, K. YEGAMI AND S. MORIYASU. *Researches Electrotech. Lab., Tokyo* No. 189, 15 pp (1927). (In English.) - The samples were taken from melts of 1.0 R₂O, 0.5 BaO, γ SiO₂; 1.0 R₂O, 0.75 BaO, γ SiO₂; 1.0 R₂O, 0.5 CaO, γ SiO₂; 1.0 R₂O, 0.8 CaO, γ SiO₂ and 1.0 R₂O, 0.5 ZnO, γ SiO₂ (cf. C. A. 21, 1170). The results showed that all the glasses under expt. suffered weathering pretty much in the atm. The crystals produced on the glass surface by weathering were alkali metasilicate (with some water of crystn.). The results show that the alkali present in ordinary glass constitutes alkali metasilicate. W. OGAWA

The relative importance of errors in sampling and measurement in ceramic research. A. E. R. WESTERMAN. *J. Am. Ceram. Soc.* 11, 264-70(1928). C. H. KERR

The effect of temperature on the optical properties of kaolinite. T. N. McVAY. *J. Am. Ceram. Soc.* 11, 224-6(1928). - Euhedral crystals of kaolinite were heated to various temps., draw trials made at frequent intervals and the effect of temp. was studied microscopically. The results indicate 3 classes of kaolinite: (1) the natural kaolinite, (2) the uniaxial form produced at 625°, the metanacrite of Rinne and (3) the change of the metanacrite into what is probably mullite and glass at 1450°. C. H. KERR

A lecture on china clay. G. S. CLARKE. *Pottery Gazette* 31, 435(1928).

The influence of different feldspars on the "freezing" behavior of cones. E. ORTON, JR. AND J. F. KREHBIEL. *J. Am. Ceram. Soc.* 11, 215-23(1928). - While German and American cones (cone 10) check well in normal firing, they diverge when subjected to a freezing (or arrested heating) treatment. The freezing effect was most

serious in the Hybla feldspar and best in the Swedish feldspar. The kaolin used with the feldspar has some influence in the amt. of freezing effect produced. C. H. K.

The water-absorbing capacity of ceramic products referred to volumetric values exclusively. JOSEF MATRJKÁ. *Sprechsaal* 61, 39-40(1928).—The formula $\frac{\% \text{ absorp-}}{\text{wet wt - dry wt.}}$

$\text{tion} = \frac{\text{wet wt} - \text{dry wt.}}{\text{dry wt.}} \times 100$ does not give a sufficiently clear conception of the relative porosity of pottery because its value is not only dependent on the size of the open pores but also on the wt per unit of the vol material. It is therefore better to refer the pore vol. to the total specimen vol. The volumetric H_2O -absorbing capacity = $\frac{\text{wet wt} - \text{dry wt.}}{\text{vol. of specimen}} \times 100$.

R. A. HEINDL

Use of manganese in the manufacture of face brick. G. E. SEIL and H. A. HEILIGMAN. *J. Am. Ceram. Soc.* 11, 241 8(1928).—A discussion of the effect on color of variations in size of the Mn particles, compn. of the Mn and of the character of gaseous conditions of firing.

Some experiments in terra cotta slips. E. C. HILL. *J. Am. Ceram. Soc.* 11, 260-3(1928).—Variations in compn were studied. *Vitrification*.—Decreasing clay is the most effective means of increasing vitrification. Other means are to increase feldspar, decrease Cornwall stone or increase ball clay at the expense of china clay. *Crazing* is best overcome by increasing clay. Crazing may be reduced by substituting Cornwall stone for feldspar or china clay for ball clay. *Cracking* is reduced by increasing Cornwall stone or by substituting china clay for ball clay. *Color*.—Whiteness is increased by increasing clay or substituting Cornwall stone for feldspar or china clay for ball clay.

C. H. KERR

A new method of testing paving bricks. J. A. VAN DER KLOES. *Brit. Clayworker* 36, 364-6(1928).—The Brinell test for steel is recommended with certain changes. The test consists in laying the bricks in a suitable box of sand and filling the interstices with sand. The middle brick of several in the box is subjected at its middle to the pressure of a steel ball 19 mm in diam until failure occurs.

R. A. HEINDL

Porcelain as structural material. H. HANDREK. *Z. Ver. deut. Ing.* 71, 1553-60 (1927).—The phys. and chem. properties of porcelain are compared with those of the several metallic and non metallic structural materials commonly employed in industry. The effect of temp. upon the d., elec. resistance and mech. strength of porcelain is discussed.

H. F. K.

The causes of the yellow discoloration obtained in firing porcelain. M. MIELDS. *Sprechsaal* 61, 22-3(1928). A short review and discussion of the principal reasons for and against the two present theories that the yellow color obtained in firing porcelains is due to the (1) atm. or (2) smoke.

R. A. HEINDL

The decorating of porcelain. MAX SCHNEIDER. *Sprechsaal* 61, 40-2(1928).—A discussion of procedures involved in printing of designs on porcelains by decalcomania and metal plates.

R. A. HEINDL

Steatite. W. DEMUTH. *Z. Ver. deut. Ing.* 71, 1566-8(1927).—Steatite is well adapted to particular ceramic uses such as elec. insulators especially for high voltage. Steatite can be worked well and develop great body strength and d. when fired.

H. F. K.

Mullite refractories extend field of high-temperature processes. W. A. KOEHLER. *Chem. Met. Eng.* 35, 86-8(1928).—The related minerals andalusite, sillimanite and cyanite are discussed in connection with the formation of mullite. A recent development in refractories for condition of high temp. and excessive corrosion is the cast mullite. Bauxite and fireclay are fused in an elec. arc furnace and cast, the molds being glass sand baked with a binder. Annealing for about 8 days is necessary for these mullite refractories. Excellent phys. and chem. properties are developed.

H. F. K.

Refractories for the glass industry. W. J. REES. *Glass* 4, 52, 97, 184, 232, 372, 468(1927).—The characteristic properties of clays and the relative merits of aluminous and siliceous clays are discussed. An Al_2O_3 - SiO_2 eutectic curve is given together with a table showing the analysis and refractiveness of various clays from ten different countries. Porosity and shrinkage of various clays are discussed. Curves are given showing the porosities obtained by firing at diff. temps. Clays for pot and tank block manuf. should show steady reduction in porosity and vol. and should be fairly dense at 1400° . The shrinkage should not exceed 5% between 1000° and 1450° . Up to a porosity of 50% an increase in porosity is accompanied by a decrease in coeff. of expansion. With porosities over 50% the change in thermal expansion with change in porosity is very small. Angular grog particles give greater crushing strength than do rounded particles.

and also increase the resistance to deformation under load when heated. Proper grading of size is a means of control of shrinkage. The analyses of several clays are given together with their refractoriness and deformation temps. The method of testing fire clays under load at high temps. and the characteristics which make a clay suitable for pots are described. Resistance to erosion and corrosion is discussed. W. RISING

Ceramic glazes and enamels. I, II. B. M. PEARSON. *Ceram. Age* 10, 92, 214 (1927).—A review. W. RISING

Glazes containing lead or lead-free glazes. JACOB KLUG. *Sprechsaal* 61, 79-82 (1928).—The possibility and suitability for the substitution of lead-free glazes for those containing Pb in the manuf. of stoneware are considered. R. A. HEINDL

Enamels containing antimony. K. BECK AND W. A. SCHMIDT. *Z. Untersuch. Lebensm.* 55, 1-24 (1928).—Expts. were carried out on the use of opacifiers contg. Sb compds., especially Na metantimonate. Such enamels may be so prepd. that the quantity of Sb which goes into soln. during the prepn. of liquid foods is very small. A method is given for the accurate detn. of small quantities of Sb^{III} and Sb^V when both are present. WILLIAM J. HUSA

The labor and air-power cost of sand blasting [in enameling]. E. A. STEHMAN. *J. Am. Ceram. Soc.* 11, 227-34 (1928). C. H. KERR

HANSEN, JAMES EDWARD: **The Technique of Vitreous Enameling Cast Iron by Wet Process—Sheet Iron.** Cleveland, O.: The Ferro Enameling Co. 203 pp.

Apparatus for feeding "gobs" of molten glass. UNITED GLASS BOTTLE MANUFACTURERS, LTD. and J. TIPPING. *Brit.* 274,370, Feb. 19, 1927.

Apparatus for drawing sheet glass. H. N. DIEDERICHS. U. S. 1,667,145, April 24

Polished sheet glass. J. L. DRAKE. U. S. 1,667,146, April 24. Both sides of a glass sheet are ground, the ground sheet is passed through a heating chamber and on one side is fire-polished; the sheet is then turned and the other side is fire-polished, and it is then cooled. An app. is described.

Glass annealing leer of the tunnel type. E. O. HILLER. *Brit.* 273,724, July 1, 1926.

Apparatus for fire-polishing tumblers or other glassware. R. BROWN. *Brit.* 274,377, Feb. 28, 1927.

Lens-polishing composition. H. W. HILL. U. S. 1,666,701, April 17. A backing such as textile fabric is treated with a compn. contg. beeswax, methyl salicylate, a phenolic substance and an abrasive.

Decolorizing china clay. P. E. WICKHAM. *Brit.* 273,373, March 23, 1926. Any Fe present is removed, and org. coloring matter is first reduced and then removed by treating an aq. paste of the clay with a hydrosulfite and then with an acid and filtering.

Pottery. J. W. MELLOR. U. S. 1,666,828, April 17. See *Brit.* 253,184 (*C. A.* 21, 2543).

Molded ceramic products. L. KERN. U. S. 1,666,936, April 24. In forming bricks, tiles or similar articles, a substantial proportion of hydrated silicic acid is added to a sand and Ca(OH)₂ mixt., the mixt. is molded under pressure, and the product is indurated under superatm. pressure with an elastic fluid such as steam capable of entering into a reaction with the material and effecting hardening.

Fused silica laboratory ware. QUARTZ ET SILICE. *Brit.* 273,636, July 15, 1926. In making ware such as crucibles or dishes, a silica blank is molded in approx. the desired shape but of somewhat larger than final dimensions and is then reheated and allowed to shrink onto a metal form which may be made of Ni or a Ni alloy. Cf. *C. A.* 22, 148, 849.

Sintering refractory metals. N. R. DAVIS and METROPOLITAN-VICKERS ELECTRICAL CO., LTD. *Brit.* 274,283, July 26, 1926. Refractory metals which are chem. active when hot are slowly heated in the form of a body of the compressed powd. metal while maintained in a high vacuum to remove gases at a temp. below that at which the occluded gases would combine with the metal, and finally heated to effect sintering quickly after an intermediate cooling *in vacuo*. With Zr, occluded gases may be removed at about 350° and the metal may be preliminary sintered at 800-1000° before the cooling stage and the final sintering effected near the m. p. by elec. induction or resistance heating.

Abrasive articles. M. L. HARTMANN. *Brit.* 273,679, July 3, 1926. Abrasive grains are bonded with other granular material, the grains of which break down more readily than the abrasive material, e. g., calcined clay, diatomaceous earth, MgO or

porous alumina. The bond may be ceramic material, synthetic resin, cement, rubber, shellac, glue or like substances. Cf. *C. A.* 21, 808.

Cementing porcelain or porcelain and iron. *STUDEN GES. FÜR WIRTSCHAFT U. INDUSTRIE.* Brit. 274,408, July 17, 1926. The process of Brit. 260,592-3 (*C. A.* 21, 3439) is modified by use of Se or Se compds. such as Se oxide instead of S in the cementing compn.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Historical development of cement testing. BURCHARTZ. *Zement* 16, 947-50, 970-4(1927). H. F. K.

Cement classification in Sweden. W. DE SHARENBRAD. *Zement* 16, 746-7(1927). H. F. K.

Technical progress of cement manufacture in England during the last fifty years. A. C. DAVIS. *Zement* 16, 749-53(1927).—Improvements include quality of labor, and equipment, closer control of raw materials and plant processes with increased fineness and strength of product and the development of quick hardening and special cements. H. F. K.

Cements and lutes. S. S. SADTLER. *Trans. Am. Inst. Chem. Eng.* 19, 1-8(1927).—"Cements are substances used to join surfaces, and to fill spaces between surfaces that are being united in a more or less permanent way, and lutes are similar substances or compns. used in a distinctly temporary way." Surface prepn. is important and expansion on setting is a virtue in cements. Cements are classified by compn. and by use made of them. Numerous inorg. and org. cements are listed. Means of testing of chemically resistant cements are outlined. W. H. BOYNTON

Analysis of cements. G. GALLO. *Giorn. chim. ind. applicata* 9, 313-7(1927). *Brit. Chem. Abstracts* 1927B, 780.—From analyses of cements of known compn. before and after setting, it is concluded that the method of Kriege (*C. A.* 18, 2231) is inaccurate. An alternative method, considered more satisfactory, is described. C. C. DAVIS

Early strength cements and cold water. H. VIERHILLER. *Zement* 16, 998-9 (1927).—The temp. change during the setting of 1.3 cement-sand mortar was observed. Blocks 30 cm. each way were poured, the initial temp. of the wet mix being 10.5°, the air temp. being -6-8°. The lowest point reached by the setting mass was 6°, after 3 hrs. After 7 hrs. the peak temp. of 27° was reached. Not until after 17½ hrs. had the mass cooled to 0°. After 10-day cold-air curing a compression strength of 350 kg./sq. cm. was attained. In large masses the low-temp. effect is less. Aluminous cements suffer least of the early strength cements because of their high energy liberated as heat during the hardening process. H. F. K.

Technical research of the American portland cement industry. F. R. McMILLAN. *Zement* 16, 757-60(1927).—A discussion of the lab. of the Portland Cement Association and its accomplishments. H. F. K.

Present condition of portland cement research and the possibilities of producing superior cements. P. H. BATES. *Zement* 16, 753-7(1927).—The discussion includes the possible changes in character of portland cement with altered proportions of the major constituents, additions of other materials, and improvements in the manuf. processes. H. F. K.

Influence of different methods for the analysis of portland cement. O. KALLAUNER AND J. SIMANE. *Zement* 16, 974-6(1927).—A comparison of several American and German methods of cement analysis showed greatest variations in the procedures and results of the SiO₂ and R₂O₃ detns. H. F. K.

The weight per liter of portland cement. K. GOSLICH. *Zement* 16, 895-7(1927).—The app. is described which consists of an upper box contg. 5 kg. cement provided with a trap bottom permitting the cement to fall upon a 2 l. cylinder below. No further tamping or jolting is given. The top is struck off at once and the full container weighed. The app. is enclosed. H. F. K.

The reactions during the first part of burning a calcareous-argillaceous mixture for portland cement. E. MONATH. *Rev. matériaux construction trav. publics* No. 222, 81-6 (1928).—Mixts. heated in a small furnace at various temps. up to 1000° were analyzed. Free CaO was found first at 750° and reached a max. at about 920°, at which point the insol. residue began to fall off. F. O. A.

A review of the literature on the constitution of portland cement clinker. H. RICHARZ. *Tonind. Ztg.* 52, 410-2, 566-9(1928). F. O. A.

Types of crystals in technical portland cement clinker. A. GUTTMANN AND F. GILLE. *Zement* 16, 921-4, 951-3(1927); cf. *C. A.* 22, 1663.—The cryst. minerals and the glass commonly found in clinker are described. Some photomicrographs are shown. H. F. K.

Clinker research. HANS KUHLE. *Zement* 16, 869-71(1927).—The statements by Dyckerhoff (*C. A.* 22, 1837) that the compd. $8\text{CaO} \cdot 2\text{SiO}_2 \cdot \text{Al}_2\text{O}_3$ does not exist and that $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ is not formed in cement clinker are refuted. H. F. K.

Some observations regarding the nature and occurrence of adhering masses in the sintering zone of rotary kilns. KARL BIEHL. *Zement* 16, 817-20(1927).—The chem. examn. of the material from 3 plants' furnaces shows quite dissimilar compn. even within portions of the same mass. The causes of the formation were different in each case: (1) an increase in the total fluxes, (2) increase in the alk. SO_4 content and (3) the nature of the raw materials themselves. H. F. K.

Our actual knowledge of the constitution of aluminous cements. CHARLES BLANCHET. *Rev. matériaux construction trav. publics* No. 219, 397-402(1927), No. 220, 8-14, No. 221, 44-8(1928).—A review of the literature covering the silicates and aluminates of Ca. Some of the effects on aluminous cement of ferric oxide, method of burning and of cooling are considered. F. O. A.

Colloidal chemical reactions of aluminous cement mortars. LÉOPOLD JESSER. *Zement* 16, 741-6(1927).—The hydration properties and physical characters of cement mortars subjected to definite temps. and humidities are studied. The adsorption isotherms of several mortars are established. It was found that the H_2O held in the pores of sand-cement mortar goes into the cement-gel soon after hardening begins. H. F. K.

Influence of hardening temperature on the mortar strength of an aluminous cement. A. F. R. LUND. *Zement* 16, 747-9(1927).—Tensile and compression tests were made on 1.3 mortar cylinders kept at temps. of 9-92° during the first 24 hrs. At 25-27° compression strength was more slowly attained than at higher or lower temps. while the slowest gain in tensile strength was found at 27-37°. No ill effect on 7- and 28-day strength was found by a starting temp. of 7-9°. Cylinders cured at 16° for a day gave the highest compression strength at 28 days' water curing. In 19 hrs' curing at 52° very high strength was found, though no further gain was made in 28 days. Early high-temp. curing reduced the later strengths. H. F. K.

Cements used in heavy chemical manufacture. H. B. BISHOP. *Trans. Am. Inst. Chem. Eng.* 19, 9-12(1927).—A tabular résumé. The types are those for bonding bricks; those applicable for chem. stoneware and fused silica; and those adapted to metal joints. W. H. BOYNTON

Cements for gaseous and liquid hydrocarbons. F. W. SPERR, JR. *Trans. Am. Inst. Chem. Eng.* 19, 13-7(1927).—Cements ordinarily used in the gas and petroleum industries in app. handling gaseous and liquid hydrocarbons are (1) red- or white-lead and linseed oil; (2) shellac; (3) portland cement; (4) litharge and glycerol; (5) rust-joint cements; and (6) miscellaneous plastic materials, e. g., soap and clay. The applicability of each is outlined. W. H. BOYNTON

Silicates of soda—their application in cements. JAMES G. VAIL. *Trans. Am. Inst. Chem. Eng.* 19, 27-34(1927); *Ceram. Age* 10, 91.—Cements made from sol. silicates can be designed for the uses of the chem. engineer by taking into account the properties and relations of the materials entering the mixts. and building up the required combination. According to setting properties cements are classified as those becoming hard by simple drying and those depending upon some reaction in which silicate soln. takes part. The behavior on drying, materials used with silicate solns. and refractory cements and the effect of acidic material addns are discussed. W. H. BOYNTON

The determination of manganese in lime, cement and their raw materials. F. PUJOL. *Rev. matériaux construction trav. publics* No. 220, 7-8(1928).—Treat 1 g. material with 20 cc. HCl and evap. to dryness. Take up with 10 cc. HNO_3 , sp. gr. 1.20, and a little H_2SO_4 and evap. till SO_3 fumes are produced to remove Cl . Cool, add 30 cc. H_2O and 5 cc. of 1.1 HNO_3 and transfer to a conical flask. Add 10 cc. 0.01 N AgNO_3 and 20 cc. satd. $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and raise to boiling in 10 min. Cool and just decolorize with FeSO_4 soln. Add 10 cc. more $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and heat to boiling, cool and finally titrate with standard As_2O_3 . This method does not work for more than 1% MnO . F. O. A.

Tests on the influence of calcium chloride on the compression strength and the volume changes of cement mortar and concrete. O. GRAF. *Zement* 16, 776-7(1927).—The addn. of CaCl_2 to the mixing H_2O lessened the effect of low-temp. curing on test pieces. The vol. changes were increased by CaCl_2 addns. H. F. K.

Some later investigations of the institute for concrete in Karlsruhe. B. E. PROBST AND A. HUMMEL. *Zement* 16, 778-81(1927).—The application of the water/cement ratio depends upon the grading of the sand in sand-cement mortars as well as upon the kind of cement. Aluminous neat cements and mortars are least affected by increasing water content. H. F. K.

Our knowledge of gas concrete. JULIUS MEYER. *Zement* 16, 1002-4, 1026-30 (1927).—The discussion includes a review of the patent literature and the present practices in the prepn. of porous concrete by gas evolution processes. Of the gas formers considered, Al, Ca, Mg, Zn, Ca-Zn and Ca-Mg, the last most effectively produced H_2 bubbles in the wet batch, 0.15% addn. increasing the vol. nearly 50%. Larger quantities increased the final vol. of mortars but not in like proportion. Concrete of sp. gr. as low as 1.20 can be produced. The compression strength of concrete decreases with decreased sp. gr. H. F. K.

Proper proportioning of mortar and concrete. R. DUTRON. *Rev. matériaux construction trav. publics* No. 216, 304-6; No. 217, 329-33; No. 218, 374-7; No. 219, 406-14(1927); No. 220, 14-21; No. 221, 48-52; No. 222, 91-7(1928).—A study of the strength as a function of the water-cement ratio. F. O. A.

Comparison of the strength of test specimens with the compression strength of the concrete in the structure. H. BURCHARTZ. *Zement* 16, 764-71(1927).—Tests were made on several series of mixes differing in type of cement, kind of coarse aggregate and quantity of H_2O , both with the usual tamped molded test pieces and with specimens sawed from the finished concrete. With wet mixes the molded test pieces gave higher strengths than the sawed samples while with drier consistencies no difference was found. H. F. K.

Effect of water on the strength of powdered materials upon heating. BERNWARD GARRIE. *Zement* 16, 1023-4(1927); cf. *C. A.* 22, 520.—Finely powd. Al_2O_3 , SiO_2 and $CaCO_3$ were mixed with 6-30% H_2O or C_6H_6 and pressed into pellets. The strength of these pellets after ignition to 900° increased definitely with the H_2O content but decreased or increased slowly with increasing C_6H_6 . The strength developed by H_2O -moistened batches is due to (1) its action on the surfaces of the particles, (2) the distribution of the particles and (3) the recrystallization. H. F. K.

Preparation of dry raw mixes. MARC ELBER. *Rev. matériaux construction trav. publics* No. 220, 1-7(1928). F. O. A.

Building research and the building research station. ANON. *Munic. Eng. Sanit. Record* 80, 332-3(1927).—A brief description of the plan and equipment and mention of some of the investigations on terra cotta, cements, concrete, steel, heat, ventilation, etc., is given. The station is located at Garston near Watford (England) and was set up by the Department of Scientific and Industrial Research. Information collected is freely available. C. H. BADGER

An experience in cold-surface treatment of roads. WM. RIDLEY. *Munic. Eng. Sanit. Record* 80, 429-30(1927).—"Colas" a cold bitumen was used. Cost figures are given. C. H. BADGER

Air-seasoning and conditioning of timber. F. M. OLIPHANT. *Dept. Sci. Ind. Research, Forest Products Research*, 1927, (Special Reprint) No. 1, 26 pp.—The drying and seasoning of wood are complicated by the heterogeneous cellular structure. Wet green wood may contain double the wt. of water compared with that of the dry wood, as free water in the cell cavities and water absorbed by the cell walls, the latter moisture causing considerable lateral shrinkage on evapn. This shrinkage is by no means uniform, because of presence of bands known as wood rays, which restrict contraction of the adjacent cell walls. Hence "checking" and warping (cupping and twisting) result from internal straining. End-checking of sawn logs can be diminished by coating the ends with paint or a resin prepn.; sometimes paraffin wax is used on the ends of high-class furniture timber. Case-hardening is caused by quick surface-drying and may give rise to cupping, and a further defect known as collapse is probably due to the rapid removal of water in the cells without a corresponding penetration of air, the cell walls thereby being drawn together. When air-seasoning, advantage must be taken of drying air currents, while avoiding undue shrinkage and a heavy decay by fungi. Illustrations of various methods of piling are given. In addn. to reducing wt., increasing stability and reducing the liability to decay, the seasoning of wood increases all the strength values except toughness. The prevailing poor reputation of kiln-dried wood is due to excessive drying below the fiber satn. point, together with the use of too high temps. at the commencement of the "run." B. C. A.

Photographic transfer process for imitating grains of different kinds of wood (Brit. pat. 274,030) 5. Mixing ingredients of cement (Brit. pat. 273,768) 13.

Coloring cement, concrete and plaster. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDLEY, A. SHEPHERDSON and A. DAVIDSON. Brit. 273,477, June 19, 1926. Vat dyes are added in highly dispersed form before, during or after the gaging process.

Staining and hardening concrete. R. B. LAMMENS. U. S. 1,666,423, April 17. In coloring concrete and the like, solns. such as those of tannic acid and $K_2Cr_2O_7$ are successively introduced so that they react to produce the desired color; each soln. also contains a substance, e. g., 2% of sucrose, capable of producing a relatively high osmotic pressure.

Waterproofing walls, building materials, etc. A. J. BUITENHUIS. Brit. 274,017, July 10, 1926. Surfaces are first treated with a soln. of colophony or other resin in a solvent such as "methylated spirit" and then with a soln. of paraffin or similar hydrocarbon material in another solvent, e. g., C_6H_6 . Several formulas for similar solns. are given.

Preservative impregnation of building materials. D. FINLEY. U. S. 1,667,201, April 24. A sheathing material comprises a fibrous base such as roofing felt satd. with asphalt, stearin pitch and creosote.

Plaster-block composition. F. M. VENZIE. U. S. 1,667,019, April 24. Plaster of Paris 100 is mixed with sawdust 50-100 parts and with about 100 parts of an aq. soln. contg. liquid glue 5, dextrin 5 and Na silicate 10%.

Moldable oxychloride compositions. R. H. ABBEY. Brit. 273,989, Feb. 14, 1927. Raw or calcined magnesite is heated with a fluxing material such as Na silicate or borax and the clinkered product thus formed is mixed with a soln. of $MgCl_2$. $AlCl_3$ and $BaCl_2$ may be added as may also waterproofing substances such as resin soap, Al, Zn, Mg or other insol. stearates or greasy or fatty substances and fibrous or other fillers. Wall tiles, table tops, floorings, wash basins or other articles may be formed from the mixts.

Bituminous pavements. M. LEVY and PRODORITE SOC. ANON. Brit. 273,759, July 2, 1926. A liquid coat of tar or bitumen is applied to a concrete or macadam road and stone powder is applied, with or without an addnl. treatment with sand.

Road surfacing compositions. J. F. BENNETT and J. HADFIELD. Brit. 274,248, June 4, 1926. A mixt. of equal quantities of an oil such as castor oil and bitumen 32 parts is heated with 13-64 parts of S until evolution of gas takes place. Tars, resins, filling and coloring substances may also be used and the product may be applied hot or dissolved in creosote and sprayed on the road.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Newer points of view on carrying out fuel investigations. P. SCHLÄPFER. *Monats-Bull. Schweiz. Ver. Gas-Wassersach.* 8, 60-6(1928).—General discussion of the usual methods of coal and coke analysis, etc., with recommendations for their standardization and special reference to and research on the detn. of coke reactivity.

F. S. GRANGER

Fuels and motors for power vehicles. A. HELLER. *Z. Ver. deut. Ing.* 72, 335-40 (1928).—A general paper dealing with the present state of substitute fuels, cracking, remedies for knocking, choice of both motor design and no. of cylinders for internal-combustion motors, improved cooling system and the elec. propulsion of power vehicles.

R. E. SCHAAD

Fineness and structure of coal dust under the influence of types of mills and coals. P. ROSIN and E. RAMMLER. *Zement* 16, 820-3, 840-4, 871-5, 897-901(1927).—Sieve analyses and microscopic exams. were made of the coal dust of a series of coals ground in various types of mills. The fineness and the shape of the particles of coal dust were independent of the type of mill or method of grinding. Photomicrographs are included.

H. F. K.

The preparation and examination of coal sections. JAMES LOMAX. *J. Roy. Microscop. Soc.* 47, 239-49(1927).—The applications of microscopic studies of coal to the recognition of ingredients, history and relationships of deposits. Methods are given for sampling seams, mounting and sectioning of slices for examn. by transmitted light.

C. W. MASON

An examination of the influence of various factors on the products of the carbonization of coal. H. H. THOMAS. *J. Soc. Chem. Ind.* **47**, 77-83T(1928).—Lab. tests were made in a test plant carbonizing 0.001 ton. Distns. at 950°, 1000° and 1050° showed that reduction of temp. decreased the gas yield but increased its calorific value; the net result was a loss in heating value. At high temp., the tar formed is less and has higher free C. The rate of carbonization is greater at higher temp. Reducing the size of the coal in the retort charge increases the gas vol. but reduces its calorific value, and at the same time the rate of carbonization is reduced. The addn. of coke to the coal before carbonization gives a net calorific yield about the same as with coal alone, but the rate of carbonization is increased. Admixt. with non-coking coal instead of coke gives the same calorific yield, but slightly increases the carbonization time. The coke from the last expt was the most reactive, when tested by reduction of CO₂ to CO.

T. S. CARSWELL

Compression of city gas for automotive use. JAMES CHAPPUIS. *J. usines gaz* **52**, 145-53(1928); cf. *C. A.* **22**, 860.—City gas, contg. less than 6% O₂, can be compressed to 200 kg. per sq. cm. and stored in cylinders without danger. The compressor should be of at least 3 stages, lubricated with distd. water, and of low enough linear piston velocity to permit the temp. to be kept below 80° by water cooling.

F. S. G.

Removal of dusts and mists from gases by electrical precipitation. C. HAHN. *Gas u. Wasserfach* **71**, 269-76(1928).—Elec. pptn. is contrasted with other methods of removing dusts and mists from gases, and modern plants are described and illustrated. Among the special uses of elec. pptn. are the removal of coal dust from air used to dry coal or lignite, sepn. of ashes from flue gases in powdered-fuel-burning installations, removal of dust from hot producer gases and tar from cool gases, dusts from all types of milling operations may be collected, dust from sulfur-burner gases and acid fogs may be collected, blast furnace gases may be freed from dust (it is said that several such installations are being made and that all requirements for the use of blast furnace gas have been satisfied). Moist air used in textile mills may be freed from fibers and dust and recirculated. In one briquetting plant 300 tons of coal per week were recovered and in a cement plant 70 tons of cement in a week.

R. W. RYAN

Some aspects of corrosion in gas supply practice. F. C. SMITH. *Gas J.* **182**, 118-23(1928).—The increased corrosion of distributing pipes since the war is attributed to the practice of stripping the gas initiated at that time. Previously, a protective tarry coating was deposited by the gas. CO₂ + O₂, or city gas, passed through clean pipes at a temp. above the dew point for a considerable time produced no corrosion. But when moisture was allowed to condense, rust began to appear, even in the absence of CO₂. But CO₂ greatly increased the rate of corrosion which was then accompanied by liberation of H. Fe, under water under CO₂ alone, liberated gas bubbles but the water remained clear. This was attributed to the formation of Fe(HCO₃)₂ in soln., the existence of which in gas mains is shown by the pptn. of Fe(OH)₃ from rapidly filtered siphon liquor on standing in the air. Corrosion tests were made by suspending specimens of pipe in purified water of definite cond., through which pure CO₂ was passing and measuring the steadily increasing cond. due to soln. of the Fe as bicarbonate. Blank tests, CO₂ without and N₂ with the specimen, both showed const. cond. Leakage of O₂ into the cell causes reduction of the rate of cond. increase due to the pptn. of the electrolyte as Fe(OH)₃. The app., method and precautions are described in detail. The rate of corrosion, as Fe dissolved per unit time and surface, is calcd. from the cond. The loss in wt. was of course too small to detect by weighing. It increased with the S content of the Fe.

F. S. GRANGER

Soot—How to control and dispose of it in gas-producer practice. R. A. BLUNT. *Ceram. Ind.* **10**, 153(1928).—Causes of soot formation and former methods of disposal are discussed. The author describes an incinerator which has been successfully used and in which the soot is quickly and completely burned periodically by being drawn through a preheated chamber of checkerwork accompanied by a regulated amount of air from a blower.

W. RISING

Evaluation of gasifying equipment. OSW. PEISCHER. *Gas u. Wasserfach* **71**, 247-52(1928).—The evaluation of water-gas, producer-gas and coke-oven installations is critically discussed. The usual method of evaluating the over-all efficiency of coke-oven plants is unsatisfactory. In comparing various coke-oven installations, type of coal and moisture content, gas used for heating the coke ovens, heating surface per kg. of coal per hour, as well as air excess in the flue gases and temperature of the flue gases must be considered.

R. W. RYAN

The use of active charcoal in the gas industry. A. ENGELHARDT. *Gas u. Wasserfach* **71**, 290-7(1928).—Active carbon for use in the gas industry must not be too

friable, since it is desirable to use it in granular form and to avoid dust. Comparisons of different charcoals should be made with equal grain size, equal water content, and with the same temp., humidity and solvent content of the air or gas. The "shaken down" wt. of active charcoal varies from 200 to 500 g. per l., depending on the method of prepn. Ease of regeneration must be considered in evaluating a charcoal. Adsorbed materials such as benzene are ordinarily removed from the active charcoal by passing steam through the reaction chamber, and this is facilitated by the use of a heating coil in the chamber, so that water vapor will not be condensed. Active carbon may be used for removing benzene from gas on analytical and plant scales. Means of saving steam in benzene recovery are suggested. The chief cause of loss of activity in a benzene-recovery unit is adsorption of higher hydrocarbons. Such a plant is more economical than one using wash oil. Active charcoal may also be used advantageously in the recovery of natural gas gasoline, especially where only 100 g./m³ or less is present, as compression or wash oil processes are uneconomical for such concns. H₂S in coal gas may be removed by passing over the active carbon which oxidizes the H₂S to S completely even at high rates. 400 kg. active carbon will remove 400 to 600 kg. S. The active carbon may be regenerated by repeatedly digesting with (NH₄)₂S. The polysulfide thus formed decomposes to give S, NH₃ and H₂S when heated under pressure; the melted sulfur is recovered and the (NH₄)₂S formed by the condensation of the NH₃ and H₂S under pressure is reused. In the NH₃ works at Oppau and Merseburg 175,000,000 cu. ft. of gas per day give 15 tons of S. Illustrations are given.

R. W. RYAN

Chemical constituents of lignites. J. MARCUSSEN. *Z. anorg. Chem.* **40**, 1101 (1927); cf. *C. A.* **21**, 641.—Lignites contain, on an av., about 69% C, 5.5% H, 25% O and 0.8% N (reckoned on the ash-free, dry substance). The constituents, other than water and mineral matter, are waxes, resins, free humic acids, humic acid anhydrides, humic ketones, water-sol. carbonyl acids, acetic acid, lignin and cellulose. Waxes and resins are extd. with CCl₄, and sepd. with a mixt. of alc. and ether at a reduced temp., the waxes being insol. Free humic acids are removed with NH₃, and humic acid anhydrides are hydrated with hot 1% NaOH. Lignin and ketones are sepd. by mixing with molten resorcinol, the ketones remaining unchanged. Cellulose is detd. by chlorination. Lignites derived from tree trunks are principally composed of humic acid anhydrides, lignin, cellulose and water-sol. carbonyl acids. In earthy lignites, lignin and cellulose have been almost completely converted into humic acids and anhydrides. The content of humic ketones increases with the age of the lignite. Alkali-sol. lignites contain a high proportion of free humic acids, and their cellulose is in the form of oxycellulose, so that they are almost completely sol. in cold 1% Na₂CO₃. Water-sol. carbonyl acids present in lignites have reducing properties and comprise a mixt. of glucuronic acid and an acid derived from it by oxidation.

B. C. A.

Decomposition of lignite wax. A. MAILHE. *J. usines gaz* **52**, 132-5 (1928).—Heating with ZnCl₂ to 440° yields about 50% liquid hydrocarbons, mostly satd. paraffins, covering the whole petroleum range. The sp. gr. is high because of the presence of a small quantity of ketones. The changing compn. of the gas evolved in the course of heating resembles that from lignite semi-coke, H₂ greatly predominating, CO next and CO₂ falling off rapidly from an initial value of 18%. Olefins predominate in the gaseous hydrocarbons until the final stage when CH₄ rises suddenly from 1% to 18.6%.

F. S. GRANGER

Brown coals of the Cheliaba region. G. L. STADNIKOV AND N. F. PROSKURNINA. *Trans. Karpov Inst. Chem.* **1926**, No. 5, 95-9.—The coals of the Cheliaba region have the external appearance of typical coals, as they are black, brilliant and fairly hard; their C content is also similar to that of typical coals. Nevertheless their contents in matter extractible by aq. alkalies, their ability to react with 10% HNO₃, their calorific capacity and the circumstance that they give resinous water (acid to litmus) on being distd. in Fischer's still classify them as brown coals. Elementary compn. is: C 71.51-76.05, H 4.40-4.97, N 1.32-2.00, S 0.84-3.53 and O 16.49-20.61%. They give moisture 16.9-19.0, ash 7.3-23.4, volatile matter 44.1-52.3, coke 47.7-55.9, S 0.75-2.52 and resins 0.8-3.2%. Calorific capacity is 4018-5334. The dry distn. of semi-coke shows that the latter contains a considerable quantity of volatile matter, hence these coals on gasification will give a generator gas rich in hydrocarbons and H and poor in CO₂; such a gas will find wide application in metallurgical processes. Because of the high content in N, a large quantity of NH₃ will be recovered on gasification. These coals are not suitable for briquetting.

BERNARD NELSON

Extraction and carbonization of Westerwald bituminous clay. G. AGDE AND F. SCHIMMEL. *Braunkohle* **27**, 191-3 (1928).—The material was a brown coal called clay

because of its high ash content. As taken from the mine it was approx. $\frac{1}{3}$ water, $\frac{1}{3}$ ash and $\frac{1}{3}$ combustible. The usual extn. methods yielded 4.5% resin and 8.2% wax, on the dry coal. The carbonization test, heating to 550° in 46 min., yielded 3140 cc. of gas per 100 g. moist coal, or 8% by wt., 38.5% H₂O, 8% tar and 45.5% residue. The residue contained 70.3% ash, 22.7% C, 1.6% H and 5.4% miscellaneous volatile constituents. The tar yielded 1.6% asphaltene (insol. in gasoline), 1.6% phenols, 41% paraffin + montan wax (insol. in acetone), 10% light oil distillate, becoming dark and turbid in contact with air and 14% brown viscous high-boiling distillate, stable in air.

F. S. GRANGER

The volatile constituents of brown coal semi-coke. A contribution to the closer characterization of brown coal semi-coke and its behavior in the fire. M. DOLCH AND O. KOCH. *Braunkohle* 27, 141-53, 169-73, 185-91 (1928).—A 1-cm. quartz test tube was filled to a depth of 3 cm. with weighed specimens of various semi-cokes, connected through a 2-way cock to 2 gas burets, so that the gas evolved could be measured and removed for analysis without interruption of flow, and heated horizontally in an elec. furnace to a final temp. of 1150° which was maintained until evolution of gas ceased. The heating was so regulated that the time-temp curve was the same in all cases. The gas evolved was cut in 3 temp. intervals for measurement and analysis. The results are plotted against temp. for comparison. Three groups of specimens were investigated (1) com. semi-cokes from earthy brown coals, (2) from lignitic brown coal and (3) lab. specimens produced in a Fischer Al retort from the same coal under various conditions. Previous methods of detg. the gas yield of semi-cokes, with its important bearing on their firing behavior, have been very inadequate because the max. temps. attained were far below those required for complete gasification, and the fractions of the total gas yields, evolved in corresponding temp. intervals, differ greatly for different specimens. This is shown in the present work by the variety of curve forms obtained. In some cases there was no sign of a falling-off of gas evolution even at 1150°, while in others the horizontal was approached below that temp. The 3 lignitic specimens, however, though of widely different origin, gave nearly parallel straight lines lying close together. The total gas compns. differed so little that the coke specimens fell in the same order whether arranged according to gas yields or gas thermal yields calcd. from the individual gas constituent yields. The changes in gas compn., during degasification, were also similar. CO₂ predominated in the early stages but fell off rapidly while the other 2 main constituents, H₂ and CO, increased accordingly. Of the 3 lab. specimens, the 1st was prep'd by carbonizing the moist coal directly, with superheated steam, the others after drying at 110°, the 2nd in a current of H₂ and the 3rd in O₂. The 1st and 2nd developed heat on exposure to air, presumably from oxidation, and gave the same gas yield. The 3rd gave a higher yield. The 2nd yielded less H₂ than the others, whereas the CO and CO₂ increased in the order 1, 2, 3. The results are discussed at length with reference to conditions before and during carbonization and degasification.

F. S. GRANGER

A comparison of oven and gas coke for central heating plant boilers. W. LEDER. *Gas u. Wasserfach* 70, 1045-7 (1927).—The prejudice against gas coke is not well founded. At prevailing German prices (30-33% below oven coke) it is a more economical source of fuel than oven coke.

R. W. RYAN

A new device for determining the ignition point of coke and technical charcoals. W. SWIENTOSLAWSKI AND B. ROGA. *Przemysł Chem* 12, 18-31 (1928).—The ignition point of cokes, wood charcoals and the like is defined as that temp. at which on contact of O₂ with the given coal spontaneous combustion of the coal takes place, and at the same time there is a marked rise in the temp. of the device. This device consists of an Al block in which tubes are bored for conducting the gas from the outside to the combustion chamber in the center of the block, thereby bringing the gas to the temp. of the app. The combustion chamber holds on a grate 2 cc. of the powd. sample which surrounds the bulb of a Hg thermometer or the junction of a thermocouple. The block is heated externally by a gas flame, and the corresponding time-temp. curve is plotted. The temp. of intersection of the 2 smooth curves marks the ignition point sought. The complete app. consists of a H₂SO₄ gas wash bottle, a flowmeter and a CaCl₂ column through which O₂ must pass before entering the Al block. The coal sample is held in a removable part so that cleaning and assembly are easy. Results can be reproduced to $\pm 1^\circ$ on activated charcoals and $\pm 3^\circ$ on cokes. Effects of grain size of the sample, and of rate of flow of O₂ were found measurable but small. A brief review of earlier work is given.

A. C. ZACHLIN

Cracking, especially of lignite tars, by the Blümner process (KARSTEN) 22. Purifica-

tion of waste water from lignite-distillation plants (WITT, SCHUSTER) 14. Homologs of $C_{10}H_8$ [as motor fuel] (Brit. pat. 273,665) 10. Hydrogenating coal (Brit. pat. 273,337) 22. Ozonides [as motor fuels] (Brit. pat. 273,832) 10. Condensation product of olefins with hydrocarbons of the naphthalene series [as motor fuels] (U. S. pat. 1,667,214) 10.

LITINSKY, L.: Kokerei und Gaswerkofen. Halle (Saale): W. Knapp. Reviewed in *Am. Gas J.* 128, 66(1928).

Fuel briquet. J. S. ROBESON. U. S. 1,667,358, April 24. Tubular briquets are formed of fine coal, oil and lignone; the outer portions are harder than the inner portions and contain less volatile matter.

Fuel briquets. E. W. BOWEN. U. S. 1,667,304, April 24. Fine dust is sepd. from the granular portion of fuels such as coal or coke and after the granular portion has been mixed with sulfite liquor or other binder a definite proportion of the fine dust is added to the mixt. An app. is described.

Fuel briquets. T. NAGEL. U. S. 1,666,663, April 17. An acid phosphatic compd. such as crude dil. H_3PO_4 and flour mill sweepings or other starchy material are used together as a binder for finely divided coal or other fuels.

Fuel briquets. S. SHIMAMOTO. Brit. 273,556, Oct. 30, 1926. Sawdust or other pulverized vegetable fuel is steeped in slaked lime while still hot and may be formed into briquets with various addns. such as coal, wood, chips, starch paste or heavy oils.

Briquetting fuels. H. E. WETTERBER and W. L. JACOBUS. Brit. 274,046, July 10, 1926. Anthracite, bituminous coal, lignite or other carbonaceous fuels in sub divided form are briquetted with binders which comprise coking material such as a petroleum residuum or coal-tar residuum and kerosene, light coal tar, gas-producer distillate or other filming carrier to assist in evenly distributing the binder. The materials may be mixed in hot water, briquetted after draining off the water and then heated for several hrs. at about 200–315°. Cf. *C. A.* 21, 2977.

Distillation of carbonaceous materials. SALERMO, LTD. and E. M. SALERNI. Brit. 273,528, Sept. 15, 1926. Material such as coal, lignite or shale is ground to pass a sieve of about 0.375 in. mesh, dried by being fed from hoppers in a thin layer onto flat plates exposed to heating gases and then carbonized during lateral passage through a series of open-topped troughs; the coke formed is cooled by being conveyed along water-cooled plates. An app. is described.

Fuel for internal-combustion engines. J. B. NEUENDORFF. U. S. 1,666,976, April 24. Liquid petroleum distillates such as kerosene, gasoline and naphtha mixts. are subjected to the action of clear line water, to remove impurities.

Generating power from low-grade fuels. M. J. TRUMBLE. U. S. 1,667,403, April 24. Steam is blown through fuel such as oil shale in a closed chamber to vaporize hydrocarbons, the steam and hydrocarbons are used in a prime mover such as turbine and hydrocarbon values are recovered by condensation from the exhaust.

Downwardly flared retort for carbonizing solid fuels. T. M. DAVIDSON. Brit. 273,389, March 30, 1926.

Low-temperature carbonization of coal. K. M. SIMPSON. Brit. 273,935, Sept. 22, 1926. Uncharged receptacles are preheated to carbonize the charge which is then placed in them and conveyed through the distg. zone. An app. is described.

Treating fine coal. E. W. WILKINSON. U. S. 1,667,277, April 24. Fine coal is agitated in an aq. pulp with the addn. of less than 1% of K xanthate or K Et mercaptide or other org. S compd. which improve agglomeration, to obtain an oil-coated floating coal and the coal is sepd. from excess water and may be briquetted.

Hydrogenizing coal, etc. I. G. FARBENIND. A.-G. Brit. 274,404, March 13, 1926. In the destructive hydrogenation of coal or like solid carbonaceous fuel by a 2-step process as described in Brit. 249,156 (*C. A.* 21, 1002), the tarry vapors from the first stage are submitted to the second stage without condensation, and preferably after sepg. them from solid substances.

Destructive hydrogenation of coal, oils, etc. I. G. FARBENIND. A.-G. Brit. 273,712, June 29, 1926. Low-boiling oils are obtained from coals, tars, oils, bitumens and the like by first heating them under pressure in the presence of H or gases contg. H and of catalysts which assist cracking and then further hydrogenating the products by the aid of catalysts. Brown coal-tar oil may be heated in an Al-lined vessel with H under 200 atm. pressure at 450° in the presence of active C and the vapors thus produced may then be passed over a Co catalyst to produce a product contg. 90% of "benzine." Cf. *C. A.* 21, 3733; 22, 1843.

Gasifying powdered fuel. G. SZIKLA and A. ROZINEK. Brit. 274,110, July 9, 1926. In gasifying or distg. powd. coal in a limited air supply, incandescent fuel dust is added to fresh fuel dust during circulation in a closed circuit in the gasifying chamber as described in Brit. 255,857 (C. A. 21, 2977) and an app. is employed in which the bottom of the gasifying chamber inclines so closely to the horizontal that coal dust collects on it in the shape of a crater surrounding the air flame. Various other details of the app. are described.

Gas from coal. F. J. WEST, E. WEST and WEST'S GAS IMPROVEMENT CO., LTD. Brit. 273,474, June 18, 1926. A charge of coal in vertical retorts is steamed to obtain a large vol. of gas of low calorific value and this gas is enriched by admixt. with oil gas from a retort heated by the hot waste gases from the heating flues of the coal gas retorts.

Gas producer. C. W. LUMMIS. U. S. 1,666,604, April 17.

Carbureted water gas. F. B. HAYES. U. S. 1,667,518, April 24. In making water gas by the alternate up and down steam run method, the up-run water gas is passed through a carburetor and simultaneously enriched with oil supplied to the carburetor; the down-run blue water gas is by-passed with respect to the carburetor and oil gas is made in the carburetor during the steam down-run period; the different gases are commingled in a holder.

Silica brick bench setting for gas retorts. H. J. TOOGOOD and R. DEMPSTER & SONS, LTD. Brit. 274,154, March 15, 1926.

Distilling coal tar. C. WESSEL. Brit. 273,675, June 29, 1926. The $C_{10}H_8$ from coal tar together with light oil and water is driven off by steam led directly into the distg. vessel. An app. is described in which a distg. column and dephlegmator are placed above the still. The $C_{10}H_8$ seps. out in receivers and liquids are decanted.

Coke-oven construction. E. COPPER ET CIE. Brit. 273,630, Sept. 4, 1926.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

The light-oil residues of oil-gas tar from Solar oil (gas-oil) and from raw naphtha. EWALD PYHALÄ. *Erdöl u. Teer* 4, 146-9 (1928).—The distillate and distn. residue from the Solar-oil residue resembled those from raw turpentine oil in phys. and tech. properties. The yield and properties were improved by treatment with flordin. These products were absent in the Baku oil residue which yielded, instead, considerable quantities of marketable naphthalene, the yield of which was trebled by distg. under partial decompn. conditions.

Transformer oils and their brown deposit. G. L. STADNIKOV and Z. I. VOZZINSKAIA. *Trans. Karpov Inst. Chem.* 1926, No. 5, 109-26.—The brown deposit obtained on filtering used transformer oils has been subjected to a systematic analysis. On being heated in a current of H at 100° it lost 0.70% of its wt. The ash was 13.16% and contained Fe, Cu, Pb and Sn. The dry ash-free portion contained N (Kjeldhal) 0.83, S (bomb test) 78.03, H 9.29, O (by difference) 11.48%. The deposit on destructive distn. gave 5% water, 49% oil, a small amt. of tar and gas contg. CO_2 . The water had an acid reaction and discolored a permanganate soln. The oil, on being extd. with water and with 3% aq. NaOH, gave org. acids. Thus during the destructive distn. of the deposit are formed CO_2 , volatile and water-sol. org. acids and non-volatile water-insol. org. acids. On fusing the brown deposit with NaOH, then dissolving in water and HCl and treating with $BaCl_2$, a ppt. was obtained indicating the presence of sulfo acids in the original deposit. This result shows that the brown deposit is formed in transformer oil by condensation of its resinous substance with org. compds. produced by oxidation of the oil. In these condensations, sulfo acids and their Na salts which are contained in transformer oils that have been refined with H_2SO_4 , and insufficiently washed play a very important part, even if they are present only as traces, since they act as very effective catalyzers; they effect condensations in oils free from resins as well as in oils contg. a slight amt. of resin. They exist in the oils in form of an emulsion formed by their aq. soln. and the oil, and this emulsion is not always broken up when the oil appears clear and transparent to the naked eye, for it is possible to detect a turbidity of the oil by means of the microscope. To obtain confirmation of these views on the harmful action of traces of sulfo acids or of their salts on resin-free and slightly resinous oils, the authors subjected various grades of commercial transformer oils to different refining treatments. Two samples were refined by 3

treatments with 5% of their wt. of 90% H_2SO_4 followed by centrifuging, repeated washing with water, then agitating with a 40% soln. of alkali, washing again very thoroughly until agitating the oil with water formed no emulsion, and water easily sepd. from the oil on mere standing. Two other samples were refined by 3 treatments with 10% of their wt. of 90% H_2SO_4 followed by the same careful purification. Finally 2 samples were refined by 2 treatments with fuming H_2SO_4 (4.3% SO_3) and purification as above. No treatment of these samples with silica gel or flordin has been made, for fear of polymerization of unsatd. constituents. After being thus refined the samples were oxidized by air for 45 hrs. at 120° in presence of reduced copper gauze. The air, before it entered the oil, was passed through wash flasks contg. alkali and H_2SO_4 , and after it came out of the oil was passed into titrated NaOH . After this oxidation, the acid values, resinification numbers, and particularly the capacity of forming a solid deposit, were carefully detd. on the oils obtained; for the latter test, the oils, after cooling, were kept for several months in closed cylinders. Volatile acids were formed in noticeable amounts. The oils refined with 90% H_2SO_4 had slightly increased acid and resinification numbers, but the oils which were treated with fuming H_2SO_4 had suffered changes increasing their capacity for oxidation. No solid deposit developed in any of the samples. The same oils were oxidized after an addition of 0.1% of naphtha sulfo acids, and under these conditions soon darkened and easily gave considerable amts. of brown deposit. In repeating the oxidation treatments in presence of 0.2% of K salts of sulfo acids it was found that the salts cause an even more abundant formation of solid deposits than the free acids.

BERNARD NELSON

Remarks on the preparation, purification and analysis of pyrogenous oils. R. HUERRER. *J. pharm. chim.* 7, 58-69(1928); cf. *C. A.* 20, 2561; Massy, *C. A.* 20, 3775.—For complete extn. of phenols, the pyroligneous fraction contg. much phenol must not be discarded. To free pyrogenated oil (A) from acid, wash the oil, instead of with H_2O , with a 10% soln. of $(\text{NH}_4)_2\text{CO}_3$, which leaves the phenols unaffected. In detg. phenols in A, treat it with $(\text{NH}_4)_2\text{CO}_3$ before setting free the phenols with 5% NaOH . Since warm alkalies have a marked effect on the optical rotation of *l*-cadinene, only cold alkalies should be used. When distn. temps. of A are to be detd., the oil must be a carefully prepd. homogeneous mixt.

S. WALDBOTT

Judging the knock-stability of hydrocarbons. N. A. BUTKOW. *Erdöl u. Teer* 4, 162-3(1928).—Investigation of the sensitiveness to oxidation, by heating with O_2 under 3 atm. at 230° , of heptane, typically knocking, and toluene, non-knocking, showed that this is a measure of their tendency to knock. β -Naphthylamine and aniline, known as antiknock agents, check the oxidation of heptane. Addn. of toluene to aviation gasoline reduces the latter's sensitiveness to oxidation.

F. S. GRANGER

Action of lead tetraethyl in delaying detonation in the internal-combustion engine. E. MARDLES. *Nature* 121, 424-7(1928).—Antiknock fuel arriving in Gt. Brit. from the U. S. contains 6 cc. of ethyl fluid (PbEt_4 , 54.5%; $(\text{CH}_3\text{Br})_2$, 36.5%; monochloronaphthalene, 9%) per gal. gasoline. A water-cooled engine with comparatively low performance detonated badly at 5:1 compression ratio when run on gasoline alone, but on gasoline contg. 5 cc. Et fluid/gal., compression could be raised to 6:1 before detonation began. With the higher compression, power development increased 10.5% while fuel consumption decreased 6%. Prolonged engine tests with fuels contg. not more than 6 cc. Et fluid/gal. confirmed the claim that ethyl gasoline will not injure spark plugs, valves or stems. Typical analyses are given of a gray deposit found in the engine stripped after a 33-hr. continuous run. A brief review is given of various explanations of detonation.

R. E. SCHAAD

Solubility of paraffin wax in pure hydrocarbons. PAUL WEBER and H. L. DUNLAP. *Ind. Eng. Chem.* 20, 383(1928).—The soly. of purified paraffin wax in pentane, hexane, heptane, octane and isodecane decreases with increasing mol. wt. of the solvent and increases rapidly with rise in temp. This increase in soly. with rise in temp. is greater the higher the mol. wt. of the solvent. The soly. per mol. of solvent is nearly const.

E. E. CRANDAL

Improved manufacture of crack-benzine especially from brown-coal tar and shale oils. ALFRED KARSTEN-SALMONY. *Chem.-Ztg.* 52, 209-10, 232-3(1928); cf. following abstract, also *C. A.* 22, 1465.—The Blümner cracking process produces about 70% refined benzine from paraffin base oil, 50-60% from asphaltic oil, and 35-50% from brown-coal tar. The benzine contains approx. 15-20% aromatics. Light gasoline is recovered by activated charcoal from the approx. 10% uncondensable gas evolved in cracking.

R. E. SCHAAD

Cracking, especially of lignite tars and shale oils, by the Blümner process. ALFRED KARSTEN. *Oesterr. Chem.-Ztg.* 31, 38-9(1928); cf. Brit. Pat. 182,868 (*C. A.* 16,

4332); also preceding abstract.—A description is given of the Blümner process, Ger. pat. 338,846 (1922). Crude oil, shale oil, low-quality lignite tars or tars of any kind are pumped and injected through a pipe lowered into molten Pb contained in an autoclave heated externally. The charged oil bubbles to the surface of the melt without touching the walls of the heated zone. The process is carried on under pressure of 35–40 atm. at about 450°, the cracking temp. of the oil. Automatic circulation of the melt causes const. heat transfer from the source to the oil, thus preventing overheating and coking. Advantages of the process are: larger yield of benzine of better quality, uninterrupted operation, greater safety and ability to handle crude and distillates simultaneously. The process is operated commercially in a plant near Berlin.

R. E. SCHAAD

Method for extracting high-quality cylinder oils from residue left from lubricating oil.

R. E. VORONOV. *Neftyanoye Khozyaystvo* 14, 213–6(1928).—Lubricating-oil residues were mixed with 15% of heavy gasoline or kerosene and the mixt. was treated with 92.5% H_2SO_4 and fuming H_2SO_4 (22% SO_3). The product obtained is then stripped from gasoline or kerosene and treated with fuller's earth. The residue was mixed with 15% kerosene and 0.5% naphthenic acids. This mixt. had a flash point (Brenken) 100–110°, Engler viscosity at 100°, 3–3.5. Forty kg. of the mixt. was heated with steam to 90° and the sepd. H_2O drawn off; 1% H_2SO_4 (92.5%) was added, the mixt. was agitated with air for 30 min. and allowed to settle 2 hrs. The acid sludge was drawn off. If water was still left, the drying operation was repeated. Three % of fuming acid was added, the mixt. agitated 1 hr., allowed to settle 3 hrs. and the acid sludge drawn off again. A second portion (4%) of fuming acid was added, the mixt. agitated 1.5 hrs., allowed to settle 3 hrs. and the acid sludge drawn off again. The residue was given another treatment with 2% (92.5%) H_2SO_4 , agitated for 1.5 hrs. and 0.05% of 20° B ϕ . NaOH added. After 4 hrs. settling the sludge was drawn off, 15% of hot water added to keep the temp. at 90° and after 3 hrs the acid H_2O was drawn off. The flash point (Brenken) increased 2–5°; Engler viscosity at 20° decreased 3–4°; the color was dark green. Superheated steam (250–280°) was used to evap. the kerosene and SO_2 and SO_3 . After this treatment the yield of oil was 65–66% of the residue used. The oil obtained had a flash point (Brenken) 290°, Engler viscosity at 100°, 6.10, coke (Konradson) 3.2%, color faint dark green. Treatment with 3% of fuller's earth 5% gave a total yield of 60%.

	Treated residue	American cylinder oil	Russ. Viskosin 7
Flash (Brenken)	305–310°	280–290°	300° and more
Viscosity E_{100}	6.65	5.55	7–8
Carbon (Konradson)	2.2–2.4%	4.5–5.5	2.8–3.0
Color	Dark green	green	black

The cost of making this oil is equal to that of Viskosin 7. This process is covered by the Russian Patent No. 16, 151, issued March 26, 1927. A. A. BOGHTLINGK

Lubrication. W. R. ORMANDY. *Proc. Inst. Mech. Eng. (London)* 1927, 291–327; *Engineer* 143, 361–2, 393–4(1927).—The forces active at the surfaces of solids are discussed. When oil is allowed to penetrate between two metallic surfaces, the equilibrium position is quickly taken, but if an excess of oil is placed between the plates a long time is necessary for the excess to be squeezed out and the metal to settle into equilibrium position, this behavior suggests that the viscosity of the oil is enormously increased in these circumstances. This period can be shortened by heating or mechanical agitation. The presence of 0.7% or over of a polar compound in a lubricant insures a coeff. of friction of the order of that for the polar compd. alone. Lubricating films of limiting thickness are probably very rare in practical experience. Measurements of elec. resistance and capacity between two ground and polished stainless-steel disks immersed in oil showed that the metal pieces formed contact at one or more points long before the film between was reduced to thickness. Even with optically true surfaces such as Hardy used in his studies, the height of the unevennesses would be some 40 times the length of a stearic acid mol. Expts. indicate that when spheres or disks fall freely through a mass of liquid, as in one type of viscometer, the viscous resistance is proportional to the velocity as long as the viscous forces are large compared with the forces causing motion. When the moving body approaches the walls or bottom of the container, the influence of the walls is exerted; in the viscometer, a large correction has to be applied. As a disk rotating in oil in a horizontal plane at the end of a wire attached perpendicularly to its center approaches the bottom of the container, the logarithmic decrement of rotation increases very rapidly. The flatter the viscosity-

temp. curve of an oil, the better its lubricating properties; these are generally, but not always, the oils of lowest sp. gr. Oxidizing conditions to which lubricating oils are subjected produce asphaltic substances in the oil or acids which easily emulsify with water; in either case the oil ducts are liable to become clogged. S content is thought by Moore to be concomitant with the tendency to asphalt formation. Fe, Cu, Pb and Zn, all catalyze the oxidation processes, though in different degrees.

E. E. CRANDAL

Viscosity of lubricants under pressure. M. D. HERSEY and HENRY SHORE. *Mech. Eng.* 50, 221-32(1928).—Under pressures of 20,000 lb per sq. in. viscosities of animal and vegetable oils are less affected by pressure than the viscosities of mineral oils. Above this pressure, lard oil in particular gives evidence of suddenly solidifying. This fact reopens the possibility suggested by Kingsbury in 1903 that oiliness is a sort of intensified viscosity. Lard oil, Veedol medium (paraffin), Texaco medium (naphthene-base), Mobiloil A (mixed-base or blended) and castor oil were studied. Pressures up to 57,000 lbs. per sq. in. were applied by means of a specially designed pump and an intensifier. Viscosity was measured in a ball- and -slanted-tube viscometer. The actual pressure applied to the oil in the tube as the ball passed down the 15° slope was measured through the elec. resistance of a manganin wire which had a resistance of over 100 ohms. The resistance of a manganin wire increases 1.6% per 100,000 lbs per sq. in. This coiled-wire pressure-gage was inserted in one of the 3 openings of a tee in a rectangular block of steel. The left-hand arm of the tee connected with the high-pressure side of the intensifier, the right with the viscometer. A glycerol-and-water mixture was used to communicate pressure on the low side of the intensifier and kerosene was the medium between the high side and the pressure gage. The viscometer was heated by a coil of nichrome wire around it and two pyrometers indicated temps. For "roll-times" over 6 sec, the abs. viscosity, $\mu = T/T'$ (T is the observed roll-time, and T' the roll-time for a liquid with a viscosity of 1 poise, T' being a function of the density of the oil). For shorter roll-times it is necessary to plot a curve from the data for oils of known viscosities and densities; this may be used for obtaining abs. viscosities giving short roll-times. Of the five oils whose viscosities were taken at high pressures, only the lard oil and paraffin-base oil appear to solidify at such pressures; castor oil showed a slight tendency to do so. By plotting log-viscosity against $\log(t^\circ + 18)$, (t is temp.), const.-pressure curves or isopiesticities were obtained; from these curves it was seen that the temp. coeffs. of all the oils tested except lard oil were considerably higher at high pressures.

E. J. CRANDAL

Practical observations on stability in bitumens. R. W. PARKHURST. *Commonwealth Eng.* 15, 261-5(1928).—Stability is of 2 forms: phys. and chem. The former is usually indicated by 3 standard tests: softening point, penetration and ductility. Binding power depends upon cohesiveness and adhesiveness. While highly cohesive bitumens are most resistant to temp. change, the very adhesive ones are the least resistant; from a practical standpoint the most desirable combination is a proper "balance" in these properties. Mineral matter may reduce the susceptibility of bitumen to thermal changes without altering its chem. structure. Observations were made on the colloidal capacity of bitumens, and the existence of colloidal conditions in residual bitumens. Trinidad has a greater colloidal capacity than residual. Relative to chem. stability, carbenes (compds. insol. in CCl_4) are not related to phys. stability, the ratio between the asphaltene and petrole content as disclosed by the naphtha soly. test is of particular interest when the character of the petrole is known. No mineral values are yet available to indicate the binding power. From service results it seems that cementitiousness in a bitumen depends largely upon the ratio of asphaltenes and petrole and upon the character of the latter. A bibliography is appended.

W. H. BOYNTON

The ignition point of wood charcoals. W. SWIENTOSLAWSKI and M. CHORAZY. *Przemysł Chem.* 12, 31-7(1928).—The ignition point of a wood charcoal may be regarded as one of its characteristic consts and can be detd. with the specially designed app. (cf. C. A. 22, 2047). The conditions of the expt. must be held strictly standard, however, to obtain comparable results. The ignition point depends on the wood and on the temp. of charring. Charcoals obtained at a lower temp. on a subsequent heating to a higher temp. show an ignition point of the same temp. that they would have had if they were originally prepd. at that higher temp. Having the necessary graphs it is possible to tell at what temp. a given charcoal was prepd.

A. C. ZACHLIN

Ignition point of activated charcoals. W. SWIENTOSLAWSKI and B. ROGA. *Przemysł Chem.* 12, 38-9(1928); cf preceding abstr.—No relationship is evident between

the ignition temp. and the adsorbing power of charcoals. A relationship does exist between the ignition point and the temp. of activation. In some cases where charcoal obtained from similar raw materials but prepd. at different temps. was used a straight line relationship was found between the ignition point and the activating temp.

A. C. ZACHLIN

A device for determining the ignition point of technical charcoals (SWIENTOSLAWSKI, ROGA) 21. Flood waters of Bradford pool and relation to oil production (TORREY) 8. Destructive hydrogenation of coal, oils, etc. (Brit. pat. 273,712) 21. Distillation of carbonaceous materials (Brit. 273,528) 21.

KLEVER, HELMUT W., and MAUCH, KARL: Über den estländischen Olschiefer, "Kukkersit." Halle (Saale): W. Knapp. 60 pp.

Cracking hydrocarbon oils. PETROLEUM CHEMICAL CORPORATION and E. P. STEVENSON. Brit. 273,781, March 24, 1926. In cracking gas-oil or other petroleum products to obtain gas for carburetting water gas and other products, intermediate products such as a motor spirit fraction and olefins are sep'd. from the cracked products, e. g., by use of H_2SO_4 . An app. is described and various details of procedure are given.

Fractionating hydrocarbon oils. C. M. ALEXANDER. U. S. 1,667,340, April 24. Oil vapors are brought into contact with reflux condensate having a lower final b. p. than the highest b. p. constituent of the vapors being contacted and the vapors are subsequently brought into contact with a condensate of higher b. p. An app. is described.

Distilling petroleum hydrocarbons. W. M. CROSS. U. S. 1,666,119, April 17. Oil such as crude petroleum is heated in a preliminary heating stage to a temp. sufficient to vaporize the lighter hydrocarbons, the heated oil is passed to a vaporizing stage and the liquid and volatilized material are there sep'd. The liquid products are returned for further heating to vaporize addnl. fractions of high b. p. and the reheated material is passed to a sep. vaporizing stage. The relative heating to which the charging stock and recycled stock are subjected is controlled by limiting the extent of their circulation through the heating zone. An app. is described.

Distilling petroleum oils. A. E. PEW, JR. and H. THOMAS. U. S. 1,666,300, April 17. Oil is heated to a distg. temp. and a stream of the hot oil is caused to flow within a still at successively higher elevations and the stream of oil at each elevation is divided into confined multiple streams which are spaced apart. Oil to be vaporized is introduced into the upper part of the still and passes in heat-exchanging relation to but not in contact with the hot streams of oil and passes successively in thin films in heat-exchange relation with the stream of oil at successively lower elevations and at successively higher temps. so as to effect fractionation. An app. is described. U. S. 1,666,301 specifies a generally similar system in which separate streams of oil may be consolidated before passing from one stage to another of the treatment. An app. is described. U. S. 1,666,302 also relates to similar process and app.

Distilling mineral oil. A. E. HARNSBERGER. U. S. 1,666,597, April 17. In vacuum distn. of mineral oils a quantity of oil is drawn, without reduction in its total weight, through a heated pipe still of progressively increasing cross-sectional pipe area from the inlet to the outlet end; this increasing area permits such reduction in back pressure due to pipe friction of the oil and vapors drawn through the still as to allow a vacuum carried on the outlet end of the still to penetrate back to the inlet end. An app. is described.

Purifying mineral oils. J. P. FRASER. Brit. 273,351, Jan. 25, 1926. In order to sep. aromatic and unsat'd. hydrocarbons, mineral oils are shaken with phenol contg. a small quantity of H_2O . Numerous details are given.

Converting hydrocarbon oils with aluminum chloride. ALLGEMEINE GES. FÜR CHEMISCHE INDUSTRIE. Brit. 273,999, Sept. 17, 1926. In the process described in Brit. 272,433 (C. A. 22, 1847), the residue after the first distn. with $AlCl_3$ is ext'd. with concd. H_2SO_4 instead of with SO_2 .

Oxidizing mineral hydrocarbons. J. H. JAMES. U. S. 1,667,419, April 24. Hydrocarbon material of mixed character such as petroleum or shale oil is heated at least sufficiently to vaporize part of the material, heavier portions are sep'd. from a lighter portion in the vapor phase, and a lighter portion is mixed while still in vapor or gaseous phase with an O-contg. gas and the vapor-O mixt. is passed in contact with a catalyst such as blue oxides of Mo and partial oxidation is effected.

Refining heavy mineral oils with sulfur dioxide. L. EDELEANU, K. PFEIFFER, K. GREGG and P. JODECK. U. S. 1,666,560, April 17. In a continuous refining operation, an intimate mixt. of the oil and SO_2 is prepd. in a vessel by use of a churning device, and the mixt. is continuously supplied to a settling receptacle with a successively decreasing speed at a zone about in the midst of the mixt. already in the settling receptacle.

Hydrogenating coal, oils, etc. I. G. FARBENIND. A.-G. Brit. 273,337, June 26, 1926. Liquid hydrocarbons of low b. p. are obtained from coals, mineral oils, bitumens and like materials by first producing fractions of narrow b.-p. range and then subjecting the fractions to hydrogenation at high temps. and pressures in the presence of a catalyst. Middle fractions b. 250-350° are especially suitable and may be hydrogenated by use of H_2 in the presence of porous C, active SiO_2 and hydrosilicates. Cf. C. A. 21, 3122.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 274,401, Mar. 8, 1926. The process described in Brit. 247,583, (C. A. 21, 643) and in Brit. 249,501 (C. A. 21, 1005) for destructive hydrogenation of carbonaceous materials under a pressure of at least 50 atm. in the presence of Mo or its compds. is applied to the treatment of conversion products of mineral oils and bitumens such as to cracked products, acid sludge or hydrogenation products of bitumens. Cf. C. A. 22, 1848.

Separation of petrolatum from oil. C. R. WAGNER. Can. 276,498, Dec. 20, 1927, U. S. 1,669,151, May 8. Steam-refined stock is dild. with a solvent (e. g., MeEtCO) in which petrolatum is less sol. than in naphtha and the dild. stock is chilled to sep. the petrolatum.

Automatic relief valve for pressure oil stills. A. J. SLOAN. U. S. 1,667,055, April 24.

Apparatus for extracting oil from shale deposits by heating in situ. R. CRAWSHAW. U. S. 1,666,488, April 17.

System for obtaining of oil from natural strata by treatment with compressed air, etc. L. RANNEY. U. S. 1,667,269, April 24.

Apparatus for removing coke deposits from petroleum stills. L. V. ROBBINS. U. S. 1,666,865, April 17.

Apparatus for mixing sludge (derived from petroleum) with fuel oil, etc. R. BRATTIE. U. S. 1,667,235, April 24.

Treating lead sludge. J. B. HILL. U. S. 1,667,550, April 24. Pb sludge such as is obtained in refining petroleum with plumbites is treated with an alkali metal hydroxide and an O-contg. gas, to regenerate alkali metal plumbite.

"Antiknock" liquid fuels. W. GAUS. U. S. 1,666,693, April 17. Fuels such as gasoline are treated with a metal carbonyl such as Fe carbonyl and with MeCl , NH_4Cl or other suitable halogen compd. sol. in the fuel.

Gas-absorption apparatus for recovering gasoline from natural gas or for other purposes. W. G. LAIRD. U. S. 1,666,744, April 17.

Lubricating mixture. R. P. JUDN. U. S. reissue 16,943, April 24. See original pat. 1,449,608, C. A. 17, 1852.

Bituminous emulsion. H. PLAUSON. Can. 276,480, Dec. 20, 1927. Bituminous emulsions are prepd. by emulsifying a glyceride with K_2CO_3 and agitating the bituminous material with the emulsion so obtained.

Packing asphalt for shipment. F. BREEZE, JR. U. S. 1,666,730, April 17. Melted asphalt is poured into a mold which may be formed of metal plates and the walls of which are coated with a clay slurry or other lubricating substance; the asphalt is allowed to solidify and the molded block thus formed is then placed in a fiber container in which it fits snugly and in which retained lubricant prevents adhesion.

23 CELLULOSE AND PAPER

CARLETON E. CURRAN

Recent work on the oxidation of cellulose. J. L. PARSONS. *Ind. Eng. Chem.* 20, 483-5 (1928).—A review (with bibliography) covering 2 yrs. from which it is concluded, in agreement with Cross and Doré, that there is no justification for the term "oxycellulose" as applied to a chem. individual. The expression "oxidized cellulose" is preferable to designate the mixt. resulting from the oxidation of cellulose. E. J. C.

Sulfite cellulose from spruce wood. R. BERGGVIST. *Svensk. Pappers-Tid.* 31, 138-40, 171-3 (1928).—The importance of the different variables, particularly the temp. curve, affecting the sulfite process, is emphasized. Cooking at 130° is insufficient as a

basis for fully evaluating results and detns. should be made on standard com. sized chips to compare results with greater certainty. Various theories proposed to explain the mechanism of the reactions in sulfite digesting are discussed. A suspension of 6% unbleached pulp in $\text{Ca}(\text{OH})_2$ soln. contg about 0.03% $\text{Ca}(\text{OH})_2$ after standing 10 hrs. at 35° sepd. nearly half the resin. Lime soap from spruce resin is far from insol. Samples of pulp withdrawn at digesting periods of 13, 14, 15, 16 and 17.5 hrs. gave 0.70, 0.68, 0.58, 0.35 and 0.86% resin, resp., indicating that, as the neutral point is passed and the p_H value drops, the lime soap is decompd and the resin fixes itself to the fibers again. The action of NaOH and $\text{Ca}(\text{OH})_2$ on the resin is compared. Investigations on the diffusion of acid in the chips are discussed. B. suggests considering sulfite digesting in 3 steps: (1) in acid digesting liquor, causing satn of the wood by the digesting acid; (2) in alk. digesting liquor, causing certain hydrolytic decompns.; and (3) in the presence of available lime with lowering of p_H . The chem. compn. of spruce wood is discussed with reference to improved methods of prep. pulp. The necessity of not exceeding a max. SO_2 content of 0.06% is emphasized, also sufficiently long absorbing period during digesting and the use of S free from Se.

W. SEGERBLUM

Polysaccharides. XXXVII. The behavior of different celluloses toward snail cellulase. P. KARRER AND P. SCHUBERT. *Helv. Chim. Acta* 11, 229-30(1928); cf. *C. A.* 21, 3466.—There is no apparent relation between the amt. of enzyme action on the different celluloses and other properties such as viscosity, Cu no., etc. Cellulase from snails ferments β -cellulose more quickly than α -cellulose. Filter paper was 93% decompd. after 4 successive treatments with an especially active, concd. snail enzyme soln. XXXVIII. Contribution to the knowledge of the behavior of viscose silk toward snail cellulase. O. FAUST, P. KARRER AND P. SCHUBERT. *Ibid* 231-3. The resistance of viscose to enzyme action is considerably increased by stretching during coagulation. Origin and processing appear to have some influence on the enzyme resistance

RUBY K. WORNER

Viscose. IV. The viscose film (cellophane). M. NUMA. *Cellulose Ind. Tokyo* 3, 235-49(1927); cf. *C. A.* 22, 1038.—In the prepn of films from ripened viscose the permanence of the qualities of the film is perfectly satisfactory if a cellulose of high quality is used, but with low-quality wood pulp a marked degradation of the film may take place after a year. Under the conditions adopted the toughest films were obtained when the sulfurized viscose product was dissolved in caustic soda of 7% concn. The quantity of ash, ranging between 0.2 and 1.0%, had no influence on the mech. properties of the film. Within a certain limit of moisture content the tensile strength and elongation increase regularly with the thickness of the film, but with higher moisture the increase in elongation is no longer proportional to the increase in thickness. Increase in moisture decreases the tensile strength and increases elongation, but there is no definite relation. Above 12% of moisture these effects are strongly marked. Generally, if the film is comparatively thin, the influence due to a variation of 1-2% in moisture is negligible. The moisture content of a film of medium softness is 9-12% and independent of the thickness; a soft film has higher tensile strength and lower elongation than a harsh one, apart from the moisture content. The mech. properties of the film depend chiefly on the phys. properties rather than on the chem. properties of the pulp, although the colloidal condition plays a part. The higher the intensity of color of the pulp in cuprammonium soln., the better are the mech. properties. It is advantageous to dry the film before desulfurizing and bleaching; the presence of free fibers in the film is stated to be advantageous from the point of view of strength and elongation, though affecting its transparency and luster.

B. C. A.

Forerunners of rayon. H. A. GOODMAN. *Am. Dyestuff Rept.* 17, 203-6(1928).—An interesting sketch is given, which presents the ideas of Hooke (*Micrographia*, year 1665, *Reaumur Histoire des insectes*, years 1740 to 1754) and those of the workers of the 19th century.

L. W. RIGGS

Possible cellulose bases for rayon manufacture run gamut of vegetable kingdom. JOHN E. JACKSON. *Textile World* 73, 1291-2(1928).—Brief discussion of possible sources of cellulose.

CHAS. E. MULLIN

Artificial silk. J. W. PENNINGTON. *Textile Am.* 48, No. 3, 17-9; No. 4, 17-8, 21; No. 5, 13-5, 52; No. 6, 16-20(1927); 49, No. 1, 16-20; No. 2, 14-6(1928).—The prepn. of the soln. for spinning, the spinning process and the app. used in spinning the four varieties of rayon are described.

CHAS. E. MULLIN

Industrial hygiene and its relation to the manufacture of artificial silk in Italy. UMBERTO POMILIO. *Giorn. chim. ind. applicata* 10, 7-11(1928).—A description, with special reference to the Soie de Chatillon viscose plant, of problems of industrial hy-

giene, such as the removal of H_2S . In any viscose plant H_2S and CS_2 are the chief sources of danger, and if these are properly controlled unhealthful conditions are minimized. The suggestions of Loriga (cf. *Boll. Lavoro*, May, 1925) are considered to be of special value. A survey of different plants indicates that most of the latter eliminate the H_2S danger by diln. of the air, and the methods are so well developed that physiol. disturbances from H_2S are almost unknown. Analyses of spent liquors of the viscose process of the Soie de Chatillon are given to show the character of the waste substances and that such waters are harmless to fauna and flora and can be used for irrigation.

C. C. DAVIS

Efficient arrangement characterizes this modern newsprint mill. A. E. BUCHANAN, JR. *Chem. Mct. Eng.* 35, 205-9 (1928).—The plant of the Anglo Canadian Pulp and Paper Co. at Quebec is described.

E. H.

The acetolysis of mannocellulose (BERTRAND, LABARRÉ) 10. Preparation of larger amounts of vanillin from sulfite waste liquors (KÜRSCHNER) 10. Formation of SO_2 by burning S (ANON) 18. The determination of polysaccharides (APPLEMAN, *et al.*) 7.

REINHOLD, GERHARD: Die Papierholzversorgung. Berlin: Carl Hofmann. G. m. b. H. 147 pp. M. 6. Reviewed in *Pulp and Paper Magazine* 26, 427 (1928).

Cellulose esters. G. SCHNIDER and C. DREYFUS. Brit. 273,743, July 2, 1926. The viscosity characteristics of cellulose esters such as cellulose acetate are lowered by treatment with H_2O_2 in the presence of Fe or an Fe salt, preferably a ferrous salt such as ferrous acetate. The treatment may also be applied to cellulose butyrate or nitrate.

Sheets of cellulose ester compositions. H. J. HANDS. U. S. 1,666,377, April 17. Sheets of material such as photographic films are formed with gradual variations in density, flexibility, etc., from one face to the other of the sheet, which may be produced by superposing different fluent compns. in forming the sheets.

Saccharifying cellulose, etc. H. SCHOLLER. Brit. 273,317, June 23, 1926. Cellulose-dextrins and the like are saccharified by passing dil. acid through the material while heated under pressure; the glucose soln. formed is continuously withdrawn and cooled.

Use of liquid jets for detaching hollow articles of cellulose or cellulose derivatives from molds. WOLFF & Co., E. CZAPEK and R. WEINGAND. Brit. 273,564, Nov. 27, 1926.

Recovering camphor from celluloid or like materials. A. FRIEDEN. U. S. 1,666,645, April 17. Celluloid or similar material from which camphor is to be recovered is placed in an alk. soln. such as NaOH, the strength of which is such that most of the nitrocellulose is not decompd. and the batch is subjected to steam distn. to distil off the camphor.

Hollow filaments from viscose. COURTAULDS, LTD., H. J. HEGAN and E. HAZELRY. Brit. 273,506, July 19, 1926. A viscose contg. Na_2CO_3 (suitably 1-3%) is used with a coagulating bath contg. H_2SO_4 9-11, Na_2SO_4 10-14, $MgSO_4$ 8-14 and $ZnSO_4$ 8% or less (a total of 15-28% sulfates being used in the bath). Glucose or other org. material may also be added to the coagulating bath.

Artificial silk. BORVISK SYNDICATE, LTD. Brit. 273,647, July 2, 1926. Artificial silk having a mat appearance is obtained from viscose by adding, before spinning, olive oil, castor oil, mineral oil, tetrahydronaphthalene or other suitable oils, fats, soaps or hydrogenated hydrocarbons.

Artificial silk. COURTAULDS, LTD., W. H. GLOVER and G. S. HEAVEN. Brit. 273,386, March 29, 1926. Artificial silk of diminished luster is made by spinning a viscose soln. with which has been incorporated a small proportion (suitably about 0.5%) of liquid petroleum or petroleum jelly. The petroleum jelly is retained in the filaments.

Artificial silk. F. J. GAHLERT. U. S. 1,666,090, April 17. Freshly spun threads of artificial silk are treated with water or other suitable softening agent and the softened thread is stretched and retwisted.

Artificial silk, films or other products from cellulosic solutions. WOLFF & Co., E. CZAPEK and R. WEINGAND. Brit. 274,054, July 8, 1926. Products from viscose or other cellulosic derivs. are given a silky luster by mixing with the solns. from which the products are formed powd. asbestos or similar materials.

Apparatus for continuous wet-spinning and collection of artificial silk. W. P. DREAPER. Brit. 273,354, Jan. 11, 1926.

Utilizing material rich in lignin. R. GRIESSBACH and J. EISEL. U. S. 1,666,696, April 17. Lignin from wood meal or similar material is extd. with an org. halogen-contg. solvent such as ethylenechlorohydrin to ext. vanillin and other substances which may be recovered.

Wood pulp. J. D. RUE, F. G. RAWLING and S. D. WELLS. Can. 276,156, Dec. 13, 1927. Wood is treated so as to dissolve the intercellular material without materially decomp. the lignocellulose content, by digestion with an aq. soln. contg. Na_2SO_3 and an alkali capable of producing CO_2 during the period of digestion. The wood is boiled under pressure, CO_2 and steam being released during the boiling period.

Paper-making apparatus. C. J. GUENTHER. U. S. 1,667,516, April 24. Devices are provided for recording the tautness of the sheet and for automatically controlling the heat for drying in accord with the tautness.

Paper-making apparatus. F. MOUFANG. Brit. 273,602, March 26, 1926.

Paper-making apparatus. C. SEYBOLD and J. BOLTERS DORF. U. S. 1,666,472, April 17.

Drying section of paper-making apparatus. E. v. ASTEN. Brit. 273,610, Nov. 11, 1926. Hot air is supplied by rotating slotted tubes.

Paper pulp. S. D. WELLS. Brit. 273,663, June 29, 1926. Materials such as wood, cereal straws and grasses are boiled under pressure with a soln. of Na_2CO_3 to which S is added. Temps. above 120° are suitable.

Beating engine for paper pulp. R. M. WENDEL. U. S. 1,666,587, April 17.

Waterproofed paper. J. RUED. U. S. 1,667,691, April 24. In forming material suitable for waterproof bags the surface layer of paper is infused with bituminous material having a m. p. above 120° by passing it through a bath of the molten material repeatedly and while the latter cools until viscous; the sheet is removed before it is completely satd. with the bituminous material.

Fibrous paint-like material for use as a "substitute for wall paper," etc. G. E. HEYL. Brit. 273,848, April 21, 1926. See U. S. 1,656,198 (cf. C. A. 22, 1051).

Metal foil for wallpaper decoration. ALUMINUM-WALZWERKE SINGEN DR. LAUBER, NEHER Co., GRS. Brit. 273,669, July 5, 1926. Wallpaper such as described in Brit. 247,234 is made with a soft annealed foil, the back of which is preferably roughened as by etching with water-sol. agents such as waterglass or acid or alk. solns. The foil may be attached by an adhesive having an etching action such as a soln. of shellac in NH_4OH .

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

The explosive industry of Italy. FRANCO GROTANELLI. *Atti II congresso naz. chim. pura applicata* 1926, 168-81.—A description of developments since the World War. C. C. DAVIS

Special motors reduce hazards in explosive atmospheres. R. H. ROGERS. *Chem. Met. Eng.* 35, 232-3(1928).—Various types of enclosed elec. motors are described. E. H.

Liquid-air blasting explosives. C. BUNGE. *Z. ges. Schiess-Sprengstoffw.* 22, 21-7 (1927).—Controversial as to the relative tendencies of ordinary and liquid-air explosives to generate toxic fumes, etc. C. G. STORM

A new method of determining water in dynamite glycerol. RIESENER AND KESSEN. *Chem.-Ztg.* 52, 243-4(1928); cf. *Chem.-Ztg.* 23, 975).—A thorough check showed that the H_2O content of a dynamite glycerol after distn. over AgNO_3 was about 0.6% higher than without AgNO_3 . Brown vapors were observed again, especially after distn. was stopped. The AgNO_3 was converted into AgCl . At 140° AgNO_3 is attacked by glycerol, giving a Ag mirror. $\text{CH}_2\text{ClCCl}_3$ heated with AgNO_3 gives small quantities of AgCl , the least with freshly distd. $\text{CH}_2\text{ClCCl}_3$, but the latter always forms HCl on long storage, especially if moist. The proposed method gives false values for H_2O in the glycerol because the H_2O found was not in the glycerol originally. Distn. without AgNO_3 gives concordant results for H_2O . E. M. SYMMES

Explosibility of moving picture films. A. H. GILL and A. H. HAMILTON. *Army and Navy Register* 83, 314(1928).—By firing tests with a 38-caliber pistol it was found that moving picture films, cut or filed to powder, used as the powder charge gave results similar to smokeless powder except that it produced less muzzle velocity and penetration. In one round, at a distance of 10 in. from the target, the bullet penetrated about 2 in. of white pine. CHARLES E. MUNROE

Inflammability. PAUL BEYERSDORFER AND LOTHAR BRAUN. *Z. tech. Physik* **9**, 17-9 (1928); cf. *C. A.* **22**, 1475.—A numerical value for the inflammability of a substance can be given by the quotient (heat of combustion)/(heat of ignition); heat of ignition is ignition temp. divided by sp. heat. For a few substances the value of this quotient is: H_2 (from C_2) 25, H_2 (from C_2) 35, CS_2 63, sugar dust 5, P (yellow) 834, P (red) 128, S dust 39, Al powder in diff. degrees of fineness 1.2, 60 and 140.

B. J. C. VAN DER HORVEN

Limits of inflammability of gases and vapors. H. F. COWARD AND G. W. JONES. *Bur. of Mines, Bull.* **279**, 99 pp (1928).—This presents the results of cooperative work of the Mines Research Board of Great Britain and U. S. Bureau of Mines in detg. the limits in mixts with air, or O and occasionally other atms. of some 34 diff. aliphatic and aromatic hydrocarbons, alcs., acids, esters, ketones, NH_3 , H_2S , CS_2 and other compds., together with many data on mixts of combined inflammable gases and vapors in air and other atms., which includes many com. products such as gasoline and oil, coal, blast-furnace and natural gases. The subject, including Le Chatelier's formula, is discussed at length, and there is appended a considerable bibliography. C. E. M.

The explosion temperature and sensitiveness to impact of liquid and solid explosives. G. TAMMANN AND C. KROGER. *Z. anorg. allgem. Chem.* **169**, 1-32 (1928).—The explosion temp. of an explosive decreases with increasing size of sample and increases with rate of heating. With volatile explosives which melt before exploding the explosive limits are at appreciably higher quantities than with non-volatile explosives, 20 to 100 mg vs 0.4 to 10 mg. With volatile explosives having gaseous products of explosion the substance evaps or decomposes below the explosive limits. Non-volatile explosives decomp. and oxidize below the explosive limits. The dependence of explosion temp. upon rate of heating is linear in most cases, the exception being K picrate. With non-volatile explosives these straight lines do not run parallel with various quantities of sample, and the explosion temp. falls with increasing quantities of sample at the same rate of heating. With volatile explosives the corresponding lines converge at higher rates of heating and intersect at a temp. at which the explosion temp. is independent of temp. Trinitrocresol begins to decomp. at 180° , trinitrotoluene at 150° , detd. by rise in the heating curve. The true explosion temp. of trinitrocresol is 30° to 50° higher than ordinarily observed. The true explosion temp. observed in closed vessels is always higher than in open vessels. On long heating at const temp. the explosion temp. of trinitrotoluene is raised, by formation of decompn. products. Uniform distribution of impact throughout a liquid explosive can cause explosion. Distribution of pressure in an explosive by propagation of impact through a solid substance is quite different from hydrostatic (Hg) propagation where no local high pressures can develop. Suspended in Hg a solid explosive withstands a far greater impact.

E. M. SYMMES

Investigations on the explosion and fire risk of potassium and ammonium persulfates and the best method of packing and loading. G. AGDE AND E. ALBERTI. *Chem.-Ztg.* **52**, 229-32 (1928).—German railways regard $(NH_4)_2S_2O_8$ as safe and impose no restrictions, but some ship lines refuse to load it. $(NH_4)_2S_2O_8$ alone and mixed with ship sweepings gave no deflagration and only charring at 160° . Impact tests with a 10 kg. weight dropped 1 m. were negative. No tests with blasting caps were made as these would not correspond to actual conditions. When heated 20° per min. the decompn point of $(NH_4)_2S_2O_8$ is 180° , of $K_2S_2O_8$ 195° . By admixing 10% org. material the former was reduced to about 160° and the latter to about 185° . Mixed with 10% H_2O and tested at 60° the decompn. was appreciable and increased by the presence of org. material. At a high temp. persulfates melt, evolving SO_3 which chars the org. material, excluding air and hindering combustion. Wood pulp covered with persulfate and ignited only charred and the salt incrustation prevented glowing. Persulfates are neither explosive nor flammable.

E. M. SYMMES

The gaseous explosive reaction—the effect of inert gases. F. W. STEVENS. *Nat. advisory Com. for Aeronautics, Rept.* No. **280**, 12 pp. (1927).—Attention is called to previous investigations carried out under const.-vol. conditions where the effect of inert gases on the thermodynamic equil. was detd. The advantage of const.-pressure over const.-vol. methods as applied to this problem is pointed out and the possibility of realizing a const.-pressure bomb for this purpose mentioned. The application of const.-pressure methods to the study of gaseous explosive reactions, made possible by the use of a const.-pressure bomb, led to the discovery of an important kinetic relation connecting the rate of propagation of the zone of explosive reaction within the active gases, with the initial course of those gases: $s = k_1[A]^{n_1}[B]^{n_2}[C]^{n_3}xxxx$. By a method analogous to that followed in detg. the effect of inert gases on the equilibrium

const., K , this paper records an attempt to det. their kinetic effect upon the expression given above with the result that for N_2 , He and CO_2 it may be stated as follows: $s = k_1[A]^n[B]^m[C]^p \dots + \beta[G_1]$, where $[G_1]$ represents the initial course of the inert gas. From results obtained it seems probable that the value of β depends upon the combined effect of the thermal properties of the inert gas on the heat distribution of the reaction, the property of heat cond. being predominant. An example of the suitability of the const.- pressure bomb for the study of the kinetics of the gaseous explosive reaction is offered in the results of the present paper (cf. *C. A.* 20, 2749). CHARLES E. MUNROE

Processes, products and personnel links explosives manufacture to other chemical engineering industries. E. M. SYMMES. *Chem. Met. Eng.* 35, 234-5(1928).—The inter-relation of the explosives manuf. with other industries is shown by citation of concrete examples. Incidentally attention is called to the recent development of "high count" cartridges of detonating explosives by the use of bulky materials in the dope, the no. of cartridges per 100 lbs. of explosive rising from 270, the former general average, to 500. These high count detonating explosives give a "pushing" effect on explosion similar to black blasting powder CHARLES E. MUNROE

Analysis of nitroglycerin waste acid (WERR) 7. Season-cracking of small-arms cartridge cases during manufacture (GRIMSTON) 9.

Hydraulic press for extruding cordite, etc. J. H. BARKER. *Brit* 273,850, April 24 1926.

Gelatin dynamite. R. B. SMITH and E. M. SYMMES U. S. 1,667,083, April 24 low strength gelatin dynamite contains nitroglycerin 17-18, dinitrotoluene 2-4, "nitrocotton" 0.1-0.2, $NaNO_3$ 60-65, S 9-12, starch 2-5% and a small proportion of chalk.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

A history of dyestuffs. A. P. SACHS. *Textile Colorist* 50, 87-9(1928) —General. CHAS. E. MULLIN

Standardization of the fastness of dyestuffs. S. G. BARKER. *J. Textile Inst* (special issue) 18, 313-48T(1927) —A survey of the requirements in the establishment of standards of fastness to light. The violet C arc is suggested as the most suitable source of light in fading tests. Fading comprises simple loss of color, color change to a different hue, and loss of brightness, but not of color, *i. e.*, the material looks dull. Its extent for exposures under natural conditions depends on the constitution of the sunlight and atm. conditions, humidity being of special importance, for testing, 75% R. H. is suggested as a standard. Fading is related to the wave length of the incident light, and for expts with a fadeometer the relation, $T = aL^n$, where T is the time of exposure in hours, L the percentage loss of the predominant color, a is a numerical const. depending on the dyestuff, and n is a no. of value about 2, holds approx. except for short exposures. For different depths of shade of the same color the actual loss of color for exposure under the same conditions is approx. const. As increase in the ultra-violet radiation produces increase of fading, an artificial fading lamp should transmit only such radiation in the ultra-violet region as would be detd. by the limits of the solar spectrum, if results are to be compared with those due to sunlight. Several instruments, such as the tintometer, and the Eastman and Guild colorimeters, useful for purposes of color matching, are described in detail. B. C. A.

Standardization of laboratory tests on dyed fabrics for fastness. L. C. HIMEBAUGH. *Proc. Am. Assn. Textile Chem. Colorists* 1928, 125-6; *Am. Dyestuff Rept.* 17, 217-8.—The ability of dyed fabrics to withstand light and power-laundry operations was detd. for a wide range of colors which had proved satisfactory to the trade. The fadeometer and washing tests are described. L. W. RIGGS

New plant of the Thies Dyeing & Processing Company at Belmont, North Carolina. A. H. GRIMSHAW. *Textile World* 73, 2617-21(1928).—A description of the Thies system of dyeing is included. Illustrated. RUBY K. WORTER

Red and yellow dyes from the species of *Centrobolium*. C. D. MELL. *Textile Colorist* 50, 100-1(1928). CHAS. E. MULLIN

Hematoxylin from *Saraca indica*. C. D. MELL. *Textile Colorist* 50, 101-2(1928); cf. *C. A.* 22, 1045. CHAS. E. MULLIN

Neolan dyes for printing wool and silk. ISMAR GINSBERG. *Textile Colorist* 50, 89-91(1928).—Formulas and dyestuffs are suggested. CHAS. E. MULLIN

A wide range of fast shades may be produced on cotton piece goods with naphthol colors. WINN W. CHASE. *Textile World* 73, 457-8, 1301-3(1928).—A discussion of the application of the naphthols, fast color salts and fast color bases, formulas, fastness of the resulting colors, etc. CHAS. E. MULLIN

Determining suitability of dyes. ARTHUR S. ROBERTS. *Textile World* 73, 1313 (1928).—An app. for detg. the capillarity of dyestuff solns. is described. C. E. M.

Azoic and other insoluble colors. A. E. EVEREST AND J. H. WALLWORK. *J. Soc. Dyers Colorists* 44, 101-6(1928).—A history of the production of azoic is given. New processes discovered by the authors are shown. These relate to the application of azoic colors to silk and wool. By the use of selected azoic colors in combination with vat dye discharges it is often possible to produce colors of fastness comparable to those of vat dyes, and which are satisfactory to the "Guarantee" trade. L. W. RIGGS

Direct cotton dyes for viscose. COURTAULDS, LTD. *Textile World* 73, 2627, 2635(1928).—Description of a recently developed temp range test which enables a more selective gradation to be made between the individual dyestuffs than is possible with the capillary test. RUBY K. WORNER

Dyeing, sizing, delustering and scrooping rayon yarn in the skein. R. M. GUTKUNST. *Textile World* 72, 3117-8, 3131(1927).—The requirements for rayon dyestuffs also apply to the selection of vat dyes. Compd. shades should be avoided wherever possible. A good rayon size may be prepd by boiling glue in H₂O and dilg. to 0.25° Tw. at 38°. Add 5% of soap to lubricate and soften the thread. The addn. of a trace of caustic increases the absorption of the size by the rayon, giving a heavier sizing. Rayons may be scrooped by washing in a heavy soap soln. at 49°, hydroextracting and immersing in a bath contg. 160 gal. H₂O, 24 lbs tartaric acid, 8 oz. gelatin and 1 pt. HCHO for 100 lbs. of yarn. It is then hydroextracted again and dried in the usual manner. CHAS. E. MULLIN

Dyeing viscose with direct cotton dyestuffs. ANON. *Rayon* 5, No. 5, 20-3, 34 (1927).—A list of dyes with the capillarity numbers for viscose. CHAS. E. MULLIN

Dyeing viscose with direct cotton dyestuffs. C. E. MULLIN. *Textile Colorist* 49, 591-4(1927); *Can. Colorist Textile Processor* 8, 10-11(1928).—Contrary to the commonly accepted saying that "viscose dyes like cotton," there are many differences in dyeing cotton and viscose, particularly in the selection of easily leveling direct cotton dyestuffs and their correct application for level shades. On cotton the direct dyestuff solns. having the greatest capillary attraction for the fiber give the most level shades, while on viscose the exact reverse is the case. Rapid-dyeing dyestuffs give the most level shades on rayon. In selecting direct cotton dyestuffs for rayon, those having a high capillary number (low capillarity), dyeing most rapidly, bleeding most upon undyed rayon, and requiring the least salt in the dye bath, give the best results. Viscose should be dyed in a bath contg. only soap and dyestuff (no Glauber's or common salt) at a high temp for a short time, say 30 min. It should be entered at the same temp. as the dyeing, 90°. Various tests for detg. the suitability of direct dyestuffs for use upon viscose are described. CHAS. E. MULLIN

Faults in woolen piece dyeing. S. KIRKLAND. *Dyer, Calico Printer* 59, 6-7 (1928).—Causes, prevention and cures. CHAS. E. MULLIN

Comparative tests with the precipitants Katanol and Tamol for basic dyes to obtain lakes. GUSTAVE ARNOLD. *Chem.-Ztg.* 52, 211(1928).—The prepn. of lakes with Tamol which are light-, lime- and water-fast. A. S. CARTER

Black on cotton. H. D. ARNOLD. *Prcc. Am. Assocn. Textile Chem. Colorists* 1928, 129-32; *Am. Dyestuff Rept.* 17, 247-50.—An address. L. W. RIGGS

Rapid and continuous printing. RAFFAELE SANSONE. *Dyer, Calico Printer* 59, 29(1928).—Mechanical. CHAS. E. MULLIN

Printing with naphthol AS dyes. H. GÜRTLER. *Rayon* 6, No. 3, 10-11, 33-4 (1928).—Formulas and methods are given. CHAS. E. MULLIN

Bleaching of "back-greys" (in printing) stained with indanthrene dyes. M. M. CHILKIN. *Textilber* 8, 280-1(1927).—Back-greys, after use for printing indanthrene dyes, become stained in colors very resistant to bleaching when afterwards subjected to a kier boil. Thus, Helindone Orange R yields a pinkish orange stain, Thioindigo Red B a violet. The staining is due to dissoln. of the loose dye on the back-grey in the alk. kier liquor, which has a reducing action, so that dyeing of the back-grey in a pale shade then occurs. Staining is prevented, so that the back-greys may be satisfactorily bleached by adding Leucotrope W to the kier liquor and first maintaining this for 15 min. at 50-100° and ordinary pressure. Alternatively stained back-greys

may be decolorized by boiling for 15 min. at 100° in a liquor contg. 5 g. of caustic soda and 0.03 g. of Leucotrope W per l. B. C. A.

Some "foolproof" dyehouse methods. W. R. SMITH. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 126-8; *Am. Dyestuff Rept.* 17, 218-20.—Knowing the amt. necessary to dye 100 lbs. of hose, the dyer weighs out that quantity, which is dissolved and made up to 100 oz. One oz. of this stock liquid dyes 1 lb. of material. As the trade demands lots of less than 100 lbs. it is only necessary to weigh out the no. of liquid oz. corresponding to the no. of lbs. to be dyed. This procedure insures uniform shades, and avoids the errors incident to weighing powders for each batch. L. W. RIGGS

Painting of dye houses and bleaching rooms. MAXIMILIAN TOCH. *Textile Colorist* 50, 45-6(1928).—Paints made from China-wood oil varnish and bituminous compounds are superior to linseed-oil paints for materials exposed to Cl. CHAS. E. MULLIN

Textile Research Association plant at the Bureau of Standards, Washington. CHARLES W. SCHOFFSTALL. *Textile World* 73, 1567-70(1928). C. E. M.

Practical textile microscopy. E. R. SCHWARZ. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 143-8; *Am. Dyestuff Rept.* 17, 261-6.—The app. and technic are described. L. W. RIGGS

Some problems of textile testing. F. T. PEIRCE. *J. Textile Inst.* (special issue) 18, 475-89T(1927).—The influences of variable factors in the testing of textile materials are discussed from a math. point of view. B. C. A.

Ultra-violet radiation as an aid to textile analyses. H. R. HIRST. *J. Textile Inst.* (special issue) 18, 369-75T(1927).—By the examn. of substances submitted to the radiation from a Hg vapor lamp 2 types may be qualitatively distinguished: those showing pure brilliant colors and those having only ordinarily colored appearances. Patterns of dyed fabric which have faded through exposure to light show considerable change in appearance under the influence of this radiation, and the method of examn. furnishes a means of controlling the dyeing process in the production of shades fast to light. Many benzene substitution products, and azo dyes having benzene nuclei, show no fluorescence; similar naphthalene compds. and dyes are strongly fluorescent. α -Naphthol in aq. alk. soln. gives a brilliant blue, β -naphthol a violet fluorescence, while salts of fluorescent compds. are more fluorescent than the acids or bases themselves. Solns. of fluorescent compds. (e. g., α - or β -naphthol, or quinone sulfate) may be used as indicators for the titration of colored or turbid solns., since definite changes in the color of the fluorescence are given at the neutral point. Textile fibers, and the same fibers in different stages of bleaching, give characteristic colors and can be thus identified; the method also furnishes information about oils and oil, mildew and other stains on wool fabrics. Unsatsd. fatty acids give blue or violet, the satd. compds. white, and oxidized fatty acids yellow-brown or no fluorescence. Satd. hydrocarbon oils are non-fluorescent and unsatd. strongly so, although oxidation appears to destroy the source of fluorescence in oils. B. C. A.

Transmission of ultra-violet radiation by various fabrics. H. R. HIRST, P. E. KING AND P. N. LAMBERT. *J. Soc. Dyers Colorists* 44, 109-13(1928).—The construction and use of app. for measuring the transmission of ultra-violet radiation by fabrics are described. An examn. of over 100 fabrics showed that every one cuts off a large proportion of the ultra-violet radiation. The amt. transmitted depends mainly on the weave and texture of the fabric and not on the material of the fiber, as has been claimed elsewhere. For equal thicknesses of material, wool has on the whole a higher transmissive power than the other fabrics examd. Any kind of dyeing decreases the ultra-violet transmission. These results are in agreement with those of the U. S. Bureau of Standards, published while this work was in progress. L. W. RIGGS

Strength test for knitted fabrics. W. H. WHITCOMB. *Textile World* 73, 1701-2(1928).—The rubber diaphragm of the usual fabric bursting machine is a const. and variable source of error in all detns. In order to avoid this error, an app. has been developed and is described, wherein a hemispherically topped steel plunger furnishes the bursting pressure. Three tables of results are given. CHAS. E. MULLIN

Cleaning and brightening prints. HENRY P. BAND. *Dyer, Calico Printer* 59, 8-9(1928). CHAS. E. MULLIN

Facts and fallacies in fulling. A. W. DAVIDSON. *Dyer, Calico Printer* 59, 38-9(1928). CHAS. E. MULLIN

A practical program for humidity (in textile manufacture). GEORGE B. HAVEN. *Textile World* 73, 1700-1(1928).—It is proposed, among other things, to retain 70° F. and 65% relative humidity as standard condition, and to specify a standard regain for cotton of 6.5% for fabrics and heavy yarns, 7.5% for fabrics and 8.5% for fleece cottons. CHAS. E. MULLIN

Constant humidity in textile testing. R. W. FEARNSIDES. *Textile Recorder* **45**, No. 539, 52-4, 68(1928).—The effects of humidity on regain upon the results of tests are discussed. CHAS. E. MULLIN

Humidity alters worsted yarn. GEORGE BARKER. *Textile World* **72**, 3131(1927); *Dyer, Calico Printer* **59**, 17(1928). CHAS. E. MULLIN

Extensibility of flax yarns. J. A. MATTHEW. *J. Textile Inst.* (special issue) **18**, 506-14T(1927).—A brief survey of published work with deductions therefrom. It is shown that stretch-load diagrams from flax yarns may be interpreted to reveal effects due to differences in the nature of the fiber in the yarns, and a measure is deduced which reveals the effects of past tensions and is an indication of irregularities in mfg conditions. B. C. A.

Use of fine filament yarns. G. J. GROH. *Textile World* **73**, 2606-7(1928).—An address, dealing with problems and methods of treating and dyeing fine filament rayon yarns and knit fabrics made from them. The development of an all-around ideal oil to be used on rayon yarns is not yet accomplished. RUBY K. WORNER

The contact potential of textile fibers in water. P. KARRER and P. SCHUBERT. *Helv. Chim. Acta* **11**, 221-9(1928).—The potentials at the surface of contact of a no. of textile fibers in water have been detd. The exptl. method and data are given. Silk appears to be the most nearly electrically compensated fiber. Wool assumes in water a strongly negative character. Cu, Chardonnnet and viscose rayons are only weakly negative, while cellulose acetate is strongly so. The decrease in negative character going from native to mercerized cotton to regenerated cellulose is striking. All yarns treated with pyridine assume a positive charge. There appears no relation between the contact potential and dyeing properties, enzyme resistance or the acid or salt content of the coagulation bath of the viscose rayon. RUBY K. WORNER

Moisture relations of colloidal fibers. J. J. HEDGES. *J. Textile Inst.* (Special issue) **18**, 350-9T(1927).—The percentage regain of wool obtained by use of a com. oven is always lower than that given by a lab. method. A Bradford Conditioning House oven gives results as near the true moisture content as can be obtained without circulating dry air through the oven, the attraction for the last traces of moisture being very great. Curves for the variation of moisture content of chemically pure wool with atm. R.H. are of the usual sigmoid character given by other hygroscopic colloids. The heat of wetting of dry wool is considerable, being 24.1 g.-cal./g. Wool and its absorbed water may be considered as a two-phase system in which a little water is adsorbed by the colloid particles, while the bulk is held in a system of pores. The difference between the apparent (in water) and true sp. vols. of wool is much greater than that between the corresponding values for cotton, which, in conjunction with the relative values of the satn. moisture contents, points to a much greater contraction in total vol. for wool. Wool, artificial silk and silk (except heavily weighted silk) are perfect elec. insulators when dry and all, except chemically pure wool, increase in cond. with increasing humidity. The fastness to light of dyed fabrics also appears to depend on the amt. of moisture present. B. C. A.

Cultivation and preparation of jute fiber for the market. T. WOODHOUSE and A. BRAND. *Textile Recorder* **45**, No. 539, 67-8(1928).—Reeling is described and discussed. CHAS. E. MULLIN

Nature of the action of sunlight on cotton. C. BARR and (MISS) I. H. HADFIELD. *J. Textile Inst.* (special issue) **18**, 490-3T(1927).—Continuous decrease of strength and of the viscosity in cuprammonium soln., with increase in reducing power (as shown by the Cu and Ag nos.), are obtained with increasing time of exposure of cotton, while the methylene blue absorption shows first a fall and then a slow rise, the modification of cotton thus produced corresponding to that formed by mild oxidation with Cl water. Expts. with linen show the reaction to be essentially one of oxidation, loss of strength occurring most rapidly in O, less so in air, and to an almost negligible extent in a vacuum, H, or CO₂. No significant change takes place when strips of cotton cloth are exposed for 6 months in sealed glass tubes contg. H, either dry or about 2/3 satd. with water vapor. Similar exposure in tubes contg. O results in considerable loss of strength with increase of Cu no. and the production of CO₂, and CO and perhaps H, the reaction being more rapid in the presence of moisture and a rough parallelism being shown between Cu no. and the corresponding quantities of CO₂ produced. Similar cloth previously steeped in 0.001N H₂SO₄ is more highly reducing and shows a greater production of CO₂ after exposure under the same conditions. Pptn. of Fe(OH)₃ on the cotton before exposure (0.1% Fe₂O₃ on the wt. of cloth) results in increased attack but diminished formation of CO₂. It is suggested that at least 2 reactions may occur during the exposure of cotton to sunlight, both being accompanied by the development of

reducing power and loss of strength, but one producing much less CO_2 than the other, Fe being a photocatalyst to the latter reaction. B. C. A.

Sizing of cotton. PAUL KRAIS AND HERBERT GENSEL. *Dresdner Forschungsinstitut für Textilindustrie, Forschungsheft 7; Leipzig. Monatschr. Textil Industrie* **43**, 3-7, 50-3(1928).—Exptl. studies with a miniature slasher showed that wheat starch and potato starch worked up with *activin* give good results. E. R. CLARK

After-treatment of hypochlorite-bleached cotton with commercial hyposulfites. H. KORTÉ. *Leipzig. Monatschr. Textil Industrie* **43**, 30-2, 73-5(1928).—In Cl bleaching, after treatment with $\text{Na}_2\text{S}_2\text{O}_4$ (Blankit I) gives material of better appearance than similar use of NaHSO_3 . Blankit is really a bleaching agent; for anti-chloring NaHSO_3 is as good and cheaper. Blankit is specially useful in cold bleaching. E. R. CLARK

Strength of oiled cotton cloth. A. H. GILL AND W. D. MCJENNETT. *Textile World* **73**, 2621-3(1928).—In general, oiled cotton cloth shows a gain in tensile strength during the first 2 weeks after oiling and a loss during the subsequent 3 weeks. The gain is ascribed to the oil acting as a glue, the loss to oxidation. The comparative effect on the tensile strength of cotton cloth, of raw and boiled linseed oils with or without driers is shown. RUBY K. WORNER

Some chemical aspects of wool research. A. T. KING. *J. Textile Inst.* (special issue) **18**, 361-8T(1927).—Clean wool removes hydrolysis-alkali from neutral soap solns., the liberated fatty acids being partly deposited on the fiber as acid soap and partly left in suspension in the liquid. In proportion to the amt. of NaOH absorbed, the wool becomes yellowed by heating or steaming, acquires an increased affinity for dyestuffs, is more susceptible to bacterial attack, and less resistant to bleaching and chlorination. Wool keratin allows of no criterion of purity. Its S content varies not only with variety, but also with fibers of different fineness from the same fleece. Approx. 66% of the total S is removed in cystine, one of the most readily isolated of the hydrolysis products of wool, but although several products of amino-acid nature of known constitution have been obtained by the acid hydrolysis of keratin, no light has been shed on the nature of the keratin complex. In view of the changes in properties (e. g., dyeing affinity) produced by exposure or chem. processing, it is suggested that some form of incipient hydrolysis occurs which, if it does not detach the simpler proteins, liberates their active groups by lactone or other ring formations. The anhydride of glycine (diketopiperazine) is suggested as representing the ring formation predominantly present in keratin, and its behavior on hydrolysis as being similar to that of keratin; a large no. of substituted diketopiperazine ring formations are, however, possible. The cystine nucleus may act as an O carrier in a similar manner to glutathione from which it is derived by hydrolysis, thus explaining the oxidation occurring on the exposure of neutral wool to light, and the behavior of certain azo dyes on wool. B. C. A.

Yield and scour tests (on raw wool). ANON. *Textile Recorder* **45** No. 539, 76 (1928).—A sample washing machine for raw wool is shown. CHAS. F. MULLIN

Pointers on wool oiling and scouring. JAMES JOHNSON. *Textile Colorist* **50**, 102-3 (1928).—General. CHAS. F. MULLIN

Wool scouring. A discussion of soap in its relation to the scouring of wool. How to determine the efficiency of a soap for wool scouring. PROCTER & GAMBLE. *Textile Res. Div., Procter & Gamble Wool Scouring Bull.* No. 1, 1-19.—The most desirable characteristics in a soap for wool processing are high degree of soly., high degree of rinsibility, ability to form a stable fatty acid emulsion in the presence of acids, low degree of hydrolysis, low degree of preferential absorption, and stability toward oxidation and rancidity. Since the properties of a soap are dependent finally on the percentage of solid and liquid fatty acids, comparison of a soap made from 100% liquid fatty acid with one made from 100% solid fatty acid furnishes data for detg. the efficiency of any soap made from a mixt. Na oleate and Na stearate were studied. The former was superior in all respects except the tendency to become rancid. If this tendency is no greater than that of Na oleate, the soap will be sufficiently stable for practical purposes. Conclusion. In general, the higher the percentage of liquid fatty acid in the stock from which the soap is made, the more nearly ideal that soap will be for the scouring of wool. RUBY K. WORNER

Recent wool finishing manufacture. The chlorination process. RAFFAËLE SANSONE. *Textile Recorder* **45**, No. 539, 57-64(1928).—The process and app. used are described. CHAS. F. MULLIN

Intracellular structure of the wool fiber. J. B. SPEAKMAN. *J. Textile Inst.* (special issue) **18**, 431-53T(1927); cf. C. A. **21**, 2068.—The elastic properties of the wool fiber

as a whole are those of the single cell, which is assumed to consist of an elastic cell wall, enclosing a fibrillar structure the interstices of which are filled with a viscous medium. This structure tends to lie preferentially along the axis of the fiber and is heterogeneous in compn. Under small stress, extension of the cell is at first delayed by internal friction, Hooke's law being obeyed up to 2% extension for different wools in water and for the same wool at different humidities; for the same wool in water at higher temps. (up to 100°), deviation begins between 1.4 and 2% extension. Above this crit. value rapid extension occurs chiefly by rotation of the fibrillae, the rate being detd. by the viscosity of the medium within the cell and the elastic constns. of the cell framework; it is greatest at high humidities. When all the fibrillae are drawn into line, extension is retarded and afterwards takes place by direct extension of the fibrillae. The parts of the cell structure which are not plastic in water at ordinary temps. become so at higher temps., while at 100° extended fibers take a set which is permanent as regards subsequent immersion in cold water and is due to plastic flow within the fibrillae. Different wools show fibrilla plasticity to different degrees, and for ease in manuf. wools should be highly plastic. B. C. A.

The nitrogen content of natural and processed wools. JOHN BARRITT. *J. Soc. Chem. Ind.* 47, 69-72T (1928).—Analytical methods and results are given. With the exception of the colored samples, natural wools varying widely in quality of fiber and locality where grown show little variation in N content. The av. value is 16.72%. The N content of the colored samples decreases with increasing color contrast, suggesting the presence of a pigment of lower N content than normal wool. The general effect of alkali is to increase the N content, that of acid to decrease it. The portion of wool substance removed by chlorination and also by chlorination followed by treatment with dil. NH_3 soln. appears to have a similar N content to that of the remainder. RUBY K. WORNER

Testing black silk for loading substances. JAMES R. SPENCER. *Textile Colorist* 50, 109 (1928).—Various tests are outlined. CHAS. E. MULLIN

Determination of materials used in weighting raw silk. JAMES WALLACE. *Textile Colorist* 50, 111 (1928).—Fat, soap, glycerol and sugar are sometimes used to increase the wt. of raw silk. Various methods of detecting these are suggested. C. E. M.

Determination of the physical properties of artificial silk and their relationship to textile manufacture. A. L. WYKES. *J. Textile Inst.* (special issue) 18, 494-505T (1927).—An artificial silk thread acts as though it consisted of 2 components, one brittle and one ductile, difficulties in weaving and knitting being ascribed to this dual nature. Its percentage extension under load increases very slowly with increasing tension until a yield point is reached, when it increases rapidly. Tension-% extension curves show that artificial silk can be converted into such a form that the thread is very brittle, very strong, and almost completely elastic, and it is suggested that the material under ordinary conditions contains a varying proportion of this brittle form of cellulose. For a thread tested first in a dry and then in a wet state the following relation holds. E/T for dry viscose, $E/1.9T$ for wet viscose (where E is the % extension and T the tension), and from it the phys. properties of any viscose silk, e. g., yield point, elasticity, etc. may be calcd. B. C. A.

Methods of applying rayon size have undergone gradual change. ANON. *Rayon* 6, No. 3, 12-3, 22 (1928).—Sizing formulas and methods of application are discussed. Tragacanth and gum arabic are recommended for rayon. CHAS. E. MULLIN

Waterproofing umbrella cloth, awnings and rain coats. GEORGE RICH. *Dyer, Calico Printer* 59, No. 697, 60-1 (1928).—General. CHAS. E. MULLIN

Why, when and how of temperature control. T. J. KENNY. *Proc. Am. Assocn. Textile Chem. Colorists* 1928, 123-5; *Am. Dyestuff Rept.* 17, 215-7.—The 2 types of thermoregulators discussed are represented by the externally controlled which is more sensitive than necessary in dye work, and the self-contained type which holds the temp. within 2 to 2.5° F. Large saving of heat and more uniform results follow the proper use of temp.-control app. L. W. RIGGS

Oil sizes and finishes. J. J. SOKOLINSKI. *Proc. Am. Assocn. Textile Chem. Colorists* 1928, 136-9; *Am. Dyestuff Rept.* 17, 254-7.—An address. L. W. RIGGS

Possible cellulose bases for rayon manufacture (JACKSON) 23. Condensation product of olefins with hydrocarbon of the naphthalene series [as intermediate] (U. S. pat. 1,667,214) 10. Alkali fusion [production of indanthrene blue R] (U. S. pat. 1,667,480) 10. Isoelectric point of silk fibroin (DENHAM, BRASH) 2.

Dyes. H. A. E. DRESHER, J. E. G. HARRIS, B. WYLLAM, J. THOMAS and SCOTTISH DYES, LTD. Brit. 274,156, March 15, 1926. Vat dyes and quinones generally are converted into water-sol. derivs. of their reduction products by treatment in the presence of a tertiary base with a quaternary NH_4 halide, a metal and a compd. of a tertiary base with SO_3 such as the product from pyridine and methylchlorosulfonate. Several examples are given.

Dyes. SOC. POUR L'IND. CHIM. A. BALE. Brit. 274,130, July 10, 1926. Azo dyes of the general formula $\text{R}'-\text{N}:\text{N}-\text{R}''-\text{NH}-\text{X}-\text{NH}-\text{R}'$ (in which R' is an α -naphthyl residue coupled in the *peri*-position to the azo group, R'' the residue of a primary amine of the C_6H_5 or C_{10}H_7 series which can be coupled in the 4-position to the amino group, R''' any aromatic complex contg. at least one azo group, and X a connecting link such as $-\text{CO}-$ or $-\text{CS}-$) are obtained by the action of phosgene or a substitute or thiophosgene or CS_2 on 2 mol. proportions of aromatic amino compds. of which at least one must consist of an aminoazo dye obtained by coupling a diazotized 1,8-aminonaphthol or an *O*-acydyl deriv. with a primary amine of the C_6H_5 or C_{10}H_7 series, while the other may consist of an aminomono- or polyazo dye or of a component of such a dye which can be transformed into the dye after being united with the first-mentioned aminoazo dye. The products dye vegetable fibers in various shades of orange, red and blue which are fast to light and can readily be discharged. The fastness of some of the dyeings can be increased by after-treatment with metal salts, or the dyes may be converted into metal compds. Several examples are given.

Dyes and lakes. I. G. FARRENIND. A.-G. Brit. 274,128, July 9, 1926. Azo dyes are made in substance, on a substratum, or on the fiber, by coupling a 1,3-dimethyl-4-amino-6-halogen (or 2,6-dihalogen)-benzene with a 2,3-hydroxynaphthoic arylide. Various shades of yellow and red are obtained and several examples are given. 1,3-Dimethyl-4-amino-6-halogen (or 2,6-dihalogen)-benzenes are obtained by halogenating asym-*m*-xylidine in H_2SO_4 or by similar processes. Cf. C. A. 21, 2804.

Azo dyes. H. FRITZSCHE, E. KRUMMENACHER, H. GÜBLER and O. KAISER. U. S. 1,667,312, April 24. Azo dyes which contain the cyanuric nucleus are formed by condensing a cyanuric halide with components which have reactive H atoms attached to O, S or N and at least one of which components contains an azo group. A large no. of detailed examples are given for producing dyes of a wide variety of colors.

Azo dyes. M. ISLER and L. VON MEHREL. U. S. 1,667,318, April 24. A large variety of azo dyes are produced by combination of 3-amino-1,8-naphthalenedicarboxylic acid with the diazo derivs. of 1-aminobenzene-4-sulfonic acid, 5-nitro-2-amino-1-phenol-4-sulfonic acid and other components. The dyes are yellow to brown and black powders, which dye wool in an acid bath yellow to brown, violet and grayish blue tints. They have characteristics of mordant dyes. Numerous examples are given.

Azo dyes. A. L. LASKA and A. ZITSCHER. U. S. 1,667,667, April 24. Diazotized aromatic aminopseudoazimine compds. with arylides of 2,3-hydroxynaphthoic acid are specified. The aminopseudoazimines may be obtained by reducing nitro-substituted pseudoazimines or according to the process of Schmidt and Hagenböcker, which involves treating *o*-aminoazo dyestuffs with $\text{CuO}-\text{NH}_4$ salts (cf. C. A. 16, 1092). Among the compds. of this kind, not described hitherto, the following may be mentioned: 2-(2'-aminophenyl)pseudoazimino- α - β -naphthalene, crystg. from 80% alc. as feebly colored granules, m. 120° (not corr.); 2-(3'-aminophenyl)pseudoazimino- α - β -naphthalene, crystg. from a mixt. of xylene and ligroin as almost colorless granules, m. 160° (not corr.); 2-(4'-aminophenyl)pseudoazimino- α - β -naphthalene, crystg. from xylene as almost colorless granules, m. 203–205° (not corr.); 2-(3'-amino-4'-methylphenyl)pseudoazimino- α - β -naphthalene, obtained from a mixt. of xylene and ligroin as colorless scales, m. 172–173° (not corr.); 2-(3'-amino-4'-methoxyphenyl)pseudoazimino- α - β -naphthalene, crystg. from xylene as feebly yellowish soft needles, m. 185° (not corr.); 2-(2'-amino-4'-methylphenyl)pseudoazimino- α - β -naphthalene, crystg. from a mixt. of alc. and pyridine as lemon-yellow soft needles, m. 137–136° (not corr.); 2-(2'-amino-4'-chlorophenyl)pseudoazimino- α - β -naphthalene, crystg. from xylene as feebly yellowish glassy scales, m. 192° (not corr.). As azo components for the process all the arylides of 2,3-hydroxynaphthoic acid may be used, e. g., the anilide, toluidides, anisidides and phenetidides, α - and β -naphthalide, arylides, chloro-substituted in the arylido residue, the bis-2,3-hydroxynaphthoylarylenediamines. The dyes obtained (numerous examples of which are given) are suitable for the production of lakes and when produced on vegetable fiber give fast scarlet red to dark violet shades. Cf. C. A. 22, 1049.

Triazo dyes. B. MAYER and J. GRUNGER. U. S. 1,667,327, April 24. Substantive azo dyes are obtained by coupling equimol. proportions of resorcinol, diazotized

dehydrothio-*p*-toluidinesulfonic acid and a diazotized amino-azo dye of the general formula $R'-N:N-R''-NH_2$, in which R' and R'' are aromatic nuclei free from OH groups and at least one of which contains a sulfonic group. The dyes produce yellow-brown to red-brown and violet-brown tints on cotton and may be readily discharged. Several examples are given.

Vat dye. J. G. DINWIDDIE. U. S. reissue 16,939, April 24. See original pat. 1,558,252; C. A. 20, 114.

Dyes from benzanthrone derivatives. I. G. FARBENIND. A.-G. Brit. 273,656, July 1, 1926. The 2-benzanthronyl-1-aminoanthraquinones obtainable by condensing 2-halogenbenzanthrone with 1-aminoanthraquinones are treated with acid condensing agents such as H_2SO_4 , H_3BO_3 or a mixt. of $AlCl_3$ and $NaCl$; the resultant dyes produce on vegetable fibers from the vat orange-red, brown and violet-brown shades.

Metal compounds of dyes. F. STRAUB and H. SCHNIDER. U. S. 1,667,333, April 24. Metal compds. such as those of Cu, Cr, Ni or Co are obtained from azo dyes produced from 2-amino-1-hydroxynaphthalene-4,8-disulfonic acid and other components such as β -naphthol, 1-hydroxynaphthalene-3,8-disulfonic acid, 1-phenyl-3-methyl-5-pyrazolone or α -naphthol. Several examples are given of dyes producing different colors.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. Brit. 274,211, April 19, 1926. *p*-Diaminoanthrarufin-2,6-disulfonic acid or one of its *N*-methyl derivs is condensed, in the form of its boric acid ester in H_2SO_4 soln, with PhOH or other suitable aromatic hydroxy compd. or an ether of such a compd. in equimol. quantity or in excess. Addn. products are first obtained which upon further treatment with acid or alk. reagents are converted into other compds. in which the phenol residue has probably replaced a sulfo group with elimination of SO_2 . These compds. dye wool or mordanted wool fast blue shades. By removing the second sulfo group other products may be obtained which may serve as mordant dyes or as intermediates. Several examples are given.

Leuco flavanthrone, etc. B. WYLLAM, J. F. G. HARRIS, J. THOMAS and SCOTTISH DYERS, LTD. Brit. 274,303, March 1, 1926. Leuco flavanthrone is treated with chlorosulfonic acid in the presence of a tertiary base such as pyridine at a temp. of not less than 45°. Reddish compds. are obtained which after soln. in weak alkalis such as Na_2CO_3 soln. can be used for dyeing or printing cotton and the shade of flavanthrone developed by hydrolysis and oxidation.

Carbonizing fabrics. C. DREYFUS, R. G. DORT and H. PLATT. Brit. 274,074, July 8, 1926. Carbonization treatment is applied to mixed fabrics or articles comprising fibers or threads of cellulose acetates, propionates or other org. esters or ethers of cellulose mixed with vegetable fibers. $AlCl_3$ may be used as carbonizing agent and the luster of the cellulose esters or ether may be preserved by adding a protecting salt such as Na_2SO_4 , or the luster may be restored by a soaping treatment. The dye resist properties of cellulose acetate and the like to wool dyes are unaltered by the carbonization treatment. The process may be used in the production of embroidery from cellulose acetate or similar fibers on a cotton or jute canvas which is removed by carbonizing with HCl, rinsing and soaping.

Jigger dyeing-apparatus. D. McCAIG and R. LIVINGSTONE. Brit. 273,418, April 13, 1926.

Dyeing cellulose acetate. DURAND ET HUGUENIN SOC. ANON. Brit. 274,094, July 10, 1926. An ester salt of a leuco-vat-dye is applied, steamed and developed at a high temp. by an oxidizing agent such as H_2SO_4 (which may be used at a temp. of 80°) and a nitrite or dichromate. Solid shades are thus obtainable on a mixed fabric of cotton and cellulose acetate.

Dyeing cellulose acetate. BRITISH CELANESE, LTD. and G. H. ELLIS. Brit. 273,819, April 10, 1926. Insol. or difficultly sol. coloring substances or org. compds. for dyeing or printing cellulose acetate and the like are solubilized by pretreatment with sulfo-aromatic ricinoleic acids such as sulfo-benzene-(or phenol or naphthalene) ricinoleic acid or their salts. Several examples are given. Brit. 273,820 specifies the use of sol. resin soaps or Na or other sol. salts or soaps of resin acids as solubilizing agents (preferably as free as possible from free alkalis).

Dyeing, printing or stenciling of cellulose acetate. H. DREYFUS. Can. 276,512, Dec. 20, 1927. Stilbene disazobisphenol, stilbene disazobis-*m*-toluidine, stilbene disazobis- α -naphthylamine, aminostilbene-azo-*m*-phenylenediamine or aminostilbene-azo-*m*-toldidine is employed in the dyeing, printing or stenciling of threads, yarns, fabrics, etc., made with or contg. cellulose acetate.

Dyeing, printing or stenciling of cellulose acetate. G. H. ELLIS and W. O. BOB-

THORPE. Can. 276,515, Dec. 20, 1927. Materials contg. cellulose acetate are treated with relatively H_2O -sol. org. compds. capable of coloring cellulose acetate, such org. compds. being employed in the form of solubilized modifications obtained by pretreating them with a solubilizing agent consisting of a Na salt of sulforincinoic acid and with at least 1 hydrocarbon.

Dyeing cellulose esters. R. MERTZGER. U. S. 1,666,715, April 17. Molasses is used with aminoazobenzene, dinitrodiphenylamine or other org. substances capable of producing dyeings in full and deep shades on cellulose esters such as cellulose acetate but not sufficiently sol. in water to permit use of its simple aq. soln. The molasses may in part be replaced by concd. sulfite cellulose waste liquor.

Dyeing cellulose esters and ethers. C. DREYFUS. Brit. 273,692, June 30, 1926. When Fe-mordanting material made from cellulose acetate or other cellulose esters or ethers, concd. solns. (suitably those of 40-55% strength) are used of Fe salts such as $Fe(NO_3)_3$, $Fe_2(SO_4)_3$ or $FeCl_3$. The treatment may be effected at a temp. of 40-60° and excess Fe salt may be removed and the material treated with a cold aq. NH_3 bath after washing. The product is readily dyed with vegetable dyes such as logwood (which gives deep black on cellulose acetate). Brit. 273,693 specifies the use of mordanting salts such as acetates of Cr, Al or Fe in connection with swelling agents such as formic acid, HOAc, furfural, PhOH and pyridine. The treatments may be applied to mixed goods formed only in part of cellulose esters or ethers.

Dyeing of material containing cellulose derivatives. H. DREYFUS, Can. 276,553, Dec. 27, 1927. Materials, comprising an org. substitution deriv. of cellulose, are dyed with a coloring compd. comprising at least 1 urethan residue. Cf. C. A. 22, 1859.

Dyeing of materials containing cellulose derivatives. H. DREYFUS. Can. 276,554, Dec. 27, 1927. Materials, contg. an org. substitution deriv. of cellulose, are dyed with an azo coloring compd. which comprises at least 1 amino group substituted by a glyceryl residue.

Dyeing of materials containing cellulose derivatives. H. DREYFUS. Can. 276,555, Dec. 27, 1927. Materials, contg. an org. substitution deriv. of cellulose, are dyed with a coloring compd. which comprises at least 1 ω -amino group.

Dyeing of materials containing cellulose derivatives. H. DREYFUS. Can. 276,556, Dec. 27, 1927. Materials, contg. an org. substitution deriv. of cellulose, are dyed with a coloring compd. in which an aryl dye nucleus is linked through N_2 to at least 1 glyceryl residue.

Dyeing artificial silk. J. BADDILEY, P. CHORLEY and C. BUTLER. U. S. 1,667,524, April 24. Regenerated cellulose "silks" are dyed with the secondary diazo dyes which can be made by combining amino-*o*-hydroxycarboxy acids of the $C_{10}H_8$ series such as aminosalicic acids with α -naphthylamine or other usual middle components, further diazotizing and combining with a sulfonated 1,8-disubstituted $C_{10}H_8$ deriv. Cf. C. A. 22, 875.

Dyeing cotton. SANDOZ CHEMICAL CO., LTD. and A. E. WOODHEAD. Brit. 274,276, July 19, 1926. Cotton which has been treated by processes as described in Brit. 224,502 and Brit. 241,854 (C. A. 20, 3577) and in German pat. 346,883 is colored according to the process described in Brit. 246,609 (C. A. 21, 501) in which there is used substantially insol. dyes which have been solubilized by treatment with higher fatty acids or their sulfo or other derivs. or salts of such acids or derivs. The process of German pat. 346,883 comprises the treatment of alkali-treated cotton with aromatic acid chlorides in the presence of inert solvents.

Dyeing textile materials. J. S. WILSON, J. THOMAS and SCOTTISH DYES, LTD. Brit. 274,178, April 12, 1926. A mixt. of 2 or more vat dyes is used, of which at least one is dischargeable with a reducing agent in conjunction with a leucotrope while at least one is not dischargeable; the material is then printed with an appropriate discharge paste to obtain a 2-color effect. Several examples are given.

Dyeing and other treatments of rolls of fabric by immersion. W. FEHRMANN. Brit. 273,828, April 12, 1926. Mech. features.

Printing fabrics. C. DREYFUS. Can. 276,367, Dec. 20, 1927. To portions of a mixed fabric contg. fibers of a cellulose deriv. there is applied a mixt. of 12 parts of infusorial earth, 5 parts dextrin, 30 parts lactic acid and 3 parts H_2O . This mixt. is allowed to remain in contact with the fabric at a temp. below 125° until at least a part of the fibers of the cellulose deriv. are removable by washing with water.

Preparing fibers for spinning. NAAMLOOZE VENNOOTSCHAP OCTROOI MAATSCHAPPIJ VEDE. Brit. 274,331, Nov. 8, 1926. Straw, grasses, especially agaves, cantula, sicilana, coconut husks, leaves, barks, etc., are treated with an alk. soln. such as NaOH, if necessary with the addn. of a catalyst such as a soln. of a salt of a heavy metal such as $CuSO_4$.

or Ni sulfate and NH_4Cl , and the material is then treated (while still impregnated with the alkali soln.) with stearic acid or other suitable fat, fatty acid, oil or emulsion.

Mercerizing and similar treatments of fabrics. M. MELLIAND. Brit. 273,327, June 25, 1926. In the treatment of cotton materials, the ordinary mercerizing processes may be used and may precede or follow treatment as described in Brit. 254,605 (C. A. 21, 2565). The liquors are used alternately hot and cold in any desired sequence. If the soln. employed for the hot treatment is of higher concn., such as 60% NaOH , the feel of the material becomes somewhat fuller.

Composition for edging fabrics. * T. MILLER. U. S. 1,666,143, April 17. Shellac 15, rosin 5, stearic acid 5.5 and a metallic powder such as Al or bronze 5.5 parts.

Treating vegetable yarns and fabrics. A. BODMER. U. S. 1,666,082, April 17. The material is given a permanent finish by treating it with an inorg. acid such as concd. H_2SO_4 , capable of dissolving cellulose, in the presence of pyridine or other heterocyclic base contg. a pyridine nucleus and which serves to stabilize the reaction by retarding its rate without inhibiting the ultimate effect desired. U. S. 1,666,083 relates to similar processes of producing wool-like effects on cellulosic yarns and fabrics.

Obtaining metallic effects on fabrics. R. CLAVEL. Can. 276,359, Dec. 20, 1927. Metallic effects are obtained on fabrics contg. org. derivs. of cellulose by applying to the surface of the fabric a paste contg. a gum, a solvent for the org. derivs. in the fabric and a powder suitable for obtaining the desired effects.

Mothproofing various materials. I. G. FARBERIND. A.-G. Brit. 274,425, July 13, 1926. Wool, skins, hair or other materials are treated with 1-hydroxy-4-chloro-2-benzoic acid, 1-hydroxy-4,6-dichloro-2-benzoic acid or similar compds. or sulfurized derivs. of such compds.

Washing wool. E. C. DUHAMEL and COMPAGNIE GÉNÉRALE DES INDUSTRIES TEXTILES. Brit. 273,755, May 4, 1925. The process of Brit. 256,635 (C. A. 21, 2990) is used, so far as applicable, to wool in sheep-skins or on live sheep.

Washing wool. E. C. DUHAMEL and COMPAGNIE GÉNÉRALE DES INDUSTRIES TEXTILES. Brit. 274,100, May 4, 1925. The process of Brit. 240,477 (C. A. 20, 2253) is modified to apply to limed, acidified or similarly treated wool flocks; they are subjected to a preliminary desuinting washing, *e. g.*, with soap or Na_2CO_3 , before entering the suint bath. Various details are described.

Mercerizing cotton associated with cellulose acetate. CALICO PRINTERS' ASSOCIATION, LTD., L. A. LANTZ and C. M. KRYWORTH. Brit. 273,830, April 12, 1926. Cotton fabrics contg. cellulose acetate artificial silk are mercerized with caustic lye in the manner usual for cotton fabrics, after the acetylcellulose has been pretreated with liquids which are insol. in caustic alkali of mercerizing strength such as C_6H_6 and its homologs, PhCl , *o*-dichlorobenzene, PhNO_2 , monomethylaniline, hydrogenated phenols, hydrogenated naphthalenes, petroleum distillates, solvent naphtha and essential oils. The protective liquid may be floated on the surface of the mercerizing soln. or may be otherwise applied.

Hot-pressing patterns on fabrics of cellulose derivatives after treating them with volatile swelling or softening liquids. BRITISH CELENASE, LTD., W. A. DICKIE and H. HALKVARD. Brit. 273,406, April 1, 1926.

Treatment of threads, fabrics, etc., of cellulose acetate. J. F. BRIGGS, C. W. PALMER and J. T. KIDD. Can. 276,514, Dec. 20, 1927. AcOH , PhOH , PhCH_2OH , triacetin, cyclohexanone, NH_4SCN or other thiocyanates are employed as solvents or swelling agents for cellulose acetate in a process for imparting luster to delustered cellulose acetate filaments.

Weighting silk with tin phosphotungstate. J. C. MACKAY and J. S. KAUFMAN. U. S. 1,666,501, April 17. Silk weighted with Sn phosphotungstate has the same properties as regards dyeing and printing as exist in unweighted silk.

Loading material containing cellulose derivatives. G. H. ELLIS. Can. 276,516, Dec. 20, 1927. Materials, comprising an org. substitution deriv. of cellulose, are treated with a soln. of a loading metal, *e. g.*, Sn , at least partly in the form of thiocyanate.

Treating "viscose silk." SILVER SPRINGS BLEACHING & DYEING CO., LTD., F. E. MASON and A. J. HALL. Brit. 274,266, July 2, 1926. Yarns and fabrics contg. non-desulfurized viscose artificial silk and other fibers such as cotton, wool, natural silk or cellulose acetate artificial silk are treated with caustic alkali of mercerizing strength and are then desulfurized; deleterious action of the alkali on the viscose artificial silk is thus avoided. The fabric may subsequently be washed and bleached.

Treating artificial silk for making shaving brushes. J. ST. MARTIN. Brit. 274,340, Nov. 30, 1926. Bristles of artificial fiber are successively treated with 3 baths: a concd. aq. H_2SO_4 soln., an aq. NH_3 soln. and a 20% aq. Na_2SO_4 soln.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Causes of livering in paints, enamels and printing inks. P. E. MARLING. *Am. Paint & Varnish Mfrs.' Assn.*, *Circ.* No. 319, 535-40 (1927).—Mixts. of ZnO and variously treated linseed oils (e. g., blown, heat-treated, free fatty acids added) were observed for livering. It is shown that the acid value of an oil is not a deciding factor in this connection, its previous history being more significant. The formation of metallic soaps that later redissolve is discussed. B. C. A.

Zinc oxide in exterior mixed paints. E. H. BUNCE. *Am. Paint & Varnish Mfrs.' Assn.*, *Circ.* No. 319, 541-50 (1927).—The advantages of using ZnO in paints for exterior use are: increased gloss of finished surface, protection of binding material from actinic rays, hardening of the film and neutralization of acidic decompn. products. Each of these points is amplified. B. C. A.

Kauri reduction test as applied to flat wall paints. R. H. EVERETT. *Am. Paint & Varnish Mfrs.' Assn.*, *Circ.* No. 319, 570-7 (1927).—The Kauri reduction test does not give concordant results in the hands of various operators when applied to flat wall paints, nor are the results substantiated by exposure tests on the paints. Reliable conclusions as to the life of this type of paint on exposure may be drawn from the compn. by vol. of the paint. B. C. A.

Lead pigments present highly developed technology. J. B. NEALEY. *Chem. Met. Eng.* 35, 219-20 (1928).—The Chicago plant and process for the manuf. of white lead of the National Lead Co. are described. The Dutch process is used. E. H.

Austrian standards for pigments. *Farben-Ztg.* 32, 1498 (1927). J. SCHALCH
Standards for pigments, given by the German Pigment Manufacturer's Association. *Farben-Ztg.* 32, 1495-6 (1927). J. SCHALCH

Pigments for iron and steel primers. E. W. FASIG AND J. M. PURDY. *Am. Paint & Varnish Mfrs.' Assn.*, *Circ.* No. 319, 611-22 (Nov., 1927).—A general dissertation on rusting and rust prevention is followed by details of tests on a no. of pigments when placed in wet contact with steel. The results of the tests, which were still proceeding, indicated that among the foremost rust inhibitors, litharge compares favorably with Zn chromate, and it is suggested that red lead pigments with as much as 10% of free litharge are preferable to pure red lead in this connection. B. C. A.

The curing phenomenon in polymerized and oxidized linseed oils. P. SLANSKY AND L. KÖHLER. *Chem. Umschau Fette, Oele, Wachse, Harze* 35, 41-4 (1928).—Linseed oil was blown at 50° for 10 days, 8 hrs. daily, and samples were drawn at intervals. These samples were examd., then set aside in stoppered bottles in H₂O at 21-24° in the dark and analyzed after 1 and 3 months. Another linseed oil was polymerized (heated without blowing) at 290-295°. Ultramicroscopic examn. showed that the no. of visible particles increased from 1 to 40 during blowing, and to 80 during polymerization. In the curing stage the no. of particles increased in each sample by about 30 for the oxidized oil and by 8 for the polymerized oil. This increase may be due to the sepn. of impurities that had become insol. by the treatment. During storage the oxidized as well as polymerized oil increased in viscosity—a colloidal change that had been started during blowing and during heating. No chem. change occurred during curing. P. ESCHER

A study of the composition of galipot from *Pinus silvestris*. B. A. ARBUZOV. *J. Russ.-Phys. Chem. Soc.* 59, 247-64 (1927).—Galipot was obtained from 3 specimens of *Pinus silvestris* in the absence of air. The α_D of the liquid portion varied from 9.14° to 15°, α_D/α_O from 2.16 to 2.59 and d_{40}^{20} 0.950-0.959. Turpentine formed 35.5% of the galipot, the α -pinene content of the former reaching 87%. A sample of the turpentine of $\alpha_D = +37.95^\circ$ was allowed to stand for 12 hrs. over fused K and then fractionated 4 times under reduced pressure until the change in α_D was only a few tenths of a degree. A sample of α -pinene thus obtained $b_{71.1}^{20}$ 155.7°, its α_D was 40.79°, d_{40}^{20} 0.8625, d_{40}^{20} 0.8580 and (α_D/α_O) = 1.97. The rotatory dispersion can serve as a criterion of purity of Russian turpentines because of their relatively simple compn. BASIL C. SOYENKOFF

Limited splitting during the natural drying of oils and the so-called non-drying linseed oils. A. EIBNER AND R. HELD. *Chem. Umschau Fette, Oele, Wachse, Harze* 35, 65-77 (1928).—In order to det. the effect of H₂O vapor upon the drying process of oils, 25 g. linseed oil was heated in a fused tube with 1 g. H₂O to 110°, 150°, 200° and 250° for 24-70 hrs., in an atm. of CO₂.

Temp.	110° -	150° -	200° -	250°	Original
Hgs.	70	55	36	24	3.7
Acid no.	7.07	64.3	72.5	73.5	179.9
I no.	176.5	163.3	160.3	147.5	766.5
Mol. wt.	701	405	455	524	

On opening, the product turned rapidly brown in all cases. The fat that was left undissociated contained 6.3% α -linolenic acid. The free fatty acids (54.8%) were sepd. and identified. 13.4% α -linolenic, 0.9% β -linolenic, 11.2% α -linolic, 25.0% β -linolic, 2.5% oleic and 2.8% solid acids, total 54.8%. The hydroxyl value of mono- and diglycerides was detd. to be 34.1 from the difference between the sapon no. of the undissociated fat in the product and its hydroxyl value after acetylation. Drying tests of the undissocd. fat showed tackiness after 5 days and dryness after 15 days. The mono- and diglycerides show drying quality but less than the triglycerides. Sadt. as well as unsatd. acids are split off in part; of the linolenic acid $\frac{2}{3}$ had been split off. The drying of fatty oils occurs in steps *via* di- and monoglycerides, disclosing limited sapon. The natural drying of fatty oils occurs slowly because the amt of free acids increases slowly, in addition oxidative splitting occurs. The presence of large amts of free fatty acids makes drying oils unfit for use. Basic lead colors aid in drying by neutralizing the acids. Allowing linseed to turn moldy to varying degrees and then pressing yielded oils with 15.6-162.1 acid no. The compn. of these free acids was 17.8% α -linolenic, 16.4 α -linolic, 1.8 β -linolenic, 40.9 β -linolic, 3.97 oleic, 5.85 solid and 13.9 hydroxy acid. Splitting linseed oil by fermentation yields the same products as accelerated sapon, in a closed tube, with the exception of oxyenic acids in the fermentation products. Oil quality can be improved by adding basic lead colors or wood oil or polymerized oil.

P. ESCHER

Cellulose lacquers. STANLEY SMITH. *J. Soc. Dyers Colorists* **44**, 106-9(1928).--S. gives a sketch of the manuf. of cellulose lacquers, particularly those that are applied by spraying methods.

L. W. RIGGS

Urushi lacquers as an insulating varnish. T. HANYU. *Researches Electrotech. Lab., Tokyo* No. **215**, 49 pp.(1927) -- Elec. and other properties of raw and treated urushi lacquers necessary for insulating varnish were examd. Lacquer films dried at 100° possess exceedingly good insulating properties when dry, but in humid air their elec. resistance is remarkably decreased by their high water-absorbing capacity. Various substances have been employed up to this time as siccativ, but most of them, especially inorg. metallic salts, lower the elec. resistance of the film and their use must be avoided in insulating varnish. Perilla oil, coumarone resin and furfural resin are good mixing ingredients for the lacquer. If these lacquers can be made more flexible and non-absorbent for water they will be excellent insulating varnishes.

W. O.

Consistency, storage and clouding of lacquers, varnishes and so forth. E. O. RASSER. *Kunststoffe* **18**, 5-6(1928).--The correct consistency of lacquers and varnishes and methods of testing it are briefly discussed. In general, lacquers should not be stored in rooms in which the temp. may go below 5-6°, and they should never be used until they have reached ordinary room temp. (14-16°). The clouding of lacquers and varnishes is attributed to the formation of Pb salts of hydroxy and sadt. acids.

A. L. HENNE

Causes of instability of varnishes on standing. J. F. MAGUIRE. Am. Paint & Varnish Mfrs.' Asscn., *Circ.* No. **319**, 564-9(1927).--A brief summary of the effects of the constituents of varnishes, mixing, aging, chilling and centrifuging on the stability of colloidal varnish systems.

B. C. A.

The baking insulating varnishes. S. MIZUSHIMA. *Researches Electrotech. Lab., Tokyo* No. **221**, 39 pp.(1928).--About 30 kinds of baking insulating varnishes were prepd. with gilsonite, petroleum and coal-tar pitches, rosin pitch, mineral rubber, Manila copal, rosin, rosin ester, linseed, perilla and Chinese wood oils. Gilsonite is the most suitable bitumen for the prepn. of black baking insulating varnish, no other pitch being able to compare with it. Oil resistivity and time of drying of the black varnish can be materially improved by the addn. of a small amt. of resin. Gilsonite 20%, copal 5%, boiled linseed oil 75% or gilsonite 25%, copal 5%, boiled linseed oil 70% is the most favorable compn. Boiled oils for the manuf. of the insulating varnishes must have rather thick consistency, and the use of those having d. above 0.967 or refractive index higher than 1.49 is recommended. During the process of oil-boiling, the degree of the thickness of the oil can be conveniently measured by the estn. of the refractive index. As the thinner for the insulating varnishes, low-boiling petroleum naphtha is more suitable in every connection than the spirit of turpentine, although

for wood-oil varnish spirit of turpentine is the best thinner. Boiled perilla oil compares favorably with boiled linseed oil. Moreover, during the boiling process, acidity formation in the former is lower than in the latter. Because of the rapid drying of boiled perilla oil, it is specially recommended for the prepn. of black baking varnish. For insulating purpose, rosin ester wood oil varnish has no advantage over the ordinary rosin wood oil varnish.

W. OGAWA

Evaluation of the kauri-butyl alcohol solvency test (for varnish thinners). S. R. KIEHL. *Am. Paint & Varnish Mfrs.' Assocn., Circ. No. 319*, 585-96 (1927).—A "solvency" test for varnish thinners dependent on their degree of miscibility with a standard soln. of kauri in butyl alc. is described in full detail. The applications of this test to the specification of individual thinners and to the examn. of binary mixts. are illustrated. It is shown that mixts. of equal "solvency" may exercise similar functions when used as thinners.

B. C. A.

Damar Penak. R. W. BLAIR AND F. E. BYRON. *Malayan Forest Rec.* 3, 1-12 (1926).—The chem. and phys. properties of 5 grades of Damar Penak (pale yellow, amber, dust coarse and dust fine) and 3 grades of "dead" (opaque) Damar, all obtained from *Balanocarpus Heimis*, are tabulated and compared with the results of earlier observers. The acid value of pale Damar Penak increases with age, light or absence thereof having no effect on this change. Details of varnish trials and of methods of purification of the resin are given.

B. C. A.

Synthetic resins from polybasic acids and polyhydric alcohols. T. HEDLEY BARRY. *Ind. Chemist* 4, 53-6 (1928).—A résumé of Pre-War and Post-War developments in the polymerization of polybasic acids and polyhydric alcs. Resinification products resulting from the condensation of polybasic acids with glycerol may be classed in stages as: "A" form which is fusible, sol. in acetone and not resistant to water. It is converted by heat into—"B" form which is fusible, insol. in acetone, and not resistant to water. This is converted by heat to—"C" form which is infusible, insol. and resistant to water. The glyptal resins yield a more flexible yet tougher condensation product than do the bakelite resins and have greater adherence to very smooth surfaces such as glass, mica, etc. The vol. and surface resistivity of glyptal bonded micanites is 2-3 times as strong as that of shellac-bonded articles. A short bibliography and a list of related patents are appended.

W. H. BOYNTON

Painting of dye houses and bleaching rooms (TOCH) 25. Fruits of Siberian cedar and the cedar oil (RUCHKIN) 27. Chromic oxide and its recovery from waste products (MUTIN) 18. Ozonides [as turpentine substitute, etc.] (Brit. pat. 273,832) 10.

Titanium pigment. G. CARTERET. Brit. 274,072, July 12, 1926. A white pigment is made by pptg. Ti oxide on a powd. base such as SiO_2 or Al silicate (or a mixt. of these). Kaolin or "fossil silica" is preferred. The product is washed, dried and calcined at a temp. of cherry redness.

Steam turpentine still. J. O. REED. U. S. 1,667,168, April 24

Lacquers and varnishes. L. LEVY. Brit. 273,756, July 3, 1926. The sulfuretted condensation products of phenols and aldehydes of the fatty series such as CH_2O are dissolved in liquids such as alc., "carbureto," furfural, PhNO_2 , pyridine, mesityl oxide, melted or dissolved $\text{C}_{10}\text{H}_{18}$, acetins or cyclohexanol. Materials coated with the resulting lacquers are preferably dried first by exposure to the air or by moderate heating and then at 110-160°. The lacquers made with furfural are black. The sulfuretted starting materials may be prepd. as described in Brit. 184,164.

Coating paper, wood, glass, marble or other materials successively with gelatin and varnish. M. A. V. C. GEORGES VILLE. Brit. 273,708, July 2, 1926.

Enamel for coating cans. R. H. LUECK. U. S. 1,667,212, April 24. An enamel suitable for use on cans which are to contain food products consists of a substantially neutral oleoresin varnish substantially free from Pb and which has incorporated in it ZnO or other insol. compd. of a metal which forms sulfides which are not dark colored and which is held in place in the compn. during processing of foods in the cans.

Printing ink. K. STEPHAN. Can. 276,638, Dec. 27, 1927. One-half part by wt. of a fat-sol. blue dye is mixed with 74.5 parts varnish and 25 parts of MnO_2 .

Synthetic resin. C. F. BURKE AND H. H. HOPKINS. U. S. 1,667,189, April 24. Pentaerythrite is heated with a polybasic acid or its anhydride such as phthalic anhydride and with a "drying oil acid" such as the acid derived from linseed or China wood oil. The reaction may be effected at a temp. of about 180-265° and the product is suitable for use as coatings.

Synthetic resins. I. G. FARBENIND. A.-G. Brit. 274,155, March 15, 1926. Condensation products are obtained by the action of CH_2O on aniline, *o*-toluidine or other aromatic amines in the presence of a quantity of amino salt not substantially exceeding 10% of the quantity of amine used. The condensation may be effected in aq. solns. of alcs. in which the amines are sol. The products are resistant to alkali and may be used as resists in batik dyeing and printing. They can be removed from the fabric by org. solvents or by weak acids or by treatment with hot water.

Synthetic resins. J. V. MEIGS. Brit. 274,146, Feb. 9, 1926. PhOH, corn sugar and a quantity of H_2SO_4 equal to 0.833 the quantity of the PhOH may be boiled while refluxing the PhOH but allowing water vapor to escape. The temp. rises from 120° to 180° and when the reaction is complete the resinous product is treated with stearic acid, serving as a mold lubricant, and is then distd. *in vacuo* to sep. excess PhOH. The material is prepd. for molding by grinding it with $(\text{CH}_2)_6\text{N}_4$ and wood fiber and may be pressed in a steel mold for 5 min. at a temp. of 170° . Other similar processes are described in which aniline, furfural and other reagents and starting materials may be used.

Synthetic resin. C. R. DOWNS and L. WEISBERG. U. S. 1,667,197, April 24. A dibasic aliphatic carboxylic acid such as fumaric acid is heated (suitably at a temp. of about 170 – 200°) with a polyhydric alc. such as glycerol to form a synthetic resin resistant to water and suitable for making molded articles. U. S. 1,667,198 specifies the use of tribasic aliphatic carboxylic acids such as malo-malic acid. U. S. 1,667,199 specifies the use of malic acid. U. S. 1,667,200 specifies the use of succinic acid which may be heated with a polyhydric alc. such as glycerol for about 20 hrs. at 170 – 200° , then below 135° for about 10 hrs., and then between 170° and 250° until a water-resistant resin is obtained.

Synthetic resin compositions. L. V. ADAMS. Brit. 273,748, July 1, 1926. Condensation products in the heat-hardened or insol-cold condition ("C stage") are heated with a material liquid or liquefiable at the treating temp. until complete soln. is effected. Suitable treating liquids are: glycol diacetate, diethyl phthalate, acetone, acetone oils, benzyl alc., acetate or benzoate, toluidine, cresol, tricresyl phosphate, triacetin, anisole, *o*-cresyl benzoate, Et lactate, indene or indene polymer. The soln. produced may be used as a varnish or for other purposes and may be prepd. from various classes of synthetic resins. Cf. C. A. 22, 1863.

Accelerator for hardening phenol urea synthetic resins. H. V. POTTER and J. W. CRUMP. U. S. 1,667,675, April 24. An intermediate product is formed by the condensation of a phenol, a urea and an aldehyde; this intermediate product is then treated, without heating, with a hardening agent of acid reaction such as oxalic acid or urea nitrate.

Coating compositions. K. LOOS, M. LEHNIG, C. HENNING and R. DASSDORF. Brit. 274,333, Nov. 15, 1926. Artificial resin (or substances which form such a resin) is used with waterglass, with or without silicic compds., and clay or metallic oxides to form coatings resistant to various chem. influences. Solvents such as alc. or acetone may be added. Brit. 274,355 specifies hardening the coatings by heating in the absence of air, *e. g.*, in a bath of oil of h. b. p.

Linoleum cement. A. B. CRAVEN, C. S. BEDFORD and YORKSHIRE DYEWARE & CHEMICAL CO., LTD. Brit. 274,300, Aug. 30, 1926. A cement suitable for use in the manuf. of linoleum is made by incorporating colophony or other resinous substance in vulcanized rubber at such a temp. and for such a time that a homogeneous material is produced. Various oils or hydrocarbon solvents may be added.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Systematic classification of fats. I. A proposal for a scientific classification of fats. W. HALDEN. *Chem. Umschau, Fette, Oele, Wachse, Harze* 35, 55–6(1928).—The following classification of fats is proposed: (I) fats of marine and poikilothermic animals; (II) fats of homoiothermic animals. Subdivision: milk fats. Appendix: fats of lower animals. The individual animal fats are to be classified zoologically. P. 3.

Neutral saponification or fat splitting? K. CAZAFURA. *Seifensieder-Ztg.* 55, 115–6, 126–7(1928).—Working data of factory runs are given, showing a larger yield of glycerol by splitting, a larger loss by purifying lyes, recovery of NaCl by concg. lyes, and better color of soap by sapon. Preference of either method depends upon 3 factors: quality of raw materials, glycerol market and desires of consumer. P. ESCHER

Comparative experiments on the different methods for the separation of solid and liquid fatty acids. KONRAD AMBERGER AND E. WHEELER-HILL. *Z. Untersuch. Lebensm.* 54, 431-4(1927).—By the methods of Twitchell and of Holde and co-workers, solid fatty acids may be sepd. from the liquid acids almost quantitatively, the results by these methods being superior to those obtained by the Pb salt-ether method.

WILLIAM J. HUSA

The hexabromide of eleostearic acid. K. H. BAUER AND E. ROHRBACK. *Chem. Umschau Fette, Oele, Wachse, Harze* 35, 53-4(1928).—Eighteen g. α -eleostearic acid in 180 g. petroleum ether in a freezing mixt. was exposed in a quartz flask to ultra-violet light and Br added dropwise with agitation to the amt. of 6 atoms Br; a white solid sepd. after several hrs. with evolution of much HBr. Recrystd., it sinters at 134° and m. 139-141°; it is sol. in C_6H_6 , Me_2CO , $CHCl_3$ and ether; less so in alc., ligroin and $AcOEt$. Analysis confirms the formula $C_{18}H_{30}O_2Br_6$. By debrominating with Zn in alc. the β -eleostearic acid, m. 69-71°, was obtained. An oily by-product of the hexabromide has a Br content between that of penta- and hexabromide, and when debrominated with Zn in alc. it yields an oil with a Br content between di- and tribromoeleostearic acid.

P. ESCHER

The standard Polenski apparatus. G. D. ELDON AND J. R. STUBBS. *Analyst* 53, 212(1928).—In the Official Methods of the A.O.A.C. the distance between the adapter and the bulb of the still head is given as 70 mm. whereas 78 mm. was recommended in the original publication.

W. T. H.

Oxidation products of fatty oils. A. W. *Seifensieder-Ztg.* 55, 100-1(1928).—Analyses of oils from bleaching earths for semi-drying oils led to the following conclusions: Autoxidation of the oil in fuller's earth leads to extended polymerization of the fatty acids at their double C bonds (low I no.) but little formation of hydroxy acids occurs. On further oxidation, some lower acids and hydrocarbon-like substances are split off.

P. ESCHER

Oxidation of vaseline oil. G. S. PETROV, A. I. DANILOVICH, AND A. YU. RABINOVICH. *Trans. Karpov. Inst. Chem.* 1926, No. 5, 81-9.—Vaseline oil purified with fuming H_2SO_4 when heated and refined with alkalis does not become oxidized when treated with a current of air for 49 hrs. at 100° in the presence or absence of catalyzers such as metallic Zn or Fe, although its color darkens in presence of Fe. With Pb as catalyzer, which is sol. in the oil, some oxidation takes place with formation of oxyacids insol. in benzene and having a tendency to ppt. Com. vaseline heated at 250-70° begins to show signs of oxidation after 10 hrs., whereas vaseline oil thoroughly purified by fuming H_2SO_4 does not oxidize under those circumstances. Distd. oils, though not purified by H_2SO_4 , do not oxidize on being heated at 250-70° in a flask with an inverted condenser. Oxidation of oils below 100° gives the best results, in the presence of catalyzers sol. in the oils, e. g., the Co salt of naphthenic acid. With these low-temp. oxidations and in presence of water one obtains more acids sol. in benzene and less benzene-insol. matter than in the oxidations in the presence of Pb at 100°; e. g., on oxidizing vaseline in the presence of Pb at 100° 27.07% of the acids formed were sol. in benzene and 68.61% were insol., whereas on operating at 90-94° in the presence of water and of Co naphthenate as catalyzer, 82.24% of the acids formed were sol. and only 17.76% were insol. in benzene.

BERNARD NELSON

Rancidification and oxidation of olive oil. L. L. LLOYD. *J. Textile Inst. (Special issue)* 18, 517-9T(1927).—The rancidity of olive oil is due chiefly to the marc or foots, which either acts as a fermentative agent or aids bacterial action. Moisture plays only a small part in the production of fatty acids. By passing, resp., dry and moist air through samples of (a) oil contg. foots, (b) the same oil free from foots, and (c) a mixt. of equal parts of both, for periods up to 3 years, it was shown that the fatty acids are almost completely oxidized, whereas the neutral oil is oxidized only to a small extent. The larger the content of fatty acids, the more is the neutral oil oxidized; it appears that the former have a catalytic oxidizing effect on the latter. It is advantageous to filter fresh oil to free it from foots before storing.

B. C. A.

The composition of oat oil. KONRAD AMBERGER AND E. WHEELER-HILL. *Z. Untersuch. Lebensm.* 54, 417-31(1927).—The following fatty acids were found in oat oil: palmitic 10.4, α -linoleic 17.2, β -linoleic 13.9 and oleic 58.5%. Erucic acid was absent. Linolenic acid could not be detected either by bromination or by the oxidation method of Hazura.

WILLIAM J. HUSA

Determination of the iodine number of oils in aqueous emulsions. B. M. MARGOSCHES AND K. FUCHS. *Z. anal. Chem.* 72, 185-7(1927).—Fialkov (C. A. 21, 1718) claimed to have improved the method of Margosches and Hinner by adding gum arabic and obtaining an emulsion. Tests with the method of F. show that low results are

invariably obtained unless the time of contact is much more than the 5 min. specified and the time required varies with different oils. W. T. H.

•The determination of organically combined sulfuric acid in sulfonated oils. K. H. BAUER. *Chem. Umschau Fette, Ole, Wachse, Harze* 35, 25-6(1928).—B. uses the U. S. A. standard method and tabulates results which vary from 2.06% in Turkey red oil to 9.0% in olive oil. P. ESCHER

Fruits of Siberian cedar and the cedar oil. V. RUCHKIN. *Oil and Fat Ind.* (Russia) 1926, No. 4-5, 13-6.—The seeds of the Siberian cedar (*Pinus cembra* L.) contain about 60% of a light yellow drying oil (d 0.93, n 1.485, sapon. value about 192, I value (Hul) 130-160, Reichert-Meissl value 0.44-3.77) which is edible and can also be used for the prepn. of a slow-drying varnish. B. C. A.

Correction in the method for the determination of lecithin in oil. W. FRESSENIUS. *Z. anal. Chem.* 73, 295(1928).—A change in one of the formulas given in the paper by Fresenius and Grunhut (C. A. 5, 1846) is suggested. W. T. H.

The utilization of whales. JAKOB LUND. *Chem.-Ztg.* 52, 241-2(1928).—The whale catch has increased during the last 20 yrs. to about 200,000 tons annually, and improved processes, e. g., hydrogenation of oils, have increased the value of the product. Methods for obtaining, refining and utilizing the blubber, tongue and intestines, bone, flesh, etc., are outlined; these portions amount to approx. 20, 8, 17 and 55%, resp. Blubber contains 50-88% oil, 14-26% H₂O and 15-26% connective tissue, while the tongue and intestines contain 30% fat, 50% H₂O and 20% connective tissue, and the bones 23% fat, and the flesh runs only traces of fat, about 75% H₂O and 25% meat substance. W. C. EBAUGH

Change of iodine number of fatty acids in aged cakes of settled soaps. W. KRISTEN. *Chem. Umschau Fette, Ole, Wachse, Harze* 35, 105-6(1928).—Analyses of outside and inside layers of cakes of settled soaps, contg. rosin, of varying ages showed that the inside had from 2 to 18% greater I no in from 2 to 130 weeks. When the cakes were cut into 4 or 6 concentric layers, the following I nos. were found in a sample contg. no rosin, in the outside and inside layers, resp.: 38.0, 49.7; 37.2, 52.6; 37.5, 58.5; 41.7, 58.9; 42.2, —; 45.5, —. P. ESCHER

Limeproof hexalin soaps. W. SCHRAUTH. *Seifensieder-Ztg.* 55, 108-9(1928).—Contrary to Welwart's views (C. A. 1866), the addn. to soaps of 20-30% hexalin or methylhexalin prevents formation of Ca ppts in hard waters, and produces a turbidity when added in lesser quantities. P. ESCHER

Bleaching soaps with chlorine. CHAS. F. SCHUMAKER. *Soap* 3, 25-6(1928).—The soap in chip form for milling is used dry with not over 2% of hypochlorite and 1% of 40% formaldehyde. The chips are passed through 2 mills in tandem; and the bleaching operation takes place during the milling. Another method is to add the hypochlorite to the soap in the crutcher and after it is in chip form the formaldehyde is added at the mill. Neither of the bleaching agents used alone gave satisfactory results. The formaldehyde apparently liberates nascent O from the hypochlorite soln. and also prevents rancidity and after-darkening; but its exact action is not known. E. SCHERUBEL

Soap analysis in cost figures. E. SCHOTTE. *Soap* 3, 33-4(1928).—Reports of analyses from different labs. differ in the interpretations of the terms used. An analysis should not only give the figures found but also the percentages figured on a dry basis which will make it easy to compare 2 reports on the same kind of soap. E. S.

Utilization of the soy bean for human nutrition (VENTURI) 12. Action of cold on the fats of milk (QUAGLIARIELLO) 12.

Preparation of kneadable fats from crumbling fat. K. EISLER. *Dutch* 17, 124, Feb. 15, 1928. To the crumbling fat (e. g., coconut fat) are added small quantities (1/2%) of rubber in the form of a concd. soln. (10%) of crepe rubber in fat.

Purifying wool fat* E. MERTENS. *Brit.* 273,642, July 1, 1926. A purified "lanolin" is prepd. by treating the viscous mass obtained from wool washing water in a digester under a "few atm." pressure. NaOH may be added to eliminate fatty acids.

Sulfonating polymerized fats, oils and acids. H. T. BOHME AKT.-GES. and H. BERTSCH. *Brit.* 274,104, July 8, 1926. Polymerization products of fats, oils or fatty acids are sulfonated in the presence of anhyd. org. acids, their anhydrides or chlorides; e. g., "floricin" (obtained from castor oil by dry heating) is mixed with Ac₂O and the mixt. is treated with H₂SO₄. Glacial HOAc or AcCl also may be used. Cf. C. A. 21, 4084.

Sulfonic derivatives of unsaturated aliphatic acids. A. THAUSS, G. MAUTHÉ and A. GÜNTHER. U. S. 1,667,225, April 24. In producing sulfonic acids of unsatd. aliphatic acids unalkylated on a C atom, an aralkyl halide such as benzyl chloride is reacted on with an unsatd. aliphatic acid such as oleic acid and the resulting product is treated with H_2SO_4 or other sulfonating agent. U. S. 1,667,226 specifies producing sulfonic acids of aralkylated unsatd. aliphatic acids by reacting with benzyl chloride or other aralkyl halide upon a glyceride of an unsatd. aliphatic acid such as that of rape-seed oil and then sulfonating the product.

28—SUGAR, STARCH AND GUMS

P. W. ZIERBAN

Production of sugar in India by modern refineries and factories during 1925-26. WYNNE SAYER. *Agr. J. India* 22, 384 5(1927).—Statistical. K. D. JACOB

The undetermined chemical losses in refinery work. M. J. NACHMANOWICH. *Centr. Zuckerind.* 35, 1371-72(1927); *Zapiski* 1926 27, 339-54, 396-411.—From 18 observations on massecuites for loaves and cubes N. concludes that crystn. of the slightly acid massecuite, leaving the vacuum pans at 101-102.5°, is accompanied by an increase of invert sugar of 0.07% on the weight of the dry substance and an increase in color of 20% in Stammer units. In fillmasses of lower quality contg. 0.48-0.80% invert sugar on the dry substance the invert sugar increases amounted to 0.1% on the weight of the dry substance. In refining by the Adant process which is characterized by fillmass dropping temp. of 103-105°, decompn. of sugar takes place after dropping and invert sugar increases 0.03-0.06% on the dry substance. Color increases 20-45%. In refining by the Dix and Kriner process cooling of fillmass takes place so rapidly in small molds that no decompn. occurs. No decompn. occurs during covering of fillmass while in the centrifuges but during the subsequent stages in the curing room requiring 2-3 days at 45°, addnl. 0.047% of invert sugar are formed. From 29 observations on boiling of after-products, N. concludes that a comparison of reducing sugars in sirups and the fillmasses thereof is not permissible because of the destruction of reducing sugars during boiling. Decompn. losses may be approximated from a comparison of org. non-sugar of sirups and resulting fillmass. F. R. BACHLER

Juice purification with special consideration of important physical processes. KARL KOLLMANN. *Centr. Zuckerind.* 35, 1257(1927)—K. speculates upon the effect which acid or alk. diffusion water will have upon the protein and pectin movement from beet to diffusion juice and the probable behavior of these colloidal substances during defecation and carbonation, and concludes that acid diffusion water will probably give diffusion juices of superior quality. F. R. BACHLER

Determination of melassigenic nitrogen in beet root. M. S. FILOSOFV. *Ukrainskii Khim. Zhurnal* 2, Tech. Pt. 127-35(1926).—The total sol. N in beet root was first detd. and then that present as amides and ammoniacal salts, the difference giving the amt. of melassigenic N, i. e., that present as betaine and primary amines. The values so obtained agreed within 0.04% with those found by direct titration with formalin. With treacle it is necessary to acidify the soln. before titration until an acid reaction toward litmus is given. B. C. A.

Ultramicroscopic examination of starch sols. M. SAMEC. *Archiv. Hem. Farm.* 1, 243-4(1927).—Sols. of starch examd. under an ultramicroscope exhibit thread-like aggregates of erythro-starch and granular aggregates of amylo-starch. Heating diminishes the Brownian movement of the particles of starch sols, thus accelerating aggregation. Peptization is accompanied by diminution in the size of the ultramicros, the no. of which in unpeptized starch sols is therefore less than might be expected from osmotic pressure measurements. B. C. A.

The determination of polysaccharides (APPLEMAN, *et al*) 7.

Extracting sugar or other substances from vegetable materials. K. KOMERS and K. CUKER. *Brit.* 274,131, July 10, 1926. The material is subjected to a gentle pressing or suction which does not injure the cell membrane and is then subjected to an oxidizing current of gas which dries the cells and concentrates their internal juices, thus raising the osmotic pressure and accelerating the diffusion process. Slices of beet, sugar cane, wood or bark may be thus treated, and a battery of diffusers with interposed centrifuges may be used for extrn.

Tricalcium sucrate. C. STEFFEN, JR. U. S. 1,667,446, April 24. A filter cake of impure tri-Ca sucrate contg. sol. non-sugars is washed under pressure with a tri-Ca suspension substantially free of sol. non-sugars.

Starch. D. R. NANJL. Brit. 273,481, June 23, 1926. Purified and dried starch is mixed with an alk. agent such as a carbonate, bicarbonate or hydroxide or borate, in a quantity not more than 0.3% that of the starch, to obtain a product which gives limpid, neutral solns. in water, the viscosity of which varies inversely as the quantity of alk. substance added. It may be used for sizing and finishing textile materials and paper. The preliminary purification of the starch may be effected with HCl, KMnO_4 or dichromate and SO_2 or a bisulfite.

29—LEATHER AND GLUE

• ALLEN ROGERS

New tanning materials and sundries. LEOPOLD POLLAK. *Gerber* 54, 11-2(1928); cf. C. A. 21, 1027.—Analysis and description of various proprietary products are given.

H. B. MERRILL

Report of the Committee on qualitative tannin analysis. E. STIASNY. *Ledertech Rundschau* 20, 14-7(1928).—A review of recent literature.

I. D. CLARKE

Tannin analysis by the shake method with the aid of the centrifuge. V. KUBELKA. *Collegium* 1928, 21-2.—The solns. are centrifugalized at about 4000 revolutions instead of being filtered. Special 200-cc. vessels are used in which the hide powder is chromed and washed and the liquor detannized.

I. D. CLARKE

Determination of tannin substance by means of chromed hide powder; its possible application to medicinal tannins. MAURICE FRANÇOIS. *J. pharm. chim.* 7, 114-23 (1928).—The chroming of hide powder, and the method of removing and detg. tannin by means of it are described in detail. Since tests with gelatin and FeCl_3 showed complete absence of gall tannin in the filtrate, the method was applied to 20 com. samples of tannin of which 7 were prepd. by extn. with Et_2O , 13 with EtOH . In 5 of the Et_2O samples, the tannin content referred to anhyd. com. tannin was 97.31-99.82%; in 2 samples, 87.20-91.60%. Three of the EtOH samples contained 70.01-76.50%, 10 showed 90.86-99.23%. Thus the method permits detection of excessive non-tannin matter, i. e., control of quality in manuf.

S. WALDBOTT

The influence of hydrogen-ion concentration on tanning. P. PAVLOVICH. *Collegium* 1928, 2-12.—The quantity of tannin absorbed by gelatin or hide powder (found by measuring the decrease in concn. of the tannin soln.) did not reach a max. at p_H 7-8 as found by Thomas (C. A. 20, 2426). Penetration of skin by tannin was most rapid at the p_H of min. astringency of the tannin, usually p_H 6 to 8. Rapid tanning should be possible by starting at this p_H and finishing at the natural p_H of the tannin ext.

I. D. CLARKE

Tanning, dyeing, and finishing formaldehyde-tanned leathers and skins. J. W. LAMB. *Halle aux cuirs* 1926, 6-16; cf. C. A. 21, 4089.—A description.

H. B. M.

Dyeing of chrome-tanned side leather for shoe stock. F. H. SCHORTEMAYER. *Dyestuffs* 29, 9-11(1928).—Dyestuffs and formulas are suggested.

C. E. M.

Dyeing of glove and clothing leather. M. C. LAMB. *Shoe and Leather Reporter* 169, 30-31 et seq. (1928); cf. C. A. 22, 1872.—A description.

H. B. MERRILL

Microscopical observation of fat liquors for leather. WILHELM SCHINDLER. *Collegium* 1928, 12-20.—Drawings are given showing the appearance of fat liquors magnified 540 times. Addn. of alkali usually decreased the size of the droplets; acid finally destroyed all emulsions.

I. D. CLARKE

Ultra-violet light and its applications [in leather chemistry]. A. DEFORGE. *Halle aux cuirs* 1928, 36-9.—Fluorescence in ultra-violet light and its application to tanning extracts. A. DEFORGE. *Ibid* 83-9.—A review.

H. B. MERRILL

Influence of salt and temperature during preparation of the extract on the results of enzyme analysis. JOSEF SCHNEIDER, JR. AND ANTONIN VLCEK. *Collegium* 1928, 22-6; cf. C. A. 21, 4090.—Oropon was extd. with solns. of $(\text{NH}_4)_2\text{SO}_4$, NH_4Cl , NaCl or mixts. of these. Before heating with casein the salt content of each ext. was made the same. The quantity of casein digested increased as the quantity of salt during extn. was increased. Com. bates differed but usually showed max. activity at a temp. between 40 and 30°.

I. D. CLARKE

Tannery and leather factory sewage and its purification. A. SCHULZE-FORSTER. *Gerber* 54, 39-40(1928).—A brief discussion.

H. B. MERRILL

Chromic oxide and its recovery from waste products (HUTIN) 18.

Leather substitutes. J. D. MCBURNEY and E. H. NOLLAU. Brit. 273,324, June 24, 1926. A backing of textile fabric is coated with a cellulose ester compn. and with a surface film of a compn. such as one contg. casein with an alkali and a polyhydric alc. such as glycerol which facilitates adhesion of glue, paste or inks. The material is suitable for book covers. Cf. C. A. 22, 1056.

Glue. P. KREISMANN. U. S. 1,667,073, April 24. Potato starch, clay, water and an alkali such as NaOH are heated together to obtain a semi-fluid product by conversion.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

American rubber factories. F. KIRCHHOF. *Kautschuk* 1928, 35-9.—An abridged version of a recent address by van Rossem (*The American Rubber Industry and Its Scientific Research Work*).

Twenty years' work on the synthesis of rubber. FRITZ HOFMANN. *Gummi-Ztg.* 42, 1190-2(1928).—A review.

Patent review. C. BÖHM. *Kautschuk* 1928, 43-4.—Recent American and foreign patents on latex, raw rubber, mixing, vulcanization and the manuf. of rubber are itemized.

The coagulation of latex. PAUL BARY. *Rev. gén. caoutchouc* 1928, No. 39, 3-5.—A crit. review of recent experimentation and hypotheses, with 17 references

Some data on rubber from *Ficus*, *Castilloa* and *Manihot*. O. DE VRIES AND W. SPOON. *Arch. Rubbercultuur* 12, 7-19(1928). (In English 20-4.)—The report is a summary of tests of the 3 rubbers in comparison with *Hevea* rubber, made from 1916 to 1925, and includes detns. of the ash, N content, acetone ext., viscosity and vulcanizing properties with S alone, with S-hexamethylenetetramine-ZnO and with S-PbO. Rubber from *Ficus elastica* had a higher acetone ext. and much slower rate of vulcanization than *Hevea* rubber. The plasticity was usually greater also, and the tensile strengths were low. Rubber from *Castilloa elastica* cured more slowly than *Hevea* rubber, had a higher acetone ext. (which was not diminished by previous water extrn.) and resembled *Ficus* rubber more than *Hevea*. On the other hand *Manihot glaziovii* (Ceara) rubber more nearly resembled *Hevea* in compn. and in its rate of vulcanization. It coagulated spontaneously when dild. with water. It has a very high viscosity, high acetone ext. and low tensile strength when cured. A representative sample of latex contained 21-22% rubber.

Coagulation, structure and plasticity of crude rubber. O. DE VRIES. *Trans. Inst. Rubber Industry* 3, 284-303(1927).—Expts. in which plasticity and vulcanization tests of rubber contg. varying proportions of serum substances were made show that the serum substances have little or no influence on the plasticity of the resulting rubber but they do tend to decrease the slope of the stress-strain curves of the cured rubber. Therefore the dry serum residues deposited irregularly throughout the rubber do not act as a lubricant but rather increase the internal friction. When rubber prepd. by evapn. of latex films was extd. with water and stored, the plasticity decreased so that the rubber was considerably softer after 1 yr., whereas rubber prepd. similarly but not extd. became harder. Kerbosch rubber and latex-sprayed rubber harden for the same reason. In general, reduction of serum substances (by using dil. latex, by washing or by soaking crepe or sheet in water) gives products which become softer. Therefore to obtain a rubber of invariable plasticity, which is of great importance commercially, the proportion of serum substances must be controlled closely. The content of serum substances best suited for const. plasticity may, however, not conform to that which imparts the best aging properties to the vulcanized rubber, and a systematic study should be made of the influence of the individual serum substances. Besides the serum substances, proteins are pptd. during coagulation and these may form a network in the coagulum. Removal of these from rubber (by centrifuge methods) or increasing their proportion had little influence on the plasticity. Different methods (mech. pressure, EtOH, thymol or coalse) of coalescing the flocculates of heated latex (1:9) had very little influence on the plasticity of the rubber. The expts. indicate that it is difficult to produce by manipulation of the non-rubber components a soft rubber which has no

tendency to become tacky or hard. A discussion of closely related earlier work by de V. and others is included, and a general open discussion follows the paper.

C. C. DAVIS

Phenomena of swelling. The swelling of rubber. P. STAMBERGER. *Rec. trav. chim.* **47**, 316-28 (1928). cf. *C. A.* **21**, 3767; Klein and S., *C. A.* **19**, 1064.—Expts. deal with the extent of swelling of unmilled rubber (I), dead-milled rubber (II) and dead-milled rubber contg. various proportions of C black (III) in solvents and in their vapor. When swollen to the same degree in vapors, the consistency of I, II and III differed greatly. I maintained its structural shape and was very elastic and almost without tackiness, whereas II became a viscous liquid. With III the greater the proportion of C black the greater its structural strength. With 5 vol.-% C black, swelling was still unlimited and the mass lost its form, but with higher proportions of C black the structural form remained as with I. In excess liquid solvent, I and III contg. 20 vol.-% C black maintained their structural form, even though the swelling was unlimited. With III contg. less C black and with II, swelling was unlimited and the structure disappeared. In liquids the magnitude of the swelling differed greatly with I, II and III, whereas in vapor the magnitude of the swelling of I, II and III was the same for a given vapor pressure. This does not mean, however, that mastication fails to cause deep-seated changes, as maintained by Pohle (cf. *C. A.* **15**, 1089). The relative magnitudes of swelling in liquid and in vapor were very different with I compared with II, the swelling of I being around 16 times as great in liquid C_6H_6 as in C_6H_6 vapor, whereas the swelling of II in liquid C_6H_6 was less than twice that in C_6H_6 vapor. The phenomena observed cannot be explained by any concept of swelling suggested up to the present time, and both material and structural factors are probably involved, the former being independent of the swelling medium, the latter being evident only in a liquid (cf. Terzaghi, *Colloid Symposium Monograph IV*, 58).

C. C. DAVIS

Latex contaminated with copper compounds as a source of danger of fire. J. G. FOL AND W. DE WISSER. *Bull. Rubber Growers' Assoc.* **10**, 124-7 (1928).—Double texture cotton fabric rubberized with latex became on standing rolled up so hot that the fabric scorched and the rubber became resinous. Investigation showed that the fabric contained no Cu, but that the latex had been stored in a brass tank and that the NH_3 in the latex dissolved enough Cu to cause the subsequent rapid oxidation. Systematic expts. therefore were carried out with the Mackay app. (cf. Lewkowitsch, *Chem. Technology and Analysis of Oils, Fats and Waxes*, **III**, 99 (1915), *C. A.* **9**, 1852) in which cloth impregnated with (1) pure ammoniated latex, (2) $CuO-NH_3$ soln. and (3) latex in which Cu had been immersed for 24 hrs. (290 mg. Cu per l. or 40 mg. per sq. m. of fabric) was used. With (1) and (2) there was no rise of temp. above the 92° used as a medium, but with (3) the temp. rose in 45 min. to 249°, which caused complete oxidation and distn. of the rubber and charring of the cotton, and the temp. then returned toward its original value. The expts. show the danger of spontaneous combustion, particularly when rubberized cloth with Cu present is rolled while still warm. Cu or brass equipment must be avoided.

C. C. DAVIS

Aldol- α -naphthylamine [as a rubber accelerator]. H. KLOPSTOCK. *Kautschuk* **1928**, 40.—Comments on expts. by Esch (cf. *C. A.* **22**, 511) with aldol- α -naphthylamine. The latter has a slight accelerating action. Reply. WERNER ESCH. *Ibid.* 40-1.

C. C. DAVIS

Adsorption and diffusion of gases through rubber and balloon fabrics. A. DUBOSC. *Rev. gén. caoutchouc* Feb., 1928, No. 39, 7-8.—A review and discussion of the general phenomena.

C. C. DAVIS

Jelutong. C. D. V. GEORGI. *Malayan Agr. J.* **15**, 400-7 (1927).—Jelutong may deteriorate by drying to a brittle mass or by becoming sticky and resinous through mold (cf. *C. A.* **22**, 183). In an exptl. study of the causes of such deterioration, jelutong latex was coagulated with $AcOH$, HCO_2H , H_2SO_4 , K alum and Na_2SiF_6 , let stand 3 days, squeezed and dried slowly with periodic examn. After 7 months only the sample coagulated with Na_2SiF_6 was in good condition, and the moisture in this had decreased from 60 to 15%. Aside from Na_2SiF_6 , which prevented mold development, the order of merit of the coagulants was $AcOH$, HCO_2H , H_2SO_4 , and K alum. With K alum the product had become a brown-black sticky mass. In further expts. the same coagulants were used, but the coagula were creped. Deterioration was less rapid, but again the only product which did not deteriorate was that with Na_2SiF_6 . Coagulated with $EtOH$, jelutong dried more rapidly than with the other agents, and after 7 months it contained only 1% water. The results indicate that mold development is the chief cause of deterioration, and since the sugars and gums are attacked, removal of these by boiling jelutong in water greatly retards deterioration. Jelutong, refined by boiling

and dried, showed no deterioration from drying or fungoid growth after 14 months, though the moisture was then only 2%. This is confirmed by new reports from America on the good quality of jelutong prep. by boiling the acidified latex and then boiling the coagulum with water. Though Na_2SiF_6 is shown to be an excellent coagulant, its toxic properties preclude its use. The addn. of soap emulsion when refining the coagulum is unnecessary and does not influence the aging. Jelutong prep. by boiling acidified latex is less porous and dries more slowly than that prep. by allowing the acidified latex to stand.

C. C. DAVIS

The colloidal and elastic properties of polyvinyl acetate. G. S. WHITBY, J. C. McNALLY and W. GALLAY. *Trans. Roy. Soc. Can.* **22**, 27-32 (1928).—Polyvinyl acetate (cf. German Patents 271,381, 403,784, 281,687, 281,688; Staudinger, Frey and Starck, *C. A.* **22**, 215) swells and dissolves generally in polar org. liquids, and dissolves in the lower fatty acids, ketones, alcs. and esters, but less readily in the higher members of such homologous series. It also dissolves in liquids of high dielec. const., *e. g.*, AcCN and MeNO_2 . It is insol in paraffin hydrocarbons, but resembles hydrocarbon colloids in its soly. in CHCl_3 and aromatic hydrocarbons. When heated or swollen in solvents it becomes elastic, and this property is shown when the polymerization is low and corresponds only to a hexamer. Unlike rubber, it fails to give an x-ray fiber diagram when stretched. Unlike sols of most lyophilic colloids, the relative viscosity of its sols changes only slightly with change of temp. Polyvinyl acetate is chem. heterogeneous, and a representative sample prep. with benzoyl peroxide contained mols. with mol. wts. from 566 to 6192. There is an approx. linear relation between the state of polymerization and the viscosity of C_6H_6 sols. A study of the swelling or solvent power of various hydrocarbons, esters, ketones, alcs., ethers, acids, aldehydes, halogenated hydrocarbons and certain other representative compds. showed that the best solvents are HCO_2Me , HCO_2Et , AcCN, Me_2CO , CHCl_3 , AcH, $\text{CH}_3(\text{OMe})_2$, and MeNO_2 , the power of the solvents decreasing in the order cited.

C. C. D.

Some derivatives of β , γ -dimethylbutadiene. A. D. MACALLUM and G. S. WHITBY. *Trans. Roy. Soc. Can.* **22**, 33-8 (1928).—Modifying a method already described (German Patent 233,894), 42% of pinacone hydrate (I) was obtained from Me_2CO . Fused over NaOH, I was converted to pinacone. A comparison of different methods for converting pinacone to β , γ -dimethylbutadiene (II) showed the best results by distn. over 10% of K alum (cf. German Patent 250,086). This gave 60% II, 22% higher fraction (chiefly pinacone) and 5% I. Sulfanilic acid also gave a good yield. S_2Cl_2 in CS_2 added dropwise to II in CS_2 , let stand several days in darkness and evapd. *in vacuo* at 50°, yielded an oil which on attempted distn. gave a solid polymer or decompn. product, probably $\text{C}_{12}\text{H}_{20}\text{Cl}_2\text{S}_2$, n_D^{26} 1.5400, d_4^{26} 1.1172. With S, II in C_6H_6 at 100° gave no thiophene deriv., nor did it react in MeOH at room temp with SbCl_3 . Brominated at 0° in CCl_4 , Et_2O or EtCl , washed with MeOH, and recrystd. repeatedly, II yielded the solid dibromide, $\text{BrCH}_2\text{CMe}:\text{CMeCH}_2\text{Br}$ (III) (cf. *J. prakt. Chem.* **62**, 166 (1900)), $b_{18.6}$ 105-10°, d_4^{50} 1.6912, n_D^{50} 1.5470. The liquid dibromide (IV), $b_{18.6}$ 105-10°, n_D^{50} 1.5390, d_4^{50} 1.6502. Ozonization of III in very cold EtCl gave 84.15% bromoacetone. III heated at 100° with EtONa (calcd. quantity), dild., salted out with KOH, dried and distd., yielded 1,4-dimethoxy-2,3-dimethyl-2-butene, oil, peppermint odor, $b_{33.6}$ 81-4°. Prep. similarly, 1,4-diethoxy-2,3-dimethyl-2-butene, oil, faint rose odor, b_{26} 90-5°. III in Et_2O added slowly to excess MeMgI soln., ice and then HNEt_3 added, dild. with mineral acid, dried and the Et_2O ext. distd., gave a terpene oil, $\text{C}_{12}\text{H}_{20}$, b_{20} 50°, not the normal terpene of Lebedev and Merezchkovskii (*C. A.* **8**, 320), and a residue with high b. p. III in C_6H_6 heated 4 hrs at 100° with HNMe_2 (2 mols.), extd. with dil. HCl, the acid ext. extd. with Et_2O , made alk., again extd. with Et_2O , the aq. soln. made acid to Congo red and H_2PtCl_6 added, yielded 1,1,3,4-tetramethyl- Δ^3 -pyrrolinium bromide platinichloride $\text{C}_{16}\text{H}_{32}\text{N}_2\text{Cl}_6\text{Pt}$, yellow, m. 199°. A higher yield was obtained by pptn. as the auribromide, red. Washed with water, extd. with dil. HCl and made acid to Congo red, and pptd. with a Au salt, the combined Et_2O exts. pptd. 23.4% of 1,4-bisdimethylamino-2,3-dimethyl- Δ^2 -butene dihydrobromide aurichloride, $(\text{BrHMe}_2\text{NCH}_2\text{CMe})_2\text{Au}_2\text{Cl}_6$, yellow, m. 188-9°. The tendency toward ring formation is therefore less in III than in the solid dibromide of Braun (*C. A.* **17**, 1083-4). Following the same procedure was prep. after purification from EtOH , 1,4-diphenylmethylamino-2,3-dimethyl- Δ^2 -butene, $(\text{PhMeNCH}_2\text{CMe})_2$, m. 76-7°. The aq. soln. gave no ppt. with Au or Pt chlorides or picric acid. From III and $\text{C}_6\text{H}_5\text{N}$ (20 parts) was obtained, after purification from Et_2O , 2,3-dimethyl- Δ^2 -butene-1,4-dipyridonium dibromide, $(\text{PhBrNCH}_2\text{CMe})_2$, m. 124°. Platinichloride, $\text{C}_{16}\text{H}_{30}\text{N}_2\text{Cl}_6\text{Pt}$, m. 228° (decompn.). IV, HNEt_3 (2 mols.) and Et_2O (50 parts) let stand 1.5 days,

evapd. and the products isolated in the way described for the auribromides yielded 26.75% *quaternalry salt*, $C_{10}H_{20}NBr_4Au$, dark red, m. $106-7^\circ$, and 21.22% of *dilertiary salt*, $C_{14}H_{22}N_3Br_3Au_3$ (V), orange, purified by pptn. with Et_2O from MeOH, m. $177-8^\circ$. By the same method III gave 11.55% of *quaternalry salt* (28.78% Au), m. 52.8° and 27.2% of *dilertiary salt*, m. $177-9^\circ$ (unchanged by mixing with V). The greater tendency of IV to form a ring compd. showed that it is the *cis*-form and III the *trans*-form. Other reasons are given to show that IV is the *cis*-form. Since, however, the quaternalry compds. from III and IV were not identical, IV as prepd. may have been a mixt. or the product from III may have been bimol., thus. $BrEt_2NCH_2CMe:CMech_2N(Et_2Br)CH_2CMe:CMech_2$, instead of $MeC.CMech_2N(Et_2Br)CH_2$. III refluxed with Zn dust and 90% EtOH, extd. with Et_2O and the ext.

brominated yielded III. III in dry Et_2O with Mg ($1/2$ atom) gave no trace of rubber or $C_{12}H_{10}Br_2$, but only IV. III heated 12 hrs. at 100° with II gave II, III and IV.

C. C. DAVIS

A new tetramethylbutadiene. A. D. MACALLUM AND G. S. WHITBY. *Trans. Roy. Soc. Can.* 22, 39-44(1928).—The expts. are part of a study of the influence of methylation on the ability of butadiene to polymerize, earlier work having indicated that methylation of the end positions has, compared with methylation of the middle positions, an unfavorable effect, and that the greater the no. of Me groups the less the tendency to polymerize. Reduction of $MeEtCO$ to 3,4-dimethylhexan-3,4-diol (I) was tried under various conditions. Na and moist Et_2O gave a 9.5% yield. In C_6H_6 , Fe or Zn gave no yield, Al and Mg gave a 40% yield (Mg acting much more rapidly), amalgams were not better than the corresponding metal with $HgCl_2$, small proportions of I or CuCl did not increase the yield, too great diln. with C_6H_6 diminished the yield and excess ketone ruined the yield. The best crude yield (41%) was obtained by refluxing Mg shavings (1 equiv.) with $HgCl_2$ (0.0747 mol.), $MeEtCO$ (2.22 mols.) and C_6H_6 (2.13 mols.), adding when stiff more C_6H_6 (1.06 mol.), decomp. with ice, adding NaOH (2 mols.), drying over NaOH, distg. *in vacuo* and purifying by fractionation. I (10-30 g.) and 20% H_2SO_4 (1 drop) distd. at $140-50^\circ$, the oil sepd., dried over $CaCl_2$, fractionated *in vacuo*, gave 84% of crude product which on further fractionation under 100 mm. pressure gave 3,4-dimethylhexa-3,4-diene (II), b. $132-4^\circ$, b_{100} $71-3^\circ$, n_D^{25} 1.4630, $d_4^{19.2}$ 0.7832, $[\alpha]$ 38.78. In soln. with Br at 0° it absorbs 2 atoms of Br, and on standing at 20° it absorbs 4 atoms with evolution of HBr, yielding a dibromide, could not be crystd. and decompd. on standing at 20° . Excess 3% aq. $KMnO_4$ added to II, filtered, neutralized with HNO_3 , excess $AgNO_3$ added and evapd. *in vacuo* yielded $AcOAg$. Crude II may contain a structural isomer, for fractions above and below its b. p. had the same compn. but different *n* values and oxidation yielded a *Ag salt* contg. less Ag. II did not undergo thermopolymerization when heated at 100° under 28 mm. pressure. Neither was it polymerized by long standing with Na. Dissolved in concd. H_2SO_4 and pptd. with water, II formed a viscous liquid compd., b. $170-200^\circ$, n_D^{25} 1.4915, contg. 85.4% C and 12.69% H and probably an impure dimer. Unlike isoprene and dimethylbutadiene, it does not react with aq. SO_2 . Exposed to air II undergoes autooxidation, forming a gummy polymer. Short exposure to a deficiency of air formed a colorless gum, which purified with MeOH contained 67.1% C and 10.01% H, gave a strong peroxide reaction with hot titan. acid, but a negative test with KI. II probably differs from a compd. of the same compn. prepd. by Herschmann (*Monatshfte* 14, 233(1893)). Attempts to brominate *n*-BuBr by prolonged exposure to light with Br and water gave negative results. With the Linne-mann method (*Ann.* 161, 199(1872)) 15.5% of a dibromo compd., b. $170-80^\circ$, was obtained, probably a 1,3-1,2-deriv. Reboul's method (*Bull. soc. chim.* 7, 124(1892)) and Fe as catalyst gave 32.6% of the 2,3-dibromide (*Ann.* 144, 234). Therefore Fe causes isomerization during bromination. In prep. $MeCH:CMech_3$, it was found best to use excess KOH (cf. *Ann.* 253, 231(1889)), 263 g. of dibromide, 82 g. of KOH and 400 cc. of MeOH, giving 124.7 g. of $MeCH:CMech_3$, b. $89-93^\circ$. Treated in dry Et_2O with Mg and with I as catalyst, decompd. with ice and dil. AcOH and distd. it gave, not the diene desired, but the compd. $C_{10}H_{18}O$, oil, onion odor, boiling approx. 160° , n_D^{25} 1.4735. The compn. of II, as indicated by the formation of AcOH on oxidation, is $MeCH:CMech_2CMe:CHMe$.

C. C. DAVIS

Comparative study of the addition of zinc oxide, lithopone, zinc sulfide and titanic acid to thin-walled rubber products vulcanized with sulfur chloride. RUDOLF DITTMAR AND GUSTAV BALLOG. *Gummi-Ztg.* 42, 1303-4(1928).—Expts. indicate that 8% is

about as much "colloidal" pigment as can be added to rubber cured with S_2Cl_2 vapor or S_2Cl_2 in CS_2 without causing imperfect goods. Using this max. of 8%, the relative merits of ZnO , ZnS , lithopone and TiO_2 were detd. ZnO imparted the most nearly white color; in all cases the quality was good when new and there was no essential difference in the aging.

C. C. DAVIS

Direct determination of rubber in soft vulcanized rubber. A. R. KEMP, W. S. BISHOP AND T. J. LACKNER. *Ind. Eng. Chem.* 20, 427-9 (1928).—When somewhat modified, the Wijs method, which has already been shown to be suitable for raw rubber (cf. *C. A.* 21, 1901), is applicable to the detn. of the rubber content of vulcanized rubber. Ext. the sample with Me_2CO , then with $CHCl_3$, ext. with alc. KOH if factice is present, disperse the dry residue (0.07-0.10 g.) in $(CHCl_3)_2$ (50 cc.) by refluxing, dil. with pure CS_2 (25 cc.), add 0.02*N* Wijs soln. (25 cc.), keep cold for 2 hrs., add 15% aq. KI (25 cc.) and water (50 cc.), titrate with 0.1 *N* $Na_2S_2O_8$, adding 5% starch soln. (5 cc.). From the difference between the blank and sample titration is calcd. the I no. as before (*C. A.* 21, 1901). To det. combined S, disperse the extd. residue (0.5 g.) in $(CHCl_3)_2$ (50 cc.), make up at 25° to 250 cc. with CCl_4 , centrifuge or let settle, evap. 100 cc. to dryness and det. S by the method of Waters and Tuttle (Byr. Standards, *Sci. Paper* 174 (1911); cf. *C. A.* 6, 1540). From the sum of the hydrocarbons in the unsatd. and combined states is calcd. the total rubber content. The various factors influencing the precision are discussed and representative analyses are given. Factice is about the only org. or inorg. ingredient which ordinarily affects the results. $(CHCl_3)_2$ was chosen as the best of numerous solvents of vulcanized rubber.

C. C. DAVIS

The effect of mineral rubber on the tensile strength of vulcanized rubber. WERNER ESCH. *Kautschuk* 1928, 31-5.—Papers by Stoll (*C. A.* 22, 888) and by Ditmar (*C. A.* 22, 1061) on the properties and effects of "mineral rubber" are reviewed critically. Phys. tests of several vulcanized mixts. are tabulated to show that the effect of "mineral rubber" depends upon the temp. and time of vulcanization, on the particular accelerator and its proportion and on the proportion of S. The addn. of small proportions, e. g., 5%, tends to stiffen a vulcanized mixt. and also to accelerate its rate of vulcanization.

C. C. DAVIS

Measurement of resistance of vulcanized rubber to penetration of benzene and other combustible substances. F. C. SCHMELKES. *Ind. Eng. Chem.* 20, 430-1 (1928).—The method is particularly suitable for hose. A definite length and diam., i. e., a const. surface of the latter, is surrounded by the solvent (C_6H_6 , gasoline, etc.) and air is blown through the hose at a definite and const. rate. The issuing air is then analyzed continuously for its solvent content by a calorimetric device operating a current recorder. Besides the dimension of the hose, such factors as temp. must be controlled.

C. C. DAVIS

The resistance to stretching of vulcanized rubber. II. R. ARIANO. *Nuovo cimento* [N. S.] 4, 263-81 (1927).—A. has extended his investigations (*C. A.* 20, 3362) to a consideration of the effect of various inorg. ingredients, to a study of the variation in vol. with respect to the Joule effect and to an examn. of the degree of vulcanization upon the parameters characteristic of stretching. He had demonstrated the independence of the type of mixt. and of the degree of vulcanization (Poisson's coeff.) and explains various characteristic parameters and their phys. significance. L. T. F.

A new process for the manufacture of ZnO (BERTHONNEAU) 18.

Rubber Chemistry and Rubber Technology. (*New Journal*.) C. C. DAVIS, editor. Published quarterly under the auspices of the Rubber Division of the American Chemical Society, Easton, Pa. Vol. 1, No. 1, appeared in Apr., 1928.

KIRCHHOF, FERDINAND: Fortschritte in der Kautschuk-Technologie. Dresden and Leipzig: T. Steinkopff. 201 pp.

Rubber composition. H. P. BUTLER. *Can.* 276,353, Dec. 20, 1927. A surfacing compn. is made by dissolving 3-5 ozs. crude rubber in 2 pints C_6H_6 , adding 4-5 pints CCl_4 and cooking the mixt. for 2-3 hrs., after which pyroxalin is added.

Rubber articles from latex. RUBBER LATEX RESEARCH CORPORATION. Brit. 273,991, Feb. 14, 1927. A jet of latex is coagulated in contact with acid, e. g., 20-30% $HOAc$, the superficially coated material is allowed to stand until the coagulation proceeds throughout, and the product is pressed, washed and dried. An app. is described.

Apparatus for mixing, masticating, working or kneading rubber, etc. R. C. LEWIS and FARREL FOUNDRY & MACHINE CO. Brit. 273,455, June 2, 1926.

Electrodeposition of rubber. P. SCHIDROWITZ. Brit. 273,662, July 5, 1926. Articles are produced and fabrics are impregnated by electrodeposition of vulcanized rubber by methods as described in Brit. 193,451 (C. A. 17, 3430) and Brit. 208,235 (C. A. 18, 1589). A mold may be connected as anode in a 30% vulcanized latex and a current d. of 0.8-1.0 amp. per sq. dcm. maintained. A porous layer may be placed before the anode and fillers and dyes may be added to the latex.

Vulcanizing rubber footwear. L. CANDEE & Co. Brit. 274,357, Jan. 15, 1927. Articles such as footwear covered with a soft tacky vulcanizable varnish are given a hard finish by treatment with a halogen or a halogen S compd. such as Cl, Br, S chlorides, sulfonyl chloride, thionyl chloride or Se oxychloride. The varnish used preferably contains an oxidizable or drying oil. An app. is described.

Regenerating vulcanized rubber. C. O. CARLSSON. Brit. 274,387, March 15, 1927. Vulcanized rubber is dissolved in tar oil, impurities are removed by centrifuging or otherwise and the rubber is pptd. from the soln. by adding alc. or other suitable reagent.

Sheet material containing rubber. E. C. VILLIERS. Brit. 273,961, Dec. 8, 1926. A filler such as powd. asbestos, bitumen, C. black, chalk, kieselguhr, lime, portland cement, "sulfur talc," dried or baked clay or sand, is mixed with coal-tar naphtha or other rubber solvent to form a pasty mixt. and there is added to this rubber latex or a similar latex. The order of mixing also may be reversed. After preliminary stirring and coagulation, the material is rolled into sheets, which may be reinforced with fabric or wire netting, and if S is present vulcanization by heating may be effected.

Molding ebonite. A. FRASER and R. and F. RISSIK, FRASER & Co., LTD. Brit. 273,355, Feb. 2, 1926. Undercured ebonite dust is placed in molds and subjected to a pressure exceeding 500 lbs. per sq. in. and heated to 220-250° for a short time, and allowed to cool before removing from the mold. Ni or other metals may be embedded in the material.

"Catgut substitutes." DUNLOP RUBBER CO., LTD., R. TRUBSDALE, R. C. SMITH and E. SIMPSON. Brit. 273,896, July 7, 1926. Threads of silk, ramie, cotton or wool are impregnated with solns. such as those of cellulose, rubber, gutta percha or balata and twisted. An app. is described. Cf. C. A. 22, 165.

CHEMICAL ABSTRACTS

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No. 12

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Iodine colorimeter with artificial light. L. S. VAN DER VLUGT. *Chem. Weekblad* 25, 196-7(1928).—The Fellenberg tubes (I in CHCl_3 color) are observed by magnifying glass, illuminated from behind by a 10-candle lamp with Co glass light filter. In a horizontally sliding tube rack test solns and standard colors alternate.

B. J. C. VAN DER HOEVEN

A modification of the Brown apparatus for the colorimetric determination of p_H . W. H. WRIGHT. *J. Lab. Clin. Med.* 13, 182-4(1927).—An inexpensive app., with an improved indicator scale, is described for the colorimetric detn. of p_H by the drop method.

E. WICKWIRE

Recent modifications of electrical temperature-measuring apparatus. W. JAEKEL. *Messtechnik* 2, 57-9, 95-8, 127-8(1926); *J. Inst. Metals* 38, 541.

E. J. C.

An improved titration apparatus for preservation of carbon dioxide-free alkali.

H. W. VAN URK. *Pharm. Weekblad* 65, 390(1928).—By the use of a stopcock at A and air pressure at D, the liquid is forced through the buret to the desired level and a normal meniscus obtained. C and D are soda-lime tubes.

A. W. DOX

A simple and accurate constant-volume pycnometer for specific gravity determinations. H. V. ELLSWORTH. *Mineralog. Mag.* 21, 431-5(1928).—The pycnometer is constructed of silica glass of 10 cc. capacity and 10 g. wt. The stopper has a capillary side tube of uniform bore which is graduated at intervals of $\frac{1}{2}$ cm. A ring on the neck permits of convenient handling by means of tongs. A special thermometer 5 mm. diam., 260 mm. long and graduated from 12° to 30° enables the temp. to be read to at least $\frac{1}{20}^\circ$. Rapid results are obtained which are extremely accurate.

W. F. H.

Developing the internal-type vacuum filter. J. T. SHIMMIN. *Mining and Metallurgy* 9, 227-8(1928).

E. H.

Some recent improvements in spray driers. C. D. POWER. *Chem. Eng. Mining Rev.* 20, 201-5(1928).—Detailed descriptions are given of the Kestner, Krause and Gray-Jensen driers.

T. S. CARSWELL

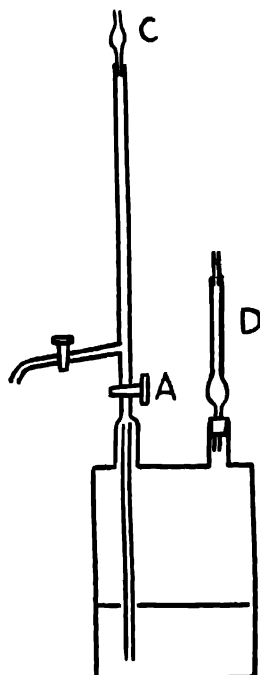
Sensitive springs from quartz fibers. H. D. H. DRANE. *Phil. Mag.* [7], 5, 559-60(1928).—Directions are given for producing helical springs of quartz fiber of diam. 0.005 cm. and less.

GEORGE GLOCKLER

Calculations concerning containers, especially those made of cast iron, designed for high pressures. F. VON ZEPEL. *Svensk Pappers-Tid.* 31, 140-2(1928).—Data are given for globe-shaped containers similar to those given in detail in C. A. 20, 3813, for plane container walls.

W. SEGERBLOM

Thermoelectric platinum-platinum rhodium couples. A. SOURDILLON AND ROLET. *Rev. métal.* 25, 90-7(1928).—Deterioration of the Pt wires is due to S-contg. gases only, and is permanent and cannot be destroyed by any known heat treatment. Metal protecting tubes are insufficient, but SiO_2 tubes afford perfect protection. An unprotected couple rapidly corrodes. If the whole of the corroded zone is at an absolutely uniform temp., it causes no error in the reading; otherwise (as is generally the case) the reading is inaccurate. Direct standardization of the couple by means of fixed points (as generally



recommended) must be accompanied by testing for parasite couples, and if such are present the standardization is meaningless unless the whole zone where they are present is at a uniform temp.; but if there are no parasite couples the instrument can be used without special precautions, otherwise the comparison should be made with a standard non-corroded couple under the same temp. conditions. A. PAPINEAU-COUTURE

The three-electrode vacuum tube and its application to some chemical engineering problems. H. C. WEBER. *Trans. Am. Inst. Chem. Eng.* 19, 107-16(1927).—The general principles of the three-electrode vacuum tube are discussed. Descriptions are given of its use in gas analysis, for measurement of gas velocity and pressure, as a sensitive micrometer, and for the detn. of dielec. const. and resistance. T. S. CARSWELL

Tungsten-zirconium furnaces. W. M. COHN. *Z. tech. Physik* 9, 110-5(1928).—A review on lab. furnaces for temps. up to 3000° (31 references). The technic of winding coils for W-Zr ovens with internal or external heating is described; a mixt. of 50-50 high and low burned ZrO₂ is used as cement. Pure H₂ (25%) and N₂ (75%) are used as protective gas, being passed around the heating coils. Temps. up to 2000° can be reached with these furnaces. B. J. C. VAN DER HORVEN

HAUSBRAND, E.: **Evaporating, Condensing and Cooling Apparatus.** London: Ernest Benn, Ltd. Price, approx. 21s., net.

Manifold for gas-analysis apparatus. C. B. FRANCIS. U. S. 1,668,362, May 1.
Resistance thermometers for stacks, rooms, silos, etc. C. E. FOSTER. Brit. 275,036, Sept. 9, 1926.

Spectroscope for gas analysis. SOC. ANON. DES CHARBONS ACTIFS E. URBAIN. Brit. 274,826, July 24, 1926.

Titration apparatus (suitable for determining salinity of brackish water). J. F. MARSHALL. Brit. 274,623, June 17, 1926.

Ultra-violet lamp apparatus. D. C. LINK. U. S. 1,668,566, May 8.

Viscometer. W. A. NIVLING. Brit. 274,479, July 13, 1926.

Filter for effecting thickening of various materials. J. B. VARNAY. Brit. 275,573, Aug. 3, 1926.

Filter and sterilizer for air or other gases. M. G. VON LINDEN, R. MELDAU and DEUTSCHE LUFTFILTER-BAUGES. Brit. 274,942, April 23, 1926. Cu or material contg. Cu is used for the filter and is coated with a viscous soln. of a Cu salt such as colloidal Cu oleate mixed with paraffin or "white oil."

Intermittently operating filter for liquids. E. J. SWEETLAND. Brit. 275,333, May 5, 1926.

Strainer head for filtering apparatus. W. J. HUGHES. U. S. 1,668,205, May 1.

Filter plate formed of expanded silica particles adhering together without a binder. H. L. WATSON. U. S. 1,669,362, May 8.

Apparatus for continuous filtration of chemical precipitates or other materials. G. GRÖNDAL. U. S. 1,668,557, May 8.

Baffle apparatus for separating dust from gases. E. BUDIL (NÉE MEIXNER). Brit. 275,257, July 31, 1926.

Apparatus for determining the degree of fineness of pulverulent or fine granular substances by suspending them in liquids. H. HARKORT. U. S. 1,667,783, May 1.

Apparatus for charging gas producers, shaft furnaces, etc. J. LAMBOT. U. S. 1,668,968, May 8.

Apparatus for producing gaseous ozonides. E. J. BAGNALL. U. S. 1,668,884, May 8.

Apparatus for screening wood pulp or other materials. R. E. WAGNER. U. S. 1,669,029, May 8.

Apparatus for gradual production of gases such as chlorine by reaction of chemicals mixed with inert materials. W. E. KEMMERICH. U. S. 1,668,371, May 1.

Temperature indicator for encased electrical apparatus. E. D. TREANOR. Brit. 274,852, July 23, 1926.

Tubular heat-exchange apparatus. D. K. DEAN. U. S. 1,669,291, May 8.

Annular rotary hearth furnace or oven for drying or dry distillation of granular and pulverulent materials. TROCKNUNGS-, VERSCHWELUNGS- UND VERGASUNGS, GEs., L. HONIGMANN and F. BARTLING. Brit. 275,041, Oct. 2, 1926.

Heat-exchange apparatus adapted for use with gases, vapors and liquids. E. MENZEL. U. S. 1,669,062, May 8.

Electric discharge device. F. MEYER, H. J. SPANNER and E. HERFURT. Brit.

275,552, Aug. 6, 1926. The pressure of gas or vapor in an incandescent-cathode rectifier is maintained by means of a highly porous material such as activated C or silica gel, satd. with gas and which may be placed in the main or in an auxiliary container. Inert gases such as Kr or Ar may be used in the filling.

Electron-emitting cathode. E. E. SCHUMACHER. U. S. 1,668,734, May 8. A filament of metal such as W or Mo is supported in an evacuated vessel contg. powd. Ce or other thermionically active material, a heating current is passed through the vessel and the latter is agitated to bring the thermionically active material into contact with the filament. Cf. C. A. 21, 3494.

Apparatus (with catalytic disks) for hydrogenating liquids and semi-liquids. G. R. SCHUBLER. Brit. 274,952, April 28, 1926.

Apparatus (with rotating disks) for effecting contact between gases and liquids. P. F. HOLMES, D. M. HENSHAW and W. C. HOLMES & Co., LTD. Brit. 275,092, Feb. 7, 1927.

Multiple-chamber continuous kiln. M. BISCH. Brit. 275,616, Aug. 6, 1926.

Apparatus for emulsifying fats, dried milk or other materials with water. A. C. BAMFORD. Brit. 275,375, June 12, 1926.

Apparatus for preparing filaments of platinum or other metal coated with calcium oxide or like substances. E. R. STOEKLE. U. S. 1,668,742, May 8. A metallic boat holds the coating material which is heated out of contact with the filament.

Tanks or vats formed of cement mixed with latex and lined with rubber. N. SWINDIN. Brit. 275,316, May 3, 1926.

Apparatus for depositing metals on textile materials, paper or the like by electric discharges in a vacuum chamber. W. A. F. PFANHAUSER. Brit. 275,523, April 14, 1927.

Apparatus for producing actinic rays of extremely short wave length for sterilizing water or foods or for other purposes. V. H. M. A. DANGERFIELD. Brit. 275,596, Aug. 4, 1926.

Thermionic valves. S. LOEWY. Brit. 274,509, July 19, 1926. Incandescent cathodes of rectifiers and other electron tubes comprise a coating of metal oxides or other substances of high electron emission properties which may be applied to a wire of Fe or Cr-Ni covered with Pt or Pt-Ir.

Thermionic valve. NAAMLIOOZE VENNOOTSCHAP PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 275,449, Oct. 27, 1926. A helical cathode such as described in Brit. 274,981 (cf. following abstract) is formed of Ni and a layer of Cu oxide may be placed between the Ni and the alk. earth oxide.

Thermionic valves. NAAMLIOOZE VENNOOTSCHAP PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 274,981, May 6, 1926. Cathodes are formed with a core or metal such as W or Mo, helically wound with a wire of Pt, Pt-Rh or other Pt alloy, and coated with alk. earth oxide or other material of high electron emissivity. Cu may be applied to the cathode and oxidized and Ba applied to the Cu oxide, followed by heating to form BaO and volatilize the Cu. Cf. preceding abstract.

Thermionic valves. RADIOWERK E. SCHRACK. Brit. 275,542, Aug. 6, 1926. A carrier wire which may be formed of W, Mo, or thoriated W may be coated electrolytically with Au, Pt, Ni, Cu, Ag or Fe, or coated with C (which is preferred) to render further coating material more firmly adherent, and is then sprayed with carbonate or other suitable alk. earth compd. which will serve for providing an oxide coating when heated.

Thermostat. A. J. MOTTLAU. U. S. 1,668,973, May 8.

Thermostat. SPENCER THERMOSTAT Co. and L. K. MARSHALL. Brit. 275,527, April 19, 1927.

Thermostatic devices. J. V. GIESLER. U. S. 1,668,896, May 8.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

Physics in Sicily from the scientific renaissance to the present day. SER. TIMPANARO. *Atti II congresso naz. chim. pura applicata* 1926, 1453-6.—Historical.

C. C. DAVIS

Science in Sicily in antiquity. ALDO MIELI. *Atti II congresso naz. chim. pura applicata* 1926, 1425-7.—Historical.

C. C. DAVIS

Stanislao Cannizzaro, historian of science. ALDO MIELI. *Atti II congresso naz.*

chim. pura applicata 1926, 1422-4.—A review of the contribution of Cannizzaro in promulgating the mol. theory. C. C. DAVIS

"The work of Stanislaw Cannizzaro in physiology and in medicine. S. BAGLIONI. *Atti II congresso naz. chim. pura applicata* 1926, 1413-21.—An historical sketch, with medallion reproduction of Cannizzaro. C. C. DAVIS

An outline of the history of the Edinburgh Chemists', Assistants' and Apprentices' Association. J. W. LAING. *Pharm. J.* 119, 585-8, 614-7(1927).—An address, commemorating the 50th anniversary. S. WALDBOTT

Sir Edward Frankland: a great Lancastrian. H. D. ARMSTRONG. *Chemistry and Industry* 47, 408-10(1928).—Biographical. E. H.

The improved physical laboratory of the University of Groningen. D. COSTER. *Physica* 8, 45-60(1928). B. J. C. VAN DER HOEVEN

Barium or barium? REINHOLD BAHMANN. *Apoth. Ztg.* 43, 450(1928).—A further discussion of the etymology of this name. W. O. L.

Critical study of the origin and the development of the atomic-molecular theory and of its symbolic expression in the form of chemical notation. ADRIANO OSTROGOVICH. *Atti II congresso naz. chim. pura applicata* 1926, 120-67.—A long and very detailed historical and crit. review of the most important contributions, particularly those of Dalton, Berzelius, Avogadro, Ampère, Gerhardt, Gaudin, Laurent, Cannizzaro and Mendeleev. Corrections. *Ibid* 1645. C. C. DAVIS

Variability of old standard kilograms. L. H. SIERTSEMA. *Physica* 8, 37-43 (1928).—A study of wt. changes, appearance, etc., of 27 standard kg. weights over a period of more than 100 yrs. B. J. C. VAN DER HOEVEN

Composition of the air in the streets of Paris. R. CAMBIER AND F. MARCY. *Compt. rend.* 186, 918-21(1928).—The findings agree with those of Florentin (*C. A.* 22, 1069). Six samples of air 0.2 m. above ground contained from 0.08 to 0.50 l. of CO per cu. m. At 1.6 m. above ground the range was 0.01 to 0.05 l. per cu. m. The no. of automobiles per hr. ranged from 800 to 2600 and had no relation to the quantity of CO as detd. in the samples taken, except from samples in confined spaces. The range of CO₂ was 0.34 to 0.60 l. per cu. m. for samples 0.2 m. above ground and 0.30 to 0.51 for samples 1.6 m. above ground. The enormous increase of automobiles has not caused any important change in the compn. of the air. L. W. RIGGS

The atomic weight of copper. RUDOLF RÜER. *Z. anorg. allgem. Chem.* 169, 251-6(1928).—Cu reduced at 750° by H for at. wt. detns. can be weighed in air and still maintain the accuracy of weighing (1-100,000) set by T. W. Richards, if after the reduction the Cu be maintained at 750° in a current of H until it has attained const. wt. Four g. of Cu requires heating for about 50 hrs. after reduction. This gradual change probably corresponds with the fusion of the Cu to a mass of const. surface so that the wt. of the CuO film formed on the surface is const. Cu so formed has a sp. gr. 8.880 (19°/4°). E. R. SCHIERZ

Chemical affinity, cohesion, compressibility, and atomic volume. Studies on the effects of internal pressure. T. W. RICHARDS. *J. chim. phys.* 25, 83-119(1928); cf. *C. A.* 20, 1158; 21, 1728; 22, 518.—A comprehensive review of R's work on this subject since 1902. This summary, the last and in many ways the most complete which he wrote, was prepd. with especial care, and may be considered a statement of his final attitude. W. T. RICHARDS

Latent heat of vaporization as a function of temperature. R. M. WINTER. *J. Phys. Chem.* 32, 576-82(1928).—The expression $\lambda = \lambda_0 (1 - T_r)^{2/3}$ where λ is the total latent heat of vaporization, T_r the reduced temp., and λ_0 an empirical const., is tested and found adequate over a considerable range. No new exptl. data are presented. Relations between this expression and those of similar form involving surface tension and density are pointed out. W. T. RICHARDS

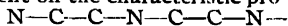
A periodic classification of the hardness and melting points of the elements. S. A. KORFF. *Science* 67, 370-1(1928); cf. *C. A.* 21, 2864.—It is possible to classify the elements according to hardness and m. p. This classification fits with considerable precision into an 18-period table based on spectroscopic similarities. In this table, the elements are arranged according to at. no., with those of similar spectra in columns. The horizontal rows are successively: H and He, Li and Be, B to Mg, Al to Ca, Sc to Sr, Y to Ba, Hf to Ra and Th to U. Thus the latter column comprises He, Be, Mg, Ca, Sr, Ba and Ra. The correlation of the m. p. and hardnesses in this table is considered; predictions are made of the properties of the unknown elements. A. L. HENNE

Influence of relative ionic sizes on the properties of ionic compounds. LINUS PAULING. *J. Am. Chem. Soc.* 50, 1036-45(1928).—The ratio of cation radius to anion radius influences the properties of ionic substances. Irregularities in interionic dis-

tances, m. ps. and b. ps. of the alkali halides can be explained as resulting from this effect.

Molecular weight determinations and solubilities in liquid chlorine. K. H. BUTLER AND D. MCINTOSH. *Trans. Roy. Soc. Can.* [3], 21, Sect. 3, 19–26 (1927); cf. C. A. 22, 599.—The soly. of 60 salts and 10 elements in liquid Cl was detd. by the b. p. method with an accuracy of 0.1%. Tetrahedra of Ag and pieces of garnet were used in the b. p. app. to avoid superheating. The const. for the b. p. of Cl was found to be 1.73. Br gave evidence of dissociation in liquid Cl, but the soln. showed no elec. cond. Polar salts proved insol while many liquids with low f. ps. were extremely sol. in liquid Cl. The reactions of certain of the elements in boiling Cl were examd. and the solubilities of the resulting compds. detd.

Specific molecular geometry. R. FERRIER. *Compt. rend.* 186, 577–8 (1928).—In considering proteins which show a specific absorption for certain other proteins in many cases no difference in chem. properties can be detected. It is suggested that these substances form definite geometrical mol. polygons dependent on the characteristic pro-



tein type of linking. The type of polygons formed may be

$$\begin{array}{ccccccc} & & \text{O} & & \text{O} & & \text{O} & & \text{O} & & \text{O} \\ & & \parallel & & \parallel & & \parallel & & \parallel & & \parallel \\ \text{C} & - & \text{C} & - & \text{N} & - & \text{C} & - & \text{C} & - & \text{N} & - & \text{C} \end{array}$$

Each substance capable of forming this type of linking is unable to ppt. itself. This type of linking would be possible only for compds. showing definite orientation and periodicity of certain groupings.

D. H. POWERS

Conception of polarity derived from physical measurements and its relations to the electronic configuration of aromatic organic compds. J. F. T. BERLINER. *J. Phys. Chem.* 32, 293–306 (1928).—Variations in the entropies of vaporization of the isomeric nitroanilines, mononitrotoluenes and toluidines are used as the basis for discussion of the relation existing between their electronic structure and mol. association. Configurations are illustrated and shown in agreement with properties considered. Study is made of the significance of these relations.

J. L. COSTA

The tenacity of tellurium crystals. E. SCHMID AND G. WASSERMAN. *Z. Physik* 46, 653–67 (1928).—Large crystals of Te were prepd. by fusion in vacuum and subsequent slow cooling. Angles of cleavage planes were verified. For orientations 90° to 29° between cleavage plane and tension, the crit normal tension is 431 g./sq. mm. Below 29° the value falls very rapidly, a secondary fracture type apparently taking place. Plastic deformation occurs along the cleavage plane and in the direction of the diagonal axis.

J. L. COSTA

The vaporization of orthorhombic sulfur. G. AMINOFF. *Z. Krist.* 65, 632–5 (1927).—The vaporization of a sphere cut from a crystal of S develops plane faces which correspond to the most important crystal faces.

L. S. RAMSDALL

The principles of temperature measurement. KARL SCHIEBL. *Messtechnik* 1, 3–6, 32–5 (1925).

E. J. C.

A method of great precision and simplicity for determining the index of refraction of liquids. A. SELLERIO. *Atti II congresso naz. chim. pura applicata* 1926, 1232–43.—See C. A. 21, 3015.

C. C. DAVIS

The crystal structure of stannic sulfide. IVAR OPTEDAL. *Norsk Geol. Tids.* 9, 225–33 (1927).—Debye-Scherrer photographs were taken from 2 different preps. of SnS₂. From these the crystal structure was found completely analogous to that of CdI₂, ZrS₂, etc. Positions: Sn (000) or (00¹/₂), 2S (1/3, 2/3 u, 2/3, 1/3 ū), u lying between the limits 0.23 and 0.27, most probably being exactly 0.25. Dimensions of the unit cell: a = 3.62 Å. U., c = 5.85 Å. U., c/a = 1.615. Least distance between atoms: Sn–Sn 3.62 Å. U., S–S 3.60 Å. U. (u = 0.25), Sn–S 2.55 Å. U. (u = 0.25), Sn–S 2.62 Å. U. (u = 0.27), Sn–S 2.49 Å. U. (u = 0.23). A remarkable anomaly of the intensities of certain reflections was explained from the prevalence of a certain form among the powder particles, tables parallel to (001).

C. A. ROBAX

The lattice dimensions of zinc oxide. TOM BARTH. *Norsk Geol. Tids.* 9, 317–9 (1927).—Powder photographs of c. p. ZnO according to the method used by Wyckoff with an addn. of NaCl for comparison showed the following exact dimensions of the unit cell: a₀ = 3.242 Å. U., c₀ = 5.176 Å. U., accordingly c/a = 1.596 ± 0.004.

C. A. R.

X-ray investigation of the alkaline earth fluorides. F. THILO. *Z. Krist.* 65, 720–2 (1927).—SrF₂ and BaF₂ have the fluorite type of structure, with the side of the unit cube 5.81 and 6.20 Å. U., resp.

L. S. RAMSDALL

The crystal structure of the modification C of the sesquioxides of the rare earth metals and of indium and thallium. WILLIAM ZACHARIASEN. *Norsk Geol. Tids.* 9,

310-6(1927).—A preliminary report on x-ray investigations of the oxides M_2O_3 of the elements Sc, Y, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, In and Tl. The elementary cube contains 16 mols. M_2O_3 , which is in good agreement with the observed ds. As only even values of $h^2 + k^2 + l^2$ are observed, the underlying lattice is body-centered. Consequently only the following space groups are possible: T^3 , T^4 , T_h^6 and T_h^7 . None of these has 32 equiv. positions, so the metal atoms cannot all be equiv. In order to get further data on the symmetry of the crystals Laue photographs were prepd. (of Tl_2O_3). The patterns obtained showed hemihedral symmetry thus excluding the space groups of the classes Oh, O and Td. A comparison of the powder photographs of the lightest and the heaviest molecule in the series Sc_2O_3 – Tl_2O_3 shows that all the interference lines except 16, 32, 48, 64, etc., must be due to the metal atoms alone. The lattice const., a_0 in A. U., were: Sc 9.79, Y 10.60, In 10.12, Sm 10.85, Eu 10.84, Gd 10.79, Tb 10.70, Dy 10.63, Ho 10.58, Er 10.54, Tm 10.52, Yb 10.39, Lu 10.37, Tl 10.57. Of all the possible arrangements of the 32 metal atoms it was proved that only the arrangement $12c + 12c + 8b$ is compatible with the observed intensities. As the predominating lines in the powder photographs are reflections from the faces 222, 400, 440, 622, 444, 800, etc., the unit cell may be divided into 8 small cubes, each of them being nearly a face-centered cubic lattice. The parameters consequently must obtain values which nearly place them in special positions. The 3 parameters $8b$ (t), $12c$ (u) and $12c$ (v) therefore differ only very little from the figures $t = 1/4$, $u = 0$, $v = 1/2$. It looks very probable that it is exactly 0.25. The values of u and v are detd.: $u = 0.021$ and $v = 0.542$. Presuming that an O atom has the same distance from the 4 surrounding metal atoms the following values of at. distances were calcd.: Sc–O = 2.18 A. U., Y–O = 2.36 A. U., Sm–O = 2.42 A. U. By regarding one-eighth cube of the whole unit cell the analogy to the CaF_2 arrangement is evident. The metal atoms form a distorted face-centered lattice while O atoms occupy approx. 6 of the 8 positions of the F atoms. Each metal atom consequently is surrounded by 6 O atoms at the same distance and each O atom by 4 metal atoms forming a nearly regular tetrahedron.

C. A. ROBAK

The crystal structure of the antimony oxides. U. DEHLINGER. *Z. Krist.* 66, 108–19(1927).— Sb_2O_3 is cubic and gives the same diffraction pattern as Sb_2O_4 , but with the side of the unit cube 10.22 A. U. which is about 10% smaller than that of Sb_2O_3 . Powder photograph patterns identical with that of Sb_2O_4 were obtained from what D. assumed to be Sb_2O_3 and Sb_2O_4 .

L. S. RAMSDELL

The crystal structure of cobalthexammine iodide. HANS HENTSCHEL. *Z. Krist.* 66, 466–7(1928); cf. C. A. 22, 1711.—The structure of $Co(NH_3)_6I_3$ as detn. by H. is identical with that by Wyckoff and McCutcheon. Cf. C. A. 21, 1384.

L. S. R.

Crystal structure of potassium hydroxystannate. R. W. G. WYCKOFF. *Am. J. Sci.* 15, 297–302(1928).—Laue and spectral photographs of $K_2Sn(OH)_6$ have been taken. The atomic arrangement is a distortion of the R_2PtCl_6 structure. The crystal is rhombohedral. The K and Sn positions can be expressed in terms of a uni-mol. unit: $a_0 = 5.66$ A. U.; $\alpha = 70^\circ 1'$, with Sn at 000, K at uuu , $\bar{u}\bar{u}\bar{u}$ where $0.25 < u < 0.27$. The cell is developed from the space group 3 Di-5.

R. L. HERSHEY

The fine structure of β -corundum. C. GOTTFRIED. *Z. Krist.* 66, 393–8(1928).—The unit cell of β -corundum contains 12 mols. and has the dimensions $a = 5.63$ and $c = 22.63$ A. U. The axial ratio is $a:c = 1:4.02$. The O atoms are not close packed. An analysis of β -corundum is given.

L. S. RAMSDELL

The space lattice of calcium carbide. CARL HERMANN. *Z. Krist.* 66, 314–6(1928).—A criticism of the x-ray detn. of Glocker and Dehlinger (cf. C. A. 21, 1210).

L. S. R.

The crystal structure of beryllium sulfate. R. FRICKE and L. HAVESTADT. *Z. anorg. allgem. Chem.* 170, 35–41(1928).— $BeSO_4 \cdot 4H_2O$ is tetragonal body-centered. The cell dimensions are: $a = b = 8.03$ A. U.; $c = 10.75$ A. U. There are 4 mols. per unit cell and the space group is D_{4h}^{18} .

R. L. HERSHEY

The crystal structure of lithium chloride monohydrate. S. B. HENDRICKS. *Z. Krist.* 66, 297–302(1928).—Powder, Laue, and spectrum photographs indicate a simple tetragonal unit for $LiCl \cdot H_2O$. The unit cell contains 1 mol. and has the dimensions $a = 3.88$ and $c = 3.81$ A. U. The Cl atoms are at 000, the O atoms at $\frac{1}{2}\frac{1}{2}\frac{1}{2}$ ($u = 0.42$ – 0.46) and Li at 00v or $\frac{1}{2}\frac{1}{2}\frac{1}{2}$. An alternative soln. is a unit cell with 2 mols. and $a = 3.88$ and $c = 3.81\sqrt{2}$ A. U. The detn. by Ott (cf. C. A. 20, 3106) giving a simple cubic lattice, based on powder data alone, is wrong.

L. S. RAMSDELL

The crystal structure of the tetragonal compounds silver chlorate and silver bromate. LEIV HARANG. *Z. Krist.* 66, 399–407(1928).—There are 8 mols. in the unit cells of $AgClO_3$ and $AgBrO_3$ and the dimensions are $a = 8.49$ and 8.59 , and $c = 7.91$ and 8.01 A. U., resp.

L. S. RAMSDELL

Crystal structures of the normal paraffins, octane, hexane and pentane. J. C. McLENNAN AND W. G. PLUMMER. *Trans. Roy. Soc. Can.* [3], 21, Sect. 3, 99-113 (1927).—X-ray photographs of the powdered crystals of the lower members of the paraffin series were made, by means of a modified Debye app., with liquid air or liquid H as refrigerant. Each of the hydrocarbons was found to crystallize in 2 forms, orthorhombic and monoclinic. In the rhombic modification the mols. apparently arrange themselves so as to produce a straight line of carbon atoms, while the monoclinic modification with approx. the same length of mol. has tilted over so as to make an angle of 60° with the basal plane. The authors consider the mol. symmetry for the orthorhombic forms is of a low order. J. W. SHIPLEY

A note on the crystalline structure of certain aromatic compounds. W. H. BRAGG. *Z. Krist.* 66, 22-32 (1927).—Naphthalene and anthracene give certain reflections due to carbon rings which show a periodicity that is a submultiple of the unit cell spacing. The unit cells of naphthalene tetrachloride and tetrabromide are as follows: $a = 7.88$, $b = 10.30$, $c = 14.20$ A. U., $\beta = 112^\circ 40'$, and $a = 10.75$, $b = 8.97$, $c = 13.25$ A. U., and $\beta = 112^\circ 57'$. The additional Cl and Br atoms change the length of the b axis, but have little effect on c or a . L. S. RAMSDELL

Investigation of two remarkable organic substances. SIEGFRIED RÖSCH. *Z. Krist.* 65, 680-711 (1927).—A detailed crystallographic and optical investigation of *p*-toluylacetophenone enol and dibenzoylmethane enol. L. S. RAMSDELL

The molecular symmetry of pentaerythritol. S. B. HENDRICKS. *Z. Krist.* 66, 131-5 (1927); cf. *C. A.* 20, 2435.—A redctn. gives 4C-2 (S_4^2) or 4C-5 (C_5^4) as the correct space group of $C(CH_2OH)_4$. It is possible to have a splenoidal arrangement of (CH_2OH) groups around the central C atom. L. S. RAMSDELL

The crystal structure of pentaerythritol. A. NEHMITS. *Z. Krist.* 66, 408-16 (1928).—The space group of pentaerythritol cannot be C_4 , but is S_6^2 . L. S. R.

The crystal structure of the tetracetate and tetranitrate of pentaerythritol. A. GERSTACKER, H. MÖLLER AND A. REIS. *Z. Krist.* 66, 355-92 (1928).—The tetracetate of pentaerythritol is tetragonal, C_{4h}^2 . The unit cell contains 2 mols., and $a = 12.18$ and $c = 5.58$ A. U. The tetranitrate is also tetragonal, with symmetry V_4^4 . The unit cell contains 2 mols. and $a = 9.38$ and $c = 6.69$ A. U. The two O atoms in the NO_2 group are not strictly equiv. L. S. RAMSDELL

X-ray investigation of several triclinic-pinacoidal crystals. A. GERSTACKER, H. MÖLLER AND A. REIS. *Z. Krist.* 66, 421-33 (1928).—The unit cell of racemic acid monohydrate contains 2 formula weights, and has $a = 8.3$, $b = 10.03$, and $c = 4.90$ A. U. Anhydrous racemic acid: 2 formula wts., $a = 7.18$, $b = 9.71$, $c = 4.98$. Malonic acid: 2 formula wts., $a = 8.36$, $b = 5.33$, $c = 5.14$. $K_2S_2O_8$: 1 formula wt., $a = 5.11$, $b = 6.51$, $c = 5.48$. L. S. RAMSDELL

Crystallographic and optical investigation of dicyanamide. E. BAIER. *Z. Krist.* 65, 719 (1927).— $(CN_2H_2)_2$ is monoclinic, with $a:b:c$ 1.0021:1.04854, $\beta = 90^\circ 31'$. $n_D^{20} = 1.5492$ and $2V = 38^\circ 31'$. The optical character is positive. L. S. R.

The tetroxalates of the alkali metals K, Rb, Cs and of NH_4 and Tl. MARY W. PORTER. *Z. Krist.* 66, 217-35 (1928).—Optical and crystallographic data are given for this isomorphous series of triclinic crystals. L. S. RAMSDELL

New kinds of mixed crystals. V. D. BALAREFF AND R. KAISCHEW. *Z. anorg. allgem. Chem.* 167, 237-40 (1927); cf. *C. A.* 21, 3502.—Expts. in pptg. $BaSO_4$ from a soln. containing $KMnO_4$ indicate that the coloration is due to adsorbed $KMnO_4$ and not to the formation of mixed crystals. The co-pptn. of CuS and ZnS is found to depend upon the conditions, indicating that the ZnS is adsorbed on the CuS. Thus in hot neutral soln. no ZnS is pptd. in the CuS, but an increase in acidity causes first a sharp increase in the amt. of enclosed ZnS, and then a gradual decrease. VI. D. BALAREFF, R. KAISCHEW AND G. KRATSCHEW. *Ibid* 168, 154-62.— $BaSO_4$ pptd. from solns. containing other salts, e. g., $KMnO_4$, brings down some of the other salt. The analysis of a series of such ppts. shows that the amount of foreign salt in the ppt. first increases with increasing concn. in the soln., then reaches a max. and finally declines. In general the greater the H_2O content of the ppt., which corresponds to a greater surface of ppt., the greater the amt. of foreign salt. Microscopic analysis reveals the ppt. from solns. of low foreign salt concn. to be composed of small regular crystals; from the concd. solns. they are deformed. It is concluded that $BaSO_4$ can enclose not only permanganates but salts of the types Na_2SO_4 , $BaCl_2$, $FeCl_3$, $AlCl_3$, $CaSO_4$; these enclosures are mechanical, and stand in a relation to the presence of interior surfaces in the $BaSO_4$ ppt. $BaSO_4$ was pptd. in 3 ways: (1) slowly in a hot slightly acid soln., (2) slowly in a hot strongly acid soln., (3) rapidly in a cold soln. All ppts. were similarly washed, dried, etc., and direct

detns. of soly. made. (1) and (3) gave solubilities of 2.3 mg./l.; (2) gave 3.3 mg./l. There appear to be two different forms. (1) and (3) are the stable form; (2) is metastable and of itself or in the presence of I or BaCl_2 reverts to the stable form. R. L. H.

* The isomorphism of trivalent molybdenum and trivalent iron. G. CAROBBI. *Gazz. chim. ital.* 58, 35-45 (1928).— $(\text{NH}_4)_2\text{MoCl}_6 \cdot \text{H}_2\text{O}$ prepd. by the method of Chilesotti (*Ibid.* 33, 349 (1903)); *Z. Elektrochem.* 12, 146 (1906)) is an intense red with distinct pleochroism, brown-red longitudinally and wine-red normally. Its d_{111} is 2.175. It is rhombic, with $a \ b \ c = 0.6862 \ 1.07166$, and is isomorphic with $(\text{NH}_4)_2\text{FeCl}_6 \cdot \text{H}_2\text{O}$. Mixed crystals of $(\text{NH}_4)_2\text{MoCl}_6 \cdot \text{H}_2\text{O}$ and $(\text{NH}_4)_2\text{FeCl}_6 \cdot \text{H}_2\text{O}$ contains a max. of 10% of the former. Similarly $\text{K}_2\text{MoCl}_6 \cdot \text{H}_2\text{O}$, d. 2.39, is rhombic and is isomorphic with $\text{K}_2\text{FeCl}_6 \cdot \text{H}_2\text{O}$, d. 2.184, and mixed crystals were obtained, with d. 2.22, which contained a max. of 17% $\text{K}_2\text{MoCl}_6 \cdot \text{H}_2\text{O}$. When a soln. of the 2 salts was let stand several days and then concd., $\text{K}_2\text{FeCl}_4 \cdot 2\text{H}_2\text{O}$ sep'd., showing the strong reducing action of MoCl_5 . MoCl_5 soln. (40 cc. from 40 g. MoO_3 in 150 cc. concd. HCl), concd. to 0.5 its vol., treated with NH_4Cl (6 g. in 10 cc. water), formed anomalous mixed crystals contg. either 2.59% $\text{MoCl}_5 \cdot 4\text{H}_2\text{O}$ and 97.31% NH_4Cl or else 2.93% $\text{MoCl}_5 \cdot 6\text{H}_2\text{O}$ and 97.31% NH_4Cl , d. 1.551, monorefringent, with no optical anomaly, stable for many months. $(\text{NH}_4)_3\text{MoCl}_9$ prepd. by the method of Foerster and Fricke (*C. A.* 18, 1094) was microcryst., d. 2.069, and probably octohedric, monometric and monorefringent. NH_4Cl (22.5 g.) added to MoCl_5 soln. (20 cc. of same concn. as above), concd., satd. with HCl gas and let stand, formed the previously unknown compd. $(\text{NH}_4)_4\text{MoCl}_7 \cdot \text{H}_2\text{O}$, d. 1.905, monoclinic but difficult to analyze crystallographically. C. C. DAVIS

Demonstrations of the progress of crystallization by means of the Schlieren method. I and II. W. KRAEMER. *Z. wiss. Mikroskop.* 44, 476-7 (1927).—Crystals of org and inorg. substances are followed microscopically, between crossed nicols. Typical phenomena of liquid crystals are described briefly. C. W. MASON

Crystallization of silver beads and detection of the platinum metals by the microscope. C. O. BANNISTER. *J. Roy. Microscop. Soc.* [3], 47, 143-4 (1927).—Illustrations are given of distinctive effects of the various metals of the Pt group on the surface crystal. of Ag cupellation beads. C. W. MASON

The determination of the melting point of paraffin, and the preparation of paraffin mixtures of definite melting points. J. KISSER. *Z. wiss. Mikroskop.* 44, 443-51 (1927).—F. ps. are detd. by noting crystn. in a drop floating on water which is slowly cooled. M. ps. are detd. in a capillary, the range from incipient fusion to complete transparency being noted. Formulas are given for making up mixts. from paraffins of known m. ps. C. W. MASON

Equation of state for binary mixtures of methane and nitrogen. F. G. KEYES AND H. G. BURKS. *J. Am. Chem. Soc.* 50, 1100-6 (1928).—Exptl. data for three mixts. of N_2 and CH_4 were obtained for the temp. range 0° to 200° and at pressures up to 200 or 300 atms. The equation of state for each mixt. has been found to be the same in form as that applying to the pure gases (*C. A.* 21, 1732, 2825). The consts. of the equations of state representing the mixts. were found to be linear functions of the consts. of N_2 and CH_4 and compos. of the mixts. JAMES M. BEIL

The pseudo-integration constant in the Kirchhoff formula. NICOLAS KOLOSOVSKII. *J. chim. phys.* 24, 723-6 (1928).—Mathematical discussion of the apparent anomaly between λ_0 of the Kirchhoff formula in $\lim (\lambda)_{t \rightarrow 0} = \lambda_0 = \text{const.}$, and value $\lim (\lambda)_{t \rightarrow 0} = 0$ derived from Clapeyron-Clausius equation for perfect gases. J. L. COSTA

Chemical constant of hydrogen vapor and the failure of Nernst's heat theorem. R. H. FOWLER. *Proc. Roy. Soc. (London)* A118, 52-60 (1928).—An investigation is made of the chem. const. of H_2 on the assumption, indicated by Demison's explanation of the sp. heat, that H_2 at low and ordinary temp. is a mixt. in metastable equil. of 2 distinct sets of mols., anti-symmetrical and symmetrical, in the ratio 3:1, the rate of change of the one to the other being very slow. On the assumption that in the vapor-solid equil. the 2 components are always present in both phases in the const. 3:1 ratio, the vapor-pressure curve can be satisfactorily accounted for in the ordinary way. The statistical weight, however, of the H_2 mol. in the condensed phase cannot be unity, but must be 9 and 1 for the lowest states of the anti symmetrical and symmetrical mols., resp., and the const. in the vapor pressure equation is not the chem. const. of gaseous H_2 , but is smaller than that by $3/2 \log 3$, a result which throws doubt on the validity of the Heat Theorem for H_2 . The failure is due to the fact that theory and observation consider a metastable equil. instead of the true equil. state of the H_2 . If the H_2 were in a state of true equil., the theory requires a weight of 1 for the lowest state of the mol. both in the crystal and in the vapor, and no failure of the heat theorem is involved;

but all the ordinary equil. properties of H_2 , as its vapor pressure, sp. heat, reaction rates do not refer to these true equil. states at all. W. WEST

The Budde effect with a mixture of bromine vapor and air. ERNEST BROWN AND D. L. CHAPMAN. *J. Chem. Soc.* 1928, 560 3.—According to Ludlam (*C. A.* 19, 3222), and Lewis and Rideal (*C. A.* 20, 2123) a dry mixt. of Br_2 and air does not expand when exposed to light. By a different method, B. and C.'s results indicate that the Budde effect with air and Br_2 is not diminished by drying. The app. and method used are described, the light source being a 1000-w gas-filled W-filament lamp, the rays being filtered through $Fe(NH_4)_2(SO_4)_2$ or $Na_2Cr_2O_7$ solns. J. BALOZIAN

Method for demonstrating the diffusion of oxygen through rubber and various other substances. S. E. HILL. *Science* 67, 374-6 (1928).—A simple visual demonstration of the diffusion of O may be made by using luminous bacteria as an indicator. A test tube is completely filled with a dilute suspension of bacteria and stoppered. If the stopper is made of glass, the luminescence disappears completely. If a rubber membrane is used as stopper, the bacteria in contact with the membrane or within a short distance of it remain active. A comparison of the luminous columns will give a rough estimation of the amts of O diffusing through various substances. A. L. H.

The diffusion of gaseous mixtures through membranes. D. ALEXEJEV AND V. MATALSKI. *J. chim. phys.* 24, 737-41 (1927).—Exptl study of the diffusion velocities of CO_2 , O_2 , C_2H_2 and N_2 through a rubber membrane gives relative velocities ($N_2 = 1$) of $O_2 = 2.29$, $C_2H_2 = 0.85$, $CO_2 = 13.7$. Results obtained with mixts of these gases show that the diffusion velocity of a mixt is equal to the sum of the diffusion velocities of its components, even for wide differences in value of the latter and wide ranges in the compn. of mixt. J. L. COSTA

Researches on molybdenum sulfides. I. The vapor pressures of the sulfur of molybdenum trisulfide. N. PARRAVANO AND G. MALQUORI. *Atti accad. Lincei* [6], 7, 19-22 (1928).—The method allowed the detn. of the temp. at which the vapor pressure of S evolved from MoS_3 is in equil. with the vapor pressure of S maintained at a fixed temp. The end of a sealed tube contg. MoS_3 was inserted (with a thermoelec. temp. recorder) in an elec. furnace and the other end in the vapor of a const.-boiling liquid. The temp. of each end could be measured at all times. When the liquid was boiled and the furnace was heated, a dew of S suddenly formed in the coldest point of the tube and at this moment the vapor pressure of MoS_3 at the temp. of the thermocouple was the same as liquid S possessed at the temp. of the boiling liquid. The method was standardized by detg. the vapor pressure of S in CuS at the b. ps. of naphthalene, quinoline and benzoic acid (217° , 237° and 249° , resp.). At these temps. the vapor pressures of S were 4, 7.5 and 11.8 mm., resp., and CuS had to be heated to 423.5° , 431° and 349.5° , resp., to maintain equil. These results are in good agreement with those of Allen and Lombard (*C. A.* 11, 1348). With MoS_3 and naphthalene, α -naphthylamine and anthracene (217° , 301° and 351° , resp.), the S deriv. appeared when the MoS_3 was at 355° , 390° and 418° , resp. The vapor pressures of the S of MoS_3 at 355° , 390° and 418° are 4.0, 28.8 and 178.6 mm (Hg), resp. A lowering of the temp. of the furnace of $7-8^\circ$ caused complete disappearance of the S deriv., showing that the evolution of S from MoS_3 is reversible. II. Equilibrium of reduction of molybdenum bisulfide by means of hydrogen. *Ibid* 109-12.—The equil. of $MoS_2 + 2H_2 \rightleftharpoons 2H_2S + Mo$ was studied by a dynamic method similar to that of Jellinek (*C. A.* 19, 1513), H being passed at a const. velocity over MoS_2 and H_2S over Mo at 805° , 910° , 1005° and 1100° . With the aid of the disocn. consts. of H_2S and the V_{H_2S}/V_{H_2} ratios obtained, the vapor pressures of S from MoS_2 could be detd. from the relation: $\log P_{H_2S} = 2 \log (P_{H_2S}/P_{H_2}) + \log K$. With the Nernst formula and the log P_{H_2} values, the Q values were then calcd. These averaged 79,425 cal. over the range $805-1100^\circ$. With the isochor equation the heat tones of the reaction could be calcd. These were -20,000, -28,000 and -24,000 cal. at $805-910^\circ$, $910-1005^\circ$ and $1005-1100^\circ$, resp. To prove that the system is univariant, isothermic reduction at 1100° was studied by passing a known vol. of H at a const. velocity over MoS_2 and periodically detg. the V_{H_2S}/V_{H_2} ratio. The constancy of the latter showed that 2 solids are always present. C. C. DAVIS

The vapor pressure of acetone at low temperatures. E. H. ARCHIBALD AND WILLIAM URE. *Trans. Roy Soc. Can.* [3], 21, Sect. 3, 133-44 (1927); cf. *C. A.* 18, 1770.—Vapor-pressure measurements for acetone over the temp. interval $+20^\circ$ to -105° , were taken in order to det. the assocn. of the liquid at different temps. Calcn. of the degree of assocn. was made from the variation in the latent heat of vaporization over this temp. interval. The measurements were made with a differential tensimeter, with purified C_3H_8 as the standard of reference. Temps., measured with a Pt resistance

thermometer, were const. to 0.2° . The purified acetone had $d_4^{20} = 0.79170$ and $n_D^{20} = 1.3597$. The latent heat of vaporization increased with the temp. up to a max. at 4.6° and then decreased as the temp. rose higher. This abnormal variation was attributed to assocn. of the acetone. Between the f. p. and 4.6° the liquid associates with rise in temp. and then proceeds to break down. Equations for the variation of vapor pressure and for the variation of the latent heat of vaporization with temp. were obtained which fit the exptl. results very satisfactorily.

J. W. SHIPLEY

The surface tension and the structure of the surface of aqueous ammonia solutions. O. K. RICE. *J. Phys. Chem.* **32**, 583-92(1928); cf. *C. A.* **21**, 1212.—Data are presented for the surface tension of aq. NH_3 solns. from 0 to 14 molal, detd. by a modification of the capillary-rise method, using glass tubes. From adsorption calcs. it appears that there are not enough NH_3 mols. at the surface to fill it even at the highest concn. used. The work done on a mole of NH_3 when brought from the body of the soln. to a small distance from the surface is calcd. as a function of the concn., from which, by extrapolation to infinite diln., it is inferred that the average distance of the adsorbed mol. from the surface is about 10^{-8} cm.

W. T. RICHARDS

The adsorption of iodine by charcoal in organic solvents. TRIVIDIC. *Compt. rend.* **186**, 865-7(1928).—T. finds, contrary to results reported by previous investigators, that adsorption of I by charcoal is a reaction that approaches completion rapidly and that the adsorption values obtained follow closely the Freundlich adsorption isotherm.

L. B. MILLER

Adsorption of vapor by charcoal and silica gel. J. TRAUBE AND ST. BIRUTOWITSCH. *Kolloid-Z.* **44**, 233-9(1928).—Air satd. with various vapors has been brought in contact with activated charcoal and SiO_2 gel. H_2O , CS_2 , MeAc, Me_2CO , MeOH, C_6H_{14} , EtOAc, EtOH, C_6H_6 , MeCOEt, PrOH, iso-AmOH have been tested. After completion of the equil., the product of the no. of adsorbed mols by the surface of one mol. (calcd. from the molar refraction) seems to be a const. at least in first approximation; this would verify Langmuir's theory. The adsorption velocity for steam-air mixts. has been measured.

A. L. HENNE

The adsorption of electrolytes by crystalline surfaces. A. PINKUS AND M. DE BROUCKERE. *Bull. sci. acad. roy. Belg.* **13**, 415-40(1927).—Pure cryst. BaSO_4 (I) is added to solns. of HCl, LiCl, KCl, CuCl_2 and NiCl_2 previously satd. with I and allowed to come to equil. by agitation for 5-10 hrs. The electrolyte absorbed is detd. in four ways: (a) by fusing I with Na_2CO_3 and analyzing for Cl nephelometrically and for the cations gravimetrically. (b) by washing I repeatedly with pure H_2O and detg. the desorbed electrolyte as above. (c) by detg. the change in cond. of the soln. after the addn. of I. (d) by the change as detd. electrotitrimetrically. The results obtained show that a reproducible equil. is reached in each case and that there is equiv. adsorption of the cations and anions. The agreement of results obtained by the different methods proves that the adsorption of the solvent is too small to modify the equil. concns. Their adsorption isotherm $x = p/(Ax^v + Bp)$ is verified for all concns. studied; $x = \text{g. equiv. adsorbed}$, $p = \text{osmotic pressure of the anions}$, $A = Na/S$ where $N = \text{no. of particles absorbed by cc. of surface per sec.}$ and $S = \text{the absorbent surface in cc. per g. of adsorbent, and } a \text{ is a const., and } B = 4N\theta/mnS \text{ where } \theta \text{ is the surface in cc. occupied by an adsorbed particle and } mn \text{ the concn. of cations and anions, and } v \text{ is a const.}$ As detd. by the isotherms the order of decreasing dimensions of the cations are $\text{K}^+ > \text{Li}^+ > \text{H}^+$; $\text{Cu}^{++} > \text{Ni}^{++}$. By measuring 1000 crystals of BaSO_4 an approx. value for the mean surface of the crystal was obtained as $S = 2.8 \times 10^{-7}$ cc. Calcg. into the isotherm close approximation to the at. diams. were obtained.

D. H. POWERS

Adsorption of vapors on charcoal and the thermal expansion of the liquified surface film. F. GOLDMANN AND M. POLYANI. *Z. physik. Chem.* **132**, 321-70(1928).—Adsorption isotherms of EtCl, $(\text{CH}_3)_2\text{O}$, $n\text{-C}_6\text{H}_{12}$ and CS_2 on charcoal at -15.3 , 0 and 20° , and of $n\text{-C}_6\text{H}_{12}$ at -63.7 and $+5.2^\circ$, were measured. Equil. pressures from 0.01 mm. to 90% of the satn. pressure were used. A refinement of the usual adsorption method permitted weighing as liquid, successive portions of desorbed vapor. Equil. was attained before each portion was removed and condensed. Capillary condensation of the adsorbed vapors was not indicated by the results. The amt. of each liquid necessary to wet a given adsorbent was proportional to the ds. of the liquids. The vol. of the liquid surface film was independent of temp. The thermal expansion of the film was about 20% less than that of the liquid. The potential theory of adsorption (cf. *C. A.* **10**, 1131) was approx. confirmed by the exptl. results. A hypothetical picture of the mechanism of adsorption of vapors is deduced from the exptl. data by the help of the potential adsorption theory.

R. L. DODGE

Adsorption of dyes in aqueous solutions by means of charcoal, silica gels or earths.

ST. BIRUTOWITSCH. *Kolloid-Z.* **44**, 239-42(1928).—The adsorption of dyes in aq. soln. by means of charcoal, SiO_2 gel or earth is a function of the dye basicity and of its degree of dispersion. The adsorption on charcoal resembles that of the majority of adsorbent materials. The differences exhibited by SiO_2 and earth are possibly connected with their polarities.

A. L. HENNE

The absorption of sulfur dioxide by titania gel. SIMON KLOSKY AND A. J. BURGRAFF. *J. Am. Chem. Soc.* **50**, 1045-9(1928).—The object of this investigation was to det. whether a porous substance similar to SiO_2 gel, but with more specific attraction for SO_2 , would absorb it according to Patrick's condensation formula. The app. was similar to Patrick and Ophdyke's (cf. *C. A.* **19**, 2290). Titania gel was exposed to a current of air- SO_2 mixt. until no further increase in wt. was observed. The absorption was measured at -22.5 , 0 , 25 and 50° . The data substantiated Patrick's formula at low relative pressures, but over the whole range Polanyi's absorption equation was more suitable. The absorption was not strictly reversible.

R. L. DODGE

Sectioning methods applied to the study of the microstructure of charcoal, bone and wood fibers. W. CLERC. *Z. wiss. Mikroskop.* **44**, 417-34(1927).—Detailed directions are given for the rapid prep. of sections of hard and brittle materials, using cooked balsam as an imbedding medium, and pumice powder in paraffin oil as an abrasive.

C. W. MASON

Properties of powders. IX. The scattering of light by graded particles in suspension. T. M. LOWRY AND M. C. MARSH. *Trans. Faraday Soc.* **24**, 195-201(1928).—Powd. barytes, consisting of transparent cleavage fragments of a good grade, was graded into 13 fractions by means of a water elutriator. The av. size of the particles in the several fractions was detd. by means of a microscope with calibrated eye-piece. Light scattering by the particles suspended in medicinal paraffin was detd. by means of a Hilger sector-photometer. The optical d. is proportional to the surface-concn. of the powder, but increases slowly as the diam. is reduced to 50μ and much more rapidly when the diam. is reduced below 30μ . The probable existence of a max. degree of opacity on further subdivision is indicated. The results are applicable in regard to the covering power of pigments.

L. B. MILLER

Activating and retarding agents of the setting of plaster of Paris. P. P. BUDNIKOV. *Kolloid-Z.* **44**, 242-9(1928); cf. *C. A.* **21**, 3326.—Plaster mixed with water evolves heat, due to its hydration. The gypsum particles swell and a colloidal gel forms on their surface. The hydration is retarded and the temp. sinks. Further hydration and the transformation of the gel into cryst. needles occurs only after an induction period, when heat is again evolved. Solns. of various compds. modify sharply the character of the temp./time curve. The accelerating agents are many inorg. salts which increase the gypsum soly. (chlorides and nitrates); compds. isomorphous with gypsum; water glass, which causes an instantaneous setting when used in proper amt. The retarding agents are: $\text{Ca}(\text{OH})_2$, casein, tannin, which act as protective colloids; alcohol, sugar and soluble citrates, which diminish gypsum solubility; $\text{Ca}(\text{OAc})_2$. Phosphates and sulfates are capable of acting both ways, depending on the concn. used.

A. L. HENNE

Some new properties of silicic acid gels. PAUL BARY. *Compt. rend.* **186**, 863-4(1928).—Silicic acid gels prepd. by mixing water glass and HCl and dried in the air at room temp. pulverize violently upon being dropped into water. Best results are obtained with water to which a trace of acid has been added. Et_2O , either liquid or vapor, produces the same effect. C_6H_6 and C_7H_8 have very little effect.

L. B. M.

Gelation of silicic acid. The formation of gas bubbles and drops in silicic acid during gelation. H. A. FELS AND J. B. FIRTH. *Trans. Faraday Soc.* **23**, 623-30(1927).—Methods are given by which the formation of bubbles or liquid drops during the process of gelation may be partially or completely controlled. The shape and size of the bubbles have been detd. by photographic methods. They are found to vary as gelation occurs. Deductions concerning the internal condition of the gel are drawn from the character of the bubbles. Gelation is closely associated with hydration of the silicic acid. Water present in the gel is of two kinds: "free water" contained in the cells of the gel structure and "fixed water" which is combined with the silicic acid as water of hydration.

L. B. MILLER

The structure and formation of colloidal particles. HERBERT FREUNDLICH. *Trans. Faraday Soc.* **23**, 614-22(1927).—F. explains the deductions which may be drawn with regard to state of aggregation, cryst. form and shape of colloidal particles from studies with x-rays, the Siedentopf ultra-microscope, the cardioid ultra-microscope, and other optical instruments. The effect upon aggregation, cryst. form, shape and size of colloidal particles of the mode of formation is discussed.

L. B. MILLER

Some properties of jellies. EMIL HATSCHKE. *Pharm. J.* **119**, 676-7; F. B.

ELWELL. *Ibid* 709; *Chemist and Druggist* 107, 762-3(1927).—An address, with demonstrations. Addnl. notes by E. S. WALDBOTT

Viscosity of colloids in the presence of electrolytes. N. R. DHAR, D. N. CHAKRAVARTI AND M. N. CHAKRAVARTI. *Kolloid-Z.* 44, 225-33(1928).—The viscosity of the following salts has been detd. in the presence and the absence of electrolytes: ThO_2 , CeO_2 (prepared at high and at low temp.), W_2O_3 , benzopurpurin and SiO_2 (prepd. at high and at low temp.). In each case, the addn. of an electrolyte lowers the viscosity. In the case of ThO_2 , the viscosity is more reduced by $\text{Th}(\text{NO}_3)_4$ than by KI ; this is due to the larger charge increase caused by $\text{Th}(\text{NO}_3)_4$. In the case of SiO_2 , the viscosity decreases immediately a little upon addn. of an electrolyte, then it increases rapidly, reaches a max., then starts to fall again. A tentative explanation of this phenomenon is proposed. The viscosity of a 1% gelatin soln. is increased by the presence of KCl or BaCl_2 ; NaOH or HCl raise the viscosity to a max., behind which the viscosity decreases. It has been mathematically shown that by increase of a colloidal particle charge, the surface and consequently the hydration and viscosity are reduced, expts. confirm the calcd. results.

A. L. HENNE

The kinetics of coagulation. B. N. DESAI. *Trans. Faraday Soc.* 24, 181-95 (1928).—The velocity of coagulation of colloidal ThO_2 has been measured by a very accurate optical method, *i. e.*, the scattering of light. The constancy of the ratio T_∞/T demanded by Smoluchowski's theory is maintained only up to a certain coagulator concn. The view that the nature of coagulation is autocatalytic is supported by the exptl. results. The velocity const. K has been calcd. according to the equation $dx/dt = K(1-bx)(1-x)$, the value of b being equal to dx/dt at the point of inflection of the $x-t$ curve. A fairly const. value is obtained. Reasons for the non-observance of the slow coagulation region by many workers are advanced. The value of P in the equations of Paine and Freundlich varies with the diln. and depends upon the concn. of the electrolyte taken as a standard. The difference in the value of K for corresponding concns. of KCl and LiCl is due to the difference of the ion carrying the same charge as the colloid. Freundlich's theory for rapid and slow coagulation is extended. The ultimate size of coagulated particles varies with the concn. of the coagulator. The peculiar behavior of bivalent ions is due to their greater adsorbability and consequent initial rapid rate of coagulation.

L. B. MILLER

Note on the explanation of a so-called interaction phenomenon. N. K. ADAM. *Proc. Roy. Soc. (London)* A118, 262-3(1928); cf. *C. A.* 21, 1041. —A slow upward stream of water, impinging on a disk of filter paper soaked in a dye soln., washes out the color in a no. of radial streamers; a slow current of colored liquid, impinging on a plate on the surface, does not produce streamers. This is given as evidence in support of the author's explanation that the streamers appearing when a disk of filter paper soaked in colored-albumin soln., and fixed to the under side of a cover glass, is floated on salt soln., are due to the outward motion of currents of less dense salt soln. from beneath the cover glass which have lost salt to the filter paper by diffusion.

W. WEST

Alumina gels. D. G. R. BONNELL. *Z. anorg. allgem. Chem.* 169, 345-55(1928).—Three alumina gels, A, B and C, were prepared by the method of Willstätter and Kraut (*C. A.* 20, 533) and their properties confirmed. Suspensions of C gel boiled under a reflux with varying quantities of HCl gave clear solns. after excess suspension settled. Au particles from a gold sol were adsorbed by the suspension of C with no change in color. Gel B boiled with varying concn. of HCl gave polydisperse suspensions which showed a strong Tyndall effect. The no. of particles obtained in the sol was independent of the concn. of the acid, but the size decreased with increasing acidity. Gel A is completely insol. in 1% HCl and difficultly sol. in stronger acid. It is very easily peptized by HCl and does not lose this property on aging or drying. The residues of the hydrosols obtained on drying dissolve colloiddally in water.

ARTHUR FLEISCHER

Fundamental principles of the Weimarn theory on the colloidal state. S. F. SLOKASOFF. *Anales asoc. quim. Argentina* 15, 237-86(1927).—A summary and review.

E. M. SYMMES

A simple method to measure coagulation. Preliminary communication. BR. JIRGENSONS. *Kolloid-Z.* 44, 202-5(1928).—The coagulation of dispersoids can be quantitatively observed on the scale of a spectroscope. When the degree of dispersion increases, the diffuse absorption limit shifts from the violet toward the red, then back to the violet when flocculation and sedimentation occur.

A. L. HENNE

Colloidal nature of lignic acid—so-called Cassel brown; a comparison. E. WEDKIND AND G. GARRE. *Kolloid-Z.* 44, 205-12(1928).—Lignic acid is easily peptized by OH ions, even in minute concn. The hydrosol is easily purified by dialysis. The sol. is negatively charged; an acid reagent or any positively charged hydrosol causes im-

mediate coagulation. With the exception of SO_2 , the gel does not adsorb acids; in this it is different from the lignin prepared by Willstätter. A wet gel fixes irreversibly 1 or basic dyes (up to 63% of the dry substratum). The sol and the gel resemble closely those of Cassel brown, which is also easily peptized in the same conditions. Cassel brown exhibits the colloidal characteristics of a typical humic acid. It differs from lignic acid only by being subject to autoxidation.

A. L. HENNE

Sensitization of Prussian blue and sulfur sol (in accordance with Sven Odén) by means of gelatin and tannic acid. S. GHOSH AND N. R. DHAR. *Kolloid-Z.* **44**, 218-25 (1928).—In the coagulation of Prussian blue with KCl or BaCl_2 , a small amt. of gelatin acts only as a weak sensitizer; a large amt. stabilizes the sol. The sensitization is much more apparent in the flocculation with HCl . Small amts. of tannic acid sensitize Prussian blue in the coagulation with KCl , but have a reverse action on the coagulation with HCl . The stability of S sols (prepd. in accordance with Sven Odén) toward KCl or BaCl_2 is decreased by a gelatin addn.; large amts. of gelatin cause coagulation. Tannic acid stabilizes S sols. Traces of acids are stabilizers, traces of alkalis are sensitizers. The coagulation powers of Na or K salts of weak org. acids decrease when their dissociation consts. increase. The following explanation is available: pentathionic acid, which is the stabilizing agent of S sols, is stable in the presence of acids, but is decomposed by alkalis. The discrepancies from the Schulze-Hardy law may be explained by an hydrolysis of the salts investigated. Traces of OIL ions have a sensitizing influence on SiO_2 , WO_3 and MoO_3 ; this action should be referred to the splitting of a easily adsorbed stabilizing ion. The sensitizing properties of gelatin, albumin and tannic acid should be explained as follows: the H ions of the sensitizer cause a retrogradation of the sol hydrolysis; the H ions of the sol reverse the charge of the sensitizer; the sol charges are neutralized by the opposite charges of the sensitizer.

A. L. HENNE

Ultrafiltration. W. J. ELFORD. *J. Roy. Microscop. Soc.* [3], **48**, 36-45 (1928); 3 text figs.—A historical survey, with methods for the prepn. of a graded series of collodion membranes. Selection of nitrocellulose (11% N), purification of solvents, and choice of paper for supports (Schleicher and Schull 575, or Whatman 50) are discussed. Vacuum impregnation is used for treatment of paper disks with glacial AcOH . Method I: After draining for 1 min. the disks are kept *in vacuo* for 1 hr. They are then immersed in the collodion, contained in a petri disk in a vacuum desiccator, and the air withdrawn from the paper. Amounts of collodion, and times of evacuation and draining should be kept uniform. Method II: (Bechhold's method) Collodion is admitted to the previously evacuated vessel in which the paper disks are suspended. After 15 min. air is admitted, and soaking continued for 1 hr. or more. Uniform draining is insured by "wringing" between two glass rods. From either method of impregnation, the disks are immersed in dist. H_2O for gelation and washing. Collodion membranes are made from 1.5-2.0% nitrocellulose in 75:25 ether-alcohol (by weight). A definite quantity is floated on mercury in a shallow dish, evapd. for a definite time at known temp., flooded with water, and washed. By varying the amount of evapn. very uniform and evenly graded membranes are obtained, superior to impregnated papers, and of good strength.

C. W. MASON

The viscosity of supersaturated solutions. I. I. K. TAIMNI. *J. Phys. Chem.* **32**, 604-15 (1928).—The viscosities of the supersatd. solns. of six substances: NaNO_3 , NaClO_4 , CuSO_4 , $\text{Na}_2\text{S}_2\text{O}_8$, tartaric acid and cane sugar—have been measured by a specially arranged app. The viscosity-temp. plots obtained are in all cases smooth curves, showing irregularities neither at the satn. temps., nor at the so-called "temps. of spontaneous crystallization." Tendency to crystallize spontaneously was observed only with CuSO_4 solns. T. gives no theoretical treatment, and makes it exceedingly difficult for others, since the data are presented as small-scale curves and not as tables.

W. T. RICHARDS

The creeping of solutions. J. G. F. DRUCE. *Pharm. J.* **119**, 333 (1927); cf. Washburn, *C. A.* **21**, 3792.—The tendency to creep is seen with solns. of the following salts in descending order: NH_4Cl , ZnSO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$, CuSO_4 , alum, Na_2SO_4 , FeSO_4 , BaCl_2 , KNO_3 , MnSO_4 , NaCl .

S. WALDBOTT

The solution velocity of aluminum. W. KUCZYNSKI. *Czechoslovak Chem.* **7**, 397-401 (1927).—The rate of soln. of Al in 1.5 N HCl was studied. It is reduced by 0.025 N KNO_3 and KClO_4 . On an Al surface electrolytically oxidized in 4% $\text{K}_2\text{Cr}_2\text{O}_7$ at room temp. with 220 v. HCl produced only pitting. An Al sheet with a just perceptible oxide layer showed after a 4-hr. period of induction a const. rate of soln. suggesting that the action of HCl was limited to certain surface areas from which it proceeded into the depth of the sheet.

MARY JACOBSEN

Velocity of solution of solid substances. W. JACEK AND Z. LEHR-SPAWINSKA.

Roczniki Chem. 7, 309-33(1927).—The equation $dx/dt = Pk(S-x)$ (I) involves the surface of the solid substance P . Spheres cut from NaCl crystals behave like amorphous substances when uniformly agitated in water. Even after a prolonged action of the solvent the deformation is within the limits of the exptl. error. This permits the calcul. of the velocity independently of P : $-dr/dt = K_1(c+r)$, where r is the radius of the sphere after the time t , $k_1 = 4/3\pi k$, the velocity const. and $c = a_1^3 - a^3$, a_1 being the radius of a sphere sufficient to sat. the quantity of solvent applied and a the radius of the sphere at the time 0. The equation may be applied to irregularly shaped bodies provided they resemble a sphere or a regular body. In this instance k_1 is actually higher and the following equation permits a more correct calcul.: $dr/dt = (P/4r_1\pi)k_1(c+r)$, P being the surface, r the radius of a sphere of the same vol. $P/4r^2\pi$ is const. within the limits of variation of r and always >1 . Since dissoln. is a reversible process the equation $-dr/dt = \xi/a_1^3(cr^3)$, identical with I is obtained where ξ is the thickness of the surface layer dissolving in the unit of time. Consequently $(\xi \text{ surface unit})/(4/3\pi a_1^3) = k$ where k is the const. of I. ξ is a const. characteristic of soln. velocity and independent of the size of the sphere and the quantity of the solvent, but dependent on the temp. and the velocity of agitation.*

MARY JACOBSEN

The viscosities of solutions and mixtures. W. HERZ AND GEORG SCHELIGA. *Z. anorg. allgem. Chem.* 169, 161-72(1928).—In general, the viscosities η of solns. up to 7% of I, $C_{10}H_8$, and phenanthrene separately in PhH, PhMe, CCl_4 , CS_2 , and Me_2CO at 20°, 40°, and 60° vary in the order $I < (II) < (III)$ except that in Me_2CO the order is $(II) < (III) < I$. The amt. of increase is peculiar to the solvent and the solute. For mixts. of equal amts. of (II) and (III) (2 and 4%) in the same solvents at 20°, 40° and 60° the detd. results agree within the limit of exptl. error with those calcd. from the law of mixts. The d . is also additive. η for mixts. by wt. of PhH- CS_2 (1.1)(2.1)(1.2); PhH-PhMe (1-1); PhHMe- CS_2 (1-1)(1-2)(2-1) at 20° and 40° is not additive. The viscosity of 2.5% fumaric acid in 80% alc. exceeds that of its isomer, maleic acid, and that of succinic acid of the same concn. The latter two have about the same η (5% maleic $\eta_{sp} = 0.02159$). Aq. solns. of d -tartaric and racemic acids show the following peculiarities at concns. 14.28 and 21.73% η for the d -form exceeds that for racemic acid at all temps.; for concn. 7.69% η for racemic acid becomes equal to that of the d -form at 40° (0.00789) and exceeds it at 60°. The variations in η for l - and dl -malic acids in aq. soln. are negligible. (27.18% l -malic acid $\eta_{sp} = 0.02021$). The formula $(1/x) = ky^n$ (x = mols. water, y = viscosity, k and n consts.) expresses the facts for NaCl solns., but not for $MgCl_2$ solns. Densities and viscosities for all concns. measured are given.

E. R. SCHIERZ

Prediction of boiling points of concentrated caustic-salt solutions. F. W. ADAMS AND C. W. RICHARDS. *Ind. Eng. Chem.* 20, 470-1(1928).—The effect of pressure on the b. ps. of NaOH solns. satd. with NaCl has been detd. at various concns. Dühring's rule gives valid predictions of the b. p. of such concd. solns. with a max. deviation from observed data of 2.1° at 50 mm. pressure.

J. H. PERRY

Solubility relations of isomeric organic compounds. VII. The mutual solubility of the dinitrobenzenes with the nitroanilines, and of the three chlorobenzoic acids. JOHN JOHNSTON AND E. P. JONES. *J. Phys. Chem.* 32, 593-603(1928).—"Investigation of each of the 30 soly. curves in the 15 possible binary mixts. of the dinitrobenzenes and nitroanilines shows that the curve is in all cases not far from the ideal calcd. from the heat of melting; these divergencies, though small and in either direction, are real, but bear no obvious relation to any other measured properties of the pair of compounds. There is no appreciable formation of mix-crystals even between those three pairs in which the relative position of the substituents is the same. On the other hand, the three like pairs of the chloronitrobenzenes and bromonitrobenzenes form a complete series of solid solns., p -toluic and p -chlorobenzoic acid, however, show only partial mutual crystal miscibility."

W. T. RICHARDS

The question of the solubility of the "natural semi-hydrate" or natural anhydrite. P. P. BUDNIKOV. *Z. anorg. allgem. Chem.* 170, 111-2(1928).—A naturally occurring $CaSO_4$, designated by Zvorukin (*C. A.* 21, 3297) as the semihydrate, does not behave as artificial semihydrate, e. g. react with water with the evolution of heat to form gypsum. B. holds therefore that the substance is a mixture of anhydrite and dihydrate. A. YA. ZVORUKIN. *Ibid.*—The possibility of the deposition of $CaSO_4 \cdot 1/2 H_2O$ from sea water as well as its formation in steam boilers is maintained.

H. F. JOHNSTONE

The effect of salts on the solubility of water in phenol. R. CERNATESCU. *Z. physik. Chem.* 133, 31-8(1928); cf. *C. A.* 21, 1912.—The cations and anions of the salts investigated can be arranged in the order of decreasing effect on the soly. of H_2O in

PhOH, as follows: Li, Na, NH₄, Rb, Cs and Cl, Br, I, F, SCN. The formula $t = ac^b$, where t is the elevation of the crit. temp., a is a const. depending on the added salt and b is a const. depending only on the H₂O-PhOH mixt., was used to interpret the results.

E. R. SMITH

Density and electrostriction of dilute manganese salt solutions. N. CAMPBELL. *J. Chem. Soc.* 1928, 653-8.—The ds._{15°} are detd. for 0.5, 0.3, 0.2, 0.1, 0.05, 0.02 and 0.01 *N* NH₄Cl, MnCl₂, MnSO₄ and Mn(NO₃)₂ solns. by Kohlrausch and Hallwachs' method (*Wied. Ann.* 53, 14(1894)). The solid anhyd. MnCl₂ and MnSO₄ ds. are obtained from the literature, while that of Mn(NO₃)₂ is calcd., approx., from the ds. of the 6-hydrate and ice. By substituting the ds. of the above salt solns. in Bender's equation (*Wied. Ann.* 20, 560(1883)) the modulus for Mn is obtained, practically const. at 355 in dilns. to 0.1 *N*. From these data, the electrostrictions (*I*) are calcd. As these and results of others make no allowance for the contraction of the solute on dissolving, new values of *I* are calcd., on the assumption that the mol. vol. of the salt is given by: $M(n^2-1)/d(n^2+2)$, n being the refractive index of light of infinite wave length. Hydrogen C and F line values of n for Mn salt solns. are detd. at 20°, the mol. refractivities of the solid salts being obtained from these by the rule of mixts. The refractivity moduli are calcd. from an equation similar to that of B., with KCl solns. as reference. Max. in the curves indicate the existence of two opposing forces, one being greatest on each side of the max. Using the true mol. vol. gives a negative value of *I* for MnCl₂ and Mn(NO₃)₂ solns., indicating an expansion of the solvent.

J. BALOZIAN

Temperature coefficients of electrical conductivity for concentrated solutions of calcium chloride with precision measurements of conductivity for the high concentrations. MARGUERITE CROWE. *Trans. Roy Soc. Can.* [3], 21, Sect. 3, 145-56(1927).—Figures and tables are given for (1) the relation between d . and the temp. of solns. of CaCl₂ between 25 and 50%, (2) the variation of sp. cond. of these solns. between 10° and 30°, (3) the relation between concn. and cond. of CaCl₂ solns., and (4) the temp. coeff. of cond. of CaCl₂ solns. over the specified ranges. An accuracy of five parts in 10,000 is claimed for the d . and cond. data.

J. W. SHIPLEY

Chemistry of the platinum-group metals. VIII and IX. Isolation of chloroiridic acid. Electrolytic dissociation of chloroiridic and chloroplatinic acids. Equivalent conductances of the salts of platinum and iridium at 25°. SAICHIRO NAGAMI. *J. Chem. Soc. Japan* 48, 501-20(1927).—The object of investigation was the isolation of chloroiridic acid, supposed to have a compn. analogous to that of chloroplatinic acid, H₂PtCl₆IrO₂ from 50 g. K₂IrCl₆ was dissolved in HCl and the soln. concd. in a current of Cl₂ to prevent reduction. A yield of about 40 g. of reddish black crystals of H₂IrCl₆ was obtained. The crystals are deliquescent, and appear to belong to the triclinic system. An abrupt change in cond. upon neutralization and reaction velocity data indicate a strength almost the same as that of HCl. This strength was definitely shown not to be due to the presence of HCl. By means of a specially designed app. the absence of the Cl⁻ ion was demonstrated. The existence of IrCl₆⁻ ions is indicated by migration-velocity measurements. The hydrolysis of acetates by H₂IrCl₆ and H₂PtCl₆, equivalent conductances at 18° and 25°, λ_{∞} , f. p. depressions and ionic mobilities indicate that for concns. less than 0.05 *N*, dissociation is of the form $H_2MCl_6 \rightleftharpoons 2H^+ + MCl_6^{--}$. Equiv. conductances of H₂IrCl₆, H₂PtCl₆, K₂PtCl₆ and (NH₄)₂PtCl₆ at 18° and 25° were detd.

T. IRIE

Relation between hydrogen ion and metallic ion activities in the hydrolysis of salts of heavy metals. (MLL.) M. QUINTIN. *J. chim. phys.* 24, 712-22(1927); cf. *C. A.* 21, 3149.—The metallic ion activities in Cu, Cd and Zn sulfates and nitrates are detd. by a series of electrode-potential measurements. For concns. 0.005 to 0.5 molal, the activity of the cation is proportional to that of the H-ion and the values are equal if corresponding standard states are chosen.

J. L. COSTA

Hydrolysis of sucrose by hydrochloric acid in the presence of alkali and alkaline earth chlorides. C. F. KAUTZ AND A. L. ROBINSON. *J. Am. Chem. Soc.* 50, 1022-30 (1928).—The rate of inversion of sucrose by 0.100 *N* HCl at 25° in the presence of the chlorides of K, Na, Li, Ca, Sr and Ba of concns. from 0.05 to 3 *M* was detd. No simple relationship was found to exist between the increased rate of inversion in the presence of these salts and the activity coeffs. of the H ion in solns. of the same acid and salt concns. contg. no sucrose, but the rough parallelism observed indicates that the activity of the H ion is probably the most important factor detg. the rate of inversion. For salt concns. above 0.500 *M* the equation of Schmid and Olsen (*C. A.* 21, 519) applied fairly well. This equation is $K = K_0 \times 10^{rc}$, where K is the velocity const., K_0 is the velocity const. in the absence of the salt, C is the concn. of the salt and r is an arbitrary const.

JAMES M. BELL

The action of hydrogen peroxide on ferrous salts. (Studies on oxidation processes.) WILHELM MANCIOT AND GERHARD LEHMANN. *Ann.* **460**, 179-201(1928).—At large dilns. 1 atom of Fe^{++} is equal to 3 equivs. of H_2O_2 . This leads to the conclusion that a primary oxide Fe_2O_3 must form. In concd. solns. as many as 24 equivs. of H_2O_2 are consumed per atom of Fe^{++} . This is explained by the tendency of peroxide to oxidize and then reduce itself, which reaction is catalyzed by Fe^{+++} ions. In acid solns. the equivs. are changed considerably. With dil. acids the reaction is retarded and considerably more than 3 equivs. of H_2O_2 are reduced per atom Fe^{++} . The authors believe that expts. with org. acceptors confirm their conclusion that an oxide of quinquevalent iron exists.

HANS C. DUTTS

The low-pressure decomposition of nitric and nitrous oxides. J. H. HIBBEN. *J. Am. Chem. Soc.* **50**, 940-50(1928).—The decompn. of N_2O , studied with the Pirani gage between 0.075 and 0.026 mm., gives a fair unimol. const., especially at the lower pressures. The most probable explanation is that the reaction is entirely heterogeneous at these pressures. The velocity const. for the decompn. of N_2O_4 does not vary essentially in the range 0.18 to 0.0018 mm., and agrees with Daniels and Johnston's value for high pressure, in contradiction to the observations of Hirst and Rideal.

W. W.

Intermediate products in oxidation with chromic acid. CARL WAGNER. *Z. anorg. allgem. Chem.* **168**, 279-91(1928).—In the oxidation of org. acids such as oxalic, lactic, tartaric and HSCN by CrO_3 , an intermediate product is formed as indicated by liberation of I from KI solns. This intermediate product is found to be stable in AcOH soln. of $[\text{H}^+] = 10^{-4}$, but is very fragile in approx. neutral soln., $[\text{H}^+] = 10^{-7}$. The presence of Cr^{V} is indicated by the fact that $\text{CrOCl}_2 \cdot \text{C}_2\text{H}_5\text{N} \cdot \text{HCl}$ behaves similarly when allowed to act upon lactic acid, a complex of Cr^{V} and lactic acid being formed. In the reaction between CrO_3 and HSCN , free thiocyanogen $(\text{SCN})_2$ is formed as an intermediate product, indicated by formation of an intense red color on addn. of Fe powder in the presence of Et_2O . The presence of Mn^{++} salts suppresses the oxidation velocity of org. acids by CrO_3 , the intermediate Cr^{V} breaking up as follows: $3\text{Cr}^{\text{V}} \rightarrow 2\text{Cr}^{\text{VI}} + \text{Cr}^{\text{III}}$.

H. STOERTZ

The oxidation of sodium sulfite in sodium carbonate solution with air. SUSUMU MIYAMOTO. *Bull. Chem. Soc. Japan* **3**, 76-82(1928), cf. *C. A.* **21**, 2089.—S. studies quant. the oxidation velocity of Na_2SO_3 in Na_2CO_3 solns. of various concns. Under the conditions used, the oxidation velocity is independent of the Na_2SO_3 concn. and is a linear function of the Na_2CO_3 concn. when the latter concn. is larger than 0.02 *N*. Temp. has a negligible effect. The solution velocity of O in Na_2CO_3 solns. of various concns. is calcd. indirectly.

A. L. HENNE

The sulfite addition in unsaturated compounds. II. ERIK HAGGLUND AND ANDERS RINGBOM. *Z. anorg. allgem. Chem.* **169**, 96-8(1928).—Extending their previous investigations (cf. *C. A.* **20**, 1165) to methylpropionic acid (I) (prepd. from acetoacetic ester and PCl_5) and phenylpropionic acid (II) (recrystd. Kahlbaum product) H. and R. found that at 80° the rate of addition of Na_2SO_3 to (I) and (II) ($k = 0.0025$ and 0.00104, resp. 2nd order) is much slower than in the corresponding acids of the ethylene series. This is the reverse of rates for halogen addn. k for (II) decreases with time indicating a decompn. of the acid. From these results the authors conclude that rate of reaction cannot, unreservedly, be taken as a measure of valence force. The excess of Na_2SO_3 is detd. by titration with 0.05 *N* I_2 . There was no evidence of addn. of I_2 to (I) or (II) during titration.

J. R. SCHIERZ

Oxidation of ammonia in presence of contact catalysts. IV. JÓZSEF ZAWADZKI AND HENRYK NARKIEWICZ. *Roczniki Chem.* **7**, 369-79(1927); cf. *C. A.* **21**, 3531.—The results of previous expts. are confirmed. The max. yields are obtained with high temps. and rapid flow. They are further increased and shifted in this direction by the application of several layers and of finer-mesh Pt gauze. Above 1000° the yield may exceed 90%. A comparison between single (I) and triple (II) Pt gauze for equal contact time (triple rate of flow for II) shows that not only the yield in NO but also the percentage of unchanged NH_3 is higher in II. This is of interest for the mechanism of the reaction.

MARY JACOBSEN

Catalytic reduction of nitrobenzene into aniline in the gaseous phase. G. B. SERNERIA AND M. MILONE. *Atti accad. sci. Torino* **63**, parts 1-3(1927-28).— H_2 gas together with $\text{C}_6\text{H}_5\text{NO}_2$ (in drops) was passed over a catalyst of Cu as well as Ag pptd. on pumice. The catalyst was heated to various temps. from 250° to 400°, the H_2 was passed over in theoretical quantities, according to the reaction $\text{C}_6\text{H}_5\text{NO}_2 + 3\text{H}_2 = \text{C}_6\text{H}_5\text{NH}_2 + 2\text{H}_2\text{O}$ as well as 200, 300 up to 900% of the theoretical amt. A table is given showing the yield of $\text{C}_6\text{H}_5\text{NH}_2$ under varying temps., with increasing amts. of

catalyst, both Cu and Ag, as well as with increasing amts. of H_2 . The reaction is exothermic. Cu gives best yields at 350° , as at 400° the reaction $C_6H_5NO_2 + 4H_2 = C_6H_5 + NH_3 + 2H_2O$ becomes appreciable. With Ag the optimum temp. is 400° . The yield increases with increasing amts. of catalyst up to a certain limit and then remains const. Increase in H_2 increases yield when temp. is higher and with greater amts. of catalyst. The catalyst does not lose its activity even after several months' use at 12 hrs. per day. With Cu, the $C_6H_5NH_2$ is always colored by traces of azobenzene; with Ag at 350° the yield is 99.5% pure aniline. Also in *Ann. chim. applicata* 18, 68-77(1928).

A. W. CONTIERI

A catalyst for hydrogenation in the cold. I. A study of the mechanism of this catalysis. M. BOURGUEL. *Bull. soc. chim.* 41, 1443-50(1927).—The rate of catalytic hydrogenation of several acetylenic hydrocarbons was measured at room temp. in order to test a theory of the mechanism. The theory postulates a 3-step mechanism: (1) formation of a labile Pd-H compd., (2) formation of a labile combination of Pd-H-org. compd., (3) decompn. of the second compd. into Pd and mol. H. The catalyst used was a protected colloidal Pd made from Na chloropalladate. The hydrogenation was effected by agitating a 2-phase aq. colloid-org. liquid mixt. in an atm. of H_2 . The rate of reaction was measured by the rate of H consumption. The reaction was selective, yielding reduction to ethylenic hydrocarbons only. The colloidal Pd, in the presence of H , collected in globules at the org. liquid- H_2O interface. The results seemed to be consistent with the proposed 3-step mechanism.

R. L. DODGE

Equilibrium in the reaction of tin with water vapor and carbon dioxide. E. D. EASTMAN AND PRESTON ROBINSON. *J. Am. Chem. Soc.* 50, 1106-14(1928).—The equilibria: $Sn + 2H_2O \rightleftharpoons SnO_2 + H_2$ and $Sn + 2CO_2 \rightleftharpoons SnO_2 + 2CO$ were studied between 650° and 800° by a modification of the dynamic method in which the oxidizing or reducing effect of the gas stream is observed visibly. This method is probably useful in studies of other systems. In confirmation of the method, detns. by the static scheme due to Deville were made in the reaction of tin with water vapor. By combining the equil. consts. of the two reactions, it is possible to estimate the water-gas equil. const., and these results agree with previous indirect detns. (*C. A.* 18, 1418), but differ largely from direct detns., which are now considered to be in error.

JAMES M. BELL

A supplement to the researches on the Landolt reaction. A. THIEL. *Z. Elektrochem. angew. physik. Chem.* 34, 113-4(1928).—Points in the researches of T. (*C. A.* 18, 3517) incomprehensible to Skrabal (*C. A.* 21, 1742) are further discussed.

J. B.

Equilibria at high temperatures in the system iron-oxygen-carbon. R. R. GARRAN. *Trans. Faraday Soc.* 24, 201-7(1928).—G. finds that most of the exptl. results dealing with this system given in the literature were made below 1000° . Extrapolation to temps. above 1000° is very uncertain. Exptl. results are given covering the temp. range 600° to 1300° .

L. B. MILLER

Equilibrium between alcohols and salts. II. ELLIS LLOYD, C. B. BROWN, D. G. R. BONNELL AND WILLIAM JACOB JONES. *J. Chem. Soc.* 1928, 658-66; cf. *C. A.* 20, 1746.—The solubilities are given of LiCl, NaBr, KBr, $CuCl_2$, $BaBr_2$, CaI_2 , $Ba(NO_3)_2$, $CaBr_2$, $MgCl_2$, $Mg(NO_3)_2$, $CdCl_2$, $CdBr_2$, CdI_2 , $NiBr_2$, NaI , $SrBr_2$, $Ca(NO_3)_2$, $HgBr_2$, $CoCl_2$ and $CoBr_2$ are detd. in MeOH, and of $CuCl_2$, $MgCl_2$, $Mg(NO_3)_2$, $CdCl_2$, $HgBr_2$, $CoCl_2$, $Ca(NO_3)_2$, $SrBr_2$, $CdBr_2$, CdI_2 and $CoBr_2$ in EtOH, at various temps. from 0 to 80° , and those of $CuCl_2$ in $PrOH$, iso-AmOH and $PhCH_2OH$ and $CaCl_2$ and $CaBr_2$ in $PrOH$, $BuOH$, AmOH, iso-AmOH and $PhCH_2OH$ at various temps. from 0 to 80° . Dalton's law is assumed to hold for mixts. of air and alc. vapor for pressures of alc. below the satn. point in disscn. pressure calens., shown to be in agreement with theory. The disscn. pressures of the Me alcohols, $CuCl_2 \cdot 2A$, $MgCl_2 \cdot 6A$, $Mg(NO_3)_2 \cdot 6A$, $CdCl_2 \cdot 3A$, $CdBr_2 \cdot 3A$, $NiBr_2 \cdot 6A$, $NaI \cdot 3A$, $Ca(NO_3)_2 \cdot 2A$, $SrBr_2 \cdot 1\frac{1}{2}A$, $HgBr_2 \cdot A$, $HgBr_2 \cdot A$, $CoCl_2 \cdot 3A$ and $CoBr_2 \cdot 6A$ ($A = MeOH$), and the Et alcohols, $CuCl_2 \cdot 2A'$, $MgCl_2 \cdot 6A'$, $Mg(NO_3)_2 \cdot 6A'$, $CdCl_2 \cdot 1\frac{1}{2}A'$, $CoCl_2 \cdot 3A'$, $Ca(NO_3)_2 \cdot 2A'$, $SrBr_2 \cdot 1\frac{1}{2}A'$, $CdBr_2 \cdot 1\frac{1}{2}A'$ and $CoBr_2 \cdot 3A'$ ($A' = EtOH$) are detd. at various temps. from 10- 80° . In general, over a moderate range of temps. logarithms of the dissociation pressures of alcohols are a linear function of the reciprocal of the abs. temps., e. g., for $Mg(NO_3)_2 \cdot 6MeOH$ $\log p = 11.02341 - 3006.63/T$, from expt., gives values of dissociation pressure agreeing closely with exptl. ones, at 30° , 40° and 50° . Further tables of the % salt in the solid phase, dissociation pressures in mm. at 20° and the transition points of Me and Et alcohols are given.

J. BALOZIAN

Equilibria in the reduction of ferric oxide. C. C. FURNAS AND G. G. BROWN. *Ind. Eng. Chem.* 20, 507-10(1928).—New thermal data on Fe_2O_3 have been used with other data in the literature to compute, by means of the 3rd law of thermodynamics, the equil. consts. of 7 reactions involved in the reduction of Fe_2O_3 by CO, C and H_2 , and one

for the decompn. of Fe_2O_3 into Fe_3O_4 and O_2 . Such values of K (equil. const.) are given for 100° , 250° , 500° and 750° based upon actual measurable data, and for 1000° and 1500° upon extrapolation data. It is shown that (a) reduction of Fe_2O_3 by CO and of Fe_3O_4 to Fe_2O_3 by H_2 takes place readily at lower temps.; (b) reduction of Fe_3O_4 by C will not occur to any great extent at low temps., but the possibility of such reduction with higher temps. becomes increasingly greater, a conclusion in harmony with exptl. evidence but contrary to popular belief; (If the gaseous phase is absent no reduction occurs except at high temps.); (c) reduction of Fe_2O_3 by H_2 shows that the power of superheated steam to oxidize metallic Fe decreases with temp., while its ability to oxidize Fe_3O_4 increases with the temp.; (d) data for the decompn. of Fe_2O_3 to Fe_3O_4 and O_2 are not conclusive, but in general the K are lower for 1000° and 1500° than the exptl. work justifies. Inconsistencies are ascribed to the variations in solid phases used. The existence of solid solns. rather than intermediate compds. in the series FeO , Fe_3O_4 , Fe_2O_3 may be assumed. Graphs and tables give much condensed information on the matter treated above.

W. C. EBAUGH

Eutectic freezing point lowering in binary mixtures. IV. Independence of the eutectic equation respecting pressure. E. KORBES. *Z. anorg. allgem. Chem.* **169**, 246-50 (1928), cf. *C. A.* **22**, 902.—The general eutectic equation $[(T_b - T_e)/T_b] : [(T_a - T_e)/T_a] = a : b$ in which T_e = eutectic temp., T_a and T_b are the m. ps. of the 2 constituents (all in degrees abs.), and a and b their concn. in the eutectic in mol. %, is found to be independent of external pressure. This is verified by measurements on the system $\text{Cd}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ - $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ at pressures of 1, 1000, 2000 and 3000 kg./sq. cm. The relation of eutectic temp. to melting temp. of the pure components, $[(T_b - T_e)/(T_a - T_e)]^b = T_b/T_a$, is also independent of external pressure variation. II. STOERTZ

The partition of a base (caustic soda) between two acids (nitric and hydrochloric) in saturated solutions. V. I. NIKOLAEV. *J. Russ. Phys.-Chem. Soc.* **59**, 677-84 (1927).—The system NaCl - NaNO_3 - H_2O was studied, the total content of the salts varied between 40.22% (by wt.) at 15° and 89.6% at 210° . Thermostat was used in soly. measurements below 100° , while at higher temps. the mixt. was introduced in one of the legs of an H-vessel which was subsequently sealed and suspended inside of an electrically heated bomb. Temp. variations did not exceed 0.5° . While still in the bomb, the liquid phase sepd. without difficulty and was quickly decanted into the other leg of the vessel. The total soly. polytherm is a straight line over most of the temp. range, with a positive curvature near the origin and a negative one in the region of higher temps. At 15° Na_2O is about equally divided between the two acids (mol. fraction of NaCl = 0.282, NaNO_3 = 0.279). The mol. fraction of NaNO_3 increases with the increasing temp. and that of NaCl decreases until at 130° the ratio is 0.067:0.0778; from this point on, both the fractions increase, their ratio reaching a min. value of 0.08 at 162° . The presence of free HCl and HNO_3 similarly decreases the soly. of NaCl , while in the presence of 38.45% (by wt.) of free NaOH at 25° there is 6.52% NaNO_3 , 55.03% H_2O and practically no NaCl . Although the "avidities" of both the acids as detd. by the heats of neutralization are the same, the heats of soln. probably influence the equil. in favor of HNO_3 . The part played by water here is important, since at 210° six mols. of H_2O are distributed among 9.6 mols. NaNO_3 and 0.2 mols. of NaCl ; similarly at 25° the mol. fraction of H_2O does not change appreciably with the addition of alkali; i. e., water is drawn away by NaOH from NaNO_3 and NaCl . The existence of undissociated salt mols. is possible in such satd. solns. A tetrahedral model of the system Na_2O - N_2O_5 - H_2Cl_2 - H_2O at 25° shows the displacement of crystn. fields toward HNO_3 . The eutonic point situated at 15° on the line of symmetry NaCl - H_2O shifts to the right at 25° and lies in the triangle N_2O_5 - H_2O - Na_2O . With rising temp. this point recedes from the NaCl - H_2O line, so that the crystn. fields approach HNO_3 . The neutral mols. of NaCl and HNO_3 are represented by a plane through H_2O - NaCl - NaNO_3 on either side of which lie the conjoined pyramids, a tetrahedron on the acid side and a trihedral one on the alk. side.

BASIL C. SOYENKOFF

The different interpretation to give to the critical temperatures of solubility: lower and higher. The ternary systems: water-nicotine-acetone. P. LEONE. *Atti II congresso naz. chim. pura applicata* **1926**, 1200-20.—The system water-nicotine is one of the few known examples of a system in which there are 2 crit. temps. of soln., i. e., where the temp.-concn. curve is a closed curve, 2 strata existing only within a definite interval of temp. above or below which only a single homogeneous phase exists (cf. Hudson, *Z. physik. Chem.* **47**, 113 (1904)). Redetn. of data for the system water-nicotine confirmed except for the smallest variation the data of Hudson. Acetone, which is miscible with each component in all proportions, was then introduced as a 3rd component. The data, tabulated in detail, show that acetone increases the mutual soly. of

water and nicotine, reducing the temp. zone of existence of the 2 phases until with enough acetone the 2 phases disappear. The max. distance between the 2 crit. points occurs with the mixt. contg. 31.73% nicotine and the max. concn. of acetone which still allows the existence of a non-miscibility zone is 35.44%, at which concn. this zone is so greatly reduced that it presents only a slight opalescence between 146° and 155°. With a slightly greater concn. of acetone 2 phases are not formed on heating. The mol. variations of the crit. temp., calculated by the $(T' - T)/C$ formula of Timmermans (*Z. physik. Chem.* **58**, 129) are not const. for all proportions of water and nicotine, but tend to increase slightly with increase in the concn. of acetone. In the crit. zone between 20 and 48% nicotine, the general relation between the ratios of the mol. variations is const. The mol. variations of acetone remain within values of 100–150 for the lower crit. temps., while for the higher crit. temps. they hardly reach 100. For a given sample the mol. variation of the lower crit. temp. is 30–40° greater than the corresponding variation of the higher crit. temp. A distinct and const. difference between the values of the mol. increases of the lower crit. temp. and the corresponding mol. lowering of the higher crit. temp. supports the hypothesis that the 2 crit. points must be interpreted differently.

C. C. DAVIS

The simplest method of representing polynary systems in a plane. VARTAN N. LODOČNIKOV. *Z. anorg. allgem. Chem.* **169**, 177–245 (1928); cf. *C. A.* **20**, 1939.—The author has extended his method to systems of 9 components.

E. R. SCHIERZ

Heat of vaporization and molecules per cubic centimeter. W. HERR. *Z. anorg. allgem. Chem.* **169**, 173–6 (1928).—By means of data from Landolt-Börnstein Tabellen H. has shown that for C_6H_{14} , C_7H_{16} , C_8H_{18} , esters, $SnCl_4$, CCl_4 and PhH the \sqrt{L} (L = heat of vaporization) varies with temp. in the same way as mol./cc. (Z). The value Z/\sqrt{L} , though almost const., first falls, then increases again with increasing temp. For associated liquids $EtOH$, H_2O the same relation holds except that for H_2O the fluctuation of the ratio is in the reverse order, for liquid NH_3 , O_2 and N_2 the ratio is not const., but decreases with temp. This may be due to lack of data over sufficient temp. range. For unassociated compds the ratio \sqrt{Z}/L_s (L_s = heat of vaporization at normal b. p.) is const. near 8.5×10^4 , but for associated compds. like alcs. and fatty acids it varies considerably.

J. R. SCHIERZ

Variation of the specific heat of aniline with temperature, using the continuous-flow electric method. H. R. LANG. *Proc. Roy. Soc. (London)* **A118**, 138–56 (1928).—Measurements on the sp. heat of aniline were made by the continuous-flow elec. method over short ranges between 5° and 75°. Pure dry aniline was used, and the minute water content was detd. The rate of change of sp. heat with temp. increases with temp., and is given between 5° and 60° in terms of the 20-degree cal. per gm. degree, by the formula $S = 0.4951 + 0.0287(t - 20) + 0.027(t - 20)^2 + 0.061(t - 20)^3$.

W. WEST

Isothermal calorimetry at high temperatures. A. MAGNUS AND F. OPPENHEIMER. *Z. anorg. allgem. Chem.* **168**, 305–8 (1928).—The app. described consists of a high-melting glass tube in which the crucible is placed, and sepd. from this tube by only a few mm. is a second tube wound with a heating coil (H). The whole is sealed into a glass chamber which can be highly evacuated and which contains some wood charcoal previously cooled in liquid air. The Fe crucible has double walls, also wound with a heating coil (constantan). The metal or salt is brought just to its m. p. by the coil (H), then when the temp. has become const., a measured current is passed through the crucible coil until the thermoelement in its contents shows a sudden temp. rise. The mol. heat of fusion is given by the equation. $Q = 0.239 M/m e i t$, in which m is the mass of the melt of mol. wt. M , i is the heating current, e the voltage and t the time to temp. rise. Good agreement is obtained and Q in cal./mole is given for Pb as 1224 and for $AgNO_3$ as 2757.

H. STORZT

The free energy of transition in the system calcite-aragonite. J. L. BUCHAN. *Trans. Faraday Soc.* **23**, 668–71 (1927).—The results of previous investigators are tabulated. The free energy of transition is detd. by e. m. f. methods and found to be –414 cal. per g. mol. at 25°. Methods of prepg. pure calcite and aragonite are described.

L. B. MILLER

Thermodynamic studies of chemical change. II. Thermodynamic studies of lead monoxide. 2. FUSAO ISHIKAWA AND IICHI SHIBATA. *J. Chem. Soc. Japan* **48**, 59–66 (1927).—From the e. m. f. of the cell, H_2 (atm.) | 0.26 N $Ba(OH)_2$ | PbO | Pb amalgam (5.7% Pb), the changes in free energy (1), (2), (3), heats of reaction (1), (2), entropy, dissociation pressure and activity product of PbO were detd. For (1), $PbO(s) + H_2(1 \text{ atm.}) \rightarrow Pb(s) + H_2O$, $\Delta F = -11,639$ cal. and $\Delta H = -17,017$ cal. For (2), Pb

(s) + $\frac{1}{2}\text{O}_2$ (1 atm.) \rightarrow PbO (s), $\Delta F_{298}^\circ = -44,921$ cal. and $\Delta H = -51,253$ cal. For (3), $\text{Pb}^{++} + 2\text{OH}^- \rightarrow \text{PbO}$ (s), $\Delta F_{298}^\circ = -20,941$ cal. For PbO at 25° , the entropy is 18.29 units, the dissociation pressure is 1.52×10^{-28} atms. and the activity product is 4.55×10^{-16} . T. SAITO

The free energies of solid compounds, deduced from their crystal structure: with special reference to calcite and aragonite. J. L. BUCHAN. *Trans. Faraday Soc.* 23, 672-6 (1927).—From x-ray measurements the simplest lattice from which the crystal can be built up by a process of repetition is considered, and the ions are taken as point charges. From the force acting between any two ions according to Thompson's formula $F = E_1 E_2 / D a^2 [1 - (K/a)]$, the free energy of formation is calcd. The free energy of formation of calcite is calcd. to be -4060 cal. per g. mol.; of aragonite, -3680 cal. per g. mol.

L. B. MILLER

A new method of measuring overvoltage. L. J. P. BYRNE. *Trans. Faraday Soc.* 23, 661-71 (1927).—A new method of measuring the true overvoltage existing during electrolysis is described and illustrated. Results are given for the electrolysis of CuSO_4 and H_2SO_4 , to show how overvoltage varies with c. d. L. B. MILLER

Electrode potential of nickel. I. Measurements in an atmosphere of hydrogen with reduced nickel powder. KWANGI MURATA. *Bull. Chem. Soc. Japan* 3, 57-69 (1928).—A reproducible electrode, which gives a const. and reversible potential of active Ni has been obtained by using powd. Ni reduced with H directly in the cell, and also using an app. which allows the cell to be filled with the electrolyte entirely in the absence of air. The potentials of the reduced Ni powder in 0.05 and 0.005 molar NiSO_4 soln. have been measured in a H atm. at 18° and 25° . From these observed potentials the normal electrode potentials of Ni have been calcd. on the ground of two different concepts of the strong electrolytes, one of them is that the ion concn. calcd. from the conductance viscosity ratios are involved in the expression of the e. m. f. of a concn. cell; the other one is that the ion activities are involved. The av. values of these normal electrode potentials are 0.2496 v. and 0.2508 v. at 25° and 18° , resp., at one molal ion concn., and 0.2480 v. and 0.2492 v. at the same temps., at one molal ion activity. The change in free energy of Ni electrode reaction per equiv., $i. e., 0.5 \text{Ni}^{++} + \ominus = 0.5 \text{Ni}$, has been calcd.; $\Delta F = 5759$ or 5723 cal. at 25° , and 5787 or 5750 cal. at 18° .

A. I. HENNE

Magnetic transformations of the ferromagnetic metals. Reply to Herr R. Ruer. FRANZ WIEBER. *Z. anorg. allgem. Chem.* 168, 327-8 (1928).—W. takes up and answers specifically certain objections raised by R. (cf. C. A. 22, 208) to W.'s papers on the nature of the magnetic transformation of Fe (cf. C. A. 21, 2245, 2871). W. W. STIFLER

Influence of the electric and magnetic fields on the crystallization of undercooled liquids. W. KONDOGURI. *Z. Physik* 47, 589-601 (1928).—The no. of centers of crystn. of undercooled piperine and salol is considerably increased by elec. and magnetic fields. This was investigated exhaustively for elec. fields with the following results: for equal time intervals the no. of crystn. centers is approx. proportional to the strength of the elec. field; for const. field, the no. increases with time up to a limiting value; an increase in field then produces an increase in the no. of crystn. centers until a new satn. value is reached. Similar results were obtained for magnetic fields. (Cf. C. A. 21, 2207.)

W. W. STIFLER

The interpretation of the paramagnetism of the iron group. OTTO LAPORTE. *Z. Physik* 47, 761-9 (1928).—By use of the relativity doublet formula, L. computes, from purely spectroscopic data, the magneton numbers for the Fe group. In no case do the calcd. values agree with the exptl. results. Various possible explanations are offered. The original should be consulted for the math. details. W. W. STIFLER

Magnetizability of thin manganese films. H. FREEZE. *Physik. Z.* 29, 191-7 (1928).—Mn melted in H_2 was found by Weiss and Kuh to be partly ferromagnetic. F. confirmed this and then attempted to produce films of ferromagnetic Mn (a) by cathode sputtering in H_2 and (b) by electrolysis with simultaneous deposition of H. However, all of the films gave values for the susceptibility of the order of 10^{-5} . There seems to be no satisfactory explanation of the apparent ferromagnetism produced by melting in H_2 . A bibliography is given. W. W. STIFLER

Magnetic rotary dispersion of methanol and propyl alcohol. D. O. JONES AND E. J. EVANS. *Phil. Mag.* [7], 5, 593-608 (1928).—The magnetic rotation of MeOH has been examd. for wave lengths ranging from 0.4379μ to 0.2600μ , and the values of δ (Verdet's constant) can be represented by the equation $\Phi = n\delta\lambda^2 = 1.189 [\lambda^2 / \lambda^2 - (0.1100)^2]^2$, where n is the refractive index of MeOH for wave length λ and 0.1100μ is the wave length of absorption band in the extreme ultra-violet. The weak absorption band in the central region of the ultra-violet at 0.2207μ does not contribute materially

to the magnetic rotation, but the wave length of the strong absorption band (0.1100μ) deduced from the magnetic rotation expts. is very nearly one half that of the weak absorption band. The magnetic rotation of PrOH has been examd. over the range 0.4390μ to 0.2586μ , and the value of δ can be represented by the equation $\Phi = n\delta\lambda^2 = 1.553 [\lambda^2/\lambda^2 - (0.1138)^2]^{1/2}$. The wave length of the absorption band (0.1138μ) is almost exactly one half that of the weak absorption band at 0.2273μ , but the latter does not contribute materially to the magnetic rotation.

GEORGE GLOCKLER

Theory of the magnetic properties of iron and other metals. R. H. DE WAARD. *Phil. Mag.* [7], 4, 641-67 (1927).—A mathematical theory of magnetism based on the result obtained by Barkhausen (*Physik. Z.* 20, 401 (1919)) that during the magnetization of a body the change of magnetic moment is partly discontinuous, and on the extension of Barkhausen's work by van der Pol to show that hysteresis curves in iron wires show discontinuities.

GEORGE GLOCKLER

The refraction and absorption of electrical waves in electrolytes. Part I. KONTANTY ZAKRZEWSKI. *Bull. intern. acad. polonaise* 1927A, 489-503.—The verification of Maxwell's laws deduced for semi-conductors and applied to very dil. solns. is now extended to more concd. solns. The indices of absorption of pure water and of aqueous NaCl were measured. The index of refraction was calcd. by the help of Cauchy's equation and it is concluded that n for concd. solns. of NaCl for a wave length of 23 cm. is much less than that for pure water. To establish whether differences between theoretical and exptl. results are real it would be necessary, however, to use an accuracy greater than that used in the present work.

S. L. B. ETHERTON

New determination of the atomic moments of iron and nickel at low temperatures. PIERRE WEISS and R. FORRER. *Compt. rend.* 186, 821-3 (1928).—The at. moment is computed from the satn. value of the intensity of magnetization at zero abs. This is obtained by double extrapolation to $H = \infty$ and $T = 0$. For any temp. the magnetization, σ , is connected with the satn. value, σ_0 , by the equation $\sigma = \sigma_0[1 - (a/H)]$. The const. a has the same value from room temp. down to that of liquid air. For Fe, $a = 3$; for one specimen of Ni, $a = 10$; and for another, $a = 12$. The internal field of Fe is 16,820 gauss and of Ni it is 18,550 gauss. The satn. value of the magnetization, σ_0 , at any temp., T , is connected with the value, Σ_0 , at $T = 0$ by the relation $\sigma_0 = \Sigma_0(1 - AT^2 - BT^4)$. For Fe, $A = 2.17 \times 10^{-7}$ and the T^4 term is negligible below $T = 288$; for the two specimens of Ni, $A = 5.42 \times 10^{-7}$ and 5.34×10^{-7} resp., and $B = 1.3 \times 10^{-12}$ for both. For both Fe and Ni the value of σ_0 at 100° abs. differs from Σ_0 by not over $1/2\%$. When corrected for the traces of impurities present, the values obtained for the at. intensity of magnetization at satn. are: Fe = $12,393 = 11 \times 1126.6$; Ni (Hereaus) = $3376.4 = 3 \times 1125.5$; Ni (Mond) = $3379.5 = 3 \times 1126.5$. These values for the "exptl. magneton," therefore, agree with the value 1126 deduced in 1924 from measurements on the paramagnetic ions.

W. W. STIFLER

Different magnetic states of the cobaltous ion. ALBERT CHATILLON. *Ann. phys.* 9, 187-260 (1928).—Previous work by Cabrera and by Trumpler indicated the possibility of 2 different magnetic states for the Co^{++} ion in aq. soln., viz., one in which the coeff. of magnetization varies with the concn., and another characterized by a fractional magnetic moment, 24.5 magnetons. C. shows that only this second state is stable. Moreover the Curie point for it is independent of the diln. and of the anion, and is neg. ($\theta = -12^\circ$ abs.). This gives the integral value 25 magnetons for the magnetic moment. CoCl_2 in alc. soln. has the integral moment 23 magnetons. $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ at temps. below 50°C . has a negative θ and a moment of 23 magnetons; below 110°C . it is sol. in its H_2O of cryst. and the Co^{++} ion has not more than 24 magnetons. Partial dehydration gives 25 magnetons as the moment, with θ pos. The moment of anhyd. CoSO_4 , calcined below 400° is 25 magnetons with $\theta = -20^\circ$ to -30° abs.; if calcined above 600° the moment is 26 magnetons and $\theta = -50^\circ$ abs. As found previously by Mlle. Serres, CoSO_4 (hexagonal) has the fractional moment $25\frac{1}{2}$ magnetons. CoCl_2 in aq. soln. with addn. of HCl has the integral moments 22, 23, 24 and 25 magnetons and the fractional moment 23.5 magnetons. Hence C. concludes that the Co^{++} ion is characterized by the integral magnetic moments 22, 23, 24, 25 and 26 magnetons and that the fractional moments 23.5 and $25\frac{1}{2}$ are to be ascribed to mixts. of ions with integral moments. Crystn. seems to play an important role in detg. the magnetic moments; at times there seems to be a sort of "remembrance" of a previous state. A table summarizing C.'s results and those of previous investigators is given, together with a full bibliography.

W. W. STIFLER

The relation of the diamagnetic susceptibility in the liquid and vapor states. V. I. VAIDYANATHAN. *Indian J. Physics* 2, 135-50 (1928).—The torsion exerted on a test system suspended in the vapor when placed in a non-homogeneous magnetic field

was measured for a no. of org. compds. The app. was calibrated in terms of Takā Sofu's values for the vol. susceptibility of dry air. Measurements were taken at several different pressures and from these the vol. diamagnetic susceptibility, χ_m , was computed. For comparison, the results obtained by V. by measuring the translatory force acting on a thin closed bulb when surrounded by the different vapors, as well as the accepted values for the liquids, are included.

Substance	Vapor $\chi_m \times 10^6$ by Torsion method	Vapor $\chi_m \times 10^6$ by trans force	Liquid. $\chi_m \times 10^6$
CS ₂	62.5	75	45
C ₆ H ₆	74	83	51 and 56
C ₆ H ₁₂	82	82	68
CH ₃ (CH ₂) ₄ CH ₃	96	89	80
CCl ₄	77	79	70
CH ₃ COOCH ₃	57	51	53
HCOOC ₂ H ₅	55	50	53 and 45
C ₂ H ₅ OC ₂ H ₅	62	70	63
CH ₃ Cl	73	76	70 and 62
CH ₃ COCH ₃	..	34	40
CH ₃ (CH ₂) ₈ CH ₃	..	97	92
HCCOCl ₃	..	38	33

It is hard to reconcile the large differences in susceptibilities of vapor and liquid in the cases of CS₂, C₆H₆, C₆H₁₂ and CH₃(CH₂)₄CH₃ with any theory of the at. nature of diamagnetism. The possible influence of neighboring mols. is discussed. W. W. S.

The indexes of refraction and rotatory power of crystals of sodium rubidium *d*-tartrate. Sr. KOZIK. *Bull. intern. acad. Polonoise* 1927A, 229-36. The values of n given in the table were obtained by measurements made on 6 different prisms

Wave length in $\mu\mu$	n_α	n_β	n_γ	Specific rotation of the crystals	Specific rotation of the sol
670.8	1.4884	1.4920	1.4942	59.3°	15.3°
656.1	1.4888	1.4924	1.4947	60.9°	15.6°
610.0	1.4902	1.4940	1.4965	70.8°	17.7°
589.0	1.4909	1.4948	1.4975	75.6°	19.4°
546.0	1.4934	1.4971	1.4998	88.9°	22.6°
527.0	1.4942	1.4985	1.5011	93.8°	24.0°
486.1	1.4971	1.5012	1.5044	111.1°	28.6°
435.9	1.5022	1.5059	1.5095	132.1°	35.5°
404.7	1.5060	1.5100	1.5139		

$$t = +17^\circ \text{C} \pm 0.25^\circ$$

With solns. of NaRbC₄H₄O₄·4H₂O the angle of rotation is a linear function of the concn. Both the crystals and the solns. of the salt are dextrorotatory. LOUISE KELLEY

Molecular scattering of light in solid bodies. I. Scattering of light in crystalline quartz and its dependence on temperature. G. LANDSBERG. *Z. Physik* 43, 773-8 (1927); *Sci. Abstracts* 30A, 798-9. —L. refers to previous work by Strutt and by Raman on the scattering of light by solid bodies, and their suggestions that it was due to mol. scattering. In his own expts a point source of light was used, and a narrow beam from it concd. on the quartz crystal. The scattered light was received on a photographic plate. Particular care was taken to exclude extraneous light. To det. whether the effect was due to mol. scattering and not to admixture of foreign bodies the variation of intensity with temp. was measured. The intensity of the scattered light was found to increase with rise of temp. and to be approx. proportional to the abs. temp. Glass gave an intensity 100 times as great because of its want of homogeneity. In the quartz crystal investigated approx. 25% of the scattered light was due to want of homogeneity, and the remaining 75% due to mol. scattering. Further tests are in progress. H. G.

• Reform of the nomenclature of inorganic chemistry (DELÉPINE) 6.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

The electron theory and surface energy at the limit of two amorphous media. B. M. EIDELSON. *Physik. Z.* 29, 200-4 (1928).—Mathematical. MARIE FARNSWORTH

The "dative" chemical bond. A. W. C. MENZIES. *Nature* 121, 457 (1928).—The name "dative bond" or "dative linkage" is proposed for the type of co-valence in which both shared electrons are contributed by the same atom. A. I. HENNE

Langevin's theory of atomic magnetism extended to molecules (electronic isomers). S. S. BHATNAGAR and C. L. DHAWAN. *Phil. Mag.* [7], 5, 536-45 (1928).—On Langevin's theory the diamagnetic susceptibility of an atom is proportional to the sum of the av. squares of the projection of the electronic orbit-radius perpendicular to the field. B. and D. use Bragg at. radii (*C. A.* 14, 3584) and calc. from them mean mol. radii (\bar{r}) by assuming closest packing. For isomorphous substances or electronic isomers they obtain the mol. susceptibility $\chi_m = -2.85 \times 10^{10} \Sigma (K\bar{r})^2$. K is a const. for a given group of electronic isomers and for a group of isomorphous substances it is proportional to the at. no. GEORGE GLOCKLER

Recent attempts at transmutation of the elements. F. WOLFERS. *J. chim. phys.* 24, 727-36 (1927).—A review of work of recent years with succeeding critical control expts. Account is included of previously unpublished work by W. with HgCl_2 . The latter is placed between powdered charcoal electrodes and subjected to 3000 to 4000 v. for 100 hrs., current several milliamperes. Spectroscopic examn. revealed no Au, but pptn. with SnCl_2 gave trace of Au, regarded as inconclusive of transmutation by W. Traces of Au pptd. from HgCl_2 with SnCl_2 give a violet coloration of the initial ppt. of Hg_2Cl_2 . One to two parts per million of Au is easily detected. J. L. COSTA

The resolution of an absorption line which has been assumed to be common to praseodymium and neodymium. LORENZO FERNANDES. *Z. anorg. allgem. Chem.* 169, 267-71 (1928).—By observing the absorption spectra of thin sections (1 mm. thick) of $\text{Pr}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ (I) and $\text{Nd}_2(\text{SO}_4)_3 \cdot 8\text{H}_2\text{O}$ (II) as well as solid solns. of (I) in La sulfate with a large Hilger const.-deviation, direct reading spectrograph F. has found that the line $\lambda = 469 \text{ \AA. U.}$ which has been accepted as common to Pr and Nd, can be resolved into series of lines which do not coincide for the two elements. At liquid-air temps. the line for Nd is resolved into 16 distinct lines $\lambda = 4776-4560 \times 10^{-8} \text{ cm.}$ and for Pr into 7 $\lambda = 4732-4641 \times 10^{-8} \text{ cm.}$ Spectrum photographs and wave lengths for each line are given. E. R. SCHIERZ

The asymmetric two-center problem according to the wave mechanics and its application to crystal theory (scattering power of atoms). K. F. NIESSEN. *Physik. Z.* 29, 132-43 (1928).—A highly mathematical treatment of the problem of the scattering power of atoms in certain types of crystal structure developed from Schrödinger's equations. R. L. HERSHEY

Thermodynamic fluctuations and radiation from stars. CZESLAW BEALOBZESKE. *Bull. intern. acad. Polonaise* 1927A, 349-62.—The first period in the development of the thermodynamic theory of stars was concluded by the publication of "Gas Kugeln" by Emden in 1907. The second period includes the work of Eddington, Jeans, Eggert, Saha, Milne, Fowler, Rosseland, Zeipel and others. In 1924, Eddington established the assumption that matter within the stars was in the perfect-gas state, an hypothesis hitherto considered only approximate. Contraction alone is insufficient to account for the maintenance of solar radiation over geological (10^8 years) or astronomical (10^{10} years) periods of time. Consequently it is assumed that powerful sources of energy, originally interatomic, exist in the stars. The stars should attain thermal equil. and this is not observed. To account for this B. introduces thermodynamic fluctuations into the theory of gaseous spheres and shows thus how thermal equil. is combated. From statistical mechanics thermodynamic equil. is never perfect; deviations from the state of equil., termed fluctuations, occur without cessation. Moreover, a star is an open,

not a closed system. Complete compensation of deviations from equil., therefore, cannot exist either within or at the surface of a star. In the center of a star, at. nuclei may occur completely stripped of their electronic atm. Neutral atoms, numerous only in the superficial layers occur for the most part in excited states. It is probable that photo-elec. effect and the inverse effect of the combination between electrons and ions is the principal factor in the energy interchange between matter and radiation from the stars. Fluctuations in energy of absorption or emission in a small vol. are very great compared with the energy lost by the same vol. as a result of the exterior radiation and it is possible that all energy radiation is due to fluctuations. Comparison of energy radiated by different stars and referred back to unit mass leads to a remarkable conformity between the formula deduced from the theory of fluctuations and astronomical values.

S. L. B. ETHERTON

Studies with radioactive rays. K. W. F. KOHLRAUSCH. *Physik. Z.* 29, 153-68 (1928).

—The expression $1/N \Sigma \log v$ occurs in the Bohr formulas for the loss in energy and the ionization which results with α - and β -particles. Through a schematic evaluation of these expressions, expt. can be compared with theory. Expts. on energy change, range and ionization of the α - and β -particles in relation to velocity of particles and extent of material traversed, shows that in all cases a quant. agreement is reached, which in many cases is surprisingly good; in other cases, at least not bad. MARIE FARNSWORTH

The radioactivity of an isotope of potassium. MARTIN BILTZ and HANS ZIEGERT. *Physik. Z.* 29, 197-200 (1928).—With a Hoffmann vacuum electrometer, the β activity of the KCl prepn. of v. Hevesy and Logstrup is found to be $4.2 \pm 0.8\%$ greater than that of ordinary KCl. According to the at. wt. detn. of von Honigschmid and Goubau, the first-named prepn. contains a 4.8% higher content of K_{41} . From this agreement it can be concluded that the radioactive constituent of K is the isotope of at. wt. 41. M. F.

The usefulness of the Geiger point counter for β -rays of different velocities and the number of β -rays of radium E and radium D. N. RÜHL. *Z. Physik* 46, 478-505 (1928); 47, 456 (1928).—It was detd. whether with Ra E, which is a pure β -ray emitter, the no. of emitted β -particles was equal to or greater than the no. of decomposing atoms. Since the counting was done by means of a Geiger point counter, it was first detd. what pressure had to prevail in the chamber in order that β -rays with velocities of 34-94% of the velocity of light could be quantitatively counted. A must be used at higher pressures than air. By comparison with the range, pressure and no. of ion pairs formed with Ra D, it was concluded that the quickest β -rays of Ra E (94% c) at atm. pressure gave rise to less than 10 ion pairs per cm. The no. of β -rays sent out per atom decomp. was found to be 1.2. Besides the primary rays emitted by the nucleus there were about 20% as many secondary electrons whose velocity was about 40% of that of light. With Ra D, a comparison of the no. of β -particles with the no. of atoms decomposing showed that only a small part of the primary β -rays was captured under the existing conditions because of absorption in the sample, etc. The velocity of the primary β -rays from Ra D must be smaller or at the highest equal to 20% of the velocity of light. M. F.

The atomic weight of actinium lead, the end product of the actinium decomposition series. FRANZ LOTZE. *Z. anorg. allgem. Chem.* 170, 213-21 (1928).—A review of the different detns. of the at. wts. of radioactive Pb. MARIE FARNSWORTH

Formation of pleochroic halos in biotite. J. H. J. POOLE. *Phil. Mag.* [7], 5, 444 (1928).—Poole now believes that the actual oxidation of Fe^{++} to Fe^{+++} is responsible for halo formation. The oxidation is caused by O_2 which is produced from water decomp. due to α rays. In this connection it is of interest that biotite is distinguished from muscovite (which neither darkens on heating nor contains halos) by its much greater content of ferrous iron. The darkening produced by heating biotite is now thought to be due to oxidation of Fe^{+++} by the heated H_2O , Cf. C. A. 22, 1096.

GEORGE GLOCKLER

Pleochroic halos in biotite from near Murray Bay, P. Q. D. E. KERR-LAWSON. *Univ. Toronto Studies, Geol. Series, Contributions to Canadian Mineralogy* No. 24, 1927, 54-70.—Pleochroic halos in this biotite are distributed along major and minor cleavage planes in such a way as to suggest that the nuclei were formed after the crystn. and rupture of the mica. The halos consist of shells of darkened mica, sepd. by lighter shells, in which there is an active lightening or bleaching action at work, which is capable of influencing a normally dark portion of an interfering halo. The first effect of rays from Ra C is to lighten the biotite. L. W. RIGGS

Thermal instability of earth's crust. H. H. POOLE and J. H. J. POOLE. *Phil. Mag.* [7], 5, 662-7 (1928).—Polemical against H. Jeffreys, C. A. 22, 1093. G. G.

The precise measurement of the ionization effect of single α -particles, and evidence of new activities. HANS ZEIGERT. *Z. Physik* 46, 668-715 (1928).—An original

device for the photographic recording of the ionization effect of single α -particle emissions, connected with a highly sensitive Hoffmann type dipole electrometer (sensitivity 1 mm. = 6740 ions) was used. Emission from U_I , U_{II} , and Ra , gave ionization numbers (0° , 760 mm.) $U_I = 1.16 \times 10^5$, $U_{II} = 1.29 \times 10^5$, $Ra = 1.36 \times 10^5$; whence, the fundamental constant $Z = 3.71 \times 10^{10}$ α -particles per g. Ra per sec. These detns. in the U - Ra group were used as basis for examg. the ionization number of emission from other elements. No activity could be ascribed to Cu or Zn , but examn. of Zn residues and ppts. showed new emission with ionization nos. 0.42×10^5 , 0.69×10^5 and 1.01×10^5 . Ra content of Al , Cu , Zn and a Pb sample 150 years old was detd. as of the order of 10^{-14} g. Ra per g. metal.

J. L. COSTA

Note on the problem of the mass of a moving electron. T. J. I. BROMWICH. *Phil. Mag.* [7], 5, 636-8(1928).

GEORGE GLOCKLER

The hypothesis of G. v. Gleich, that with a moving electron the mass is constant and the charge changes. WILHELM ANDERSON. *Ann. Physik* 85, 494-6(1928); cf. *C. A.* 21, 3155.—The wave length detd. by Millikan for the penetrating rays of the atm. is more in agreement with the theory of changing charge of the electron with velocity rather than with that of changing mass.

MARIE FARNSWORTH

Affinity of neutral iodine and bromine atoms for electrons. G. PICCARDI. *Atti II congresso naz. chim. pura applicata* 1926, 1248-53.—See *C. A.* 20, 2945; 21, 1753; 22, 18.

C. C. DAVIS

Electrodeless discharge—spectra of ionized mercury and of iodine. J. K. ROBERTSON AND J. H. FINDLAY. *Trans. Roy. Soc. Can.* [3], 21, Sect. 3, 89-97(1928); cf. *C. A.* 20, 2118.—In order to det. the origin of certain metallic lines produced in the electrodeless discharge through H_2 when metals were placed in the discharge region, expts. were conducted on Hg and I , in which the main supply was placed outside the discharge region. Spectra were taken chiefly in the ultra-violet region. Most of the lines observed for Hg , with He as the discharge medium, were spark lines including probably ultimate and penultimate lines for ionized Hg . Analysis of the lines observed under varying conditions of discharge favored Carroll's classification of $HgII$ in preference to Sawyer's. The spectra of I in H_2 and in He and alone were also photographed by means of the same app. After the I - He expts. the tube was covered in spots with a brownish flaky coating. The usual violet hue of I_2 was not observed on bringing the tube to room temp. but the color was distinctly brownish, like Br_2 . No evidence of a possible compd. of He and I at low temps was observed. Several plates accompany the paper.

J. W. SHIPLEY

Photoelectric threshold frequency and the thermionic work function. R. H. FOWLER. *Proc. Roy. Soc. (London)* A118, 229-32(1928).—It follows directly from Sommerfeld's electron theory of metals, without assumptions as to the nature of the surface action, that there is a sharp photoelec. threshold frequency ν_0 , and that $h\nu_0 = \phi$, the thermionic work function.

W. WEST

Cathode rays in electrodeless ring discharge. G. HERZBERG. *Phil. Mag.* [7], 5, 446-8(1928).—Herzberg observes a phosphorescence in electrodeless discharge at low pressure as J. J. Thomson (*C. A.* 22, 725) also noted. Herzberg thinks the glow is caused by cathode rays.

GEORGE GLOCKLER

Ionization by collision. J. TAYLOR. *Phil. Mag.* [7], 5, 445-6(1928).—Polemical against Huxley, *C. A.* 22, 349, 1724.

GEORGE GLOCKLER

Oscillatory ionization currents from clouds of CdO particles. H. P. WALMSLEY. *Phil. Mag.* [7], 5, 561-73(1928); cf. *C. A.* 21, 1927.—The ionization currents from CdO clouds dispersed from an arc have been registered photographically, by the steady-deflection method of measuring currents. They fluctuate rapidly. On exptl. grounds, and by comparison of the magnitude of the effect with what would be expected from the theory of chance fluctuations, it is concluded that the observed fluctuations represent time-changes in the density of ionization throughout the cloud. As the currents investigated arise from the disruption of unstable complex particles which have been produced in the cloud during the process of coagulation, it is suggested that each fluctuation is due to a group of unstable complexes which apparently possess the same av. life. The current due to a group is conceived to be zero at first, increase with time to a sharp max. (corresponding to the fluctuation) at the mean time of disruption of the group, and afterwards steadily to diminish. The superposition of currents corresponding to successive groups of unstable particles gives the fluctuating current which is observed.

GEORGE GLOCKLER

The ionization potential of silver. G. PICCARDI. *Atti II congresso naz. chim. pura applicata* 1926, 1254-5.—See *C. A.* 20, 2946.

C. C. DAVIS

Auto-electronic currents from cold metals. N. A. DE BRUYNE. *Phil. Mag.* [7], 5,

574-80(1928); cf. *C. A.* 20, 4100; 21, 1927, 3308.—A clean W cathode of small diam. was produced by burning out a W filament. The auto-electronic currents from this cathode in a high vacuum were reproducible. The currents were decreased by H_2 and still more by air; they were increased by coating the cathode with Ba. It is concluded that auto-electronic currents are not due to gas, but that they depend on the nature of the cathode in somewhat the same way as the thermionic emission. G. G.

The electric moment of the water molecule. J. W. WILLIAMS. *Physik. Z.* 29, 204-5(1928).—By using a soln. of H_2O in C_6H_6 , the elec. moment of the H_2O mol. was found to be $(1.70 \pm 0.06) \times 10^{-18}$. MARIE FARNSWORTH

Internal tension in Röntgen photographs. KARL BECKER. *Z. Physik* 47, 454-6 (1928).—An answer to the paper of Goler and Sachs (*C. A.* 22, 209), in which B. calls attention to their misunderstanding of his paper (*C. A.* 21, 2428). B. further disagrees with some of the conclusions of G. and S. MARIE FARNSWORTH

Röntgenographic methods for determining substances adsorbed on carbon. OTTO RUFF, FRITZ EBBERT AND FRITZ LUFT. *Z. anorg. allgem. Chem.* 170, 49-61(1928).—By employing Röntgenographic and chem. methods the question in which form adsorbed substances are deposited on active C is studied. Cryst. deposits in such layer thicknesses that Röntgen interferences occur are detected in only a few cases. With $HgCl_2$, $AgNO_3$ and $AuCl_3$, besides the adsorption of the salts, there is also a deposit of their reduction products, $HgCl$, Ag and Au on the C surface. Röntgenographs detect only the latter. This reduction ability is a property of the C and cannot be lessened by purifying it. It falsifies the results of measurements on adsorbing ability and deceives with the circumstances of a sp. adsorption. With $HgCl$ there is evidence of an orientation of the deposited salt. MARIE FARNSWORTH

The course of a crystal structure determination by x-rays. N. H. KOLKMEIJER. *Chem. Weekblad* 25, 175-83(1928).—A review. B. J. C. VAN DER HOEVEN

Determination of the crystal lattice of microcrystalline substance by means of the radiograms of powders. M. G. ALLARD. *Compt. rend.* 186, 638-40(1928).—A general method for the detn. of the crystal lattice from powder photographs and using the idea of the reciprocal lattice is outlined. R. L. HERSHEY

Absorption of ultra-violet light by glucose, levulose and lactose. L. KWIECINSKI AND L. MARCHLEWSKI. *Bull. intern. acad. Polonaise* 1927A, 379-94.—Two samples of *d*-glucose were examd., the less pure sample gave indications of a band at 2800 Å. U. The purer sample gave no traces of a band. Lactose (lactobiose) gives an absorption band with a max. at about 2750 Å. U., according to Purvis (*C. A.* 18, 498) and to Niederhoff (*C. A.* 21, 1932) but Moroz in 1923 in the lab. of K. and M. and now K. and M. found none. Six samples of *d*-fructose were examd. Some preps. of levulose suffer from being too often crystd. An absorption band was obtained with a max. at 2800 Å. U., confirming the statement of Purvis (*loc. cit.*), but the result is not conclusive since crystn. alone appears insufficient for purification. S. L. B. ITHERTON

Origin of the auroral green line in the oxygen spectrum. J. C. McLENNAN, RICHARD RUDY AND J. H. McLEOD. *Trans. Roy. Soc. Can.* [3], 21, Sect. 3, 22-31 (1928); cf. *C. A.* 21, 3559.—If the auroral green line, $\lambda 5577.341$ Å. U. is due to O_2 , its origin arises from an electronic transition usually classed as "forbidden." This abnormality is explained on the possibility of mol. O_2 breaking up into atoms of O and the resulting atomic fields being decisive factors in detg. the character of the radiation emitted by the excited atoms on reverting to the normal state. Analogous "forbidden" lines in the spectrum of Hg support this view. J. W. SHIPLEY

Under-water spark spectra of certain elements. ELIZABETH J. ALLIN AND H. J. C. IRETON. *Trans. Roy. Soc. Can.* [3], 21, Sect. 3, 127-31(1927); cf. *C. A.* 20, 336; 21, 2609; 22, 1100.—The under-water spark spectra of Be, Au, Mo, Ta and Wo, were produced and photographed, by a small Hilger quartz spectrograph. The values of the absorbed wave lengths were calcd. by means of Hartmann's formula. An additional line, wave length 2175.1 Å. U., to those tabulated in Kayser's Handbuch was found for Be. Eight new absorption lines were observed for Au, and four for Mo. The 8 reversed lines in the spectrum of Ta and 9 lines for Wo correspond to the lines tabulated for the emission spectrum of these metals. Tables of wave lengths accompany the paper. J. W. SHIPLEY

The Zeeman effect of an intercombination line. W. C. VAN GEEL. *Z. Physik* 47, 615-21(1928).—Deviations of the observed from the theoretical positions and intensities were noted in the Zeeman effect of the Hg intercombination line 3663.28 Å. U. ($^3P_2^1D_1$). These are interpreted as an incipient Paschen-Back effect for 3663.28 and its companion line 3662.88 Å. U. ($^3P_2^3D_1$). C. C. KIESS

Intensities in the spark spectrum of oxygen. W. R. VAN WIJK. *Z. Physik* 47,

622-6(1928).—Measured intensities of lines in PP', PD and DD' multiplets of the doublet and quartet systems of O II are in close agreement with the theoretical values.

C. C. KIESS

The doublet components of H α in absorption. L. S. ORNSTEIN, F. ZERNIKE AND J. L. SNOEK, JR. *Z. Physik* **47**, 627-30(1928).—An exptl. procedure was devised for photographing simultaneously, with high resolving power, the components of H α as emitted by the longitudinal and transverse portions of the discharge tube. From the measured intensities of the lines it was found that, for different exciting currents, the lines observed longitudinally were broadened and were not so intense as when observed transversely. This is shown to be the result of absorption. The curves indicate equal absorption for both components, which is regarded as proof that the life of the two final levels of H α is of the same order of magnitude, and that one, 2^3S_1 , cannot be regarded as a metastable state as compared with the other, 2^3P_1 .

C. C. KIESS

A spectroscopic criterion for the benzenoid structure in some types of triphenylmethane derivatives. R. C. GIBBS AND C. V. SHAPIRO. *Proc. Nat. Acad. Sci.* **14**, 251-3(1928).—A study of the absorption spectra of various types of Ph $_3$ CH derivs., including benzenes, phthalenes, sulfonephthalenes, and fluoresceins, has revealed a definite regularity in those compds. known to be benzenoid or lactoid in structure. This consists of a pair of close absorption bands (in neutral alc. solns.) in the ultra-violet which are sepd. on the av. by about 100 m μ .⁻¹. Similar solns. of compds. known to be quinoid do not show the bands. A table presents a list of the compds. and the positions of their absorption bands.

C. C. KIESS

The spark spectrum of neon. H. N. RUSSELL, K. T. COMPTON AND J. C. BOYCE. *Proc. Nat. Acad. Sci.* **14**, 280-3(1928); cf. *C. A.* **22**, 1728.—A new series of Ne lines has been discovered which appear strongly only when the gas is excited by electron impacts at 80 v. The wave nos. of the new lines exhibit differences already known for the Ne II spectrum and lead to a classification of the lines as combinations between higher terms and the ground terms 2P_1 and 2P_2 with values 329647 and 330429, resp. A table contains values for quartet and doublet system terms now established.

C. C. KIESS

The origin of the spectrum of the glow phosphorous. H. J. EMBELUS AND H. R. PURCELL. *J. Chem. Soc.* **1928**, 628-30.—Some of the ultra-violet bands previously described (*C. A.* **21**, 2435) as originating in the mol. of some oxide of P appear to agree with bands of the singly ionized mol. of O observed by Johnson (*C. A.* **18**, 2469). It is concluded that the origin of the glow spectrum of P must be regarded as still unsettled, requiring more accurate and more extensive knowledge of the spectra than is now available.

C. C. KIESS

Composition of the Kundt displacements in absorption spectra with several maxima. P. VAILLANT. *Compt. rend.* **186**, 755-7(1928).—The absorption spectra of solns. of erythrosin and malachite green in H $_2$ O and benzene + alcohol were measured spectrophotometrically throughout the interval from 450 m μ to 700 m μ . Each exhibits two bands, those of erythrosin overlapping and being shifted together with change in solvent; those of malachite green being widely sepd. and shifting independently of each other as the solvent is varied. These facts should be of service in explaining the deviations from Kundt's law which are ordinarily attributed to a change in the nature of the absorbing particles as the solvent is changed.

C. C. KIESS

The absorption of carbon K radiation in carbon, nitrogen and oxygen. HEINRICH KURTZ. *Ann. Physik* **85**, 520-51(1928).—An exptl. procedure is described for detg. the absorption coeffs. of various gases for the soft K radiation of C by measuring directly the ionic current produced in the gas by the absorbed radiation. By proper dimensioning of the ionization chamber the ionic current is made proportional to the intensity of the incident radiation which emanated from a C deposit on the anti-cathode and was transmitted into the chamber through a thin celluloid membrane. The gases for which the mass absorption coeffs. were thus detd. were air, O, N, CO, CO $_2$ and C $_2$ H $_6$. From these were derived the atomic absorption coeffs. of O, N, C $_1$, C $_2$ and C $_3$, on the assumption that the same simple additive rule holds for them as for substances of higher at. no. when harder x-rays are used. The at. coeffs. may be represented by the formula $\alpha = 1.7 \times 10^{-23} \times Z^{4.4}$ where Z is the at. no.

C. C. KIESS

The polarization of the iron K α -ray. HANNS HAAS. *Ann. Physik* **85**, 470-82(1928).—The K α -ray of Fe is spectrally sepd. from the rays sent out by an Fe anti-cathode. It is unpolarized in the tension interval 12.6-7.4 kv.

M. F.

The band spectrum of water vapor. II. DAVID JACK. *Proc. Roy. Soc. (London)* **A118**, 647-64(1928).—The methods of analysis already applied to the H $_2$ O vapor band at 2608 A. U. (*C. A.* **21**, 3157) are here extended to the band at 3428 A. U. The analysis is based on new wave-length measurements. The band corresponds to the transition

$0 \rightarrow 1$ of the vibrational quantum no. New values of the moments of inertia of the mol. system concerned in the emission of all the bands have been calcd. and for the vibrationless state are $I_0' = 1.633$ and $I_0'' = 1.498$, in units of 10^{-40} gm. cm.² These correspond to nuclear sepsns. of $r_0' = 1.022 \times 10^{-8}$ cm. and $r_0'' = 0.979 \times 10^{-8}$ cm. C. C. K.

Studies in the behavior of hydrogen and mercury at the electrode surfaces of spectrum tubes. M. C. JOHNSON. *Proc. Roy. Soc. (London)* **A118**, 695-708(1928).—A series of expts on Doppler effects, on current and potential relations, and on cathode disintegration was performed to det. the effect of Hg on the positive rays of H. The predominance of the Hg spectrum over that of H, and the increase in rate of disintegration of the Al cathode, noted when the cathode is exposed to Hg vapor, are accounted for as follows. The presence in the discharge tube of a gas, Hg, liable to multiple ionization causes a more violent bombardment of the cathode, with the result that the protective film of oxide on the cathode is broken through and the occluded gases diffuse out. This diffusion is accompanied by a weakening of the Al structure and a consequent increase in cathode disintegration. The Hg is evapd. from the cathode material and on account of its greater ability to capture electrons its spectrum appears to dominate over that of H.

C. C. KIESS

Analysis of spectra arising from quadruply ionized tin, Sn V. R. C. GIBBS AND H. E. WHITE. *Proc. Nat. Acad. Sci.* **14**, 345-8(1928).—New wave lengths of Sn observed in the extreme ultra-violet with a vacuum spectrograph have been classified as combinations between 3F , 3D , 3P , 1F , 1D and 1P terms with a common 3D term of Sn V. The analysis was aided by the linear relation which exists between the terms arising from the same electron transition of the iso-electronic systems Pd, Ag⁺, Cd⁺⁺, In⁺⁺⁺ and Sn⁺⁺⁺⁺.

C. C. KIESS

Band fluorescence of mercury vapor. PETER PRINGSHEIM AND A. TERENIN. *Z. Physik* **47**, 330-43(1928).—An investigation by subjective photometry of the visible band fluorescence and by the spectroscope of the ultra-violet bands and line 2537 Å. U produced in Hg vapor by an uncooled Hg lamp and by an Al spark (λ 1854-1862 Å. U of the latter the effective radiation). The two sources produce the same fluorescence spectrum; the intensity of fluorescence produced by the Hg lamp does not increase as the square of the intensity of the exciting beam, which indicates that only 1 quantum of 2537 Å. U. radiation is required. At low pressure the fluorescence increases very rapidly with Hg pressure, then more slowly; the addn. of inert gases and of N₂ increases the intensity at low Hg pressure, but not at larger, addn. of very small amts. of H₂ and O₂ suppresses the fluorescence; the half value pressure for H₂, 3×10^{-3} mm., indicates an av. life for the excited state of some 10^{-9} sec. The visible fluorescence is accompanied by the emission of the line 2537 Å. U., whose behavior runs parallel to that of the band. The suggested explanation is that Hg mols., raised to a non-metastable excited state, undergo a transition on collision with a Hg atom or a foreign gas mol. to a metastable state, which is the same whether the initial excitation is produced by the Hg lamp or the Al spark. The energy of this state must be nearly 4.9 v., the atomic resonance potential. Whether this excited state loses its energy spontaneously after an av. life of about 10^{-9} sec., or whether a further collision must occur before emission can take place is not decided by these expts.

W. WEST

Luminescence of mercurous chloride of standard purity. J. KŘEPELKA. *Nature* **121**, 457(1928).—Pure and dry HgCl shows a greenish white luminescence when stirred with a dry glass rod. This phenomenon occurs in glass, porcelain or metal and lasts about 5 secs.; a clean rod is required to reproduce it. The dryness of the sample plays an important role. The phenomenon is not caused by elec. charge produced by rubbing, nor is it a case of phosphorescence or crystalloluminescence, since it is affected neither by a previous illumination nor by a perfect pulverizing.

A. L. HENNE

Photoluminescence of esculin solutions at low temperatures. J. STARKIEWICZ. *Bull. intern. acad. Polonaise* **1927A**, 459-71.—Investigation of photoluminescence of solns. has drawn attention to progressive phosphorescence. Certain analogies have been observed between phosphorescence and fluorescence spectra of benzene derivatives at ordinary temps. Phosphorescence was considered as a stage in the evolution of fluorescence phenomena, the important factor being variation in viscosity of solvent due to lowering of temp. The facts observed agree with the supposition that the duration of phosphorescence varied with the viscosity of the soln. and increased with decreasing mol. agitation. Thus there appears no essential difference between fluorescence and phosphorescence. Nevertheless it is not certain that it is possible to pass gradually from fluorescence to phosphorescence with fall in temp. Vavilov and Levisin did not find an intermediate state of relatively long duration between fluorescence and phosphorescence. Pringsheim and Vavilov found phosphorescence occurring at low

temps. in a sugar soln. is not polarized, while phosphorescence is partially polarized. Hence recent results on the effect of increasing viscosity on certain characteristics of luminescence are not favorable toward the hypothesis of a gradual transition from fluorescence to phosphorescence. Since phosphorescence and fluorescence spectra have now been found to be different in almost all cases, this too disagrees with the hypothesis. Owing to the occurrence of secondary phenomena at low temps. such as crystn., etc., which can exert a considerable influence on luminescence spectra, S employed anhydrous glycerol as a solvent. This has a relatively large viscosity at ordinary temps., which increases with reduction in temp., and at -80° gives a glassy solid. Photographic observations were made of the changes in luminescent spectra of glycerol solns. of esculin at -12° , -80° and at -180° . Luminescence was induced by an incandescent lamp and phosphorescence by the C arc and observed 0.005 sec. after excitation. Jongla plates of great sensitivity were used which could be sensitized by the use of "pinacol" and "pinacol" for green or red light. A Moll type registering microphotometer was used to study every photograph photometrically. Solns. of esculin probably possess two distinct phosphorescences. One is a large continuous band, the other consists of narrow bands which do not appear except at low temps. (liquid air). However, new work on the phosphorescence between -80° and -180° will show whether the maxima of the phosphorescence spectra at very low temps. may be considered as due to the evolution of phosphorescence spectra at -80° . A weak phosphorescence was noticed at -80° lasting for several seconds and an intense and more prolonged phosphorescence at -180° . Observations on the duration of luminescence confirm above conclusion.

S. I. B. ETHERTON

The yield of photochemical reactions with pulsating light. M. PADOA AND NERINA VITA *Atti II congresso naz. chim. pura applicata* 1926, 1256-S.—Substantially the same as C. A. 21, 2104; 22, 1913.

C. C. DAVIS

Remarks on the contribution "the photochemistry of chlorine" by F. Weigert and M. Nicolai. G. KORNFIELD. *Z. physik. Chem.* 132, 460-1 (1928); cf. C. A. 22, 1544.—K.'s objections referred to by Weigert (*Z. physik. Chem.* 108, 118 (1924)) did not refer to luminescence in itself but its general use on photochem. reactions sensitized by Cl_2 . Energy will not be transmitted by radiation. The sensitized reaction will take place just as little through isochromatic fluorescence as through short wave rays. It can be shown by simple calcns. that even with intensive radiation the no. of mols. brought to a higher electron level is much too low appreciably to decrease the no. of unaffected mols., and therefore their absorption; but on the other hand if the energy density is sufficiently great the no. of mols. may be considerable which may be changed from the stationary basic condition to one with a higher quantum no., for example, through local increase in temp. corresponding to the absorption. Kuhn (C. A. 21, 19) showed that the absorption at the convergence wave length (478 $\text{m}\mu$) must be assocd. with the single quantum vibration condition of Cl_2 because at the following convergence wave length the intensity is so low as to be covered up by the general radiation accompanying the above wave length. If at these places the 2 general radiations overlap, the transition probability for the stationary condition is not essentially greater than for the single quantum condition; therefore, increase in temp. cannot decrease absorption. An expt. is suggested to det. the temp. necessary to produce the observed effect.

O. A. NELSON

The photochemical synthesis of phosgene. JH. CATHALA. *J. chim. phys.* 24, 663-711 (1927).—Com. COCl_2 is purified over Cu amalgam subsequently decomposed thermally in a quartz tube, and exposed to radiation of a quartz mercury arc. C. demonstrates the poison effect of the presence of small quantities of CO_2 . COCl_2 is purified by fractioning in vacuum-tight app. to vapor pressure 554.9 mm. at 0° . The reaction velocities of photochem. reaction are shown to be identical with thermal reaction. The influence of varying amts. (0-21%) of CO_2 is studied; the retarding action is approximately linear for low concns. but apparently an inverse exponential function of CO_2 concns. for higher values. The retarding effect is considerably diminished for $\lambda < 3500$ A. U.; the influence may be due to CO_2 dissoen. with liberation of O_2 . At the temp. of Hg ebullition (357°) however, the retarding action of CO_2 disappears, similarly as in the thermal synthesis.

J. L. COSTA

The measurement of the kinetics, the quantum effect and the influence of light intensity on the reaction between chromic and several organic acids. A. K. BHATTACHARYA AND N. R. DHAR. *Z. anorg. allgem. Chem.* 169, 381-93 (1928); cf. C. A. 12, 111; 16, 4116; 17, 2520, 3837; 19, 925; 20, 3644.—The org. acids used in this investigation were citric, tartaric and lactic acids. The reactions were studied with or without MnSO_4 in the dark and in light (sunlight) at 30° , 40° and 50° . The reaction between citric acid and chromic acid in the dark is very slow and has a high temp. coeff. ($k_{40^{\circ}}/$

k_{300° is 3.8). In the light this coeff. is reduced to 1.05, which is in accord with the general rule. The order of the reactions is diminished in the presence of MnSO_4 or light. A large no. of mols. react for a quanta of energy, the no. increasing with increasing temp. and concn. This is in accordance with the fact previously noted that exothermic reactions do not obey the Einstein photochem. law. For the most light-sensitive reactions, such as citric and chronic acids, the velocity varies as the square root of the light intensity; for the others it is directly proportional to light intensity. A. FLEISCHER

Effect of radiation on the decomposition of ozone and nitrous oxide. J. H. HIBBEN. *J. Am. Chem. Soc.* 50, 937-40 (1928).—Exposure of N_2O at 883°K . to the infra-red radiation from a C arc which is transmitted through quartz or fluorite does not alter the rate of decompn., nor is the low-temp. heterogeneous decompn. of O_3 influenced by this radiation. It is concluded that mol. activation through the absorption of single or multiple frequencies seems improbable. W. W.

Kinetics of the action of iodine on potassium nitrite in the light and in the dark. A. BERTHOUD AND W. BERGER. *Helv. Chim. Acta* 11, 354-63 (1928).—In a study of the reaction, $\text{KNO}_2 + \text{I}_2 + \text{H}_2\text{O} \longrightarrow \text{KNO}_3 + 2\text{HI}$, in the presence of KI it was found that the course of the reaction could not be followed by titrating the unreacted I_2 with $\text{Na}_2\text{S}_2\text{O}_3$ in the presence of NaOAc . The error under certain conditions was as high as 50%. Titrations with 0.005 *N* As_2O_3 gave correct results. Mixts. of mono- and disodium phosphates repressed the H-ion concn. better than NaOAc . In the dark, the rate of reaction (k) is proportional to the concns. of I_2 and KNO_2 . The KI has a marked retarding action and the increase in I^- concn. corresponds to the decrease in the values for k . The temp. coeff. for a concn. of KNO_2 of 0.5-1 *N* and for a temp. of $45-60^\circ$ varies from 3.66 to 4.36 for a 10° rise in temp. In yellow light the velocity const. k_1 (corrected to represent the effect of light only) is large as compared to k and bears the same relation as k to the concn. of KNO_2 , I_2 and KI. In blue light k_1 is practically const. during the course of the reaction, it varies directly with the intensity of the light. The temp. coeff. ($35-45^\circ$) is 1.30. With violet light ($\lambda = 435 \mu\mu$) 22 quanta are required for one mol. of I_2 to react in a soln. contg. 0.1 mol. KI and 1 mol. KNO_2 . The reactions are presented as follows: (a) $\text{I}_2 + h\nu \longrightarrow 2\text{I}$, (b) $2\text{I} + \text{H}_2\text{O} \longrightarrow \text{HIO} + \text{H}^+ + \text{I}^-$; (c) $\text{HIO} + \text{I}^- \longrightarrow \text{I}_2 + \text{OH}^-$; (d) $\text{HIO} + \text{NO}_2^- \longrightarrow \text{NO}_3^- + \text{I}^- + \text{H}^+$; (e) $\text{I}_2 + \text{I}^- \longrightarrow \text{I}_3$. In the absence of light (a) and (b) become $\text{I}_2 + \text{H}_2\text{O} \longrightarrow \text{HIO} + \text{II}^+ + \text{I}^-$. J. S. REICHERT

The photochemical decompn. of hydrogen-iodide - mode of optical dissociation. BERNARD LEWIS. *J. Phys. Chem.* 32, 270-84 (1928), cf. *C. A.* 21, 1760; 22, 356.—Expts. with HI are carried out at pressures neighboring 0.1 mm., at which only 3.5% of mols. should collide during their mean life in an electronic excited state of the order of 10^{-7} sec. Bands 2080 A. U. and 2530 A. U. from a condensed zinc spark are selected by a quartz prism and lenses. A quartz reaction cell is used, the residual I_2 and HI being frozen by a trap and H_2 pressure measured by a MacLeod gage. Radiation measurements are affected by a sensitive galvanometer and a calibrated Moll thermopile with fluorite window. Results corrected for quartz absorption and cell area give mol. HI decompd. = 2.35 mol./*h.v.* The corresponding calcd. absorption coeffs. from Beer's law are 0.0427 and 0.0251 for $\lambda = 2080$ and 2530, of the same order as Warburg's 0.0270 and 0.0139 (cf. *C. A.* 10, 1299, 12, 2490). HI dissociates without collision as result of radiation absorption into a normal H atom and an excited I atom in the metastable 2P_1 state, any excess energy being dissipated as kinetic energy. The time between absorption and decompn. may be less than 2×10^{-10} sec. H. B. WEISER

Structure of the arc spectra of the elements of the nitrogen group. J. C. McLENNAN AND A. B. McLAY. *Trans. Roy. Soc. Can.* [3], 21, Sect. 3, 63-71 (1928)—A theoretical consideration of the arc spectra of N , P, As, Sb and Bi, which shows that the Pauli-Henisenberg-Hund theory is in agreement with the spectra observed. J. W. SHIPLEY

The photochemical decomposition of nitrous and nitric oxides. J. Y. MACDONALD. *J. Chem. Soc.* 1928, 1-14.— N_2O and NO at various pressures were illuminated by a condensed Al spark through a fluorite lens in a reaction vessel of quartz or glass with fluorite window. A series of runs was made with N_2O at 21-607 mm. pressure and $0-40^\circ$, time 2 to 66.5 min. and a number of runs with NO under less varied conditions. The wave lengths employed were 1860-1990 A. U. The decompn. proceeds $4\text{N}_2\text{O} \longrightarrow 2\text{NO} + \text{O}_2 + 3\text{N}_2$. The deduced quantum efficiency is calcd. to be 3.9 ± 0.3 and was fairly independent of temp. and pressure. The absorption coeff. increases 1.47 ± 0.05 times for each 10° rise in temp. 90% of the NO decomposes according to $2\text{NO} \longrightarrow \text{N}_2 + \text{O}_2$; 10% according to $3\text{NO} \longrightarrow \text{N}_2\text{O} + \text{NO}_2$. The quantum efficiency in this case is 0.73 ± 0.05 . Beer's absorption law holds for both gases, N_2O however absorbing more strongly than NO. Reaction mechanisms are proposed. J. L. COSTA

The influence of very low radiant energies on silver bromide; a contribution to the question: Is light undulatory or corpuscular? A. MARCH. *Z. Physik* **46**, 759-63 (1928).—The effect on the photographic plate of x-radiation of intensities calcd. to be less than one quantum per grain are studied. Hauff ultra-rapid plates are used and observations and calcs. based on grains of 3μ mean diam. A Coolidge tube with a W anticathode operating at 50 kv. and 1 milliamperes is employed as source and the plate in a Pb box is half exposed to the radiation at a distance of 3 m. Calcn. from input and radiant efficiency for $\lambda = 0.40$ A. U. sinusoidal wave form, gives $h\nu = 0.49 \times 10^{-7}$ ergs, and 5 to 6 quanta per sec. per grain area. With allowance for possible efficiency in secondary radiation effects, at least 10^{-1} secs. should be required to furnish 1 quantum per grain. M. exposed plates $1/80$, $1/60$, $1/40$ and $1/20$ sec., and compares unexposed and exposed portions. For $1/20$ sec., darkening is visible to the naked eye. In the case of expts. less than $1/20$ sec., darkened grains are counted under the microscope with use of a shield. Results: $t = 1/80$, exposed 16.3, unexposed 15.0; $t = 1/60$, 13.2, 11.4; $t = 1/40$, 19.5, 15.7. The results are inexplicable by undulatory theory; the acceptance of corpuscles must be inhibited by photoelec. and Compton effects. J. L. COSTA

Absorption of x- and γ -radiations and the secondary radiations which accompany them. DUC DE BROGLIE. *Brit. J. Radiology* (Roentgen Soc. Sect.) **23**, 55-62 (1927).—The therapeutic effect of any radiation is due to the energy absorbed, and depends to some extent on the wave length of the rays and the state of division of the cell, as well as on the intensity of the radiation. Absorption of radiant energy is accompanied by ionization of the absorbing material. A homogeneous beam of rays is transformed into a wide range of secondary radiation, all of longer wave length than the primary. Electrons liberated in the matter traversed produce the ionization to which therapeutic effects are attributed. As the wave length of the incident rays becomes less, the second method becomes more important. For a given wave length, heavier atoms in the medium will contribute a larger proportion of fluorescent effects. Thus in biol. material, with a predominance of light atoms, the few heavy ones will be the seat of greater absorption. Gamma rays, being relatively shorter than x-rays, are mostly absorbed by the second method. It is possible that there is also some kind of trigger effect in the action of radiations on living cells. E. H. QUIMBY

The basis of the selective chemical action of x-rays and light. LEWIS SIMONS. *Brit. J. Radiology* (Roentgen Soc. Sect.) **23**, 124-34 (1927).—In absorption of x-ray or light energy by atoms the significant thing is the displacement of electrons. Atoms in this transitory state can enter into chem. reactions with the surrounding atoms or mols. that were previously impossible. Electrons may be disengaged from atoms in 2 ways: (a) by impact of another electron or atom; (b) by the absorption of a light quantum. Simons investigates, from a phys. standpoint, the basis of any possible selective action that may occur in these complex processes between the energies available and the atoms absorbing them. In the case (a), only impact by electrons need be considered. It is shown that there is very little variation in the ionization produced by complete absorption of corpuscular radiation in a number of org. vapors, H_2 , air and SO_2 , that is, there is no selective action. In case (b) the actual no. of atoms included in the class will be very small in comparison to the other class. The generating beam of x-rays was made to vary in wave length over the crit. K-range for Ag. No selective change was observed in the average energy of the photoelectrons. The selective rise in absorption observed is due to an increase in the no. of atoms thus ionized. Since the mean energy required to ionize any atom is but a few volts, and the mean energy of the photoelectrons in the case of x-rays is several thousand, the primary ionization in which selective effects are shown will always be negligible in comparison with the total ionization, which includes ionization by impact. The author's conclusion is that to det. the activity of radiation on a mixed substance, all that need be known is the true absorption coeff. of the whole, then the chem. change will be proportional to the product of the absorption coeff. into the energy density of the x-rays at each point. The possibility of a "trigger action" of the radiation is mentioned. E. H. QUIMBY

MORTON, R. ALAN: **Radiation in chemistry.** London: Baillière, Tindall & Cox. 284 pp. 15s., net. Reviewed in *Chem. News* **136**, 239; *Chem. Trade J.* **82**, 406 (1928).

4—ELECTROCHEMISTRY

COLIN G. FINK

Electric heat-treating furnaces. H. TAMELE. *Siemens Z.* **8**, 162-71(1928).—A review of present practice in the construction and operation of elec. heat-treating equipment. Ni-Cr heating units are most generally used. The resistor "silit," having a carborundum-like compn plus some oxides and nitrides, is applicable to temp. up to 1300°. It is very resistant to corrosive gases but is as yet used only in small installations. C. G. F.

A test run on ferro-silicon in the electric furnace. ANON. *J. four élec.* **37**, 108 (1928).—The elec. arc furnace was of 4500 kw. capacity; 205 kg. of 45% ferro-Si were produced. Charge (in kg.) 225 SiO₂ (97% SiO₂); 102 steel scrap (98% Fe, 0.5 C, 15% FeO); 90 anthracite (8% ash); 43 charcoal (80% fixed C, 3.4% ash); 14 coke (90% fixed C, 7% ash). The ash of the coke and anthracite ran about half SiO₂. Electrode consumption, 11 kg. per ton of ferro-Si. 88% of the SiO₂ introduced into the furnace entered the alloy; the rest, 12%, was volatilized. Fe losses were 2%; C losses 33%; energy losses in transformers, 4%, in cables and contacts, 4%; radiation losses 20%; with volatile Si, etc., 9%, leaving 63% useful energy for chem. reactions. Total consumption of energy, 5,900 kw. for the 205 kg. of ferro-Si. C. G. F.

The magnesium industry. ANON. *J. four élec.* **37**, 112-3(1928).—A review with particular emphasis on costs. C. G. F.

The production of magnesium. RICHARD THIEWS. *Metallborse* **15**, 1350-51, 1406-7(1925); *J. Inst. Metals* **36**, 563—Various electrolytic methods are described. H. G.

The electrochemical production of ammonium phosphate. ANON. *J. four élec.* **37**, 115-6(1928).—A review. C. G. F.

The validity of Faraday's laws to currents due to ionization by collision. P. KOREKO AND I. KURCHATOV. *Compt. rend. Republ. Soviet* **1928**, 7-8(1928).—It has previously been shown by Kurchatov, *et al.*, that in an elec. field exceeding 2×10^6 v./cm. new "charges" arise due to collision. Whether these "charges" are ions or electrons had not been detd. Accordingly, K. and K. filled a glass bulb (soda glass) having 0.003 to 0.005-mm. wall, with 0.02 N Na₂SO₄ soln., surrounding the outer wall of the bulb with the same soln. The cathode (not divulged but probably Pt) was introduced into the little bulb. A coulometer was connected in series. The increase in Na ions in the bulb after the passage of definite amounts of current was in full accord with Faraday's law, the "new charges" are sodium ions. C. G. F.

Common defects in nickel deposits. D. J. MACNAUGHTAN. *Metal Ind.* (London) **32**, 326-7, 331(1928).—A general discussion of porosity, pitting, the effect of impurities and dirt, growths and spontaneous stripping or peeling. Factors influencing stripping are: the stress, the adhesion, and the causes of local rupture. Growths are caused by: the use of excessive c. d., or by the pressure of particles of impurities at the cathode surface during deposition. W. H. BOYNTON

Electrolytic pressure decomposer for the production of hydrogen and oxygen at high pressures without a compressor. J. E. NORRGERATH. *Z. Ver. deut. Ing.* **72**, 373-8(1928).—The app. described electrolyzes KOH under pressures up to 200 atm., the electrode compartments being arranged in such manner that no mixing of gases occurs, the O obtained having a purity of 99.1% and the H 99.9%. The gases are passed directly into cylinders. At high current densities the energy consumption is 3-3.5 kw. hr./cu. m., and very small space is occupied, a machine which will give 120 cu. m. per hr. taking only 2 sq. m. of floor space. As the pressure rises, the voltage required for decompn. drops from over 3 v. at 25 amp./sq. dm. at 1 atm. to about 2.5 v. at 100 atm., and about 2.4 v. at 1000 atm. H. STOERTZ

Electrosyntheses (of organic compounds). Z. YOVITCHITCH. *Bull. sci. acad. roy. Belg.* **13**, 365-70(1927).—Y. considers the phenomenon that hydrocarbons, either satd. or unsatd., on exposure to silent elec. discharge give condensed products whose C and H content total less than 100% or show a deficit. In some cases this change may be due to combination with O, N or H₂O, but in other cases it is due to the action of the discharge. Samples of C₂H₄ (I), C₆H₆ (II) and C₂H₂ (III) were exposed to elec. discharge for 18 to 40 hrs. The app. consists of 2 concentric glass tubes hermetically sealed and set in a cylinder filled with dil. H₂SO₄ (1:12). One Cu electrode dips in the cylinder and the other in the inner tube. The current is supplied by a Ruhmkoff coil with an interrupter of 1300 to 1400 interruptions per min. furnishing 130 to 140 v.

The C and H values of the condensation products were detd. microanalytically. Two l. of I after 32 hrs. exposure gave 1.67 g. of liquid condensate (IV), contg. 68.95% C and 10.26% H. IV after exposure to air for 8 hrs. gave 70.60% C and 10.41% H. II on exposure to the elec. discharge for 40 hrs. gave a black thick liquid contg. 87.91% C and 7.85% H. On exposure to air for 12 days it lost 9.7% by wt. A small amt. of solid was also isolated in the treatment of II and contd. 75.94% C, 6.78% H and 7.63% N. III after 18 hrs. gave a liquid contg. 76.81% C and 7.24% H. **The relation between the electrical energy and the deficit.** *Ibid* 371-6.—A series of hydrocarbons exposed to the elec. discharge from 20 to 40 hrs. give liquid or solid condensation products whose C and H content is less than the original material. This deficiency varies from 1 to 20% and is usually around 4%. This deficiency is believed to be due to the exposure to the so-called "electric rays." These rays are believed to be capable of building up or breaking down the molecules. It is possible that HCHO is formed from CO₂ and H₂O under their influence, or HCONH₂ from CO₂ and NH₃ or the higher hydrocarbons from the lower.

D. H. POWERS

Contact resistance. B. W. JONES. *Gen. Elec. Rev.* 30, 85-6(1927); *Science Abstracts* 30B, 299-300.—If Cu contacts increase abnormally in resistance, with attendant temp. rise and oxidation, the resistance and temp. will suddenly decrease almost to normal and then repeat the cycle. The sudden decrease in resistance may be due to the conversion of CuO to Cu₂O when a certain temp. is reached, there being an excess of Cu and a deficiency of air in the contact. When the temp. decreases the Cu₂O is gradually reconverted to CuO with the increase of resistance to an abnormal value. The initial value of the resistance of the working contact of contactors and circuit breakers is often from 5 to 20% of the total resistance of the device. A contact between two solid blocks is preferable to one between subdivided blocks because in the first case, the whole of the block conducts heat away from hot spots. The oxide film on Cu contacts may be removed by wiping or by arcking. Ag has a higher cond. than Cu and Ag₂O is a good conductor. The drawbacks of cost and inability to withstand arcing may be overcome by the use of auxiliary arcing tips and by using Ag only for facing the contacts.

W. H. BOYNTON

Refractories for the electric steel furnace (KOTHNY) 19. A new method of measuring overvoltage (BYRNÆ) 2.

ARENDT, MORTON: *Storage Batteries*. New York: D. Van Nostrand Co., Inc. 290 pp. \$4.50.

ELLIOTT, C.: *Electrolytic Alkali*. London: Ernest Benn. Price approx. 45 s., net.

WOGRINZ, ALFRED: *Die galvanotechnischen Bäder*. Berlin: M. Krayn. 123 pp. Paper, M. 9.

Electric battery. W. HADDON and J. M. BURNETT. *Brit.* 274,632, July 7, 1926. Structural features.

Dry cell electric battery. G. C. FURNESS. *Brit.* 274,907, July 23, 1926. The life and energy output are augmented by passing a low reversed current through the battery during its rest intervals.

Photoelectric cell. W. S. SMITH and N. W. McLACHLAN. U. S. 1,668,383, May 1.

Storage battery. W. HADDON and J. M. BURNETT. *Brit.* 275,010, July 7, 1926. Structural features.

Storage battery. F. E. HOLLEN. U. S. 1,668,404, May 1. Structural features.

Storage battery. OLDHAM & SON, LTD., and G. L. DARBY. *Brit.* 275,418, Aug. 11, 1926. Structural features.

Electrolyte for storage batteries. A. DEMBOWICK. U. S. 1,669,393, May 8. H₂SO₄ (1.835 sp. gr.) 82.5, water 75.5, powd. alum 1, Epsom salts 1, NH₄HSO₄ 1, Hg bisulfate 1 and glycerol 0.25 part.

Storage battery electrolyte. L. R. STEELE. U. S. 1,668,740, May 8. Na silicate or other sol. silicate is used with (NH₄)₂SO₄ and H₂O to form an aq. suspension for use instead of H₂SO₄ in batteries of the Planté type. U. S. 1,668,741 specifies substituting such an electrolyte in the battery after discharging a battery, contg. H₂SO₄ electrolyte, to a voltage of 1.7 per cell.

Storage battery plates. J. H. CALBECK and J. A. SCHAEFFER. U. S. 1,668,801, May 8. Durable porous plates of high capacity are formed with substantial quantities of fumed basic Pb sulfate and derivs. of the basic sulfate which are produced in the development of the plate.

Storage battery electrodes. W. HADDON and J. M. BURNETT. Brit. 275,392, July 7, 1926. Electrodes are pasted with a mixt. of lower oxides of Pb and a soln. of S in NaOH. After standing for 2-3 days, the electrode material is hardened by immersion in a mixt. of PbO_2 and H_2SO_4 or PbO_2 and a soln. of a sulfate such as that of NH_4 or Mg.

Electrode for luminous arcs. W. IRBY. U. S. 1,669,129, May 8. Electrodes are formed contg. ilmenite, chromite, magnetite, NaF and LiF.

Anodes for electroplating. A. P. MUNNING & Co. Brit. 275,359, May 26, 1926. Anodes for depositing metal, e. g., Ni, are formed so that the crystals making up the major active portions of the anode are substantially perpendicular to the main path of current travel at each point.

Casting metal crowns on hollow carbon electrodes. T. POGANY and E. BAGOTA. Brit. 274,735, Jan. 28, 1927. Mech. features.

Electrodeposition of thin easily separable metal layers. E. BREUNING and O. SCHNEIDER. Brit. 275,221, July 27, 1926. Thin separable layers of Ni, Co, Fe or other metals are produced by electrodeposition, the surface being rendered passive after each deposition, e. g., by treatment with concd. HNO_3 or chromic acid soln. or by electrolytic treatment in a 5% NaOH soln. To facilitate sepn., the layers may be treated with a 0.1% H_2SO_4 soln. to generate H between the layers.

Electrodeposition of copper, etc. H. E. SUNDBERG. Brit. 274,477, July 13, 1926. An electrolyte contains Cu_2Cl_2 or other cuprous halide, a chloride or other halide of an alkali or alk. earth metal or of NH_4 and a third substance which increases the cathode potential such as gelatin or peptone or org. amino-, quinone-, aromatic or aliphatic compds. or their derivs. or alkaloids or dyes. Alloys of Cu with Zn, Sn or Ni may be similarly deposited from baths of mixed salts.

Electrodeposition of chromium. R. APPEL. Brit. 274,882, July 21, 1926. The electrolyte comprises chromic acid or an acidified soln. of a chromate, to which is added a small quantity of a borate or iodate. Anodes of sheet Pb are used. Cf. C. A. 22, 358.

Electrodeposition of chromium, etc. C. G. FINK. Brit. 275,223, July 27, 1926. In deposition of Cr or other metal requiring a high c. d., current is passed from an anode to a portion only of the object to be plated at a time while other parts are protected from oxidation by the electrolyte or by H or by both. An app. is described.

Electrodeposition of chromium, etc. H. E. SUNDBERG. Brit. 274,913, July 24, 1926. Cr is deposited from a soln. of Cr compds., which may be in different states of oxidation, in water, glycerol or pyridine. Oxycompds. contg. H, B, C, Si, N, S, Se, Te or P may be used, such as fluoborate, fluosilicate or selenate. Bromo-chromate or iodo-chromate also may be used and Al, Mg or other metal compds. may be added to enable use of a low c. d. Numerous details and modifications are described and the process is stated to be suitable also for deposition of metals of groups IV to VII, e. g., deposition of Ta from a partially reduced tantalate and also of alloys or anodic pptn. of oxides.

Apparatus for electroplating articles carried by conveyers through the plating bath. H. GÖTHE. Brit. 274,671, Sept. 14, 1926.

Electric induction furnace. P. H. BRACE. Brit. 275,189, July 27, 1926.

Electric induction furnace. R. DUFOUR. Brit. 275,611, Aug. 4, 1926.

Electric induction furnace. SIEMENS & HALSKE AKT.-GES. Brit. 274,888, July 24, 1926.

Electric induction furnace. SIEMENS & HALSKE AKT.-GES. Brit. 275,249, July 29, 1926. A modification of the furnace described in Brit. 274,888 (preceding abstr.)

Electric induction furnace. J. M. WEED. U. S. 1,669,109, May 8.

Electrolytic rectifier. W. MORRISON. U. S. 1,668,863, May 8. One electrode is formed of a filming metal such as Al and the other electrode is formed of an alloy of a filming metal and a noble metal, e. g., an alloy of Al and Au. These may be used with an electrolyte such as H_3PO_4 or phosphate or Na, K or NH_4 . Cf. C. A. 22, 196.

Rectifiers for alternating electric currents. D. G. ACKERLY. Brit. 275,152, July 29, 1926. A Cu blank is oxidized to produce Cu_2O and the oxidized blank is then heated in an atm. contg. little or no O to improve the crystal structure of the oxide layer.

Current-rectifying material. E. R. GILL. U. S. 1,668,201, May 1. A rectifying material such as Fe pyrites is moistened with water or a dil. acid and an elec. current is passed through its surface to render the more sensitive areas visible.

Electric resistances. S. LOEWE. Brit. 274,505, July 19, 1926. A soln. of colloidal C contg. a protective colloid is sprayed on a glass support and the deposit may be heated to 420° for 15-30 min. to form a resistance suitable for use in "multiple valves."

Tubular electric resistance heating unit. C. C. HARPSTER and W. R. KING. U. S. 1,667,857, May 1. A coil which may be formed of nichrome is packed, both within and without the coil, with material such as Mg which expands on oxidation and this material is then oxidized.

Electric conductors for overhead wires, etc. FELTEN & GUILLEAUME CARLSWERK, AKT.-GES. Brit. 275,322, May 3, 1926. Cores of non-magnetizable or only slightly magnetizable alloy such as an Fe alloy contg. Ni and which may also contain Mn and Cr are used for central supporting strands carrying cond. wires of metal such as Cu, bronze or Al.

Protecting oil-filled electric transformers. AKT.-GES. BROWN, BOVERI, ET C^{IE}. Brit. 274,495, July 16, 1926. A fuse or like device is placed in the oil at the spot where a gas bubble would form by overheating and this fuse serves to give a warning signal or to operate a safety device.

Apparatus for purifying oils, etc., by electric treatment. F. J. SIMINGTON. U. S. 1,667,954, May 1.

Acetylene and carbon black, etc. C. LONGHILL. Brit. 275,281, March 1, 1926. A liquid hydrocarbon oil is decompd. to form C_2H_2 and C black by the action of an arc which is formed within the liquid and which, by rotation of the electrode, is caused to elongate and is then quenched, a second arc is struck at the point where the first arc was formed. An app. is described.

Apparatus for pasteurizing milk or for other similar electric treatment of liquids. F. F. VAN TUYL. U. S. 1,668,293, May 1.

Forming filaments of tungsten or similar metal. M. HAUSCHILD and W. BERGER. U. S. 1,668,016, May 1. Ready-formed long-crystal wire such as W is bent over a mandrel of triangular or other non-circular shape and allowed to relax after removal from the mandrel and before mounting in a lamp.

Carbon for lamp filaments or other purposes. A. LEDERER. Brit. 274,883, July 21, 1926. C compds. such as CS_2 are decompd at temps. of 1100–1750° (preferably about 1600–1700°) to obtain a black C which is hard, coherent and brittle. Various details are given.

5—PHOTOGRAPHY

C. R. K. MEES

Notes on the technic of the photographic industry. P. ZANEN. *Ingénieur chimiste* 16, 19–21 (1928).—Brief outline of the coating and application of the emulsion to photographic paper.

A. PAPINEAU-COUTURE

The influence of low radiant energies on AgBr (MARCH) 3.

Films for color photography. R. BERTHON. Brit. 274,837, July 20, 1926.

Cemented multicolor cinematographic films. J. E. THORNTON. Brit. 275,331, May 5, 1926.

Color screen for color cinematography. CHROMO FILMGES. Brit. 274,804, July 22, 1926.

Uniting various layers of photographic sensitive material with supporting and reinforcing layers. J. E. THORNTON. Brit. 274,591, May 6, 1926.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Reform of the nomenclature of inorganic chemistry. Report by MARCEL DELÉPINE. *Bull. soc. chim.* 43, 289–300 (1928).—Definitive decisions of the Committee of the International Union of pure and applied Chemistry on this subject are stated as follows: *I. Classification for indexes.*—For formula indexes, the system used by C. A. is adopted. In word indexes the name of the metal or positive group should come first. *II. Indication of valence.*—The valence of elements in names of compds. is indicated by Roman numerals; as, antimony-III sulfide, Sb_2S_3 . Formular names may also be used; as diantimony trisulfide (or, for indexes, antimony-2-sulfide-3). *III. Writing of formulas.*—This will harmonize with the spoken language (SO_4K_2 in French, K_2SO_4 in English) but should be consistent. For compds. of metalloids the order of increasing negativity is fixed

as: Si, C, Sb, As, P, N, Te, Se, S, I, Br, Cl, F, O. IV. *Oxygen acids*.—The customary names of 37 common acids are recognized. "Anhydride" names should be reserved for oxides that form acids with water (but these may also be named as oxides). V. *Names of salts*.—The usual endings -ate, -ite and -ide are retained. Acid salts are named from the number of unreplaced hydrogen atoms of the acid; *e. g.*, $\text{Ca}(\text{H}_2\text{PO}_4)_2$ is diacid calcium phosphate or (in English) dihydrogen calcium phosphate or even dihydrocalcium phosphate. Superacid salts will be named thus: hydrofluoric potassium fluoride, KHF_2 ; or designated as superacid salts, the formulas being stated. VI. "*Acid*" and "*basic*."—The adjectives "monoacid," "diacid," "triacid," etc., are reserved for acids and "monobasic," "dibasic," etc., for bases. To avoid "diacid acid," "monobasic base," etc., the nouns "diacid," "monobase," etc., may be used. VII. *Water in compds.*.—"Hydrate" should not be used to mean "hydroxide." VIII. *Complex compds.*.—Modifications of the Werner naming are approved but not finally adopted. These include use of Roman numerals instead of special endings to indicate valence, substitution of "ammonio" for "ammino," placing the name of the central metal first in the name of the complex ion, etc. IX. *Sulfur compds.*.—The prefixes thiono, thiol and thio will be used as in organic names. The names dithionic, trithionic, etc., are retained. "Thiosulfuric" (not "hyposulfurous") and "thiosulfate" (not "hyposulfite") should be used for $\text{H}_2\text{S}_2\text{O}_4$ and its salts. The sulphydrates, MHS, should be called acid sulfides [in English they may be called hydrosulfides.—ABSTR.]. X. *Basic salts and salts of complex acids*.—For the present general names, as basic sulfate, basic nitrate, accompanied by the formulas, will suffice for basic salts, though no objection is seen to such names as lead hydroxyacetate, $\text{Pb}(\text{OH})\text{C}_2\text{H}_3\text{O}_2$, and mercury-II trioxydichloride, $\text{Hg}_2(\text{O})_2\text{Cl}_2$. The consideration of complex acids, such as phosphotungstic, is postponed.

AUSTIN M. PATTERSON

Contributions to the study of the rare earths. ERNST WILKE-DÖRFURT and OTTO SCHLIEPHAKE. *Z. anorg. allgem. Chem.* 170, 129-44 (1928).—The sepn. of Pr from La has been accomplished by the basic fractionation of their perchlorates in the presence of NH_4OH and without the aid of auxiliary metallic ions (cf. Prandtl, *C. A.* 19, 1826). In the presence of Cd ions the sepn. is somewhat better than that of the nitrates. Rose-colored $\text{Nd}(\text{ClO}_4)_3 \cdot 6\text{H}_2\text{O}$ was prepd. by dissolving the oxide in HClO_4 . At 170° the hydrate loses most of its water of crystn. and becomes exceedingly hygroscopic. The complex antipyrine salts of the rare earths were also studied with a view of obtaining stable water-free compds. of which the soly differences would permit sepn. of the earths. These were prepd. by mixing in soln. the calcd. quantities of the respective nitrates, antipyrine and HClO_4 or NH_4ClO_4 . The following hexaantipyrine perchlorates were obtained (the soly. is given in g. per 100 cc. of soln. at 20°): lanthanum ($\text{La}[(\text{COC}_6\text{H}_4\text{N}_2)_6](\text{ClO}_4)_3$), colorless hexagonal crystals, m. $290-5^\circ$ (decompn.), soly. 1.48; neodymium, rose-colored hexagonal crystals, m. $285-9^\circ$ (decompn.), soly. 0.98; cerous, colorless hexagonal crystals, m. $295-300^\circ$ (decompn.), soly. 1.07; praseodymium, green hexagonal leaflets, m. $286-91^\circ$ (decompn.); and yttrium, colorless hexagonal crystals, m. $293-6^\circ$ (decompn.), soly. 0.55 g. The following complex hexaantipyrine iodides were made by adding the calcd. amt. of antipyrine to aq. solns. of the respective iodides. cerous, large yellow crystals, m. $268-70^\circ$ without decompn., soly. 13.12; lanthanum, yellow crystals, m. $268-9^\circ$ (decompn.), soly. 29.5; neodymium, rose-colored crystals, m. $270-2^\circ$, soly. 11.3, and yttrium, colorless crystals, m. $280-2^\circ$, soly. 4.44. The salts were analyzed by heating with H_2SO_4 and weighing the sulfate, and by measuring the vol. of N given off when decompn. occurred. The stabilizing influence of antipyrine was shown by heating the cerous antipyrine perchlorate with water to 150° in a bomb tube for 4 hrs. On cooling the substance repptd. unchanged. An improved method for prepng CeI_3 is slining CeO_2 (small excess) and I_2 in water and treating with H_2S to complete decolorization.

H. F. JOHNSTONE

Note on the formulation of Lothar Wohler's conception of sub-compounds. ALFRED HETTRICH. *Z. anorg. allgem. Chem.* 170, 107-8 (1928).—Silver subfluoride is considered an example of the deposition of a salt in a metal, *i. e.*, AgF in Ag (cf. Brody and Millner, *C. A.* 22, 1924). When shaken with Hg at $200-300^\circ$, silver subfluoride apparently dissolves. The mixt. solidifies on cooling and with water produces Ag ions. H. views the action as the possible formation of an amalgam of AgF .

H. F. J.

The binary system: Mn_2SiO_4 - Ca_2SiO_4 . L. TOKOVY. *Z. anorg. allgem. Chem.* 169, 51-6 (1928).—The conclusion of Kallenberg (cf. *C. A.* 8, 3281) that the components of this system form an isodimorphous series and that the m.-p. curve is of the Bakhuis-Roozeboom type III has been confirmed. SiO_2 , CaCO_3 and Na_2CO_3 were well mixed in a mortar, formed into cylinders and sintered at $800-1000^\circ$ in an atm. of N in a resistance furnace. The sintered mass was first pulverized then and melted in a graphite crucible

in an atm. of N. Crystals formed during a period of 1-1.5 hrs. at a practically const. temp. The m. ps. were detd. on thin sections on Pt foil on the stage of a microscope; for high Ca content an optical pyrometer was used. A continuous m.-p. compn. curve is obtained with a min. (1160°) at 90 mol. % Mn_2SiO_4 and 10 mol. % Ca_2SiO_4 . The mixed crystals are rhombic Mn_2SiO_4 with γ Ca_2SiO_4 . They have a prismatic habit and cleavage, belong to the rhombic system, are biaxial, show parallel extinction and are optically negative. For pure artificial Mn_2SiO_4 d. = 4.05; 50 mol. % mixed crystal d. = 3.39; pure Ca_2SiO_4 exists in 3 forms: α d. = 3.27, m. p. 2080°; β d. = 3.28 (approx.), stable 675-1410°; γ d. = 2.97, stable at low temps. The α and β forms change to γ spontaneously on cooling.

E. R. SCHERZ

A practical application of the system: $\text{Na}_2\text{O}-\text{Al}_2\text{O}_3-\text{SiO}_2$. W. FISCHER. *Keram. Rundschau* 34, 849(1926); *J. Soc. Glass Tech.* 11, 145A.—In the triangular diagram $\text{Na}_2\text{O}-\text{Al}_2\text{O}_3-\text{SiO}_2$ the isothermals 1100°, 1200° and 1300° were inserted from analysis of published data on this system. From the diagram a table of mixts. melting at these temps. was drawn up.

H. G.

Water of crystallization of calcium citrate and the manner in which it is eliminated at different temperatures. FILIPPO PERCIABOSCO. *Atti II congresso naz. chim. pura applicata* 1926, 1368.—Expts show that data in the literature on the loss of H_2O from Ca citrate are erroneous (cf. Villavecchia, *Chimica analitica* 1, 130; Beilstein, *Handbuch der organischen Chemie* 3, 564, *Gazz. chim. ital.* 2, 489(1899)). Ca citrate loses all 4 mols. of H_2O of crystn. at 1:8-40° and turns yellow and begins to decomp. at 175-85°.

C. C. DAVIS

The thermal decomposition of the hydrates, nitrates and oxide of aluminum. N. PARRAVANO AND G. MALQUORI. *Atti II congresso naz. chim. pura applicata* 1926, 1131-4.— $\text{Al}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ is formed when $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ is maintained at ordinary temp. over P_2O_5 in *vacuo*, or by repeated treatment of $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ with hot HNO_3 . $\text{Al}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ has already been prepd. in other ways (cf. Inamura, *Mem. Coll. Sci. Kyoto* 4, 105(1919), *C. A.* 14, 2451). A new hydrate, $\text{Al}(\text{NO}_3)_3 \cdot 4\text{H}_2\text{O}$, was prepd. by maintaining $\text{Al}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$ in contact with excess N_2O_5 at ordinary temp. for 12 hrs. It remains unaltered up to 180°, at which temp. it decomps. to Al_2O_3 , N_2O_5 and H_2O . The thermal decompn. curve of $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ showed breaks at 73.5°, 140° and 200°, corresponding to fusion and conversion to $\text{Al}(\text{NO}_3)_3 \cdot 6\text{H}_2\text{O}$, to decompn. of the latter to the basic salt, $4\text{Al}_2\text{O}_3 \cdot 3\text{N}_2\text{O}_5 \cdot 14\text{H}_2\text{O}$, and to decompn. of the latter to Al_2O_3 . The curve of $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$ showed breaks at 122° and at 180°, the latter corresponding to decompn. of Al_2O_3 . $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$ behaves differently. At 105° it becomes anhydrous and at 760° the $\text{Al}_2(\text{SO}_4)_3$ decomps. to Al_2O_3 and SO_3 . Samples from various sources of Al_2O_3 contg. different proportions of H_2O of hydration were then heated, and the curves were compared with those of gibbsite, diaspore and bauxite. The results were complicated and difficult of interpretation but indicate that the breaks in the curve which were observed were caused by the formation of lower hydrates of definite chem. compn. and (2) by adsorption phenomena.

C. C. DAVIS

Glasses from sodium metaphosphate with oxides of lead, cadmium and manganese. FELICE DE CARLI. *Atti II congresso naz. chim. pura applicata* 1926, 1146-50.—The systems NaPO_3-PbO , NaPO_3-CdO and NaPO_3-MnO were studied by detg. the temps. of devitrification by a method already described (*C. A.* 20, 1963). Mixts. rich in PbO are cryst. and yellow; toward 60% PbO they are still cryst. but are white, and below 50% PbO the fused products do not crystallize but form vitreous masses sol. in warm very dil. HNO_3 . The diagram of state shows a max. at 950° with sepn. of the compd., NaPbPO_4 . Above this % NaPO_3 the temp. of devitrification decreases rapidly to 600°, then increases with the sepn. of the compd., $\text{Na}_2\text{PbP}_2\text{O}_7$, then decreases to a min. at 350° and finally increases to 600° for NaPO_3 . Between 650° and the eutectic the curve changes its slope abruptly at a point corresponding to the compd., $3\text{NaPO}_3 \cdot \text{PbO}$, (cf. *Z. anorg. Chem.* 9, 229(1895); 12, 444(1896)). CdO dissolves with difficulty in NaPO_3 , and no data were obtained above 40% CdO . The glasses are colorless and devitrify readily, and the diagram of state is similar to that of $\text{PbO}-\text{NaPO}_3$. The min. is at 380° and the max. at 580° for a mixt. contg. 37% CdO . In this zone the reactions of $\text{H}_2\text{P}_2\text{O}_7$ are positive. MnO gives glasses of a dark violet color, which easily devitrify with formation of violet cryst. masses. Because of the infusibility of MnO , mixts. rich in the latter could not be prepd. Qual. tests proved the sepn. of a mixed pyrophosphate and a mixed orthophosphate. The results show that NaPO_3 forms orthophosphates and metaphosphates with metallic oxides, and that glass beads owe their colors to the formation of pyrophosphates.

C. C. DAVIS

The crystallization of lead oxide-silica glasses. FELICE DE CARLI. *Atti II congresso naz. chim. pura applicata* 1926, 1141-5.—The system $\text{PbO}-\text{SiO}_2$ was studied

by a method already described (C. A. 20, 1963), temps. up to 1300° being used. The results are shown in tabular and diagrammatic form. The temps. of devitrification correspond to the zone of max. velocity of crystn. and furnish data which are more precise than those of the beginning of crystn., which are too much influenced by supercooling (cf. Hilpert and Nacken, C. A. 5, 40). The data obtained allow the construction of a diagram of state showing the individual compds. and the zones of concn. corresponding to mixts. having the max. tendency to devitrify and therefore to be avoided as components of smalts. At the max. points of the diagram the velocities of devitrification are much greater than at the min. points, and while in the former case abundant crystn. occurs in a short time, in the latter case traces of crystn. appear only after several days. The results confirm the existence of the ortho- and metasilicate and also show the existence of the compd., $\text{PbO} \cdot 2\text{SiO}_2$. Contrary to Hilpert and Nacken (*loc. cit.*) there was no evidence of the compd., $3\text{PbO} \cdot 2\text{SiO}_2$. Mixts. contg. 100–90%, 85–80% and 76–72% PbO are the most readily fusible, with the least tendency to devitrify. $\text{PbO} \cdot \text{SiO}_2$ has a max. velocity of devitrification around 1000° where the glass has hardly begun to soften.

C. C. DAVIS

The systems: $\text{NaPO}_3\text{-MoO}_3$ and $\text{NaPO}_3\text{-WO}_3$. FELICE DE CARLI. *Atti II congresso naz. chim. pura applicata* 1926, 1151–5.—The same method was used as before (cf. preceding abstr.). MoO_3 and WO_3 dissolve easily in fused NaPO_3 , giving glasses which devitrify without difficulty except with mixts. near the min. point, in which zone crystn. is slow. A pale green color with MoO_3 is due to partial reduction, but tests with KMnO_4 showed that this reduction is insignificant. Even this reduction may be avoided by fusion in an O atm. With small proportions of NaPO_3 the temp. decreases from 790° (MoO_3) to a min. at 540° for 25% NaPO_3 , then increases to a max. of 600° corresponding to the compd. $\text{MoO}_3 \cdot \text{NaPO}_3$, then decreases to a second min. at 320° and finally increases to 600° (NaPO_3). $\text{MoO}_3 \cdot \text{NaPO}_3$ dissolves easily and completely in hot water, the soln. giving the reactions of orthophosphates. The formula is probably $\text{Na-O-MoO}_3\text{-O-P-O}_2$. With WO_3 the glasses contg. not too much WO_3 are colorless, but with high proportions of WO_3 they are sometimes blue, owing to slight reduction. The max. is at 850° , corresponding to the compd. $\text{WO}_3 \cdot \text{NaPO}_3$ which is white and cryst. Because of the difficulty of fusing WO_3 , no mixts. contg. over 75% WO_3 were prepd. The min. is at 350° for a mixt. contg. 30% NaPO_3 .

C. C. DAVIS

Formation and stability of inorganic complexes in solution. P. JON. *Ann. chim.* 9, 113–203(1928); cf. C. A. 21, 2230—J. has made a study of a no. of "imperfect" complexes, i. e., those which in soln. are in mobile equil. with their constituents. The method used was the so-called method of continuous variations. Since in using this method the property to be measured should be additive, J. chose to study the absorption of light by solns. of the complexes. The method enables one to det. the formula of the complex formed by the mixt. of the two solns. and also to evaluate the equil. const. corresponding to its formation. The results of J.'s study indicate the existence of the following complexes: K_2CdI_4 , K_2CdBr_4 , KI_3 , KBr_3 , KClI_2 , KClBr_2 , KBrI_2 (a little more stable in EtOH than in H_2O), KHgCl_3 , K_2HgBr_4 , K_2HgI_4 , $\text{Ag}(\text{NH}_3)_2^+$, $\text{Ag}(\text{C}_2\text{H}_7(\text{NH}_2)_2)_2^+$, $\text{Ag}(\text{Et}_2\text{NH})_2^+$, $\text{Ag}(\text{EtNH}_2)_2^+$, $\text{Ag}(\text{Me}_2\text{NH})_2^+$, $\text{Ag}((\text{CH}_2)_6\text{N}_4)_2^+$. These Ag complexes are stable only in the presence of a sufficient excess of NH_3 or the amine. In more dil. soln. three of the amines form monoamine complexes: $\text{Ag}(\text{EtNH}_2)^+$, $\text{Ag}(\text{C}_2\text{H}_4(\text{NH}_2)_2)^+$ and $\text{Ag}((\text{CH}_2)_6\text{N}_4)^+$. Other complexes obtained were $\text{Cu}(\text{NH}_3)_4^{++}$, $\text{Cu}(\text{C}_2\text{H}_4(\text{NH}_2)_2)_2^{++}$, TiNH_3^+ , $\text{Ti}(\text{C}_2\text{H}_4(\text{NH}_2)_2)^+$. The Ti complexes are not very stable. The equil. const. corresponding to the formation of each complex is given.

LOUISE KELLEY

Cobaltic fluoride hydrate. G. A. BARBIERI AND F. CALZOLARI. *Z. anorg. allgem. Chem.* 170, 109–10(1928).—The authors hold that the work of Birk (C. A. 22, 922) forms a confirmation and completion rather than a correction of their (1905) work on cobaltic fluoride hydrate. They detd. only the ratio Co:F since their product was not completely dry. Their data for wt. % of Co and F are only slightly less than those required for Birk's formula, $\text{Co}_2\text{F}_6 \cdot 7\text{H}_2\text{O}$.

H. F. JOHNSTONE

A new method for the preparation of thiophosphoryl chloride. REMO DE FAZI. *Atti II congresso naz. chim. pura applicata* 1926, 1293–4.—Among at least 8 methods for prep. PSCl_3 described in the literature, that of Baudrimont (*Compt. rend.* 53, 468(1861)) seems the most practical, and yet it is not wholly satisfactory. The new method involves the direct reaction of CCl_4 and P_2S_6 , thus: $3\text{CCl}_4 + 2\text{P}_2\text{S}_6 \longrightarrow 4\text{PSCl}_3 + 3\text{CS}_2$. By varying the proportions of the reagents, the temp. and the time, it was found best to heat 220 g. of CCl_4 with 250 g. of anhyd. P_2S_6 in a closed tube at $180\text{--}200^{\circ}$ for 2 hrs. About 150 g. of PSCl_3 is obtained (60% yield).

C. C. DAVIS

A new molybdenum compound: the phospho-ceruleomolybdic conjugate of Denigès. A. VERDA. *Pharm. Acta Helv.* 3, 4-9(1928); cf. *C. A.* 21, 2442.—V. examd. the dictum of D. that whenever MoO_3 is reduced in the presence of phosphate ion, the ceruleo compd. (A) is formed, not the ordinary blue compd., $4\text{MoO}_3 \cdot \text{MoO}_2$ (B). Blue colorations by reduction of *phosphomolybdic acid* (5 g. of Na phosphomolybdate + 80 cc. H_2O + 7 cc. concd. HNO_3 ; cf. D.) with Zn, etc., have been obtained before by V. (*Thesis*, Lausanne, 1905), but no Et_2O -soly. test was then applied. V. now finds that most of the blue colors obtained by him failed to pass into Et_2O soln., except when Al, Sn or Pb is employed as reducing agents.¹ The intensity of the blue color in Et_2O decreases in the order of the metals named. It is notable that with Al, no heating is required in V.'s process to produce the Et_2O -sol. blue color. Conclusion: A being somewhat unstable, it is formed only under very special conditions of reduction which D. has correctly seized. When B is formed, the Et_2O remains colorless, except when certain org. reducing agents, e. g., PhNH_2 , $\text{C}_6\text{H}_4(\text{OH})_2$, etc., are employed; then the Et_2O solns. may present a veritable scale of color reactions.

S. WALDBOTT

Isomorphism relations between the hexachloro salts of pyridine with cerium, thorium, tin, lead and quadrivalent titanium: $(\text{C}_5\text{H}_5\text{NH})_2\text{XCl}_6$. V. CAGLIOTI. *Atti II congresso naz. chim. pura applicata* 1926, 1182-93.— $(\text{C}_5\text{H}_5\text{NH})_2\text{CeCl}_6$, prepd. by the method of Koppel (*Z. anorg. Chem.* 28, 305(1898)), had d_{18} 1.901. The microcrystals are probably monoclinic, and decomp. on exposure to air. $(\text{C}_5\text{H}_5\text{NH})_2\text{SnCl}_6$, prepd. by the method of Weinland and Barnes (*C. A.* 4, 879), had d_{18} 1.830. The crystals are probably monoclinic. $(\text{C}_5\text{H}_5\text{NH})_2\text{ThCl}_6$, prepd. by the method of Rosenheim and Schilling (*Z. anorg. Chem.* 35, 426(1903)), had d_{18} 2.148. The crystals are very deliquescent and could not be measured. $(\text{C}_5\text{H}_5\text{NH})_2\text{PbCl}_6$, prepd. by the method of Guthrie and Wissmüller (*C. A.* 9, 1014), had d_{18} 2.070. $(\text{C}_5\text{H}_5\text{NH})_2\text{TiCl}_6$, prepd. by the method of Rosenheim and Schlutte (*Z. anorg. Chem.* 26, 239), was so unstable in air that neither its d. nor its crystallographic characteristics could be detd. These compds. were chosen to study the formation of isomorphous mixed crystals because of the difficulty of prep. $(\text{NH}_4)_2\text{CeCl}_6$ (cf. C., *C. A.* 20, 2025). From SnCl_4 and CeCl_4 were obtained 3 series of *mixed crystals* which contained 3.25, 16.81 and 35.64% of $(\text{C}_5\text{H}_5\text{NH})_2\text{CeCl}_6$, resp., had d. 1.835, 1.845 and 1.855, resp., and were of a pale yellow, yellow and golden yellow color, resp. The method of Zambonini (*C. A.* 18, 947) was used to prove that all 3 crystals were true solid solns. The sp. vols. calcd. from the d. showed that the Retgers law was valid. The great difference in soly. between CeCl_4 and PbCl_4 was an obstacle in obtaining mixed crystals. One type of *mixed crystal* was obtained, which contained 14.39% $(\text{C}_5\text{H}_5\text{NH})_2\text{CeCl}_6$, d_{18} 2.041, and the color of which was between the colors of the components. Here the Retgers law held true. Because of the instability of $(\text{C}_5\text{H}_5\text{NH})_2\text{TiCl}_6$, mixed crystals of this and $(\text{C}_5\text{H}_5\text{NH})_2\text{CeCl}_6$ were prepd. by cong. a mixed soln. of the 2 salts and then adding $\text{C}_5\text{H}_5\text{NHCl}$. One type of *mixed crystal* was obtained, which contained 11.68% $(\text{C}_5\text{H}_5\text{NH})_2\text{TiCl}_6$. Its d. could not be detd., but it was orange-yellow and microcryst. From ThCl_4 and SnCl_4 were obtained 2 series of *mixed crystals* which contained 8.81 and 90.32% $(\text{C}_5\text{H}_5\text{NH})_2\text{ThCl}_6$, resp., and had d. 1.859 and 2.110, resp., the Retgers law being followed. Both were deliquescent. From ThCl_4 and PbCl_4 with a soln. very rich in ThCl_4 , was obtained 1 type of *mixed crystal*, which contained 71.5% $(\text{C}_5\text{H}_5\text{NH})_2\text{ThCl}_6$. It was pale yellow, was very deliquescent, had d_{18} 2.132 (conforming to the Retgers law) and the angle of its optical axes was between those of its components. Also from ThCl_4 and TiCl_4 was obtained 1 type of *mixed crystal* which contained 15.01% $(\text{C}_5\text{H}_5\text{NH})_2\text{TiCl}_6$ and was so extremely unstable in air that neither its d. nor crystallographic properties could be detd. The isomorphism of the various groups is confirmed by the almost identical mol. vols. of the individual members.

C. C. DAVIS

Di- and tetrasubstituted siloxenes. H. KAUTSKY AND A. HIRSCH. *Z. anorg. allgem. Chem.* 170, 1-17(1928); cf. *C. A.* 20, 3140.—Treatment of siloxene with dil. solns. of halogens in acid anhydrides gives di- and tetrasubstituted siloxenes contg. the halogen and acid residue. The simultaneous entrance of the two groups is explained by the presence of a complex between the halogen and the solvent. Because of the preferential adsorption of the hydrocarbon radical of the anhydride by the hydrophilic-SiH groups the reactions are slow compared to those between siloxene and the pure halogens. I in Ac_2O gives green *monoacetato-monoiodosiloxene*, $\text{Si}_2\text{O}_2\text{H}_2\text{I}(\text{CH}_3\text{COO})$. Br in Ac_2O gives yellow *diacetato-dibromosiloxene* provided the HBr formed in the reaction is carefully removed. If the HBr is not removed yellow *monoacetato-dibromosiloxene* is formed. Bromination with a dil. soln. of Br in CS_2 gives the yellow *tetrabromosiloxene*; with concd. solns. the orange-yellow *hexabromosiloxene* is given provided the HBr is removed. These compounds are easily hydrolyzed or

aminolyzed with the production of *hydroxy- or aminosiloxenes*, the colors of which are much darker and more intense than those of similar compds. prep'd. from the pure halogenated siloxene, possibly because of different relative positions of the substituent groups.

H. F. JOHNSTONE

Intermediate products in oxidation with chromic acid (WAGNER) 2.

Dictionary of Inorganic Substances. London: Ernest Benn. Price, approx. 42s., net.

7—ANALYTICAL CHEMISTRY

W. T. IALI,

The use of liquid amalgams* in volumetric analysis. X. More new methods for the determination of vanadium, chromium, and several nitro compounds. KIN'ICHI SOMEYA. *Z. anorg. allgem. Chem.* **169**, 293-300(1928); cf. *C. A.* **19**, 224, 2614, 3229; **20**, 26, 2469; **21**, 1604, 2858.—Certain dyestuffs such as safranine, neutral violet, neutral red and methylene blue undergo a change of color when acted upon by the oxidants used in volumetric analysis and the reduction potentials of these dyes are such that they do not undergo color change until the usual oxidation has been accomplished so that they can be used as indicators. Thus in 10-12 *N* acid soln., tungstic acid can be reduced by liquid amalgam and the reduced soln. titrated with CuSO_4 soln. or with I_2 soln. using safranine as indicator. To det. V in an Fe alloy, evap. the acid soln. to fumes with H_2SO_4 , dil. to make the soln. 12 *N* in acid and shake with liquid Zn-Hg. Remove from the reductor, add 10 cc. of 0.1% safranine soln. and titrate in an atm. of CO_2 with I_2 soln. Cr can be det'd. similarly with KIO_3 , KBrO_3 or I_2 as oxidant. A nitro compd. can be also det'd. by reducing it with a known quantity of reduced Cr^{++} soln. and titrating the excess of the latter in the FeCl_3 . Also in *Sci. Repts. Tôhoku Imp. Univ.* [1], **17**, 131-9(1928).

ARTHUR FLEISCHER

Micro-Kjeldahl experiments. BERTA SAIKO-PITTMER. *Pharm. Presse* **33**, 60-1 (1928).—An attempt was made to develop Pregl's micro-Kjeldahl method to compds such as pyrimidone, PhN_2H_3 , semicarbazide, etc. With pyrimidone in 1% soln, addns of $\text{CuSO}_4 + \text{K}_2\text{SO}_4$, $\text{CuSO}_4 + \text{K}_2\text{SO}_4 + \text{PtCl}_4$, $\text{Fe} + \text{CuO}$, $\text{Fe} + \text{CuO} + \text{PtCl}_4$, $\text{Fe} + \text{CuO} + \text{PdCl}_2$ and $\text{Cd} + \text{K}_2\text{SO}_4$ were made to the conc'd. H_2SO_4 . It was found that the addn of PtCl_4 tended to boost the % of N slightly, but the best results were obtained with metallic Cd + K_2SO_4 . With PhN_2H_3 the Cd combination did not prove efficient but a suitable catalyst proved to be $\text{K}_2\text{SO}_4 +$ powdered Se + alc. With semicarbazide, the N % was raised appreciably by the use of Se + $\text{K}_2\text{SO}_4 +$ alc., but failed to reach the theory. With phenylsemicarbazide the above addn. yielded very nearly theoretical values.

W. O. E.

The adjustment of the reaction of indicator solutions and its importance in determining the hydrogen-ion concentration of slightly buffered solutions. W. H. PIERRE AND J. F. FUDGE. *J. Am. Chem. Soc.* **50**, 1254-62(1928).—The quinhydrone electrode can be used for detg. the p_{H} value of buffered solns. but the H_2 electrode is not absolutely reliable when indicators are present. The *varying drop method* is also useful for this purpose. It depends on the principle that if an indicator soln. is more alk. or more acid than the weakly buffered soln. to be tested, a different p_{H} value will be found when different quantities of the indicator soln. are used. Indicator solns. made up without neutralization, solns. adjusted to $p_{\text{H}} = 7.0$ and solns. made up according to Clark give erroneous results with solns. that are buffered slightly. With such solns. the indicator solns. require adjustment to the p_{H} corresponding to about the middle of the transition change.

W. T. H.

A demonstration of membrane hydrolysis on "indicator foils." [Colloid films containing indicators.], HANS KROEPFELIN. *Kolloid-Z.* **44**, 188-90(1928).—The accuracy of Wulff's "indicator foil" method (cf. *C. A.* **21**, 3855) has been investigated. Foil I shows an error toward the alk. side; it is affected by the presence of a buffer. Foil II and foil III show an acid error, due to hydrolysis of their indicator; the addition of a neutral salt, 35 millimolal KCl for instance, corrects the discrepancy. A. L. H.

The correctness of acid and alkali titers. TADEUSZ MIŁOBĘCNDZKI. *Roczniki Chem.* **7**, 295-308(1927).—The errors involved in the titration of HCl , $\text{H}_2\text{C}_2\text{O}_4$ and glyceric-boric acid, the errors due to instability or impurity of acidimetric or alkali-metric standards, the satn. point as distinct from the neutral point, the indicator error and the CO_2 error are discussed and familiar conclusions drawn. For titrations in which

the end point is at about $p_H = 7$, the indicator "kap" from red cabbage is recommended. It is blue at $p_H = 6.8-7.4$, purple in more acid solns. and red in more alk. ones. *
MARY JACOBSEN

Detection and determination of barium, calcium and strontium. O. MACCHIA. *Chem.-Ztg.* 52, 281-2(1928).—The paper was originally published in Italian (cf. C. A. 21, 3030).
W. T. H.

An improved test for borates. A. GABRIEL AND H. G. TANNER. *J. Am. Chem. Soc.* 50, 1385(1928).—A modification of the flame test depending upon the formation of Me_3BO_3 by which 0.2 mg. of H_3BO_3 can be detected.
W. T. H.

Ceric sulfate as a volumetric oxidizing agent. I. Preparation and standardization of solutions. Determination of calcium. II. Determination of iron. III. The titration of iodide. IV. Determination of arsenic. V. Determination of antimony. VI. Volumetric determination of cerium. H. H. WILLARD AND PHILENA YOUNG. *J. Am. Chem. Soc.* 50, 1322-38, 1368-85(1928).—These interesting papers show that the oxidation potential of Ce^{++++} to Ce^{+++} is similar to that of MnO_4^- to Mn^{++} . For this reason a soln. of $Ce(SO_4)_2$ easily prepd. by oxidation with $NaBiO_3$ or by $(NH_4)_2S_2O_8$ in the presence of Ag^+ , can be standardized, like $KMnO_4$, against $Na_2C_2O_4$ and can be used for the detn. of Ca after prior pptn. as CaC_2O_4 . Just as $KMnO_4$ oxidizes Fe^{++} to Fe^{+++} , As^{+++} or Sb^{+++} to quinquivalent As or Sb and I^- to I_2 , so Ce^{++++} can be used for the titration of Fe^{++} , As^{+++} , Sb^{+++} or I^- and accurate results obtained. Moreover, Ce itself can be detd. by oxidizing it to Ce^{++++} and titrating with standard $FeSO_4$, KI or $NaNO_2$ solns. In all the work described, the end points were detd. by potentiometric titration although it was possible in some cases to detect the end point by the color change. As an oxidizer, quadrivalent Ce has an advantage over $KMnO_4$ with respect to the fact that there is no possibility of any intermediate reduction and the disadvantage that the equivalent wt of Ce is nearly 5 times as large as that of $KMnO_4$. Moreover, some of the end points are not obtained very rapidly. Inasmuch as the other rare earths do not show properties simulating Ce^{++++} as an oxidizer, these papers represent a valuable increase to our knowledge of the reactions of the element Ce.
W. T. H.

An innovation in the determination of ferrous oxide in rocks. E. SALVATORE AND A. SQURO. *Z. Krist.* 66, 162-6(1927).—The method is essentially the same as that used by Mellor, C. A. 4, 1440 and by Barnebey, C. A. 10, 3003.
L. S. R.

The estimation of hydrogen in complex gaseous mixtures by absorption in colloidal palladium solution. A. E. BERT. *Fuel in Science and Practice* 7, 44(1928).—Application of the method of absorption of H by colloidal Pd (cf. C. A. 4, 1006) to the Bone-Wheeler app.
D. A. REYNOLDS

Determination of the nitric and sulfuric acid content of the nitrating acid for use in the preparation of Gossypium collodii. S. G. CATH. *Pharm. Weekblad* 65, 332-3(1928).—The concn. of the acid. mixt. for use in the nitration of cellulose for the prepn. of collodion may be detd. by Ulsch's method of electrolytic reduction (*Z. Elektrochem.* 3, 546), whereby the HNO_3 is converted into NH_3 . Dil. 2 cc. of the acid to 100 cc. and titrate 20 cc. with N KOH (titer = a). Titrate another aliquot of 20 cc. after electrolytic reduction (titer = b). $(a - b)/2 = \text{cc. } N HNO_3$, and $(a + b)/2 = \text{cc. } N H_2SO_4$. The reduction is performed at 4 v. and 1-1.25 amperes, in a test tube 20 \times 170 mm. A Cu spiral of about 40 turns serves as the cathode and a Pt wire as the anode. The reduction requires about 20 min.
A. W. DOX

New micro-phosphorus determination. ADALBERT ELEK. *J. Am. Chem. Soc.* 50, 1213-4(1928).—The method consists in fusing 3-6 mg. of the substance in a Ag crucible with 0.2 g. KNO_3 and 1 g. KOH and pptg. the P as NH_4 phosphomolybdate essentially according to Lieb.
C. J. WEST

Variation of the Carius method for the determination of sulfur. V. C. ROGERS AND GREGG DOUGHERTY. *J. Am. Chem. Soc.* 50, 1231-2(1928).—The use of $BaCl_2$ or NaCl with the HNO_3 in the Carius method for S is advocated.
C. J. WEST

Determination of sulfur dioxide in small amounts in the atmosphere. R. J. MCKAY AND D. E. ACKERMAN. *Ind. Eng. Chem.* 20, 538-42(1928).—A modified, detailed description of the rapid Selby method is given (cf. A. E. Wells, C. A. 10, 404, 447). Emphasis is placed upon the manipulation in taking the sample.
W. T. H.

Potassium ferrocyanide as a qualitative test for zinc. GEORGE W. BENNETT AND F. C. MCKEE. *J. Chem. Education* 5, 473-5(1928).—The formation of $K_2Zn_3[Fe(CN)_6]_4$, the basis of the well-known volumetric method for detg. Zn, is recommended as a confirmatory test for Zn in qual. analysis.
W. T. H.

Studies on the changeability of the thiosulfate titer. C. MAYR AND E. KRESCHBAUM. *Z. anal. Chem.* 73, 321-52(1928); cf. C. A. 21, 29.—Although it is true that

CO_2 in water can accomplish decompn. of $\text{S}_2\text{O}_3^{--}$ with liberation of S, and there is likely to be a little H_2S in freshly prepd. solns. of this reagent, these effects are of minor importance with respect to the permanence of the $\text{Na}_2\text{S}_2\text{O}_3$ titer. The chief cause of trouble is bacterial action and the best way to keep the titer permanent is to keep the soln. sterile by adding 1% of amyl alc. by vol. It is seldom that the titer increases on standing. When Cu^{++} makes the titer of the soln. more permanent it is because of its germicidal effect. The fact that a small quantity of base is likely to make the soln. more stable is due to the fact that the bacteria are not very active when the pH value of the soln. lies between 9 and 10. W. T. HALL

Iodometric determination of vanadium in alloy steel and in ferro-vanadium. K. ROESCH AND W. WERZ. *Z. anal. Chem.* **73**, 352-5 (1928).—In the presence of H_3PO_4 , HVO_3 is reduced quantitatively to quadrivalent vanadyl salt by KI and the liberated I_2 can be titrated with $\text{Na}_2\text{S}_2\text{O}_3$. By means of this reaction it is a simple matter to det. the V content of Fe-V because the V is obtained as water-sol. NaVO_3 by fusion with NaOH while interfering Mn and Fe are left insol. An analysis can be made in 2 hrs. The method is somewhat more involved in the analysis of alloy steels. For them, take 3-5 g. of filings and dissolve in 30-50 cc. of HCl. Oxidize with HNO_3 and evap. to 25 cc. Filter off the WO_3 and for the most accurate work, ignite the ppt. in a Pt crucible, remove SiO_2 by fuming with HF and H_2SO_4 and fuse the residue with KHSO_4 . Ext. the melt with $(\text{NH}_4)_2\text{CO}_3$ soln. and unite the residue with the ppt. obtained later in the analysis. Conc. the filtrate from the WO_3 and treat the HCl soln. with ether to remove FeCl_3 . Treat the ethereal soln. with a little H_2O_2 to remove a little V. Evap. the aq. soln. to remove ether and HCl and take up the residue in 6 N HNO_3 . Dil. with water and a little 10% MnSO_4 soln. and make ammoniacal. Filter and ignite the ppt. in an Fe crucible. Add to it the residue from the WO_3 and fuse both ppts. with 2-4 g. of NaOH in an atm. of H_2 to prevent oxidation of Cr. Ext. the NaVO_3 with water, filter, add 75 cc. of H_3PO_4 and 0.5 g. of $(\text{NH}_4)_2\text{S}_2\text{O}_8$. Boil 15 min. to decomp. the persulfate, cool, add KI and titrate. W. T. H

Rapid method for the determination of zinc. G. SPACU AND J. DICK. *Z. anal. Chem.* **73**, 356-9 (1928).—If a soln. of Zn salt is treated with alkali thiocyanate and pyridine, the Zn is pptd. completely as $[\text{ZnPy}]_2(\text{SCN})$. The ppt. is finely cryst. when produced in the cold and after washing successively with dil. alc. contg. pyridine and KCNS, a soln. of pyridine in abs. alc., and finally with ether contg. a little pyridine, the ppt. can be dried in a vacuum at room temp. and weighed (cf. *C. A.* **17**, 3464; **18**, 1250). The ppt. contains 18.25% of Zn. Excellent results were obtained with 0.16-0.89 g. of Zn vitriol. W. T. H.

Iodometric determination of glucose. P. F. NICHOLS. *Ind. Eng. Chem.* **20**, 553 (1928); A. M. ALVARADO AND ALEXIS VOORHIES. *Ibid.*—As comment upon the paper of Voorhies and Alvarado (*C. A.* **21**, 2635) 8 references are given to similar studies. To this A. and V. reply that they made no claim to priority with respect to the direct oxidation of glucose in alk. soln. W. T. H.

Unification of bromination methods of analysis as applied to phenols and aromatic amines. A. R. DAY AND W. T. TAGGART. *Ind. Eng. Chem.* **20**, 545-7 (1928).—By treatment with KBrO_3 and KBr in the presence of HCl, a part of the nuclear H in phenols and aromatic amines is replaced by Br. Then by adding KI the excess reagent can be titrated with $\text{Na}_2\text{S}_2\text{O}_3$. In this way excellent results were obtained in the analysis of some 25 aromatic amines and phenols. W. T. H.

Smooth platinum wire for electrometric titrations in neutralization reactions. STEPHEN POPOFF AND M. J. MCHENRY. *Ind. Eng. Chem.* **20**, 534-8 (1928).—The detn. of total acidity or basicity in the presence of oxidizing agents, certain metal ions, phenol, cresol and varnish can be solved easily by using a smooth Pt electrode instead of the usual H_2 electrode. In this case the smooth Pt wire is essentially an O_2 electrode. Sufficient breaks at the end point can be obtained to permit the titration of acid or base in the presence of MnO_4^- to within 1×10^{-4} milli-equivalent. The method applied to the analysis of alkaloids gives greater precision than has been obtained hitherto. W. T. H.

The spectrophotometric evaluation of mixtures of methylene blue and trimethylthionine. W. C. HOLMES. *Stain Tech.* **3**, 45-8 (1928).—Spectrophotometric analysis affords the most convenient means for detg. the proportion of methylene blue and trimethylthionine (azure B) present in a mixt. of these 2 dyes. The proposed method depends upon the detn. of an absorption ratio. A suitable ratio for the purpose is that of the extinction coeff. at $64\text{m}\mu$ to that at $670\text{m}\mu$. On account of the differences in the absorption max. of the 2 dyes, this ratio increases as the % of methylene blue decreases. The ratio value for 11 different mixts. is given together with a graph by

means of which the proportions of the 2 dyes present in any mixt. can be calcd. from the absorption ratio detd.

C. R. FELLERS

Crystallization of silver beads and detection of the platinum metals by the microscope (BANNISTER) 2.

CLOWES, F. AND COLEMAN, J. B.: *Elementary Practical Chemistry and Qualitative Analysis. II. Analytical Chemistry*. Tenth ed. London: J. and A. Churchill. 294 pp. 6s., net.

KOLTHOFF, I. M.: *Die Massanalyse. Vol. II. Die Praxis der Massanalyse*. Berlin: Julius Springer. 512 pp. Paper, R. M. 20.40; bound, R. M. 21.60. Cf. C. A. 22, 561.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Potarite, a new mineral discovered by the late Sir John Harrison in British Guiana. L. J. SPENCER. *Mineralog. Mag.* 21, 397-406 (1928).—This white mineral, PdHg, previously erroneously described as "allopalladium," has sp. gr. 15-16.1, hardness $3\frac{1}{2}$, and is sol. in HNO_3 to a brown soln. It shows cryst. crusts with angles that suggest cubic crystn., and occurs as small nuggets in the diamond washings in the Kangaruma district on the Potaro River.

W. F. HUNT

Carrollite (synchodymite). W. F. DE JONG AND A. HOOG. *Z. Krist.* 66, 168-71 (1927).—Synchodymite and carrollite should be considered identical unless the former term be reserved for the Ni-bearing variety of the latter. An analysis of synchodymite from Katanga is given. It has the spinel structure, like linnæite and polydymite, with $a = 9.458$ A. U. and u about $\frac{1}{8}$. The distance Cu to S is 2.05 and Co to S 2.36 A. U.

L. S. RAMSDELL

A study of bauxite. T. V. M. RAO. *Mineralog. Mag.* 21, 407-30 (1928).—From an intensive study of bauxite, including expts. extending over a period of 6-9 months in which alkali carbonates, H_2SO_4 , "humic acid," and H_2CO_3 were permitted to act upon granulated basalt and dolerite at various temps. and pressures, it is concluded that bauxite ($\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$) is an independent mineral species and the chief constituent of laterite. The gibbsite present is secondary and is formed by the hydration of bauxite. Lateritization results from the action of alkali carbonates on the Al silicates forming hydrated Al carbonate, which breaks down into hydrated Al oxide which is deposited as bauxite. This with the undecompd. minerals of the rock comprises laterite.

W. F. HUNT

Mineralogical data from Hungary. VICTOR ZSIVNY. *Z. Krist.* 65, 728-31 (1927).—Description and analyses of a dolomite and a Cd-bearing rhodochrosite.

L. S. R.

The symmetry of orthoclase. TOM BARTH. *Norsk. Geol. Tids.* 9, 398-400 (1927).—As shown by A. Hadding (*Lunds Universitets Årsskrift* II, 1921, No. 6), the ordinary cross-hatched microcline gives Laue diagrams completely similar to those of orthoclase. However, when using a simple microcline consisting of a single crystal individual and thus without the common cross-hatching on (001) a somewhat different Laue diagram is obtained. B. presents and discusses such a diagram and concludes: Since all the spacings of microcline, as accurately as they can be detd. on an ordinary Laue photograph, are equal to the corresponding spacings of orthoclase, these 2 minerals cannot be different modifications of K feldspar. As the orthoclase gives a Laue photograph identical with that of a cross-hatched microcline the former must consist of submicroscopically twinned lamellas of the latter.

C. A. ROBAX

The crystal structure of zircon, and criteria for the special position in tetragonal space groups. R. W. G. WYCKOFF AND S. B. HENDRICKS. *Z. Krist.* 66, 73-102 (1927).— ZrSiO_4 is tetragonal and has the symmetry of space group 4 Di-19 (D_{4h}^{19}). There are 4 mols. in the unit cell which has $a = 6.60$ and $c = 5.88$ A. U. Zr atoms are in special positions (b) Si atoms in (a) and O atoms in (h) with u about 0.20 and v about 0.34. Distinguishing criteria for all the special positions in tetragonal space groups are tabulated.

L. S. RAMSDELL

The structure of monticellite (MgCaSiO_4). G. B. BROWN AND J. WEST. *Z. Krist.* 66, 154-61 (1927).—Monticellite is orthorhombic, with 4 mols. in the unit cell where $a = 4.815$, $b = 11.08$ and $c = 6.37$ A. U. The space group is V_h^{16} , and the structure is isomorphous with that of olivine (cf. C. A. 20, 3668; 21, 1907). The O atoms ap-

prox. a close-packed hexagonal arrangement, with the remaining atoms in the interstices. L. S. RAMSDELL

• **The space group of staurolite.** C. GOTTFRIED. *Z. Krist.* **66**, 103-7(1927).— $\text{HFe}_2\text{Al}_3(\text{SiO}_4)_3$ is orthorhombic and belongs to space group V_{11}^h . There are 2 mols. in the unit cell, which has $a = 7.84$, $b = 16.52$ and $c = 5.61$ A. U. L. S. R.

The occurrence of tourmaline in Norwegian pyrite deposits. C. W. CARSTENS. *Norsk. Geol. Tids.* **9**, 331-6(1927).—A review. C. A. ROBAX

The first occurrence of pisanite in Hungary. GABRIEL VAVRINECZ. *Z. Krist.* **66**, 167-8(1927).—A description, with analyses, of 3 crystals of pisanite, $(\text{Fe}, \text{Cu})\text{SO}_4 \cdot 7\text{H}_2\text{O}$, is given. L. S. RAMSDELL

The constituents and genesis of a few minerals produced from hot springs and their vicinities in Japan. I. The Akita hokutolite. ICHIZO SUGANUMA. *Bull. Chem. Soc. Japan* **3**, 69-72, 73-6(1928).—A heavy cryst. mineral produced by a sulfurous spring in Akita-Ken (Japan) has been called Akita hokutolite, and compared with Taiwan hokutolite. It consists chiefly of BaSO_4 and PbSO_4 , the proportions of which vary widely. The elements contained only in small amounts are Sr, Ca, Mg, Ba, Al, Fe, Ti, Zr, Th, Ce, La, Pd, Nd, Ra, Rn, Po. In regard to the genesis of the mineral, S. finds that it is deposited only on the rock surface which is covered or washed by the spring water cooled to 40° ; this temp. highly favors the growth of Cyanophyceae; the gelatinous matter contained in this organism causes the coagulation of SiO_2 hydrosol from the acidic soln. containing Al ion just as ordinary gelatin or albumin does. Tables give complete analysis of the white and brown layers of the mineral and of the water of the spring. II. **Composition and genesis of soluble sulfates produced in the environments of a sulfurous spring.** *Ibid.* 73-6.—Natural halotrichite can be reproduced by passing steam with H_2S and CO_2 over finely powdered Hakone andesite. Clay poor in Fe will form alunogen, while clay rich in Fe produces halotrichite. Melanterite is formed only on clays or rocks very rich in Fe; usually it is contaminated with halotrichite. A. I. HENNE

Present condition of knowledge of the composition of meteorites. G. P. MERRILL. *Proc. Am. Phil. Soc.* **65**, 119-30(1926), *Science Abstracts* **30A**, 261.—The results of many analyses have shown that meteorites come from a basic group of rocks, mainly peridotites, with an elemental compn. essentially the same as allied terrestrial rocks but with a deficiency of O. The presence of some doubtful elements was confirmed, but others were not found, while a few were found in traces for the first time. The percentages of various gases in stony and iron meteorites are given, while other tables show the geographical distribution in North America, and the annual falls, geographical distribution, and no. of siderites, siderolites and aerolites over the world. No signs of animal or vegetable life have been found in meteorites, and all are of volcanic material, while their absence from all but the most recent geological deposits indicates that if any fell earlier they were of a different type, or have decomposed and become unrecognizable. H. G.

Phosphate minerals in the province of Lecce. G. TARULLI AND A. MARCUCCI. *Ann. chim. applicata* **18**, 40-6(1928).—Examn. and analyses of minerals, in conjunction with a crit. review of earlier work, show that the subsoil of the Tallone is filled with phosphates to a considerable depth, but with a rather low P content. Phosphate sands at a low depth are most promising as a source of superphosphate. C. C. D.

Celestites of the Archangel province. M. B. FIDEMSKII. *Bull. acad. sci. union rep. soviet social.* **1927**, 185-94.—Celestite deposits unusually rich in Sr were discovered in the regions of the rivers Pinega and Kuloi, where they are disposed in nests. The quantity of the mineral is roughly estimated at about 500,000 tons. Compn.: SrSO_4 97.49-98.82%, BaSO_4 0.64-0.97%, CaSO_4 0.66-0.78%, loss on ignition 0.24%. B. N.

The properties of magnesites. HANS HIRSCH. *Arch. Eisenhüttenwesen* **1**, 439-44 (1927); *Stahl u. Eisen* **48**, 371-2(1928).—A classification of the different brands of magnesite, based on their phys. and chem. examn. J. A. SZILARD

Norwegian feldspars. OLAF ANDERSEN. *Norges Geol. Unders.* No. **128**, 142 pp. (1926).—A description of the properties, geological mode of occurrence, exploitation and uses of feldspar with special reference to the Norwegian industry. C. A. ROBAX

Lignin and oxycellulose theory (of the origin of coal). III. J. MARCUSSEN. *Z. angew. Chem.* **40**, 1233-4(1927).—Further expts. (C. A. **21**, 1784) are given which indicate the role of lignin and oxycellulose in the formation of coals. The action of a large mass of wood-destroying fungus enclosed in a flask, air excluded, produced a dark brown acidic fluid; a portion of it gave the naphthoresorcin reaction for a water-sol. carbonyl acid. On adding $\text{Pb}(\text{AcO})_2$ to an AcOH soln. of the fluid the larger portion of the

dark material was pptd. in a manner similar to the pptn. of glucuronic acid. Both acids are produced from cellulose through the life processes of the fungus, building up from unchanged cellulose by coupling with oxycellulose. That cellulose has played a like role in the formation of coals is shown by studies on lignites. Data from expts. with 3 lignites are tabulated as follows: source, color, apparent structure; and % of: bitumen, free humic acids, humic acid anhydride, humic-ketones, cellulose, lignin, water-sol. carbonyl acids, volatile fatty acids (acetic), water and ash. Lignites Nos. 1 and 2, brown, hard, firm, woody masses, had lignin contents of 28 and 30%, resp., about the same as that of the original conifers; also their contents of humic acids, anhydrides and ketones (22 and 41%) could not have come from lignin, but must have been formed from cellulose. The sum of the humic materials, cellulose and water-sol. carbonyl acids in lignite No. 1 was 55%, of No. 2, was 54%, which is only 10% less than the amt. of cellulose in fresh wood. Lignite No. 3, dull, light brown, was alkali sol. and contained 15.3% cellulose, all but 1.9% of it dissolved in cold 1% soda soln., so it is present essentially as oxycellulose. Apparently with few exceptions the brown coals are lignitic and the study of lignites should help to clear the question as to the chem. processes in coal formation. As further evidence that the greater part of the humic acids and coals are formed from carbohydrates 2 expts. are described in which humic acid and grape sugar were separately oxidized by 30% H_2O_2 in the presence of Fe sulfate soln. A "caramel acid" resulted in each case; it was sepd. as the Pb salt on adding $\text{Pb}(\text{AcO})_2$. The pptd. brown mass was extd. with alc. and the ext. treated with H_2S which liberated the free "caramel acid." The formation of "caramel acid" from humic acid and from grape sugar is held to throw new light on the humic acids obtained from coals. The expts. of Bray and Andrews (*C. A.* 18, 901) on chem. changes in wood during decay are discussed and the use of 72% sulfurous acid in detg. lignin is criticized.

W. W. HODGE

The granite of precarpathian southwest Poland and its relation to adjacent granites. STEFAN KREUTZ. *Bull. intern. acad. Polonoise* 1927A, 395-446.—Descriptions of a number of cryst. precarpathian rocks from southwest Poland are given. The very old intrusives are rich in alkali but a genuine lime-granite was also found. The former constitute a connected series of gneiss, granite and granite-porphry to true porphyry, and show characteristics of Caledonian rocks. A special structure often met with among these rocks has been designated "granite-pegmatite-porphyritic." Characteristic albitization processes were studied and myrmekite formation has been linked with them. The relation of precarpathian granite to continuous massifs is discussed and the successive and distinct periods of occurrence of intrusion and eruption are studied, and a double cyclical change of magma has been established. S. L. B. ETHERTON

Sagvandite, a magnesite-bearing igneous rock. TOM BARTH. *Norsk. Geol. Tids.* 9, 271-303(1927).—An occurrence of a rare igneous rock, called sagvandite, in northern Norway is described. Its chief constituents are the minerals bronzite (about 90%) and magnesite (about 10%). The bronzite contains 86.2 MgSiO_3 , 11.8 FeSiO_3 and 2% Al_2O_3 (AlAlO_3), while the magnesite approx. corresponds to 9 MgCO_3 , FeCO_3 . A noticeable amount of Pt was found in this rock, namely 0.73 g. per ton, and as much as 1.22 g. per ton in the chlorite-bearing rocks of the contact zone. C. A. ROBAX

Studies of the petrology of Kittilä-Lappmark. VICTOR HACKMAN. *Bull. Comm. Geol. Finlande* No. 79, 105 pp.(1927).—H. has studied the eruptive and sedimentation formations of the central district of Kittilä-Lappmark (Finland); 43 references are given. A. L. HENNE

The alkaline rocks of the Merapi Volcano, Java, and their genesis. H. A. BROUWER. *Verslag Akad. Wetenschappen Amsterdam* 37, 130-6(1928).—Descriptive. A. L. HENNE

The biotite-bearing greenstones and a rhyolitic pumice in the metamorphic aureole of the Falmouth granite. P. K. GHOSH. *Mineralog. Mag.* 21, 436-9(1928).—The biotite in the greenstone is not considered the result of contact metamorphism by the granite but due rather to the assimilation of slate by the basic magma. Rhyolitic pumice is recorded for the first time from this region. Some cordierite showing sector twinning, porphyritic feldspar, quartz, brown hornblende and pyrite were observed in the glass. The gas holes are empty in most cases but a little chalcedony and tridymite (?) were found in some. W. F. HUNT

Diabases and melanocratic rock veins of Sardinia. U. PANICHI. *Atti acad. Lincei* [6], 7, 71-5(1928).—Various rock formations are described, with a bibliography. C. C. DAVIS

Contribution to the study of the geochemical laws of distribution of elements on the basis of metallurgical experience concerning the chemical equilibrium in the three-

phase system: metal-sulfide-silicate. H. SKAPPEL. *Norsk. Geol. Tids.* 9, 239-57 (1927).—V. M. Goldschmidt (*C. A.* 17, 3664; 20, 3415) does not satisfactorily explain why in the interior of the earth there is a sharp limit, definitely proved by seismic expts., between the metal kernel and the sulfidic zone, when from metallurgy it is known that Fe and FeS at high temp. are perfectly sol. in each other and have no tendency to sep. in 2 phases. From his own metallurgical experiences S. explains the sharp limit between the metal and the sulfide phase by the presence in the latter of considerable amts. of "non-metallic" sulfides, particularly those of the alkali metals, but also some CaS, BaS, MgS, etc. If it may be presumed that the silicate phase of the earth has a compn. about equal to that of the crust as stated by G. (*loc. cit.*) namely: SiO_2 59.09, Al_2O_3 15.35, $(\text{Fe}_2\text{O}_3 + \text{FeO})$ 6.88, CaO 5.08, MgO 3.49, Na_2O 3.84, K_2O 3.13, H_2O 1.14, TiO_2 1.05 and P_2O_5 0.3%, then the sulfide phase will contain at least 4% of $(\text{Na}_2\text{S} + \text{K}_2\text{S})$ and most probably between 5 and 12%. Metallurgical expts. have shown that the chalkophile tendencies of Na and K in the 3-phase system lie very near that of Fe, and in a 3-phase system where the content of O is so limited as to correspond to a Fe content of only 6.88% $(\text{Fe}_2\text{O}_3 + \text{FeO})$ in the silicate phase, a degree of reduction has been reached where not only Na and K but also Ca and Mg begin to show considerable chalkophile tendencies. This statement stands in opposition to G. (*loc. cit.*) who classifies the alkali metals as distinctly lithophile elements. Direct expts. have shown that this is not correct. In the 2-phase system silicate-FeS, S. has numerous times observed that a slag contg. much FeO is able to stay in contact with a mat contg. considerable amts. of Na_2S , for instance (1) a slag contg. SiO_2 55.68, FeO 13.5, Al_2O_3 15.1, CaO 5.7, Na_2O 8.5% stood in chem. equil. with a mat contg. about 2.5% Na_2S ; (2) a slag contg. SiO_2 43.1, FeO 24.4, Na_2O 3.9% in contact with a mat contg. 3.97% Na_2S , and (3) a slag contg. SiO_2 60.43, Al_2O_3 14.9, CaO 16.3, FeO 6.84 and Na_2O 3.74% stood in contact with a sulfide phase contg. about 2% Na_2S . In all these cases the sulfide phase consisted chiefly of Fe sulfide satd. with S at a temp. of 1100-1200°. The conditions change much by varying the ratio between metal and S in the sulfide phase, the chalkophile tendency of Na decreasing with increasing S content. In the 3-phase system the S content is low owing to the contact with metal; thus in the case of FeS and Fe the sulfide phase has a little lower content of S than corresponding to FeS. Skappel has worked out a process aiming to reduce the amt. of O and S in a 3-phase system silicate-sulfide-metal and while experimenting with this process has had opportunity to observe different chem. equil. resulting. The process consists in using the silicate phase as electrolyte with the metal and sulfide phases connected as cathode while as anode is used a C electrode dipping into the silicate phase through the roof of the furnace. The chem. reactions taking place during electrolysis may be expressed by the equation: $\text{FeS} + \text{MO} + \text{C} = \text{Fe} + \text{MS} + \text{CO}$. In one expt. carried out with a current of 1000-1500 amp. for 19 hr. at a temp. of 16-1800° the resulting phases had the following compn.: silicates, SiO_2 26.7, Al_2O_3 14.4, MgO 24.7, MgS 7.4, CaO 5.3, CaS 8.0, FeO 4.0, FeS 2.5, Na_2O 1.1 and Na_2S 3.0%. Sulfides, FeS 75.16, metallic Fe 3-4, Cu_2S 3.38, Na_2S 8.0, CaS 4.77 and MgS 4.56%. Metal phase, Si 1.24, C 0.38, Cu 0.2, S 0.3, Fe rest. From this it may be deduced that with increasing degree of reduction of the silicate phase, the chalkophile tendency of all the components increases and so does the lithophile tendency of the S. Under certain conditions this may go so far that the 2 phases swallow up each other, forming only one phase. S. is of the opinion that the influence of electrolytic currents has played and still plays an important part in the magmatic differentiation of the silicates, especially as a means of splitting up a magma into a basic and an acid part. C. A. ROBAK

Recent advances in science: Geology. G. W. TYRRELL. *Science Progress* 22, 583-92(1928).—Review of recent chem. work on igneous and metamorphic rocks.

JOSEPH S. HEPBURN

Constant-volume pycnometer for specific gravity determinations (ELLSWORTH) 1. The free energies of solid compounds—calcite and aragonite (BUCHAN) 2. The free energy of transition in the system calcite-aragonite (BUCHAN) 2. Some factors influencing the thermal properties of minerals and products of the ceramic industry (COHN) 19. Formation of pleochroic halos in biotite (POOLE) 3. Thermal instability of earth's crust (POOLE, POOLE) 3.

LILLEY, ERNEST RAYMOND: *The Geology of Petroleum and Natural Gas.* New York: D. Van Nostrand Co., Inc. 512 pp. \$6.

LOUIS, HENRY: *Mineral Deposits.* London: Ernest Benn, Ltd. Price, approx. 15s., net.

WINCHELL, N. H., and WINCHELL, A. N.: **Elements of Optical Mineralogy: an Introduction to Microscopic Petrography. Pt. II. Description of Minerals.** Second ed. New York: John Wiley & Sons; London: Chapman & Hall. 424 pp. Reviewed in *Bull. Imp. Inst.* 26, 131-2(1928).

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, R. H. ABORN

Fundamentals in the flotation of sulfidized and oxidized ores. F. A. BIRD. *Eng. Mining J.* 125, 652-4(1928).—Higher recoveries and higher-grade concentrates are invariably obtained by pebble-mill pulverizing than by ball-mill pulverizing. Also the formation of deleterious Fe compds. cannot occur and the amt. of sulfidizing and promoting agents required is less. A bibliography is given. J. W. BOECK

Notes on flotation practice in Canada. B. W. HOLMAN. *Mining Mag.* 38, 21-7, 82-7(1928).—Lab. and government testing is discussed, and practice at the Sullivan mill (with flow-sheet), Blue Bell mine, Allenby mill, and the Britannia mill (with flow-sheet). At the Sullivan over 1,000,000 tons were treated in pilot plants before the mill was built. Outstanding features of Canadian practice are use of but few reagents and in small quantities, due to care and skill in control. A. BUTTS

Cementation practice in Spain. J. H. FENNEL. *Mining Mag.* 37, 207-14, 275-84(1927).—Operation is divided into (1) formation of heaps, (2) leaching and (3) pptn. of Cu from leach liquors. (1) includes laying of ore, ventilation, and prepn. for distribution of water. In (3) the liquors are passed through a "filter" to reduce the Fe^{+++} salts, then passed over scrap Fe. Heaps are of 10,000 to several hundred thousand tons, usually 100,000 to 150,000 tons. When possible the liquors are cascaded from one heap onto another at a lower level. Depth of heaps is 3.5 to 20 m.; there is little channeling even in the deepest. The ore is crushed to 1.5-3 in. size. Ventilation of the heap sets the rate of oxidation and therefore the speed of extn. Ventilation is of 2 kinds, natural and controlled. As soon as the heap is completed it is covered with $\frac{1}{2}$ to 1 m. of fines to prevent natural ventilation, so that the temp. rise in the heap may be limited. Controlled ventilation is provided by a network of flues and cross-flues on the ground, made of coarse stone, with chimneys at the intersections reaching to the surface of the heap. FeS_2 is oxidized to $Fe_2(SO_4)_3$, which in turn oxidizes Cu_2S and $CuFeS_2$ to $CuSO_4$. The only danger of too much ventilation is that of fire by spontaneous combustion. Leaching is done with either fresh H_2O or Fe^{+++} liquors. The latter are either from another heap or from a storage dam above the heap supplied with the liquors from which the Cu has been pptd. The latter, however, are used only when the H_2O supply is short, as at the end of a dry season. The leach water is applied by (1) irrigation or (2) spraying. (1) is done by means of ditches in the fines on the top of the heap; a long ditch at the back feeds into squares constructed over the entire surface. Leaching is intermittent, being applied to the heap in sections and moved from day to day. Oxidation is by water and air aided by the rise in temp. After several days the oxidized part is ready for the rush of fresh water which carries out the $CuSO_4$ and leaves the heap ready for further oxidation. Heaps are leached 4 years or more. The temp. is 40° to 80° and the amt. of water 3 to 15 l. per ton of ore per 24 hr. The necessary reduction of Fe^{+++} before pptn. is done with FeS_2 , sometimes with SO_2 , which at first was not successful. The pptn. is carried out in long narrow canals. The extn. is from 1.4% Cu in the raw ore to 0.25% in the residue. The ppt. carries 84-92% Cu. A. BUTTS

Absorption of atmospheric moisture by molten metals. P. KOSOVSKII. *Messageur russe ind. métaux* 1927, 50-1, *Rev. métal.* 25, (Extraits), 45(1928).—In the case of low-m. metals (Sn, etc.), relatively large amts. of H_2O may sometimes be found in the cavities formed by shrinking on cooling. As much as 10 cc. H_2O has been found at the Huta-Bankowa plant in a conical ingot 100 mm. high by 100-25 mm. in diameter. The phenomenon is much more serious with high-m. metals such as Fe and its alloys or Cu, in which case there is dissociation of the absorbed H_2O by the molten metal with production of H. Such metals are liable to develop cracks on rolling. K. considers that the casting of Fe or Cu should be carried out in as dry an atm. as possible. A. PAPINEAU-COUTURE

Reduction and oxidation of metals. A. A. BAIKOFF. *Métallurgiste* (Russian) No. 3, 1926; *Rev. métal.* 25 (Extraits), 47-54(1928).—A general discussion and review, dealing particularly with reduction of Fe oxides by H and by CO and with the oxidation of Fe. A. PAPINEAU-COUTURE

Metallurgical considerations of brass melting. FR. DOERINCKEL. *Metallbörse* 15, 57-8, 165-6, 278-9, 390-1 (1925); *J. Inst. Metals* 36, 636-7.—The importance of the homogeneity on the rational working of brass is discussed, and the influence of the reactions between the molten metal and the combustion products, such as CO_2 , CO , SO_2 , H , N and O , on the mech. and chem. properties of the brass described. The relation of melting and casting temps. to properties, difficulties of measurement of molten brass, and various furnace constructions for melting of brass and their relation to the homogeneity of metal are discussed. H. G.

Sand control methods and their developments in a light casting foundry. W. G. REICHERT. *Trans. Am. Foundrymen's Assoc.* 1928, (preprint) 213-34.—R. covers the practical application of the standard methods of sand testing to the control of molding sand in a light casting foundry of the mech. handling type, also developments directly associated with these tests. The following tests were applied for control and investigation of the sand: (1) tensile strength on green sand, (2) dry strength, (3) permeability, (4) moisture, (5) grade, (6) durability, (7) relative fusion point and (8) microscopic examin. Proper sand testing decreases foundry losses, produces a better surface quality, and effects an economy in the use of sand. Investigation of the milling action of molding sands in a mech. system shows the following advantages: (1) a uniform distribution of green sand and moisture, (2) good distribution of clay over the sand grains, (3) increase in tensile strength of the sand and (4) a breakdown of clusters or balled sand particles arising from mech. handling. Balling may be counteracted by the addn. of a fine sand, a lower clay sand content, milling, improved handling conditions or a combination of these. Balling action, moisture control and conservation and reclama- tion are briefly discussed and numerous tables and curves are shown. W. H. B.

Testing molding sands for durability. M. A. BLAKEY. *Trans. Am. Foundrymen's Assoc.* 1928, (preprint) 213-34.—In addn. to the standard A. F. A. bond strength and permeability tests, a simple mold, lab. made, is taken to the foundry, and several pourings are made of regular iron from a hot hand ladle. Before each cast the bond strength and permeability are detd. The pattern, stripper plate, flask on bottom board, rammer mold ready for shaking out, and a casting made in the test mold are illustrated, and the procedure is described. These durability tests furnish other information. Some sands burn on and some peel nicely, some give a smooth finish and some a rough one, etc. Results on natural sands from Wisconsin, Indiana, Illinois and Ohio and on commercial clay bonds are charted. W. H. BOYNTON

Mills-Crowe cyanide-recovery process in Honduras. P. T. BRUHL. *Eng. Mining J.* 125, 658-9 (1928).—The difficulties encountered in the process and their solution are given. Some of the advantages and disadvantages of the process are outlined.

J. W. BOECK

Speiss and the metals of the platinum group. H. RUSDEN AND J. HENDERSON. *J. Chem. Met. Mining Soc. S. Africa* 28, 181-98 (1928).—Speiss is produced in pan furnace and Pb blast furnace when As is present in the charges. It possesses a remarkable affinity for the Pt metals. Inconsistencies in the results of speiss analyses by different analysts led to the evolution of a method of obtaining total Pt metals in speiss. The speiss is ground to —90 mesh, and $\frac{1}{4}$ A. T. mixed with 70 g. litharge, 30 g. Na_2CO_3 , 15 g. borax, and 15 g. silica. The mixt. is fused, poured and the slag returned to the pot and washed twice with a mixt. of litharge 45%, silica 5%, Na_2CO_3 31%, borax 15% and meal meal 4%. The resulting button weighs about 26 g. and is assayed as usual. Two methods are suggested for large-scale extn. of precious metals from speiss: (1) soln. in acids to obtain the precious metals in the residue, and (2) fusion with litharge and fluxes for the production of Pb bullion. The bullion can be greatly reduced by scorification without loss of precious metals. The advantages and disadvantages of the fusion method are summarized. Decomposition of speiss by electrolysis showed recoveries as follows: Pt metals 95.7% and Au 94.6% in the anode sludge; As evenly divided between all products; Fe 80% in soln.; Cu 47.6% remained in anode sludge; Ni 75% passed into soln., Pb in the anode sludge as sulfate; and S in the sludge. The electrolyte contained 5% by wt. of 90% H_2SO_4 (commercial), and the anode sludge was 25.5% of the wt. of the speiss decomposed. Three methods of treating the anode sludge were tried: (1) treatment with acids, (2) fusion for the production of an enriched speiss to be further treated by electrolysis for the production of a very rich anode sludge; and (3) fusion for the production of a Pb bullion to collect the precious metals. It has not been established whether the Pt metals are mixed in the speiss or are in some form of combination. No reliable method of speiss assay is yet available. Tabulated data and a brief discussion of the paper are included.

W. H. BOYNTON

Principles of successful cupola operation. II. J. W. BOLTON. *Foundry* 56, 363-7 (1928). III. *Ibid* 387-9; cf. *C. A.* 22, 1748. E. H.

Developments in furnace practice for production of high-test cast iron. RICHARD MOLDENKE. *Fuels and Furnaces* 6, 627-30 (1928). E. H.

Influence of various scrap- and pig-iron ratios on the efficiency of the Siemens-Martin furnace. G. BULLE. *Stahl u. Eisen* 48, 329-38, 368-71 (1928). J. A. S.

The cleaning of blast-furnace gas. I. A. J. BOYNTON. *Blast Furnace Steel Plant* 16, 482-6, 488 (1928).—Uses to which blast-furnace gas are put are listed and the benefits derived from cooling to 32° and from fine cleaning are pointed out. The conditions of gas cleaning necessary or desirable are: (1) cooling to 94° for the condensation of slag and metal vapors; (2) further cooling to the lowest practicable temp. for water-vapor removal; (3) classification of dust to permit economic recovery of values; and (4) the reduction of the amount of dust necessary to handle as wet sludge. German blast-furnace plants conduct a secondary washing of the entire blast-furnace gas production. This permits refinement and control of every operation in which the gas is used. The mech. conditions within the system, such as size of orifice, cond. of refractory surfaces, frictional resistance and direction and intensity of gas currents, are const. and the conditions of operation are capable of continuous study and gradual improvement. Estd. savings to the German steel industry, produced largely by improved use of blast-furnace and coke-oven gas, are 200,000,000 gold marks. In every case, secondary washing is employed. W. H. BOYNTON

Review of iron and steel literature for 1927. E. H. McCLELLAND. *Blast Furnace Steel Plant* 16, 20-3, 33 (1928).—A classified list of the more important books, serials and trade publications during the year; with a few of earlier date, not previously announced. E. J. C.

Changes in structure and electrical resistance by cold working metals. G. TAMMANN and M. STRAUMANIS. *Z. anorg. allgem. Chem.* 169, 365-80 (1928).—The mechanism of the changes in the orientation of crystallites in the rolling and drawing of Cu is discussed. Cold-drawn Cu and Ag wires were heated at various temps. up to 800°, and elec. resistance and orientation were detd. In the Cu wires the decrease in resistance is a max. between 350° and 450° (about 2.5%), while in the Ag wires the max. decrease occurs between 200° and 250° (about 7.5%). With the Cu wire, practically no change in crystallite orientation takes place below 250°, although a considerable change in resistance has occurred at this point. After heating at 350°, about 38% of the crystallites have changed in orientation, at 400° about 48% and at 500° about 58%. Such properties as tensile strength and elongation change at about the same rate as crystal orientation. The elec. resistance of a cold-drawn Al wire (99.5%) changes in about the same manner as Cu and Ag, decreasing about 10% at 350° and then rising again, but with quite pure Al no change in resistance occurs on heating, because of the absence of intercryst. material. With W, the change in resistance on cold drawing is greater than with other metals, an increase in sp. resistance of 1.6 times being observed. H. STORITZ

The photomicrography of metals. H. WRIGHTON. *J. Roy. Microscop. Soc.* [3], 47, 107-15 (1927).—The general principles of critical illumination for max. resolving power are discussed. Analogies are drawn between transmitted illumination and reflected illumination as applied to metallography. A simple illuminating app. and photomicrographic camera are described. C. W. MASON

Unusual features on the microstructure of ferrite. H. S. RAWDON and TORKEL BERGLUND. *Bur. Standards, Sci. Paper* No. 571, 649-717 (1928).—The unusual features which are revealed by etching are of 3 types and are named, resp., α veining, γ network and δ network. These features exist throughout the body of the metal and appear to be associated in their origin with the 3 allotropic forms of Fe. The γ and δ networks can usually be associated with tiny inclusions distributed in such a manner as to record the grain structure which existed in the high-temp. allotropic conditions. In the α (ordinary) condition there often appears within the grains a "veining" which gives the metal a pseudo-fine-grained appearance. Ferrite stressed or forged at a temp. close to the α - γ transformation shows veining exceptionally well. Additions of Al or Mn to Fe had no pronounced effect on α veining, whereas ferrite contg. Si in amount sufficient to suppress the transformation showed no veining. The ordinary mech. properties of Fe are affected little, if any, by α veining. The δ network appears to be associated with the hot-shortness of Fe. The real nature of α veining is still in question. WILLIAM F. EBBERT

The best method of illumination of metallurgical specimens with the vertical illuminator. CONRAD BECK. *J. Roy. Microscop. Soc.* [3], 47, 116-27 (1927); cf. preced-

ing abstr.—Diagrams and discussion emphasizing the theoretical relationships between transmitted and reflected illumination. To obtain max. resolution the light must be centered, focused on the prep., fill the back lens of the objective and illuminate only the field under examn. Stops giving unsymmetrical illumination are recommended for enhancing the appearance of "relief" and contrast in metal specimens.

C. W. MASON

Metallic solid solutions and metallic compounds. TOMOJIRŌ TANABE. *Tetsu-to-Iagane* [9], 10, 612-25(1924).—In Japanese.

H. G.

Passivity limits in solid solution series. G. TAMMANN. *Z. anorg. allgem. Chem.* 169, 151-6(1928).—In Fe-Cr alloys, on the assumption that a Cr atom in the surface can render 1 adjacent Fe atom passive to the action of dil. acids, the (101) crystal face should become passive to solvent action with a Cr content of $\frac{2}{8}$ mol., while the (100)- and (111)- faces should first become passive with $\frac{3}{8}$ mol. Cr. Exptl. results show that passivation takes place at lower Cr content than that predicted, occurring at 0.16 to 0.28 mol. Cr. It is concluded that passivity is affected by various factors, such as the nature of the solvent, previous treatment of the alloy, and the nature of the second component. In Ni-Cr alloys, 10% Cr (0.11 mol.) is sufficient to make the alloy passive. In general the passivity limit is independent of time of action, temp., concn. of the chem. agent and particle size.

H. STOERTZ

The transformation of austenite into martensite in liquid air. KURT SCHROETER. *Z. anorg. allgem. Chem.* 169, 157-60(1928).—A Mn steel contg. 1.89% C and 2.22% Mn, on immersion in liquid air together with a small magnet, is seized by the magnet shortly after immersion. Measurements of magnetic satn. gave the following results. A water-hardened specimen gives 1070 gauss before immersion in liquid air and 11380 after immersion, while with an oil-hardened specimen these values are 2410 and 14670 gauss. Similar results are obtained with a 25% Ni steel, and S. concludes that the transformation of austenite into martensite has taken place.

H. STOERTZ

Recent development in cast iron. II. J. G. PEARCE. *Metallurgist* (Suppl. to *Engineer* 145, 13) 38-42(1928); cf. C. A. 22, 1310.—A review of recent patents with illustrations

D. B. DILL

Temperature measurements of molten cast iron. H. T. WENSEL AND W. F. ROESER. *Trans. Am. Foundrymen's Assocn.* 1928 (preprint) 191-212.—Measurements of the true temp. with a thermocouple and the apparent temp. with an optical pyrometer on molten cast Fe show that the character of the surface undergoes a change in the neighborhood of 1375° (true temp.). Observations on streams and ladles all indicate that the uncorrected optical pyrometer reading is approx. 40° lower than the true temp. below 1375° when the bright (presumably oxidized) surface is observed. This corresponds to an emissivity of 0.7 in this region. Above this region the emissivity is approx. 0.4, corresponding to a correction of 110° at 1400° and 140° at 1600° true temp. The change in emissivity is attributed to the formation of Fe oxides below 1375°. Above this temp. the difference between true and apparent temp. corresponds to the emissivity found for pure Fe.

S. G. SIMPSON

Equilibrium in the reduction, oxidation and carburization of iron. V. R. SCHENCK. *Z. anorg. allgem. Chem.* 167, 315-28(1927); cf. C. A. 22, 937.—A summary of the previous papers in this series is given. The three-dimensional equil. model of the system Fe-C-O₂ is discussed, the system being under an atm. of CO and CO₂ and at various temps. from 500° to 1000°. An isobar at 1 atm. shows the concns. of CO and CO₂ and the temps. at which the following will be stable: Fe₃C, Fe₃O₄, wustite, oxoferrite and oxo-austenite. Isotherms at 50° intervals from 542° to 1000° show the range of stability of the above-mentioned substances when under pressures ranging from 0 to 1200 mm. The remarkable influence which impurities have upon the equil. is again stressed. The effect of MgO is given in detail. Problems for future solution are: (1) the systematic investigation of the influence of impurities, and (2) the detn. of the compn. of the solid solns. oxoferrite and oxo-austenite as they exist under various gas pressures and compns.

WILIAM F. EHRET

Intricate spun-sorbite castings. J. E. HURST. *Iron Age* 121, 1007-8(1928).—A centrifugal casting process is described which yields castings having a tensile strength around 60,000 lb. per sq. in. The Si content of the cast Fe can be kept low, a desirable feature where the castings are to be machined. By carefully controlling the cooling of the castings there results a microstructure which is distinctly sorbitic.

W. F. E.

Properties of ferrous metals at elevated temps. A. E. WHITE AND C. L. CLARK. *Univ. Michigan Dept. Eng. Research Reprint Series* 1928, No. 3, 16 pp.—Short-time tensile and expansion tests were run on: (1) plain C-steels of tubular stock contg. 0.13 and 0.38% C, (2) Enduro, an alloy contg. 16.7% Cr and 0.09% C. The tensile

strength and proportional limit of the steels considered decrease steadily with increasing temps. The range covered was from 20 to 800°. The Enduro metal showed superior proportional-limit values over practically the whole temp. range. By a comparison of the proportional-limit values of various steels at corresponding temps. it is brought out that the steels possessing the best properties at elevated temps. are a 20.0% Cr, a 1.55% Mn, a 4.96% Co and a Cr-V. The 20% Cr seems to have advantages above 538° whereas the 1.55% Mn, because of its good qualities and relative cheapness, possesses decided advantages at temps. lower than the above. WILLIAM F. EHRET

Recrystallization of steel used for transformer sheets. M. VON MOOS, P. OBERHOFFER AND W. OERTEL. *Stahl u. Eisen* **48**, 393-403(1928).—The recrystn. of steel with 4% Si and from 0.05 to 0.12% C was investigated and the recrystn. diagram, after cold working, showing the grain size as a function of the annealing temp. and rate of reduction, for annealing periods of 1 and 4 hrs., was developed. The laws governing recrystn. were found to be valid, although the process is shifted into temp. ranges several hundred degrees higher. No crit. ratg. of reduction was observed. In addn. to the old grain boundaries, the gliding planes were found to be the nuclei of recrystn. The form of C in transformer sheets is illustrated by numerous photomicrographs. The recrystn. expts. following warm working showed that in a coarse-grained material, with few gliding planes, the recrystn. is very slow, because of the lack of recrystn. nuclei. By refining the structure of the starting material, complete recrystn. can be obtained in a short time. J. A. SZILARD

The fragility of steel. P. RÉGNAULD. *Rev. métal.* **24**, 509-15(1927).—Some varieties of special steels after hardening develop internal fissures on keeping or during use, greatly reducing resistance to shock with little or no change in tensile strength. From a theoretical discussion of the phenomenon from the standpoint of hidden internal stress and mol. de-cohesion, it is suggested that the mechanism is analogous to that of season-cracking in brass. A. PAPINEAU-COUTURE

Heat-resisting and non-corrodible steels. S. A. MAIN. *J. Inst. of Aeronautical Eng. (British)* **1**, 5-44(1927). *Fuels in Science & Practice* **7**, 4-20(1928).—A popular discussion of the various uses to which some special English steels are adaptable. The steels are referred to by trade names only. D. A. REYNOLDS

Manganese steel. H. P. EVANS AND A. F. BURTT. *Trans. Am. Foundrymen's Asscn.* **1928** (preprint) 129-40.—A brief outline of the historical development, common heat treatments, properties and structure of Mn steel. S. G. SIMPSON

General characteristics of alloy steel castings. J. W. FRANK. *Trans. Am. Foundrymen's Asscn.* **1928** (preprint) 119-28.—An outline of practical modern uses of alloy steel castings together with a brief discussion of some of their outstanding characteristics. S. G. SIMPSON

Hydrogen overvoltage on alloys. M. G. RAEDER AND J. BRUN. *Z. physik. Chem.* **133**, 15-30(1928).—The c. d.-potential curves were detd. during contact with H₂ for the following alloy types. Single-phase system of homogeneous solid soln., Cu-Ni; two-phase systems. (a) simple eutectic, Ag-Pb; (b) eutectic system with incomplete solid soln. formation, Pb-Sb, Bi-Sn; (c) system contg. a compd., Ag-Sb. In a solid soln. system the overvoltage may vary continuously between the limiting values of the components or it may be greater than the normal values of the components. In eutectic systems the overvoltage is not detd. by the component which has the lower overvoltage but varies more or less regularly between the values characteristic of the components. In the Pb-Sb system the overvoltage values appear to confirm the existence of the compd. Pb₃Sb. In the system Sb-Ag the compd. Ag₃Sb has practically the same overvoltage as the component of higher overvoltage, Sb. Overvoltage measurements may be used at times to det. structural relations in alloy systems. E. R. SMITH

Peritectic transformations of ternary alloy systems. HIDEO NISHIMURA. *Suiyō-Kwaishi* [7], **4**, 1139-46(1924).—In Japanese. H. G.

The theory of the Heusler alloys. A. KUSSMANN AND B. SCHARNOW. *Z. Physik* **47**, 770-85(1928).—The magnetic anomalies which appear in Heusler alloys on aging have been explained heretofore by the theory that the elementary magnets undergo a reduction in their freedom of orientation due to the formation of "complexes." This theory has been supported by the behavior of the alloys in the neighborhood of 400°. K. and S. describe expts. which demonstrate the existence of a transformation at 160 to 150°. It is still uncertain whether this is due to a change in the mutual solubilities of the components or whether it represents an allotropic transformation. In either case, however, a different magnetic satn. value, and hence a different Curie point, would correspond to the two phases, above and below 130°. As several hrs. are re-

quired for the completion of this transformation, different values for the satn. intensity of magnetization and for the Curie point can be obtained for the same specimen by varying the heat treatment. W. W. STIFLER

The effect of heat treatment on some mechanical properties of 85:15 copper-tin alloy. R. J. ANDERSON. *Am. Metal Market* (Magazine Section), reprint from August, 1927.—The first of a series of articles on the effect of heat treatment on some mech. properties of sand-cast Cu-rich alloys. Expts. are described and tables given which show: (1) That simple annealing above 400° produces slight changes in tensile properties, *i. e.*, increased strength, elongation, reduction in area, decrease in yield point. Such annealing relieves quenching strains without impairing the tensile properties. (2) That quenching from 600° (the optimum temp.) causes marked improvement in tensile strength, elongation, reduction in area, with slight decrease in yield point, and that such quenching may be applied commercially with good results. ROBERT F. MEHL

The effect of heat treatment on some mechanical properties of 88:10:2 copper-tin-zinc alloy. R. J. ANDERSON. *Am. Metal Market* (Magazine Section), reprint from December, 1927; cf. preceding abstract.—Annealing below 700° followed by air cooling is harmful. Annealing at 750° improves the strength and elongation slightly. Quenching from any temp. within the range 400–700° is harmful. The effect of heat treatment is quite dependent upon the condition of the alloy prior to the treatment. The time for heating and rate of cooling are important in detg. the resultant properties. The article is accompanied by tables, photomicrographs, and curves. ROBERT F. MEHL

The effect of heat treatment on some mechanical properties of 88.7:11:0.3 copper-tin-phosphorus alloy. R. J. ANDERSON. *Am. Metal Market* (Magazine Section), reprint from Nov., 1927, cf. preceding abstract.—Annealing at temps. below 600° has little effect; at 600° the ductility is increased. Max. elongation is obtained by annealing at 650–700°. Annealing to remove casting strains does not materially alter mech. properties. Quenching in water from 600° and above is harmful. Annealing for 30 min. at 700° followed by air cooling gives the best properties. The article is accompanied by tables, photomicrographs and curves. ROBERT F. MEHL

The effect of heat treatment on some mechanical properties of 90:10 copper-tin alloy. R. J. ANDERSON. *Am. Metal Market* (Magazine Section), reprint from Oct., 1927; cf. preceding abstract.—Simple annealing followed by air cooling on the sand-cast alloy has little effect upon yield point and tensile strength until 700° is reached when the strength is considerably improved. Annealing above 600° results in marked improvement in elongation and reduction of area. Annealing below 600° for short periods (to relieve casting strains) does not affect the mech. properties appreciably. Quenching in water from below 550° results in little change in properties. Quenching from above 550° causes increased elongation and reduction in area but the strength is little affected until 700° is reached, the yield pt. is but little affected by quenching in the range 400–700°. Tables, photomicrographs, and curves accompany the article. ROBERT F. MEHL

Miscibility gap in liquid iron-copper alloys. A. MÜLLER. *Z. anorg. allgem. Chem.* 169, 272(1928); cf. *C. A.* 21, 2245, 3591, 3879.—A reply to R. Ruer. H. S.

Mother-of-pearl alloys. W. HANNICH. *Allgem. Glas. Keram. Ind.* 18, 5(1927); *J. Soc. Glass Tech.* 11, 344–5A.—About 90 parts of tin and 10 of Cu can be used in making artificial mother of pearl. The alloy is cooled from 500° down to 220°, thereby being obtained in a plastic condition. It is then mixed with powd. opal glass, the temp. being kept const. The resulting mass can be molded and pressed when cold and ground and polished. Mixts. of Cu, Ag and Mn give brilliant colors which are greatly enhanced by the Sn salt iridizing process by exposing the semi-soft glass in closed chambers to the vapor produced by heating one or other of the following mixts.: (1) SnCl₂ 90, BaCl₂ 5, Ba(NO₃)₂ 2, (2) SnCl₂ 20, BaCO₃ 10, Cu(NO₃)₂ 10, SrCO₃ 5; (3) SnCl₂ 90, Sn(NO₃)₂ 5, BaCl₂ 5; (4) SnCl₂ 100, Sn(NO₃)₂ 3, BaCl₂ 8. Another way of producing mother of pearl is to take suitable blast-furnace slag rich in iron oxide, coat with crystal or colored glass, etch with acid lightly, and expose to the atm.; an iridescent surface develops. H. G.

Hardness, microstructure and electrical conductivity of platinum-silver alloys. N. S. KURNAKOV and V. A. NEMILOV. *Z. anorg. allgem. Chem.* 168, 339–48(1928).—See *C. A.* 21, 2654. H. STORRTZ

Transformation in β -brass and the demagnetization of ferromagnetic metals. C. H. JOHANSSON. *Ann. Physik* 84, 976–1008(1927).—The transformation in β -brass, which proceeds continuously over an extended temp. interval, is caused by heat vibrations about an axis of inertia perpendicular to the axis of symmetry of the Zn atom. Similar transformations involved in the demagnetization of ferromagnetic

elements can likewise be ascribed to heat vibrations about an axis of inertia perpendicular to the magnetic axis of the atom. The magnetic moment of an atom or mol. is independent of heat motion, but changes of phase or chem. reactions in which alteration of the electron configuration is involved can alter the atomic moment discontinuously. Solid solns. of a weakly magnetizable metal and small quantities of a ferromagnetic metal give a weakly magnetizable alloy, even if the moments of the ferromagnetic atoms are unchanged. This is to be expected from *Larmor's theorem*. The ferromagnetic atoms are so widely sepd. that an external field has no directional effect upon the individual atoms.

H. STÖRZT

Aluminum bronze. II. ANON. *Metallurgist* (Suppl. to *Engineer* 145, No. 13) 42-3(1928).—Self-annealing in large castings can be reduced by addition of Fe up to 4%. Zn also reduces self-annealing but adversely affects physical properties. Mn raises tensile strength without reducing ductility and increases resistance to sea water corrosion. However, sound castings are difficult to obtain when more than 1% Mn is present. Pouring temp. should be near incipient solidification temp. The addition of 1-2% Pb improved machinability without leading to segregation. Difficulties in casting are discussed.

D. B. DILL

A study of the tin bronzes. M. HANSEN. *Z. anorg. allgem. Chem.* 170, 18-24 (1928).—A study of the fringes obtained on quenching Cu-Sn alloys of 15-25% Sn shows: (1) that under the same conditions of quenching the width of the fringes increases as the temp. of quenching decreases and becomes greatest when the temp. is nearest 520°; (2) that at the same quenching temp. the fringes are wider the slower the quenching. These results are interpreted as showing that the fringes are connected with the transformation at 520° and not with that at 587° as has previously been assumed. The fringes are probably due to an intermediate product between the α and β mixed crystals and the ($\alpha + \delta$) eutectoid formed at 520°.

H. F. JOHNSTONE

The effect of small additions of tin and cadmium on the qualities of lead. JEAN COURNOT. *Compt. rend.* 186, 867-9(1928).—Pure lead used as a covering for telephone cables possesses certain unfavorable qualities. C. discusses the effect upon lead for cable covers of small additions of several metals, including lead and tin.

L. B. M.

The Parkerization method for protecting ferrous alloys against corrosion. GOURNOT. *J. usines gaz* 52, 137 8(1928); *Memoires et compte-rendu des travaux de la Societe Ingenieurs Civils de France* 1927, 1071.—The method consists of immersion in a hot soln. of complex phosphates of Fe and Mn. It is superior to other phosphate methods in that the bath is easily replenished and the metal is not discolored. The metal is superficially attacked, liberating H_2 , only until the surface is completely covered. The extreme adherence of the coat is due to a slight initial etching. It is insol. in water and very resistant to normal atm. corrosion and, in general, equal or superior to other methods. It does not alter the physical properties of the metal and is applicable regardless of physicochem. state. If scratched, the rusting does not spread beyond the exposed surface. It is not applicable to non-ferrous metals and electrolytic deposits will not adhere to it. It has been applied extensively in the U. S. for nails, screws, machine parts, etc.

F. S. GRANGER

Practical problems of corrosion. III. Formation of rust and its consequences. U. R. EVANS. *J. Soc. Chem. Ind.* 47, 55-62T(1928); cf. *C. A.* 22, 1318.—The compn. of, and vol. occupied by rust, are discussed. The mechanism of the formation of rust varies for different waters, rust in general not being formed at the seat of corrosion. Hard waters produce rust films contg. Ca and Mg compds. which, being deposited at cathodic portions, decrease corrosion by obstructing the diffusion of O_2 . $MgSO_4$ was found to reduce corrosion of partially immersed specimens. Loose rust films if continuous will protect the underlying metal, otherwise will promote pitting. The formation of voluminous corrosion products may cause disintegration of coatings or the metal itself. IV. **The corrosion of wrought iron in relation to that of steel.** *Ibid* 62-9T.—Wrought iron immersed in dil. H_2SO_4 showed rapid attack on cut edges and on planes parallel to the surface, with the surface only slightly attacked. Protection of the edges decreases the acid attack, while polishing with emery increases the attack. The initial attack of acids on wrought iron is much slower than on steel, but the velocity increases with time until the attack is much more rapid. Loss of wt. is no indication of the depth of pitting. Corrosion by rain water is not usually of the H_2 evolution type; consequently the acid type of attack on wrought iron does not take place in this case. The resistance of wrought iron in atm. corrosion is attributed to the plugging up of pits by corrosion products, this action being more effective on wrought iron because of the form of the pits. Under anodic corrosion produced by stray currents, wrought iron will form shallower and broader pits than steel because of resistant planes

of silicate. For this reason wrought iron possesses an advantage over steel in resisting corrosion by stray-current electrolysis underground, although extra precaution in providing protective coatings might possibly show better economy in the use of steel pipe. It is concluded that in general under favorable conditions steel and wrought iron will have equal life, but that because of its structure wrought iron will have the advantage in deflecting attack of intense localized character. **V. Corrosion and protection at the contacts of dissimilar metals.** *Ibid* 73-7T.—Cu and Ni are usually cathodic to steel, Zn and Cd usually anodic, while Sn, Pb and Al are variable. Contact of steel with Cu in salt solns. accelerates corrosion of the steel, with Ni to a less extent, while Pb causes only slight acceleration. Hardness of water decreases contact effect. Zn affords complete protection to steel in most liquids, although at the expense of the Zn in salt solns.

J. K. ROBERTS

Corrosion in ice plants. H. L. LINCOLN. *Power* 67, 688-9(1928).—Corrosion is decreased when the p_H value of the brine is maintained between 8 and 9. D. B. DILL.

Pipe-line welding from the oxy-acetylene viewpoint. LEROY EDWARDS. *J. New England Water Works Assocn.* 42, 3-20(1928). **Thermite pipe welding.** R. L. BROWNE. *Ibid* 21-4. **Pipe welding and other recent developments in welding.** D. H. DEVOR. *Ibid* 25-32. **The metallurgy of welding wire.** C. A. McCUNE. *Ibid* 33-5—A group of papers presenting the mechanics and chemistry of welding from many points of view.

D. K. FRENCH

Coke for crucible steel melting (WHEELER) 21. Equilibria at high temperatures in the system Fe-O-C (GARRAN) 2. Evaluation and testing of foundry coke (ZERZOG) 21. Apparatus for charging shaft furnaces (U. S. pat 1,668,968) 1. Ore briquets (Brit. pat. 274,876) 21. Casting metal crowns on hollow C electrodes (Brit. pat. 274,735) 4.

BRANDT, G., and SCHWARZ, M. V.: *Die praktische Nutzenanwendung der Prüfung des Eisens durch Aetzverfahren und mit Hilfe des Microscopes.* Berlin: Julius Springer. Reviewed in *Rev. metal.* 25, 98(1928).

CLEMENTS, FRED: *Blast Furnace Practice.* In 3 Vols. London: Ernst Benn, Ltd. Price approx. £5. 4 s., the set.

EULER, WOLF ADOLF: *Die Gichtgas-Reinigung. Die wichtigsten Verfahren unter besonderer Berücksichtigung des Trockingasreinigungs Verfahrens System Halbergerhütte-Beth sowie des Theisen-Disintegrator-Verfahrens.* Berlin: Julius Springer. 132 pp. Paper, M. 15; bound, M. 16 50 Reviewed in *Ind. Eng. Chem.* 20, 558(1928).

NEWMAN, W. A. C.: *The Chemistry, Manufacture and Uses of Aluminium.* London: Ernest Benn. 25 s., net.

OBERHOFFER, PAUL: *Industrial Steel and Iron--Their Constitution and Properties.* Authorized Eng. ed., revised and edited by Wesley Austin. London: Ernest Benn, Ltd. Price, approx. 45 s., net.

SIDNEY, L. P.: *Pure Iron—Its Nature, Properties and Commercial Applications.* London: Ernest Benn, Ltd. Price, approx. 25 s., net.

WILLIAMS, R. S., and HOMERBERG, V. O.: *Principles of Metallography.* Second ed., revised and enlarged. New York: McGraw-Hill Book Co., Inc. 259 pp. \$3. Reviewed in *Ind. Eng. Chem.* 20, 554(1928).

Ore flotation. G. G. GRISWOLD, JR., and G. E. SHERIDAN. U. S. 1,668,202, May 1. An ore contg. sulfides of Pb, Cu, Zn and Fe is treated with a halogen in such a quantity as will substantially inhibit the flotation of Zn and Fe sulfides and the treated ore is then subjected to a flotation in which Cu and Pb sulfides are in large part removed and recovered from the froth.

Ore flotation. D. GUGGENHEIM, M. GUGGENHEIM, S. GUGGENHEIM, S. R. GUGGENHEIM and E. A. C. SMITH. Brit. 275,561, Aug. 3, 1926. Derivs. of thiocarbonic acid such as dioxanthogen and xanthic anhydride or similar compds. are used as flotation agents, *e. g.*, in soln. in oils such as kerosene, and flotation may be effected in acid or alk. liquid and in the presence of a frothing agent such as pine oil. Brit. 275,562-3 also relates to similar process and to the prepn. of the xantho compds. used.

Ore flotation. C. P. LEWIS. U. S. 1,668,917, May 8. A pulp of oxidized ore is agitated with a xanthate and a sol. silicate to effect froth flotation of Cu values or other constituents.

Reducing calamine or other ores. H. WITTEK. Brit. 274,803, July 26, 1926.

Ore reduction is effected in connection with the manuf. of Ca cyanamide from carbide and N in order to utilize the C and H and other reducing gases.

Agglomerating tin ore. METALLBANK UND METALLURGISCHE GES., AKT.-GES. Brit. 275,618, Aug. 9, 1926. Sn ores are briquetted or agglomerated with Sn oxide and preferably also with lime or an oxide or hydrate of Mg or Al and sufficient water to facilitate pressing the mixt.

Treating ores to facilitate magnetic separation. R. RADEMACHER and E. GOEBEL. Brit. 274,889, July 23, 1926. The material is roasted either at 300–600° or at a temp. above 1100°, or it may be successively roasted at both temp. ranges specified with an intermediate magnetic sepn.

Cupola furnace. O. WEICHEL and W. HOLLINDERBAUMER. U. S. 1,668,133, May 1. A furnace is specified adapted for *melting Fe*.

Furnace for annealing or other heat-treatments of metals in an inert atmosphere. A. SMALLWOOD and J. FALLON. Brit. 274,730, Jan. 22, 1927.

Furnace for heating metal plates. BRITISH FURNACES, LTD., AND E. W. SMITH. Brit. 275,513, March 23, 1927.

Rotary furnace for melting or refining metals. W. BURSS. Brit. 274,451, July 16, 1926.

Rotary furnace for roasting or other operations. A. F. MEYERHOFER. Brit. 275,222, July 27, 1926.

Blast-furnace operation. FREYN ENGINEERING CO. Brit. 275,289, April 7, 1926. To avoid choking of hot-blast stoves fired by washed blast-furnace gases, the gas is preliminarily passed through a heater which serves to remove dust not already removed by the washer. An app. is described.

Operating blast furnaces or similar furnaces. F. KRUPP AKT.-GES. FRIEDRICH-ALFRED-HUTTE Brit. 275,601, Aug. 6, 1926. In connection with utilization of a portion of the waste gases in the furnace, the blast is supplied "at the highest possible temp." and the coke charge used is correspondingly small, and changes in the temp. equil. of the process are compensated for by varying the quantity of waste gas supplied. Coal dust also may be supplied and may serve as an addnl. means of temp. control.

Casting metal containers. E. GALASSINI. Brit. 275,621, Aug. 4, 1926. Engine cylinders, containers for chem. synthesis at high temps, ordnance projectiles, etc., are cast around an integral metal core having a m. p. at least equal to that of the cast metal, in order to provide a nonporous lining or one with other desirable properties.

Apparatus for casting melted metals under pressure. E. BRUMM. U. S. 1,669,323, May 8.

Joining cast iron or other metals. B. RACHIEFF and M. GOFMANN. Brit. 274,481, July 15, 1926. A mixt. of powd. Fe 85 and a preformed mixt. of powd. Al 9 and Ca 6 parts may be formed into a paste with water or grease and placed between surfaces of cast Fe to be united which are then heated to about 700° to effect welding. The Ca and Al with addn. of metal corresponding to the surfaces to be joined may also be used for joining other metals.

Hot top for ingot molds. E. L. MESSLER. U. S. 1,668,567, May 8.

Rotary table apparatus for making gray iron castings or other castings in molds. E. WILL. Brit. 274,522, Jan. 16, 1926.

Cast iron. E. PIWOWARSKY. Brit. 274,457, July 15, 1926. Molten Fe is freed from gases and other non-metallic impurities in the fore hearth of a furnace or a ladle which is rotated at high speed.

Iron low in carbon. F. WÜST. Brit. 275,646, Aug. 6, 1926. Scrap Fe after smelting in a cupola is delivered into a reverberatory furnace in which a sufficiently high temp is maintained to ensure formation of eutectic graphite. Waste heat from the reverberatory furnace is utilized for heating the cupola and gases from the latter heat air supplied to the reverberatory furnace. The app. is described.

Purifying iron scale. A. LUCAS. Brit. 275,099, Feb. 14, 1927. See U. S. 1,631, 423 (C. A. 21, 2538).

Uniting iron and aluminum by cold rolling. O. JAEGER and E. LUETH. U. S. 1,667,787, May 1.

Refining iron and steel. B. ZWIEBEL. Brit. 275,002, June 28, 1926. Fe or steel melts in furnaces or converters are protected from oxidation and absorption of gases by forming a reducing atm. over the surface of the slag above the melt; for this purpose a heavy hydrocarbon in small pieces or atomized state is introduced above the slag towards the end of the process (the particular time of introduction depending on the character of the product which is to be produced). An app. is described.

Drill steel. W. H. WINEMAN. U. S. 1,668,442, May 1. In shanking drill steel, the steel is quenched at one end after heating near this end, the heated portion near the end is upset by striking the quenched end while the heated portion is held in suitable dies and the upset portion is then swaged into the desired form. An app. is described.

Alloys for tools, etc. W. SCHROBSORFF. Brit. 274,866, July 21, 1926. At least 50% of Ta or Nb or both is alloyed with a metal which does not form carbides such as Co, Cu or Ni, or a metal of the Pt group, or with a carbide of Cr, U, Mo or W, or with both a metal and carbide as specified. The products may be cast in C molds.

Magnetic alloys. W. S. SMITH, H. J. GARNETT and J. A. HOLDEN. U. S. 1,667,746, May 1. Alloys which have high elec. resistance comprise Ni together with Fe 10-17, Si 1.5-4, Cr, W, V or Mo 1-4%, and are substantially free from C.

Magnetizable alloy. E. GUMLICH. U. S. 1,668,115, May 1. Fe is alloyed with at least 40% Ni and Mn 2-20% is added, to produce an alloy which is suitable for use with various elec. app. Cf. C. 1. 21, 3596.

Bronze. M. G. CORSON. U. S. 1,667,966, May 1. A bronze which is highly resistant to corrosion comprises Al not more than 9%, Cr in solid soln. over 0.5% and sufficient Ni (suitably about 6% with 2% Cr) to hold the Cr in soln.

Refractory copper alloy. J. G. DONALDSON and H. L. COLES. U. S. 1,668,306, May 1. An alloy which resists high temps. and is suitable for vaults and safes comprises Cu together with Si 0.60-0.75 and less than 1% C. U. S. 1,668,307 specifies forming safe or vault plates or similar articles with a core of alloy contg. Cu 99.385-99.230, C 0.015-0.020 and Si 0.60-0.75% united with an encasing metal of different character such as cast Fe.

Alloy of nickel and zinc. W. M. GROSVENOR and V. P. GERSHON. U. S. 1,668,642, May 8. A substantially uniform and homogeneous alloy contg. Ni about 80 and Zn about 20% may be further alloyed with 3 times its wt. of Au to form an alloy resembling Pt and suitable for making jewelry.

Hollow bars or rods. H. S. POTTER. Brit. 274,978, May 4, 1926. Prior to rolling it into bar form, the bore of a metal billet may be lined with a metal such as Cu, Ni or "rustless" Fe or steel by spraying or by electrodeposition to protect the surface of the bore from damage during working.

Hollow steel bars. T. S. WHEELWRIGHT. U. S. 1,668,705, May 8. A hollow metal core is surrounded by a jacket of metal rods. The hollow core is packed with refractory material and an ingot is cast around the core at a temp. to fuse with the core; the ingot is rolled to desired dimensions, and the refractory core is removed.

Producing pipe or other hollow articles by centrifugal casting and alternating vibrations in different directions. C. HUMPERDINCK. U. S. 1,668,318, May 1. An app. is described.

Coating metal articles with nickel, cobalt or chromium, etc. GENERAL ELECTRIC CO., LTD., and E. WEINTRAUB. Brit. 275,233, July 27, 1926. Metal coatings are welded to the foundation metal, e. g., by heating *in vacuo* or a reducing atm. With Ni-plated Cu, a temp. of 700° is suitable.

Corrosion-resisting linings of hollow drill shanks, etc. L. PRYCE. Brit. 275,560, Aug. 9, 1926. The bore of a drill shank is coated with metals such as pure Fe, Ni or Cr-Fe alloy or with paint or varnish which may be renewed as required.

Annealing box for holding metal sheets, etc. F. H. CLAY. U. S. 1,668,230, May 1. Structural features.

Apparatus for pickling metal sheets. W. J. COOK. U. S. 1,668,355, May 1.

Stitching wire. J. B. GREEN. U. S. 1,667,730, May 1. A flat C steel wire suitable for stitching cardboard or fiber receptacles, etc., contains the carbide in pearlitic form and is 1.75-3 times as wide as thick.

Flux for soldering metals such as iron or brass. J. BLACKFORD. Brit. 274,693, Nov. 16, 1926. Anhyd. ZnCl_2 1 oz., finely ground NH_4Cl 8 oz. and NaF 1.25 oz. are used together.

10—ORGANIC CHEMISTRY

CHAS. A. ROULLIER AND CLARENCE J. WEST

Oxidation of alcohols to aldehydes and condensation of aldehydes and alcohols to mixed esters. I. S. N. DANILOV. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 5, 66-88.—Expts. were instituted in order to find the best operating methods of transforming of alcs. into the corresponding aldehydes. The alcs. (chiefly Am and

iso-Bu) were passed at various rates of speed over various catalyzers through tubes (2–3 cm. in diam. and 80–100 cm. long) made of glass or of various metals and placed in an elec. furnace. The catalyzers tried were Cu, brass, Zn, Zn-Fe, Cu-Zn, adsorptive charcoals. With Zn as catalyzer, aldehyde yields of 40–70% were obtained by operating at 580° and maintaining the speed of introducing the alc. at a rate of 50–100 g. per hr.; in this case about 10–15% of alc. was destroyed. By using birch charcoal as catalyzer and operating at 320–30° yields of 56–7% of aldehyde were obtained. The results given by other catalyzers were not so good. To find a convenient industrial method of prepn. of mixed esters from aldehydes D. made a series of expts. designed to improve Tishchenko's method (cf. T., C. A. 9, 1749; 19, 2640; Childs and Adkins, C. A. 18, 1814; 19, 1247) so as to obtain the best yields and no evil-smelling and colored by-products. One expt. (no. 17) was made thus: 0.4 Al turnings was placed in an app. provided with a stirrer, a funnel with a stopcock for dropping in liquids, a thermometer and a tube for introduction of the gases. Dry H was lead into the app. for 5 min., then a stream of HCl, then the latter was displaced by H. After thus activating the Al, 18 cc. AmOH was introduced. The reaction began in the cold and became energetic on heating. In 20 min. the Al dissolved and formed an alcoholate. The soln. was cooled to 5°, whereupon it partly solidified. 100 g. BuCHO was added with cooling and stirring. After an hr. the stirring was continued without cooling. To end the reaction the app. was heated for 30 min. at 80°. The product was distd. under 100 mm. Yield of ester 94–6%. Other expts. were made with iso-BuCHO and iso-PrCHO, the alcoholates used being Al(OAm)₃ and Al(OCHMe₂)₃ and the yields of esters reaching 94 and 96% of the theoretical. Very slight differences in the operating method have a considerable influence on the yield.

BERNARD NELSON

Equilibrium in the reaction $\text{CH}_4 + 2\text{H}_2 \rightleftharpoons \text{CO}_2 + 4\text{H}_2$. R. N. PEASE AND P. R. CHESBRO. *J. Am. Chem. Soc.* 50, 1464–9(1928).—The reaction $\text{CH}_4 + 2\text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + 4\text{H}_2$ has been studied at 500° and atm. pressure. Equil. was approached from both sides and the value of the const. found to be 0.037 (partial pressures being expressed in atms.) at 505°. This is in excellent agreement with the value calcd. from Lewis and Randall's free-energy equations and thus supports in particular their equation for CH_4 in the low temp. region. It is pointed out that the reactions $\text{CH}_4 + \text{H}_2\text{O} \rightleftharpoons \text{CO} + 3\text{H}_2$ and $\text{CO}_2 + \text{H}_2 \rightleftharpoons \text{CO} + \text{H}_2\text{O}$ are also to be taken into account at higher temps. Equil. consts. at 500°, 600° and 700° are given for reference. Attention is called to the CH_4 -steam reactions as a source of H and of H-CO mixts.

C. J. WEST

Synthesis of 1-butene. H. J. LUCAS AND R. T. DILLON. *J. Am. Chem. Soc.* 50, 1460–4(1928).—1-Butene is conveniently and rapidly prepd. by adding $\text{CH}_2\text{:CHCH}_2\text{Br}$ to MeMgBr at 70° with stirring; the Grignard reagent should be previously heated at 130° in order to remove as much Et_2O as possible. The yield is about 40%. Dil. HClO_4 is effective in removing Et_2O from the gas stream. A detailed description of the app. and method is given.

C. J. WEST

The preparation and physical properties of isobutylene. C. C. COFFIN AND O. MAASS. *Trans. Roy. Soc. Can.* [3], 21, No. 3, 33–40(1928); cf. C. A. 15, 2369.—Isobutylene was prepd. by dehydrating iso-BuOH by alumina at 250–300°. The product was dried by freezing out the H_2O by means of CO_2 -ether. Final purification was secured by fractionation *in vacuo*. The middle fraction b. $-6.6^\circ \pm 0.1^\circ$. The dibromide of this butylene was prepd. and its v. p. detd. over the temp. range 54.0°–149.0°. The detns. of d., surface tension, f. ps. and critical temp. were by the methods used by Maass and Wright (ref. above). The results are given in the following table:

	MP	t_B	t_o	ML	d_B	$\frac{\Delta V}{\Delta T}$	γ_B
Ethylene	–169.4 C	–103.9	9.9	3510	0.5699	0.0045	16.50
Propylene	–185.2	–47.0	92.1	4600	0.6095	0.0034	16.70
Isobutylene	–146.8	–6.6	143.5	5240	0.6268	0.0011	15.72
	$\frac{dV}{dT}$	U	K	$\frac{ML}{T}$	T_B/T_o	$V_m - V'_m$	(calcd.)
Ethylene	0.1845	47.7	2.14	20.8	0.60	5.1	5.9
Propylene	0.1462	49.7	2.12	19.0	0.62	2.9	91.3
Isobutylene	0.1280	49.8	2.17	19.7	0.64	1.5	147.4

Isobutylene is a normal unassociated liquid in which the phys. consts. have reached the limiting values which will be found for the higher members. J. W. SHIPLEY

Preparation and physical properties of α -, β - and γ -butylene and normal and isobutane. C. C. COFFIN AND O. MAASS. *J. Am. Chem. Soc.* **50**, 1427-37(1928).—Data are given for vapor pressure, d., and surface tension for α -, β - and γ -C₄H₈, C₄H₁₀ and iso-C₄H₁₀, over a wide range of temp. These quantities, together with those previously obtained for C₂H₄, C₂H₆, C₃H₆ and C₃H₈, are discussed. C. J. WEST

Decomposition of methyl chloride at elevated temperatures. KARL WIESSLER. *Chem.-Ztg.* **52**, 182-3(1928).—MeCl was led over quartz at various temps., being heated for 4-5 min. Decompn. becomes important above 500° and is nearly complete at 900°. Diln. with CH₄ had little effect; H₂O raised the rate of decompn. slightly and CO₂ increased it greatly. All detns. were by absorption and detn of the HCl produced. At 800-900° formation of C₁₀H₈ was observed. FOSTER DEB SNELL

Reaction of the Grignard reagent with γ -chloropropyl *p*-toluenesulfonate. A method of lengthening carbon chains by three carbon atoms. S. S. ROSSANDER AND C. S. MARVEL. *J. Am. Chem. Soc.* **50**, 1491-6(1928).—Details are given for the prepn of *p*-MeC₆H₄SO₂O(CH₂)₃Cl (I), b_p 188-92°, d₂₅²⁵ 1.2396, n_D²⁵ 1.5225, the yield being 50-5%. I (1 mol) and 1 mol. of RMgX give the following products: 93 g. C₄H₉Cl, 27 g. (CH₂)₃Cl₂ (II); 137 g. C₄H₉Br, 50 g. Cl(CH₂)₃Br (III); 184 g. C₄H₉I, 60 g. Cl-(CH₂)₃I; 179 g. C₇H₁₅Br, 63 g. III and 20 g. (11.44%) C₇H₁₅(CH₂)₃Cl, 163 g. C₆H₁₁Br, 73 g. III and 24 g. (14%) C₆H₁₁(CH₂)₃Cl, b_s 76.9°, d₂₅²⁵ 0.9977, n_D²⁵ 1.4660; 127 g. Ph(CH₂)₃Cl, 34 g. of a mixt. of II and PhMe and 72 g. (42%) of Ph(CH₂)₄Cl, 169 g. Ph-(CH₂)₄Cl, 36 g. II, 50 g. Ph(CH₂)₃Me and 53 g. Ph(CH₂)₇Cl, b_s 131-6°, d₂₅²⁵ 0.9899, n_D²⁵ 1.5152. One mol. RMgX with 2 mols I gives the following products: 127 g. PhCH₂-Cl, 50 g. II and 99 g. Ph(CH₂)₃Cl; 157 g. PhBr, 51 g. II and 93 g. Ph(CH₂)₃Cl; 109 g. EtBr, 100 g. III and 25 g. (23%) of Et(CH₂)₃Cl; 55 g. C₁₂H₂₅Br, 33 g. III and 20 g. C₁₂H₂₅(CH₂)₃Cl; 163 g. C₆H₁₁Br, 98 g. III and 100 g. (62%) of C₆H₁₁(CH₂)₃Cl, 173 g. Ph(CH₂)₃Cl, 60 g. II, 62 g. Ph(CH₂)₇Cl and 28 g. Ph(CH₂)₃Me; 179 g. C₇H₁₅Br, 101 g. III and 87 g. (50%) of C₇H₁₅(CH₂)₃Cl. One mol. PhCH₂MgCl and 1 mol I give 18 g. BuCl, 22 g. PhMe and 45 g. PhAm; with 2 mols. I there result 24 g. BuCl and 74 g. PhAm. This method of lengthening C chains by 3 CH₂ groups is satisfactory when a Grignard reagent with 6 or more C atoms is used as the starting material. C. J. WEST

Catalytic oxidation with air of ethyl, isopropyl and butyl alcohols. R. M. SIMINGTON AND HOMER ADKINS. *J. Am. Chem. Soc.* **50**, 1449-56(1928).—EtOH (I), iso-PrOH (II) and BuOH (III) have been mixed with air and passed over a no. of catalysts with the production of aldehyde or ketone, acid, CO₂, CO, satd and unsatd. hydrocarbons and H. The oxidation of III resulted in the formation of a small quantity of ester with all catalysts and some HCHO with the mixed oxide catalysts. The following catalysts were used: Ag, Ni, Cu and Pt gauzes; Cu wire, Ag pellets, pellets of alloys of Cu and Zn, Ni, Bi, Pd, Pt, Au and Bi; oxide mixts of U and Cu, W and Cu, Mo and Cu, V, Fe and Cu. Ag and Ag-Cu alloys produced better than 70% yields of aldehyde or ketone. I has been found to produce approx. 3 times as much CO₂ as III and twice as much as II. The amt. of H in the effluent gases was found to be small except when brasses were used as catalysts. Large quantities of Zn apparently promote dehydrogenation but not oxidation of the H.* III was found to produce more unsatd. hydrocarbons than either I or II except with oxide catalysts, which caused the production of 10-15% of unsatd. compds. with iso-PrOH. This latter fact indicates that the oxide catalysts were not completely reduced to the metals. The production of satd. hydrocarbons is rather small in all other cases. Acid production was found to be small and fairly const. for the same alcs. over different catalysts. The plated catalysts are unsatisfactory because the high temp. of reaction apparently caused soln. of the plated metal into the supporting metal. It also seems likely that the reaction takes place throughout the catalyst. Evidence for this view is found in the change in the mech. properties of the gauzes, wire and pellets and in the reduction of CuO to metallic Cu in the center of the pellets of a CuO-V₂O₅ mixt. The temp. of the reaction varied with the alc-air ratios and with the catalysts employed. The Cu-V, Cu-Mo and Cu-W oxide mixts. were comparatively inactive and external heating was necessary. Heat was also applied to maintain a reaction at the surface of the 50% Zn-Cu alloy. The fact that small quantities of material incorporated into the metallic catalysts produce no marked effect indicates that a large portion of the surface of the catalyst is active in the catalytic oxidation of alcs. C. J. WEST

New method for the preparation of *O,N*-dialkylhydroxylamines. R. T. MAJOR AND E. E. FLECK. *J. Am. Chem. Soc.* **50**, 1479-81(1928).—*O,N*-Dialkylhydroxyurethans have been prepd. by the action of alkyl sulfates on HONHCO₂Et; hydrolysis

of these compds. with EtOH-KOH gives *O,N*-dialkylhydroxylamines, RONRH. A soln. of mol. equivs. of EtONeH and H₂O distils at 74°; no corresponding mixt. could be detected in the case of MeONMeH and H₂O.

C. J. WEST

Reactions relating to carbohydrates and polysaccharides. XIII. Properties of γ,δ -dihydroxycarbonyl derivatives and their bearing on the polymerization of polysaccharides. HAROLD HIBBERT AND C. P. BURT. *J. Am. Chem. Soc.* **50**, 1411-6 (1928); cf. *C. A.* **22**, 867.—Oxidation of Δ^6,δ -hepten-2-one with 2% aq. KMnO₄ gives 54% of *Me* γ,δ -dihydroxyamyl ketone, pale yellow, b_D^{20} 139-43°; with a trace of concd. H₂SO₄ at 90° this gives a resin (loss of 1 mol. H₂O₂ per mol. ketone), insol. in dil. acid and alkali but readily sol. in concd. HCl or H₂SO₄, mol. wt. in C₆H₆ 590, in camphor, 3706. *Me* γ,δ -dihydroxyisovaleryl ketone under the same conditions gives 60% methylheptenone and shows little tendency towards polymerization. The introduction of the 2nd Me group in the δ -position thus facilitates to a pronounced degree the splitting off of H₂O from the 2 adjacent HO groups.

C. J. WEST

Preparation and properties of the 2-methyl-5-isopropylphenylamides of some higher fatty acids. R. M. HANN AND G. S. JAMIESON. *J. Am. Chem. Soc.* **50**, 1442-3 (1928).—The compds. were prepd. by treating the acid chloride in Et₂O with an excess of cyminidine; 2-methyl-5-isopropylphenylamide of l^{aric} acid, m. 82-3°; myristic acid, m. 88-9°; palmitic acid, m. 90-1°; stearic acid, m. 93-4°; arachidic acid, m. 81-2°; lignoceric acid, m. 84-5°.

C. J. WEST

Gossypol. III. The oxidation of gossypol. E. P. CLARK. *J. Biol. Chem.* **77**, 81-7 (1928); cf. *C. A.* **22**, 772.—Among the reaction products of the oxidation of gossypol with alk. KMnO₄, were identified HCO₂H, AcOH and Me₂CHCO₂H. Assuming 1 mol. of gossypol to contain 1 mol. of the acid, 92.1% of this calcd. amt. of Me₂CHCO₂H was obtained. This is taken to indicate the presence in the gossypol mol. of a side chain consisting of at least the iso-Bu group.

ARTHUR GROLLMAN

The synthesis of monobenzoylcadaverine. S. I. KANEVSKII. *J. Russ. Phys.-Chem. Soc.* **59**, 649-52 (1927).—Benzoylchloroamylamine (prepd. according to Gabriel from benzylpiperidine and PCl₅) was treated with KCN (cf. *C. A.* **3**, 2137) and 10 g. of the nitrile heated with 20 cc. concd. H₂SO₄ on the water bath for 10 min. The resulting oil was poured into snow and benzoylcaproic amide, m. 126-30°, sepd. (yield close to the theory). Recrystd. from hot water it m. 140-1°. The amide (4.7 g.) was added in small portions to 9 g. KOH and 3.2 g. Br in 50 cc. cold water. After 5-15 min. on a water bath at 80° an oily layer sepd., was extd. with CHCl₃ and dried. The product (monobenzoylcadaverine) was sol. in water and acids, sparingly in Et₂O, it could not be crystd. or distd. *in vacuo*. The HCl salt (m. 159-60°; yield 90%) was prepd. by the action of HCl in EtOH. To 1 g. of this salt was added 1 cc. concd. HCl and the mixt. refluxed for 3 hrs.; 0.7 g. of cadaverine HCl resulted which when recrystd. m. 255°. Dibenzoylcadaverine, prepd. by adding BzCl to a 1% soln. of the mono deriv. in water, m. 135-55°.

B. C. S.

Chemical constitution of pentaerythritol. HANS BINCER AND KURT HESS. *Ber.* **61B**, 537-42 (1928).—The present work confirms the correctness of Tollens and Wigand's formula, C(CH₂OH)₄, for pentaerythritol (I) and rigorously excludes any other possible formula. From I and H₂ was obtained the diiodohydrin (ICH₂)₂C(CH₂OH)₂ (II), the yield of which was increased to 45% by modifying the conditions of prepn.; in II the C skeleton of the I remains unchanged, for II with AgOAc and subsequent exhaustive acetylation gave the tetraacetate of I. In alc. at 50-5° in the presence of C₆H₅N and MgO the I in II is quant. replaced by H by means of H₂ and Pd-BaSO₄, giving Me₂C(CH₂OH)₂, identical with the product obtained by Apel and Tollens from Me₂CHCHO and HCHO, its dibenzoate m. 52-4°. Contrary to the statement of Zelinskii, in the prepn. of the dibromohydrin of I there is also formed the tribromohydrin (9.2 g., together with 5.9 g. of the dibromohydrin, from 20 g. I heated 8 hrs. at 125° in 120 g. aq. HBr satd. at 0°), m. 70-1°; it is best obtained (44%), together with 5% of C(CH₂Br)₄, by heating 25 g. I 20 hrs. at 140° in 150 g. HBr satd. at 0°.

C. A. R.

Condensation of hydroxy acids by the simultaneous action of several catalysts under a high hydrogen pressure; α -hydroxybutyric acid and α -hydroxyisovaleric acid. V. IPAT'EV AND G. RAZUVAEV. *Ber.* **61B**, 634-7 (1928); cf. *C. A.* **22**, 386.—It has been shown that solns. of the Na salts of α -HO acids (glycolic and lactic) heated with NiQ and Al₂O₃ under a high H pressure at 250-70° yield dibasic acids by condensation of 2 mols. of the original acid. When the C chain in the acids is longer, the condensation is more complex. EtCH(OH)CO₂H yields about 10% of a dibasic acid (II) which seems to be HO₂CCH₂EtCHMeCO₂H; the mechanism of its formation cannot be explained. There are also formed about 25% of PrCO₂H and higher monobasic acids.

$\text{Me}_2\text{CHCH}(\text{OH})\text{CO}_2\text{H}$ does not condense under the above conditions but considerable CO_2H is split off, with the formation of about 40% carbonate and a considerable quantity of HCO_2H , together with $\text{Me}_2\text{CHCH}_2\text{OH}$, satd. acids (EtCO_2H) and CH_4 ; no $\text{Me}_2\text{CHCH}_2\text{CO}_2\text{H}$ could be isolated in pure form.

C. A. R.

Condensation of hydroxy and keto acids; β - and γ -hydroxy and keto acids and acids with tertiary hydroxyl groups. G. RAZUVAEV. *Ber.* 61B, 637-40(1928); cf. preceding abstr.—It was assumed that in the formation of dibasic acids from the Na salts of α -HO acids heated under a high H pressure with NiO and Al_2O_3 there is first formed a dibasic HO acid by elimination of H_2O from 2 mols. of the original acid. This work was undertaken to det. whether the reaction takes place with (1) β - and γ -HO and keto acids, and (2) acids with a tertiary HO group where a cleavage of H_2O from 2 mols. in the above sense is not possible. None of the 3 acids tried ($\text{MeCH}(\text{OH})\text{CH}_2\text{CO}_2\text{H}$ (I), levulinic acid (II) and $\text{Me}_2\text{C}(\text{OH})\text{CO}_2\text{H}$ (III)) yielded a dibasic acid. I gives about 35% PrCO_2H , along with HCO_2H , AcOH , CO_2 (up to 12%), CH_4 and an oil of pleasant odor. II is reduced with considerably greater difficulty (the temp. has to be kept relatively low—not above 230°); it gives BuCO_2H (not above 20%) through $\text{MeCH}(\text{OH})\text{CH}_2\text{CH}_2\text{CO}_2\text{H}$, and about 20% decomps. into carbonate, CH_4 and other products. If the temp. is raised to only 250° , the II undergoes deep-seated decompn.; the yield of carbonate increases to 48%; the gaseous products contain CO_2 and much CH_4 , and acids ppt. a tar from the soln. III gives 60% $\text{Me}_2\text{CHCO}_2\text{H}$ and the remainder loses CO_2H with formation of carbonate, formate, CH_4 and other products.

C. A. R.

Catalytic reduction of hydrophthalic anhydrides. F. P. MAZZA. *Atti II congresso naz. chim. pura applicata* 1926, 1340-1.—A summary of work by M. and his collaborators (cf. M. and de Mase, *C. A.* 21, 2676-7; M. and Cremona, *C. A.* 21, 2678; M. and Cato, *C. A.* 21, 2677).

C. C. DAVIS

Biochemistry of sulfur. II. The isolation of ergothioneine from ergot of rye. B. A. EAGLES. *J. Am. Chem. Soc.* 50, 1386-7(1928); cf. *C. A.* 21, 915.—The original procedure of Tanret was followed up to the sepn. of the compd. as the HgCl_2 salt, instead of isolating the compd. as the HCl salt at this stage, the procedure of Hunter and Eagles for its isolation from blood was then used and the substance isolated in the pure state as the free base; 1 kg. ergot of rye gave 0.65 g. pure ergothioneine.

C. J. WEST

Addition of sodium malonic ester to aliphatic mustard oils. D. E. WOKRALL. *J. Am. Chem. Soc.* 50, 1456-9(1928).— $\text{NaCH}(\text{CO}_2\text{Et})_2$ and MeNCS give the addn. product $\text{CH}(\text{CO}_2\text{Et})_2\text{C}(\text{SNa})\text{:NMe}$, sol. in cold H_2O ; HCl gives $\text{CH}(\text{CO}_2\text{Et})_2\text{C}(\text{SH})\text{:NMe} = \text{CH}(\text{CO}_2\text{Et})_2\text{CSNHMe}$; the yield in all cases is about 80 %. On heating with dil. acid or alkali there results AcOH , CO_2 , H_2S , MeNH_2 and EtOH . *Et carbethoxymalonate monothiomethylamide*, m. $49-50^\circ$; *ethylamide*, m. $51-2^\circ$; *propylamide*, m. 11° ; *butylamide*, oil; *Me carbethoxymalonate monothioisopropylamide*, m. $42-3^\circ$; *butylamide*, m. $62-3^\circ$; *amylamide*, m. $52-3^\circ$; the Na salt of malonic acid monothioethylamide, decomp. $148-9^\circ$; *propylamide*, decomp. $155-6^\circ$; *butylamide*, decomp. $156-7^\circ$; *amylamide*, decomp. $157-8^\circ$; the benzylamide of the free acid, m. $95-6^\circ$, with loss of CO_2 , forming thioacetylbenzylamide, m. $62-3^\circ$.

C. J. WEST

An activated form of oxalic acid. F. OBERHAUSER AND W. HENSINGER. *Ber.* 61B, 521-33(1928).—In spite of the great amount of study which has been devoted to the reaction between $(\text{CO}_2\text{H})_2$ and KMnO_4 it has as yet not been possible to work out a complete picture of its chem. mechanism. The present work was undertaken to fill up some gaps in the earlier investigations and led to entirely unexpected results. Having observed that the previous presence of a Mn salt may bring about an almost spontaneous reduction of Hg^{++} salts, proceeding within a few sec., O. and H. undertook to det., by a careful study of the behavior of $(\text{CO}_2\text{H})_2$, whether a reactive intermediate form of the acid might not make its appearance along with the Mn salts of higher valence. It was first established, by systematic expts., that, contrary to previous indications, the greatest part of the peroxide is formed only when the action of the Mn salts of higher valence on an excess of the acid has come completely to an end. The reaction was allowed to proceed in CO_2 or N_2 at about 60° until the cherry-red color of the $(\text{C}_2\text{O}_4)_2\text{Mn}$ had disappeared; the absence of Mn^{+++} salt was shown by means of KI, that of peroxide with the $\text{Ti-H}_2\text{SO}_4$ reagent. If, however, air was passed through the soln. immediately after it became completely colorless, distinctly detectable quantities of a peroxide (intense yellow color with $\text{Ti-H}_2\text{SO}_4$) were produced. On shaking the mixt. with CrO_3 and Et_2O , the blue color of perchromic acid could be detected only when the concn. of $(\text{CO}_2\text{H})_2$ was small; with higher concns. the perchromic acid immediately reacts with the $(\text{CO}_2\text{H})_2$ without visibly going into the Et_2O . Consider-

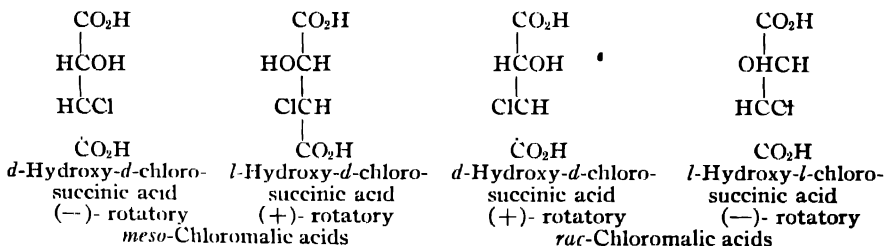
ably larger quantities of H_2O_2 were found when O_2 was used instead of air (with 30 cc. 0.1 N $(\text{CO}_2\text{H})_2$ and 2 cc. 0.1 N KMnO_4 treated 1 hr. with air, 0.28 cc. 0.1 N H_2O_2 ; with O_2 , 0.83 cc. H_2O_2). The same values are obtained when the reaction is carried out from the very beginning, under otherwise identical conditions, in air or O_2 . The yield of H_2O_2 is somewhat increased, but only to a definite optimum not far from the above values, when either the quantity of KMnO_4 is increased or a Mn^{++} salt is added. The velocity of the absorption of O_2 increases at first rapidly to a sharp max. and then rapidly decreases. The magnitude of the surface does not influence the yield of H_2O_2 . Contrary to previous indications, there is no induced participation of the atm. O during the reaction between $(\text{CO}_2\text{H})_2$ and KMnO_4 , for treatment of the $(\text{CO}_2\text{H})_2$ with KMnO_4 shortly before the treatment with air or O_2 produces the same result and for each mol. $(\text{CO}_2\text{H})_2$ disappearing as the result of auto-oxidation exactly 1 mol. H_2O_2 is formed. Since under the same conditions of time and temp. $(\text{CO}_2\text{H})_2$ itself, even in the presence of an amount of MnSO_4 corresponding to the KMnO_4 used, forms no H_2O_2 , it must be assumed that the treatment with KMnO_4 produces a reactive form of $(\text{CO}_2\text{H})_2$ which can react more rapidly with atm. O . It is worthy of note that no H_2O_2 is formed if the O_2 is passed through the soln. only some hrs. after the $(\text{CO}_2\text{H})_2$ has been treated with KMnO_4 , nor if such nitrates are present. The formation of this activated $(\text{CO}_2\text{H})_2$ is manifested with extraordinary distinctness by its behavior with other oxidizing agents. Even in almost neutral soln. CrO_3 , Br_2 , KBrO_3 , I_2 , etc., are almost instantly reduced; under special conditions, a quant. reduction of Ag , Pt and Hg^{++} salts and even a distinct reduction of nitrates can be effected. The extent of reaction with Hg salts is conditioned by the concn. of the reactants and also of the other acids and salts present. Under favorable conditions it apparently reaches an end when the activated $(\text{CO}_2\text{H})_2$ is used up. An exact, simple, quant. sepn. of Hg from Bi and Cd and a very exact volumetric method for the detn. of the Hg^{++} ion, which can be used for the detn. of Hg in org. compds., has been worked out and will be described elsewhere. Although $(\text{CO}_2\text{H})_2$ and $(\text{CO}_2\text{Na})_2$ with or without Mn^{++} salts react exceedingly slowly with Hg^{++} salts even in high concns. and on long boiling, on heating with small quantities of KMnO_4 to 60° there results a very energetic reduction to HgCl , the nature of the acid, along with the concn. of the reactants, playing an important part in the reaction. Expts with HCl , H_2SO_4 , H_3PO_4 , AcOH , HNO_3 , KNO_3 and KCl showed that the extent of the reaction depends in the 1st place on the acidity of the soln. Thus, HCl , which favors the formation of complexes of the type $\text{X}_2[\text{Hg}(\text{C}_2\text{O}_4)\text{Cl}_2]$, $\text{X}_2[(\text{HgC}_2\text{O}_4)_2\text{Cl}_2]$, and diminishes the concn. of oxalate ions, decreases the reduction to HgCl . KNO_3 and KNO_4 , like HCl and KCl , decrease the concn. of oxalate ions but, by formation of the more highly dissociated $\text{Hg}(\text{NO}_3)_2$, increase the concn. of Hg ions (with consequent increase in the reduction to HgCl) up to a certain point until, as the concn. of NO_3 ions is increased, the dissocn. of the $\text{Hg}(\text{NO}_3)_2$ is repressed. The reduction reaction, then, is ionic; everything which favors dissocn. accelerates the reaction and *vice versa*. CO_2 also accelerates the reduction; it is not to be assumed that there is formed a CO_2 deriv. which is more easily reduced than $(\text{CO}_2)_2\text{Hg}$, nor that CO_2 acts catalytically as a weak acid, for AcOH retards the reaction, if anything, probably as the result of complex formation. Moreover the same results are obtained with N_2 . It seems more probable that the formation of peroxide in the air retards the reduction to HgCl and that the accelerating action of CO_2 and N_2 results from the prevention of the peroxide formation. At room temp., more rapidly at higher, more slowly at lower temps., the activated $(\text{CO}_2\text{H})_2$ mols. revert to their original condition, although at least 24 hrs. is required at room temp. for complete disappearance of activation. Addn. of CaCl_2 at once destroys the reducing power of the activated acid. The ratio of activated to inactive acid (as detd. from the quantity of HgCl_2 reduced to HgCl) formed by treating $(\text{CO}_2\text{H})_2$ with varying quantities of KMnO_4 diminishes at first very rapidly, then more slowly with increasing quantities of KMnO_4 (1:36.86 with 50 cc. 0.1060 N $(\text{CO}_2\text{H})_2$, 1.25 g. HgCl_2 and 0.1 cc. 0.1 N KMnO_4 made up to 160 cc. and heated 15 min. in a H_2O bath; 1:10.37 with 0.5 cc. KMnO_4 ; 1:2.84 with 1 cc.; 1:1.61 with 22 cc.) and approaches an almost const. value 1:1 shortly before the point where MnO_2 is formed. For the reduction of HgCl_2 to HgCl , MnSO_4 can be used instead of KMnO_4 , HgCl being pptd. quant. on heating to $60-70^\circ$ and adding a few cc. of NaOH several times; probably the MnSO_4 takes up O when the NaOH is added, with formation of $(\text{C}_2\text{O}_4)_2\text{Mn}$. The reducing action of the activated acid towards HgCl_2 is maintained even after the Mn has been removed by pptn. Quant. pptn. of HgCl can also be secured with $\text{K}_2\text{Mn}(\text{C}_2\text{O}_4)_2$ (Kehrmann, *Ber.* 20, 1594(1887)), for the prepn. of which O and H . have devised a greatly improved method. Activated $(\text{CO}_2\text{H})_2$ can also be produced with $\text{Ni}(\text{OH})_2$ and $\text{K}_2\text{Co}(\text{C}_2\text{O}_4)_2$, although not as satis-

factorily as with the Mn salts of higher valence, but it is never formed with CrO_3 and Au salts unless Mn^{IV} salts are also present. Attempts to isolate the activated acid (e. g., by shaking out with org. solvents) have failed.

• **Cleavage of diethyl α,α' -dibromosuccinate by diethylamine.** R. C. FUSON. *J. Am. Chem. Soc.* 50, 1444-9 (1928).—von Braun, Leistner and Münch (*C. A.* 21, 60) showed that $(\text{CH}_2\text{CHBrCO}_2\text{Et})_2$ with excess of Et_2NH gives AcCO_2Et and $\text{MeC}(\text{NEt}_2)\text{HCO}_2\text{Et}$; it is shown that $\text{CH}_2\text{C}(\text{NEt}_2)\text{CO}_2\text{Et}$ is probably an intermediate in the formation of the AcCO_2Et . A mechanism involving the intermediate formation of a cyclobutane ring is suggested to explain these results.

Stereochemistry of the tetrahedral carbon atom. VII. The number of isomeric chloromalonic acids. RICHARD KUHN AND THEODOR WAGNER-JAUREGG. *Ber.* 61B, 481-3 (1928), cf. *C. A.* 21, 3180.—According to the van't Hoff and LeBel theory, chloromalonic acid (I) should exist only in 2 inactive and 4 optically active forms, whereas 6 active forms are described in the literature. Sonn and Rosinsky obtained optical antipodes of Lössen's I by means of brucine and Kuhn and Zell (*C. A.* 21, 569) by addn. of HCl to (—)-ethylene- α,α' -dicarboxylic acid (II) obtained an optically active acid which should have been identical with 1 of S and R's acids (for *dl*-II with HCl gives Lössen's I), but such did not prove to be the case. A repetition of S. and R.'s work showed that in the resolution of L.'s I the more difficultly sol. brucine salt yields a (+)-I which, from all its properties, is the antipode of K. and Z.'s (—)-I; the statements of S. and R. could in no respect be confirmed. From 31.3 g. of the salt was obtained 2.5 g. of the pure (+)-acid, decomp. $166-7^\circ$, $[\alpha]_D^{19}$ in H_2O , 6.80° (c 3.73), 7.07° (c 1.87), converted quant. by *N* NaOH at room temp. into (+)-*trans*-II, $[\alpha]_D^{20}$ 98.3° (H_2O), and by long boiling in H_2O into *l*-tartaric acid, $[\alpha]_D^{18}$ 5° -6.87° (H_2O). The mother liquors from the (+)-I yielded crystals m. 151° (the m. p. given by S. and R.), but their optical consts. showed that they consisted of a mixt. of the *dl*- and (+)-I.

VIII. Configuration of the chloromalonic acids. *Ibid.* 483-504.—To det. the configuration of the chloromalonic acids (I) as many different phys. consts. as possible of the 2 inactive I and their di-Et esters were compared with the corresponding consts. of the *meso*- and *dl*-dichloro- (II) and dihydroxysuccinic acids (III). Below are given the consts. in the order *dl*-III, *meso*-III, I m. 157° , I m. 145° , *dl*-II, *meso*-II. M. p. of the acids, 205° , 140° , 157° , 145° , 173° , 215° . B. p. of the di-Et esters, 158° (14 mm.), 157.5° (14), 153.5° (14), 151.5° (14), 129.5° (12.5), 125.5° (12.5). n for the esters at 64.5° , 1.4246, 1.4315, 1.4305, 1.4321, 1.4296, 1.4266, $n_F - n_C$ at 64.5° , 0.0069, 0.0076, 0.0075, 0.0074, 0.0076, 0.0076; $n_F - n_C$ at $19.5-20^\circ$, 0.0076, —, 0.0082, 0.0079, 0.0081, —. d_4^{20} for the esters, 1.246, 1.1350, 1.1496, 1.1560, 1.1636, 1.1490. In freezing C_6H_6 the esters of the two II are monomol. up to a concn. of about 3% but the mol. wt. of the esters of the I increase considerably with increasing concn., being about 1.25 times the calcd. in 7% soln. and increasing in the same way for both forms of I. With the esters of *dl*- and *meso*-III the association is much greater and is considerably more pronounced in the *meso*-ester, being about twice as great in 7%



soln. as at great diln. Soln. of the acids in H_2O at 0° (g./100 cc soln.), 8.26, 50.7, 85.2, 85.0, 64.0, 12.0. From H_2O soln. Merck's Carbo medicinalis adsorbs the II best (59-60%), next the I (49-50.5%) and the III least (*dl* 42, *meso* 40.5%); the differences between the isomers are too small to establish any relationship with the configuration. Dissoen. consts. of the acids $K_1 \times 10^3$ 1.17, 0.775, 6.35, 4.90, 37.2, 36.1; $K_2 \times 10^4$ 0.589, 0.160, 2.65, 1.01, 18.0, 9.40. $K_1 \times 10^3$ for the *dl*- and *meso*-forms of other disubstituted succinic acids: Br_2 , 41.5, 35.7; ClBr , 35, 37; Cl_2 , 37.2, 36.1; Ph_2 (in 50% MeOH), 0.0105, 0.0140, $K_2 \times 10^4$ Br_2 , 8.17, 23.9; ClBr , 17, 25; Cl_2 , 18.0, 9.40; Ph_2 , 0.00132, 0.00124. The results indicate that Lössen's I, m. 145° , is the *meso*-acid, and Kuhn and Ebel's isomer, m. 157° the *dl*-acid. Since the position in space of the HO groups

in the active I is established by the principle of optical superposition (C. A. 21, 569) the configuration of the 4 acids can be represented by the accompanying formulas, and as it is shown in the following abstr. that *d*-II is (+)-rotatory, it follows that the direction of the rotation of the I is detd. by the position of the Cl atom, a conclusion already reached by Kuhn and Zell on the basis of the principle of optical superposition. *Di-Me ester of dl-meso-I*, b_D^{25} 140.5–1.5°. IX. In which phase of the reaction does the rearrangement of the substituents in the Walden inversion take place? *Ibid* 504–21.—The method of detg. configurations used in this work is based on the principle that addn. of a 2nd asym. C atom to the compd. of unknown configuration will give 2 non-mirror image substances which will differ not only in rotation but in a large no. of physical properties. Representing the configuration of the HO groups by $\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$ and $\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$ that of the Cl atoms by $\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$ and $\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$, replacement of the Cl atoms in *d*- and *l*-chlorosuccinic acids (I) by the $\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$ -HO group of *d*-(+)-malic acid (II) gives 2 chloromalic acids (III) ($\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$ and $\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$), which can be differentiated by their m. ps., b ps of their esters, etc. That the configuration of the HO group is really the same in both is shown by their reduction with nascent H to the same *d*-(+)-II. Of the two III, the first must, as a whole, lie between *d*-tartaric acid ($\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$) (IV) and *d*-dichlorosuccinic acid ($\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$) (V) in its phys. properties, the 2nd between *meso*-IV ($\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$) and *meso*-V ($\begin{smallmatrix} \text{H} \\ | \\ \text{C} \\ | \\ \text{H} \end{smallmatrix}$). The *rac*-forms ($\begin{smallmatrix} \text{H} & \text{H} & \text{H} & \text{H} \\ | & | & | & | \\ \text{C} & \text{C} & \text{C} & \text{C} \\ | & | & | & | \\ \text{H} & \text{H} & \text{H} & \text{H} \end{smallmatrix}$) can also be compared; those III whose const. lie between those of the *rac*-forms of the sym. disubstitution products will have the configuration $\begin{smallmatrix} \text{H} & \text{H} \\ | & | \\ \text{C} & \text{C} \\ | & | \\ \text{H} & \text{H} \end{smallmatrix}$, the others $\begin{smallmatrix} \text{H} & \text{H} \\ | & | \\ \text{C} & \text{C} \\ | & | \\ \text{H} & \text{H} \end{smallmatrix}$. The inactive III, whose configuration is thus established, are converted, by replacement of the HO group by Cl, into the V; whether or not a Walden inversion occurs can be established directly by resolution of the resulting *rac*-V. The relationship between the active IV and V with the active I and II is established by reduction, optical superposition, optical comparison of the esters, etc. The configuration of the inactive III had already been established experimentally (preceding abstr.) and that of the HO groups in the active acids detd. by reduction to the corresponding II (C. A. 21, 569). *d*-IV di-Et ester is converted in 1 operation, with 1 mol. SOCl_2 in $\text{C}_6\text{H}_5\text{N}$, into di-Et *d*-hydroxy-*l*-chlorosuccinate. The corresponding racemate (*dl-meso*-III di-Me ester) was converted with a 2nd mol. of SOCl_2 into the well-crystd. *rac*-V di-Me ester, m. 42–3°. *d*-(+)-IV di-Me ester with 2 mols. SOCl_2 gives the (–)-V di-Me ester, m. 62–3°, a reaction which, as shown by carrying it out stepwise, proceeds through the *meso*-III ester. Therefore, in the conversion of the *d*-(+)-IV ester into the (–)-V ester a double inversion takes place; in the (–)-V the Cl atoms have the same configuration as the HO groups in *l*-(–)-IV and the (–)-V is to be designated as *l*-(–)-V. Comparison of the rotatory power of the I and V and their di-Me and di-Et esters in various solvents and at different temps. indicates, in harmony with the principle of optical superposition, that (–)-I and (–)-V have the same configuration. (–)-I is *l*-(–)-I. The last step in the cycle, reduction of an active V to I, could not be effected. In the catalytic hydrogenation of *l*-(–)-V di-Me ester with Pd-BaSO₄ in MeOH and NaOAc, which proceeded very smoothly, 0.5 of the V ester remained unchanged after 1 mol. H₂ had been absorbed, both Cl atoms being removed simultaneously. These results, in connection with those reported in Papers I, IV, VII and VIII, show that in the conversion of *d*- into *l*-II and *vice versa*, the inversion occurs in the replacement of the HO group by Cl (with PCl₅) and not in that of the Cl atom by OH (with Ag₂O). The detn. of the configuration of the III also affords an insight into addn. and cleavage reactions of inactive compds., the mechanism of which, in a spatial sense, was hitherto unknown. Addn. of HOCl to maleic acid, which yields *dl-meso*-III exclusively, is a *cis*-addn. To fumaric acid, on the other hand, HOCl adds chiefly in the *trans*-position and only about 20% *dl-rac*-III is formed by *cis*-addn. The formation of chloromaleic acid from *meso*-III seems to be a *trans*-splitting off of H₂O, i. e., the elimination of H₂O does not proceed as would be expected from a consideration of the tetrahedral models. The hydrolysis of *rac*-III to *meso*-IV proceeds quant., that of the *meso*-III to the extent of about 90%, with inversion. Maleic acid with Cl₂ gives 100% *meso*-V, fumaric acid 82% *meso*- and 18% *rac*-V (Terry and Eichelberger, C. A. 19, 1559, say that under the same conditions Cl adds to fumaric as well as maleic acid exclusively in the *cis*-position); it is a striking fact that Cl adds in the same way as HOCl to the 2 acids. *l*-(–)-V di-Me ester (19.5 g. from 47 g. *d*-IV di-Me ester), b_D^{25} 117–8° (cor.), $[\alpha]_D^{25}$ –114.1°

(CS₂, c 6.63), -69.5° (CHCl₃, c 13.04), -63.07° (AcOEt, c 6.75), -42.97° (MeOH, c 6.42), all at 21° except in CHCl₃ (22°), dispersion coeff. ($\alpha_D:\alpha_{586}$) in CHCl₃ (c 18.1) at 22° , 1.00, 1.28, 1.72, 2.64 for 656, 589, 527, 486, resp. *Di-Et ester*, from the di-Me ester in 99% MeOH satd. with HCl at 0° , b_D 127– 30° (cor.), d_4^{20} 1.2784, $[\alpha]_D^{20}$ -53.6° (no solvent), $[\alpha]_D^{22}$ -104.8° (CS₂, c 5.06), $[\alpha]_D^{22.5}$ -61.0° (CHCl₃, c 5.05), $[\alpha]_D^{22.5}$ -49.40° (96% alc., c 8.97), dispersion coeff. 1.00, 1.27, 1.69, 2.00, 2.6 for 656, 589, 527, 486, 436. The rotation of the ester decreases with increase in temp.: α_D (0.7-dm. tube), -48.00° , -47.68° , -47.55° , -47.48° at 20° , 35° , 40° and 45° , resp. C. A. R.

The influence of the temperature on the rotatory powers of active compounds. RENÉ LUCAS. *Compt. rend.* 186, 857–9 (1928).—In order to explain variations in the rotatory power of certain compds. in soln (tartaric or camphor derivs.), L. proposes the following mechanism: the mols of the compds are capable of existing in several monomol. forms; passage from 1 form to another occurs in a discontinuous manner. The solvents and the temp. modify the proportions of the various forms in equil. If the rotatory power of a compd. is modified by solvents, it will also be modified by temp. The study of the modification permits the detn. of the no. of forms in equil. Mathematical developments are given which deal with an equil. of 2 and one of 3 forms. Et tartrate, iso-Bu tartrate and iso-Bu diacetyltartrate are examples of a 3-form equil.

A. L. HENRI

Thiocyanoacetone and derivatives. J. TCHERNIAC. *Ber.* 61B, 574–9 (1928).—Reply to Hantzsch (*C. A.* 22, 1158). C. A. R.

Interaction of hydrogen sulfide with certain amino and imino acid nitriles. ELIZABETH GATEWOOD AND T. B. JOHNSON. *J. Am. Chem. Soc.* 50, 1422–7 (1928).—Three characteristic types of reaction of H₂S towards nitriles of NH₂ acids have been observed: Formation of a dithiopiperazine (H₂NCH₂CN); mol. condensation with formation of an imino nitrile (MeCII(NH₂)CN); formation of a thiodesoxyhydantoin (Me₂C(NH₂)-CN). 2,2,4,4-Tetramethyl-5-thio-2-desoxyhydantoin, m. $153-5^\circ$, results from the action of H₂S upon Me₂C(NH₂)CN or NH(CMe₂CN)₂. NH(CH₂CN)₂ gives iminodiacetothioamide, 5-thio-2-desoxyhydantoin and an amorphous product. Thus it is impossible to predict the course of the reaction which will take place when a given nitrile in this series of compds. is exposed to the action of H₂S. C. J. WEST

Red compounds of barbituric acid, picric acid and sodium, or lead hydroxide. ISIDOR GREENWALD. *J. Am. Chem. Soc.* 50, 1469–74 (1928).—By the addn of EtOH to a mixt. of solns. of barbituric acid (I), picric acid (II) and NaOH a red ppt. is obtained, which contains 3 mols. I, 2 mols. II, 9 mols. NaOH and 1–2 mols. H₂O. The addn. of basic Pb(OAc)₂ to a soln. of the new Na compd. yields a red ppt. which contains 3 mols. I, 2 mols. II and 11 mols. Pb(OH)₂. C. J. WEST

The action of phosphorus pentachloride and trichloride on acetone cyanohydrin. ANNA CHRZASZCZEWSKA AND WACŁAW SOBIEŃSKI. *Roczniki Chem.* 7, 470–6 (1927).—To a soln. of 255 g. Me₂C(OH)CN (I) in 255 cc. pure benzene 312 g. PCl₅ is added with efficient stirring at $25-30^\circ$ (cooling). The product is then heated to 50° until the HCl stream has ceased, poured into ice water and the benzene layer washed with Na₂CO₃ and fractionated. α -Chloroisopropyl cyanide is obtained in poor yield as a liquid of fairly pleasant odor, b_D 51.5– 2.5° , d_4^{13} 1.0641, n 1.43482, 1.43242, 1.44021, 1.44498 for D, H _{α} , H _{β} and H _{γ} at 13.8° . With excess or equimol. quantities of PCl₅, products with a higher Cl content were obtained. α -Cyanoisopropyl phosphite, [Me₂C(NC)]₂-PO₃, prepd. in 69 g. yield by 2 hrs. refluxing of 85 g. I and 45.8 g. PCl₅ in 130 cc. benzene, oil, scarcely sol. in water, b_D 153– 4° , n 1.4467, 1.4442, 1.4528 for D, H _{α} and H _{β} at 12° , d_4^{12} 1.082. MARY JACOBSEN

Mechanism of carbohydrate oxidation. VIII. The action of potassium hydroxide on fructose. WM. L. EVANS AND J. F. HUTCHMAN. *J. Am. Chem. Soc.* 50, 1496–503 (1928); cf. *C. A.* 22, 1138.—The action of aq. KOH of various concns. on fructose was studied at 25° , 50° and 75° for the purpose of ascertaining whether the character and the quantities of the reaction products obtained under these conditions were in harmony with the commonly accepted views with reference to the presence of equilibrated systems of certain isomeric hexoses and enediols in such solns. The equilibrated systems should be disturbed by such exptl. conditions as temp. and concn. of alkali. Since glucose is 1 of the carbohydrates formed from fructose in alk. soln., then these 2 hexoses should show the same general relationship to the exptl. factors of temp. and concn. of alkali. The general results show that this is true. If the hexose-3,4-enediols in alk. solns. of appropriate concn. rupture at the double bond to form 2 mols. of HO-CH₂CH(OH)CHO, then the reaction products obtained from fructose should be the same as those obtained from HOCH₂CH(OH)CHO under similar conditions and they

should bear the same general relationship to each other and to the variable exptl. conditions. The exptl. data bearing on the formation of lactic acid, AcOH and HCO_2H and also the production of AcCHO are in harmony with this statement. The max. yields of AcCHO occur at approx. the same alkali normality as that at which appreciable amts. of lactic acid were first observed. This max. point for AcCHO production from fructose at 25° was approx. N and at 50° $0.5\ N$. This is also true for $\text{HOCH}_2\text{CH}(\text{OH})\text{CHO}$, $(\text{HOCH}_2)_2\text{CO}$ and galactose. The max. yields of AcCHO from fructose and glucose should be different by reason of the difference in the concn. of the $\text{HOCH}_2\text{CH}(\text{OH})\text{CHO}$ in each case, which is due in turn to the fact that equilibria in the case of each carbohydrate are not quant. identical. Max. yields of AcOH and HCO_2H are also obtained with fructose, as has been observed for glucose. The quant. differences are probably due to the differences in the equil. conditions noted above. C. J. WEST

Constitution of pine-wood lignin. VII. β -Lignosulfonic acid. PETER KLASON. *Ber.* 61B, 614-5 (1928); cf. C. A. 22, 1361.— β -Lignosulfonic acid (I) differs from the α -acid chiefly in that it is not pptd. from acid soln. by β - $\text{C}_{10}\text{H}_7\text{NH}_2 \cdot \text{HCl}$ and it also forms no insol. basic Ba salt. In paper I it was stated that on complete extrn. of the lignin from the wood with SO_3 , 70% of the lignin is found in the waste liquor as the α -acid. A repetition of the expt. has given the value 67%, the lignin content of the wood being taken as 27%. β -Lignin must, therefore, constitute about 30% of the total lignin. After the α -acid has been completely removed from the waste liquor, I is pptd. by $\text{Pb}(\text{OAc})_2$ in almost white amorphous form. To test the earlier suggestion that lignin may contain not only the complex $\text{RCH}:\text{CHCHO}$ but also the alc. $\text{RCH}:\text{CHCH}_2\text{OH}$, 50 cc. was treated with 2 cc. of 30% H_2O_2 and 0.2 cc. FeCl_3 and when the H_2O_2 had disappeared (12 hrs.) addn. of β - $\text{C}_{10}\text{H}_7\text{NH}_2 \cdot \text{HCl}$ gave at once a yellow ppt. with the same properties as the $\text{C}_{10}\text{H}_7\text{NH}_2$ salt of the α -acid but contg. only 0.5 as much MeO , i. e., the complex in the resulting acid was $\text{C}_{10}\text{H}_{18}\text{O}_6$ instead of $\text{C}_{20}\text{H}_{20}\text{O}_6$. I itself, therefore, probably contains a combination of coniferyl aldehyde and alc. of the type $\text{RCH}(\text{OH})\text{OCH}_2\text{R}$ with the compn. $\text{C}_{10}\text{H}_{18}\text{O}_6$. In the salt $\text{C}_{10}\text{H}_{18}\text{O}_7 + \text{H}_2\text{SO}_4 + 2\text{C}_{10}\text{H}_7\text{NH}_2 + \text{H}_2\text{O}$ of I previously described it seemed that there must be a CO_2H group but treatment with alkali gave no non-volatile CO_2H acid and K. therefore thinks it more probable that it is a salt $\text{C}_{10}\text{H}_{18}\text{O}_6 + \text{H}_2\text{SO}_4 + 2\text{C}_{10}\text{H}_7\text{NH}_2 + \text{H}_2\text{O}$. β -Lignin is probably that more easily sol. part of the lignin which, according to Kullgren (*Ingeniör-vetenkaps Akad. Handl.* No. 65 (1927)) is dissolved out in the 1st stage (at 130°) of the boiling of the wood with NaOH . C. A. R.

Synthesis of a truxinic acid. F. BACHÉR. *Ber.* 61B, 543-7 (1928).—This preliminary communication is published now because of the appearance of Vogel's paper (C. A. 21, 3603). $\text{PhCH}:\text{C}(\text{CO}_2\text{Me})_2$ in Et_2O with activated Al-Hg and a little H_2O gives, along with $\text{PhCH}_2\text{CH}(\text{CO}_2\text{Me})_2$ as the chief product, 5-15% of the 2 isomeric *tra*-*Me* 2,3-diphenylbutane-1,1,4,4-tetracarboxylates, sepd. by tedious crystn. from Et_2O into the 2 forms, m. $163-4^\circ$ and 167° (about 5.5 and 2.8 g., resp., from 10 g. of the mixt.). The lower melting form in xylene- PhMe in ice-salt added to a cold suspension of NaOMe (prepd. by pulverizing Na under xylene, adding PhMe and MeOH and warming) and then treated with Br in PhMe gives, together with about 20% of unchanged material and a brominated compd. insol. in Na_2CO_3 , *tetra*-*Me* 3,4-diphenylcyclobutane-1,1,2,2-tetracarboxylate, m. 148° , which is completely sapon. only with extreme difficulty; heated a short time with KOH in MeOH and then 3 hrs. with aq. NaOH it yields the *di*-*Me* ester, m. $203-5^\circ$ (decompn.), losing 2 mols. CO_2 and yielding *di*-*Me* γ -truxinate, m. $116-7^\circ$ (free acid, m. 238°). C. A. R.

Cyclohexyl- and cyclohexylmethylalkylacetic acids and their action towards B. leprae. ROGER ADAMS, W. M. STANLEY AND H. A. STEARNS. *J. Am. Chem. Soc.* 50, 1475-8 (1928); cf. C. A. 22, 228.—By the previously described methods, the following *di*-*Et* cyclohexylalkylmalonates, $\text{C}_6\text{H}_{11}\text{C}(\text{CO}_2\text{Et})_2\text{R}$, were prepd.: R is C_6H_{11} , b_2 121-5°, n_D^{25} 1.4553, d_4^{25} 0.9850 (this order will be used below); C_6H_{13} , b_2 128-30°, 1.4559, 0.9755; C_7H_{15} , b_2 135-9°, 1.4562, 0.9685; C_8H_{17} , b_2 144-8°, C_8H_{19} , b_2 149-54°, 1.4567, 0.9574; $\text{C}_{10}\text{H}_{21}$, b_2 157-61°, 1.4570, 0.9540; $\text{C}_{11}\text{H}_{23}$, b_2 170-5°, 1.4574, 0.9532; $\text{C}_{12}\text{H}_{25}$, b_2 185-9°, 1.4589, 0.9466. *Di*-*Et* cyclohexylmethylalkylmalonates, $\text{C}_6\text{H}_{11}\text{CH}_2\text{C}(\text{CO}_2\text{Et})_2\text{R}$: R is *Et*, $b_{4.5}$ 143-5°, 1.4542, 1.0104; *Pr*, b_3 154-5°, 1.4529, 1.0062; *Bu*, $b_{4.5}$ 157-9°, 1.4548, 0.9910; *Am*, b_4 159-60°, 1.4558, 0.9853; C_6H_{13} , $b_{2.5}$ 160-3°, 1.4544, 0.9721; C_7H_{15} , b_4 183-5°, 1.4560, 0.9679; C_8H_{17} , b_4 178-81°, 1.4570, 0.9612. Cyclohexylmethylalkylmalonic acids, $\text{C}_6\text{H}_{11}\text{CH}_2\text{C}(\text{CO}_2\text{H})_2\text{R}$: R is *Et*, m. 127.5-30°; *Pr*, m. 145-7°; *Bu*, m. 132-4°; *Am*, m. 132-5°. Cyclohexylalkylacetic acids, $\text{C}_6\text{H}_{11}\text{CH}(\text{CO}_2\text{H})\text{R}$: R is C_6H_{11} , b_2 136-9°, n_D^{25} 1.4640, d_4^{25} 0.9544; C_6H_{13} , b_2 145-9°, 1.4641, 0.9449; C_7H_{15} , b_2 148-52°, 1.4641, 0.9350; C_8H_{17} , b_2 158-61°, 1.4642, 0.9298; C_8H_{19} , b_2 167-71°, 1.4645,

0.9245; $C_{10}H_{21}$, b_2 165–9°, 1.4649, 0.9224; $C_{11}H_{23}$, b_2 173–7°, 1.4650, 0.9166; $C_{12}H_{25}$, b_2 187–91°, 1.4653, 0.9129. *Cyclohexylmethylalkylacetic acids*, $C_6H_{11}CH_2CH(CO_2H)R$: R is *Et*, b_2 131–2°, 1.4623, 0.9814; *Pr*, $b_{4,5}$ 141–3°, 1.4628, 0.9720; *Bu*, b_3 133–6°, 1.4620, 0.9564; *Am*, b_2 139–42°, 1.4630, 0.9516; C_8H_{17} , b_4 174–5°, 1.4627, 0.9448; C_7H_{15} , b_3 202–4°, 1.4632, 0.9393; C_8H_{17} , b_4 186–90°, 1.4640, 0.9331. Those acids having 16–18 C atoms were especially effective towards *B. leprae*. C. J. WEST

Cyclopentylalkylacetic acids and ω -cyclopentylethylalkylacetic acids and their bactericidal action towards *B. leprae*. G. R. YOHE and ROGER ADAMS. *J. Am. Chem. Soc.* **50**, 1503–8 (1928); cf. preceding abstr.—Cyclopentylethanol, b_{24} 96.5–7°, n_D^{20} 1.4577, d_4^{20} 0.9180; bromide, b_{19} 75–7°, 1.4863, 1.2860. Cyclopentylbutanol, b_2 88–92°, 1.4613, 0.9033 (70–5% yield); bromide, b_{17} 110–1°, 1.4820, 1.1872 (60–5% yield); cyanide, b_{17} 124–6.5°, 1.4542, 0.8887 (80–5% yield); hydrolysis with NaOH in 60% EtOH gives 80–5% of δ -cyclopentylpentanoic acid, b_2 124–8°, 1.4594, 0.9752. *Di-Et δ -cyclopentylbutylmalonate*, $b_{2,2}$ 154–60°, 1.4493, 0.9934 (40% yield); the acid, m. 121–4° (85% yield); heating the acid 2 hrs. at 160–80° gives 75% of ϵ -cyclopentylhexanoic acid, $b_{1,8}$ 133–5°, m. 33 3.5°, n_D^{36} 1.4549, d_4^{35} 0.9518. The following *di-Et cyclopentylalkylmalonates* were prep'd where R in the formula $C_5H_9C(CO_2Et)_2R$ is: C_7H_{15} , b_1 143–6°, n_D^{20} 1.4548, d_4^{20} 0.9749; C_8H_{17} , b_1 160–5°, 1.4553, 0.9659; C_9H_{19} , $b_{0,5}$ 152–5°, 1.4567, 0.9617; $C_{10}H_{21}$, b_1 169–71°, 1.4571, 0.9560, $C_{11}H_{23}$, b_1 186–9°, 1.4580, 0.9522. *Di-Et β -cyclopentylethylalkylmalonates*, $C_5H_9(CH_2)_2C(CO_2Et)_2R$: R is *Et*, b_2 125°, 1.4478, 1.0082; *Et*, $b_{1,9}$ 126–9°, 1.4511, 0.9924; *Pr*, $b_{1,7}$ 134–5°, 1.4510, 0.9873; *Bu*, $b_{1,8}$ 136–40°, 1.4523, 0.9783; *Am*, $b_{1,1}$ 148–50°, 1.4526, 0.9688; C_8H_{17} , 157–62°, 1.4531, 0.9624; C_7H_{15} , b_2 172–4°, 1.4541, 0.9563; C_8H_{17} , $b_{1,2}$ 182–4°, 1.4548, 0.9524. β -Cyclopentylethylalkylmalonic acids, $C_5H_9(CH_2)_2C(CO_2H)_2R$: R is *Et*, m. 126.5°, *Et*, m. 141–3°, *Pr*, m. 137–8°, *Bu*, m. 139–40.5°, *Am*, m. 124–7°, C_8H_{17} , m. 129.5–30°. β -Cyclopentylalkylacetic acids, $C_5H_9CH(CO_2H)R$: R is C_7H_{15} , $b_{1,4}$ 155–60°, 1.4594, 0.9312; C_8H_{17} , b_2 166–9°, 1.4609, 0.9279; C_9H_{19} , $b_{1,4}$ 177–8.5°, m. 37–7.5°; $C_{10}H_{21}$, $b_{1,7}$ 189–90°, m. 34 5–6°; $C_{11}H_{23}$, b_3 193–7°, m. 43.5–5.5°. β -Cyclopentylethylalkylacetic acids, $C_5H_9(CH_2)_2CH(CO_2H)R$: R is *Et*, $b_{2,4}$ 115–8°, 1.4575, 0.9849; *Et*, $b_{1,3}$ 122–4.5°, 1.4590, 0.9602; *Pr*, $b_{1,9}$ 130–2°, 1.4595, 0.9533; *Bu*, b_1 136–7°, 1.4608, 0.9435; *Am*, $b_{1,9}$ 150–4°, 1.4610, 0.9360; C_8H_{17} , $b_{1,9}$ 157–61°, 1.4616, 0.9303; C_7H_{15} , b_2 167–9°, 1.4621, 0.9252; C_8H_{17} , $b_{1,5}$ 173–6°, 1.4629, 0.9210. Undecyl bromide, $b_{1,8}$ 134–7°, 1.4571, 1.0521. *Di-Et cyclopentylmalonate*, b_2 115–7°, 1.4440, 1.0325. The greatest bactericidal action is found in the acids contg. 16–18 C atoms; the β -cyclopentylethylalkylacetic acids are slightly more effective than the isomeric cyclopentylalkylacetic acids; a similar slight difference could be detected in the cyclohexyl series. Cyclopentylnonylacetic acid and cyclopentylethylheptylacetic acid, isomeric with dihydrohydnoacarpic acid, are far more bactericidal than the latter compd. There is no significant difference in bactericidal effect between the cyclohexyl and cyclopentyl compds. of equal mol. wt. or of equal length side chain, though the figures appear to favor the cyclohexyl compds. The bactericidal action is not affected markedly by the presence of the double bond. C. J. WEST

Heat treatment of cyclic ketones. WILHELM TREIBS. *Ber* **61B**, 683–7 (1928); cf. Ipat'ev and Petrov, *C. A.* **22**, 1135.—The ketones were heated in a 500-cc. autoclave with 0.5 their wt. of unglazed clay plate fragments. There occurred (1) Polymerization of 2 and 3 mols. with elimination of H_2O and formation of unsatd. ketones and hydrocarbons of higher mol. wt.: $2C_{11}H_{16}O - H_2O = C_{20}H_{30}O$. (2) Formation of phenols, especially at high temps.: $C_{10}H_{16}O - H_2 = C_{10}H_{14}O$. (3) Formation of cymene: $C_{10}H_{16}O - H_2O = C_{10}H_{14}$. (4) With fenchone and camphor satd. hydrocarbons, C_8H_{16} , were formed by elimination of CO. Cyclohexanone in 6 hrs. at 300° gave about 25% of higher polymerization products, chiefly cyclohexylidene cyclohexanone, b. 274–8°; the higher fractions deposited cryst. triphenylene dodecahydride, m. 226°. At 250° about $1/3$ of the ketone O was split off as H_2O in 18 hrs., $1/2$ in 30 hrs. Only small quantities of low boiling hydrocarbons were formed; cyclohexene, b. 80–6°, was identified. No gases were formed at 250° but considerable quantities (especially CO) were evolved after 3 hrs. at 350°; after 7 hrs. the CO production was diminished and there were formed low-boiling, chiefly satd. products from which a hydrocarbon $C_{12}H_{22}$ (probably cyclohexane), b. 74–80°, was isolated in considerable quantity. Methylcyclohexanone (a mixt. of the 3 isomers) split off no CO at 300–50° but formed considerable quantities of a dimol. unsatd. ketone $C_{14}H_{22}O$, b. 290–3°, b_{20} 160–4°, d_{20} 0.9771, high-boiling, strongly unsatd. compds (the highest-boiling fractions of which were O-free) and small quantities of low-boiling products, among which was identified methyleyclohexene, b. 105–10°. At 375–400° were formed

CO and low-boiling, chiefly satd. hydrocarbons. With piperitone, splitting off of CO began at 400°. After 3 hrs. at 420° 0.2 of the ketone O was eliminated as GO and *p*-cymene was detected in the products; 17% of the ketone was converted into phenols, b. 200–40° (*m*-cresol and thymol were isolated). Thymol itself at 500° yielded *m*-cresol and MeCH:CH₂. Carvacrol decomp. in the same way but less easily, and cymene still less readily, slowly decomp. to C₆H₆ only at 600°. Carvone in 6 hrs. at 450° gave 25% phenols, b. 190–235° (the higher-boiling fractions contained carvacrol). Citronellal in 3 hrs. at 420° gave very small quantities of cymene and phenols, b. 190–215°. Fenchone lost CO above 400° (0.2 of the ketone O in 15 hrs.). The elimination of H₂O was very irregular and amounted up to 0.25 of the ketone O. Phenols were formed in relatively small and varying quantities (5% after 8 hrs., 10% after 16 hrs. at 450°). There were also obtained *m*-cymene, a small quantity of hydrocarbons b. 130–40°, consisting of about 2/3 satd. compds. C₈H₁₈ and 1/3 unsatd. compds. C₈H₁₄, and higher, unsatd. polymerization products, b. 220–370°, whose O content and rotatory power decrease with increase in the b. p. Camphor lost CO at 380° until about 1/3 of the ketone O was eliminated and then chiefly easily volatile satd. hydrocarbons were formed. In 6 hrs. at 420° it gave 8% phenols, in 14 hrs. 15% (*m*-cresol and carvacrol were isolated). There were also obtained satd. hydrocarbons (C 88.1, H 11.3%), b. 188–98°, d₂₀ 0.8797, and *p*- and *m*-cymene. The product obtained by heating 10 hrs. at 420° yielded a ketone identical in all of its properties and those of its derivs. with fenchone. C. A. R.

The Friedel and Crafts reaction and organometallic aluminum compounds. PIETRO LEONE. *Atti II congresso naz. chim. pura applicata* 1926, 1332–7.—A compilation of work described in sep. articles elsewhere (cf. C. A. 19, 2929; 20, 1065).

C. C. DAVIS

The mechanism of the Claisen reaction. FRED. SWARTZ. *Atti II congresso naz. chim. pura applicata* 1926, 1322–5 (in French).—See C. A. 21, 898.

C. C. DAVIS

The nitration of *m*-acetaminotrifluorotoluene. H. ROUCHE. *Bull. sci. acad. roy. Belg.* 13, 346–57 (1927).—R. studies the nitration of *m*-CF₃C₆H₄NIHAc (I), m. 203°. Dissolving I in 20 parts of H₂SO₄ (II) and adding fuming HNO₃ in 4 parts of II at –5°, gives 1,3,6-C₆H₃(CF₃)(NIH₂)NO₂ (III), m. 129° (84%), and the 1,3,4-isomer (IV), m. 101° (6%). I with 2 moles of AcNO₃ at –5° gives IV (61%) and 1,2,3-C₆H₃(CF₃)(NO₂)NIH₂ (V), m. 64° (25%). III and V have been characterized by their amides, m. 123.5° and 171°. The structure has been detd. by deamination with EtNO₂ and II in EtOH. III gives *o*-CF₃C₆H₄NO₂ (VI), m. 32.5°, b₇₆₅ 216.3°. V on deamination also gives VI. IV gives *p*-CF₃C₆H₄NO₂ (VII), m. 41.5°. VI on reduction with Sn and HCl gives *o*-CF₃C₆H₄NIH₂ (VIII), b₂₁ 73°, amide, m. 94°. VIII by the Sandmeyer method with KCN gives *o*-CF₃C₆H₄CN, m. 7.5°, which on hydrolysis with 75% II gives *o*-C₆H₄(CO₂H)₂. III in a similar manner has been identified by conversion to the following compds: 1,3,6-C₆H₃(CF₃)(NIH₂)₂, m. 58°, to 1,3,6-C₆H₃(CO₂H)(NH₂)₂, to *p*-C₆H₄(NH₂)₂. D. H. POWERS

Solubility of *m*-nitroaniline in water. J. H. WALTON AND T. G. FINZEL. *J. Am. Chem. Soc.* 50, 1508–10 (1928).—The soly. of *m*-O₂NC₆H₄NH₂ in H₂O is reported from 0° to 83.4°. In agitating *m*-O₂NC₆H₄NH₂ and H₂O it is shown that the solid phase settles with such difficulty and is so finely divided that either an asbestos or Mandler filter must be used as a sampler. At 25° the rate of soln., near the satn. point, is extremely slow. The av. soly. at 83.4° is 1.23%. A comparison between the TiCl₃ and the NaNO₂ method for the analysis of *m*-O₂NC₆H₄NH₂ is made, the former giving the more concordant results. C. J. WEST

***p*-Nitrophenylnitrosohydroxylamine.** DINO BIGIACI. *Atti II congresso naz. chim. pura applicata* 1926, 1315–21.—No nitronitrosophenylnitrosohydroxylamines are mentioned in the literature. They cannot in general be prepd. by the method of Baudisch for nitrosoarylhydroxylamines, for *o*- and *p*-O₂NC₆H₄NHOH are unknown. On the other hand the method of Angeli is applicable. *p*-ONC₆H₄NO₂ (I) (1 g.) in boiling EtOH (30 cc.), dild. with water (50 cc.), concd. aq. ON:NONa (II) (1 g.) slowly added, filtered (residue of 0.2 g. of (*p*-O₂NC₆H₄)₂N₂O (III)), the filtrate concd. to 20 cc., again filtered while warm, let cool, the ppt. filtered and washed with a little water yields *Na p*-nitrophenylnitrosohydroxylamine, *p*-O₂NC₆H₄N(O):NONa. 5H₂O (IV); in powder form it is maroon-yellow, adheres to the m. p. tube at 80–100°, forms a compact mass at 110°, which becomes light yellow at 140°, darkens toward 200°, blackens at 260° and fuses to a black liquid, deflagrates on Pt foil, gives a brown-yellow soln. in hot water, is not hygroscopic, is stable in air when not in soln., loses 4H₂O in a desiccator and all 5H₂O at 100°. The formation of both III and IV shows simultaneous reduction and oxidation, like the Cannizzaro reaction. If in the reaction with I a large

excess of II is added rapidly, instead of III being formed, $(p\text{-O}_2\text{NC}_6\text{H}_4\text{N})_2$ is pptd. No $p\text{-C}_6\text{H}_4(\text{NO}_2)_2$ is formed under any condition. Its absence is due to the fact that it is capable of reacting with $\text{ON}:\text{NOH}$, being reduced for the most part to $p\text{-ONC}_6\text{H}_4\text{NO}_2$, which in turn reacts with the Angeli acid, probably by a mechanism analogous to that observed by Meisenheimer with H_2NOH and $p\text{-C}_6\text{H}_4(\text{NO}_2)_2$ (cf. C. A. 14, 52). Ba $p\text{-nitrophenylnitrosohydroxylamine}$, prepd. from IV, m. 260° , suspended in ice-water, acidified with dil. HCl, filtered, the residue dissolved in dil. KOH and repptd. with dil. HCl, yields $p\text{-nitrosophenylnitrosohydroxylamine}$ (V), also formed by acidifying aq. IV at 0° with dil. H_2SO_4 , m. $78\text{--}80^\circ$ (decompn.), reacts with HNO_2 like other compds. of its type; with PhHNHNH_2 in Et_2O it forms the addn. compd. $p\text{-O}_2\text{NC}_6\text{H}_4\text{N}(\text{O})\text{PhHNHNH}_2$, light yellow, with pearly luster, softens 88° , m. 90.5° to an orange-red liquid with evolution of gas, unstable *in vacuo* in darkness. NiH_4 salt of V prepd. from the acid in Et_2O and NH_3 gas, yellow, becomes rose-colored around 80° , m. 145° to a brown liquid with evolution of gas. The Sn, Ag, Hg and Li salts were prepd. by pptn. from aq. IV. Aq. CoCl_2 added slowly to aq. IV gives an orange ppt. which redissolves in excess IV, but with enough CoCl_2 is formed a permanent ppt. of the Co salt, $(\text{C}_6\text{H}_4\text{O}_4\text{N}_3)_2\text{Co}$, orange-yellow, turns brown at 215° and m. 222° (decompn.) to a black liquid. It gives in Me_2CO , a brown-red soln. which on concn. deposits maroon-red crystals. In hot $\text{C}_6\text{H}_5\text{N}$ it gives a dark red soln. which on cooling deposits violet-red crystals of a $\text{C}_6\text{H}_5\text{N}$ addn. compd., loses $\text{C}_6\text{H}_5\text{N}$ on exposure to air, becoming maroon-red. Ni salt, $(\text{C}_6\text{H}_4\text{O}_4\text{N}_3)_2\text{Ni}$, light green from Me_2CO , darkens at 225° , turns brown at 240° , m. 249° to a black liquid (decompn.). Crystd. from $\text{C}_6\text{H}_5\text{N}$, a grass-green compd. is formed, while the mother liquor acquires a maroon-green tone. Aq. CuCl_2 added to an aq. suspension of IV ppts. the Cu salt, $(\text{C}_6\text{H}_4\text{O}_4\text{N}_3)_2\text{Cu}$, blue-green; its $\text{C}_6\text{H}_5\text{N}$ soln. deposits a compd. contg. $\text{C}_6\text{H}_5\text{N}$, green, becomes greenish gray at 100° . The Cu salt turns brown at 200° and m. 250° (decompn.). Aq. FeCl_3 added to an aq. suspension of IV, and the ppt. recrystd. from hot Me_2CO , yields the Fe salt, $(\text{C}_6\text{H}_4\text{O}_4\text{N}_3)_3\text{Fe}$, dark maroon-red, m. 202° (decompn.); its Me_2CO soln. dild. with water and acidified with dil. HCl gives almost no color with KSCN, no immediate reaction with $\text{K}_4\text{Fe}(\text{CN})_6$ and no immediate ppt. with $(\text{NH}_4)_2\text{S}$ from its neutral aq.- Me_2CO soln. Water (300 cc.) added to $p\text{-C}_6\text{H}_4(\text{NO}_2)_2$ (1.75 g.) in boiling EtOH (75 cc.) to give extremely fine crystals, IV (5.3 g.) added in 5 portions during 1.5 hr., the greater part of the EtOH distd. *in vacuo* and the ppt. in the residual soln. recrystd. from EtOH , yields 0.75 g. of $p\text{-HOC}_6\text{H}_4\text{NO}_2$, while the mother liquor when filtered and concd. yields 1.4 g. of IV.

C. C. DAVIS

Aliphatic-aromatic arseno compounds. II. β -Hydroxyethylarsonic acid and some arsenoethanols. R. H. EDDE. *J. Am. Chem. Soc.* 50, 1394-9 (1928); cf. C. A. 21, 1627.—In the 1st series of compds. reported all of the members were sol. because of the presence of a CO_2H group in the aliphatic part of the mol.; the present series contains the $\text{CH}_2\text{CH}_2\text{OH}$, as the aliphatic portion and various aryl groups as the aromatic part of the arseno mol. An improved method is given for the prepn. of $\text{H}_2\text{O}_3\text{AsCH}_2\text{CH}_2\text{OH}$ (I), which crysts. after standing about 1 yr. with 1 mol. H_2O , lost *in vacuo* at 80° and m. $157\text{--}9^\circ$; its metallic salts are all extremely sol. and decomp. on evapn. of their solns. Reduction of a mixt. of $\text{H}_2\text{O}_3\text{AsC}_6\text{H}_4\text{OH}$ and I gives 67% of 4-hydroxyphenylarsonoethanol, orange powder; oxidation with alk. H_2O_2 gives the 2 original acids. I and arsanilic acid give 4-aminophenylarsonoethanol, orange powder; the HCl salt is orange-yellow. 4-Acetoxypheylarsonoethanol, yellow (36% yield); if the reaction product is heated to 60° for 10 min. after standing 3 days, there results the unsymtriarsenoethanol, $\text{C}_{10}\text{H}_{12}\text{O}_4\text{As}$, yellow; both are alkali-sol. Reduction of 3,4- $\text{H}_2\text{N}(\text{HO})\text{C}_6\text{H}_3\text{AsO}_3\text{H}_2$ and I gives 11.2% of 3-amino-4-hydroxyphenyltetraarsenoethanol, orange. 4-Glycinephenyltetraarsenoethanol, orange.

C. J. WEST

A new method for the preparation of organic aliphatic selenium, tellurium and arsenic compounds. GIULIO NATTA. *Atti II congresso naz. chim. pura applicata 1926*, 1326-31.—See C. A. 20, 3273.

C. C. DAVIS

Cyclic organo-metallic compounds. IV. Tellurylum compounds. H. D. K. DREW. *J. Chem. Soc.* 1928, 506-10; cf. C. A. 21, 1251.—Further study of the compd. previously named diphenoxytellurylum hydroxybisulfate monohydrate shows that the decompn. by H_2O is quant.; the % of phenoxtellurine present as acceptor in this compd. is 53.5; the % in the donor form is 27.9; the compd. is therefore triphenoxytellurylum dibisulfate. The same method has been applied to the parent compds. of the series and the structures previously assigned to them have been confirmed. The previously described compd. of phenoxtellurine and 2-chloro-8-methylphenoxtellurine in mol. equiv. proportions has now been sep'd. into its constituents by the fractional pptn. of its CHCl_3 soln. with Br; the phenoxtellurine is pptd. first as the dibromide.

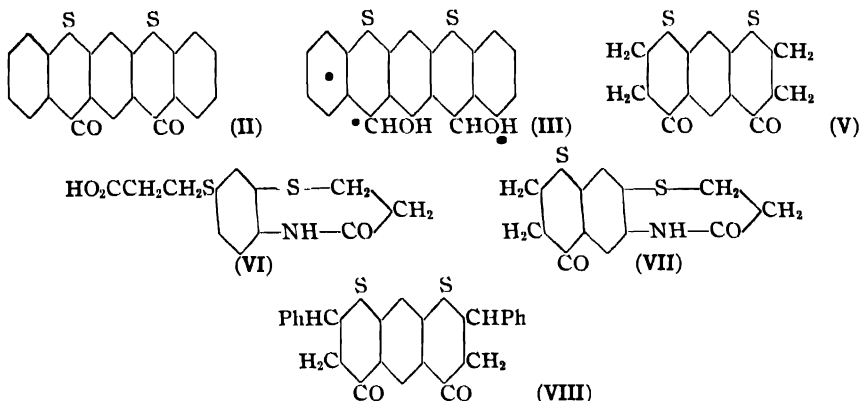
Chloromethylphenoxtellurine dibromide, yellow, m. 315° (decompn.); reduction to the *tellurine*, pale yellow, m. 46–7°, takes place very slowly; the *dichloride*, pale yellow, m. 300° (decompn.); *diacetate*, m. 230–2° (decompn.); *bisulfate*, cream-colored. In cold concd. H_2SO_4 the tellurine gives a deep maroon-red soln., which evolved SO_2 ; a little H_2O gives a dark red product, crystg. from AcOH as a dark blue-black powder with greenish bronze luster; the AcOH soln. is intense reddish purple, which becomes pale yellow on diln. or heating (reversible change). The di- α -bromocamphor- π -sulfonate was prepd. but could not be purified because of its tendency to hydrolyze.

C. J. WEST

Cresolarsonic acids. C. FINZI. *Atti II congresso naz. chim. pura applicata* 1926, 1302–11.—Of the 10 possible cresolarsonic acids, only 3 are definitely known (cf. Jacobs and Heidelberger, *C. A.* 13, 2371; Christiansen, *C. A.* 17, 2109). The most direct way to prep. these compds. should be to apply the Bart method (*C. A.* 17, 82) to the corresponding aminophenols. Expts., however, with 3,2-, 5,2-, 4,3- and 2,5-Me(HO)- $\text{C}_6\text{H}_3\text{NH}_2$ under various conditions gave only in the first 2 cases an appreciable yield of the $\text{AsO}(\text{OH})_2$ acid, the 1st already known, the 2nd a new compd. The Bart reaction is therefore not suitable for prep. cresolarsonic acids, and resort was had to the prepn. of the aminomethylphenylarsonic acids. This involved the prepn. of 3 of the latter which were not known. 3,2-Me(HO) $\text{C}_6\text{H}_3\text{NH}_2\text{Cl}$ (6.4 g.) diazotized with NaNO_2 , poured into a soln. prepd. from As_2O_3 (3.96 g.), NaOH (11.25 g.) and water (750–800 cc.), let stand overnight, heated to 60–70°, concd., the excess arsenite oxidized with H_2O_2 , the arsenate pptd. with BaCl_2 , filtered, excess BaCl_2 eliminated with Na_2SO_4 , concd. until NaCl seps., acidified with HCl , the ppt. crystd. repeatedly from boiling water, with purification by animal charcoal, yields 3,2-Me(HO) $\text{C}_6\text{H}_3\text{AsO}(\text{OH})_2$, m. 205° (cf. 198–200° of Christiansen), gives a color with FeCl_3 . 4,3-Me(H_2N) $\text{C}_6\text{H}_3\text{AsO}(\text{OH})_2$ (cf. *C. A.* 12, 2550) (5 g.) in N H_2SO_4 (25 cc.) diazotized with NaNO_2 , warmed to 50–60°, dild., the H_2SO_4 pptd. with $\text{Ba}(\text{OH})_2$, filtered, made alk. with Na_2CO_3 , concd., acidified with HCl and the ppt. recrystd. from boiling water, yields 3-hydroxy-4-methylphenylarsonic acid, m. 174–5°, gives no color with FeCl_3 . Two g. dissolved in 5–6 cc. of a H_2SO_4 - HNO_3 mixt. (3 parts concd. H_2SO_4 + 2 parts HNO_3 of d. 1.40) cooled with ice, let stand at room temp., poured into ice water (20–25 cc.) and the ppt. recrystd. from boiling water, yields 3-hydroxy-4-methylnitrophenylarsonic acid, yellowish, m. toward 237° (decompn.), gives no color with FeCl_3 . From 4,2-Me(H_2N) $\text{C}_6\text{H}_3\text{AsO}(\text{OH})_2$ (2.3 g.) was obtained 2-hydroxy-4-methylphenylarsonic acid, 4,2-Me(HO)- $\text{C}_6\text{H}_3\text{AsO}(\text{OH})_2$, H_2O , softens at 125°, then solidifies, and the anhyd. acid, m. 173°, gives an intense red color with FeCl_3 . Four g. treated with 7–8 cc. of the same H_2SO_4 - HNO_3 mixt. used before yielded 2-hydroxy-4-methylnitrophenylarsonic acid, 4,2-Me(HO)- $\text{C}_6\text{H}_3(\text{NO}_2)\text{AsO}(\text{OH})_2 \cdot 2\text{H}_2\text{O}$, contracts around 120°, and the anhyd. acid, m. 193°, gives a purplish red color with FeCl_3 . Prepd. in the same way as 3,2-Me(HO) $\text{C}_6\text{H}_3\text{AsO}(\text{OH})_2$, 5,2-Me(HO) $\text{C}_6\text{H}_3\text{NH}_2$ (8 g.) and Na_3AsO_3 (from 4.95 g. As_2O_3) yielded 2-hydroxy-5-methylphenylarsonic acid (1.5H \cdot O), softens at 90–100°, solidifies at higher temps., and the anhyd. acid, m. around 218°, gives a color reaction with FeCl_3 . From 2,5-Me(H_2N) $\text{C}_6\text{H}_3\text{AsO}(\text{OH})_2$ (cf. *C. A.* 9, 1333; 12, 2550; 19, 478) was prepd. 5-hydroxy-2-methylphenylarsonic acid, m. 184–5°, gives no color with FeCl_3 . 4,3-Me(HO)- $\text{C}_6\text{H}_3\text{AsO}(\text{OH})_2$ (2 g.) heated on the water bath with a few cc. of H_3PO_2 (d. 1.27) ppts 3,3'-dihydroxy-4,4'-dimethylarsenobenzene, m. 192–7°, sol. in aq. alkalis. In the same way from 4,2-Me(HO) $\text{C}_6\text{H}_3\text{AsO}(\text{OH})_2$ was prepd. 2,2'-dihydroxy-4,4'-dimethylarsenobenzene, amorphous, orange-yellow, m. 108–10° (decompn.), sol. in aq. alkalis. Similarly from 4,2-Me(HO) $\text{C}_6\text{H}_3(\text{NO}_2)\text{AsO}(\text{OH})_2$ was prepd. 2,2'-dihydroxy-4,4'-dimethyldinitroarsenobenzene, amorphous, canary-yellow, turns brown toward 189°, m. 191° (decompn.), gives intense orange-red solns. in aq. alkalis. Only the cresolarsonic acids with the OH in the *o*-position to the $\text{AsO}(\text{OH})_2$ group give a color reaction with FeCl_3 . The position of the NO_2 in the nitro derivs. described above was not detd. C. C. DAVIS

Thiophenols. Formation of heterocyclic sulfurated nuclei. C. FINZI. *Atti II congresso naz. chim. pura applicata* 1926, 1312–5.—An outline of researches on derivs. of thiophenols, but without exptl. data. The diazo deriv. of $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ reacts with $m\text{-C}_6\text{H}_4(\text{SH})_2$ (I) to form thioresorcinol-*o*-dibenzoic acid $m\text{-C}_6\text{H}_4(\text{SC}_6\text{H}_4\text{CO}_2\text{H-}o)_2$. The position of the 2 CO_2H groups allows the formation of 2 hexatomic sulfurated nuclei by elimination of water from each CO_2H group and H in the I nucleus, so that by dissolving I in concd. H_2SO_4 , dithioxanthone (II) is obtained directly. Reduced in alk. soln. II forms dithioxanthidrol (III). By condensation of I with $\text{ClCH}_2\text{CO}_2\text{H}$ thioresorcinoldipropionic acid, $m\text{-C}_6\text{H}_4(\text{SCH}_2\text{CH}_2\text{CO}_2\text{H})_2$ (IV), was formed. Thioresorcinolacetic acid does not with strong dehydrating agents form the corresponding compd. with pentatomic sulfurated nucleus, a compd. of great importance because of

its relation to thioindigo, but IV with concd. H_2SO_4 loses $2\text{H}_2\text{O}$, forming *dithiochromanone* (V). IV also forms a compd. with a heptatomic sulfurated nucleus, a structure which is little mentioned in the literature (cf. Mayer and Horst, *C. A.* 17, 3344; Braun, *C. A.* 20, 905). On nitration IV forms the *nitro deriv.* $2,4\text{-(HO}_2\text{CCH}_2\text{CH}_2\text{S)}_2\text{C}_6\text{H}_3\text{NO}_2$, which by reduction gives the corresponding *amino deriv.* The latter heated above its m. p. loses H_2O , forming *heptaketodihydrothiazinethiopropionic acid* (VI). By dehydration with concd. H_2SO_4 VI retains its thiazine group but forms a sulfurated nucleus from the lateral chain, corresponding to that of V, giving *thiochromanoneheptathiazine* (VII). By condensation of I with α -bromohydrocinnamic acid or by the action of HBr gas on I and $\text{PhCH:CHCO}_2\text{H}$ in AcOH , *thioresorcinolhydrocinnamic acid* is formed, which with POCl_3 or P_2O_5 gives *dithioflavonone* (VIII).



C. C. DAVIS

The condensation of pyruvic acid with amines and aromatic aldehydes. ST. WEIL AND FR. GOLDBERZANKA. *Bull. trav. inst. pharm. état.* No. 6, 1-6(1927).—W. and G. condensed AcCO_2H and $p\text{-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{Et}$ in alc. with various compds. with results as follows: BzH yielded $\text{C}_{20}\text{H}_{26}\text{O}_5\text{N}_2$, m. $203\text{--}4^\circ$; vanillin gave $\text{C}_{27}\text{H}_{28}\text{O}_7\text{N}_2$, m. $202\text{--}3^\circ$; piperonal gave $\text{C}_{29}\text{H}_{26}\text{O}_7\text{N}_2$, m. 219° ; $o\text{-HOC}_6\text{H}_4\text{CHO}$ gave $\text{C}_{28}\text{H}_{26}\text{O}_6\text{N}_2$, m. 219° ; $\text{Me}_2\text{NC}_6\text{H}_4\text{CHO}$ gave $\text{C}_{30}\text{H}_{31}\text{O}_5\text{N}_3$, m. 176° .

WILLIAM J. HUSA

Hydrophthalides. Action of alkylmagnesium iodides on $\Delta^{2,6}$ -dihydrophthalic anhydride. S. BERLINGOZZI AND C. MENNONNA. *Atti II congresso naz. chim. pura applicata* 1926, 1338.—A summary of work by B. on this subject (cf. *C. A.* 21, 2260).

C. C. DAVIS

Hydrophthalides. Reduction products of alkylidenephthalides. S. BERLINGOZZI AND A. PALMA. *Atti II congresso naz. chim. pura applicata* 1926, 1339.—A summary of work by B. and Cione (cf. *C. A.* 21, 2260).

C. C. DAVIS

Decomposition of acid anhydrides. Preparation of the anhydrides by direct dehydration of the acids. J. CAMPARDOU AND M. SÉON. *Compt. rend.* 186, 591-3(1928).—By passing Ac_2O (I), over thoria at 300° complete decompn. is obtained at a temp. 100° lower than that required to decomp. the acid. When 2 moles of I and 1 mole of Bz_2O are mixed and passed over the catalyst the chief liquid fraction is BzMe . It is suggested that the decompn. of acids goes through the anhydride and that their higher temp. of decompn. is only the temp. of anhydride formation. Passing pure AcOH over TiO_2 at 300° gave a product contg. 12.8% I.

D. H. POWERS

Parachor and chemical constitution. VII. Further examples of semipolar bonds. ADOLPH FREIMAN AND SAMUEL SUGDEN. *J. Chem. Soc.* 1928, 263-9; cf. *C. A.* 22, 768.—The parachor const. for the semipolar double bond is found to be -1.6 from measurements on 5 carefully purified sulfones and related compds., which agrees with earlier work. CrO_2Cl_2 contains 2 semipolar bonds and $\text{K}_2\text{Cr}_2\text{O}_7$ 4 such linkages. The parachor for Cr is assigned the value 54 units. Sulfonal and trional give a large negative anomaly in their parachors, which may be because of the production of a cyclic phase by the formation of singlet linkages between O atoms of the SO_2 groups. $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{Cl}$, m. 68° (cor.), $d_4^{25} = 1.333 - 0.000961t$, γ 35.54, 31.82 at 74° and 103.5° ; $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{Et}$, m. $33\text{--}4^\circ$, $d_4^{25} = 1.206 - 0.000862t$, γ 40.62, 39.18, 37.62 and 36.14 at 40° , 53.5° , 70° and 83° ; $\text{PhCH}_2\text{SO}_2\text{Me}$, m. 124.5° , $d_4^{25} = 1.246 - 0.000825t$, γ 35.92,

33.93, 32.22 at 142.5°, 164.5° and 184°; Ph_2SO_2 , m. 125°, $d_4^{25} = 1.267 - 0.000774t$, γ 37.77, 35.97 and 33.42 at 137.5°, 157° and 179.5°; $\text{PhSO}_2\text{CH}_2\text{Ph}$, m. 146°, $d_4^{25} = 1.249 - 0.000809t$, γ 35.40, 32.38 at 153.5° and 184°; CrO_2Cl_2 , b_{788} 115–6°, $d_4^{25} = 1.965 - 0.00185t$, γ 36.61, 34.55, 32.16, 30.48 at 19°, 41°, 64°, 78°; sulfonal, m. 125.8°, $d_4^{25} = 1.278 - 0.000725t$, γ 34.31, 32.20, 30.54 and 29.91 at 132.5°, 154.5°, 169.5° and 177.5°; trional, m. 75°, $d_4^{25} = 1.272 - 0.00839t$, γ from 88.5° to 164°. **VIII. Ring-chain valency tautomerism in phorone derivatives.** S. SUGDEN. *Ibid* 410–5.—The results of this study are in good agreement with the conclusions as to the structure reached by Ingold and Shoppee (cf. *C. A.* 22, 1952). Phorone, m. 28°, $d_4^{25} = 0.906 - 0.00084t$, γ 30.22, 27.94, 25.77, 22.88 at 29.5°, 51.5°, 71° and 99°; α, α' -Cl₂ deriv., b_{17} 119–21°, $d_4^{25} = 1.191 - 0.00095t$, γ 33.97, 32.31, 30.15, 27.79 at 21°, 41°, 59° and 83°; α, α' -Br₂ deriv., m. 32°, $d_4^{25} = 1.598 - 0.00126t$, γ 35.51, 33.38, 31.46 at 31.5°, 49.5° and 67.5°; α -Ac deriv., b_3 109°, $d_4^{25} = 1.038 - 0.00088t$, γ 32.64, 30.12, 28.29, 26.08 at 16.5°, 43.5°, 61.5° and 84°; α -Br- α' -Ac deriv., m. 74°, $d_4^{25} = 1.348 - 0.00103t$, γ 29.45, 27.53, 25.84, 23.80 at 80°, 101°, 120° and 142.5°; α -Br- α' -MeO deriv., b_{25} 133°, $d_4^{25} = 1.339 - 0.00107t$, γ 34.86, 32.02, 29.87, 27.73 at 17.5°, 46°, 67.5° and 89°; α -Br- α' -Bz deriv., m. 92°, $d_4^{25} = 1.344 - 0.00086t$, γ 33.22, 31.23, 29.66, 27.35 at 95.5°, 117°, 136° and 162°; α -Br- α' -BrC₆H₄CO deriv., m. 63–4°, $d_4^{25} = 1.510 - 0.00099t$, γ 35.57, 33.93, 32.69, 30.63 at 73.5°, 91°, 110° and 131°; α -Bz deriv., m. 68°, $d_4^{25} = 1.117 - 0.00080t$, γ 32.42, 30.82, 28.81, 27.76 at 75°, 93°, 117° and 131.5°; α -*p*-Br-C₆H₄CO deriv., m. 86–7°, $d_4^{25} = 1.302 - 0.00087t$, γ 31.86, 31.26, 29.99, 29.18, 27.86, 27.14 at 96°, 101°, 115°, 128.5°, 146° and 154.5°; distyryl ketone, m. 112°, $d_4^{25} = 1.118 - 0.00072t$, γ 38.20, 37.14, 35.72, 33.78 at 120°, 130°, 144.5° and 164°; α, α' -Br₂ deriv., m. 98°, $d_4^{100} = 1.516$, γ_{100} 40.07.

C. J. WEST

Action of mixed organomagnesium compounds on some *N*-diethyl aromatic amides and on the *N*-tetraethylphthalic diamides. N. MAXIM. *Ann. chim.* 9, 55–111 (1928); cf. *C. A.* 21, 1980, 3346.—M. studies the action of RMgX on di-Et aromatic amides and the effect of varying the position of the benzene nucleus. The amides were prepd. by adding the acid chloride in C₆H₆ slowly to Et₂NH in C₆H₆ agitated under a reflux. The following new amides were prepd. in this way: $\text{PhCH}_2\text{CH}_2\text{CONEt}_2$ (I), b_{11} 170°; $\text{Ph}_2\text{CHCONEt}_2$ (II), m. 64–5°; $(\text{PhCH}_2)_2\text{CHCONEt}_2$ (III), b_{18} 225°, m. 56°; *o*-HO₂C(C₆H₄)CONEt₂ (IV), b_{14} 177°, m. 153°; *o*-C₆H₄(CONEt₂)₂ (V), b_{16} 204°, m. 36° (prepd. by carrying out the reaction at 60°); *m*-C₆H₄(CONEt₂)₂ (VI), b_{12} 242°, m. 85°; *p*-C₆H₄(CONEt₂)₂ (VII), m. 127°. The organo-Mg halide was prepd. in Et₂O and the amide slowly added to it (in Et₂O if sol.). The mixt. was heated on a water bath for 4 hrs. and allowed to stand for 12 hrs. at room temp. The product was then hydrolyzed with 20% H₂SO₄. EtMgBr (VIII), with PhCONEt₂ (IX), gave PhCOEt in the following yields with the different solvents: 31% in Et₂O; 56% C₆H₆; 60% PhMe. VIII was always prepd. in Et₂O. PhCH₂MgCl (X), with IX gave PhCOCH₂Ph 21%, 31%, 33%; a small quantity of what may have been Ph(PhCH₂)C:C(COPh)Ph was also formed. PhMgBr (XI) with IX gave no reaction. XI with PhCH₂CONEt₂ (XII), gave PhCH₂COPh (37%). VIII with XII gave PhCH₂COEt (39%). VIII with I gave PhCH₂CH₂COEt (50%); semicarbazone, m. 131–2°. IX with I gave PhCH₂CH₂COPh (69%); semicarbazone, m. 140°. PhEtCHCH₂CONEt₂ did not react with VIII. II with VIII gave Ph₂CHCOEt (31%), b_{14} 186°; oxime, m. 110°; semicarbazone, m. 189–90°. II with XI gave Ph₂CHCOPh (42%). III with VIII gave (PhCH₂)₂CHCOEt (32%), b_{17} 205°; semicarbazone, m. 160–1°. IV reacted with VIII vigorously with the evolution of H₂ and gave not the usual ketone but

o-O:C(C₆H₄)CEt₂O (XIII) (80%). V with VIII gave XIII and *o*-EtCOC₆H₄CONEt₂, b_{18} 186°; oxime, m. 110°; semicarbazone m. 195°. V and XI did not react. VI with VIII gave *m*-C₆H₄(COEt)₂, b_{10} 182°, m. 34° (disemicarbazone, m. 222°), and *m*-EtCO-C₆H₄CONEt₂, b_{10} 205° (semicarbazone, m. 145°). VI did not react with XI. VII with VIII gave *p*-C₆H₄(COEt)₂, m. 100° (disemicarbazone, m. 260°; dioxime, m. 226°) and *p*-EtCOC₆H₄CONEt₂, m. 82° (semicarbazone, m. 175°; oxime, m. 105°). VII and XI did not react. VIII with PhCH:CHCONEt₂ (XIV), gave PhCHEtCH₂CONEt₂ (80%), b_{11} 174°. XI with XIV gave Ph₂CHCH₂CONEt₂ (83%), b_{10} 225°.

D. H. POWERS

Syntheses in organic chemistry with radiant energy. II. The photosynthesis of α -phenyl- β -diphenyllactic acid. REMO DE FAZI. *Atti II congresso naz. chim. pura applicata* 1926, 1287-92.—The expts. are an amplification of previous ones (cf. *C. A.* 20, 594). $\text{PhCH}_2\text{CO}_2\text{H}$ (20 g.) and anhyd. C_6H_6 (50 cc.) exposed in a sealed tube to sunlight for 6 months evolved CO_2 and became an intense yellow. The reaction mixt. agitated repeatedly with 10% aq. Na_2CO_3 , extd. with C_6H_6 , the C_6H_6 ext. evapd., gave a trace of an unidentified neutral oil. The aq. layer yielded unaltered $\text{PhCH}_2\text{CO}_2\text{H}$. Exposed in a similar way for 228 days, $\text{PhCH}_2\text{CO}_2\text{H}$ (20 g.) in C_6H_6 (50 cc.) and U acetate (0.2 g.) gave an intense yellow reaction mixt., with evolution of CO_2 and the sepn. of a trace of oil as before. $\text{PhCH}_2\text{CO}_2\text{H}$ in C_6H_6 exposed to an "Osram" lamp (2000 c. p.) for 280 hrs evolved CO_2 and became yellow. Treated as before, the reaction mixt. gave a trace of oil and unaltered $\text{PhCH}_2\text{CO}_2\text{H}$. The oil when chilled yielded a trace of a cryst. compd., m. $51-2^\circ$, which may have been $\text{PhCH}_2\text{CH}_2\text{Ph}$, formed by the reaction: $2 \text{PhCH}_2\text{CO}_2\text{H} \rightarrow \text{H}_2 + 2 \text{CO}_2 + \text{PhCH}_2\text{CH}_2\text{Ph}$. No PhMe was identified in any of the 3 cases above. $\text{PhCH}_2\text{CO}_2\text{H}$ (26 g.), Ph_2CO (30 g.) and C_6H_6 (30 g.) exposed to sunlight for 112 days, became orange-yellow, evolved CO_2 , and deposited 2.5 g. of α -phenyl- β -diphenyllactic acid, and from the mother liquid was recovered unaltered Ph_2CO and a viscous oil, b. $818-22^\circ$, identical with that obtained in the previous work (*C. A.* 20, 594). With equal quantities of $\text{PhCH}_2\text{CO}_2\text{H}$, C_6H_6 and Ph_2CO under the same conditions, 0.5 g. of α -phenyl- β -diphenyllactic acid, a trace of benzopinacol and a trace of oil were recovered. No PhMe was recovered in either case. $\text{PhCH}_2\text{CO}_2\text{H}$ (13 g.), C_6H_6 (50 cc.) and Ph_2CO (15 g.) exposed in a quartz receptacle to ultra-violet light became greenish yellow after 100 hrs, evolved only a trace of CO_2 , and the initial reagents were recovered unaltered in practically their original quantities. No trace of α -phenyl- β -diphenyllactic acid could be detected, even by the sensitive test already described (*C. A.* 9, 3063). The results indicate that the course of the reaction between $\text{PhCH}_2\text{CO}_2\text{H}$ and Ph_2CO varies with the radiation, and that probably the difficulties frequently encountered in studying photochem. reactions arise from secondary products formed by transformation of the primary products of the reactions.

C. C. DAVIS

Study of the rotatory dispersion of monoalkyl and of dialkyl aspartic esters in the visible region of the spectrum. F. P. MAZZA. *Atti II congresso naz. chim. pura applicata* 1926, 1342; cf. *C. A.* 22, 1957.—A summary of *C. A.* 21, 1798.

C. C. DAVIS

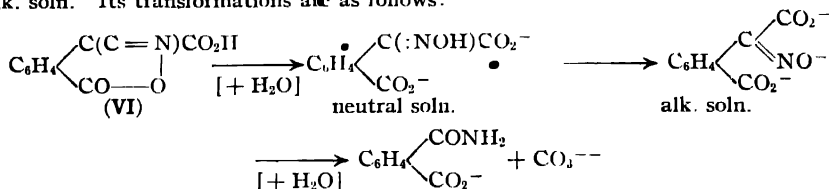
5-Bromo-2,4-dimethoxybenzoylacrylic acid and its esters. II. GRACE POTTER RICE. *J. Am. Chem. Soc.* 50, 1481-91 (1928); cf. *C. A.* 22, 407.-5,2,4-Br(MeO) $_2$ - $\text{C}_6\text{H}_2\text{COCH}_2\text{CHCO}_2\text{Me}$ and Br in CHCl_3 give quant. *Me* α,β -dibromo-5-bromo-2,4-dimethoxybenzoylpropionate; extg. with MeOH and recrystg the residue with MeOH gives 70-80% of an ester m. $150-5^\circ$; a small quantity of a 2nd isomer, m. $149-50^\circ$, was isolated but most of the remainder crystd. as mixed crystals, m. 127° ; the mixt., however, showed the same behavior as the pure isomer, m. 150.5° . With AcOK in MeOH there results 80% of *Me* bromo-5-bromo-2,4-dimethoxybenzoylacrylate (I), which crysts. from MeOH as lemon needles, m. 139° , and on concn. of the filtrate, as transparent crystals, m. 164° ; sunlight transforms the yellow into the colorless form. With MeONa (0.4 g. Na in 10 cc. MeOH) 4 g. I in 70 cc. MeOH gives 60% of the α -MeO deriv. (II), m. 157° ; with Br in CHCl_3 at 0° there results an unstable di-Br ester, $\text{C}_{14}\text{H}_{10}\text{O}_6\text{Br}_2$, which changes into a high-melting solid on standing; on recrystn. from MeOH HBr is lost, giving the ester, $\text{C}_{14}\text{H}_{14}\text{O}_6\text{Br}_2$ (III), m. 123° ; hydrolysis of II with concd. HCl gives the α -HO deriv. of I, brilliant yellow, m. 168° ; $\text{Cu}(\text{OAc})_2$ gives an olive-green Cu compd.; FeCl_3 gives a brownish green color; the ester is 100% enol. Two mol. equivs. of MeONa give *Me* α,α -dimethoxy-5-bromo-2,4-dimethoxybenzoylpropionate, m. 128° , with Br at room temp. III is formed. If the heating is continued for 1 hr., there results the free acid (IV), m. 152° , and a smaller quantity of α -hydroxy-5-bromo-2,4-dimethoxybenzoylacrylic acid (V), yellow, m. 179° (decompn.), which also results from IV by soln. in AcOH; V and Br in CHCl_3 at 0° give a di-Br compd., m. 170° . V and CH_2N_2 give the *Me* ester, bright yellow, m. 168° , further changed by CH_2N_2 into the *Me* α -HO deriv., m. 113° , which is the geometrical isomer of III; it is an enol or it rapidly enolizes at -5° to 0° . The reaction with aq. KOH in MeOH is also discussed. Et α,β -dibromo-5-bromo-2,4-dimethoxybenzoylpropionate exists in 2 isomeric forms, m. $160-1^\circ$ and 141° (the latter about 80% of the product); with KOAc 2 isomeric unsatd. esters result, yellow, m. 144° , and colorless, m. 114° . EtONa gives Et α -ethoxy-5-bromo-2,4-dimethoxybenzoylacrylate, m. 162° , and Et α,α -diethoxy-5-bromo-2,4-dimethoxybenzoylpropionate, m. 132° . Conc'd. HCl gives Et α -hydroxy-5-bromo-2,4-dimethoxybenzoylacrylate, yellow, m. 143° ; FeCl_3 gives a brownish green

color; $\text{Cu}(\text{OAc})_2$ an olive-green Cu salt. α, β -Dibromo-5-bromo-2,4-dimethoxybenzoyl-propionic acid, m. 184.5° ; with KOAc in AcOH there results α (or β)-bromo-5-bromo-2,4-dimethoxybenzoylacrylic acid, yellow, m. 200° , transformed by sunlight into the colorless isomer, m. 182° . Aq. KOH in MeOH or EtOH gives a small yield of α -methoxy-5-bromo-2,4-dimethoxybenzoylacrylic acid, pale yellow, m. 202° or the α - EtO deriv., m. 197° . C. J. West

Introduction to the study of tautomerism in the phthalonic and carboxyphthalide series. A. CORNILLON. *Ann. chim.* [10], 7, 227–73, 275–313 (1927); 8, 120–205 (1927); cf. Graebe and Trumpp, *Ber.* 31, 369; Tscherniac, *C. A.* 11, 253; Perkin and Kuroda, *C. A.* 18, 63.—From a very brief review of the chief hitherto known chem. properties of phthalonic acid (I) and its derivs., C. shows that they are characteristic of what is generally called "tautomerism." He then goes into an extensive philosophical discussion of tautomerism, starting from the phys. and chem. definition of an individual substance and showing that there seems to be an incompatibility between the phys. homogeneity and reactional multiformity of a tautomeric compd. The problem can be considered from the standpoint of systematics, but it must also meet the requirements of logic, at the basis of which are the purely chem. aspects of the question, such as: (1) how is a single compd transformed by a single reagent according to two entirely different reactions, without the coexistence of distinct functional groups to account for the duality of reactions? or (2) how do different reagents convert a single compd. into derivs. belonging to entirely different series between which there is generally no direct expl. method of transition? This problem is not specific of tautomerism but forms part of the general problem of migration of atoms or groups. Laar's theory of tautomerism by oscillation of certain atoms between the "bond zones" of certain others (*Ber.* 18, 648; 19, 730), when freed from certain apparently untenable features, is considered extremely original and fertile. C. then discusses tautomerism in the light of this theory from both the atomistic and the dynamic viewpoints. The reactional duality of a tautomeric substance depends on a peculiarity of its activation and is due to a distribution of its active structures into two groups differentiated by their action on the reagent which attacks them. The duality of a *desmotropic substance* is more deep-seated since it is the mean structure which is twofold; there is duality not merely of activation but of structure. The term *mesomerism* is proposed to designate allfinitive tautomerism and distinguish it from structural tautomerism (or desmotropism) and activation tautomerism (or tautomerism proper). A general plan is outlined for the dynamic study and differentiation of these phenomena. *Prepn. and purification of I.*—Oxidation of α -naphthol in the cold with KMnO_4 , without excess alkali, gives at most 15% of I contaminated with considerable phthalic acid; at 32° , with notable excess of alkali, the yield increases to 60% of similarly contaminated I. Oxidation of C_{10}H_8 with KMnO_4 via a modification of Graebe and Trumpp (*loc. cit.*), can give up to 50% of the theoretical yield (based on the KMnO_4 used) of perfectly colorless I, provided there is efficient agitation and the total amt. of KMnO_4 used does not exceed 100 g. Oxidation of tetrahydronaphthalene ("tetralin") in slightly alk. soln. was found most satisfactory under the following conditions: to a vigorously stirred mixt. of 1 g.-mol. of tetralin and 1 l. of H_2O at 64° add 1050 g. KMnO_4 in 20-g. portions, waiting for complete decolorization each time and maintaining the temp. at 64 – 8° , and eliminate any residual tetralin by steam distn. The mean yield of 10 such operations was 56% of theory (based on the KMnO_4) and the max. 75%. The crude (98–9%) I is best purified by converting into the anhydride, crystg. from Ac_2O , washing with C_6H_6 , allowing to hydrate spontaneously in the air and recrystg. from AcOEt containing a little C_6H_6 ; it m. 148 – 9° . Evapn. of solns. of pure I gives a product with a cont. m. p. of 144° . *Titration, acidity and structure of I.*—Titration with KMnO_4 (adding a slight excess and titrating back with $\text{Na}_2\text{C}_2\text{O}_4$) in the presence of considerable H_2SO_4 gives practically theoretical results according to: $\text{C}_8\text{H}_6\text{O}_4 + \text{O} = \text{C}_8\text{H}_6\text{O}_4 + \text{CO}_2$. Acidimetric titration (in approx. 0.1 *N* soln.) in the presence of thymol blue gives practically the same results as with KMnO_4 (e. g., 19.15, 19.3 cc., resp.); slightly lower results are obtained in the presence of phenolphthalein; with litmus the end point is rather indefinite with direct titration, but is sharp by back titration and the results are almost the same as with phenolphthalein; with helianthin the end point is rather indefinite, but somewhat better by back titration, and I acts as a monobasic acid. From a discussion of the titration curve, C. shows that $K = 9 \times 10^{-6}$ and that the formulas for anhyd. and hydrated I and for the mono- and diacid ions are,

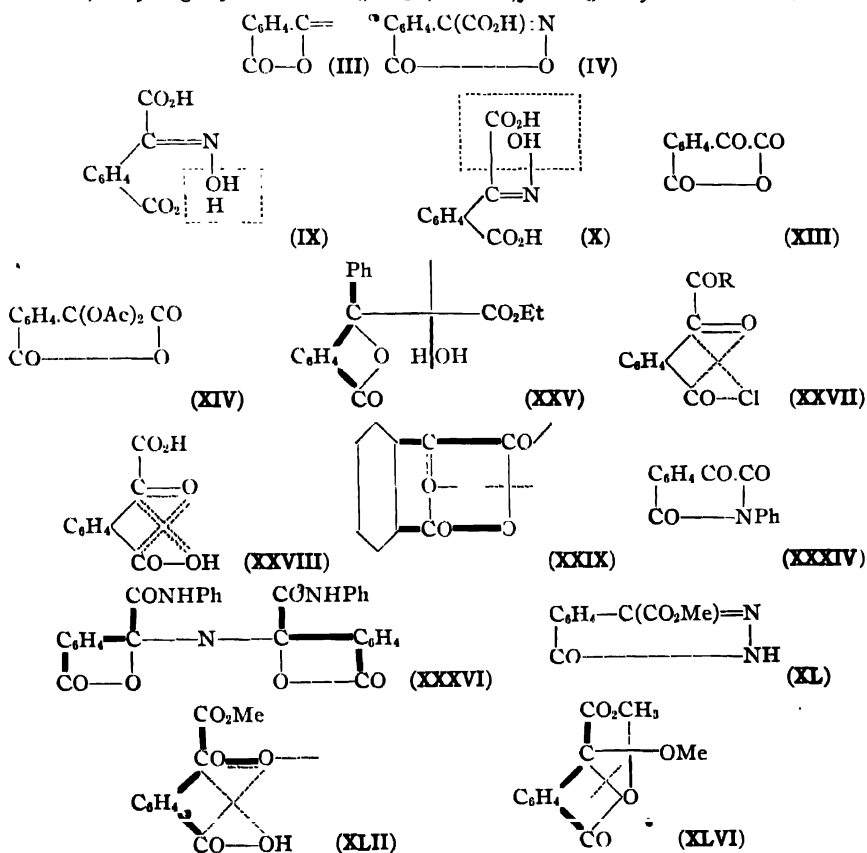
resp., $\text{HO}_2\text{CC}_6\text{H}_4\text{COCO}_2\text{H}$, $\text{HO}_2\text{CC}_6\text{H}_4\text{C}(\text{OH})_2\text{CO}_2\text{H}$, $\text{R}(\text{OH})\text{CO}_2^-$, $\text{R} \begin{array}{c} \text{O}^- \\ \diagup \\ \text{CO}_2^- \end{array}$ ($\text{R} = \text{III}$).

Action of nitrogenous reagents on I.—In neutral or acid soln. semicarbazide gives with I clearly defined crystals of the semicarbazone, $\text{HO}_2\text{CC}_6\text{H}_4\text{C}(\text{NNHCONH}_2)\text{CO}_2\text{H}$ (V), insol. in nearly all solvents, sol. in boiling H_2O (apparently undergoing some change, possibly dehydration to carbaminophthalazonecarboxylic acid), m. about 160° (decompn.), subsequently resolidifying and remaining unchanged up to 250° ; it is detd. quant. by acidimetric titration. According to Graebe and Trumpy (*loc. cit.*) at 100° NH_2OH reacts with I with evolution of CO_2 to give an oxime (VI) and phthalimide, of which they give the following explanation: the oxime VI spontaneously loses CO_2 being thereby converted into phthalaldehydeoxime anhydride, which is known to undergo transposition into phthalimide. C. found that under the same conditions there was produced K acid phthalate, the oxime VI (no definite m. p.) but no phthalimide, and the evolution of CO_2 was equiv. to about 75% of the I used. VI is quite stable in acid org. media and cannot therefore be involved in the reaction whereby CO_2 is evolved; on acidimetric titration it behaves as a dibasic acid and is unstable in alk. soln. Its transformations are as follows:



decrease in stability being accompanied by increased ionization and increased hydration, the 3 phenomena being intimately related to the p_{H} value of the medium. In 50% AcOH and in presence of AcONa , I and NH_2OH at the b. p. of the reaction mixt. give VI and a compd. corresponding to $\text{C}_{22}\text{H}_{14}$ (or 16) O_7N_4 , without definite m. p., sublimes at 250° , undoubtedly due to fixation of a 2nd mol of NH_2OH to I with elimination of CO_2 . NH_2OH and neutralized I at 0° give a very unstable addn. product having a homophthalic structure, $\text{HO}_2\text{CC}_6\text{H}_4\text{C}(\text{OH})(\text{NHOH})\text{CO}_2\text{H}$ (VII), which C. calls a *hydrate of the oxime*, easily transposed with loss of CO_2 into a phthalic deriv., not isolated sufficiently pure to permit of its analysis, readily combines with AcOH to give the *oxime acetate*, $\text{HO}_2\text{CC}_6\text{H}_4\text{C}(\text{OAc})(\text{NHOH})\text{CO}_2\text{H}$ (VIII), which decomps. about 100° into phthalimide, H_2O , AcOH and CO_2 , and which is also produced directly by the action of NH_2OH on I in AcOH at 0° (avoiding agitation which causes evolution of CO_2). C. considers that production of the oxime hydrate is the 1st stage in the reaction of NH_2OH and I at low temps. and is the intermediary through which phthalic derivs. are formed by transposition, the yield of the latter increasing with the length of time during which the reaction is allowed to proceed. The oxime acetate is extremely sol. in H_2O , alc., Me_2CO , considerably less sol. in AcOEt and AcOH , insol. in hydrocarbons and CHCl_3 , can be purified only by dissolving in exactly 10 times its wt. of cold AcOEt , adding 0.5 vol. of cold CHCl_3 , filtering, crystg. at 0° and drying at atm. pressure over H_2SO_4 , which gives $\text{C}_6\text{H}_4\text{O}_5 + \text{AcOH} + \text{NH}_2\text{OH}$; on further drying overnight *in vacuo* over H_2SO_4 it loses H_2O . Dehydration of the oxime hydrate by Ac_2O in the cold gives *phthalic acid nitrile* (on which C. could not obtain the characteristic m. p. 85°), instantly converted into phthalimide at $210-20^\circ$. These various phenomena are represented by a scheme which brings out that the degree of dehydration increases with the rate of transposition. There is introduced a hypothetical, intermediary, highly unstable oxime, the assumption of which is indispensable since the loss of H_2O from the oxime hydrate to convert it into phthalamic acid must take place before the transposition; this reaction takes place in all media in the cold and is therefore distinct from the cyclic oxime described above, which seems characteristic of reactions in hot media. The 2 are considered to be stereoisomeric: the *anti*-oxime (IX) cyclizes easily and must be the one which has been isolated; the *syn*-oxime (X) is the hypothetical oxime which, after elimination of its unstable CO_2H , can undergo only transposition or further dehydration to phthalic acid nitrile. C. concludes that the evolution of CO_2 when NH_2OH and I react at 100° is due to a reaction of the following type, which resolves itself into a straight oxidation of I by NH_2OH (similar to that produced by KMnO_4): $\text{HO}_2\text{CC}_6\text{H}_4\text{C}(\text{OH})(\text{NHOH})\text{CO}_2\text{H} \rightarrow \text{HO}_2\text{CC}_6\text{H}_4\text{CO}_2\text{NH}_2 + \text{CO}_2$. As to the oxime hydrate, which is admitted to be formed only transitorily as no useful purpose is served by assuming any form of isomerism, it must be considered to be produced in different states of activation in the hot and in the cold. A case has thus been found of a transposition (which is of the same nature as the Beckmann transpositions and is

characteristic of the keto-oxime function) affecting (certainly in the case of the ionized *anti*-oxime, and probably also in other cases) an oxime actually comtg. the double bond $C=N$. But there are also cases in which the same final products were obtained by a closely related transposition of a NH_2OH deriv. having a homophthalic structure. Two types of formulas can be imagined for addn. products obtained from NH_2OH and a phthalonic compd. with elimination of H_2O , one ketonic $HO_2CC_6H_4C(:NOH)COR'$ (XI), the other lactonic, $R(NHOH)COR'$ (XII). In H_2O both these types can give the same hydrate, with a homophthalic structure, which can undergo transposition as above described; but such transposition must not be considered as a characteristic Beckmann ketonic transposition. Hence, the choice between formulas XI and XII should be made only according to the acidity of the CO_2H linked directly to the C_6H_5 ring (unless the oxime is already cyclicized), which is possible only in XI. *Action of dehydrating agents on I.*—Phthalonic anhydride, best prepd. by means of $AcCl$ ($SOCl_2$ is unsatisfactory and Ac_2O is not as reliable, particularly when working on a relatively large scale) and best purified by rapid recrystn. from Ac_2O , m. fairly sharply $190-1^\circ$ (decompn.), sublimes without appreciable decompn. at about 170° *in vacuo*, very slightly sol. in C_6H_6 , Et_2O , $EtOAc$, $CHCl_3$, very sol. in ketones and

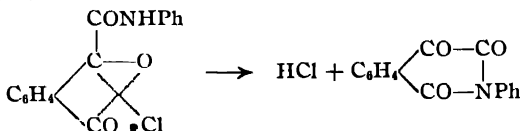


phenols, dissolves in most of the other common solvents by reacting with them, converted by H_2O into I. Its generally accepted structure (XIII) is confirmed. Prolonged action (48 hrs.) of Ac_2O on XIII at 100° gives diacetoxyhomophthalic anhydride (XIV), m. 240° (decompn.), instantly hydrolyzed by H_2O to I and $AcOH$ (which permits of its acidimetric titration), sublimes under 2 mm. about 160° with decompn. into XIII. Under conditions precluding a secondary hydration XIII gives with $AcOH$ α -acetoxyphthalidecarboxylic acid, $R(OAc)CO_2H$ (XV) (called *acetylpsuedophthalonic acid* by Perkin and Ku-

derivs. to the study of the constitution of I.—Treatment of I with boiling SOCl_2 , removal of the excess of SOCl_2 and treatment of the reaction product with PCl_5 gives XVIII. Taken in conjunction with the prepn. of the latter from XIII, C. assumes there is formed an intermediate unstable ketone chloride, $\text{ClOCC}_6\text{H}_4\text{COCOC}_6\text{H}_4\text{Cl}$, which is immediately

transformed into the lactone chloride. This explains both the internal migration of the hydroxylated link from a hexagonal to a pentagonal ring structure and also the apparent tautomerism of I (since it shows how I can react as ketone though its deriv. reacts as lactone). This theory, which has the advantage of conciliating under a single explanation all facts so far described, merely assumes the evolution of the mol. structures (after substitution of the acid OH by Cl) towards a static position of equil. corresponding to a min. thermodynamic potential, in which the energetic conditions of the bonds between the atoms, even after substitution of Cl by other radicals, exhibit the chem. properties represented by the lactone formula of chlorophthalidecarboxylic derivs. This constitutes what C. defined as "mesomerism"; and the conception is justified by the fact that the remainder of the work described shows it to be an essential characteristic of all the compds. of the series. As rigid formulas are doubtless insufficient to express all the properties of these compds. C. proposes formulas **XXVII**, **XXVIII** and **XXIX**, resp., for chlorophthalidecarboxy derivs., I and **XIII**. *Aniline derivs. of I.*—Heating **XIII** with excess PhNH_2 30 min. at 100° gives α -phenylaminophthalidecarboxanilide (**XXX**), m. $217-8^\circ$ (Perkin and Kuroda give $206-8^\circ$), also obtained by the action of PhNH_2 on α -chlorophthalidecarboxanilide (which confirms the lactone structure of both compds.), does not react with Ac_2O nor with semicarbazide, with PhNCO gives α -phenylurea, $\text{R}(\text{NPhCONHPh})\text{CONHPh}$ (**XXXI**), m. 203.5° , neutral to NaHCO_3 and Na_2CO_3 , sol. in NaOH from which on neutralization it is reprecipitated as an unstable hydrate which readily reverts to **XXXI**, resists sapon. by acids and alkalis under the most drastic conditions, showing that the fundamental phthalonic nucleus has been converted into an exceptionally stable lactone. Under milder conditions (in presence of C_6H_6 , at lower temp., and avoiding local excess of PhNH_2), PhNH_2 and **XIII** give quant. phthalooanilic acid, $\text{HO}_2\text{CC}_6\text{H}_4\text{COCONHPh}$ (**XXXII**), m. 180° , insol. in H_2O and hydrocarbons, more sol. in AcOH and EtOH , acid to NaHCO_3 , readily saponified by both acids and alkalis, resinified by Ac_2O or AcCl with production of unidentified compds., reacts with PhNH_2 in boiling abs. alc. to give **XXX** as main product together with a small amt. of colloidal phenylimine, $[\text{HO}_2\text{CC}_6\text{H}_4\text{C}(\text{NPh})\text{CONHPh}]_2$ (**XXXIII**), of **XXXII**, which shows that **XXXII** in this case reacts mainly as lactone, but also to a slight extent as ketone. The compd. (**XXXII** + $2\text{PhNH}_2 - \text{H}_2\text{O}$) obtained by Perkin and Kuroda on treating **XIII** in the cold with a very large excess of PhNH_2 is considered as merely intermediate and formed by addn. to the ketone function of **XIII**, and of no value in favor of the ketone structure of **XXXII**. Heating **XXXII** at 100° in 60% AcOH contg. a little HCl produces **XXX**, the HCl catalyzing the migration of the base between the mols. With SOCl_2 in boiling C_6H_6 **XXXII** gives mostly **XXII** with some *N*-phenylphthalonimide (**XXXIV**), m. 218.5° , showing that the structure of **XXXII** is intermediate between lactone and ketone, but closer to the former; in the absence of C_6H_6 the yield of **XXXIV** is smaller; in the cold there is a vigorous reaction giving unidentified viscous resinous reaction products. Boiling **XXXII** in alc. with NH_2OH gives phthalooanilic oxime (α -hydroxylaminophthalidecarboxanilide), $\text{R}(\text{NHOH})\text{CONHPh}$ (**XXXV**), with ill-defined m. p. in the neighborhood of 180° , and a smaller quantity of a substance, m. 168° , which is possibly that shown in formula **XXXVI**. On dissolving **XXXV** in dil. alkali and reprecipitating by careful neutralization it gains $1\text{H}_2\text{O}$, which is lost only on recrystg. from alc. but not on prolonged heating at 100° ; heating at 100° with a little concd. HCl decomposes it to phthalic acid, PhNH_2 , NH_3 but no NH_2OH ; sapon. by HCl should give a lactone-oxime of I, but the latter is instantly decomposed by transposition. **XXXVI**(?) is extremely stable, resisting prolonged action of acids, alkalis, Ac_2O , SOCl_2 , decomposed by HCl in a sealed tube at 150° to PhNH_2 , NH_3 , CO_2 and phthalic acid. In cold H_2O equimol. amts. of **XXXII** and NH_2OH give **XXXV**, **XXXVI** and very small quantities of PhNH_2 , NH_3 and CO_2 . In hot alc. **XXXII** and **XXXV** combine to give a reaction product in which no definite compd. could be identified and contg. no **XXXVI**. Excess NH_2OH (4 mols.) and **XXXII** in cold H_2O give no **XXXVI**, but apparently more PhNH_2 than with equiv. proportions of the reagents; with excess **XXXII** (2 mols. to 1 of NH_2OH) in 6 hrs. at 100° there is formed **XXXVI**, phthalanil (*N*-phenylphthalimide) (**XXXVII**), m. 206° (Maquenne block), but no **XXXV**. **XXXII** and 15% excess NH_2OH in 60% AcOH at 100° give about 50% **XXXVII**, which C. interprets as a new mode of reaction of NH_2OH towards which **XXXII** acts as ketone, and which shows the importance of the p_H of the medium, already brought out in the case of the oximes of I. Considerable work on the action of semicarbazide on **XXXII** gave very little definite result because of the complexity of the reactions and decompn. of the reaction products during purification (doubtless owing to the sensitiveness of the carbaminohydrazine chain). **XXXII** and free semicarbazide in 65% AcOH at 100° give crystals m. about 180° (decompn.), probably hydrated α -semicarbazidophthalidecarboxanilide (normal semicarbazone),

$R(NHNHCONH_2)CONHPh$ (XXXVIII), and a small quantity of a cryst. acid semicarbazide deriv., m. 250° (decompn.), the compn. and constitution of which could not be detd. There was recognized the very probable formation of a lactone compd., and possibly of traces of a true ketosemicarbazone, $HO_2CC_6H_4C(:NNHCONH_2)CONHPh$ (XXXIX). When treated with C_6H_5N under the same conditions which, with $PhNH_2$, had caused merely a substitution, XXII loses HCl and, by cyclicization gives *N*-phenylphthalonimide, thus disagreeing with the α -chlorolactone structure which the preceding work had led to be adopted. The reaction is best expressed by passage to a ketone reactivity, as follows:



C. considers that the chloroanilide does not possess a rigid ketone or lactone structure, its individuality depending on the distribution of the affinities between the groups of atoms; if Cl is replaced by $PhNH$ the only possible new (statistic) distribution is the one which brings out the characteristics of the lactonedianilide and the chem. functions of an α -anilinolactone. This is not a case of tautomerism proper (as previously defined) but of mesomerism. The only case of tautomerism proper encountered in the whole investigation was in the reaction of XXXII and $PhNH_2$ where, there was detected a trace of ketone substitution. *Phthalonic esters*.—Wegscheider and Glogau's method for the prepn. of acid *Me phthalonate* (*Monatsh.* 24, 915) gives a monohydrate of ill-defined m. p. owing to decompn; recrystn. from alc. gives an addn. compd. of 1 mol. of ester and 1 of alc., without definite m. p. owing to decompn., after heating the latter *in vacuo*, the residue after recrystn. from C_6H_6 m. 94° , has $K = 1.3 \times 10^{-4}$ (Suss), in cold dil. MeOH readily gives a normal semicarbazone with distinct acid properties, m. about 200° (decompn.). Together with the semicarbazone there is sometimes formed a small quantity of *carbomethoxyphthalazone* (XL), m. 207° , apparently very stable at high temp., also produced when the semicarbazone is allowed to stand a long time in MeOH with a trace of HCl , obtained quant. by trying completely to esterify the semicarbazone by MeOH satd. with HCl , which confirms the ketone structure of the semicarbazone. These properties refer to the ester in soln., where it probably has a homophthalic structure, $HO_2CC_6H_4C(OH)_2CO_2Me$ (XLI). Prolonged action (several days) of Ac_2O at 100° on the ester gives *methylacetoxycarboxyphthalide* (cf. XVII), m. 112° ; action of $SOCl_2$ or PCl_5 on the ester gives almost quant. the corresponding carboxychlorophthalide ester: these reactions indicate that in anhyd. or dehydrating medium the ester had a lactone structure. Its affinitive structure is therefore expressed by formula XLII. The two neutral *Me phthalonates* obtained by Wegscheider and Glogau (*loc. cit.*) on complete esterification of I with cold MeOH satd. with HCl are shown to be due to ketolactonic isomerism and are not desmotropic. The one m. 66° is the α -methoxycarboxyphthalide ester, $R(OMe)CO_2Me$ (XLIII), isomerized by $MeONa$ (or better by $MeOK$) into a true ketone ester, $MeO_2CC_6H_4COCO_2Me$ (XLIV), which m. considerably below 36° (which is the figure given by Wegscheider and Glogau), and gives a normal semicarbazone which is converted by PCl_5 into a neutral dichlorohomophthalic ester, $MeO_2CC_6H_4CCl_2CO_2Me$ (XLV). The affinitive structure assigned to the neutral esters is XLVI. (Even when not specifically mentioned in the abstr., considerable exptl. and theoretical evidence is adduced in support of practically all the structural formulas given; and in several cases alternative formulas are discussed and rejected.—Abstractor.)

A. PAPINEAU-COUTURE

Polish turpentine. J. FLATAU AND A. KORCZYNSKI. *Roczniki Chem.* 7, 246-60 (1927).—The turpentine from the eastern province of Białowiez had a $d_{20} 0.8793$, $[\alpha]_D^{20} 25.87^\circ$. The light fraction b. up to 150° , the main part of which, b. $50-70^\circ$ and $85-112^\circ$, resembles Finnish turpentine and the products of dry distn. of beech wood. It is a reddish brown liquid of pungent odor, distinctly acid to litmus and free from mineral acids. It resinifies with alkalis and concd. acids and reduces alk. $KMnO_4$ and NH_4Ag . Of the part sol. in 40% $NaHSO_4$ the fraction (f.) $45-50^\circ$ contains propionic aldehyde, $55-60^\circ$ traces of acetone, $80-90^\circ$ diacetyl, $105-110^\circ$ diketopentane, $140-50^\circ$ 2,5-diketohexane. The part insol. in $NaHSO_4$ b. $28-150^\circ$. The smallest f., b. $28-40^\circ$, yielded after 12 hrs. refluxing with Na a product b. $31-3^\circ$ with a distinct furan reaction. Methylfuran was isolated from f. $60-70^\circ$ by Harries' method (*Ber.* 31, 38(1894)). Traces of benzene were identified in f. $80-85^\circ$, *Me isobutyrate*

and α, α' -dimethylfuran in *f.* 90–95°. A definite % of *toluene* is present in *f.* 105–15°, and traces of *m-xylene* in *f.* 135–45°. The aq. ext. of the light fraction contained *MeOH* and *AcOH*. The higher *f. b.* 161–5° has a d_{20} 0.8619, $[\alpha]_D^{20}$ 28.77°. The *f.* 161–8° absorbed at 16° 25–30% dry *HCl*, yielding 39–50% bornyl chloride. The latter was not formed at 0° and 50°, and in the presence of *Al* or *AlCl₃* at 16°. It was found by control expts. that *AlCl₃*, *ZnCl₂*, *Al₂O₃*, and *Fe* decomp. bornyl chloride to products *b.* 160–345°, the effect decreasing in the above order. Terpinol hydrate and terpineol were formed in traces only, if at all, on shaking this *f.* with an equal quantity of 33, 45 and 60% *H₂SO₄* at 16° or with $\frac{1}{8}$ to $\frac{1}{4}$ of anhyd. *p-C₇H₇SO₃H* or in 75 and 5% solns.; about 4% was formed with 25 and 60% solns. Diln. with alc. or ether did not affect the reaction. When heated with 20–80% *PhOH* to 126–50° for 4–43 hrs., treated with *NaOH* and distd. with steam the *f.* yields 33–42% of a product of the *b. p.* of α -pinene; the yield is 47% after 4 hrs. heating with 20% *BzOH* to 126° and decreases with increasing temp., quantity of acid and length of heating. Salicylic acid yields under similar condition 10–16%. When allowed to react 15–29 hrs. at 16° with 0.5 part *p-C₇H₇SO₃H* (60% soln.) the product of isomerization with phenol *b.* 150–4° formed about 40% terpinol hydrate (the terpineol although present was not detd.). Although it absorbed 40% *HCl* it gave no bornyl chloride, while American turpentine gave under the same conditions a very good yield. Attempts at the identification of nopinene by means of the *KMnO₄* oxidation (Wallach, Baeyer) and the *AcOHg*-compd. (*C. A.* 21, 400) failed, apparently because of the impurity of the compd. That nopinene reacts with *HCl* was ascertained by an expt. with technically pure French nopinene *b.* 162–5°, d_{20} 0.8806, $[\alpha]_D^{20}$, which at 16° reacted more rapidly than pure American pinene, yielding 32 g. bornyl chloride (from 50 g.) and 14 g. liquid *Cl* derivs. The constns. of Pomeranian (Czersk) turpentine are: crude: d_{20} 0.8622, $[\alpha]_D^{20}$ 20.52°, *f. b.* 162–5°, d_{20} 0.8608, $[\alpha]_D^{20}$ 22.65°. The *f.* 160–8° yielded no bornyl chloride after the absorption of 33% *HCl* at 16°. It gave 4% terpinol hydrate with *p-C₇H₇SO₃H* and after isomerization with phenol at 145° 15% terpinol hydrate. After the reaction with *PhOH* and *C₇H₇SO₃H* the product absorbs 40% *HCl* but gives no bornyl chloride. The *f.* apparently contains a compd. which is neither α - nor β -pinene but can be isomerized to the former.

MARY JACOBSEN

6-Methylbornylene. L. YA. BRYUSOVA. *J. Russ. Phys.-Chem. Soc.* 59, 653–8 (1927).—In the dehydration of bicyclic alcs. several products are known to be formed, isomeric hydrocarbons being among them; 6-methylborneol might thus be converted into 6-methylbornylene or into methylcyclohexene (cf. *C. A.* 21, 1809). The actual product *m.* 118.5–9°, was totally oxidized by *BzO₂H* (while tricyclic hydrocarbons are not acted upon) and with *KMnO₄* gave 6-methylcamphoric acid. It was therefore 6-methylbornylene. The exptl. details follow. *Me 6-methylbornylxanthate.*—To 38 g. of 6-methylborneol in 50 cc. boiling abs. xylene was added 9 g. *K*. After 10 hrs. the mixt. was cooled, treated with dry *CS₂* and heated on the water bath for 4 hrs. The xanthate was heated with *MeI*; a yellow oil was obtained which did not crystallize and could not be distd. Yield, 89%. *6-Methylbornyldixanthogenide* resulted upon the addn. of 1 mol. of *I₂* to the salt suspended in ether; pale yellow needles, *m.* 90.2–0.7°. *6-Methylbornylxanthamide.*—A mixt. of 10 g. of the *Me* ester and 200 cc. of 10% *NH₃* in *EtOH* was allowed to stand for 6 days, then poured into water and the amide filtered off. Recrystd. from 2 parts petrole ether + 3 parts benzene, *it m.* 126–7°; yield, 96%. *6-Methylbornylene.*—The *Me* ester was distd. Decompn. began at 60–70°, the main fraction *b.* 210–5°. The solid was 3 times dissolved in alc. *NaOH* (1:3) and reprecipd. with water, and finally recrystd. from *EtOH*. Yield, 52%. *Oxidation with BzO₂H.*—The reaction was carried out at 10–12° for 24 hrs. The quantity of *BzO₂H* which combined corresponds to 100.39–100.86% of an unsatd. hydrocarbon *C₁₁H₁₈*. *6-Methylcamphoric acid.*—6-Methylbornylene in *PhH* was allowed to react with 1% aq. *KMnO₄* for 19 hrs. Half of the hydrocarbon remained unchanged; the acid, sep'd. from the water layer by adding 20% *H₂SO₄*, *m.* 184–5°; 0.0960 g. neutralized 8.7 cc. 0.1 *N NaOH* (theory 8.76 cc.). B. C. S.

Camphorol. YASUHIKO ASAHINA and MORIZO ISHIDATE. *Ber.* 61B, 533–6 (1928).—The *d*-camphorol (I) prepd. from the *d*-camphoglucuronic acid mixt. excreted in the urine of dogs fed with camphor was found not to have a sharp *m. p.* Attempts to prep. a well-crystd. *Me* ether from the I with *MeOH-HCl* failed. Reduction of various preps. with *Na* gave ordinary camphor in satisfactory yield but with *HNO₃* only a relatively small quantity of camphoric acid was obtained. *K₂Cr₂O₇* in *AcOH* yielded a yellowish product which had the compn. *C₁₀H₁₆O₂* of camphorquinone but which was obviously a mixt. of isomers. The quinone with *H₂O₂* in *Na₂CO₃* was partly converted

into camphoric acid but there remained unchanged a portion which proved to be identical with Bredt and Goeb's 5-ketocamphor (*p*-diketocamphane). The so-called camphorol is therefore not a homogeneous substance but a mixt. of a modification of 3-hydroxycamphor and the 5-isomer. Whether the difference between the α - and β -camphogluconic acids is to be referred to the different aglucons 3- and 5-hydroxycamphor cannot yet be stated definitely, for according to Schmiedeberg and Meyer both acids give the same I. C. A. R.

Reactions of strongly electropositive metals with organic substances in liquid ammonia solution. VI. A. The reduction of benzophenone. B. The hydrolysis of metal ketyls. CHARLES BUSHNELL, WOOSTER. *J. Am. Chem. Soc.* 50, 1388-94 (1928), cf. *C. A.* 18, 1980.—Both mono- and di-Na derivs. of Ph_2CO can be prepd. readily by the action of Na in liquid NH_3 . Dimetallic derivs. may also result from the action of amides on the corresponding alc. The di-Na deriv., Ph_2CNaONa , reacts with H_2O or NH_4Cl to give Ph_2CHOH , EtBr gives Ph_2EtCOH , prolonged action of EtBr gives only the free alc., not the ester and some EtNH_2 ; PhBr does not react but PhI gives $\text{Ph}_2\text{C}(\text{NH}_2)_2\text{ONa}$, C_6H_6 and NaI , the 1st product decomp. with H_2O to give NaOH , NH_3 and Ph_2CO . The mono-Na deriv. forms in liquid NH_3 a blue soln., which is immediately decolorized by NH_4Cl , giving Ph_2CHOH and Ph_2CO ; EtBr gives as the final products Ph_2CO and Ph_2EtCOH . Evidence is presented to show that the occurrence of addn. reactions is a more general property of the metal ketyls than has been previously supposed. Even their decompn. by strong acids may be preceded by the formation of addn. products. C. J. WET

The Cannizzaro reaction in pinacolinic and benzilic transpositions. B. I. VANZETTI. *Atti II congresso naz. chim. pura applicata* 1926, 1928-301.—In the prepn. of veratrilic acid (cf. *C. A.* 21, 1974) there was isolated from the mother liquors of the reaction between veratril and KOH a neutral substance which was extremely stable toward oxidizing agents, sublimed without decompn. at a high temp. and which was probably an anthraquinone or a tetramethoxyphenanthrenequinone. Since it did not react with NaHSO_3 , could not be reduced, and did not give with *o*-diamines the known reactions of quinoxalines, it was probably an *anthraquinone*, particularly since it was also formed by oxidation of veratrilic acid. With the hope of studying its action with AlCl_3 , the attempt was made first to condense anisil with AlCl_3 to the corresponding phenanthrenequinone, but the OMe group seemed to oppose the condensation. No anthraquinone could be detected in the red resin from the thermal decompn. of benzilic acid. Further attempts are to be made to identify the nature of the new compd. The difficulties are considerable, since in spite of the numerous publications (Staudinger, Schoenberg, Lachman, Schenung, Tiffenau, Nicolet, etc.) in recent yrs., there is no satisfactory explanation of the benzilic transposition, though it probably resembles the Cannizzaro reaction (cf. Michael, *C. A.* 14, 1682). C. C. DAVIS

Cyclical thioureas derived from fluorene. LUIS GUGLIALMELLI AND ARMANDO NOVELLI. *Anales asoc. quim. Argentina* 15, 287-307 (1927).—From previous work (*C. A.* 20, 2325) and from results with other thioureas the resistance of amino-2-fluorene to the formation of the resp. sym. thiourea by the Hofmann method is due to its constitution. This amine should be regarded as a substituted deriv., since otherwise it would be not only the 1st example known of an unsubstituted amine which does not react with CS_2 and alc. but would also be a new, curious case of isomerism in position 2, like that apparently met in position 9 corresponding to the $>\text{CH}_2$ group. Assuming that this fluorenic amine is derived from the pentagonal hydrocarbon cyclopentadiene (dibenzocyclopentadienylamine) it seems to be the only case of a primary cyclical amine not reacting directly with CS_2 , even with the aid of catalysts very effective in the prepn. of thioureas of other aromatic amines. If fluorene is regarded as a deriv. of Ph_2 there is no explanation of the clear difference shown by amines analogous and corresponding to *p*- $\text{PhC}_6\text{H}_4\text{NH}_2$ whose thiourea has been prepd. with some difficulty. On the other hand, as a substituted deriv. of Ph_2 , methylene-2,2'-diphenyl explains this anomaly. The $>\text{CH}_2$ group, assuming an electronegative polarity, makes its influence felt in the same manner as the groups $>\text{CO}$, $-\text{CO}_2\text{H}$, $-\text{NO}_2$, etc., retarding or preventing the formation of thiourea, as with some substituted derivs. of other amines which are not converted into thioureas even by the best catalysts. The formula of 2-aminofluorene shows that if regarded as a substituted Ph_2 deriv. (2,2'-methylene-diphenyl) it is a *p*- and *m*-compd. as regards the amino function. All these derivs. of benzene and C_{10}H_8 offer no difficulty in combining with CS_2 by the Hofmann reaction. The curious theory of Kaufer on the constitution of Ph_2 , recently applied to fluorene, may explain the facts better. E. M. SYMMES

2,7-Dimethylsulfonefluoran, 2'-hydroxy-5'-methylbenzoyl-2-benzenesulfonic acid

and some of their derivatives. W. R. ORNDORFF and I. T. BEACH. *J. Am. Chem. Soc.* 50, 1416–21(1928).—Condensation of *o*-sulfobenzoic anhydride with *p*-MeC₆H₄OH gives after 15 hrs. at 121–3° approx. 20% II. *p*-MeC₆H₄OH and the chlorides of *o*-HO₂SC₆H₄CO₂H in alk. soln. give 70% of di-*p*-cresyl *o*-sulfobenzoate (I), triclinic, *m.* 95.5°; if the reaction mixt. is not heated, there is obtained *p*-cresyl benzoate-*o*-sulfone chloride. Equal quantities of I and ZnCl₂, with a few drops HCl heated at 175° for 45 min. and the aq. filtrate made alk. with NaOH, give the Na salt of the carbinol sulfonic acid of II, biaxial and probably monoclinic, which soon turns yellow on exposure to light and air; concd. HCl added to a hot, satd. soln. of the Na salt gives 2,7-dimethylsulfonefluoran (II), chars about 250°, orange, triclinic crystals; in thin fragments, yellow with a distinct pleochroism, yellow to orange; optically biaxial; the color changes sharply from yellow to colorless between *p*_H 9.6 and 10.0; concd. NaOH added to an aq. soln. gives a very transient deep blue color. Fusion with NaOH gives 2,7-dimethylxanthone and *p*-homosalicylic acid. II absorbs 1 mol. dry HCl, given off over NaOH; it does not absorb NH₃ and gives a Br addn. product of variable compn. The Ba salt crysts. with 4 H₂O; the Me ester and perchlorate (yellow) were also prepd. Reduction gives 2,7-dimethylhydrosulfonefluoran, which is unstable but was analyzed as the Zn salt. 2'-Hydroxy-5'-methylbenzoyl-2-benzenesulfonic acid, *m.* 90°, unstable, decomp. into *p*-MeC₆H₄OH and *o*-sulfobenzoic anhydride, from which it is prepd. by heating with AlCl₃ in C₂H₅Cl₄; *NH*₄ salt, monoclinic crystals with very strong double refraction. II and concd. H₂SO₄, heated 2 hrs. at 200°, give the brownish 2,7-dimethylsulfoneoctoxonol, sol. in acids with an intense red color. C. J. WEST

An improved method for the *C*-methylation of 1,3-diketones, and methyl-*p*-methoxydibenzoylmethane (1-*p*-methoxyphenyl-2-methyl-3-phenylpropane-1,3-dione). C. WEYGAND, WITH H. FORCKEL AND C. BISCHOFF. *Ber.* 61B, 687–90(1928).—In view of the inability of Bradley and Robinson (*C. A.* 21, 81) to prep. *p*-MeOC₆H₄COCHMeCOPh (I) from MeOC₆H₄COCH₂COPh (II) by the usual methods, the authors describe a new method of methylating 1,3-diketones and 3-ketonic acid esters which they have used to advantage in numerous cases. Instead of alc. they use Me₂CO or its homologs in which most alkali enolates dissolve well. Thus 3 g. of the Na deriv. of BzCH₂Ac (dried with P₂O₅) refluxed 4 hrs. with 1.9 g. MeI in 50 cc. Me₂CO gives up to 88% of BzCHMeAc, *b*_m 130–4°. MeCHBz₂, *m.* 82–3°, is similarly obtained in 92% yield from CH₂Bz₂ and MeI and BzCl gives 45% CHBz₂, *m.* 223–7°. The Na salt of II cannot be methylated even by this method and is quant. recovered, but 10 g. of the *K* salt, yellow cryst. powder prepd. from II in Et₂O-thiophene on the H₂O bath, yields 7 g. *p*-methoxymethyl-dibenzoylmethane (I), light yellow oil, *b*_m 249°, solidifies in a few days to an almost colorless mass, *m.* 71.5–2.0°, which gives no color with FeCl₃, but by allowing the distillate to stand 0.5 hr. in 1 equiv. of NaOMe and pouring the yellow filtered soln. into ice-cold 10 *N* H₂SO₄, it is converted into the *enol form*, faintly yellow, *m.* 80°, gives with FeCl₃ a blue-violet color, forms a *Cu* salt, *m.* 178°, and on recrystn. regenerates the original keto form, *m.* 72°. Bradley and Robinson's "α-anisoylpropio-phenone," prepd. by the condensation of *p*-MeOC₆H₄COEt and BzOEt with NaNH₂, has entirely different properties and it has not been possible to repeat their work. Further to confirm the correctness of the structure assigned to I, it was treated with PhNHNH₂ and found to yield, as expected, the 2 isomeric 3(5)-phenyl-4-methyl-5(3)-*p*-anisyl-*N*-phenylpyrazoles. C. A. R.

Chemical constitution and rotatory power. MARIO BETTI and G. B. BONINO. *Atti II congresso naz. chim. pura applicata* 1926, 1244–7.—There has been no relation established between the optical rotation of an active compd. and the chem. nature of the substituents on the asym. C atom, though it has been shown by Betti (*C. A.* 18, 194) that the character of the substituents often has more influence than their mass. There is a remarkable parallelism between the rotatory powers of aldehyde-amine derivs. and the dissoen. consts. of the corresponding CO₂H acids. When the sq. roots of mol. rotatory powers (*[M_D]*) are plotted as ordinates and the negative logs of the dissoen. consts. (–log *K*) as abscissae, and *m*- and *p*-acids plotted, each series of acids gives a smooth curve. By means of these curves it is possible to predict the dissoen. const. of an acid when its rotatory power is known. This is of special value when the soly. of an acid is so low that its dissoen. const. cannot be detd. directly. In the earlier work (*C. A.* 18, 194) the [*M_D*] value of β-naphtholbenzylamine and the dissoen. const. of *m*-BrC₆H₄CO₂H were not detd. Extrapolation of the curve indicated 278°, and when the acid was prepd., the exptl. value was 280.9°, which is considered to confirm the relation represented by the curves. The work proves that there is a simple relation between the rotatory power of aldehyde-amines and the log of the dissoen. consts. of the corresponding acids. Based on the recent theories of Debye and Hückel, this

dissoen. const. as used above must be regarded as an *activity const.* Since there is a relation between rotatory power and activity const., there should be a *relation between the rotatory power and the elec. moment of mols.*

C. C. DAVIS

α -Benzyl-naphthalene. I. 1-Benzyl-naphthalene-4-sulfonic acid and its transformations. KAROL DZIEWONSKI AND STEFAN DZIECIELEWSKI. *Bull. intern. acad. Polonaise* 1927A, 273-86.—The method used for the prepn. of α -C₁₀H₇CH₂Ph (I) was a modification of that given by Roux (*Ann. chim. phys.* [6], 12, 293(1887)). A mixt. of 150 g. C₁₀H₈, 50 g. ZnCl₂ and 100 g. PhCH₂Cl was warmed slightly to start the reaction. When evolution of H₂Cl had ceased, the mixt. was heated for some time at 125°. Unchanged C₁₀H₈ was removed by distn. with steam. The residue, distd. with superheated steam, gave a distillate contg. a yellow oil which solidified on cooling. Recrystd. from EtOH, it m. 59°. The yield of I was 40-5% of the PhCH₂Cl used. I (1 mol.), treated with concd. H₂SO₄ (2.5 mols.) at 66° and warmed until the product was almost completely sol. in H₂O, gave a red-brown melt, which was dissolved in H₂O. The soln. was filtered and NaCl added. Na 1-benzyl-naphthalene-4-sulfonate (II) crystd. II was also prepd. by the action of ClSO₃H on α -C₁₀H₇CH₂Ph in PhNO₂ at room temp., and treatment of the soln. of the acid with NaCl. The Pb and Ba salts were prepd. by neutralizing the free acid with PbCO₃ and BaCO₃. From the Pb salt by treatment with H₂S was obtained 1-benzyl-naphthalene-4-sulfonic acid, m. 70-80°. Chloride, from II and PCl₅, m. 104-5°. Amide, m. 164-5°. II, heated at 240° with fused KOH, gave 4-benzyl-1-hydroxynaphthalene (III), m. 125-6°, also made from α -naphthol and PhCH₂Cl in CHCl₃ in the presence of ZnCl₂. The following derivs. of III were prepd.: acetate, m. 87-8°; benzoate, reddish, m. 103°; Me ether, m. 85-7°, and a yellow NO₂ deriv. of it, m. 130-2°; 2-NO deriv., yellow, m. 170° (decompn.), sol. in cold H₂SO₄ and pptd. by H₂O. 2-Azo derivs. of III: Benzene, scarlet-red, m. 191-3°, almost insol. in alkalis; p-nitrobenzene, red, m. 252-3°, almost insol. in alkalis, sol. in cold concd. H₂SO₄ with red color; 1'-naphthalene, red, m. 201-3°, sol. in cold concd. H₂SO₄ with blue color; 2'-naphthalene, violet-red, m. 207-8°, almost insol. in alkalis, sol. in cold concd. H₂SO₄ with violet color and pptd. by H₂O. Other compds. prepd. were 4-benzyl-1-aminonaphthalene, m. 114.5°, and its Ac deriv., violet, m. 208-9°.

LOUISE KELLEY

Inner complex salts of diindyl- and dipyrrolymethenes. I. Constitution of the Kunz diindylmethene-copper compound. O. SCHMIDT-DUMONT AND E. MOTZKUS. *Ber.* 61B, 580-6(1928).—Kunz has recently (C. A. 20, 1880) expressed the opinion that in the blood pigment and in chlorophyll the metal is combined purely additively and that therefore the blood pigment is not an inner complex salt. He bases his views on the results of expts. with indigo and related indole compds. Indigo forms with metallic Cu a Cu compd. without evolution of H. The same compd. is obtained by treating indigo with Cu(OAc)₂, whereby AcOH is liberated, hence the interaction of indigo and similar compds. (diindylmethenes, dipyrrolymethenes, porphyrins) with heavy metal acetates is no sure indication that a substituting introduction of the metal has occurred. To obtain strict proof whether the theory of purely additive metal combination is correct, the simplest thing seemed to be to prep. the metal compds. in question by double decompn. with a metal salt of the K compds, whose nature as substitution products must first be proved. If the K is replaced by the metal and the product is identical with K's, there can no longer be any doubt that the latter is a salt-like compd. of the metal. K. found that bis-[α -methyl- β -indyl]methene (I), which with Cu(OAc)₂ in C₆H₅N forms a Cu compd. (II), reacts with K with evolution of H but was unable to isolate the K compd. S.-D. and M. have succeeded in prepg. this K compd. from I and metallic K in liquid NH₃. The I, which is very difficultly sol. in liquid NH₃, dissolves with orange-red color and vigorous evolution of H when treated with K and on filtering and concg. there remains an orange-red cryst. mass with bluish surface luster which can be purified by pptn. from C₆H₅N. If II is a substitution product, the Cu must have replaced a single H atom, i. e., it must be a Cu' salt, although it has been prepd. from a Cu'' salt. The apparent anomaly can be explained by assuming that the Cu'' salt is not stable but spontaneously decomps. into the Cu' deriv. If this is true, it should be formed from both Cu' and Cu'' salts by double decompn. with the K salt of I. Such proved to be the case. Of the Cu' salts, CuI and CuBr proved to be best adapted for the reaction. If the K salt in C₆H₅N is treated with 1 of these Cu' halides, the Cu compd. seps. instantly as a brown-violet ppt. with green surface luster; the same product is obtained in liquid NH₃, in which it is very difficultly sol. It is also formed from the K salt with a Cu' salt, viz., tetramminecupric nitrate (III); in this reaction there is also formed a Cu-free compd., equal in wt. to about 0.5 of the I employed and which is probably an oxidation

product of the indole base resulting from a spontaneous decompn. of the unstable Cu⁺ compd. From the Cu compd. the I can be quant. regenerated in pure form, either by long treatment with concd. HCO₂H at room temp. and pptn. with dil. NH₄OH or by treatment in C₅H₅N suspension with aq. KCN. That in the product obtained from both CuI and III the Cu is present in the univalent form was shown by heating a short time with dil. HCl under N and making ammoniacal; the resulting soln., filtered under N, was perfectly colorless but on shaking with air immediately became blue. The Cu compd. so obtained is identical with K.'s II. These facts seem to prove beyond doubt that II is a true Cu salt contg. the metal in the univalent form, and may be considered as an inner complex salt in which the Cu is fixed within an 8-membered secondary valence ring. Doubt is thus cast on the purely additive nature of the other metal compds. prepd. by K.; these are being studied by S.-D. and M. C. A. R.

The synthesis of indones. REMO DE FAZI. *Atti II congresso naz. chim. pura applicata* 1926, 1285-6; cf. C. A. 22, 234.—A continuation of expts. in which α -methyl- and α -ethyl- β -phenyllindone were prepd. by the action of concd. H₂SO₄ on the Et esters of α -methyl- and α -ethyl- β -diphenyllactic acids resp. (cf. C. A. 19, 2208) led to the discovery of the first known general method for the synthesis of indones. This method consists of treating the substituted β -phenyllactic ester at ordinary temp. with concd. H₂SO₄. After 1 hr. the reaction mixt. is poured on to ice, which gives a theoretical yield of the indone. The reactions comprise the following stages: $\text{RPh}(\text{HO})\text{CCH}(\text{R}')\text{CO}_2\text{Et} \rightarrow \text{RPh}(\text{HO})\text{CCH}(\text{R}')\text{CO}_2\text{H} \rightarrow \text{RPhC}(\text{CR}')\text{CO}_2\text{H} \rightarrow \text{C}_6\text{H}_4(\text{CR}')\text{CR}'\text{CO}_2\text{H}$.

The prepn. of the esters of β -phenyllactic acid contg. alkyl and aryl groups in α - and β -positions, necessary to the synthesis of indones, is very easy, since it is sufficient only to treat the aromatic ketones with acyclic α -Br esters in the presence of granulated Zn. Therefore the method is of practical application. C. C. DAVIS

Esters of furoylacetic acid. J. E. ZANETTI AND C. O. BECKMANN. *J. Am. Chem. Soc.* 50, 1438-42 (1928).—Et furoate and AcOMe are condensed by EtONa, giving 45-50% Me furoylacetate, b₁ 96-8°, b₂ 144-5°, turns yellow on standing; oxime, m. 124-5°, semicarbazone, m. 141-2°; the Na, K and Cu salts of the 3 esters were also prepd. Pr ester, b₁ 110-2°; oxime, m. 120-1°; semicarbazone, m. 137-8°. Bu ester, b₁ 136-8°, m. 25.2°; oxime, m. 102°; semicarbazone, m. 127-8°. The stability of the oximes is discussed and shown to be contrary to Hantzsch's theory and not fully explained by Abegg's theory. C. J. WEST

Studies on phenylcoumarins. GUIDO BARGELLINI. *Atti II congresso naz. chim. pura applicata* 1926, 1295-7; cf. C. A. 21, 1981, 3193.—A summary of various papers by B. and his collaborators. C. C. DAVIS

New reactions of indolenines and indolinols. HERMANN LEUCHS, DAVID PHILPOTT, PAUL SANDER, ARNOLD HELLER AND HERBERT KOHLER. *Ann.* 461, 27-46 (1928).—Ethylhydrindone (8 g.) heated with 5.5 g. PhNHNH₂ and 0.5 g. AcONa 2 hrs. at 100° and then 4 hrs. with 30 cc. EtOH and 50 g. ZnCl₂, gives 11-13 g. of the Zn compd., Zn(C₁₇H₁₅N)₂Cl₂; aq. NH₃ liberates the free base, 3-ethyl-3,2-[o-benzylene]-indolenine (I), b₁₄ 202-4°, which crysts. with 0.5 H₂O, m. 79-80°, decomps. 150°; the H₂O is retained in soln. as a part of the mol.; HCl salt, sinters at 78° and 15 mm. with loss of HCl, m. 124-6° (decompn.); picrate, m. 173-5°. I (1.5 g.) with Ac₂O and AcONa at 100° gives 1.8 g. 3-ethyl-3,2-[o-benzylene]-2-O-1-diacetyl-2-indolinol (II), m. 125-6°. Heating 1.5 g. II with 50 cc. MeOH 15 min. gives the 2-O-methyl-1-acetyl deriv., m. 105°; this is not unchanged by Ac₂O and is largely recovered unchanged after 4 hrs. heating with 20 parts NH₃-MeOH. Heating 0.6 g. II in 6 cc. AcOH with 3 cc. 12 N HCl at 60° gives 0.4 g. 3-ethyl-3,2-[o-benzylene]-1-acetyl-2-indolinol, m. 159-61°; this also results from the Me ether; it is unchanged by CH₃N₃ or Ac₂O and AcONa at 100°. Heating 1 g. II 4 hrs. with 20 cc. NH₃-MeOH at 100° gives 0.75 g. 3-ethyl-3,2-[o-benzylene]-2-amino-1-acetylindoline, m. 138-9°. Bz₂O and BzONa with I at 100° give the di-Bz deriv. corresponding to II, m. 179-81°, and a little of the 1-Bz deriv., m. 145.5-65°; the O-methyl-1-benzoyl deriv., m. 125-6°. 3-Ethyl-3,2-[o-benzylene]-1-benzoyl-2-aminoindoline, m. 130°; HCl salt, m. 231-3°. I (2 g.) and 12 g. C₆H₄(CO)₂O, heated 4 hrs. at 160°, give 1.1 g. 3-ethyl-[o-benzylene]-2-O-1-phthaloyl-2-indolinol, m. 200-1°. I (1 g.) heated with 20 cc. MeOH-NH₃ 4 hrs. at 100° gives 3-ethyl-3,2-[o-benzylene]-2-aminoindoline, crystg. with 1 H₂O, m. 95° (evolution of NH₃); in CHCl₃ soln. HCl ppts. NH₄Cl at 0°. I, reduced with HCl and Zn-Hg in EtOH, gives 3-ethyl-3,2-[o-benzylene]indoline, light green, m. 101-2°; HCl salt, decomps. 230-3°; picrate, yellow, m. 170-2°; Ac deriv., m. 128°. β -Phenylhydrindone phenylhydrazone in CHCl₃, shaken 0.5 hr. with 12 N HCl, gives 85% of 3-phenyl-3,2-[o-benzylene]indolenine (III), m. 182-3°; HCl salt, sinters 180°; picrate, yellow, m. 185-6°

(decompn.). Ac_2O and III give 3-phenyl-3,2-[o-benzylene]-2-O-1-diacetylindolinol, m. 168°; with MeOH at 100° this gives the 2-O-methyl-1-acetyl deriv., m. 160-1° and with HCl the 1-Ac deriv., m. 183-4°. With PhNHNH_2 III gives 3-phenyl-3,2-[o-benzylene]-2-phenylhydrazinindoline, m. 224-6°; the 2-amino deriv. m. 145° (evolution of NH_3). Heating diacetylindolinol with MeOH-NH_3 4 hrs. at 100° gives 3-benzyl-3,2-[o-benzylene]-2-amino-1-acetylindoline, m. 118-20° (decompn.) (Ac deriv., m. 174°); the corresponding 1-Bz deriv. m. 219-20° (Bz deriv., m. 255-8°). 3-Benzyl-3,2-[o-benzylene]indolenine-MeI, m. 165-8° (decompn.), from the base and MeI in MeOH at 100° (40% yield); $\bullet\text{Ag}_2\text{CO}_3$ in Me_2CO gives 3-benzyl-3,2-[o-benzylene]-1-methyl-2-indolinol, m. 147-8°. Na 3-benzyl-3,2-[o-benzylene]indoline-2-sulfonate, m. 115-20° (decompn.), results from the HCl salt and Na_2SO_3 in EtOH and crysts. with 4 H_2O . 3-Benzyl-3,2-[o-benzylene]-2-aminoindoline, m. 110-5° (decompn.). 3-Benzyl-3,2-[o-benzylene]indoline, m. 85-6° (Ac deriv., m. 85-6°; picrate, m. 184°); 1-Me deriv., m. 81°; picrate, m. 166-70°. β -Benzyltetralone phenylhydrazone and 12 N HCl give 3-benzyl-2,3-[o-phenyleneethyl]indolenine, m. 104-6°; HCl salt, pale greenish yellow, m. 194-6°; picrate, m. 180-2° (decompn.); this base does not react with PhNHNH_2 at 130° or with Ac_2O or Bz_2O at 100° or 140°. Reduction gives 3-benzyl-2,3-[o-phenyleneethyl]indoline, m. 84-6°; picrate, m. 179-81°. β -Phenethyltetralone, yellow oil, d_{12} 232-4°; semicarbazone, m. 166-7°; phenylhydrazone, m. 97-103° and gradually resinifies. 3-[β -Phenethyl]-2,3-[o-phenyleneethyl]indolenine, obtained only as a resin, HCl salt, greenish yellow, m. 215-23° (decompn.), picrate, yellow, m. 170-1°.

C. J. WEST

Thiazole derivatives by thiocyanation of amines. H. P. KAUFMANN, W. OEHNING AND A. CLAUBERG. *Arch. Pharm.* **266**, 197-218(1928).—The methods used in the present study were essentially the same as those previously employed by K. and O. (cf. C. A. **20**, 1603). The following compds. were prepd and characterized: *Et* 3-thiocyano-4-aminobenzoate, m. 97-8°; bis-[*Et* 4-aminobenzoate] 3-disulfide, m. 153°; 2-amino-6-carboxybenzothiazole, m. 241°, 2-amino-6-ethoxybenzothiazole, m. 161-2°, 2-amino-6-chlorobenzothiazole, m. 198°; 2-amino-4-methyl-6-chlorobenzothiazole, m. 206°; 1-methyl-3,5-dithiocyano-4-aminobenzene, m. 123°; 2-amino-6-methylbenzothiazole, m. 136°; 2-amino-4-thiocyano-6-methylbenzothiazole, m. 225°; 2-amino- α -naphthothiazole, m. 261°; 2-amino-6-thiocyanobenzothiazole, m. 198°; 1,4-dimethyl-2-amino-5-thiocyanobenzene, m. 65°; bis-[1,4-dimethyl-2-aminobenzene] 5-disulfide, m. 192°, 2-amino-4,7-dimethyl-6-thiocyanobenzothiazole, m. 231°; 2-amino-8-thiocyano- β -naphthothiazole, m. 272°.

W. O. F.

Molecular weight of hemocyanin. THE SVEDBERG AND EUGEN CHIRNOAGA. *J. Am. Chem. Soc.* **50**, 1399-411(1928).—The centrifugal methods have been applied to the study of the mol. wt of hemocyanin from *Helix pomatia*. The unexpected phenomenon of a strong variation of its diffusion const. with concn. down to a certain low limit of concn. has been encountered and an assumption has been put forward to explain it. Both the sedimentation velocity and sedimentation equil. methods for detg. the mol. wt have resulted in good agreement in the figure of $5,000,000 \pm 5\%$ as the most probable value in dil. soln. at p_H 4.7. Within the limits of exptl. error all the mols. of a dil. soln. of hemocyanin from *Helix pomatia* at p_H 4.7 are found to be of equal wt. and size and this protein is therefore probably to be regarded as a chem. individual. As to shape, the calcs. based on the exptl. data indicate that at p_H 4.7 the mols. are practically spherical with a radius of 12.1×10^{-7} cm.

C. J. WEST

Tautomerism in the pyridine series: diphenylpyridylmethanes and some of their derivatives. A. E. CHICHIBABIN AND S. V. BENEVOLENSKAIA. *Ber.* **61B**, 547-55 (1928).—Earlier work on the pyridonemethides would seem to indicate that replacement of the H atoms of the Me group by C_6H_5 residues facilitates the formation of the pyridonemethides and increases their stability. This has been further confirmed by the prepn. of *N*-methyl- α - (I) and γ -pyridonediphenylmethide (II), which are quite stable as compared with the corresponding monobenzyl derivs. They are red cryst. substances quite stable in the air when dry, only slowly sol. in H_2O , more rapidly on

heating, with formation of strongly alk. solns., the equil.
$$\text{CH}:\text{CH}:\text{C}:\text{CPh}_2 \rightleftharpoons \text{CH}:\text{CH}:\text{NMeOH}$$

$\text{CH}:\text{CH}:\text{C}:\text{CPh}_2$

\downarrow
 $\text{CH}:\text{CH}:\text{NMe}$ + H_2O being shifted far to the right. α - $\text{C}_6\text{H}_4\text{NCOPh}$ (III), the

starting material in the prepn. of I, had hitherto been obtained only in liquid form but 1 sample prepd. some yrs. ago solidified after being distd. to prisms m. 50° and all the prepn. on hand, some even 25 yrs. old, could then be made to cryst. by seeding;

now, they generally cryst. spontaneously. In the prepn. of derivs. of γ - C_6H_4NCOPh an unexpected phenomenon was encountered for which there is as yet no explanation; the $C_6H_4NC(OH)Ph_2$, prepd. from the ketone with $PhMgBr$, was obtained in 1906 as a cryst. powder (IV) m. 203° (C. A. 1, 2478) but on repeating the expt. many times there has always been obtained a product (V) of the same compn. but m. 235° (mixed m. p. with the older prepn., 203 – 20°). Both carbinols dissolve in H_2SO_4 with intense color. With HI - $AcOH$ V gives a $C_6H_4NCHPh_2$ m. 125° . IV an isomer m. 111 – 2° (mixed m. p., 103 – 16°). *Diphenyl- α -pyridylcarbinol* (12.8 g. from 9 g. III with $PhMgBr$ in Et_2O), m. 105° , easily sol. in dil. acids, sol. in concd. H_2SO_4 with intense red color; *chloroplatinate*, orange leaflets with 2 H_2O , loses its H_2O and apparently some of its HCl at 90 – 5° , then gradually blackens without melting; *picrate*, m. 173° (decompn.). *Diphenyl- α -pyridylmethane* (4.4 g. from 5 g. of the carbinol with HI - $AcOH$), m. 63° ; *chloroplatinate*, orange, m. 182° (decompn.); *picrate*, m. 172° ; *methiodide* (9 g. from 6 g. of the methane with excess of MeI at 100°), almost colorless leafy needles from H_2O , gradually becomes yellow, m. 222 – 4° , gives in H_2O with concd. KOH dark red-violet needles of I, m. 147° , which gradually darken and deliquesce in the air, dissolve with red color in alc., Et_2O , C_6H_6 and $AcOEt$, the solns. being decolorized by shaking with H_2O but again colored on addn. of alkalis; the colorless aq. solns. treated with HI and evapd. regenerate the original methiodide. *Chloroplatinate* of V, orange, m. 203° ; *picrate*, needles (probably solvated) from C_6H_6 , m. 101 – 3° (gas evolution). *Diphenyl- γ -pyridylmethane* (4.5 g. from 5 g. V); *chloroplatinate*, golden yellow, m. 201° ; *picrate*, m. 172° ; *methiodide* (7.5 g. from 5 g. of the methane), almost colorless needles from hot H_2O , gradually becomes yellow, m. 159 – 61° . II (1.19 g. from 2 g. of the methiodide), yellow, m. 113° , sol. in Et_2O , alc., C_6H_6 and $AcOEt$ with yellow color.

C. A. R.

Synthesis of pyridine analogs of quinizarin. STEFAN NIEMENTOWSKI, JÓZEF FRÜHLING AND RUDOLF JOSZT. *Koczniki Chem.* 7, 218–29 (1927); cf. Philips, *Ber.* 27, 1923 (1894).—5,8-Dihydroxy- α -anthrapyridinequinone (I) is obtained by immersing a well-triturated mixt. of equal parts of pure quinolinic anhydride, m. 130° , and p - $C_6H_4(OMe)_2$ and 3 parts dry distd. $AlCl_3$ in a metal bath at 200 – 15° . The violent reaction lasts 3–4 min. The mass is allowed to cool to 160° within 15 min, is kept so for 45 min., then cooled to room temp. After the addn. of 6–8 parts concd. H_2SO_4 the product is heated, first gently until the liberation of HCl ceases, then 1–2 hrs. to 130 – 40° . The red product is dild. with 10 parts water while still fairly hot and shaken out with benzene, avoiding emulsification. The color and fluorescence of the aq. layer suggest the presence of a *quinolein*, which however was not isolated. When concd., the benzene layer seps. bright red crystals of I with 0.5 mol. of benzene, which lose benzene at room temp., leaving c. p. I, m. 230° , scarcely sol. in water, sol. in dil. $NaOH$ with blue color. Yield 50% of the $C_{16}H_8(OMe)_2$. It drops to 25% when $C_6H_4(OH)_2$ is used. *Dihydroxymethyl- α -anthrapyridinequinone* was prepd. in poor yield from hydrotoluquinone. The small quantity did not permit examn. For the prepn. of 5,8-dihydroxy- β -anthrapyridinequinone (II) cinchomeric acid (III) was obtained by boiling 48 hrs. a soln. of 100 g. quinine- HCl with 3 g. HNO_3 (d. 1.4), until no quinine was liberated by NH_3 . After evapn. to a sirupy consistency and dildn. with water fairly pure III, m. 260° (decompn.), sep'd. Further III was recovered from the mother liquid by repeated treatment with HNO_3 and water. Yield, 26–7 g. III anhydride is obtained in 5.2 g. yield by heating 6 g. III with 30 g. Ac_2O , distg. *in vacuo* and drying 2–3 weeks *in vacuo* over CaO or KOH . It is very unstable. A well-triturated mixt. of 5.2 g. III anhydride, 3.3 g. p - $C_6H_4(OMe)_2$ and 24 g. dry distd. $AlCl_3$ is heated as under I. Condensation with H_2SO_4 is not necessary. A few cc. concd. H_2SO_4 is added to the soln. in 1 l. cold water until the fluorescence disappears. A slight ppt. of II seps. out; the main part is shaken out with benzene. The benzene ext. is recrystd. from alc. Red shining platelets, m. 209° . Yield 1.3–1.6 g. It is easily sol. in HCl and H_2SO_4 with a red, in alkalis with a blue color. The acid or neutral aq. soln. is orange-red. When shaken with Zn dust the blue NH_3 soln. turns red, the pink or orange soln. in glacial $AcOH$ turns blue, and on subsequent heating permanently colorless. The original colors are restored by contact with the air. II *diacetate* light, greenish yellow, sintering between 160 and 90° , m. 187.5 – 9.5° , is obtained by refluxing 10 min. 1 part II with 2 parts $AcONa$ and at least 10 parts Ac_2O . *Dihydroxy- β -anthrahydroquinone tetraacetate*, prepd. by 10 min. refluxing of 1 part II, 3 parts Zn dust, 2 parts $AcONa$ and 15 parts Ac_2O , yellowish, darkens at 250° , softens at 275° and m. 283° (decompn.). The mother liquids probably contain the *triacetate* of the anthranol analog.

MARY JACOBSEN

Oxidation of N -benzoylhexamethylenimine. ADOLF MÜLLER. *Ber.* 61B, 568–9

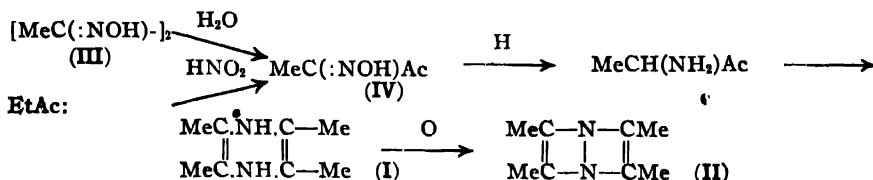
(1928).—It has been found (C. A. 22, 214) that $\text{Br}(\text{CH}_2)_6\text{Br}$ with $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{NH}_2$ gives the N - $p\text{-MeC}_6\text{H}_4\text{SO}_2$ deriv. of hexamethylenimine (I), which is hydrolyzed to I-HCl by heating with concd. HCl, and that the N -Bz deriv. of the I is converted by the Braun P halide method into $\text{I}(\text{CH}_2)_6\text{I}$. While this seemed to be sufficient proof of the structure of the I, M. undertook to establish this with even greater certainty because, as shown in the following abstr., the action of $\text{I}(\text{CH}_2)_6\text{I}$ on amines does not, as hitherto assumed, give α -pipecoline derivs. but derivs. of I, and it was desirable that there should be no possible doubt as to the structure of the I derivs. used for comparison. He accordingly oxidized the N -Bz deriv. of I with KMnO_4 and obtained 44% of the expected $\text{BzNH}(\text{CH}_2)_6\text{CO}_2\text{H}$, m. $80\text{--}1^\circ$ (cor.), identical with the product obtained from $\text{BzNH}(\text{CH}_2)_6\text{Cl}$ (Gabriel, C. A. 3, 2137). C. A. R.

Action of 1,6-diiodohexane on amines. ADOLF MÜLLER AND ERICH RÖHL. *Ber. 61B*, 570-4 (1928); cf. preceding abstr.—According to v. Braun (C. A. 5, 490) when $\text{I}(\text{CH}_2)_6\text{I}$ reacts with MeNH_2 , PhNH_2 , Me_2NH and piperidine, no trace of hexamethylenimine derivs. is formed but the ring is shortened and α -pipecoline derivs. are obtained, whereas M. and Sauerwald found just the opposite with $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{NH}_2$ and $\text{Br}(\text{CH}_2)_6\text{Br}$. A repetition of v. B.'s work with MeNH_2 and piperidine showed that the product obtained from $\text{I}(\text{CH}_2)_6\text{I}$ and MeNH_2 , with subsequent methylation, m. 265° (cor.) (v. B. gives 255°) and is identical with the N,N -hexamethyleniminium iodide prepd. from hexamethylenimine and MeI ; the corresponding chloroplatinate decomps. 233° (cor.), while N,N -dimethyl- α -pipecolinium chloroplatinate decomps. 246° (v. B., 222°). Similarly, $\text{I}(\text{CH}_2)_6\text{I}$ and piperidine give hexamethylenepiperidinium iodide (I), also obtained from $\text{I}(\text{CH}_2)_6\text{I}$ and hexamethylenimine, while $\text{I}(\text{CH}_2)_6\text{I}$ and α -pipecoline give the isomeric α -methylpentamethylenepiperidinium iodide (II). The $\text{I}(\text{CH}_2)_6\text{I}$, b₁₀ $141\text{--}2^\circ$, is obtained in 73% yield from $\text{HO}(\text{CH}_2)_6\text{OH}$ with red P and I. I m. 273° (cor.) (v. B., 263° , apparently uncor.). II, m. 268° (mixed m. p. with I, about 233°). Hexamethylenepiperidinium chloroplatinate, m. $240\text{--}1^\circ$ (cor., decomps.); v. B. gives 231° . C. A. R.

Amides of α -phenylcinchoninic acid. ST. WEIL AND A. KONÓWNA. *Bull. trav. inst. pharm. état* No. 7, 467-9 (1927).—W. and K. prepd. amides of α -phenylcinchoninic acid by the action of the acid chloride on the following amines. *o*-phenetidine, amide m. 130° ; aminodimethylphenylpyrazolone, m. 249° ; piperazine, m. 280° ; lysidine, m. 160° . WILLIAM J. HUSA

A few esters of phenylquinolinecarboxylic acid. ST. WEIL AND A. JOSKOWICZ. *Roczniki Chem.* 7, 362-7 (1927).—The esters of α -phenylcinchoninic acid with the following alcs. were prepd. by adding the calcd. quantity or a slight excess of POCl_3 to the melted equimol. mixts. of acid and alc. (on the water bath or oil bath according to the m. p.), shaking vigorously until HCl is no longer evolved, pouring into water, recrystg. from 95% alc., and finally from ligroin: *p*-chlorophenol, m. $117\text{--}8^\circ$; phenylethyl alc., m. 72° ; pyrocatechol, m. $178\text{--}9^\circ$; guaiacol, m. $104\text{--}5^\circ$; resorcinol, m. $193\text{--}5^\circ$; pyrogallol (prepd. from gallic acid), m. $170\text{--}1^\circ$; pyrogallol (prepd. from pyrogallol), m. $160\text{--}1^\circ$, apparently an isomer of the former; thymol, m. $110\text{--}11^\circ$, also sol. in oils, and the tri- $[\alpha$ -phenylcinchoninic acid]ester of quinide (from quinic acid), yellow, m. 208° . MARY JACOBSEN

The conversion of *o*-diketoximes into pyrazines. *O. WALLACH. *Nach. Ges. Wiss. Göttingen math. physik. Klasse* 1927, 238-44.—Dioximes of *o*-diketones do not usually yield diamines when reduced, but are first hydrolyzed to the mono-oximes, which are then reduced to *o*-amino ketones, 2 moles of the enolic form condensing with each other by loss of 2 H_2O to yield an easily oxidized dihydropyrazine (I), which is oxidized by air to a pyrazine (II). The mechanism of the reaction is:



These reactions readily take place during alk. reduction. II is obtained almost quant. when 5 g. III in 40 cc. 10% NaOH is warmed for 0.75 hr. with 40 g. Zn dust (previously etched with HCl) or better when 5 g. IV in 20 cc. 10% NaOH is treated with 10 cc. H_2O and 20 g. Zn for 10-15 min., filtered, the filtrate extd. with Et_2O , the ext. distd., then steam-distd. and the distillate extd. with Et_2O ; evapn. of the Et_2O gives colorless

crystals of II, m. 75–85°, which, recrystd. from H₂O and dried over CaCl₂, m. 86–7°; when dried by melting over K or Na, it b. 189–90°; *picrate*, yellow, m. 192–5°; the HgCl₂ and Hg(CN)₂ *double salts* were prepd. In accord with these reactions, the product obtained on reduction of the *dioxime* of cyclohexane-1,2-dione (cf. C. A. 18,

2336) is seen to be a *dihydropyrazine*, $C_4H_8 \begin{smallmatrix} \diagup C.NH.C \\ \diagdown C.NH.C \end{smallmatrix} \diagup C_4H_8$, which on oxidation

for several days with H₂O₂ in acid soln., filtering, pptg. with NH₄OH, steam-distg. the ppt., extg. the distillate with Et₂O or CHCl₃ gives the corresponding *pyrazine*, C₁₂H₁₆N₂, m. 108°; the *picrate*, HCl salt and *chloroplatinate* are sol. in H₂O.

N. A. LANGE

The resin acids of conifers. PAUL LEVY. *Ber.* 61B, 616–23(1928); cf. C. A. 22, 87.—In the earlier paper it was reported that oxidation of the so-called Steele abietic acid had given a hitherto unknown dihydroxyabietic acid. This, however, seems to be really dihydroxy-*d*-pimaric acid (I) (cf. Ruzicka and Balas, C. A. 22, 1587) and is also obtained by oxidation of abietic acid (prepd. according to Ger. pat. 221,889) and from crude American colophony, confirming the view of Dupont that the abietic acids, hitherto considered as being homogeneous substances, in reality still contain isomeric resin acids. A further confirmation of this is found in the fact that dihydro-*d*-pimaric acid has been identified among the products of the catalytic hydrogenation of abietic acid prepd. from American turpentine. Beyond doubt the formation of di- along with the 2 tetra-HO acids in the 1 case and only of the tetra-HO acids in others is intimately related with the quantity of oxidizing agent used. With a large excess of the oxidizing agent both tetra-HO acids were formed while with the quantity of KMnO₄ calcd. for 2 ethylene bonds in the abietic acid only the higher melting tetra-HO acid (along with I) was formed. All 3 products obtained by L. were homogeneous, as was established by special expts. to meet the criticism of Ruzicka (C. A. 18, 681)

C. A. R.

Catalytic hydrogenation of carotin. L. ZECHMEISTER, L. V. CHOLNOKY and V. VRABÉLY. *Ber.* 61B, 566–8(1928); cf. C. A. 21, 2919.—If a soln. or suspension of pure carotin (I), *e. g.*, in cyclohexane or Et₂O, is treated with Pt sponge and H₂, it soon becomes perfectly colorless (in 15 min. with 0.5 g. I and enough Pt) and takes up 22 atoms of H per mol. of I. Since under such mild conditions opening of ring systems is improbable, I must have essentially an aliphatic structure; in harmony with this view are the wax-like consistency of I, the ease with which it resinifies and its slight tinctorial power. The hydrogenation product, the study of which has not been completed, remains on evapn. of the solvent as a white transparent mass, which soon solidifies and resembles paraffin; pptn. from Et₂O-EtOH yields about 50% of needles, m. 65°; it is satd. towards halogens and does not give with H₂SO₄ the blue color characteristic of carotinoids.

C. A. R.

The photochemical oxidation and dehydrogenation of ergosterol. A. WINDAUS, P. BORGEAUD and J. BRUNKEN. *Nach. Ges. Wiss. Göttingen math. physik. Klasse* 1927, 313–4; *Pharm. Monatsh.* 9, 61(1928).—It has been found that light of the visible spectrum activates ergosterol (I) to which has been added a sensitizer but the photochem. rearrangements are of a different kind than that produced by ultra-violet light and do not seem to have any direct biol. significance. The effects of visible light are different depending upon the presence or exclusion of O₂ during the irradiation. When dyes having an absorption max. between 500 and 520μ (eosine and erythrosin) are the sensitizing agents and with exclusion of O₂, visible light causes a bleaching of the dye and dehydrogenation of I with the formation of a difficultly sol., cryst. product, m. 203°, which was identified as a *pinacol*, C₂₈H₄₂O; this cannot be activated by ultra-violet light and is not antirachitic; when carefully heated it is split into a monomol. product isomeric with I, m. 152°, forming an *Ac deriv.*, m. 122–3°. In the presence of O₂, the dye (methylene blue, eosin, erythrosin or hematoporphyrin) acts as an O₂ carrier and is not consumed during the photo-oxidation, whereby a cryst. *peroxide* (II) of I is formed, m. 178°, [α]_D²⁰ –36° (*Ac deriv.*, m. 202°); reduction with Na + EtOH converts II to I and finally to a *dihydroergosterol*, m. 174°, [α]_D²⁰ –20°; dihydroergosterol acetate when catalytically reduced with Pt and AcOH at 75° gives *γ-ergostyl acetate* (cf. Reindel, C. A. 21, 1464). Digitonin and II in hot EtOH form an insol. *addn. compd.*; AsCl₃ and SbCl₃ give color reactions with II which are similar to those with vitamin A. II is not antirachitic, cannot be activated by ultra-violet light, but can be reconverted to I, which shows that I does not owe its property of activation to an impurity.

N. A. LANGE

Electrosyntheses [of organic compounds] (YOVIRCHITCH) 4. Investigation of two remarkable organic substances [*p*-toluylacetophenone enol and dibenzoylmethane enol] (RÖSCH) 2. Specific molecular geometry (FERRIER) 2. The indexes of refraction and rotatory power of crystals of Na Rb *d*-tartrate (KOZIK) 2. Intermediate products in oxidation with chromic acid (WAGNER) 2.

ARNALL, FRANCIS, AND HODGES, FRANCIS W.: **Theoretical Organic Chemistry. II.** London: J. and A. Churchill. 340 pp. 12s. 6d., net. (Postage 6d.) Cf. C. A. 21, 592.

COHEN, J. B.: **Organic Chemistry. I. Reactions.** 427 pp. **II. Structure** 427 pp. **III. Synthesis.** 440 pp. 5th ed. London: E. Arnold & Co., Ltd. 18s. each vol. obtainable separately.

FOSSE, R.: **L'urée** (Recherches de chimie analytique, biologique et agricole). **Les fonctions dinaphtopyranol, xanthidrol et sel de pyryle** (chimie organique). Paris: Presses Universitaires de France. Reviewed in *Ann. fals.* 21, 108(1928).

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Grafes Handbuch der organischen Warenkunde. Band II. Halbbd. 1 Kohlehydrate u. d. Waren d. Kohlehydratgruppe. Mit Einschluss der mechanischen Technologie und technischen Warenprüfung. Edited by Victor Grafe. Stuttgart: C. F. Poeschel. 631 pp. M. 37; cloth binding, M. 40; Subscr., M. 33; cloth binding, M. 36.

Catalytic oxidation of hydrocarbons. E. I. DU PONT DE NEMOURS & Co. Brit. 275,321, May 3, 1926. In the production of phthalic anhydride from $C_{10}H_8$ vapor or in similar oxidations, a mixt. of the hydrocarbon gas or vapor and O-contg. gas is passed through a plurality of relatively small reaction zones arranged in a medium of high heat cond. such as molten metal or fused salts such as a mixt. of fused $NaNO_3$ and KNO_3 . An app. is described.

Addition products of unsaturated hydrocarbons. H. WALTER. U. S. 1,669,384, May 8. In producing AcH or in similar reactions in which C_2H_2 is passed into a dil. acid soln. contg. a catalyst such as a Hg compd., steam is added with the C_2H_2 , which enables the addn. of the components of H_2O to take place without impairing the catalyzer in any way. Examples are given for the production of acetaldehyde, ethylidene diacetate, propionic acid and ethylidene propionate, trichloroacetic acid and trichloroacetic acid vinyl ester.

1-Aminonaphthalene-8-carboxylic acid. R. HERZ and F. SCHULTE. U. S. 1,668,148, May 1. An 8-cyanonaphthalene-1-sulfonic acid compd. such as the 8,1-acid itself is treated with $Ca(OH)_2$ or other alk. earth hydroxide at temp. not exceeding 250° (suitably about $200-250^\circ$) and under pressure. Cf. C. A. 22, 91.

Concentrating acetic acid or similar acids. E. RICARD. U. S. 1,668,380, May 1. Dehydration is effected in 2 stages. In the first stage, a "withdrawing liquid" is used which has a relatively high b. p. and forms a binary mixt. contg. a large quantity of H_2O ; in the second stage a liquid is used which has a lower b. p. so that it can be more readily sep'd. from the anhyd. acid produced. Xylene and C_6H_6 may be used for the first and second stages, resp., in concg. $HOAc$. In dehydrating formic acid, Bu formate and gasoline may be used. In dehydrating acrylic acid solvent naphtha and $BuCl$ may be used. An app. is described.

Converting cyanonaphthalenesulfonic acids. R. HERZ, F. SCHULTE and W. ZERWECK. U. S. 1,669,307, May 8. Cyanonaphthalenesulfonic acids, contg. at least 1 sulfonic group in *o*- or *p*-position to the cyanic group, are heated with an alk. reagent such as alc. KOH to effect formation of various products, among which examples are given for the production of 2-methoxynaphthalene-1-carboxamide (m. 189°), the corresponding ethoxy and butyloxy compds., 1-methoxy naphthalene-2-carboxamide (m. $156-7^\circ$), 4-methoxy-1-naphthamide (m. 237°), 4-methoxy-1-naphthoic acid (m. 239°), 4-ethoxy-1-naphthoic acid (m. 214°), 4-butyloxy-1-naphthamide (m. 250°), 4-butyloxy-1-naphthoic acid (m. 208°) and similar compds.

Acenaphthenecarboxylic acids. I. G. FARBERIND. A.-G. Brit. 274,894, July 24,

1926. Acetyl-, diacetyl-, chloroacetyl- or dichloroacetyl-acenaphthene, or a substitution product of these compds., is treated with an alk. hypochlorite; CHCl_3 is eliminated. Several examples are given.

Acenaphthene derivatives. I. G. FARBERIND. A.-G. Brit. 274,902, July 24, 1926. 5-Acenaphthencarboxylic acid (which may be prep'd. as described in Brit. 274,894 (cf. above)) or other acenaphthene derivs. contg. a carboxylic or sulfonic acid group in the 5-position are nitrated and then reduced, so that the amino deriv. formed is further converted into the acenaphthostyryl with elimination of water.

Treating dilute acetic acid vapors with cresol to effect concentration by extraction. H. SUIDA. Brit. 275,158, July 31, 1926. A distg. system is described.

Alcohols, etc., by catalytic hydrogenation or carbon monoxide. I. G. FARBERIND. A.-G. Brit. 275,284, March 4, 1926. The CO_2 formed in the reaction is removed continuously or periodically by absorption in solvents such as water or by fixing it chemically under high pressures, e. g., by water contg. a small quantity of NH_3 . Several examples are given.

Methanol synthesis, etc. COMPAGNIE DE BETHUNE. Brit. 274,492, July 17, 1926. Catalysts for synthesis of alcs., especially of MeOH, by reaction of CO and H under the influence of heat and pressure, are prep'd. by depositing sol. salts such as formates of U, W, V, Zn, Be, Cr or Ti upon a porous support such as pumice, asbestos, charcoal or activated C.

Methanol synthesis, etc. COMPAGNIE DE BETHUNE. Brit. 275,600, Aug. 6, 1926. Catalysts suitable for use in hydrogenation of CO comprise irreducible oxides to which 2-10% of Ni, Ni oxide or a Ni salt has been added; e. g., a catalyst may be prep'd. by immersing heated active C in a soln. of Zn and Cr formates contg. a small quantity of Ni formate, and evapg. to dryness; this catalyst may be used for producing MeOH from a mixt. contg. CO, H, N and CH_4 at 800 atm. pressure and a temp. of 300° .

Methanol synthesis, etc. SYNTHETIC AMMONIA & NITRATES, LTD., AND H. G. SMITH. Brit. 275,345, May 12, 1926. A catalyst for production of MeOH, higher alcs. and other O-contg. org. compds from C oxides and H at elevated temps. and pressures comprises a basic Zn chromate of the formula $4\text{ZnO} \cdot \text{CrO}_3$. This catalyst enables a temp. of $300-400^\circ$ to be employed for the synthesis and is not poisoned by S. Volatile compds of Fe, Ni and Co should be excluded.

Crotonaldehyde, etc. SOC. ANON. DISTILLERIES DES DEUX-SEVRES. Brit. 274,488, July 14, 1926. Equal quantities of AcH and water are mixed, cooled and NaOH soln. is gradually added. The soln. is acidified and distd. α -Ethyl- β -propylacrolein is similarly obtained from butyraldehyde. Other alk. hydroxides or carbonates may be used in similar reactions instead of NaOH.

Aromatic amino compounds. I. G. FARBERIND. A.-G. Brit. 274,562, April 21, 1926. Reduction of PhNO_2 or other nitro compds. to the corresponding amino compds. is effected with Fe and an acid concd. aq. soln. of an easily sol. salt of a metal more electropositive than Fe such as a soln. of NaCl or CaCl_2 and HCl; the Fe is converted into a finely divided oxide suitable for use as a pigment.

Hydroxylic compounds from primary amines. J. W. C. CRAWFORD and F. G. WILLSON. Brit. 274,960, April 28, 1926. In producing PhOH from PhNH_2 , *p*-cresol from *p*-toluidine, *p*-chlorophenol from *p*-chloroaniline, *m*-hydroxybenzaldehyde from *m*-aminobenzaldehyde, 1-hydroxy-2,4-dimethylbenzene from 1-amino-2,4-dimethylbenzene, salicylic acid from anthranilic acid and in similar reactions the amines are treated with HNO_2 or a nitrite and decompn. of the resulting product is effected in the presence of an inert solvent for the hydroxylic compd. such as xylene so that the OH compd. is removed from the aq. medium immediately after its formation.

Methylamino compounds. A. MARKERT. Brit. 275,377, June 17, 1926. In order to effect methylation of NH_3 and primary and secondary amines they are passed in mixt. with dimethyl ether over dehydrating catalyzers such as oxides of Al, Ti, Zr or Th. Various details and examples are given.

Diaminopropanols. I. G. FARBERIND. A.-G. Brit. 275,622, Aug. 3, 1926. Unsym. substituted diaminopropanols are made by causing a secondary or primary base or NH_3 to react with α -tertiaryaminoepihydrins (which are obtained from epichlorohydrin and secondary bases). Examples are given of the production of 1-amino-3-diethylamino-2-propanol, 1-ethyl-amino-3-diethylamino-2-propanol, 1-amino-3-piperidino-2-propanol and 1-amino-3-(phenylmethylamino)-2-propanol.

Anthraquinone derivatives. I. G. FARBERIND. A.-G. Brit. 274,558, April 21, 1926. Homonuclear substituted anthraquinonesulfonic acids are converted into hydrogenated compds. by treatment with a hyposulfite in weak acid or weak alk. soln. The hydrogenated compds. revert to the original compds. by careful oxidation in acid

soln., *e. g.*, with persulfate, but on boiling their aq. solns. or adding alkali or heating with strong H_2SO_4 with or without H_3BO_3 , sulfonic groups are split off, leaving non-hydrogenated anthraquinone derivs. Several examples are given.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. Brit. 274,966, April 29, 1926. Leuco-anthraquinones are made by heating a *p*-aminohydroxyanthraquinone or a deriv. substituted by sulfo groups or by halogen in the β -position with an alk. reducing agent such as NaOH and hyposulfite until NH_3 is evolved. Several examples are given.

Phenylglycine and its compounds. G. IMBERT. U. S. 1,668,964, May 8. An aq. soln. of $PhNH_2$ and an alk. substance such as NaOH or Na_2CO_3 is heated with trichloroethylene or tetrachloroethane.

Normal tributyl borate. W. J. BANNISTER. U. S. 1,668,797, May 8. This compd. is formed by heating H_3BO_3 with BuOH and distg. It is a colorless, nearly odorless liquid b. $230-5^\circ$.

Normal butyl lactate. C. L. GABRIEL and C. BOGIN. U. S. 1,668,806, May 8. This compd. is obtained by heating BuOH with lactic acid and distg. It is a colorless liquid b. $186-9^\circ$.

Stable preparations of diazo salts. I.-G. FARBENIND. A.-G. Brit. 275,245, Aug. 2, 1926. Diazo salts are mixed with a free arylsulfonic acid, alone or mixed with a readily sol. salt, *e. g.*, a mixt. of the acid and neutral 1,5-naphthalenedisulfonates of diazotized *o*-nitroaniline is mixed with free 1,5-naphthalenedisulfonic acid and Na benzylnaphthalenesulfonate. The products readily form clear solns. with water. Cf. C. A. 22, 1980.

Phenyl-*o*-tolylguanidine. R. V. HEUSER. U. S. 1,669,242, May 8. $PhNH_2$ and *o*-toluidine in mol. proportions are treated with CS_2 to form phenyl-*o*-tolylthiourea and the latter is desulfurized, *e. g.*, by use of alc. NH_3 and PbO.

Chloranil and bromanil. L. B. HOLLIDAY & CO., LTD. AND C. SHAW. Brit. 274,700, Nov. 26, 1926. *p*-Nitrosophenol is treated with Cl or Br in HCl or glacial HOAc; the chloranil and bromanil formed are sepd. and then purified.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 275,248, July 28, 1926. The heat required for high-pressure reactions is supplied wholly or partially by injection of a preheated gas such as H or gas contg. H. The process may be applied to destructive hydrogenation of carbonaceous material or to the conversion of MeOH or EtOH into higher alcs.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

The advancement of learning in medicine through biochemistry. WM. J. MAYO. *Ind. Eng. Chem.* 20, 456-60(1928).—An address. E. J. C.

Historical sketch of the development of the biological sciences in Sicily. DOMENICO LANZA. *Atti II congresso naz. chim. pura applicata* 1926, 1457-561.—Many old and rare references are included. C. C. DAVIS

The history of medicine in Sicily from 1000 to 1800 A.D. V. PIAZZA MARTINI. *Atti II congresso naz. chim. pura applicata* 1926, 1576.—Old and rare references are included. C. C. DAVIS

Adsorption of indicators by body fluids. H. W. VAN URK. *Pharm. Weekblad* 65, 389-90(1928).—A cerebrospinal fluid of pH 9.6 gave no color with phenolphthalein until an excess of the latter was added. The phenomenon is attributed to adsorption of the indicator. A. W. DOX.

A new circulatory hormone. II. H. KRAUT, E. K. FREY AND E. BAUER. *Z. physiol. Chem.* 175, 97-114(1928); cf. *Z. physiol. Chem.* 157, 32.—The hormone which was obtained from urine and characterized by its power to increase the amplitude and accelerate the rhythm of the heart beat is present also in the blood. By pptn. of the urine with $UO_2(OAc)_2$ and adsorption on $Al(OH)_3$, a prepn. can be obtained of which 0.5mg. injected intravenously into a dog of av. size exerts a marked increase in pulse amplitude lasting 1 min. This amt. is taken as the standard unit to which other prepn. are referred. Dialyzed human urine contains an av. of 1 unit per 5 cc. From 60 to 80 cc of blood 140 mg. of a prepn. was obtained which corresponded to 1 unit. Serum contains an inactivator which is destroyed by boiling, addn. of EtOH, filtration with

kieselguhr, and especially by slight acidification. Inactivation of the hormone by serum is a reversible process. The hormone is probably present in the blood largely in the inactivated form and hence not so readily demonstrated as in the urine. One unit per 2 cc. of blood may, however, be demonstrated by digestion of defibrinated blood with papain at faintly acid reaction and simultaneous dialysis through parchment. The acid decomps. the compd. with inactivator and destroys the latter while dialysis removes the protein-cleavage products. Hormone thus obtained from blood is identical with that from urine. Both are destroyed by boiling, inactivated by serum and reactivated by acid. This behavior distinguished the substance from histamine. A further distinction is that histamine increases the vol. of the liver and raises the carotid blood pressure of the rabbit, while the hormone from urine and blood has the opposite effect. Although the amt. of hormone in the urine is fairly const., the amt. present in the blood is subject to wide variations. The substance thus occurs in the blood and is excreted by the kidney. It serves the purpose of regulating the blood circulation and the heart activity. It is controlled by the inactivator present in the serum and by kidney excretion. Some sera contained no inactivator, with others 1-5 cc. inactivated 1 unit of hormone. The greatest inactivating power was observed with horse sera where occasionally 0.1 cc. per unit of hormone caused complete inactivation. All the hormone preps. caused both increased heart activity and lowered blood pressure regardless of their source and method of purification; hence both types of action are believed to be due to one and the same substance. The effect of decreased blood pressure is counter-balanced by increased heart activity, so that the amt. of blood discharged through the aorta is not more than temporarily diminished.

A. W. DOX

Preliminary treatment (Aufschliessung) of keratin for tryptic digestion. III. ZDENKO STARY. *Z. physiol. Chem.* 175, 178-236(1928); cf. *C. A.* 19, 2504.—The compn. products obtained by treatment of human hair with Br in AcOH can be sepd. into a series of fractions, some of which resemble the higher proteins while others have the properties of peptones. All contain Br and are amenable to tryptic digestion. The individual fractions differ in elementary compn., soly., and behavior toward precipitants. The Br content varied from 9.9 to 34.3%, N from 4.78 to 13.20% and S from 1.68 to 4.38%. The constituents of these fractions are probably polypeptide-like substances. In the keratin itself it is possible that parallel polypeptide chains are bound together at intervals by the S-S groupings of cystine, like the rungs of a ladder. Such linkages would be disrupted by oxidizing agents but not by acid hydrolysis; hence the Br treatment renders keratin amenable to enzyme action while partial hydrolysis does not. The soly. and digestibility of all the fractions diminish during the treatment of fractionation, purification and drying, a peculiarity which has already been observed with the so-called heteroalbumoses. It is not improbable that human hair consists of a mixt. of individual keratins, a sepn. of which is effected in the fractionation of the brominated products.

A. W. DOX

Proteins and acids. W. PAULI. *Wochschr. Brau.* 44, 246-50, 257-60(1927); cf. *C. A.* 21, 3059.—The behavior of sol. proteins, such as albumins, towards acids is explained by the fact that the amino group has a positive ion and the COOH group has a negative ion. If equal in no. the mol. is negative. Mineral acids depress ionization of the COOH group and increase that of the amino group, and the mol. becomes a multi-valent positive ion.

C. N. FREY

The index of polypeptidemia and the index of deamination. M. PURCH AND CRYSTOL. *Bull. Soc. Sci. Méd.* 8, 63-9(1927); *Physiol. Abstracts* 12, 286.—The polypeptide index for serum is the difference between the trichloroacetic acid N and phosphotungstic N. This in normal and fasting condition is very low (0.003 to 0.02%). The claim of Fiessinger and his co-workers, that the deamination index—namely, polypeptide index divided by trichloroacetic N—is more significant in investigating liver function than the polypeptide index, is disputed. The claim is based on the view that the polypeptide index represents deamination, as it states a relation between non-protein amino N and non-protein total N. The question rests on the relative values of the indices as ureogenic coeffs., and it is argued in the present contribution that the introduction of total N as denominator is unnecessary, and leads to errors which are not assocd. with the polypeptide index.

H. G.

Relation of distention of cells to acidity of solutions. V. ULÉHLA. *Carnegie Inst. Washington Yearbook* 25, 170(1925-6); *Expt. Sta. Record* 57, 817.—In a study of the pH of the cell surfaces as related to distention in water, two maxima of action were found in most cases between which a point of min. action is located, usually about pH_{act}^6 , and this is considered the point of physiol. neutrality.

H. G.

Diffusion with chemical transformation. A contribution on the chemical analysis

of biological and periodically varied reactions. V. MORAVEK. *Carnegie Inst. Washington Yearbook* 25, 173-5(1925-6); *Expt. Sta. Record* 57, 817; cf. *C. A.* 21, 3637.—It is regarded as a safe conclusion that the behavior of every kind of cell is specific. Use is made of expts. on colloidal membranes, agar-agar and gelatin. "Diffusion, which brings about a chem. transformation in gel, depends in its progress on the structure of the gel and the concn. of the reacting ions." H. G.

The proteolytic enzyme of Hsiang-Kua, *Cucumis melo*. HSIANG-CHU'AN HOU AND CHIH-CH'EN CHEN. *Chinese J. Physiol.* 1, 33-6(1927); *Physiol. Abstracts* 12, 336.—This enzyme present in some varieties of the plant, chiefly in endocarp, slightly in mesocarp, but not in the seeds, behaves like an ereptase. H. G.

Certain physico-chemical characteristics of muscle globulin. W. T. SALTER. *Proc. Soc. Exp. Biol. Med.* 24, 116-9(1926); *Physiol. Abstracts* 12, 147.—An NH_4Cl soln., rendered alk. by excess of NH_3 , was used as solvent. The protein was pptd. by $(\text{NH}_4)_2\text{SO}_4$ dissolved in more dil. salt soln., and pptd. by further diln. The fraction studied is appreciably sol. only in the presence of salt. Although at reactions alk. to p_{H} 6.0 this globulin dissolves in salt solns., at more acid reactions the solvent action of neutral salts is greatly diminished. In this and in other respects the behavior of this muscle globulin resembles that of edestin. It appears to be of a type different from that of hemoglobin or the serum globulins. H. G.

Effect of varying hydrogen-ion concentration upon rate of action of proteolytic enzymes in gastric mucous membrane. G. M. KLOSTER. *Proc. Soc. Exptl. Biol. Med.* 24, 156-7(1926); *Physiol. Abstracts* 12, 140.—The inactive principle of an ext. of gastric mucosa can be activated to various degrees by varying the degree of original activity. The activity at a given degree of acidity can be destroyed by exposure to weak alkali, and cannot be restored on acidification to a point below or equiv. to the original H-ion concn. The effect of alkali on unactivated ext. is to lower the resultant activity after acidification. H. G.

Experiments on activation of cholesterol derivatives and allied sterols by ultra-violet irradiation. A. F. HESS AND A. WINDAUS. *Proc. Soc. Exptl. Biol. Med.* 24, 171-2(1926); *Physiol. Abstracts* 12, 156.— β -Cholesterol, heterocholesterol, α -phytosterol, cholesteryl chloride, cholesterylamine acetate, cholestene, pseudocholestene, cholesterolilene, cholestan-4,7-diol, cholestan 4- or 7-ol, cholestenone, stigmasterol, α -amyrol, cholesteryl ether, cholesterol dibromide, cholesterol ozonide (non-irradiated and irradiated), apocholic acid, were tested. None of these acquired antirachitic properties after irradiation, though some of them are so closely allied to cholesterol. H. G.

Current views concerning the mechanisms of biological oxidation. F. G. HOPKINS. *Skand. Arch. Physiol.* 49, 33-59(1926); *Physiol. Abstracts* 12, 113.—Beginning with the theories of Wieland and Warburg, outstanding evidence is reviewed for or against activation of org. mols. on the one hand, or of O on the other. H. believes that most, if not all, oxidations characteristic of the living cell are preceded by activation of the org. mols. concerned, this activation being due to agencies more individualized than non-specific surface capillary forces. In some cases, however, activation of O plays a part. H. G.

Studies on the effect of temperature on the catalase reaction. VI. Heat inactivation of catalase at different hydrogen-ion concentrations. SERGIUS MORGULIS AND M. BEBER. *J. Biol. Chem.* 77, 115-26(1928); cf. *C. A.* 21, 1996.—Catalase is very slowly inactivated at temps. below 50° , the inactivation becoming very rapid as the temp. is raised to 55° or above, especially at p_{H} less than 6.0. At p_{H} 4.5 the inactivation is instantaneous at temps. above 50° , while at p_{H} 8.0 this does not occur until 63° . The critical temp. of inactivation is 65° . This inactivation by heat is a bimol. reaction. The max. stability of catalase which occurs at p_{H} 6.0 is in marked contrast to its extensive p_{H} range of optimum activity. Catalase is considered as an ampholyte whose isoelec. point is near p_{H} 6.0. In the form of cations, catalase is inactive and the reaction whereby the combination in which catalase acts as the cation is formed, is irreversible. The catalytic activity, however, is shared by both mols. and anions, the latter being heat-labile. ARTHUR GROLLMAN

Observations upon the enzyme asparaginase. W. F. GEDDES AND A. HUNTER. *J. Biol. Chem.* 77, 197-229(1928).—Asparaginase was obtained by H_2O or glycerol extp. of disintegrated yeast cells or from calf's liver. It is very labile, being destroyed by heat or contact with cold alc. or acetone. It is adsorbed by kieselguhr and $\text{Fe}(\text{OH})_3$, and pptd. from its soln. at p_{H} 4.5. It may be concd. by pptn. with safranine. The active ppt. thus formed removes the amide N of asparagine, quantitatively, but leaves the NH_2 group intact. Only glutamine among a no. of other acid amides tested was

hydrolyzed by the enzyme. The equations $Kt = m \log a/(a - x) + x$ (in which m is an empirical const.) and $Kt = \sqrt{a - x}$ were found to be applicable to the rate of hydrolysis of asparagine by the enzyme. The range of enzymic activity was from p_H 5.5 to 10.3 while the max. activity was at about p_H 8.0. ARTHUR GROLLMAN.²

Studies on the oxygen-, acid- and base-combining properties of blood. III. The validity of hydrogen-ion activity determinations by the hydrogen electrode in systems containing carbonic acid, carbonates, hemoglobin, carbon monoxide hemoglobin and methemoglobin. W. C. STADIE AND E. R. HAWES. *J. Biol. Chem.* 77, 241-64 (1928) — The assumptions involved in calcg. the p_H in $\text{BHC}_3\text{O}_3\text{-CO}_2\text{-H}_2\text{CO}_3\text{-BCL-Hb}$ systems from electromotive force measurements with the H electrode are discussed. Approx. evaluations are made of the error involved in assumptions concerning the activity of the hydrogen ion (a_H^+) of the reference soln and the liquid junction potentials between 0.1 *N* HCl, satd. KCl and (BHC_3O_3 , BCL, Hb) || satd. KCl. The liquid junction potentials between solns. of $\text{BHC}_3\text{O}_3\text{-CO}_2\text{-H}_2\text{CO}_3\text{-BCL-Hb}$, of widely varying concns., and satd. KCl are negligible as indicated by Bjerrum's extrapolation, the error in relative p_H detns. being probably $< 0.016 p_H$ units. The H electrode is a reversible source of electromotive force in $\text{BHC}_3\text{O}_3\text{-CO}_2\text{-H}_2\text{CO}_3\text{-BCL-Hb}$ systems as shown by the applicability over a wide range of the relation $e. m. f. \propto RT/NF \ln P_{H_2}$, in which P_{H_2} is the H_2 pressure. The free energies of the ionization of H_2CO_3 calcd. from e. f. m. and cond. measurements agree at 38° but are not identical at all temps. The heats of ionization of H_2CO_3 calcd. from thermal and cond. data and those from e. m. f. data differ by 20%. The latter alone are identical when detd. in simple H_2O soln. and in 10 *m M* hemoglobin soln. There are no appreciable side reactions in $\text{BHC}_3\text{O}_3\text{-CO}_2\text{-H}_2\text{CO}_3\text{-BCL-Hb}$ systems giving rise to irreversible electromotive forces. The H electrode is reproducible to ± 0.5 millivolt in 0.1 *N* HCl and in 10 *m M* hemoglobin soln. Existing evidence also establishes the reversibility of the cell reaction in e. m. f. measurements of a_H^+ in $\text{BHC}_3\text{O}_3\text{-CO}_2\text{-H}_2\text{CO}_3\text{-HCL-Hb}$ systems. The relation of hydrated and unhydrated H^+ on hemoglobin solns. is discussed. **IV. The apparent first dissociation constant $p_{K'}$ of carbonic acid and the activity coefficient of the bicarbonate ion in solutions of hemoglobin, methemoglobin, cyano-hemoglobin and nitric oxide hemoglobin at varying ionic strengths.** *Ibid* 265-301.—The apparent first dissocn. const., $p_{K'}$, of H_2CO_3 was calcd. from elec. trometric p_H and stoichiometrical total CO_2 and P_{CO_2} in solns. of varying concns. of CO_2 , reduced-, met-, cyano- and NO-hemoglobin and varying ionic strengths. These values when plotted against \sqrt{I} , the square root of the ionic strength expressed as mols. per l., gave linear equations of the form $p_{K'} = p_{K^*} - \beta \sqrt{I}$. The total activity coeff. of HCO_3^- was calcd. from $p_{K'}$. These values of $\gamma_{\text{HCO}_3^-}$ are related to \sqrt{I} according to the linear relation $\log \gamma_{\text{HCO}_3^-} = -\beta \sqrt{I}$, which is the limiting equation of the Debye-Hückel theory. When $[\text{Hb}] = 0$, the theoretical value, $\beta = 0.54$, is obtained. With increasing $[\text{Hb}]$, β decreases and this can be expressed by the equation $\beta = \beta_0 - \sigma [\text{Hb}]$, in which $\beta_0 = 0.54$ and σ is a const. p_{K^*} , the value of $p_{K'}$ at finite $[\text{Hb}]$ and when $I = 0$ decreases according to the equation $p_{K^*} = 6.33 \rho [\text{Hb}]$, where ρ is a const. On the basis of the consts σ and ρ , both of which are characteristic of the derivs. of Hb, these derivs. may be divided into 2 groups: (1) HbCO and HbNO and (2) reduced Hb, meta-Hb and HbCN . The activity coeff., $\gamma_{\text{HCO}_3^-}$, can be equated to 2 activity coeffs. γ_* and γ_0 and calcd. by the equations $\log \gamma_{\text{HCO}_3^-} = \log \gamma_* + \log \gamma_0$; $\log \gamma_* = -\rho [\text{Hb}]$ and $\log \gamma_0 = -[0.54 - \sigma [\text{Hb}]]\sqrt{I}$. These coeffs. permit the calcn. of $p_{K'}$ over wide ranges of Hb and I ; γ_* measures the effect of $[\text{Hb}]$ on $\gamma_{\text{HCO}_3^-}$ and γ_0 , the effect of salt. The value of $p_{K'}$ in the red blood cells is calcd. as 5.98 and 5.87 for the oxidized and reduced states, resp. At const. I , $p_{K'}$ and $\gamma_{\text{HCO}_3^-}$ are const. in Hb solns. at p_H values above and below the isoelec. point, showing $\gamma_{\text{HCO}_3^-}$ to be the same whether HCO_3^- is combined with Na^+ or with Hb. **V. Extension of the Debye-Hückel theory of ionic interaction to hemoglobin, bicarbonate-sodium chloride systems.** W. C. STADIE. *Ibid* 303-23.—The Debye-Hückel theory is applied with special reference to concd. Hb solns. The assumption is supported that the colloidal Hb ion has an ionic strength valence of 1. The relations of the ionic collision sphere of HCO_3^- , the dielec. const. of $\text{NaHCO}_3\text{-NaCl}$ solns., the hydration of Hb, and the possible existence of X_{HbCO_2} to the activity coeff. of HCO_3^- are outlined. The functions γ_* and γ_0 are discussed from the theoretical standpoint. Values of the characteristic consts., b , the ionic diam. of HCO_3^- , and δ , the effect of the Hb on the dielec. const. of H_2O are calcd. and shown to be consistent with measurements by independent methods. Equations are given for calcg. the activity coeffs. of HCO_3^- and hence $p_{K'}$ in solns. of Hb varying from 0 to 20 *m M* per l. and of salt from 0 to 0.5 *M*

per l., in terms of universal consts. and b and δ . From these equations $p_{x_1} = 6.33 + \log \gamma_0$ and $b = 2 \times 10^{-8}$ cm.

Chemical constitution and toxicity. ERNEST WALKER. *Biochem. J.* **22**, 292-305 (1928).—The toxicity was measured against the unicellular organism, *Colpidium colpoda*. Among As compds. aromatic derivs. are more toxic than the aliphatic; the tervalent derivs. are more toxic than the quinquevalent; the secondary derivs. are more toxic than the primary and tertiary; the primary derivs. are more toxic than the tertiary. The most toxic compds. are the tervalent secondary derivs., particularly compds. of the diphenylarsene type. The toxicity of arsenicals is concerned with the sulfhydryl constituents of the cell.

ERNEST HENRY STARLING, 1866-1927. C. J. M. *Proc. Roy. Soc. (London)* **B102**, xvii-xxvii (1928).—This obituary note includes a picture of Starling and an account of his contributions to chem. physiology.

Heredity, development and chemistry of organisms. HANS SCHIMMELFUSS. *Naturwissenschaften* **16**, 209-19 (1928).—A lecture on the chem. aspects of heredity factors (genetical chemistry). It is pointed out that chem. and phys. chem. influences on the substances transmitting heredity (chromomers) may cause mutation or modification of species. Examples are cited of apparent polymerization of factors depending on the conditions of the medium, buffer action on or steric orientation of factors. The influence of the chromomers on the development of the cell is compared with that of a catalyzer of high local concn. From chem. action of the constituents of the progeny hybridization and Mendelian cleavage can be explained. Numerous schemes are developed including those for dominating factors.

The biological significance of the salt concentration of natural waters. CARL SCHLEIFER. *Naturwissenschaften* **16**, 229-37 (1928).—A review.

Occurrence and decomposition of pyrophosphate in the muscle. K. LOHMANN. *Naturwissenschaften* **16**, 298 (1928).—On digesting a muscle suspension at 40° to 45° for one to two hrs. with NaHCO_3 the total P_2O_5 increases with 0.7 to 0.9 mg. per g. muscle. This reaction, explained by Embden as decompn. of lactacidogen, is now ascribed for at least 75 to 90% to enzymic hydrolysis of $\text{K}_2\text{P}_2\text{O}_7$ to K_2HPO_4 and is assumed to be independent of lactic acid. In fresh muscle 0.6 to 0.7 mg. P_2O_5 is present as pyrophosphate, i. e., $1/4$ of the total acid-sol. phosphate. The acid was identified after sepn. as Cu salt from the $\text{CCl}_3\text{CO}_2\text{H}$ muscle ext. by its Na and by its diaquotetramminocobalt salt. Fresh muscle is able to perform hydrolysis of pyrophosphate; this function is destroyed by heating for 1 min. in a water bath. The lactacidogen, a hexose-monophosphoric acid, is not decomposed noticeably by NaHCO_3 autolysis or during a muscle cramp condition. However Embden's ester added to the muscle suspension decomposed completely. Fresh muscle tissue does not seem to contain any hexosediphosphoric acid; it is formed after prepn. of the ext.

The biological functions of the proteins. DOROTHY JORDAN LLOYD. *Biol. Rev.* **3**, 165-77 (1928).—The amphoteric nature of the proteins and the resulting high degree of sensitiveness to changes of reaction and compn. of cell fluids establishes a relation between the proteins of different cells and between the cell and the environment. The inertia of the colloidal particles ensures a certain stability to the system. The many possibilities of structural differences are the chem. basis of the differentiation of species. Proteins play an important role in metabolism as constituents of the respiratory pigments, enzymes, nucleoproteins (chromatin) and possibly also of insulin.

Researches on the combination between glucose and protein. P. DE LUCIA. *Boll. soc. ital. biol. sper.* **2**, 260-2 (1927).—Working with gelatin and egg albumin, L. failed to obtain any evidence that glucose combines chemically with either of these two proteins.

Oxidases and peroxidases not bound to hemoglobin in red bone marrow (oxone) and their properties. I. The technic of preparation of oxone. ALFRED NEUMANN. *Folia Hematol.* **35**, 30-7 (1927); cf. *C. A.* **21**, 2028. **II. Influence of oxone on the blood picture.** ALFRED NEUMANN AND ERWIN GRATZL. *Ibid.* 38-64.—Oxone or dried ext. of red bone marrow, injected intraperitoneally into dogs, produced a leucopenia. The effect on rabbits was similar but less marked. It seems to injure the function of the hematopoietic system.

The determination of osmotic erythrocyte resistance by the method of Cohnreich. F. ROUTER. *Folia Hematol.* **35**, 116-8 (1927).—The Cohnreich method gives slightly lower figures than the Hamburger method.

Infra-red absorption spectra of blood and of gelatin. J. RISLER AND POUVEAU DE COURMELLES. *Rev. pathol. comp. hyg. gén.* **27**, 957 (1927); *Bull. soc. hyg. aliment.* **16**, 33 (1928).—It follows from the observations of R. and C. that the heat emitted by the

human body (measured in wave lengths) corresponds to the heat absorbed by the constituent elements of living org. matter, which leads to the belief that one of the chief functions of proteins is to maintain the temp. equil.

Inorganic composition of human and animal tissues. L. LEMATTE, G. BOINOT AND E. KAHANE. *Rev. pathol. comp. hyg. gén.* 27, 1170(1927); *Bull. soc. hyg. aliment.* 16, 35-6(1928).—From detns. of the inorg. constituents of the chief human and animal tissues, no general conclusions could be drawn, and it is suggested that the problem might more profitably be attacked by prep. solns. of the lipoids, carbohydrates and proteins by extrn. with neutral solvents and examg. these solns.

Studies on crystalline insulin. III. Further observations on the crystallization of insulin and on the nature of the sulfur linkage. The isolation of cystine and tyrosine from hydrolyzed crystalline insulin. VINCENT DU VIGNEAUD, H. JENSEN AND OSKAR WINTERSTEINER. *J. Pharmacol.* 32, 367-85(1928); cf. *C. A.* 21, 2912.—Crystals of insulin obtained by the brucine method were redissolved in AcOH, the soln. was treated with pyridine, centrifuged and dil. NH₃ added to the supernatant fluid. Crystals of insulin, brucine-free, were obtained. Cryst. insulin, brucine-free, could also be obtained from the impure powder by the same general procedure. Cryst. insulin was heated on the water bath with HCl. Samples were analyzed at intervals of 4.5, 8.5 and 12.5 hrs. The total N and tyrosine content remained the same. Amino N increased slightly. The value for cystine by the Folin-Looney method decreased, while the cystine value by the Sullivan method increased. The latter is due to liberation of free cystine, while the decrease in the Folin-Looney value (which detns. free and dipeptide cystine) is probably due to a destruction of cystine by HCl. There is a significant difference between the Folin-Looney and Sullivan values, the latter being only about one-half the former. A mixt. of cystine and tyrosine obtained by hydrolysis of insulin with HCl was extd. with a mixt. of equal parts of BuOH and ether contg. one drop concd. HCl per 5 cc. This extd. practically all the tyrosine and only a trace of the cystine. The tyrosine could be obtained by evapg. the soln. to dryness, adding NH₄OH, and pptg. with AcOH. The insol. portion left after extg. with alc.-ether was dissolved in HCl and pptd. by addition of NaOH until only slightly acid to Congo red. Crystals of cystine were obtained. Analysis of the mixt. of amino acids and of the mother liquor showed the Folin-Looney and Sullivan values to be the same in the ppt. but the former was twice the Sullivan value in the mother liquor. Two subsequent crops of amino acid crystals were obtained from this mother liquor, and the latter again showed a Folin-Looney value twice the Sullivan value. This indicates the presence of another S compd. besides cystine, probably a dipeptide. IV. The isolation of arginine, histidine and leucine. H. JENSEN, OSKAR WINTERSTEINER AND VINCENT DU VIGNEAUD. *Ibid* 387-96.—Cryst. insulin was hydrolyzed by boiling with H₂SO₄ and from the hydrolyzate were isolated histidine, as the picrolonate, arginine as picrolonate and flavianate, lysine as picrate and leucine. Insulin was found to contain 2.57% histidine, estd. by the colorimetric method of Koessler and Hanke. V. The distribution of nitrogen in crystalline insulin. OSKAR WINTERSTEINER, VINCENT DU VIGNEAUD AND H. JENSEN. *Ibid* 397-411.—The N distribution in cryst. insulin was studied by the application, with some modifications, of the method of Van Slyke for the detn. of N distribution in proteins. Cryst. insulin was hydrolyzed with HCl and samples of the hydrolyzate were analyzed for total N, giving values of 15.72 and 15.68%. After the hydrolyzate was freed from HCl by distn. *in vacuo*, samples again analyzed for total N gave 15.68%. Arginine, cystine, lysine and histidine ppt. with phosphotungstic acid. This fraction, and filtrate were analyzed. Distribution was as follows: ammonia N 9.58, humin N 2.42, arginine N 6.60, cystine N 6.08, histidine N 7.60, lysine N 2.76, amino N in filtrate 56.30, non-amino N in filtrate 8.31%. The hydrolyzate was also analyzed for S by the method of Denis, giving a value of 3.16% S. The basic fraction gave 57.5% of total S, while the monoamino fraction gave 46.7%. The high value of the sum is probably due to the presence in both fractions of some phosphotungstic acid. By the Folin-Looney colorimetric method the S content was slightly higher than by the Denis method. The Sullivan method gave 1/2 the Folin-Looney value. In the basic fractions the three methods gave practically the same values, indicating that most of the S here was accounted for by cystine. The discrepancy between the Folin-Looney and Sullivan values in the hydrolyzate is accounted for in the monoamino fraction.

Study of the reducible and hydrolyzable sugar in blood plasma. GEORGES FONTES AND LUCIEN THIVOLLE. *Bull. soc. chim. biol.* 10, 262-71(1928); cf. *C. A.* 21, 231f.—The sugars in total blood after defecation with Hg(NO₃)₂ are from 50 to 85% of the immediately reducible sugars in the plasma defecated by tungstic acid. The hexoec-diphosphoric acid is not completely pptd. by Hg(NO₃)₂ at a p_H 6.5; it is not totally

hydrolyzed in 1 hr. on the water bath in a medium of $1/30$ N H_2SO_4 , and after this partial hydrolysis its reducing power increases. The hydrolyzable and reducing substance of the blood plasma is a sugar but it is not lactacidogen. L. W. RIGGS

• **The nonfermentable residue of free sugar of the blood.** E. J. BIGOOD AND (MLLE.) A. WUILLOT. *Bull. soc. chim. biol.* **10**, 272-3(1928); cf. C. A. **22**, 105.—The reducing power of a soln. of levulose contg. 0.25 g. per l. is not modified by the action of H_2SO_4 sufficient to make the soln 0.5 N, for 1 hr. at 100° . A similar treatment of the nonfermentable residue of the free sugar of the blood causes the reducing power to disappear. **Proteinic sugar in the blood plasma.** *Ibid* 274-8.—A review and discussion of the work of Condorelli are given. (Cf. C. A. **19**, 2961.) L. W. RIGGS

The protein group in hemoglobin. J. BARCROFT. *Bull. soc. chim. biol.* **10**, 279-81 (1928).—The questions reviewed are: the differences between the hemoglobins of different species, the causes of these differences and the biological signification of the specificity of hemoglobin. L. W. RIGGS

Preparation, by the bacterium of sorbose, of a new reducing sugar with seven atoms of carbon. GABRIEL BERTRAND AND GEORGES NITZBERG. *Compt. rend.* **186**, 925-8(1928).—By the action of the bacterium of sorbose upon α -glucoheptide, a new reducing cryst. sugar is obtained contg. 7 atoms of C and named α -glucoheptulose. It has a sweet taste, dissolves in a little more than its wt. of water at ordinary temp., but is much less sol. in alc. Elementary analysis and cryoscopic detns. indicate the formula $C_7H_{14}O_7$. The purified crystals m. 173.5° , $[\alpha]_D -67.8'$. Its osazone m. $209-210^\circ$. The reducing power of the sugar is 80% that of glucose. It does not undergo alc. fermentation, and probably contains a ketone group. L. W. RIGGS

Measure of the thickness of thin protoplasmic layers. FAURÉ-FREMIET AND (MLLE.) CHOUCROUN. *Compt. rend.* **186**, 979-82(1928).—An optical and histological study. L. W. RIGGS

The nucleo-plasmatic ratio in various mammalian organs. (MLLE.) M. ROWINSKA. *Compt. rend. soc. biol.* **98**, 783-4(1928).—The total and purine N was detd. in the pancreas, spleen, thyroid, suprarenal, kidney, intestine, lung, brain and muscle of the horse, liver of the ox and thymus of the calf. The nucleo-plasmatic ratio varies roughly as the purine N. In the fowl both purine N and the nucleo-plasmatic ratio were higher in white than in dark meat. L. W. RIGGS

Preparation of uricase. ST. J. PRZYŁECKI. *Compt. rend. soc. biol.* **98**, 787-8(1928).—To 300 g. of hashed frog tissue was added 60 cc. $CHCl_3$, 160 glycerol and 200 water. The mixt. was allowed to stand 2 days at 15 to 20° , when 2500 cc. of water were added and 24 hrs. later the liquid, called the ext., was collected and served as a source of the enzyme. Attempts were made to prep. a powder from the ext. but the product lacked the enzymic activity of the ext. from which it was made. A prepn. made by dialysis of the liquid after pptn. by acetone was more active than the powder. Uricase was also prepd. from mammalian liver and from wheat. **Mode of action of uricase.** ST. J. PRZYŁECKI AND R. TRUSZKOWSKI. *Ibid* 789-90.—To compare the action of uricase in anaerobiosis with its action in aerobiosis the following coeffs. were detd.: Q_1 = (uric acid degraded in anaerobiosis in presence of methylene blue $\times 100$)/uric acid degraded in aerobiosis without acceptor of H, Q_2 = (uric acid degraded in anaerobiosis in presence of methylene blue $\times 100$)/uric acid degraded in aerobiosis in presence of methylene blue. With uricase obtained from the frog $Q_1 = 3$, $Q_2 = 5$ to 10 . These coeffs. were not influenced by purification, heat or chem. agents. Uricase is inactivated by solns. of $HgCl_2$, NaF and by alcs. Inactivation by solns. of $HgCl_2$ or NaF is the same in the presence of an acceptor of H, or in the presence of air without this acceptor. KCN in concns. of M/500 to M/5000 totally inactivates uricase. It appears that uricase is not a dis-hydrogenase, but an oxidase in which its principal role is the activation of O. The action of cyanogen suggests that in the degradation of uric acid by uricase, a heavy metal in an ionized state intervenes in a great measure. **Properties of uricase.** *Ibid* 790-2.—The conditions of thermostability, thermostability and substrate of uricase are discussed at length. Chemically, all the prepn. of uricase give faint biuret and xanthoproteic reactions and the Millon reaction. The tryptophan reaction is almost negative. Uricase contains S, N and traces of P. The intensity of the biuret reaction is not in proportion to the activity of the uricase. It reduces Fehling and Nylander solns. The heavy metal which appears to be necessary for the activity of uricase is probably Cu. L. W. RIGGS

Recent work on the chemical determination of sex. PH. JOYET-LAVERGNE. *Rev. g n. sci.* **39**, 168-9(1928).—A review. L. W. RIGGS

The reducing power of blood in vitro. (MLLE.) E. SLUTTER AND J. KOK. *Arch. n erland. physiol.* **11**, 189-99(1926).—The reducing power of dog blood *in vitro* measured

by the Shaffer Hartmann-Tewaert method decreases at first, then rises at about the 5th hr. and then falls continuously. It is possible that the rise is due to the formation of glyceraldehyde, which is then converted to lactic acid, the degree of rise depending on the rates of the several reactions taking place simultaneously. In the presence of red cells, the phloroglucinol-HCl test for glyceraldehyde gave in several expts. a positive result. Since the reducing power of the blood is the balance of such processes as the combustion of glucose to CO_2 and H_2O , the formation of glucose, the synthesis of carbohydrates of high mol. wt., the combination of glucose with globulins or cholesterol and the formation of intermediary reducing compds. the authors postulate that the fluctuation of the quantity of reducing substances in the blood *in vitro* is due to the formation of intermediate reducing substances in the decompn. of glucose. M. H. SOULE

Differences between the mononuclear and polynuclear cells of exudates. A contribution to the knowledge of amoeboid motion in polynuclear leucocytes. A. BAKKER. *Arch. neerland. physiol.* 11, 234-305(1926).—White blood cells were examd. for phagocytic ability, glycogen content, consumption of O_2 , production of CO_2 , amoeboid motion and the effect of various physicochem. changes on this motion. The lymphocytes were obtained by adding 3 vols. of horse blood to a mixt. of 0.7% NaCl and 1.1% Na citrate (1 vol.). Mononuclear leucocytes were obtained by the injection of sterile liquid paraffin or milk into the peritoneal cavity of rabbits and a week later washing out with saline. Polymorphonuclears were obtained in the same manner by the injection of saline. The washed-out fluid was received in citrate mixt. The polymorphonuclears formed long pseudopodia in Ringer soln. or phosphate mixts., especially when the reaction of the solns. was below p_{H} 7.4. CO_2 was not a specific stimulant for pseudopodia formation. The leucocytes were capable of giving large extrusions in the phosphate mixts. The Na salts of the lower fatty acids (up to butyric) stimulated the production of pseudopodia due probably to the lowering of the surface tension. The undissocd. higher fatty acids were toxic. In solns. of colloids (serum gum arabic and gelatin) pseudopodia were also formed. The mononuclear cells showed no pseudopodia in any of the media but actively phagocytosed starch granules in spite of the absence of pseudopodia. The polymorphonuclear cells formed pseudopodia even in a 0.9% NaCl soln. After the mononuclear cells phagocytosed polymorphonuclear cells their granules gave the I_2 reaction but no glycogen could be demonstrated. The rate of O_2 consumption and CO_2 production was the same for both types of cells. The former action depends on the O_2 tension. Similarly the cells were capable of decomposing glucose with the formation of lactic acid under aerobic and anaerobic conditions. The quantities of O_2 consumed and CO_2 produced were of the same order as that found by Warburg for cancer cells. M. H. SOULE

Microchemistry and microphysics in biology. JOS. GICKLHORN. *Protoplasma* 2, 89-125(1927).—An excellent review in German covering the entire domain of cytology. References are made to about 100 original papers. M. H. SOULE

Recent advances in colloid chemistry and their biological significance. HERBERT FREUNDLICH. *Protoplasma* 2, 278-99(1927).—A critical review in German of the work of the last 15 years. Particular attention is given to the application of modern methods to the detn. of such data for biol. materials as the size of the colloidal particles; whether they are cryst., amorphous or mesomorphous; whether rod-like or plate-like; whether they are arranged in some definite manner, or are under the influences of stresses in definite directions; the elastic properties, etc. A very complete bibliography is given. M. H. SOULE

Studies on proteins. III. A comparative study of various meals; the influence of non-protein substance on the hydrolysis of proteins. T. YANAGIGAWA AND Y. NISHIDA. *Repts. Imp. Ind. Research Inst. Osaka Japan* 8, No. 14, 1-30(1928); cf. *C. A.* 21, 430.—Various vegetable and fish meals were analyzed for protein, fats, water and ash. They were also hydrolyzed with HCl and the N distribution was studied. The study on the influence of glucose, sucrose, starch and cellulose on the hydrolysis of casein showed that the above carbohydrates increased the human N content in the hydrolyzate in the inverse order of their mol. wt., while fats had no effect other than slightly retarding the speed of hydrolysis. NAO UYHI

A note on the calcium content of the serum of normal adults. ISADORE ROSEN AND FRANCES KRASNOW. *J. Lab. Clin. Med.* 12, 157-8(1926).—Ca was detd. by the Kramer-Tisdall method in sera from 50 normal persons and found to be definitely higher (10.7-13.2 mg. per 100 cc.) than the values usually accepted (9-11 mg. per 100 cc.) 91% of these cases had between 11.0 and 12.9 mg. of Ca per 100 cc. of serum, while only 7% had less than 11.0 mg. and none had less than 10.0 mg. E. W. WICKWIRE

The organic phosphorus of the cerebrospinal fluids. G. E. YOUNGBURG. *J. Lab.*

Clin. Med. 12, 845-49(1927).—It was impossible to point out any nerve tissue changes by the amt. of org. P. Change in the amt. of org. P after death is very slow. In 200 cerebrospinal fluids, between 0.06 mg. and 0.59 mg. % of P was found, the great majority being between 0.1 mg. and 0.3 mg. %. This P was not in lipid form but in all probability in protein combination. No diagnostic value can yet be attached to the detn. of org. P. Org. and inorg. P contents are independent of each other. E. W. W.

Absorption of α - and γ -radiation and the secondary radiation which accompany them (DE BROGLIE) 3. Specific molecular geometry (FERRIER) 2.

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Experimental investigation on the technic of hemoglobin resistance tests. M. WISSLER. *Zentr. inn. Med.* 49, 49-55(1928).—The hemoglobin resistance is measured by the time in seconds necessary for the disappearance of the oxyhemoglobin bands spectroscopically after the destruction of a blood soln. containing a definite amt. of this pigment by addn. of acid or alkali. It is as satisfactorily carried out by the detn. of the time necessary for the color loss with the naked eye. For const. results the soln. must be shaken at least 15 sec. and the temp. of the room must be uniform. Higher hemoglobin resistance was found with men than with women but no differences from the normal were observed in the case of icterus. H. J. DEUEL, JR.

Indican in urine investigations. CARL OTTO. *Pharm. Ztg.* 73, 439(1928).—Referring to a recent paper by Schlecht (cf. *C. A.* 22, 1788) the author describes his experience in detecting indican in various samples of urine, using as reagent a soln. of FeCl_3 in concd. HCl . W. O. E.

Histochemical detection of cholesterol. LÉVELIER AND NOEL. *Bull. hist. appl. physiol. path.* 3, 316-9(1927); *Physiol. Abstracts* 12, 193.—Cholesterol can be shown in sections (suprarenal) by slow pptn. with a 1% soln. of digitonin in weak alc. at 35°. The complex crystals of digitonin-cholesterol so formed were studied microscopically. H. G.

Method of vivi-dialysis. H. NECHLES. *Chinese J. Physiol.* 1, 69-80(1927); *Physiol. Abstracts* 12, 326.—The membrane is gold-beater's skin impregnated with gelatin and treated with dichromate. H. G.

A comparison of the Folin-Wu and new Benedict methods for the estimation of blood sugar. A. E. OSTERBERG. *J. Lab. Clin. Med.* 12, 278-82(1926); *Physiol. Abstracts* 12, 164.—Analysis in 194 consecutive blood specimens showed that the new method gives considerably lower results than the original Folin-Wu procedure. H. G.

A simpler method for the preparation of potassium pyrogallate solution for metabolic rate determinations. F. F. SCHWENTKER. *J. Lab. Clin. Med.* 12, 287-8(1926); *Physiol. Abstracts* 12, 136.—The KOH is dissolved in distd. water by heat, and the d. of the resulting soln. immediately detd. and brought to 1.517. The hot soln. is poured into a bottle contg. the requisite amt. of pyrogallic acid, and allowed to ripen for a month. H. G.

Modified digestion acid for non-protein nitrogen determination. M. DUPRAY. *J. Lab. Clin. Med.* 12, 387(1927); *Physiol. Abstracts* 12, 136.—A mixt. of H_2SO_4 , HClO_4 , and H_3PO_4 is used, the advantage being that no ppt. occurs in the cooled digest. H. G.

Oxalic acid, a good white cell diluting fluid. R. JONES. *J. Lab. Clin. Med.* 12, 614(1927); *Physiol. Abstracts* 12, 319.—A 2% soln. of oxalic acid destroys the red cells and renders the white cells more clearly defined than the usual acetic acid method.

H. G.

The determination of minute amounts of lead. P. SCHMIDT. *Deut. med. Wochschr.* 54, 520(1928).—A preliminary report of a combined electrolytic and colorimetric method for the detn. of small amts. of Pb in tissues.

ARTHUR GROLLMAN

The estimation of amino acid nitrogen in animal tissues. J. M. LUCK. *J. Biol. Chem.* 77, 1-12(1928).—The following procedure is described for detg. the amino-acid content of liver and muscle tissue. Excise 4 to 5 g. of the tissue and drop into liquid air. Powder the tissue and weigh a 3-g. portion to a mg. Transfer by means of 30 to 35 cc. of boiling 0.01 N AcOH to a tube 8 × 1 inches, graduated to 50 cc. Keep the tube at b. p. for 7 min. in a H₂O bath and shake from time to time. Cool, add 3 cc. of 50% CCl₃COOH and adjust the vol. to 50 cc. with H₂O. Mix the suspension and allow to stand for 30 min.; add 2 g. of infusorial earth; shake the mixt. vigorously for 10-15 sec. and filter. Measure 35 cc. of the filtrate into a 100-cc. beaker and evap. to about 10 cc. Add 10% NaOH until the soln. is alk. to phenolphthalein and boil the soln. for 2 min. Acidify by adding an excess of glacial AcOH and concentrate to a vol. of about 1 cc. Wash the residue into a Van Slyke app. and det. the amino acid as usual.

ARTHUR GROLLMAN

The determination of small amounts of lipid in blood plasma. W. R. BLOOR. *J. Biol. Chem.* 77, 53-73(1928).—The following procedure for detg. the lipids of blood plasma is described: Add slowly 3 cc. of the plasma to about 40 cc. of a 3:1 mixt. of redistd. alc. and ether, in a 50-cc. volumetric flask, while rotating the flask to give a finely flocculent ppt. Bring to a boil by immersing the flask in boiling H₂O, with const. rotation; maintain at this temp. for a few secs.; allow to cool, make up to vol. with the alc.-ether mixt. and filter through a fat-free filter. To a measured portion of this ext. contg. about 5 mg. of total lipid in a 100-cc. Erlenmeyer flask, add 2 cc. of an approx. N soln. of NaOEt made by dissolving 2 to 3 g. of Na in 100 cc. of abs. alc. Evap. the mixt. on the H₂O bath to absence of alc., leaving a pasty residue. Add 1 cc. of dil. H₂SO₄ (1 H₂SO₄:3H₂O), then heat on the H₂O bath for 1 min. and add 10 cc. of petr. ether (especially prepd. by fractional distn. and purification) to the hot mixt. Rotate the flask gently at the b. p. for 2-3 min. and pour the solvent completely into a 25-cc. volumetric flask. Heat and ext. again with 5-cc. portions of petr. ether until the flask is nearly full. Cool, adjust to the mark and mix the contents. Place 10-cc. aliquots of this soln. in 125-cc. glass-stoppered digestion flasks. Evap. the solvent and remove the last traces by a current of air. Add 5 cc. of *Nicloux'* Ag reagent and 3 cc. of N K₂Cr₂O₇ and set the loosely stoppered flasks in the oven for 5 min. Then rotate, stopper tightly and keep for 15-20 min. at 124° ± 2°. Without cooling add 75 cc. distd. H₂O and det. the excess K₂Cr₂O₇ with 0.1 N Na₂S₂O₃ by adding 10% KI and titrating the liberated I with 0.1 N Na₂S₂O₃. Cholesterol was detd. colorimetrically and the total fatty acids were calcd.

ARTHUR GROLLMAN

The determination of the circulating blood volume with carbon monoxide. H. C. CHANG AND G. A. HARROP, JR. *J. Clin. Investigation* 5, 393-405(1928).

A. G.

Can Dr. Einhorn's fermentation saccharimeter be used for the determination of sugar? TH. UMBACH. *Chem.-Ztg.* 52, 273(1928).—E.'s saccharimeter is used for detg. sugar in urine. Expts. with yeast and known amts. of sugar show that the cc. of CO₂ evolved varies unless a definite vol. of fermentable liquid is used. The instrument, therefore, as now calibrated is not reliable.

W. T. H.

Determination of amino acids in the blood: a note on Folin's method. S. H. EDGAR. *Biochem. J.* 22, 162-7(1928).—An increase in the amino-acid N follows from increasing the alkyl. The rate of increase falls off gradually, to give a const. value at an alkyl. higher than that used by Folin.

BENJAMIN HARROW

Estimation of hippuric and phenaceturic acids in urine. E. J. WAYNE. *Biochem. J.* 22, 183-87(1928).—A modification of Steenbock's method (*C. A.* 6, 2244).

B. J.

Accurate micro-determination of chlorine and iron in blood and other liquids. F. H. SMIRK. *Biochem. J.* 22, 201-7(1928); cf. *C. A.* 21, 2143.—Estn. of Fe and Cl₂ on 0.02 cc. of whole blood or corpuscles is described. For details the original must be consulted.

BENJAMIN HARROW

Further developments of rapid volumetric methods for the determination of amino acids, organic acids and bases. I. Rapid accurate determination of ammonia and volatile amines in fluids of biological interest, and the determination of the different classes of acid radicals represented in the total alcohol titration value. F. W. FOSMAN. *Biochem. J.* 22, 208-21(1928).—The original must be consulted. II. Rapid

quantitative removal and determination of the carbonic acid radical, especially in bacterial cultures, without exposing other constituents to risk of loss or change. F. R. FOREMAN. *Ibid* 222-9. —A strong alc. in which carbonic acid and small quantities of "free" volatile acids are dissolved parts with the CO_2 but retains the volatile acids on aeration. In alc., bicarbonates of "weak" nitrogenous bases and "free" carbonic acid lose their CO_2 on aeration. The estn. of the carbonic acid radical is based on these observations.

BENJAMIN HARROW
Chemical changes in muscle. I. Methods of analysis. ERIC BOYLAND. *Biochem. J.* 22, 236-44 (1928). —The methods of estg. glycogen, lower carbohydrates and lactic acid are critically examd. An improved method for detg. lactic acid, involving steam distn. combined with oxidation, is described.

BENJAMIN HARROW
A modification of the peroxidase reaction with sodium nitroprusside and benzidine. M. M. STRUMIA. *Arch. Path. Lab. Med.* 5, 447 (1928). —The method of Goodpasture (*C. A.* 13, 2224) for staining the oxidase granules of myelogenous cells has been modified by prepg. stock solutions A and B. A: Sodium nitroprusside, 5% aq. soln. B: Benzidine, 2.5% alc. soln. For use, mix 1 cc. of soln. A and 95 cc. of 95% alc., add 2 cc. of soln. B and 2 cc. of fresh soln. of H_2O_2 . While the mixt. keeps at least as well as the original Goodpasture soln., the stock solutions A and B keep indefinitely. The second modification is the substitution of any of the Romanowski stains for fuchsin. H. F. H.

T. PETERFI. *Z. wiss. Mikroskop.* 45, 56-9 (1928). —A micropipet filled with a gelatin gel contg. a high concn. of indicator is used to puncture the cell. The indicator diffuses into the cell contents, but the gel prevents other mixing or diln.

C. W. MASON
The staining of fixed tissues in relation to their isoelectric point. CLAUDIO PULCHER. *Boll. soc. ital. biol. sper.* 2, 223-4 (1927). —Studies were made to det. whether the electrochem. theory of adsorption could be applied to the staining of tissues. Slides streaked with frog blood, guinea-pig blood, egg albumin, fibrin, and hemolyzed blood were fixed with MeOH and heated. One group of slides was stained with an acid dye (acid fuchsin, eosin) and another with a basic dye (methylene blue) with solns. of the dye at p_H 1.4-12.5. Examns. of the preps. showed that the critical point for staining was displaced at $p_H + 0.7$ from the known isoelec. points. This displacement coincides to that of denatured egg albumin, which is displaced from p_H 4.7 to 5.4 and may be due to the fixation of the tissues. P concludes that the protein must be at the isoelec. point in order to take the stain.

PETER MASUCCI
Methods of determination of the p_H of liquids of the organism. E. J. BIGWOOD. *Bull. soc. chim. biol.* 10, 15-213 (1928). —This extensive paper reports a general examn. of all the methods in use for detg. p_H , the characters of the body fluids which must be taken in account in the detn. of their p_H values and the selection of methods for the different classes of fluids. Detailed lab. procedures are not given. The bibliography fills 27 addnl. pages.

L. W. RIGGS
Volumetric estimation of phosphorus and its application in biological analysis. M. JAVILLIER AND D. DJELATIDES. *Bull. soc. chim. biol.* 10, 342-53 (1928). —Various methods are discussed with 36 references to the literature. The authors' method was to ppt. the P with $(\text{NH}_4)_2\text{MoO}_4$ in a warm soln. in the presence of H_2SO_4 and the absence of HNO_3 . The washed ppt. was dissolved in NH_4OH , the soln. acidified with H_2SO_4 and the molybdate was reduced by Al foil and reoxidized by standard permanganate.

L. W. RIGGS
New procedure for the microestimation of free sugar and protein sugar in blood plasma. H. BIERRY AND A. VOSKRESSENSKY. *Compt. rend. soc. biol.* 98, 287-9 (1928); cf. *C. A.* 21, 2142; 22, 252, 790. —After hydrolysis the plasma is freed from albumin by $\text{Hg}(\text{NO}_3)_2$. Detailed directions are given.

L. W. RIGGS
Microestimation of free sugar and of protein sugar in the blood plasma. H. BIERRY AND A. VOSKRESSENSKY. *Compt. rend. soc. biol.* 98, 744-7 (1928); cf. preceding abstract. —The method consists in heating for 6 min. in the boiling water bath 5 cc. of the filtrate of disalbuminated blood with 2 cc. of an alk.-Cu soln. and measuring the Cu_2O produced by the Mohr-Bertrand method.

L. W. RIGGS
Distribution of uric acid in the blood and the cause of errors in its estimation. R. VLADESCO. *Compt. rend. soc. biol.* 98, 462-4 (1928). —The detn. of uric acid in the total blood is preferable to detns. in the serum, and should be preceded by a total hemolysis of the red corpuscles. Tungstic acid is always better than trichloroacetic acid as a defecating agent.

L. W. RIGGS
Cause of error in the application of the Hehner method of estimating the organic acids in the gastric juice. PAUL FLEURY AND PIERRE AMBERT. *Compt. rend. soc. biol.* 98, 503-4 (1928). —An artificial juice, consisting of 200 cc. of 4% egg albumin,

60 cc. N HCl, 2 g. NaCl, 1 g. pepsin and H_2O to 1 liter, none of the constituents of which gave an alk. ash, yielded by the Hehner method an ash with an alk. of 0.6 cc. 0.1 N NaOH. On evapn. of a soln. of egg albumin and NaCl and heating the residue to dull redness, an alk. ash is produced. Other proteins give a similar result. L. W. R.

A colorimeter for the determination of adrenaline by the method of Suto and Inouye. TAKEO KOJIMA. *Tohoku J. Exptl. Med.* 10, 281-92(1928).—The construction and use of the colorimeter are described. L. W. RIGGS

A simple method for the determination of calcium in whole blood. W. R. CAVEN AND A. CANTAROW. *J. Lab. Clin. Med.* 12, 76-77(1926); cf. *C. A.* 21, 3379.—To 2 cc. of 4% $(NH_4)_2C_2O_4$ in an accurately graduated centrifuge tube add 2 cc. of blood. Thoroughly mix, let stand 1 hr., then centrifuge at high speed for 10 min. Pour off supernatant fluid, invert the tube for 5 min. with the mouth on a pad of filter paper. Wash the ppt. once with 5 cc. distd. H_2O and once with 3 cc. dil. NH_4OH (2 cc. of concd. NH_4OH and 98 cc. distd. H_2O), centrifuging and draining each time as before. Add 2 cc. NH_2SO_4 , blown directly upon the ppt. to break up mat. Place the tube in a boiling water bath 1 min. and titrate oxalic acid with 0.01 N $KMnO_4$ in a water bath at 75°. This titration value multiplied by 10 gives Ca in mg. per 100 cc. of whole blood. E. W. WICKWIRE

A rapid method for the determination of chlorides in blood or urine. S. L. LIEBOFF. *J. Lab. Clin. Med.* 12, 702-6(1927).—Neutralize with $CaCO_3$ the soln. contg. chlorides and titrate with a standard $AgNO_3$ soln. with Na_2CrO_4 as an indicator giving a red color for an end point. For chlorides in blood place 5 cc. of tungstic acid filtrate of Folin-Wu (0.5 g. blood) in a small beaker. In a similar beaker place 5 cc. H_2O for control. Add to each beaker about 0.3 g. powdered $CaCO_3$ and 0.5 cc. of 0.25% aq. Na_2CrO_4 . Add 1 drop of the standard $AgNO_3$ soln. to the control, then add $AgNO_3$ standard to blood filtrate until change to color of control is produced. For chlorides in urine, place 5 cc. of urine in each of 2 small beakers and follow the same procedure as for chlorides in blood. If the urine is alk. acidify it with dil. AcOH before adding $CaCO_3$. E. W. WICKWIRE

Note on the tungstic acid precipitation of blood proteins. MICHAEL SOMAGYI. *J. Lab. Clin. Med.* 12, 800-1(1927).—To overcome incomplete protein pptn. in the prepn. of protein-free filtrates by the Folin-Wu method introduce the blood into 8 vols. of $1/11$ N H_2SO_4 . After laking, add 1 mol. of 10% Na tungstate. Shake, allow to stand about 5 min., then filter. E. W. WICKWIRE

A new standard for the Van Den Bergh test. B. W. RHAMY AND P. H. ADAMS. *J. Lab. Clin. Med.* 13, 87-9(1927).—It is found that 0.7 cc. 0.1 N stock $KMnO_4$ dild. to 50 cc. with distd. H_2O gives a color identical with azo-bilirubin soln. and is equiv. to 5 parts per million of bilirubin. 0.1 N $KMnO_4$ should stand a month to ripen. The top soln. is then siphoned off and the last 2 are discarded. The siphoned soln. may be standardized in the usual way and is stable, no appreciable change occurring under 4 months. The $KMnO_4$ soln. should be kept tightly corked, free from reducing vapors and in a dark bottle. E. W. WICKWIRE

Iodometric determination of glucose (NICHOLS) (ALVARADO, VOORHIES) 7. A modification of the Brown apparatus for the colorimetric determination of p_{H_2} (WRIGHT) 1. The spectrophotometric evaluation of mixtures of methylene blue and trimethylthionine (HOLMES) 7.

C—BACTERIOLOGY

A. K. BALLS

Autolytic power of *B. coli communis*. E. G. YOUNG. *Proc. and Trans. Nova Scotian Inst. Sci.* 17, 79(1927).—Sterile solns. obtained by alternately freezing and thawing emulsions of *B. coli communis* and then filtering through a Berkefeld filter have no action on dextrose in an atm. of N at 37° for several weeks, but effect a very slow hydrolysis of peptone as evinced by an increase in the free amino N. B. C. A.

A flagella staining technic. A. W. TURNER. *Rev. Hyg. Med.* 50, 318-9(1928).—A new, precise but rather difficult technic of especial value for *B. sporogenes*, *B. oedematus* and *B. tertius*. C. R. FELLERS

Further studies on a modification of the Gram stain. NICHOLAS KOPELOFF AND PETER COHEN. *Stain Tech.* 3, 64-9(1928).—As a substitute for acetone in decolorizing, equal parts of acetone and 95% EtOH for 10 sec. or less are now recommended. Aq. basic fuchsin (0.1%) serves as a strongly contrasting counter stain. Prolonged application renders Gram-positive organisms doubtful, or even Gram-negative, while short application renders Gram-negative organisms doubtful or Gram-positive. Exactly 20

sec. is recommended for counter staining. The method is of particular value in staining pure or mixed cultures, for org. materials such as acidophilus milk or feces.

C. R. FELLERS

A new substitute for ethyl alcohol in the Gram stain. H. J. CONN. *Stain Tech.* 3, 71-2(1928).—A mixt. of MeOH and isopropyl alc. in equal parts serves as a satisfactory substitute for EtOH in decolorizing in the Gram-stain technic. C. R. FELLERS

Rancidity of coconut oil produced by mold action. W. N. STOKOR. *Biochem. J.* 22, 80-93(1928).—The rancidity, caused by a *Penicillium* organism, is due to the presence of methyl amyl, methyl heptyl and methyl nonyl ketones. BENJAMIN HARROW

The metabolism of the *Bacillus tetani*. I. H. SIEVERS AND E. MÜLLER. *Z. Biol.* 86, 527-34(1927).—Exts. from large quantities of organisms yielded methylhydantoin (m. 165°, easily sol. in water, acid to litmus, sol. with difficulty in alc.), propionic, acetic, butyric and lactic acids.

FRANCES KRASNOW

• D—BOTANY

THOMAS G. PHILLIPS

Acidification of unbuffered salt solutions by plant tissue in relation to the question of tissue isoelectric points. F. E. DENNY AND W. J. YODEN. *Am. J. Botany* 14, 395-414(1927).—Studies were made of the effect of plant tissues upon unbuffered salt solns. Plant tissues such as thin disks of potato tubers, carrots, apples, whole seeds of corn, rye and wheat and corn seed powder were placed in various salt solns. of concns. varying from 0.1 M to 0.001 M. p_H detns. of the external liquid were made. These values varied with the salt used, the concn. of salt and especially with the nature of the cation. There was no characteristic p_H for a given tissue except as high diln. approached that of a water ext. of a tissue. The changes produced in the external soln. by salts were always in the direction of increased acidity. The effect was less marked for univalent cations, such as Na and K, than for the bivalent ions, Ca and Cu. Increases in acidity resulting from plant tissues placed in $CaCl_2$ were very great. The observed changes in p_H cannot be interpreted as indicating an isoelec. point for the tissue as a whole, nor do they furnish proof that a reaction has occurred between the ions of the salt solns. and the proteins with characteristic isoelec. points. In fact the increase in p_H may come primarily from non-protein non-colloidal substances which diffuse out of the tissue.

M. S. ANDERSON

The protein metabolism of the soy bean. O. K. STARK. *Am. J. Botany* 14, 532-47(1927).—Environmental factors are of great importance in protein metabolism. Frequent analyses are necessary in order to interpret the progress of protein hydrolysis since it may vary widely in different stages of growth. Temp. has a marked influence upon protein hydrolysis in early stages of growth but in later periods has no effect. Two varieties of soy beans are extensively compared. There is a great difference in N relationships of the 2 varieties; the Manchu is high in protein while the Midwest is low. Curves representing α -amino N content of the 2 varieties show much the same modes, but corresponding stages are reached earlier in the Midwest variety. Manchu seedlings are able to live longer on reserves in the seed than are those of the Midwest. This may be due to the kind of reserves rather than to the amt. During the period of growth the decrease in total N is both earlier and more marked in the Midwest. In both varieties, however, a part of the N reserve is finally respired. Contrary to the general hypothesis, no correlation exists between protein hydrolysis and growth except at very early periods. Respiratory intensity is unrelated to α -amino N content.

M. S. ANDERSON

Physiological aspects of the flow of latex in rubber plants. A. ZIMMERMANN. *Kautschuk* 1927, 95-8, 118-21, 147-9; *Brit. Chem. Abstracts* 1927B, 635.—A crit. review and discussion of the nature and phenomena of the flow of latex under different conditions.

C. C. DAVIS

A particular form of biological oxidation. II. An analysis of the generalization of different Bryophyta and their products of humification. J. HOUGHT, ANDRÉ MAYER AND L. PLANTÉPOL. *Ann. physiol. physicochim. biol.* 4, 123-8(1928); cf. C. A. 21, 3385, 22, 640.—The same technic was used as in the previous expts. The property of the *Hypnum triquetrum* to oxidize oxalic acid in soln. was found with some other aerial mosses of different species and genera. It was not found in the Sphagnes, an aquatic variety nor in some semi-aquatic Hepaticae although it was found in the aerial Hepaticae. The constituent which causes the oxidation resists the natural death of the plant and its decomposition. The humus shows the same activity. The property is

annuled by sunlight. The humus from other plants appears active or inactive, depending on how the whole plant behaves. H. J. DUGEL, JR.

Pentosan content in relation to winter hardiness in the apple. W. A. DELONG, *Sci. Agr.* 8, 501-23 (1928).—The least hardy varieties of apples have the greatest pentosan content as detd. by the HCl-phloroglucinol method. The correlation was not definite as marked inconsistencies occur. The results disagree with previous findings. There is no positive correlation between pentosan content and total loss of moisture or rate of loss of moisture at 75° in either the aerial or subterranean portions of the apple tree. The tops of trees contained 30% more pentosan than the roots, with the moisture loss the same in both cases. A critical review of pentosan literature indicates the indefiniteness of the product measured in the different analytical procedures and the obscurity of the origin of pentosans in plants. The discrepancy between results obtained by the HCl-phloroglucinol and the fermentation-Cu reduction methods is not due to any appreciable degree to substances precipitable by phloroglucinol and sol. in 95% EtOH at 60°. The small EtOH-sol. fraction of the phloroglucide ppt. is probably derived from hexoses rather than from methylpentosans since it gave color reactions characteristic of hydroxymethylfurfural. A list of 51 references is appended. C. R. FELLERS

The development of the wheat kernel. C. E. SAUNDERS. *Sci. Agr.* 8, 524-31 (1928).—In the development of the wheat kernel, protein was deposited throughout the whole period of development of the kernel, the rate of deposition being most rapid at the time when the kernel gained most rapidly in wt. During the first few days of the expt. the deposition of other material was relatively more rapid than that of the protein, so that the % of the latter actually decreased. The period of greatest physiol. activity was also the period of max. protein deposition. The % of protein remained relatively const. during the last 10 days of the expt. C. R. FELLERS

Staining cell constituents in diseased plant tissue. J. DUFRENOY. *Stain Tech.* 3, 57-63 (1928).—Staining with acid fuchsin and decolorizing with light green makes it possible in properly killed tissues to detect the slightest alteration in tissues and to observe the different parts of the cell, nucleus, mitochondria and plastids, even when excessive vacuolation compresses the cytoplasmic inclusions. Meves or Regaud fluids are considered best for tissue killing. C. R. FELLERS

Growth of seedling in relation to composition of seed. M. E. REID. *Botan. Gaz.* 81, 196-203 (1926); *Physiol. Abstracts* 12, 131.—Differences in different seedlings in their response to external influence were shown to be often correlated with the compn. of the seed. The investigations were carried out on several types of seedlings, and the chief chem. property of the seed investigated was the proportion of carbohydrates to N. H. G.

The absorption of water by plant tissue in relation to external hydrogen-ion concentration. W. H. PEARSALE AND J. EWING. *Brit. J. Exptl. Biol.* 4, 245-57 (1927); *Physiol. Abstracts* 12, 140.—The vol. of water absorbed by various vegetable tissues is a min. around p_H 3.2, 4.5, 5.5 and 6.6, whether fresh or dried tissue be used. Cellulose and starch do not show these turning points, which correspond closely to the isoelec. points of the vegetable proteins likely to be present. H. G.

Recent work on the localization of iodine and bromine in the cells of marine algae. MANGENOT. *Bull. hist. appl. physiol. path.* 4, 52-70 (1927); *Physiol. Abstracts* 12, 193-4.—Botanists have demonstrated the presence in algae of cells contg. I compds. in which the I is very loosely held. This is of great interest from the point of view of biology and of general cytology. The present review is devoted to the discussion of these facts and their consequences from the point of view of physiology in general. H. G.

The biology of the apple tree. G. RIVIÈRE AND G. PICHARD. *J. Soc. Nat. Hort. France* 25, 481-2 (1924); *Botan. Abstracts* 15, 1174-5.—This is a chem. study concerned especially with the glucoside, phlorhizin and malic acid. The authors believe that this glucoside is a reserve food which is used in starting growth in spring. During the growing season it is formed in the leaves and through hydrolysis furnishes glucose to the fruit. The glucose content of the fruit increases as the fruit ripens. H. G.

Plant distribution as affected by the hydrogen-ion concentration of the soil. F. G. GUSTAFSON. *Papers of the Michigan Acad. of Sci. and Letters* 6, 237-46 (1926); *Physiol. Abstracts* 12, 410.—A study of the H-ion concn. of the soil in the neighborhood of roots supports the view that plant distribution depends to a large extent on the acidity of the soil. Ways in which H-ion concn. may affect plant growth are noted. H. G.

The evidence for phosphatides in the external surface of the plant protoplast. F. C. STREWARD. *Biochem. J.* 22, 268-75 (1928).—There is no evidence that phosphatides are present in the surface layer of the protoplasm of various parenchymatous

tissues. Leaching expts. fail to show that the phosphatides diffuse from living tissues into distd. water. (Cf. Grafe, *C. A.* 21, 2912.)

Experimental semi-parasitism. COLLA SILVIA. *Boll. soc. ital. biol. sper.* 2, 225-8 (1927).—Expts. were made by introducing into the cut surface of potato tubers, wheat, corn and oat seeds. Under the exptl. conditions the seeds germinated and lived long after they had exhausted their food reserve, on the living but quiescent potato tubers.

PETER MASUCCI

Quantitative variations of enzymes in grains of wheat in the course of ripening, resting and germinating. A. M. BACH, A. I. OPARIN AND R. A. VENER. *Trans. Karpov Inst. Chem.* 1926, No. 5, 62-70; cf. *C. A.* 17, 1044.—Two sorts of wheats have been studied: *Triticum vulgare*, var. erythrospermum and *Triticum vulgare*, var. vebstinum. In the course of the growth samples of 100 grains each were taken every 1-2 days, dried in a vacuum desiccator over H_2SO_4 , weighed and used for detns of N (by Kjeldahl's method), and of the following 4 enzymes (by the authors' own method): catalase, peroxidase, amylase and protease. Curves have been drawn expressing these quant. changes as a function of time. The curves of enzymes at first mount irregularly, reach a certain max., then drop more or less abruptly. In the course of the ripening of the grains 2 opposite processes take place simultaneously: formation of active enzymes and their transition into inactive zymogens; the latter become transformed into enzymes in the course of germinating. It remains to be established how and from what materials enzymes are formed in ripening grains and how they turn into inactive zymogens. The comparison of curves shows that for all enzymes the max. in the course of ripening is always below the max. obtained in the course of germinating. Catalase and peroxidase decrease comparatively little in the course of ripening and increase 2-8 fold in the process of germinating; amylase and protease disappear in the process of ripening of grains, but show a phenomenal increase in the course of germinating.

BERNARD NELSON

Further contribution to the biochemistry and physiology of the cell phosphatides of plants. II. B. H. CRANNER. *Meldinger Norges Landbruks.* 7, 611-43(1927); cf. *C. A.* 21, 1290.—Phosphatide exts. from a number of diff. plants were prepd. especially from the blossoms and the fruits. The reactions with diff. reagents were studied, particularly the reactions with alk. and acid dyestuffs. Aq. exts. from peas, both the sol. and the insol. fraction, gave beautiful colored ppts. with 14 different alk. dyestuffs but no ppt. at all with acid dyestuffs. The insol. fraction was not attacked by pepsin even after several days at 30-35°. It was, however, readily dissolved in concd. HCl and also in satd. Na_2CO_3 . A great number of similar observations are reported.

C. A. ROBAK

Effect on plants of commercial brands of flowerpots. ARNE THURSRUD. *Meldinger Norges Landbruks* 7, 644-62(1927).—Expts. show a marked effect on the roots of the plants cultivated in new pots of certain brands. The harmful effect is probably due to basic matter, especially CaO. By elutriation of the pots for several weeks in running water the injurious substances are washed out and the harmful effect is reduced or removed. Still better is to elutriate the pots in dil HCl, for instance, 1-3 days in 0.1 N HCl. This treatment ought to be carried out by the potteries.

C. A. ROBAK

Contribution to the physicochemical analysis of the turgor mechanism in the separation-layer in plants. HANS PFEIFFER. *Protoplasma* 2, 206-38(1927).—A study was made of the morphology and physicochem. character of the various sepn. tissues. The sepn. and casting off of the male flowers of *Vallisneria spiralis* took place as a result of the increased turgidity and rounding up of the separation layer. There was a measurable increase in osmotic pressure and a diminution in the permeability of the cells of this layer. Treatment with narcotics, which was known to bring about increased turgor, was found to cause acceleration in the casting off of the flowers; other methods of causing increase in turgor, e. g., treatment with bases, isotonic sucrose solns., heat or CO_2 , had no effect on the time of casting off the flowers. It is suggested since there is some evidence that before sepn. the O_2 supply in the separation-layer is cut down that this partial anaerobiosis by altering the H/OH ratio is responsible for the phenomenon of increase in turgor.

M. H. SOULE

The relation between mechanical and chemical injuries to protoplasm and the action of some protective substances. V. V. LEPESHKIN. *Protoplasma* 2, 239-70 (1927).—The cells of *Spirogyra neglecta* were employed. The poisons act either on the disperse phase or on the dispersion medium. If the disperse phase coagulates a motion is set up which may exert a mech. action on the elements of the dispersion medium and cause death. The complete breaking down of the compds. of fats and proteins produces destruction of the cell. Acids, bases, salts of heavy metals, narcotics and

I_2 act directly on the dispersion medium, producing a chem. alteration of the proteins or fats. Neutral salts are poisonous only insofar as they produce coagulation of the disperse phase. The action of Al salts in aq. soln. is due to the pH as the non-hydrolyzed part of the electrolyte ($AlCl_3$) is not injurious. The protective action of Al salts is due to the removal of H_2O from the protoplasm.

M. H. SOULE

E—NUTRITION

PHILIP B. HAWK

Studies on "salt ophthalmia." III. E. V. MCCOLLUM, N. SIMMONDS AND J. E. BECKER. *Proc. Soc. Exptl. Biol. Med.* **24**, 952(1927).—The $FeSO_4$ in Salt Mixture 20 is responsible for the ophthalmia noted in rats fed diets contg. it. The $FeSO_4$ appears to destroy the vitamin A when fats are allowed to remain mixed with the salt.

C. V. B.

Growth-promoting value of cod-liver oil irradiated by sunlight and the mercury vapor lamp. A. L. DANIELS AND L. M. BROOKS. *Proc. Soc. Exptl. Biol. Med.* **24**, 971-2(1927).—The irradiation of cod-liver oil did not increase its antirachitic potency.

C. V. B.

Influence of feeding mixture on the antirachitic potency of cod-liver oil concentrate. A. L. DANIELS AND L. M. BROOKS. *Proc. Soc. Exptl. Biol. Med.* **24**, 972-4(1927).—The most effective method of administering a cod-liver oil concentrate is to dissolve it in oil.

C. V. B.

Vitamin A deficiency and urolithiasis. E. C. VAN LEERSUM. *Brit. Med. J.* **1927**, II, 873-4; cf. *C. A.* **22**, 800.—In rats there is a definite connection between vitamin A deficiency and formation of phosphatic calculi.

A. T. CAMERON

Familial pellagra in Ireland. J. T. MACCARTHY. *Brit. Med. J.* **1927**, II, 1180.—Two sisters, adult, both showed typical pellagra. M. considers that this could not be traced to the diet but represented an acute exacerbation of a chronic condition, the disease being due to an inability of the patient to use biologically valuable protein.

A. T. C.

Rice in the chemistry of nutrition. L. BORASIO. *Notiz. chim. ind.* **3**, 142-3 (1928).—Samples of Italian white rice were analyzed with the following % results: moisture 13.87, 13.70, 13.20, 14.00, 13.39, 13.60; fats 2.26, 0.44, 1.85, 0.24, 0.30, 0.27; proteins 9.53, 8.39, 7.14, 6.05, 8.37, 6.20; cellulose 1.80, 0.70, 1.29, 0.32, 0.42, 0.30; ash 1.43, 0.58, 1.17, 0.51, 0.67, 0.53; non-N extractives 71.11, 76.19, 75.35, 78.88, 76.85, 79.10; total P_2O_5 0.81, 0.65, 0.38, 0.20, 0.20, 0.21; phytinic P_2O_5 0.48, 0.39, 0.13, 0.06, 0.10, 0.05; lecithinic P_2O_5 0.12, 0.10, trace, trace, trace, trace; vitamin units 0.42, 0.38, trace, trace, trace, trace; catalases (15 min.-cc. 0) 40, 40, 1.5, 1.0, 1.5, 1.0; calorific power 3725, 3685, 3631, 3631, 3631, 3631. The results indicate the general character of Italian rice and show that it is fairly rich in vitamins, mineral substances, P compds., org. P (phytin, lecithin, etc.), fats and proteins.

C. C. DAVIS

The vitamin content of mung bean sprouts. CAREY D. MILLER AND DORIS B. HAIR. *J. Home Econ.* **20**, 263-71(1928).—Compared with other common vegetables in feeding expts. on animals the sprouts of the mung bean (*Phaseolus mungo* or *P. aureus*) are a fair source of vitamin A (both raw and cooked) a very good source of B (raw and cooked) and an excellent source of C in the raw state and a good source when cooked.

L. D. ELLIOTT

The multiple nature of vitamin B. SYBIL L. SMITH. *J. Home Econ.* **20**, 241-4 (1928).—A plea for uniform nomenclature in distinguishing the two component factors of vitamin B. S. suggests the terms vitamin F and G.

L. D. ELLIOTT

A basal diet for nitrogen balance experiments. LOUISE M. PICKENS AND ROSSLENE M. ARNOLD. *J. Home Econ.* **20**, 250-2(1928).—A basal diet consisting of almonds, apple butter, cheese and crackers was found to be easily prepd., required a min. of analytical work and secured a uniformity of diet through the expts. The diet was palatable and satisfying and did not cause digestive disturbances.

L. D. ELLIOTT

Vitamins. ALEXANDER JANKE. *Deut. Essigind.* **32**, 49-51, 59-60(1928).—The general subject of vitamins is discussed in connection with the possibility of fermentation vinegar being a source or carrier of such substances.

W. O. E.

Biologic assays for vitamins. P. S. PITTINGER. *Am. J. Pharm.* **100**, 63-91 (1928).—The biologic assays for vitamins have been sufficiently developed to render it possible to det. the vitamin A, B, C and D content of a medicinal or food product. The details of these assay processes and of important general principles which must be applied to all assays of this type and with which the bio-assayist must be thoroughly familiar are given. The method employed for proving the presence or

absence of vitamin E in a given product is qual. only. It cannot readily be adapted to a quant. measurement of vitamin E owing to the variation in the symptoms of vitamin-E deficiency. There is at present no satisfactory method for biologically assaying a product for the P-P Factor. A description of the various vitamins and their sources together with a list of existing color reactions for their identification is also included.

W. G. GAESSLER

Limits and methods of influencing the mineral metabolism. A. VON KORÁNYI. *Deut. med. Wochschr.* 54, 297-9, 342-4(1928).—An address. ARTHUR GROLLMAN

Examination of yeast fat for the presence of vitamins A and D before irradiation and of vitamin D after irradiation. E. M. HUME, H. H. SMITH and IDA SMEDLEY-MACLEAN. *Biochem. J.* 22, 27-33(1928).—Vitamin A is absent from yeast fat (total fat). Vitamin D is absent from acetone-soluble fat obtained from yeast. (See, however, *Biochem. J.* 19, 47(1925)) Irradiation of the samples of fat before feeding it to the rats promoted growth and bone formation in the latter. BENJAMIN HARROW

Estimation of vitamin D. HARRY JEPICOTT and A. L. BACHARACH. *Biochem. J.* 22, 60-2(1928); cf. *C. A.* 21, 3938.—Further evidence that the extent of the lowering of fecal p_H , due to the administration of vitamin D to rats on a rachitic diet, is a function of the amount of vitamin D administered. (Cf. *C. A.* 21, 1833). B. H.

Vitamins of orange juice. S. G. WILLIMOTT. *Biochem. J.* 22, 67-76(1928).—Five cc. of orange juice (California navel and Valencia, Sunkist brand) contain sufficient vitamin A for growth and well-being in the rat. Ten cc. were required for the vitamin B needs. Vitamin D is absent. BENJAMIN HARROW

Rat technic for demonstrating the interfering effect of cereals on bone calcification. H. N. GREEN and EDWARD MELLANBY. *Biochem. J.* 22, 102-12(1928).—The finding of Mellanby (*Brit. Med. J.* 1922, II, 849) that cereals interfere actively with the calcification of bones of dogs has now been demonstrated by using rats. B. H.

Quantitative determination of vitamin D. EDVARD POULSSON. *Biochem. J.* 22, 135-41(1928).—The same rats are used for the preparatory period as for the test period. The rats are put on a Steenbock and Black diet 2965 (*C. A.* 19, 2690-1) and after 25 days a skiagram of the left knee joint is taken, and the rats are weighed. The antirachitic substance to be tested is given for 6 days and then another skiagram is taken and the rats are weighed again. The results are indicated in units per g. on a principle analogous to that adopted by the U. S. Pharmacopeia in its method for vitamin A assay. BENJAMIN HARROW

Chemical composition of the milk of cows receiving cod-liver oil. E. C. V. MATTICK. *Biochem. J.* 22, 144-9(1928).—The acidity of the milk is less when cows receive cod-liver oil, and the time of coagulation by rennet is increased. The total percentage of Ca is higher in the milk of cows receiving cod-liver oil and the fat content is lower. The total P and N appear unaffected. BENJAMIN HARROW

Influence of the cow's diet on the fat-soluble vitamins of winter milk. II. JOHN GOLDING and S. S. ZILVA. *Biochem. J.* 22, 173-82(1928); cf. *C. A.* 21, 1833.—Daily additions of 2 oz. cod-liver oil to rations of silage and hay did not materially depress the percentage of milk fat nor did it raise the vitamin D of the butter to any appreciable extent. Higher amts. of cod-liver oil depressed the percentage of milk fat and increased the antirachitic potency of the butter. BENJAMIN HARROW

Use of olive oil subcutaneously. ABRAHAM TOW. *Arch. Pediatrics* 45, 182-6(1928).—A child aged 2.5 yrs. received 95 cc. of olive oil subcutaneously in the abdominal region in doses of 5 to 30 cc. over a period of 9 days; a gain in body wt. of 17 oz. resulted. However, subcutaneous nodules formed. Histological examn. of these nodules, obtained by bioscopy, showed a typical foreign body reaction about the oil globules present in them. Since olive oil administered subcutaneously is but slowly if at all completely absorbed, the conclusion is drawn that its use in this manner should be considered in children with a lowered tolerance for food by mouth only if other procedures have failed or are unavailable. JOSEPH S. HEPBURN

The vitamin content of the technical soy phosphatide preparation used in the manufacture of margarine. ARTHUR SCHEUNERT. *Z. Untersuch. Lebensm.* 54, 302-7(1927).—The phosphatide mixt. obtained as a by-product in the manuf. of soy-bean oil and used in the margarine industry as a coloring agent and water binder contains no antirachitic vitamin and only negligible traces of vitamin A; it may be given antirachitic properties by irradiation with ultra-violet light. WILLIAM J. HUSA

Alimentary glucemia and pancreatic function in the dog. G. MARTINO. *Arch. sci. biol.* 10, 438-55; *Boll. soc. ital. biol. sper.* 2, 777-9(1927); cf. Ciaccio and Racchiusa, *C. A.* 22, 1794 and Martino (cf. following abstract).—Administration of 15 g. peptone to fasting dogs caused an increase of blood sugar which was proportional to

the duration of the fast. Peptone caused hypoglycemia in dogs with ligated pancreatic duct, and had no effect on the blood sugar when both pancreatic duct and veins were ligated. In dogs with ligated pancreatic veins the peptone hyperglucemia was more pronounced than in normal dogs, but ligation of the pancreatic duct reduced the sugar to the normal level.

MARY JACOBSEN

Effect of inanition on the behavior of the alimentary glucemia in doves. G. MARTINO. *Boll. soc. ital. biol. sper.* 2, 316-20(1927).—The glucose content of a dove's blood was detd. at the start, and after fasting one and five days, immediately before, and one half hour after injecting 5 g. of glucose in soln. Similarly Witte's peptone, olive oil, egg albumin, glycocoll and glucose were injected. Glucose increased the glucose in blood, 83-86%; glycocoll, 26%; egg albumin, 23%; olive oil, 0.0%. Fats, therefore, do not induce hyperglucemia as the carbohydrates do.

A. W. CONTIERI

The effect of ungerminated seeds, normal and autoclaved, on muscle contraction. GUIDO GUERRINI. *Biochim. terap. sper.* 15, 1-16(1928); cf. *C. A.* 21, 3933.—The exts. were prepd. by incubating whole rice 50 days at 37°, pressing the liquid out and filtering it through paper. Part of the ext. was autoclaved 180 min. at 150°. The physical and chem. properties were not perceptibly changed by autoclaving. Both exts. had a pronounced acid reaction, reduced Felling soln., gave positive Millon, biuret and xanthoprotein reactions and formed slight ppts. with HgK_2I_4 , NH_3 and $(NH_4)_2SO_4$ and more abundant ones with tannic acid. Neither became turbid on heating to the b. p. The effect was studied on the frog gastrocnemius immediately and 3 hrs. after the instillation of 1 cc./25 g. into the dorsal sac and 0.5 hr. after the last of 2-6 injections made at 24-hr. intervals. The normal ext. increased the height and length of the isotonic contraction curve (I) by 43.01 and 13.44%, resp., the no. of contractions in the automatic fatigue curve (II) by 22.14% and the mechanical work (III) (ergogram) by 39.15%. The increases caused by the non-autoclaved exts. of boiled rice were: I, 44.50 and 17.08%, resp.; II, 31.32, III, 27.56%. The autoclaved exts. from raw and boiled rice had no effect. In view of the behavior of boiled rice exts. the ineffectiveness of the autoclaved exts. cannot be attributed to the absence of vitamins, but is apparently caused by additional profound changes.

M. J.

Isolated vitamins as a therapeutic means of choice in specific and associated deficiencies. FRANCESCO CASSELLA. *Pediatria Arch.* 2, 49-85(1928).—Isolated vitamins (nature and proportions not stated) were given orally and subcutaneously over a long period of time. Latent deficiencies and indirect nutritive disturbances and dystrophias resulting from infectious diseases such as pneumonia or chronic gastroenteritis were cured. Dystrophias and anemias of nutritional origin and those incidental to toxic-infectious diseases (incipient tuberculosis, pretuberculous conditions, syphilis) were favorably influenced. Vitamin combinations may be used therapeutically in early tuberculosis, rickets and scurvy. The clinical experiences support the view of endocrine stimulation by the vitamins and indirect action through the hormones.

M. J.

The growth-promoting effect of irradiated foods. L. M. SPOLVERINI AND G. C. BENTIVOGLIO. *Pediatria Rivista* 35, 1110(1927).—Properly irradiated and administered powdered milk has a remarkable eutrophic effect on infants.

MARY JACOBSEN

Ozonized milk as infant food. A. MACCHI. *Pediatria Rivista* 35, 1113(1927).—Ozonization renders milk completely sterile and reduces the caloric value only by 5-8%. Remarkable effects on skeletal growth and condition and on the blood picture were obtained.

MARY JACOBSEN

Protein metabolism in bottle-fed infants and its relation to other fundamental factors. V. PINOZZI. *Pediatria Rivista* 35, 1115(1927).—Protein utilization may be enhanced by a high protein intake, up to a certain limit above which a paradoxical reaction ensues. There is a direct relation between growth and protein utilization. The latter is entirely independent of the nature and quantity of the fat taken. A high carbohydrate diet considerably reduces the protein absorption and utilization.

M. J.

Effect of vitamin B on fat tolerance. G. CAREDDU. *Pediatria Rivista* 35, 1116(1927).—Rats fed on a vitamin-B-free diet with an excess of cod-liver or soy-bean oil presented severe emaciation, lowered temp., exudative symptoms and the paralysis characteristic of beriberi. Rats with exudative symptoms had a very thin epidermis. The 1st 3 symptoms are not caused by vitamin-A excess as claimed by Franck, since cod-liver and soy-bean oils had the same effect. Frontali's assumption that vitamin-B deficiency lowers the fat tolerance seems more acceptable.

MARY JACOBSEN

Vitamin B and automatin action. H. ZWAARDEMAKER. *Verslag Akad. Wetenschappen Amsterdam* 37, 6-8(1928); cf. following abstract.—Automatins from an irradiated heart revived an eel heart after a latent period of 3.5 hrs. The beat rate grew fast and reached a max. after 15 min. The effect lasted 16 hrs. Vitamin B of Donath

and Jensen freed from K by extn. with 96% alc. caused under the same conditions only single intermittent contractions; the effect lasted 2 hrs. After irradiation with soft Ra rays vitamin B caused a vigorous and rapid heart beat after a latent period of 1 hr. A max. was reached after 20 min; the effect lasted 13 hrs. The length of the latent period depended in some instances on the time of washing the heart, but the beat rate was detd. by the concn. of the active substance. The length of irradiation with soft rays from 5 mg. Ra in enamel should be at least 4 hrs., preferably 24 hrs.

MARY JACOBSEN

The nature of the heart injury in beri-beri patients. K. F. WENCKENBACH AND W. C. AALSMER. *Verslag Akad. Wetenschappen Amsterdam* 37, 137-40(1928); cf. Tiemann, *Z. ges. expil. Med.* 58, 821(1928); Zwaardemaker, cf. preceding abstract.—The heart muscle of beriberi patients shows on both sides an increase in vol. and wt. generally called hypertrophy, which is independent of the extent of the degeneration of the nervous system, Stimulation and stimulus conduction are unimpaired. Heart remedies are ineffective. The prompt effect of vitamin B on the size of the heart muscle and the intact automatism suggest that the increase in size is caused by swelling rather than by hypertrophy. It has been pointed out repeatedly that striped muscle loses its contractility through swelling. The swollen and painful skeletal muscles of beriberi patients benefit by vitamin B in the same manner. The injury to the nervous system is possibly also caused by water imbibition or retention and swelling of the nerve tissue. The dehydrating action of vitamin B must be of a sp. nature since thyroid ext., novasurol and salyrgan are incapable of producing the same effect. The automatinic effect of irradiated vitamin B is of interest in this connection. M. J.

Influence of vitamin-fast days on metabolism. W. ARNOLDI, E. FINK AND R. MICHELIN. *Arch. Verdauungs-Krankh.* 41, 239-46(1927).—There is an av. wt. loss of 1.6 kg. with a decrease in rest, and an increase in uric acid of the blood. No difference could be established between cases which received vitamin C directly after the fast and those that did not.

FRANCES KRASNOW

Nitrogen equilibrium and nitrogen reserve dependent on researches with coarse rye bread. AUGUST PÜTTER. *Z. Biol.* 86, 317-44(1927).—The minimal N-exchange under conditions of decreased N reserve may be determined only when there is simultaneously a good glycogen-fat reserve. If this is not adjusted the N values obtained are too high.

FRANCES KRASNOW

Studies in fat metabolism. IX. Formation of acetone bodies. R. MANCKE AND P. SERBESCU. *Z. Biol.* 87, 1-7(1928); cf. *C. A.* 21, 1291.—Hogs (healthy, 35 kg. wt.) were fed 8-17 days on fat. No acetone bodies appeared in the urine. To raise the ketogenic factor, butyric acid was added to the diet and the anti-ketogenic factor (glycerol) diminished. No other effects were noted. With amounts of fatty acid greater than 2 g. mol. very small amounts of acetone bodies were found in the urine.

FRANCES KRASNOW

Soy-bean feeding and blood calcium. A. A. HORVATH. *Japan Med. World* 8, 1-5(1928).—Soy beans, contrary to current belief, are not low in Ca. The av. figures for Ca in the blood serum of normal rabbits were found to be 15.8 mg. per cc. Yellow soy beans contain an excess of fat with respect to the "calcium-fat" ratio required for optimal absorption and metabolism of Ca salts. Raw soaked soy beans can restore a lowered blood Ca caused by bleeding in rabbits.

N. KOPELOFF

Development of paralysis in the suckling young of mothers deprived of vitamin E. HERBERT M. EVANS AND GEORGE O. BURR. *J. Biol. Chem.* 76, 273-97(1928).—A high proportion of the suckling young of mothers receiving a simplified diet (casein, corn starch, lard, salts and vitamins A and B) adequate except for vitamin E develop a day or two before weaning a paralysis characterized by difficulty in regaining their limbs when placed on their backs. The onset is very sudden and may be well advanced in young which are of normal body wt. and still actively growing. About 35% of the affected animals die, about 17% recover perfectly and 48% continue to exhibit paralysis of some limb and body muscle group throughout life. Besides the inability to right themselves most of the animals exhibit a clearly marked spastic condition of the lower limbs and a flexor spasm of the toes somewhat resembling the claw hand. The paralysis is always partial, never complete. Surviving animals in time exhibit every evidence of normality and health except for the paralysis and may give birth to normal litters which at no time develop paralysis, if the mothers receive a sufficient supply of vitamin E. Spontaneous arrest of this deficiency disease is in marked contrast to the picture shown by animals suffering from vitamin B or C deficiencies. All attempts to cure the disease after its manifestation for several days have resulted in failure. That the condition is due entirely to lack of vitamin E is shown by the re-

markable correspondence which has been found in the sterility-curing and paralysis-preventing properties (or lack of these properties) in fractions of wheat germ oil, which could be said to possess or lack vitamin E in accordance with the presence or absence of power to prevent the resorption of embryos in gravid females previously proved to be sterile from vitamin-E deficiency.

A. P. LOTHROP

The fundamental food requirements for the growth of the rat. III. Yeast and yeast fractions as a supplement to synthetic rations. CORNELIA KENNEDY AND LEROY S. PALMER. *J. Biol. Chem.* **76**, 591-606(1928); cf. *C. A.* **22**, 797.—A highly purified ration presumably complete except for vitamin B is made adequate for the growth of rats when each animal receives daily a 0.6 g. pellet of dry starch-free yeast. The same basal ration is not adequate for growth when the source of vitamin B is the Osborne and Wakeman concentrate from pure dry yeast, the residue left from the prepn. of this concentrate, a yeast concentrate supplied by the Harris Labs., or dry yeast which has been autoclaved at 15 lbs. for 2½ hrs. A highly purified diet contg. an adequate amt. of vitamin B in the form of an ext. of wheat embryo which was found to be non-growth-promoting was made adequate by daily doses of 0.2 g. of dry starch-free yeast or of the same yeast after thorough extn. with hot 85-90% alc., or the residue left from the same yeast after removal of the Osborne and Wakeman vitamin fractions, or yeast that had been autoclaved to destroy its recognized growth-promoting and antineuritic properties. Neither the Osborne and Wakeman vitamin B Fraction II prepd. from dry yeast, nor the Harris Lab. prepn. from brewers' yeast, nor an alc. ext. of dried yeast carries adequate amts. of the same growth factor which was found to be present in alc.-extd. yeast, in autoclaved yeast, and in the residue left after removing the Osborne and Wakeman concentrate. This growth factor is extd. from yeast to only a slight extent by alc. or acidulated H₂O and is stable to autoclaving at 15 lbs. for 2½ hrs. It is not bios. The conclusion is reached, therefore, "that yeast contains some factor other than vitamin B or the antineuritic factor, and that this factor is necessary for satisfactory growth. The factor is in some respects similar to but not identical with the yeast growth factor of Smith and Hendrick (*C. A.* **20**, 1433) and the P-P factor of Goldberger and associates (*C. A.* **20**, 1431)." **IV. Coprophagy as a factor in the nutrition of the rat.** *Ibid* 607-22.—Decline in wt. in exptl. rats fed a highly purified presumably complete ration was stopped and fair gains in wt. were made by allowing the rats to consume their feces. The feces of the rats on a mixed diet were no more potent in stimulating growth than the feces of rats on a highly purified synthetic diet. The factor present in feces, which is growth-stimulating, is sol. in alc., and insol. in Et₂O, and is injured by prolonged heating. The employment in the basal diet of com. casein purified merely by leaching with acid H₂O overcomes the necessity of coprophagy made evident by the use of highly purified casein. The conclusion is reached that the feces act beneficially because of some unrecognized dietary factor which they carry.

A. P. LOTHROP

Rickets in dogs. Metabolism of calcium and phosphorus. A. T. SHOHL AND HELEN B. BENNETT. *J. Biol. Chem.* **76**, 633-42(1928); cf. *C. A.* **21**, 3387.—Puppies were fed a diet consisting of 10 g. of dried skim milk powder, 40 g. of Quick Quaker Oats cooked 5 min., 5 cc. of linseed oil and 1 g. of NaCl per kg. of body wt. and in addn. 60 mg. of Harris yeast vitamin concentrate per kg. and 5 cc. of orange juice daily. This diet was relatively rich in Ca and poor in P and had a Ca : P ratio of 0.66. A control received cod-liver oil in place of the linseed oil. Development of severe rickets in puppies is associated not with a negative balance but with a diminished positive balance of both Ca and P. Although the P in the food exceeded the Ca, the P balance was smaller or even negative so that here the element of which the least is consumed was not the limiting factor. The limiting factor was vitamin D which stabilizes the metabolism of Ca and P. Undue emphasis is usually laid upon Ca as compared with P in ossification, a process universally referred to as calcification; the more important defect in rickets lies in the inadequate retention of P. Quant. measurement of the defect in Ca and P metabolism is preferable to an analysis of the bones for the latter may show calcification at the expense of the rest of the body while the former measures this defect in the whole organism.

A. P. LOTHROP

Dietary requirements for fertility and lactation. XIII. Storage of fat-soluble vitamins for lactation, with some observations on the cod-liver oil requirements of nursing young. BARNETT SURE. *J. Biol. Chem.* **76**, 659-71(1928); *C. A.* **21**, 3936.—A sufficient storage of fat-sol. vitamins for normal lactation occurs when females with their litters are transferred from a stock cereal diet contg. 1% cod-liver oil (supplemented by a liberal daily supply of fresh milk) to a purified synthetic fat-sol. vitamin-deficient diet. There is a depletion of the fat-sol. vitamin reserve in the 2nd generation if a similar transfer is made from a stock ¾ whole wheat and ¼ whole milk powder diet

contg. 9% of milk fat. No evidence was obtained of the existence of a specific vitamin essential for lactation other than vitamins A and D and whether or not vitamin E should be divided into 2 specific factors, one essential for fertility and one for lactation, still awaits proof. By drawing out a medicine dropper to a very fine capillary it has been found possible to administer a small drop of cod-liver oil to baby rats at birth; in this way it has been found that a min. curative dose (out of about 30 litters studied) of 12 mg. of cod-liver oil on the 4th day sufficed for the entire lactation period. **XIV. A quantitative biological method for the study of vitamin B requirements for lactation.** *Ibid* 673-83.—Yeasts from various sources vary considerably in their biol. value as a source of vitamin B for lactation. A concd. prepn. obtained by releasing vitamin B adsorbed from yeast on fuller's earth with NaOH has 3 times the potency for normal lactation as Harris yeast. It is necessary to administer as much as 1500 mg. of Harris yeast daily to each nursing female to avoid infant mortality. The animals were kept in cages with raised screens and the yeast was administered daily separately from the ration as soon as the young reached a maintenance curve showing depletion of the vitamin reserves of the mother. **XV. The inefficiency of the lactating mother (*Mus norvegicus albinus*) in secreting vitamin B in the milk, and the relation of this phenomenon to infant mortality (detailed report).** *Ibid* 865-70.—The lactating mother dissipates at least 60%, if not more, of the vitamin B dosage daily apportioned to it in the metabolism of transfer to the milk so that the large requirements of vitamin B for lactation can now be explained as due to the inability of the nursing mother to secrete the vitamin anywhere near quant. in the milk. The growth of nursing young can be greatly accelerated by administering liberal quantities (in H₂O soln. from a medicine dropper) of potent concd. prepn. of vitamin B. It is suggested that a great proportion of infant mortality during the 1st year of life may be due to vitamin-B deficiencies as the av. human nursing mother on the av. American diet is probably on the border line with respect to this vitamin. This is a problem that needs extensive study by pediatricians.

A. P. LOTHROP

The relation of diet to the quality of fat produced in the animal body. W. E. ANDERSON AND L. B. MENDEL. *J. Biol. Chem.* **76**, 729-47(1928).—Male albino rats were fed a diet furnishing 15% of its cal. in the form of protein and supplied by dried skim milk in amts. to furnish 40% of the total cal. intake. The remaining 60% of the energy intake was variously supplied as carbohydrate or fat. The body fat resembled the food fat when soy-bean oil, cottonseed oil or peanut oil was ingested. With butter fat or coconut oil the body fat contained considerably more unsatd. fatty acids than the ingested fat. Substitution of equicaloric amts. of carbohydrates, corn starch, dextrin and dextrin-maltose for fat produced hard body fats with I values of about 60. When proteins such as casein and cottonseed globulin were fed in high concn. amounting to 96% of the total cals., a body fat was produced with an I value approx. the same as that of rats receiving the diets rich in carbohydrates. A soft body fat can be altered to a harder fat by changing to a ration rich in carbohydrate but such alteration occurs only very slowly. If the fat reserves are depleted through brief fasting periods prior to the change in dietary, the change in the type of fat takes place quite rapidly. Observations made on animals receiving a uniform mixt. of whole wheat and whole milk indicate that the body fat tends to become harder as the body wt. increases. The samples of fat used for analysis were obtained by rendering the carcass remaining after removal of the stomach and intestines, which thus excluded any food fat. A. P. L.

The influence of protein, blood, liver, fat, iron and potassium in the diet upon the rate of blood regeneration after hemorrhage in the rat and dog. C. M. McCAY. *Am. J. Physiol.* **84**, 16-35(1928).—White rats and dogs, fed "synthetic" diets with and without various supplements, were repeatedly made anemic by removal of blood by cardiac puncture. The rate of hemoglobin regeneration was calcd. from the total hemoglobin of the blood removed. Dried liver added to the synthetic ration promoted very rapid blood regeneration; ferric citrate was fairly effective in the rat (not tried in the dog); blood was much less effective, particularly in the dog. Blood regeneration was independent of the protein and fat of the diet, provided the diet was adequate in other respects and at least the maintenance supply of protein was furnished. K may exert a marked accelerating influence on hemoglobin formation particularly when the diet is very low in Fe. J. F. LYMAN

The influence of yeast on the alimentary rate. D. W. THORUP AND A. J. CARLSON. *Am. J. Physiol.* **85**, 90-7(1928).—Yeast added to the diets of white rats in amts. up to 25% had no effect on the rate at which small glass beads passed through the digestive tract but there was some increase in the moisture content of the stools during yeast ingestion. In human beings yeast ingestion produced no const. laxative effect. J. F. L.

The index of refraction of blood serum in beriberi. A. BASILICO. *Boll. soc. ital. biol. sper.* 2, 805(1927).—There was an increase in the index of refraction of the blood serum of pigeons kept on a beriberi producing diet. PETER MASUCCI

Histological alterations of the myocardium in experimental avitaminosis scurvy. A. BASILICO. *Boll. soc. ital. biol. sper.* 2, 806-7(1927).—Definite histological changes were noted in the myocardium of guinea pigs affected with exptl. scurvy. Details of the histological picture are given. PETER MASUCCI

The gastric digestion of albumin under the action of x-rays. M. LATTUCA. *Boll. soc. ital. biol. sper.* 2, 820-2(1927).—Gastric fistula was produced in dogs 15-18 kg. wt. Ten days after operation 5 g. coagulated albumin was introduced into the stomach. Samples of gastric contents were tested before and after irradiation. With small doses of x-rays there was an increase in the quantity of albumin digested; with longer irradiation there was a diminution. PETER MASUCCI

Metabolic changes in white rats fed with egg albumin. S. BAGLIONI. *Boll. soc. ital. biol. sper.* 2, 978-82(1927).—White rats were fed exclusively egg albumin in unrestricted amts. and also given daily 0.2 g. butter, 9 drops lemon juice and 0.2 g. yeast. The wt. was taken before and after; the feces and urine were collected and weighed; N, urea and NH_3 detd. The animals survived weeks and months although they showed noticeable disturbances consisting especially of hepatic and renal hyperfunction. P. M.

A comparative study of factor C in bergamot juice and lemon juice. R. DE MARCO. *Boll. soc. ital. biol. sper.* 2, 1023-6(1927).—The antiscorbutic factor C is present in bergamot juice. Compared with lemon juice, its preventive and curative action against scurvy in exptl. animals is not as great. PETER MASUCCI

Antiberiberi vitamin content of sweet potato leaves and shoots. F. O. SANTOS AND E. G. COLLADO. *Philippine Agr.* 16, 513-20(1928).—Expts. with cockerels indicate that sweet potato leaves and shoots are a good source of antineuritic vitamin as well as the growth-promoting H_2O -sol. factor. Twelve references are given. A. I. M.

The influence of active iron on body weight and oxygen utilization of organisms. WALTER ARNOLDI. *Folia Hematol.* 35, 21-9(1927).—Rats were given 0.1 g. of Fe_2O_4 per day for 5 weeks. After 9 to 12 days there was a marked increase in O utilization, but this effect disappeared after 2 or 3 days. The respiratory quotient remained unchanged. In 2 clinical cases the administration of non-magnetic active ferric carbonate increased O utilization and body wt. Active Fe seems to increase oxidative processes. JOHN T. MYERS

Hunting the vitamin. W. H. EDDY. *Am. J. Pub. Health* 18, 313(1928).—A lecture describing investigations on the chem. nature of vitamin B. The question arises and is not solved as to whether the "torulin" fraction described by Peters, the fuller's earth fraction described by Williams and a cryst. antineuritic substance reported by Jansen and Donath have the same biol. properties. It is certain that vitamin B consists of an antineuritic factor and an anti pellagric factor both of which are essential for growth; therefore foods must be described relative to their content of each sep. factor. Expts. indicate the banana and also spinach to be more active in anti pellagric than in the antineuritic factor. Such differentiation must be studied for other foods. α and β Bioses extd. from yeast are described as to method of prepn. and properties. N. M. NAYLOR

Vitamin D and its relation to the irradiation of foodstuffs. I. M. HEILBRON. *Brit. J. Actinotherapy* 2, 210-5(1928).—A review. Studies on irradiation of sterols and of foods contg. these substances, with subsequent spectroscopic examn., have led to the conclusions that selective absorption is shown in cholesterol derivs. of certain chem. structure; that irradiated ergosterol shows absorption bands of the same nature as those of vitamin D; and that further irradiation shows the instability of vitamin D. Reference is made to the irradiation of vegetable oils, margarines and other foodstuffs. N. M. NAYLOR

Activation of cholesterol at liquid oxygen temperature. C. E. BILLS AND FERDINAND BRICKWEDDE. *Nature* 121, 452(1928).—Cholesterol (m. 149° and contg. 1.2/1000 ergosterol) was irradiated at room temp. and a second portion, at liquid-oxygen temp. (-183°) for 105 min. Both samples of cholesterol induced healing of rickets at 0.1% of a diet, but only that irradiated at room temp. induced healing at 0.01% of diet. N. M. NAYLOR

Cholesterol and vitamin D. I. M. HEILBRON, R. A. MORTON AND W. A. SEXTON. *Nature* 121, 452-3(1928).—Absorption bands at 304 to 315 μ , thought to be associated with activation of purified cholesterol, may be due to traces of cholesterolene. N. M. N.

Biological test of the antirachitic value of lipoids carried out on young rats by

means of a new simple rachitogenic diet composed of definite substances. (MRS.) L. RANDOIN AND R. LÉCOQ. *Ann. fals.* 21, 68-74(1928).—After a discussion of the defects of various diets proposed for the biological detn. of vitamin A, the following is proposed: meat peptone 17, powdered dried brewers' yeast 3, butter fat 5, olive oil 5, sucrose 65, salt mixt. Z-84 4, Ca lactate 1. It contains P 0.134, Ca 0.466, Ca: P 3.5. Salt mixt Z-84 contains: KCl 85, anhyd. Na_2CO_3 85, MgCO_3 28.6, Ca lactate 200, ferric citrate 10, KI 0.020, MnSO_4 0.078, NaF 0.240, $\text{KAl}(\text{SO}_4)_2$ 0.024. The advantages of this diet are discussed, and the method of making the tests is described. A. P.-C.

The antiscorbutic vitamin value of some Peking fruits. KANG-LIANG HSÜ. (*Chinese J. Physiol.* 2, 41-4(1928).—Feeding tests with guinea pigs proved that "red fruit," *Crataegus pinnatifida*, contains vitamin C and is about $\frac{1}{3}$ as potent as orange juice. "Haitang," *Pirus spectabilis* and the persimmon, *Diodpyros kaki*, are poor in vitamin C. Subjecting the "red fruit" to sirup at a temp. of 110° to 120° for a few min. and allowing the sirup to dry on its surface did not decrease its vitamin content. L. W. R.

Influence of water diet on urinary excretion of ketonic substances by the dog. F. MAIGNON AND E. KINTHAKIS. *Compt. rend.* 186, 463-5(1928); cf. following abstr. — Ten dogs were fed a bread-soup ration for 2 to 8 days. The same dogs were then kept on a water diet from 8 to 16 days. During the first period the av. daily excretion of acetone and acetoacetic acid was 0.001 g. and that of β -hydroxybutyric acid was 0.077 g. In the second period while on the water diet the corresponding figures were 0.005 and 0.023. Thus a water diet increases the excretion of acetone and acetoacetic acid but causes a pronounced decrease in the excretion of β -hydroxybutyric acid. L. W. R.

Variations of blood p_{H} and alkaline reserve in the course of a water diet in the dog. F. MAIGNON AND E. KINTHAKIS. *Compt. rend.* 186, 600-2(1928); cf. preceding abstr. — In man the acidosis of fasting is almost always compensated. In the dog this is rarely the case as the p_{H} is lowered while the alk. reserve remains about const. On a water diet prolonged beyond about 20 days, inverse oscillations are observed between the p_{H} and the alk. reserve, as well as a raising to the normal of these 2 factors during the final cachexia in case life is sufficiently prolonged. L. W. RIGGS

Quantitative law of the minimum consumption of nitrogen in homeotherms, intra-specific validity. (MME) HÉLÈNE SORG-MATTER. *Compt. rend.* 186, 534-5(1928); cf. C. A. 21, 1835.—Expts. with rats and cocks in which the N consumption per kg. hr. (A) and cal. production per kg. hr. (B) gave a ratio (A)/(B) which, multiplied by 1000, ranged from 2.03 to 2.5 in 9 tests. The law of min. consumption is restated as follows: At the interior of the same species, the consumption of N varies inversely with the size of the individual and is directly proportional to the production of energy. L. W. RIGGS

Activation of fats and lipoids by ultra-violet rays. SIM KI AY. *Compt. rend. soc. biol.* 98, 276 9(1928).—Treatment of rickets in infants by irradiated ergosterol resulted within a month in an increase of 60, 94 and 96% in the serum content of inorg phosphates in 3 cases and an increase of 43 and 60% in the serum Ca in 2 of these cases. Under this treatment the appearance of "chalk lines" was shown by radiograph within 2 weeks. L. W. RIGGS

The chemical nature of vitamins. A. VERDA. *Pharm. Acta Helv.* 2, 168-74, 175-9(1927).—A survey of recent work on vitamins and discussion of the use of Bezsonov's colorimetric reagent (C. A. 17, 3684; 20, 3477) for the detection of vitamin C and the nature of the reaction involved. — S. WALDBOTT

MARCOVICI, EUGENE E.: **Handbook on Diet.** Philadelphia: Davis. 323 pp. \$3.50.

F—PHYSIOLOGY

E. K. MARSHALL, JR.

The female sexual hormone, menformone. IX. Further experiments on its action on the mammary glands; menformone as the hormone causing their normal development. E. LAQUEUR, F. BORCHARDT, E. DINGEMANSE AND S. E. DE JONGH. *Deut. med. Wochschr.* 64, 265-7(1928); cf. C. A. 21, 3059, 3227.—Injection of menformone into castrated or normal male guinea pigs or dogs produced a hyperplasia of the secretory portion of the mammary glands and hypertrophy of the nipples. In castrated undeveloped females, milk production could be induced. A. G.

The metabolism of amino acids. J. M. LUCK. *J. Biol. Chem.* 77, 13-26(1928).—Amino acids administered in equimol. quantities to rats, by mouth, resulted in varying increases in the amino-acid content of the liver, but except in the case of glycine, no change was observed in the content of muscle. Glycine and alanine increased the amino-acid content of the systemic blood to the same degree but the former produced

a great change in the amino N content of the liver, while the latter produced no significant change in this organ. In most cases no appreciable changes were observed in the NH_3 content of liver or muscle.

The specific dynamic action and nitrogen elimination following intravenous administration of various amino acids. C. M. WILHELMJ AND J. L. BOLLMAN. *J. Biol. Chem.* 77, 127-49(1928).—The intravenous injection of alanine, glycocoll or phenylalanine resulted in an immediate rise in heat production and an elevation of the $R. Q.$ The specific dynamic actions of these 3 substances are in the ratio of 1:1.3:2 expressed as calories of extra heat produced per mol. of the amino acid deaminized. When racemic forms were injected, more than 50% of the N appeared in the urine as "extra" urea N, indicating the deamination of all of one component plus a varying fraction of the optical antipode.

A note on the influence of the circulation on the utilization of carbohydrates. R. PEMBERTON AND F. A. CAJORI. *J. Clin. Investigation* 5, 503-9(1928).—An answer to Lennox and Bellinger's criticism (*C. A.* 21, 3390) of the author's work.

Influence of nucleic acids of various origin upon the growth and longevity of the white mouse. T. BRAILSFORD ROBERTSON. *Australian J. Exptl. Biol. Med. Sci.* 5, 47-67(1928).—Thymus nuclei in daily doses corresponding to 0.5 g. of fresh thymus tissue, yeast nucleic acid in daily doses of 25 mg. and spleen nucleic acid in daily doses of 15 mg., on the whole tend to promote post adolescent growth and to enhance longevity. These 2 effects, however, appear to be mutually opposed so that when the growth effect predominates the effect on longevity is at a min. In every instance the administration of nucleic acid increased the variability of the animals. **Influence of thyroid alone and of thyroid administered together with nucleic acids upon the growth and longevity of the white mouse.** *Ibid* 69-83.—Desiccated thyroid alone administered to white mice in daily doses corresponding to 1.9 mg. of fresh thyroid accelerates the early growth of the animals without affecting the max. wt. which they ultimately attain and shortens the life duration by 17%. A daily dose corresponding to 1 in 10000 of the body wt. of desiccated thyroid in conjunction with 15 mg. of spleen nucleic acid was very injurious to adult mice; they died much younger than control animals. Desiccated thymus in daily doses equiv. to 0.5 g. of fresh tissue did not affect the growth of mice, but neutralized the effect of thyroid tissue on longevity. Spleen nucleic acid in daily doses of 15 mg. slightly diminished the effect of the thyroid tissue in abbreviating duration of life but apparently did not modify the effect of thyroid upon growth. The effects of thyroid and nucleic acids upon life duration, when administered together, are additive and are within 5% of the algebraic mean of the life durations of the animals in receipt of these substances separately. The variability of animals is not affected by thyroid.

Action of liver powder on the water content of blood, muscles and certain organs. C. I. PARHON, V. MARZA AND M. KAHANE. *Compt. rend. soc. biol.* 98, 391-3(1928); cf. *C. A.* 22, 98, 636, 820.—The blood, muscles, brain, thyroid, suprarenals, testicles, pancreas, liver and kidneys of guinea pigs which had been fed 0.025 g. of powdered liver per day contained less water than the corresponding organs of control animals, but the differences were slight. The thymus, on the contrary, contained more water.

Glucemia and phosphatemia consecutive with intravenous injection of defibrinated blood. I. I. NITZESCU AND GR. BENETATO. *Compt. rend. soc. biol.* 98, 410-2(1928).—The injection in rabbits of 4 cc. of defibrinated blood from the same animal or animal of the same species was followed in 10 min. by a moderate hyperglucemia which increased for 40 to 60 min., then returned gradually to the normal figure. Defibrinated venous blood injected in doses as large as 5 cc. was followed by a moderate shock. Defibrinated arterial blood was much more toxic, causing a more acute hyperglucemia, and frequently the injected rabbits die within a few min. Injections of defibrinated blood also caused a progressive increase in the content of mineral P in the blood, which increase may reach 35% in 60 to 90 min.

Hyperglucemia action of the blood of the depancreated dog. L. KÉPINOV AND S. PETIT-DUTALLIS. *Compt. rend. soc. biol.* 98, 425-7(1928).—Transfusion of blood from a depancreated to a normal dog was followed by an immediate large increase in the blood sugar of the receiving dog, which generally decreased during the next 3 to 4 hrs. to nearly the normal figure, then usually increased moderately during the 4th to 6th hrs.

Inhibition of ovulation by the yellow body. PIERRE GLEY. *Compt. rend. soc. biol.* 98, 504-5(1928).—Expts. with rats proved that under the influence of the hormone of the yellow body the vaginal phenomenon of estrus (the exterior sign of ovulation)

disappeared. Thus the hormone of the yellow body inhibits the cyclic production of folliculin. L. W. RIGGS

Gaseous metabolism of large wild birds under aviary life. F. G. BENEDICT AND E. L. FOX. *Proc. Am. Phil. Soc.* **66**, 511-34(1927).—At the N. Y. Zool. Park a study was made of 24 full-grown adult birds, ranging from a 17 kg. cassowary to a 0.6 kg. Am. bittern. The measurements were made in a modern respiration calorimeter during muscular repose at 28 or more hrs. after feeding, and at a controlled environmental temp. of 19°. The rectal temp. of the birds was about 40° and the R. Q. was between 0.72 and 0.74. The 24 hr. heat production ranged from 576 cal. with the cassowary to 56 cal. with the Am. bittern. With few exceptions the heat production per kg. of body wt. was inversely proportional to the wt. of the bird. The heat production per sq. m. of body surface per 24 hrs. (computed from the formula $10 w^{2/3}$) ranged from 526 cal. with the Chilian eagle to 1267 cal. with the black-backed pelican. The av. for all of the birds was 874 cal. No explanation was found for these wide differences other than these birds represent 2 entirely different heat-producing organisms in which surface area is without the slightest significance. L. W. RIGGS

KNIPPING, H. W., AND RONA, PETER: *Praktikum der physiologischen Chemie. Teil 3. Stoffwechsel und Energiewechsel.* Berlin: Julius Springer. 268 pp. M. 15. Cf. *C. A.* **21**, 110

G—PATHOLOGY

H. GIDEON WELLS

Anaphylactic shock produced by a soluble specific substance largely carbohydrate in nature. J. TOMCSIK. *Proc. Soc. Exptl. Biol. Med.* **24**, 812-3(1927).—In passively sensitized guinea pigs anaphylactic shock is produced by very high dilns. of a substance that is largely carbohydrate in nature, isolated from *B. lactis aerogenes*. The presence of a trace of N, presumably an impurity, prevents one from concluding that shock may be produced by carbohydrate alone. C. V. B.

Optimal proportions of hapten and immune serum in the precipitation and complement-fixation reactions. J. TOMCSIK. *Proc. Soc. Exptl. Biol. Med.* **24**, 813-6(1927).—Approx. the same ratio of antiserum to antigen, 1:2400, in the indicator tube holds for the precipitin and complement-fixation tests in various dilns. used. A carbohydrate gum obtained from a pathogenic yeast was the hapten. C. V. B.

Blood of animals in hematoporphyrin shock. H. SMETANA. *Proc. Soc. Exptl. Biol. Med.* **24**, 821-2(1927).—Expts. designed to throw light on the state of the blood of animals sensitized by hematoporphyrin and exposed to light were carried out on cats, guinea pigs, rats and mice. Blood pressure, pulse and respiration rates, numbers of red and white blood cells, amts of blood sugar, total non-protein N and creatinine, O₂ content, CO₂-combining power and toxicity of the blood, and effect of light on sensitized blood *in vitro* were studied. C. V. B.

Blood sugar changes in avian polyneuritis. H. E. REDENBAUGH. *Proc. Soc. Exptl. Biol. Med.* **24**, 842-3(1927).—Polyneuritic pigeons showed hyperglucemia; their blood sugar was almost double that of normal pigeons. C. V. B.

Simple experimental anemia and liver extracts. G. H. WHIPPLE AND F. S. ROBSCHT-ROBBINS. *Proc. Soc. Exptl. Biol. Med.* **24**, 860-4(1927).—An aq. ext., an alc. ext. and a liver residue were prepd from freshly ground beef liver as described. All 3 of these fractions contained substances favorable for hemoglobin and red cell regeneration in simple anemia in dogs. C. V. B.

The influence of ultra-violet irradiation of menotoxin and pernicious anemia toxin. D. I. MACHT. *Proc. Soc. Exptl. Biol. Med.* **24**, 966-8(1927); cf. *C. A.* **22**, 265.—Exposure to ultra-violet rays greatly decreased the toxicity for plants of blood serum from pernicious anemia cases, while the toxicity of specimens of menstrual serum was not detoxified by the ultra-violet rays. These findings support the view that menotoxin is chemically related to oxycholesterol. C. V. B.

The seasonal variation of the antirachitic effect of sunshine and its effect on resistance to disease. ALAN BROWN AND F. F. TISDALL. *Can. Med. Assoc. J.* **17**, 1425-9(1927).—The sun's rays in Dec., Jan. and Feb. in the latitude of Toronto produce a slight but definite antirachitic effect on rats fed a rachitogenic diet. A sharp increase in the antirachitic effect occurs early in March, while the effect in April and May is approx. 8 times that in Dec.-Jan. The antirachitic effect of skyshine (reflected rays from sky and clouds) is $1/2$ to $2/3$ that of sunshine. Sunshine which has passed through Corning glass, Vita-glass and Vioryn has from 25 to 50% the antirachitic effect obtained without glass. Sunshine definitely increases the resistance of albino rats to infection

with a sp. organism. It increases the acidity of the intestinal tract of rachitic rats. Reddening of the skin by ultra-violet rays is not a suitable unit for measurement of ultra-violet therapy, but should be considered simply as an accompanying phenomenon which may or may not be a measurement of the rays.

Change in fat content of various organs after splenectomy. L. CANNAVÓ AND F. ARAGONA. *Boll. soc. ital. biol. sper.* 2, 306-7 (1927).—A no. of white rats were operated by splenectomy and after 1 month the fat contents in the liver, kidneys and brains detd. The increases were 0.3 g., 0.4 g., 0.02 g., resp., over controls, which is no more than to be expected in normal growth. It is therefore evident that the functions of the spleen, as well as the other organs, are not related as far as fat metabolism is concerned.

The chemical composition of the active principle of tuberculin. IX. The fractional heat coagulation of the protein of tuberculin. FLORENCE B. SEIBERT. *Am. Rev. Tuberculosis* 17, 394-401 (1928); cf. *C. A.* 21, 767. —A protein-free fraction giving the sp. tuberculin reaction could not be sepd. from the whole protein of tuberculin by fractional heat coagulation. Fractions coagulated at 50°, 70°, 80-90°, 97-99° (boiling) 120° (autoclaving), and even the final non-coagulable fraction, which also definitely contained some whole protein, all gave equally marked tuberculin skin reactions, indicating that the sp. biol. activity is not due to any particular fraction but rather accompanies all fractions where the tuberculin protein is present. All fractions may, therefore, be derivs. of the same protein in varying stages of chem. change. These variations in coagulability are analogous to variations in soly. of different fractions of the same protein. The non-coagulable fraction has more primary toxicity than the coagulable fractions, as indicated by the lethal test, for normal as well as for tuberculous animals, although it gives no more marked sp. skin reaction in tuberculous animals. In considering the tuberculin reaction, therefore, a certain primary toxicity of tuberculin must be recognized in additions to its well-known capacity to elicit the sp. tuberculin reaction in infected animals. X. The isolation in crystalline form and identification of the active principle of tuberculin. *Ibid.* 402-21.—The specifically active substance in tuberculin, responsible for the production of the tuberculin skin reaction, is a water-sol. coagulable protein of the nature of an albumin, staining blue with methylene blue, and contg. the ordinary amino groups, but no carbohydrate, and crystallizable by the Hopkins method at an optimum p_H of 4.9. Even after 14 crystns. the protein gave max. tuberculin skin reactions and caused a typical tuberculin atrophy in the testicle of a tuberculous guinea pig. A test made after ten crystns. showed that less than half as much of the purified protein was required to produce an equally strong reaction as of the original fraction. The unit mol. of this crystd. protein is, however, very unstable and easily becomes denatured. Such denaturation is recognized, first by the facts that the protein will no longer crystallize and that its soly. is changed, and second, by a loss in biol. activity. This instability explains the small yield of crystals obtained and also the great losses in activity during the isolation of the protein.

A note on the cholesterol content of sputum. RUBY G. KELLY AND MAX PINNER. *Am. Rev. Tuberculosis* 17, 430-3 (1928).—The amt. of sputum cholesterol has a rather definite, though not const., relation to the type of lesions. Extensiveness, acuteness and tissue destruction make for larger amts. of cholesterol. If the fact that a qual. diagnosis of tuberculous pulmonary lesions is difficult and uncertain to a degree is taken into account, and that it involves a considerable factor of subjective judgment, the parallelism referred to above must be considered as a fairly close one. It is probably of approx. the same order as that of the so-called "activity tests" (sedimentation reaction, Daranyi and Matéfy reactions, etc.), and of differential blood counts, for all of which rather exaggerated claims have been made. A critical application shows for all these procedures (including the detn. of the sputum cholesterol) that, at the best, they can confirm a well-balanced clinical judgment, but that they are hardly ever likely to secure information beyond that gained by clinical observation, physical exams., x-ray studies and bacteriol. findings.

Relation between concentration and quantity of hemagglutinin to be absorbed by red blood corpuscles. OSAMU ISHIKAWA. *Sei-i-kwai Med. J.* 46, No. 9, 1-3 (1927).—Expts. were carried out with washed red blood cells of goat and sera from rabbits immunized to these cells. It is concluded that hemagglutinin is absorbed in a quant. relationship, the red blood cells absorbing about 4 units.

The sulfuric acid reaction in protein-free serum of uremia. KARL MACROLD. *Wiener klin. Wochschr.* 41, 447-9 (1928).—All cases of uremia gave a positive reaction.

Cholesterol in the cerebrospinal fluid of cancer patients. A. H. ROSSO. *Bel.*

inst. med exp 3, 309 19(1927); *Physiol. Abstracts* 12, 417; *C A* 21, 2734.—Cholesterol is present in cerebrospinal fluid of normal individuals in quantities of less than 0.0025 g. per thousand; in patients with cancer it is present in from 0.10 g. to 0.21 per thousand. H. G.

The glucose tolerance test. W. B. LEWIS. *J. Lab. Clin. Med.* 12, 380-7(1927); *Physiol. Abstracts* 12, 161.—A very definite renal threshold exists for glucose. The relation between the normal sugar in the urine and the blood sugar is discussed. H. G.

Study of the pigment in Addison's disease. C. L. SPOHR AND R. A. MOORE. *J. Lab. Clin. Med.* 12, 438-41(1927); *Physiol. Abstracts* 12, 390.—The pigment was extd. from the lymph glands in a case of Addison's disease, isolated, purified and analyzed. S. and M. regard the pigment as a melanin. H. G.

The Van den Bergh reaction for serum bilirubin with notes on interpretation and technic. W. H. HALL. *J. Lab. Clin. Med.* 12, 529-35(1927); *Physiol. Abstracts* 12, 371.—Serum bilirubin may be studied qual. (direct reaction) and quant. (indirect reaction), the presence of bile salts probably explains the difference of reaction in obstructive and hemolytic jaundice. Details are given of certain variations in technique. H. G.

Blood sugar in infectious diseases. F. ANDERSON AND A. SCHMIDT. *Klin. Wochschr.* 6, 213-4(1927); *Physiol. Abstracts* 12, 231.—The fasting blood sugar was detd. in a series of cases of the commoner infectious diseases. In general, fever causes the blood sugar to rise, but the fever and hyperglycemia do not always run parallel. There was no rise in blood sugar in measles. The greatest hyperglycemia was encountered in typhoid fever. In dysentery there was hyperglycemia without fever. H. G.

Similarity between carcinoma cells and those of exudates. A. BARKER. *Klin. Wochschr.* 6, 252-4(1927); *Physiol. Abstracts* 12, 196.—The exudate cells were obtained by injecting 300 cc. normal saline into the peritoneal cavity of rabbits. The cells were tested by Warburg's method to det. their capacity to produce lactic acid aerobically and anaerobically. The ratio, extra CO_2 consumed, was 13:3. Warburg's figures for human carcinoma cells varied between 1:5 and 11:5. The exudate cells have thus metabolic properties similar to carcinoma cells. H. G.

Diabetics refractory to insulin. H. HAUSSLER AND F. HODER. *Klin. Wochschr.* 6, 511-3(1927); *Physiol. Abstracts* 12, 378-9.—The authors have investigated the "fixation" of glucose by blood corpuscles from normal, diabetic and insulin-refractory diabetic cases when a known amt. of glucose is added to the blood. It is shown that the blood corpuscles of insulin refractory diabetics do not take up glucose under the influence of insulin to the same extent as those from normal persons or ordinary diabetics. The inhibitory substance is removed by washing the corpuscles several times with normal saline. Since the behavior of the body cells may be similar to that of the blood corpuscles, the authors suggest that their expts. support the view that insulin refractory diabetes is not of pancreatic origin. H. G.

Cause of delayed coagulation in diseases of the liver. E. HARTMANN. *Klin. Wochschr.* 6, 1322-4(1927); *Physiol. Abstracts* 12, 186.—The conversion of proserozyme to serozyme in blood from cases of chronic icterus is slower than normal. This is due to the presence of substances in the plasma which inhibit this change. These substances are absorbed by $\text{Ca}_3(\text{PO}_4)_2$. It is presumed that these inhibitory substances are produced in excessive amt. as a result of the abnormal condition of the liver parenchyma, and that they are the cause of delayed coagulation in chronic icterus. H. G.

Basal metabolism in acromegaly. M. R. CASTEX AND M. SCHTEINGART. *Rev. soc. méd. int.* 3, 66-72(1927); *Physiol. Abstracts* 12, 451.—The basal metabolism of 7 cases of acromegaly was studied. It was normal in 4, increased in 3 cases, but after operations for decompression it became normal in the latter. H. G.

The circulating blood volume in diabetic acidosis. H. C. CHANG, G. A. HARROP, JR. AND B. M. SCHAUB. *J. Clin. Investigation* 5, 407-11(1928). ARTHUR GROLLMAN

Hydrogen-ion concentration of the feces of rachitic children. THIRZA REIDMAN. *Biochem. J.* 22, 15-21(1928); *C. A.* 21, 3072.—R. could not obtain a correlation between different stages of rickets and the p_{H} of the feces. (See Jeppeott and Bacharach, *C. A.* 21, 1833.) BENJAMIN HARROW

The cause of Andrewes's diazo test for renal insufficiency. G. A. HARRISON AND R. J. BROMFIELD. *Biochem. J.* 22, 43-5(1928).—The substance responsible for Andrewes's reaction (see *C. A.* 18, 1856) is an indoxyl compd., probably mdican. R. H.

Chlorides and inorganic constituents of the serum and cerebrospinal fluid in meningitis. G. C. LINDER AND E. A. CARMICHAEL. *Biochem. J.* 22, 46-50(1928).—The fall of chloride concn. in the cerebrospinal fluid in meningitis is dependent on a similar fall in the chloride concn. of the serum. The relative concns. in the cerebrospinal fluid

and serum remain the same. There is an increase of the bicarbonate in both fluids and a small decrease in total base in the cerebrospinal fluid. BENJAMIN HARROW

Amino-acid content of the blood of children in health and in disease. S. H. EDGAR. *Biochem. J.* **22**, 168-72(1928).—The amino-acid N is lower in fasting bloods than in non-fasting. In rheumatism and chorea no change is found (as compared with normal healthy children); in nephritis there is a lowering of amino N, and in renal and celiac infantilism this lowering is still more marked. BENJAMIN HARROW

Some contributions of chemistry to diagnosis. JOSEPH CHANDLER. *J. Am. Inst. Homoeopathy* **21**, 292-9(1928).—Review with bibliography. J. S. HEPBURN

Studies in the microchemistry of the cell. I. The chromatin content of normal and malignant cells as demonstrated by Feulgen's "Nuclearreaktion." R. J. LUDFORD. *Proc. Roy. Soc. (London)*, **B102**, 397-406(1928).—The following results were obtained by use of this reaction. In the rat and the mouse, the chromatin content of the nucleus does not increase during oogenesis, and no chromatin is extruded into the cytoplasm when the germinal vesicle breaks down to form the chromosomes. Chromatin is not present in either the oxyphilic or the basophilic nucleoli of the oocyte of the mollusk, *Limnaea stagnalis*. The sperm heads of all 3 species yield a faint reaction when the chromosomes are stretched; but the reaction becomes progressively more marked as condensation occurs in spermatogenesis. The chromosomes apparently contain other substances besides chromatin. Extrusion of chromatin does not occur in the epithelial cells of the epididymis. Shrinkage of the nuclei of gland cells after secretion (e. g., in the adrenal medulla after exposure to cold) is apparently due to the loss of some substance other than chromatin. No relationship is found between the chromatin content of a tumor cell nucleus and the rate of growth of the tumor. In a tar tumor and the surrounding skin, the chromatin content is apparently the same in the normal and the malignant cells. During cellular degeneration of tumors, their nuclei become shrunken and the chromatin runs together. In tumors, the chromosomes stain intensely, and are separate from the nucleolus during the prophase of mitosis. Nuclear extrusions, which are well marked in some tumors, consist of nucleolar material and not chromatin. Nucleolar extrusions are the chief source of keratohyalin during cornification. While the same amt. of chromatin may be present in both large and small nuclei, yet giant nuclei contain large masses of chromatin. JOSEPH S. HEPBURN

Plasma and corpuscular chlorides in peptic ulcer. LEON BLOCH and A. M. SERRY. *Arch. Internal Med.* **41**, 415-9(1928).—There is no relation between blood Cl and gastric acidity. The Cl contents in gastric ulcer do not show marked deviations from normal. The plasma Cl is fairly const. and reaches the highest values. The corpuscular Cl shows greater variations and reaches the lowest level. The changes in the latter suggest that corpuscles play an important part in Cl metabolism. MARY JACOBSEN

Effect of toxemia on tolerance for dextrose and on the action of insulin. J. S. SWEENEY. *Arch. Internal Med.* **41**, 420-7(1928). "Daily tests of the tolerance for dextrose were made on rabbits in which toxemias had been produced with diphtheria toxin. Two units of insulin were injected daily 15 min. after the administration of dextrose. The toxemia appeared to have little if any effect on the injected insulin. On the basis of these and preceding expts., it is suggested that the effect of toxemia is that of a suppression of endogenous production of insulin." MARY JACOBSEN

The icterus index. Spectrophotometric and quantitative study. CLAIRE CUTTEN, EDITH E. EMERSON and WARRNER WOODRUFF. *Arch. Internal Med.* **41**, 428-44(1928).—In CHCl_3 soln. (8-20 mg./l., soly. 25 mg./100 cc.) bilirubin (I) has one max. of absorption at 450μ , the other at 250μ , and a min. at 350μ . The absorption ratio, A_1 for 450μ was 11.14 with a variation of 9.79%. The solns. are unstable, identical readings having been obtained only within 2 weeks. The acetone curve (soly. < 5 mg./100 cc.) resembles the CHCl_3 curve, max. at 450μ , A 0.67. The soly. in abs. EtOH was insufficient to permit detn. Five mg. I dissolved immediately in 100 cc. abs. EtOH contg. 1 cc. 0.1 N NaOH. The soln. (20 mg./l.) had an absorption max. at 450μ , A 1.17, the curve was less steep than the CHCl_3 curve. In alk. EtOH-acetone (3:1, 1 cc. 0.1 N NaOH, 10 mg. I/1.) the curve resembled the alk. EtOH curve. Solns. in alk. water (NaOH, Na_2CO_3 , pH 9.8, 5 mg. I/100 cc.) were colorimetrically very unstable. In the presence of Na_2HPO_4 , pH 9.6, practically no I went into soln. Solns. of quinoline yellow, fast yellow, flavazine and chrysoidine Y could not be used as standards since their spectra differed too much from that of I. Solns. of I in dog serum which in itself is colorless were tested: the stock soln. contained 25 mg. I to 50 cc. serum, 25 cc. 0.01 N NaOH and 25 cc. 0.01 N HCl. The soln. (16 mg./l.) has a max. absorption at 460-470 with a lesser peak at 420-430 and a depression in the bump at around 440. The other max. is at 310μ , a min. at 370μ . A was 10.88 for 450μ . A com-

parison with various $K_2Cr_2O_7$ solus. shows that an icterus index of 100 matches roughly a synthetic jaundiced serum contg. 100 mg. I per l. and that weaker dilns. are nearly proportional. Addn. of alc-acetone for the removal of turbidity causes pptn. of 60-75% I. Light filters must be used in order to eliminate errors caused by even very slight hemolysis. Sp. blue filters will permit a fairly accurate detn. even in the presence of relatively large hemolysis.

MARY JACOBSEN

The effect of toxemia on tolerance for dextrose. J. S. SWEENEY AND R. W. LACKEY. *Arch. Internal Med.* 41, 257-63(1928).—"Rabbits made toxic by diphtheria toxin are shown to have a marked decrease in tolerance to dextrose. The decrease in tolerance becomes more marked during the course of the toxemia. This suggests a quant. relationship between toxemia and tolerance to dextrose. It is suggested that an explanation of the phenomenon lies in a disturbance of insulin action or insulin production. The toxemia did not have a noticeable effect on the gastrointestinal absorption of dextrose."

MARY JACOBSEN

Experimental anemia produced by Clostridium welchii. Chemical analysis of the blood. J. A. KILLIAN, MARJORIE PATTERSON AND EDWIG KAST. *Arch. Internal Med.* 41, 370-84(1928).—Acute intoxication of rabbits with the products of *Clostridium welchii* was associated with the following blood-changes: a marked decrease of hemoglobin, a still greater decrease in red cells, decrease of cholesterol in the early stages followed by an increase with progressing remission, an increase of the icterus index to 1.5-6 times of the normal in proportion to blood destruction. The blood sugar rose slightly, passed a max. on the 3rd day and diminished in spite of repeated inoculations. There was a rise in the non-protein N without a corresponding increase in urea, while the amino acid N remained within the normal limits. The urine urobilin varied from traces to 710 mg./100 cc., increasing in proportion to red cell destruction. Many of the changes resemble those of anemia in man.

MARY JACOBSEN

The non-protein sulfur of the blood in certain pathologic conditions. W. DENIS, G. R. HERRMANN AND LUCILLE REED. *Arch. Internal Med.* 41, 385-402(1928).—In normal persons the inorg. S is limited to the plasma. In nephritis with retention of inorg. S the latter increases in the whole blood more rapidly than it does in the plasma, indicating diffusion into and retention in the cells. There is no apparent direct relation between the retention of non-protein N and inorg. S or between the latter and the neutral S or the Cl.

MARY JACOBSEN

Hemocidal properties of the blood serum. With special reference to pernicious anemia. O. H. HORALL AND F. E. BUCHMAN. *Arch. Internal Med.* 41, 182-98(1928). Normal serum seems to have a protective action on normal red cells. In 78 cases the mean for the beginning hemolysis in salt was 0.40, in own serum 0.45, in normal serum of another person 0.44. The range for NaCl was 0.11, for serum 0.20. The variations from the av. are very small, so that any deviation may be considered as abnormal. A few hrs. after hemorrhage the cells are normal to NaCl; the resistance to own serum is increased. In secondary anemias the av. is normal individual cases show striking variations. In hemolytic jaundice the cells are less resistant to normal and still less to the own serum, while the serum acts normal with normal cells. In pernicious anemia with relapse and in septic anemia the serum contains intermittently a hemolytic and toxic substance. In jaundice and in the remission stage of pernicious anemia the curves are, on an av., normal. Abnormal red cells appear in polycythemia aplastic anemia and secondary anemia. Reticulated cells of normal size are more resistant than non-reticulated ones.

MARY JACOBSEN

Temporary urobilinemia. A. LICHTENSTEIN. *Geneeskund. Tijdschr. Nederland. Indie* 67, 899-906(1927).—Urobilinemia may be produced by the injection of the subject's own laked blood. Whole blood has no such effect. The urobilinemia appears about 5 hrs. after injection and lasts from 24 hrs. to several days. In some normal subjects (Javanese and white) urobilin appeared in the urine periodically in the afternoon or the evening after larger meals and had no pathol. significance. The periodicity was not affected by the injection of the subject's own laked blood. Urobilinemia in the morning may have pathol. significance. The subcutaneous injection of 2 cc. pituitrin which causes the gall bladder to contract and to discharge bile into the intestine produced urobilinemia only in 2 out of 6 subjects. The escape of urobilin into circulation in healthy subjects is ascribed partly to its absorption by the hemorrhoidal veins, partly to the permeability of some normal livers.

MARY JACOBSEN

Surface tension of cerebrospinal fluid in children with normal and diseased meninges. M. GIUFFRÉ. *Pediatrica Arch.* 2, 31-7(1926).—The surface tension of normal cerebrospinal fluid (Traube stalagmometer) is about 5-15% lower than that of water. It keeps within normal limits in chronic diseases (tuberculosis, syphilis) with or without

affections of the nervous system, provided the meninges are not involved. It is also normal in acute diseases (pneumonia, typhoid) assocd. with pronounced meningeal irritation and in the acute stages of encephalitis and infantile paralysis. It is consistently lowered in tuberculous meningitis and markedly diminished in suppurative meningitis of epidemic, staphylococcal, diplococcal or Pfeiffer bacillus origin. It may serve for the differentiation between encephalitis and tuberculous meningitis. M. J.

Glucemia of infancy. MARIO SOLITO. *Pediatria Arch.* 2, 38-48(1926).—The blood sugar (blood from the finger tip) varies in the 1st 2 years of life from 0.08 to 0.12%, av. 0.097%, and is higher in the 1st year than in the 2nd. Gastroenteritis and dyspepsia cause an increase in proportion to the severity of the condition. Lobar and bronchopneumonia have no effect. The literature is reviewed. MARY JACOBSEN

Infantile tetany. STANISLAO FARRIS. *Pediatria Arch.* 2, 231-410(1926).—Exhaustive review with large bibliography. MARY JACOBSEN

The reducing substances of the cerebrospinal fluid in various diseases of children. A. BARBARNI. *Pediatria Arch.* 2, 453-63(1926).—Detns. by the method of Bardisian (reduction of an alk. methylene blue soln.) were made in various diseases with and without involvement of the nervous system; great variations were observed. For details see the original. MARY JACOBSEN

Modification of physicochemical properties of blood in vaccine shock. M. GIUFFRÉ. *Pediatria Rivista* 35, 980-8(1927).—In vaccine shock caused in mchtemis and typhoid patients by the injection of lyzed vaccine the surface tension and Δ are lowered, viscosity and coagulability show a rise after an initial decrease, the p_H is sometimes slightly higher, while the alkali reserve is always diminished. These changes do not occur in patients who have not been sensitized before the disease. The resemblance between vaccine and anaphylactic shock suggests that their mechanisms are identical. M. J.

Taccione's reaction of the cerebrospinal fluid in infancy. F. BARBARNI. *Pediatria Rivista* 35, 989-1007(1927); cf. C. A. 20, 1641. Taccione's reaction is always negative in normal fluids and pretty sensitive for pathological cases. A distinct meningitic reaction is obtained in tuberculous and cerebrospinal meningitis. It may also appear in paralytic and epileptic dementia and cerebral lues. The encephalitic reaction appears in many diseases of the nervous system in which meningeal reactions are scarce, such as infantile paralysis, lethargic encephalitis, Little's disease, epilepsy, etc., further in diseases with transient meningeal disturbances (typhoid, grippe). It may also appear in diseases free from clinical manifestations (congenital lues). MARY JACOBSEN

The actual reaction of blood and urine in the nephropathies of childhood. M. GIUFFRÉ and A. S. PAGLIARO. *Pediatria Rivista* 35, 1035-49(1927).—Kidney diseases with N retention are always assocd. with a corresponding decrease in alkali reserve severe conditions also with a lowered p_H . The changes may also occur in the absence of clinical uremic symptoms. A single p_H detn. is of no value. Series detns. of p_H and d. in connection with the water-drinking test give an idea of the kidney function. MARY JACOBSEN

The acid and alkali test in renal disease. A. PAGANI CESA. *Pediatria Rivista* 35, 1092(1927).— Na_2CO_3 (0.5 g.) was injected; 15 drops HCl was given by mouth. Rehn's finding is confirmed according to which nephritic children eliminate HCl normally but retain almost all alkali, while the reverse is the case for other nephrotic children. MARY JACOBSEN

Creatine-creatinine metabolism in the nephropathies of childhood. M. RASPI. *Pediatria Rivista* 35, 1092(1927).—The creatine and creatinine content of blood and urine is normal; the former is only slightly increased in the blood. The cord blood of fetus from albuminuric mothers also shows a normal creatinine content. M. J.

The potassium dichromate reaction of the cerebrospinal fluid of children, with syphilis of the spinal cord. G. TACCONE. *Pediatria Rivista* 35, 1097(1927).—The reaction is the most sensitive known. It was positive in 92% of children with syphilis of the spinal cord, 45% of whom had no apparent lesions of the nervous system. MARY JACOBSEN

A new immunological reaction of great importance for pediatrics. G. CANDIDO. *Pediatria Rivista* 35, 1103(1927).—The milk of luetic women has a powerful agglutinating action on red cells. MARY JACOBSEN

The fat and cholesterol content of the child's lungs in health and disease. S. GANDOLFO. *Pediatria Rivista* 35, 1105(1927).—G. believes that the "protoplasmic" fats have a sp. respiratory function. In diseases in which the latter is typically deranged the non-cholesterol fat is increased. Conclusions: cholesterol has no direct relation to the sp. function of the lungs. Its presence is a result of cell destruction. M. J.

The p_H and carbon dioxide content of exudates and transudates. M. GIUFFRÉ.

Pediatria Rivista 35, 1106(1927)—A study of 36 fluids of different origin shows that the p_H of exudates is generally low and their CO_2 content usually lower than that of the transudates.

MARY JACOBSEN

The histamine test for gastric secretion in children. M. MANCLOSSI. *Pediatria Rivista* 35, 1106(1927).—The free HCl of normal children especially in the 1st year is considerably lower than that of the adult. Gastrointestinal disturbances cause a further decrease or complete disappearance.

MARY JACOBSEN

The value of determining the creatine substances in the urine. G. SALVIOLI. *Pediatria Rivista* 35, 1106(1927).—In normal children of all ages the urinary creatine-creatinine practically runs parallel with the daily output. In tuberculosis and pulmonary diseases the parallelism is limited to the variations of concn. and output. The reasons for the parallelism are discussed.

MARY JACOBSEN

Cholesterol metabolism in childhood. G. HALPER. *Pediatria Rivista* 35, 1107(1927).—The normal cholesterol content of the serum of children and adolescents varies from 0.058 to 0.160%. It is considerably increased in all nephrotic cases and lowered in tuberculosis. The decrease is pronounced in oligemias. Sympathetic stimulants cause an increase.

MARY JACOBSEN

Blood cholesterol of children in health and disease. L. VARONE. *Pediatria Rivista* 35, 1107(1927).—There are no definite differences between the newborn, the nursing and the older child. The cholesterol content is increased in the florid stages of rickets and spasmophilia. With the progress of clinical improvement cholesterol, Ca and P return to normal at about the same rate. An increase is also present in chronic tuberculosis, a decrease in severe cases of diphtheria with paralysis.

M. J.

Effect of ultra-violet rays on experimental anaphylaxis. G. P. BENTIVOGLIO. *Pediatria Rivista* 35, 1111(1927).—Guinea pigs may be partly or completely desensitized by the inhalation of irradiated air. When irradiated in high diln. with large doses the serum loses its toxic effect, but not its sensitizing properties. The effect on the antitoxin properties is insignificant if any.

MARY JACOBSEN

Behavior of sera irradiated with ultra-violet rays in experimental anaphylaxis. C. GIAUME. *Pediatria Rivista* 35, 1111(1927).—Irradiated normal horse serum does not produce shock in sensitized guinea pigs. Five min. irradiation of the sensitized guinea pig attenuates the shock produced by normal serum. Severe and mostly fatal shock results when both sensitizing and shock releasing serum have been irradiated. The antibody content of diphtheria serum is not noticeably diminished by irradiation.

MARY JACOBSEN

The reducing power of irradiated and non-irradiated neoplastic cells in childhood. R. SIMONINI. *Pediatria Rivista* 35, 1111(1927).—The reducing power is inherent in the cell elements. It is always higher than that of the tissues on which the tumor grows and increases with the activity of the tumor. It is partly but not entirely attributable to a content in oxidizing enzymes and is lowered but not abolished by Röntgen irradiation.

MARY JACOBSEN

Glucemia in the prematurely born. A. MAZZEO. *Pediatria Rivista* 35, 1121(1927).—The values vary between 0.035 and 0.110%.

MARY JACOBSEN

The p_H of normal and pathologic cerebrospinal fluids. C. GUASSARDO. *Pediatria Rivista* 35, 1124(1927).—The normal p_H is 7.55. It was lowered in purulent meningitis, but showed the normal value in all (148) other cases of meningitis, encephalitis, infantile paralysis and hydrocephalus of various origin.

MARY JACOBSEN

Alimentary and adrenaline glucemia in infantile paralysis and in the cerebroplegias of childhood. A. DE CAPITTE. *Pediatria Rivista* 35, 1201-13(1927).—In 20 cases of infantile paralysis (I) the blood sugar was practically normal: 0.058-0.102%, while 42.3% cases of cerebral paralysis (II) showed an increase up to 0.112-0.126%. Administration of glucose caused in I a 20% increase of long duration, in II a considerable increase of much shorter duration. The adrenaline hyperglucemia was in I by far lower than in II, although higher than the alimentary glucemia in I. The exaggerated adrenaline reaction in II is related to endocrine disturbances through stimulation of the presumably diseased sympathetic. The protracted alimentary reaction in I is a result of the neuro-muscular disturbance.

MARY JACOBSEN

The colloid-chemical significance of electrolytes for precipitation. NAQYOSH HAYASHI. *Sei-i-Kwan Med. J.* 46, 3-5(1927).—The presence of salt is necessary for pptn. (agglutination); if salt is absent, the reaction will not necessarily appear. Among the 31 salts employed, all of the univalent cations can be substituted for NaCl in this reaction; also the bivalent cation salts as $CaCl_2$, $MgCl_2$, $SrCl_2$, $BaCl_2$, $CaBr_2$, $MgBr_2$, $SrBr_2$, CaI_2 , $MgSO_4$, $CaSO_4$ can be used instead of NaCl. All these salts are capable of enhancing the reaction in certain concns.; higher concn. inhibits the reaction and

lower concn. has no influence at all. With chloride, iodide and bromide, the area of concn. which intensifies the pptn. and the intensity of the reaction is proportional to the valency of the cation. This would indicate that the cation play the main role in pptn. The above results could not be observed with SO_4 which would indicate that anions also take part in the pptn. Salts which in certain concn (high) inhibit the pptn. dissolve it once it is formed. p_{H} of the pptg. reaction lies between 6.3 and 8.3

J. A. K

Parathyroidectomized dogs, with particular attention to the regional incidence of tetany, and to the blood mineral changes in this condition. C. I. REED, R. W. LACKEY AND J. I. PAYTE. *Am. J. Physiol.* **84**, 176-88(1928)—The tetany level of blood Ca was not const; but tetany always occurred when $\text{Ca}:\text{P} = 1$ or less. The product $\text{Ca} \times \text{P}$ bore no relation to tetany.

J. F. LYMAN

Studies on anaphylaxis. V. Anaphylaxis and avitaminoses. ENRICO SERENI. *Boll. soc. ital. biol. sper.* **2**, 254-9(1927).—The influence of vitamin-free diet on active and passive sensitization was investigated. A group of guinea pigs kept on a vitamin-free diet for 15 days was sensitized with 0.1 cc. horse serum; another group which received normal feed was likewise sensitized. Eleven days later, some animals from each group were re-injected with horse serum with the following results: the animals kept on a normal diet showed few if any symptoms of shock; those kept on a vitamin-free diet showed intense shock, lowering of temp., followed by death in 3 hrs. On the 12th day after sensitization a few animals from each group were re-injected. The normal group presented severe symptoms of anaphylaxis followed in some cases by death; the other group behaved similarly. Animals from both groups injected 20 days after sensitization all died from acute anaphylaxis. The study of passive anaphylaxis demonstrated very clearly that with homologous and heterologous sensitization, animals on a vitamin-free diet become more sensitive to anaphylaxis. A theory of antibody formation is advanced to explain the contradictory results on active anaphylaxis obtained with the normally fed animals re-injected on the 11th and 12th days after sensitization.

PETER MASUCCI

Alimentary glucemia in carcinoma. L. O. CANNARO. *Boll. soc. ital. biol. sper.* **2**, 269-71(1927).—The increased glucemia in carcinoma is always greater than that of normal individuals following the ingestion of sugar; the glucose titer is increased 0.06 to 0.07% after $\frac{1}{2}$ hr. while in the normals the increase is seldom greater than 0.03 to 0.04%. Two hrs. after the ingestion of carbohydrate, the blood sugar becomes normal. Adrenaline does not affect the sugar curve in carcinoma patients any differently than in normal individuals.

PETER MASUCCI

The total fatty acid contents of blood in cancer. L. O. CANNARO. *Boll. soc. ital. biol. sper.* **2**, 272-4(1927).—Fatty acid detns. were made on the anemic blood of cancerous individuals by the Kumagawa-Suto method. The results showed: (1) in all cases examined the lipemic titer was much higher than that of normal blood, 0.3 to 0.35% being taken as the normal; (2) the increase in fatty acids parallels the diminution in the number of red cells.

PETER MASUCCI

The mechanism involved in the production of hyperglucemia with colloidal silver. G. TRIMARCHI. *Boll. soc. ital. biol. sper.* **2**, 274-7(1927).—The histological examn. of the liver, spleen and kidneys of animals previously injected intraperitoneally with colloidal Ag failed to show any evidence of reticulo-endothelial block. T. concludes from these and other results that Demant's hypothesis which attributes hyperglucemia by the injection of colloidal silver to the blocking of the reticulo-endothelial system is untenable.

PETER MASUCCI

The gaseous exchange of inflamed tissues—experimental studies. MARIO GIANOTTI. *Boll. soc. ital. biol. sper.* **2**, 737-42(1927).—The amounts of O_2 consumed and CO_2 eliminated were detd. on normal rabbit ears and on rabbit ears inflamed by means of heat—immersed in water at 50° for 5 min. The results of the respiratory quotient ($R. Q.$) when plotted form a segment of a hyperbola ($y = (a/x) + b$). This shows there is a direct relation between the wt. of the normal ear and the increase of $R. Q.$ of the inflamed ear.

PETER MASUCCI

The formation of tumors by distillates from the asphaltic rocks of Ragusa. E. GIUFFRIDA AND G. SCHILLACI. *Boll. soc. ital. biol. sper.* **2**, 761-3(1927).—No formation of tumors was noted on 4 mice painted with "pure bitumen," a distillate, after 225 days. Small ulcers were noted on the 3 out of 4 mice treated with "heavy oil" after 140-160 days.

PETER MASUCCI

The behavior of the proteolytic, amylolytic and lipolytic power of pancreatic extract in animals treated with typhoid and paratyphoid toxins. MARGIOTTA AND INGRASSIA. *Boll. soc. ital. biol. sper.* **2**, 819-20(1927).—The enzyme activity of the pancreatic se-

cretions of normal dogs with a Pavlov pancreatic fistula remains unaltered until complications arise. After injections of typhoid and paratyphoid toxins, the enzymes are slightly weakened; lipase is the least affected; trypsin and amylase are affected in direct proportion to the general condition of the animal. PETER MASUCCI

Relation of the parathyroids to the healing of fracture as controlled by the Röntgen ray. D. E. ROSS. *Arch. Surg.* **16**, 922-37 (1928).—Removal of 2 parathyroids does not lower the blood Ca or delay the union of fractures. Removal of 3 parathyroids causes a drop of 2 to 3 mg. of Ca per 100 cc. of serum, and delays the union of fractures 4 to 5 weeks. When the serum Ca returns to normal, union of fractures occurs. J. T. M.

The Meinicke flocculation reaction with colored antigen. D. BOROVSKII, *Centr. Bakt. Parasitenk. I Abt.* **105**, 455-9 (1928).—The addn. of 0.1 to 0.2 g. of Victoria blue to 250 cc. of Meinicke antigen will produce a colored ppt. with a luetic serum; hence gradations can be much more easily distinguished. If the serum contains hemoglobin or bile, the end point can be made sharp by extg. with CHCl_3 , which carries down the color only if the reaction is positive. JOHN T. MYERS

Hemoclastic changes in vitro from agents causing anaphylactoid reactions. P. I. HANZLIK, F. DEJDS, L. W. EMPEY AND W. H. FARR. *J. Pharmacol.* **32**, 273-9 (1928).—The authors studied the alterations in surface tension, albumin/globulin ratio, rate of sedimentation and fragility of red blood cells in oxalated blood, plasma and serum of rabbit, guinea pig, cow and dog, produced by the following substances: venal agar, arsphenamine, CaCl_2 , CHCl_3 -plasma, CuSO_4 , kaolin, toxified serum, with 0.5% NaCl as control. The most important change was found in the surface tension which in 50 out of 62 cases was decreased. All the agents caused a change in the albumin/globulin ratio. Generally when the surface tension increased the ratio decreased, and vice versa. Sedimentation rate was increased only by gelatin and acacia. Fragility was increased by CuSO_4 and arsphenamine, and decreased by gelatin and acacia. The other agents were indifferent. The results indicate a disturbance of the blood colloidal equil., this presumably being concerned with the disturbances of anaphylactic and anaphylactoid shock. C. RIGGS

A study of blood serum with reference to diagnosis of precancerous conditions. ROGER DOURIS AND CHARLES MONDAIN. *Bull. sci. pharmacol.* **35**, 145-60 (1928).—A histologic comparison is made between the appearances of the dried residues of drops of serum from normal, syphilitic and cancerous subjects. L. W. RIGGS

Action of inorganic colloids on normal and syphilitic blood serums. P. DOURIS AND J. BECK. *Compt. rend.* **186**, 977-9 (1928); cf. *C. A.* **22**, 1392. In place of the usual colloids, called antigens, an attempt was made to substitute inorg. colloids with the same phys. condition and of const. chem. compn. by adding successively to the serum the necessary reagents. Among the substances thus formed were colloidal S, CdS , $\text{Cu}_2\text{Fe}(\text{CN})_6$, tungstic acid and silicic acid. The concns. of the reagents used to produce these inorg. colloids ranged from $1/10$ down to $1/400$ N. There was a difference in the time of forming or quantity of ppt. or turbidity in normal and syphilitic serums, which, after further study, may prove useful as a basis of serodiagnosis. L. W. R.

Variations of the lipoidal content of the serum in states of shock and under the influence of acidosis or alkalosis. JEAN VAN DE VELD. *Compt. rend. soc. biol.* **97**, 1825-7 (1927).—The variations of the lipoidal content in total blood and serum are parallel, and their differences indicate that the corpuscles absorb but little of the lipoids. Shock by injection which increases the acidity as HCl is followed by an increase of lipoids in the blood, while an injection of NaHCO_3 which increases the alk. is followed by a decrease of lipoids. L. W. RIGGS

Influence of the physical state of the antigens in the sero-diagnosis of syphilis. R. DOURIS, CH. MONDAIN AND J. BECK. *Compt. rend. soc. biol.* **98**, 507-9 (1928).—For 2 antigens of the same concn. in ext. and the same opalescence, the sensitivity varies inversely as the p_H . For the same content of ext. and the same concn. of H ions, the sensitivity of the antigen depends on the mode of diln. and consequently on its opalescence. Accordingly a suspension of antigen is characterized by at least 2 physicochem. data: its p_H and its colloidal state. L. W. RIGGS

The cause of uremia. A. OZORIO DE ALMEIDA. *Compt. rend. soc. biol.* **98**, 510-1 (1928); cf. *C. A.* **21**, 1488-9.—Expts. with dogs indicated that uremia is produced by variations in the relative proportions of the salts in the blood and in the liquids of the organism. L. W. RIGGS

Disorders of renal secretion caused by lack of sodium chloride. L. BLUM AND P. GRABAR. *Compt. rend. soc. biol.* **98**, 527-9 (1928).—See *C. A.* **22**, 1184. L. W. R.

Is there a hyperglucemic substance in diabetic blood? F. HÉDON. *Compt. rend. soc. biol.* **98**, 564-7 (1928).—The question remains unanswered. L. W. RIGGS

Development of a toxic condition in the dog during gestation. W. DE B. MACNIDER. *J. Am. Med. Assocn* **90**, 71-5(1928).—It appears that associated with gestation there is a definite tendency on the part of animals, irrespective of any renal injury, not to maintain a normal acid-base equil. of the blood. L. W. RIGGS

Ambard constant and McLean urea-index in kidney surgery. MASAKI IWAMOTO. *Tôhoku J. Exptl. Med.* **10**, 248-78(1928). L. W. RIGGS

Toxic substances in the blood after extirpation of the adrenals. N. V. PUCHKOV AND A. V. KIBYAKOV. *Arch. ges. Physiol.* (Pflüger's) **218**, 83-8(1927) - Disturbance in the functional activity of the liver as regards lipoids leads to an accumulation of choline in the blood. These changes, at times following adrenalectomy, cause death through a paralysis of the heart G. H. S.

Creatine metabolism in the brain of the pigeon during starvation and in polyneuritis. T. LJUDARSKII. *Arch. ges. Physiol.* (Pflüger's) **218**, 627-34(1928) -Disturbances in the N metabolism of the brain occur in pigeons during starvation or when on a diet deficient in vitamin B; the most marked changes appearing in the paralytic and spastic stages. In the spastic form of polyneuritis there is a reduced total N and an increase in creatine, while in the paralytic form the total N is even more reduced and the increase in creatine is less. In the chronic form and in starvation a slightly increased creatine appears but the total N is unchanged. These disturbed conditions respond very quickly to the administration of yeast. G. H. S.

The physicochemical basis for non-specific hemolysis. RUDOLF MOND. *Proto plasma* **2**, 126-34(1927). - A review in German with 61 references. M. H. SOULE

Lipoids and growth of carcinoma. S. BERNSTEIN AND H. ELIAS. *Z. Krebsforschung* **26**, 112(1927) - Inoculated adenocarcinoma of mice grows much less rapidly when the diet is low in lipoids. This effect is reduced by adding lecithin or cholesterol to the diet. Cholesterol is more effective than lecithin, and there is no evident antagonistic effect between these 2 lipoids. H. G. WELLS

The alteration in cholesterol metabolism by Röntgen rays in cancer patients. F. JACOB AND R. MOTOKIWA. *Z. Krebsforschung* **26**, 51-74(1927) -Röntgenization of patients with cancer but not cachectic is followed by a rise in blood cholesterol. Non-cancerous patients, cancer patients operated upon without recurrence, and cachectic cancer patients, all show a fall in cholesterol. These facts may have some diagnostic and prognostic significance. H. G. WELLS

Microchemical demonstration of bisinuth in experimental animal tumors. L. CALIFANO. *Z. Krebsforschung* **26**, 183-90(1928) - Expts. were conducted with transplanted mouse carcinoma and rat sarcoma, the animals being given colloidal Bi intravenously. The Bi is found only in normal cells and in the stroma of tumors, but not in the tumor cells themselves. H. G. WELLS

The nature and clinical value of the cancer reaction of Roffo. H. HILAROWICZ AND W. JANKOWSKA-HILAROWICZ. *Z. Krebsforschung* **26**, 214-27(1928).—This serum test for cancer depends on an increased globulin content, and hence is not specific for cancer. H. G. WELLS

Growth of cancer cells in relation to hydrogen-ion concentration of the medium. ALBERT FISCHER. *Z. Krebsforschung* **26**, 250-3(1928) - Carcinoma cells are more susceptible to variations in p_H than normal cells. Their growth is inhibited at p_H 5.9, at which reaction connective tissue cells can grow for several days. The optimum p_H for growth of cancer cells is at least not farther towards the acid side than for normal cells; they are more susceptible to higher acid and less to alkali. H. G. WELLS

Refractometric studies of blood serum in cancer patients. F. P. TINOZZI. *Z. Krebsforschung* **26**, 253-9(1928).—Change in refraction of serum depends on its protein contents, as well as on their cleavage products. With cachexia there is a fall in the index, progressing with the downward course of the patient. Under radiation the index rises, perhaps from absorption of decompn products. Refractometric studies have no diagnostic value. H. G. WELLS

Studies in calcium and carbohydrate metabolism. Calcium and glucose tolerance in diabetes mellitus. MAX WISNIOFSKY. *J. Lab. Clin. Med.* **13**, 133-7(1927).—A review is given of the literature on the relation of Ca to carbohydrate metabolism from which it appears definitely established that diabetes mellitus is associated with a negative calcium balance. Contrary to the findings of previous investigators, intravenous administration of $CaCl_2$ does not appear to influence the tolerance of diabetics for glucose as detd. by studying glucose-tolerance curves. ETHEL WICKVARE

BIRK, W.: Untersuchungen über den Stoffwechsel des Kindes in Fieber. Berlin: S. Karger. 104 pp. M. 7. Reviewed in *Biol. Abstracts* **1**, 1100(1927).

H—PHARMACOLOGY

A. N. RICHARDS

Action of apomorphine and santonin on the iris centers. PIETRO MATTEI. *Boll. soc. ital. biol. sper.* 2, 293-7(1927).—Injection of both apomorphine and santonin affects the pupils only by direct stimulation of the iris. There is little dilation of the pupils caused except during convulsion. A. W. CONTIERI

The seat of action of various poisons in the spinal centers. MICHELE MITOLO. *Boll. soc. ital. biol. sper.* 2, 297-302(1927).—Poisons act in two ways on the nervous system. One class, strychnine, caffeine, nicotine, excites reflex action and finally causes symptoms of tetanus. The other class, phenol, camphor, cosin, diminishes reflex action, the final state being complete paralysis. A. W. CONTIERI

The action of saccharin in various doses on hyperglucemia by dextrose. C. CIACCIO AND S. RACCHIUSA. *Boll. soc. ital. biol. sper.* 2, 309-11(1927).—Saccharin when administered together with dextrose inhibits to a great extent the resulting hyperglucemia, even 1 part in 5 being effective. A. W. CONTIERI

Influence of argyrol on experimental hypoglucemia by insulin. G. TRIMARCHI. *Boll. soc. ital. biol. sper.* 2, 323-5(1927).—Dogs were treated by injecting insulin alone; injecting insulin and argyrol mixed; insulin and argyrol at the same time but in different syringes; injection of argyrol, 15, 30 and 90 min. after insulin. The results, although varying in individual cases, show in general that when injected together, the action of insulin is not modified appreciably, whereas, when argyrol is injected after, the hyperglucemic action is both prolonged and intensified. A. W. CONTIERI

The course of glycogen injected in normal and in depancreatized dogs. U. LOMBROSO. *Boll. soc. ital. biol. sper.* 2, 330-2(1927).—Glycogen was introduced into the system of a normal dog and also in a dog with the pancreas removed in the proportion of 1 g. per kg. The sugar content of blood was examd. before and after. The increase in sugar in the blood was twice as much in the dog without the pancreas, and at the same time three times as much was found in the urine. A. N. R.

Reaction of the anterior and posterior epithelial layers of the cornea during autolysis of the corneal tissue. E. GALANTE. *Boll. soc. ital. biol. sper.* 2, 337-9(1927).—Corneas of dogs were treated *in vitro* with equal quantities of physiological soln. and NaF and the autolysis was allowed to go on at 38°. After several days the amts. of amino acids present were detd. by the method of Sørensen. In each case the cornea with the anterior epithelial layer removed produced a lower amount of acids (*i. e.*, equiv. to 4.2 cc. of 0.01 *N* NaOH, *vs.* 10.65 cc. for the normal cornea). With removal of the posterior epithelial layer the acids increase, *i. e.*, from equiv. to 10.65 cc. 0.01 *N* NaOH to 14.40 cc. The effect of antagonistic substances, as atropine and pilocarpine, will be considered in a later paper. A. W. CONTIERI

The injection of amides in circulatory system. II. Effect on depancreatized dogs. G. SUNZERI. *Boll. soc. ital. biol. sper.* 2, 339-41(1927).—Soluble amides were injected in dogs and then various organs, *i. e.*, the liver, muscles, gall bladder, tested for amides. Only glycogen could be found (mahogany color with I₂ soln.). With dogs with pancreas removed the same organs again failed to show traces of amide, but large quantities were found unchanged in the urine. A. W. CONTIERI

Insulin. II. Acetylation of insulin. KARL FREUDENBERG AND WILHELM DIRSCHERL. *Z. physiol. Chem.* 175, 1-17(1928); cf. C. A. 20, 3701.—Insulin preps. were acetylated by treating the suspension in C₆H₆ with pyridine and Ac₂O at 0° for 3 hrs., dilg. with Et₂O and centrifuging. From 1 g. of insulin 0.95 g. of the acetylated product was obtained. The loss is attributed to the H₂O or EtOH content of the original material. The "acetylinsulin" is insol. in H₂O and EtOH, sol. in alkali, and is of much diminished but complex activity. Occasionally it caused even a slight increase in blood sugar and in rare cases a paralysis of the hind legs and death of the rabbit. Perfusion expts. with the isolated frog liver showed the absence of any noteworthy influence on glycogen degradation such as occurs with adrenaline. The preliminary stage of insulin action, *viz.*, the adsorption of glucose on the red corpuscles, was also absent. Under conditions which do not injure insulin itself (0.03 *N* alkali at 1-3° for 24 hrs.) the acetylinsulin is converted into a product which behaves like insulin but exerts only 1/5-1/3 of the insulin activity. Acetylation of this "regenerate" gives an almost inert acetylinsulin which, however, under the same alkali treatment yields a 2nd regenerate with 80% of the activity of the 1st regenerate. The inference is that the insulin is converted into an almost inert acetylinsulin, which on alkali treatment yields an insulin-like, but specifically weaker regenerate, differing from the original insulin in its greater stability. Acetylation may have occurred on OH, NH₂ or NH groups. The simplest explanation

of the phenomena observed is that in regeneration the OAc is saponified, and the NHAc remains intact. This, however, postulates the homogeneity of the insulin factor in the protein mixt. Acetylinsulin contains 3-4% Ac, and the ease with which the Ac is removed suggests the OAc grouping, a view in harmony with the absence of Van Slyke NH_2 from insulin observed by Shonle and Waldo (*C. A.* 18, 2179). The regenerate contains 0.8% Ac. Since the bulk of insulin preps. consists of protein and only a small fraction is actual hormone, the Ac and NH_2 detns. cannot be interpreted in terms of the insulin mol.

A. W. DOX

Experiments with nicotine. W. BURRIDGE. *Arch. intern. pharmacodynamie* 32, 216-24 (1926); *Physiol. Abstracts* 12, 123.—Use was made of addnl. solns. to those employed by Barry, whose exptl. results were confirmed, and it was shown that the effects of nicotine on the frog's heart are divisible into 2 groups: those that come and go with the drug, and those that persist after removing nicotine from the perfusing soln. The action in the first group is ascribed to reduction of the soly. of CaHPO_4 . As an autonomic analyzer it ppts. CaHPO_4 . The second effect is attributed to some firm combination between nicotine and excitable substance. It is suggested that the action of nicotine should not be regarded in terms of stimulative or sedative effects, but in those of increased concn. capacity.

H. G.

Influence of anesthetics on hyperthermia on methylene blue. C. HEYMANS AND P. REGINERS. *Arch. intern. pharmacodynamie* 32, 311-26 (1926); *Physiol. Abstracts* 12, 121-2.—Intravenous injection of methylene blue had been previously shown to cause hyperthermia in the dog. In this the respiratory vol. passes from 0.3 or 0.4 l. per kg. to 3 l. per kg. per min. Ether given to produce deep anesthesia does not prevent this action, but the respiratory vol. is reduced, the CO_2 output, though diminished, being greater than normal. The mixt. chloroform, alc., ether slows the progress of the hyperthermia. There is a diminution of respiratory vol. and of CO_2 output, which approach the normal. Morphine injected before methylene blue prevents hyperthermia, but the fall of temp. and CO_2 is not so marked as that ordinarily found in morphine narcosis. Morphine given after methylene blue does not prevent the effects. The respiratory vol. and CO_2 are decidedly greater than normal. Chloral intravenously inhibits the effects of methylene blue when injected after the pigment.

H. G.

Coramine in chloroform-ether narcosis. P. GUNS. *Arch. intern. pharmacodynamie* 32, 373-99 (1926); *Physiol. Abstracts* 12, 178.—Coramine, a diethylamide, in small dose or large had no other effect than that of depression on the respiration in deep chloroform-ether narcosis in which it was tried. In two cases of very light anesthesia coramine increased respiratory vol., which was normal beforehand. The dose which had this effect varied from 1.5 to 25 mg. per kg. The convulsions which are caused by coramine are masked by chloroform-ether, and are gradually exhibited as the effects of the anesthetic pass off, sometimes ending in death. It is a dangerous drug to use in deep narcosis, though it may be useful in other circumstances.

H. G.

The influence of stereoisomerism on the action of aldoximes. G. LIO. *Arch. intern. pharmacodynamie* 32, 461-88 (1926); *Physiol. Abstracts* 12, 178.—The oximes studied were prepd. by treating aldehydes with NaOH and NH_2OH . Benzaldoximes are more toxic than anisaldoximes, and these latter are more toxic than piperonal-doximes. That the α form is more toxic than the β form is confirmed by expts. on fermentation, on *Paramecium*, on cold- and warm-blooded animals, on the heart, muscles and blood pressure. The oximes studied pass into the urine in part unaltered and in part as aldehydes.

H. G.

Can bromide and iodide of sodium be usefully employed as antidotes of strychnine? G. CAMPO. *Arch. intern. pharmacodynamie* 33, 73-7 (1927); *Physiol. Abstracts* 12, 308.—If NaBr or NaI be injected subcutaneously into an animal within 4 min. after a poisonous injection of strychnine, and at the same point the animal is saved. Part of the strychnine should still remain at the site of injection. If there is a delay of 5 min. after the strychnine injection the animal always dies. A similar result had been obtained by Giribaldi for NaCl. The bromide is preferable to the iodide, which may cause an eschar. Intramuscular injection of bromide has been found useful as an antidote to strychnine poisoning when it has been introduced by the mouth.

H. G.

Studies on quinine and quinidine. II. Their action on the blood vessels. E. E. NELSON. *Arch. intern. pharmacodynamie* 33, 186-96 (1927); *Physiol. Abstracts* 12, 401.—Small doses of quinine or quinidine given intravenously cause a fall of blood pressure. This is due to dilatation of peripheral vessels, and there is no evidence of dilatation of splanchnic vessels. The effect is partly a depression of vaso-motor endings, and in part a direct one on muscle. There is no evidence to show that a vaso-constriction occurs. Quinidine has a stronger effect, passing off more slowly than

quinine. III. The antagonism of quinine and quinidine for the circulatory effects of adrenaline. *Ibid* 197-203.—The antagonism for the pressor effect of adrenaline is vascular, not cardiac. Failure of adrenaline to cause a slowing after either is due to paralysis of the vagus mechanism, which is chiefly peripheral. A minor factor may be that the pressure increase is not great enough to cause reflex slowing. IV. A note on their comparative toxicity. *Ibid* 204-7.—Quinidine given to white rats intraperitoneally or to frogs into the ventral lymph sac is slightly but definitely more toxic than quinine. This is contrary to what is usually found in optical isomers, in which the levorotatory member of a pair is more active, but it agrees with the results of others concerning the relative toxicity of quinine and quinidine on the mammalian circulation. There is no evidence that the fluorescent soln. of sulfate of quinine is more toxic than the non-fluorescent hydrochloride. H. G.

The absorption of mercurials from ointments applied to the skin. R. B. WILD AND I. ROBERTS. *Brit. Med. J.* 1926, I, 1076-9; *Physiol. Abstracts* 12, 125.—All mercurials were absorbed to some extent. Though hydrous wool fat was absorbed in greater quantity than lard when these were used as bases, the absorption of the mercurial itself was greater from the lard basis. A paraffin base was less effective, but the amt. of mercurial absorbed from any ointment was greater proportionally to the amt. present up to 30%. HgO was most readily absorbed; ammoniated Hg, metallic Hg and Hg salicylate were absorbed almost as well; and calomel was least. H. G.

Effect of hypodermic insulin on the fasting blood sugar in normal and diabetic subjects in relation to percentage normal weight. W. M. BARTLETT. *J. Lab. Clin. Med.* 12, 115-8(1926); *Physiol. Abstracts* 12, 165.—Since insulin produces a more marked effect if the initial blood sugar is high, it was thought that the blood-sugar curve after insulin might be a better diagnostic procedure in diabetes than the usual tolerance test. The curve was not found specific enough for this purpose; underweight normal and underweight diabetic subjects were the most sensitive to the blood-sugar lowering effect of insulin, and obese normal subjects the least sensitive. The effect occurs most slowly in obese diabetics and normal weight normal subjects. H. G.

Isopropyl alcohol—an investigation of its physiologic properties. H. C. FULLER AND O. B. HUNTER. *J. Lab. Clin. Med.* 12, 326-49(1927); *Physiol. Abstracts* 12, 181.—The results vary with diff. animals; the intoxication produced is similar to that produced by ethyl alc. and tolerance is usually established quickly. H. G.

Ketonuria due to overdosage with insulin. F. MAINZER. *Klin. Wochschr.* 6, 107-8(1927); *Physiol. Abstracts* 12, 230.—Three cases are described in which a marked hypoglycemia occurred after administration of insulin, this being assocd. with acetoneuria. In two of the cases the alkali reserve of the blood was 86 vol. %, indicating a concurrent alkalemia. H. G.

Thyroid-like action of inorganic iodine. I. ABELIN. *Klin. Wochschr.* 6, 584-6(1927); *Physiol. Abstracts* 12, 387.—Expts. on metamorphosis of the axolotl are described. Intraperitoneal injection of Lugol's soln. (I in KI) caused metamorphosis to take place, but neg. results were obtained when the soln. was merely added to the water in which the axolotl was kept. H. G.

Action of glycine in urticaria. K. GLAESSNER. *Klin. Wochschr.* 6, 597-9(1927); *Physiol. Abstracts* 12, 404.—The author describes several cases of successful treatment of urticaria with glycine. Doses of 5 to 10 g. daily were given. The cases which benefit by this treatment are those in which the urticaria is an anaphylactic manifestation. Cases assocd. with asthma did not respond to the treatment. It is suggested that the glycine exerts its action by forming a non-toxic compd. with the toxic agent. H. G.

Pharmacology of plasmoquin. J. W. LE HEUX AND C. DE L. VAN WYNGAARDEN. *Klin. Wochschr.* 6, 857(1927); *Physiol. Abstracts* 12, 520.—Plasmoquin is a new antimalarial agent. The lethal dose per kg. for rabbits is 3.5 mg. (intravenous), 20 mg. (hypodermic), and 225 mg. (*per os*). In toxic doses the heart beat is irregular and slow; there is marked dyspnea, and the animal lies on its side; convulsions occur. Recovery, if it occurs, is rapid. The substance is soon rendered non-toxic in the body. The lethal dose per kg. for cats is 5 mg. (intravenous), 5 mg. (hypodermic), and 7.5 mg. (*per os*). In these animals it is destroyed much more slowly than in rabbits. In cats a methemoglobinemia is produced, and the drug also produces methemoglobin in the blood of many species *in vitro*. H. G.

Functions of paralyzed muscle. XVI. Action of guanidine. L. CALIFANO. *Riv. patol. sper.* 2, 85-92(1927); *Physiol. Abstracts* 12, 487; cf. *C. A.* 22, 619.—Guanidine is without action on the denervated muscle of the toad after the neuromuscular junction has lost its excitability. H. G.

The problem of the danger of small amounts of mercury. PAUL FLEISCHMANN.

Deut. med. Wochschr. 54, 304-7(1928).—An examn. of a number of patients showed that Hg even in very small amount, (e. g., from amalgam fillings in teeth) may produce considerable harm to the individual. ARTHUR GROLLMAN

Experiments on the therapeutic administration of manganese. F. FALUDI. *Deut. med. Wochschr.* 54, 470-2(1928).—Mn administered orally in combination with proteins had a marked *hematopoietic* action. Alone, and in combination with As, Mn was found of great value in clinical cases of anemia of diverse origin. ARTHUR GROLLMAN

Hypersensitivity towards ethyl acetate. BEINTKER. *Deut. med. Wochschr.* 54, 528(1928). ARTHUR GROLLMAN

The lipid distribution in normal and abnormal liver tissues. II. The effect of insulin on the lipoids of rabbit liver. E. R. THEIS. *J. Biol. Chem.* 77, 75-80(1928); cf. *C. A.* 22, 978.—When administered over a long period of time, insulin caused a decrease in the total lipid content of the liver. Over a very short period the phospholipoid-neutral fat ratio was markedly changed. Less phospholipoid was found in the livers of animals killed at the peak of the insulin action than in those killed several hrs. after this peak. ARTHUR GROLLMAN

Studies in the synthesis of hippuric acid in the animal organism. VII. A comparison of the rate of elimination of hippuric acid after the ingestion of sodium benzoate, benzyl alcohol and benzyl esters of succinic acid. S. L. DIACK AND H. B. LEWIS. *J. Biol. Chem.* 77, 89-95(1928).—After the oral administration of benzyl alc. to rabbits, the velocity of hippuric acid excretion by the kidneys was only slightly less than that obtained after feeding Na benzoate. After the administration of Na benzyl succinate, more hippuric acid was eliminated in the first 6 hrs. than when dibenzyl succinate was fed, but the amt. excreted in 24 hrs. was less in the first case. The results are taken to indicate a rapid oxidation of benzyl alc. and a hydrolysis of the monobenzyl succinate in the body. ARTHUR GROLLMAN

The effect of insulin on the amino acid content of blood. J. M. LUCK, G. MORRISON AND L. F. WILBUR. *J. Biol. Chem.* 77, 151-6(1928).—Subconvulsive doses of insulin lowered the amino acid content of the blood of rabbits, rats and men. The observed decrease when expressed as mol. concn. was at times almost as great as the decrease in blood sugar concn., similarly expressed. ARTHUR GROLLMAN

The effect of anti-rheumatic drugs on the arthritis and immune-body production in serum disease. C. L. DERICK, C. H. HITCHCOCK AND H. F. SWIFT. *J. Clin. Investigation* 5, 427-40(1928).—The administration of neocinchophen or aspirin immediately following the discontinuance of serum therapy, and its continuation throughout the period of the disease, prevented the occurrence of arthritis. ARTHUR GROLLMAN

Low basal metabolism following thyrotoxicosis. I. Temporary type without myxedema, with special reference to the role of iodine therapy. W. O. THOMPSON AND P. K. THOMPSON. *J. Clin. Investigation* 5, 441-69(1928). II. Permanent type without myxedema. *Ibid* 471-501. ARTHUR GROLLMAN

Anticoagulant action of peptone. J. O. W. BARRATT. *Biochem. J.* 22, 230-5(1928).—Peptone acts upon fibrinogen, which, in consequence, becomes diminished in amount. The peptone is without action on thrombin. BENJAMIN HARROW

Effect of phlorhizin and other substances on fermentation by yeast. W. J. DANN AND J. H. QUASTEL. *Biochem. J.* 22, 245-57(1928).—Allyl alc. and acrylic acid bring about an almost complete cessation of the fermentation of glucose by yeast and zymim (cf. *C. A.* 22, 249). Of the glucosides tried one only, phlorhizin, showed a marked retarding action on the fermentation of glucose by zymim. Among the polyhydric alcs. phloroglucinol (the phenol present in phlorhizin) was the most effective in retarding the rate of fermentation by zymim. Phlorhizin had no perceptible action on the fermentation of pyruvic acid by zymim or by live yeast, or on the fermentation of glucose by live yeast. BENJAMIN HARROW

Role and scope of carbon dioxide in general anesthesia. JULIUS WISOFF. *Dental Cosmos* 70, 528-31(1928).—A discussion of the use of CO₂ in gas anesthesia with a bibliography. JOSEPH S. HEPBURN

Changes in the lumen of the capillaries during the action of certain drugs: adrenaline, atropine, pilocarpine. FRANCO CASTELLOTTI. *Biochim. terap. sper.* 14, 359-65(1927).—The subcutaneous injection of 1 cc. 0.1% adrenaline into human subjects causes an increase of heart tone, of the force of heart contractions and of arterial pressure and a decrease of the pulse rate and of the capillary (chiefly arterial, possibly also venous) lumen. Atropine and pilocarpine (1 mg.) have the opposite effect. The effect on the heart and arteries is direct; the contraction and dilatation of the capillaries are detected by the quantity of blood which reaches the capillary barrier through the precapillary arterioles. MARY JACOBSEN

Gold compounds in the therapy of tuberculosis. LINO URIZIO. *Biochim. terap. sper.* 14, 366-7(1927).—U. has detd. the min. inhibiting concns. of sancocrysin (I), krysofolgan (II), trifal (III), aurofos (IV) and neocrisolo (V) for 17 strains of *B. tuberculosis* cultured from sputum or taken from Kral's culture museum in Vienna. All preps. have a peculiar sweet taste increasing with the Au content. The resistance to the same prepn. varies greatly with the strain. Certain strains exhibit a great and const. resistance to all preps. A similar behavior has been observed toward the salts of rare earths. The infections produced in guinea pigs by strains of low resistance to metals are malignant and run a rapid course, while highly resistant strains produce mild and chronic infections. The tolerance of guinea pigs to the preps. increases in the order I to V. For the final expts. the strain *K. Blum* was selected because of its moderate resistance and virulence. Although the doses used were only 0.1 to 0.05 of the tolerated dose death with diffuse hemorrhages occurred in almost every series. Under I only 2 out of 8 animals survived a little longer than the controls. II, III and IV cause febrile reactions; IV is the most effective and least toxic of the 3. Of all preps. V showed the least toxicity. The clinical results confirm the lab. expts., although only V has been used extensively. It was used to advantage especially in asthenic cases with secondary anemia (17). Out of 214 infiltrative pulmonary cases only 32 were cured.

MARY JACOBSEN

Excretion of hydrogen sulfide by the respiratory route following intravenous injections of hypertonic sulfur waters in the rabbit. C. G. GASPERINI. *Biochim. terap. sper.* 14, 388-92(1927).—The water of the thermal spring of Castellamare di Stabia contg. 0.0068 g./l. total S and 0.0020 g./l. S as H_2S was injected into rabbits in doses of 8, 10 and 15 cc./kg. at a rate of 5 cc./min. Mild and transient toxic symptoms appeared 1-4 min. after the injection, increasing with the dose. The expired air smelled slightly of H_2S but stained Pb paper only when the dose was 15 cc./kg., the stain appearing 4 min. after the odor became first perceptible. This 2nd exhalation of H_2S is probably not attributable to a conversion of combined S to H_2S (Sabbatani and the French authors) but has its source rather in the S fixed by protozoa.

M. J.

The effect of insulin on the blood sugar of the pig. H. E. MAGIE and D. HARVEY. *Proc. Physiol. Soc. J. Physiol.* 64, xxxi-xxxii(1927).—Insulin administered to the fasting pig caused a fall in blood sugar, convulsions occurring when the blood sugar was about 75 mg. per 100 cc.

J. F. LYMAN

Experiments with phenylhydrazine. I. Studies on the blood. II. Z. GIFFEN and E. V. ALLEN. *Ann. Internal Med.* 1, 655-76(1928).—Dogs given $PhNHNH_2 \cdot HCl$ for 146 days out of a period of 8 months, and a total dosage equal to that of from 4 to 6 yrs. treatment in man for polycythemia vera, were well at the end. The erythrocytic effects were the same whether given subcutaneously or by stomach tube, or in single or divided doses over a 10-day period. There is an irregular tendency to an increase in leucocytes. Each mg. per kg. of body wt. caused a decrease of 38,000 erythrocytes when given in large doses over periods of a few days. II. Studies on renal and hepatic function and erythropoiesis. E. V. ALLEN and H. Z. GIFFEN. *Ibid.* 677-82.—In 3 dogs treated with $PhNH.NH_2 \cdot HCl$ as above there was an av. reduction of 27% in phenolsulfonephthalein output. Urinalyses were negative, and blood urea was normal. One dog showed a very slight reduction in dye excretion by the liver. The rate of regeneration of erythrocytes was unchanged. Removal of the spleen did not affect the action of hydrazine. III. Pathologic anatomy. E. V. ALLEN and N. W. BARKER. *Ibid.* 683-93.—No pathologic histology could be found except increased deposition of Fe in the liver and spleen when the administration was in therapeutic amts. One dog was given doses which were lethal in 6 days. There was rapid destruction of erythrocytes and hemoglobin, atrophy of liver parenchymal cells, reduction in the number of splenic leucocytes, and over-loading of the cells of the renal convoluted tubules with Fe.

JOHN T. MYERS

The intravenous injection of starch. G. SUNZERI. *Boll. soc. ital. biol. sper.* 2, 213-5(1927).—The intravenous injection of sol. starch (1 g. per kg.) is followed by the elimination of starch in the urine. It disappears very rapidly from the blood and can be detected in the urine only two or three hrs. after injection.

PETER MASUCCI

The behavior of the glucemic titer in castrated rabbits following the injection of diuretin. G. RUGGERI. *Boll. soc. ital. biol. sper.* 2, 277-9(1927).—Following castration (10 cg. per kg.) in female rabbits diuretin gives rise to a moderate hyperglucemia which is not obtained in normal animals.

PETER MASUCCI

Contribution to the treatment of hemorrhagic shock by the use of gum-saline solutions. *Boll. soc. ital. biol. sper.* 2, 965-72(1927).—Dogs were bled until 70% of the total blood was withdrawn; the animals developed a state of shock with an arterial

pressure of 40 mm Hg. The intravenous injection of Ringer soln. failed to save the life of the dog although it momentarily raised the arterial pressure. The intravenous injection of 6% gum-saline soln. equal in vol. to the blood withdrawn not only raised the pressure but saved the life of the dog.

PETER MASUCCI *

Alcohol, saccharose and muscular work. A. GALAMINI. *Boll. soc. ital. biol. sper.* 2, 972-6(1927).—EtOH (95%) and sucrose were administered to healthy men 23-25 yrs. old in the proportion of 0.5 cc. per kg. and 1.5 g. per kg., resp.. The substances were given on an empty stomach before beginning work. The effect of the muscular work on the blood sugar and alc. curve was studied. Samples of blood were taken every 30 min., glucose was detd. by Bang's method, and alc. by the modified Widmark method. The alc. and blood-sugar curves were not affected by each other and indicated that the EtOH was not utilized directly by muscular contraction. P. M.

The effect of alcohols, glycerol and nicotine on the survival of leucocytes. S. BAGLIONI. *Boll. soc. ital. biol. sper.* 2, 976-7(1927).—The effects of alcs (EtOH, MeOH, propyl and benzyl), glycerol and nicotine, on the survival of the leucocytes of *Bufo vulgaris* were studied. Small amts. of EtOH, 0.28 to 0.1%, increase slightly the ameoboid movements, but do not influence time of survival. 1.12 to 2.81% decrease the survival, the latter strength paralyzes animals rapidly within 1.5 hrs. MeOH was less toxic than EtOH. Propyl and benzyl alc. were more toxic. Glycerol in amts. 0.25 to 0.5% had no effect; in 2% there was noticeable damage, but rapid destruction took place only in 20% concn. Nicotine in 0.01% diminished activity and survival; 0.1% destroyed activity completely within a few hrs.

PETER MASUCCI

The stimulating action of alcohols and alkaloids on ameoboid movements. C. FORRI. *Boll. soc. ital. biol. sper.* 2, 985-7(1927).—The effects of methyl, ethyl, propyl and benzyl alcohol, and of strychnine nitrate, caffeine and quinine HCl were studied on the blood of *Bufo vulgaris*. With two methods it was established that the alcs. and the alkaloids increase the ameoboid activity of the white corpuscles before paralyzing them. The stimulating action of the alcs. lasts much longer than that of the alkaloids. P. M.

Physiological reactions induced by α -lobeline. I. Intravenous injections during anesthesia and certain other forms of depression. M. J. KING, HELEN R. HOSMER and M. DRESBACH. *J. Pharmacol.* 32, 241-72(1928).—Ether, morphine, amytal, carbon monoxide, CO, illuminating gas and increased intracranial pressure were used, either separately or in various combinations, to produce respiratory depression in cats, dogs, 1 rabbit and 1 monkey. The effects of intravenous injections of α -lobeline after such depression were studied. In cases of light or moderate depression α -lobeline caused stimulation of respiration, and a rise in blood pressure. In cases of marked depression, there was after α -lobeline little or no effect on respiration and a lowering of blood pressure. Adrenaline and α -lobeline resemble each other in their effects on blood pressure, respiration and blood sugar.

C. RIEGEL

The toxicology of mercurochrome alone and in combination with glucose. D. I. MACHT and W. C. HARDEN. *J. Pharmacol.* 32, 321-40(1928).—The fatal dose of mercurochrome for rabbits, cats and dogs was 25-30 mg. per kg., rather than 10 mg., the figure reported by other workers. This lower toxicity is ascribed to the absence of impurities in the form of other more highly toxic fluorescein derivs. If a glucose soln. is injected at the same time as the mercurochrome, or a freshly prepd. mixt. of mercurochrome and glucose given, the mercurochrome is much less toxic. The mixt. of the two must be freshly prepd. as decompn. of the mercurochrome occurs in the presence of glucose on standing, with pptn. of metallic Hg. Analyses of blood and urine after injection of mercurochrome alone, and after mercurochrome plus glucose, indicate that in the latter case there is a more rapid elimination of Hg from the blood, and a greater excretion in the urine for a given period of time.

C. RIEGEL

The effect of salicylates on the nitrogen metabolism with special reference to the effect of the cation of the salt. G. P. GRABFIELD and EMILY KNAPP. *J. Pharmacol.* 32, 341-50(1928).—See C. A. 21, 3977.

C. RIEGEL

The influence of certain arsenicals upon sulfur excretion. F. P. UNDERHILL and ALICE DIMICK. *J. Pharmacol.* 32, 359-65(1928).—Subcutaneous injection of As_2O_3 in a dog caused increase in the etheral sulfate and neutral S fractions of the urinary S. Doses of As_2O_3 given in gelatin capsules by mouth to 2 dogs were followed by no conclusive changes in the S fractions of the urine. Intravenous injections of neoparsphenamine in a dog caused an increase in the neutral S, and in the S:N ratio. C. R.

Mode of action of synthalin. EDGARD ZUNZ and JEAN LABARRE. *Bull. soc. chim. biol.* 10, 322-6(1928); cf. C. A. 22, 1927.—By pancreatic-jugular anastomosis expts. it was concluded that synthalin excites the secretion of insulin. L. W. RIGGS

Pseudo-inexcitability of the cardiac vagus by uzarin and the extract of uzara.

RAYMOND-HAMET. *Compt. rend.* **186**, 971-3(1928)—Uzarin, which is more sol. than digitalin and much less toxic than ouabain, deserves a place with these glucosides in cardiac therapy. L. W. RIGGS

• Influence of rubidium on the excitability of the frog heart. W. DULIÉRE AND L. DEBORGGRAEF. *Compt. rend. soc. biol.* **98**, 335-6(1928).—The irritability consts. existing after 90 min. of perfusion with normal Ringer soln. are perfectly conserved when the heart is perfused with a soln. contg. Rb, and a mol. equiv. of the K in Rb is not necessary to preserve the irritability. The heart is much less sensitive to variations in the quantity of Rb than to variations in the quantity of K. L. W. RIGGS

Action of nearsphenamine on the formed elements of the blood. HILDING EKERFORS. *Compt. rend. soc. biol.* **98**, 793-5(1928).—Doses of 0.11 to 0.15 g. of nearsphenamine per kg. of body wt. are followed by a thrombocytosis which appears a few hrs. after the injection and persists for about 20 days before the return to normal conditions. The polymorphonuclear and mononuclear leucocytes show no variations. Smaller doses down to 0.021 g. produce similar effects. Doses of 0.01 g. do not appear to change the no. of thrombocytes but cause a mild leucocytosis, the no. of leucocytes increasing from 13,500 to 20,000 per cc. 4 hrs. after the injection. This leucocytosis disappears in the course of the following day. Nearsphenamine causes a strong excitation of the elements of red marrow which produce the thrombocytes. L. W. R.

Action of aconitine on the heart. HILDING EKERFORS. *Compt. rend. soc. biol.* **98**, 795-7(1928).—Aconitine paralyzed the vagus of the heart of *Rana esculenta*, but did not affect the sympathetic. This result is further confirmed by the fact that aconitine does not restrain or modify the motor action on the heart of a dose of adrenaline. Action of aconitine on the autonomic innervation of the intestine and uterus. *Ibid* 797-800.—Aconitine exerts mildly excitant action on parasympathetic nerve terminations of the intestine and uterus; it is a muscular excitant; in relatively large doses it does not paralyze the parasympathetic; and it does not have an affinity for the sympathetic. In large doses it paralyzes smooth muscle fibers. L. W. RIGGS

Action of thyroxine on the autonomic innervation. VICTOR KALNINS. *Compt. rend. soc. biol.* **98**, 800-2(1928).—In the rabbit, thyroxine reinforces the action of adrenaline on the intestine and uterus; it appears to increase the excitability of the sympathetic endings but only with large doses. With small doses it sensitizes the parasympathetic innervation of the intestines; with large doses it paralyzes. Action of thyroxine on the autonomic excitability of the heart. *Ibid* 802-4.—The autonomic excitability of the frog heart was not influenced by thyroxine. The sympathetic motor, as well as the parasympathetic inhibitor, retains its normal excitability in the presence of thyroxine. This substance acts differently in the frog and in the rabbit. In the latter thyroxine in large doses reinforces the action of adrenaline, but weakens or suppresses the intestinal motor effects produced by alkaloids acting on the parasympathetic. On the contrary, small doses increase the irritability of the parasympathetic terminations in the intestine. L. W. RIGGS

Action of certain narcotics on the autonomic excitability of the intestine and uterus of the rabbit. BJORN MORAEUS. *Compt. rend. soc. biol.* **98**, 804-6(1928).—The action of bromoisovalerylcarbamide, ethylurethan, ethylacetylurea-HBr, paraldehyde, chlorethyl, chloralose and amylene-chloral were tested on the parasympathetic excitability of preps. of the intestine and uterus of the rabbit isolated and kept alive in Tyrode soln. after the method of Magnus. Pilocarpine, arecoline and acetylcholine were used as parasympathetic excitants. BaCl₂ served as a muscular excitant. None of these narcotics modified the action of adrenaline in the intestinal tests. None of them had any effect on the uterus tests, except in large doses which caused paralysis. Action of certain narcotics on the parasympathetic innervation of the heart. *Ibid* 807-9.—The same narcotics as above were used in these tests. Paraldehyde, chloralose and amylene-chloral in moderate doses sensitize the parasympathetic elements of the frog heart. The property of amylene-chloral of sensitizing rabbit intestine to motor excitations is attributed to an irritability of the terminal parasympathetic nerve organs. L. W. R.

Action of ephedrine on the intestine and uterus. NICOLAI REINITZ. *Compt. rend. soc. biol.* **98**, 809-11(1928).—Tests on pieces of rabbit intestine kept alive in Tyrode soln. by the method of Magnus gave contradictory results following equal doses of ephedrine, thus indicating that the actions of ephedrine depend on accidental conditions of excitability. Ephedrine has only a slight stimulant action on the intestine through the parasympathetic terminations. Large doses of ephedrine render the intestine less sensitive to adrenaline. Action on the uterus is characterized by increase in tonus and in amplitude of contractions and acceleration of rhythm. Atropine completely blocks these effects. L. W. RIGGS

Action of hepatic extract on the formed elements of the blood. NICOLAI REINITZ. *Compt. rend. soc. biol.* **98**, 811-2(1928).—In normal conditions liver ext. appears to exercise no action on the erythrocytes and hemoglobin. The mononuclear leucocytes show a gradual increase, while there is a pronounced thrombocytosis. Liver ext. appears to be an excitant of the red bone marrow and is of value in the treatment of pernicious anemia. L. W. RIGGS

Action of chlorophyll on the blood pressure and blood vessels. EDUARD RENTZ. *Compt. rend. soc. biol.* **98**, 812-4(1928).—In perfusion tests with frog and rabbit, chlorophyll in concns. of 0.001 to 0.1% caused vasodilatation which was easily and completely reversible. On preps. of rabbit aorta, chlorophyll causes increase in tonus. Intravenous injections of 0.0002 to 0.02 g. per kg. caused a transient slight increase in blood pressure. Chlorophyll acts by sensitizing the sympathetic innervation. **Action of chlorophyll on the blood thrombocytes and leucocytes of the rabbit.** *Ibid* 814-6.—Chlorophyll strongly excites that part of bone marrow which produces the thrombocytes (megacaryocytes) and increases the no. of polymorphonuclear leucocytes. Other leucopoietic organs also appear to be stimulated by chlorophyll. **Action of chlorophyll on organs with autonomic innervation.** *Ibid* 818-20.—Moderate doses of chlorophyll sensitize the sympathetic innervation. L. W. RIGGS

Action of insulin on experimental anemia of the rabbit. Inhibitory substances of the blood in hyperglucemia. EDUARD RENTZ. *Compt. rend. soc. biol.* **98**, 816-8(1928).—Bled animals always show a hyperglucemia. The injection of large doses of insulin in anemic (bled) animals caused a diminution of blood sugar to the normal figure. L. W. RIGGS

Pharmacology of iodine ions. In normal animals and in those deprived of thyroid. W. WADI. *Arch. expl. Path. Pharmacol.* **129**, 1-42(1928).—The influence of the thyroid upon the effects of I was detd. in rabbits. Apparently the thyroid influences the way in which I administered by mouth stimulates erythropoiesis. Two effects upon the leucocytic response are manifest, one, a secondary action operating through a thyroid effect causing a hyperleucocytosis, the other, a primary effect of the I tending toward a leucopenia. As primary effects, wholly or in part, should be included the relative shift between myeloid and lymphoid elements in the blood, damage to the lung after continued administration of large doses of I, the increased thermoregulation to cooling, an increased susceptibility to deprivation of O, augmented respiratory metabolism. Subcutaneously injected I compds. exerted comparable effects. G. H. S.

Intensifying the systolic action of digitalis glucosides by cardiazole. K. FAHRENKAMP. *Arch. expl. Path. Pharmacol.* **129**, 52-71(1928).—See C. A. **22**, 816. G. H. S.

Influence of allyl groups on the pharmacological action of different amines. E. BRAUCHLI AND M. CLOETTA. *Arch. expl. Path. Pharmacol.* **129**, 72-84(1928).—With the 8 amines tested, the introduction of an allyl group reversed the pharmacol. action. Normally, when injected intravenously in dogs they cause an increased blood pressure; after chem. modification they reduce blood pressure. G. H. S.

Velocity of narcosis with homologs and isomers of monohydric alcohols. I. LENDLE. *Arch. expl. Path. Pharmacol.* **129**, 85-92(1928).—Velocity of narcosis increases with the length of the C chain; thus the series is, methyl < ethyl, < propyl, < butyl, < amyl, < heptyl. With amyl alc., the tertiary form acts more slowly than the iso-primary, and secondary isomers. G. H. S.

Mechanism of adrenaline hypoglucemia. F. GEIGER. *Arch. expl. Path. Pharmacol.* **129**, 93-9(1928).—Since adrenaline hypoglucemia during hyperventilation tetany occurs only when the vagi are intact, and since the glucose adsorption is increased, the hypoglucemia must be explained on the basis of a delivery of insulin resulting from a central vagus stimulation. G. H. S.

Inflammation. III. Carbohydrate metabolism of the tissues in the initial stages of inflammation. F. BRICKER AND F. SUPONIZKA. *Arch. expl. Path. Pharmacol.* **129**, 100-7(1928).—The venous blood of the inflamed ear contains more sugar and has a higher amylolytic index than does that of the normal ear. The tissue fluid of the inflamed ear also contains an increased amt. of sugar. **IV. Nitrogen metabolism in the initial stages of inflammation.** F. BRICKER. *Ibid* 122-32.—In inflamed tissue there is an intensified protein break-down, as evidenced by an increased formation of the higher products of protein degradation. G. H. S.

Chemistry and pharmacological action of Banisteria caapi Spr. L. LEWIN. *Arch. expl. Path. Pharmacol.* **129**, 133-49(1928).—The alkaloid banisterine causes an increased motor irritability in all species of animal tested. In frogs the increased reflex irritability is followed by paralysis of the extremities. Doses of 0.05 g. cause a strychnine-like reflex tetanus. Pulse rate is slowed. In mammals respiration is accelerated and

the pupils are dilated. Convulsions appear, and if the dosage is raised to 0.2 g. per kg., given subcutaneously, death occurs in 3 to 6 hrs. With subcutaneous injection, the smallest effective dose for guinea pigs is 0.005 g. per kg., the minimal lethal dose is 0.1 g. per kg. In apes the smallest active dose was 8 mg. per kg. From the results of a few injections in man the possible use of banisterine as a therapeutic agent is discussed.

G. H. S.

Causes of the differences in the pharmacological action of optical isomers. E. KEESER. *Arch. expl. Path. Pharmacol.* 129, 236-55(1928).—Detns. of capillary activity made by means of the stalagmometer failed to show any difference between the *l*- and *d*-forms of a number of substances under various conditions of concn. Viscosity of colloidal solns. is modified by the optical isomers in different ways, quite independently of the pH . The *d*-forms increase the gain in wt. of gelatin through inhibition of water more than do the *l*-comps. No material difference in the adsorptive power of compds. of the two types could be demonstrated. The *l*-forms diffused through a levorotatory gelatin more quickly than did the *d*-forms.

G. H. S.

Effect of strychnine, picrotoxin and samandarine on the vessels. OTTO GESSNER. *Arch. expl. Path. Pharmacol.* 129, 261-70(1928).—Strychnine, picrotoxin and samandarine were inert when tested upon carotid of the calf, but with the Lawen-Trendelenburg frog prepn. a definite vasoconstriction was obtained with concns. of 1×10^{-3} . Unlike the constriction, which is reversible, due to picrotoxin, the constricting effects of strychnine and samandarine are only partially reversible. Ergotamine prevents strychnine constriction but not that induced by picrotoxin.

G. H. S.

Comparative pharmacology of the different skeletal muscles of the frog. TOSHIO KITANO. *Arch. expl. Path. Pharmacol.* 129, 271-84(1928).—Corresponding with known differences in contraction phenomena the different muscles of the frog present differences in response to pharmacol. agents. This is particularly true with regard to the reactions to acetylcholine, veratrine and KCN, with which the gastrocnemius and the rectus respond in one way, the sartorius, gracilis and the semimembranosus in another. With NII, and HCl another and less characteristic grouping is obtained.

G. H. S.

Pharmacology of oriental hashish and Cannabis indica. HERMANN CAYER. *Arch. expl. Path. Pharmacol.* 129, 312-8(1928).—The active substance of Persian hashish causes a definite anesthesia of the cornea of the rabbit, by intravenous injection the corneal unit of the acetone soln. being 0.0056 g. per kg. Artificially grown *Cannabis indica* has the same qual. effects, the corneal unit being at the lower limit of activity for men.

G. H. S.

Effect of hashish on man. FRITZ KANT AND EDUARD KRAPE. *Arch. expl. Path. Pharmacol.* 129, 319-38(1928).—Description of the subjective symptoms.

G. H. S.

The dosage and action of pituitary extract and of the ergot alkaloids on the uterus in labor, with a note on the action of adrenaline. ALBCK BOURNE AND J. H. BURN. *Pharm. J.* 119, 485-90(1927).—A series of elaborate clinical investigations. As to the use of pituitary ext., doses of safe administration are established, based on the legal standard of unit strength in force in Great Britain since August, 1927. As to ergot alkaloids, tyramine has no value in obstetrics; lustamine in a dose of 20 mg., when injected under the skin, produces a powerful but short-lived effect; it appears to exhaust the uterine activity. The sp. alkaloid (ergotamine or ergotoxine) exerts a very prolonged action and appears to be an ideal agent for use after delivery. Extractum ergotae liquidum of the Brit. Pharm. being devoid of the sp. alkaloid has no therapeutic effect (cf. *C. A.* 17, 3749). Adrenaline injected into a vein inhibits uterine contraction before delivery; the administration of H_2O has a similar effect.

S. WALDBOTT

Explanation of a surprising resistance to the toxic action of hydrocyanic acid. L. DE SAINT-RAT. *Presse médicale* 1927, 26. R. W. *Schweiz. Apoth. Ztg.* 65, 139-41(1927).—The results obtained by Violle (*C. A.* 21, 136) seem to be supported by a famous case of attempted poisoning with HCN. In an expt *in vitro*, 5 g. of crystd. KCN was added to 250 g. of Port wine contg. 19% EtOH and 85 g. per l. of reducing sugar, and the soln. was titrated at once. After 35 min., titration of 10 cc. showed that 35% of the KCN had combined, after 2 hrs. 35 min., 70%. After 24 hrs., all the KCN as such had disappeared. The presence of EtOH seems to facilitate the formation of glucoheptonic acid; in the absence of EtOH, the reaction is still rapid, but is not complete in 24 hrs.

S. WALDBOTT

DYSON, G. MALCOLM: **The Chemistry of Chemotherapy.** London: Ernest Benn, 272 pp. 32s. 6d., net. Reviewed in *Chem. News* 136, 255(1928).

WEBSTER, RALPH W.: **Potassium and Tartrates.** With digest and bibliography of the literature, by W. A. Brennan. Chicago: Commonwealth Press, Inc. 168 pp. \$2.50. Reviewed in *Biol. Abstracts* 1, 1035(1927).

I—ZOOLOGY

R. A. GORTNER

Comparison between the dissociation of the hemocyanins of Helix and Crustacea. L. T. HOGBEN AND K. F. PINHEY. *Brit. J. Exptl. Biol.* 4, 203-14(1926); *Physiol. Abstracts* 12, 144.—The dissociation curves for the hemocyanins of *Helix* and *Maia* are compared, with the effects thereon of varying temp., H-ion concn. and salt content, and the marked differences in their behavior, except for temp. changes, are discussed. H. G.

Amebocytes of invertebrates. FAURÉ-FRÉMIET. *Bull. hist. appl. physiol. path.* 4, 33-9(1927); *Physiol. Abstracts* 12, 195; cf. *C. A.* 21, 3982.—A short review of the structure, origin and properties of the amebocytes of invertebrates—i. e., the cells met with in the perivisceral and celomic fluid and in the hemolymph. A biol. and physico-chem. study of the more important modifications of form presented by these elements, of their power of making complexes and of forming pseudopodial layers of extreme thinness. H. G.

The effect of fluorides on the echinoderm egg. M. M. LOUCKS AND A. G. DE GRAFF. *Proc. Soc. Exptl. Biol. Med.* 24, 43-4(1928); *Physiol. Abstracts* 12, 140.—Arbacia eggs were placed in 70 cc. of sea water contg. 1 cc. of an isotonic soln. of NaF, KF, K oxalate and K citrate, resp. An immediate flocculation of the eggs occurred in the sea water to which NaF or KF was added, but this did not occur with K oxalate or K citrate, or when artificial sea water was used in which Ca was absent. The flocculation is, therefore, a direct effect of the F ion. The cells became clumped into large masses enmeshed in a gelatinous bed. Cells to which KF or NaF had been added divided at the same rate as the controls. H. G.

Influence of certain salts upon the hatching and development of salmon fry (Salmo trutta). M. RAMULT. *Bull. intern. acad. Polonaise* 1927B, 45-62.—Solns. of weak concn., 0.05 to 0.1 N NaCl, in which salmon fry can live normally do not influence the growth of hatching fry or at periods up to and later than the end of yolk absorption. Solns. of 0.2 to 0.25 N NaCl, in which young fry perish after a time, do not influence their growth at hatching. Solns. of still higher concn., as 0.15 N NaCl, in which young fry die off speedily, appear to reduce the size of the hatched fry. Cf. following abstr. L. W. RIGGS

Influence of certain salts upon the development of young sticklebacks (Gasterosteus aculeatus). M. RAMULT. *Bull. intern. acad. Polonaise* 1927B, 63-6; cf. preceding abstr.—The object of this study was to learn the resisting power of young stickleback fish to NaCl and to van't Hoff's solns. beginning 24 hrs. after hatching. NaCl and van't Hoff's solns. in a weaker concn. than 0.05 to 0.1 N do not seem to exercise any poisonous action upon young sticklebacks. The same solns. in concns. of 0.2 to 0.25 N poison the fish, the NaCl being more poisonous than van't Hoff's isotonic soln. The fish were tested in solns. of KCl, CaCl₂ and mixts. of KCl—CaCl₂ in varying proportions. All of these solns. were poisonous, KCl or CaCl₂ alone being more poisonous than mixts. of the 2 salts. The most favorable mixt. was 1 of KCl to 2 of CaCl₂. Cane sugar was added to preserve a const. osmotic pressure. L. W. RIGGS

Comparison between different species of vertebrates from the point of view of nucleic phosphorus indices and the phosphorus balance of their organs. M. JAVILLIER, (Mlle.) ALICE CRÉMIEU AND (Mme.) H. HINGLAIS. *Bull. soc. chim. biol.* 10, 327-37 (1928); cf. *C. A.* 21, 750, 951, 3208, 3667.—The total P, nucleic P, lipidic P and P of transition were detd. and calcd. to mg. per 100 g. of fresh material and per 100 g. of dry material in the spleen, liver, kidney, brain, heart and muscle of the horse, guinea pig, rat, pigeon, frog, tench and dog-fish. The analytical figures are assembled in 12 tables and ratios of quantities of different forms of P are calcd. **Nucleic phosphorus balances and phosphorus ratios in certain entire animals, invertebrates in particular.** M. JAVILLIER AND (Mlle.) ALICE CRÉMIEU. *Ibid.* 338-41.—P partitions were made in *Sagartia parasitica* (Coelenterata), *Synapta inchoerens* (Holothuroidea), *Nereis diversicolor* (Chaetopoda), *Tubifex rivulorum* (Chaetopoda), *Hirudo medicinalis* (Hirudinea), *Hydrophilus picens* (Arthropoda), *Cardium edule* (Lamellibranchiata), and for comparison the bronze cyprinus and the mouse. The invertebrates have a much smaller percentage of insol. P and a much larger percentage of lipidal, nucleic and transitional P. L. W. RIGGS

Action of hydroquinone on the electrochemical polarity of Infusoria. PAUL ROTH. *Compt. rend. soc. biol.* 98, 377-9(1928).—The action of hydroquinone is definite but varies in time with several other factors such as the no. and age of the Infusoria, age of culture, and state of the soln. with reference to the stability of hydroquinone. L. W. RIGGS

Oxidation-reduction power of the chondriome of gregarines and the procedure for studying the chondriome. PII. JOYET-LAVERGNE. *Compt. rend. soc. biol.* **98**, 501-2 (1928), cf. *C. A.* **22**, 1792. L. W. RIGGS

Limits of temperature and salinity supported by *Convoluta roscoffensis*. M. GOMPEL AND R. LEGENDRE. *Compt. rend. soc. biol.* **98**, 572-3 (1928).—The fatal temp. for *C. roscoffensis* is about 38° but the worms lose their phototropism at a lower temp. In fresh water their movements instantly cease and the worms swell and burst. The lower limit of salinity is represented by a d. of about 1.005 and the upper limit by d. 1.037. Under the combined action of temp. and salinity the worms at 38° behave normally until the sea water is dild. to d. 1.010. At d. 1.0075 they die rapidly at 35°. Beginning at 1.010 the critical temp. is lowered as the salinity diminishes. L. W. R.

Experimental infection of *Pyrausta nubilais* by entomophytous fungi. S. MÉTALNIKOV AND K. TOUMANOFF. *Compt. rend. soc. biol.* **98**, 583-4 (1928).—The corn borer larvae were readily infected with *Aspergillus flavus*, *Botrytis bassiana*, *Isaria farinosa* and *Sterigmatocystis nigra*. The first named caused death in every case, and the second and third named were markedly virulent. Simple contact with the spores of the fungus without the aid of moisture was sufficient for inoculation of the larvae. L. W. RIGGS

Action of a nucleus of hydroxyaminoquinoline on the gametes and the sporozoites of the *Halteridium* of the pigeon. A. GODOY AND J. G. LACORTE. *Compt. rend. soc. biol.* **98**, 617-9 (1928).—The nucleus of hydroxyaminoquinoline (plasmochine) has a gameticidic action on the *Halteridium* of the pigeon, but does not act on the schizogonic forms of the same species. Plasmochine has a destructive action on the sporozoites of the *Halteridium* of the pigeon. These sporozoites may possess a plasmatic constitution identical to that of the gametes or very similar. The constitution of plasmochine is rapidly modified as 24 hrs. after its ingestion it does not prevent the development of the parasite. L. W. RIGGS

Role of skin and visual excitations in the maintenance of cardiac frequency in the frog. A. A. XAVIER. *Compt. rend. soc. biol.* **98**, 627-8 (1928).—The fall in cardiac frequency produced by ablation of the skin is not due to the action of CO₂ nor to the suppression of the respiratory movements. The suppression of vision reinforces the effect of the ablation of the skin. The cardiac modifications are not produced after section of the vagus nerves. Cf. following abstr. L. W. RIGGS

Effects of ablation of the skin on the respiratory movements in the frog. MIGUEL OZORIO DE ALMEIDA. *Compt. rend. soc. biol.* **98**, 641-2 (1928); cf. preceding abstr.—In the frog in which chem. regulation is much reduced, the activity of the respiratory center depends directly on the excitations coming from the exterior. The skin is the principal source of these excitations. L. W. RIGGS

New findings on the biochemistry of *Centrina vulpecula* Rond. M. KOLLMANN, F. VAN GAVER AND J. TIMON-DAVID. *Compt. rend. soc. biol.* **98**, 776-7 (1928).—The sample of *C. vulpecula* studied weighed 6450 g. Its interior was nearly filled with liver and 16 ovarian eggs, weighing 1535 and 1525 g, resp. Both liver and ovarian eggs furnish oils with the following consts., resp: d at 15° 0.9002, 0.9016; n_D^{14} 1.4689 1.4744; abs. coeff. of dilatation between 18° and 60° 0.00069, 0.000775; iodine index 73.4, 113.9; sapon. index 132.3, 133.7. L. W. RIGGS

Studies on the function of dissolved foodstuffs in the metabolism of aquatic animals. VII. Decrease of the surface tension of the media and growth production. JAROSLAV KRÍŽENECKÝ AND OLGA DUBSKÁ. *Protoplasma* **2**, 17-33 (1927).—Dissolved foodstuff (peptone, sucrose, glycerol) caused growth in tadpoles. Bauer had demonstrated that the surface tension of the media had an effect on the growth of tadpoles. Were the results with foodstuffs due, therefore, to their action on the surface tension? In solns. of lactic acid and ethyl acetate in which no decrease in surface tension took place there was no growth. It was concluded that the action of dissolved foodstuffs is indirect and that the surface tension of the H₂O alters the permeability of the tadpole skin. M. H. SOULE

Heat resistance of sea urchin eggs (*Paracentrotus lividus* Lk). BORIS EPHRUSSI AND ALEXANDRE NEUKOMM. *Protoplasma* **2**, 34-44 (1927).—The sea-water suspensions of the eggs were placed in Borrel tubes and the p_H was varied by the addn. of acids or NaOH. The desired temps. were obtained by placing the tubes in a H₂O bath. The eggs were more resistant to the effects of heat at p_H 7.1 and 10. This resistance was independent of the degree of heat to which the cells were subjected. The nature of the acid (HCl, butyric, etc.) employed seemed not to have much effect. The vol. of the eggs at p_H 7.1 was +5.3%, at p_H 10 —3.1%. It is unlikely that the heat resistance was associated with the intensity of imbibition as was found for the stomata cells of

plants by Weber. It is not possible to account for the heat stability of protoplasm on the basis of imbibition.

Reversible gelatin produced by an increase in the temperature of a freshwater ameba. M. A. VAN HERWERDEN. *Protoplasma* 2, 271-7 (1927).—Two varieties of fresh water ameba (probably *A. vespertilio*) were subjected to slight increases in temp. At first a diminution and then a rise in protoplasmic viscosity took place. Irreversible gelatin occurred at 40°; after this point local reversals continued till 48°. M. H. S.

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Isolation and identification of benzoic acid in food products. GIOVANNI ISSOGLIO. *Atti II congresso naz. chim. pura applicata* 1926, 1381-3.—Comparative tests were made of all methods for the extn. of BzOH from food products to det. which method is the most rapid, economical and reliable. The investigation led to the adoption of a method which is based on that of Lehmann (*C. A.* 2, 3373; 3, 674). Add 200 cc. of water and 20 cc. of 10% H_2SO_4 to 100-200 g. of food product, steam-distill, collect 200 cc., add aq. Na_2CO_3 until distinctly alk., evap. to 20 cc., acidify with dil. H_2SO_4 , ext. twice with 20 cc. of Et_2O , wash the Et_2O ext. with a little water, filter, evap. until crystn. is complete, and if desired sublime this pure BzOH, and identify it by a m.-p. detn. It may also be identified with the following additional tests. Dissolve in NH_4OH , evap. the excess NH_3 , and add dil. $FeCl_3$, which ppts. rose-colored $(BzO)_3Fe$. Dissolve the latter in dil. HCl , ext. with twice the vol. of petr. ether, evap. the ether ext., add to the residue $(BzOH)$, a drop of aq. $FeCl_3$ and a drop of H_2O_2 , which gives a violet color (Ionescu reaction). Acidify this with HCl , ext. with petr. ether, evap., add a few drops of a mixt. of fuming HNO_3 and concd. H_2SO_4 , heat until red fumes are no longer evolved, dil. with water, add a slight excess of NH_4OH and 1 cc. of 10% KCN , which gives a red color. C. C. DAVIS

Dairy bacteriology in Scandinavia. WILFRED SADTLER. *Sci. Agr.* 8, 591-8 (1928).—A well-prepd. and complete report of a year's research spent among the dairy labs. of Sweden and Denmark. C. R. FELLERS

The relative value of potato flours. W. EKHARD. *Z. Spiritusind.* 51, 16 (1928).—Viscosity tests were made according to Lawaczek, and the viscosity of a given concn. of an unknown flour paste compared with the control is used as an index of its relative value. If 2.5 g. of flour requires 68 sec. to discharge, and the unknown giving a reading of 68 has a concn. of 1.97, then $(2.5 \times 100)/1.97 = 1.27\%$. Na and K increase the values and Ca and Mg tend to decrease them. Acids are harmful in the prepn. and should not be permitted to act on the paste. Size of starch grains had no material influence on the viscosity. C. N. FREY

Milk and its adulteration. R. GRASSBERGER. *Wiener med. Wochschr.* 77, 1451-3, 1483-8 (1927). ARTHUR GROLLMAN

Clean milk production. ALLAN SKELTON. *Munic. Eng. Sanit. Record* 80, 291 (1927).—Clean milk should be free from dirt or contamination, reasonably low in bacteria (the non-pathogenic variety, lactic acid bacteria, etc.), absolutely free from tubercle bacilli, *B. coli* absent in 1 cc. and should keep under reasonable conditions for several days. Pasteurized or treated milk tends to make milk producers careless in their methods. Sanitary methods of milking are described. C. H. BADGER

The "alkalinity value" of milk and its electrolytic determination. Z. v. MARIKOVSKY AND E. LINDNER. *Chem.-Ztg.* 52, 283 (1928).—By "alkalinity value" of milk is meant the total cations; for normal milk this is practically const. Upon electrolysis by the Hg-cathode method, 5 cc. of normal milk gives an alky. value equiv. to 5.6 cc. of 0.1 N $NaOH$. This alky. expressed in terms of 1 cc. of milk is known as the alky. factor, it averages about 1.12 for normal samples. RUSSELL C. ERB

Adjustment of composition important. F. J. DOAN. *Butter, Cheese, and Egg J.* (Feb., 1927) 23, 24, 26, 27; *Expt. Sta. Record* 56, 873.—D. describes methods of standardizing mixes for the manuf. of uniform high quality sweetened condensed milk. It is almost invariably necessary to add skim milk or to remove cream to adjust the mix, and examples of both procedures are described. H. G.

Nature of the neutralization precipitate and its effect on the recovery of milk sugar from grain-curd-casein whey. R. W. BELL AND P. N. PETER. *Ind. Eng. Chem.* 20, 510-2 (1928).—When grain-curd-casein whey is neutralized with $NaOH$ or $Ca(OH)_2$, a ppt. of $Ca_3(PO_4)_2$ and protein matter forms, the amt. of ppt. and the ratio of $Ca_3(PO_4)_2$ to protein increasing with pH . When the whey is concd. this ppt. increases the

viscosity to such an extent that development of lactose crystals is hindered. Complete removal of the ppt. at p_H 7, which is difficult, permits a good yield of lactose to be obtained.

F. L. SEYMOUR-JONES

Grading of commercial gelatin and its use in the manufacture of ice cream. II. A. C. DAHLBERG, D. C. CARPENTER AND J. C. HENING. *Ind. Eng. Chem.* **20**, 516-26 (1928).—A studied comparison was made of the Bloom, Hall, Burke and test-tube methods of testing gelatin according to their gel stiffness by means of the MacMichael viscometer. The lowest percentages of different gelatins giving a mix of over 700 centipoises in viscosity were detd. In evaluating the worth of gelatin in ice cream a standard process in manufg. was employed and the melting-down consistency as well as the texture of the resulting ice cream were considered. Differentiations are recognized between gel consistency and gel stiffness. The use of skim milk as a medium in which to dissolve the gelatin for automatic control of p_H is superior to the adjustment of the p_H of gelatin in water soln. The destruction of gelatin by material means and its reformation into a gel upon standing at low temp. is an important property of gelatin as a binder in ice cream.

H. F. ZOLLER

The composition of Canadian Cheddar and process cheese. E. G. HOOD AND A. H. WHITE. *Canada Dept. Agr. Bull.* **79**, (n. ser.), 18 (1927), *Expt. Sta. Record* **57**, 179.—An analysis of 444 samples of Cheddar cheese showed an av. compn. of moisture 34.82, fat 33.75, fat in water-free substance 51.77, and casein and other solids 31.43%. There was no definite relation between the texture and the ratio of the principal constituents.

H. G.

Investigations on maize. B. LAMPE. *Z. Spiritusind.* **51**, 14 (1928).—Analyses of a large number of samples of maize from different countries are given. La Plata maize had the highest starch content.

C. N. FREY

Maize silage. II. H. J. WOODMAN AND A. AMOS. *J. Agr. Sci.* **18**, 194-9 (1928), cf. *C. A.* **18**, 3438.—In regard to compn., digestibility and nutritive value, silage obtained in expts. with a French variety of maize, Jaune Gros, was somewhat superior to American maize silage, the av. results of numerous investigations being taken in that country. Compared on a dry matter basis, its nutritive value was also superior to that of "green fruity" oat and tare silage. Further feeding tests on calves confirmed the results of the digestion trials in respect to the feeding value.

P. R. DAWSON

Ethylene is a ripener of fruits and vegetables. R. B. HARVEY. *Science* **67**, 421-2 (1928); cf. *C. A.* **21**, 2944.—Contrary to the findings of Chace and Church (cf. *C. A.* **21**, 3688), H. insists that C_2H_4 has a ripening effect on fruits and vegetables when applied in concns. of 1 to 1000 of air by vol. and at 65° or higher. In the expts. of Chace and Church a concn. of 1 to 5000 by vol. was used, whereby it was stated that the color of the fruit was changed, but that the compn. of citrus fruits was not appreciably altered.

L. W. RIGGS

The composition of the fruits of Moravia. K. NEORAL AND J. BLAHA. *Mín. Zeměděl., Spr. Vyzkumn. Úst. Zeměděl. (Czechoslovakia)* No. **18**, 26 pp. (1926); *French Abstr.* 22-26; *Expt. Sta. Record* **57**, 138.—Results are given of a study of the chem. compn. of fruits grown in Moravia, including such items as dry matter, insol. substances, sugars, acids, mineral content, etc.

H. G.

Storing of lemons. F. M. READ. *J. Agr. Victoria* **24**, 292-303 (1926); *Physiol. Abstracts* **12**, 466.—The fruit should be picked as it reaches a diam. of 2½ in. while still green. Ripe or nearly ripe fruit will not keep satisfactorily. Lemons improve in keeping quality and chem. compn. during the process of curing.

H. G.

Loss of nutrients in the mechanical removal of water from potatoes. E. PAROW, A. STIRNUS AND W. EKHARD. *Z. Spiritusind.* **50**, 277-8; cf. *C. A.* **21**, 3419.—Analyses of original, potatoes, flakes and juice are given. In general the greatest loss of nutrients occurs in processes involving the greatest removal of the H_2O . One exception was found out of 7 expts. reported. In all cases the losses are great, and to overcome this the concd. juice should be returned to the cake.

C. N. FREY

Chemical composition of some varieties of edible onions. G. RIVIÈRE AND G. PICHARD. *J. Soc. Nut. Hort. France* **26**, 277-8 (1925); *Botan. Abstracts* **15**, 1175.—Analyses of 3 types show considerable differences in dry matter, ash and reducing sugars. A so-called sweet variety possesses much larger sugar content and considerably lower dry matter content than the other varieties.

H. G.

The chloride content of canned sauerkraut. M. E. STARK. *J. Lab. Clin. Med.* **12**, 561-3 (1927); *Expt. Sta. Record* **57**, 193.—Detns. of the content of chlorides, calcd. as NaCl, in canned sauerkraut are reported. The min., max. and av. values for the juice as detd. on 11 samples, including 8 brands, were 1.502, 2.228 and 1.881 g. per 100 cc. and 1.469, 2.167 and 1.83 g. per 100 g., resp. Corresponding values in grams

per 100 g. for solid kraut representing 7 samples from 5 cans and including 4 brands, were 1.605, 1.947 and 1.736 g., resp. H. G.

Pickling olives by the modern Greek process. S. A. KALOYERAS. *Fruit Products, J. and Am. Vinegar Ind.* 7, No. 8, 14-6(1928).—Old methods are briefly considered, in addn. to the modern or salt process. The chem. compns. of olive flesh of olives prepd. by the 3 leading processes are tabulated. The compns. of California and imported Greek process olives are compared. The conclusion seems warranted that the olives treated by the salt process have greater nutritive value, especially those imported from Greece, because of their higher oil content and higher % of other nutritive properties. The green olives, although appetizing, are not very nutritious and are hard to digest. They contain a comparatively small quantity of oil. J. A. KENNEDY

The influence of the stage of lactation and the breed of the cow on the yield and quality of the milk. T. J. DRAKELEY AND M. K. WHITE. *J. Agr. Sci.* 17, 118-39 (1927).—The % of fat decreases to a min. on about the 40th day after calving and then steadily rises again. The yield of milk increases to a max. on about the 45th day and then decreases. The shorter the interval between milking, the lower is the yield of milk as well as the % of solids-not-fat, but the greater is the % of fat. The yield of solids-not-fat increases until approx. the 30th day, after which there is a decline. The Jersey breed yielded milk of the highest fat content. P. R. DAWSON

The "mineral" factor in the feeding of animals. F. E. CORRIE. *Pharm. J.* 119, 667-9(1927).—The importance of the addition of mineral supplements to the food of animals to avoid malnutrition and disease is discussed. Formulas for such mixts. are quoted. S. WALDBOTT

Dried brewers' yeast vs. linseed-oil meal as a protein supplement for dairy cows in milk. H. BARTON, A. R. NESS AND E. W. CRAMPTON. Macdonald Coll., McGill Univ., *Tech. Bull.* 3, 30 pp.(1926); *Expt. Sta. Record* 57, 74.—Dried brewers' yeast may be substituted lb for lb. for linseed-oil meal in rations for milking cows. The suggestion is made that the brewers' yeast be incorporated with the brewers' grains and sold in that form. Such a practice would materially increase the value of the grains. H. G.

Grapefruit refuse as a dairy feed. J. M. SCORR. *Florida Sta. Rept.* 1926, 25, 26; *Expt. Sta. Record* 56, 872.—Two lots of cows were fed by the reversal method for 3 periods. During the first period all cows were fed alike. During the second period grapefruit refuse, analyzing moisture 18%, fat 5.25, protein 5.31, carbohydrates 61.69 and fiber 9.75%, was added to the grain ration of one lot and during the third period the rations were reversed. The grapefruit refuse seemed to have a tendency to increase the milk flow. H. G.

Nutritive value of pasture. III. The influence of the intensity of grazing on the composition and nutritive value of pasture herbage. I. H. E. WOODMAN, D. B. NORMAN AND J. W. BEE. *J. Agr. Sci.* 18, 266-96(1928); cf. *C. A.* 20, 2346; 21, 2522.—The differences in chem. compn., both org. and inorg., between pasture grass cut at intervals of 1 week and 2 weeks are slight. The dry matter of the fortnightly cut grass is extremely high in crude protein and contains a low % of crude fiber, as compared with grass cut at the hay stage of maturity. These characteristics are retained by systematic cutting at intervals of 2 weeks throughout the entire season. The results of digestion tests justify the conclusion that the dry matter of pasture herbage under a system of fortnightly cutting is a protein concentrate equal in digestibility and nutritive value to that obtained by weekly cuttings. The herbage still consists of the same immature, non-lignified tissue as it was at the end of 1 week's growth, with no running-off in respect to compn. and feeding value. It may be inferred that similar results would be obtained with a system of sectional grazing, where pastures eaten down are allowed a fortnightly interval of unchecked growth. In spite of a slight widening of the nutritive ratio in the fortnightly cut grass as compared with that cut weekly, the value is still significantly narrower than the nutrition ratio of milk. As in a system of weekly cutting, it is desirable to employ carbohydrate instead of protein concentrates for supplementing feeding under a more lenient system of grazing. A light-land pasture plot produced increases in dry matter, starch equiv. and digestible protein of 26, 29 and 21%, resp., during 1927, with fortnightly cutting, as compared with 1925 with weekly cutting. However, these differences may be due in part to differences in meteorological conditions in the two seasons. It is concluded that, although intensification of the system of cutting tends to depress productivity, the difference between weekly and fortnightly systems is not sufficient to bring out this effect prominently. Under favorable meteorological conditions the difference is not more than 10%; under less favorable conditions it may be greater. P. R. D.

Apparatus for emulsifying dried milk with water (Brit. pat 275,375) 1. Apparatus for pasteurizing milk (U. S. pat. 1,668,293) 4. Apparatus for producing actinic rays of extremely short wave-lengths for sterilizing foods (Brit. pat 275,596) 1.

DAMON, SAMUEL REED: **Food Infections and Food Intoxications**. Baltimore, Md.: Williams and Wilkins. 266 pp. \$4.

WUHLFAHRT, JULIUS E., and BROOKS, ROBERT W.: **A Treatise on Baking**. New York: The Fleischmann Co. 362 pp. \$1. Reviewed in *Cereal Chemistry* 5, 162 (1928).

Beverages. SIEMENS & HALSKE AKT.-GES., H. ENGELHARDT and K. ENGELHARDT. Brit. 275,454, Oct. 21, 1926. Pulverized substances of relatively low sp. gr. such as MgO , $CaCO_3$, pulverized Al or Be or their oxides are mixed with alc. beverages or fruit juices in the process of artificially maturing them with ozone, in order to prevent impairment of flavor.

Preparing foods with kola. A. CHALAS and E. CHALAS. U. S. 1,669,326, May 8. The oxalides of fresh kola are destroyed, *e. g.*, by heat, and a soft ext. is prepd. from the kola thus treated; this ext. is dild. with hot water and lactose is gradually added and stirred into the product until it is almost in the state of dry grains; the product is then crushed.

Differentiating between cooked and uncooked cans of foods. J. HANSON and E. F. LEE. U. S. 1,668,767, May 8. The cans are marked with a compn. comprising a binder, a solvent and a coloring substance, *e. g.*, with a mixt. of shellac, alc. and erythrosin, prior to cooking the filled cans, and the latter are then passed through a cooking zone at a temp. of about 115° which changes the color marking on the can permanently.

Sterilizing and preserving foods. G. A. KRAUSE. Brit. 274,909, July 26, 1926. Foods such as meat, fish, eggs, butter, fruits and vegetables, and anatomical specimens are treated with water or other liquids which have been in contact with metals such as Cu, Ag and Au or alloys capable of destroying microorganisms.

Preserving meat or other foods at low temperatures in an atmosphere containing atomized salt solution. FOOD CHILLERS, LTD. Brit. 275,184, July 30, 1926. An app. is described.

Preserving vegetable food products. A. B. HASLACHER. U. S. 1,668,903, May 8. Corn on the cob, peas or other vegetable material is heated with water to a temp. of about 99° and is afterward frozen while immersed in water.

Drying fruits, vegetables, etc., by circulating superheated steam under partial vacuum. S. T. HOYT. U. S. 1,668,591, May 8.

Apparatus for pasteurizing milk in bulk. R. HORTON. U. S. 1,668,316, May 1.

Apparatus with cooled rollers for kneading ingredients of margarine, etc. B. JIROTKA. Brit. 274,949, April 26, 1926.

Preserving yeast. W. R. JOHNSTON. U. S. 1,667,895, May 1. Compressed moist yeast is formed into a creamy mixt. with an aq. soln. formed from flaxseed and hops, further admixed with an absorbent material such as cornmeal, and the mixt. is dried.

Distributing gases for fumigation, etc. F. A. EUSTIS. U. S. 1,668,496, May 1. In fumigating grapes or other foods with SO_2 , or in similar operations, the reagent used, *e. g.*, liquid SO_2 , is heated sufficiently to effect volatilization and generate a high pressure and a fine stream of the gas is led into one part of the treatment chamber where it is commingled with a stream of air and the mixt. thus produced is further distributed uniformly about the fruit or other substances being treated. An app. is described.

Food for animals. A. E. KIENZLE. Brit. 275,434, Sept. 16, 1926. Ground maize cobs are mixed with wet spent malt or like material, with or without addn. of molasses, or other foods.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Some problems encountered in making fine chemicals. F. H. CARR. *Chemistry & Industry* 47, 384-8(1928); cf. C. A. 21, 971.—In the prepn. of lime permanganate granules for Army respirators, the use of a cast-Fe edge-runner mill contg. an impurity in the Fe, presumably Ni or Co, gave an unstable product. Thorough mixing is of great importance, and may be gained by the use of a high-speed centrifugal pump or a Buhtz reaction machine. Concn. of aq. solns. may be accomplished without heating

by freezing and straining away the ice-crystals. The general details of *isoelectric pptn.* and of *concn.* are discussed.

Synthetic ammonia in refrigeration machines. P. PETIT. *Brasserie et malterie*, 18, 1-5(1928).—Sustained low efficiency is occasionally observed with refrigeration machines using synthetic NH_3 , but does not seem to have been reported with machines using NH_3 from other sources. P. suggests that the trouble is probably due to incomplete elimination of the dissolved N and H which is always present in synthetic NH_3 as manufd., but not in NH_3 from other sources.

Ethylene dichloride as a solvent. K. H. BAUER AND H. LAUTH. *Chem. Umschau Fette, Oele, Wachse Harze* 35, 82-6(1928).—Purified $\text{C}_2\text{H}_4\text{Cl}_2$ has d_{20} 1.250; distn. 82.6-82.8° 10%; 83° 54%; 83.3° 24%; 84-86° 9.5%; loss, 2.5%; flash (Abel-Pensky) 12-13°; inflammability. a flame will ignite $\text{C}_2\text{H}_4\text{Cl}_2$ in an open dish, but dies out on removal of the flame; at 40° and 60° it dies out more slowly and still more slowly when a galvanized-iron dish is used. Evapn. tests with 5 g. of material in a $2\frac{1}{2} \times 7$ cm. weighing glass: 99.98% at room temp. in 276 min.; 100% for $\text{C}_2\text{H}_4\text{Cl}_2$ in 240 min.; and 99.92% for 76-143° benzine after 24.5 hrs. $\text{C}_2\text{H}_4\text{Cl}_2$ is miscible with CH_3OH , $\text{C}_2\text{H}_5\text{OH}$, acetone, AcOEt , C_6H_6 , toluene, petr. ether, ligroin, benzene, pyridine, CCl_4 , trichloroethylene, pentachloroethane, cyclohexanol; CS_2 causes turbidity. Soly. in H_2O : 0.5 cc. at 18-9° in 100 cc. H_2O , and 0.1 cc. H_2O in 100 cc. $\text{C}_2\text{H}_4\text{Cl}_2$; it readily dissolves vegetable oils (12 samples tested) and with difficulty, a no. of resins (table given). Nitrocellulose swells little in $\text{C}_2\text{H}_4\text{Cl}_2$, but dissolves in a mixt. of 80 $\text{C}_2\text{H}_4\text{Cl}_2$, 15 CH_3OH and 5 AcOEt . Acetylcellulose swells strongly in $\text{C}_2\text{H}_4\text{Cl}_2$. Expts. for extg. oil from olive-press residues showed $\text{C}_2\text{H}_4\text{Cl}_2$ to be slightly superior to ether; the solvent can be completely removed from the oil by steam and flavor and odor are unaffected. Boiling $\text{C}_2\text{H}_4\text{Cl}_2$ in the presence of 10% H_2O splits off only traces of HCl and with alk. or acid KMnO_4 it is about as stable as CCl_4 , but surpasses $\text{C}_2\text{H}_5\text{Cl}$ and C_6H_6 . With neutral $\text{K}_2\text{Cr}_2\text{O}_7$ it remains uncompd. but with acid $\text{K}_2\text{Cr}_2\text{O}_7$, it is less stable than CCl_4 and C_6H_6 . $\text{C}_2\text{H}_4\text{Cl}_2$ 0.25-5% by vol. in air causes increased heart activity in white mice and difficulty in breathing; they recover in fresh air.

Compressed and liquefied gases with special reference to the requirements of maritime transport. GIULIO MORPURGO. *Notiz. chim.-ind.* 3, 141-2; cf. C. A. 22, 1637.—A discussion, with illustrations, of the causes of explosions of cylinders.

Chronic benzene poisoning among women industrial workers. A study of the women exposed to benzene fumes in six factories. ADELAIDE R. SMITH. *J. Ind. Hyg.* 10, 73-93(1928).—Blood examn. and physical examn. of 79 women exposed to benzene vapors from rubber cement showed unmistakable evidence of injury in 25 cases. There was a reduction of the white-cell count from the normal of 7500 to 5600 and below; there were purpuric spots and pronounced anemia in some cases; and there were very frequent complaints of headaches, excessive fatigue, dizziness, nausea, anorexia and other characteristic symptoms; there was a large increase in endothelialocytes and abnormal cells were found. There was a distinct odor of benzene in the workrooms, but it was not strong enough to cause immediate discomfort. A substitute for benzene was found, and tests repeated at the end of six weeks showed definite improvement.

C. C. DAVIS

Hard rubber for the chemical industry (SILVER) 30. Rubber in engineering (SCHADE) 30.

Chemical Specifications Yearbook, 1928. New York: Chemical Specifications, Inc. \$8.

Chemische Technologie der Neuzeit. Vol. III. Second ed., revised and enlarged. Edited by Franz Peters. Stuttgart: Ferdinand Enke. 936 pp. M. 48; linen, M. 53. GREEN, STANLEY: **Industrial Catalysis.** London: Ernest Benn, Ltd. Price, approx. 35s., net.

KERSHAW, JOHN B. C.: **The Recovery and Use of Industrial Wastes.** London: Ernest Benn, Ltd. Price, approx. 6s., net.

KNIBBS, N. U. S.: **The Industrial Uses of Bauxite.** London: Ernest Benn, Ltd. Price, approx. 21s., net.

PÖSCHL, VICTOR: **Technische Mikroskopie.** Ein Lehrbuch der mikroskopischen Warenprüfung für Studierende, Techniker, Kaufleute, Industrielle und Zollbeamte. Stuttgart: Ferdinand Enke. 311 pp. M. 23.20, linen, M. 25.

ÜLLMANN, FRITZ: **Enzyklopädie der technischen Chemie.** 2nd ed., completely

revised. Berlin and Vienna: Urban & Schwarzenberg. 10 Vols. of about 800 pp. Monthly editions. 8 to 10 R. M.

• URE, S. G. M.: **The General Principles of Chemical Engineering.** London: Ernest Benn, Ltd. Price, approx. 30s., net.

Absorption refrigerating apparatus. B. C. VON PLATEN and C. G. MUNTJERS. U. S. 1,669,269, May 8.

Absorption refrigerating apparatus. ELECTROLUX, LTD. Brit. 274,840, July 26, 1926.

Absorption refrigerating apparatus. ELECTROLUX, LTD. Brit. 275,576, Aug. 3, 1926.

Continuous-cycle absorption refrigerating apparatus. ELECTROLUX, LTD. Brit. 275,188, July 31, 1926.

Electrical insulators. J. J. WELDON. Brit. 274,851, July 20, 1926. Insulating rods or studs are formed of cotton or other textile cords held in compressed condition by a binder such as bakelite.

Electric insulation. P. ALLMAN, H. N. MORRIS and L. H. MARJOR. Brit. 275,304, April 30, 1926. Wires and cables are coated by use of a combined soln. of rubber and cellulose and volatile hydrogenated aromatic hydrocarbon products or their hydroxy compds. or esters such as tetrahydronaphthol, tetrahydrophenol, and cyclohexanone. Gutta-percha, balata or other resinous products also may be used.

Heat-insulating sheets. J. WEISS and R. KARG. Brit. 274,471, July 14, 1926. Fibrous vegetable material such as "wood wool," shavings, rushes or straw is used with magnesite and a reactive substance such as an aq. soln. of kieserite, "bitter salt" or Na_2SO_4 and the mass is pressed and dried in perforated molds. Reinforcing or facing materials may also be used on or embedded in the material.

Drying printing inks or other oily substances carried by sheet material. G. L. CLARK. U. S. 1,668,943, May 8. The material is first progressively heated to a relatively high temp. and then, before cooling, is subjected to the action of a confined mixt. of ozone and air.

Hydrogenizing oils. H. MARCHAND. Brit. 275,642, Aug. 5, 1926. Materials such as tar, mazout, or heavy oils are mixed with powd. coal, coke, wood, lignite or the like and the mixt. is distd. at 200–800° and the gaseous products formed are washed, cracked, mixed with products sep'd in the washing operation and the mixt. is treated with H to effect hydrogenation. An app. is described.

Regenerating catalysts used in decomposing steam by phosphorus. M. LARSSON. U. S. 1,668,539, May 1. H is passed over the spent catalyst (which may be formed of metals or metallic oxides) at such a temp. (suitably about 500–700°) that its deleterious coating is converted into a substance of such character that it can be reacted on by steam on the resumption of the decompn. of steam by P.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

What every engineer and water works superintendent should know about chlorination. R. V. DONNELLY. *J. New England Water Works Assocn.* **42**, 79 (1928).—D. describes the equipment generally used, its use, and the common troubles an operator may encounter. New and old uses for Cl are considered. D. K. FRENCH

Relining Payson Park Reservoir: Cambridge Water Works. L. M. HASTINGS. *J. New England Water Works Assocn.* **42**, 47–52 (1928).—An American portland-cement mortar, or, as applied, "re-inforced gunite" was used. The compn. and laying of a two-inch lining to a leaking reservoir are described. D. K. FRENCH

Observations on purification plant reports. J. W. ARMSTRONG. *J. Am. Water Works Assocn.* **19**, 402–7 (1928).—Suggestions are made to make plotted charts more valuable. D. K. FRENCH

Decolorization of soft colored waters. R. S. WESTON. *J. Am. Water Works Assocn.* **19**, 416–27 (1928).—Storage, filtration, and coagulation are considered. Al⁺⁺⁺ ions must combine directly with and ppt. the color particles for best results. Certain industrial colored wastes cannot as yet be economically treated. The mechanics of treatment and mixing are important factors. D. K. FRENCH

Purification and treatment of feedwater. S. T. POWELL. *Power Plant Engineering* **32**, 24–6 (1928).—Innovations within recent years are: (1) continuous blow down

where solids concentrate rapidly and where there is a marked tendency toward priming and foaming, (2) electrolytic scale and corrosion-prevention systems, (3) acid feeding equipment to inhibit embrittlement of metal, (4) deaerators, and (5) deaerating heaters.

S. D. POARCH

Purification of water from rivers polluted by sisal effluent. F. C. KELLY. *Kenya Med. J.* 3, 212-5(1926); *Bull. Hyg.* 2, 651(1927).—Sisal waste markedly increases albuminoid N and decreases absorbed O. The absorbed O test furnishes an excellent indication of sisal pollution because of the marked reducing properties of some unidentified constituent. Fish life but not frogs are destroyed by sisal effluent. Filtration is effective in overcoming pollution by sisal.

C. R. FELLERS

Coagulation processes in the purification of river water. C. P. MOM. *Mededeel. Dienst Volksgezondheid Nederland. Indis* 17, 1-12, 13-9(1928).—Coagulation of the colloidal clay in the water of the Tjilwoni by means of lime was investigated. Removal of the excess lime still present after coagulation and filtration by means of lime-absorbing materials gave unsatisfactory results. Different methods of removing excess lime are discussed, the difficulties experienced in this portion of the purification process are not sufficiently compensated for by the advantage of the sterilizing effect of the lime as a coagulating agent. Coagulation of the colloidal clay by means of $\text{Fe}_2(\text{SO}_4)_3$ and lime also was investigated. $\text{Fe}(\text{OH})_3$, together with the $\text{Ca}(\text{OH})_2$, constitutes the actual coagulating agent in this process. The practical value of $\text{Fe}_2(\text{SO}_4)_3$ -lime coagulation is discussed. Its sterilizing influence when treating water rich in alkali is a great advantage. Its disadvantages are (1) difficulty of neutralizing the alk. reaction after coagulation and (2) the reductive character of the $\text{Fe}_2(\text{SO}_4)_3$ which requires extra O_2 in oxidizing the water.

J. A. KENNEDY

Oxidation processes in the purification of river water. C. P. MOM. *Mededeel. Dienst Volksgezondheid Nederland. Indis* 17, 21-32(1928).—Different methods of oxidizing org. matter which occurs in river water and hinders coagulation were examd. The catalytic influence was shown of sunlight and colloidal clay on the decompn. of KMnO_4 , Cl_2 and Caporite. (This is a Griesheim Electron prepn. of Ca hypochlorite with a content of so-called active Cl_2 of about 70%. It is fairly stable and can be kept for a long time. Chemically and physiologically it is practically as active as liquid Cl_2 and in many cases can replace the latter, cf. *Geneeskundig Tijdschrift voor Nederland. Indis* 63, No. 6(1923).) Sunlight brings about decompn. more quickly and affects these oxidizing agents favorably. It is strongest in the case of KMnO_4 . Filtered river water decomposes less of the oxidizing agent than raw water. Colloidal clay advances the decompn. both of KMnO_4 and of Caporite. In the flocculated form clay does not act as strongly. Cl_2 gas acted practically the same as Caporite. Colloidal kaolin has no influence upon the decompn. of KMnO_4 , but it does influence that of Caporite. In practice, the p_H generally proves to be of little importance. Glazed earthenware jars and glass cylinders were used in the work. Considerable discussion of the above is given by the author.

J. A. KENNEDY

Plants as indicators of ground water. O. E. MEINZER. U. S. Geol. Survey, *Water Supply Paper* 577, 95 pp., 12 plates(1927).—Plants of the arid regions of N. Mex., Ariz. and Nev. are described with reference to the distance to the water table from the surface where the plants are growing. Thus the salt grasses, *Eragrostis obtusiflora* and *Distichlis spicata* and the wild rye *Elymus condensatus*, indicate water within 15 ft. To a slight extent the vegetation indicates the quality of the water. Salt grasses and alkali-resistant plants are apt to be found near highly mineralized water.

L. W. RIGGS

Activities of plankton in the natural purification of polluted water. W. C. PURDY. *Am. J. Pub. Health* 18, 468-75(1928).—The activities of plankton and related organisms constitute a part of the program of natural purification of polluted water. Plankton by their food habits tend to remove a portion of the org. matter. The photosynthetic activities of chlorophyll-bearing organisms operate to produce O_2 . The energy of harmful org. matter consumed as food and released to the water in terms of motion serves to furnish as intimate mixing and microscopic circulation during the critical initial stages of recovery from pollution.

C. R. FELLERS

Chemical character of waters of Florida. W. D. COLLINS AND C. S. HOWARD. U. S. Geol. Survey, *Water-Supply Paper* 596-G, 177-233(1928).—Analyses of 458 waters are tabulated, the constituents detd. being total solids, SiO_2 , Fe, Ca, Mg, Na + K, HCO_3 , SO_4 , Cl, NO_3 and the total hardness as CaCO_3 . These analyses relate to mineral constituents only and do not indicate the sanitary quality except when waters are unfit to drink because of excessive mineral content. Of the 458 samples representing every county in the state, 73 had a hardness less than 50 parts CaCO_3 per million,

36 showed a hardness between 50 and 100, and the remaining 349 samples gave a hardness above 100.

L. W. RIGGS

• **The physicochemical condition of the waters in the Strait of Messina.** MARIO PICOTTI. *Atti II congresso naz. chim. pura applicata* 1926, 1221-31.—A review of work which has been summarized elsewhere (cf. P., C. A. 20, 3275; 21, 881; Vercelli, C. A. 20, 3275) and which is now published in complete detail in book form (cf. *Crociere per lo studio dei fenomeni nello stretto di Messina*: vol. I, by Vercelli, Venezia 1925; Vol. II, by Vercelli and Picotti, about to be published). Corrections. *Ibid* 1946.

C. C. DAVIS

Chlorination of water supplies in Assam. R. T. SEN. *Proc. Assam Branch British Med. Assocn.* 1926, 43-5; *Bull. Hyg.* 2, 649(1927).—Dechlorination of water supplies treated with excess Cl is recommended. Less than 0.1 p. p. m. of Cl will not give a taste *per se* or injure water mains.

C. R. FELLERS

Feed water for world's largest boilers receives zeolite and acid treatment. ALFRED H. WHITE, J. H. WALKER, EVERETT P. PARTRIDGE AND LEO F. COLLINS. *Power* 66, 90-4(1928); cf. C. A. 21, 3096.—The Beacon Street heating plant of Detroit, supplying steam for heating in the business district, contains 12 boilers each of 41,500 sq. ft. of heating surface. The city water used contains free CO_2 , 1.8; SiO_2 , 6.4; Fe_2O_3 , 2.0; Ca, 25.7; Mg, 7.3; HCO_3 , 75.6; CO_2 , 0.0; SO_4 , 31.1; Cl, 7.7 and solids by evapn. 121.0 p. p. m. The high alk. resulting from zeolite treatment is corrected by addn. of 35 p. p. m. of H_2SO_4 . The p_{H} values are recorded in the storage reservoir and as the water leaves the feed-water heater. This amount of acid neutralizes about $\frac{1}{2}$ the total NaHCO_3 present. The p_{H} is 6.5 before deaeration and 8.5 after. Continuous blowdown through a heat exchanger is satisfactory. After 8 months' operation the tubes were clean, there were no tube burnouts and no serious corrosion.

D. B. DILL

Lime and soda treatment of feed water. E. M. PARTRIDGE. *Power* 67, 507-9(1928).—Partial softening with lime and soda may increase corrosive properties and result in the formation of a scale which is harder, though less in amount than is formed from untreated water. Hence complete softening is important.

D. B. DILL

Treatment of filtered water with lime at Harrisburg, Pa. R. H. GOULD. *J. Am. Water Works Assocn.* 19, 358-73(1928).—Harrisburg water is a river supply; it is filtered with alum assisted by lime, when necessary. It was then quite corrosive. Treatment with addnl. lime after filtration was based on free CO_2 present. As a result the drop in dissolved O taken as an index of corrosion was decreased from about 4.45 p. p. m. to about 0.2 p. p. m. A very interesting discussion is included.

D. K. F.

The residual germicidal action of water treated with ultra-violet light. J. F. NORTON. *Am. J. Pub. Health* 18, 476-9(1928).—Water exposed to ultra-violet light retained a slight germicidal power which could be detected by appropriate bacteriol. means. This activity was detected with *Bact. typhosum* and Friedlander's bacillus but not with *Staph. aureus*. No residual germicidal action was noted when certain salt solns. were irradiated. This was likewise true of peptone, phenol and meat extract. Bacterial cells killed by exposure to ultra-violet light appeared to exhibit a residual germicidal action but the data are too incomplete to warrant definite deductions. The work is being continued.

C. R. FELLERS

Deferrization, aeration and filtration of industrial waters. A. LANGUMIER. *Arts et métiers* No. 90, 96-109(March, 1928).—Descriptive.

A. PAPINEAU-COUTURE

Iron removal plant for Amesbury, Massachusetts. G. A. SAMPSON. *J. New England Water Works Assocn.* 42, 43-64(1928).—Aeration is sufficient. There is included a detailed description covering aerators, tricklers, filters, filter basin, etc. A 98.2% removal has been obtained at a cost of about \$3.50 per million gallons of water delivered.

D. K. FRENCH

Clarification of the Catskill water supply of the City of New York by coagulation and sedimentation. WM. W. BRUSH. *J. New England Water Works Assocn.* 42, 65-78(1928); cf. C. A. 21, 1686.—Given plenty of time 1 grain per gallon of alum fed continuously into the aqueduct at Pleasantville for a 100 p. p. m. turbidity reduces it to about 3 p. p. m. at Brooklyn. The p_{H} , however, was lowered to about 6.1; so soda ash was necessary to prevent corrosion; about 0.5 grain per gallon was sufficient. The cost is about one cent a month per person.

D. K. FRENCH

The methods for determining sulfur trioxide in natural waters and soil extracts. B. G. ZAPROMETOV. *Bull. Univ. Asie Centrale* (Tachkent) 1927, 91-5.—The gravimetric pptn. as BaSO_4 , the iodometric titration and the benzidine methods are compared. Raschig's benzidine method (*Z. angew. Chem.* 16, 617(1903)) was found to

be best. Z. simplifies this method by omitting the usual filtration with suction of benzidine sulfate.

RUSSELL C. ERB

Research on the mechanism of the activated-sludge process. A. SEISER. *Gesundh. Ing.* 51, 253-9, 273-6(1928).—The real mechanism of activated sludge is a combination of the properties of the sludge and of the organisms. In the case of bovine serums, peptone, sugar and aspartic acid, as much disappear in the first stages through adsorption as through biol. decompn. Of the N-contg. compds. tested, serum was the most strongly, peptone less strongly and the Na salt of aspartic acid the least adsorbed. The decompn. of albumin was nearly identical with that of globulin. These two show no distinctive difference in regard to the putrescibility test. For the serums it was detd. that the decrease of the permanganate consumption approx. parallels the org. N. The addn. of a good source of energy (sugar) to aspartic acid promotes the fixation of N while the lack of sugar promotes the formation of NH_3 . Nitrification and NO_2 reduction are functions of the intensity of aeration. A lack of air results in a reduction of the oxidized N. The salt content has little effect on the activated-sludge process. Ferrous compds. are quickly oxidized and promote activation during aeration in compounds with protective colloids

WAYNE L. DENMAN

Mansfield (England) sewage-disposal works. Some leading features. W. THOMPSON. *Munic. Eng. Sanit. Record* 80, 157(1927).—The works consist of shallow settling tanks ("grit pans"), detritus chambers, sedimentation, bio-aeration, humus (Dortmund type), settling tanks, etc. A brief description of the purification process is given.

C. H. BADGER

Bedford (England) refuse destructor and sewage-disposal works. N. GREEN-SHIELDS. *Munic. Eng. Sanit. Record* 80, 48(1927).—A brief description of the destructor is given. The sewage pumping station adjoins the destructor. Enough steam is generated by burning house refuse to pump all the screened sewage, about 1,600,000 gal. per day, against a head of 65 ft. to the sewage-disposal works. The sewage screenings are mixed with the destructor flue dust and sold as fertilizer. An underground sewage-pumping station discharging into a high-level sewer and the disposal works are also briefly described. Storm water is treated on 37 acres of land. About 9000 tons of liquid sludge and humus per yr. is put on arable land for 2 to 3 yrs, which is then rented to small holders for 3 yrs.

C. H. BADGER

Warwick (England) and its municipal undertakings. RICHARD WORMELL. *Munic. Eng. Sanit. Record* 80, 96-8(1927).—W. discusses in detail road construction, etc., and describes briefly the sewerage and the means of sewage disposal.

C. H. BADGER

Experimental salvage plant. Results obtained at Nottingham (England). W. C. CULLEY. *Munic. Eng. Sanit. Record* 80, 133-4(1927).—Practical working uncovered a no. of faults which are described. Alterations based on experience showed a reduction in working costs and increased the capacity from 50 to 60 tons of crude refuse per day. Unwashed cinder is sold to an electric power plant. The disposal of screened dust is at present unsatisfactory, most of it being hauled away on contract. The exptl. plant has proved that the destructors cannot compete in economical working with a combined separation and incineration method for the disposal of crude refuse.

C. H. BADGER

Sanitary progress in Plymouth (England). N. RUSE. *Munic. Eng. Sanit. Record* 80, 260-1(1927).—Includes descriptions of water supply and drainage systems.

C. H. BADGER

Apparatus for producing actinic rays of extremely short wave length for sterilizing water (Brit. pat. 275,596) 1. Titration apparatus suitable for determining salinity of brackish water (Brit. pat. 274,623) 1.

JOHNSTONE-TAYLOR, F.: **Modern Waterworks Practice.** London: Ernest Benn, Ltd. Price, approx. 10s. 6d., net.

Artificial mineral water. O. WARBURG. Brit. 274,834, July 22, 1926. Mineral waters prepd. as described in Brit. 259,612 (C. A. 21, 3410) are prepd. by use of Mg K chloride and finely ground CaSO_4 which are assocd. with the bicarbonate and with the bisulfate, resp., in compounding the ingredients.

Filter and water-softening apparatus of the filter type. W. J. HUGHES. U. S. 1,668,206, May 1. U. S. 1,668,207 specifies a system for supplying salt soln. to water-softening app., using base-exchange silicates.

System for heating and deaerating water. G. H. GIBSON. U. S. 1,667,850, May 1.

Apparatus for hot filtration of water, etc. C. G. HAWLEY. U. S. 1,668,807, May 8.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Agricultural instruction and experimentation in Belgium. Modern institutes of agricultural economy. FRANCESCO SCURT. *Atti. II. congresso naz. chim. pura applicata 1926*, 224-69.—A detailed description, with 61 illustrations, of present lab. and agricultural developments. C. C. DAVIS

An index of soil texture. F. HARDY. *J. Agr. Sci.* **18**, 252-6(1928).—A procedure is described for evaluating an "index of texture" ($I. T.$), based on detns. of moisture contents at the points of stickiness (P), and of sand contents (S) of soil samples. ($I. T. = P - (S/5)$.) The procedure is simple and allows of a rapid lab. examn. of a great no. of spot samples, so that detailed texture maps can readily be constructed. Employed in conjunction with soil-reaction maps, the texture maps form a useful basis for detailed investigations of soil genesis and soil fertility. P. R. DAWSON

Remarks on the mechanical analysis of soils. II. M. KOHN. *Z. Pflanzenernähr. Düngung u. Bodenk.* **10A**, 91-9(1927); cf. *C. A.* **22**, 292.—K. calls attention to numerous errors attending the mech. analysis of the soil. The use of the Stokes and the Oseen formulas for the calcn. of the size of the particles falling in a definite time is recommended instead of the Stokes formula alone. The shape of the particles has an influence on the fall. Formulas for the calcn. of the effective radius of ellipsoid particles are given. Influence of the temp. upon the rate of fall of soil particles is stressed and useful tables for the change in velocity of the fall of soil particles with temp. are given. The advantage of giving the mech. analysis in a distribution curve is emphasized again. The danger of using a const. for the sp. gr. of the different soil fractions and for all soils is stressed. R. M. BARNETTE

The mechanical analysis of heavy ferruginous soils. RUBY C. GROVES. *J. Agr. Sci.* **18**, 200-5(1928).—Certain heavy ferruginous soils do not respond to the usual preliminary treatment with H_2O_2 , for mech. analysis by the pipet method. A method of preliminary treatment is described, involving the use of ammoniacal H_2O_2 , and repeated gentle rubbing with a rubber pestle, which appears to give a satisfactory dispersion with such soils. The results are not affected by mech. shaking, hence the latter may be omitted. P. R. DAWSON

A simple method for the determination of the p_H values of turbid soil and other solutions. C. H. GADD. *J. Agr. Sci.* **18**, 206-8(1928).—A method employed by Atkins (*Notes from Bot. School, Trinity Coll., Dublin* **3**, 178-90(1925)) for the detn. of the p_H of plant juices has been adapted for use with turbid soil solns. To samples of the soil soln, prepd. as usual, is added a sufficient quantity of the desired indicator to make the color clearly visible in the turbid fluid. Equal quantities of this colored sample are then placed in standard comparator tubes or the equiv. Ten drops of distd. water are added to one tube, which is used as a control. To another tube are then added 10 drops of a buffer soln. of known p_H value and the resulting color is compared with that of the control. If no alteration of color occurs the soil soln. and buffer have the same p_H ; if not, other buffer solns. are tried in other tubes until the colors match. If very turbid, the solns. may have to be dild. with water (equal amts. to each tube). P. R. DAWSON

The influence of soil treatment on the assimilability of nutrients in the seedling method of Neubauer. P. HAUSCHILD. *Z. Pflanzenernähr. Düngung u. Bodenk.* **10A**, 37-53(1927).—The assimilability of the K_2O and P_2O_5 of soil increased with the temp. of the drying of the soil from moist soil, air-dried soil, soil dried at 40° , soil dried at 80° and soil dried at 115° . Thus the method of drying the soil must be taken into consideration in interpreting the results of the assimilability of plant nutrients as tested by the Neubauer method. R. M. BARNETTE

An investigation of the method of Page and Williams for the determination of the saturation capacity of soils. P. E. TURNER. *J. Agr. Sci.* **18**, 251-55(1928); cf. Page and Williams, *C. A.* **19**, 1022.—Leaching the mixt. of soil and $CaCO_3$ to 2 l. is insufficient to displace all the exchangeable bases from the soil. It is hence recommended that 3 l. or more of filtrate be obtained, or preferably, that the amt. of soil be reduced to 10 g. The leaching soln. remains in contact with the soil mixt. for a period adequate for the normal $NaCl$ soln. to be satd. with $CaCO_3$. The difference in the amt. of Ca , derived by soln. from the carbonate in the 1st and 2nd liters of filtrate is negligible. The tardiness with which the reaction proceeds to completion is probably due to the difficulty of displacing the final amts. of adsorbed ions, rather than to the presence of Ca ions in the leaching soln. The incompleteness of the reaction renders the method

of Hissink inaccurate for calcn. of the satn. capacity. The variation in the character of the colloidal material of soils is to some extent reflected in the value of the ratio of the Ca passing into soln., through exchange reactions in the 2nd l., to that dissolved in this manner by the total vol. of filtrate.

P. R. DAWSON

Three-year comparison of Neubauer analyses and field experiments. T. RORMER, DIRKS AND WOACK. *Z. Pflanzenernähr. Düngung u. Bodenk.* **6B**, 529-62(1927).—The Neubauer limiting values for root-sol. P_2O_5 varied from 4 to 7 mg. depending upon the crop. Results by the Neubauer method agreed in general with field expts., although there were marked divergences in the case of some crops. In the case of K the agreement was not as good, being best with potatoes. The limiting values ranged from 20 to 42 mg. according to the crop. The Neubauer results generally were higher, when they differed from those of field expts. These differences may in part be attributed to different exptl conditions, such as the prepn. of the soil sample for the lab. tests, differences in temp. and moisture conditions, etc. The pH values of the soil samples may be altered by the Neubauer treatment. The Neubauer method is considered a helpful basis for detg. fertilizer requirements, but it needs further development.

P. R. DAWSON

The soils of Bowie, Denton, Freestone and Red River counties. G. S. FRAPS. Texas Agr. Exp. Sta., *Bull.* **375**, 48 pp (1927).—The forested soils of these counties are usually low in active P_2O_5 and N. They are a little better supplied with active K but some are low. A number are acid. The upland prairie soils are better supplied with plant food and with lime than the forested soils. They contain 2 or 3 times as much active plant food or total N as the forested soils. Most of them are limestone soils but a few are acid. The second-bottom or terrace soils are usually better supplied with plant food than the upland forested soils but are not as well supplied as the prairie soils; some are low in N. The first-bottom soils are better supplied with plant food than the other groups of soils discussed. They contain 4 to 8 times as much active P_2O_5 , 2 to 3 times as much active K, and 2 to 4 times as much total N as the surface soil of the upland forested soils.

J. J. SKINNER

The specific conductivities of soil extracts. C. H. WRIGHT. *J. Agr. Sci.* **18**, 186-93(1928).—Considerable differences were found in the sp. conductivities of different soils at any one time of year; likewise considerable differences appeared in any one soil at different times of the year, the sp. cond. being highest in March and lowest in June and July. Results from different soils are comparable only when samples are taken at the same time of year. A relation was found between the sp. cond. of soil exts. and the mean wts. of lint per plant per row in 2 strains of Llan cotton. Data are presented, showing that the sp. cond. of a 1:5 soil ext. is an index of the fertility. The sp. cond. of a soil decreases under continuous cultivation and there is evidence that the rate of soln. also decreases under the same conditions.

P. R. DAWSON

The effect of dehydration of soils upon their colloid constituents. II. J. L. STEENKAMP. *Soil Sci.* **25**, 239-51(1928); cf. *C. A.* **22**, 2021.—A method is described for detg. neutral salt-forming bases and acid-salt-forming bases in soils. Twenty g. of soil is shaken with 200 cc. 0.1 N HCl, allowed to stand 24 hrs. and filtered. Two aliquots are titrated against standard alkali. In one, phenolphthalein is used as an indicator, and in the other methyl orange is used. The difference between the original titer of acid and that of the soil ext., when phenolphthalein is used, is the amt. of neutral-salt-forming base present in the soil, while the difference between the phenolphthalein figure and that obtained with methyl orange represents the amt. of acid-salt-forming base. Acid-salt-forming bases (Fe_2O_3 and Al_2O_3) are increased by drying, while the neutral-salt-forming bases are decreased. Drying for various periods of time and in atms. of various gases, in most cases, decreases the neutral-salt-forming bases, and increases the acid salt-forming bases. Dehydration decreases the adsorption of CaO from 0.1 N $Ca(NO_3)_2$ and of K_2O from KNO_3 . The adsorption, of P_2O_5 from 0.01 N NaH_2PO_4 is increased by drying in a black clay soil and decreased in a yellow clay soil. Adsorbed bases and adsorption of 0.1 N HNO_3 are plotted at different water values of soil. The varying points of intersection of the curves indicate the beneficial effects of dehydration in increasing plant nutrients. Such beneficial effects will commence earlier in some soils than in others.

M. S. ANDERSON

The movement of water in soils and subsoils. A. F. LEBEDEV. *Z. Pflanzenernähr. Düngung u. Bodenk.* **10A**, 1-36(1927).—A clear and concise discussion of the influence of different phys. factors on the movement and changes of the gaseous water, of the hygroscopic water, of the film water and of the gravitation water in the soils.

R. M. BARNETTE

Acidity, degree of saturation and the lime requirements of soils on the basis of

pot experiments. P. OBST, K. WODARZ AND D. MEYER. *Z. Pflanzenernähr. Düngung u. Bodenk.* 10A, 65-90(1927).—In lab. expts. pptd. CaCO_3 , CaO , ground limestone and K_2CO_3 significantly neutralized the exchange acidity of soils after 4 weeks. The pptd. CaCO_3 was slightly superior to CaO in the rapidity of neutralization of the exchange acidity, while ground limestone was somewhat slower in action. The K_2CO_3 was most active. The lime requirement as calcd. from the detn. of the exchange acidity did not completely neutralize the acidity. The degree of satn. of the soil which gave the highest yields for the different plants varied with the soil type. There seems to be no definite degree of satn. for the effective growing of plants for all soils, despite the fact that it gives a good basis for the detn. of the lime requirement of the soil.

R. M. BARNETTE

The ammoniacal nitrogen of peats and humus soils. II. J. C. B. ILLIS AND C. G. T. MORISON. *J. Agr. Sci.* 18, 346-9(1928).—When a peat, as obtained from a bog, is dried, considerable changes occur in the amt. of ammoniacal N removable by distn. with MgO at reduced pressure. Removal of water causes a relative increase in the quantity of NH_3 extractable by water. This is due to reduction in the adsorptive colloidal properties of the peat. A partial recovery in the adsorptive power takes place on prolonged contact with water.

P. R. DAWSON

The determination of nickel in soils. G. SCHIECKENTHAL. *Z. Pflanzenernähr. Düngung u. Bodenk.* 10A, 104-7(1927).—A method consisting of treating the soil with HCl (1.15 sp. gr.) and removing the Fe and Al with NH_3 , subsequently pptg. Ni in the filtrate with H_2S , dissolving the sulfides of Ni and Co in aqua regia and pptg. Ni as nickel dimethylglyoxime is described. There is believed to exist a relation between the Fe and Ni contents of the soil.

R. M. BARNETTE

Transformations (particularly nitrification) of nitrogen in soil, and the acidity of certain types of soil. W. WOHLBER. *Kuhn Archiv.* 1926, No. 12, 1-37. *Chimie et industrie* 19, 518(1928).—Increase in soil acidity decreases its nitrifying power. The activity of *Azotobacter* ceases entirely at a given acidity, the value of which depends on such factors as soil constitution, aeration, humidity, atm. temp., etc., in light soil horn-N can be nitrified in March, even at a p_{H} value of 4.3, but with lower p_{H} values nitrification is impossible. Nitrification of mineral salts depends on the amt. of Al ion dissolved in the soil, i. e., on the acidity resulting from the complex colloidal exchanges in the soil. Acidity exerts a much less marked action on ammonization, the persistence of which is particularly notable in humiferous soils in consequence of the acidity of the fungi. Ammonization increases slowly with the soil alk., but the phenomenon is obscured by the rapid nitrification of the NH_3 formed. Ammonization is already quite appreciable for very high acidities, and presence of NH_3 in the soil can be detected. In an alk. soil all the N is rapidly nitrified. Nitrites are sometimes found in recently limed soils which are nearly neutral, and they are apparently formed during mineralization of org. N (horn) rather than during nitrification of NH_3 salts. N losses are much higher in alk. than in acid soils. A neutral soil allows of rapid nitrification, avoiding losses of N, and is most favorable to the different transformations of N.

A. PAPINEAU-COUTURE

The reversion of nitrates in the soil under cultural conditions in Mauritius. N. CRAIG AND F. GIRAUD. *Mauritius Dept. Agr., Sci. Ser. Bull.* 11, Eng. ed., 19 pp. (1926), *Expt. Sta. Record* 57, 18.—Under the conditions of the expts. reported, large applications of molasses arrested nitrification and caused the conversion of NH_4 compds. into org. N. Large amts. of org. matter in general caused a reversion of nitrate to org. N, molasses having the greatest effect of the substances tried, with dried green manure second and dried farmyard manure third. Neither molasses nor dried green manures caused loss of N as gas, but farmyard manure caused a large loss of this kind.

H. G.

The sulfur content of Alberta soils. F. A. WYATT AND J. L. DOUGHRY. *Sci. Agr.* 8, 549-55(1928).—In semi-arid soils the S content is often greater than the P content and increases with depth. Because of limited rainfall, concn. zones of sol. salts are formed 3-6 ft. below the surface. Sulfates do not leach out of these soils which contain from 320 to 710 p. p. m. of S in the surface layer and 380 to 1250 p. p. m. of P. The zone of sulfate concn. may or may not be identical with the lime layer; usually it is deeper. The result of leaching in various soil belts is more uniformly and distinctly shown by the depth of the zone of CaCO_3 accumulation, than by the zone of sulfate accumulation, since sulfate is not as uniformly a const. constituent as is carbonate. Sulfates make up the chief salts in alkali soils in Alberta. The alk. of aq. exts. of alkali soils consists mainly of bicarbonate alk. The total alk. seldom

reaches 0.1% and is usually less than 0.05%. Crops did not respond to application of S on 2 types of soil.

C. R. FELLERS

Dye adsorption by hydrous alumina in soils. H. II. CROUCHER. *J. Agr. Sci.* **18**, 350-62(1928).—A critical study of the literature on the dye-adsorption method for measuring the colloidal matter of soils shows that the general failure of the method is due to variations in the chem. compn. of the colloidal material, the presence of previously adsorbed ions, the H-ion concn. of the soil suspension, and the nature of the dye and its concn. in the suspension medium. Special emphasis is placed on the isoelec. theory. A procedure for detection of hydrous alumina in soils is described, involving demonstration of the isoelec. point of the substance by means of preferential dye adsorption in suspensions of various p_H values. Such a method lays the foundation for rapid detection of free hydrous alumina in soils contg. appreciable quantities. The test, however, is not sufficiently precise for all purposes. More efficient dyes than those finally selected could undoubtedly be found. An ideal dye for such studies must be sol. in solns. of p_H 2.0-9.5; must be readily but not excessively adsorbed by hydrous alumina; the 2 dyes and mixts. must have the same depth and shade of color throughout the p_H range, they must be fairly "fast", must have intense and widely contrasting colors; must not be fluorescent; must not be mutually pptd. on mixing, and if possible they should be adsorbed only by hydrous alumina. The 2 dyes should be absorbed in approx. equal amts. at p_H values equidistant from, but on opposite sides of the isoelec. point. The most satisfactory results were obtained with a mixt. of acidic Bielrich Scarlet and basic Iodine Green. The former is adsorbed by hydrous alumina only on the acid side of its isoelec. point and the latter only on the alk. side. The applicability of the mixt. of dyestuffs finally selected is demonstrated for a series of soils of varying basic ratio and including examples of lateritic soils and clays.

P. R. DAWSON

Soil microorganisms and their relation to soil fertility. M. M. ALICANTE. *Sugar News* **7**, 730-5(1926); *Expt. Sta. Record* **57**, 17-8; cf. *C. A.* **21**, 2346.—A sandy soil low in org. matter contained 100,000 bacteria per g. and a sticky, poorly aerated clay showed about the same amt., while good soils under favorable conditions contained from 1,000,000 to 1,000,000,000 organisms per g. Acid, relatively in fertile soils showed low bacterial counts, which increased upon liming and fertilizing the soils. The most important factors limiting the bacterial nitrification of the Philippine Island soils examd. were acidity and excessive clay. A red, sticky soil bearing stunted, yellow cane and contg. 44.9% of clay and an acidity of 0.15% failed to nitrify addns. of $(NH_4)_2SO_4$ during an incubation of 28 days. After liming a 16.7% nitrification was secured. A 4% clay soil of 0.05% acidity was capable of a 14% nitrification of $(NH_4)_2SO_4$. After liming a 94.1% nitrification was obtained, and the soil bore an excellent stand of sugar cane.

H. G.

The study of soil protozoa. M. KOFFMAN. *Acta Zool.* **7**, 277-328(1926); *Expt. Sta. Record* **56**, 809.—An investigation of the protozoa of garden soils about Stockholm is reported, the 93 forms identified and drawn including both forms peculiar to the soil and aquatic forms which appear in soils only under certain conditions. The protozoa were very sensitive to slight changes in such physiol. conditions as p_H , temp., salt concn., nutrients, etc., in the culture media. Protozoa peculiar to soils, commonly small flagellates, together with their cysts, were present in normal soils, but most of the cysts originated from forms not peculiar to soils alone. Results obtained by soil inoculations of culture media hardly give a true picture of the actual protozoan soil fauna, on account of the presence of cysts of protozoa not specifically soil forms and because of the above-noted sensitiveness of the Protista. This applies equally to the identification and to the counting of the protozoa. The effect of the distribution of the protozoa on soil fertility can hardly be detd. without knowledge of the kind and nos. of the forms present. A method applicable to the direct identification and counting of the soil protozoa, at least in certain soils, is given.

H. G.

New concepts of the fertilization of soil. GIUSEPPE TOMMASI. *Atti II. congresso naz. chim. pura applicata* **1926**, 327-35.—Fertilization of soil is now based on the principle of supplying to the plant, in soil, and therefore readily assimilable form, the particular nutrients which are deficient in the soil. It is probable, however, that besides this effect, fertilizers modify the structure and other phys. properties of the soil, so that nutrients which are already present in difficultly sol. and assimilable form are rendered sol. and readily assimilated. In general, fertilizers are beneficial not only in supplying a deficiency of nutrient, but in causing a favorable displacement of certain equilibria in a soil, e. g., its p_H value, in fact fertilization may in some cases owe its chief value to a favorable influence on the H-ion concn. This concept is supported by various exptl.

facts, e. g., the growth of plants is sometimes increased by supplying phosphates when the soil is already rich in phosphates, while the addn. of phosphates to some soils deficient in phosphates does not give beneficial results, phenomena which are also true of N and K fertilization.

Nitrogen fertilizers. ALBERTO DE DOMINICIS. *Atti II congresso naz. chim. pura applicata* 1926, 336-45.—A review and discussion of present developments.

C. C. DAVIS

A new process for the production of fertilizer from spent alcoholic liquors. EMIL BAUER. *Oesterr. Chem.-Ztg.* 31, 39(1928).—This is a brief description of the difficulties overcome by the patented process together with an analysis of the product. The small cost of production by this process is a decided advantage.

E. F. SNYDER

Potash fertilization in Italy. S. DOJMI DI DELUPIS. *Atti II congresso naz. chim. pura applicata* 1926, 368-75.—A crit. review of the requirements of K fertilizers. In Italy leucite is the most economic source of K. The latter is of special importance in the cultivation of wheat on some Italian soils, because it compensates for the high proportion of available Ca with respect to P_2O_5 , and because it corrects unfavorable reactions of the soil, such as too great alk.

C. C. DAVIS

Synthetic pen manure. Use of distillery sludge. V. M. HINCHY. *Trop. Agr. (Trinidad)* 4, 129(1927).—Sludge from the wash vats of a rum distillery produced excellent fermentation of sugar cane trash and grass when mixed with it. The actual degree of humification by the H_2O_2 method was 10-30% in different trials.

A. L. MEHRING

Organic fertilizers from sugar cane. The utilization of field and factory refuse. F. HARDY. *Trop. Agr. (Trinidad)* 4, Sugar supplement 47-8(1927).—A review.

A. L. MEHRING

Analytical investigations on the use of green fertilizers. F. MARTIN. *Kuhn Archv.* 1926, No. 12, 146-204, *Chimie et industrie* 19, 518(1928).—(1) Increase in the yield and improvement in the quality of the harvest through the use of green fertilizers (leguminosae) was observed in all kinds of soils (sandy, clay, mixed clay and calcareous). (2) Green manure increases the org. matter content of the soil (increase of 3000 kg. dry matter per Ha) and the humus content of the surface layers. (3) The variations of the moisture-absorption capacity are similar to those of the humus content. (4) The phys. condition of the soil is unfavorably affected, the proportion of fine material being decreased in the surface layers and increased in the sub-soil. (5) The plots having received green manure had the lowest bacterial activity and N content, the decompn. of org. matter being retarded by the unfavorable phys. condition of the soil, but the losses of N were decreased. (6) Green manure increased the fertility of the soil, as measured by the evolution of CO_2 , which increased 1600 kg. per Ha because of the increased humus content. (7) Green manure increases soil acidity. (8) Plots treated with green manure are more sensitive to modifications in the pH value, the buffer value of the soil being appreciably reduced. (9) Green manure tends to decalcify the surface layers to the benefit of the sub-soil. (10) It increases the P_2O_5 content of the surface layers at the expense of the sub-soil, presumably by reason of the development and acid secretions of the roots of the leguminosae.

A. P.-C.

The solubility of phosphorites in salt solutions saturated with carbon dioxide. K. FLEROW. *Z. Pflanzenernähr. Düngung u. Bodenk.* 10A, 109-14(1927).—Sols. of the alkali metals and alkali earths satd. with CO_2 increased the soly. of Ca phosphate over that in CO_2 -satd. water in the series $SO_4 > NO_3 > Cl$. Ca salts decreased the soly. of the phosphate. Increased concn. of the salts increased the soly. of the phosphates. The possible effects of fertilizer salts on the soly. of soil phosphates are discussed.

R. M. BARNETTE

The evaluation of phosphate-containing fertilizer material from their solubility in citric and nitric acids. Z. *Pflanzenernähr. Düngung u. Bodenk.* 10A, 100-3(1927).—The importance of the control of the H-ion concn. in the evaluation of different phosphates by their soly. in citric and nitric acids is emphasized. With base-contg. phosphates such as Thomas meal, this is particularly important, as the final H-ion concn. of the mixt. of the phosphate and the acid is shown significantly to influence the soly. of the phosphate.

R. M. BARNETTE

Elemental sulfur and phosphate salt mixtures as fertilizer. R. R. MCKIBBIN AND W. H. MOORE. *Sci. Agr.* 8, 579-81(1928).—With Marquis wheat in greenhouse expts., acid phosphate-S mixts. proved toxic on Coastal Plain soils. With other sol. phosphate salts the toxic effect of the S admixt. obtains, though not to the same degree as with $Ca(H_2PO_4)_2 \cdot H_2O$. The explanation is that sol. phosphate salt strongly buffers

the acidity locally produced by S oxidation. The resultant long-maintained intense acidity in pockets is injurious to plant root tissue.

The physiological reaction of "Nitrophoska." R. W. BELINS. *Z. Pflanzenernähr., Düngung Boden.* 6B, 562-7(1927).—When used as a nutrient in water cultures "Nitrophoska" has no effect on the reaction. In soils, however, it shows a definite physiological acidity, increasing both the exchange and hydrolytic acidity and reducing the buffer capacity. On an equiv. N basis this effect is considerably less than that of $(\text{NH}_4)_2\text{SO}_4$.

Superphosphate in Italian agriculture. F. ZAGO., *Atti II congresso naz. chim. pura applicata* 1926, 346-67.—A crit. review of the use of P fertilizers, of the advantages of superphosphate, and of the past and present use of the latter in Italy. Corrections. *Ibid* 1945-6.

The agricultural value of specially prepared blast-furnace slag. J. W. WHITE. Penn. Agr. Expt. Sta., *Bull.* 220, 1-19(1928).—Blast-furnace slag contains 45-50% CaO and MgO and may be used successfully as a substitute for ground limestone or CaO for agricultural purposes. Incomplete data show no distinctive crop increases over ground limestone when both are ground to the same degree of fineness.

The fertilization of agricultural soil for cereals, with special reference to treatment in hot dry climates. EMANUELE DE CILLIS. *Atti II congresso naz. chim. pura applicata* 1926, 303-16.—A crit. discussion of the possibilities of increasing and improving the cultivation of cereals, particularly wheat, in Italy, with the aid of the most advanced knowledge of agricultural chemistry.

The relation between the particle size of phosphorites and their assimilability. G. PIANO. *Atti II congresso naz. chim. pura applicata* 1926, 409-20.—Because of the tremendous saving if pulverized phosphorites could be used directly as fertilizers, the soly. of a typical phosphorite of 2 different degrees of fineness (greater and less than 0.17 mm. diam.) was tested in water contg. (1) org. substances, such as garden mold, manure, fresh and dried blood, legumes, etc., (2) salts, including $(\text{NH}_4)_2\text{SO}_4$, NaNO_3 , NH_4NO_3 and KCl, and (3) citric acid at various concns. (0.2-20%). The quantities of P in soln. after increasing times up to about 1 yr. were detd. Garden mold and legumes had the greatest and manure the least solvent action on the phosphorite. The more finely divided phosphorite dissolved to a greater extent than the coarser grade. The greater part of the phosphorite which became sol. passed into soln. during the first 4 months of contact, after which the solvent action slowly became appreciable. Unlike the org. media, the saline solns. had almost no solvent action, on the coarse or fine phosphorite. Aq. citric acid had a marked solvent action which was far greater than that of any of the preceding substances, and the quantity of phosphorite dissolved was almost directly proportional to the concn. of citric acid. The soly. of the phosphorite in 2% aq. citric acid was only slightly less than that of Thomas slag under the same conditions.

Injection experiments for controlling insects. W. O. HOLLISTER and H. L. JACOBS. *J. Econ. Entomol.* 21, 198-201(1928).—Aloes, aloin, thymol and acid fuchsin were injected into trees infested with borers. The results were negative.

Experiments in the control of the round-headed apple tree borer (*Saperda candida* Fab.) with calcium cyanide. C. E. PERCH. *Sci. Agr.* 8, 560-6(1928).— $\text{Ca}(\text{CN})_2$ killed *Saperda candida* larvae without injury to trees during 2 seasons. The activity of $\text{Ca}(\text{CN})_2$ begins about the 6th hr. and ceases after 24 hrs. A paste using castor oil proved most efficient against young borers. Shellac was of no value KCN when applied to apple trees at the rate of 0.5 oz. per tree killed the trees. One application of $\text{Ca}(\text{CN})_2$ at the rate of 1 teaspoonful per tree and covered with dirt, destroyed about 90% of the old borers.

The domestic production of tobacco for use in nicotine-containing sprays. A simple method for determining the nicotine content of sprays. R. SCHERPE. *Centr. Bakt. Parasitenk. II Abt.* 71, 93-105(1927).—It is desirable that Germany produce her own tobacco and study the methods of increasing the nicotine content by appropriate fertilizers. Nicotine can be detd. as follows: To 6 cc. of fluid in a beaker, add 0.6 cc. of satd. $\text{Pb}(\text{OAc})_2$ and 0.32 g. powd. Na_2SO_4 . Filter into a graduated cylinder. Wash with 1% Na_2SO_4 . Add 3 cc. of 15% silicotungstic acid. Make the vol. 20 cc. Let stand 24 hrs. Shake down any surface ppt. Read after 2 hrs. more. Multiply the height of the column of sediment in cm. by 0.70 to det. the mg. of nicotine. If less than 2 cm., multiply by 0.83.

The content of As, Cu and nicotine in the products from grape vines treated late

in the season for protection against grape worms (VIALA, MARSAIS) 16. The methods for determining SO_2 in natural waters and soil extracts (ZAPROMETOV) 14. Plant distribution as affected by the H-ion concentration of the soil (GUSTAFSON) 11D.

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SCHUCHT, LUDWIG: **Die Fabrikation des Superphosphates.** 4th ed., revised and enlarged. Mit Berücksichtigung der anderen gebräuchlichen Düngemittel. Braunschweig: Friedr. Vieweg & Sohn. Akt.-Ges. 372 pp. M. 27.50; linen, M. 30.

TRAPPMANN, WALTHER: **Schädlingsbekämpfung, Grundlagen und Methoden im Pflanzenschutz—Bedeutung und Ziele der Schädlingsbekämpfung.** Leipzig: S. Hirzel.

Fertilizer. E. L. PEASE. U. S. 1,668,464, May 1. See Brit. 253,291 (C. A. 21, 2526).

Fungicides. I. G. FARBERMIND. A.-G. Brit. 275,539, Aug. 6, 1926. Fungicides suitable for destroying smut on seed oats contain benzoquinone or other suitable quinone or quinone deriv. or an addn. compd. of a quinone with a phenol, together with a diluent. Comps. of Hg, Cu or As also may be used.

Treating seeds with mercury compounds. SACCHARIN-FABRIK AKT.-GES. VORM. FAHLBERG, I. ST. & CO. AND A. KLAGES. Brit. 274,974, May 1, 1926. In order to protect seeds from fungi and bacteria they are treated with complex Hg salts of aromatic bases such as $p\text{-ClHgC}_6\text{H}_4\text{NH}_2\cdot\text{HCl}$ and $p\text{-ClHgC}_6\text{H}_4\text{NMe}_2\cdot\text{HCl}$. Various solvents and diluents may be used for prepg. solns or powd. mixts.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

The chemism of fermentation in a medium of constant composition. LEFFRONT. *Petit j. brasseur* 34, 1619-29(1926); *Chimie et industrie* 19, 515(1928), cf. C. A. 20, 1885.—Under the ordinary conditions of alc. fermentation yeast has but a low vitality. In a sufficiently dil. (0.2-0.4% sugar) medium of const. compn. yeast does not produce alc., but evolves CO_2 . On keeping the compn. of the medium const. (about 2.5% sugar and 0.16% N) by means of analyses made at hourly intervals, the amt. of yeast produced can reach 75 g. per l. Under these conditions fermentation does not proceed as far as the production of alc., and as tests have shown that yeast cannot assimilate alc., E. considers it is more admissible to consider the aldehyde (which is assimilable by yeast) as the last stage of the transformation, as follows: sugar \rightarrow pyruvic acid \rightarrow CO_2 + aldehyde \rightarrow yeast. According to this hypothesis the whole of the C which is not liberated from the sugar in the form of CO_2 should be found in the yeast: this has been verified exptly. to within 4%. E. explains this loss by supposing that in the early stages of fermentation the evolution of CO_2 is greater than the theoretical evolution due to a total combustion of the sugar at this stage. — A. P.-C.

The importance of hydrogen-ion concentration in brewing. H. T. S. BRITTON. *Ind. Chemist* 4, 150-3(1928).—Emslander in 1913 first used the H electrode in brewing. The p_{H} at which the malting is carried on detcs. the changes in the protein, and eventually the proteins by their buffer action affect the beer. Mashing should be conducted at an optimum p_{H} for the various enzymes to obtain a good yield and good conversion. The optimum p_{H} for polypeptide hydrolysis is 4.4-4.5 at 40°. Peptase has an optimum p_{H} between 3.7 and 4.3, and diastase has an optimum activity at 4.2-5.0. Various authors give values within this range. The break produced by boiling wort with hops is influenced by the p_{H} of the medium; usually a p_{H} of 5 is considered best. Only 6% of the total N of the wort is pptd. by boiling. The control of p_{H} is necessary to promote stability of beer. Treatment of brewing water is facilitated by correcting the p_{H} . — C. N. FREY

Importance in brewing of the ethereal oils from different types of hops. H. LÜERS. *Wochschr. Brau.* 44, 588-90(1927).—Hops vary in the amt. of ethereal ext. yielded by steam distn. At 2 atms. pressure the Kent hops yield a green oil; at normal pressure it is yellow. From Cal. hops the yield is increased under pressure, whereas in Saag and Hallertau it is decreased. The flavors of beers made from various hops

differ in bitterness; that is due possibly to derivs. produced from hop oils by boiling.

C. N. FREY

Material and shape of fermentation vats and storage vessels. H. GEBEL. *Wochschr. Brau.* 44, 109-14(1927).—The type of structure, cost and ease of handling, and cost of repair are considered. Iron, Krupp steel, aluminum, iron with pitch, enamel and ferro-concrete tanks are discussed. No definite conclusions are given regarding any definite type.

C. N. FREY

Fermentation glycerol. TH. KROEBER. *Chem.-Ztg.* 52, 222(1928).—Recent patent developments on production and recovery of glycerol are discussed. In order to make glycerol cheaply and of equal purity to that obtained from fat, a cheap raw material and a high yield are necessary, which have not been achieved at present. Except in war time when fat is scarce, fermentation glycerol is not economical.

C. N. FREY

Industrial absolute alcohol. J. L. GENDRE. *Chimie et industrie* 19, 396-401 (1928), cf. *C. A.* 22, 759.—A brief review of processes actually used commercially.

A. PAPINEAU-COUTURE

Correction of the hardness of brewing water by lactic acid. H. LÜERS. *Wochschr. Brau.* 44, 385-7(1927).—Neutralization of the alk. of brewing H₂O contg. sol. carbonates improved the quality of beer. The acidity produced is favorable to the enzyme action desired, as more maltose is produced as well as more sol. N. The phosphate content is lowered. On boiling the flocculation is improved and a better yield of ext. is obtained. The resulting beer is also more brilliant and has a better flavor.

C. N. FREY

Influence of certain factors on formation of empyreumatic oil by fermentation of molasses. SVETOZAR JANKOVIĆ. *Arhiv. Hemiju Farm.* 1, 218-26(1927).—The yields of empyreumatic oil from the alc. fermentation of molasses increase with temp. and concn. of molasses, and fall with increasing acidity of the culture medium. With dil. solns. the addn. of large quantities of yeast causes increased production of oil, while with concn. solns. the yield of oil is greater when smaller quantities of yeast are used.

B. C. A.

New investigations on the content of arsenic, copper and nicotine in the products from (grape) vines treated late in the season (for protection) against grape worms. P. VIALA AND P. MARSAIS. *Rev. vit.* 68, 233 6(1928); cf. *C. A.* 22, 2024.—As, Cu and nicotine were detd. in samples of musts, lees and wines produced from grapes, the vines of which had been treated with sprays contg. As, Cu and nicotine. Small quantities of As and Cu that appear in the must and raw wines appear to be gradually reduced in concn. by pptn. in the lees. With nicotine, however, appreciable amts. may persist in sol. form in the finished wine.

P. R. DAWSON

The ripeness of barley. W. WINDISCH. *Wochschr. Brau.* 44, 25-9(1927).—If a barley is thoroughly ripe it is most suitable for malting, and beers of 16-18% protein can be prepd. These beers are stable and can be exported. Ripeness depends on the protein being of a high mol. wt.

C. N. FREY

Utilization of beets. E. LÜBER. *Z. Spiritusind.* 51, 7(1928).—The prepn. of beets for fermentation by malting is discussed.

C. N. FREY

The distillation of koumiss by the Mongolian nomads. E. HÜBER. *Z. Spiritusind.* 50, 372-3(1927).—Historical.

C. N. FREY

Phytase of malt. H. LÜERS AND K. SILBREISEN. *Wochschr. Brau.* 44, 263-8, 273-8(1927).—This enzyme hydrolyzes phytin in barley malt. It can be extd. from green malt by means of a weak alc. soln. and then pptd. by means of concd. alc. The optimum temp. for the enzyme is 48° at an optimum p_H 5.2. Inorg. phosphates retard the action of the enzyme. At 0.009 mol. concn. complete inhibition is produced. Inositol does not inhibit the action of the enzyme. Above 50° phytase is destroyed. The reaction of the enzyme is not unimol. The P₂O₅ is apparently removed in stages.

C. N. FREY

Decomposition of starch by the amylase of *Aspergillus oryzae* and of malt with special reference to the limit of decomposition. S. NISHIMURA. *Wochschr. Brau.* 44, 533-5(1927).—A diastase ext. from *Aspergillus oryzae* or from malt when added to starch will hydrolyze 95% of it if the amt. of enzyme added is large. When these conditions prevail the normal limit of decompn., 70-80%, is exceeded, regardless of the action of the complement.

C. N. FREY

Errors in malt analysis due to the want of standardization of the degree of fineness of the malt meal. E. F. ROTHENBACH. *Wochschr. Brau.* 44, 601(1927).—The yield of malt exts. obtained may vary by reason of variation in the fineness of grinding of malt. The screens of the mill may also introduce errors.

C. N. FREY

Characteristics of cider. W. H. BUFTON. *J. Inst. Brewing* 33, 450-8(1927); *Analyst* 52, 649.—The three main groups of vintage cider apples are (1) sweet, (2) bitter-sweet and (3) sour; (1) and (2) contain more sugar and give a juice of higher sp. gr. than (3), while (1) and (3) contain about the same av. amts. of tannin, and (2) a greater proportion. (1) and (2) have less malic acid (0.2-0.3%) than (3) (0.6-0.8%). It is not practicable to inoculate fresh apple juice, natural yeasts almost invariably becoming dominant over even heavy addns. of pure yeasts. Washing of the fruit helps to keep down acetic fermentation, and the *apiculatus* type of yeast appears to be more readily washed off than *S. cerevisiae*. The freshly expressed apple juice has a sp. gr. of 1.044 to 1.056, occasionally even 1.060. The sugars consist of cane sugar (0.25 of the total sugar), dextrose (not over 0.2 of total sugar) and levulose (seldom less than 60%, rising to 90% of the total), the total sugar in apple juice being generally between 10 and 14%. The tannin of apple juice (0.5-0.3% for sweet and sour, and up to 0.3-0.6% for bitter-sweet fruit) differs from gallotannin, and appears to be more closely allied to that of catechu and coffee, giving a reddish brown color with caustic alkalis and pptg. vegetable albumins and gelatin. Clean sound apples only contain an av. of 0.01% of N (Warcollier, *Cidricrie et Pomologie*), and only half is assimilable by yeasts. Fermentation starts about 3-4 days after pressing, and in 14 days the sp. gr. will have fallen to 1.025-1.030, when a first filtration is made to retard the process. The total acetic acid in cider should not exceed 0.075%, and with the best ciders should be between 0.03 and 0.05%. Less than 0.2% of malic acid renders the cider liable to sickness, especially if the sp. gr. is high, and impairs flavor, but if over 0.5 or 0.6% is present long storage will be necessary to prevent a harsh flavor. Total sulfurous acid must not exceed 200 parts per million (*Preservatives in Food Regulations*), and the use of sulfured casks should be avoided, as the sulfurous acid content of the cider may thereby be doubled. H. G.

Sulfuric acid in vinegar. C. LUCKOW. *Deut. Essigind.* 32, 125-6(1928).—Attention is called to the possibility of mistaken identification of H_2SO_4 in vinegar if based on the behavior of $BaCl_2$ as the reagent. Rather should a color test be applied for the presence of free mineral acid, by diln. of the sample to an acid strength of 2%, with addn. thereto of 2 drops of a 0.1% methylviolet soln. In the presence of free mineral acid the color of the liquid becomes blue to green, depending on the amt. of such contamination. This test is to be compared with a control made of a pure sample of vinegar, both being held against a white background. W. O. E.

Examination of brandies. ROBERT COHN. *Pharm. Zentralhalle* 69, 241-6, 261-5(1928).—The methods commonly used in the evaluation of brandies are discussed, as also the foundation for a more uniform procedure. W. O. E.

Rapid approximate determination of volatile acidity in wine. P. BALAVOINE. *Mitt. Lebensm. Hyg.* 19, 66-7(1928). (In French.) Cf. C. A. 21, 623.—Distil 100 cc. wine + 30 cc. H_2O to 75 cc. and titrate 50 cc. of the distillate with 0.1 N NaOH. Volatile acidity (in g. per l.) = 0.24 (cc. NaOH) + 0.2. The results agree within 0.1 g. per l. with those of the Swiss official method. A. PAPINEAU-COUTURE

Detection of fruit wine and grape wine by the Röntgen method. H. WÜSTENFELD. *Deutsche Essigind.* 32, 133-5(1928).—The method depends on the formation of varying color tones according to the resp. content of fruit and grape wines, when the neutralized sample is treated with $Cu(OAc)_2$ soln. The procedure can be made quant. through recourse to an Ostwald colorimeter. The results obtained in the examn. of a series of Ger. and foreign wines are recorded. W. O. E.

The sweetening of beer. W. BELGEONNE. *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 146-56(1928).—Belgian brewers add sucrose or invert sugar at the end of the primary fermentation to improve the mellowness, foaming quality and stability of the beer. A study of the effects of various factors on the rate and degree of fermentation of these sugars showed that they increase with the protein content of the beer at the end of the primary fermentation; filtering after primary fermentation retards the starting up and rate of the secondary fermentation, but increases the ultimate degree of fermentation; reducing the d. of the wort decreases both the N and buffer contents, both of which reduce the degree of secondary fermentation; the degree of fermentation increases with the p_H value of the wort, and decreases with increase in the sugar concn. above 10%; raw grain contains proportionately less N than malt and its addn. (above 10%) reduces the degree of fermentation; increasing the temp. (from 62-4° to 68-70°) activates fermentation slightly. A. PAPINEAU-COUTURE

The effect of p_H value on the clarification of beers. P. VAN CAUWENBERGE. *Petit j. brasseur* 34, 1516-7(1926); *Chimie et industrie* 19, 415(1928).—Clarification depends essentially on the p_H value of the initial wort. In the lab. the p_H of any wort

can be adjusted to give proper clarification; but C. doubts whether this can be done in the brewery.

Turbidity (of beer) due to amorphous nitrogenous compounds. E. BEKAERT. *Petit j. brasseur* 34, 1542-4(1926); *Chimie et industrie* 19, 415(1928).—A brief outline of the various causes of this trouble.

Absorption of odors by beer. A. J. MURPHY AND F. A. MASON. *Bull. Bur. Bio-Tech.* 2, 165-71(1927).—Beers can acquire a flavor by the mere absorption of odor without actual contact with the odoriferous material and without biol. infection. When a small bulk of wort is fermented and racked in an atm. permeated by each odor under consideration, no odor or flavor is communicated to the beer by P, CS₂, H₂S, mineral naphtha and SO₂. On the contrary, free Cl, gas tar, coal-tar disinfectant and mold communicate their characteristic odors and flavors to the beer, while the flavor derived from exposure to turpentine is of a decidedly fruity nature. A metallic-looking film appears upon the surface of the beers in contact with Cl, while those fermented in the presence of H₂S, mineral naphtha and gas tar are inclined to be lazy. B. C. A.

Washing top fermentation yeasts. G. LEFRANCO. *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 136-45(1928).—The tests were carried out on factory scale, by comparing the yields of yeast from 60 hl. fermentations carried out with variously treated yeasts and with untreated yeasts. Washing with pure water had practically neither beneficial nor detrimental effect. Washing with 0.2% tartaric acid soln. had a slight beneficial effect only on yeast which had been working sufficiently long to show signs of exhaustion. Washing with 0.2% phosphoric acid gave somewhat better results than with tartaric acid. Direct addn. of phosphoric acid to the yeast (about 2.5 g. per kg.) increased the amt. of yeast which rose to the surface, provided the addn. was not too frequent, but somewhat reduced the degree of primary fermentation.

A. PAPINEAU-COUTURE

Loss of nutrients in the mechanical removal of water from potatoes (PAROW, *et al.*)

12. Cereals and the agricultural-chemical industries which depend upon them (SCURTT)
12. Synthetic pen manure. Use of distillery sludge (HINCHY) 15.

"Butyl-acetonic" fermentation. D. A. LEEG. U. S. 1,668,814, May 8. An immunized culture of "butyl-acetone bacilli" is produced by repeatedly subcultivating the bacilli in carbohydrate media in the presence of some "sluggishly-fermenting" carbohydrate mash and subjecting the cultures to "heat shock" at each transfer to eliminate attenuated vegetative cells. Cf. C. A. 20, 2045.

Glycerol from vinasse liquors. SOC. DES ETABLISSEMENTS BARBET. Brit. 274,519, July 19, 1926. Petroleum oil, C₆H₆, toluene or the like is added to concd. vinasse liquor and the mixt. is superheated under pressure of 6-8 kg. and the pressure is then released so that evapn. is effected and part of the glycerol is carried over with the hydrocarbon oil. The product seps. into a portion contg. vesicular particles which is returned for retreatment and another portion which is rectified, purified with charcoal, filtered and concd. *in vacuo*. An app. is described.

Wine mixture. M. JORDT (NÉF FREISE). Brit. 274,707, Dec. 11, 1926. A "wine tincture" is formed of raw sugar 3 kg., water 0.67 l., alc. 0.25 l., Maraschino a wineglassfull, cognac 1/2 bottle and ether oils 50 drops; this is mixed with 15 times the quantity of wine and may be bottled, pasteurized and "aerated" in the bottle by a device which is described.

Pasteurizing beer. HANSENA AKT.-GES. and I. NATHAN. Brit. 275,090, April 26, 1926. After heating to 25-30° to drive off CO₂, beer is further heated to 65-75°, cooled to -1°, carbonated, bottled and then again pasteurized at a temp. about 1° below that used for the first pasteurization.

Yeast. DISTILLERS CO., LTD., and E. A. MEYER. Brit. 275,328, May 4, 1926. In yeast propagating processes involving the continuous or periodic addn. of yeast foods to the propagating medium, periodic changes are made in the nature of the yeast foods added; e. g., strong molasses wort may be added to 40 hrs. and grain wort for 6-12 hrs. The use of skim milk or other material to regulate the vitamin content is also mentioned. Brit. 275,329 specifies fully or partially sterilizing the yeast propagating medium before use, by the addn. of a halogen, preferably Cl or I, or of a hypochlorite and an acid.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

The ethereal oil of *Gastrochilus panduratum* Ridl. A. J. ULTÉN. *Verslag. akad. Wetenschappen Amsterdam* **36**, 1262-4(1927).—The root stock of this plant, belonging to the family Zingiberaceae, yields a dextrorotatory yellow oil, d. 0.8636 to 0.8731, b. 200° and higher. Me cinnamate and cineole have been found. Exposure to air gives it the appearance of oxidized terpenes.

M. ACHTERHOF

Rapid test for *Atractylis gummifera* (Masticogna) extract in the juice of the licorice. PIETRO CONDORELLI. *Atti II congresso naz. chim. pura applicata* **1926**, 1353-5.—In Sicily *Atractylis gummifera* ext. is a frequent adulterant of licorice juice, and methods have already been proposed for its detection (cf. Giuffrè, *C. A.* **17**, 179; Bertolo, *C. A.* **17**, 3747). A new method suitable for those with little experience in analysis is described. Add 50 cc. of boiling water contg. a few drops of NH_4OH to 5 g. of licorice ext., cool to 20°, acidify with dil. HCl, let stand, filter and wash. A small portion of the residue, when warmed gently with 2-3 drops of concd. H_2SO_4 emits the odor of valeric acid, according to the reaction of Angelico (cf. *Gazz. chim. ital.* **36**, ii, 636(1906); *C. A.* **5**, 1317). If H_2SO_4 is completely washed out of the residue, the latter may then be oxidized by the method of Bertolo (*loc. cit.*), and the SO_3H group identified.

C. C. DAVIS

The de Myttenaere index for the chemical determination of the toxicity of arsenobenzenes. A. CONTARDI AND U. CAZZANI. *Atti II congresso naz. chim. pura applicata* **1926**, 1384-95.—See *C. A.* **21**, 475.

C. C. DAVIS

Colloidal silver preparations. I. M. KOLTHOFF. *Pharm. Weekblad* **65**, 362-5 (1928).—The test for ionic Ag in colloidal Ag prepns. by pptn. of the colloid with MgSO_4 or alum and then testing the filtrate with HCl is not always conclusive. Often the colloid is incompletely pptd. and the filtrate then gives a negative AgCl test. In general, the smaller the mol. wt. of the protective colloid the more difficult is its removal by pptn. with a salt. The pptn. method cannot supersede the dialysis test. Ultrafiltration is suggested as a promising aid to pharmaceutical research.

A. W. DOX

Essential oil from the timber of rosewood (*Dysoxylon fraseranum*). A. R. PENFOLD. *J. Proc. Royal Soc. N. S. Wales* **61**, 337-46(1927).—Several dists. of the shavings yielded oils varying in color from a pale azure blue to a very intense dark blue, the latter being similar to that of cupric ammonium sulfate. The oils were viscous, and possessed a bacon-like odor, being obtained in a yield of from 1.3 to 2.7% on timber contg. 41 to 46% moisture, equal to 1.6 to 3.42% on air-dried timber contg. 12% moisture. The main constituents identified were mixts. of sesquiterpenes, possibly two, which are apparently hydroazulenes, as on dehydrogenation with S the intensely blue hydrocarbon, azulene, is obtained, a 3rd sesquiterpene yielding an inactive dihydrochloride m. 108-9°, for which the name *dysoxylonene* is suggested. Cadinene was found to be one of the principal sesquiterpenes in the 1st 2 distns. It is not unlikely that copaene is present as well. A sesquiterpene alc. was also detected, but as it would not combine with phthalic anhydride it could not be isolated on account of the large quantity of sesquiterpenes present. The naming of the principal sesquiterpenes is deferred on account of the investigations of Ruzicka at present in progress.

W. O. E.

Determination of acetylizable constituents and of phenols. JOHN ALLAN, *et al.* *Perfumery Essent. Oil Record* **19**, 131-2(1928).—Because of serious differences in the results heretofore obtained by different workers in detg. acetylizable constituents, the following method is suggested as obviating the difficulties previously encountered. To 10 cc. of the oil in a long-necked round-bottomed 200-cc. Kjeldahl flask add 20 cc. of Ac_2O (95 to 100%), 2 g. of freshly fused anhydrous NaOAc and a fragment of broken glass, then boil the mixt. under an air reflux condenser for 2 hrs., supporting the flask on a sheet of asbestos in which has been cut a hole about 1.5 in. in diam. and heating by a small naked flame placed about 1 in. below and not impinging on the bottom of flask. Remove the flame after 2 hrs. and allow to cool. Add 50 cc. of H_2O and heat on a boiling water bath for 15 min with frequent and thorough shaking. After cooling transfer the liquid to a separatory funnel, and reject the lower aq. layer. Wash the acetylated oil successively with (1) 50 cc. of satd. aq. NaCl soln., (2) 50 cc. of brine contg. 1 g. Na_2CO_3 , (3) 50 cc. of brine, (4) 20 cc. of H_2O . Mixts. 1, 2 and 3 should be shaken vigorously, but the final washing with H_2O must be effected gently. The aq. layer from the 2nd washing should be alk. to phenolphthalein (alc. phenolphthalein

must not be added to the mixt. in the separator). On completing the washing remove the aq. layer as completely as possible, pour out the oil and mix with about 3 g. powd. anhydrous Na_2SO_4 , stir 15 min. or until one drop of the oil produces no cloudiness when added to 10 drops of CS_2 in a dry test tube, then pass through a dry filter. For purposes of hydrolysis, weigh out 2 g. of the oil thus dried into a hard-glass flask, add 2 cc. distd. H_2O , then titrate the free acidity with 0.1 *N* aq. KOH, using 1 cc. of 1% soln. of phenolphthalein in 60% alc. as indicator. Add 40 cc. 0.5 *N* alc. KOH and boil under a reflux on a water bath for 1 hr. Cool rapidly, add 20 cc. of H_2O , and titrate the excess of alkali with 0.5 *N* H_2SO_4 . Make a blank detn. of the alc. KOH simultaneously and under like conditions. With regard to the detn. of phenols in essential oils, as shown in expts. with ajowan, bay, cinnamon-leaf, clove, origanum, pimento and thyme, the sample should be shaken with cold aq. KOH soln. and the amt. of unabsorbed oil measured. Uniform results are possible only when standard conditions are maintained. Into a flask (previously cleaned with concd. H_2SO_4 and well rinsed with distd. H_2O) consisting of a 150-cc. bulb and a long neck, of which 10 cc. is graduated in tenths of a cc., the length of the graduated portion being not less than 15 cc., introduce 80 cc. of 5% aq. KOH soln. and 10 cc. of the clear oil, shake thoroughly at 5-min. intervals during 30 min. at room temp. Gradually elevate the unabsorbed portion of the oil into the neck of flask by addn. of more KOH soln., rotating and tapping the flask the while. Let stand not less than 24 hrs. and read off the vol. of unabsorbed oil, taking the lower meniscus in each case. Multiply by 10 the portion absorbed to obtain the % by vol. of the phenolic content. The results obtained in a series of runs indicate that KOH is better than NaOH, that a 5% soln. is the most suitable strength for general purposes, and that for the oils enumerated cold treatment is preferable.

W. O. E.

Determination of total geraniol content in citronella oil. A. RECLAIRE AND D. B. SPOELSTRA. *Perfumery Essent. Oil Record* 19, 143 (1928); cf. C. A. 21, 2167.—In calcg. the analytical results, absolutely correct values are obtained by the following formula: $x = n \cdot 154.14 / (50q - 0.15n)$, in which n represents the no. of cc. of 0.2 *N* H_2SO_4 required to neutralize the NH_3 , q the weighed quantity in g. of oxidized oil, and x the citronellal content.

W. O. E.

Eucalyptus oil—should phellandrene be excluded? HORACE FINNEMORE. *Perfumery Essent. Oil Record* 19, 144 (1928).—While pharmacopeial tests should be made as definite as possible, the question arises whether the retention of the phellandrene test in the Pharm. is justified. A discussion of the subject developed the view that there now appears no good reason for including a precise test for the presence of phellandrene in eucalyptus oil of the B. P.

W. O. E.

Purified oil of cassia. HORACE FINNEMORE. *Perfumery Essent. Oil Record* 19, 144–5 (1928).—Expts. are described in repeating the recent work of Dodge on the removal of certain phenolic constituents from cassia oil, and in ascertaining in what way the flavor of com. samples was modified by following his process. Treatment 1st by distn. under reduced pressure to remove resin, followed by extr. with 0.5% NaOH soln. (removal of salicylaldehyde and cinnamic acid), and final fractionation yielded a principal product practically devoid of the curiously unpleasant odor of the 1st fractions. It is suggested that this main fraction be recognized as "purified cassia oil."

W. O. E.

Experimental basis and practical application of adsorption therapy. E. HERRMANN. *Pharm. Zentralhalle* 69, 225–8 (1928).—A discussion leading to the conclusion that the exptl. studies of Bechhold and his co-workers, as also clinical practice, show the superiority of metallized adsorbents like adsorgan and silargel over the materials heretofore commonly used.

W. O. E.

Simple method for estimating silver. GREGOR KOGAN. *Pharm. Zentralhalle* 69, 228–9 (1928).—In the evaluation of Ag preps. like collargol, protargol and albagin the following method is suggested: To a weighed portion of the sample in a titration flask add 15 cc. HNO_3 (d. 1.2), place in a boiling water bath and dil. with 30 to 40 cc. of H_2O . Now add a few drops of KMnO_4 soln., sufficient to maintain a red color after the lapse of 1 min. On further standing the color should disappear or if persistent may be discharged by a particle of FeSO_4 . The addn. of KMnO_4 is done to convert the N oxides to HNO_3 . Titrate with standard NH_4CNS . The results obtained in the examn. of some 10 different Ag preps. are recorded.

W. O. E.

Modern sulfur preparations. L. SIDIKMANN. *Pharm. Zentralhalle* 69, 229–31 (1928).—A discussion of the action of pptd. and colloidal S on the animal organism.

W. O. E.

Estimation of the potassium iodide content in tincture of iodine. P. MANICK

AND W. PÖRTHEKE. *Pharm. Zentralhalle* 69, 259-61(1928).—An exptl. study of the official Ger. prepn. based on the procedure of Dietz and Margosches. W. O. E.

• Suggestions for an international pharmacopeia. ANON. *Apoth. Ztg.* 43, 491-3 (1928). W. O. E.

Valerian root and its sucrose-yielding capacity. HERMANN KUNZ-KRAUSE. *Apoth. Ztg.* 43, 484-5(1928).—A discussion of the pharmacopeial requirements for the drug, together with further expts. leading to the isolation of large sucrose crystals from an ext. of the root. W. O. E.

Detection of colocynthin in colocynth extract. LUDWIG DAVID. *Pharm. Ztg.* 73, 525-6(1928).—An exptl. study of the color reactions involved in detecting colocynthin according to the methods of Kremels, Keller and Johannson. W. O. E.

Sanchinin. AUFRICHT. *Pharm. Ztg.* 73, 527(1928).—This prepn. consisting of a combination of quinine and gall acids designed for the treatment of malaria; it is sol. in artificial gastric juice to the extent of 18.70, in trypsin soln. 90.42%, and possesses pronounced antiseptic properties, in that the growth of *Streptococcus pyogenes* was checked in 5 and the organisms were killed in 8 min. Growth of colibacillus was checked in 3 and the organisms were killed in 5 min. W. O. E.

A rapid and accurate means of estimating nicotine in tobacco and tobacco extracts. R. R. L. WORSLEY. *Egypt Min. Agr., Tech. and Sci. Service Bull.* 73, 5 pp.(1927); *Expt. Sta. Record* 57, 410 —For the accurate detn. of nicotine in warm climates ether is too volatile. Petroleum ether of a b.-p. range of from 50° to 60° or higher gave accurate results. Any NH_3 present was best removed by drawing a stream of air through the solvent prior to titration. The fixation of the NH_3 by means of gypsum was found useless except with very small quantities of NH_3 . The following method is given: Pipet carefully 100 cc. of nicotine sulfate soln. into a 400-cc. bottle having a well-fitting stopper, add 20 to 25 cc. of 20% NaOH , and further add exactly 100 cc. of petroleum ether. Shake the mixt. well for from 10 to 15 min. and allow it to settle for 10 min., after which decant off 40 cc. and pour into 50 cc. of distd. water. Do not filter the ext., as this is unnecessary and causes loss of solvent by evapn. Add an excess (about 5 cc.) of exactly 0.1 N H_2SO_4 , shake the mixt. gently for a min. and titrate back with exactly 0.01 N NaOH . Should the end point be passed, add 5 cc. of exactly 0.01 N H_2SO_4 and continue the titration. This frequently gives better end point, as the solvent tends to retain a little of the nicotine. H. G.

Novonal as an hypnotic and sedative. E. LEVINGER. *Deut. med. Wochschr.* 54, 271-2(1928). ARTHUR GROLLMAN

Chlorothymol as a disinfectant. K. LAUBENHEIMER. *Deut. med. Wochschr.* 54, 481-2(1928).—A description of the antiseptic action of *lavasan*, a com. prepn. of chlorothymol. ARTHUR GROLLMAN

Biological assay of drugs. W. A. PEARSON. *J. Am. Inst. Homeopathy* 21, 366-9 (1928).—A comprehensive review of the methods employed. JOSEPH S. HEPBURN

Narcotics and drug addiction. F. W. HERMES. *Dental Cosmos* 70, 531-6(1928).—A description of the various narcotics, their occurrence, symptomatology and chemistry. JOSEPH S. HEPBURN

Medical profession's fight against commercialized therapeutics. A. J. CRAMP. *Dental Cosmos* 70, 537-43(1928).—An account of the work of the Council on Pharmacy and Chemistry of the American Medical Association. JOSEPH S. HEPBURN

Anise-scented oil of bay. F. H. S. WARNEFORD. *Trop.-Agr. (Trinidad)* 4, 128 (1927).—Its sp. gr. is 0.958. Like ordinary bay oil it contains myrcene, chavicol and eugenol, but differs from it in having a high content of estragol (15%), to which the odor of anise is due, and methyleugenol (13%). It contains approx. 25% phenols and 40% tar. A. L. MEHRING

Constants of oil of bergamot from the 1919 to 1926 harvests. ANON. *Boll. uff. r. s. sper. ind. essence* 2, No. 3, 1-5(March, 1927); *Chimie et industrie* 19, 477(1928).—The generally admitted consts. are d_{15} 0.8810-0.8860; α 18-24°; esters (as linalyl acetate) 34-45%; non-volatile residue 4.5-6.0%; sol. in 2 vols. 80% alc. (with turbidity) and in 0.2-0.5 vol. 90% alc. Numerous analyses of samples of known purity gave consts. falling within the following limits: d_{15} 0.8800-0.8870 (exceptionally 0.8890); α 4-28° (exceptionally 30°); esters (as linalyl acetate) 30-45 (exceptionally 48-9%); non-volatile residue 4-6%; sol. in from 1 vol. 82.5% alc. to 0.5 vol. 90% alc.

A. PAPINEAU-COUTURE

Cinchona bark from Uganda. ANON. *Bull. Imp. Inst.* 26, 17-22(1927); cf. *C. A.* 14, 3751.—Bark of *C. succirubra* which was 5 yrs. old and raised in Uganda from seed obtained from the Govt. cinchona plantation, Munson, Kalimpong, Bengal, contained on the dry basis (H_2O 9.4%): total alkaloids 7.56 and quinine 4.11 (equiv. to cryst.

quinine sulfate 5.57%). This is closer to the usual alkaloidal and quinine contents of *C. calisaya* than of *C. succirubra*. Bark of *C. robusta* (?) which was 6 yrs. old and raised at the Bukalasa plantation from seed obtained from the Amani Institute contained on the dry basis (H_2O 10.3%): total alkaloids 7.75 and quinine 3.05 (equiv. to cryst. quinine sulfate 4.15%), which is close to the results previously obtained with bark from the Amani Institute and of the same order as the usual contents found in *C. calisaya*.

A. PAPINEAU-COUTURE

The determination of citronellal. LABORATOIRE "DAUPHIN." *Parfums de France* 6, 77-80(1928). (In French and English.) Cf. Holtappel, *C. A.* 22, 1214.—The original Dauphin method is as follows. weigh 2 g. oil in a 100-cc. flask, add 20 cc. of 5% alc. NH_4OH . HCl previously neutralized to helianthin, immediately titrate the liberated HCl with 0.2 *N* KOH in presence of helianthin. Holtappel's modifications consist essentially in cooling the soln. with ice, use of excess alkali with back titration after 15 min., and use of bromothymol blue instead of helianthin. Investigation of the effects of temp. showed negligible variations (max. 0.5%) from 0° to 35°. Investigation of the causes of the irregularities in results obtained by Holtappel brought out the following facts: (1) citronellal is cyclized by strong acids into isopulegol and its derivs., there being formed chiefly *hydroxy-3-ethoxy-8-p-menthane* in alc. soln., while in hydro-alc. soln. there is formed a mixt. of this compd. with *3,8-p-menthenediol*; (2) neither of these compds. combines with NH_4OH . HCl, and their formation leads to low results; (3) in strongly alc. soln. these reactions are of secondary importance, there being formed *citronellal ethylacetal*, which protects the aliphatic mol. against cyclization; (4) contrary to generally accepted data, this reaction is almost instantaneous, even at -15°; (5) slight acidity catalyzes oximation before cyclization can take place to any appreciable extent. It is concluded that: (1) helianthin should be used as indicator, as the turning point of bromothymol blue is at such a low p_H value of the soln. that appreciable cyclization can occur, while a light red color with helianthin indicates optimum conditions for oximation and absence of cyclization; (2) the alc. KOH should be added sufficiently quickly to avoid production for any appreciable time of the distinct red characteristic of relatively high acidity, and sufficiently slowly to prevent high alkyl. which might slow the reaction and even prevent it from going to completion through formation of the fairly stable acetal. The fact that Holtappel obtained lower results by oximation in alk. soln. than by oximation at low temp. in acid soln. is attributed to the fact that, because of the use of bromothymol blue instead of helianthin, the true effects of acidity could not be detected. The original Dauphin method is more simple and rapid than Holtappel's modification and is as accurate as the latter. The method is being applied in the Dauphin Laboratories to the detn. of ketones in all essential oils (the detn. of citronellal being the most delicate); and where the speed of the reaction is relatively low, by plotting curves the presence of several ketones in the same oil can frequently be brought out very clearly. The method is particularly suitable for detn. of menthone in oil of mint, instead of the usual method of reducing with Na, washing, acetylating and sapon.

A. P.-C.

The supposed influence of polarized light on the deterioration of digitalis. W. R. BOND AND E. W. GRAY. *J. Pharmacol.* 32, 351-8(1928).—Samples of tincture of digitalis were exposed to polarized light for periods of 6 hrs. to 5 yrs. Averages of several expts. showed a somewhat higher toxicity (lower MLD) than tincture of digitalis not so exposed, the difference, however, being within the limits of error of the method of detn. of MLD (cat assay).

C. RIEGEL

The preparation of colloidal lead. S. W. PENNYQUICK AND A. E. SCOTT. *Australian J. Exptl. Biol. Med. Sci.* 5, 95-9(1928); cf. Bell, *C. A.* 20, 2202.—Full details are given for the prepn. of colloidal Pb for use in the treatment of cancer. Very pure samples, prepd. in the presence of N, were less effective in producing the results described by Bell, than those prepd. by the ordinary exposed method. It is concluded that the presence of a certain percentage of the hydroxide in the Pb sol is important. It is claimed that colloidal Pb, prepd. as outlined and bottled out of contact with air, remains stable for several weeks. Such aged samples should be reentrified and re-bottled before use. The results obtained with this prepn. are so far indefinite.

L. W. RIGGS

Reaction of adrenaline with novocaine. HEDWIG LANGECKER. *Arch. exptl. Path. Pharmacol.* 129, 202-35(1928).—When adrenaline-novocaine solns. are allowed to stand, a loss in the adrenaline activity takes place. In the cold the change is gradual; at higher temps. it occurs quickly, and it proceeds in two stages. The initial step, comparable to that taking place in the spontaneous decompn. of adrenaline, is favored by the influence of novocaine in stimulating oxidation of the adrenaline. In the second

phase of the reaction the rose color developed in the first is altered to a yellow shade, and this requires a considerable excess of novocaine. This reaction is but an example of a general reaction between aromatic amines and *o*- and *p*-dihydroxybenzenes.

G. H. S.

The production of medicinal plants in Japan. III. Hibiscus manihot, L. T. KARIYONE. *J. Pharm. Soc. Japan* **48**, 152-4 (1928).—The distribution, the production and the cultivation of the plant are briefly described.

NAO UYER

Tonkin star anise oil. PHILIPPE EBERHARDT. *Bull. agence gén. des colonies*, March, 1927, No. 222; *Chemist and Druggist* **107**, 337 (1927).—The cultivation of the plant and the prepn and properties of the oil are described. A com. and inferior "anise flower oil" is derived not from the flowers, but from the immature fruits of the plant, which are removed to promote the ripening of selected fruits.

S. WALDBOTT

Note on licorice. C. E. SAGE. *Chemist and Druggist* **107**, 340-1 (1927).—Analyses of 21 com. samples of *black licorice* showed loss on drying at 100° 9.4-17.5%, sol. in cold H₂O 56.5-81.4%, insol. in cold H₂O 7.1-28.0%, ash 4.6-12.1%, glycyrrhizin 6.0-14.4%, insol. in 90% cold EtOH 20.0-53.8%, total sugar before inversion 4.5-32%, after inversion 8.4-45.4%. Analyses of 15 com. samples of *stick licorice* gave loss on drying at 100° 7.0-15.5%, sol. in cold H₂O 58.0-80.4%, insol. in cold H₂O 8.6-31.0%, ash 3.9-7.7%, glycyrrhizin 6.6-14.6%. Licorice differs much according to its source and method of manuf.; glycyrrhizin detcs. its flavor; a high % of sugar might indicate sophistication.

S. WALDBOTT

Samuel Walter Woolley, Editor of Chemist and Druggist, 1917-27.—EDITORIAL. *Chemist and Druggist* **107**, 707-9, HERBERT SKINNER. *Ibid* 709 (1927).—Obituary, with portrait and tributes of appreciation. Also see *Pharm. J.* **119**, 633 (1927).

S. WALDBOTT

The weighing of standard pituitary powders. J. H. GADDUM. *Pharm. J.* **119**, 580 (1927).—Standard pituitary powders, required to be kept *in vacuo* over P₂O₅, are very hygroscopic; within 3 min. of exposure to air at 19.7° and 73% relative humidity, the powder gained 10% in wt. To minimize this source of error in weighing, rapidly transfer about 10 mg. of the powder into a weighing tube previously tared together with the stopper. Quickly insert the latter, then reweigh at leisure.

S. W.

Notes on some pharmaceutical preparations. J. H. FRANKLIN. *Pharm. J.* **119**, 581-2; JAMES GRIER. *Ibid* 635 (1927).—The prepn. *compd. confectio of guaiacum* of the Brit. Pharm. Codex is not firm enough to hold the powders in suspension; they settle to form a dense mass, making the prepn. appear defective. *Compd. phenacetin tablets*, Brit. Pharm. Codex, being granulated with gum acacia, disintegrate in H₂O only after hrs., hence fail when needed quickly, as in nervous troubles. A green coloration noted in a mixt. of NaHCO₃, *o*-C₆H₄(OH)CO₂Na, tincture of nux vomica, concd. infusion of senega and H₂O, is caused by an *oxidase* contained in the *senega*, acting on the alk. salicylate. When the senega infusion is boiled, or when a little CHCl₃ is added, the formation of the green color is much retarded. The color is prevented by adding to the prepn. a trace of Na₂S₂O₃ (0.5 grain/0.5 pint). *The darkening of phosphoric sirups* is claimed by F. to be caused by caramelization of sugar by H₃PO₄. G. found in a freshly opened bottle contg. Brit. Pharm. H₃PO₄ sufficient Fe to account for the formation of a highly colored Fe saccharophosphate noted by Timmis and Evers (*C. A.* **21**, 156).

S. WALDBOTT

Barium sulfate. HENRY BODSWORTH. *Pharm. J.* **119**, 639-40 (1927).—The mode of the use of BaSO₄ in diagnostic x-ray work is described, and its action compared with that of bismuth carbonate. Particular stress is laid on the necessity of purity of the BaSO₄ to be used. A scheme of systematic examn. of BaSO₄ is presented, including tests for sulfides, sol. Ba salts, salts of Ag, Hg, other heavy metals, limit test for As (Brit. Pharm.), a special control test for Pb (with Na₂S), tests for phosphates, chlorides, etc., free acid and alkali. At the London Hospital where 644 lbs. BaSO₄ were used in 1 year, the BaSO₄ contained < 3 p. m. of As and Pb, and a trace of Na₂SO₄. Rarely, a trace of free H₂SO₄ was found, but never any other impurity.

S. WALDBOTT

Notes on some Brit. Pharm. Codex preparations. W. A. KNIGHT. *Pharm. J.* **119**, 641 (1927).—As *liquor quinae et strychninae* rapidly develops fungus growths and crystallizes in cold weather, K. suggests replacing it by a sirup of quinine and strychnine, made by dilig. the liquor with sirup (1.5 in 7 vols.). By mixing 7 parts of this sirup with 1 part of liquor ferri phosphatis, *Easton's sirup*, Brit. Pharm. Codex is obtained. The use of liquid ext. of squill in prepg. oxymel, sirup and vinegar of squill, Brit. Pharm., as recommended in the Codex, leads to a product contg. AcOEt and differing in AcOH content. An *AcOH ext. of squill* should be used for this purpose.

The "0.1% strength" of *aqua amygdalae amarae*, *Pharm. Ind.* given in the Codex, refers to HCN, not to BzH. *Emulsio chloroformi* is "a cheap substitute for spiritus chloroformi at the expense of accuracy," since the frothy liquid cannot be measured reliably. In the prepn. of *compd. sirup of hypophosphites*, which darkens in incompletely filled bottles, K. preps. a stock soln. $5 \times$ the strength of the sirup, storing it in 4-ounce bottles kept filled. For a simpler method of prep. *mistura magnesi hydroxidi*, mix 5 drachms of freshly calcined light MgO with 12 ounces of boiled then cooled H₂O; a thick cream results upon shaking the mixt. when it begins to jelly. To facilitate rapid disintegration of tablets contg. *phenacetin* or *acetylsalicylic acid*, compress with 15% of dried neutral potato starch.

S. WALDBOTT

Liquid extract of ipecacuanha, *Brit. Pharm. J. H. FRANKLIN. Pharm. J. 119*, 662; H. D. RICHMOND. *Ibid* 685(1927).—A recent com. sample contained only 64% EtOH instead of 78% which is contained in the official prepn. R. records similar cases.

S. WALDBOTT

Dried sulfate of iron. A. C. ABRAHAM. *Pharm. J. 119*, 666(1927), cf. Liverseege, *C. A. 21*, 1521.—For dried ferrous sulfate the *Brit. Pharm.* 1885 and 1898 adopted the standard FeSO₄·H₂O, which A. had recommended. In *Brit. Pharm.* 1914, the standard was changed to "77% Fe" (equiv. to FeSO₄ 2.5H₂O). A. deprecates this change, as the old standard gives a well-defined end product and is easily obtained, e. g., by drying FeSO₄·7H₂O in thin layers on a flat enameled dish over steam pipes. The new standard is not easily prepd., probably not stable, and for the prepn. of Bland's pills (cf. following abstr.) involves a special detn. of the H₂O content.

S. W.

Bland's pills. A. C. ABRAHAM AND J. RAE. *Pharm. J. 119*, 666-7(1927); cf. Liverseege, *C. A. 21*, 1521, and preceding abstr.—Genuine Bland's pills were prepd., according to an authoritative formula (cf. Humphreys, *Pharm. J. 70*, 643(1903)). FeSO₄·H₂O 60, K₂CO₃ 60; powd. gum arabic 10; distd. H₂O 60; sirup 30. Analyses of freshly made pills and of others, resp. 3 and 30 years old, showed their extreme stability. Total Fe, resp. 14.61, 14.64, 15.11%; Fe⁺⁺ 14.61, 14.02, 13.22%; Fe⁺⁺⁺ trace, 0.62, 1.89%; FeCO₃ 16.97, 11.2% (in 3 year sample). FeO (causing the black color of the pills). 7.19, 11.12%; Fe(OH)₃ trace, 1.97%; K₂CO₃ 0, 0.646%. A freshly prepd. sample of *Pil. ferri*, *Brit. Pharm.* contained CO₂ equiv. to 20% FeCO₃, confirming L.'s conclusions. Bland's pill and *Pil. ferri*, *Brit. Pharm.* are essentially different medicines.

S. WALDBOTT

Notes on the constituents of Artemisia brevifolia, Wallich. T. AND H. SMITH, *Ltd. Pharm. J. 119*, 688, 701; *Chemist and Druggist 107*, 785(1927), cf. Greenish and Pearson, *C. A. 15*, 924.—*Camphor* of *A. brevifolia* m. 177°, [α]_D -44°; i. e., it is the exact *l*-isomer of the *Brit. Pharm.* camphor. The monobromo compd., m. 76°, identical with that of the *d*-camphor; but by mixing the 2, the m. p. is lowered. *Essential oil* is difficult to sep. completely from the camphor; b. 110-180°; d. 0.950. It is a terpene, contg. neither phenol nor aldehyde. The characteristic odor of the herb resides in a minute quantity of a very volatile oil. *Brevifolin* (A) occurs in the herb to the extent of 0.01%; it is extd. from the mother liquors in the prepn. of santonin; unlike this it can be extd. from alk. soln. with CHCl₃. Recrystd. from 60% alc. it forms short glistening needles, m. 80°, is little sol. in cold H₂O, sol. in C₆H₆, CHCl₃, Et₂O and EtOH, also in dil. NaOH. Concd. H₂SO₄ forms a yellow soln; on diln., A is re-pptd. Concd. HNO₃ forms at once an intense blue color, which on warming changes to violet, purple, then red. Like santonin, A is N-free, but differs from it by not being affected by light. It also differs from Merck's *artemisin* (m 200°) from *A. maritima*. A forms a monobromo compd., but no Ac compd.

S. WALDBOTT

Some analytical notes on pharmacopeia revision. E. J. SCHORN. *Pharm. J. 119*, 688-91, 701-2; *Chemist and Druggist 107*, 785-6(1927).—General and sp. suggestions anent the revision of the *Brit. Pharm.*; a plea for definiteness as an analytical guide.

S. WALDBOTT

Notes on pharmacopeia revision, with special reference to tests and alkaloidal solutions. D. B. DORR. *Pharm. J. 119*, 691-2, 701-2; *Chemist and Druggist 107*, 828-9(1927).—Solubilities should be established rather than the dispensing point of view than from that of strict accuracy. Similarly, certain tests are too exacting, e. g., for reduced Fe, and the limit tests for As and Pb; substances should be "physiologically pure." Recommendations are made as to alkaloidal solns. and assay processes. The following identity test for *salicin* is suggested: To the aq. soln. add 0.2 \times its vol. of HCl and warm. The soln. develops an aromatic odor and ppts. saliretin. Ext. this with Et₂O, and evap. to dryness; the amorphous residue gives a red color with H₂SO₄.

S. WALDBOTT

Solubilities and standard temperatures. J. R. HILL. *Pharm. J. 119*, 692-3,

701-2; *Chemist and Druggist* 107, 828-9(1927).—Solubilities detd. at higher temps. are not as safe in dispensing practice as those detd. at lower temps.; detn. of sp. gr. can safely be made at a higher standard temp. The temps. adopted by the Brit. Pharm. (15.5°) and the U. S. P. (25°) are selected arbitrarily, and are not based on av. prevailing temps. The U. S. and Great Britain should unite on a common standard of temp for soly. and sp. gr. S. WALDBOTT

Removal of peroxides from anesthetic ether. J. RAE. *Pharm. J.* 119, 693-4 (1927); F. A. HOCKING. *Ibid* 120, 26(1928).—Samples of Et₂O were shaken with 1.1% of animal charcoal, then, together with untreated samples set aside. Applying Hocking's test (C. A. 21, 4020), R. finds the intensity of the reaction unchanged in 2 days, half as strong in 14 days, faint in 28, a slight trace in 48 and no reaction in 54 days. The same value of p_H (6.5) was found in the H₂O ext. of the untreated as of the treated Et₂O, showing that the charcoal added neither acid nor alkali. H. states that with proper storage and frequent renewals of the stock, no peroxides are formed; but each fresh lot of Et₂O should be tested. Cf. C. A. 18, 3452; 21, 3103. S. WALDBOTT

Pharmaceutical notes. WILLIAM DUNCAN. *Pharm. J.* 119, 694-5(1927).—*Unguentum hydrargyri nitrat* is best prepd. by heating together the HNO₃, lard and oil (Brit. Pharm.) with const. stirring until the reaction is complete and frothing ceases, then add the equiv. of yellow HgO (10.8 g.), stirring the mass till combination of the HgO is complete. A more direct way of prepg. *liquor hydrargyri nitrat* acidus (Brit. Pharm.) is to dissolve the equiv. of HgO in the HNO₃ and adjust with H₂O to the required wt. *Sulfurated potash* is now chiefly used as a fungicide. For its quick prepn., put KOH 2, sublimed S 1, H₂O 2 parts into a bottle, and shake. In 2 hrs. the reaction is complete. Use 1-1.5 ounces per gallon of H₂O, e. g., as a spray for apple trees. D. finds the sp. gr. of camphor in small crystals $d_{15.5}$ 0.996; $d_{15.5}$ "about 0.995" (Brit. Pharm.); d_{10} for camphor is about that of H₂O, slightly above or below 10° camphor expands and contracts more than H₂O. To avoid clotting of quinine (caused by rise of temp) in prepg. the mixt: quinine sulfate 1, aromatic spirit of ammonia 3, H₂O to make 24 parts, diffuse the sulfate in half the H₂O and the volatile salt in the remainder, chill both by means of ice, then mix, a readily diffusible ppt. is obtained. S. WALDBOTT

Zamia floridana and Florida arrowroot. T. E. WALLIS. *Pharm. J.* 120, 50(1928); cf. C. A. 17, 2170.—Florida arrowroot is obtained from *Zamia floridana*, A. DC., a species distinct from both *Zamia integrifolia*, Aiton and from *Z. angustifolia*, Jacquin. Florida arrowroot contains H₂O varying from 12 to 15%, and CaC₂O₄ 0.38% (max.), i. e., 27 grains of anhyd. CaC₂O₄ per pound. S. WALDBOTT

The tincture of iodine question. P. C. *Schweiz. Apoth. Ztg.* 65, 277-8; THOMANN. *Ibid* 301-2; V., *Ibid* 325-6(1927).—P. C. refers to a discussion by A. Jentzer, W. Odermatt and R. Baumann in *Schweiz. med. Wochschr.* 1927, on the irritating effect of vapors of old tincture of I, and methods of avoidance. Tincture of I prepd. with alc. denatured with 2% Me₂CO had bad effects in 96%, prepd. with pure alc. in 28% of all clinical cases reported; a 10% I soln. caused trouble in 52%, a 5% soln. in 22% of all cases (J.). The products of decompn. are discussed. A soln. of 5% I in 80% EtOH with 4-5% KI is recommended, since a 5% soln. has been found sufficiently strong as a disinfectant (Brunner, v. Gonzenbach and Ritter) (O.)† B. recommends as a disinfectant in operations alc. denatured with gas tar, in the place of tincture of I (digest 5 parts liquid tar with 100 of 95% alc., decant and filter the yellow turbid liquid, add 80 g. of the filtrate to 100 kg. of 70% alc.). T. recalls the improved army method of ready prepn. of 5% I soln. contg. 2% KI. 2 tablets sealed in a glass tube contain 0.5 g. I and 0.2 g. KI. When needed, dissolve these in 80-90% EtOH (sol. also in 70%) in a glass graduated to 10 cc. V. condemns the use of 10% I soln. also of alc. denatured with Me₂CO. Cf. C. A. 16, 2385, 2387, and V., *Schweiz. Apoth. Ztg.* 1922, 202-4. S. WALDBOTT

Warning against the use of santonin. ANON. *Schweiz. Apoth. Ztg.* 65, 453 (1927).—The case of a 5-year-old child affected by tetany with coma after it had been given 0.05 g. santonin, is cited by Lesné. Santonin on aging may undergo changes causing it to become more toxic. S. WALDBOTT

Formula AL-14. ANON. *J. Am. Med. Assocn.* 89, 1394(1928).—AL-14 is sold as "an insurance against Colds, Flu and Pneumonia." The package contained 12 powders (A) with directions printed in red and 12 (B) with directions printed in blue. A consisted of CaCO₃ 0.6, KHCO₃ 39.2 and NaHCO₃ 60.1%. B consisted essentially of citric acid. L. E. WARREN

The constants of chloroform liniment? L. E. WARREN. *J. Am. Pharm. Assocn.* 16, 1029-33(1927).—Soap liniment was prepd. from materials of known constns. Several

specimens of CHCl_3 liniment were then prep'd. from soap liniment and CHCl_3 , some of which were purposely not according to standard. The phys. properties of the several specimens were then observed. The d. varied most with variation in CHCl_3 content. The d_{20} should be 1.050–1.060; α_D 1.14–1.6°; solids 3.9 to 4.5 g. per 100 cc.; EtOH 43–45%. No standard for CHCl_3 is suggested. L. E. WARREN

The ephedrine assay of Chinese Ephedra. C. T. FENG AND B. E. READ. *J. Am. Pharm. Assocn.* 16, 1034–9(1927).—Various methods for the assay of *Ephedra* were tried. Hot extn. and the use of strong bases like NaOH to liberate the alkaloid are most satisfactory. The total yields of alkaloid may exceed 1%. The $\text{NH}_4\text{OH}-\text{CHCl}_3$ process has been critically studied and it was found that a large excess of NH_4OH was necessary to liberate the alkaloids. A physiol. assay is suggested to confirm the chem. assay. L. E. WARREN

The quantity of alkaloid in Hyoscyamus and a new method for its evaluation. H. R. WATKINS AND S. PALKIN. *J. Am. Pharm. Assocn.* 16, 1039–44(1927).—The essentials of the new method consist in (1) liberation of the alkaloid in a continuous extn. app. (C. A. 19, 2106), with Et_2O chiefly as solvent, (2) purification of the alkaloid by treatment with dil. acid to ppt. chlorophyll and ether extractives, (3) re-extraction of alkaloid from the aq. soln. after making alk. with NH_4OH and (4) subsequent titration. All procedures were carried out in such a manner as to insure the stability of the alkaloid. Place 15 g. of the drug (no. 60 powder) in a type B extractor and pour sufficient Et_2O through the center delivery tube to render the tube moist. Add a mixt. consisting of 5 cc. of 28% NH_4OH , 10 cc. of EtOH and 20 cc. of Et_2O . Stir the drug with a glass rod. Attach the delivery tube to a 300-cc. Erlenmeyer flask, stopper the app. securely and allow to macerate overnight. Stir the drug again with the glass rod and wash the rod with Et_2O . Insert the filtering gauze and place the funnel in the upper end of the center delivery tube. Pour Et_2O into the funnel in the tube until the liquid flows over into the Erlenmeyer flask to the extent of about 75 cc. Connect the extractor with a reflux condenser, allowing the Erlenmeyer flask to rest on a steam bath. Boil briskly for 2 hrs. (If any channeling in the powdered mass is observed during the process of extn., the extractor should be removed and the mass again stirred with the glass rod to break up the channels.) Remove the extractor and pour the solvent remaining in the jacket into the Erlenmeyer flask. Evap. the ext. to about $\frac{1}{3}$ its vol., using a current of air. Add 10 cc. of 0.05 N H_2SO_4 and 5 cc. of H_2O and evap. until the odor of Et_2O is entirely gone. Pour the acidified liquid into a 50-cc. volumetric flask and rinse the Erlenmeyer flask with 5 cc. of water. Take up the residue remaining in the Erlenmeyer flask with a small quantity of CHCl_3 . Pour the acidified liquid into the volumetric flask; cool the contents to room temp and make up to the mark with water. Mix thoroughly and filter through paper, rejecting the first few cc. of the filtrate. Use an aliquot of 40 cc. of the filtrate for extn. Place the soln. in a type C extractor, make alk. with NH_4OH and ext. with CHCl_3 until the soln. is exhausted of alkaloid. Evap. the ext. on the steam bath to about 5 cc. Add a measured excess of 0.05 N H_2SO_4 and continue the evapn. until the CHCl_3 has disappeared. Cool the soln. and titrate back with 0.05 N NaOH, using 1 drop of methyl red soln. as indicator. Extended trials show that the new method yields more than 3 times the quantity of alkaloid obtainable by the U. S. P. IX or the U. S. P. X procedure. L. E. W.

The biological assay of aconite. M. G. JAUREGUI. *J. Am. Pharm. Assocn.* 16, 1045–52(1927).—Aconitine of approved m. p. was used. Each day a soln. of 0.100 g. in 100 cc. of 2% AcOH was prep'd. The guinea-pig method was used and the standard was found to be within the U. S. P. X requirements. The m. i. d. for cats and dogs was nearly the same as that for guinea pigs. The intravenous method for dogs is unsatisfactory. Cutting the vagus does not improve the accuracy of the method. In cats the intravenous method of administration is wholly unreliable. The method was more reliable if the depressing effect of the anesthetic on the heart could be eliminated by insufflation of the Et_2O into the bronchi with maintenance of artificial respiration. L. E. WARREN

Phenols from distillates obtained in oil cracking [as disinfecants] (Brit. pat. 275,313) 22.

FOURNEAU, ERNEST: *Heilmittel der organischen Chemie und ihre Herstellung—Lokalanaesthetika*. Braunschweig: Friedr. Vieweg & Sohn Akt.-Ges.

THOMPSON, C. J. S.: *The Mystery and Lure of Perfume*. London: John Lane. 247 pp. 10s. 6d. Reviewed in *Chem. News* 136, 222(1928).

THOMS, HERMANN: *Handbuch der praktischen und wissenschaftlichen Pharmazie*. In 6 vols. Berlin and Wien: Urban & Schwarzenberg.

Antidiabetic medicine. H. W. DUDLEY. U. S. 1,669,328, May 8. Material such as a crude product from pancreas which contains a crude specific diabetic principle is treated with picric acid to form an insol. compd. and the latter is treated with an inorg. acid such as HCl to obtain a sol. salt of the diabetic principle.

Base for ointments. C. SCHROEDER and A. KEIL. U. S. 1,668,382, May 1. Finely divided ZnO is mixed with a sirupy product obtained by concg. sepd. or skim milk and glycerol also is added.

Hormones from animal organs. G. EICHELBAUM and J. ALTENBURG. Brit. 275,183, July 28, 1926. The material used or exts. obtained are treated with ultra-violet rays, preferably *in vacuo* or in an inert atm.

Mixtures of vegetable foods with medicinal substances. O. STINER and B. DIETHELM. Brit. 274,915, July 26, 1926. Medicines such as K1, As₂O₃, strychnine and K₂CO₃ are mixed with bran or other vegetable substances.

Iodo derivatives of cyanophenol ethers. CHEMISCHE FABRIK AUF AKTIEN, FORM. E. SCHERING. Brit. 275,213, Aug. 2, 1926. Intermediates for use in producing pharmaceutical compds. are obtained by condensing iodophenol ether with metallic salts of iodo-hydroxybenzonitriles or metallic salts of iodophenol ethers with iodobenzonitriles. An iodonitrobenzene or iodonitrohydroxybenzene may be used also and the condensation product in that case reduced and treated after diazotization with Cu cyanide. To effect the condensation the materials may be heated to 210–240° in the presence of a catalyst such as Cu.

Nitropyridinearsonic acids. A. BINZ and C. RATH. Brit. 275,590, Aug. 5, 1926. 2-Hydroxy- and 2-halogen-pyridine-5-arsonic acids or other substituted pyridinearsonic acids are treated with strong nitrating agents. The products, and the amino compds which can be formed from them by reduction, may be used as *therapeutic agents*.

Quinoline derivatives. I. G. FARBENIND. A.-G. Brit. 275,277, Feb. 4, 1926. 6-Alkoxy-8-aminoquinolines are made either by reducing the 8-nitro or 8-azo derivs of 6-alkoxyquinolines or by alkylation of the O of the OH group of a 6-hydroxy-8-acylaminoquinoline or 6-hydroxy-8-arylidencaminoquinoline and subsequently splitting off the acyl or arylidene such as benzyldene group or by direct alkylation of 6-hydroxy-8-aminoquinoline. The products may be used as *therapeutic agents* or as intermediates for the prepn. of other pharmaceutical compds. Several examples are given.

Surgical ligatures. P. BOSR. Brit. 274,493, July 15, 1926. Ligatures are formed of spun or woven animal fibers such as those of muscle, which may first be washed, sterilized and hardened with CH₂O, chromic acid or I soln. and may also be degreased and tanned, vulcanized or twisted.

Deodorant. E. H. O'NEIL. U. S. 1,669,016, May 8. A compn. adapted for application to the body is prepd. by melting together spermaceti 2 and petrolatum 1 part, adding ZnO 1 and H₃BO₃ 1 part, cooling the compn. and molding it into stick form.

Composition for "permanent waving" of hair. E. O. SCHNEILL. U. S. 1,668,608, May 8. An emulsion is formed of a non-drying oil such as olive or castor oil, colloidal clay, water and an alk. salt such as Na₂HPO₄ or NaHCO₃.

Composition for softening the beard for shaving. W. E. POOLE. Brit. 274,659, Aug. 17, 1926. Sugar, borax and turpentine are dissolved in boiling water and this mixt. may be added to shaving creams.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

High-pressure ammonia synthesis. F. MÜLLER. *Arch. Eisenhüttenwesen* 1, 517–23(1927); *Stahl u. Eisen* 48, 405–6(1928).—Description of the Haber-Bosch, Claude, Casale and Mont-Cenis processes.

Synthetic ammonia and the Casale process. A. MIOLATI. *Notiz. chim.-ind.* 3, 138–41, 201–10(1928).—Following a general description of the chemistry of the fixation of N and the various processes which have become of industrial importance, the Casale process is discussed, with diagrams and illustrations, including chem. and engineering problems and results attained at various plants.

A technical method of the preparation of sodium nitrate and hydrochloric acid by the action of nitric acid on sodium chloride. V. I. NIKOLAEV. *J. Russ. Phys.-Chem. Soc.* 59, 685–8(1927).—A study of the system Na₂O–N₂O₅–H₂Cl₂–H₂O has shown that increasing acidity displaces the equil. in favor of HNO₃ in the liquid phase, the phenomenon being more marked at higher temps. By adding to a soln. of 10.17 parts

NaCl in 47.2 parts water at 45°, 46.62 parts Na_2O_3 , a satd. soln. is obtained from which 14.8 parts of pure NaNO_3 deposit on evapn. The distillate (contg. HNO_3 and HCl in the ratio 5:1) is satd. at 100° with NaCl and cooled to room temp. whereupon crude NaNO_3 (contg. 27.4% NaCl) seps; the residual liquor leaves a mixt. of 90.2% NaNO_3 and 9.8% NaCl. The second distillate contains HNO_3 and HCl in the ratio of 1.09:1, i. e., about 60% of the original HNO_3 has reacted to form NaNO_3 . The acid mixt. is slowly added to concd. H_2SO_4 and the HCl liberated dissolved in water. The remaining HNO_3 is distd. off with repeated addns. of water, 90% being recovered. NaNO_3 from the second distn. is purified by dissolving in water at 100°, the soly. of NaNO_3 being 58.25% and that of NaCl 5.54%.

BASIL C. SOYENKOFF

The colloidal behavior of lime. K. W. RAY AND F. C. MATHERS. *Ind. Eng. Chem.* 20, 475-7(1928).—The properties of hydrated lime are explained by assuming it to be a non-reversible colloid. Plastic lime putties show cataphoresis to a limited extent. The differences between putties are attributed to the difference in their colloid content, since the amt. of cataphoresis varies with diff. samples and is related in a rough way to the relative plasticities. The extent of cataphoresis is greatest for plastic putties and least for non-plastic putties. By the application of the Donnan membrane equil. equation to the charged particles of lime in a putty, a theory is developed in which the plasticity of a lime putty depends on a water-film held around each particle by a force depending upon the charge held by the particle.

J. H. PERRY

Some interesting experiments with gypsum. P. P. BUDNIKOFF. *Pit and Quarry* 16, No. 1, 72-6(1928).—The effects of heating gypsum to temps. from 100° to over 750° are outlined and the various theories advanced for the mechanism of the effect of catalysts on the acceleration or retardation of the setting of gypsum are discussed. Exptl. results show the effects of normal and molar acid solns. of their Na salts, of salts of univalent, bivalent, or tervalent metals, of complex salts, and bases on the speed of setting of plaster of Paris. H_2SO_4 , HNO_3 , HCl and HF are accelerators, while H_3PO_4 , lactic acid, boric acid, formic acid, acetic and citric acids are retarders. Expts. on M , N and 0.1 N solns. of the carboxylic acids showed such negative action on the setting of plaster of Paris that even the 0.1 N solns. of the salts give no second increase in temp. Samples thus secured possessed greater strength than those prepd. with the aid of positive catalysts or with pure water. Salts of the univalent metals are strongly positive catalysts. Bivalent metals with sulfate anion differ but slightly in catalytic properties. The effects of Ba, Ca, Sr and the tervalent metals are noted. Most salts aid in the hydration and setting of anhydrite.

W. H. BOYNTON

The system: potassium, sodium, and calcium nitrates and water. FR. FROWEN. *Z. anorg. allgem. Chem.* 169, 336-44(1928), cf. *C. A.* 21, 850.—The object of this study is to find methods based upon the phase rule to convert synthetic $\text{Ca}(\text{NO}_3)_2$ to KNO_3 . The soly. curves at 0° and 20° were detd. for those systems not yet studied. Great difficulties were met with $\text{Ca}(\text{NO}_3)_2$ solns. due to supersatn., high viscosities, and d. often over 1.76. They were overcome by long stirring (7-8 hrs.), settling and careful pipetting of the solns. The binary systems KNO_3 - $\text{Ca}(\text{NO}_3)_2$ and NaNO_3 - $\text{Ca}(\text{NO}_3)_2$ and the non-variant point of the ternary system were detd. KNO_3 raises the soly. of $\text{Ca}(\text{NO}_3)_2$, while the latter raises the soly. of the KNO_3 . The hydrated Ca nitrate causes a curvature in the soly. of the non-hydrated Na and K nitrates. Contrary to the results of Barbaudy (*C. A.* 18, 191) at 30° $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ was the only hydrated Ca nitrate found and no mixed crystals occurred in any system.

A. F.

Treatment of leucite with alkali. FELIX JOURDAN. *Atti II congresso naz. chim. pura applicata* 1926, 1194-8.—See *C. A.* 21, 989.

C. C. DAVIS

Decomposition of clays. L. WASILEWSKI. *Przemysl Chem.* 12, 40-8(1928).—The decompn. of clays and kaolins by means of $(\text{NH}_4)_2\text{SO}_4$ and the individual factors involved were studied. The decompn. proceeds as if first $(\text{NH}_4)\text{HSO}_4$ and ammonium alum were produced, which reaction would go up to 357°, and next NH_3 and $(\text{NH}_4)_2\text{SO}_4$ were driven off from the alum, which reaction would begin at 420-30°, and end above 450°. The temp. of decompn. affects the losses of NH_3 , since up to 360° about 0.5% NH_3 used in the reaction is oxidized and ammonium alum is leached out of the products, while at 450° about 9% NH_3 is oxidized and at the same time $\text{Al}_2(\text{SO}_4)_3$ is obtained. A curve showing the relationship between the temp. and % NH_3 oxidized is given. Clays of varying chem. compn. decompose at different times and in different ways, i. e. g., clays with a higher Fe_2O_3 content release NH_3 more easily and quickly than those of lower Fe_2O_3 content, and those free from Fe_2O_3 resist conversion to $\text{Al}_2(\text{SO}_4)_3$.

A. C. ZACHARIN

Oxychloride and other dental cements. WALTER S. CROWELL. *Trans. Am. Inst. Chem. Eng.* 19, 19-25(1927).—Dental cements are placed in 3 classes: oxychloride

cements, heavy metal phosphate cements and silicate cements. Zn oxychloride cements have been largely superseded by those of the second group, while Zn phosphate cements, as filling agents, have been superseded by the silicate cements. Most recent developments are the substitution of acid-sol. silicates contg. Al for Zn or Cu compds. previously used. All dental cements consist of basic powder and an acid liquid mixed immediately before use. At 37° , 4 phosphates of Zn are formed. The range of stability of each is given. Silicate cements resemble industrial porcelain. The necessity of slow setting, the mechanism of setting, and the limited industrial uses of dental cements are outlined, also a means of testing them. Other things being equal, the cement with the lowest shrinkage and highest strength is the best. W. H. B.

The microscopic pictures of a few decolorizing carbons. FERDINAND KRYŽ. *Z. Zucker ind. Czecho-Slov. Rep.* 52, 98-9 (1927).—Microscopic analysis permits definite differentiation between animal and vegetable carbons. Further studies should lead to recognition of different brands of the latter. F. R. BACILER

Fumigation of stored-products insects with certain alkyl and alkylene formates. R. T. COTTON and R. C. ROARK. *Ind. Eng. Chem.* 20, 380-2 (1928).—The vapors of methyl, ethyl, secondary butyl, isobutyl, isoamyl, and allyl formates are toxic to insects infesting stored products, such as rice weevils, clothes moths, carpet beetles and furniture beetles. About 70% CCl_4 is added to remove the fire hazard. C. M. S.

BISCHOFF, J.: Handelswichtige anorganische Chemikalien. LEIPZIG: Max Jänecke. 331 pp. Paper, R. M. 12; bound, R. M. 13.50.

KEGHEL, DE: Manuel du fabricant d'encre, cirages et colles. PARIS: J. B. Baillière et fils. 384 pp. F. 22.

Hydrocyanic acid. G. H. BUCHANAN. U. S. 1,667,838, May 1. $\text{Ca}(\text{CN})_2$ or other crude cyanide contg. an alk. earth metal compd. is treated with water and HCN is removed from the zone of reaction before any objectionable quantities of azulmic compds. are formed. An app. is described.

Sulfuric acid. C. W. FIELDING. Brit. 274,918, Jan. 29, 1926. In producing H_2SO_4 directly from SO_2 and nitrous vitriol, gases contg. SO_2 and free O with or without oxides of N and water vapor are introduced into the bottom of a mixing column or similar app. and brought into intimate contact with nitrous vitriol which is circulated and cooled. Brit. 274,919 specifies a similar process in which the gas is forced into nitrous vitriol and raises the latter on the air-lift principle to effect intimate contact partly as a foam and partly as a spray. An app. is described.

Caustic alkalies. R. E. WILBY and C. E. MENSING. Brit. 275,044, Oct. 11, 1926. Caustic alkalies are converted into granular form by centrifuging the fused material, subjecting it to the action of an air blast, and directing addnl. cold air upon the material. An app. is described.

Ammonia synthesis and reductions by hydrogen. SOC. INTERNATIONALE DES PROCÉDÉS PRUDHOMME HOUDRY (formerly SOC. INTERNATIONALE DES PROCÉDÉS PRUDHOMME). Brit. 274,846, July 23, 1926. The H used is preliminarily passed through a material such as metallic Ni or a suitable oxide which converts the H into nascent condition. An app. is described.

Burning alkaline earth carbonates. DWIGHT & LLOYD METALLURGICAL CO. Brit. 275,463, Nov. 26, 1926. In burning carbonates such as limestone, dolomite and magnesite, the material is spread in a layer on a pervious support and heating gases are passed through it. An app. is described.

Ammonium carbonate. RHEINANIA-KUNHEIM VEREIN CHEMISCHER FABRIKEN AKT.-GES. Brit. 275,459, Nov. 20, 1926. In carrying out the process described in Brit. 262,408 (C. A. 21, 3716), the temp. is maintained so that it does not substantially exceed 60° when atm. pressure is used. When higher pressures are used, the temp. may be 60 – 90° .

Carbon monoxide and hydrogen from hydrocarbons. L. CASALÉ. Brit. 274,610, June 2, 1926. Reaction is effected at about 1000° in an excess of steam and at a pressure less than atm. pressure. H and CO free from CH_4 are obtained and if air is used a gas may be produced suitable for use in NH_3 synthesis.

Chlorides of calcium, strontium, magnesium, zinc, etc. I. G. FARBENIND. A.-G. and K. STAIB. Brit. 275,116, March 5, 1927. In converting oxides into anhyd. fused chlorides, the finely divided oxide, suspended in a mixt. of Cl and CO, is introduced into a heated chamber where conversion takes place. By using the oxide with Cl and finely divided C, the CO may be omitted.

Potassium ferrocyanide. G. H. BUCHANAN and C. M. HULINGS. U. S. 1,667,839,

May 1. A ferrocyanide mother liquor such as that obtained by use of crude cyanide material is treated with Ca ferrocyanide in excess, com. KCl is added, insol. substances are sepd. from the soln. and the insol. constituents are treated with sufficient K_2CO_3 to decomp. any double salt of K and Ca ferrocyanide present but insufficient to react with any $CaSO_4$ present; the soln. is filtered and $K_4FeC_6N_4$ is recovered from it.

Concentrating or purifying caustic soda, etc. C. F. HAMMOND. U. S. 1,668,504, May 1. Material such as NaOH is conducted over the surface of a hot liquid mass, *e. g.*, molten Pb, heated directly by the flame or gases of a submerged flame burner and the products of combustion are withdrawn at a portion of the surface which is not covered by the material under treatment. An app. is described.

Purifying solutions containing sodium arsenate and stannate, etc. H. HARRIS. Brit. 275,344, May 7, 1926. Solns. contg. Na arsenate and stannate are freed from Sb by treating them with a reducing agent, *e. g.*, by heating in contact with Sn plates, filings or turnings for 1-2 hrs. Na antimonate may be obtained as a by-product. Cf. C. A. 22, 2036.

Zinc oxide catalysts. G. BLOOMFIELD. U. S. 1,668,838, May 8. In prepg. a catalyst suitable for use in MeOH synthesis or other processes, ZnO is combined with a soln. of NH_4NO_3 and the mass is ignited.

Separating compounds of aluminum and potassium. H. J. FALCK. U. S. 1,667,968, May 1. Al and K compds. such as those of leucite are converted into nitrates, the latter are treated with concd. HNO_3 and the soln. of KNO_3 in HNO_3 thus obtained is used for producing a mixt. of KNO_3 and $Al(NO_3)_3$ from fresh raw material.

Separating metalloids from their compounds, etc. H. WITTEK. Brit. 275,145, July 27, 1926. Extn. of metalloids from their compds. such as those of P, As and Sb is carried on in connection with nitrogenation of Ca, Ba or other carbide and the metalloid is obtained in the free state or as another compd. such as CS_2 . Various details and modifications are described.

Treating titanium-bearing materials. TITAN CO. AKTIESELSKABET. Brit. 275,578, Aug. 3, 1926. An aq. liquid, preferably an aq. soln. of an acid or a salt such as $FeSO_4$, is added to the H_2SO_4 or other acid used for treating materials such as ilmenite or titanite, to restrict hydrolysis or crystn. of the compds. dissolved. The process of soln. may be conducted at progressively decreasing temps., *e. g.*, 170-130° and may be carried out under pressure. Brit. 275,579 specifies the use of acid such as H_2SO_4 for treating ilmenite, rutile or titanite together with a reducing agent such as pyrites or various metals or H_2S . Brit. 275,580 specifies the treatment of the Ti-bearing material, preliminarily, with various reducing agents, with or without Mg, to effect selective reduction of the Fe present without reducing the Ti, and then dissolving the Ti with an acid solvent such as H_2SO_4 . If desired, an excess of reducing agent may be used in the presence of N to obtain N compds. of Ti, in which case $(NH_4)_2SO_4$ is obtained from the soln. produced in the acid treatment.

Hydrogen. F. GÜLKER. Brit. 275,273, July 30, 1926. CO or water gas or other gas contg. CO is treated with steam in the presence of a catalyst in the presence of substances which under the conditions of the process will absorb CO_2 , *e. g.*, lime (which may be prepd. *in situ* from marble). Mineral substances such as spathic Fe ore and bauxite may be used as catalysts without preliminary activation. An app. is described.

Carbon black. CANADA CARBIDE CO., LTD. Brit. 274,573, April 24, 1926. In dissocn. of a hydrocarbon gas such as C_2H_2 or natural gas, by passing the gas into a heated chamber, the gas is maintained at a temp. sufficiently low to prevent polymerization up to the time of its entry into the reaction chamber and it is then suddenly heated to dissocn. temp. The entering stream of gas may be kept cool by an enveloping stream of another gas such as air, CO_2 or N. An app. and various details and modifications of procedure are described.

Active carbon and other products. K. S. C. BONE and WILSON BROS. BOBBIN CO., LTD. Brit. 274,538, March 19, 1926. Finely divided wood impregnated with Ca acetate is continuously fed in a layer through a retort and gradually and uniformly heated to 1000° or higher; creosote oils are recovered at temp. below 450° and a bath of Pb may be used at the end of the retort from which the vapors are withdrawn or two retorts in series may be used. Acetone, Me Et ketone, higher ketones, HOAc and creosote oils are recovered. The active C formed is removed from the retort, its oxidation being avoided and is extd. with HOAc or HCl to remove ash and $CaCO_3$. App. is described.

Apparatus for continuous hydration of lime, etc. J. C. SCHAFFER. U. S. 1,668,839, May 1.

Apparatus for hydrating lime. J. C. SCHAFFER. U. S. 1,668,924, May 8.

Destructive hydrogenations and other catalytic reactions. I. G. FARBENIND. A.-G. Brit. 274,904, July 24, 1926. The catalyst is brought into a state of suspension throughout the reaction space and whirled by a current of gas, *e. g.*, in destructive hydrogenation of a heavy oil with a Mo-Cr catalyst at 460° under 20 atm. pressure, or in synthesizing NH_3 or MeOH.

Heat exchange system for catalytic processes. SOC. L'AIR LIQUIDE, SOC. ANON. POUR L'ÉTUDE ET L'EXPLOITATION DES PROCÉDÉS G. CLAUDE. Brit. 275,592, Aug. 9, 1926. Processes such as the NH_3 synthesis described in Brit. 268,722 (C. A. 22, 1444) may be modified by passing the reaction products through the reaction chamber in such a way that they absorb heat from the hottest zone of the catalyst. An app. and other modifications are described.

Adhesives. G. HONSCHE. Brit. 274,490, July 16, 1926. Glue powders suitable for use by adding cold H_2O are formed from animal glue with the addn. of oxalic acid, H_2BO_3 , salicylic acid, phthalic acid, Na salicylate, NaCl, Zn NH_4 chloride, $\text{Ca}(\text{NO}_3)_2$ or similar substances and quartz powder, MgCO_3 , alum, aldehydes or their condensation products or substances of like action.

Molded products from amphibole. L. H. HARTUNG and F. FOLBERT. U. S. 1,668,768, May 8. In forming articles such as panels or furniture, amphibole is used with ZnCl_2 and soap, the material is initially molded under pressure, heated and dried and the surface of the molded product is then further treated with a soap soln.

Plastic molding composition. M. SASAKAWA. U. S. 1,668,172, May 1. A compn. suitable for use instead of clay for modeling is formed by adding powd. CaCO_3 and flower of S to a soft fat-like substance produced by kneading a mixt. of lime soap and mineral grease and further kneading the complete mixt.

Plastic condensation product. E. L. AIKEN. U. S. 1,668,444, May 1. Phenol and glycerol are caused to react in the presence of a dehydrating agent such as CuSO_4 and the dehydrating agent and assocd. water are removed from the reaction product. The reaction product thus obtained is suitable for reacting further in the presence of $(\text{NH}_4)_2\text{CO}_3$ with a reactive CH_2 -contg. substance such as a CH_2O polymer to obtain a viscous condensation product. U. S. 1,668,445 specifies forming flexible articles by condensing a phenylglyceryl compd. with available CH_2 such as may be supplied by a CH_2O polymer to form an intermediate product, and shaping the intermediate product without pressure and heating the shaped article to cure it.

Uniting vitreous surfaces. B. LONG. U. S. 1,668,853, May 8. Surfaces to be joined, after accurate fitting and grinding to a smoothness such as is obtainable with fine emery, are coated with a thin film of a synthetic resin and joined by heat and pressure.

Absorbent materials. A. ROSENHEIM. Brit. 275,203, July 30, 1926. The basic content of natural or artificial zeolites, glauconite, tuffs, natural glasses and like materials is at least partially extd. with acids or acid salts; the product may be used as an adsorbent for gases or vapors or for decolorizing liquids such as oils or sugar solns. If the oil or other substance treated contains acid, this may serve for extg. the bases from the decolorizing material. Numerous examples are given.

"Antifriction" material for bearings, etc. SOC. ANON. FRANÇAISE DU FÉRODO. Brit. 275,648, Aug. 7, 1926. Artificial resin may be mixed with textile fabrics, flakes, waste of fibrous material, graphite, etc., for making bearings, piston packing, valves and other sliding parts of machinery.

Metal for "self-lubricating" bearings. C. CLAUS. Brit. 275,444, Oct. 13, 1926. See U. S. 1,648,722 (C. A. 22, 485).

Composition for polishing metals. W. BREITZKE. U. S. 1,669,281, May 8. A pasty mixt. is formed from confectioner's sugar 68, camphor 26, ether 6 parts and water.

Preventing and removing incrustations from radiators and water jackets of engines, etc. H. MENZ and H. VOM BRUCK. Brit. 274,718, Dec. 22, 1926. A device is arranged to hold a mass of tannin (with or without addn. of 5% Na_2CO_3) in the top of the radiator.

Rope rendered waterproof and floatable by paraffin and occluded air. C. A. O. BERNER. Brit. 275,327, May 4, 1926.

Pictures on metal plates. F. D. LIVERMORE. U. S. 1,668,686, May 8. A "key print" is formed from a gelatin plate; a transfer from this "key print" is made to the surface of a metal plate which may be formed of Zn or Al, portions of the transferred image on the metal plate are blocked in and the metal plate is treated, *e. g.*, etched with acid, to remove portions of the image not covered by the blocking in operation.

Fire-extinguishing compositions. EXCELSIOR FEUERLÖSCHGERÄTE AKT.-GES. and C. WAGNER. Brit. 274,567, April 23, 1926. In producing foam, at least one ma-

terial is used which is insol. in water such as carbonate or bicarbonate of Ca or Mg which may be made into a paste and mixed with an acid and water.

Fire-extinguishing compositions. W. GRAAFF. Brit. 274,574, April 24, 1926. A foam is used together with CCl_4 or similar substances.

Generating foam for extinguishing fires or for other purposes. R. SCHNABEL. U. S. 1,669,213, May 8. A saponin soln. is oversatd. with a gas such as CO_2 in a container under pressure, so that on relieving the pressure the gas escapes and foam is produced.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Some recent improvements in the manufacture of flat glass. H. K. HITCHCOCK. *Mech. Eng.* 50, 368-72(1928). E. H.

Glass, resistant to drastic temperature changes, mechanical influence, and chemical attack. Its manufacture and properties. HUGO KÜHL. *Glashütte* 56, 743 et seq. (1926); 57, 3 et seq. (1927); *J. Soc. Glass Tech.* 11, 233A.—For the manuf. of chem. app., cooking ware, lamp cylinders, centrifuge glasses, as well as for containers for certain foods, drink, acids and alkalies, a batch must be used which should give a eutectic soln. of silicates in one another and should not show any alteration with time. The value of different oxides in producing resistant glass was discussed. Phonolith was recommended as a very suitable source of Al_2O_3 in cases where the green color due to iron oxide impurity was no serious disadvantage. H. G.

Magnesia glass. HUGO KÜHL. *Glashütte* 57, 123(1927); *J. Soc. Glass Tech.* 11, 233A.—A glass which showed an extraordinary resistance to temp. change could be obtained by using a German dolomite of the compn CaCO_3 55.39%, MgCO_3 41.90, SiO_2 1.65, Al_2O_3 0.90, Fe_2O_3 trace. Plasks made from such a glass contg 4.5% MgO withstood very drastic temp. changes without breaking. H. G.

Practical instructions in annealing of hollow glassware. OSCAR KNAPP. *Sprechsaal* 61, 42-3, 62-3, 83-6(1928).—The temp. at the beginning of annealing should be high, preferably near the deformation temp. When a variety of large glasses of different wall thickness are annealed at the same time the initial temp. should be governed by the ware of smallest wall thickness. The greater the rate of cooling, the shorter the time of annealing. In this case the largest glasses with the greatest wall thickness must be the controlling factor. The annealing operation should be continuously controlled. R. A. HEINDL

Some effects of carefully annealing optical glass. L. W. TILTON, A. N. FINN AND A. Q. TOOL. *J. Am. Ceram. Soc.* 11, 292-5(1928).—Small differences in annealing temp. may be eliminated by careful furnace control. There need be no change in the av. n if the "thermo-optical" const. of the glass are detd. C. H. KERR

The ring test for casing glasses. L. SPRINGER. *Sprechsaal* 59, 806(1926); *J. Soc. Glass Tech.* 11, 135A.—S was in agreement with the results of Gehlhoff and Thomas on the subject of the ring test (see *Ibid* 59, 697(1926)) and quoted several earlier

	Cobalt blue glass	Cadmium yellow glass	Crystal glass
	1	2	3
SiO_2	45.7%	46.5%	77.15%
PbO	32.7	31.5	—
Al_2O_3	0.5	0.5	—
CaO	Trace	Trace	6.05
K_2O	9.0	9.8	10.05
Na_2O	Trace	Trace	6.75
B_2O_3	11.0	11.0	—
CoO	About 0.5	—	—
CdS	—	About 0.5	—
Expansion coeff.	21.8×10^{-6}	21.9×10^{-6}	24.5×10^{-6}

communications by various authors. Tests had proved that a colored casing made from the parent batch with large addns. of coloring oxide (Fe and Mn) could often be combined successfully with the parent crystal glass, even though its expansion coeff. was appreciably altered. Other properties, such as elasticity and relative thickness of the base and the casing glasses, also came into play. Casing glasses 1 and 2 in the

table were used in conjunction with Bohemian crystal glass 3, although the calcd. expansions were somewhat different. H. G.

Fluorspar, cryolite and artificial cryolite as opacifiers in the glass industry. HUGO KÜHL. *Keram. Rundschau* 35, 823-4(1927).—Small quantities of fluorspar, NaF, Na fluosilicate and cryolite act always as fluxes. Opacity is produced as soon as a certain upper limit, which is different for each opacifier and very high for fluorspar, is exceeded. With an opacifier present glass which is usually clear becomes milky-white when it is re-heated and slowly cooled. Cryolite is considered a better opacifier than fluorspar because of the smaller quantity required. Since Greenland is the only com source of cryolite synthetic cryolite is suggested as a satisfactory substitute. H. I.

The requirements for a pure red lead for glass-making and methods of analysis. RUDOLF SCHMIDT. *Keram. Rundschau* 35, 840-3(1927).—Although pure red lead contains 65.11% PbO and 34.89% PbO₂, com. red lead also contains varying amts. of Pb₃O₄ and Pb₂O₃, and often as little as 24 to 26% PbO₂. Red lead with low PbO₂ content used in glass batches makes the glass difficult to melt and to refine. "Scarlet-red" lead (cryst. red lead) is more satisfactory for glass making than "brick-red" lead which is more pulverulent. The oxides of Sb and Sn and PbSO₄ are the principal impurities in red lead which has not been deliberately adulterated. Other impurities are Fe, Cu and Co. For glass-making purposes Fe₂O₃ should not exceed 0.005%, CuO 0.002% and Sb₂O₃ 0.006%. A chem. method for detg. the purity of the red lead and for detg. qualitatively the nature of the impurities is given as well as the detailed method for quant. chem. analysis. H. I.

Influence of porosity and compactness on refractory materials used in glass-making. A. THURET. *Céram. Ver.* 46, 493(1926); *J. Soc. Glass Tech.* 11, 277-8A.—Porous materials dried more uniformly and so had less tendency to crack and more resistance to sudden temp. changes. More compact materials had better resistance to attack by the glass and its constituents and did not disengage gas bubbles into the glass in contact with them to so great an extent, nor did they adsorb coloring matters from the glass so much and thus cause variations in the tints of glass melted in pots of such materials. Pots in which optical glass was to be melted should, therefore, be of materials as non-porous as possible, while pots for ordinary glass should be less compact, as they had to withstand changes of temp. between the working and the founding temp. Siege blocks for pot-furnaces should be of similar material to these latter, while tank blocks should be as dense as possible, as they were in contact with glass at a uniform temp. Silica bricks of low expansion were used for furnace arches, but porous aluminous bricks might be used. Movable refractories such as stoppers should be very porous. Suggested compns. for refractory materials were:

	Raw clay %	Grog % of sieve mesh			
		45	26	16	14
Optical glass pot	49	37	—	14	—
Ordinary glass pot	50	25	—	—	25
Tank blocks	44	38	—	18	—
Siege blocks (pot-furnaces)	40	—	35	—	25

To obtain the advantages of both types of material, pots might be lined with a more compact type of material of the same compn. on the inside. Trials had been made with pots lined with a finely ground siliceous material—or rather less aluminous than the body of the pot—so that the outer layer, having a higher expansion coeff., contracted on to the inner layer, making it dense and durable. H. G.

Plasticity of clay. L. E. JENKS. *J. Am. Ceram. Soc.* 11, 317-22(1928).—The cause of plasticity is the formation in the moistened clay of a continuous external phase through the action of water in making gelatinous the material that forms the enveloping surface around the non-gelatinous particles and aggregates present in the clay. C. H. KERR

Acidity of Japanese acid clay (Japanese fuller's earth). K. KOBAYASHI. *Mem. Faculty Sci. Eng. Tokyo* 4, 1-2(1927); *Analyst* 52, 559.—Analyses of the chief Japanese acid clays suggest that the clay is a mixt. of colloidal hydrated Al silicates and an amorphous anhyd. compd. of orthosilicic acid, and may be expressed as Al₂O₃·6SiO₂·xH₂O, x being greater than 6. The clay is not a true acid, the acid reaction being due to free acid liberated by the adsorption of the clay to the indicator and the reaction is similar in nature to that with silk and wool fibers. H. G.

The specific heats and heat variations of clays. W. M. COHN. *Ber. deut. keram. Ges.* 7, 149(1926); *J. Soc. Glass Tech.* 11, 285A; cf. C. A. 21, 2773.—The methods

for the detn. of the sp. heat of ceramic materials and the heat absorbed by them during firing were discussed. C.'s results (C. A. 18, 3259) were then compared in detail with those of MacGee (C. A. 20, 2233). H. G.

A study of the calcium-sodium ratio of certain waters. R. A. HART. *J. Am. Ceram. Soc.* 11, 314-6(1928).—Clays deposited by water in an arid section should have a greater d. than similar clays deposited by waters in a humid section. Tempering clays with water having a relatively low Ca-Na ratio should produce a body of greater d. C. H. KERR

A continuous kiln for the firing of pottery and other clay products. J. WILLIAMSON. *Brit. Clayworker* 37, 18-22(1928); *Pottery Gaz.* 53, 111.—This kiln is of the tunnel type; it may be fired by gas, oil or coal, and is of the combined direct flame and muffle type. Instead of traveling in a longitudinal direction as in present practice, the flame takes a transverse course, which may be either up draft or down draft. The flame may also alternate from one side of the kiln to the other, resulting in uniformity of temp. R. A. HEINDL

The influence of titanium on the coloring of clay ware. E. KLEVER. *Keram. Rundschau* 36, 101-2(1928).—The presence of Ti may cause a bluish to purplish color in burned clay ware. The color is most frequently produced when (1) the ware is burned to the sintering point and (2) a reducing fire is used. Fe_2O_3 may mask the coloring effect of Ti. H. INSLEY

The history of ceramics. C. F. BONINI. *Giorn. bibl. tech. intern.* 3, 763-74(1927). C. C. DAVIS

Some factors influencing the thermal properties of minerals and products of the ceramic industry. W. M. COHN. *J. Am. Ceram. Soc.* 11, 296-306(1928).—A survey is given of factors influencing sp. heat, thermal reaction, thermal cond., thermal expansion, thermal radiation, etc. A bibliography is added. C. H. KERR

Bibliography of plasticity. P. J. SLEGEL. *Bull. Am. Ceram. Soc.* 7, 130-6(1928). C. H. KERR

English porcelain. W. B. HONEY. *Pottery Gaz.* 53, 644-50(1928).—Starting with Chelsea porcelain of 1745, H. discusses various porcelains down to modern type of English ware. R. A. HEINDL

Methods for testing crazing of glazes caused by increases in size of ceramic bodies. H. G. SCHURECHT. *J. Am. Ceram. Soc.* 11, 271-7(1928).—The autoclave test (subjecting the sample to a steam pressure of 150-175 lbs. per sq. in. for 1 hr.) proved reliable in detecting bodies which would craze in 1 or more yrs. of storage. The more vitreous bodies are less apt to develop the type of crazing caused by increase in size of body. Bodies having a low soly. in H_2SO_4 are less apt to craze than bodies of high soly. Bodies having a low ignition loss above 110° after 3 or more years' storage in general show the least crazing. The expansion of the body, which causes this crazing, is probably due to combination of H_2O with the body. C. H. KERR

Acid-resisting overglaze colors. R. V. TILBY. *J. Am. Ceram. Soc.* 11, 307-9(1928).—Requirements, difficulties and testing are discussed. C. H. KERR

The prevention of disintegration of blast-furnace linings. H. K. MITRA AND A. SILVERMAN. *J. Ceram. Soc.* 11, 278-91(1928).—The spots of Fe_2O_3 in a fire brick are the points where disintegration starts. Fe_2O_3 is reduced to FeO by CO at 500° and FeO is the catalyst which hastens the reaction $2\text{CO} \rightarrow \text{CO}_2 + \text{C}$, depositing C, the absorption of which by the linings is the cause of failure. The oxide Fe_3O_4 is immune to such action. Converting the Fe_2O_3 to Fe_3O_4 will, therefore, prevent disintegration. This is commercially difficult and requires further exptl. work. C. H. KERR

Use of the simulative-test furnace as a means of making comparative tests of fire brick. G. L. ROGERS. *J. Am. Ceram. Soc.* 11, 323-9(1928).—The U. S. Navy Simulative Service Test is described. C. H. KERR

Brick machine, bucket elevator and hammer mill power determinations. D. P. OGDEN. *J. Am. Ceram. Soc.* 11, 310-3(1928). C. H. KERR

Refractories for the electric steel furnace. E. KOTHNY. *Feuerfest* 3, 157-64(1927).—The characteristics of 14 different refractories are described and their actual or possible application in elec. furnace construction is indicated. The relative costs per cu. m. of brickwork are tabulated for 6 different types of refractory bricks. Silica bricks may be used in all parts of radiation furnaces and above the slag line in basic furnaces. By reason of their comparatively low price, they constitute one of the chief materials for elec. furnace construction. Magnesite bricks are sensitive to abrupt changes of temp.; they are only applied where their slag-resisting property can be utilized. Calcined magnesite and calcined dolomite are suitable for basic furnaces.

Chromite bricks may be used to form a neutral layer between acid and basic brickwork. Carborundum bricks are destroyed by the action of slags, and can therefore only be used in the roofs of furnaces. Corundum bricks are very refractory and resistant to temp. changes. Magnesia spinel brick are very refractory and highly resistant to basic slags and changes of temp. Sillimanite bricks are attacked by acid slags. Fused magnesite is suitable for low-frequency induction furnaces. Zirconia bricks have a very high m. p. (3000°), high refractoriness under load (2500°), and are very resistant to basic slag and to temp. changes. The disadvantage of the last-mentioned seven materials (chromite-zirconia) is their high cost as compared with silica. Zirconia, however, may possibly find permanent application in the construction of high-frequency induction furnaces.

Practical aids to wet-process cast-iron enameling. J. E. HANSEN. *Bull. Am. Ceram. Soc.* 7, 122-7 (1928). B. C. A.

Discussion on "acid-resistant enamels." C. MUSIOL. *Bull. Am. Ceram. Soc.* 7, 127-30 (1928); cf. C. A. 22, 1023.—Malinovsky's statements are criticized. C. H. K.

Glasses from NaPO_3 and oxides of Pb, Cd and Mn (DE CARLI) 6. The crystallization of PbO-SiO_2 glasses (DE CARLI) 6.

Glass articles. G. CHANRL. *Brit.* 275,141, July 31, 1926. Ornamental articles are formed from quartz or from low-expansion glass by welding the parts together with an O-H blow-pipe and then annealing the welded spots with a gas blow-pipe. *Brit.* 275,142 relates to a similar method of forming artificial flowers from "Pyrex" or similar glass.

Apparatus for forming glass sheets reinforced with wire. N. FRANZEN. U. S. 1,668,200, May 1.

Apparatus for making sheet glass by rolling. H. S. HEICHERT. *Brit.* 275,169, July 29, 1926.

Tank furnace for melting glass. P. G. WILLETTTS. *Brit.* 275,555, Aug. 3, 1926. The inner walls and bottom of the furnace preferably are formed of blocks of combined SiO_2 and Al_2O_3 vitrified at a temp. above 1500° united by a luting into a monolithic structure.

Regenerative glass melting and refining tank. G. E. STICKLER. U. S. 1,668,700. May 8.

Rotary glass pot or tank. S. J. SELLAR. *Brit.* 275,138, Jan. 28, 1926.

Laminated glass. F. FRASER. U. S. 1,669,044, May 8. Two sheets of glass are united by an intervening sheet of non-brittle material such as a cellulose deriv. or compn. which is impregnated with castor oil.

Laminated sheet material of glass and celluloid or like materials. P. H. HEAD and SAFETY GLASS AND METAL PRODUCTS, LTD. *Brit.* 275,279, Feb. 10, 1926. Sheets of glass of different thicknesses are joined by intervening sheets of celluloid, gelatin or the like.

Heating ceramic articles in tunnel furnaces. BARTON FOREIGN PATENTS, LTD. *Brit.* 275,104, Feb. 19, 1927. In the manuf. of vitrified paving bricks or other ceramic articles, the ware is first heated to vitrifying temp. and then passed to a cooling zone maintained at a considerably lower temp. than that of the vitrifying zone, is then reheated, and allowed to cool first slowly and then rapidly.

Gas-fired tunnel-kiln for burning tiles, pottery, etc. J. MARLOW. *Brit.* 275,048, Oct. 18, 1926.

Highly porous silica product. H. L. WATSON. U. S. 1,669,363, May 8. Cryst. SiO_2 is heated to about 1700°, cooled to below about 230°, impregnated with a decomposable binder such as shellac and reheated rapidly to about 1750°. The product may be used for heat insulation.

Abrasive articles. W. B. WESCOTT. U. S. 1,668,476, May 1. Granular abrasive material such as SiC or emery is formed into wheels or other articles with a composite binder carrying fibers disposed at random and including a continuous bond of rubber.

Abrasive articles. W. B. WESCOTT. U. S. 1,668,439, May 1. In forming abrasive wheels or other abrasive articles, granules of SiC , emery or other abrasive material are bonded by films of gelled latex rubber contg. a small proportion of asbestos fiber.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

The action of pure water on quick-setting cements. MOURRAL. *Génie civil* 92, 121-2(1928).—Contrary to popular opinion pure water does not readily break down quick-setting cements such as are used in water mains. If pure ingredients are used and the mix is made rich good results may be expected. At least 7 installations over 20 years old were still found to be in good condition. C. R. FELLERS

Recording instrument for determining the time of setting of cement. L. LIAUTHAUD. *Arts et métiers* No. 91, 146-50(April, 1928).—A brief description of an instrument for making and recording periodical (every 10 min.) Vicat-needle tests under controlled humidity and temp conditions. Examples are given of the type of diagrams obtained, showing that in every case setting starts in some time (varying with different cements) after the cement has been mixed with water. A. PAPINEAU-COUTURE

A method of interpreting an analysis (of portland cement) by a system of triangular coordinates. WM. A. ERNST, E. S. ERNST AND W. S. ERNST. *Rock Products* 31, No. 9, 54-7(1928). RAYMOND WILSON

Rate of absorption of limestone. H. F. KRIEGER. *Rock Products* 31, No. 9, 62 (1928).—Stones having high 24-hr. absorption generally absorb water at a high rate during the early part of the test. Absorption from a concrete mix is slower than that from free water, the difference depending on the size of the stone. RAYMOND WILSON

Variation in adsorption of asphalt by different mineral aggregates. A. W. DOW. *Pit & Quarry* 16, No. 1, 88-90(1928).—The method employed for detg. the relative adsorption of asphalt by sand grains is outlined. Brief consideration is given to the effect variations in the adsorption of the mineral aggregate will have on asphalt paving mixes. Other things being equal, the mixt. with the mineral aggregate having the highest adsorptive power should hold the most asphalt cement. The adsorption of asphalt cement from a CS_2 soln. is used as a basis of test in the case of fillers and sands. W. H. BOYNTON

Effect of decay on the chemical composition of wood. L. F. HAWLEY, L. C. FLECK AND C. A. RICHARDS. *Ind. Eng. Chem.* 20, 504-7(1928).—The comparative effects of decay on the chem. compn. of wood have been studied. Analysis was made of several species of wood before and after decay with both a white-rot and a brown-rot fungus. Detn. was made of pentosans in cellulose and of the hydrolysis no. of cellulose. "The loss of wt. due to decay in a lab. sample of wood cannot be taken as an exact measure of the usual effect of the fungus on that particular species of wood." Pentosans in cellulose are among the first constituents attacked by decay. They are, in proportion to the amount present, more rapidly removed than the hexosans in the cellulose. Both the stable and the readily hydrolyzed portions of the cellulose were always attacked, but in most cases there was a preferential attack on the readily hydrolyzed portion. *Polystictus hirsutus*, a white rot, is like the brown rot during the first stages of decay in its preferential attack on the cellulose. The two softwoods studied had a larger amount of stable cellulose than the hardwoods, while the two hardwoods had more pentosans in their stable cellulose than did the softwoods. W. H. BOYNTON

MALCHOW, W., AND MALLISON, HEINRICH: *Die Industrie der Dachpappe*. Halle (Saale): W. Knapp. Monograph of the Chemisch-technische Fabrikationsmethoden. Vol. 43. 113 pp. M. 7.50; bound, M. 9.30.

WARNES, ARTHUR R.: *Building Stones. The Causes of Their Decay and Their Preservation*. London: Ernst Benn, Ltd. Price, approx. 16s., net.

Rotary cooling drum for cement clinker, etc. E. ALLEN & Co., LTD., AND W. J. COLES. *Brit.* 274,656, Aug. 10, 1926.

Cementitious material suitable for stucco plasters. H. E. BROOKBY AND C. K. ROOS. U. S. 1,668,548, May 8. Natural ground anhydrite without calcination is mixed with less than 1% of $Na_2S_2O_3$ and the mixt. is formed into a mortar with water when desired for use. $ZnSO_4$, clay and calcined gypsum also may be added.

Bituminous concrete. L. S. VAN WESTRUM. *Brit.* 275,364, May 31, 1926. Dry mineral aggregate is mixed with either (a) a cementitious material such as lime, portland cement or plaster of Paris, or (b) a mixt. of such cementitious material with stone or slag flour, with or without Fe oxide, is then mixed with a bituminous soap other than that described in *Brit.* 269,975 (*C. A.* 22, 1454), e. g., with a bituminous soap

prepd. by mixing hot 30-50 parts of bitumen and 2-5 parts of vegetable oil, with or without resin, and saponifying with 20-40 parts of weak alk. lye.

* **Artificial marble.** G. BIA and J. E. D. DE GRANVILLE DE BIELIZE. Brit. 275,448, Oct. 26, 1926. Calcined magnesite is used with $ZnSO_4$ soln., $MgSO_4$ soln. and a mineral or resinous oil or agar-agar jelly or a soln. of a phenol-aldehyde condensation product. Fillers such as $BaSO_4$ and a small quantity of H_2SO_4 also may be added.

Molding bakelite dentures. C. H. WARDELL. Brit. 275,541, Aug. 4, 1926. Portions of the mold may be formed of a yielding material such as a mixt. of plaster of Paris 62, hard rubber 35 and bronze powder 3 parts. Other similar compns. also are described.

Pavement. A. JANIN. Brit. 275,280, Feb. 27, 1926. For a top dressing on macadam roads, aggregate of sand size is coated with a film formed from a light oil and a small quantity of bituminous material to cause the fragments to be tacky to the touch but capable of being handled without matting. The light oil is preferably applied first followed by application of less than 2.5% of a heavy bituminous material. Lime also may be added.

Thermoplastic material adapted for making sheets or boards. A. L. CLAPP. U. S. 1,668,760, May 8. Na silicate soln. is formed into a pulp together with material such as wood flour, Montan wax, resin and asphalt.

Plastic composition containing paper mill sludge. A. E. HANSEN and A. C. RUGER. U. S. 1,668,961, May 8. Paper mill sludge is used with rubber, plaster of Paris, etc. for making building boards or other products.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Notes on recent developments in fuel technology. R. WIGGINTON. *Fuel in Science & Practice* 6, 529-31 (1927).—Brief reviews of the following subjects. new pulverized fuel burner; bituminous sands of Alberta; oil transport. D. A. R.

Notes on recent developments in fuel technology. R. WIGGINTON. *Fuel in Science & Practice* 7, 1-3, 49-51 (1928).—Brief reviews of the following subjects: the Pittsburgh explosion, the Bergius method, calorific values of H and C, chamber ovens for gas manufacture, synthetic gasoline, natural steam power, submerged combustion, the Benson boiler, pulverized fuel on ships, Smith tar extractor, water gas from vertical retorts. D. A. REYNOLDS

The action of bacteria on coal. W. FUCHS. *Fuel in Science & Practice* 7, 28-30 (1928).—See C. A. 22, 1840. D. A. REYNOLDS

Notes on coal cleaning and its relation to the cost and quality of coke. G. W. J. BRADLEY. *Fuel in Science & Practice* 7, 31-6 (1928). D. A. REYNOLDS

The cleaning of coal. XXI. W. R. CHAPMAN and R. A. MOTT. *Fuel in Science & Practice* 6, 552-69 (1927); cf. C. A. 22, 493.—The economic advantages of coal cleaning are discussed. D. A. REYNOLDS

The dry cleaning of coal. H. WINKHAU. *Glückauf* 64, 1-13 (1928).—A description and discussion. ALDEN H. EMERY

Industrial chemistry of coal, its possibilities and its present needs. A. GILLET. *Rev. univ. mines* 15, 15-27 (1927). C. W. OWINGS

Recent developments in coal burning. F. S. COLLINGS. *Power* 65, 476-9 (1927).—Pulverized fuel plants of the unit type with water-cooled furnaces give best results in burning coal of low heat value, high H_2O , ash and S contents and undesirable ash characteristics. A polemic followed the presentation of the paper. D. B. DILL

The combustion of solid carbon. R. T. HASLAM. *Proc. Inst. Fuel Tech.* 1927, 8; *J. Soc. Glass Tech.* 11, 153A.—In tests by the U. S. Bur. of Mines (1917) on the combustion of coal in hand-fired furnaces, results indicated that the primary reaction $C + O_2 = CO_2$ (brought about through an intermediate complex C_2O_2) was limited by the rate of diffusion of O_2 through the stationary gas film on the solid only, the chem. reaction being practically instantaneous. The rate of diffusion was nearly proportional to the gas velocity, and the compn. of the gas at a fixed distance above the grate was const. whatever the velocity. Since the CO was produced at a rate proportional to the CO_2 , it was evidently formed by reduction therefrom. The O was always consumed completely at 3-4 1/2 in. above the top of the ash zone. Later work from the same source, by Haslam and also by Weyman and others, served to confirm the diffusion theory of reaction. The capacity of a furnace was limited only by the draft obtainable and if this was forced, by the velocity required to blow the fuel from the grate. Since

the oxidation zone was quite thin whatever the gas velocity, the fuel-bed should be kept as thin as possible, to allow of heat radiation from the oxidation zone and reduce clinking. Volatile matter should be distd. off in an oxidizing atm. Greater capacity per unit vol. of combustion space was obtained by the use of finer coal particles and by furnace design such as to give increased turbulence of the gas. H. G.

Combustion in the open-hearth furnace. W. TRINKS. *Fuels and Furnaces* 5, 477(1927); *J. Soc. Glass Tech.* 11, 270-1.—In a slow-working 60-ton steel furnace making 25 lb. per sq. ft. per hr., heat losses from walls and ports were approx. 1,750,000 B. t. u. per ton, so that with a regenerator efficiency of 40%, 4,400,000 B. t. u. were needed per ton made. Since at most 880,000 B. t. u. were required for actual working it was evident that relative wall losses could be appreciably lessened by increased rate of production. Speeding up was possible by the use of a sharp, hot, radiating flame, the hot spot of which was adjustable. With oil-fired furnaces, it was necessary, in order to maintain const. ratio of fuel to air, to keep the pressure and temp. of the fuel const., and to keep const. also the pressure of the steam for atomizing in lines near the furnace. Much could be accomplished by employing pressure-reducing valves, thermostats, return-flow systems for the fuel, and sufficiently large pipe lines to allow reducing valves to work. A trap on the steam line close to the furnace was desirable. Flame length was adjusted by variation of the ratio of pressure of fuel to steam. The direction of the flame was detd. by the slope of gas and air ports and could only be altered by rebuilding. To adjust the length of flame to suit furnace length, air ports were inclined to gas ports more steeply in shorter furnaces. Quick mixing of gas and air to give a short flame was obtained by (1) forcing gas and air through a comparatively small opening in which they mix, (2) forcing gas at a high velocity to induce air, (3) sloping ports, side walls, and roof so as to direct the air stream into the gas stream, (4) premixing some air with the gas in the gas ports, (5) by external aids such as fan draft or jets of steam or air. H. G.

Oxidation of different coals at different temperatures. II. D. J. W. KREULEN. *Brennstoff-Chem.* 8, 241-4(1927).—A flaming gas coal, a gas coal, a fat coal and a lean coal were heated in air for 6 hrs. at 125°, 150°, 175° and 225°. The resulting oxidation caused an increase in the combined water content, which runs parallel to an increase in the humic acid content, the effect being greater with increased temp. The coking properties of a coal are reduced by oxidation. The coking properties are even reduced by heating for some hrs. in a drying oven at 100-105°. The coking properties were not affected by heating a coal for 3 hrs. at 175° in an atm. of CO₂. By heating a flaming gas coal for 56 hrs. and repeated extn. of the humic acid, only 5% of the coal was not changed into humic acid. E. G. MEYER

The absorption of oxygen by preheated coal. G. COLES AND J. I. GRAHAM. *Fuel in Science & Practice* 7, 21-30(1928), cf. C. A. 19, 569.—The effect of preheating coal *in vacuo* at 300° upon its oxidation over a period of 180 hrs. at 50° and 100° was detd. for 8 coals ranging from anthracite to lignite. At 50°, bituminous coals all showed a large increase in oxidation, this increase being greater during the first 48 hrs. Lignite showed a reduction in oxidation of nearly 20%. Anthracite oxidized more during the first 48 hrs. but less during the 48-180-hr. period. At 100°, the preheated coals oxidized in the same order as at 50°. With bituminous and lignitic coals the percent increase in oxidation, due to preheating, varied inversely with the O content of the fresh coal. When oxidized at 100° there was less increase in the oxidation of the preheated coal (percentage basis), than when oxidized at 50°; this is attributed to the greatly increased absorption of O by the untreated coal at 100°. Three bituminous coals were preheated at 200°, 300°, 400° and 500°, and then oxidized at 100°; the most effective temp. was found to differ for each coal and varied from less than 300° to 400°. Preheating at 500° caused a decrease in oxidation with each coal. Preheating in N at 300° under 30 to 33 atm. pressure did not cause as large an increase in the subsequent oxidation as when the preheating was carried out *in vacuo*. D. A. REYNOLDS

Modification of the Thomson mixture for the determination of the calorific power of coals. MAURIZIO COUTURE. *Atti Il congresso naz. chim. pura applicata* 1926, 1374-5.—With the usual mixt. of 2 g. of coal and 18 g. of KNO₃-KClO₃, combustion is so rapid (17-20 min.) that serious losses occur. A greater quantity of KNO₃-KClO₃ does not prevent all loss, and with a smaller quantity of coal combustion is incomplete and irregular. Excellent results are, however, obtained if 1 g. of coal, 1 g. of NH₄NO₃ and 18 g. of KNO₃-KClO₃ mixt. are used, combustion being complete in 30-35 min. (an ideal length of time) and the results agreeing closely with those by the Mahler method. As in the ordinary 2-g. method, 10% is added in the calcs. The factor 0.54 corresponding to the NH₄NO₃ is then subtracted according to the directions of Salvadori (cf. *Gazz. chim. ital.* 36(1906)). C. C. DAVIS

Coal heat value from ash. A. W. COLE. *Power Plant Engineering* 32, 289-90 (1928).—B. t. u. for dry coal were detd. graphically from the ash content. S. D. P.

Further data on the determination of ash melting points of coal. D. J. W. KRUELEN. *Chem. Weekblad* 25, 192-4 (1928).—A more detailed description is given of the technic of detn. of the ash m. p. previously given (*C. A.* 22, 1027). B. J. C. v. d. H.

Siberian boghead coals. G. STADNIKOFF. *Brennstoff-Chem.* 8, 244-5 (1927).—An analysis of three Siberian boghead coals showed the following: moisture 1.26-3.98% (moisture-free basis) ash 5.93-14.79, and volatile matter 70.4-80.0% (ash-free basis) C 76.5-81.1, H 8.34-10.41 and N 0.56-1.12%. The gross calorific value varied from 7584 to 8325 cal. On low-temp. carbonization they yielded 39.1-48.8% tar and 10.0-39.4% semi-coke. The low-temp. tars are remarkable for their low content of phenols and org. bases. E. G. MEITER

The K. S. G. low-temperature process. J. N. HAZELDON. *Fuel in Science & Practice* 7, 155-60 (1928).—The process of low-temp. carbonization operated continuously at Karnap, Germany, since 1924 is described and illustrated. The chief feature of the process is the construction of the retort, which comprises 2 inclined concentric drums which rotate as one. The coal is fed into the lower end of the inner drum and is carried upwards by a screw conveyor to the upper end, where it falls into the outer drum and moves downward as the drum rotates to the lower end, where it is discharged. Heat is supplied externally by the combustion of producer gas and internally by steam superheated by the hot flue gases. Preheating the coal in the inner drum limits the overheating of the tar vapors and renders the entire length of the outer drum available for carbonization. The range of blends or straight coals adaptable to this process is extended by: (1) change in rate of feed of coal; (2) change in rate of revolution of the drum, affecting the depth of fuel in the retort, and the time of contact; (3) variation in temp.; (4) variation in quantity and temp of superheated steam. Cokes made at 750° contain 10-12% volatile matter and are about as hard and dense as by-product coke; they ignite readily and serve well as domestic fuel. Plant and assay yields of coke, tar, gas and light spirit are given. D. A. REYNOLDS

Three smoke abatement reports. J. B. C. KERSHAW. *Engineer* 145, 149-51 (1928).—A review of reports of (1) Hamburg Smoke Abatement for the Year 1926, (2) of the medical officer of health for Salford and (3) of the meteorological department of the County Borough of Southport for 1927. D. B. DILL

Discoveries on alcohol motor fuel in Schlesien. H. NEUMANN. *Z. Spiritusind* 50, 376 (1927).—Expts with monopolin, a motor fuel, are discussed. More power is obtained and less motor trouble is experienced with its use than with benzene mixts. C. N. FREY

Synthetic liquid fuels: the problem of the rational utilization of mineral fuels. R. BRUNSCHWEIG. *Chaleur et industrie* 9, 143-51 (1928).—An address. A. P.-C

Utilization of mineral fuels. M. BOHM, A. PONTREMOLI AND S. SALES. *Notiz chim.-ind.* 3, 143-6, 216-9 (1928).—Various German plants were inspected with a view to the application of successful processes to the utilization of low-grade fuels in Italy. These German plants and processes are described individually, and from their crit. study a general scheme is recommended for the most economical utilization of the Italian lignites and other similar natural fuels. C. C. DAVIS

Report of test on the Crozier retort installed by Mineral Oils Extraction, Ltd., at Wembley. C. H. LANDER, et al. *Dept. Sci. Ind. Res. (Brit.) Rept.* 1927, 21 pp.—The retort consists of two cast-Fe walls, 15 ft. high and 5 ft. in max. width, with semicircular ends. Temp. control is maintained by adjustable dampers on 5 inclined cross-flues passing through the retort. Coal is charged in a hopper at the top; coke is discharged by a screw at the bottom, while the retort is heated externally and through the flues by gases from a furnace burning solid or gaseous fuel. A 5-day test run indicated a throughput of 4 tons of Scottish splint coal per day yielding per ton: coke 15.4 cwt., gas (6555 cu. ft.) 23.9 therms, tar 16.4 gal., crude spirit 0.8 gal., (NH₄)₂SO₄ 9.1 lb. The temp. is 800° to 280° from the bottom to the top of the retort. A diagram of plant and detailed tables and curves of products and working conditions are included.

Vertical retort installation at Edinburgh. H. W. STRONG. *Chem. Eng. Mining Rev.* 20, 191-2 (1928).—A description of the works at Granton, near Edinburgh, Scotland. T. S. CARSWELL

Studies and investigations on the lignites of Valdarno. M. G. LEVI AND C. PADOVANI. *Atti II congresso naz. chim. pura applicata* 1926, 558-600; cf. *C. A.* 19, 2265.—The object of the expts. was to det. the suitability of the white and brown lignites as fuel, in view of which detns. were made of the calorific power, moisture, ash, C, H, S, N and

O, as well as low-temp. distn. in a Fischer rotatory furnace at 500°, with similar analysis of the solid, liquid and gaseous products. The original lignites, the tars and the semicokes were then subjected to hydrogenation under pressure (Bergius method) and the products analyzed as before. The technic is described in detail and the equipment is illustrated. The results are tabulated in full detail with an extensive discussion of their significance and value. It is considered that the lignites can be profitably distd. at low temps., under which conditions the semicoke is of special economic value as a source of elec. power and for industrial fuel. Hydrogenation is of no economic utility.

C. C. DAVIS

Chemical and technical study of a xyloid lignite of the Castellina basin at Chianti. C. PADOVANI AND A. AMATI. *Atti II congresso naz. chim. pura applicata* 1926, 601-8.—The expts. included detns. of the chief chem. and thermal properties of the lignite, its behavior on distn. at low temp. in a Fischer rotatory furnace, including the yields and analyses of the solid liquid and gaseous distn. products, and a comparison of the tars from the Fischer furnace, from the Pieters furnace and from redistn. The results, given in detail, show the lignite to be a normal xyloid lignite. It has a low ash and high calorific power, and yields a semicoke (50-60% of the dry lignite) which is of promise industrially. The tar is of good quality compared with those from other lignites, but the gas is of almost no value. The Pieters furnace is particularly adaptable to the production of a primary tar of good quality. The yield of phenols is also high enough to warrant further research.

C. C. DAVIS

Burning pulverized lignite in a Texas power plant. L. H. MORRISON. *Power* 67, 410-3(1928).—The compn. of Texas lignite used is fixed C 35.93, volatile matter 21.10, S 0.48, ash 9.16 and H₂O 33.39%. The heat value is 7069 B. t. u. per lb. Stack CO₂ is about 15%. Not more than 1% of the ash is combustible and very little ash is carried out of the stacks. The account of the plant is illustrated.

D. B. DILL

Producers for the gasification of high- and low-quality fuels and of waste products. H. BARTH. *Ker. Rundschau* 34, 494(1926); *J. Soc. Glass Tech.* 11, 269-70A.—After a discussion on the economic factors relative to the use of coal, slack, lignite briquets and peat as fuel for industrial purposes, B. described a patented producer that could be adapted with slight alterations for the gasification of all grades of fuel from rough coal to waste sludge. The grate (the most important part of the producer) could be arranged without rebuilding, either as a step grate, flat grate or combination of the two. A special feeding device allowed of the producer being used for the gasifying of fine coal or sludge, these being fed into sloping shafts at the sides of the producer. A central feeding hopper allowed of the simultaneous feeding in of other fuel—peat, briquets or coal. It was possible with such a generator to produce gaseous fuel adequate to the heat requirements of a furnace at a much less cost than when fuel of good quality was used, since the fine coal and washer sludge was in the nature of a waste product at the pit head and was obtainable at a very cheap rate.

H. G.

The gas industry. G. ARRIGO OLIVIERI. *Atti II congresso naz. chim. pura applicata* 1926, 526-9.—A crit. review of the industry in Italy.

C. C. DAVIS

Gas pressure. D. STAVORINUS. *Het Gas* 48, 163-7(1928).—The most favorable pressure for domestic gas consumption is discussed (around 75 mm.). Details and drawings are given of the "Progas" pressure reducer.

B. J. C. VAN DER HOEVEN

Corrosion of pipe lines and dehydration of gas. D. STAVORINUS. *Het Gas* 48, 110-3(1928).—A review of the Taunton CaCl₂ dehydration process (cf. Harris, C. A. 22, 311) as used in 12 English gas plants of up to 280,000 cu. m. per day production; the cost per day per 1000 cu. m. is about \$0.165. For the glycerol process (Kirkham, Hulett and Chandler) is calcd. a cost of (Radford plant) \$0.114 per day per 1000 cu. m. by assuming a glycerol price of \$0.40 per l. and a consumption of 240 l. per day per 1000 cu. m.

B. J. C. VAN DER HOEVEN

The spiral-guided gas holder at Delft. F. J. SWARTWOUT DE HOOG. *Het Gas* 48, 156-63(1928).—Description of a 14,000-cu. m. three-lift spiral-guided gas holder of 27.2 × 38.9 m. size, total twist 125°, 150, 250 and 350 mm. water pressure.

B. J. C. VAN DER HOEVEN

The influence of preheating hot gas and secondary air on the temperature of combustion and the fuel consumption. W. BRASS. *Sprechsaal* 59, 763(1926); *J. Soc. Glass Tech.* 11, 1567A.—The relationship between calorific value and theoretical combustion temp. for a preheated gas was represented by the equation $\Sigma Q_v + \Sigma C_{v_1} v_1 h_1 = \Sigma C_v v t$, where Q_v = calorific value of the gas, v_1 = vol. of preheated gas, v = vol. of products of combustion, h_1 = temp. of preheating, t = theoretical temp. of combustion, C_v = sp. heat per vol. unit of gas and C_v = that of residual gas. By use of the above equation, the effect of preheating on the combustion temp. was calcd. in 2 pro-

ducer gases. Gas of the compn. CO_2 7, CO 26, CH_4 1, H_2 14 and N_2 52% would normally give a temp. (with 10% of excess air) of 1500° when dry or 1420° with 10% of water vapor. A theoretical combustion temp. of 1800° could be reached by preheating the gas alone to 1100° , the air alone to 1350° or both to 650° . The saving of fuel by preheating was pointed out. H. G.

The constituents of low-temperature tar. E. BÖRNSTEIN. *Nature* 121, 356-7 (1928).—The presence of β -methylanthracene is confirmed in low-temp. tars from three geologically-old Westphalian coals. The yellow hydrocarbon, "Crackene," was also observed. J. H. PERRY

The constituents of low-temperature tar. G. T. MORGAN AND D. D. PRATT. *Nature* 121, 357 (1928).—Other anthracene derivs. besides β -methylanthracene have been extd. from low-temp. tars as well as complex hydrocarbons. J. H. P.

Combustibility of coke. C. HOLTBAUS. *Mitt. Dortmunder Union* 1, 194-236 (1926); *J. Inst. Metals* 38, 657-8.—The causes of the varying combustibility of coke were investigated by chem. and phys. methods. The combustibility and the ignition temp. depend mainly upon duration of coking. Gas content and ignition temp. may sometimes be taken as a criterion of combustibility. Content of metallic ore has no influence. H. G.

Evaluation and testing of foundry coke. L. ZERZOG. *Giesserei-Ztg.* 22, 477-85, 528-39 (1925); *J. Inst. Metals* 36, 657.—The influence of the nature of the coal and the temp. of conversion into coke on the suitability of the coke for foundry purposes is discussed at some length and illustrations of suitable and unsuitable foundry cokes are included, together with analyses of samples of Ger. coke of different origins and of the ash obtained from them. The combustibility of coke in the foundry is discussed chiefly with reference to the economical production of iron castings. H. G.

Coke for crucible steel melting. R. V. WHEELER. *Fuel in Science & Practice* 7, 148-51 (1928).—Beehive coke only meets the requirements of crucible steel melters. By-product cokes do not break readily into pieces desirable for good feeding of the fuel bed, are less uniform in physical characteristics, and do not afford the high temps. required. D. A. REYNOLDS

The reactivity of coke and a new method of determining it. R. A. DENGGE. *Fuel in Science & Practice* 7, 152-4 (1928).—An app. for detn. of coke reactivity is described and illustrated. Air passes over the 0.2 g. sample contained in a boat placed in a tube furnace. The dried effluent gas passes through a soln. of $\text{Ba}(\text{OH})_2$ whose cond. is known accurately, and to which is connected a Wheatstone bridge with a telephone. Rate of CO_2 formation is calcd. from cond. measurements. D. A. REYNOLDS

The coking industry in Japan. TADAJI SHIMMURA. *Fuel in Science & Practice* 7, 186-9 (1928).—The principal developments of coke-oven construction are described and statistics are given to show the present position of the coking industry. D. A. R.

The application of low-temperature carbonization to gas-producer practice. S. UCHIDA. *Fuel in Science & Practice* 7, 179-85 (1928).—A gas producer with a carbonization retort designed for using a carbonization process for Japanese coals prior to gasification is described and illustrated. Data concerning the conditions in the producer and properties of the products are given. D. A. REYNOLDS

Coke-oven operation. VACHEROT. *Gas u. Wasserfach* 71, 317-8 (1928).—Data are given for the Bielefeld Gas Works as to daily gas production, coal used and analysis of gas for each day during Feb., 1928. R. W. RYAN

Coke-oven gas properties. C. W. STEVENS. *Chem. Met. Eng.* 35, 243 (1928).—Curves based upon a 6 months' record of daily analyses show that the calorific value of coke-oven gas decreases from 585 to 540 B. t. u./cu. ft., its H content decreases from 56.7 to 45.4%, and its N content increases from 2.4 to 11.1% as its sp. gr. (air = 1) increases from 0.34 to 0.46. RAYMOND E. SCHAAD

Phenol-recovery plant avoids waste pollution of streams. H. E. JONES. *Chem. Met. Eng.* 35, 215-8 (1928).—Phenol is extd. continuously with an efficiency of 96% from the crude ammonia liquor of the coke plant by motor benzene, which is then stripped of phenol by washing with 23% NaOH soln. The Na phenolate thus produced upon acidification with 60° Bc. H_2SO_4 yields a crude phenol of the volumetric compn.: phenol 54, cresols 23, water 16 and tarry matter 7%. RAYMOND E. SCHAAD

Bituminous limestones as a source of fuels (MANUELLI) 22. Saving \$28,000 annually in paper-mill coal cost (BERGER) 23. Apparatus for charging gas producers (U. S. pat. 1,668,968) 1.

AGDE, GEORG, AND SCHMITT, H.: *Theorie der Reduktionsfähigkeit von Steinkohlenkoks auf Grund experimenteller Untersuchungen*. Halle (Saale): W. KNAPP, 165 pp. M. 16.50; bound, M. 18.50.

AUFHÄUSER, DAVID: *Brennstoff und Verbrennung. II. Verbrennung*. Berlin: J. Springer. 107 pp. M. 4.20.

HOTZ, EDGAR: *Untersuchungen über die Wirkungsweise des Steinkohlenteers als bituminöses Bindemittel bei Teermineraldecken*. Karlsruhe: F. Gutsch. 145 pp. M. 10.

PULT, ANTONIO: *Il problema dei combustibili. Studi teorici ed applicazioni industriali. Part I: Il potere agglomerante nelle ligniti xiloidi*. Pistoia: G. Grazzini. 47 pp. L. 7.50.

THAU, A.: *Die Schwelung von Braun- und Steinkohle*. Halle (Saale): Wilhelm Knapp. 722 pp. Bound, M. 52. Reviewed in *Ind. Eng. Chem.* 20, 557 (1928).

Fuel. A. B. LOW. U. S. 1,669,341, May 8. A relatively slow-burning fuel is formed from finely divided Fe pyrites 5, a finely divided nitrate such as NaNO_3 3 and a finely divided carbohydrate, e. g., dextrin 0.5 part. Na_2CO_3 1 part may be added.

Carbonized fuel. W. W. STRAFFORD. U. S. 1,667,906, May 1. An aq. colloidal suspension is formed from pulverized coking coal, this suspension is mixed with pulverized non-coking coal and the mixt. is molded and carbonized.

Powdered fuels for Diesel engines, etc. I. G. FARBENIND. A.-G. Brit. 274,462, July 13, 1926. Mineral coal 80 and a coaly material of more recent origin such as lignite 20% are used together.

Synthetic liquid fuels. SOC. INTERNATIONALE DES PROCÉDÉS PRUDHOMME HOUDRY. Brit. 275,585, Aug. 3, 1926. Gaseous products obtained in the combustion of tars, heavy oils and the like are brought into contact with H or a H-bearing gas such as water gas which have been passed through a metallic filter, so that hydrogenation is effected in the absence of a catalyst. An app. is described.

Fuel briquets. A. M. HART. U. S. 1,668,643, May 8. Na silicate is used as a binder with carbonized vegetable matter such as grasses, weeds, leaves, "tropical waste" and sea weeds.

Fuel and ore briquets. KOKS- UND HALBKOKS-BRIKETTIERUNGS GES. Brit. 274,876, July 24, 1926. The material is briquetted with 3-6% of very finely ground clay and sulfite waste liquor may also be added to strengthen the briquets formed. Waterproofing materials also may be added and the briquets may be roasted or kiln-dried.

Drying and destructive hydrogenation of fuels. I. G. FARBENIND. A.-G. Brit. 274,858, July 21, 1926. Moist fuels such as brown coal, peat, wood, tars or mineral oils are heated under pressure to above 200° and the sepd. water is removed. The operation is facilitated by stirring, centrifuging, action of an elec. field or addn. of reagents such as PhNH_2 or alkyl sulfonates. The fuels so treated are suitable for subsequent destructive hydrogenation.

Apparatus for low-temperature distillation and carbonization of fuels. J. PLASSMANN. Brit. 275,546, Aug. 5, 1926. Modifications are specified in the app. described in Brit. 240,800 (C. A. 20, 2243).

Carbonizing coal. W. RUNGE. U. S. 1,669,023, May 8. Pulverized coal having agglutinating properties is preliminarily suspended in hot air until it loses its agglutinating properties and a small proportion only of its volatile content; the coal, still retaining its finely divided state, is then subjected to carbonization in hot gases which are inert to it, forming a finely divided carbonized residue. An app. is described. U. S. 1,669,024 relates to a similar process and app.

Carbonizing coal. C. B. WISNER. Brit. 275,602, Aug. 7, 1926. In the first stage of a 2-stage process of coal distn. the coal is heated with access of air to retain a sufficient hydrocarbon content to allow the charge to take the form of balls, and in the second stage the material is carbonized at a temp. sufficient only to remove condensable hydrocarbons. An app. comprising rotatable retorts is described.

Low-temperature distillation of coal or lignite. E. PIRON. Brit. 275,178, July 27, 1926. Particles of coal or lignite not larger than 0.25 in. are heated in a layer 0.25-0.75 in. in thickness on a stationary hot surface at a temp. of about $590-730^\circ$.

Low-temperature distillation and hydrogenation of coal. R. FRIGG. Brit. 274,465, July 16, 1926. Coal is dried in a drum heated by exhaust gases from a turbine and sifted. The fine material is used for heating a boiler and the coarser particles are passed into retorts through which gases and vapors from a condenser may be passed. Part of the coke formed is used in a gas generator which also may be supplied with dust

from the grinding mill. O from electrolytic decompn. of water is supplied to the gas generator and distn products from the coal are hydrogenated by the H formed by the electrolysis of the water. An app. is described.

Distilling and carbonizing coal and oil or similar materials. W. E. TRENT. U. S. 1,668,132, May 1. A heat storage element such as a cast Fe cover is placed over charge units to be treated as these are passed through the treating chamber and these serve for transmitting heat to the charge. Vapors and gases evolved are discharged below the fuel charges. An app. is described. Cf. C. A. 21, 3449.

Use of ethylene as a fuel for airship engines. HOLZVERKOHLEND-INDUSTRIE AKT.-GES. Brit. 274,811, July 20, 1926.

Oil gas. C. A. PHELPS. U. S. 1,669,172, May 8. A portion of the oil used is completely burned with air and the heat thus generated is used to heat a checker-work to a temp. above the reaction temp. of the products of combustion with volatilized and cracked products of the oil; a remaining portion of the oil is volatilized and cracked with heat from the combustion but out of direct contact with the combustion products; the volatilized and cracked products are then mixed with products of combustion and the mixt. is passed into contact with the heated checker-work to produce a uniform combustible gas. An app. is described.

Pulverized wood for fuel. S. SHIMAMOTO. U. S. 1,668, 660, May 8. Sawdust is softened by treatment with a hot milk of lime soln., mixed with powd. coal and formed into briquets which are pressed and dried.

Recovery of benzene, etc., from gases. GES. FÜR LINDR'S EISMASCHINEN AKT.-GES. AND SOC. ANON. METALLURGIQUE DE SAMBRE ET MOSELLE. Brit. 275,633, Aug. 4, 1926. Gas such as that produced by coal distn., freed from tar and preferably also from NH_3 , is passed through a compressor to a cooler which is fed with water at such a temp. and in such a quantity that C_6H_6 , oil from the compressor and water are deposited as an emulsion in a separator to which the cooler is connected; the gas passes thence to additional coolers for condensation of C_6H_6 . An app. is described.

Water-bottom gas producer. T. R. WOLLASTON. Brit. 275,411, Aug. 3, 1926

Water-gas plant. R. & J. DEMPSTER, LTD., and C. ANDREWS. Brit. 275,490, Jan 22, 1927.

Automatic electric control system for operating the valves of gas-making apparatus. J. S. KENNEDY. U. S. 1,668,319, May 1.

Distilling tar. SOC. DES ETABLISSEMENTS BARRET. Brit. 274,513, July 17, 1926. Gas and coke-oven tars are distd. by heating under pressure to 150-170° and then reducing the pressure and permitting ammoniacal liquors and light oils to distil and sepg. these by decantation. An app. is described.

Batch distilling apparatus for producing coke and generating gas. W. E. TRENT. U. S. 1,668,131, May 1.

Coke-oven battery construction. H. H. KOPPERS. U. S. 1,669,168, May 8.

Coke-oven construction and pressure-regulating device for same. DR. C. OTTO & Co., GES. Brit. 275,139, July 30, 1926.

Regenerative coke-oven construction. SIMONCARVES, LTD., and J. H. BROWN. Brit. 274,653, Aug. 6, 1926.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

The present and future of the Italian petroleum industry. STEFANO FACHINI. *Atti II congresso naz. chim. pura applicata 1926*, 518-22.—A crit. review of the present economic situation in Italy and the influence of foreign industries on the future of the Italian industry. It is considered that by proper application of cracking processes to heavy oils and residues a large expansion can be attained. C. C. DAVIS

Tabulated analyses of representative crude petroleum of the United States. N. A. C. SMITH AND E. C. LANE. *Bur. Mines, Bull.* 291, 69 pp.(1928); cf. C. A. 21, 2183. E. H.

Separation of the components of petroleum. VI. **The action of glacial acetic acid.** P. F. GORDON AND J. MERRY. *J. Soc. Chem. Ind.* 46, 429-32T(1927); 47, 30T(1928); cf. C. A. 21, 2979.—Untopped Persian petroleum was divided into two parts by extg. with glacial AcOH and the acid-sol. portion fractionated by adding successive portions of H_2O . Large amts. of the volatile components were lost in dehydrating. All fractions, acid-sol. and -insol., flashed at about 50°. The acid-insol. portion yield-

ed about 5.1 g. of asphaltic residue per 100 cc. of crude, a larger % than with AmOH, abs. alc., abs. alc. added to Et₂O soln., CHCl₃, or Et₂O as the solvent, or by filtering after topping with open steam. These residues were all similar and were probably dropped out of suspension after the solvent had removed the protecting membrane of oil. The asphalt when refined was shown to consist of wax crystals and a brown oil, probably a fine and stable emulsion. The acid-insol. oil dissolved in Et₂O was fractionated by successive additions of abs. alc., and then of water. The abs. alc. threw out the heaviest fractions first. Crude oil was similarly fractionated from Et₂O soln. The acetic acid solns. contained the heaviest and the lightest fractions of the oil. The portion of the crude oil insol. in AcOH was intermediate in sp. gr. probably because of the presence of wax, since it contained all the wax in the crude oil except that in the asphalt.

E. E. CRANDAL

Studies and researches to obtain fuels from bituminous rocks and from heavy petroleum of Italy. M. G. LEVI, C. PADOVANI AND A. AMATI. *Atti II congresso naz. chim. pura applicata* 1926, 530-55; cf. L. and P., *C. A.*, 19, 2265.—The expts. dealt with petroleum from S. Giovanni Incarico, 2 bituminous ores from Sicily, Serradifalco schist and bituminous or asphaltic limestone from Ragusa and consisted essentially in cracking and in heating with H under pressure (Bergius process) of the distd. oils. The cracked and hydrogenated oils were compared with the corresponding oils by detns. of calorific power, d., S, I no., viscosity, inflammability, ash, etc., and the gaseous products were analyzed. The extensive data are tabulated in complete detail. The Serradifalco schist was exceptionally rich in bituminous substances and gave on distn. a very high yield of oil. The gas contained 25% H₂S and had such a calorific power and was of such quantity that it would furnish most of the heat for distn. on an industrial scale. In simple cracking, the difference between the final pressure and the initial pressure (atm. pressure) of the charge is always a positive value, whereas in hydrogenating cracking (Bergius) this difference is always a negative value. This shows that, during hydrogenation, the contraction from absorption of H (1-3% absorption based on the original oil) compensates and even exceeds the ultimate increase of vol. by evolution of non-condensable gases. The temp.-pressure curves tend to confirm the recent supposition of Kling and Florentin (*C. A.* 20, 1587, 1791). A comparison of the compn. of the gases obtained by simple cracking and by hydrogenation under pressure does not show any notable differences in the % of unsatd. components. On the other hand the % of satd. hydrocarbons, CII₄ and C₂H₆, is far greater in the gases from simple cracking, indicating that the antidissociating action of H on the gaseous phase predominates over the true chem. satn. action. The favorable influence of H under pressure on the pyrogenic disson. is also evident in the relatively low % S and I no. of the oils produced with H, the higher the pressure of H the lower these values. The results show that at elevated temps. with H under pressure and with a single compd., there is an optimum temp. and pressure at which the resistance of hydrogenated products is diminished sufficiently, without however causing so extensive disson., that the pressure of H fails to predominate. The expts. also show that it is possible to control the pyrogenic decompn. of heavy oils by the use of H under suitable pressure, and thus to obtain a very high yield of light oils. Particularly noteworthy is the tendency for these light oils to have a very low S content, the S being in part eliminated in the gases, in part fixed by the Fe oxide and most of the remainder appearing in the heavy oils. C. C. D.

A comparison of the results obtained with the oxygen-bomb and Carius methods in determining sulfur in the heavier petroleum oils. J. M. DEVINE AND F. W. LANE. *Bur. Mines, Repts. Investigations* No. 2866, 3 pp. (1928).—For oils of 2.5 to 0.15% S content the O-bomb method gives consistently lower results than the Carius method. The variation amounts to 3.1% for a sample of 2.47% S content and increases with decrease of S content to 7.3% for oil contg. 0.15% S. Presence of NH₄NO₃ in the bomb did not materially influence the results with the oils studied. Conclusion: The Carius method is necessary only when results of the highest accuracy are essential.

D. F. BROWN

The manufacture of fuel oil. HECTOR PAULEUR. *Rev. univ. mines* 15, 234-45 (1927).

C. W. OWINGS

Desirable qualities of a motor fuel for internal-combustion engines. E. DAVIN. *Génie civil* 92, 140-2 (1928).—An app. for testing homogeneity of gasolines is described. Volatility, homogeneity and anti-knock properties are the 3 most important factors in evaluating motor fuels.

CARL R. FELLERS

Motor fuel anti-detonants. Their history and development. H. S. TEGNER. *Chem. Trade J.* 82, 427-9; *Chem. Age* 18, 388-9 (1928).

E. H.

Cleaning Diesel oil by a centrifuge. L. S. CHEATHAM. *Power* 67, 471 (1928).—

About 1.1% H_2O and 0.024% solids are removed from California residuum oil of 19% B \acute{e} . by centrifuging in a DeLaval app. at 170° F. D. B. DILL

• **Designing equipment for chemical treatment of oil distillates.** J. C. MORRELL AND D. J. BERGMAN. *Chem. Met. Eng.* 35, 210-4(1928).—Designs are given of columns for mixing petroleum distillates with H_2SO_4 , NaOH or plumbite soln. The efficiency of contact between oil and reagent, with the different mixing devices designed, decreases in the order: orifice, packed (Raschig rings preferred) and baffle-plate column. Jet, mechanical and pump mixers are also discussed and blow-cases for introduction of treating reagents are described. RAYMOND S. SCHAAD

A rapid corrosion test for gasoline. H. P. RUE. *Bur. Mines, Repts. of Investigations* No. 2862, 5 pp.(1928).—A Hg corrosion test developed by the Barnsdall Refineries, Inc., comprises shaking 1 cc. of metallic mercury with 100 cc. of the sample in a 4-oz. bottle for two min. The gasoline is then decanted off and filtered at once and the filter paper dried. The intensity of the black ppt. on the paper is the measure of the corrosiveness of the gasoline. The test seems to offer possibilities, especially in the control of continuous sweetening plants using doctor soln., and in testing the corrosion of very volatile gasolines. D. F. BROWN

Gasoline stripping plant. V. DENISEVICH. *Azerbeydj. Neft. Khoz.* 1928, No 1, 59-64.—A plant is described and very complete drawings are supplied. The slightly preheated crude oil is pumped through a tube still, which is connected to an evaporator; both are heated from the same fire box. The evaporator is placed in the stack and is heated by open fire and flue gases. The gasoline, ligroin (Russian) and partly the light kerosene are evapd.; the oil left is heated in the battery in the customary way. The evapd. fraction consisted of 3.73% of benzine, 2.32% of ligroin, 4% of light kerosene. The crude oil contained originally 5.5% of gasoline. The crude oil had a temp. of 75° when it entered this still and 175° on leaving. The heat recovery of this equipment is given as about 75%; fuel consumption 0.7%. A. A. BOEHLINGK

Some new developments in the utilization of mineral oil. FELICE EPSTEIN. *Atti II congresso naz. chim. pura applicata* 1926, 451-67.—A crit review and discussion of recent developments. C. C. DAVIS

Observations on insulating mineral oils and methods of control. STEFANO FACHINI. *Atti II congresso naz. chim. pura applicata* 1926, 523-5.—A crit. review of the desirable properties of transformer oils, with special reference to the work of Snyder (cf. C. A. 18, 1193; 20, 1513). Exception is taken to the opinion that the Italian method of testing is unreliable. Tests of numerous oils during 2 yrs., using the Italian testing procedure, indicate that the method is satisfactory for distinguishing the relative quality of different oils. C. C. DAVIS

Use of the formolite reaction for testing mineral oils. M. BORODULIN. *Neft-yanoye Khoz.* 14, 363-4(1928).—When the formolite ppt. is washed with water, the first part of the water is clear but gradually it becomes brown. This is attributed to the presence of $(NH_4)_2SO_4$, which is gradually washed out and the formolite is dissolved. B. recommends the use of methylal, the methylal residue being sol. in $CHCl_3$. A. A. BOEHLINGK

Deterioration of mineral oils. II. Mechanism of oxidation and action of negative catalysts as determined by static methods. BRIAN MEAD AND COLLABORATORS. *Ind. Eng. Chem.* 19, 1240-5(1927); cf. C. A. 21, 1345.—The subject was studied statically by (A) exposing closed tubes of oil to the action of O for a period of time at 130°; (B) leaving the tubes open to the air at 150°; (C) testing a large number of substances for their antioxidant action. (A) Effects of varying temp., time, area of oil surfaces, and chem. unsatn. were noted; the catalytic effect of initial acidity upon sludge formation appeared as a possibility. (B) This possibility was strengthened by the results with open tubes. (C) $MeC_6H_4NO_2$, $PhNO_2$ and S showed very marked antioxidant action. E. E. CRANDAL

Insulating oils. C. O. HARVEY. *Chemistry and Industry* 46, 904-6(1927).—According to Rodman 3 types of sludge are found in transformer oils: asphaltic sludge, which consists of oxygenated compds. of high mol. wt. and which is a good insulator but interferes with the transference of heat away from the windings of the transformers; soap sludge, produced by the formation of salts of org. acids in the oil and having poor insulating properties; and carbon sludge, the result of arcking or the corona discharge; this is less common than the others and is easily removed by filtering or centrifuging. The Michie sludge test by which the oil, held at 150°, is blown with air for 45 hrs. is tedious, difficult to control, and takes no account of acid compds. formed which do not constitute any part of the sludge. Kissling's tar test takes account only of the acidic compds. produced. The Brown-Boveri test attempts to measure sludge, acidity and

peroxide development. Olefins if present in the oil may polymerize or may be oxidized to ozonides or peroxides, to be followed by the formation of aldehydes, ketones and acids. Diolefins may undergo similar reactions. Naphthenes may form naphthylenes, which may polymerize or may yield asphaltenes. If S and N compounds exist in the oil they may serve to accelerate polymerization as in the vulcanization of rubber hydrocarbons, especially as combined S is found in asphaltenes from natural asphalt. If phenols are formed during the oxidation they may combine with ketones and aldehydes to give resinoid substances. Van der Heyden and Typke have recently shown that exposure to light may aid in the development of sludge and acidity; and Becker has found that the silent discharge causes mol. condensation, loss of H, and increased viscosity.

E. E. CRANDAL

Tube still for distillation of crude oil. I. N. ACKERMAN. *Neftyanoye Khoz.* 14, 193-212(1928).—Very complete calcns. are given for the construction of tube stills, including whole equipment such as evaporators, condensers, heat exchangers, etc.

A. A. BOEHLINGK

Separation of fractions and the size and shape of rectification columns. K. V. KOSTRIN. *Neftyanoye Khoz.* 13, 180-7(1927).—Higher columns increase the fuel consumption of stills. By increasing the cross section of the column the fuel consumption is not always increased. Very high columns connected to open-fire stills improve the sepn. of heavy fractions; those for steam distn. improve the sepn. of light fractions. A high narrow column works better than a wide low one with the same capacity.

A. A. BOEHLINGK

Changes in construction of present-time stills. S. VUSHETRAVSKII. *Azerbeydj. Neft. Khoz.* 1928, No. 3, 58-69.—Diff. still equipments used by American oil concerns are described together with two Russian constructions which have never been made known. The still constructed by Krupoves for the Shibaev Company in Baku is a combination of 3 stills in cascade form. Each still has a dephlegmator. The preheated gasoline enters the top dephlegmator; the uncondensed vapors enter the top still; from the top still the evapd. gasoline is led into the second dephlegmator, then second still, etc. The still constructed by Pokrovskii for the A. I. Mantashev Company in Baku, is based on the same principle, but in construction details is slightly different. A. A. B.

Crude oils from the district of the Kruinskaya settlement (Kuban, Black Sea District). A. O. YURKOV. *Neftyanoye Khoz.* 14, 217-9(1928).—Some of the wells have a high percentage of gasoline, 6.6%, b. 100°, and 28.8%, b. 200°; but the sp. gr. is high and the amount distg. below 100° is not satisfactory. As the wells are rich in gas it might be possible to improve the gasoline fraction. The kerosene fraction gives a satisfactory yield but the sp. gr. is high, which indicates a high content of aromatics or of S. The mazout is similar to Kaluga crude oil but it contains less tarry substances. It is possible to obtain an appreciable amount of lubricating oils. The high sp. gr. prohibits its use for fuel. The Kruinskaya crude oil has less aromatics than the crude oil from Maikop. Consts. are given for the oils.

A. A. BOEHLINGK

New method for improving the viscosines (cylinder stocks). L. GUKHMAN. *Azerbeydj. Neft. Khoz.* 1928, No. 2, 61-3.—Cylinder stocks obtained from Balakhanui crude oil are called viscosines; those from Emba crude oil, vapors. Vapors have a better color (green) and are lower in carbon, 2.1-3.1% against 3.0-7.0%. The viscosine was obtained after acid and caustic treatment of bottoms ("Nigrol"). The washing of this cylinder stock was very complicated because of high viscosity. Gurvich suggested the use of steam, which improved the quality and eliminated the treatment with caustic. The ash content dropped considerably. To obtain viscosines of higher viscosity it was necessary to distil off the lighter parts, still increasing the ash content. Pengu suggested mixing bottoms with flash 300° with 1/3 of fuel oil to ppt. the acid sludge. To obtain heavier viscosines less distn. was necessary, cheapening the production considerably. The bottoms from Emba are treated in a soln. of Solar oils. This method was used for Balakhanui bottoms on a lab. scale. It produced a good color and lower C content and much less H₂SO₄ was required. The proportion used was 2 parts by wt. of bottoms with flash 305° and 1 part of black Solar oil with sp. gr. 0.880-0.882. Viscosity of the mixt. was E₁₀₀ 2.7. Twelve % of acid was required for treatment (on the amount of bottoms). Treatment was carried out in two steps with 3 and 9% of acid. The temp. during the process was 20-25°. Loss through treatment was 36-37%. For a cylinder stock of higher viscosity this product was partly distd. off. The distillates could be used for different lubricating oils after one or two treatments with caustic. The satisfactory results are due in great part to the low temp. used in treating the bottoms.

A. A. BOEHLINGK

Cracking or hydrogenation? M. NAPHTALI. *Chem. Umschau Fette Oele Wachse*

Harze 35, 100-3(1928).—A general review of present methods of cracking the heavier petroleum oils and of hydrogenating hydrocarbons and coal with and without catalysts.

P. ESCHER

Cracking of mazouts from heavy crude oils. A. N. SAKHANOV and M. D. TILICHEV. *Neftyanoye Khoz.* 14, 328-53(1928).—An investigation was made of the methods of cracking for obtaining (1) a better fuel-oil (lowering of cold test and viscosity), (2) gasoline and fuel-oil, (3) gasoline and coke. A method was developed for testing oils for cracking at 425°, a pressure of 10-60 atm., depending on the product used and the kind of cracking desired, and during periods of 10 min. to many hrs. The speed at which gasoline and kerosene are formed is practically the same for all mazouts and heavy crude oils. At 425° are formed in 30 min. 8-10% gasoline and 12-15% kerosene; in 60 min. 18-20% gasoline and 18-22% kerosene. For higher temps. the rate of cracking is doubled every 10°. The speed of formation of gasoline and kerosene is dependent only on time and temp., not on the pressure. The rate of formation of coke depends to a great extent on the nature of oil used. The following oils have been investigated: Mazout from Surakhanui; heavy crude from Voznesenskii, from Binagadii, from Kaluga; paraffin, mazout from Groznui; oil tar from Groznui. Surakhanui mazout formed the lowest % of coke; oil tar from Groznui the highest. A certain amount of cracked gasoline corresponds to a certain amount of coke for each oil. This relation is independent of the temp. The calcn. of a cracking unit depends on the gasoline and on the amount of coke expected. The following exptl. data have been obtained for Groznui paraffin mazout: When cracked according to (1) the cold test is decreased from plus 34° to plus 11°. According to (2) 35% of cracked gasoline and 1% of coke are formed. (3) With heavy cracking, up to 57% of gasoline and 15% coke could be obtained. Mazout from Surakhanui yields 50% gasoline at 1% of coke. By applying the first method of cracking to Kaluga crude oil the viscosity could be lowered sufficiently to make it very suitable for fuel oil. The cracking of oil tar and paraffin tar from Groznui could not be carried out on a commercial scale because of excessive formation of coke. These expts. were carried out in an autoclave with release for vapors.

A. A. BOEHLINGK

Acid sludge from oil fractions from Emba crude oil. S. OBRVADCHIKOV. *Neftyanoye Khoz.* 14, 360-2(1928).—The acid sludge was washed with water, the residue heated in an oil bath to 130-150°. At this temp. the coke sepd. from the tar. The sepd. tar was treated with air at 300° and asphalts m. 80°, 60° and 30° were obtained. At 130° there were formed water and gas 2.15%, asphalt 53.6%, coke 44.25%; at 150° water and gas 6.03%, asphalt 51.82%, coke 42.15%; at 170° water and gas 13.94%, asphalt 50.87%, coke 35.19%. The coke mixed with some cheap oil could be used as fuel. This coke contains up to 2% of ash and could not be used for electrodes.

A. A. BOEHLINGK

Lubricating oils and their rational use. STEFANO FACHINI. *Atti II congresso naz. chim. pura applicata* 1926, 514-17.—A crit. discussion, with special reference to the advantages of "Vollol" oils.

C. C. DAVIS

Bituminous limestones as a source of lubricants and of fuels. CAMILLO MANUELLE. *Atti II congresso naz. chim. pura applicata* 1926, 423-50.—Expts. are described to illustrate the manner in which asphalt oils can be transformed into light oils and benzine, which are quite suitable as lubricants and as fuels. In principle, the asphalts are steam-distd. *in vacuo* by a continuous system where the hot asphalt oil falls through towers and is met by ascending superheated steam. By proper control of the temps. of oil and steam and with several towers in series, benzine, light, medium and heavy oils and bituminous residues are sepd. Detailed tabulated data show the properties of the various fractionation products obtained in representative runs. The lubricating oils are yellow or red, solidify only at temps. far below 0° and are practically neutral. Expts. on the cracking of asphalt oils in the vapor and in the liquid form are also described, with tabulation in detail of the data. The results show that when properly treated, asphalt oils are a valuable source of benzine. A review is included of earlier attempts at the utilization of bituminous rocks and the possibilities of an Italian industry. C. C. D.

The utilization of bituminous rocks, with special reference to Sicily. MARIA BAKUNIN. *Atti II congresso naz. chim. pura applicata* 1926, 468-513.—A crit. review and discussion, the subjects including the historical aspects, the character of the bituminous rocks of Sicily, their org. components, distn. and cracking processes, treatment of the oils and the economic status of the industry. C. C. DAVIS

Comparison of Foreign and Soviet lubricating oils. G. ANDREYEV. *Neftyanoye Khoz.* 14, 354-9(1928).—Usual tests are run on 4 American spindle oils and 4 Russian oils. The Russian oils have a lower flash point. The cold test is in favor of Russian

oils, being below -20° ; also the resin content. American spindle oils are paraffin-base oils; the Emba (Russian) oil seems to be of the same nature. A. A. BOEHLINGK

Lubricating oils from Surakhanui crude oil. A. SAKHANOV. *Azerbejdj. Nefti. Khoz.* 1928, No. 1, 50-2.—The light fractions of this oil consist of naphthenes, the heavy of paraffins. The crude was worked up for lubricating oils after distn. of the gasoline and kerosene. The fractions left for lubricating oil amounted to about 54.2%. This mazout was distd. under a vacuum varying between 8 and 13 mm. The diff. fractions had d. 0.858-0.932, E_{100} 1.3-10.0, b. $122-322^{\circ}$, cold test -17.5 to plus 35° , flash (Brenken) $143-341^{\circ}$. About 72% of mazout was recovered as oil. Approx. 28% of residue left was taken up with ligroin and treated with fuller's earth (50%). The paraffin wax was frozen out at -15° and filtered. The filtrate after evapn. of the ligroin consisted of cylinder stock, free from paraffin. d_{15} 0.920, flash 323° , cold test 19° , E_{100} 7.0, color dark red. The treatment of the residue is carried out without difficulty as no asphaltenes are present. Lighter cylinder stock could be obtained, providing the lubricating oil fractionation is not carried out that far. This stock compares very favorably with American cylinder oils. About 10% of the residue consisted of crude paraffin wax with melting point 60° , 75% of which is a high-grade, slightly yellow ceresin m. 65° .

A. A. BOEHLINGK

Some modern methods of recovery of lubricating oil. A. J. BROUGHALL. *Chemistry and Industry* 46, 1096-9, 1112-7 (1927).—About half of the lubricating oil used could probably be reclaimed. Ten per cent of the cost of electricity produced by Diesel engines is accounted for by the cost of the lubricating oil. The impurities usually found in lubricating oils include (1) H_2O , (2) metallic particles produced by wear, (3) C particles formed by heating the oil to a high temp. and (4) particles of grit. Oil from internal-combustion engines will also contain heavy fuel ends. The impurities are removed by settling, centrifuging or filtering. By a process used with a settling tank made by Industrial Waste Eliminators, Ltd., the 80-gal. tankful of oil is heated to boiling point and held there 15-20 min., dropped to $170-180^{\circ} F.$ and allowed to stand at that temp. for 2 weeks for water and sediment to settle out. The temp. for light oils is $150^{\circ} F.$ and the time 1 wk. The Stream-Line filter, made by the Stream Line Filter Co., Ltd., filters by passing the liquid between the leaves of packed columns of papers. The pressure on the column controls the fineness of the particles which will be carried through. The colloidal C in a used lubricating oil can be filtered out completely. The paper must be so prep'd. that the solid particles do not penetrate between the fibers; otherwise the edges would thicken. In the commercial stream-line filter the solid residue from the oil remains outside the oil, only the clean oil passing between the papers into the center holes which lead to the outlet. Heating arrangements and a small vacuum pump are provided to vaporize and draw off the light oil and H_2O and these are then readily absorbed in the paper. The vacuum pump can be converted to an air compressor for forcing off the cake of solid particles. Tables of data show the results obtained by settling, centrifuging and the stream-line filter. E. E. CRANDAL

Treatment of bottoms from the lubricating-oil fraction of Emba crude oil. N. CHERNOZHUKOV. *Neftyanoye Khoz.* 13, 188 (1927).—The heavy bottoms were treated with a mixt. of 2 parts of H_2SO_4 and 1 part of naphthenic acids left from treatment of engine oils. Forty-five % of oil could be sepd. this way. A. A. BOEHLINGK

Pyro-benzine from mazout from Surakhanui paraffin oils and from residue from heavy gas tars. N. NOVIKOV-VAKULENKO. *Azerbejdj. Neft. Khoz.* 1928, No. 1, 55-9.—Heavy residues were atomized and blown against a heated surface of fire bricks of a gas-producing equipment. The temps. of vapors leaving the brick surface were $617-774^{\circ}$, depending on the nature of residue. After passing a hydraulic seal and scrubbers they were ready for use. In this way was obtained about 33.5-54% of gas; the rest was tar. This tar was heated to 175° and the distillate re-distd. according to Engler. The following oils and residues were used. (1) Solar oil, d. 0.889; temp. of gas leaving the brick surface 617° , leaving the producer 551° ; tar (hydraulic) condensed, d_{15} 0.9006 63.5%; gas yield 33.5%, distn. of tar up to 175° 3.08%, $175-240^{\circ}$ 6.82%, $240-260^{\circ}$ 5.77%; residue left 82.94%. (2) Concd. paraffin mazout, d. 0.9172; temp. of gas leaving the heated brick surface 737° , leaving the producer 646° ; tar (hydraulic) condensed, d_{15} 0.9208 61%; gas yield 36%; distn. of tar up to 175° 11.45%, $175-240^{\circ}$ 13.9%, $240-260^{\circ}$ 6.07%; residue left 63.8%. (3) Mazout from Surakhanui paraffin crude oil d. 0.8939; temp. of gas leaving the heated brick surface 774° , leaving the producer 623° ; tar (hydraulic) condensed, d_{15} 0.9580 43%; gas yield 54%; distn. of tar up to 175° 9.43%, $175-240^{\circ}$ 9.59%, $240-260^{\circ}$ 6.29%; residue left 74.09%. (4) A mixt. of heavy gas tar and mazout from Balakhanui paraffin crude oil in equal parts; temp. of gas leaving the heated brick surface 790° , leaving the producer 650° ;

tar (hydraulic) condensed, d_{20}^{20} 0.9780 (11.4%), light tar 17.8%; gas 67.8%; distn. of tar up to 175° 6.83%, 175-240° 16.53%, 240-260° 4.17%. All tars contained naphthalene. The compns. of gases obtained from these tars for Solar oil and for mazout from paraffin crude oil were, resp., CO_2 0.7-1.3, 0.8; CO 0.7-0.5, 1.0; O_2 1.1-1.6, 1.8; H_2 9.2-25.4, 16.79; CH_4 46.7-36.5, 36.14; heavy hydrocarbons 38.8-27.6, 20.8; N_2 2.8-7.1, 22.67%.

A. A. BOEHLINGK

Methods of dealing with paraffin troubles encountered in producing crude oil. C. E. REISTLE, JR. *Bur. Mines, Tech. Paper* 414, 39 pp.(1928).—Paraffin accumulation in wells and flow lines is affected by temp., loss of volatile constituents in the oil and suspended inorg. material. By proper control of these factors, paraffin deposits can be reduced or eliminated. Control methods are discussed with respect to flowing wells, wells flowed by compressed air or gas, pumping wells during the transition period, settled pumpers, paraffin in the sand, flow lines and tanks. Methods of removing deposits from casing and tubing are described with respect to the use of standard tools and elec. hoist and paraffin hook. Removal of paraffin from the tubing of pumping wells is discussed with respect to pulling rods and use of the paraffin hook, knife or auger, the use of rod guards or protectors, the use of solvents, elec. heaters, steam and chemicals. Methods of removing paraffin deposited on or in the sand are: raising the fluid level, use of solvents, circulation of hot oil, and use of compressed air or gas, steam, flame at the bottom of the well, chemicals, sand reamers and explosives. Advantages and disadvantages together with the cost of each method are pointed out. D. F. B.

Determination of sulfur and sulfur derivatives of hydrocarbons in naphtha solutions and in petroleum distillates. W. F. FARAGHER, J. C. MORRELL AND G. S. MONROE. *Ind. Eng. Chem.* 19, 1281-4(1927).— H_2S is pptd. as CdS , free S is removed by shaking with Hg and the loss detd. Mercaptan S is estd. by removing as Pb mercaptide. Disulfides are reduced to mercaptans and detd. as mercaptides. Sulfides are pptd. from the residual oil with HgNO_3 and residual S is detd. in the sample by the lamp method. Sulfide S is found by difference.

J. E. CRANDAL

Action of refining agents on pure sulfur compounds. M. A. YOUTZ AND P. P. PERKINS. *Ind. Eng. Chem.* 19, 1247-50(1927).—Solns. of pure hydrocarbon sulfides, disulfides and thiophenes in straight-run naphtha were made up of such concn. as to contain about 0.5% of S. These solns. were treated with 95% H_2SO_4 , AlCl_3 , SiO_2 gel and fuller's earth, and the loss of S was detd. H_2SO_4 has mainly a solvent action, AlCl_3 affects all the S compds.; SiO_2 gel removes all the forms of S partially but has the least effect upon thiophenes; fuller's earth is not effectual for secondary sulfides, disulfides or thiophenes.

E. E. CRANDAL

Ultramicroscopic study on asphalt. F. J. NELLENSTEIJN AND J. P. KUIPERS. *Chem. Weekblad* 25, 190 2(1928).—It is shown from tables of observations of the ultramicroscopic picture of asphalts, natural (Trinidad and Neufchatel) and artificial, dissolved in various solvents that all of them show ultramicroscopic particles, the natural species more readily than the artificial. By admixt. of finely ground mineral powder (e. g., cement powder) to the artificial asphalt solns. as many particles appear in these as in natural asphalt. Probably the finest cement particles are taken up in the asphalt micelle. For petroleum asphalt the ultramicros appear most readily in CS_2 soln. ($\sigma = 30.9$); in liquids with higher surface tension σ the observation is more difficult (particles too small); for surface tensions lower than 25 coagulation is apparent. Coal-tar asphalt, which has a σ larger than that of petroleum, shows an optimal σ for observation of 40 to 44 (quinoline, furfurole, aniline, nitrobenzene, o-nitrotoluene); CS_2 causes coagulation. This peculiarity will have to be taken into account for a detn. of free C in coal-tar products based on that for petroleum products. B. J. C. v. d. H.

Carbonization of soft-wood sawdust in the Pacific Northwest. W. L. BEUSCHLEIN. *Trans. Am. Inst. Chem. Eng.* 19, 93-106(1927).—Complete details are given of an entire carbonization process, using a rotating kiln.

T. S. CARSWELL

Distilling and carbonizing coal (U. S. pat 1,668,132) 21.

Apparatus for heating crude petroleum. F. GARDNER. U. S. 1,668,766, May 8. A settling tank for effecting a primary sepn. of oil from water is connected with app. for filtration and chem. treatment.

Apparatus for distilling and cracking hydrocarbon oils. F. TINKER. *Brit.* 274,959, April 28, 1926. Crude oil is preheated by the residuum and also by the vapors and condensates and the various streams of preheated oil or mixts. of vapor and oil are passed into a mixing vessel prior to passage into a vapor-sepg. chamber. Various other features are described.

Cracking hydrocarbon oils. V. W. NORTHRUP. Brit. 275,120, March 21, 1927. A mixt. of the vapors of heavier hydrocarbon oils and gas contg. available H is passed through an electrified zone and afterward through an independent catalyzing zone which may contain catalysts such as Ni, Co, Pd, Al, Fe or their mixts. An app. is described.

Distilling and cracking hydrocarbon oils. W. M. CROSS. U. S. 1,667,883, May 1. An oil such as crude petroleum is distd. and different fractions are condensed and collected; the tarry residual products are withdrawn, and the gasoline-like fractions are refined and redistd. to produce gasoline; the more refractory fractions and selected portions of the residual material are subjected to cracking under a pressure above 500 lbs. per sq. in. so that conversion is effected substantially in the liquid phase; the synthetic product contg. a substantial proportion of material of low b. p. is drawn off and cooled, and is recycled through the fractional distn. stage; a portion of the heavy oils is diverted from the system.

Distilling petroleum oil. A. E. PEW, JR., and H. THOMAS. U. S. 1,668,602, May 8. Oil such as crude petroleum after being preliminarily heated is partially vaporized and the vapors are fractionated in one part of a described app.; another body of oil is partially vaporized in another part of the app. and its vapors are fractionated in a third portion of the app.; residual oil and condensed oil from the first evapn. and fractionation and also condensed oil from the last fractionation are conveyed to the "body of oil" mentioned and distributed over an extended surface and brought into contact with the vapors from this body of oil. Cf. C. A. 22, 2053.

Refining petroleum oils. C. R. WAGNER. U. S. 1,669,180, May 8. In order to sep. petrolatum from steam-refined stocks, the stock is dild. with a mixt. of a Bu alc. and naphtha, contg. over 25% of the Bu alc., and gravity sepn. is effected after chilling the dild. oil.

Purifying mineral oils, petrolatum or paraffin. I. G. FARBERNIND. A.-G. Brit. 274,828, July 21, 1926. After refining with acid and alkali, bleaching is effected with hypochlorite in the presence of auxiliary agents such as Ni sulfate or other salts of Ni, Cu or Co, or a bicarbonate which serve to remove caustic alkali and may also produce HOCl.

Refining mineral oil. H. T. MAITLAND. U. S. 1,668,920, May 8. Particles of sand or other material affording a large superficial area are coated with a film of H_2SO_4 and lubricating oil distillate or other oil is passed through a body of this material.

Phenols from distillates obtained in oil cracking. R. CROSS. Brit. 275,313, May 3, 1926. Mixts. of phenols, cresols, etc., which may be used as *disinfectants* are obtained by extg., with NaOH, distillates obtained in the cracking of coal tar, or its distillates or of shale oil, asphaltic-base crude oils, cracked oils, etc. If the oils initially used do not contain O compds., the cracking is carried out after adding substances such as glycols, glycerol or alcs. An app. is described.

Plant for distilling oil from shale. W. RHOADES. U. S. 1,668,820, May 8.

Hydrocarbons from bituminous shale-like material. W. H. HAMPTON. U. S. 1,668,898, May 8. Bituminous shale or similar material is digested at a temp. above 260° with a liquid oil, while the materials are agitated, and the solid residue is sepd. by centrifuging. An app. is described.

Treating hydrocarbons with sulfur dioxide. W. HESS. U. S. 1,668,275, May 1. Hydrocarbon material is treated with gaseous SO_2 and then with liquid SO_2 , to avoid losses of liquid SO_2 .

Removing sulfur and sulfur compounds from hydrocarbon oils. G. L. WENDT. U. S. 1,668,225, May 1. Lower mercaptan compds. such as Na mercaptides with less than 10 C atoms are added to the oil and it is then treated with "doctor soln." The added mercaptan compds. serve to prevent souring on distn. Cf. C. A. 22, 1233.

Removing wax from oil. G. D. GRAVES. U. S. 1,668,239, May 1. In order to remove, from oil distillates contg. principally paraffin wax and other waxes which hinder filtration or sweating of ordinary paraffin, the latter class of waxes, the oil is filter-pressed at a temp. (suitably about $22-30^\circ$) at which the paraffin remains in soln. in the oil but at which the interfering waxes crystallize.

Cast metal return bend for oil stills. F. E. KAY. U. S. 1,668,680, May 8.

Apparatus for pressure cracking of petroleum residuums, etc. STANDARD DEVELOPMENT Co. Brit. 274,763, March 14, 1927.

Apparatus for treating hydrocarbon distillates and gases by various blending operations, etc. N. H. COLWELL. U. S. 1,668,104, May 1.

Sulfuric acid recovery from acid sludges. J. D. RUYS. U. S. 1,669,102, May 8.

Acid sludge produced in petroleum refining is treated with acid oils derived from cracked petroleum oils, to facilitate concn. and recovery of acid.

• **Emulsions.** C. A. AGTHE. U. S. 1,668,136, May 1. A substance to be dispersed, *e. g.*, a mineral oil, is atomized with steam or other suitable atomizing agent in the form of a hollow fluid jet with the interior and exterior of which the material treated is caused to come into contact; the atomized material is incorporated in a dispersion medium such as an aq. soln. in which the atomizing agent condenses and within which the atomization is effected. An app. is described.

Breaking emulsions of hydrocarbon oils. L. BURGESS. U. S. 1,668,941, May 8. Emulsions such as those of oil and water are broken by the addn. of a sulfonic acid obtained from sludge of hydrocarbons refined with strong H_2SO_4 .

Treating emulsions of hydrocarbon oils and water. C. F. PESTER. U. S. 1,669,379, May 8. The emulsion is subjected to the action of an unneutralized sludge obtained from refining hydrocarbon lubricating oils with strong H_2SO_4 , in order to break the emulsion. A temp. of about 75° is suitable.

Wetting and emulsifying agents. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDILEY AND E. CHAPMAN. Brit. 274,611, June 3, 1926. A mineral oil fraction, *e. g.*, that obtained by extg. *Boone* petroleum with liquid SO_2 , is sulfonated and the product is condensed with an alc., *e. g.*, with isopropyl alc. or benzyl alc. in the presence of H_2SO_4 . The products are suitable for use in various treatments of textile materials or in prepng. emulsions of oils and solvents for treating leather or other purposes. Several examples are given.

Apparatus for gaging temperature of gasoline in tank cars. H. B. HICKMAN. U. S. 1,668,149, May 1.

Fuel for internal-combustion engines. H. F. PARKER. Brit. 275,334, May 5, 1926. "Knocking" of kerosene or like fuels is reduced by adding cyclic compds. extd. from kerosene by liquid SO_2 . Fifty % or more of these compds. may be used.

Fuel for internal-combustion engines. C. A. WALTER and F. B. MUHLENBERG. U. S. 1,669,181, May 8. A compn. for addn. to fuels such as gasoline is prepd. by agitating gasoline or similar material with NH_4Cl and adding small quantities of $CuSO_4$ and $ZnSO_4$ which serve to reduce knocking and otherwise improve the effect of the fuel.

Motor fuel. T. MIDGLEY, JR. U. S. 1,668,022, May 1. A hydrocarbon fuel such as kerosene and gasoline is mixed with a volatile metal compd. such as Et_4Pb and with a halogenated lubricating oil, contg., *e. g.*, C_2H_5Br or $C_{10}H_7Cl$, which serves to prevent deposits on the valve stems or other engine parts.

Lubricating oil. F. W. HALL. U. S. 1,668,313, May 1. Cylinder stock is treated with H_2SO_4 , mixed with a lighter petroleum oil and the acid sludge materials are allowed to settle out from the mixt.

Decolorizing and purifying lubricating oils. P. W. PRUTZMAN. U. S. 1,667,984, May 1. A stream composed solely of oil under treatment mixed with an adsorbent such as fuller's earth is passed through a pipe coil in which it is heated to a temp. above the vaporizing point of the oil and the vapors are retained within the flowing stream by subsequently cooling it below the vaporization point. An app. is described. Cf. C. A. 22, 865.

Apparatus (with a mercury heater) for reclaiming used lubricating oil by distilling off gasoline, etc. O. WERNER. U. S. 1,669,182, May 8.

Oxidizing paraffin. J. R. SCANLIN. U. S. 1,668,871, May 8. An oxidized paraffin product, free from gummy substances, suitable for use in lubricants is obtained by exposing the paraffin to the action of an oxidizing gas such as air and to heat (suitably at a temp. of about $150-165^\circ$), and discontinuing the oxidation when an acid value not exceeding 40 has been reached.

Treating asphalts. N. TESTRUP, T. BOBERG and TECHNOCHEMICAL LABORATORIES, LTD. Brit. 274,540, March 20, 1926. In order to facilitate transportation and storage of bituminous material such as Trinidad asphalt, it is melted and freed from water, treated with about an equal quantity of a vaporizable solvent, insol. substances are allowed to settle out and the solvent is then recovered and its residue is removed by steam distn. An app. is described.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Erroneous determination of the cellulose space lattice. O. L. SPONSLER. *Naturwissenschaften* 16, 263(1928).—S. claims that Herzog's interpretation of the cellulose lattice is false for several reasons (cf. C. A. 22, 1679). Reply. M. POLANYI. *Ibid* 263-4. B. J. C. VAN DER HOEVEN

The hygroscopicity of cellulose esters. ABEL CAILLÉ. *Chimie et industrie* 19, 402-6 (1928); cf. C. A. 20, 1719; 21, 2062, 4065.—The retention of hygroscopic H_2O by nitrocellulose and by vegetable parchment increases with the total H_2SO_4 content, as in the case of fixation of methylene blue. In the case of acetylcellulose: (1) the Me_2CO -insol. residue has an appreciably lower H_2SO_4 content than the sol. portion; (2) of 2 acetates having the same total H_2SO_4 content, the one with the higher combined H_2SO_4 is more sol. and more viscous; (3) the Me_2CO soly. of a given acetate decreases with the combined H_2SO_4 content; (4) fractional pptn. of Me_2CO solns. with H_2O shows that the acetate can be sepd. into fractions of decreasing H_2SO_4 contents, of which C. gives the following interpretation: H_2SO_4 , which is a depolymerizing agent, has reacted differently with acetylcelluloses of different degrees of polymerization and on dispersion of the acetate in Me_2CO there are different-sized micellas with varying combined H_2SO_4 contents. A. PAPINEAU-COUTURE

Correct calculation of costs. G. M. JOHANSSON. *Svensk. Pappers-Tid.* 31, 209-16 (1928).—Production costs in cellulose plants are analyzed. Several of the 28 tables give proportions of chemicals involved in the process. W. SEGERBLOM

Viscosity of nitrocellulose. OTTO MERZ. *Färbem-Ztg.* 32, 2768-71, 2886-7 (1927).—The viscosity of nitrocellulose solns. depends on the size of the nitrocellulose particles and, to some extent, on the solvents. Nitrocellulose of a low viscosity is mfd. by maintaining the following conditions: high nitration temp., prolonged reaction time, increase of the H_2O and decrease of the HNO_3 content of the mixed acid, lessening the amt. of the mixed acid, boiling and bleaching of the nitrocellulose and the addn. of free acid to the latter. With an increasing mol. weight of the solvent, cotton solns. of higher viscosity are obtained. Small quantities of water lower the viscosity of the soln. but the solvent power of the solvent is raised. 3.55 parts of water to 100 parts of Am ester increase the soly. of nitrocellulose 34.3%. Adding alc., heating and allowing to rest for a certain period lowers the viscosity of the cotton soln. The temp. at which the nitrocellulose is dried scarcely influences the viscosity of the final soln. M. gives a review of the various viscometers applied in the lacquer industry, discusses the usefulness of Engler's app. and gives directions for its use. With this app. the time it takes for a certain amt. of lacquer to pass through a given opening is measured. J. S.

The manufacture and industrial development of rayon. M. G. LUFT. *Kunstseide* 9, 387, 430(1927).—Various factors in the manuf. and use of rayon are reviewed and discussed. FREDERICK C. HAHN

Theory of spinning and structure of rayon. KÄMPFF. *Kunstseide* 9, 361-5, 409-15(1927).—A theoretical discussion of the spinning of rayon is given, based on the micelle theory. K. discusses from a mathematical standpoint the effects of variations in the quantity of spinning soln. pumped, the concn. of the spinning soln., the size of the opening of the nozzle, and the change of the velocity of pulling (take-up speed). A spinning soln. contains a mass of disordered micelles, which are rod-shaped particles and which are pictured as fine-tooth combs or as scaling ladders. The teeth or rungs represent mechanical forces to which are due "friction" or "ability to aggregate." The capability of a soln. to be spun presupposes that the micelles are sufficiently close together to prevent their free-floating. The soln., therefore, must have a certain concn., certain viscosity, and a min. inner friction. The larger the individual micelles, the more intense is their intramol. imbibition, and the lower can be the concn. If the means of dispersion is removed from such a dispersion of micelles, a clotting and finally a coagulation of the micelles occur while they shrink together. The moment the spinning soln. leaves the nozzle, attenuation occurs, and simultaneously by the action of the pptg. bath the spinning mass is covered with a thin film caused by the dense accumulation of micelles. These micelles by a combing action accumulate the still freely moving micelles within the soln. and orient them in the direction of flow of the soln. The velocities of flow and aggregation are what det. the arrangement of the micelles in the rayon filament. If the ratio of the take-up speed to the speed of flow at the nozzle is increased, the degree of orientation of the micelles is greater, they are closer together, and the mutual effect of their forces directed at right angles to the longitudinal axis results

in increased strength of filaments. K. discusses permanent extension and elasticity, and explains as follows the observation by Weltzian that a stretching of the fiber in the dry state may be reproduced in the same way when the stretched fiber is subjected to swelling in caustic soda soln. As a result of stretching, such an intensive mutual interference occurs in the close stratification of the micelles in the dried gel that a rigid strain is set up. By swelling, the formation of the micelles becomes looser, the tensions swing back to normal position, so the process is reproducible after drying. On the basis of the foregoing picture, the effects of the quantity of soln. pumped, change in concn. of the spinning soln., changes in the size of openings in the nozzle, and changes in the exit velocity are discussed from the standpoints of elasticity, strength, etc., of the rayon.

FREDERICK C. HAHN

Measurement of the fluidity of cotton in cuprammonium solution. D. A. CLIBBENS AND ARTHUR GRAKE. *J. Textile Inst.* 19, 77-82T (1928).—A soln. contg. 15 g. Cu, 240 g. NH_3 and less than 0.5 g. HNO_3 per l. is prepd. and standardized. In a capillary viscometer contg. an Fe cylinder as stirrer the cotton is dissolved in the absence of air. Unless the HNO_3 is low, bleached cotton will not dissolve completely. By use of a 0.5% soln. of cotton the extreme range of change is 60-fold and can be measured with a single instrument. The time of flow is standardized against 64.4% $\text{C}_3\text{H}_5(\text{OH})$ (d_{20} 1.1681), which has the max. rate of flow permissible for bleached cotton. The ratio to the glycerol standard may be used but it is more satisfactory to express results as abs. fluidity (reciprocal of viscosity in poises). If cotton is highly tendered a correction for the kinetic energy of the liquid which may amount to 30% must be applied. Detns. with solns. which are not clear are of doubtful significance. Unbleached cotton without chem. treatment contains at least 7% of non-cellulose and will not give a clear soln. Overnight mechanical agitation to produce soln. is necessary; excess does no harm. A temp. variation of 2° from 20° is permissible. A 0.5% soln. of lightly scoured cotton has a viscosity of about 1 poise; vigorous scouring reduces this to 0.2 without detracting from the quality; a further reduction to 0.05 is accompanied by 20-30% loss in tensile strength. Changes of fluidity have roughly the same significance in any part of the scale. Values are of theoretical significance only when the soln. follows the law of true viscous flow. Cotton solns. approach this more closely the higher their fluidity. A detailed method for detn. of the extent to which they follow this law is given. For fluidities above 8 this is approached closely enough for control work. Chemically modified cotton shows a correction different from that of normally bleached cotton. This chemically modified cotton may be studied in 2% soln. and calcd. to 0.5%. Cloth high in oxy- and hydrocelluloses shows a soly. of about 60-70% in cuprammonium contg. 2-3 g. HNO_3 per l., the residues being fragments of normal hairs showing little swelling. Cloth may be sepd. as yarns and boiled in 1% NaOH at 20 lbs. excess pressure to render it more sol. in this soln. These effects are not observed with the soln. low in HNO_3 . The effect of the mechanical form of the fabric and of HNO_3 content of the soln. is clearly indicated.

FOSTER DEE SNELL

Libyan esparto. CAMILLO LEVI. *Atti II congresso naz. chim. pura applicata* 1926, 270-99; cf. *C. A.* 21, 3742.—The botanical characteristics of *Stipa tenacissima* L. (I) and *Lygeum spartum* L. (II) and agricultural and economic problems connected with its cultivation and its utilization for cellulose are described, with illustrations and with new data. The chem. compn. differed according to the source of the esparto and the nature of the soil. The cellulose was 45-50%, the ash of I was 3.4% and of II was 3.9%. About 65% of the ash was SiO_2 . A crit. examn. of the English (NaOH) process for the production of cellulose showed the high cost of fuel and indicated the possibility of developing a more economical process. A method using Cl was considered most promising, particularly for Italy where Cl from the electrolytic NaOH process is available in great quantities. A comparison of the de Vains and the Cataldi Cl processes led to the choice of the latter as a basis for the development of a process for esparto. After numerous expts., particularly attempts to minimize the harmful action of HCl, it was found best to treat the esparto with 2-2.5% aq. NaOH at 90° for a max. of 2 hrs. with agitation and circulation of the liquors, wash, press, treat with Cl gas, wash with dil. NaOH, sort, bleach and dry. The more NaOH in the initial treatment the less the Cl usually required, but for economic reasons it is best to minimize the NaOH and use a relatively large quantity of Cl. Excellent results are obtainable with 16 parts of NaOH and 38-40 parts of Cl per 100 parts of dry I, with a 40% yield. Comparative analyses of cellulose from I made by this process and by the English NaOH process gave the following results: ash 1.81, 3.0; fats + waxes + resins 1.07, 0.73, aq. ext. 3.82, 6.49; α -cellulose 78.8, 72.74; β -cellulose 13.9, 21.48; γ -cellulose 7.3, 5.78; pentosans 20.04, 14.57; Cu no. 2.16, 3.74; cellulose no. 0.57, 0.70. The Cu nos. indicate less altera-

tion of the cellulose in the Cl process. Analyses of papers made from cellulose prep'd. by the NaOH, Cl, de Vains and Schlacht processes are compared. Paper from cellulose of the Cl process is lighter and softer than that from other processes. Photomicrographs of cellulose from the Cl and the NaOH processes are shown. The cellulose from the Cl process had a fiber approx. 1.2 mm. long and 11 μ diam. Microscopic differences in the cellulose from I and from II are described. The Cl process had been shown by large-scale expts. at the Pomilio electrochem. plants to give an excellent cellulose and to be of great promise industrially. C. C. DAVIS

The bleaching of sulfite pulp. L. RYS. *Paper Trade J.* 85, No. 18, 61-7 (1927); cf. C. A. 21, 1711.—During the bleaching of sulfite pulp with hypochlorite soln. chlorination takes place, the end products of the reaction going into soln.; whether insol. chlorination products are first formed was not detd. The amt. of organically combined Cl is higher the higher the lignin content of the unbleached pulp. The expts. described indicate that the chem. equil. during bleaching can be expressed by the reversible equation $2\text{NaOH} + \text{Cl}_2 \rightleftharpoons \text{NaOCl} + \text{NaCl} + \text{H}_2\text{O}$, the left side representing chlorination and the right side oxidizing conditions. The proportion between oxidation and chlorination reaches and maintains a practically const. value under similar conditions, which supports the theoretical explanation already given. The time necessary for a given consumption of available Cl increases as the chlorination decreases. Although the acidity or alkyl. was not closely followed during the expts., it appeared that under the conditions used there was a tendency to approach and maintain a condition of, or nearly approaching, neutrality. Though the color relations of the pulps were not detd., it was easy to see that the color was degraded by the action of free Cl and also by the addn. of chloride ion. It may be considered that increasing the intensity of chlorination without a corresponding increase in oxidation results in a resinification of the lignin, which makes the H- or OH-ion concn. important. Contrary to the results of Schwalbe and Wenzl, chlorates were found to take no part in the bleaching of sulfite pulp. The presence of chlorates in the bleach liquors has no appreciable effect on the chem. equil. during the bleaching reaction, and neither the phys. conditions of bleaching nor the chem. compn. of the bleached pulp is altered by its presence. Contrary to the results of Wenzl, the presence of acetates was not found to influence the bleaching action materially, so far as the bleaching time, color of the waste liquor, and color and chem. properties of the bleached pulp were concerned. With increasing amts. of acetate, a very slight increase in chlorination and an increased acidity of the waste liquor were found. The amt. of ash decreased as the acidity of the waste liquor increased. The amt. of acetates which were used did not appear to cause any salting-out effect such as was suggested by Wenzl. The action of carbonates, bicarbonates and air upon bleach is due only to the changes which they cause in the H-ion concn., since no changes were observed when the concns. of carbonate and bicarbonate ions in the bleach were increased. A. PAPINEAU-COUTURE

The typical action of wax sizing in pulp. WIEGER. *Wochbl. Papierfabr.* 59, 11-8 (1928).—The proper use of Montan wax gives a soft, flexible, waterproof material capable of a high finish, and with good coloring qualities. Many problems of application are still to be solved, however. R. H. DOUGHTY

The solubility of cellulose esters. I. G. KITA, I. SAKURADA AND T. NAKASHIMA. *Cellulosechemie* 9, 13-7 (1928). II. Acetone solubility of cellulose acetate. *Ibid* 27-9; cf. C. A. 22, 499, 1472. R. H. DOUGHTY

Alpina nutans for paper making. ANON. *Bull. Imp. Inst.* 25, 122-6 (1927).—The dried, fibrous stems of *A. nutans*, contg. a large amt. of pithy matter, have the following compn.: H₂O 90, ash 6.25, cellulose 49.9% (54.8% on dry basis), av. fiber length 2.62 mm., av. fiber diameter 0.0162 mm. Pulping tests showed the material can be converted into paper of satisfactory quality in good yield and without excessive NaOH consumption. A. PAPINEAU-COUTURE

Saving \$28,000 annually in paper-mill coal cost. J. G. BERGER. *Power* 67, 456-8 (1928).—Test runs and various plant improvements are described. D. B. D.

Paper sizing. FR. ARLEDTER. *Papier-Fabr.* 26, 33-6 (1928).—Address. R. H. DOUGHTY

Parchment paper. ROBERT FRITSCH. *Wochbl. Papierfabr.* 59, 63-7 (1928).—Descriptive of the development and present status of the industry. R. H. DOUGHTY

The passage of air through paper. BRUNO SCHULZE. *Papier-Fabr.* 26, 198 (1928).—The vol. of air in l. per min. passing through 100 sq. cm. of paper, under a pressure difference of 10 cm. of H₂O, are reported for 103 samples handled in routine testing. Tests were made at 65% relative humidity. Values varied from 0.09 to 7.58

for bag paper, less widely for other materials. Since no other data on the paper were available, no conclusions can be drawn.

R. H. DOUGHTY

• **Measurement of the light-fastness of colored papers by illumination with the quartz mercury lamp.** G. DALÉN AND P. WILKE. *Papier-Fabr.* 26, 199-202; *Wochbl. Papierfabr.* 59, 345-49 (1928).—From qual. tests it is concluded that this lamp should furnish a satisfactory substitute for sunlight in making fading tests on papers. One hr. of lamplight is equiv. to 3 hrs. direct sunlight, or to 10 days north daylight, under the conditions used. Temp. and moisture content of the sample affect the results; activation of the air by the lamp apparently does not. Aging of the lamp is not a serious factor after it has been operated a few hours.

R. H. DOUGHTY

Calculations concerning containers, especially those made of cast iron designed for high pressures (VON ZEIPPEL) 1. Determination of the HNO_3 and H_2SO_4 content of the nitrating bath for use in the preparation of *Gossypium colloidii* (CATH) 7. Apparatus for screening wood pulp (U. S. pat. 1,669,029) 1. Plastic composition containing paper mill sludge (U. S. pat. 1,668,961) 20. Compositions containing rubber and cellulose derivatives (Brit. pat. 274,968) 30. Apparatus for depositing metals on paper (Brit. pat. 275,523) 1.

WANDROWSKY, HERMANN: **Wasserdicht-Machen von Papier.** 2nd ed. Berlin: Verlag der Papier-Zeitung, Carl Hofmann, G. m. b. H. 53 pp. Paper, M. 1.50. Reviewed in *Ind. Eng. Chem.* 20, 558 (1928).

Cellulose acetate. SOC. CHIMIQUE DES USINES DU RHONE. Brit. 274,814, July 26, 1926. An app. is described for continuous operation in the manuf. of cellulose acetate.

Cellulose acetate. H. L. B. GRAY and C. J. STAUD. U. S. 1,668,959, May 8. Cellulose acetate substantially free from haze and graininess is made by treating cellulosic material such as cotton dust with an aq. bath contg. 35-75% H_2SO_4 , stopping the action of the bath before the cellulose is degraded, removing the acid from the material to render the latter at least neutral to litmus, and then acetylating in a bath contg. ZnCl_2 or other catalyst which is weaker than H_2SO_4 .

Acetylcellulose. H. L. BARTHELEMY. U. S. 1,668,482, May 1. In the manuf. of acetylcelluloses or other mixed acetic esters of cellulose, in which acetylation is effected in the presence of a catalyzer, sapon. in the "primitive acetic sol" is effected by the addn. of a dil. acetic medium contg. HCl and HF . U. S. 1,668,483 specifies softening cellulose fibers such as cotton to facilitate their esterification by subjecting the mass of fibers to the combined action of the vapors of glacial HOAc and Cl or other suitable intensifying agent selected from the halogen group. U. S. 1,668,484 specifies subjecting a mass of cellulose to a series of at least 4 successive partial acetylations, each of which is deferred until the preceding partial acetylation has terminated. U. S. 1,668,485 specifies first subjecting cellulose material such as cotton linters to the action of an alk. soln. contg. peroxides and a soap to diminish the superficial contact tension and facilitate diffusion of nascent O , then treating the mass, to soften it, with a halogen such as Cl and vapor of HOAc , then acetylating in successive stages; the quantity of HOAc and catalyst contg. H_2SO_4 used in the bath is detd. by the no. of acetyl groups which must be present at the end of each addn. and the sapon. is effected in the presence of HCl to ensure elimination of sulfates.

Reacetylating cellulose acetate. H. T. CLARKE and C. J. MALM. U. S. 1,668,946, May 8. Cellulose acetate from which acetyl groups have been removed until its soly. is impaired is treated with HOAc as the sole reacetylating agent.

Cellulose esters of acetic or other fatty acids. H. T. CLARKE and C. J. MALM. U. S. 1,668,944, May 8. Esters are formed contg. 1 mol. proportion of the fatty acid component for approx. 24 C atoms of the cellulose component; the fatty acid is one contg. less than 8 C atoms, e. g., HOAc or propionic or butyric acid. These esters may be further esterified.

Moldable material from cellulose acetate, etc. SOC. CHIMIQUE DES USINES DU RHONE. Brit. 275,558, Aug. 3, 1926. A soln. of cellulose acetate or other cellulose ester or ether is mixed with fillers, coloring agents if desired and plastifying substances, e. g., with ultramarine and *p*-toluolsulfonamide, and water or other pptg. agent is added to ppt. the cellulose deriv. in the form of a fine powder suitable for molding.

Cellulose ester compositions for impregnating fabric for use as shoe stiffening. M. MOREL. Brit. 275,575, Aug. 3, 1926. Examples are given of solns. of cellulose

nitrate and cellulose acetate with admixts. such as camphor, acetone, benzene, alc., ether, copal, ocher, benzyl alc., tricresyl phosphate, abietic acid and ZnO.

Coating threads, fabrics, films, etc., with cellulose esters or ethers. G. SCHNEIDER and C. DREYFUS. Brit. 274,841, July 23, 1926. Two layers of cellulose ester or ether are formed one upon the other by employing for the second layer a soln. of cellulose acetate or other cellulose ester or ether in which the solvent used is not a solvent for the ester or ether of the underlying ether. A large variety of examples are given.

Esterifying hydrated cellulose with lower fatty acids. H. T. CLARKE and C. J. MALM. U. S. 1,668,945, May 8. Hydrated cellulose is heated to 100–170° with HOAc, propionic acid, butyric acid or other fatty acid with 2–7 C atoms, without use of any catalyst, until 4 mol. proportions of the acid combine for each 24 C atoms in the hydrated cellulose. In some cases a mild catalyst such as $ZnCl_2$ or Mg perchlorate trihydrate may be used. In using heptylic acid, a temp. of 145–165° is suitable. Numerous details are given.

Cellulose formate. E. ELÖD. Brit. 275,641, Aug. 9, 1926. Cellulose is esterified with concd. formic acid, *e. g.*, 98–100% acid, in the presence of swelling agents such as $ZnCl_2$ or $CaBr_2$; catalysts such as HCl or P_2O_5 may be used and the cellulose may be preliminarily slightly nitrated. Various details of procedure are given.

Artificial silk, etc. L. LILIENTHAL. Brit. 274,521, Jan. 11, 1926. Artificial silk, ribbons and like products of good dry and wet tensile strength and resistance to aq. alkalies and soap are made from viscose by use of a setting bath which contains not less than 55% H_2SO_4 (suitably 65–85%). Other inorg. acids, sulfates, sulfitcs, nitrite, H_3BO_3 , glycerol, glucose, alc., salts of bases such as $PhNH_2$ and org. acids such as acetic formic, lactic and oxalic also may be added. The setting bath may be operated at room temp. or at lower temps. down to -10° . The strength of the acid which gives best results depends somewhat upon the degree of maturation of the alkali cellulose, the time of ripening of the viscose and other details. Numerous details of procedure are described.

Artificial silk from viscose. L. LILIENTHAL. Brit. 274,690, Jan. 11, 1926. Artificial threads of high dry tenacity are made from viscose by use of a setting bath in which the H_2SO_4 used as described in Brit. 274,521 (preceding abstr.) is substituted, in whole or in part, by another inorg. acid such as 25–40% HCl, 60–90% HNO_3 , H_3PO_4 of 1.5–1.86 sp. gr. or 60–90% arsenic acid.

Artificial silk, films, etc. H. DREYFUS. Brit. 275,286, March 26, 1926. In the manuf. of filaments, films or other products from cellulose acetates or other cellulose esters of high-viscosity characteristics, the ripening or secondary treatment is prolonged beyond the normal stage to give products which may serve to form solns. of lower viscosity than products at earlier stages of ripening. Water may be added to an acetylating mixt. to destroy the acetylating agent and the mixt. may then be allowed to stand until a product sol. in acetone contg. 3–10% of water is produced.

Apparatus for making artificial silk filaments. COURTAULDS, LTD., F. SHEDDEN, A. E. DELPH and N. G. BAGULEY. Brit. 275,042, Oct. 4, 1926. A gas-testing app. is provided to facilitate maintaining a const. proportion of solvent vapor in the atm. of a spinning chamber.

Artificial filaments or threads. H. DREYFUS. U. S. 1,669,158, May 8. A soln. of an org. cellulose deriv. such as cellulose acetate in acetone and aldehyde mixt. or other solvent with a b. p. below 40° is spun into an evaporative atm.

Forming composite threads from artificial silk filaments produced by the stretching process from copper-ammoniacal solutions. J. P. BEMBERG AKT.-GES. Brit. 275,637, Aug. 5, 1926. Mech. features.

Cellulosic pulp. I. G. FARBERNIND, A.-G. Brit. 274,892, July 21, 1926. Materials such as wood or straw are subjected to the action of HNO_3 vapors which may be obtained by passing air through a 60% HNO_3 soln. at a temp. of 30–40°. Subsequent boiling in alkali yields a cellulose of high purity.

Pulp from wood or similar materials. T. L. DUNBAR. U. S. 1,669,234, May 8. Fibrous material is digested with a soln. such as sulfate or soda while steam is introduced and the steam is permitted to condense and mix with the liquor used for digestion; the mixed liquor is continuously circulated through the fibrous material, and after a certain vol. of liquor accumulates the excess is then passed into an accumulator. An app. is described.

Apparatus for making laminated paper. I. A. NEWCOMER. U. S. 1,669,011, May 8.

Apparatus for cleaning paper pulp and feeding it to a paper-making apparatus. R. S. CLARKE. U. S. 1,668,141, May 1.

Friction-drag device for testing the finish of paper sheets. C. H. LE P. JONES. U. S. 1,668,593, May 8.

Treating paper to render it impermeable and washable, etc. L. R. MÈCRE. Brit. 275,617, Aug. 4, 1926. Paper is first treated with a soln. contg. a mixt. of at least 2 of the substances: alum, orchid flower (farine d'orchi), gum tragacanth, alga gum and resin; and is subsequently treated with borax, $(\text{NH}_4)_2\text{SO}_4$, $(\text{NH}_4)_2\text{CO}_3$, H_3BO_3 or other reagent to render the material first applied insol. Coloring substances may be added, and the paper may be preliminarily treated with an alk. soln.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Microscopic studies of the structure of Poudre B. J. DESMAROUX. *Mem. poudres* 22, 259-84(1926).—A study of the condition of guncotton in Poudre B showed that nitration did not alter the structure but beating cuts, grinds and tears the fibers. Guncottons contg. up to 25% sol. in ether-alc. were found to consist of a phys. mixt. of sol. and insol. fibers. Some of the insol. fibers were superficially etched and corroded by ether-alc. (cf. Bruin, C. A. 16, 1317). Diphenylamine powders (2%) exposed to alc. vapors in a closed vessel at temps. as high as 55° turned black in 3-4 days. Diphenylamine powders which go through a cycle of mixing, graining, solvent recovery, resolution in a non-oxidizing atm., followed by mixing, etc., become black after the 7th or 8th remixing. Information as to the structure of gelatinized powders was obtained by dyeing the guncotton with oxydiamine black J. W. R., gelatinizing with sol. cotton, mixing, extruding and pressing into strips. These were dried, softened with 95% alc., sectioned with a microtome and mounted in balsam. The solvent in powders is distributed between the swollen guncotton and the sol. gelatinized cotton. The morphological texture of the fiber was found to be without influence on soly. A method was developed for counting the number of fibers per sq. mm. in the sections, which gave approx. results with regard to uniformity in mixing. The longitudinal resistance of the extruded strips was found to be greater than the lateral resist. No differences were observed in the rate of combustion of long and lateral sections. Based on their differing solubilities in alc. and water, with corresponding differences in rate of diffusion, several dyes were found suitable for staining the dried undyed sections. The best water-sol. dye found was oxydiamine black J. W. R. and the best alc.-sol. dye diamine blue R, although this was a poor color for photographing. With aq. dyes, the alc.-softened sections required 24-42 hrs.' soaking in an almost satd. soln., while the alc. dyes required 1-2 min., the method being that of trial and error. By the use of dyes it is possible to distinguish a well-dehydrated from a poorly dehydrated powder and a water-dried from an air- or alc.-dried powder.

Purification of guncotton. P. VIEILLE. *Mem. poudres* 22, 317-19(1926).—The fact that an approx. const. coeff. of exchange was secured whether boiling was carried out for 80 hrs. or for 200 hrs. led to an investigation of the acid content of the water. Analysis showed that the increase in acidity was 84% HNO_3 , 8% H_2SO_4 , 8% of undetd. org. acids.

Influence of temperature on the washing of guncotton. P. VIEILLE. *Mem. poudres* 22, 315-6(1926).—A quant. measure of the influence of temp. was secured by measuring the exchange coeffs. between 89.5° and 110°. The results showed that the reaction was tripled in speed for each 10° rise in temp.

Influence of the coefficient of exchange on the ease of alkaline saturation of guncotton. P. VIEILLE. *Mem. poudres* 22, 307-10, 311-4(1926).—A low coeff. will not necessarily give good stability at 110° but it is necessary for good stability if a short carbonation with CaCO_3 is employed. Alk. boils which reduce the exchange coeff. to a low figure will not necessarily produce a guncotton of high stability. Prolonging the boiling from 80 to 450 hrs. had little effect in lowering stability. Prolonged acid washing had no effect on soly. or nitrogen content. An exchange coeff. of 0.014 after 64 hrs.' boiling is insufficient for a good stability test; an 80-hr. boil is necessary for a satisfactory carbonation.

Inflammability of nitrocelluloses. P. PASCAL. *Mem. poudres* 22, 285-98, 299-306(1926).—Uniformly moistened nitrocelluloses were packed in paper cartons and fired from the exposed surface or from the center of the carton. Ignition proceeded from a slow combustion to a detonation as the % moisture decreased. Beaten cotton was less inflammable than unbeaten. A comparison of nitrocelluloses prepd.

by displacement and by the pot process showed the former to be consistently more inflammable. The free acidity, alky. and origin of the cotton were eliminated as factors and the effect was traced to a higher percentage of nitric acid in the displacement nitrating bath. The nitrocelluloses which ignite most readily burn more slowly and with less deflagration than the more difficultly ignitable samples. The factors affecting inflammability are physical state (beaten or unbeaten), density of loading, % of nitrogen, composition and temperature of the nitrating bath. The av. moisture content of a lot is no indication as to the inflammability of the mass, as the surface may dry, ignite readily and propagate the flame throughout the mass. A. J. PHILLIPS

The evolution of gases from heated nitrocellulose powders. J. DESMAROUX. *Mem. poudres* 22, 245-53(1926).—Powders stabilized with AmOH or Ph₃NH were heated in a glycerol bath to 75° or 108.5° and the gases evolved were collected in an evacuated tube over Hg. The gases consisted of CO₂, N, N₂O, NO and CO, the vol. of the first increasing and that of the second decreasing with time. The tests at 75° were less precise than those at 108.5° and the gas compns. at the 2 temps. were diff. for the same period of heating. The rate of evolution of gas rose to a max. and then declined. A. J. PHILLIPS

Coefficients of exchange of nitrocellulose. A. KOEHLER AND M. MARQUEROL. *Mem. poudres* 22, 320-5(1926).—Nitrocellulose decarbonated with water satd. with CO₂ is dried for 2 hrs. on the steam bath. To a non-soluble, green glass pressure flask of 125-cc. capacity are added 5 g. dry cotton and 90 cc. of distd. water. The flask is closed and heated in a sterilizer for 23 hrs. at 100°, cooled, the soln. filtered and titrated to det. the coeff. of exchange. This is the acidity in mg. of H₂SO₄ given up in 1 hr. by 100 g. of nitrocellulose in the presence of water at a definite temp. A correction is applied for the acid left on the fibers and the process is repeated on the same sample. Results are reported on powders manufd. in 1911-12 showing coeffs. ranging from 5.0 (first heating) to 2.9 (second heating). Relations between the coeffs. indicate that between 90° and 130° an increase of 10° triples the values, while between 40° and 90° an increase of 5° doubles the value of the coeff. A. J. PHILLIPS

Effects of temperature and pressure on the explosibility of coal-dust and air mixtures. HIDENOSUKE SANO. *Nihon-Kôgyôkwaishi* No. 486, 845-52(1925); *J. Inst. Metals* 38, 659; (cf. *C. A.* 21, 177. In Japanese).—It has been shown that the lower limit of inflammability in coal-dust and air mixts. descends with rising initial temp. Increasing the initial pressure of the mixt. up to 5 atm. from atm. pressure had no effect in changing its lower limit, but had the tendency to lower its ignition temp. Dust clouds which are incapable of starting inflammation by simple ignition can propagate explosions, being affected by rising initial temp. and pressure caused by the pioneering wave accompanied ahead by the flame of explosion. H. G.

A firedamp explosion in the Gabriel field, Karwin (Silesia), and the reopening of the mine. ANON. *Montan. Rundschau* 20, 121-9, 157-66(1928).—While workers were digging into a seam a slight escape of smoke and a burned odor were observed. The spot was walled off, whereupon an explosion occurred, blowing down the walls and killing 15 men, injuring 10 badly, 7 slightly. Two major explosions occurred, 10-12 minor explosions on blocking off, and 24 minor explosions after blocking off. In reopening work 2 were killed, one from lack of O₂, the other from a fall. E. M. S.

PIQUE, RENÉ: La poudre noire et le service des poudres. Paris: Société de Publications Colloïdales. 210 pp. F. 15 (bound). Reviewed in *Parfumerie moderne* 21, 64; *Rev. prod. chim.* 31, 246-7(1928).

Explosives. F. W. GUTHKE. *Brit.* 275,228, July 28, 1926. Solid polyvalent alcs. such as pentites and hexites and liquid polyvalent alcs. such as glycol and glycerol are nitrated together. Mannitol, sorbitol, glycerol and ethylene glycol and similar compds. may be used.

Non-detonating composition for smoke or flame production, signalling, etc. VICKERS, LTD., AND E. E. F. BERGER. *Brit.* 275,021, Aug. 9, 1926. Ca silicide 40 and KNO₃ 60% may be formed into granules and used alone or with a smoke-producing compn. as described in *Brit.* 127,031.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Old and new methods of printing basic colors. M. W. ALLING. *Am. Dyestuff Rept.* 17, 235-8, 270-1 (1928). L. W. RIGGS

Modern vs. "old-school" piece dyeing. C. F. HOPPE. *Am. Dyestuff Rept.* 17, 239-41 (1928). L. W. RIGGS

Dyeing rayon with indanthrene colors. G. RUDOLPH. *Kunstseide* 9, 366-8 (1927).—A general description is given of the process of dyeing viscose rayon with indanthrene dyes. Detailed directions for 11 shades of colors of an accompanying sample are given. FREDERICK C. HAHN

Sisal dyeing. FRED GROVE-PALMER. *Am. Dyestuff Rept.* 17, 241-3 (1928). L. W. RIGGS

Simultaneous charging and black-dyeing of silk. A. L. HOFFMANN. *Kunstseide* 9, 369-70, 461-2 (1927).—Different processes for the simultaneous dyeing in black and charging of silks are discussed, and a no. of good processes are recommended. In contrast to the catechu-bluewood treatment, higher charging is obtained by treating the silk, after treatment with iron liquor, with 10% $K_4Fe(CN)_6$ soln. at 50°, followed by a hot catechu bath, the further treatment being as usual. FREDERICK C. HAHN

Method of detecting complete development of Indigosols and Soledon colors on wool. Preliminary communication. H. R. HIRST AND P. E. KING. *J. Soc. Dyers Colourists* 43, 266-7 (1927).—Certain anomalies exist in the fastness to light and weather of dyeings of Indigosol and Soledon colors on wool. The object of this study was to det. the cause of these anomalous results and to test the possibility of the use of ultra-violet radiation as a check on the correct development of the leuco- or other compd. on the wool, and hence assist the dyer in producing fast dyeings. Certain Indigosol dyeings when examd. by means of ultra-violet radiations showed a strong violet fluorescence on the original dyeing, but not on portions exposed to light for some weeks. Also Indigosol dyeings developed by different oxidizers showed strong fluorescence in some cases, in others none. Fluorescence appears to indicate incomplete development caused by incomplete oxidation. With dichromate oxidizer the results were better at 50° to 55° than at 20° to 25°. On the other hand at 85° there was fluorescence attributed to oxidation products of indigotin. Unoxidized or undeveloped Indigosol can be extd. from dyed wool by dil NH_4OH or Na_2CO_3 . When this is completely removed the wool no longer fluoresces, but the extd. solns. fluoresce as long as they contain any Indigosol. The exhaustion of the dye bath is shown by only a faint fluorescence when subjected to ultra-violet radiation. An aq. soln. of Indigosol acidified with H_2SO_4 and exposed to light of the fadeometer, deposited a blue ppt. and lost its fluorescence in 90 min. Examn. for fluorescence by ultra-violet radiation gives promise of being a valuable method of control in this type of dyeing. Further work is in progress. L. W. R.

Critical theory of the examination of textiles. ADOLPH ROSENZWEIG. *Kunstseide* 9, 372-4, 418-20, 464-6, 519-21, 607-9 (1927).—The testing of textiles is discussed from a critical and theoretical standpoint. FREDERICK C. HAHN

The influence of ultra-violet rays on the strength properties of fiber materials. P. HEERMANN AND H. SOMMER. *Leipzig Monatschr. Textil Ind.* 40, 207-12 (1925); *Expt. Sta. Record* 57, 694. —According to addnl. data (cf. *Leipzig Monatschr. Textil Ind.* 40, 161-3 (1925)), mineral-weighted silk is most sensitive to light, followed in order by raw silk, jute, raw and bleached cotton, raw wool, mercerized cotton, nitro- and viscose rayons, chrome wool, bleached flax yarn and the most resistant cuprammonium rayon and raw flax yarn "Monopol black" dye appeared to render silk highly resistant, and its use is suggested for balloon and airplane fabrics. H. G.

Manila hemp from St. Vincent. ANON. *Bull. Imp. Inst.* 26, 1-4 (1928).—Samples of different grades of *Musa textilis* grown in St. Vincent were found to have approx. the same chem. comp. and to be of comparable quality to the ordinary commercial grades from the Philippines. A. PAPINEAU-COUTURE

Treatment of rayon. W. ALTERHOFF. *Kunstseide* 9, 368-9 (1927).—*Avivage*, a treatment which makes rayon resemble silk from the standpoint of "feel" and other qualities, is described, and the most recent oils used in this treatment are discussed. F. C. H.

Weaving and knitting of rayon. CARL ABERLE. *Kunstseide* 9, 379-80, 425-7, 472-5 (1927).—A general article on the prepn. of yarn, types of knitting, types of machines, forming and finishing. FREDERICK C. HAHN

Streaked rayon fabric. FRANZ MÜLLER. *Kunstseide* 9, 381-4 (1927).—The causes

of streakiness in rayon cloth and methods of avoiding this difficulty by special weaving methods are discussed.

FREDERICK C. HAHN *

Immunized cotton. W. A. MIEDENORP. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 132-6; *Am. Dyestuff Rept.* 17, 250-4.—"Immunized" cotton is made by the esterification of alkalinized cotton with *p*-toluenesulfonyl chloride. Its uses and advantages are shown in an address and discussion.

L. W. RIGGS

Apparatus for depositing metals on textile materials (Brit. pat. 275,523) 1. Wetting and emulsifying agents [in treatments of textiles] (Brit. pat. 274,611) 22.

FORMANEK, J., AND KNOP, V.: *Untersuchung und Nachweis organischer Farbstoffe auf spektroskopischem Wege* Pt. II, No. 4 (pp. 575-774). Berlin: Julius Springer. M. 39. Reviewed in *Rev. chim. ind.* 37, 99(1928).

HALL, A. J.: *The Chemistry and Technology of Artificial Silks*. London: Ernest Benn, Ltd. Price approx. 35s., net.

LAWRIE, L. G.: *Textile Microscopy*. London: Ernest Benn, Ltd. 139 pp. 25s., net.

LEHNE, ADOLF: *Textilchemische Erfindungen Lieferung 1*. (July 1, 1926-June 30, 1927). Wittenberg: A. Ziemsen Verlag. 100 pp. M. 10. Reviewed in *Chemistry and Industry* 47, 344; *Ind. Eng. Chem.* 20, 557(1928).

SCHOFIELD, JOHN, AND SCHOFIELD, J. COLIN: *Cloth Finishing, Woolen and Worsted*. New York: Bragdon, Lord & Nagle Co., Inc. 750 pp. \$8. Reviewed in *Textile World* 73, 154(1928).

Dyes. BRITISH ALIZARINE CO., LTD., W. H. DAWSON and P. BEGHIN. Brit. 275,283, March 4, 1926. Isoviolanthrones are made by heating Bz-1-halogenbenzanthrones or their derivs. which are not substituted in the 2-position, with alkali hydroxide in concd. form in the presence of an aromatic amino compd. such as PhNH_2 , *p*-toluidine or naphthylamine; temps. of 75-220° may be used.

Dyes. BRITISH DYE STUFFS CORPORATION, LTD., A. SHEPHERDSON and W. W. TATUM. Brit. 275,421, Aug. 19, 1926. 1-Hydroxy-2-sulfo-4-sulfoarylidioanthraquinones which dye wool reddish blue shades are made by treating 1-hydroxy-2-halogen-4-sulfoarylidioanthraquinones with a soln. of a metal sulfite such as Na_2SO_3 , filtering, and evapg. the filtrate.

Dyes. F. STRAUB and H. SCHNEIDER. U. S. 1,669,069, May 8. Chromable dyes are made by the action of a reducing agent such as an alkali sulfide in the presence of a water-sol. org. OH compd. such as glycerol on azo dyes derived from nitrated diazotized 1-amino-2-hydroxynaphthalene-4-sulfonic acid and a naphthol.

Dyes. I. G. FARBERIND. A.-G. Brit. 274,527, Feb. 17, 1926. Vat dyes of the 2-thionaphthene-2-indolindigo series are formed by condensing hydroxythionaphthenes such as 5,7-dichloro- or 5,6,7-trichloro-hydroxythionaphthene or similar halogen, or halogen, alkyl and acyl derivs. with isatin- α -derivs. such as 5,7-dibromoisatin chloride, isatin- α -anilide or similar compds. Numerous examples and directions for making the intermediates are given. The dyes obtained dye wool and cotton from the vat in fast blue to violet shades.

Dyes. I. G. FARBERIND. A.-G. Brit. 275,258, July 29, 1926. Diazotized *p*-aminomethylacetanilide or other diazo compd. is coupled with the product obtained by the action of chloroformic ethyl ester on the Na salt of 2,8,6-aminonaphtholsulfonic acid or other similar aminonaphthol derivs. suitably in the presence of an acid-binding agent.

Dyes. I. G. FARBERIND. A.-G. Brit. 275,292, April 9, 1926. Thioindigoid dyes are made by condensing perinaphthoxypenthiophene or one of its nuclear substitution derivs. with 1-halogen-2,3-naphthisatin- α -halides or arylides or their further halogenated derivs., 2,3-diketodihydro-4,5-benzo-3-hydroxythionaphthenes or their 2-halides or 2-anils or similar compds. The dyes from acylaminoepinaphthoxypenthiophenes may be saponif. for the removal of the acyl group. The products may be further halogenated. They dye animal and vegetable fibers from the vat fast blue to green shades. Several examples are given for producing the dyes and the intermediates used.

Dyes. I. G. FARBERIND. A.-G. Brit. 275,609, Aug. 9, 1926. Dyes giving blue tints on wool in a feebly acid bath are produced by introducing the residue of a 4-alkoxydiphenylamine into a triarylmethane dye as one of the aryl groups. Examples are given.

Dyes. I. G. FARBENIND. A.-G. Brit. 275,613, Aug. 5, 1926. Dyes similar to those described in Brit. 274,128 (C. A. 22, 2065) are obtained by coupling a diazo compd. of a 1,3-dimethyl-4-amino-2-halogenbenzene or of a 1,3-dimethyl-6-alkyl-4-amino-2-halogenbenzene with a 2,3-hydroxynaphthoic arylide.

Dyes. I. G. FARBENIND. A.-G. Brit. 275,636, Aug. 4, 1926. Amino compds. of the anthraquinone series are treated with halohydrins in the presence of acid-binding agents such as Na_2CO_3 , Na_2HPO_4 , NaOAc or MgO , with or without condensing agents. The products, several examples of which are given, dye cellulose acetate red, red-violet and blue shades and color stearic acid similar shades.

Dinitrodiphenylamine dyes. I. G. FARBENIND. A.-G. Brit. 274,999, June 21, 1926. Dyes contg. at least 2 nitro groups in their mol., which dye wool and leather yellow and brown to red-brown tints, are made by condensing an aromatic nitro compd. having an exchangeable halogen (other than 1-halogen-2,4-dinitrobenzene) with 4-aminodiphenylamine or a deriv. 4-Nitro-4'-aminodiphenylamine-2-sulfonic acid may be condensed with 1-chloro-2-nitrobenzene, 1-chloro-4-nitrobenzene or 1-chloro-2-nitro-4-benzaldehyde. Other examples also are given.

Monoazo dyes. FABRIQUE-DE PRODUITS CHIMIQUES ROHNER SOC. ANON. PRATTELIN. Brit. 275,147, Aug. 2, 1926. Diazotized oxamic acids of the diaminodiphenyl series are coupled with aromatic amines and the products are subjected to alk. sapon. The monoazo dyes thus obtained can then be tetrazotized and coupled with 2,3-hydroxynaphthoic arylides, in substance or on the fiber, to produce black trisazo dyes which form good pigment colors when produced in substance.

Monoazo dyes. J. R. GEIGY AKT.-GES. Brit. 275,220, July 29, 1926. An aminosulfobenzoic acid (such as 2-chloro-5-amino-4-sulfobenzoic acid) having the sulfo group in the o-position to the NH_2 group is diazotized and coupled with the usual coupling components such as β -naphthol or 2,8,6-aminonaphtholsulfonic acid. Red and bluish red dyes are obtained with the components just mentioned, and by using pyrazolones as components dyes are obtained which give greenish or yellow tints.

Yellow vat dyes. SEBASTIAN GASSNER. U. S. 1,667,848, May 1, 1926. 5,5'-Dibenzoyl-amino-1,1'-dianthrimide or various anthraquinone anthrimides having an acyl-amine substituent such as acetyl-, benzoyl- or salicyl-amine in each of the nuclei opposite to the nuclei linked together by the imino group are treated with concd. H_2SO_4 at a temp. not higher than about 35° . Dyes are obtained giving with alk. hyposulfite solns. reddish yellow vats from which cotton is dyed yellow to yellowish orange shades fast to light and washing.

Dyes and intermediates. I. G. FARBENIND. A.-G. Brit. 275,301, April 19, 1926. 3-Arylamino-1,8-naphthosultams and their sulfonic acids are made by treating 1,8-naphthosultamsulfonic acids which contain a sulfo group in the 3-position to the sultam N atom with aromatic amines, preferably with addn. of a salt and diluent. These products may be used as intermediates for producing dyes by condensation with aromatic nitroso compds. or by subjecting them to simultaneous oxidation with aromatic *p*-diamines, *p*-aminophenols or their homologs or substitution products. Examples are given for producing dyes which give reddish violet and violet shades on wool from an acid bath.

Forming dyes on the fiber. I. G. FARBENIND. A.-G. Brit. 275,326, May 4, 1926. Hydroxynaphthocarbazoles and their homologs and substitution products are used in dyeing or printing cotton with azo dyes formed on the fiber. Numerous examples are given and the dyeings obtained vary from brick-red to brown and black and are fast to washing, Cl and bucking.

Ester-like derivatives of vat dyes. W. BAUER. U. S. 1,668,392, May 1, 1926. A leuco compd. of dibromo-indigo or other vat dye is treated with the chloride of pyrosulfuric acid in the presence of an org. base such as dimethylaniline. The products thus obtained are stable in the solid form, sol. in water and may be used in dyeing and printing.

Benzanthrone derivatives. I. G. FARBENINDUSTRIE A.-G. Brit. 275,271, Aug. 2, 1926. Amidated sulfurized benzanthrone derivs. are obtained by reaction of hydroxylamine in H_2SO_4 soln. upon a benzanthranyl sulfide, disulfide, mercaptan or $\text{C}=\text{N}$ deriv. of one of these or upon one of the oxidation products described in Brit. 263,200 (C. A. 22, 170) preferably in the presence of a metal compd. such as FeSO_4 or CuSO_4 which promotes the reaction. The products are dye intermediates. Several examples are given.

Lakes. I. G. FARBENIND. A.-G. Brit. 274,627, June 28, 1926. Lakes are made from the condensation products obtained by the interaction of a halogen atom of an aromatic compd. halogenated in the nucleus with the amino group of a primary or secondary amine which may contain substituent groups such as sulfonic, COOH or OH groups, e. g., the condensation product of 2,4-dinitrochlorobenzene and anthranilic

acid or the condensation product of 2,4-dinitrochlorobenzene and sulfanilic acid, which form, resp., orange and greenish yellow lakes, by use of Na_2CO_3 , BaSO_4 , $\text{Al}_2(\text{SO}_4)_3$ and BaCl_2 .

Dyeing apparatus. W. GERBER. U. S. 1,669,333, May 8.

Dyeing apparatus. I. MITCHELL. Brit. 274,651, July 31, 1926.

Apparatus for bleaching, dyeing, washing and drying yarns and fabrics. W. WINTER and H. JORDAN. Brit. 275,363, May 31, 1926.

Dyeing. J. W. LEITCH & CO., LTD., A. E. EVERSHED and J. A. WALLWORK. Brit. 274,550, April 19, 1926. Animal and vegetable fibers, regenerated celluloses and cellulose acetate or their mixts. are dyed in a hyposulfite vat contg. stearin soap or other alkali salt of a higher fatty acid together with Na_2CO_3 or NH_3 or both. The vat may be used at higher temps. than when NaOH is used. Examples are given.

Dyeing "acetate silk." I. G. FARBERIND. A.-G. Brit. 275,307, May 1, 1926. Monoazo dyes are used which are obtained either by coupling a diazotized aminonaphthoic acid with a component or by coupling an unsulfonated diazo compd with an aminonaphthoic acid. Numerous examples are given.

Dyeing cellulose acetate. I. G. FARBERIND A.-G. Brit. 274,823, July 24, 1926. Azo dyes are used which contain a dihydroxydialkylamine group, e. g., the dye from diazotized 3,4,5-trichloroaniline and dihydroxydiethylaniline gives a clear orange shade, the dye from *p*-nitroaniline and dihydroxydiethyl-*m*-toluidine a dark yellowish red and the dye from 2,4-dinitroaniline and dihydroxydiethyl-*m*-toluidine a deep bluish bordeaux.

Dyeing cellulose acetate or other cellulose esters and ethers. BRITISH DYE STUFFS CORPORATION, LTD., R. S. HORSFALL, L. G. LAWRIE and J. HILL. Brit. 275,373, June 11, 1926. Azo dyes are used which are prepd. by coupling diazotized sulfonylides of amines of the C_6H_5 or C_{10}H_7 series with amines of the same 2 series. Several examples are given for prep. the dyes and intermediates.

Dyeing cellulose esters and ethers. I. G. FARBERIND. A.-G. Brit. 275,230, July 29, 1926. Dyeing of "acetate silk" or like materials is effected with a mono-sulfonated arylazodiarylamine contg. at least 1 nitro group in the diarylamine complex. Examples are given for producing dyeings of different colors.

Dyeing with irregular markings on fabrics. R. S. BRACEWELL. U. S. 1,668,934, May 8. An easily flowing color mixt. comprising an indigo dye or other finely divided insol. dye and an oil is floated to form a film on the surface of a non-solvent liquid such as water and fabric is brought into contact with this film to take up the film; afterward the fabric is treated with a reducing agent such as an alk. hyposulfite soln. to render the dye sol. and cause it to penetrate the fabric and it is then fixed by oxidation.

Pattern effects on "acetate silk." CALICO PRINTERS' ASSOCIATION, LTD. and J. R. WHINFIELD. Brit. 275,357, May 25, 1926. The material is printed with a salt of a delustering agent such as Na phenolate or aniline-HCl and subsequently treated with hot dil. inorg. acid or alkali (according as the delustering agent used is acidic or basic), to decomp. the salt and set free the delustering agent. Resists also may be used.

Coloring cellulose esters and ethers. SOC. CHIMIQUE DES USINES DU RHONE. Brit. 275,553, Aug. 3, 1926. A dispersed insol. inorg. coloring substance is formed in a soln. of a cellulose ester or ether, e. g., a soln. of cellulose acetate in acetone may be successively treated with FeCl_3 and $\text{K}_4\text{FeC}_6\text{N}_6$, and the ester or ether may then be recovered by pptn. or by evapn. of the solvent. The solns. may be used as varnishes or for the manuf. of films or threads. Org. coloring agents may be added to modify the color.

Coloring material from henna leaves. C. POLLACCHI. U. S. 1,668,603, May 8. Henna leaves are extd. with water rendered alk. by a sol. alk. salt such as Na_2CO_3 , and after acidulating the liquor thus obtained the coloring matter is extd. from the liquor with a volatile solvent such as C_2HCl_3 which is insol. in water. An app. is described.

Protecting wool during treatment with ammonia, etc. V. HABERKORN. Brit. 275,374, June 11, 1926. Material such as wool is protected during treatment with NH_3 soln., dyeing, etc. by use of a soln. such as may be prepd. from waste wool by dissolving it in an alk. soln., boiling and slightly acidifying with H_2SO_4 .

Finishing cotton fabrics to resemble wool. H. I. HUEY. Brit. 274,860, July 20, 1926. Unstretched cotton fabric is treated with gaseous or liquid CS_2 and then with alkali lye or is treated with an emulsion of CS_2 and alkali.

Apparatus for washing or other treatments of fabrics in rope form. J. E. SHAW and A. SHAW. Brit. 274,703, Dec. 1, 1926.

Yarns and fabrics of cellulose acetate, etc. C. S. PARKER, W. KERSHAW, F. L. BARRETT and BLEACHERS' ASSOCIATION, LTD. Brit. 274,584, April 29, 1926. Crepe-like effects due to shrinkage are produced in artificial threads formed of cellulose acetate

or like esters by treatment with dil. HNO_3 (30–50° T.) at temps. of 0–50°. The treatment may be applied to mixed goods.

Mixed fabric containing "acetate silk." G. HEBERLEIN. U. S. 1,667,892, May 1. A woven figured effect is produced by dissolving the "acetate silk" from portions of the fabric.

Apparatus for treating artificial silk wound on bobbins with washing or other liquids. BRYLSKA, LTD. AND F. W. SCHUBERT. Brit. 274,928, March 29, 1926.

Apparatus for treating hanks of artificial silk or other textile materials with liquids. O. KOHORN & CO. AND A. PERL. Brit. 274,885, July 20, 1926.

Apparatus for gas-singeing of yarns. R. MÜLLER-ZOLLINGER. U. S. 1,669,033, May 8.

Apparatus for singeing textile yarns. SOC. LE BLAN ET CIE AND E. FLORIN. Brit. 275,253, Aug. 2, 1926.

Creping silk fabrics. J. PAYET. U. S. 1,668,694, May 8. Creping is effected while the threads still contain their natural gums.

Treating cellulosic materials with sulfuric acid. W. KERSHAW, F. L. BARRETT, C. S. PARKER and BLEACHERS' ASSOCIATION, LTD. Brit. 274,940, April 23, 1926. Cotton fabrics or yarns or other cellulosic materials are treated with H_2SO_4 contg. dissolved cellulose and on washing out the acid with water the cellulose is pptd upon and within the body of the material. Heat and pressure treatment may be used to obtain pattern effects.

Desizing textile materials. I. G. FARHENIND. A.-G. Brit. 274,795, Jan. 18, 1926. The effect of enzymic desizing liquors is enhanced by addn. of an aromatic acid such as propyl- or butylnaphthalenesulfonic acid or benzylsulfanilic acid or their salts or condensation products of sulfonated phenols or naphthalene with CH_2O .

Recuperating "dry-cleaning" liquids. J. T. FENTON. U. S. 1,669,235, May 8. Dry-cleaning liquids such as gasoline after use are treated with a substance such as fuller's earth which will effect coagulation of colloidal impurities and these are removed by filtration after agitating the mixt. An app. is described.

Bleaching fur skins, etc. H. STEIN, W. E. AUSTIN and I. LIEBOWITZ. U. S. 1,668,875, May 8. An aq. soln. contg. over 3% H_2O_2 (suitably about 7.5%) is used together with NH_3 and a water-sol. soap.

Resists on animal fibers. K. DAIMLER, C. E. MÜLLER and H. GARTNER. U. S. 1,668,144, May 1. Aromatic sulfonic acid compds. are used, the aromatic residues of which are connected with any residues by bridging atoms which are bivalent metal-loids.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Examination of titanium white as a linoleum pigment. FELIX FRITZ. *Farbe u. Lack* 1927, 589–90, 603, 615.—In the manuf. of white linoleum, ZnO , MgO and CaO are unsuitable because they cause hardening with free fatty acids; white lead is poisonous and lithopone contains sulfur which may cause darkening. The ideal pigment, TiO_2 is non-poisonous, has low sp. gr., a high n and great tinting strength. The relatively high price is its only bar to greater use. G. G. SWARD

Use of oil shales in the preparation of ultramarine. B. K. KLIMOV AND V. A. LANIN. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 5, 89–105.—The raw materials used in U. S. S. R. in the manuf. of ultramarine consist of kaolin (10 p.), soda (10 p.), sulfur (10 p.), infusorial earth (3 p.) and tar (2–3 p.). The latter 2 ingredients being expensive, K. and L. investigated the possibility of replacing them by oil shales which are indigenous to the Leningrad area where the ultramarine factories are located. These oil shales, or rather bituminous slates, contain on the av. 40–45% volatile org. matter which serves to produce a reducing atm., and also contain the necessary silica. On an exptl. scale the prepn. of ultramarine by the use of oil shales was quite successful and even permitted a decrease in the amount of S employed; the amts. of Fe and lime contained in the shales had no harmful effect on the reaction. The best results were obtained with shales having the following compn.: Volatile matter 30–46.11%, non-volatile org. matter 8–10.65%, SiO_2 21.51–26%, CaO 6–8.36%, Al_2O_3 5–6.29%, moisture 0–4.21%. The yields in ultramarine were normal, i. e., crude ultramarine 65–70% of the mixed mass, commercial ultramarine 50–55% of the mixed mass. On a factory scale, however, the results obtained were not good, the reason for the

failure being attributed to the kaolin used, which had not previously been ignited at a sufficiently high temperature.

The significance of negative catalysis in the formation of protective coatings. BERNARD NELSON
JOHANNES SCHRIEBER. *Farbe u. Lack* 1927, 600-2; *Korrosion u. Metallschutz* 4, 82-6(1928).—Because the 3 double bonds in eleostearic acid are adjacent, wood oil dries chiefly by polymerization and with no increase in wt. On the other hand linseed and poppyseed oils dry by oxidation. The so-called negative catalysts, phenols, amines, derivs. of hydroxylamine, etc., terpenes esters and some metals retard oxidation. Wood oil contg. these compds., therefore, continues to dry Also in *Farben-Ztg.* 33, 680-2(1927).

The presence of dispersed phases in fatty drying oils. A. EIBNER AND A. GRETH.
Chem. Umschau Fette Oele Wachse, Harze 35, 97-100(1928); cf. *C. A.* 22, 1695.—Auer's hypothesis (*C. A.* 22, 1695) that fatty drying oils in their original state contains 2 phases which can be sepd. by shaking with formic acid, is disproved by expts. with 12 samples of linseed, wood and perilla oil that were treated with 45%, 95% and abs. formic acid. In no case of fresh oil could any dispersed phase be sepd., but from wood oil and from oxidized linseed oils a sepn. of the dispersed phase could readily be made with formic acid, the dispersed phase showing an I no. of 131.7 and the dispersing medium 134.2.

Cellosolve and its derivatives in nitrocellulose lacquers. E. W. REID AND H. E. HOFMANN. *Ind. Eng. Chem.* 20, 497-504(1928).—"Cellosolve" is the monoethyl ether of ethylene glycol. "Cellusolve" and its derivs. have little or no odor. These substances are excellent solvents for nitrocellulose and are being widely applied in the lacquer industry. The properties of "Cellosolve," of its acetate and of "Butyl Cellosolve" ($\text{HOCH}_2\text{CH}_2\text{OBU}$) are discussed. The use of various resins in connection with them is discussed. The manuf. of lacquers contg. these products is outlined and type formulas are given for lacquers suitable for the automobile, furniture and brush lacquers fields.

Viscometer for plant use. ROBERT FREUND. *Farben-Ztg.* 32, 2889-30(1927).—The known methods for detg. the viscosity of lacquers are inadequate for plant use. F. proposes the applications of a weight of suitable shape, suspended on a fine wire or thread the latter being marked at intervals of 5 cm. The rate of fall of the weight, i. e., the rate of submersion of the marks below the surface of the liquid indicates the viscosity of the liquid with sufficient accuracy provided that the instrument is standardized.

Varnishes with synthetic-resin base. M. H. VAN LAER. *Petit. j. du brass.* 35, 433-4(1927).—Hard varnishes with a synthetic-resin base insol. in alc., moderate heat, 1% KMnO_4 , SO_2 , 5% Na_2CO_3 , NH_4F , 1% HCHO and KHSO_3 are described. Only caustic NaOH and antiformin attacked the varnish.

Glyptal, a new synthetic resin. H. WARREN. *Electrician* 98, 286-7(1927); *Science Abstracts* 30B, 347(1927).—Glyptal is a condensation product formed by heating a mixt. of glycerols and phthalic anhydride to 210° . It is better than formaldehyde-phenol condensation products in resistance to arcking and discharge, in flexibility and in ability to bond mica. A classification is tabulated of synthetic resins with the names and makers. Glyptal is not subject to "tracking." It is very pale yellow or almost water-white, transparent and changes from a fusible and sol. state into a relatively infusible and insol. condition on heating. After curing, glyptal is not brittle, but becomes leathery, at high temps. It is freely sol. on acetone; the usual solvent consists of acetone, benzene and denatured EtOH. Glyptal holds with tenacity to smooth surfaces and is used for mica pasting.

The production of rosin and turpentine from the native pine by the incision method. F. C. PALAZZO AND E. ALINARI. *Atti II congresso naz. chim. pura applicata* 1926, 25-23; cf. *P.*, *C. A.* 18, 1916; 19, 2270.—Detailed data on the fractional distn. of the oleoresins from the same pines already described are given. The incision method furnishes an excellent rosin (*M* on the American scale) and a very high yield of limonene.

C. C. DAVIS

Viscosity of nitrocellulose [as applied to the lacquer industry] (MERZ) 23. Coloring cellulose esters and ethers [for use as varnishes] (Brit. pat. 275,553) 25. Drying printing inks (U. S. pat. 1,668,943) 13.

Final Report of the Committee, Chemical Section, National Safety Council, on Spray Coating. Chicago: National Safety Council. 53 pp. Reviewed in *J. Ind. Hygiene* 10, 131(1928).

PLÉSSOW, GUSTAV: **Die Anstrichstoffe.** Ein Auskunftsbuch über ihre Rohstoffe, Herstellg., Eigenheiten, Verwendg., Bezugsquellen, usw. Berlin: W. de Gruyter & Co. 228 pp. M. 15.

Bituminous paints. COLAS PRODUCTS, LTD., AND F. LEVY. Brit. 274,955, April 28, 1926. Pigments are incorporated in reversed bituminous emulsions or jellies such as may be prepd. by the methods described in Brit. 251,323 (C. A. 21, 1364). Several examples are given.

Rust-preventive paints. ROSTSCHUTZ-FARBWERKE DR. LIEBREICH GES. Brit. 275,234, July 27, 1926. Oil paints are made contg. an alk. or alk. earth compd. the sp. gr. of which is less than that of the pigment used. Mg oxide, hydroxide, carbonate or basic carbonate may be used, *e. g.*, in a paint which may also contain linseed oil, white lead and "vine black."

Titanium pigment. JOSEPH BLUMENFELD. U. S. reissue 16,956, May 8. See original pat. 1,504,673, C. A. 18, 3282.

Composition for removing nitrocellulose lacquers. E. F. CATHCART. U. S. 1,669,387, May 8. Acetone 75 gals. is stirred into a hot soln. of paraffin 4.5 lbs. in C_6H_6 25 gals. until the mixt. becomes cold.

Compositions for coating plaster or other porous materials. C. TAUBER (trading as G. LEUCHTE NACHF.). Brit. 275,610, Aug. 3, 1926. Compns. for coating brick, wood, stone, plaster or other surfaces comprise a Mg soap such as Mg resinate, stearate, oleate or linoleate which may be used with linseed oil, wood oil or other oils, varnishes, solvents, pigments, etc.

Linoleum cement. A. B. CRAVEN, C. S. BEDFORD and YORKSHIRE DYEWARE & CHEMICAL CO., LTD. Brit. 274,722, Jan. 3, 1927. The process described in Brit. 274,300 (C. A. 22, 2072) is modified to utilize the resinous by-product extd. from gutta-percha or balata, either in the semi-fluid condition or after oxidation to convert it into a solid resin.

Phenolic resins. BAKELITE CORPORATION. Brit. 275,011, July 12, 1926. After a usual heat curing treatment, phenolic resins are improved as to their insulating properties by further prolonged heating at a lower temp., *e. g.*, by heating for 48-80 hrs. at 125-135°.

Synthetic resins. A. A. DRUMMOND. Brit. 274,581, April 26, 1926. Synthetic resins such as those formed from phenol and CH_2O are purified by treatment with the vapor of an org. solvent, such as EtOH, of lower b. p. than water and preferably miscible with the resin.

Synthetic resins. P. HALLER and H. KAPPELER. Brit. 274,501, July 16, 1926. The process described in Brit. 266,258 (C. A. 22, 691) is modified by treating the condensation product such as obtained from CH_2O and $PhNH_2$ with an org. base, a neutral or acid salt or an org. acid, *e. g.*, with methylamine or pyridine or their aq. solns., aq. solns. of Na_2SO_3 or $NaHSO_3$, NH_4Cl , $(NH_4)_2S$, Pb acetate, HOAc or tannin.

Synthetic resins. R. H. KIENLE. Brit. 275,219, Aug. 2, 1926. Condensation products of a polyhydric alc. such as glycerol and a polybasic acid such as phthalic acid are rendered tough and flexible in their fully hardened condition by adding to the original ingredients or to the sol., fusible intermediate product materials such as indene polymer, dibutyl phthalate, triphenyl and tricresyl phosphates, benzyl benzoate, benzyl alc., indene, diphenyl, diphenyl ether, *o*-cresyl benzoate, ethyl lactate, glycol diacetate, triacetin, *p*-toluidine, aniline, benzyl acetate, BuOAc, cresol or butyl phthalate.

Synthetic resins. J. H. SCHMIDT. Brit. 275,604, Aug. 3, 1926. Synthetic resins of the glycerol-phthalic anhydride type are formed in a two-stage process; in the first stage solvents of high b. p. are either absent or are present in small quantity only, and in the second stage a solvent of high b. p. is present for which there may be used diethyl oxalate, or di-Et or di-Bu phthalate or tartrate. Polyglycerols may be used instead of glycerol and org. acids such as maleic, succinic or malic or their anhydrides may be used instead of phthalic anhydride. Various modifications are described.

Resinous condensation of phenol and butyl alcohol. C. F. SCHRIMPE. U. S. 1,667,872, May 1. PhOH 100 and BuOH 65 parts are condensed in the presence of a small proportion of an acid catalyst such as HCl. $(CH_3)_3N_4$ and wood flour or other fillers may be added.

Blocks of differently colored layers of artificial resin. M. HELFREICH. U. S. 1,668,590, May 8. Artificial resin in liquid condition is poured around colored hard artificial resin and the block thus formed is then hardened.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Rancidity determinations. C. W. POWICK. *Oil and Fat Ind.* 5, 107-8(1928).—No valid results are obtained in the Kreis test if the acid, because of the presence of NOCl, gives a blank test with phloroglucinol. Under these conditions rancid fats appear sweet while sweet fats may appear rancid unless the positive reactions be spectroscopically controlled.

E. SCHERUBEL

Behavior of potassium iodate and potassium iodide solution toward fats. B. M. MARGOSCHES, KARL FUCHS AND BRUNO KRAKOWETZ. *J. prakt. Chem.* 118, 225-37 (1928).—The action of KIO_3 and HI solns. on fats results in the production of HIO. The formation of this acid depends not only on the hydrolysis of HI and KIO_3 , but to a certain extent on the oxidation of HI by KIO_3 . The HI equiv. of the HIO, 50% of the I consumed, reacts with the KIO_3 to form I. The difference between the detn. and the blank shows only half the I consumed and this must be doubled to obtain the I no. Lower I nos. are obtained with increased time of reaction. By using equiv. amts. of HI and KIO_3 correct I nos. are obtained. In the case of wool oil, resins and fats contg. hydroxy acids, lower I nos. are obtained with HI and KIO_3 .

E. SCHERUBEL

Useful addition to laboratory extraction apparatus. P. L. MENAUL. *Oil and Fat Ind.* 5, 108(1928).—In the detn. of oil in cottonseed meal the best technic is to enfold the sample in a 12.5-cm. filter paper which is then folded in another 12.5-cm. filter paper and then extd. Meal dust always appears in the ext. To avoid this the lower tip of the outside paper is moistened with distd. H_2O . The papers are so rolled that the outer one extends $\frac{1}{2}$ in. below the inner one contg. the sample which must not be moistened. The wet tip retains all the meal dust.

E. SCHERUBEL

Unification of oil-testing methods. H. SCHLÜTER. *Chem.-Ztg.* 52, 261-4(1928).—The German Material-Prüfungsamt has developed a new open-cup app. for detg. the f. p. of mineral oils (obtainable from Dr. H. Glockel, Berlin, N. W. 6, Luisenstr. 21) which eliminates the 2 principal sources of error in present methods: (1) fixing a definite position of the therm bulb and (2) the method of applying the test flame. The app. is heated by either gas or electricity; it consists of a metal cup, 40 mm. diam. and 40 mm. deep, with a shoulder to hang from an inverted bowl that serves as air bath. The thermometer is fixed by resting its bulb on a form on the bottom of the cup. The form is removed after adjustment and is screwed in place to a standard. The bulb, when in position, is 5 mm. from the wall and 5 mm. from the bottom of the cup. The test flame is 1 cm. in length and is adjusted until it burns in the center of the oil surface and at a level with the cup's edge. The rate of heating is $3-5^\circ$ per min., beginning at 120° for machine oils and at 220° for cylinder oils. The flame is applied at every degree rise for 2 seconds until the first flash appears.

P. ESCHER

Contribution to the chemical investigation of Malvaleae. III. Hibiscus manihot. L. J. PIERAERTS. *Mat. grasses* 20, 8138-9(1928); cf. *C. A.* 21, 3756.—The compn. of the seed is: H_2O 10.80, total ash 4.56, H_2O -sol. ash 2.68, total N 3.51, crude protein (N \times 6.25) 23.34, ether ext. 13.42, crude fiber (Weende) 24.95, pentosans 11.44, P_2O_5 1.07% (= 23.46% of total ash), alky. of total ash (as K_2CO_3) 24.88, alky. of H_2O -sol. ash (as K_2CO_3) 60.64%. The constn. of the oil extd. with petr. ether b. below 60° are: d_{20}^{20} 0.9194, acid no. 6 (= 3% oleic acid), sapon. no. 197, I no. 103, Crismer no. (with 99.6% alc.) 62° , n_{25} 1.4695, unsapon. residue 0.92%, Hehner no. 95.80%, Milliau-Becchi reaction gives strong reduction with formation of a Ag mirror, Halphen reaction positive (orange color at 80° , becoming light red at 100° and cherry red after 1 hr. at 100°). The oil closely resembles cottonseed oil in many respects.

A. PAPINEAU-COUTURE

Endemic asthma due to castor-bean dust. K. D. FIGLEY AND R. H. ELROD. *J. Am. Med. Assoc.* 90, 79-82(1928).—A linseed and castor-oil mill in the neighborhood was found to be the immediate cause, by inhalation of castor-bean dust, of 30 cases of asthma, and the probable cause of 55 other cases.

L. W. RIGGS

The composition of Italian beeswax. D. CORTESSE. *Atti II congresso naz. chim. pura applicata* 1926, 1347-52.—The phys. and chem. constn. of 24 samples produced in various parts of Italy were detd. The following results show the min. and max. values: d_{15}^{15} 0.9597-0.9680, m. p. $63-4^\circ$, f. p. $60-1^\circ$, n_D^{20} 27-30, n_D^{40} 42.9-45.9, acid no. 19.03-20.92, sapon. no. 92-96.2, ester no. 72.20-77.13, I no. 8.0-10.3. The small variations indicate the uniform quality of Italian beeswax and the care exercised in its production. The data also serve as a basis for judging adulteration in beeswax which shows different constn.

C. C. DAVIS

Doubtful official standards for settled soap. K. RIETZ. *Chem.-Ztg.* 52, 261

(1928).—Com. settled soaps contain at most 0.1% free alkali, and only 0.02% when intended as a base for toilet soaps. The Deut. Arzneibuch VI allows for its official "Sapo medicatus" 0.2% free alkali (calcd. as NaOH) which is 10 times as much as the com. product contains. An error in the opposite direction is shown in the official soap specification for the Railways of the German Empire, which calls for settled soaps "free from uncombined alkali and unsapond. fat," which requirement would exclude practically all com. products. P. ESCHER

Waste in the Mexican soap industry. G. G. COLIN. *Ind. Eng. Chem.* 20, 526-7 (1928).—The chief sources of waste lie in poor glycerol recovery, excessive use of caustic and poor salt recovery. E. SCHERUBEL

Saponification under pressure. JOSEF GROSSER. *Am. Perfumer* 23, 55-6, 121-2 (1928).—This is a discussion which concludes that sapon. under pressure for soap manuf. has little prospect of realization. E. SCHERUBEL

Deflocculation and detergency not entirely correlative. Detergent experiments on cotton oiled with carbon black. R. M. CHAPIN. *Oil and Fat Ind.* 5, 95-105 (1928).—A machine was devised to wash and rinse small slips of fabric with vertical agitation in test tubes in a water bath. The slips were held at one end in spring clips suspended from rocker arms and were weighted at the free ends. The machine carried 4 double rocker arms and 8 clips with their suspending shafts, which are equipped with perforated metal disks to cover the test tubes. Detergent expts. were made on cotton cloth soiled in water suspensions of non-oily C black. The most powerful detergent was an alk. soln. of Na stearate or palmitate at 70°. In this effect of alkali, deflocculation and detergency are parallel but other correlations were vaguely defined. The method will not suffice for selection of the superior among com. soaps. Comparative tests were made on the power of soap solns. to prevent absorption of suspended C black by clean fabric. Acid soaps were the more effective, probably as a result of masking of absorptive affinities by an oily film of fatty acid. Power to prevent absorption is not correlative with detergent power in the special case of the prevention of absorption of suspended C by fabric. This result is based on tests using soap solns. E. SCHERUBEL

Cereals and the agricultural-chemical industries which depend upon them (SCURTI)
12. Rancidity of coconut oil produced by mold action (СТОКОЕ) 11C. Apparatus for emulsifying fats with water (Brit. pat. 275,375) 1.

Einheitliche Untersuchungs-Methoden für die Fett-Industrie. I. Edited and produced by the Wissenschaftliche Zentralstelle für Öl- und Fettforschung E. V. Berlin. Stuttgart: Wissenschaftliche Verlagsgesellschaft b. m. H. 105 pp. R. M. 5. Reviewed in *Chemistry and Industry* 47, 373 (1928).

TOBLER, FR.: **Der Flachs als Faser- und Ölpflanze.** Berlin: Julius Springer. 273 pp. R. M. 19.50. Reviewed in *Bull. Imp. Inst.* 26, 120; *J. Textile Inst.* 19, p 52 (1928).

Sulfonating fats, fatty acids, etc. CHEMISCHE FABRIK MILCH AKT.-GES. Brit. 275,267, Aug. 2, 1926. Sulfonation of various materials (to produce products suitable for use as fat-splitting or emulsifying or solubilizing agents) is effected by strong sulfonating agents such as chlorosulfonic acid, and the sulfo acids formed may be neutralized without sep. purification; their Ca salts are sol. Fats, oils, fatty acids of vegetable and animal origin, oxy-fatty acids, blubbers, resins, tallow oil, wool fat and its distn. products, naphthene acids or mixts. of these, with or without addn. of aromatic hydrocarbons, phenols, hydrophenols and chlorobenzenes may be treated in this manner.

Splitting fats. G. PETROFF. Brit. 274,741, Feb. 1, 1927. The emulsions formed in splitting oils and fats by Twitchel or other usual reagent of similar character are decompd. by adding a small quantity of CaSO₄ (0.1-0.5%) and preferably a small quantity of H₂SO₄ also.

Purifying fats and fatty oils. METALLBANK UND METALLURGISCHE GES., AKT.-GES. Brit. 275,536, Sept. 20, 1926. Suspended impurities are freed from water by heating *in vacuo* and are then removed by filtration.

Recovering fats from wool-washing, etc. C. VAN OVERSTRAETEN. Brit. 275,627, Aug. 6, 1926. Fat is extd. from wool-washing and other wash waters by washing with lukewarm water the ppts. obtained from froth flotation, chem. pptn. or other known processes, then boiling with Na₂CO₃ or other alkali, heating and drying, maintaining at a temp. of about 105°, decanting the fat from settled impurities and boiling with water, and then further purifying if desired by centrifuging.

Drying oils from cashew nuts. M. T. HARVEY. Brit. 275,574, Aug. 6, 1926. Oil from the shells of cashew nuts or from the gum or sap of the cashew tree or other source of anacardic acid and cardol are either heated with a metal such as Cu, Ni, "monel metal," Pb, Mg, Ca or Mn or with an oxide, hydroxide or carbonate of a metal such as Cu (as described in Brit. 272,510—C. A. 22, 1863) or with oleates, stearates or other metal compds. or may be heated under pressure either alone or with the materials specified. The products may be used for impregnating fabrics, cords or paper, or for coating metal wire, bars, or sheets, and for elec. insulating purposes. They may be thinned with hydrocarbon solvents.

Phosphatides from soy beans or other oil-seeds. H. BOLLMANN. U. S. 1,667,767, May 1. A mixt. such as that obtained from soy beans and which may comprise phosphatides with oil, water and other impurities is agitated and heated to about 60° with 3 vols. of strong alc. and the resulting soln. is cooled to successively lower temps. to effect sepn. of its constituents; the remaining soln. is finally evapd. under reduced pressure at a low temp.

Shaving soap. R. F. SMITH. U. S. 1,667,993, May 1. A K vegetable oil shaving soap is mixed with about 40–50% of finely divided talc.

28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

The sugar industry in the United States. RENÉ BOUCHON. *Bull. soc. ind. Rouen* 55, 350–68(1927).—An address. A. PAPINEAU-COUTURE

Extraction of crystallized sucrose from the carob. G. ODDO AND V. DE FONZO. *Gior. chim. ind. applicata* 9, 400(1927); *Brit. Chem. Abstracts* 1928B, 29.—On an industrial scale, sugar can be extd. directly from the carob by org. solvents, particularly EtOH, MeOH or Me₂CO. The carob contains 20–26% sucrose and about 15% invert sugar. The sugar first obtained is in the form of pale yellow crystals with an agreeable odor of carob, but the color and odor disappear after 1 crystn. and the yield of white sugar is 16–23% of the carobs. By distn. of the mother liquors almost all of the solvent can be recovered and is available for subsequent extns. The residual thick molasses contains dextrose and levulose, with 2–3% of sucrose, and it may be utilized for the prepn. of confectionery, EtOH, antiparasitic agents for plants, etc. The seeds, which are about 10% by wt. of the carob, have a market value of about 1.2 lire per kg., the perisperm yielding a dye which imparts delicate pink tints to silk and wool, and the albumin yielding a size for dressing and tanning. The residues are also of com. value. Sicily produces 300,000–450,000 quintals of carobs per yr. and Italy about 800,000 quintals. C. C. DAVIS

Nitrogen problem in cane culture in Java. O. ARRHENIUS. *Arch. Suikerind.* 36, 111, 91–152(1928).—Investigations have been carried out along 3 lines. (1) In *physiological studies* it was found that different cane varieties have varying percentages of N. As the N concn. of the nutrient soln. grows, the N assimilation also increases. Sand-water cultures show that under normal conditions the N requirement of cane corresponds to 8–10 pikols (NH₄)₂SO₄ per bouw. It is very probable that cane may utilize ammonia N directly. Old cane can stand N hunger much better than young cane. (2) Studies on *NH₄-NO₃ equil* have shown that Java soils, even when under water, have little or no nitrite. NH₄ is nitrified within 1 month, but different soils produce different amts. of nitrates. The p_H of the soil has no effect on nitrate production. The latter is the most essential process for cane growth. (3) *Statistical treatment of fertilizer tests in the field* proves that on soils of low productivity max. applications of (NH₄)₂SO₄ always give good results. The greater the productivity, the less fertilizer has to be used. There is an inverse proportionality between amt. of fertilizer added and nitrate produced. By mapping soils according to nitrate production, field expts. can be planned more intelligently. P. R. PEKELHARING

Chlorine question in sugar-cane culture in Java. O. ARRHENIUS. *Arch. Suikerind.* 36, 1, 90–100(1928).—The effect of Cl in the form of NaCl on the yield of cane was studied in sand-water cultures, the soil soln. being renewed every day. The cane was harvested after 6 months, weighed and analyzed. The results are tabulated. Two varieties were used, P. O. J. 2878 and 2883. Both gave the same type of curve. The max. limit of Cl is 0.06% of the soil soln. The curve shows a peculiar form and is probably composed of a Cl curve and an antagonism curve. The distribution of Cl in the soil is shown on soil maps of 2 plantations. In both cases the max. Cl content is found near the coast. However, this is not caused by infiltration but by the concn. of drain-

age water from the higher levels. The Cl content of cane grown on soils high in Cl is not excessive. The only practical measure against the poisonous effect of Cl is thorough leaching of the soil, perfect drainage and heavy irrigations. P. R. PEKELHARING

Relation between different properties of sugar-cane soils. O. ARRHENIUS. *Arch. Suikerind.* 35, 1197-1213(1927).—Relations between acidity, P_2O_5 and N content of soils have been studied. That between soil acidity and P_2O_5 content rests on the different solubilities of mono-, di-, and triphosphates. The P_2O_5 content influences nitrate production. Soils low in P_2O_5 will yield better crops not only with phosphate fertilizer, but in many cases addn. of N will improve the yield. Physiol. expts. will have to be carried out to support these field results. P. R. PEKELHARING

Control and mill report of the Java sugar experiment station (1927). ANON. *Arch. Suikerind.* 35, IV, 85-91, 226 51(1927).—The final report on results obtained in 171 factories taking part in the mutual control is presented. The av. purity of final molasses was 29.3, lower than ever before. Total losses were lower than in former yrs. because of better clarification and lower molasses. Unknown losses showed little difference from former yrs. Sugar production per hectare was higher than in 1926, but slightly lower than in 1925. P. R. PEKELHARING

Undetermined sugar losses* in the process of defeco-saturation. L. O. SHNAIDMAN. *Nauchnuie Zapiski* (Russian) 5, 322-8(1928).—In the chem. purification of the juices in the process of satn. a loss of sugar has been definitely established. It is caused by the adsorption power of the lime. The amt. of this loss depends on the quantity of lime pptd. in the satn. process, on the lime added in the process of defecation, on the concn. of the sucrose in the juice, on the temp. and undoubtedly on the reaction of the satd. juices. With an increase in the amt. of lime used in the defecation the coloration of the juices should diminish and the loss of dry matter increase. Under ordinary conditions of defeco-satn. where 2.5-3.0% CaO is added to the diffusion juice at a temp. of 80-85°, the loss of sugar in the filter-press mud is 0.7-0.9%. Along with the sucrose some non-sucrose substances are adsorbed and go into the filter-press mud; analysis of these is important in order to establish the amt. of sucrose lost. J. S. J.

Criticism of the chemical theory of saturation. L. O. SHNAIDMAN. *Nauchnuie Zapiski* (Russian) 5, 273-8(1928).—The polarization of a sugar-lime soln. was 60.7, alky. to phenolphthalein 2.16. CO_2 was passed through the soln. until a thick mass formed; air free from CO_2 was then forced through it. One portion of the mixt. was filtered and the fractionated filtrates were analyzed immediately; another portion was stoppered and left standing for 3 hrs. and 25 min. A cryst. ppt. was formed from the originally amorphous mass. The alky. and polarization of the filtrate from the 2nd portion were found to be 0.52 and 60.9, resp. The successive filtrates from the 1st portion showed wide variations both in alky. and polarization. The alkalinity was 2.16 (original), 0.24, 0.44, 0.53, 0.54, 0.59, 0.69 (av. 0.53); the polarization was 57.04, 59.77, 61.54, 61.67, 61.87, 63.20 (av. 60.88). Thus it may be seen that the alky. and polarization depend upon the time at which the fractions are analyzed. The chemistry of the process which takes place in the satn. vat may be represented as follows: $C_{12}H_{22}O_{11}CaO + CO_2 = CaCO_3 + C_{12}H_{22}O_{11}$. In the 1st stage of satn. a colloidal soln. of lime forms which with the decrease in alky. becomes unstable and begins to gel. The amorphous $CaCO_3$ by virtue of its high surface-adsorption power adsorbs from soln. both the sucrose and the monosucrate of Ca. As the amorphous substance crystallizes, the active surface decreases and hence the adsorption. This explains why in a delayed filtration the lost fractions have more dry matter; there is less adsorption by the crystals than by the gel. J. S. JOFFE

Observations on the crystallization of second product fill-mass in the crystallizers. B. E. KRASIL'SHCHIKOV. *Nauchnuie Zapiski* (Russian) 5, 309-12(1928).—With a fill-mass of 93.63-93.17 Brix a lowering of the coeff. of supersatn. took place, i. e., the crystn. progressed with the cooling of the fill-mass. Only after the temp. dropped to 45° the coeff. slightly increased. With a fill-mass of 94.55-94.09 Brix and with more rapid cooling the coeff. of supersatn. increased from the beginning of crystn. and remained high throughout. The purity of the mother liquor in the 2nd series of expts. towards the end of crystn. was higher than in the 1st series. J. S. JOFFE

Continuous diffusion. H. P. SOKOLOV. *Nauchnuie Zapiski* (Russian) 5, 279-81(1928).—A description of an app. for the continuous diffusion in the sugar plant is given beginning with the charging of the cosettes. A picture of the app. accompanies the article. J. S. JOFFE

***Regulating the density of milk of lime.** L. D'YACHUK. *Nauchnuie Zapiski* (Russian) 5, 285-87(1928).—D. describes in detail and illustrates with a diagram a new type of a regulator which controls the introduction of the lime during the process

of satn., etc. It is automatic in its work, easy to clean and simple in construction.

J. S. JOFFE

Washing the filter-press mud. B. E. KRASIL'SHCHIKOV. *Nauchnye Zapiski* (Russian) 5, 287-90(1928).—Tests were made on the comparative efficiency of cold and ammoniacal hot water washings of filter-press mud. There is more sugar in the cold water washings. The hot ammoniacal treatment takes out more solids, but less sugar.

J. S. JOFFE

The decolorization of refinery liquors with active carbons. JOSEF WIESNER. *Z. Zuckerind. czechoslovak. Rep.* 52, 101-108, 120-123(1927).—For a refinery, melting daily approx. 500 tons of raw sugar, W. finds from a comparison of actual working data a saving in decolorization costs of 64% in favor of Norit over bone char. In favor of bone char is its rational, easy and certain revivification, the dependable faultless and permanent decolorization of liquors, and the revenue obtained from spent char and dust. Against the use of bone char are the cost for large and high buildings, storage spaces, large heat and sugar losses, high steam, fuel and water consumption, large vol. of sweet water, high labor cost, impossibility to stop and start the process instantly and large capital investment for bone char in process and interest losses thereon. In favor of Norit is the possibility of instant starting and stopping, small capital investment for app. and machinery, small space requirements, little sweet water, smaller sugar losses, improved crystn. lower alkalinities, and higher density of liquors and a capital investment for Norit which is $\frac{1}{4}$ that of bone char and which is expended gradually throughout the year. Against Norit is the possibility of turbid liquors therefore requiring addnl. mech. filtration, greater cloth expense, 25% reduction of decolorizing power after first regeneration which must be replaced with fresh Norit, complete exhaustion after 30-70 regenerations and valueless residues. Refineries having bone char equipment can very profitably increase their melting capacity by installation of addnl. Norit equipment.

F. R. BACHLER

Simultaneous adsorption of sucrose and coloring matter by adsorption carbons. J. VAŠÁTKO. *Z. Zuckerind. czechoslovak. Rep.* 52, 45-52(1927).—The presence of sucrose reduces the decolorizing power of the char. Increased sucrose adsorption is accompanied by increased ability of the carbon to adsorb more H_2O . Adsorption of coloring matter is irreversible and grows with increasing temp. Conc'd. sugar soln. is a poor medium to accomplish chem. or chem.-phys. reactions. All purification processes occur more rapidly and the more completely the more dil. the solns. are, or, the less sucrose they contain. Therefore, decolorization of sugar soln. is best and most economically carried out in thin juices. The rate of adsorption of coloring matter is greatest in the first 5 min. and improves with increasing temp. Alky. falls with length of time of contact and increased temp.

F. R. BACHLER

Decomposition of sucrose by adsorption carbons. JOSEF VAŠÁTKO. *Z. Zuckerind. czechoslovak. Rep.* 52, 129-37(1927).—A 20 Brix sugar soln. was treated with 12 different carbons under varying conditions of time, temp., alky., quantity of C and rate of shaking. Decompn. of sucrose was detd. No relation existed between rate of adsorption and the decompn. of sucrose. In faintly alk. solns. rate of decompn. was decreased. At 20° it was negligible. Decompn. grows with temp., time of contact, quantity of C used and the rate of shaking. V. divides the carbons into 2 groups. The first, which causes no appreciable decompn. of sucrose, comprises 1 animal C. and 6 gas activated carbons (Carbo animalis Supra Norit 5 x, Supra Norit 3 x, Supra Norit 2 x, Superior Norit, Standard Norit and Poly carbon). This group shows less than 2% ash, more than 90% C and less than 0.2% Fe_2O_3 . The second group, which causes decompn. of sucrose, comprises 2 carbons of animal origin and 3 carbons produced by impregnation processes (Carboraffin H, Carboraffin, Blood Char, Anticromos, Bone Char "K"). These carbons are marked by contg. more than 3% ash, less than 90% C and more than 0.5% Fe_2O_3 . But it is not alone the chem. compn. which influences decompn., another important property plays a role on which V. promises more information.

F. R. BACHLER

Ash determinations of raw sugars. CHR. MRASEK. *Z. Zuckerind. czechoslovak. Rep.* 52, 149(1927).—Raw sugars, upon arrival at the refinery, are sampled and analyzed for the purpose of checking polarization and ash of that of the official sample. Herebefore 2 portions had to be weighed out for detn. of ash and sugar. Since Šandera's electrometric method has been introduced only one weighing is necessary. M. gives a table comparing the sulfate and conductometric ash detns. of the raw sugars produced by 21 factories. The conductometric ash is on the av. 0.007% lower than the sulfate ash. When higher differences occurred these were due to the presence of insol. inorg. matter.

F. R. BACHLER

Comparative analyses of ash of raw sugars by ignition and the electrometric method and apparatus of K. Šandera. FRANZ HERLES. *Z. Zuckerind. czechoslovak. Rep.* 52, 145-8(1927).—The ash flatus by ignition of 127 commercial raw sugar samples were checked by Šandera's electrometric app. 68.5% of the total analyses checked within $0.00 \pm 0.02\%$; 85.04% checked to within $0.00 \pm 0.03\%$. In 19 cases, or 14.96% of all samples, differences ranging between $\pm 0.04\%$ were found and in most of these the differences were due to the presence of insol. inorg. impurities which, of course, cannot be detd. by the electrometric method. The electrometric method would be ideal for commercial labs. to check the accuracy of the official chem. method. F. R. B.

The determination of invert sugar in molasses. R. OFNER. *Z. Zuckerind. czechoslovak. Rep.* 52, 103-12(1927).—Certain nitrogenous non-sugars in molasses, which partially or wholly escape pptn. by $\text{Pb}(\text{OAc})_2$, cause a heavy grayish green ppt. of Cu, which is erroneously ascribed to the presence of invert sugar. Nucleins and purines, occurring in dealed molasses soln., strongly reduce Fehling soln., and these can be completely removed by adsorption if to the soln. to be dealed about 1 g. of Norit, or bone char, is added. If these compds. are removed molasses soln. can be used directly to prep. auxiliary invert-sugar tables. For greater accuracy 10-20 g. substance should be used. Inasmuch as pptn. of Cu by invert sugar occurs in molasses later than in raw sugar soln., boiling time should be extended to 7 min. Alc. may be used to assist filtration. By frequent detns a volumetric method like that of Bruhns or Schoorl can now be used to advantage. F. R. BACHLER

Molasses of exceptionally low purity. G. VAVRINECZ. *Z. Zuckerind. czechoslovak. Rep.* 52, 124-27(1927).—At the end of the campaign 1926-27 1400 carloads of beets, that had been harvested prematurely and siloed for 7 weeks during a warm fall, were worked, resulting in extremely low purities. During storage, sugar and purity of beets fell 3%, invert sugar rose to 1.2%. Molasses from the first half and the end of campaign compared as follows: true purity 59.95-52.85, apparent purity 59.1-51.3. Total non-sugar 29.33-35.77, org. non-sugar 21.15-25.14, in 100 parts of org. non-sugar are N 6.71-4.91, volatile acid 7.19-9.51, Et_2O -sol. acids 4.73-6.77; in 100 parts of ash are Fe_2O_3 6.00-2.11, CaO 10.85-27.74. F. R. BACHLER

Fuel value of bagasse. E. C. VON PRITZELWITZ VAN DER HORST. *Arch. Suikerind.* 35, 1242-58(1927).—The meaning of "high" and "low" caloric value is explained. The high caloric value is recommended for the calens. used in the fuel control, in connection with the "quality figure," which expresses the relation between low and high caloric value. Simple formulas for calcg. low and high caloric value are given, based on moisture and sugar in bagasse, and the results are compared with those of practical tests. The agreement between the 2 was satisfactory. P. R. PEKELHARING

Starch and translocation. E. G. PRINGSHEIM. *Naturwissenschaften* 14, 305-7(1926); *Physiol. Abstracts* 12, 409.—There is no special "translocation starch." Whenever formed, starch is a reserve. H. G.

The tackiness of rice, corn and wheat starch in comparison with potato starch. W. EKHARD. *Z. Spiritusind.* 51, 23-4(1928).—By the Saase test rice was low, corn and wheat were about alike. Prolonging the cooking from 2 to 10 min. weakened rice and improved wheat and corn. Potato starch was similar to rice starch. C. N. F.

Soil microorganisms and their relation to soil fertility (ALICANTE) 15. Cereals and the agricultural-chemical industries which depend upon them (SCURTI) 12. Iodometric determination of glucose (NICHOLS) (ALVARADO, VOORHIES) 7. Investigations on maize (LAMPE) 12. Organic fertilizers from sugar cane (HARDY) 15.

Sugar. RAFFINERIE TIRLEMONTAISE SOC. ANON. Brit. 274,799, July 24, 1926. In order to obtain an increased yield of sugar crystals, massecuite is cooled to a pasty or plastic condition and then sepd. into crystals and sirup by centrifugal app. exerting an especially high centrifugal effect. Brit. 274,800 relates to the similar removal of false grain from sugar sirup or molasses which may be preliminarily treated with air, CO_2 , or other gas to form a froth.

Sugar from sugar-juices. M. R. J. SCHMID. U. S. 1,668,470, May 1. In order directly to produce refined sugar, sugar cane juice or sugar beet juice is heated, limed while hot, further treated with a small quantity of alum and H_3PO_4 , and sulfurized to produce an exceedingly slight acid reaction, filtered, treated with C, again filtered and then submitted to ordinary sugar-producing procedure.

Dextrose. C. EBBERT, W. B. NEWKIRK and M. MOSKOWITZ. U. S. 1,668,308, May 1. Starch is subjected to an acid hydrolysis conversion carried substantially as far as possible, the converted liquor is neutralized until coagulation and pptn. of

impurities occur, filtered, and then subjected to another acid hydrolysis conversion, and neutralized and filtered.

Treating molasses. R. L. CORBY, F. M. SCALES and W. H. F. BÜHRIG. U. S. 1,667,928, May 1. In treating molasses such as may be intended for use in yeast manufacture the molasses is rendered distinctly alk. with an alk. Na compd. such as NaOH, NaHCO₃ or Na₂CO₃ and a H₂O-sol. P-contg. precipitant such as a phosphate is then added, the mixt. is moderately heated and insol. substances are sepd. from the soln.; the reagents are so proportional that immediately prior to the heating the reaction of the mixt. is slightly alk. to litmus.

29—LEATHER AND GLUE

ALLEN ROGERS

Tanning materials of the British Empire. ANON. • *Bull. Imp. Inst.* 25, 380-403 (1927); 26, 22-38(1928).—A review of the distribution and uses of oak, larch, chestnut, cutch, gambier, sumach, myrobalans, divi-divi, algarobilla, teri, *Acacia arabica*, canaigre and "red dock" or "wild rhubarb" in the British Empire. A. PAPINEAU-COUTURE

Chemistry of combination chrome and vegetable tanning. G. GRASSER and HIROSE. *J. Coll. Agr. Hokkaido Imp. Univ.* 20, 203-17(1928).—Strips of calf skin were tanned in liquors contg. basic Cr sulfate and tannin from oak galls in varying proportions. The resulting leathers were subjected (1) to the boil test, and contraction in vol. and area noted, and (2) swollen with dil. HCl, and degree of swelling noted. In leathers tanned 1 day, contraction on boiling increased with increasing proportion of vegetable tannin. In leathers tanned 8 days, contraction for all leathers tanned in liquors in which chromium: tannin $\geq 1:1$ was the same as for pure chrome leather. Min. acid swelling after 1 day tannage was shown by leathers tanned in liquors in which Cr: tannin = (7:3) — (3.5:6.5). After 8 day tannage all leathers tanned in liquors contg. any Cr whatsoever showed the low degree of swelling characteristic of pure Cr leather.

H. B. MERRILL

Miscellaneous experimental investigations from the Institute of Tannery of Science [of the College of Agriculture, Hokkaido Imperial University]. GEORG GRASSER. *J. Coll. Agr. Hokkaido Imp. Univ.* 20, 219-32(1928).—I. *Soluble methylene compounds of tannin anhydrides.*—The well-known pptn. of tannin as methyleneditannin by HCHO in the presence of acid takes place only on heating or long standing. Phlobaphenes of oakwood ext., pptd. by boiling with acid, dissolve in HCHO soln. In the presence of excess HCHO, the soln. is not pptd. by diln. The dil. soln. is pptd. on heating with dil. HCl. After boiling with dil. NaOH, the dil. soln. gives no ppt. with HCl or with gelatin. The concd. soln., boiled with NaOH, gives a ppt. with both HCl and gelatin. Conclusion: 2 mols. tannin condense on heating, forming insol. phlobaphene, which with HCHO forms sol. methylenephlobaphene. The latter boiled with dil. NaOH forms a Na deriv. of methylenephlobaphene, not precipitable by acid or gelatin, but with concd. NaOH forms a Na compd. of phlobaphene, splitting out the methylene group, from which compd. the original phlobaphene is liberated on acidification. II. *Methylene derivatives of tannic acid.*—Tannic acid from oak galls forms compds. with numerous aldehydes similar to that formed with HCHO, which is supposed to contain 2 mols. pentadecalloyl-glucose joined through a methylene group. The soly. relationships of these compds. are given. III. *The phloroglucinol reaction of tannin.*—This reaction serves to distinguish (1) gambier from other catechol tannins, and (2) mimosa and maletto from oak, chestnut and valonia. The test is best made with a test paper made by soaking filter paper in 2% vanillin soln. A few drops of the tanning ext. placed on the paper and acidified with concd. HCl give a cherry red color in the presence of phloroglucinol. IV. *The behavior of the albumin-globulin and of the corine of the skin towards protein reagents.*—Lime skin was extd. with 5% NaCl, yielding a soln. of globulin + albumin (1). The residue was extd. with 0.025 N Ca(OH)₂, yielding a soln. of corine (2). Residual collagen was hydrolyzed, giving a soln. of gelatin (3). The behavior of these 3 solns. towards 12 protein reagents was detd. Positive tests were obtained as follows: biuret, 1, 2, 3; Molisch's, 3; S reaction with Pb(C₂H₃O₂)₂, 1, 2, phenol pptn., 2, 3; HgCl₂, 1, 2, 3; tannin, 1, 2, 3; KHgI₃, 1; picric acid, 2, 3. V. *Rate of conversion of green into violet chromic salts.*—The addn. of Na salts of acetic, oxalic and other org. acids hastens the conversion of the green soln. of K₂SO₄·Cr₂(SO₄)₃ into violet, judged solely on apparent color change.

H. B. MERRILL

The disinfection of skins infected with anthrax by treating with sodium sulfide. G. BRORZU. *Boll. soc. ital. biol. sper.* 2, 1015-6(1927).—The addn. of 2% Na₂SO₄ or

KSCN to a 1.5% soln. of Na_2S increases the germicidal action of the latter so that anthrax spores in rabbit or guinea-pig furs are killed in 36 hrs. at a temp. of 15–20°. P. M.

Wetting and emulsifying agents [for treating leather] (Brit. pat. 274,611) 22.

Gerbereichemisches Taschenbuch. Herausgegeben von der Vereinigung akademischer Gerbereichemiker Darmstadt (Vagda). Dresden and Leipzig: Theodor Steinkopff. 177 pp. Bound, R. M. 6.

WILSON, JOHN ARTHUR: **The Chemistry of Leather Manufacture.** Vol. I. 2nd ed. New York: The Chemical Catalog Co., Inc. 495 pp. \$10. Reviewed in *Chem. Met. Eng.* 35, 239(1928).

Tanning hides. M. M. MERRITT. U. S. 1,668,652, May 8. Hides are intermittently suspended in the atm. while wet with tanning liquor for a time sufficient to permit evapn. of a portion of the water and leave a liquor residue in the hides richer in tanning substances than that as originally absorbed and are alternately immersed in the liquor which is caused to flow rapidly over the surface of the hide. An app. is described.

Composition for staining and polishing leather. R. WEBSTER. Brit. 275,522, April 14, 1927. A wax such as carnauba wax, soap, a dye such as nigrosine and ghatti gum are formed into an emulsified pasty mixt. with water and a small quantity of CH_2O may be added.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Hard rubber for the chemical industry. J. R. SILVER. *Trans. Am. Inst. Chem. Eng.* 19, 71–7(1927).—A review of the properties and uses of hard rubber C. C. D.

Rubber in engineering. J. W. SCHADT. *Trans. Am. Inst. Chem. Eng.* 19, 57–70 (1927).—A review of the useful properties of rubber and its present wide field of application. C. C. DAVIS

Rubber inventions and processes. ANON. *Bull. Rubber Growers' Assoc.* 10, 183–4(1928).—Eight British and German patents are described. C. C. DAVIS

Development of the present automobile tire. W. F. ZIMMERLI. *Trans. Am. Inst. Chem. Eng.* 19, 79–92(1927).—Descriptive. C. C. DAVIS

The industrial application of rubber latex. PHILIP SCHIDROWITZ. *Trans. Inst. Rubber Industry* 3, 362–8(1928).—A crit. review of present developments, including the concn., preservation, handling, transport and variability of latex, and its use in tires, casings, inner tubes, proofed goods and dipped goods. A general discussion follows the paper. C. C. DAVIS

The testing of rubber goods for sunlight effect. H. E. WRIGHTMAN. *Rubber Age* (N. Y.) 23, 75–6(1928).—Exposure of vulcanized rubber mixts. to ultra-violet light showed effects which differed from the effects of sunlight, particularly with mixts. contg. reclaimed rubber, in the latter case mixts. which failed in service being comparatively resistant to ultra-violet light, and *vice versa*. The use of a violet C arc gave results conforming more closely with those for exposure to sunlight. An app. for duplicating the effect of sunlight and air is described, in which the temp., humidity and air supply are controlled while the rubber under tension is exposed to artificial light of known wave lengths which resemble sunlight in their relative intensities. C. C. DAVIS

Remarks on plasticity determinations in the Williams press. O. DE VRIES. *India Rubber J.* 75, 429–30(1928).—In comparative tests of different types of unmatificated rubber in the ordinary Williams plastometer and in the modified form of de Visser (cf. C. A. 20, 839) in which a const. pressure per unit surface is exerted on the rubber, the de Visser method gave irregular results which bore no relation to the corresponding results with the original Williams method. These irregular results with the de Visser app. were proved to be due to inherent mech. difficulties and it is considered that until this general method of detg. plasticity is placed on a mathematical basis, the de Visser app. is less reliable than the original Williams app. C. C. DAVIS

The distribution of fillers in rubber mixtures. ST. REINER. *Gummi-Ztg.* 42, 1359–60(1928).—Detns. of free S and of the ash at different points in representative rubber mixts. prepd. under ordinary factory conditions showed unexpected variations. Thus the ash of a mixt. which had not been calendered was 53.95–63.60%, a variation which was greatly reduced after calendering. Mixts. prepd. in the wet way showed relatively little variation. C. C. DAVIS

The relation between the cotton and rubber industries. R. TRUESDALE. *Trans. Inst. Rubber Industry* 3, 269-85 (1928).—A crit. review and discussion of the use of cotton in the rubber industry, with data showing the structure and phys. properties of different cotton cords and fabrics. C. C. DAVIS

Guanidine accelerators. History and litigation. ANON. *Rubber Age* (N. Y.) 23, 79-80 (1928). C. C. DAVIS

The application of the analytical quartz lamp in the rubber laboratory. F. KIRCHHOFF. *Kautschuk* 1928, 24-7.—A study similar to that of Nagle (cf. C. A. 22, 1251) was made of various inorg. and org. rubber ingredients or substances of interest in rubber manuf. to det. how many of them can be identified by means of characteristic *fluorescent colors* when viewed in ultra-violet light. The light was filtered so that the samples were lighted only with radiation of 3000-4000 Å. U. The characteristic fluorescence of substances depends upon their purity, and the presence of impurities greatly changes these fluorescent colors. Thus com. ZnO varies considerably because of differences in impurities (cf. Nagle, *loc. cit.*), varying from S-yellow for the purest grade to dark yellow-ocher, greenish yellow or pale rose. Since BaSO₄ is a brown-violet and ZnS a bright orange, the fluorescence of lithopone varies with the ZnS content. Many other inorg. compounding ingredients give characteristic colors which in most cases differ greatly from their colors in sunlight. Among aliphatic substances, vegetable and animal oils, fats and waxes and paraffin hydrocarbons show characteristic fluorescent colors. Phenols and aromatic acids show particularly bright colors and with increase in complexity of the ring, *e. g.*, quinoid compds., the intensity of the fluorescence becomes particularly great. On the other hand, NO₂ groups weaken the fluorescence. The introduction of Zn into feebly fluorescent compds. increases greatly the fluorescence, *e. g.*, quinosol, which is not fluorescent, becomes strongly so when converted to its Zn deriv. Dyes, org. rubber accelerators and antioxidants are also among the groups in which many of the individual members show characteristic colors. Proteins, sugars, starch and resins show more or less strong fluorescence. Different types of rubber show different fluorescent colors and when compounding ingredients are added these colors change so that sometimes it is possible to det. qualitatively the nature of a mixt. The differences in color of the various rubbers depend chiefly upon the acetone ext. and the exts. of different rubbers show different colors. In general, ultra-violet light analysis is useful in rubber technology for *identifying ingredients, controlling their purity and judging the correctness or thoroughness of a mixing*. It should also be of value in following the *natural or artificial aging of rubber mixts.* through oxidation. C. C. DAVIS

The identification of dusting agents on thin-walled rubber articles, cured with sulfur chloride, by means of the Hanau analytical quartz lamp. RUDOLF DITMAR AND WILHELM DIETSCH. *Gummi-Ztg.* 42, 1415 (1928).—Different types of dusting agents, *e. g.*, starches, talc, CaCO₃, etc. can be readily identified by examg. them in filtered ultra-violet light (cf. preceding abstr.), under which conditions they show characteristic fluorescent colors. Even starches from different sources can be distinguished. Org. accelerators also show characteristic colors which allow their identification.

C. C. DAVIS

Physiological aspects of the flow of latex in rubber plants (ZIMMERMANN) 11D. C black (Brit. pat. 274,573) 18. Tanks or vats formed of cement mixed with latex and lined with rubber (Brit. pat 275,316) 1.

SCHIDROWITZ, PHILIP: **Recent Progress in Rubber Chemistry and Technology.** London: Ernest Benn, Ltd. 3s. 6d., net.

Liquid rubber composition. H. P. BUTLER. Brit. 274,742, Feb. 2, 1927. A strongly adhesive compn. suitable for coating fabrics is formed by dissolving crude rubber in a solvent such as C₆H₆, with or without CCl₄, and heating to about 100° for 2-3 hrs. Gums such as damar, copal or kauri gum, drying oils and nitrocellulose may also be added, as may also various thinners and driers. Cf. C. A. 21, 3489; 22, 2081.

Rubber composition. HARRY L. FISHER. U. S. 1,668,235, May 1. Raw rubber is treated with *p*-toluenesulfonic acid (suitably at a temp. of about 110° or higher) to produce a reaction product which may be used for making molded articles. U. S. 1,668,236 specifies treating rubber 100 (in the absence of a solvent) with H₂SO₄ of 1.94 sp. gr. 2-25 parts to form a thermoplastic product.

Rubber composition. H. L. FISHER. U. S. 1,668,237, May 1. Rubber is heated with a mixt. of H₂SO₄ and *p*-toluenesulfonic acid in the relative proportions of 100:

8:2 and suitably at a temp. of about 88–130° to form a thermoplastic product suitable for making phonograph records, etc.

Rubber dispersion. H. L. TRUMBULL and J. B. DICKSON. U. S. 1,668,879, May 8. A viscous paste is formed from glue, casein or gluten, this is masticated and rubber is added, while the mastication is continued, in such large quantities as to produce a dispersion of the paste in the rubber, and the phase of the dispersion is then inverted to bring the paste into the continuous phase. The product thus obtained is similar to latex.

Reclaiming rubber. L. T. SMITH. Brit. 274,797, July 20, 1926. The material is treated with a solvent b. 160–200° such as a fraction of pine wood ext. consisting mainly of dipentene and contg. also pinene, terpinene, terpinolene and other terpenes.

Printing on rubber with colored rubber solutions. S. SAUL. Brit. 275,298, Jan. 6, 1927.

Paper for backing sheet rubber. G. E. GRIMM. U. S. 1,667,853, May 1. A backing for sheet rubber such as that used for patching rubber tires comprises paper carrying a smooth even coating of shellac or other hard resin mixed with a soft resin such as colophony and with castor oil or other suitable vegetable oil. Alc., turpentine and CH_2O also may be added. U. S. 1,667,854 specifies coating paper with waterglass, dextrin and glycerol, and then with rubber.

Articles of hard rubber. W. B. WESCOTT. U. S. 1,668,475, May 1. In forming abrasive wheels or other articles, a mixt. is made from comminuted old rubber, abrasive materials in granular form, S, and latex soln.; this mixt. is dried, molded and vulcanized.

Compositions containing rubber and cellulose derivatives. P. ALLMAN, H. N. MORRIS and I. H. MARLOR. Brit. 274,968, April 30, 1926. Rubber is dissolved in one or more of the volatile hydrogenated products of aromatic hydrocarbons or their hydroxy compds. or ketones or isomers or esters of such compds., e. g., cyclohexanone, and mixed with a soln. of cellulose derivs. such as cellulose nitrate or acetate. Non-volatile hydrogenated aromatic hydrocarbons such as *ar*-tetrahydrohydronaphthol may be used as softening agents.

Vulcanizing rubber to leather. L. B. CONANT. Brit. 275,194, July 29, 1926. The leather is preheated to about the temp. of vulcanizing and the rubber is attached by heat and pressure.

CHEMICAL ABSTRACTS

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1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

The Bates laboratory aspirator. E. N. BATES AND G. P. BODNAR. U. S. Dept. Agr., *Circ.* 9, 1-12(1927).—This device is designed to sep. granular substances by means of a current of air which passes through the substances as they fall in a thin stream. It was developed primarily for use in the lab. analysis of small grains but has other applications. Public service patent No. 1,524,012 covers the manuf. of the aspirator.
C. R. FELLERS

A constant-rate aspirator. C. F. HOTTES AND A. L. HAFENRICHTER. *Science* 67, 320-2(1928).—Two 10-40-l. bottles are supported, one in an inverted position directly over the mouth of the other. By means of tubes, compd. curves, stopcocks and a const.-level device, the principle of Mariotte is utilized to produce a const. flow from the upper to the lower bottle. The gas thus collected in the upper bottle can be sampled and analyzed. The upper bottle can be refilled with the used liquid in the lower bottle while the app. is in operation as an aspirator.
L. W. RIGGS

Practical arrangement of apparatus for microfiltration. GEORGES FONTES AND LUCIEN THIVOLLE. *Bull. soc. chim. biol.* 10, 495-500(1928); cf. C. A. 21, 2712.—
L. W. RIGGS

Dust-free air. A. BATTIGE. *Apparatebau* 40, 97-9(1928); 6 cuts.—Descriptions of H. Wittmeyer's *air filters*.
J. H. MOORE

The new pocket polarimeter of Zeiss-Ikon A. G. (Goerzwerk). K. SEILER. *Schweiz. Apoth. Ztg.* 65, 442-4(1927); cf. C. A. 18, 2944.—This improved instrument, to be used with any source of white light, allows accurate detn. of dextrose from 0.5 to 10%; the error for 0.5% is -0.04%, and for 1 to 10% varies from -0.01 to -0.05%. To find the % of dextrose, multiply the observed angle of deviation by 2. The instrument is well adapted for the *detn. of sugar in urine*.
S. WALDBOTT

Results of examination of three daylight polarimeters. K. SEILER. *Schweiz. Apoth. Ztg.* 66, 61-4(1928); cf. preceding abstr.—Five solns. of dextrose of known concns. (0.5 to 9.95%) were examd. with the Zeiss-Ikon (I), the Leitz R-polarimeter, Model B (II), and L. Merker's polarization app. (III). I is superior to II and III, as it shows a plain, clear field of vision, sharp changes of color, has exact zero adjustment and gives very accurate results. The errors in II and III are, resp., -6% and +6%.
S. WALDBOTT

Permanently saturated hydrogen electrode for the determination of p_H . JEAN SWYNGEDAUW. *Bull. soc. chim. biol.* 10, 430-42(1928).—See C. A. 21, 2487. L. W. R.

Simple apparatus for microanalytical determination of nitrogen that may be split off by caustic solution. H. LEOPOLD. *Chem.-Ztg.* 52, 309(1928); 2 cuts.—Description of an easily constructed distn. app.
J. H. MOORE

A method of calibration of a McLeod gage. R. J. CLARK. *J. Sci. Instruments* 5, 126-30(1928); 4 cuts, 2 tables.—Directions are given for constructing a gage and for correcting the error due to the meniscus.
J. H. MOORE

Buret-reading device. MAURICE HYMAN. *J. Soc. Chem. Ind.* 47, 100T(1928).—A piece of white celluloid, measuring 3 by 1.5 in., has 0.66 of its area blackened. Over the blackened portion is placed a strip of transparent celluloid so that its upper edge coincides with the upper margin of the black area and affixed by eyelets near the ends, thus leaving an opening between the pieces sufficient to allow the device to be slipped over the buret. The device is placed on the buret so that the upper margin of the black area is just below the meniscus. The eye is brought into a position such that the upper edge of the transparent celluloid in front of the buret and the upper margin of the black area behind the buret are seen as one coincident line, and the device is gradually raised until this line forms a tangent to the black crescent of the meniscus. T. S. C.

A new potentiometric titrating device. EBBE LINDE. *Svensk Kem. Tids.* 39,

285-7(1927) (German text).—A potentiometer titration chain is described in which a vacuum-tube amplifier is inserted. A. R. ROSE

* The spectrodenso-graph of Goldberg. HELMUTH SCHERING. *Collegium* 1928, 143-50.—The spectrodenso-graph gives absorption curves of solid and liquid, transparent or colored substances and of solid, opaque colored substances such as paper or fabrics. The curve is registered automatically and can be completed in 2 or 3 min. I. D. CLARKE

Apparatus for catalytic hydrogenations by Adams' method. G. A. C. GOUGH AND HAROLD KING. *Chemistry and Industry* 47, 410-1(1928).—The app. consists of a standard H cylinder, with reducing valve, which discharges through a valve into a second H cylinder. The second cylinder carries a sensitive gage, from which the H consumption can be detd., and a two-way valve. One outlet of this valve goes to the hydrogenation flask, and the other to a vacuum pump. T. S. CARSWELL

An instrument to record the carbon dioxide content of a gaseous mixture. K. GORDON AND J. F. LEHMANN. *J. Sci. Instruments* 5, 123-6(1928); 1 cut.—The app. is based on the variation in cond. of a bicarbonate soln. in equil. with a satd. carbonate soln., and is independent of other constituents of the gaseous mixt. BaCO_3 is used. J. H. MOORE

Air-free gas from a Kipp apparatus. L. C. BANNISTER. *Chemistry and Industry* 47, 364(1928).—The thistle funnel supplying the acid reservoir of the Kipp app. was replaced by a glass stopcock. To this was attached tubing from a vacuum pump and the pressure inside was reduced until the acid rose as high as possible. The stopcock was then closed and the pump tubing transferred to the gas-delivery cock. This was opened and the air sucked out of the app. until the acid came nearly into contact with the solid chemical. The process was repeated, and gas evolution then allowed to commence by opening the top stopcock and regulating it so that the pressure above the acid increased at the same rate as that in the gas reservoir, until both reached atm. pressure. Each successive repetition reduces the amt. of impurity present to a small fraction. T. S. CARSWELL

A simple automatic control of vacuum. S. P. MILLER AND P. V. MCKINNEY. *Ind. Eng. Chem.* 20, 552(1928).—A modified Bur. of Mines vacuum control (C. A. 21, 3266) was made by using a fine capillary (inner tube of a blast lamp) against which pressed a rubber stopper mounted upon the movable arm (bent down) of an electromagnet made from an old elec. bell vibrator. This device held a vacuum of 5 mm. and controlled it automatically to within 0.3 mm. W. C. EHAUGH

Improved aluminum alloys in the construction of apparatus and machines. P. SCHWERBER. *Apparatebau* 40, 85-8(1928).—A general discussion, with several references. J. H. MOORE

Lead and lead compounds (alloys) in apparatus construction. H. BUDE. *Apparatebau* 40, 101-2(1928). J. H. MOORE

Apparatus for taking cross-section samples from large quantities. RINCK. *Kali* 22, 105-6(1928).—Description of a simple device which gives satisfactory results in practice, but is no more free from error than any app. usually used for this purpose. A. L. HENNE

Flow meter. H. WINKELMANN. *Apparatebau* 40, 99-100(1928).—The Grefe meter is described. J. H. MOORE

A simple control unit for electrically heated mercury-vapor pumps. D. R. BARBER. *J. Sci. Instruments* 5, 133-4(1928); 1 cut.—An automatic cut-off based on the principle of the U-tube manometer. J. H. MOORE

A new jelly-strength tester, and some experiments on gelatin gels. A. F. TRACEY. *J. Soc. Chem. Ind.* 47, 94-6T(1928).—In testing gels made from photographic gelatin with the app. of Lipowitz, it was found that a much more definite end point was obtained when the end of the plunger resting on the gel had a spherical rather than a flat end. Much more comparable and uniform results were obtained when the jelly strength was expressed as the load in g. per cm. of plunger circumference rather than as load in g. per sq. cm. of plunger area. Temp.-jelly strength curves showed that usually the jelly strength decreased very rapidly with rise in temp., except in the range 19-23°, where the curves showed an almost horizontal inflection. An app. designed to measure the depression of a jelly under a given load consisted of a special type of strength tester, in which the movement of the plunger was observed from the movement of a spot of light thrown by a mirror attached to the plunger by a multiplying movement. T. S. CARSWELL

A new rapid incinerating oven. ARTUR FORNET. *Chem.-Ztg.* 52, 319(1928); 1

cut.—Fornet's oven for *burning flour*, etc., without using chemicals or pure O, is described. J. H. MOORE

WHITE, WALTER P.: *The Modern Calorimeter*. Am. Chem. Soc. Monograph Series, No. 42. New York City: Chemical Catalog Co., Inc. 194 pp. Bound, \$4.

Electron tube. H. C. RENTSCHALER (TO WESTINGHOUSE LAMP CO.). U. S. 1,670,483, May 22. Evacuated tubes contain a plate, a grid, and a refractory metal filament activated by a coating of Ra oxide.

Röntgen-ray tube. NAAMLOOZE VIENNOOTSCHAP PHILIPS' GLOEILAMPENFABRIKEN. Brit. 275,751, May 26, 1926. Structural features.

Luminous electric discharge tubes. J. B. J. M. ABADIE. Brit. 276,018, Aug. 14, 1926. In tubes filled with gases such as Ne, He or N and with Hg vapor, the glass is charged with fluorescent salts such as those of U or covered with fluorescent substances such as sulfides. The light from a He Ne mixt. filtered through yellow U glass is green as is also the light produced by fluorescence of the glass under the action of ultra-violet rays emitted by the gas mixt. The glass may be colored green by oxides, and the electrodes may be charged with Hg salts such as Hg cyanide which decomposes to yield Hg and N.

Luminous electric discharge tubes. J. B. J. M. ABADIE. Brit. 276,019, Aug. 14, 1926. In luminous elec. discharge tubes contg. Ne, He or other rare gas, the gas is purified before introduction into the tubes by an elec. discharge or arc between electrodes having zones of different temp. caused by the arc (one electrode being of an alkali or alk. earth metal or metal of the W group and the gas being circulated over the electrodes by convection). The gas pressure in the tube and the material of the electrodes are chosen to minimize disintegration of the electrodes and impurities in the gas are absorbed in the tubes by threads of W or other metal of the W group. Various other operative and structural details are given.

Electric resistance thermometer. SIEMENS BROS. & CO., LTD. AND L. G. SALMON. Brit. 276,464, June 15, 1926.

Mechanically-operating differential thermometer for use with recording calorimeters. SECRETARY OF THE BOARD OF TRADE AND C. V. BOYS. Brit. 276,803, July 22, 1926. Structural features.

Thermometer for automobile radiators, etc. G. JOANNES. U. S. 1,670,577, May 22.

Thermometer for use on internal-combustion engines. P. C. C. PASSMAN. Brit. 276,570, Feb. 18, 1927.

Wet and dry bulb thermometers and protective cage mounting adapted for use in drying kilns. V. R. JOSE, JR. U. S. 1,670,507, May 22.

Heat-saturator indicator. R. L. FEARN. U. S. 1,669,510, May 15.

Air filter. G. HAIN. U. S. 1,670,348, May 22.

Rotary filter with filter disks carried on a rotatable horizontal shaft. E. J. SWEETLAND. Brit. 275,779, July 23, 1926.

Filter press. W. T. CHATFIELD. Brit. 276,820, Aug. 19, 1926.

Colloid mill. R. LISTER & CO. AND F. V. LISTER. Brit. 276,594, April 22, 1927.

Colloid mills. W. H. WHATMOUGH. Brit. 276,737-8, May 29, 1926.

Forming disperse systems in a colloid mill. W. H. WHATMOUGH. Brit. 276,400-1, April 22, 1926. Mech. features.

Mixing mill for paints, foods, etc. C. J. COOPER and A. M. MASON. Brit. 276,196, Nov. 1, 1926.

System of connected kilns for continuous working. M. M. MINTER. Brit. 275,858, June 18, 1926.

Shaft kiln for manufacture of lime, "gypsum", cement, etc. and for calcining ores. G. MARTIN. Brit. 276,066, May 17, 1926.

Apparatus for feeding coal or other materials to top-fired kilns, etc. T. C. FAWCETT, LTD., D. L. FAWCETT and A. E. BOTTOMLEY. Brit. 275,701, April 24, 1926.

Electron-emission material. H. L. BERGER. U. S. 1,671,007, May 22. A metallic core of comparatively high cond. such as Ag is coated with an oxysulfide such as Ca oxysulfide.

Electron-emission material. J. W. MARDEN. U. S. 1,670,463, May 22. In order to activate W, Mo, Pt, Ta or similar refractory metal which may be used for cathodes a small proportion of a powd. Al alloy of Th or other electron-emission metal is added to the refractory metal also in powd. form, the mixt. is compressed into a slug, heat-treated and worked into the desired form.

Activating electron-emission filaments. T. P. THOMAS. U. S. 1,670,487, May 22. Filaments such as those formed of W are coated with Th oxalate and heated *in vacuo* to decomp. the Th oxalate and deposit free Th.

Apparatus for sterilizing liquids with ultra-violet rays. E. O. SCHEIDT. U. S. 1,670,217, May 15.

Mercury-vapor lamp for treating liquids with ultra-violet rays. E. GOLTSTEIN. U. S. 1,669,819, May 15. Liquid to be treated is circulated through a quartz tube extending within a Hg-vapor lamp the outer walls of which are formed of glass.

Tubular heat-exchange apparatus. BABCOCK & WILCOX, LTD. Brit. 276,262, March 22, 1927.

Continuous heat-exchange apparatus for regenerative hot-blast stoves, etc. F. A. FAHRENWALD and H. E. SMITH. Brit. 275,706, May 6, 1926.

Apparatus for aerating water or other liquids. J. J. BRATHERTON and D. MALONE. Brit. 276,495, Aug. 23, 1926.

Apparatus for deaerating liquids. RICHARDSONS, WESTGARTH & CO., LTD. AND J. R. WALKER. Brit. 277,041, March 9, 1926.

Apparatus for washing air or other gases. PNEUMATIC CONVEYANCE & EXTRACTION, LTD. AND S. N. CHEW. Brit. 277,112, June 10, 1926.

Apparatus for washing gases to remove dust, etc. ATELIERS J. HANREZ SOC. ANON. AND A. MODAVE. Brit. 277,281, Sept. 13, 1926.

Apparatus for scrubbing gases or for other gas and liquid contact operations. F. H. WAGNER. U. S. 1,669,638, May 15. Liquid is sprayed laterally at different levels of a vertical app.

Apparatus for gas scrubbing or for other contact of gases with liquid sprays. F. H. WAGNER. U. S. 1,669,795, May 15.

Liquefaction apparatus for separating gaseous mixtures. M. FRANKL. Brit. 276,292, Feb. 18, 1926.

Apparatus for estimating constituents of gases, etc., by different actions of heat rays passing through gases and falling on bolometers. SIEMENS & HALSKE A.-G. Brit. 277,025, Sept. 4, 1926.

Charging device for gas producers and similar apparatus. R. MÖLLER. U. S. 1,670,203, May 15.

Spray humidifier for treating air or other gases. CARRIER ENGINEERING CO., LTD. AND S. L. GROOM. Brit. 276,214, Dec. 24, 1926.

Automatic device (operating by diffusion and differences of pressure) to cut off gas flow in case of leakage. ELECTROLUX, LTD. Brit. 277,018, Sept. 2, 1926.

Apparatus (in which the saturation temperature of air or other gases is controlled) for effecting dehumidification. CARRIER ENGINEERING CO., LTD. AND S. L. GROOM. Brit. 276,221, Jan. 11, 1927.

Multipass gas condenser. J. S. HAUG. Brit. 275,971, Aug. 12, 1926.

Diffusion apparatus for testing gases in mines, etc. H. SEWERIN. Brit. 276,234, Oct. 23, 1926.

Apparatus for treating gases with catalysts or other solid materials. D. M. HENSHAW, S. G. WATSON and W. C. HOLMES & CO., LTD. Brit. 276,736, June 12, 1926. In removing H_2S from gases with Fe oxide, removal of moisture or C_4H_8 with silica gel, or in other gas treatments, an app. may be used in which the treating material passes downwardly through a hollow casing with foraminous walls through which the gases pass in a zig-zag manner.

Vacuum flotation apparatus for concentrated coal, ores, etc. F. E. ELMORE. Brit. 275,778, July 16, 1926.

Vacuum pump of the piston type. J. A. R. BENNET. U. S. 1,669,734, May 15. Mech. features.

Forming gas-tight seals in making electric discharge devices. A. W. HULL. Brit. 276,345, Aug. 23, 1926. A conductor such as Ni-Fe alloy coated with Cu may be surrounded by alternate cylinders of glass and Cu and by a Cu-coated metal shell, swaged together while the glass is plastic. Various structural details are given.

Apparatus for distilling volatile from non-volatile substances. E. WICKER. Brit. 277,085, June 7, 1926. An app. is specified suitable for sepp. volatile from non-volatile substances such as fatty acids, fats and oils, tars, tar oils or mineral oils by heating *in vacuo* and injecting liquids such as water, toluene or alc. as a mist suspended in heated vapors or gases such as CO_2 or N. Catalysts for hydrogenating may be added and H supplied with the gas for hardening fats, etc. Bleaching and purifying agents also may be added in the app.

Oil viscometer for use in connection with crank cases of engines, etc. F. B. MASON. Brit. 276,281, May 9, 1927.

Apparatus for conditioning fibers by spraying them. BORNE, SCRYMSEY CO. Brit. 277,213, Jan. 5, 1927.

Color comparison apparatus. TINTOMETER, LTD., F. E. LOVIBOND and G. S. FACETT. Brit. 277,166, Sept. 3, 1926.

Apparatus for testing hardness of materials. R. ESNAULT-PELTERIE. Brit. 276,776, June 30, 1926.

Thermionic valves. EDISON SWAN ELECTRIC CO., LTD., L. H. SOUNDY AND T. W. PRICE. Brit. 276,703, April 28, 1926. The electron-emitting surface of a cathode is confined to a small area so that the potential drop across the surface is less than 0.1 v. and less than $\frac{1}{1000}$ of the potential drop between the surface and the anode; e. g., a spot of CaO or SrO may be applied to a Pt filament.

Thermostat. A. D. HORNE. Brit. 275,873, Feb. 15, 1927.

Thermostat for controlling the supply of fuel to burners. O. C. SCHROEDER. U. S. 1,670,010, May 15.

Thermostatic alarm device. A. REYROLLE & CO., LTD. AND B. H. LEESON. Brit. 277,114, June 10, 1926.

Thermostatic control for radiators. E. S. PORTER. U. S. 1,669,880, May 15.

Thermostatic electric switch. W. DUBILIER. Brit. 277,279, Sept. 11, 1926.

Thermostatic electric switch. G. GILLIVER and F. PASCALL. Brit. 277,219, Jan. 27, 1927.

Thermostatically controlled electric switch and fuel cut-off. O. C. SCHROEDER. U. S. 1,670,746, May 22.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

Svante Arrhenius. W. PALMAER. *Svensk Kem. Tids.* 39, 300-34(1927).—Biography with portrait. A. R. ROSE

Karl Albert Vesterberg. ANON. *Svensk Kem. Tids.* 39, 335-6(1927).—Biography with portrait. A. R. ROSE

Alexander Classen on his eighty-fifth birthday. WALTER KRINGS. *Z. Elektrochem. angew. physik. Chem.* 34, 217-8(1928).—A biographical note. E. H.

Berthelot as an alchemy historian and an archeologist. J. BIDEZ. *Bull. soc. chim. Belg.* 37, LXXII-LXXVIII(1928).—A lecture. A. L. HENNE

Berthelot and chemical mechanics. F. SWARTS. *Bull. soc. chim. Belg.* 37, LIV-LXXI(1928).—A lecture. A. L. HENNE

Berthelot and the organic synthesis. G. CHAVANNE. *Bull. soc. chim. Belg.* 37, XLVII-LIX(1928).—A lecture. A. L. HENNE

Paul Heinrich v. Groth. H. STEINMETZ. *Ber.* 61A, 65-8(1928).—Obituary, with portrait. E. H.

Roberto Lepetit. GIUSEPPE BRUNI. *Giorn. chim. ind. applicata* 10, 117-8(1928).—An obituary with portrait. C. C. DAVIS

P. Poni. I. BORCEA. *Ann. sci. univ. Jassy* 14, 1-7(1926).—An obituary with portrait. A. PAPINEAU-COUTURE

Frederick Belding Power. C. A. BROWNE. *J. Assocn. Official Agr. Chem.* 11, iii-vi(May 15, 1928).—An obituary with portrait. A. PAPINEAU-COUTURE

Gabriel Efimovich Timofeev. An obituary. ANON. *Ukrainskii Khim. Zhurnal* 2, Sci. Pt., 65-8(1926). E. J. C.

Beginnings of chemistry. CARLO ORESTE ZURETTI. *Giorn. chim. ind. applicata* 10, 121-31(1928).—Bibliographical researches are described which deal with alchemical symbols, processes and app. used by the alchemists, alchemical doctrines in various Greek manuscripts, various formulas, symbols and diagrams of early app. Reproductions of original manuscripts are included. The work is part of a complete treatise of alchemy to be published in Italy, in which historical records from previously unexamined manuscripts will appear. C. C. DAVIS

Education in chemical and physicochemical science in the United States. WALTER FRANKENBURGER. *Z. Elektrochem. angew. physik. Chem.* 34, 269-74(1928). E. H.

Valence in chemical teaching. W. DAHMEN. *Z. physik. chem. Unterrichts*, 39, 127-9(1926).—Brief general discussion of teaching method. M. BEBER

Simple experiments on polymorphism. W. FLÖRKE. *Z. physik. chem. Unter-*

richt 40, 71-6(1927).—Expts. dealing with transition of rhombic to monoclinic sulfur, transition of monoclinic to rhombic S, specific gravity of monoclinic and rhombic S, detn. of transition point of NH_4NO_3 , proof of transition of NH_4NO_3 by the change of crystallographic relationships and transition of KNO_3 are described. M. BEBER

Experimental demonstration of the existence of the ammonium radical. S. GENELIN. *Z. physik. chem. Unterricht* 39, 235-7(1926)—A current is passed through a concd soln. of $(\text{NH}_4)_2\text{SO}_4$, mercury serving as cathode. The ammonium amalgam formed is filtered off quickly, transferred to a small test tube and allowed to decompose. The products are identified as NH_3 , H_2 and Hg , thus proving the original presence of NH_4 . M. BEBER

Microchemical reactions in teaching. P. RISCHBIETH. *Z. physik. chem. Unterricht* 39, 67-71(1926).—In addition to creating an interest in the student the study of crystals under the microscope has very definite advantages. Directions for showing Na and Li uranyl acetates; isomorphism of sulfates and selenates, phosphates and arsenates, antimony and bismuth salts; $\text{M}_2\text{CuPb}(\text{NO}_3)_4$ where M is K, Rb, Cs, Tl; $\text{M Hg}(\text{CNS})_4$ where M is Cd, Zn, Cu, Co; formation of $\text{Na}_2\text{Ca}(\text{CO}_3)_2$; reduction of selenous by sulfurous acid; formation of complexes as shown by $\text{Pb}(\text{NH}_3)_4\text{Cl}_2$ and $\text{Pb}(\text{NH}_3)_2\text{Cl}_2$. Other reactions can be obtained from texts on the subject. M. BEBER

A student experiment on the melting and crystallization points of lead and tin. FRIEDRICH HOFMANN. *Z. physik. chem. Unterricht* 39, 165-6(1926). M. BEBER

Dissociation of carbonates by heat as student experiments. L. DOERMER. *Z. physik. chem. Unterricht* 40, 122-3(1927).—Objection to Rischbieth's method (cf. following abstract) is the Pt tube, which is unavailable in many schools. Expts. described here eliminate it. M. BEBER

Dissociation experiments with a platinum tube. P. RISCHBIETH. *Z. physik. chem. Unterricht* 40, 112-5(1927); cf. preceding abstract.—Expts. giving quant. results dealing with dissociation of various carbonates, siderite, rhodochrosite and pyrolusite are described. M. BEBER

Hydrolysis of sodium chloride as an experiment. HORST BRÜCKNER. *Z. physik. chem. Unterricht* 41, 92-3(1928).—Although hydrolysis of salts of strong acids and strong bases can be practically disregarded it can be demonstrated. A knife point full of NaCl is placed in a yellow glowing Pt crucible at about $1100-1200^\circ$. After it is melted about 1 cc. H_2O is added. When about $\frac{1}{2}$ the H_2O is evapd. (about 20 sec.), the dancing drop is allowed to drop into about 100 cc. dil. blue litmus soln. The melted NaCl remains in the crucible and on cooling is dissolved in water; this turns red litmus blue. The drop of H_2O had colored the blue litmus red, showing that the solid NaCl had become alkaline and the drop acid. M. BEBER

New experiments with thermite. H. ZEITLER. *Z. physik. chem. Unterricht* 40, 16-21(1927).—Z. describes a com. thermite mixt. "moxbriquettes" which he uses to demonstrate many expts. with the thermite reaction, such as its use for heating purposes, a detn. of its heat of reaction, burning it under water, and dissociation of halides, sulfates and carbonates by its heat. M. BEBER

Revision of the atomic weight of uranium. The analysis of uranium tetrachloride. O. HÖNIGSCHMID AND W. E. SCHILZ. *Z. anorg. allgem. Chem.* 170, 145-60(1928).— UCl_4 is prep'd. by heating UO_3 with C in a current of Cl_2 , sublimed twice and melted in atm. of N_2 , to liberate dissolved Cl_2 . Nineteen detns. of the ratio $\text{UCl}_4 : 4 \text{ Ag}$ and 18 of $\text{UCl}_4 : 4 \text{ AgCl}$ gave $U = 238.14$. C CALINGAERT

Some properties of non-metallic elements in relation to their cohesive forces. A. M. TAYLOR. *Trans. Faraday Soc.* 24, 157-9(1928).—Cohesion may be explained in terms of attractive forces operative between unlike charges and between elec. doublets. With non-metals the linkage is homopolar, the cohesive forces originating from elec. doublets which arise from deformation. With metals it is heteropolar, ionic charges adding to the elec. doublet effect. "In polar crystal lattices the units are oppositely charged ions, and the forces of cohesion vary as the inverse square of the distance of sepn. provided deformation of the electronic shells is absent." Broadly speaking compressibility indicates the nature of the cohesive forces, and hardness may be treated as a quant. estimate of their magnitude. JEROME ALEXANDER

The formation of chemical formulas on transition from homopolar to heteropolar linkage and vice versa. CHRISTOPH SCHWANTKE. *Z. physik. chem. Unterricht* 39, 226-8(1926); cf. C. A. 20, 2101. M. BEBER

Physical classification of the elements. C. G. BEDREAG. *Ann. sci. univ. Jassy* 14, 47-59(1926); cf. C. A. 19, 1656.—Recent exptl. data on the spectra of Co and Ni multiplets confirm the previously given system of the elements. Two stages through which the passage from one element to the succeeding one can be analyzed: variation

of the electronic group $R_n \rightarrow R_n + 1$ and variation of $N \rightarrow N + 1$. B. notes both in his own previously-given tables and in Stoner's model how the variable properties of the same element are functions of the no. and arrangement of electrons remaining in the at. structure. He also draws attention to the importance of the detection of the electronic (or combination) bands from the standpoint of electronic distribution.

A. PAPINEAU-COUTURE

The rare earths in the general classification of the chemical elements. LUIGI ROLLA. *Scienza* 43, 159-68(1928) (Italian).—A general review of the periodic system is given and the position of the rare-earth group of elements therein is explained. The work of Moseley on at. nos. is explained together with its relation to the Mendelyev table. Finally, the analogy between ionization potential and chem. properties is given. The periodicity of 2 groups of 8 elements followed by 2 of 18 elements which in turn is followed by a large period of 32 elements is shown graphically. It is this last period which contains the rare earths. In this group is the vacant position of element 61. Its identification brilliantly confirms the general theory of the constitution of matter.

R. H. LAMBERT

The natural system of the elements. W. DAIMEN. *Z. physik. chem. Unterrichts* 40, 106-12(1927).—A review of a no. of periodic arrangements. M. BEBER

Atomic constants and physical properties. MAX BORN. *Z. physik. chem. Unterrichts* 40, 241-53(1927).—A lecture. M. BEBER

Combination and space. N. S. KURNAKOV. *Z. anorg. allgem. Chem.* 169, 113-39 (1928).—An address given at the General Assembly of the 4th Mendelyev Congress at Moscow 1925 in which K. points out the relation between geometrical conceptions and chem. equil. The formulas which apply to the relations of points, lines and surfaces in polyhedral complexes which enclose a three-dimensional space can be applied to our usual stereochemical formulas.

E. R. SCHIERZ

Pyrophoric lead. G. R. LEVI AND A. CELERI. *Atti. accad. Lincei* [6], 7, 350-5 (1928).—The paper is in 2 parts: (1) *detn. of Pb in the presence of its oxides*, and (2) *methods of prepn. of pyrophoric Pb and analyses of the products*. Ordinary analytical methods for detg. Pb are unreliable for its detn. in the presence of its oxides and 4 other methods were tried. Pb was dissolved in hot aq. FeCl₃ acidified with HCl, MnSO₄ was added, the soln. was dild. and titrated with KMnO₄. The results were very low, and elimination of HCl or its replacement by H₃PO₄ did not improve the method. Pb was then treated with aq. AgOAc, hot and cold, but no method giving uniform results could be developed. Replacement of AgOAc by AgNO₃ gave even worse results. No volumetric method could be devised and attempts were made to measure the H by treatment with boiling concd. HCl in a current of CO₂. This method of detg. Pb gave precise results even in the presence of its oxides, and it was adopted for the study of pyrophoric Pb. The method of van Rijn for the prepn. of the latter was improved by heating Pb tartrate *in vacuo* in a sealed tube at 480° for 2-4 min., cooling and filling the tube with 1% C₆H₆ soln. of paraffin. By protecting the product in this way, spontaneous oxidation is avoided. This method of prepn. gives a product with about 87% free Pb. A pyrophoric Pb which is less active and contains about 72% free Pb is prepd. by heating in a sealed tube at 350-60° a mixt. of Pb tartrate and paraffin. *Röntgenographic examn.* showed only lines of Pb, but when exposed to the air the lines of PbO appeared. Pyrophoric Pb prepd. from Pb citrate by the same 2 methods used for Pb tartrate gave products contg. 89 and 72% Pb, resp. Heating Pb oxalate and paraffin at 300° for 1 hr. also gave an active pyrophoric Pb contg. about 30% free Pb. *Röntgenographic examn.* indicated that in this case the formation of free Pb was chiefly a surface phenomenon. Decompn. of Pb oxalate in a current of CO₂ gave a product contg. only 4% free Pb which did not oxidize in air at room temp. and was composed chiefly of PbCO₃, though *röntgenographic examn.* indicated the presence of PbO. Pb formate and paraffin heated at 300° for 1 hr. yielded a product which contained about 91% free Pb, which oxidized rapidly in air and which showed only lines of Pb when examd. *röntgenographically*. The expts. showed that (1) pyrophoric Pb has the same cryst. structure (face-centered cubes) as ordinary Pb; (2) the pyrophoric granules are large enough to give sharp, fine lines in Debye photographs; (3) pyrophoric Pb sometimes slightly contaminated with PbO can readily be prepd. by heating Pb citrate, tartrate or formate, and (4) slow oxidation of pyrophoric Pb forms yellow PbO, the extent of the oxidation in a given time depending upon the size of the particles.

C. C. DAVIS

The temperature of transformation of liquid sulfur to viscous sulfur. PAUL MONDAIN-MONVAL AND PAUL SCHNEIDER. *Compt. rend.* 186, 751-3(1928).—The viscosity of pure S was studied as a function of temp. and it was found to undergo in-

ternal transformation at 160°. By adding increasing amts. of impurities (triphenylmethane was added since it does not react with S below 280°) the transformation takes place at higher and higher temps., reaching a limit corresponding to the appearance of a new phase. Around 170° S and triphenylmethane are miscible in all proportions. But raising the temp. to 200° causes a sepn. of 2 layers, one rich in S and the other in triphenylmethane.

E. G. VANDENBOSCH

Internal equilibrium in liquid sulfur. I. D. L. HAMMICK, W. R. COUSINS AND E. J. LANGFORD. *J. Chem. Soc.* 1928, 797-802.—Ineffective chilling may account for the vertical portion of the Smith and Holmes' (*J. Am. Chem. Soc.* 27, 979 (1905)) alleotropic line, which is supposed to represent the equil. between S_λ and S_μ in liquid S. In the present work an attempt is made to eliminate this portion by using better chilling methods. Thus, fine droplets of S are prepd. by suspending liquid S in a mixt. of $(\text{NH}_4)_2\text{SO}_4$ and H_2SO_4 , of about the same d. as the S. The time of transference of the S mixt. from the heating unit to the cooling-bath (ice- H_2O) is cut to a min., the mixt. falling into the bath on breaking the bottom of a glass tube. After properly washing, hardening, selecting and drying the droplets are ground to pass through 50 mesh. To analyze, this is treated with CS_2 in a Soxhlet extractor. The plot shows that as the droplets are more effectively chilled the transverse section of S. and H's alleotropic line becomes more elongated, the vertical being reached at 40% S_μ instead of their 33%. This proves that this portion of the curve is due to ineffective chilling and that it is not a truly alleotropic line. The changes taking place during the hardening of the chilled droplets have not yet been taken into account by anyone. J. BALOZIAN

A new allotropy of cobalt. HAKAR MASUMOTO. *Kinzoku no Kenku* [9], 2, 877-93 (1925); *J. Inst. Metals* 37, 377-8 (In Japanese.).—Hitherto it has been believed that Co possesses only the magnetic transformation at 1150° and has no other transformation, but from an investigation on the change of several properties of Co at high temps. (intensity of magnetization, elec. resistance, thermal expansion, sp. heat, etc.), M. concludes that Co has a new transformation or an allotropy taking place at 477° and 403° during the heating and cooling, resp. It was also confirmed by x-ray analysis that below the transformation point Co has a hexagonal close-packed lattice (H), and above it a face-centered lattice (γ); hence the new transformation during heating consists of the change from H lattice to γ lattice, and the transformation during cooling of the change from γ lattice to H lattice. The peculiar course of the magnetization-temp. curve below 400° is due to the magnetic transformation of the hexagonal Co, and the abrupt rise at 477° and the abrupt fall at 403° are due to the change of the intensity of magnetization during the transformation. The diminution of magnetization at higher temps. is due to the magnetic transformation of the face-centered Co. H. G.

Allotropic modifications of phosphorus. V. IPAT'EV AND V. NIKOLA'EV. *Ber.* 61B, 630-4 (1928).—White or colorless P is obtained by heating ordinary yellow P with benzene at 200° at 70-80 atm. pressure in presence of an inert gas (N_2 or CO_2). Its d. is 1.82. It is also obtained from the violet-ruby-red P. Purple P is obtained in different ways; it is formed when the white P is heated in the pressure app. at 200-280°. Violet-ruby-red P is obtained by heating Pb and yellow P at 335° and 165 atm. N_2 pressure. Its d. was found to be 2.11. Black P is obtained by heating red P at 350° 4-5 days under 150-250 atm. N_2 pressure. Its d. is about 2.70.

M. FENSKE

Space group of potassium, rubidium and cesium sulfates. F. P. GOEDER. *Proc. Nat. Acad. Sci.* 13, 793-7 (1927).—Assignment of a space group to the sulfates of K, Rb and Cs, is based on crystallographic measurements and x-ray pictures taken by the Laue method and studied by means of gnomonic projection combined with earlier work with x-rays by the powder method. The Laue photographs were made with a tungsten Coolidge tube at root mean square voltages which never exceeded 56,600 volts and usually was not above 50,000. The min. wave length was 0.218 Å. U. A simple orthorhombic lattice containing 4 mols. is the smallest elementary unit agreeing with the patterns. By a comparison of the observed Laue patterns with the patterns theoretically possible from space groups 2 Di-1 to 2 Di-16, it is possible to exclude all except 2 Di-13.

A. W. KENNEY

Researches on lead phosphate and lead chlorophosphate (pyromorphite). F. ZAMBONINI AND A. FERRARI. *Atti accad. Lincei* [6], 7, 283-91 (1928).—A röntgenographic examn. of $\text{Pb}_3(\text{PO}_4)_2$ and pyromorphite shows that their cryst. structure is fundamentally the same. $\text{Pb}_3(\text{PO}_4)_2$ and pyromorphite have a values of 9.66 and 10.03 Å., resp., and on the assumption that the axial ratio $a:c$ is 1:0.736 in each case, the vols. are 578 and 638 (Å. U.)³, resp. If these vols. contain $3\text{Pb}_3(\text{PO}_4)_2$ and $\text{PbCl}_2 \cdot 3\text{Pb}_3(\text{PO}_4)_2$, resp., the calcd. ds. are 7.03 and 7.06, resp. Expts. showed the d_{20}^{20} of $\text{Pb}_3(\text{PO}_4)_2$

to be 7.011. This identity of structure of $\text{Pb}_3(\text{PO}_4)_2$ and pyromorphite is at variance with the views of Abegg and Bodländer (*Z. anorg. Chem.* **30**, 480 (1899)) and of A. Werner (*C. A.* **2**, 636), who considered pyromorphites as halides of a complex cation. It is difficult to det. by expt. the orientation of PbCl_2 in the $\text{Pb}_3(\text{PO}_4)_2$ lattice, for the structure of the latter is in doubt. The increment in vol. is almost the same as the vol of PbCl_2 . The ions of PbCl_2 perhaps enter the interspaces of the $\text{Pb}_3(\text{PO}_4)_2$, in which case the ratio $3\text{Pb}_3(\text{PO}_4)_2:\text{PbCl}_2$ corresponds to satn. of the interspaces, and pyromorphites contg. less PbCl_2 would exist. The researches of Amadori and Viterbi on natural pyromorphites and of Amadori (*C. A.* **14**, 391) on the system $\text{Pb}_3(\text{PO}_4)_2\text{--PbCl}_2$ failed however to identify any such pyromorphites. Regarding pyromorphites as $\text{Pb}_4(\text{PbCl})(\text{PO}_4)_2$, the passage of $\text{Pb}_3(\text{PO}_4)_2$ to pyromorphite involves the replacement of a Pb ion by 2 univalent PbCl groups, in which case the increment in vol. would be that observed, and in accord with exptl. research there could be no crystals with a ratio of $\text{Pb}_3(\text{PO}_4)_2:\text{PbCl}_2$ other than 3:1.

C. C. DAVIS

Recrystallization of very pure aluminum wire. F. SCHMID AND G. WASSERMANN. *Z. tech. Physik* **9**, 106-9 (1928).—On heating hard Al wire (0.35 or 0.8 mm. diam., 99.95% Al) at 600° for 3 hrs. recrystn. occurs with perfect unidirectional orientation of the grains with [111] parallel to the wire axis, as shown in Debye-Scherrer diagrams. The texture of the recrystd. wire is, however, different from that of Cu wires treated in similar way. For the 0.35-mm. wire which had more or less the same texture initially, the strength decreased after the treatment from 20.6 to 3.5 kg. per sq. mm., the percentage elongation changed from 1 to 5 as compared with 20% for unicryst. Al wire. It shows that the crystallite orientation is not the only factor governing the elastic properties. For Al-Si (eutectic) alloy wires (1 mm.) the strength decreases from 26.5 to 15.6 kg. per sq. mm. after ignition, the elongation changes from 2 to 17.5% with unchanged x-ray texture.

B. J. C. VAN DER HOEVEN

Self-diffusion and recrystallization. ADOLF SMEKAL. *Naturwissenschaften* **16**, 262-3 (1928).—S. shows from several examples (ion conduction, diffusion, recrystn., etc.) that the theory of imperfect crystal lattices with loose electrons in the defective spots accounts for many features of the crystals. Only near to the m. p. of the crystal the activity of the rest of the lattice electrons becomes noticeable. B. J. C. v. d. H.

The inner crystal structure of some native metals. H. C. H. CARPENTER AND S. TAMURA. *Bull. Inst. Mining Mcl.* No. 283, 1-16 (1928); cf. *C. A.* **22**, 1879.—"Moss" Cu in mats may indicate that certain forms of native Cu have originated in the molten state. Ag may sep. from Ag-bearing Cu alloy. Very little at. rearrangement has taken place in Egyptian coppers, bronzes, etc., except in specimens accidentally heated. Metals electrolytically and also chemically deposited may show twin crystals. Slowly cooled Fe and steel did not exhibit appreciable crystn. The supposition that metals recrystallize under the influence of vibration has been eliminated. Meteoric iron has been used in the past for lethal weapons but not all native iron is of meteoric origin, for coal measures fired with native iron ore produced practically a native steel. Alluvial depositions were segregations in granular media.

S. L. B. E.

Resistance to shear in metal crystals. G. I. TAYLOR. *Trans. Faraday Soc.* **24**, 121-5 (1928).—Formation of imperfections of a single crystal under stress preventing rows of atoms from slipping is an untenable point of view. The fact that resistance increases as a crystal is placed under stress can, however, be explained by assuming regions where a high concn. of stress can occur so that locally very high values of the shearing stress can be reached although the mean shear stress is small. X-ray expts. are shown to verify the conclusions drawn.

R. H. LAMBERT

An investigation on eutectic crystals. MATSUJIRŌ HAMAZUMI. *Suiyō-Kwaishi* [6], **4**, 973-82 (1924); *J. Inst. Metals* **36**, 453.—[In Japanese.] An expt. was made to discover the crystal grain of cell in eutectic alloys. The crystal grain in eutectics can be detected by the etching method only when the metal in the cell is more basis than the surrounding crystals. The eutectic is nothing but the constituent inlaid within surrounding crystals in polygonal cells. Both these crystals crystallize simultaneously and independently of each other. This action proceeds chiefly by the spontaneous crystn. power of these metals. The primary crystal has a decided effect upon the orientation of the eutectic.

H. G.

Crystallographic study of the artificial amalgam Ag_3Hg_4 . T. J. WOYNO. *Compt. rend. soc. polonaise phys.* **7**, 1-3 (1926); *J. Inst. Metals* **37**, 523.—[In French and Polish.] The compd. Ag_3Hg_4 forms thin needles which are really rhombic dodecahedrons of which the sides [110] are elongated in the direction of the [111] axis. The substance belongs therefore to the cubic system.

H. G.

Deformation, fracture and strengthening of crystals. M. POLANYI. *Naturwissenschaften* 16, 285-94; *Trans. Faraday Soc.* 24, 72-84(1928).—A lecture with 37 references.

The fractional combustion of hydrogen and methane mixed with air. P. RITSCHBIETH. *Z. physik chem. Unterricht* 39, 121-3(1926).—Because of the facts that hydrogen burns more readily than CH_4 and that in a mixt. of the two with air the former is burned exclusively when the mixt. is in contact with a Pd wire heated almost to glowing, the two gases can be sepd. Expts. are described.

The compressibility isotherms of hydrogen, nitrogen and a 3:1 mixture of these gases at temperatures between 0° and 400° and at pressures to 1000 atmospheres. E. P. BARTLETT, H. L. CUPPLES AND T. H. TREMEARNE. *J. Am. Chem. Soc.* 50, 1275-88(1928).—The additive vol. rule in the case of these gases is apparently valid within the limits of exptl. error at 300° but at lower temps. there is a decided deviation. The additive pressure rule is valid to within 2%, if defined in the following way: the pressure exerted by one constituent in a gaseous mixt. equals the product of its mol. fraction and the pressure it would exert as a pure gas at a mol. concn. equal to the mol. concn. of the mixt.

The law of molecular forces. A. W. PORTER. *Trans. Faraday Soc.* 24, 108-11(1928).—P. reviews the work on interacting forces between mols. The term a/v^2 in the van der Waals equation is too small to obtain accurate numerical values even by assuming the term as a measure of such forces. Viscosity measurements offer some information but simple considerations based on gas laws are insufficient. More success may be expected on effects in solids, although difficulties due to motion of mols. arise.

Approximate theories of diffusion phenomena. S. CHAPMAN. *Phil. Mag.* [7], 5, 630-6(1928).—In the kinetic theory consideration of diffusion phenomena the detailed picture usually used for deriving the desired relations involves the discussion of the flow of one or more types of mols. across planes. The equation giving the no. of mols. considered, their mol. fractions and the relation $m_1c_1^2 = m_2c_2^2 = \alpha T$ have so far been combined with the above considerations in a manner which leads to incompatibilities and therefore to erroneous results. C. points out that the correct theory of the various diffusion phenomena depends on the detn. of the velocity-distribution function, which in non-uniform states deviates slightly from the Maxwellian form. However, in spite of many attempts C. has so far failed to find any simple arguments on which to base an easy approx. theory of thermal diffusion.

A consequence of two diffusion equations. W. HERZ. *Z. anorg. allgem. Chem.* 170, 246(1928).—Gapon (*C. A.* 22, 1082) has shown that $D\sqrt{n} = \text{const}$ (D = diffusion coeff., n = no. of atoms in the mol.). Since $D\sqrt{M} = \text{const}$. (M = mol. weight), it follows that $\sqrt{M}/n = \text{const}$. This is shown to be fairly correct for 19 compds. G. C.

The liquid state. W. HERZ. *Z. anorg. allgem. Chem.* 170, 233-6(1928); cf. *C. A.* 22, 1069.—The expression $Z/\sqrt{\gamma}$ (Z = no. of mols. per cc., γ = surface tension) is nearly const. for liquids over a wide range of temp. Likewise, Z/\sqrt{B} (B = internal pressure). These relations hold equally well for associated and non-associated liquids.

Boiling points of the normal paraffins at different pressures. SIDNEY YOUNG. *Proc. Roy. Irish Acad.* 38, 65-92(1928).—A crit. study of the most recent data published on the subject. The work, which is of unusual importance, contains many tables of recalcd. values of vapor tensions and crit. comparison with the actual values.

The relation between the coefficients of expansion and compressibility of fluids. V. S. VRKLIJAN. *Z. Physik* 48, 111-7(1928); cf. *C. A.* 21, 677, 1733.—The relation previously established between the coeffs. of expansion and compressibility is greatly simplified by a slight change in the definition of the coeff. of expansion. The validity of the relation is extended thereby. Application to Bridgman's data on org. liquids shows the theory is strictly accurate. The general formula for the max. density of water and aq. solns. is derived. This corresponds to the equation of van der Waals and the formula of Lussana as special approximations.

Properties of dry liquids. S. B. MALI. *Phil. Mag.* [7], 5, 609-14(1928); cf. *C. A.* 18, 348; 20, 528.—M. attempts to calc. the proportions of the less and more volatile components of dried and undried liquids.

Surface tensions of liquid mixtures. K. M. STACHORSKY. *Z. Elektrochem.* 34, 111-2(1928).—By replacing the internal pressures in Biron's equation with surface

tensions, a similar one is obtained: $\gamma = \gamma_1 \gamma_2 / [\gamma_1 (1 - x) + \gamma_2 x]$, where γ , γ_1 and γ_2 are the surface tensions of the mixt., and the first and sec. components, resp., and x is the mol. fraction of the first component. The surface tensions of unassocd. pairs of liquids (at 55°, benzene (I) and nitrobenzene (II), and toluene and II; at 20°, I and Et acetate (III), II and III, III and CCl_4 , and Pr formate and CCl_4 ; at 18.2°, I and Et_2O , and I and toluene) are calcd., x varying from 0 to 1. The exptl. values are slightly smaller than the calcd. The greater the difference between the surface tensions of the pure components, the greater the deviations of the hyperbolas, as given by the equation from a straight line.

J. BALOZIAN

Cohesion in surface films. N. K. ADAM. *Trans. Faraday Soc.* 24, 149–54 (1928).—The three principal film states are (1) condensed, with close-packed, nearly vertical mols., (2) gaseous with mols. lying flat in the surface and more or less independently motile, (3) expanded, which are intermediate between (1) and (2). Recent work indicates the correctness of the suggestion of Garner, that in liquid expanded films, the mol. chains have a considerable tilt, which may be the consequence of their trend toward close-packing, following close-packing of the mol. heads. With urea derivs. the close-packed heads form very incompressible solid films (area 25.5 sq. A. U.), the rigidity being in the plane of the surface. If the thickness is taken as 3 atoms, the compressibility is of the same order as for org. substances in bulk. Compression probably does not rearrange the film, which is maintained solid and with heads apart mainly or entirely by the cohesion of the terminal NHCONH_2 groups. "This solid structure must be one of the thinnest solids known. It breaks down at a certain transition temp., allowing the chains to come into contact. This temp. may be regarded either as a transition temp. between two 'allotropic' condensed films, or as the 'm. p.' of the two-dimensional structure 3 atoms thick, showing that allotropy may be strictly analogous to melting, a part only of the crystal lattice structure giving way under the thermal agitation." Rigidity is partly detd. by length of chains in contact, which with an effect due to lateral attraction between heads, det. closeness of packing. With aliphatic acids, especially, a double bond in the middle of the chain (as with oleic acid) tends to instability of the film, probably because of increased attraction for water. Since surface films, as always in matter, result from a balance of oppositely acting forces, rise in temp. changes condensed films into expanded, and finally into gaseous films. By noting the tendency of films to collapse, we may distinguish the attraction of the end groups for water, whose importance Langmuir first pointed out. "The hydrocarbons, and alkyl halides cannot be induced to form films on water; the ethers and phenol esters form transient films when spread by a solvent; the methyl esters show slight signs of collapse, while the acids and many other series of compds. form films which will usually resist 10 dynes per cm. compression, or more, with very little collapse. . . . a compression on these very thin films, of the order of 40 atm. The adhesion between the ends of the mols. and the water must be very great to prevent buckling of the films under this, or larger compressions." A rough classification follows: (A) Very weak attraction, no film formed: hydrocarbon, CH_3I , CH_3Br , CH_3Cl . (B) Weak attraction, films unstable (groups in increasing order of attraction for water): CH_3OCH_3 , $\text{C}_6\text{H}_5\text{OCH}_3$, COOCH_3 . (C) Strong attraction: CH_2OH , COOH , CN , CONH_2 , CH:OH , $\text{C}_6\text{H}_4\text{OH}$, CH_2COCH_3 . Films with very long chains always collapse more readily than those with chains of moderate length. Where the approach of the sol. group to water is blocked by a large group, stability diminishes. Pentaerythritol tetrapalmitate forms a fairly stable expanded film, its 4 side chains being forced into vertical position by the cohesive forces. Since the same cohesive forces dominate both film and crystal formation, predictions of m. p. may be worked out. "We now know that the structural formulas of organic chemistry, too often taught as being merely symbolical representations of reactions, do in fact represent the shapes of the mols. with considerable accuracy."

JEROME ALEXANDER

Cohesion in the crystalline state. F. I. G. RAWLINS. *Trans. Faraday Soc.* 24, 155–6 (1928).—A brief review considering the energetics of the cryst. state. "Stratified" lattices are invariably associated with great ionic deformability. Here, mean values are of no avail. "Forces of great magnitude, perhaps even pseudoheteropolar, must be operative within each layer, whereas the weakest forces akin to homopolar, hold the layers together. Actually, the crystal forms beautiful flakes, giving evidence of its stratified habit." A perfect example is CdI_2 .

JEROME ALEXANDER

The influence of particle size upon the dissociation pressure of solid substances. II. Lead carbonate. M. TZENTNERSHVER and J. KRUSTINSONS. *Z. physik. Chem.* 132, 185–8 (1928); cf. C. A. 21, 689; 22, 521.—Dissocn. pressures of PbCO_3 prepd. in 3 different ways were detd. at temps. 255.5–285.5°. Data for samples of min. particle

radius 18.75 and 37.5×10^{-5} cm., when substituted in the equation for surface tension at the boundary solid-vapor, give an approx. value of $63,000$ dynes/sq. cm.

R. J. HAVIGHURST

Adsorption. IV. Adsorption by coconut charcoal from binary mixtures of saturated vapors. The systems methanol-benzene, ethyl alcohol-benzene, propyl alcohol-benzene and butyl alcohol-benzene. F. G. TRYHORN AND W. F. WYATT. *Trans. Faraday Soc.* **24**, 36-47(1928); cf. *C. A.* **20**, 1545.—Adsorption by coconut charcoal from mixts. of benzene with the first 4 members of the normal aliphatic alcs. has been studied in order to confirm the existence of the 3 definite stages of adsorption believed to be present. In the first stage the ratio of the wts. of the 2 components is independent of time. From the Langmuir equation the molar ratio is calcd. and found to agree well with exptl. results especially in the MeOH and EtOH mixts. The close relation between the compn. of the adsorbed phase during the first stage and the form of the vapor-pressure curve of the binary system is discussed. The extent and sharpness of the second stage varies greatly from system to system. The selective action of charcoal is shown by appropriate graphs. The error resulting from displacement of air is very small. A possible quantum mechanism involving energy transfers in the infrared region is suggested for this selective action.

R. H. LAMBERT

Adsorption from solutions. W. HEYNE AND M. POLANYI. *Z. physik. Chem.* **132**, 384-98(1928).—Series of adsorption measurements from aq. and alc. solns. were made at -21.3° , 0° , 20° , 25° and 50° . The adsorbent was charcoal. The adsorbed substances were succinic, benzoic, cinnamic, aminobenzoic and phthalic acids, and phenol. "Affinity curves" are drawn by plotting affinity of wetting *versus* amt. adsorbed. Increase of temp. displaces the affinity curve in the direction of higher affinity of wetting. This is the reverse of the effect of temp. increase on adsorption of vapors by charcoal. In adsorption measurements from solns. the solvent is displaced from the charcoal by the adsorbed substance. In dealing with wetting phenomena the energy required to distort the space lattice must play a part. The adsorption of a given substance from soln. in an org. solvent is less than from aq. soln. At temps. at and above the m. p. the adsorption of phenol resembles that of a vapor.

R. L. DODGE

Adsorption, heats of adsorption, and character of attachment between small amounts of sulfur dioxide and charcoal. M. POLANYI AND K. WELKE. *Z. physik. Chem.* **132**, 371-83(1928); cf. *Ibid* **132**, 321(1928).—Earlier adsorption isotherms of SO_2 on charcoal in the range between a few ten-thousandths and 3% of the satn. value are discussed. The results indicate that up to about 0.0005 of the satn. value the SO_2 is held on the charcoal by intense but short-range forces (20,000 cal.). The SO_2 adsorbed at 0.0006-0.0008 of the satn. value is held by forces of decreasing intensity (min 6000 cal.). These SO_2 mols. have greater mobility. They can be regarded as gas mols. having 2-dimensional motion. The transition from adsorbed gas to condensed liquid film occurs when the adsorbed SO_2 amounts to about $1/30,000$ the satn. value. Above this transition range the heat of adsorption has increased to about 11,000 cal., and the mobility of the adsorbed mols. has decreased.

R. L. DODGE

The adsorption of ferric chloride by crystallized barium sulfate. M. L. DE BROUCKÈRE. *Bull. sci. acad. roy. Belg.* **13**, 827-36(1928).—B. makes a systematic study of the adsorption of FeCl_3 (I), by crystd. BaSO_4 (II), to det. whether it is due chiefly to ions, complexes or micelles. The adsorption was studied in neutral solns. and in solns. contg. 1 to 0.001 *N* HCl . The concn. of I was varied from 1 to 0.001 *N*. II was fused with Na_2CO_3 and the Cl detd. nephelometrically and the Fe colorimetrically. The results obtained indicate that in neutral soln. the Fe is adsorbed to a much greater degree than the Cl. As the acid concn. increases the ratio of Cl adsorbed increases until it is greater than the Fe. It is suggested that, all things being equal, the Fe is adsorbed 10 to 200 times more than the univalent and bivalent cations. This is not due so much to the tervalence of the Fe as it is to the existence in soln. of micelles and complexes more strongly adsorbed than the simple ions. The micelles rich in Fe decrease somewhat when HCl is added and the soln. contains more and more of the micelles rich in Cl.

D. H. POWERS

Determination of the size of particles in sols. H. J. C. TENDRLOO. *Chem. Weekblad* **25**, 158-61(1928); cf. *C. A.* **21**, 3513.—A review, 22 references.

B. J. C. VAN DER HOEVEN

The adsorption of hydrogen ions and its effect on the swelling and electrical charge of gelatin. B. N. GHOSH. *J. Chem. Soc.* **1928**, 711-9.—The relation between swelling, elec. charge and adsorption of H ion was studied with gelatin. The electroendosmotic method was used to measure variation of elec. charge with H-ion concn. Swelling attains a max. at p_H 2.6, decreasing at higher H-ion concns. while the elec. charge con-

tinues to increase, thus showing the independence of these 2 properties. H_2SO_4 shows less swelling and lower elec. charge than HCl , HNO_3 or $\text{CCl}_3\text{CO}_2\text{H}$. The Langmuir adsorption equation holds fairly well for the amt. of H_2 taken up by gelatin. The relation between amt. of H_2 taken up and elec. charge is definitely estd. R. H. LAMBERT

Colloidal platinum. III. Its natural acidity and its coagulation by acids. S. W. PENNYCUICK AND R. J. BEST. *J. Chem. Soc.* 1928, 551-60.—The acidity of colloidal Pt solns. was detd. both in the presence of other acids and alone. The acids used were HCl , HNO_3 , tartaric and citric. During coagulation, which occurs in a very limited range of p_{H} , no acid is removed from the soln. Quinhydrone electrodes were used for p_{H} detn. The free strong acid in soln. is probably platinic acid. Aging and boiling increase acidity markedly. R. H. LAMBERT

The colloidal state and cohesion at the time of solidification. JACQUES ÉRÉRA. *Trans. Faraday Soc.* 24, 162-4(1928).—The fact that the dielec. const. of certain media, having permanent dipoles near the point of fusion, varies greatly, is attributed to a colloidal state through which the substance is supposed to pass during solidification. The dielec. const. of acetic increases sharply to fall quickly again as the acid solidifies. Substances such as C_6H_6 , C_6H_{12} , CCl_4 , TiCl_4 and SnCl_4 do not show this property, since they do not possess truly permanent elec. moments. Associated mols. have permanent dipoles and it is in these materials that the colloidal phase is believed to exist. R. H. L.

Emulsions. Silicic acid gels. H. N. HOLMES. *Bull. soc. chim.* 43, 261-88(1928).—H. gives a general survey and discussion of the researches in these two fields. L. B. M.

Note on the influence of hydrolyzed gelatin on the precipitation of silver chromate. T. R. BOLAM AND B. N. DESAI. *Trans. Faraday Soc.* 24, 50-2(1928).—Hydrolyzed gel produces greater dispersion of Ag_2CrO_4 than unhydrolyzed. The inhibition period appears to pass through a max. with time of boiling. The protective action is not identical with the inhibition action. The former prevents aggregation of small particles to larger masses while the latter opposes formation of nuclei on growth centers. R. H. LAMBERT

Solvation of the disperse phase in jellies. H. GAUNT AND F. L. USHER. *Trans. Faraday Soc.* 24, 32-6(1928).—A study of gels was made to obtain information as to the mechanical structure of gels of substances usually regarded as lyophobic. The liquid obtained on syneresis of gels of SiO_2 , $\text{Fe}(\text{OH})_3$ and $\text{Al}(\text{OH})_3$ was analyzed, a reference substance having been introduced before gelation. The best reference substances found were H_2SO_4 and HNO_3 ; oxalic and arsenious acids as well as chloride and iodide also were tried. The ratio of water to material was for SiO_2 , 1.04; pptd. silicic acid, 1.5; $\text{Fe}(\text{OH})_3$ pptd., 3.0 and $\text{Al}(\text{OH})_3$ pptd., 6.1. The unity value for SiO_2 gel supports the chem.-chain hypothesis. A change of oxide to sulfide, however, breaks down the gel; so this fact together with the large ratios for the ferric and Al hydroxides favors a solvation theory. R. H. LAMBERT

The influence of electrolytes on the swelling of agar. B. K. CLARKE. *Carnegie Inst. Washington Yearbook* 25, 170-3(1925-6); *Expt. Sta. Record* 57, 817.—In an attempt to correlate some of the known phys. or chem. properties of the alkali metals or of solns. of their salts with their effect on the swelling of agar, auxographic results showing irregularities are noted. The Hofmeister or lyotropic series is not a const. thing like the atomic-number series, but depends upon concn. A careful study was made of the H-ion concn. changes in the KCl series, and the results are tabulated with suggestions. H. G.

The significance of the symbol p_{H} and the measurement of the hydrogen-ion concentration in solutions. GIUSEPPE ANTONIO BRAVO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 6, 10-31, 33-49, 61-8(1928).—A review of the theory of the electrolytic disson. and the electrochem. and colorimetric methods used for the p_{H} detn. GUENTHER SCHWOCH

Concentrated solutions. V. Experimental determination of the thermodynamic activity of the components of binary mixtures of organic compounds. MLLÉ. M. ROLAND. *Bull. soc. chim. Belg* 37, 117-40(1928).—R. measures the total vapor pressure of several binary mixts. by means of the Kohnstamm method: a known quantity of the mixt. is sealed in an ampoule free of air, and the ampoule is put in the vacuum chamber of a manometer, where it is allowed to burst; the vapor pressure is read directly. The following mixts. have been investigated: acetone-diisomyl; acetone-sec.-butylcyclohexane; sec.-BuOH- PhNO_2 ; sec.-BuOH- PhNH_2 ; sec.-BuCl- PhNO_2 ; sec.-BuOH-EtBr; sec.-BuOH-isopentane, sec.-BuOH- CS_2 . The thermodynamic activity of the constituents has been calcd. from the vapor tensions by means of G. N. Lewis' theory. A. L. HENNE

Reaction rate and law of mass action in chemical teaching. ERNST HILS. Z.

physik. chem. Unterricht 39, 62-7(1926).—To demonstrate that $V = K \cdot C_A^{q_1} \cdot C_B^{q_2} \dots$ in $q_1A + q_2B + \dots = p_1C + p_2D + \dots$ H. uses (1) Reduction of AgNO_3 by FeSO_4 : $\text{Ag}^+ + \text{Fe}^{++} = \text{Ag} + \text{Fe}^{+++}$; (2) sepn. of I_2 from HIO_3 by H_2SO_3 , $5\text{HSO}_3^- + 2\text{IO}_3^- = 3\text{HSO}_4^- + 2\text{SO}_4^{--} + \text{I}_2 + \text{H}_2\text{O}$. That $K = C_A^{q_1} \cdot C_B^{q_2} \dots / C_C^{p_1} \cdot C_D^{p_2} \dots$ in the same general reaction H. uses (1) Reaction of AgNO_3 by FeSO_4 , $\text{Ag}^+ + \text{Fe}^{++} \rightleftharpoons \text{Ag} + \text{Fe}^{+++}$; (2) $\text{Na}_2\text{CO}_3 + \text{H}_2\text{S} \rightleftharpoons \text{H}_2\text{O} + \text{Na}_2\text{S} + \text{CO}_2$; (3) $2\text{AsCl}_3 + 3\text{H}_2\text{O} \rightleftharpoons 6\text{HCl} + \text{As}_2\text{O}_3$. M. BEBER

Differential equations of a reacting mixture. R. D. KLEEMAN. *Phil. Mag.* [7], 5, 620-9(1928).—K. deduces a number of differential equations which give the final state of equil. of a reacting mixt. and claims that the various results obtained fall into line with the general result obtained (C. A. 22, 1888) that the const. of mass action is in general a function of temp., vol. and the masses of the constituents, but that in special cases it may be a function of the temp. only. The fundamental nature of the mass const. is in all cases detd. by equations of the type given. GEORGE GLOCKLER

The decomposition of *p*-phenetylcarbamide (dulcin) on heating in aqueous solution. KURT TAUFEL, CARL WAGNER AND HEINRICH DÜNWALD. *Z. Elektrochem.* 34, 115-27(1928).—Aq. solns. of *p*-phenetylcarbamide (I) when heated to 100° decompose, as primary reactions, into: (1) *p*-phenetidine (II) and cyanic acid (III) and (2) *p*-phenetilisocyanate (IV) and NH_3 . The velocity const. for the sum of these reactions is about 0.0040 (time in min.). The course of the secondary reactions is largely dependent on the H-ion concn. On heating, the final decompn. products of strong acid (HCl) solns. are II, NH_3 and CO_2 , the III and IV formed being completely hydrolyzed; of alk. solns., they are II, NH_3 , CO_2 and cyanate, the first primary action being more rapid. In AcOH soln. the II and IV formed react to produce di-I, its amt. depending largely on the II concn. In strong acids and bases the di-I formed is negligible. A retardation of the decompn. of I occurs in ammoniacal soln., due to NH_3 (autocatalysis) and slightly in AcOH and alk. solns. At room temps., the dissocn. const. of III is detd. colorimetrically as 2.2×10^{-4} . The hydrolysis const. of I is detd., at 100° , from elec. cond. measurements on II-AcOH solns. as 6×10^{-5} , and from this the basic dissocn. const. of II as approx. 8×10^{-9} . The velocity const. of the hydrolysis of the cyanate ion in alk. soln., at 100° , is found to be 0.0028 (time in min.). On boiling a normal urea soln., contg. I or II, with HCl a positive indophenol reaction is obtained, but as II or its derivs. may be present, it is not suitable as a test for *p*-aminophenol in urea. In using I to sweeten foods its decompn. on heating should be considered. J. B.

Decomposition of diacetone alcohol by sodium hydroxide in water mixtures of organic solvents. GÖSTA ÅKERLÖF. *J. Am. Chem. Soc.* 50, 1272-5(1928); cf. C. A. 21, 688; 22, 901, 1888.—A preliminary study has been made of the decompn. velocity of diacetone alc. at 25° with 0.1 N NaOH as a catalyst in non-aq. solns. Mixts. of glycerol, ethylene glycol, MeOH, EtOH, PrOH and iso-PrOH with varying amounts of H_2O were used as solvents. In pure polyhydric alcohols the velocity decreased with an increase in the no. of hydroxyl groups; in primary alcs. the velocity increased with increase in the mol. wt. of the alc. used; and in isomeric alcs. the velocity was greatest when the alc. contained the most compact alkyl group. A. J. KING

Reaction of sulfur with aluminum and magnesium. H. DANNIEL AND K. W. FRÖHLICH. *Z. angew. Chem.* 40, 809(1927).—The reactions of S with Al and Mg are commonly considered sluggish. Attention is called to their explosive nature if started with a mixt. of KClO_3 and S. H. F. KRIEGE

Displacement of metals or their oxides from solution by hydrogen under pressure. V. IPAT'EV. *Ber.* 61B, 624-30(1928).—Complicating side reactions occur in the reaction of H_2 under pressure with solns. of Pb nitrate and acetate. A series of basic salts is obtained from Pb nitrate by changing pressures and temp.; 3 cryst. modifications of Pb oxide were obtained, a blood-red, a yellow and a white. The sepn. of metallic Pb begins at 80 atm. pressure at 275° and is complete at $325-330^\circ$. M. F.

The reaction of arsenites with permanganate in acid solutions. TADEUSZ ORYNG. *Roczniki Chem.* 7, 334-44(1927); cf. C. A. 16, 2439; 19, 1998; 20, 2442; 21, 3574.—The oxidation of arsenite by KMnO_4 in H_2SO_4 soln. takes place in 3 stages: $2\text{MnO}_4^- + 6\text{OH}^- + 3\text{AsO}_3^- \rightarrow 2\text{MnO}_4^{--} + 3\text{H}_2\text{O} + 3\text{AsO}_4^-$ (I); $2\text{MnO}_4^{--} + 14\text{H}^+ + \text{AsO}_3^- \rightarrow 2\text{Mn}^{+++} + 7\text{H}_2\text{O} + \text{AsO}_4^-$ (II); $2\text{Mn}^{+++} + \text{H}_2\text{O} + \text{AsO}_3^- \rightarrow 2\text{Mn}^{++} + 2\text{H}^+ + \text{AsO}_4^-$ (III). The velocity v of I is immeasurably high, that of II very high; III alone permits kinetic measurements. The KMnO_4 consumption decreases with the speed of addn. The titration was always completed in 3-5 min. An increase in the acid concn. causes first a decrease, above 2 N an increase, in KMnO_4 consumption. Apparently H_2SO_4 hastens III and inhibits II. It was found exptly.

that Mn^{+++} is light green and Mn^{++++} raspberry red. The effect of As concn. on v is practically zero even if the ratio As:Mn is not strictly const.; v is practically independent of the temp. between 5° and 28°, but at 92–6° the entire Mn is reduced to Mn^{++} . The complete reduction is indicated by the lower $KMnO_4$ consumption and confirmed by a control expt. One drop of $KMnO_4$ in excess is sufficient. In order to obtain const. results the attempt was made either sufficiently to hasten III or to arrest the reaction at II. When sufficient $KMnO_4$ for a reduction to Mn^{++} is present the soln. is colored light green by Mn^{+++} . In the absence of excess $KMnO_4$ III takes place. It is not influenced by Ni, Cu, Cr, Fe, Th, SO_4 or Cl ions, it is hastened by relatively large Mn^{++} and by minute quantities of Br^- and especially I^- , and delayed by PO_4^{---} . In the presence of 0.0001 M KI III, which normally takes 15 hrs., is completed in 15 min. Although $MnSO_4$ increases v it also increases the $KMnO_4$ consumption in proportion to its concn. The soln. darkens and a ppt. seps. toward the end. Apparently Mn^{++} inhibits III by causing the formation of scarcely sol. manganomanganites. The $KMnO_4$ consumption, however, shows that the reduction goes beyond Mn^{+++} . It is evident at the same time that II is autocatalyzed by Mn^{+++} rather than by Mn^{++} . Na_2HPO_4 suppresses III practically completely. The excess consumption of $KMnO_4$ points to the formation of Mn^{++++} . The effect of Na_2HPO_4 is attributed to complex formation. The green solns. of Mn^{+++} turn brown (Ostwald's scale nc) on the addn. of Na_2HPO_4 , without forming a ppt. MnO_4^- and Mn^{++++} also seem to be intercepted by phosphates since the latter slow up their reduction. The ppt. formed during the titration consists of $Mn(OH)_4$ or $MnO(OH)_2$. It always contains Mn^{++} . It is concluded from the findings that insol. Mn^{++++} compds. form only by a secondary reaction which has a very low v and that the main reaction is: $2 Mn^{++} + 4 H_2O = Mn^{++} + Mn(OH)_4 + 4 H^+$ (IV). The high H^+ concn. necessarily delays IV, while the insol. of $Mn(OH)_4$ continuously shifts the reaction to the right. The hastening effect of $MnSO_4$ on III is probably caused by its hastening IV, which in its turn speeds up II very considerably. M. J.

Catalytic activity of hydrochloric acid and of potassium and of sodium hydroxide in aqueous solution. ETHEL M. TERRY. *J. Am. Chem. Soc.* 50, 1239–1250 (1928).—Use being made of the thermodynamic activity coeffs. of the various substances, the catalytic influence at various molalities has been formulated for aq. HCl, KOH and NaOH. These expressions correctly describe the observed catalytic effects even in the presence of neutral salts as NaCl and KCl, in the acid and alk. hydrolysis of esters and in the decompn. of diacetone alc. in the presence of KOH. M. FENSKE

The catalytic action of platinum and the chemical law of mass action. BERNHARD BATSCHA. *Z. physik. chem. Unterricht* 40, 258–61 (1927).—The difficulty in teaching mass action lies primarily in the insufficient mathematical prepn. of the student. But much can be accomplished by clear statement of the fundamentals and by proper expts. The catalytic action of Pt is made use of in a no. of described expts. M. BEBER

The dislocation theory of catalysis. J. BÖESKEN. *Chem. Weekblad* 25, 135–40 (1928).—A review of Böesken's theory of catalysis by "dislocation." By quasi-elastic collisions with the catalyzer mols. slowly reacting mols. are distorted (dislocated) electrically and thus activated. The process of activation takes place in the very short time (order of 10^{-12} sec.) of actual collision; no compd. with the catalyzer is formed (physical catalysis). True chem. catalysis, a second type of catalysis, includes the formation of definite intermediate compds. As shown from examples (e. g. acetaldehyde polymerization) the dislocation has a highly specific character depending on the nature of the catalyzer. Due to the fact that most catalyzers have a polar character B. assumes for the mechanism of dislocation an inductive action of the dipole on the catalyzed mols. For bimol. catalyzed reactions both mols. have to be dislocated. In physical chem. terms the catalyzer brings about changes in energy and in entropy of the intermediary activated state (Arrhenius) of the reacting mols., thus changing the value of the reaction const. K from $\ln K = -(\epsilon_i - \epsilon_p)/RT + (\eta_i - \eta_p)/R + C$ in which i and p refer to activated and normal state, ϵ is energy, η entropy (Scheffer and Kohnstamm equation). For physical catalysis the change in $(\epsilon_i - \epsilon_p)$ (A of Arrhenius) is probably small; it is the change in $(\eta_i - \eta_p)$ (B of Arrhenius) which causes K to increase (more favorable spatial conditions due to polarized state). For chem. catalysis the $\epsilon_i - \epsilon_p$ change will on account of compd. formation be noticeable (increase probably), but counterbalanced by a larger $\eta_i - \eta_p$ change (increase) so as to give a larger K . Exptl. evidence for these considerations was found by van Thiel (*Akad. Wetenschappen* 31, 235 (1922)): the temp. coeff. of the chemically catalyzed reaction was larger than that of the non-catalyzed reaction. B. J. C. VAN DER HOEVEN

Catalytic decomposition and oxidation of formic acid. ERICH MÜLLER and KJRT SCHWABE. *Z. Elektrochem.* 34, 170–185 (1928).—The rate of catalytic decompn. of

aq. solns. of HCOOH into H and CO_2 in the absence of air was measured by a static method. The catalysts employed were finely divided Pd , Pt , Rh , Ir , Ru and Os . Pd , supported on BaSO_4 , was the most active. Pt and Rh were much less active. The other metals were entirely inert. The rate of oxidation of aq. solns. of HCOOH in the presence of air was measured with the same metals as catalysts. Pd , Pt and Rh were all strongly catalytic for this reaction. The other metals were inert. Both the decompn. and oxidation rates were approx. unimol. The potential of the active catalysts was measured during reaction. The Pd , Pt and Rh showed a potential that indicated a ratio of $p_{\text{H}}/P > 1$. This fact supports Wieland's theory that catalytic oxidation of HCOOH in aq. soln. by gaseous O depends on an activation of H , not on an activation of O . R. L. DODGE

The interaction of chlorine and sulfur monochloride. Preparation of sulfur dichloride; use of antimony pentachloride as catalyst. RICHARD PARKINSON BOTHAMLEY. *Trans. Faraday Soc.* **24**, 47-50 (1928).— SbCl_5 accelerates the reaction between S_2Cl_2 and Cl_2 , the rate of the reaction having been measured. A period of induction due to the physically dissolved Cl_2 first appears. The rate increases with decreased temp. and the reaction is found to be photochem. A description of the app. follows. R. H. L.

Equilibria between molten metals and molten salts. VII. Tin, lead, stannous bromide and lead bromide. R. LORENZ AND G. SCHULTZ. *Z. anorg. allgem. Chem.* **170**, 247-56 (1928).—The equil. concns. of the system $\text{Sn} + \text{PbBr}_2 \rightleftharpoons \text{SnBr}_2 + \text{Pb}$ are detd. at 400° and 600° over the whole range of compn. Two solid phases are always present. The system does not follow the simple mass-action law. The Lorenz equation of mass action in condensed systems (*C. A.* **18**, 3518, **19**, 3412) gives a very good agreement with the values of $K = 2.79$ at 400° and 0.192 at 600° . When Bi is added to the system at 400° , it does not participate in the reaction, and is found quant. in the metal phase. It affects, however, the equil., decreasing the concn. of Sn . When the mol. concn. reaches $\text{Sn}:\text{PbBr}_2:\text{Bi} = 1:1:1$, further addn. of Bi are practically without effect. When the whole diagram is redetd. in the presence of an excess of Bi , the simple mass action law is followed much more closely, although the const. C increases regularly from 0.259 to 0.473 . The addn. of LiBr to the system does not affect the equil. G. CALINGAERT

Researches on the system: $\text{Pb}(\text{NO}_3)_2\text{-NH}_4\text{NO}_3\text{-H}_2\text{O}$. G. MALQUORI. *Atti II congresso nat. chim. pura applicata* **1926**, 1135-40.—The system was studied at 0° , 10° and 20° . The results, which are tabulated in detail and shown as a triangular diagram, show a single triple point for each temp., corresponding to satd. solns. of the 2 salts. Therefore no solids exist, other than $\text{Pb}(\text{NO}_3)_2$ and NH_4NO_3 . The quantities of $\text{Pb}(\text{NO}_3)_2$ in soln. vary only slightly even with relatively large quantities of NH_4NO_3 , but the quantity of NH_4NO_3 in soln. varies greatly with the proportion of $\text{Pb}(\text{NO}_3)_2$ present. The increment in the soly. of $\text{Pb}(\text{NO}_3)_2$ caused by increasing proportions of NH_4NO_3 diminishes with increase of temp., as with KNO_3 and NaNO_3 (cf. Glasstone and Sanders, *C. A.* **17**, 3844). Measurements of the d , viscosities and n values of satd. NH_4NO_3 and $\text{Pb}(\text{NO}_3)_2$ solns. at 20° are tabulated, and in conjunction with ultra-violet absorption spectra are to be used in an attempt to explain the anomalous soly. phenomena. C. C. DAVIS

Investigation of the alloy system aluminum tin zinc. HIDETO NISHIMURA AND OSUKE SUZUKI. *Suiyô Kwarshi* [10], **4**, 1441-53 (1925); *J. Inst. Metals* **38**, 412. [In Japanese].—The constitutional diagram of this system is explained both theoretically and practically, and the const. point was discovered as $I + \beta \rightarrow \alpha + \gamma$. The ternary eutectic point of $I \rightarrow \alpha + \gamma + \delta$ coincided at the eutectic point of the binary alloys of Sn and Zn . H. G.

The systems: Hydrogen chloride-ethyl ether and hydrogen chloride-acetone. D. MCINTOSH. *Bull. Chem. Soc. Japan* **3**, 82-6 (1928).—The systems: $\text{Et}_2\text{O-HCl}$ and $\text{Me}_2\text{CO-HCl}$ were investigated by means of the f. p. method. The following compds. were detected: $\text{C}_4\text{H}_{10}\text{O-HCl}$, $\text{C}_4\text{H}_{10}\text{O-2HCl}$, $\text{C}_4\text{H}_{10}\text{O-5HCl}$, $\text{C}_3\text{H}_7\text{O-HCl}$ and $2\text{C}_2\text{H}_5\text{O-5HCl}$. A mixt. of acetone and more than 60% mols. HCl forms a glass on cooling. A. L. HENNE

Conduction of electricity in quartz. A. D. GOLDHAMMER. *Z. Physik* **47**, 671-90 (1928).—The current passing through quartz after the removal of the potential studied by means of the quadrant electrometer falls very rapidly in the interval 0.01 to 10 sec., and does not uniformly follow the law $i = \beta t^{-n}$. Conclusion: The decay is conditioned by the formation of an opposing potential which does not depend on space charges in the crystal. A complicated effect of previous passage of a current on the cond. is described. W. WEST

Quinhydrone electrode in amyl alcohol solutions. HARRY SELTZ AND D. S. MCKIN-

REV. Ind. Eng. Chem. **20**, 542-4 (1928).—To det. the neutralization numbers of petroleum products (especially those used in turbines, transformers and oil-circuit breakers) an electrometric titration was devised. A quinhydrone half-cell is made from a 5-8 in. test tube (with a perforated bottom) contg. (a) an agar-agar bridge with dissolved LiCl and (b) an Am alc. soln. of quinhydrone into which a Pt electrode dips. This half-cell passes through a rubber stopper into a soln. to be tested, held in a wide-mouth 400-cc. bottle. Other perforations in the stopper carry a second Pt electrode, an inlet tube for passing N_2 through the oil soln., a buret tip, and a N_2 outlet tube. Ten cc. of an oil sample dissolved in 125 cc. of Am alc. are placed in the bottle and titrated with 0.1 N or 0.05 N KOH in amyl alc., with N_2 serving as a stirring agent and preventing oxidation. The potentiometer is read as usual. For comparison titrations of the Am alc. itself and of benzoic and stearic acids in Am alc. soln. are made. The app. and procedure are simple and the results accurate to within 1% when the titration amounts to 1.0 cc. or more. Illustrative data and computations are given. W. C. EBAUGH

The action of acids on metals under high pressure. G. TAMMANN and K. BOCHOW. *Z. anorg. allgem. Chem.* **169**, 33-41 (1928).—In order to det. the mechanism accompanying the decrease in the rate of soln. of metals in acid with increased pressure of H, T. and B. have devised an app. whereby the potential (P) of the metal against Hg and the resistance (R) of the soln. can be measured at 30° during the evolution of H. Measurements on Al(I), Zn(II), Fe(III) in 1 M H_2SO_4 ; Al(IV), Fe(V), Cd(VI) in 1 M HCl and Mg in 0.1 M H_2SO_4 show that for (II), (IV) and (V) the pressure rises rapidly with time, reaching max. values (II) 300 kg./ cm^2 , 5 hrs.; (V) 100 kg./ cm^2 , 5 hrs.; (I) 400 kg./ cm^2 , 10 hrs.; (IV) 240 kg./ cm^2 , 18 hrs.; (III) and (VI) require 3 days to reach max. of 300 and > 150 kg./ cm^2 , resp. As the evolution of H proceeds, the potential of Zn against Hg drops from 1.38 to 0.35 v.; R increases only 3 times, indicating that the cessation of evolution of H is not due to the formation of a protective film of H around the Zn, but at the soln. of H in the Zn, thereby "ennobling" the P of Zn, making it much less than the P of Hg against the H electrode (0.78 v. at 400 kg./ cc). Similar results obtain for Al, Fe and Cd. With Mg R increases from 30 to 400-600 Ω , indicating the formation of a protective film of basic salt ($30\text{MgO} \cdot \text{SO}_3$). The changes of P with pressure ($\Delta e / \Delta p \cdot 10^4$) for Zn, Al and Cd are of the same order of magnitude as for H/Pt electrode (0.2-0.4). For the other metals P varies irregularly with pressure. Upon removing the H pressure the metals recover their normal P almost immediately. This passivity of the metals is probably due to the accumulation of negative H ion causing the formation of hydrides like LiH on the surface. E. R. SCHIERZ

Supplement to "electrolytic decomposition of glass." P. SELÉNYI. *Ann. Physik* **85**, 643-4 (1928); cf. *C. A.* **22**, 670. —An a. c. discharge was maintained between Cu plates in an evacuated glass bulb immersed in a KNO_3 bath. The circuit furnishing current for the decompn. of the bulb included a Cu coulometer, one of the plates and the bath. O_2 is liberated quant., being detd. by weighing the oxide-coated plates, reducing with H_2 and reweighing. J. E. SNYDER

Electrical resistance of pure metals in the molten state. YOSIJI MATSUYAMA. *Kinzoku no Kenku* [4], **3**, 254-61 (1926). [In Japanese.] *J. Inst. Metals* **37**, 426-7. —The method of measurement is that constantly used in the Tôhoku Imperial University lab. (*Sci. Rep. Tôhoku Imp. Univ.* **13**, 75 (1924)), and the metals investigated were Hg, Sn, Sb, Cd, Pb, Zn, Bi, Al and Ag. Curves (reproduced in the abstract, *Trans. Am. Soc. Steel Treat.* **10**, 319 (1926)) show the relation between the sp. resistance of molten metals and the temp.; the sp. resistance of these metals increases more or less with the rise of temp., except in the case of Zn, in which a slight decrease is observable. The sp. resistances $\times 10^6$ of the molten metals at their m. ps. are: Hg 93.1, Sn 48.1, Bi 126.7, Cd 32.2, Pb 95.8, Zn 37.0, Sb 115.0, Al 25.5, Ag 17.3. H. G.

The origin of magnetism and atomic structure. KOTARÔ HONDA. *Z. Physik* **47**, 691-701 (1928). —A classical theory of magnetism is developed from the fundamental consideration that paramagnetic properties originate in the nuclear electrons. The tendency to orient in the magnetic field is opposed by the nuclear angular momentum which is very great in diamagnetic substances; in ferro-magnetic substances the resultant angular momentum is nearly zero, while in paramagnetic substances the momentum has a finite value. In the assumption that a magnetic molecule has a rotational energy of rT it is shown that the Langevin expression for the effect of temp. is obtained. The application of the theory to allotropic changes and to melting is considered. W. WEST

The magnetic susceptibility of aluminum. C. CHENEVEAU. *Compt. rend* **186**, 1102-4 (1928). —Two specimens of extra pure Al, tested by the magnetic balance method, gave $\chi = 0.58 \times 10^{-6}$ as the mean value of the mass susceptibility at 18° . The speci-

mens contained 0.06% Fe. Similar tests on 3 samples of Al used for elec. conductors gave a mean value $\chi = 0.59 \times 10^{-6}$. These samples contained 0.5% Fe. Results previously published by several observers are considered and C. suggests that the discrepancies between these results and his own may be due to superficial contamination with Fe from the tool used in shaping the specimen. Such contamination would not be detected by ordinary analytical methods and C. took special precautions to avoid it. There seems to be no simple law connecting the magnetic properties with the trace of Fe alloyed with the Al. C. concludes that absolutely Fe-free Al would probably have approx. the same susceptibility as his *extra pure* Al. W. W. STIFLER

A simple mode of procedure for an indirect determination of molecular heat of vaporization. J. NARBUTT. *Z. physik. chem. Unterricht* 39, 151-4 (1926).—The app. and method are described for the detn. of mol. heat of vaporization at atm. pressure in which the equation $d \ln p/dT = \lambda/RT^2$ is used. M. BEBER

Heat of fusion and vibration number. W. HERR. *Z. anorg. allgem. Chem.* 170, 237-40 (1928).—The ratios of the heats of fusion per g. to the vibration numbers for metals and metal-like elements are grouped around an av. value. Hg, Al and Be are out-standing exceptions to this rule. Typical metalloids do not follow the rule at all. This applies also to metallic compds., in which case the at. wts and values are replaced by the mol. wts. divided by the nb. of ions. The salts of Ca and the alkali metals do not follow the rule. G. CALINGAERT

The specific heats of amorphous carbon and semi-coke. ERNST TERRES AND HEINZ BIEDERBECK. *Gas u. Wasserfach* 71, 265-8, 297-303, 320-5, 338-45 (1928).—Pure carbon was prepd. at temps. under 600° by (1) reaction of Na on solid BaCO₃ at 550°; (2) reaction of Cl₂ with turpentine under 600°; (3) by thermal decompn. of CH₄ (porcelain fragments used as catalyzer) under 600°. Specific heats were detd. by the method of Terres and Schaller (*C. A.* 17, 1883) with a few changes. Graphs are shown for the changes of sp. heats of each of the carbons with temp. The turpentine and BaCO₃ carbons reach a nearly const. sp. heat of about 0.38 at 500° and show only slight increases up to the graphite value (1150°). The CH₄ carbon reaches a similar value at 700° and continues with only slight changes up to the graphite value. Four German coals were coked at 400-900° and their sp. heats detd. by the above method. The sp. heats of these cokes are higher than for high temp. cokes from the same coals. The calcd. sp. heat of pure coke for all of these cokes was 0.3825 ± 0.0025 between 500° and 900°. Under 500° the sp. heats differ widely. R. W. RYAN

A thermochemical contribution to the study of the system cadmium-mercury. T. W. RICHARDS, H. L. FREVERT AND C. E. TEETER, JR. *J. Am. Chem. Soc.* 50, 1293-1302 (1928).—The large amt. of heat absorbed during the soln. of Cd amalgams in Hg has been detd. to be somewhat larger than the latent heat of melting of Cd and Hg. It is dependent on the wt. and compn. of the solid. Its magnitude is one of the best means of locating the exact solidus pt., since it indicates whether or not the amalgam is fully solid or contains included liquid Hg. The solidus pt. is defined as the pt. at which liquid first appears when the solid is completely homogeneous. An amalgam that is completely homogeneous must contain drops of liquid amalgam, after it is melted and again cooled to that pt., on account of the increased concn. of Cd within the crystals, which in turn causes a smaller thermochemical effect upon soln. in Hg. The results obtained agree with those of Bijl and of Smith between 20° and 30°. • A detailed description of their app. and technic is included. J. H. PERRY

The mean specific heats of diatomic gases nitrogen, carbon monoxide, oxygen, hydrogen of carbon dioxide and of water-vapor between 0° and 3000° abs. FRITZ SCHMIDT AND HERMANN SCHNELL. *Z. tech. Physik* 9, 81-92 (1928).—A crit. review is given of data on mean sp. heats from the literature. Partly by recalcn. and graphical interpolation a table is given for the mean C_p between 0° and 3000° abs. of CO, O₂, N₂ (4.81 up to 6.10), of H₂ (4.70 to 5.90), of H₂O vapor (5.96 to 9.61) and of CO₂ (5.96 to 10.98). Data from 36 literature sources were employed. B. J. C. VAN DER HORVEN

Heats of transformation and fusion in carbon steels, cast iron, and some other metals. SABURŌ UMINO. *Kinzoku no Kenku* [8], 3, 385-93 (1926); *J. Inst. Metals* 37, 432; cf. *C. A.* 22, 1750.—By means of the method of mixts. U. measured the heat of transformation and that of fusion for carbon steels, cast Fe, Mn and Ti. Mn-heat of transformation 835°, 2.88 g.-cal.; 1044°, 4.53 g.-cal.; latent heat of fusion, 64.80 g.-cal. Ti—heat of transformation and of fusion, 232°, 0.60 g.-cal.; 303° (m. p.), 3.67 g.-cal. H. G.

The heat of fusion and that of the new transformation in tellurium. SABURŌ UMINO. *Kinzoku no Kenkyu* [10], 3, 498-501; *J. Inst. Metals* 38, 381-2; cf. *C. A.* 22, 1750. [In Japanese.]—By the calorimetric method, U. measured the heat con-

tent and the sp. heat of Te at different high temps. beyond its m. p. up to 550°. He thus found a new transformation at 348°, with a heat of transformation of 0.63 cal. The latent heat of fusion at 446° was 33.50 cal. H. G.

Relativistic rule for equipartition of energy. F. F. P. BISACRE. *Phil. Mag.* [7], 5, 639-40(1928).—Statistical-mechanical argument that the mean energy $\epsilon \rightarrow RT$ as $T \rightarrow \infty$. Cf. *C. A.* 22, 532.

Absolute zero of externally controllable entropy and internal energy of a substance and a mixture. R. D. KLEEMAN. *Phil. Mag.* [7], 5, 668(1928); cf. *C. A.* 21, 2416.—Negative sp. heat is an impossible concept. GEORGE GLOCKLER

Calculation of the energy and parameters of an ionic lattice of the corundum type. VALERIAN SCHMAELING. *Z. Physik* 47, 723-31(1928).—The lattice energy of corundum, calcd. on the assumption of a lattice of rigid spherical ions held together by Coulomb central forces, is 3330 kg. cal. per mol, in comparison with the value 3305 kg. cal. obtained by applying the Born cyclic process. The agreement is considered to support the assumption of an ionic lattice for Al_2O_3 . W. W.

The limit of transparency of air and of quartz for ultra-violet light. F. ZERNIKE. *Physica* 8, 81-7(1928).—From expts. with a large Hilger quartz spectrograph it was found that $\lambda\lambda$ 1990 and 1935 are not noticeably absorbed by 2.5 m. air path; $\lambda\lambda$ 1862 and 1854 were reduced 20 and 150 times, resp., in strength. Photograms are shown of shadows cast by quartz on a fluorescent screen indicating the lack of uniformity in transparency, angles of 60° between the shadow edges are evidence of the trigonal structure. The least absorption found for quartz was for λ 1990 75% transmitted by 1 cm., for λ 1862 60%. Fluorite is in many cases preferable for its higher transparency.

The molecular dispersion of light at the critical state. K. C. KAR. *Physik. Z.* 28, 710-11(1927); cf. *C. A.* 21, 1593—A correction of the calcn. given in the previous paper. B. J. C. VAN DER HOEVEN
EMIL KLARMANN

Theory of light-scattering in liquids. C. V. RAMAN AND K. S. KRISHNAN. *Phil. Mag.* [7], 5, 498-512(1928).—An examn. of the data for the depolarization of the light scattered by fluids indicates an apparent change, usually a large diminution, in the optical anisotropy of the mols. of a given substance, as it passes from the condition of vapor to that of liquid. A new theory is put forward which offers a natural explanation of the foregoing fact without any artificial hypotheses. In the treatment of the optical properties of liquids usually given, the polarization field acting on a mol. is assumed to be independent of its orientation in the field. This assumption is not justifiable when the shape of the mol. departs greatly from spherical symmetry, and consequently the distribution of polarizable matter surrounding it ceases to be symmetrical. The strength of the polarization field will in these circumstances be dependent on the orientation of the mol. in the field, and may be expressed in terms of three consts. characteristic of the mol. for the given d. and temp. of the fluid. The theory of light-scattering is developed on this basis, and gives an expression for the intensity of scattering which is in close accord with facts. It also enables the depolarization of the scattered light in the liquid to be successfully calcd. from that of the corresponding vapor, at least in those cases where the consts. of anisotropy of the polarization field can be detd. from the shape of the mol. GEORGE GLOCKLER

Polychroism and orientation of ions in crystals of the rare earths. R. BRUNETTI. *Atti accad. Lincei* [6], 7, 238-44(1928).—A study of the literature and an examn. of crystals of certain salts leads to the conclusion that the polychroism of crystd. salts of the rare earths is evidence of the orientation of an axis of the ionic structure in some definite relation to the directions of symmetry of the cryst. structure. Measurements of the absorption spectra of $Pr_2(SO_4)_3 \cdot 5H_2O$ and of $Nd(BrO_3)_3$ in different directions and at different temps. indicate that in the spectra of trivalent ions of the rare earths which make up a symmetrical crystal, there are (1) frequencies corresponding to linear vibrations in a direction approx. the same as that of the principal axis of the crystal, and (2) frequencies, in general distinct from the preceding, the vibrations of which take place in a plane approx. perpendicular to the principal axis, and which are resolvable into 2 vibrations of equal intensities normal to each other. The researches of Henri and Jean Becquerel (*Ann. chim. phys.* [6], 14, 170(1888); *Le Radium* 4, 49, 107, 328 (1907); 5, 5, 227(1908)), are discussed in their relation to the present expts. and deductions. The orientation of luminous vectors in a plane perpendicular to a predetd. direction and the work of B. are favorable to the supposition that radiations of type (2) are absorbed in a longitudinal direction for circularly polarized waves. This fact and the established existence of linearly polarized radiations justify the belief that ions within the cryst. lattice often assume a simple orientation. In monoaxial crystals the

ionic axis of orientation coincides with the direction of the crystallographic axis, while in biaxial crystals ions are present which have the same orientation with respect to the principal axis, but perhaps have other orientations. This orientation does not in all cases depend upon thermal movements of the ions within the cryst lattice. A *mol. energy of orientation* (cf. Debye, *Physik Z.* **27**, 67(1926); Cabrera, *C. A.* **21**, 3818) probably exists in the crystals and this orientation is characteristic not only of the mol. as an elementary unit but of its constituent parts, particularly its cations. This is in accord with the fact that the magnetic susceptibility of the anions is in general negligible compared with that of the cations of the paramagnetic rare earth elements (cf. Decker, *C. A.* **20**, 2112). The polychromism of rare earth salts also offers a means of explaining the complicated absorption spectra of colored ions of the rare earths. If λ is a quantic no. related to the orientation of the ion, the rectilinearly polarized radiations correspond to the increment $\Delta\lambda = 0$ and circularly polarized radiations to $\Delta\lambda = \pm 1$, the radiations $X \rightarrow (X - 1)$ and $-X \rightarrow -(X - 1)$ corresponding. In connection with detns. of variations of the spectra of the rare earth salts under various conditions, this suggests an intramol. field, symmetrical in the crystallographic sense to an axis coinciding with one of the directions of cryst. symmetry, and of elec. nature (cf. Weiss and Foex, *Le magnetisme* 166(1926)). C. C. DAVIS

Remarks on the chromosphere theory of A. Unsöld. E. A. MILNE. *Z. Physik* **47**, 745-50(1928); cf. *C. A.* **22**, 539, 1532. The pressure required in the chromosphere by Unsöld's theory is impossible, a layer 10⁴ km. thick could not be carried against gravity at the sun's surface at U's pressure. A theory is developed for the formation of the chromosphere above the reversing layer, whose central point is that ionization in the chromosphere, which is not in thermodynamical equl, is not detd. by Saha's formula, but by the balance of photoelec. ionization and replacement of atoms by the radiation pressure from below. W. WEST

Dispersion by hydrogen-like atoms in undulatory mechanics. BORIS PODALSKY. *Proc. Nat. Acad. Sci.* **14**, 253-8(1928). The Schrodinger wave equiv. for a hydrogen-like atom in the field of a plane electromagnetic wave is solved. The value of $n^2 - 1$ for zero frequency agrees exactly with that obtained for the dielec. const. by Van Vleck, Epstein and Pauling. The results for optical frequencies are not in very good agreement with Langer's detns. (*C. A.* **21**, 1219) but the great exptl. difficulties may account for the disagreement. W. WEST

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

A rearrangement of Wilson's apparatus for making atomic trajectories visible. THEODOR WULF. *Z. physik. chem. Unterricht* **41**, 70-3(1928). M. BEBER

Important experimental foundations of the Bohr atomic theory. J. FRANCK. *Z. physik. chem. Unterricht* **41**, 18-27(1928).—Lecture. M. BEBER

The quantum postulate and the newer development of atomistics. N. BOHR. *Naturwissenschaften* **16**, 245-57; *Nature* (supplement) **121**, 580-90(1928).—A review of modern quantum mechanics B. J. C. VAN DER HOEVEN

The limit of the periodic system. W. KOSSEL. *Naturwissenschaften* **16**, 298-9 (1928).—The end of the periodic system at the at. no. $Z = 92$ has been explained by the possibility of the K electrons falling into the nucleus *via* spiral orbits for the high nuclear charges, the limit found in this way was $Z = 137$. The same result can be found by assuming that the electronic dipole attraction ($3 M_2 r^{-4}$) becomes larger than the Coulomb repulsion ($e^2 r^{-2}$) at the short distance prevalent at high at. no., resulting in breakdown. The crit. distance is calcd. to be 3.36×10^{-11} cm. as compared with the diam. of a U K orbit of 11×10^{-11} cm. This limit will be lowered by a moment of the nucleus itself which is quite possible. It is as yet considered coincidental that at the same time the nucleus structure for the heaviest elements tends to be unstable.

B. J. C. VAN DER HOEVEN
How can atoms radiate? H. A. LORENTZ. *J. Franklin Inst.* **205**, 449-71(1928).—An excellent summary of 4 different theories of spectral emission from atoms, viz. classical, Bohr's quantum theory, dynamics of matrices, and wave mechanics, is given; the advantages and shortcomings of each are stated in plain simple words. W. F. M.

Light quanta and wave mechanics. J. C. SLATER. *Phys. Rev.* **31**, 895-9(1928).—Light quanta are treated by wave mechanics by analogy with electrons. It is shown that their wave equation is the ordinary optical wave equation. Heisenberg's principle on indeterminateness (*Z. Physik* **43**, 172(1927)) becomes a description of diffraction. In problems in which localization of quanta is found exptly., wave packets are to be set up; these are applied to the expts. of Bothe and Geiger (*Z. Physik* **32**, 639(1925)). and of Compton (*C. A.* **19**, 2779). The paths of quanta coincide with the rays of geometric optics with a deviation of the error in geometric optics; by the principle of indeterminateness, more accurate laws for the paths are neither necessary nor possible.

BERNARD LEWIS
The physical pendulum in quantum mechanics. F. U. CONDON. *Phys. Rev.* **31**, 891-4(1928).—It is pointed out that the Mathieu functions of even order are the characteristic functions of the phys. pendulum in the sense of Schrodinger's wave mechanics. The relation of various properties of the functions, as known from purely analytical investigations of them, to the pendulum problem is discussed. BERNARD LEWIS

The quantum mechanics of a system of particles. E. H. KENNARD. *Phys. Rev.* **31**, 876-90(1928).—The mechanics of a system of particles is developed on the basis of Schrodinger's wave equation without the use of matrices. It is shown that simple cases can be handled as easily by this as by the matrix method. The passage to classical theory as an approximation stands out very clearly. The measurement of velocity, energy and angular momentum as secondary phys. qualities is discussed, the usual probability amplitudes being obtained. The conservation of momentum and of energy is treated in terms of the new theory. BERNARD LEWIS

The problem of the normal hydrogen molecule in the new quantum mechanics. S. C. WANG. *Phys. Rev.* **31**, 579-86(1928).—The value of Z in the Schrodinger equation for the normal H_2 mol. is so detd. as to give a min. value to the variational integral

which generates Schrödinger's wave equation. This min. value of the integral gives the approx. energy E . For every nuclear sepn. D there is a Z which gives the best approximation and a corresponding E . An approx. energy curve is thus obtained as a function of the sepn. The min. of this curve gives the following data for the configuration corresponding to the normal H_2 mol.: Heat of dissocn. = 3.76 v., the moment of inertia $J_0 = 4.59 \times 10^{-41}$ g. sq. cm., the nuclear vibrational frequency $\nu_0 = 4900$ cm $^{-1}$.

BERNARD LEWIS

The electric moment of alkali atoms. J. J. WEIGLE *Phys. Rev.* **31**, 672-5 (1928).—The elec. moments of atoms can be calcd. if one knows van der Waals' const. a which can be obtained from the vapor-pressure equation. Thus for all the substances for which the vapor-pressure curve has been detd. it is possible to calc. the elec. moment or the elec. moment of inertia. Values of the elec. moment for Na, K and Rb as calcd. are 0.18, 0.24 and 0.24×10^{-18} , g. $^{1/2}$ cm. $^{1/2}$ sec. $^{-1}$ e, resp. These values although not very accurate are interesting, for Bohr's picture of the alkali atom, with the penetrating orbit of the valence electron precessing around the nucleus, gives no elec. moment. The values above are so small as to be negligible and are thus in accord with the theory.

BERNARD LEWIS

The energy of the helium atom and of the positive hydrogen ion in the normal state. B. N. FINKELSTEIN AND G. F. HOROWITZ *Z. Physik* **48**, 118-22(1928).—Calens. made by Wang (*C. A.* **22**, 721) on the basis of the Ritz method are extended to include the energy of the normal He atom as a limiting value of that of the H mol. In a similar way the energy of (H_2^+) is calcd. and is found to be theoretically 1.166 times that of the normal H atom.

H. F. JOHNSTONE

A statistical method for the determination of some properties of atoms. II. Application to the periodic system of the elements. E. FERMI. *Z. Physik* **48**, 73-9; *Atti accad. Lincei* [6], **7**, 342-6(1928); cf. *C. A.* **22**, 1721.—For heavy atoms the electrons surrounding the nucleus may be considered as a completely degenerated gas. On the basis of the Pauli exclusion principle statistical calens. are made for the distribution of the d. of the electron gas and from this the elec. potential in the interior of the atom is detd. From further mathematical considerations the no. of electrons, N_k , that have a given azimuthal quantum no., k , is found as a function of the at. no. Z . The values of Z at which a new electron series may occur as predicted by the theory agree well with those known from the periodic system.

H. F. JOHNSTONE

Study of a statistical theory for the transition between two excited states of an atom. KARL BOLLERT. *Z. Physik* **48**, 98-110(1928).—A type of probability closely related to complex numbers is discussed. The idea is applied to the energy relations in excited states of an atom. The theory shows that for a change from one excited state to another the energy and frequency of the resulting radiation depend on these probability conditions. Further, a definite max. deviation from these conditions detd. the width of the resulting spectral lines. The results are shown to be in accord with the Bohr frequency condition and the Heisenberg quantum condition.

H. F. J.

The energy of formation of the compound HCl-HBr. CARLOS DEL FRESNO. *Z. anorg. allgem. Chem.* **170**, 222-4(1928).—F. considers that the compd HCl-HBr must be dissocd. as either $H_2Cl^+ Br^-$ (I) or $H_2Br^+ Cl^-$ (II). (I) must have the same energy of formation as KBr, since H_2Cl^+ has the same nuclear charge and no. of electrons as K^+ ; likewise with H_2Br^+ and Rb. A comparison of the energies of KBr and RbCl leads to the conclusion that (I) (chloronium bromide) is the correct formula for the addn. compd.

G. CALINGAERT

Structure and dimensions of the benzene ring. J. K. MORSE. *Proc. Nat. Acad. Sci.* **13**, 789-93(1927).—A precise description is given of a space scale model of the benzene ring. The centers of the 6 C nuclei are located on the surface of a sphere having a radius 1.394 times the radius of the C atom (R). Twelve of the electrons assocd. with these C atoms are located on a concentric sphere whose radius is 1.155 R , and the remaining 24 possible electron positions are all on the surface of a third concentric sphere whose radius is 2.134 R . This model indicates the known properties of benzene, and, therefore, is consistent with the facts. The positions in space of the 6H atoms attached to the C atoms may well be quite different from the positions of the atoms of substituted groups attached to C atoms; and this may explain the chem. inertness of benzene compared to the activity of its derivs.

A. W. KENNEY

Isotopes. OTTO OLDENBERG. *Z. physik chem. Unterricht* **41**, 27-30(1928).—Lecture.

M. BEBER

The systematization of isotopes. GUIDO BECK. *Z. Physik* **47**, 407-16(1928).—A new way of arranging the known isotopes of at. no. up to 60 according to the no. of nuclear electrons and protons to be added to certain basic configurations is presented

by a diagram. This brings out clearly various fundamental regularities, several of which were previously recognized, and allows many predictions of isotopes not yet found. An interpretation of these regularities is sought by postulating a shell structure for the nucleus similar to that for the external electrons. The existence of an isobar then indicates the beginning of a new shell. It is suggested that the periodicity of two in no. of nuclear electrons may be connected with the known double magnetic moment of the spinning electron, and that the tendency toward an even no. of protons may be similarly interpreted. Pauli's exclusion principle may also be applicable. F. A. J.

Radioactivity and age of the earth. RENE VAN AUDEL. *Rev. gen. sci.* 39, 206-13 (1928).—This article gives a general review of the various calcns. of the age of minerals as detd. from the concn. of He and Pb formed from the disintegration of Ur and Th. The results include uraninite of South Dakota whose age was detd. by C. W. Davis to be 1665 million years. L. D. R.

Radioactivity of some springs of the Pyrenean region. J. ALOY AND JACQUES AVERSENQ. *Compt. rend.* 186, 775-7 (1928).—The content of radon and spontaneous gases of the principal springs of the 2 stations, Ax-les-Thermes and Ussat-les-Bains, and also of 2 sulfur springs in the valley of Haute-Ariège, has been detd. The waters of Ax, weak in abs. value, have considerable permanent radioactivity. The cold springs are more radioactive than the warm ones. L. D. R.

Phenomena, similar to those of radioactive substances, presented by metals. S. MARACINEANU. *Compt. rend.* 186, 746-8 (1928); cf. *C. A.* 21, 2841, 3152, 3819.—Metals of roofs exposed to the sun are radioactive. This is not due to the atm. or dust. Pb was formerly thought by M. to go back to Po, but these studies indicate that it goes to Ra D. M. has previously found pure Po develops penetrating rays after a time. L. D. R.

Coefficient of absorption in lead of γ -rays from Thorium C' and Radium C. I. BASTINGS. *Phil. Mag.* [7], 5, 785-93 (1928).—Careful measurements on the absorption of γ -rays in Pb have shown that the coeff. increases with the thickness of Pb penetrated in the case of Th C', but decreases in the case of Ra C. The difference is shown to be in general agreement with the consequences of Compton's theory of scattering. The important fact evolves that Th C' acts almost as a monochromatic source of γ -radiation. GEORGE GLOCKER

The nature of ball lightning. K. F. BOTTLINGER. *Naturwissenschaften* 16, 220 (1928).—It is suggested that ball lightning may consist of local atom disintegration (possibly of N₂) induced by the extremely high potentials of the lightning effect; the potential required for Ra α rays is 12×10^6 v. The nucleus of the ball should be radioactive for a short period. B. J. C. VAN DER HORVEN

Theory of the electrical conductivity of metals. P. LAPINSKY. *Ukrain. physikal. Abhandl.* 1, 70-4 (1926); *J. Inst. Metals* 38, 394-5. [In Russian, with German summary.]—It is shown that the formulas of W. Thomson and Borelius can be deduced from the laws of thermodynamics if it is assumed that the condition of the conducting electrons as a thermodynamic system in the metal depends on the temp., on the chem. compn., and on other phys. magnitudes. At low temps. the condition of the electrons is analogous to the vapor phase, and the relation between the abs. temp. T and the elec. cond. at low temps. may be expressed by the following equation, which is analogous to that of van der Waals: $(\sigma + a/T^2)(T - T_0) = (d.p.e.T_0)/k$, where T_0 is the original temp., d the distance between 2 atoms, p the no. of electrons passing per sec. from 1 atom to its neighbor, e the charge on the electron, and k and a are consts. H. G.

Low-voltage arcs in iodine. H. F. FRUTH. *Phys. Rev.* 31, 614-28 (1928); cf. *C. A.* 21, 3156.—Low-voltage arcs in monatomic and mol. I vapor were investigated together with their spectra. 6.5 v. is the min. radiating potential of the atoms; 8.02 and 9.5 v. are the ionization potentials of the atom and of the mol., resp. Non-oscillating abnormal arcs were maintained down to 4.9 v. and oscillations were observed around 12 v. With arc currents of about 2 amp. the filament current could be cut off and the arc sustained indefinitely at 30 v. or above. At 4.9 v. the spectrum contained only 3 lines ($\lambda\lambda$ 2062, 2535, 3135), the continuous band 3460 and several groups of bands. At slightly higher voltages arc lines appear and at 8 v. the strongest spark lines begin. These lines are succeeded by new ones at higher voltages, making it probable that the stripping of the atom is in progress. Peculiar behavior of the lines 2535 and 3135 A. U. was observed. Three continuous bands (at 4080, 4300, and 4800 A. U.) are present in mol. but not in at. I. A band system lying between 2224 and 2050 A. U. was observed and 2 groups of 4 bands each were found at 2880, 2833, 2776, 2716, A. U. and 2480, 2379, 2290 and 2243 A. U. BERNARD LEWIS

The effect of initial velocity of electrons upon the anode current of a vacuum tube.

N. KARO. *Phys. Rev.* **31**, 858-61(1928).—The initial velocity of electrons causes deviations of anode-current, anode-voltage relation of vacuum tubes as derived from the space charge equation. By eliminating other causes of deviation, K. measured the degree of deviation of the current-voltage curve from the $3/2$ power law at various filament temps., and found that the effective initial velocity of electrons varies from 0.5 v. at 2250° K. to 4 v. at 3000° K. The effective initial velocity seems to be independent of the electrode dimensions.

BERNARD LEWIS

Ionization in positive ion sheaths. P. M. MORSE AND W. UYTERHOEVEN. *Phys. Rev.* **31**, 827-32(1928).—It was found that the positive ion current to a plane auxiliary collector placed in a Ne discharge had about twice the value expected from the equations of Langmuir and Mott-Smith (*C. A.* **19**, 1531). M. and U. believe this increase must be due to an ionization within the sheath surrounding the electrode or to an emission of electrons from the surface of the electrode. Four different possible causes of the increase are analyzed and relations between the voltage drop V , total current to the collector i , and sheath thickness x are obtained. Comparison with data shows that the increase in i is probably caused by the ionization of the metastable atoms within the sheath by radiation from the discharge. The relations: $V = A (B x^{3/2} + (x^{5/2})_0)$, and $i = i_0 + I_0 x^2/2$ hold and check fairly well with the 3 exptl. curves. Considerations of at. energy states of the metastable atoms show that this ionization would be most marked in the noble gases and almost non-existent in Hg vapor, the gas investigated by Langmuir and Mott-Smith (*C. A.* **19**, 1531).

BERNARD LEWIS

Positive ray analysis of water vapor ionized by impacts of slow electrons. H. A. BAPTON AND J. H. BARTLETT, JR. *Phys. Rev.* **31**, 822-6(1928).—An electromagnetic method of sepg. gas ions of different mass, such as that used by Dempster, has been employed in a study of the ions produced by electron impact in water vapor. The principal ions appearing were $(H_2O)^+$ and $(OH)^+$. Of these the $(H_2O)^+$ ions were more abundant. Evidence was obtained that a third type of ion, probably $(H_3O)^+$, was produced in very small quantities. H^+ and H_2^+ ions were always very few in no. or unobservable. No $(OH)^-$ or any other negative ions were observed. The ionization potential corresponding to $(H_2O)^+$ was 13 ± 1.5 v., being probably in agreement with the ordinarily measured value. The $(OH)^+$ ionization potential was not distinguishably different. A study was made of variations in the relative abundance of the ions as a function of pressure. The $(H_2O)^+$ ion appears to be the primary ion, as it predominates at low pressures, but is of the same order of magnitude as the $(OH)^+$ ion at high pressures (0.007 mm.).

BERNARD LEWIS

The characteristics of triodes at saturation potentials of the grid. A. LO SURDO. *Atti accad. Lincei* [6], **7**, 279-83(1928); cf. *C. A.* **21**, 2094. —The variation of the satn. current depends upon the action of the elec. field on the filament and on the electrons in its immediate vicinity. Therefore, expts. were carried out to det. the effect of protecting the filament from strong variations of the elec. field. A triode served for this purpose, the filament and the grid being united by a pile whose c. m. f. was high enough to sat. these 2 electrodes. The filament-grid and plate acted as a rectifier. The characteristics of this system were detd. The current as a function of the potential between grid and plate is shown graphically. In the satn. phase the current increases in proportion to this p. d. as occurred in the rectifying valve already described, though the increments of current are much smaller. Below the range of currents which correspond to satn. potentials the function is far different. With increase of plate potential the current first increases to a max. at 20-5 v. (independent of the grid potential), then decreases to a min. at 450 v., where it is an inverse current. It then increases rapidly, and at a high enough p. d. the state of satn. is reached (cf. *Proc. Inst. Radio Eng.* **6**, 5(1918); **10**, 320(1922)). This behavior of the current is explained by the secondary emission of electrons from the plate by electronic bombardment. When the plate potential is less than the grid potential, the electrons are drawn toward the grid, while those from the filament bombard the plate with a velocity which varies with the plate potential. With high enough plate potential, the plate emits electrons which are drawn to the grid, compensating for the plate current due to the charges of the electrons emitted from the filament and which fall on the plate. With increase of plate tension, the velocity of the electrons bombarding the plate increases and the secondary electronic emission increases, reducing the plate current. When the velocity of the electrons which bombard the plate is sufficiently great, the secondary emission of electrons exceeds the electronic absorption and the current changes sign.

C. C. DAVIS

Influence of gaseous impregnation on the photoelectric sensitivity of metals. HANS KLUMB. *Z. Physik* **47**, 652-70(1928).—Specimens of Ta, W, Mo, Ni, Pa, originally photoelectrically sensitive to λ 254 μ , were found insensitive to wave lengths at least

as short as 230μ after degassing *in vacuo*. Since sensitivity to 254μ gradually returned, except when a liquid air trap was attached to the app., it appears that the sensitivity is assocd. with a gas which can be condensed in liquid air. Addn. of purified H_2 , N_2 , O_2 , A-He, CO_2 or coal gas to the degassed metal inhibited the return to the sensitive condition, but addn. of water vapor accelerated it. Evidently water vapor is the only gas of those investigated to which the sensitizing effect to the long ultra-violet can be attributed. The importance of these effects in connection with attempts to correlate photo-elec. properties of metals with such properties as position in the e. m. f. series, work function, ionization potentials, etc. is noted. W. W.

Variation of electromotive force in a photoactive cell containing a fluorescent electrolyte, with the intensity of illumination. WM. RULE. *Proc. Nat. Acad. Sci.* **14**, 272-8(1928).—The e. m. fs. produced when one electrode chamber of a cell filled with fluorescein soln. (0.05 g. fluorescein and 10 g. NaOH per l. of water) is illuminated were studied by means of the quadrant electrometer. During illumination, the e. m. f. takes initially a small + value, then, passing through zero, assumes a much larger - value, increasing with time to approach a max. value. Stopping the illumination causes a slight increase of e. m. f. and then a gradual fall. With increasing intensity of illumination the magnitude of the e. m. f. attained increases to approach a max. value for high intensities. The results are interpreted as due to the formation of a concn. cell by means of the photochem. changes in the electrolyte. W. WEST.

Directions of emission of photoelectrons. PIERRE AUGER. *Compt. rend.* **186**, 758-60(1928); cf. *C. A.* **21**, 1754.—The photoelec. effect produced in A, diluted with H_2 , by the $K\alpha$ rays has been taken up. A. and Francis Perrin have previously proposed a theory for the emission phenomena. The results seem to necessitate a modification of the proposed theory; possibly call for a sort of orientation in the absorbing atom. L. D. R.

The inner photoelectric effect with silver halides. S. I. SHEPPARD. *Nature* **121**, 574 5(1928).—Consideration of the energy steps in the Born cycle for calcg. lattice energies of the Ag halides shows that if the photolysis of these salts consists of a sepn. of electrons from the halide ions, followed by an acceptance by the Ag ions, 2 quanta are necessary. (1) λ 1300 or smaller, to overcome the lattice energy, (2) λ 3000 or smaller to liberate electrons. Previous work on photoconductance indicates some such mechanism, although quanta of much smaller energy are known to be active in the photolysis of Ag halides. Also new expts. on the photopotentials of Ag-AgX electrodes in electrolytes show that photoelectrons are liberated concomitant with the production of free halogen. These expts. have led to a modified theory of the inner photoelec. effect, in which it is required that both the lattice energy and electron affinity are lowered at interfaces, particularly at true interfaces with conductors. The inner photoelec. effect might therefore occur at longer wave lengths than the above. To account for the failure of the reciprocity law, Baker (*C. A.* **21**, 2853) has suggested that 2 quanta, acting within a short interval of time, are concerned in photographic action. This is in accord with the theory of S., if the first quantum is that necessary to disrupt the lattice, and the second to release the photoelectron from the halide atom. F. A. J.

Influence of charged metallic points on the spark discharge. T. THOMSON. *Phil. Mag.* [7], **5**, 513-36(1928).—Electromagnetic radiations emanate from the air in the immediate neighborhood of charged metallic points from which elec. discharges are taking place in air at atm. pressure. The intensity of the radiations increased with the intensity of the discharge. The radiations produce photoelec. effects and ionization. The radiations producing the photoelec. effects emanate only from the neighborhood of positively charged points. The ionizing radiations emanate from the neighborhood of both positive and negative points. The photoelec. radiations can penetrate 15 cm. of air at atm. pressure and the ionizing radiations are absorbed by 3 cm. of air at atm. pressure. These results differ from those of Wynn-Williams (*C. A.* **20**, 1351) in regard to the precise locality of the source of the radiations, and in regard to their penetrating powers. A theory is suggested of the action of a charged metallic point in facilitating the passage of a spark between spherical electrodes. This theory differs from that offered by W.-W. in ascribing the greater part of the action to the photoelec. effect. The action of the ionizing radiations in facilitating the passage of the spark depends on the nature and state of the surface of the cathode. The ionizing radiations are capable of facilitating the passage of the spark, even when no straight line can be drawn in air from the metallic point to the line of the spark discharge. It is suggested that the action of the ionizing radiations in such cases is an indirect effect due to the impact of positive ions on the metal of the cathode. The exptl. results of Morgan (*C. A.* **21**, 3544) are examd. and confirmed, but a somewhat different explanation

of them is given. The results of the present expts. are considered in relation to the theory of the spark discharge recently put forward by Taylor (*C. A.* **21**, 1221, 1405, 2220, 3923), and are found generally to support this hypothesis. Some of Townsend's conclusions (*Electricity in Gases*, pp 330-1) with reference to his theory of the spark discharge are considered in the light of the results of the present expts. and modifications of these conclusions are suggested.

GEORGE GLOCKLER

Field currents from points. C. F. EYRING, S. S. MACKNOWN AND R. A. MILLIKAN. *Phys. Rev.* **31**, 900-9(1928). The laws governing the extrn. of electrons in metals in high vacua by fields, first developed through expts. with crossed wires, then with fine wire cathodes discharging to cylindrical anodes have been now found to hold throughout for field currents between points and planes. The theory needed for the detn. of the potential gradients at points is given and crit. gradients are then detd. exptly. The generality of the linear relation between $\log i$ and the reciprocal of field strength is established by expt.

BERNARD LEWIS

The drop of potential at the cathode in flames. P. E. BOUCHIER. *Phys. Rev.* **31**, 833-50(1928).—The theory as given by J. J. Thompson (Conduction of Electricity through Gases, 64 pp) for the drop of potential at plane electrodes has been modified by allowing for recombination in the layer and a similar theory for cylindrical electrodes has been worked out. An equation is given for plane cathodes and the exptly. results for Pt electrodes immersed in pure and NaCl flames agree well with the theoretical equations given. The drop in potential at the cathode occurs in a sheath of uniform thickness, which completely surrounds the electrode. It is possible to est. the thickness of the sheath. Over 95% of the potential drop takes place across the sheath at the cathode provided it is of clean Pt. With an unclean cathode, electrons are emitted which partially neutralize the accumulation of positive ions reducing the sheath thickness. The mobility of the positive ions averages 12.4 and 8.1 cm. per sec. for 1 v. per cm for a pure and NaCl flame, resp. By studying the characteristic current voltage wave for a wire probe in a flame, a correction of the order of 1 v. is found, to be applied to the measured probe potential in order to obtain the true gas potential adjacent to the test probe. The c. d. at the surface of the cylindrical sheath is const. for any given flame conditions and cathode size. Thus one can measure the c. d. existing in the small uniform gradient just outside the sheath. The c. d. at the sheath surface in a pure flame varies from 1 to 2.5 microamp. and for a NaCl flame from 5 to 11 microamp.

BERNARD LEWIS

Reflection of atoms by a crystal. A. FLETT AND H. F. OLSON. *Phys. Rev.* **31**, 643-7(1928).—Beams of Cd and Hg atoms striking a clean rock-salt surface are reflected so that incident and reflected beams make equal angles with the normal to the crystal surface. The divergence of the reflected beam is only a little greater than that of the incident beam. Na is not reflected from a rock salt surface. H atoms striking a similar surface leave as at. H. The distribution of the directions in which they leave the surface was never the same for any two crystals. This may be due to residual adsorbed gas.

BERNARD LEWIS

The reflection of positive rays by a platinum surface. G. E. READ. *Phys. Rev.* **31**, 629-33(1928).—An app. similar to a spectrometer set up in a good vacuum was employed. A beam of Li ions accelerated through a known potential impinged upon a Pt reflector. The intensity, energy and direction of the reflected beam were measured by means of a rotating collector. Provided the reflector was "clean," i. e., white hot or cold but a few sec., a considerable reflection was observed at certain angles. The angle of reflection was approx. specular but varied slightly with the accelerating voltage. The percentage reflected depended markedly upon the accelerating voltage. The max. occurred approx. at 48 v. where approx. 75% was reflected. The reflected beam consisted of ions which had lost the major portion of their energy. With a beam of K positive rays, approx. the same type of results was obtained.

BERNARD LEWIS

Some experiments in positive-ion kinetics. G. P. HARNWELL. *Phys. Rev.* **31**, 634-42(1928).—The motion of positive ions of K and Cs through gases such as He, Ne, Ar, H₂ and N₂ was investigated in an exptl. tube of simple design. The results were best explained on the basis of a free path approx. equal to the kinetic theory value and on an av. fraction of energy lost per collision considerably less than would be expected on ordinary considerations. H. suggests that the explanation of this is to be found in a more accurate consideration of the fields of force involved in these encounters.

BERNARD LEWIS

Dispersion of space charge in mercury vapor. G. SPIWAK. *Z. Physik* **46**, 725-38 (1928).—The influence of Hg vapor on the current in a 3-electrode tube was studied. Up to a limiting potential the anodic and emission currents are stable at pressures from

1.7×10^{-4} to 2.0×10^{-3} mm. of Hg. Emission current-grid potential and anodic current-grid potential curves are rectilinear, the slope of the latter increasing with the vapor pressure of the Hg. A relation between emission current and Hg pressure is derived, based upon the influence of positive Hg ions on the negative space charge surrounding the hot filament. Exptl. and calcd. values are in agreement. J. E. S.

The affinity of oxygen for electrons. M. A. DA SILVA. *Compt. rend.* **186**, 583-4 (1928); cf. *C. A.* **21**, 3309.—The ionization curves for A differ markedly whether the current is carried by the neg. ions or by the pos. ions. Satn. is reached at 3×88 v. and at 18×88 v., resp. Addn. of O has no effect on the ionization curve for A when the current is carried by the pos. ions, but deflects the curve for neg. ions toward the pos. It is probable that O₂ fixes the electrons with great ease. O₂ does not fix the pos. ions of A to form ion complexes. D. H. POWERS

Physical significance of glow-electron emission. A. v. HIPPEL. *Z. Physik* **46**, 716-24 (1928).—Glow-electron emission is considered as a process of temp. ionization by at. impacts. An emission equation is developed which is independent of assumptions concerning the behavior of conducting electrons. Its validity is not restricted to the solid phase. The emission work and const. depend upon the temp., and the former is related to the polarizability of the atom. J. E. SNYDER

Corona discharge in helium and neon. L. G. H. HUXLEY. *Phil. Mag.* [7], **5**, 721-37 (1928).—The starting potentials were measured and used to discuss the behavior of positive ions and electrons in discharge tubes. The theory of Townsend that positive ions can produce ionization by impact with gas mols. is proved and H. believes that they do not set free appreciable amts. of electrons from the cathode. GEORGE GLOCKLER

The longitudinal thermomagnetic potential difference in a bismuth crystal. C. W. HEAPS. *Phys. Rev.* **31**, 648-52 (1928).—The longitudinal thermomagnetic p. d. in a Bi crystal has been measured at room temp. for various orientations of heat current, magnetic field and crystal axis. The results are plotted showing the change of thermoe. m. f. as a function of magnetic field strength. When the heat current is parallel to the crystal axis the field produces an apparent increase of thermo-e. m. f., the max. being about 7% in a field of 7000 gauss. When the heat current is perpendicular to the crystal axis the field produces a decrease in the force, the max. being 23% in a field of 7000 gauss. The results may be explained qualitatively by assuming that a magnetic field produces a structural change of some sort in the at. system of Bi. This change, in the direction normal to the field, is essentially different from the change parallel to the field. BERNARD LEWIS

Electrical properties of monatomic gases. J. S. TOWNSEND AND S. P. MACCULLUM. *Phil. Mag.* [7], **5**, 695-700 (1928).—The best way to purify monatomic gases is to remove small traces by means of a high-frequency discharge using external electrodes. The gases (H₂) evolved when sealing off a tube can thus be removed rapidly and the monatomic gas is then spectroscopically pure. The high-frequency discharge ionizes the H₂ and causes it to be absorbed rapidly by the quartz walls of the tube. Accurate measurements on the sparking potential of gases thus purified were possible. In Ne purified as above at 37.2 mm. pressure and electrode-distance of 4, 5, 6 and 7 mm. the sparking potentials are, resp., 263, 292, 318 and 344 v. There is further discussion of theories of elec. discharge. GEORGE GLOCKLER

Dielectric constants and magnetic susceptibilities in the new quantum mechanics. III. Application to dia- and paramagnetism. J. H. VAN VLECK. *Phys. Rev.* **31**, 587-613 (1928); cf. *C. A.* **21**, 2096, 2840.—Modifications are given in the mathematical theory published in part I which are required by the moment now being magnetic instead of elec. The main addns. are the appearance of a diamagnetic term, and allowance for the fact that the magnetic moment consists of 2 parts arising, resp., from orbital electronic motions and from the electron's internal spin. Pauli's formula for diamagnetic susceptibility cannot be applied to mols. contrary to V.'s previous claim. It is instead an upper limit to the diamagnetism in non-monatomic mols. Limiting values for the paramagnetic susceptibilities of atoms, are: $\chi = N[4s(s+1) + k(k+1)] \beta^2/3kT$ and $\chi = [Ng^2j(j+1)\beta^2/3kT] + N\alpha$, where β is the Bohr magneton and α is a const. These 2 formulas are vigorously applicable when the multiplet intervals are, resp., very small or very large compared to kT , and are valid regardless of whether the magnetic field is strong enough to change the quantization by producing a Paschen-Back effect. The paramagnetic susceptibility of mols. is calcd. on the basis of the Hund (cf. *C. A.* **20**, 2283; **21**, 1930) theory of mol. quantization. Formulas are given applicable to his couplings of type (a) and type (b) provided in the former the multiplet interval are either very large or very small compared to kT . The exptl. susceptibilities

for O_2 and ClO_2 are in accord with the assumption that the normal states are, resp., 3S and 2S terms. Polatonic mols. may have lower paramagnetic susceptibilities than diatomic mols. because the dissymmetry causes large fluctuations in electronic angular momentum. Spectroscopists have found that the normal states of the NO mol. are 2P terms sep'd. by 120.9 cm.^{-1} . This permits an unambiguous calcn of the susceptibility which agrees with the exptl. value within 1.5%. Deviations from Curie's law are calcd. which result from the doublet interval being comparable with kT . B. L.

Dielectric constants of dilute solutions of polar liquids in non-polar solvents. J. D. STRANATHAN. *Phys. Rev.* **31**, 653-71 (1928).—With the hope of eliminating effects of assocn., to which is attributed the failure of Debye's theory in representing the behavior of such polar liquids as the alcs., the dielec. behaviors of dil. solns. of several alcs. in benzene have been studied. A heterodyne heat method was used. Both dielec. and d. data were obtained at each 10° temp. interval from freezing to boiling. The mol. polarization found for the dissolved alc. was plotted against concn., one such curve was plotted at each 10° interval. To obtain the polarization of the alc. in the unassocd. state these curves were extended to cut the zero-concn. axis. The resulting intercepts for the various temps. were checked against theory. By taking the contribution due to electron displacement from optical data, it was found that the zero concn. intercepts for Me, Et, Pr and Am alc. (benzene as solvent) lead to values of the elec. moment which are essentially independent of temp. This is in agreement with the Debye theory; it is in contrast to the behavior of the pure liquid alcs. The moments found are 1.64, 1.74, 1.75 and 1.62×10^{-18} for the above alcs., resp.

BERNARD LEWIS

A note on magnetic susceptibility of solutions. J. J. WEIGLE. *Phys. Rev.* **31**, 676-9 (1928).—It is shown that when a soln. of different magnetic susceptibilities is placed in a magnetic field, there is a difference between the concn. of the solute in the field and outside of the field. This difference is, however, so small that it can hardly be measured experimentally; therefore it cannot vitiate the measurements of the magnetic susceptibility of solns. by the classical methods.

BERNARD LEWIS

Space-distribution of the photoelectrons ejected by x-rays. E. C. WATSON. *Phys. Rev.* **31**, 728-41 (1928); cf. *C. A.* **21**, 3309. The theories heretofore proposed to account for the apparent emission of x-ray electrons from the atom over a wide range of angles instead of in one definite direction are not entirely satisfactory. The Rutherford theory (*C. A.* **5**, 3538) is applied to the problem. This theory together with the assumption that the electrons all start out from the parent-atom in the same direction can be made to explain satisfactorily all the details of the observed space-distribution. It gives the quant. amt. of spread, it gives the form of the distribution curves; it explains the difference between the lateral and longitudinal distributions; it explains the dependence of the amt. of spread upon the nature of the atoms from which the electrons are ejected and the frequency of the x-rays which do the ejecting; and it accounts for the disagreement among various observers regarding this dependence. It is pointed out that the scattering of 17 kv. electrons by H nuclei is many times greater than can be accounted for on the classical theory.

BERNARD LEWIS

The natural width of x-ray spectra lines. D. COSTER. *Z. Physik* **45**, 797-800 (1927).—Referring to previous explanations of the variation in width of x-ray spectra lines, C. suggests that the following points should be considered: (1) higher multiplet structure; the radiating centers may have a more complex structure than doublets; (2) lines of the second type, that is, from doubly ionized atoms, (3) band spectra. In general, the abnormally great width of the line is not to be explained entirely by external causes, but may be due, at least partly, to conditions within the atoms themselves.

A. W. KENNEY

The reflection of x-rays by plane surfaces. H. E. STAUSS. *Phys. Rev.* **31**, 491-6 (1928).—The reflection of the $K\alpha$ radiation of Mo by plane surfaces of glass and quartz and by sputtered films of Ni, Pt and Ag has been investigated. The crit. angle of reflection of Ni was smaller for transparent films than for opaque ones. The crit. angles for both Ni and Pt were lower than the values calcd. from the electron theory. The exptl. values for the crit. angle of Ag agreed with the theoretical within the limits of error. Doan (*C. A.* **21**, 3548) has found exptl. values of the crit. angle for films of a no. of metals that agree with those predicted by the theory. If the theory does hold with Ni and Pt too, it is necessary to assume that the densities of sputtered films of Ni and Pt are less than those of the metals. Further, it must be assumed that with Ni the d. varies with the thickness of the film, being smaller for the thinner films. The observed crit. angle for quartz was smaller than the theoretical value as though the surface d. was less than the av. d. Both glass and quartz surfaces showed a weak residual reflection beyond the crit. angles, of a type that was not present in the sputtered films. The

phenomenon may be caused by irregular densities over the surface, due possibly to the polishing or to the heterogeneous compn. of the 2 substances. BERNARD LEWIS

Absorption and dispersion of x-rays. J. A. PRINS. *Physica* 8, 68-81(1928).—A review is given of the theory of absorption and dispersion as applied to x-rays. It is derived that the total "strength" p_k for the K shell (*i. e.*, the no. of resonators involved in the K radiation) is equal for dispersion and for absorption. For measurements on Fe (steel) p_k was found to be 1.3. Kramers and de L. Kronig explain this by a more complete occupation of the outer quantum orbits. The exptl. material used was a non-rusting steel (72 Fe, 19 Cr, 8 Ni, 1 C in at. %) mirror of 5×7 cm., n being detd. by total-reflection methods. A bibliography of 44 titles on this subject is included.

B. J. C. VAN DER HOEVEN

An anomaly in the x-ray region. J. H. VAN DER TUUK. *Physica* 8, 60-7(1928).—A short review is given of the classification of x-ray lines with their companion lines. The L_{γ_1} and L_{γ_2} lines have for W an intensity ratio 2:3, theoretical 1:2, the L_{β_1} and L_{β_2} ratio also is anomalous. Down from Dy ($Z = 66$) the L_{γ_2} satellite widens, giving $L_{\gamma_{10}}$ at the soft side of L_{γ_2} . For the study of this abnormality new photographs of the L_{γ_2} , γ_3 doublet between Mo (42) and Dy (66) were taken and are discussed. The phenomenon is considered to be due to anomalousness of the N_{II} and N_{III} levels; further insight is lacking.

B. J. C. VAN DER HOEVEN

The application of the x-ray laws to optical spectra of higher rank and the classification of Ga IV and Ge V. J. E. MACK, OTTO LAPORTE AND R. J. LANG. *Phys. Rev.* 31, 748-72(1928).—By application of the Moseley law and the 2 doublet laws of x-ray spectroscopy, the $(3d^34s)$ and $(3d^44p)$ levels of Ga IV and Ge V and a tentative $(3d^{10})$ level for Ga IV have been found. The levels formerly classified as 3D_1 , 1P_1 ($3d^44p$) of Zn III have been interchanged. On the hypothesis that as the nuclear charge increases, the levels of an isoelectronic sequence tend to cluster into groups forecasting the next higher ion due to a transition from ls - to jj -coupling, evidence is adduced to show that of the 3D , 1D (d^2s), the 3D_2 level approaches the limit $^2D_3(d^2)$ contrary to the theory of Hund. The case is analogous to that of Ne, in whose empirical series 3P_1 ($2p^33s$) approaches 2P_2 ($2p^3$). Distinction is made between x-ray and optical spectra in application to x-ray laws. (1) Exact representation of isoelectronic optical spectra on a Moseley diagram generally requires knowledge of series limit correlations of individual levels; the problem is close to that of general term-representation. (2) X-ray energy levels are ionization energies of neutral atoms, whereas in isoelectronic spectra the net charge increases with the at. no. Z ; the first-order screening no., σ , increases with Z in x-ray spectra, but decreases to an asymptote in isoelectronic spectra. The difference might be explained by outer screening. If σ is plotted as a function of Z , the initial slope of the curve depends upon the n - and l -values of the added electron but changes only slowly with the total no. of electrons and substantially not at all with the ion configuration for a given no. of electrons, this rule implies that the lines on the Moseley diagram, representing the addn. of a given n electron to different isoelectronic sequences, contg. nearly the same no. of electrons, are parallel to a second approximation. The irregular doublet law applied to isoelectronic sequences in the neighborhood of a closed d-shell (d^{10}), is valid for $(p)^{1/2} - (s)^{1/2}$ but not for $(d)^{1/2} - (p)^{1/2}$ or $(f)^{1/2} - (d)^{1/2}$.

BERNARD LEWIS

Simple method of determining orientation and structure in crystals by x-rays. W. E. DAWSON. *Phil. Mag.* [7], 5, 756-68(1928); cf. *C. A.* 22, 892.—If the rotation of a crystal be accompanied by a proportional movement of the recording film, the angle turned through by the crystal between successive reflections may be obtained and sufficient data are thus obtained for detg. uniquely the direction of the normals belonging to each set of at. reflecting planes and hence also the orientation and space-lattice of the crystal. The arrangement used may be called an x-ray goniometer. G. G.

The quantum theory of the polarization of impact radiation. J. R. OPPENHEIMER. *Proc. Nat. Acad. Sci.* 13, 800-5(1927).—If the results of the general theory of the polarization of light are applied to electrons, the momentum rule formulated by Skinner follows, and the excitation does not change the component of angular momentum in the direction of the electron beam. Experimentally, these rules are not always applicable. This paper is a mathematical discussion developing a theory more in accord with the known facts, first by taking into account the spin of the impacting electron and the Heisenberg resonance principle, and second by discarding the assumption that the perturbing energy is small. The modified theory makes the following predictions of the polarization of impact radiation: for very high electronic velocities the line has a polarization of $-p$. As the velocity of the electron diminishes the polarization diminishes and changes sign at about 200 v. The polarization then increases with diminish-

ing velocity, and if extrapolated to the resonance velocity gives a polarization of $+p$.

A. W. KENNEY

The fluorescent spectrum of sodium vapor in the vicinity of the D lines. R. W. WOOD AND E. L. KINSEY. *Phys. Rev.* 31, 793-9 (1928).—When Na vapor is mixed with H_2 , air or N_2 at pressures between 2 and 3 mm. the D lines can be excited by radiation in the region 5100 to 5250 Å. Since this radiation is absorbed only by the Na mols. it is probable that the primary act is the excitation of the mol. The D lines may then be emitted by collisions of the second kind with atoms, or by dissoec. either spontaneously or as a result of collisions with the foreign gas into a normal and an excited atom. Further expts. must distinguish between these processes. A band group previously studied by Wood and Galt (*C. A.* 6, 1092) appears in the yellow region of the fluorescence spectrum under white light stimulation when N_2 or H_2 was present at a pressure of 6 ± 1 mm. and indications are that they are excited by light of their own wave length. The expts. also verify completely the older work of Wood and Galt on a cathode ray spectrum. Photographs of the absorption spectrum and other considerations indicate that these bands are not the bands ascribed by Barret (*cf. C. A.* 18, 1433) and Pringsheim (*cf. C. A.* 20, 3387) to a Na-K mol.

BERNARD LEWIS

The K absorption edges of potassium and chlorine in various compounds. J. M. NUTTALL. *Phys. Rev.* 31, 742-7 (1928).—The K absorption edges of K and Cl were photographed, a vacuum spectrometer of the type designed by Siegbahn being used. Four compds. were used for the absorption of K namely, sylvine, orthoclase, lepidomelane and phlogopite. In the first 2 the absorption occurred in the reflecting crystal itself, in the last 2, in thin sheets of the substance placed in the path of the beam which was dispersed by a calcite crystal. The Cl of the sylvine also gave an excellent Cl K absorption edge. In these photographs as many as 5 secondary edges were observed. The fine structure of the K edge thus extended in wave lengths from 3420 to 3365 x. u. or over a range of about 67 v. The fine structure of the Cl edge extended from 4383 x. u. to 4341 x. u. or about 27 v. That portion of the fine structure which is more remote from the principal edge is not satisfactorily explained by Kossel's (*Z. Physik* 1, 119 (1920)) original hypothesis and is perhaps best accounted for by double ionization of the atoms absorbing the x-radiation.

BERNARD LEWIS

Luminescence excited by x-rays in colloidal alkaline earth salts. C. H. BOESSEVAIN AND W. P. DREA. *Phys. Rev.* 31, 851-7 (1928).—The gelatinous ppts. of Ca, Sr and Ba fluoride formed in the presence of an excess of Ca, Si or Ba ions are positive colloids which luminesce in x-rays. The intensity of luminescence increases after the ppt. has been brought to red heat. These salts do not luminesce if pptd. in the presence of excess fluoride. The positively charged fluorides are changed to negative colloids by washing in dil. alkali. This causes the luminescence to disappear. Washing with dil. acid or distd. water is without effect. Colloidal $BaSO_4$ shows a similar behavior. $CaWO_4$ and $SrWO_4$ are negative colloids, the ppts. formed in the presence of excess tungstate ions fluoresce brightly in x-rays; when formed in the presence of excess Ca or Sr ions they fluoresce very faintly. A table is given showing the extent of the luminescent bands into the ultra-violet. Fluorides that have been heated in a H_2 atm. show a dark discoloration and do not luminesce in x-rays. The presence of impurities diminishes the luminescence of colloidal ppts. The alk. earth chlorides and phosphates, Ca and Sr sulfate and $BaWO_4$ formed only cryst. ppts. that did not luminesce in x rays. The hypothesis is made that the luminescence of colloidal ppts. is due to a thin layer of ions that is adsorbed on the surface of the colloidal particles.

BERNARD LEWIS

The non-appearance of the recombination luminescence in the reaction between alkali and halogen atoms. V. KONDRAT'EV. *Nature* 121, 571-2 (1928).—The direct combination of neutral atoms to form mols. of the NaCl type does not give rise to the continuous band emission which is to be expected as the complement of the continuous absorption bands observed for such mols. by Franck, Kuhn and Rollefson (*C. A.* 21, 3023). Instead, a strong emission of the D lines is observed in the chemiluminescence spectrum during the formation of NaCl. This is interpreted as due to the excitation of Na atoms by collision with NaCl mols. having considerable energy and a relatively long life. K. assumes that these are dipoles, Na^+Cl^- . The possibility of the direct formation of these dipoles from neutral atoms is indicated by an intersection of the potential-energy curves of the systems atom-atom and ion-ion, which shows that at the corresponding internuclear distance an adiabatic transfer of the electron to the Cl atom is conceivable. A large vibrational energy would thereby be imparted to the dipole, which may be increased by the absorption of temp. radiation to $Q + J - E$ (Q = heat of reaction, $Me + X \rightarrow MeX$, J = ionizing potential of Me, E = electron affinity of X). This makes possible the excitation of lines in the chemiluminescence spectrum

having an excitation energy greater than Q . On this theory, radiation is to be expected in the recombination of 1 normal and 1 excited atom, when the curves for Me^+X or MeX^+ do not intersect with that of Me^+X^- . A continuous emission band has been observed for the reaction $\text{K} + \text{I}_2$ (C. A. 20, 1179), whereas it is not found for $\text{Na} + \text{I}_2$. The 2 curves for Na^+I and Na^+I^- intersect, while those for K^+I and K^+I^- do not.

F. A. JENKINS

The lowest terms in the spark spectrum of nickel and copper (Ni II and Cu II). R. J. LANG. *Phys. Rev.* 31, 773-5(1928).—The lowest terms $^2\text{D}_{3,1}$ in the spark spectrum of Ni (from the state d^0) are found to be 6884 and 8391 cm^{-1} below $a^4\text{F}'_6$. In the spark spectrum of Cu the lowest term is $^1\text{S}_0$ (d^10) and lies 21,925 cm^{-1} below $a^2\text{D}_3$.

BERNARD LEWIS

The arc spectrum of germanium. C. M. GARTLEIN. *Phys. Rev.* 31, 782-92 (1928).—The wave lengths of lines in the Ge arc spectrum have been measured in the region above 1870 Å. U. with an accuracy of 0.03 Å. U. From these lines the *relative energy levels* have been detd. and transitions corresponding to 73 lines have been identified. In the normal state, the Ge atom contains 2 p valence electrons which give rise to the lower levels $3\text{P}'_{012}$, $^1\text{D}_2$, $^1\text{S}_0$ which lie deepest as predicted by the theory of Hund. The next higher levels arise from the configurations ps and pd. At least 2 members of each of 11 series have been found and approx. limits have been calcd. to be 65,300 for $^2\text{P}_2$ and 63,600 for $^2\text{P}_1$. The first resonance potential is 4.65 v. and the ionization potential detd. by the limit $^2\text{P}_1$ is 7.85 v. The similarities in the arc spectra of Si, Ge, Sn and Pb are pointed out and the relative term values for these spectra are brought together in a single diagram.

BERNARD LEWIS

Certain multiplets in the spectra of cadmium III and indium IV. R. C. GIBBS AND H. E. WHITE. *Phys. Rev.* 31, 776-81(1928).—Guided by the transitions from ^3PDF , ^1PDF ($4d^5s$) to ^3D , ^1D ($4d^5s$) already detd. for Pd I and Ag II the corresponding lines have been identified in the spectra of Cd III and In IV. The transitions from ^3D , $^1\text{P}_1$ and $^1\text{P}_1$ ($4d^5p$) to $^1\text{S}_0$ ($4d^10$), the latter being the lowest level in each of the spectra, have also been identified for Ag II, Cd III and In IV. These combinations account for nearly all the strong lines in each spectrum. The term values for the 4 isoelectronic systems Pd I, Ag II, Cd III and In IV together with those in the corresponding elements in the first long period have been plotted on a Moseley diagram which brings out certain similarities and variations between these 2 sets of spectra. The validity of the irregular doublet law is again confirmed by the almost const. shift in the corresponding radiated frequencies ($4d^5s - 4d^5p$) on passing in succession from Pd I to Ag II, to Cd III and to In IV.

BERNARD LEWIS

The nitrogen after-glow. J. C. McLENNAN, RICHARD RUEDY AND J. M. ANDERSON. *Nature* 121, 537-8(1928).—The intensity distribution in the Tl series lines as excited by active N_2 is similar to that obtained when the Tl lines are excited by metastable Hg atoms having an energy of about 5 v. This does not agree with the common view that the 11 v. dissocn. energy of N_2 is available for exciting spectra in active N_2 , as a result of recombination of at. N. It is suggested that chemiluminescence may account for the appearance in active N_2 of the lines of Hg, Zn, etc., which require an electronic excitation up to 10 v. In support of this, it is found that mixts. of Kr and Xe with active N_2 do not show any lines of the inert gases. The after-glow obtained with a mixt. of Xe and N_2 showed no absorption for the Xe radiation $\lambda 8819$, indicating that no Xe atoms were present in their metastable state of about 8.4 v.

F. A. JENKINS

Production of active nitrogen. JOSEPH KAPLAN. *Proc. Nat. Acad. Sci.* 14, 258-60(1928).—A blue glow was obtained in air at 5 mm. pressure pumped through a bulb excited by a condensed discharge with spark gap in series from a 6-in. spark induction coil. The spectrum, examd. from 4500 Å. U. to 1800 Å. U., showed the α bands of N_2 , the known and some new β and γ bands of NO, 2nd positive bands of N_2 , and some 4th positive bands. No transitions to the normal level of N_2 appeared. Since the 0-0 bands both of the 2nd and 4th positive groups require more energy than that furnished by the recombination of N atoms, the presence of these bands in the after-glow raises a difficulty for the hypothesis that active N is atomic.

W. WEST

Voltage-intensity relations in the mercury spectrum. W. D. CROZIER. *Phys. Rev.* 31, 800-11(1928).—Voltage-intensity curves have been obtained for 20 lines of the Hg spectrum, when excited by electron impact. The range of accelerating voltage was from excitation to 50 v., the discharge tube being designed to eliminate most of the disturbance due to positive-ion formation. The components of 4 of the triplet groups were resolved and investigated separately. No significant change appears in the no. of atoms in a given energy state if the ionization potential is passed. The components of each of the dD groups of energy levels are excited at practically the same voltage

but have quite different excitation functions. The excitation function for d_1 , d_2 and s levels and for the $2p_2$ level appear to be similar in form and to have sharp maxima within a few v. of the excitation voltage. The excitation functions for d_2 and D levels also appear similar, increasing uniformly to 30 or 40 v. where they have broad maxima. The voltage-intensity characteristics of lines originating in transition down from the same initial level agree in type but sometimes show certain differences in shape. It appears that the probability of different transitions down from a given energy state may not be independent of the way in which this state is excited. There is evidence that a large no. of excitations of $2p_2$ by transitions down from higher levels are not followed by $1S-2p_2$ transitions. BERNARD LEWIS

Equilibrium of nitrogen and hydrogen with ammonia in a corona discharge. G. L. WENDT AND J. B. SNYDER. *J. Am. Chem. Soc.* **50**, 1288-92 (1928).—The equil. of NH_3 with a 1 to 3 ratio of N_2 and H_2 resulting from the action of a 60-cycle corona discharge between a Pt wire and a coaxial cylindrical glass electrode is such that at a pressure of 733 mm. of Hg and a temp. of 28.5°, 4.1% of NH_3 by vol. results under the conditions of the expts. The temp. at which the same equil. concn. would result thermally was calcd. and found to be 270° and, possibly, a temp. above 2500°. The mechanism of the corona discharge appears to be that of activating various mol. species in such a way as to increase enormously the reaction velocities, to change the ratio of decomposition and formation and to produce a shift in equil. corresponding to that at elevated temps. JAMES M. BELL

The quenching of mercury resonance radiation by foreign gases. M. W. ZEMANSKY. *Phys. Rev.* **31**, 812-21 (1928).—Milne's (*J. Math. Soc. (London)* **1** (1926)) theory of the diffusion of imprisoned resonance radiation is applied to Stuart's (*C. A.* **19**, 2909) expts. on the quenching of Hg resonance radiation by foreign gases and expressions obtained for the no. of excited Hg atoms per cc. and the quenching in terms of the no. of impacts of the second kind per sec. per excited atom. Stuart's experimentally detd. values of the quenching are used to give the relation between these impacts and the pressure of the foreign gas and the result is obtained that the no. of impacts of the second kind per sec. per excited atom is not a const. fraction of the total no. of collisions. The total no. of impacts of the second kind per cc. is calcd. and taken as the reaction velocity, and upon plotting against the pressure it is shown that the reaction velocity varies as the 0.6 power of the pressure for all the foreign gases. It is shown that these results can be explained on the theory that impacts between excited Hg atoms and foreign gas mols. give rise to metastable Hg atoms which diffuse to the incident wall and meet the adsorbed foreign gas mols. to which they give up their energy. This theory is also capable of explaining the behavior of a large quantity of inert gas on the disson. of H_2 by excited Hg atoms and also the effect of the latter on O_2 . BERNARD LEWIS

Decomposition of hydrazoic acid in ultra-violet light. KARL GLEU. *Ber.* **61B**, 702-7 (1928).—Solns. of HN_3 in dil. acids, H_2O and dil. alkalies have been illuminated during 15 min. by means of a quartz Hg lamp ($i = 2.25$ amps; $v = 120-180$ v.). HN_3 immediately decomposes, the products obtained were measured quantitatively.

Solution	Millimols			
	N_2	NH_2OH	NH_3	N_2H_4
{ 0.1 N HN_3	13.0	12.5	0.1	0
{ 0.4 N H_2SO_4				
{ 0.1 N HN_3	15.05	14.50	0.15	0
{ 3 N H_2SO_4				
{ 0.1 N HN_3	12.33	11.22	0.47	0
{ 0.2 N HCl				
{ 0.1 N HN_3	14.0	6.9	2.9	0
{ 0.3 N HCl				
0.2 N HN_3	12.65	11.00	0.33	0.075
0.2 N NaN_3		2.90	0.55	1.10
{ 0.2 N NaN_3		3.55	0.60	1.20
{ 1 N $NaOH$				

The infra-red absorption spectra of the halogen derivatives of methane. A. L. HENNE, EASLEY, L. FENNER AND B. J. SPENCE. *Astrophys. J.* **67**, 185-94 (1928).—A sensitive radiometer and a concave grating ruled with 10,000 lines per in. were used to examine the infra-red absorption spectra, between 1μ and 2.5μ , of CH_3I , C_2H_5Cl , CH_2Br_2 , CH_2I_2 , CH_2BrI , $CHCl_3$, $CHBr_3$, CHI_3 , CCl_4 , CBr_4 and $CBrCl_3$. No bands were found

for those compds. which do not contain H. For the others a large no. of new bands were discovered of which the wave lengths were measured. These are tabulated and illustrated graphically. Although the bands resemble each other and exhibit shifts depending on the at. no. of the halogen atom, yet attempts to establish series relationships were not successful. C. C. KIESS

The effect of pressure on the spectrum of the iron arc. H. D. BABCOCK. *Astro-phys. J.* **67**, 240-61(1928).—Wave lengths of Fe lines emitted by arcs in vacuum and in air have been examd. for pressure shifts. The measurements were made with the Fabry-Perot interferometer. Correlation of the observed shifts with the term combinations which produce the lines is explained as a depression of the terms with pressure, high terms being more affected than low terms, and those of the septet and quintet system more than those of the triplet system. An examn. of the temp. effect based on the work of King for Fe, Ti, Sc, Ba and Ca shows that a progression of one temp. class corresponds to a change in excitation potential of 0.72 v. (For a similar investigation cf. Catalan, *C. A.* **18**, 2647, 3142.—Abstractor.) C. C. KIESS

The absorption spectra of anthracene derivatives. I. EDWARD DE BARRY BARNETT, J. W. COOK AND T. H. ELLISON. *J. Chem. Soc.* **1928**, 885-90.—The absorption spectra of anthracene and its derivs. in alc. solns. exhibit a group of bands between which approx. const. frequency differences occur. These bands, up to 6 in. no., are listed in a table in which the compds. are arranged in order of complexity of the groups introduced into the *meso*-position of anthracene. As long as the bridge bond is present, the effect of substituents on the positions of the bands is slight. One alkyl, alkyloxy, phenyl or benzyl group, introduced into the *meso*-position shifts the spectrum from 60 to 80 frequency units toward the visible. A second substituent causes a further shift of approx. 70 units toward the visible. C. C. KIESS

Absorption spectra of formaldehyde and of carbon monoxide and a very close relationship between the two molecules. VICTOR HENRI AND SVEND AAGE SCHOU. *Compt. rend.* **186**, 1050-2(1928).—The vapor of CH_2O has 29 absorption bands between 3053 Å. U. and 2780 Å. U. in the ultra-violet corresponding to different vibrational states of the mol. Each of the bands is resolved into a large no. of fine lines which correspond to the rotational states of the mol. The spectrum is formed of triplets which can be arranged into P, Q and R branches, and which exhibit the same sepn. for all the bands; thus showing that they are of electronic origin. This systems of bands is likened to the at. spectrum of Mg, the normal state of which is ^1S and the excited states $^3\text{P}_{0,1,2}$. This interpretation is confirmed by comparison with the absorption spectrum of CO, for which bands corresponding to $^1\text{S} - ^1\text{P}$ have been observed by Leifson. There should be likewise bands corresponding to $^1\text{S} - ^3\text{P}$ and these have now been observed with a 1-meter column of vapor at 730 mm. pressure at the predicted place near 2060 Å. U. C. C. KIESS

Structure of the second order spectrum of sulfur (S II). J. GILLES. *Compt. rend.* **186**, 1109-11(1928).—With the aid of Zeeman effects lines of the spectrum S II have been classified as multiplets of the quartet system. They represent combinations between P' and D terms with a common P term, and of P' , D and F terms with a common D' term. C. C. KIESS

The absorption spectrum of nitrous oxide. MAURICE LAMBREY. *Compt. rend.* **186**, 1112-4(1928).—The prior discovery by others of the NO bands recently described (*C. A.* **21**, 3555) is acknowledged. Tables of wave lengths of the details of the band structure are now given. C. C. KIESS

The question of the dehydration of barium cyanoplatinite under the action of Röntgen rays. A. TRAPESNIKOV. *Z. Physik* **47**, 732-44(1928).—The dehydration of $\text{BaPt}(\text{CN})_4 \cdot 4\text{H}_2\text{O}$ in *vacuo* and the hydration at atm. pressure were studied with a microbalance. No dehydration occurs at atm. pressure. At 0.015 to 0.004 mm. there is a first water loss of either 5.34 or 4.46%, corresponding to $1\frac{1}{2}$ or $1\frac{1}{4}$ mols. of H_2O . Repeated dehydration and hydration causes the appearance of a modification contg. in the hydrated condition, $3\frac{3}{4}$, $3\frac{1}{2}$ or $3\frac{1}{4}$ mols. of H_2O , capable of losing 1 mol. or $\frac{3}{4}$ mol. in *vacuo* and regaining this at atm. pressure. In the first dehydration, the original green color changes to brick red, which persists throughout subsequent hydrations. A 6-hr. exposure of $\text{BaPt}(\text{CN})_4 \cdot 4\text{H}_2\text{O}$ to x-rays from a tube taking 55 kv. and 7 milliamps. caused the crystals to become orange; no loss of water could be detected. The radiated product behaved like the unirradiated in *vacuo*. W. WEST

A quantitative study of the changes produced in the absorption bands of certain organic fluorescent dye solutions by alteration of concentration and temperature. W. E. SPEAS. *Phys. Rev.* **31**, 569-78(1928).—The forms of the absorption bands have been obtained for solns. of rhodamine B and eosin at different concns. and temps.; also for

solns. of fluorescein, uranine and resorcinol-benzoin at various temps. An increase in concn. has the same general effect on the absorption bands as a lowering of the temp. In a concd. aq. soln. of rhodamine B there are 2 prominent bands in the visible which overlap. Effects of changes in concn. and temp. on the bands are studied both in concd. and dil. solns. The same effects are studied in concd. and dil. solns. of rhodamine B in alc., also for an alk. alc. soln. of eosin, neutral alc. solns. of fluorescein and eosin, alc. soln. of uranine and resorcinol-benzoin. A theory proposed by Merritt (C. A. 21, 204) to account for the form of the absorption bands of the org. dye solns. on the long-wave-length side has been tested with the data herein recorded and has been verified for dil. aq. solns. of rhodamine but not for the other solns. BERNARD LEWIS

Luminescence of mercury vapor in the electrodeless discharge. WITOLD MAJEWSKI. *Compt. rend. soc. polonaise phys.* 6, 15-43(1926); *J. Inst. Metals* 37, 540.—(In Polish, with French summary.) Hg vapor at a pressure of 0.001 mm. is only slightly illuminated by the electrodeless discharge, but the illumination increases rapidly with rise of pressure. The light is first white, then green, and finally with higher pressures disappears. A spectrograph shows 3 distinct spectra: a line spectrum, a continuous banded spectrum, and a spectrum of resolvable bands. The line spectrum increases in intensity with the pressure, and resembles in general the arc spectrum. Continuous bands occur between 5769 and 5461 Å. U., 4916 and 4359 Å. U. and 3663 and 3132 Å. U. H. G.

Resonance rays of selenium vapor. (Preliminary note.) VIKTOR EISENFRUCHT. *Compt. rend. soc. polonaise phys.* 7, 65-8(1926); *J. Inst. Metals* 37, 544.—[In French and Polish.] When Se vapor is illuminated by means of a Hg vapor lamp, a fluorescent spectrum contg. more than 60 lines is obtained. These may be arranged in series corresponding with the exciting Hg lines 4047, 4078 and 4359 Å. U. The lines of each series are related by the equation $v = v_0 - ai$, where v_0 is the frequency of the exciting line, a is a const. characteristic of each series, and i is 0, 1, 2, etc. H. G.

Conditions of the formation of bands in a mixture of hydrogen and mercury vapor. ANDRZEJ SOLTAN. *Compt. rend. soc. polonaise phys.* 7, 67-91(1926); *J. Inst. Metals* 37, 549; cf. C. A. 21, 3157.—[In Polish, with French summary.] Examin. of the intensities of Hg lines in the presence of H under low pressure indicates the existence of a compd., HgH. H. G.

The spark spectrum of argon. I. T. L. DE BRUIN. *Z. Physik* 48, 62-6(1928); cf. following abstract.—The lowest-energy quartet terms of the A II spectrum have been identified and details are given for 5 multiplets. A very close similarity exists between the P I, Ne II and A II spectra. W. F. MEGGERS

The spectrum of ionized argon (AII). T. L. DE BRUIN. *Nature* 121, 576; *Naturwissenschaften* 16, 238(1928); cf. preceding abstract.—The A II spectrum contains doublet and quartet terms, in close analogy to that of P I and Ne II. The triplet $4p^4S - 4s^4P$ at $\lambda\lambda 3729.300$ (9), 3850.565 (8), 3928.599 (7) involving the deep quartet $4s^4P$ term with term-differences 844.40 and 515.70 formed the starting-point for the analysis. Other low-lying quartet terms are $4p^4P$ ($\Delta v = 307.75, 357.30$) $4p^4D$ (439.36, 494.57, 260.32) and (3) d^4D (153.98, 149.62, 107.03). F. A. JENKINS

The spectra of ionized neon (Ne II) and ionized argon (A II). II. T. L. DE BRUIN. *Verslag Akad. Wetenschappen Amsterdam* 37, 340-50(1928); cf. C. A. 22, 1276.—A comparison is made between the quartet terms of ionized neon (Ne II) and ionized argon (A II). Nearly all the quartet terms expected from the Heisenberg and Hund theory have been identified. Also in *Proc. Acad. Sci. Amsterdam* 31, 2-13 (1928). A. L. HENNE

Band spectra and electron terms of the molecules Na₂, NaK and K₂. R. RITSCHL and D. VILLARS. *Naturwissenschaften* 16, 219-20(1928).—The (K₃₅)₂ and K₃₅K₄₁ (isotope) band spectra were found in agreement with the results of Carrelli and Pringsheim (C. A. 21, 3830). A classification formula is given for the edges of the band spectra of K₂ (8000 to 9000 Å. U.) and NaK (around the D line). Several details are discussed. B. J. C. VAN DER HOVEN

Anomalous Kerr effect in sodium vapor. ARTHUR BRAMLEY. *J. Franklin Inst.* 205, 539-47(1928). W. F. MEGGERS

Extreme ultra-violet spectra excited by controlled electron impacts. K. T. COMPTON and J. C. BOYCE. *J. Franklin Inst.* 205, 497-513(1928).—A new vacuum spectrograph is described. In connection with it a low-voltage arc is used as a light source and the spectra of He, Ne and A are excited practically free from impurities. The wave lengths of new lines He I, Ne I and Ne II are published and a table of term values accounting for 203 Ne II lines is given. Results for A will be reported later. W. F. M

The origin of the green aurora borealis line. L. A. SOMMER. *Naturwissenschaften*

16, 219(1928).—The longitudinal Zeeman effect of the $\lambda 5577.35$ green aurora line excited in an O_2 -A mixt. was studied by a Perot Fabry interferometer. The photograms gave a doublet of threefold normal width; this allows the classification of the aurora line in the term system of the O arc spectrum as $3P_1 - 1S_0$ with a potential of 2.23 v.

B. J. C. VAN DER HOEVEN

Extension of the violet CN band system to include the CN tail bands. F. A. JENKINS. *Phys. Rev.* 31, 539-58(1928).—The fine-structure lines of the CN tail bands are measured, the wave-nos. being given for 13 bands as excited by the reaction of C_2H_2 with active N. Estd. intensities are given. Each band has a doublet P and a doublet R branch, but the doublet sepns. vary markedly, being undetectable in the majority of the bands. Large perturbations affecting several lines of each branch are also found. The combination principle is applied to det. the relative vibrational quantum nos. for the tail bands. The consts. B' and B'' represent a continuation of the consts. of the ordinary CN bands to the high values of the vibration quantum no. n . The tail bands are thus merely the high- n members of the ordinary CN sequences and those measured are shown to be the (11, 9), (12, 10), (13, 11), (9, 8), (10, 9), (11, 10), (12, 10), (10, 10), (11, 11), (12, 12), (13, 13), (14, 14) and (15, 15) bands of the violet system. With this assignment the tail bands give $B'' = 1.894-0.0181 n^2$ compared with $1.891-0.0173 n^2$ obtained by Kratzer (*C. A.* 17, 3135) from the low- n bands of the system. There are some new features of the band-spectrum structure. The violet CN system includes some bands shaded to the violet and others shaded to the red (the tail bands), with an intermediate type in which the lines have practically equal spacing on a frequency scale. Also the band-origin of a given sequence, with increasing n , pass through a max. of frequency, the result being that a sequence may form a "head" composed of bands. One of the rotational perturbations is investigated, and the deviations of the terms from their expected values in this case give a typical "resonance" curve. A diagram of the vibrational intensity distribution in the violet CN system is discussed. Certain anomalous bands of longer wave length are found which do not fit into the system. In agreement with Mulliken's (*C. A.* 21, 3541) prediction the first line of the R branch is found to be double, that of the P branch not being resolved. The intensity difference for the doublet components for low- n is observed and the extd. relative intensities are in satisfactory quant. agreement with the theory.

BERNARD LEWIS

Absorption spectra of sulfonefluorescein and some of its derivatives (GIBBS, SHAPIRO) 10. Absorption spectra of hydroquinonophthalein and hydroquinonesulfonophthalein (SHAPIRO) 10. The electron in organic chemistry (KHARASCH, REINMUTTI) 10. The action of light on diazo derivatives (SEYEWITZ, MOUNIER) 10. The origin of magnetism and atomic structure (HONDA) 2.

BIRTWISLER, GEORGE: *The New Quantum Mechanics*. London: Cambridge Univ. Press. 304 pp. 16 s., net.

DRUMAU, P.: *La théorie des quanta*. Paris: Dunod. 152 pp. F. 25.

LENARD, PHILIPP, SCHMIDT, FERDINAND, AND TOMASCHEK, RUDOLF: *Handbuch d. Experimentalphysik*. Bd. 23. Teil 1. Phosphorescenz und Fluorescenz. 741 pp. M. 69; bound, M. 71.

LEOPOLD, C.: *Aktinonen. Die Trager d. Strahlg.* Leipzig: O. Hillmann. 38 pp. M. 2.

Luminous indicators for electric switches, etc. C. H. HOLMWOOD. *Brit.* 276,225, Jan. 22, 1927. A luminous material such as one comprising $RaBr_2$ is placed beneath a lens or disk. Various structural features are described. Cf. *C. A.* 22, 1917.

4—ELECTROCHEMISTRY

COLIN G. FINK

Progress in the electrochemical industry. RUDOLF MEINGAST. *Chem.-Ztg.* 52, No. 37, *Fortschrittsber.* No. 2, 29-52(1928).

The rational use of the electric furnace in steel foundry practice. A. TENIVELLA. *Met. italiana* 20, 69-75(1928).—A crit. review of present practice, difficulties encountered and recommendations for the most efficient operation, including discussions of the relations between the pouring temp. and the dimensions, the advantages of a battery of small furnaces over a pair of furnaces of large capacity, the advisability of heating

under conditions which assure a const. voltage with varying charges, the necessity for scrap of high quality, with low C content, the necessity for using economizers, the best types of furnace construction and problems of operation. C. C. DAVIS

Production of aluminum. A. SULFRIAN. *Metallborse* 15, 706-7, 764-5, 820-1 (1925); *J. Inst. Metals* 36, 562.—New methods, arrangements and auxiliary media and reactions for the production of light metals, especially of Al, are described. The electrolytic method for the production of Al from cryolite and Na Al fluoride is described. The difficulties in the production of Al, Mg and Ca are discussed. A method for the continuous production of Mg is described. The electrolytic production of Al from a molten bath of NaCl and AlCl₃ and several new patents for the production of Al are given. The refining of Al is considered. H. G.

Electrolysis of tin at the Mitsubishi Osaka refinery. ZENSHICHI KIMURA. *Nihon-Kôgyôkwaishi* 41, 602-38 (1925); [In Japanese]; *J. Inst. Metals* 38, 561.—Crude Sn metal obtained from ores of the Akenobe mine is refined by electrolysis. Hydrofluosilicic acid has been used as the electrolyte since 1920. Various kinds of electrolytes were compared with each other, the quality of the anode, acidity of electrolyte, c. d., and working time being varied. Expts. were made on the reduction degree of Sn in soln., purity of cathode, amt. of slime and condition of deposition. In practice the electrolyte contains SiF₄H₂, 8-10%; Sn fluosilicate, 2.5-3%; H₂SO₄, 2%; a small quantity of F₂Si and β -C₁₀H₇(OH); and glue 0.3%. C. d. is 83.3-41.6 amp. per sq. m. of anode area, voltage being 0.33 or 0.15 v. at 15-28°. The current efficiency is 85-75%, and loss of SiF₄ amounts to 8 kg. per ton of electrolytic Sn. In this plant 60 tons of Sn were treated per month. H. G.

Electrolysis of water with an alternating current. CANAUD. *Compt. rend.* 186, 688-90 (1928).—When a 50 cycle a. c. of 110 v. is passed into H₂O between 2 Fe electrodes, 14 × 7 cm., placed at such a distance that the current is 5 amps., there is gaseous evolution between the electrodes. Pieces of metal, immersed in the H₂O, not in contact with the electrodes, also cause liberation of gases. The gases consist principally of those dissolved in the H₂O, together with a small quantity of H₂. The vol. of gas is variable but the quantity of H₂ is const. and about 0.3% of that obtained with 4.5 amps d. c. During the process the electrodes are oxidized to FeO. E. G. VANDENBOSCHE

The commercial deposition of nickel. E. J. DOBBS. *Electroplaters' and Depositors' Tech. Soc.* (advance copy), 1926, Nov., 1-7; *J. Inst. Metals* 38, 553.—A comparison is made between the single and double Ni salt solns. Modern practice in the working of the former, involving the neutralization of acid, the filtration of the soln., agitation, and the removal of org. matter, is outlined. Pinholing is said to be due to org. matter, which may be removed by oxidizing agents or spraying into the air. A heated soln. is advocated. H. G.

Nickel anodes and their use. W. S. BARROWS. *Can. Foundry* 17, 14-6 (1926); *J. Inst. Metals* 37, 625.—A description of expts. on the wear of Ni anodes, and discussion of the effects of various impurities. It is much easier to maintain an equil. between anode and cathode efficiency with low-purity Ni anodes than with high-purity anodes, and a properly cast 90-92% anode is better than a poorly cast 95-97% anode. S and Cu are both injurious but red stains on anodes when the bath is idle may be due to Co and do not necessarily indicate Cu. Sn does not improve the real quality of an anode but makes the casting easier, and, like Si, increases the formation and maintenance of slime on the anodes. Fe and Mn are generally harmful, but Fe is sometimes useful where a white finish is required, as in stove plants. The question of cleaning anodes is discussed. In general, B. favors the non-cleaning system, as the cost of labor and the loss of Ni in cleaning usually outweigh the better results after cleaning. H. G.

Present status of chrome plating. E. LIEBREICH. *Korrosion Metallschutz* 4, 29-32 (1928).—See C. A. 22, 195. E. H.

Chromium versus nickel plating. B. MENDELSSOHN. *Motorwagen* 28, 728-9 (1925); *J. Inst. Metals* 36, 567.—M. points out that Cr in its passive state is resistant to oxidation almost up to red heat; it is not attacked either by HNO₃ or H₂SO₄ or by salt water; it is excessively brittle and cannot be applied as plating by any dipping process; difficulties of galvanic plating have been overcome by Liebreich. If desired, Cr may be deposited on Cu plating for a double protection. Cr coating is not expensive. H. G.

The chromium plating of glass-molds. H. W. HOWES. *Glass Rev.* 3, 12-3 (1927); *J. Inst. Metals* 38, 551.—Glass-molds plated with Ni or Ag are of no use, but Cr-plated molds have many advantages. The cost of Cr plating is very high; the "throwing power" of the solns. used is said to be low. As an illustration of the value of Cr-plated glass-molds, certain German results are quoted. These claim that whereas

an ordinary cast-iron mold has to be descaled and polished up after 1500 to 2000 pressings. Cr-plated mold has been used for 80,000 pressings without polishing. In Germany, they have improved the throwing power of the solns., so that even the deepest engravings on the molds can be evenly plated. H. G.

A theory of the electrodeposition of chromium from chromic acid solution. YOGORO KATO AND TORU MURAKAMI. *J. Soc. Chem. Ind. Japan* 31, 124-8 (1928).—By expts. it is shown that the current efficiency for the electrodeposition of Cr is low; it is below 30% in most cases and increases with increasing current density. H overvoltage for metals is known in general to increase with the increasing current density. The cause for this overvoltage is not definitely decided, but K. and M. assume that the overvoltage is due to accumulation of monatomic H. They also apply Nernst's formula for the concn. cell to the calcn. of the concn. of the monatomic H. Under the last assumption, the values of the concn. of the monatomic H at different densities are calcd. from the value of overvoltage. Then these values of supposed concn. of monatomic H and the amt. of Cr deposited are plotted against the values of current density; the two curves are nearly parallel, from which it is concluded that the electrodeposition of Cr from chromic acid soln. takes place not directly by the loss of elec. charge of CrO_4^{--} or $\text{Cr}_2\text{O}_7^{--}$, but directly by the reduction of the monatomic H of the film (consisting of Cr oxides), which is formed on the cathode. Superposition of a. c. on d. c. makes the current efficiency very low, and this fact favors the above theory. The lowering of the current efficiency with rising temp. also favors it. K. K.

Preparation of chromium plating solutions. Physicochemical studies of the solution. Explanation of the phenomena taking place during the electrolysis. YOGORO KATO, TORU MURAKAMI AND SINTARO SAITO. *J. Soc. Chem. Ind. Japan* 31, 128-31 (1928).—Cr plating soln. is generally prepd. from CrO_3 soln. by its partial reduction or by the addn. of $\text{Cr}(\text{OH})_3$. The authors recommend to treat CrO_3 soln. with insol. org. colloids (names of which are not given, cf. Japanese pat. 71,950). In the plating a film of chromic chromate is first formed on the surface of the cathode. By the electrolysis CrO_3 is reduced to $\text{Cr}(\text{OH})_3$, which forms this film when the concn. of the hydroxide becomes sufficiently large near the cathode. From the results of ultrafiltration and diffusion expts. it is confirmed that the chromic chromate soln. is not colloidal. F. p. depression and elec. cond. of the soln. show that $\text{Cr}_2(\text{CrO}_4)_3$ resembles $\text{Cr}_2(\text{SO}_4)_3$ when dissolved in H_2O . Elec. conduction through the plating soln. is therefore concluded to be electrolytic and not due to cataphoresis as is sometimes inferred. K. K.

The estimation of the metal surface protection by electrolytic chromium plating. S. YENTSCH. *Metallwaren Ind. Galvano-Tech.* 25, 147-9 (1927); *J. Inst. Metals* 37, 643.—Different methods for the production of electrolytic Cr plating are discussed. The chem. side of the Cr-plating process is considered. Three different kinds of surface appearance of Cr-plated articles, thickness of the Cr layer necessary for good protection against corrosion, properties of Cr layers, and the results obtained with different Cr-plating processes are discussed. H. G.

The electrochemical production of Prussian blue. B. ORMONT. *Z. Elektrochem.* 34, 106-11 (1928).—Prussian blue is formed on electrolyzing $\text{K}_4\text{Fe}(\text{CN})_6$ solns. with Fe electrodes and anodic c. ds. of 25-100 amp. per sq. dm. Decrease in $\text{K}_4\text{Fe}(\text{CN})_6$ concns. does not affect the current efficiency (c. e.), but as a more sol. Prussian blue is formed at higher concns., 1% $\text{K}_4\text{Fe}(\text{CN})_6$ solns. are used. The effect of the presence of NaCl, Na_2SO_4 or NaNO_3 in the soln. is studied. When NaCl is present, the c. e. is 100%, the light ppt. formed at the anode darkening with time; the energy consumed is < 1 kw. hr./kg. With Na_2SO_4 (or NaNO_3), there is development of O_2 , the anode becoming passive. After a time the passivity stops, in part, and a dark blue ppt. (probably Turnbull's blue) is formed. The energy consumed is 1.5-4 kw. hr./kg., the c. e. at 20° being < 75%. Partial replacement of NaCl by Na_2SO_4 does not affect the results. Traces of NaCl (up to 0.2%) in solns. contg. Na_2SO_4 stop the passivity, the c. e. becoming nearly 100%. Increasing the temp. of solns. contg. Na_2SO_4 (alone) to 70° increases the c. e. to 99%, the energy consumed decreasing to 1.5 kw. hr./kg. The use of air stirring, rather than mechanical, helps the reactions. J. BALOZIAN

Method of extracting and refining metallic bismuth from the flue dust recovered by the Cottrell process at the Ashio copper mine. JÜRO SHIMONO. *Suiyō-Kwaishi* 4, [6], 849-60 (1924); *J. Inst. Metals* 36, 563.—The residue of the flue dust from which arsenious acid has been extd. contains many valuable metals, such as Bi, Pb, Sn and Zn. To recover them economically the residue was treated in an elec. furnace. An alloy consisting of Pb, Sn and Bi settled in the furnace was melted. The liquefaction product was then treated by the dual operation of the simultaneous electrolysis of Sn and Pb and that of Bi. H. G.

A contribution to the theory of the galvanic cell. N. IZGARUISHEV. *Z. Elektrochem. angew. physik. Chem.* 34, 128-9(1928); cf. *C. A.* 20, 2939.—The total energy change in the galvanic cell is the sum of the energies of: (1) hydration or dehydration of the ions; (2) deposition or sepn. of electrons; (3) condensation or evapn.; (4) dissocn. of mols. into atoms or the reverse process. From energy values given in the literature, e is calcd. by substituting in: $4.2A = enF$, (A being the total energy in cal.). Thus, for $Zn|Zn^{++}|H^+|H_2-Pt$, $e = 0.78$; for $Cd|Cd^{++}|H^+|H_2-Pt$, $e = 0.31$; for $Pt-H_2|H^+|Cl^-|Cl_2|Pt$, $e = 2.4$, for $Pt|(H_2)|H^+|Br^-|Pt|(Br_2)$, $e = 1.7$. For a better agreement between the calcd. and exptl. values of e more exact detns. of the energies are necessary. J. BALOZIAN

Extracting and carbonizing coal [for use in making electrodes] (Brit. pat. 277,293)
21. Metallizing fur and feathers (Brit. pat. 276,291) 25.

KREIGHTON, H. JERMAIN: **Principles and Applications of Electrochemistry.** Vol. I. Principles. 2nd ed., revised and enlarged. New York: John Wiley & Sons, Inc. 488 pp. \$4.

DANNIEL, HEINRICH: **Elektrochemie und ihre physikalisch-chemischen Grundlagen.** IV. Elektrolyse. Berlin: W. de Gruyter & Co. 144 pp. Cloth bound, M. 1.50.

JUMAU, LUCIEN: **Piles et accumulateurs électriques.** Paris: A. Colin. 194 pp. Br. F. 9; rel., F 10.25.

Primary electric batteries. R. M. BURLISON and W. DEREHAM Brit. 276,404, April 26, 1926. Structural features.

Primary electric battery. G. A. LYON, R. W. ERWIN and G. W. HEISE. U. S. 1,670,585, May 22. In a cell contg. Zn and Cu electrodes and an electrolyte the Cu electrode comprises a perforated Cu container contg. Cu oxide and the latter is surrounded by a protective layer of unglazed paper which dissolves sufficiently in service of the battery to permit contact between the oxide and container.

Dry cell electric battery. J. J. McCANN and C. G. BIRDSALL. U. S. 1,670,590, May 22. A hollow tube is formed of spirally wound paper with overlapping edges united with flour paste; the outside of this tube is coated with a paste contg. electrolyte, and the tube is cut into lengths for insertion in Zn container electrodes.

Electrical conductivity cell. I. B. SMITH. U. S. 1,670,640, May 22. Structural features.

Electrolytic cell, etc., for supplying oxygen to incubators. F. DINTZ. Brit. 275,880, Feb. 22, 1927.

Lining for dry cell electric batteries. V. YNGVE and W. R. VALL. U. S. 1,670,604, May 22. Starchy or gelatinous material required in the cell is applied to the outside surface of paper during the manuf. of the paper.

Carbon electrodes for dry cell electric batteries. E. H. McCABE. U. S. 1,670,040, May 15. In order to provide a metal film on the end of a C electrode, a metal wire such as Cu or brass is melted at its point and the particles of metal as melted are forced by an air-blast against the surface of the C.

Electrode material for self-baking electrodes. C. W. SÖDERBERG. U. S. 1,670,052, May 15. An excess of tar and pitch or other suitable binder is used in sufficiently high proportion to cause the mass in warm condition to settle in the electrode.

Storage battery. F. G. DEWEY. U. S. 1,671,016, May 22. Structural features.

Storage battery. C. J. V. FEVY. Brit. 275,750, May 26, 1926. The negative electrode of a Pb storage battery is protected from oxidation by the air or by substances liberated at the positive plate, by enclosing it in material such as parchment paper or prepd. cellulose such as is used for the manuf. of artificial silk. Various structural features are specified.

Storage battery. N. HARRISON. Brit. 276,704, April 28, 1926. Structural features.

Storage battery. K. NEMETH and A. SZANTO. Brit. 276,797, July 20, 1926. A Pb anode is used with a cathode formed of an alloy of Zn, Ni and Cu which is amalgamated and covered with Zn. Various structural features are described.

Storage battery. OLDHAM & SON, LTD., and H. E. CLARKE. Brit. 275,832, Nov. 3, 1926.

Storage battery. J. TUDOR. Brit. 276,718, May 21, 1926. Structural features.

Storage batteries with cylindrical electrodes. B. HEAP and CHLORIDE ELECTRIC-AL STORAGE CO., LTD. Brit. 277,162, Aug. 19, 1926. Structural features.

Storage battery electrodes. W. J. PLEWS. U. S. 1,670,046, May 15. Electrodes are subjected to the action of a heated gas under pressure (sufficiently great to prevent evapn. of water) for 10 min. or less, in order to hasten setting. U. S. 1,670,047 specifies a similar process of effecting setting of the material of freshly pasted electrodes within 1-5 min. In using steam a temp. of about 260° or higher and a pressure of about 120-150 lbs. per sq. in. are suitable.

Apparatus for electrodeposition of metals. E. M. WANAMAKER. Brit. 276,306, Aug. 19, 1926. Anodes and cathodes are mounted on a frame movable along the cell. Various structural features are specified.

Electrodeposition of chromium. C. H. HUMPHRIES (TO METALS PROTECTION CORPORATION). Brit. 277,295, Sept. 9, 1926. Fe, steel or other metal is Cr-plated at a temp. (suitably about 20°) at which the current efficiency is high to produce a deposit with a dull finish and is then further plated at a higher temp. (suitably about 40°) to obtain a bright finish. The electrolyte may be formed of chromic acid, hydrated Cr hydroxide and $(\text{NH}_4)_2\text{SO}_4$.

Electrolytic refining of aluminum. DEUTSCHE VERSUCHSANSTALT FÜR LUFTFAHRT. Brit. 276,911, April 8, 1927. Al is preliminarily purified electrolytically to about 99.8-99.9% purity and is then further refined in a fused electrolyte cell in which it forms the anode and constitutes the lower-most layer. Metals such as Au, Pt or Ag which do not form solid solns. with Al are added to it to increase its sp. gr. for carrying out the process in the manner specified.

Electrolytic apparatus for producing oxygen and hydrogen, etc. W. G. ALLAN. Brit. 275,785, Aug. 4, 1926.

Apparatus for chromium-plating printing plates, etc. W. S. EATON. Brit. 276,921, May 2, 1927. An electrolytic app. is specified.

Electric arc furnace. C. H. GAGE. U. S. 1,671,026, May 22.

Electric induction furnace. INTERNATIONAL GENERAL ELECTRIC CO., INC. Brit. 276,351, Aug. 19, 1926.

Electric induction furnace. J. R. WYATT. U. S. reissue 16,967, May 15. Original pat. 1,312,069 was issued Aug. 5, 1919. (Cf. C. A. 13, 2488.)

Electric resistance furnace. I. RENNERFELT. Brit. 276,823, Aug. 24, 1926.

Zoned resistor for electric furnaces. F. T. COPE. U. S. 1,670,846, May 22.

Electric ozone generator. SIEMENS & HALSKE A.-G. Brit. 276,637, Aug. 26, 1926.

Temperature-control system for electric driers, etc. S. A. STAEGE. U. S. 1,669,582, May 15.

Electric apparatus for determining moisture content of paper, cellulose, air or other materials. J. D'A. CLARK. Brit. 275,741, May 18, 1926.

Surface contact rectifiers for rectifying alternating current. S. RUBEN. Brit. 277,102, June 9, 1926. In rectifiers of the type described in Brit. 270,362 (C. A. 22, 1550) the electropositive elements may be formed of Al amalgam bodies prepd. by immersing Al in HgCl_2 soln. with oxide coating which may be produced electrolytically by use of a Na borate soln. as electrolyte with a cathode of Pb. The electronegative elements may consist of Cu, Fe, V or Mn oxides or PbO_2 formed by compressing the powd. oxides in a mold. Various structural features are described. Brit. 277,103 specifies electropositive elements of W or other suitable metal of the Cr group and electronegative elements of oxides such as those of Fe, Pb, Mn or V.

Coating electric cables. R. JOSEPH. Brit. 277,017, Sept. 1, 1927. Pb-sheathed armored cables are given a protective coating of inert water-resisting material such as vaseline, paraffin, a mixt. of paraffin and resin or the like and wrappings of jute or other fabric are impregnated with the same substances. Other materials such as As compds. also may be added.

Coating for electric cables. STANDARD TELEPHONES & CABLES, LTD. AND T. N. RILEY. Brit. 275,721, May 11, 1926. In coating elec. cables with a fibrous dielectric such as paper impregnated with a suitable oil or the like, the duration of the drying treatment is detd. in accord with the a. c. leakage and the impregnation treatment is started after the leakage becomes substantially const. below a predetd. value.

Device for rectifying alternating electric currents. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 277, 337, Sept. 11, 1926. In rectifiers comprising oxidized-coated Cu disks the thickness of the oxide coating is 0.001-0.1 mm.

Chromium-plating apparatus formed of aluminum or aluminum alloy. SIEMENS & HALSKE A.-G. Brit. 276,610, Aug. 28, 1926. An electrolytic process is specified.

Use of iodine, phosphorus, etc., to quench the spark at break in high-tension oil or

air-break electric switches. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 277,328, Sept. 20, 1926.

Cementation of steel. SOC. ANON. DES ACIERIES ET FORGES DE FIRMINY. Brit. 277,307, Sept. 7, 1926. Steel is coated electrolytically with a thick compact Ni coating to protect it from the action of N or its compds. during cementation.

Electric lamps. NAAMLooZE VENNOOTSCHAP PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 276,176, Oct. 7, 1926. The luminous body of Nernst or similar lamps and the electrodes of arc lamps are made at least in part of Hf oxide.

Coating electric lamp bulbs. F. SKAUPY (TO GENERAL ELECTRIC CO., LTD.). Brit. 276,992, Sept. 6, 1926. Weathering of bulbs or tubes is prevented by coating them with a thin layer of org. material such as paraffin. Fused H_2BO_3 thus coated may be used on lamps emitting ultra-violet or infra-red rays.

Tungsten filament. F. BLAU, F. KOREF and K. MOERS. U. S. 1,670,292, May 22. In order to prep. a W filament which does not readily assume the macro-cryst. form when heated, the filament is subjected to the action of a fluted roller or otherwise treated to produce strains at different points along the filament sufficient to form nuclei of crystn. to promote macro-crystn. and the filament is then heated.

Filaments for incandescent lamps. GENERAL ELECTRIC CO., LTD. AND C. J. SMITHELLS. Brit. 275,735, May 14, 1926. Supports for W filaments are formed of or coated with Cr and U or Mn also may be similarly used although Cr is preferable. These metals are, however, not used adjacent the junction with the filament to avoid alloying of the metal with the W.

5—PHOTOGRAPHY

C. E. K. MEES

MOREAU, G.: *La sensitométrie photographique et ses applications.* Paris: Dunod. 304 pp. F. 30.

VIDAL, M.: *Manuel de photographie.* Paris: Dunod. 288 pp. F. 18.

Röntgen-ray photography. F. SIMON. Brit. 276,678, Aug. 25, 1926. The differences of wave length of rays penetrating the object are registered in visible color tints. The photographic sensitive layer is covered, on the side facing the object, by a screen comprising elements having different absorptive powers for the rays, such as a mixt. of starch grains satd. some with a Pb salt, some with a Cu salt and others with an Al salt and dyed with different colors such as green, blue and red.

High-light process of photoengraving. F. J. M. GERLAND. U. S. 1,670,195, May 15.

Photographic emulsion. H. C. J. DREKS. U. S. 1,669,506, May 15. A sensitive Ag halide emulsion contains transparent color pigments and chrome-yellow uniformly distributed.

Photographic etching. J. RIEDER. Brit. 275,763, June 29, 1926. A layer of varnish for use as a sensitive coating for etching is formed of a resin such as sandarac, dragon's blood or shellac which is insol. in gasoline or similar solvents, together with just sufficient benzine-sol. and sensitive asphalt to render the mixt. sol. in benzene where exposed to light for a short time. Rubber may be added, as may also paraffin oil, stearin oil or like substances.

Photographic plates and films. I. G. FARBENIND. A.-G. Brit. 275,933, Aug. 12, 1926. In prep. plates or films having between the sensitive layer and support one or more intervening layers contg. Mn compds. for preventing halation, a layer is used made from an org. colloid of hydrophil nature, contg. Mn compds. and treated by electro dialysis.

Photographic prints colored with pigment colors. F. H. FARMER. U. S. 1,669,869, May 15.

Photographic stencils. J. SURY. Brit. 277,012, Sept. 2, 1926. Fine mesh gauze of metal or other material is coated with gelatin or gum sensitized with an alk. dichromate and after printing is developed in warm water to remove the unexposed gelatin or gum and produce a stencil.

Cementing together layers of cinematograph films. J. E. THORNTON. U. S. 1,670,672, May 22. Printed colloid films to be joined are each separately satd. with a colloid adhesive which may contain glue, HOAc, molasses or glycerol, $(NH_4)_2Cr_2O_7$.

and water and after drying are clamped together and heated to unite them, and are afterward treated with a hardening and insolubilizing agent such as strong light to render the joint formed more permanent.

Projection screens. G. DELBROUCK. Brit. 276,946, Sept. 4, 1926. The screen is covered with granular material such as silica, glass or wood and may also be covered with metal such as Al, Au or an alloy in powd., leaf or other form.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

The most recent progress in inorganic chemistry. GIOVANNI CANNERI. *Giorn. chim. ind. applicata* 10, 73-6, 135-40 (1928), cf. *C. A.* 22, 1919.—Investigations on the reactivity of O with Ag, the reduction of metallic halides by H, the thermal decompn. of chloroaurates, hydrides, nitrides, selenides, halides, addn. compds. of SO₂ and aromatic hydrocarbons, double salts, Be complexes, Cr amino-acid complexes, basic Bi nitrates, Pt complexes, Fe nitrososulfides, heteropoly acids, hydrogenomolybdates, iso- and heteropolythio salts and manganomolybdates are reviewed, with the original references

C. C. DAVIS

Introduction of bromine and iodine into silicates. A. DUBOIN. *Compt. rend.* 186, 762-4 (1928).—KHF₄ and CoO are heated together in a Pt dish, the product is added to molten KF, and finally SiO₂ is added. After several hrs. heating the mixt. is cooled and KBr or KI added. After 2 or 3 days' heating the iodo- or bromosilicate is extd. with H₂O. These Co derivs. seem to be orthorhombic and are isomorphous with the chlorosilicate.

E. G. VANDENBOSCHE

The fluoride of bivalent uranium. A. SIEVERTS. *Z. anorg. allgem. Chem.* 170, 191-2 (1928).—UF₂·2H₂O, mentioned in *Chem. Zentr.* 1905, I, 1131, and in all the reference books, was never prepd. The only original article, by Giolitti and Agamemnone (*Atti accad. Lincei* [5], 14, I, 165 (1904)) contains a misprint, and the text and tables refer only to UOF₂·2H₂O.

G. CALINGAERT

Thermal dissociation of cadmium nitrate. G. MALQUORI. *Atti accad. Lincei* [6], 7, 249-50 (1928).—According to Vasiliev (*C. A.* 5, 2374) Cd(NO₃)₂, m. 360°, with decompn., but expts. by M. show that it decomp. at 325° to CdO, thus 2 Cd(NO₃)₂ → 2 CdO + 4 NO₂ + 2 O, without the formation of a basic salt. Measurements of the vapor pressures from 200° to 315° (tabulated in detail) show that the decompn. reaction is perfectly reversible and that Cd(NO₃)₂ and CdO are the only 2 solid phases. Utilizing the vapor pressure data for calcg. the heat of decompn. by the Nernst equation, Q was found to be 55,881 cal.

C. C. DAVIS

The action of copper on sulfuric acid. G. FOWLES. *Chem. News* 134, 257-9 (1928).—The nascent H theory, to account for the formation of SO₂ during the reaction of Cu and H₂SO₄, is shown to be untenable. It is suggested that the SO₂ is due to the reducing action of Cu, Cu₂S and Cu₂SO₄ present, the equations representing their action adding up to give: Cu + 2H₂SO₄ = CuSO₄ + SO₂ + 2H₂O. The theories of others are criticized.

J. BALOZIAN

The action of hydrogen on tin salts at high temperatures and pressures. V. N. IPAT'EV AND V. I. NIKOLAEV. *J. Russ. Phys.-Chem. Soc.* 60, 331-8 (1928).—See *C. A.* 21, 3845.

E. J. C.

The reaction between monohydrated ferric oxide and hydrogen sulfide at 100°. T. G. PEARSON AND P. L. ROBINSON. *J. Chem. Soc.* 1928, 814-23.—As discrepancies exist in the literature of the reaction between Fe₂O₃·H₂O and H₂S, it is studied further. The expts. are performed at room temp. and 100°, the ratio of "sulfide" to oxide being detd. in each case. At room temp., variable amts. of a hydrated sulfide are formed, this variation being principally due to caking of the material by the H₂O produced. At 100° the product becomes hot on exposure to air, although it is not pyrophoric until after treatment with CS₂. The "sulfide" ratio is more const. here than at room temp. The S sol. in CS₂ is 2.4% (av.), its presence being due to O₂ adsorbed on the hydrated oxide surface. On treating the product of the reaction with concd. KCN soln., unaltered Fe₂O₃·H₂O and FeS₂ remain as the residue. The black residue formed on dissolving the product in 10% HCl is FeS₂ (after treatment with CS₂), averaging 7%. S is obtained if this residue is extd. with CS₂, indicating that the residue is coated with S. Conclusion: Fe₂S₃ is produced by the primary reaction, some of this being decompd. to give mono- and di-sulfide, equimolarly.

J. BALOZIAN

Yellow ferric hydroxide produced by careful oxidation of suspended ferrous sulfide.

SUZANNE VEIL. *Compt. rend.* **186**, 753-5(1928).—When a suspension of FeS in H_2O is oxidized by a current of air, yellow $Fe(OH)_3$ is obtained. The yellow hydroxide is much less magnetic than the brown. Fe_2O_3 prepd. from brown $Fe(OH)_3$ becomes less magnetic while the oxide prepd. from yellow $Fe(OH)_3$ is several times more magnetic than the former.

E. G. VANDENBOSCHE

The existence of the oxide of silver, Ag_2O_3 . A. P. ROLLET. *Compt. rend.* **186**, 748-50(1928).—A soln. of KOH was electrolyzed with a Hg cathode and a Ag anode. During the process K plates out in the Hg and the Ag is covered with an oxide, so that if allowed to function as a source of e. m. f. the Hg would be cathode and Ag anode. The current obtained from the cell was studied as a function of time. The cathode potential remains const. during the process so that any change in current shows a change in anode potential. There are 2 abrupt drops in potential, giving 3 level stretches in the current. The first corresponds to the peroxide of Ag which is reduced to Ag_2O . When this change is complete there is a drop of 0.24 v. and then Ag_2O is reduced to Ag, with subsequent drop in potential when complete. A third level stretch represents the current obtained as long as K is present in the Hg. The reaction was also studied in the opposite sense. By first oxidizing Ag to Ag_2O and then to the peroxide, the current required corresponds to the formation of Ag_2O_3 .

E. G. VANDENBOSCHE

The composition of titanium peroxide. MAURICE BILLY. *Compt. rend.* **186**, 760-2(1928).—The hydrate of a pertitanic salt can be pptd. by hydrolysis, having a large excess of H_2O . By analysis the formula is found to be Ti_2O_5 , if the salt is hydrolyzed from 10° to 20° . If hydrolyzed around 0° the ratio Ti to O is 2:5.27, but not near the previously suggested formula of TiO_3 .

E. G. VANDENBOSCHE

The amines of double salts. G. SPACU AND C. CREANGA. *Bull. soc. stiinte Cluj* **3**, 160-70(1927).—It has been shown in a number of papers previously published (cf. C. A. **19**, 1995) that various double salts (sulfates, chlorides and bromides) are capable of reacting under favorable conditions with bases whereby amines are obtained corresponding to the initial double salts. This indicates that double salts in the solid state are really complex compds. Thus when the double salt $CdBr_2 \cdot BrNH_4$ (I) is treated with a soln. of pyridine in benzene, $[Cdpy_6]^{Br_2}$ ($BrNH_4$) is obtained. When exposed to

air for 24 hrs. this hexammine leads to the diammine, $[Cdpy_2]^{Br_2}$ ($BrNH_4$). By passing a current of dry NH_3 over I, $[Cd(NH_3)_6]^{Br_2}$ ($BrNH_4$) is obtained, which on heating to 60° is transformed into $[Cd(NH_3)_2]^{Br_2}$ ($BrNH_4$). Treating the double salt $ZnBr_2 \cdot KBr \cdot 2H_2O$ (II) with pyridine leads to $[Znpy_6]^{Br_2}$ K. II gives with dry NH_3 $[Zn(NH_3)_6]^{Br_2}$ BrK which at $60-70^\circ$ yields $[Zn(NH_3)_2]^{Br_2}$ BrK .

EMIL KLARMANN

Studies on the constitution of double salts. Double amines derived from iodides. G. SPACU AND O. VOICU. *Bul. soc. stiinte Cluj* **3**, 321-52(1927); cf. preceding abstract.—When a current of dry NH_3 is led over the double salt $CdI_2 \cdot IK \cdot H_2O$ (1) the double hexammoniate, $[Cd(NH_3)_6]^{I_2}$ IK , results. I gives with pyridine the corresponding compd., $[Cdpy_6]^{I_2}$ IK , which on exposure to air is transformed into $[Cdpy_2]^{I_2}$ IK . Similarly the hexammoniate, $[Cd(NH_3)_6]^{I_2}$ $(IK)_2$, is obtained from the double salt $CdI_2 \cdot 2KI \cdot 2H_2O$ with NH_3 and $[Cdpy_6]^{I_2}$ $(IK)_2$ with pyridine. The latter yields when exposed to air $[Cdpy_2]^{I_2}$ $(IK)_2$. By treating the double salt $CdI_2 \cdot 2NaI \cdot 6H_2O$ with $PhNH_2$ the tetraquodiammine, $[Cd^{an_2}(H_2O)_4]^{I_2}$ $(INa)_2$, is obtained. Analogous methods have been applied in the prepn. of $[Zn(NH_3)_6]^{I_2}$ IK , $[Zn^{1y}py_2]^{I_2}$ K_2 and $[Zn^{Iy}an_2]^{I_2}$ K from $ZnI_2 \cdot 2KI \cdot 2H_2O$, and of $[Zn(NH_3)_6]^{I_2}$ IK , $[Znpy_2]^{I_2}$ IK and $[Znan_2]^{I_2}$ IK from $ZnI_2 \cdot KI \cdot 2H_2O$.

EMIL KLARMANN

Wöhler's titanium cyanonitride. V. M. GOLDSCHMIDT. *Nachr. Ges. Wiss. Göttingen Math. physik. Klasse.* **1927**, 390-3.—In melting Fe ores contg. Ti in a blast furnace, Cu-colored crystals are formed, the so-called "blast furnace dice," which Wöhler

considered a complex titanium cyanonitride with the formula $Ti_{10}C_2N_8$. Crystallographic examn. of the material indicated a crystal structure of the NaCl type, with an av. lattice const. of 4.243 ± 0.002 A. U. G. believes it is a mixed crystal contg. 20 mol. % TiC and 80 mol. % TiN. The value of d. as calcd. on this assumption is 5.32, in good agreement with the exptl. value of 5.28. H. STORERZ

A salt of hexafluorometaphosphoric acid. WILLY LANGE. *Ber.* 61B, 799–801 (1928).—The nitron salt, $C_{10}H_{16}N_4 \cdot HPF_6$, is obtained as by-product in the prepn. of the nitron salt of HPO_3F_2 (cf. C. A. 21, 3500) and sepd. by fractional crystn. A better method consists in adding the nitron to the acid only after 12 hrs. of standing at 18° . After that time HPO_3F_2 is completely hydrolyzed, and the nitron ppts. only HPF_6 . The K salt is obtained by double decompn. with KNO_3 . The nitron salt is stable in H_2O , neutral toward methyl orange and phenolphthalein, unusually resistant toward alkaline solns. The PF_6 ions are decomposed only by molten alkali oxides or by heating with strong acids. $Ba(PF_6)_2$ is sol. in H_2O ; it ppts. immediately with H_2SO_4 . PF_5 probably reacts with NOF, yielding $NOPF_4$. A. L. HENNE

The diselenides of iron, cobalt and nickel. W. F. DE JONG AND H. W. V. WILLEMS. *Z. anorg. allgem. Chem.* 170, 241–5 (1928).—The compds. are prepd. by melting the monoselenides with a slight excess of Se under vacuum* at 230° , for 48 hrs. The Fe compd. obtained shows the x-ray diagram of $FeSe$. The diagrams of $CoSe_2$ and $NiSe_2$ correspond to the pyrites form, T'_h , with $a = 5.854$ (Co) and 6.022 (Ni), and the following distances: Co–Se 2.41, Ni–Se 2.47, and the densities. $CoSe_2$ 7.18; $NiSe_2$ 6.69. G. CALINGAERT

The complex salts of bivalent platinum with α, β, γ -triaminopropane. F. G. MANN. *J. Chem. Soc.* 1928, 890–8; cf. C. A. 21, 388.—(Triaminopropane-monohydrochloride) platinum dichloride monohydrate (I), $[Cl_2Pt \cdot NH_2CH_2CH(NH_2)CH_2NH_2 \cdot HCl] \cdot H_2O$, prepd. from K_2PtCl_6 (II) and triaminopropane 3-HCl (III), is resolved into the optically active form, γ -HCl. Thus, (triaminopropane- γ -monohydrochloride) dichloride platinum, pale yellow crystals, prepd. from II (16 g.) and III (16 g.) in H_2O (250 cc.), refluxed for 2 hrs., concd., filtered, chilled and recrystd. from hot H_2O , darkens at 280° and m. $290-1^\circ$ (decompn.). *d*-(Triaminopropane-mono-*d*-bromocamphor- π -sulfonate) platinum dichloride monohydrate (IV), $[Cl_2Pt \cdot NH_2CH_2CH(NH_2)CH_2NH_2 \cdot C_{10}H_{14}OBrSO_3H] \cdot H_2O$, orange-yellow crystals, hot aq. solns. of I (12 g.) and Ag-*d*-bromocamphorsulfonate (V) are mixed, boiled for 5 min., filtered, concd., cooled and recrystd. 5 times from H_2O ; m 0.5773% aq. soln. $[\alpha] = +76.2^\circ$ and $[M] = +522^\circ$. *d*-(Triaminopropanemonohydrochloride) dichloride platinum, prepd. by dissolving IV in a min. of hot H_2O , dilg. with hot concd. aq. $CaCl_2$, filtering, chilling, filtering off the crystals after 24 hrs., washing with alc. and Et_2O , and drying; in 1.051% soln. $[\alpha] = +49.7^\circ$ and $[M] = +195^\circ$. *l*-(Triaminopropane-mono-*l*-bromocamphor- π -sulfonate) platinum dichloride monohydrate (VI) prepd. from a satd. aq. soln. of I and NH_4 *l*-bromocamphorsulfonate, and recrystg. 5 times from H_2O ; in 0.5032% aq. soln. $[\alpha] = -76.5^\circ$ and $[M] = -524^\circ$. *l*-(Triaminopropane-monohydrochloride) dichloride platinum, pale yellow crystals, prepd. from VI and $CaCl_2$ in aq. soln.; in 1.279% soln. $[\alpha] = -49.1^\circ$ and $[M] = -192^\circ$. (Triaminopropane-mono-*d*-camphor- β -sulfonate) dichloride platinum, $[Cl_2Pt \cdot NH_2CH_2CH(NH_2)CH_2NH_2 \cdot C_{10}H_{16}OSO_3H]$, pale yellow cryst. powder, prepd. similarly to IV from I (10 g.) and V (8.4 g.) and recrystd. from H_2O twice; in 1.294% aq. soln. $[\alpha] = +10^\circ$ and $[M] = +61^\circ$. (Triaminopropane-hydrogen-oxalate) platinum dichloride $[Cl_2Pt \cdot NH_2CH_2CH(NH_2)CH_2NH_2 \cdot (CO_2H)_2]$, orange cryst. powder, prepd. from I and oxalic acid in aq. solns., recrystd. from hot H_2O and dried at 95° in a vacuum; m. $216-7^\circ$ (decompn.). Monochloridetriaminopropaneplatinous monochloride, $[ClPt \cdot NH_2CH_2CH(NH_2)CH_2NH_2] \cdot Cl$, yellow crystals, prepd. from aq. NH_3 and concd. aq. I, filtered, washed with cold H_2O and dried; m. p. $282-3^\circ$. Bis(triaminopropane-monothiocyanate) platinous dithiocyanate (VII), white crystals, prepd. from III (9.4 g.), dissolved in H_2O (50 cc.), 15% aq. NaOH (34.8 cc.) and II (6 g.) dissolved in H_2O (50 cc.), heated until a buff ppt. is formed, this ppt. redissolved, the resulting soln. concd., chilled, filtered free from NaCl, acidified with AcOH, treated with concd. KSCN soln. contg. AcOH, filtered after 24 hrs. and recrystd. twice from hot H_2O ; m. $177-8^\circ$. Bis(triaminopropane-mono-*d*-bromocamphorsulfonate) platinous di-*d*-bromocamphorsulfonate trihydrate, $[Pt(NH_2CH_2CH(NH_2)CH_2NH_2 \cdot C_{10}H_{14}OBrSO_3H)_2] \cdot (C_{10}H_{14}OBr(SO_3)_2 \cdot 3H_2O)$, white crystals, from hot aq. VII (4 g.) and V (11.7 g.; 4 mols.), concd., filtered and recrystd. 7 times from H_2O ; in 0.5184% aq. soln. $[\alpha] = 80.1^\circ$ and $[M] = 347^\circ$, the rotation being due to the 4 sulfonate ions alone. In the 3 following compds. the Pt is bivalent and has a coordination no. 6. Bis(triaminopropane) platinous di-iodide, $[Pt(NH_2CH_2CH(NH_2)CH_2NH_2)_2]I_2$, white crystals, is prepd. as VII, but is treated with KI without AcOH instead of KSCN with AcOH: m. $266-7^\circ$. Bis(triaminopropane) platinous

diiodide, white crystals, is prepd. similarly to the preceding, but NaBr is substituted for KI; m. p. 270-1°. *Bis(triaminopropane) platinumous dipicrate*, $[\text{Pt}(\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2)_2(\text{C}_6\text{H}_3(\text{NO}_2)_3\text{O})_2]$, yellow powder, from the above diiodide and a considerable excess of picric acid, which deflagrate on heating. (*Triaminopropane- γ -monohydrochloride*) *palladium dichloride*, yellowish brown crystals, NH_4 chloropalladite (3 g.) and III (6.9 g.; 3 mols.) are dissolved in H_2O (50 cc.), refluxed for 4 hrs., filtered, cooled overnight and rapidly recrystd. from hot H_2O , m. p. 279-80°. *Triaminopropane trihydrogen trioxalate monohydrate*, $\text{C}_3\text{H}_5(\text{NH}_2\text{HOCCO}_2\text{H})_3\cdot\text{H}_2\text{O}$, white needles, from aq. solns. of III and oxalic acid, and recrystd. from hot H_2O ; m. 173-4°. J. B.

BILTZ, HEINRICH, AND BILTZ, WILHELM: **Laboratory Methods of Inorganic Chemistry**. 2nd ed., revised. Authorized translation by Wm. T. Hall and Arthur H. Blanchard. New York: John Wiley & Sons, Inc.

EKELEY, JOHN BERNARD: **A Laboratory Manual of Inorganic Chemistry**. 3rd ed., revised. To accompany "A Textbook of Inorganic Chemistry," by A. F. Holleman. New York: J. Wiley & Sons; London: Constable & Co., Ltd. 259 pp. \$2.

7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Spectroscopic control of the color change in indicators of the phthalein and sulfurein groups. PAUL BRÜERE. *Bull. soc. chim. biol.* 10, 283-90(1928). Construction of stable colorimetric scales for simple and mixed indicators. *Ibid* 291-3; cf. C. A. 20, 3660; 21, 2445.

The use of indicators in the colorimetric determination of hydrogen ion concentration. T. H. FAIRBROTHER. *Ind. Chemist* 4, 66-9, 93-6(1928).—The practical value of colorimetric p_{H} detns., the method of prepg. suitable buffer solns. and the procedure for carrying out the colorimetric comparisons are explained.

Acidimetric and alkalimetric titrations. A. GRÉGOIRE. *Ann. Gembloux* 33, 277-95 (1927); *Expt. Sta. Record* 57, 804.—This is an instructive discussion of the acidimetric and alkalimetric titrations and the behavior and suitability of indicators on the basis of the theory of acid-base equilibria.

Differential potentiometric titration. I. Simple method (Method I). II. Refined methods (Methods II and III). BERNARD CAVANAGH. *J. Chem. Soc.* 1928, 843-55, 855-72.—The method of titrating to an absolute e. m. f. (cf. C. A. 22, 37) is, in general, more accurate than titrating to a marked change in e. m. f. but the latter principle is more popular in practical work. The methods described in these 2 papers refer to pptn. analysis and depend upon a broader conception of the differential principle, and while retaining the advantage of wide applicability, appear to be an improvement both with respect to convenience and to precision. Instead of the customary process of making quite a no. of readings after the addition of relatively small quantities of reagent in order to detect the max. rate of change in e. m. f., it has been found possible to det. the result of a titration with higher precision from 2 or 3 measurements of e. m. f. corresponding to one or two large additions of reagent. The method is explained with the titration of Cl^- with Ag^+ as a typical example; the original papers should be consulted for details. The methods depend on the changes of the e. m. f. of the indicator electrode and not on the particular values of the e. m. f. Method I is applicable whenever an absolute uncertainty of the order of 0.2-0.15 of the soly. product of AgCl is permissible. A first tentative addn. of reagent is made and from the resulting e. m. f. an approx. estimate of the quantity still required is obtained by reference to a table given. Nearly this amt is then added and the small residual deficiency is evaluated in the same manner as before. Precision depends chiefly on the closeness of approach to the end point, which, in the most dil. solns., is limited by the incompleteness of the reaction in the neighborhood of the end point. The second method described is for more dil. solns. and gives greater precision. It is an extension of Method I to and beyond the end point, depending upon a fairly precise knowledge of the soly. product of the ppt. formed and the use either of a set of accurately drawn curves or of a numerical table. Method III is independent of a knowledge of the soly. product of the ppt. From the 2 e. m. f. changes produced by 2 successive additions of reagent, the result of the titration is obtained by a simple calcn. with the aid of a table given, or by the use of a set of curves. Methods II and III depend upon the conformity of the titration curve to a simple general equation deduced on thermodynamic grounds alone.

W. T. H.

A quantitative method of dust determination. A. SEITZ. *Zentr. Gewerbehyg.* 14, 328; *Bull. Hyg.* 1, 230.—Exact weighed amts. of metallic dust are pptd. on a celluloid plate. The plate is photographed and standards are prepd. In the detn. the celluloid plate is smeared with paraffin and exposed to the air for 24 hrs. Org. dust does not show when photographed.

GEORGE R. GREENBANK

Notes on potassium bisulfate fusions. W. R. KERR. *J. Am. Ceram. Soc.* 11, 330(1928).—Reference is made to the well-known fact that it is advisable to heat KHSO_4 until all moisture is expelled and $\text{K}_2\text{S}_2\text{O}_7$ is formed, before using it as a flux.

C. H. KERR

The action of dichromate on manganous ions. S. ORLOVSKII. *Z. anorg. allgem. Chem.* 170, 184–90(1928).—In alk. soln., $\text{Cr}_2\text{O}_7^{--}$ oxidizes Mn^{++} to $\text{Mn}(\text{OH})_3$, and the oxidizing power of $\text{Cr}_2\text{O}_7^{--}$ decreases when the alk. increases. The method is not directly applicable to the detn. of Mn, either by back titration of $\text{Cr}_2\text{O}_7^{--}$ or by weighing the ppt. The best results are obtained when Mn is detd. by another method in the ppt.

G. CALINGAERT

Progress in the analytical chemistry of light metals. F. I. HAHN. *Z. Metallkunde* 19, 119(1927); *J. Inst. Metals* 37, 565; cf. *C. A.* 20, 2001.—It is pointed out that the methods of estns. of Al and of O in Al hitherto known are not exact. Reference is made to the possibility of an exact estn. of Mg in Al in a different way.

H. G.

Colorimetric analysis of some metals. HUGO FREUND. *Zentr. Hütt. Walzwerke* 30, 79–80(1926); *J. Inst. Metals* 37, 557.—The colorimetric methods that have been proposed for the detn. of small quantities of Mo, W, Cr, P, Fe and Co are discussed, and the procedures of Maag (*C. A.* 19, 1675), Travers (*C. A.* 12, 1158) and Evans (*C. A.* 15, 1264; 19, 3073) are recommended.

H. G.

Volumetric determination of antimony in the presence of lead, tin and copper. A. VASSILIEV AND V. KARGIN. *Papers Pure Appl. Chem. Karpov-Inst. (Moskov); Festschrift. Bach 1927*, 143–56 [In Russian]; *J. Inst. Metals* 38, 508.—In the detn. of Sb by titration with KBrO_3 , Pb and Sn do not interfere; Cu, however, causes the results for Sb to be 0.3–1.7% too low, and Cu and Pb together cause even lower results to be obtained. The PbSO_4 ppt. invariably contains a small percentage of Sb, which may be detd. by dissolving it in HCl and titrating with KBrO_3 .

H. G.

Determination of sulfur in metallic alloys and its influence on their properties. W. MEIGEN AND K. STOCK-SCHRÖBER. *Zentr. Hütt. u. Walzwerke* 30, 277–31(1926); *J. Inst. Metals* 37, 585.—The alloy is dissolved in HCl, with Br or KClO_3 as oxidizer. After removing the excess of the latter by boiling and filtering, if necessary, the soln. is treated with BaCl_2 . If the sample dissolves completely in HCl all the S is evolved as H_2S and may be collected in a Cd or Pb salt soln. Photomicrographs are given of brass, bronzes, Cu, Zn, Sn and Pb contg. less than 1% S, showing the characteristic shape of the various sulfide inclusions, and a table shows the effect of S on the tensile strength, hardness, ductility and d.

H. G.

Separation of the metals of the third group. G. G. LONGINESCU AND (Mlle.) GABRIELLE CHABORSKI. *Bul. soc. stiinti Bucuresti* 27, 41–4(1924); *J. Inst. Metals* 36, 533.—The usual $(\text{NH}_4)_2\text{S}$ ppt. is dissolved in HCl and KClO_3 , the soln. neutralized with K_2CO_3 , treated with an excess of 20% NaOH, boiled and filtered and the filtrate tested for Al and Zn by the usual methods. The ppt. is boiled with 20% $(\text{NH}_4)_2\text{CO}_3$, which dissolves Ni, Co and part of the Cr. On prolonged boiling Ni is pptd. as a green basic salt, and the filtrate can then be tested for Co by the cobaltinitrite method. The insol. residue from the $(\text{NH}_4)_2\text{CO}_3$ treatment is tested for Mn and Cr by the hypochlorite method of Chaborski (*C. A.* 18, 952), and the presence of Fe is confirmed by the $\text{K}_4\text{Fe}(\text{CN})_6$ or KCNS method.

H. G.

Determination of cobalt as cobalto-cobaltic oxide in a stream of oxygen. R. CERNATESCO AND (Mrs.) E. VASCAUTANU. *Ann. sci. univ. Jassy* 15, 69–70(1928).—In an oxidizing atm. the most stable oxide is Co_3O_4 , provided the temp. is not too high. Calcination of black Co hydroxide (from the pptn. of $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ with KOH and Br) over a good Bunsen flame in a slow current of O_2 gave results differing from +0.14 to –0.32% from theoretical.

A. PAPINEAU-COUTURE

A new method of determining copper in commercial copper sulfate. V. MORANI. *Atti II congresso naz. chim. pura applicata 1926*, 1376–80.—Detns. of Cu in CuSO_4 of known concn. as a test of the Biazzo method (cf. *C. A.* 19, 2613) showed that the latter is rapid and simple and should have the advantage over other volumetric methods in that the detn. can be carried out when Cl is present, as it usually is in com. CuSO_4 . Nevertheless it lacks the precision which it was hoped that it would possess, chiefly because of the uncertain oxidation of HSCN by excess KMnO_4 , as pointed out by B.

C. C. DAVIS

Nephelometric determination of small quantities of lead in the presence of zinc by means of potassium chromate. L. S. VAN DER VLUGT. *Chem. Weekblad* 25, 194-6 (1928).—The Pb ext. is evapd. to dryness with a drop of strong HNO_3 , the residue dissolved in H_2O , filtered and transferred to a colorimeter glass of 100 cc. One drop of N AcOH and 1 drop 10% K_2CrO_4 are added. After shaking, the turbidity is compared with standard turbidities of a scale of solns. with 0.03 up to 0.60 mg. Pb per 100 cc. In the presence of Zn the evapd. ext. (without HNO_3) is dissolved in 3 cc. 10% AcOH , filtered and transferred to the colorimeter glass. One cc. of $\text{Zn}(\text{AcO})_2$ soln. of 20 mg. Zn per cc. is added and filled up to 100 cc. After shaking 5 drops 5% K_2CrO_4 are added, the soln. is shaken again and compared after 10 min. standing. The comparison solns. in this case are made from amts. of $\text{Pb}(\text{AcO})_2$ soln. (1 cc. = 0.1 mg. Pb) with 3 cc. 10% AcOH in the colorimeter glass and further treatment as above for the tested soln.

B. J. C. VAN DER HOEVEN

Determination of potassium. LUIGI GALIMBERTI. *Atti II congresso naz. chim. pura applicata* 1926, 1396-7.—The method is simpler and more rapid than any proposed in the past, and is sufficiently precise for ordinary analyses of K salts. It depends upon the reaction. $\text{Na}_3[\text{Co}(\text{NO}_2)_6] + \text{KCl} \longrightarrow \text{Na}_2\text{K}[\text{Co}(\text{NO}_2)_6] + \text{NaCl}$, the quantity of NO_2 in the latter ppt. being detd. by oxidation with KMnO_4 . *Procedure*.—Evap. to dryness an aliquot part (contg. at least 0.02 g. of K) of the soln., dissolve in 10 cc. of water, add about 10 cc. of Billmann reagent (10% $\text{Na}_3[\text{Co}(\text{NO}_2)_6]$ soln. prepd. at the time, cf. *Z. anal. Chem.* 39, 286(1900)), let stand 3 hrs., filter, wash with cold water, add 50 cc. of 0.1 N KMnO_4 and 100 cc. of water, boil, and agitate until the ppt. is completely oxidized, as an aid to which add 10 cc. of dil. H_2SO_4 (1:4). Add a known quantity of 0.1 $\text{N Na}_2\text{C}_2\text{O}_4$ in excess, agitate until the ppt. redissolves and the soln. is colorless, titrate the excess $\text{Na}_2\text{C}_2\text{O}_4$ and calc. the vol. of KMnO_4 consumed in oxidizing the $\text{Na}_2\text{K}_2[\text{Co}(\text{NO}_2)_6]$ by subtracting from the total vol. that used for the $\text{Na}_2\text{C}_2\text{O}_4$. One cc. of KMnO_4 corresponds to 0.000711 g. of K. Dctn. of K in 40 cc. of 0.01 N KCl contg. large quantities of NaCl and MgSO_4 gave 0.01559 g. (theoretically 0.01561 g.)

C. C. DAVIS

A method for rapid estimation of the free silica contained in feldspar, by means of microscopical examination. I. SCHAEFELZER. *Céramique* 29, 301-2(1926); *J. Inst. Metals* 38, 674.—Advantage is taken of the optical properties of silica, and a preliminary sepn. of the colored portion is first made after heating to a temp. of 1200° .

H. G.

The titration of tin in white metal with potassium bromate. ADOLF SEUTHE. *Mitt. Dortmunder Union* 1, 169-78(1924).—Various methods for detg. Sn in white metal were tested and that of Pinotti (*Chem.-Ztg.* 46, 1082) proved most satisfactory. The alloy is dissolved in HCl and, when disintegrated, KClO_4 is added dropwise. Then the soln. is reduced with Fe and finally with Al, eventually heating till all reduced Sn is in soln. as SnCl_2 . The Sn^{++} is then titrated with 0.1 N I_2 soln. S. finds, however, that the results are not satisfactory if the final titration takes place with KBrO_3 soln.

W. T. H.

New microchemical method for the separation of zinc and copper. R. RIPAN. *Bull. soc. stiinte Cluj* 3, 45-8(1926); *J. Inst. Metals* 37, 575.—The soln. is neutralized with NH_4OH and treated with 5-10 drops of 0.1 $\text{N NH}_4\text{CNS}$, and 5-6 drops of $\text{C}_6\text{H}_5\text{N}$. After heating to boiling to dissolve the Zn compd., 150 cc. of cold water are added, and the green ppt. of $\text{Cu}(\text{C}_6\text{H}_5\text{N})_2(\text{SCN})_2$ is collected in a filtering tube, washed with a dilute soln. of the precipitants, and ignited to CuO for weighing. Zn is recovered by evapg. the filtrate to 10-12 cc. and adding more $\text{C}_6\text{H}_5\text{N}$. The pptd. is collected, washed and ignited to ZnO .

H. G.

Determination of sulfuric acid by means of benzidine. O. NYDEGGER. *Chem.-Ztg.* 52, 318-9(1928).—Details are again given for the pptn. of SO_4^{--} by means of benzidine and for the detn. of S in pyrite. See C. A. 1, 701.

W. T. H.

Analyses with the quartz lamp. BEIN and H. J. BRAUN. *Chem.-Ztg.* 52, 317-8 (1928).—By means of the short, ultra-violet rays from a quartz lamp it is possible to test the genuineness of writing, bank notes, postage stamps, fats, oil, cereals, fruit juices, meats, sausages, precious stones and paintings very rapidly, with certainty and without altering the object.

W. T. H.

An examination of a method of estimating iron and sulfur in sulfides of iron. P. L. ROBINSON, L. A. SAYCE and JAMES STEVENSON. *J. Chem. Soc.* 1928, 813-4.—Weyman (C. A. 14, 1428) published a method for the detn. of Fe and S based upon the observation of Wright that Fe sulfides are decomposed by treatment with neutral CuSO_4 soln. Tests with the method now prove that it is unreliable. With 0.14-0.26 g. of moist FeS , from 3 to 17% of the S is not converted into CuS , as it should be if the method were accurate.

W. T. H.

The practical application of two qualitative tests for hydrocyanic acid in ship fumigation. G. C. SHERRARD. *U. S. Pub. Health Repts.* 43, 1016-22 (1928).—Tests are necessary to det. when a ship after fumigation with HCN is habitable and to det. when it is safe for a fumigating crew to enter a hold for further ventilation and to search for rats. The benzidine-Cu(OAc)₂ test proved too rapid and too sensitive for practical purposes. The methyl orange-HgCl₂ test is sensitive to a concn. of HCN very much lower than the min. lethal concn. It requires 2 min. to complete its reaction so that a few sec. in reading the time does no great harm. To carry out the test, prepare 250 cc. of 0.5% HgCl₂ soln. and a soln. of 0.6 g. methyl orange in 250 cc. of water. Mix 10 cc. of the HgCl₂ soln. with 5 cc. of the methyl orange soln. and add 1 cc. of glycerol. Immerse filter paper in the mixt. and dry in air free from any trace of acid. Such paper will detect 0.84 g. of HCN in 1000 cu. ft. of air. The sense of smell will detect 0.25 g. of HCN per 1000 cu. ft. so that it is not intended entirely to replace the tests of odor, taste and lachrymation but it can replace the use of white rats for testing holds. Owing to the fairly high humidity in most seaports, the normal error will be on the side of safety. The test has been used at the N. Y. Quarantine Station for detecting leaky gas containers. W. T. H.

Estimation of reducing sugars by the ferricyanhydric method. IONESCO-MATIU. *Bull. soc. chim. bol.* 10, 252-60 (1928).—For macro-estn. a measured soln. of standard alk. K₃Fe(CN)₆ is heated to boiling and the sugar soln. is added from a buret, whereupon the ferricyanide is reduced to ferrocyanide, the end reaction being shown by picric acid indicator which changes to a cherry-red color. Five mols. of K₃Fe(CN)₆ oxidize 1 mol. of glucose. For micro-estn. the ferrocyanide produced by reduction of the ferricyanide is estd., after acidifying, by permanganate. L. W. RIGGS

The influence of malic acid in lemon juice in the Warrington method of analysis. FILIPPO PERCIABOSCO. *Atti II congresso naz. chim. pura applicata* 1926, 1369-70.—Lemon juice, with and without the intentional addn. of 1% malic acid, was analyzed for citric acid by the Warrington method. The % of citric acid was the same in each case, showing that even when much more malic acid is present than could occur naturally, the Warrington method is not influenced by its presence. The reason is that Ca malate is so sol. in water that even if a small part is pptd. at first with the Ca citrate it is washed out of the latter during the regular washing of the ppt. C. C. DAVIS

Rapid method of determination of phosphates in liquids in the manufacture of citric and tartaric acids. FILIPPO PERCIABOSCO. *Atti II congresso naz. chim. pura applicata* 1926, 1371-3.—The method is shorter and simpler than the regular Sonnenschein method, and though not extremely precise it is satisfactory for industrial control analyses. It depends upon the fact that when citric and tartaric acids are converted to their NH₄ salts, the oxides of Fe, Ca, Al, Cu, etc. are held in soln. provided that excess NH₄ citrate is present. *Procedure.*—Filter the liquor contg. CaSO₄ and other suspended impurities, remove 10 cc. if very impure or 50 cc. if fairly pure, dil. to 300 cc. or to 200 cc., resp., neutralize with a slight excess of NH₄OH, add 25 cc. of NH₄ citrate for tartaric liquors (this is not necessary for citric liquors), heat, add 25 cc. of Mg reagent, let stand 2 hrs. and calc. the phosphates from the wt. of Mg₂P₂O₇ obtained after ignition. Comparative tests of 11 citric and tartaric liquors with the new method showed close agreement in the analyses. Even the Sonnenschein method may be simplified by eliminating the ignition and destroying the org. substances with HNO₃ instead. In this case boil 10-50 cc. of the liquor with HNO₃ (d. 1.40) for 1.5 hr., replacing HNO₃ lost during the boiling, dil. with water, heat, add (NH₄)₂MoO₄ and proceed according to the Sonnenschein method. C. C. DAVIS

The determination of trioxymethylene. MARIA ESTER ALESSANDRINI. *Atti II congresso naz. chim. pura applicata* 1926, 1356-67.—None of the numerous methods for the detn. of HCHO is applicable to trioxymethylene. A new method is described which is rapid and precise and is not subject to error when trioxymethylene is allowed to stand in soln. a long time before detg. its HCHO content. The instability of trioxymethylene in soln. is the chief obstacle in the development of a method of detn., and expts. on the detn. of trioxymethylene with different methods for HCHO and under varying conditions show that the HCHO decreases progressively with time. This decompn. may be avoided by dissolving the trioxymethylene in alc. KOH or in aq. KCN, in neither of which does HCHO decomp. even on long standing. *First method.*—Dissolve 1.7826 g. of trioxymethylene in 25 cc. of 2% alc. KOH, make up to 1000 cc. with water, add exactly 20 cc. of this slowly to 50 cc. of 0.1 N KCN (previously standardized with 0.05 N AgNO₃), add 5 cc. of 30% MgSO₄, dissolve the ppt. in 1 g. of pure NH₄Cl, add 2 drops of 10% NH₄OH, then 2-3 drops of 5% KI, and titrate immediately the excess KCN with 0.05 N AgNO₃. Each cc. of 0.1 N KCN corresponds to 0.003 g. of HCHO. *Second*

method.—Titrate with 0.05 *N* AgNO₃ 2 solns.: (1) 50 cc. of 0.1 *N* KCN, and (2) 50 cc. from a soln. contg. 0.9541 g. of trioxymethylene in 1000 cc. of 0.1 *N* KCN, first adding 5 cc. of 30% MgSO₄, 1 g. of NH₄Cl, 2 drops of 10% NH₄OH and 2 drops of 5% KI. The difference in the no. of cc. of AgNO₃ is that KCN consumed by the HCHO in 50 cc., 1 cc. of 0.1 *N* KCN corresponding to 0.003 g. of HCHO. C. C. DAVIS

Pyrophoric lead (LEVI, CIELERI) 2.

KOLTHOFF, I. M., AND MENZEL, H.: **Volumetric Analysis. Vol. I. The Theoretical Principles of Volumetric Analysis.** Authorized translation of Ger. edition by N. Howell Furman. New York: John Wiley & Sons, Inc. Cf. *C. A.* 22, 561.

WARE, JOHN C.: **Essentials of Qualitative Chemical Analysis.** New York: John Wiley & Sons, Inc.

YOE, JOHN H.: **Photometric Chemical Analysis. Vol. I. Colorimetry.** 771 pp. \$8.50. Vol. II. Nephelometry (In preparation). New York: John Wiley & Sons, Inc.

Fortschritte der Mikrochemie in ihren verschiedenen Anwendungsgebieten. Edited by Gustav Klein and Robert Strebing. M. 24; bound, M. 26.60.

8- MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIKER

Microscopic examination of opaque minerals - determinative tables. M. LIEGRANGE. *Rev. universelle des mines* 15, 67-75 (1927). C. W. OWINGS

Linear compressibility of thirteen natural crystals. P. W. BRIDGMAN. *Am. J. Sci.* 15, 287-96 (1928).—The linear compressibilities of andradite, garnet, beryl, apatite, hanksite, tourmaline, quartz, rutile, barite, topaz, jeffersonite, orthoclase and spodumene have been detd. The results are presented in a table, and compared with other detns.

R. L. HERSHEY

The crystal structure of graphite. H. ORT. *Ann. Physik* 85, 81-109 (1928).

A new and complete analysis of the graphite structure has been made without the use of space group theory. The structure found is the same as that of Bernal (*C. A.* 19, 755).

R. L. HERSHEY

A new occurrence of selenium ores near St. Andreasberg. H. ROSE. *Z. Krist.* 66, 480-3 (1928).—The following minerals are found: clausenthalite, PbSe; tiemannite, HgSe; Bi₂Se₃; ZnSe; umangite, Cu₁₀Se₂; berzelianite, Cu₂Se; and naumannite, Ag₂Se.

L. S. RAMSDELL

Marmatite and christophite. W. F. DE JONG. *Z. Krist.* 66, 515 (1928).—X-ray powder photographs of marmatite and christophite show the ZnS pattern, but with larger spacings, as follows: ZnS, *a* = 5.395; marmatite (27% Fe) 5.415, christophite (34% Fe) 5.420 Å. U. J. concludes that the existence of definite compds., Zn₂FeS₂ and ZnFeS₂ is not disproved.

L. S. RAMSDELL

A variety of pyrite in the metasomatic lead-zinc deposits. H. CHRENDERG. *Z. Krist.* 66, 478-80 (1928).—Report of a chem., mineralographic and x-ray investigation of a variety of pyrite from Aachen and Wiesloch in Baden which contains 7% excess Fe.

L. S. RAMSDELL

The crystal structure of skutterudite and smaltite-chloanthite. IVAR OPTEDAL.

Z. Krist. 66, 517-46 (1928).—Skutterudite (CoAs₃) is cubic, with symmetry T_h^5 . The side of the unit cube is 8.189 Å. U. There are 8 mols. in the cube, and the positions of the atoms are: Co (8c) and As (24d), with *u* = 0.35 and *v* = 1/2 - *u*. The distance As-As is 2.46 and Co-As 2.35 Å. U. Smaltite and chloanthite are not diarsenides, but are impure Ni-bearing skutterudite. They give the same x-ray pattern as skutterudite, with a slight increase in the size of the unit cell, due to the Ni. They do not belong to the pyrite group.

L. S. RAMSDELL

The space group of carnallite. J. LEONHARDT. *Z. Krist.* 66, 506-7 (1928).—KCl.MgCl₂.6H₂O is orthorhombic and belongs to space group V_h^6 . The unit cell contains 12 mols. and has the dimensions *a* = 9.53, *b* = 16.08 and *c* = 22.25 Å. U.

L. S. RAMSDELL

The crystal structure of cryolithionite. G. MENZER. *Z. Krist.* 66, 457-8 (1928).—Na₂Li₃Al₂F₁₂ is cubic, with symmetry of space group O_h^{10} . The unit cube has *a* = 12.10 Å. U. and contains 8 mols. The structure is analogous to garnet, with the actual

dimensions very close to those of $\text{Ca}_3\text{Fe}_2\text{Si}_3\text{O}_{12}$. Since the F atoms are all equiv., the formula is not $3\text{NaF} \cdot 3\text{LiF} \cdot 2\text{AlF}_3$. Pseudo-cubic cryolite probably has the same type of structure.

L. S. RAMSDELL

Cassiterite and topaz from the mines of northern Nigeria. ALFRED SCHOEP. *Natuurw. Tijdschrift* 10, 3-6(1928).—Cassiterite from the Champion mines, Kuru Hills, and from the Rayfield mines is bipyramidal (111), black. The Batura Monguna mines have striated prismatic cassiterite (111 and 120), brownish. Topaz from Ninghi Hills and from Balfour Hill is almost colorless (sometimes slightly blue or green) with (110), (120) and (011) well developed, sometimes (001). The angle $2V = 64^\circ 28' - 65^\circ 54'$, $\alpha = 1.615 - 1.621$, $\beta = 1.622 - 1.628$. The value of $2V$ shows the F content to be about 20%.

B. J. C. VAN DER HOEVEN

X-ray investigation of the structure of brookite and the physical properties of the three titanium dioxides. A. SCHRODER. *Z. Krist.* 66, 493-4(1928).—There are 8 mols. of TiO_2 in the unit cell of brookite, and $a = 9.136$, $b = 5.439$ and $c = 5.153$. β -Anatase (tetragonal holohedral) at 642° changes to α -anatase (probably tetragonal). This change is reversed on cooling. At $915^\circ \pm 15^\circ$ α -anatase changes to rutile, forming stable pseudomorphs.

L. S. RAMSDELL

Titanium in bauxite ores and sludges. W. H. COGHILL. *Bur. Mines, Repts. Investigations* No. 2867, 4 pp.(1928).—Sp. gr. (float and sink) fractionation of granular bauxite sludge indicates that TiO_2 distribution is not favorable to making a rich concentrate by gr. methods. Table concn. was tried. When the Ti was in a mixt. of clay and bauxite, very little selection was shown, indicating its presence in minerals such as leucoxene and xanthitane. Leucoxene is a whitish, granular, flocculent mineral indistinguishable from the mass of amorphous $\text{Al}(\text{OH})_3$, and xanthitane (a hydrous titanate of Al) is a yellow, friable, earthy substance. A general distribution of Ti found in bauxite seems to accord with the well known statistical information that the lithosphere has a tenor of 0.77% TiO_2 . Much of it is too disseminated for concn.

W. H. BOYNTON

X-ray investigation of lateritic rocks and of sporogelite. W. F. DE JONG. *Z. Krist.* 66, 303-8(1928).—The weathering of igneous rocks may result in formation of kaolinitic material, or a sol. constituent and insol. Al and Fe hydroxides. Rinne considered bauxite powder photographs to show the presence of kaolin, diasporite, feldspar and gibbsite, and thus to be a mixt. J. disproves this with a series of powder diagrams of the above minerals, as well as artificial Al hydroxide. Crystallized $\text{Al}(\text{OH})_3$ can occur in three ways: as gibbsite, bauxite and diasporite. Amorphous $\text{Al}(\text{OH})_3$, as sporogelite is not shown by x-rays.

L. S. RAMSDELL

Greenish satinspar (calcite) of Kipushi, Katanga. A. L. HACQUAERT. *Natuurw. Tijdschrift* 10, 7-9(1928).—Calcite is described of greenish color, glassy luster, $d. 2.717$, $\omega = 1.657 \pm 0.003$, $\epsilon = 1.482 \pm 0.003$. Its peculiar structure, alternating dull and glossy bands of 1 mm. width (microcrystalline and elongated CaCO_3 crystals) permit it to be classified as satinspar (Lacroix). The color is caused by 0.095% CuO.

B. J. C. VAN DER HOEVEN

Ferri ferrous feldspar of Madagascar. D. S. BELYANKIN AND N. G. SERGIEV. *Bull. acad. sci. union rep. soviet. sociol.* (VI) 20, 1199-1206.—The mineral derived from the pegmatite of the Itroungay area in Madagascar and described as orthoclastic feldspar by Lacroix in *Minéralogie de Madagascar* (cf. *C. A.* 18, 806) has been subjected to a thorough examn. In optical properties it does not differ from sanidine, but the latter crystallizes preferably in hot lavas, whereas the present mineral is in comparatively "cold" pegmatites. Optical measurement gave $n = 1.556$. It is transparent, homogeneous and pure. It is partly colored in pink and yellow, the coloration being due to a very considerable Fe_2O_3 content. Analysis gives: 0.2 K_2O , 0.6 Fe_2O_3 , 6.9 SiO_2 , a certain amount of K having been removed by solns. The mineral is a ferri ferrous orthoclase.

BERNARD NELSON

The structure of feldspar and micas. MIECZYSLAW DOMINIKIEWICZ. *Roczniki Chem.* 7, 345-56(1927).—Structural diagrams are given showing the kaolin nucleus as a fundamental constituent of feldspar and micas. Anorthite is regarded as normal Ca kaolinite. The SiO_2 split off in the course of kaolinization of feldspar is combined with the Al and not with the SiO_2 part of the kaolin nucleus. Part of the K_2O is combined with this SiO_2 . Orthoclase is K-kaolinite-silicate; the 8 aluminate complexes of the 2 natrolite radicals are satd. with 2 mols. K silicate. The possibility of structural isomerism is evident from the diagram. Kaolinization, whereby alkali silicate is split off and replaced by H, can be effected not only by hydrolysis but also by pneumatolysis (acid vapor, steam). The acid micas with a varying ratio of $\text{Al}_2\text{O}_3 \cdot \text{SiO}_2$ are products of gradual hydrolysis. They may also partly represent mixts. of normal and acid, or of different acid compds. The simplest mica may be derived from a natrolite nucleus.

Replacement of free SiO_2 radicals by F, Mg or both leads to lepidolite, the simple biotite or phlogopite. Other biotites may be substitution products of the natrolite and kaolin nucleus, the aluminate part of which is combined with Mg silicate. M. J.

The rock-forming alkali hornblendes. W. KUNITZ. *Z. Krist.* **66**, 464-5(1928).—Chem. examn. of 16 hornblendes showed only one series: syntagmatite-arfvedsonite, with the compn. of the end members $\text{HNa}_3\text{Fe}_6\text{Si}_9\text{O}_{28}$ and $\text{HCa}_3\text{Al}_3\text{Fe}_3\text{Si}_6\text{O}_{25}$. In studying glaucophane the series gastaldite-riebeckite was confirmed, with the end member compns. of $\text{H}_2(\text{NaAl})_2\text{Mg}_4\text{Si}_9\text{O}_{27}$ and $\text{H}_2(\text{NaFe})_2\text{Fe}_4\text{Si}_9\text{O}_{27}$. L. S. RAMSDELL

An x-ray study of cyanite and staurolite. GABRIEL M. CARDOSO. *Z. Krist.* **66**, 485-7(1928).—A unit cell can be chosen for cyanite which is pseudoorthorhombic centered, with $a = 26.868$, $b = 7.883$ and $c = 5.650$ A. U. This cell contains 16 mols., and agrees closely in dimensions with those of sillimanite and andalusite, if their values of a are multiplied by 4. The parallel growths of cyanite (100) and staurolite (010) are due to the striking agreement in the lattices of the two, at least in the growth directions. The lattice values for staurolite are as follows. $a = 7.81$, $b = 16.59$ and $c = 5.64$ A. U. L. S. RAMSDELL

The structure of benitoite. J. J. P. VALETON. *Z. Krist.* **66**, 496-7(1928).— $\text{BaTiSi}_2\text{O}_9$ is hexagonal, D_{3h}^2 or D_{3h}^4 . The unit cell contains 2 mols. and has $a = 6.64$ and $c = 9.71$ A. U., giving an axial ratio 1.14634, which is twice that usually accepted. Previous detn. by Gossner and Mussgnug (*C. A.* **22**, 1304) is incorrect, because they overlooked some faint lines. L. S. RAMSDELL

Researches on minerals of the apatite group. G. CAROBBI. *Atti II congresso naz. chim. pura applicata* 1926, 1156-81.—The expts. had as their object the discovery of rare elements in minerals. Chem. and spectrographic analyses were made of pyromorphite from Braubach, Nassau and from Leadhills, Lanarkshire, Scotland and of mimetite from Santa Eulalia, Chihuahua, Mexico, the results of which are tabulated in complete detail. In the Braubach pyromorphite were identified Ce, La, Nd, Sa, Y, Eu, Gd, Dy, Er and Yb. In the Leadhills pyromorphite were identified Ce, La, Nd, Y, Eu, Gd, Dy and Er. Cr was present, at least partly as PbCrO_4 , as well as Mn and Ca. In the mimetite of Santa Eulalia were found Cr, Mn, Zn, Ca, Ba and Sr, but spectrographic analysis failed to detect even a trace of any rare earth. In view of the presence of rare earths in 2 pyromorphites, expts. were carried out to det. to what extent the Pb of $3\text{Pb}_3(\text{PO}_4)_2 \cdot \text{PbCl}_2$, of $3\text{Pb}_3(\text{VO}_4)_2 \cdot \text{PbCl}_2$ and of $3\text{Pb}_3(\text{AsO}_4)_2 \cdot \text{PbCl}_2$ can be replaced by La and the products still be isomorphous. The results of these expts. are published elsewhere (cf. C. and Restaino, *C. A.* **20**, 1969). C. C. DAVIS

The space group of gypsum. ETTORE ONORATO. *Z. Krist.* **66**, 504-5(1928).—The unit cell of gypsum has the dimensions $a = 10.47$, $b = 15.151$ and $c = 6.28$ A. U. It contains 8 mols. and has the symmetry C_{2h}^3 . L. S. RAMSDELL

Mineralogical communications from Hungary. II. VICTOR ZSIVNY. *Z. Krist.* **66**, 651-3(1928); cf. *C. A.* **22**, 2125.—A description of calcite, galena, sphalerite, barite and fluorite from Komitat Maramaros and an analysis of melanterite from Komitat Gömör. L. S. RAMSDELL

Manganiferous ore deposits of Sicily. EUGENIO MANZELLA. *Atti II congresso naz. chim. pura applicata* 1926, 1199-1205.—Mn ores at Sommatino and at Castelvetro were examd. physically and chemically. Manganite is the predominant mineral in the Sommatino ore. The Mn content of the ore increases with the depth, varying from 8 to 28.5%. Complete analyses showed the following % compn.: Mn_2O_3 44.66-46.91, CaSO_4 19.12-13.15, CaCO_3 6.90-7.00, clay (SiO_2 , Fe_2O_3 , Al_2O_3 , H_2O) 28.66-32.00. Pyrolusite is the chief component of the Castelvetro ore, analyses showing the % compn.: MnO_2 63.59, Fe_2O_3 3.49, SiO_2 10.26, CaCO_3 21.75. The presence of gang in the Sommatino ore renders it unfit for direct use in siderurgy, but suitable enrichment may make it of value. A discussion of other Mn ores is included, with certain rare references. C. C. DAVIS

Petrographic investigation of coal on the basis of the specific gravities of the individual components, which are separated by means of heavy liquids in a centrifuge. W. GROSZ. *Z. Krist.* **66**, 460-1(1928).—Sepn. by gravity of coal particles smaller than 70μ is not possible, although such sizes are common. The use of a centrifuge greatly increases the possibilities of sepn. The liquid used is CCl_4 with xylol. Petrographic uses of the Grosz apparatus for centrifuging in heavy liquids. L. MILCH. *Ibid* **66**, 461(1928). The sepn. of solid phases by means of the centrifuge. F. v. WOLFF. *Ibid* **66**, 462-4(1928).—Good results were obtained in sepg. fine plates of mica and finely powd. minerals. Practically quant. sepn. can be obtained in some cases. In place of heavy liquids, such as methylene iodide, Clerici or Thoulet solns., melts of AgNO_3 ,

AgTl nitrate, or TIHg nitrate, can be used. The ds. of these melts are 4.1, 4.8 and 5.3, resp.

L. S. RAMSDALL

Paleozoic coals recently found in the Kwantō Mountains. S. TOKUNAGA. *J. Fuel Soc. Japan* 7, 17-9 (English Section) (1928).—T. recently found layers of coal and coaly shale in the Kwantō Mountains in the northern part of Hondo. This is the first discovery of coal in the Paleozoic formations in Japan. The geological formations of the coal-bearing layers are discussed and analytical data on the coal are given.

NAO UYEI

Paleozoic coals found in the Province of Mino. S. TOKUNAGA. *J. Fuel Soc. Japan* 7, 19-20 (English Section) (1928).—The analytical data of Paleozoic coals recently found in the Province of Mino, Gifu, Japan, and the geological formation of the region are discussed.

NAO UYEI

Microscopic zircons as control minerals. J. ZERNDT. *Bull. intern. acad. Polonaise* 1927A, 363-77.—Increasing interest in microscopic petrographical investigations of sedimentary rocks accentuates the desirability of control minerals which are able to indicate the source of the clastic constituents therein. The following control minerals have been established and used. 1. "Exotics," which comprise known mineral fragments often occurring in carpathian sedimentary rocks and form the magmatic as well as the older sedimentary remains which produce the clastic material. 2. Feldspars, which in sedimentary rocks, possess a significance similar to that in large rocks. 3. Quartz, in its various forms as granite, gneiss, vein-quartz, etc., has recently been found to possess a twin structure characteristic of tatra-granite. But many exotics, which show no resemblance to tatra-granite, also possess twin structure. 4. H. R. Lovely and F. P. C. Feilman established that cyanite is characteristic of Wygoda sandstone and epidote for Jamna sandstone, both from Borislav district. 5. O. Thürrach has shown the application of zircon as control mineral in investigations of diluvial sandstones. Z. demonstrates the usefulness of microscopic zircon to characterize magmatic rocks. Zircons were isolated by the methods of Thürrach, enlarged 660 times by means of the marking prism according to Dippel, the crystal habit was detd. and then developed according to the statistical method of Niggli and Goldschmidt. Only characteristics peculiar to zircon can be used; hence only abundance-persistence, combination-persistence and form-persistence can be considered. Zircons were examd. from two kinds of widely spread granite in the Tatra mountains and possessed great similarity. These zircons were similar to zircons from eruptive in rocks the Cracow district. Zircons found in the red granite from Huta-Bystrzycka, Wolhynia, formed a special type and resembled zircons from erratic granites of Lodz and Cracow. Hence, on the basis of crystal form, zircons from northern Wolhynia form a second class. Zircons from granites from Bugaj show all kinds of forms. Zircons from Friedeberg and Streigau are different from those of the Tatra mountains and from Wolhynia. Zircons from Lysogory mountains may be inferred from the Paleozoic (Cambrian) quartzite. Zircons from Jamna sandstone from Worochta (East Carpathians) resembled those from the Lysogory mountains. Zircons from sandstones of Cieszkowice resembled those of Bugaj. Hence it is possible to differentiate petrographical provinces on the bases of phys. form of zircons and to establish the origin of sedimentary rocks. Seven plates comprising 46 orthogonal projections, 99 microphotographs, 14 three-dimensional projections are given.

L. B. ETHERTON

An extrusive gneiss complex on the Nesodden Peninsula near Oslo. O. A. BROCH. *Norsk Geol. Tids.* 9, 81-219 (1926).—Nesodden contains minerals formed on the surface of the earth, strongly metamorphosed, of origin yet partially elucidated, but which form a definite unit termed extrusive (*suprakrustale*), in contrast with gneiss granite and pegmatite. The peninsula probably is exclusively composed of Pre-Cambrian rocks with occurrences of granitic anticlinal batholiths. Extrusive minerals occur in the north, east and west. Torvik granite, an acid granite high in K, is found in the south. Separating extrusive minerals and granite is migmatite, belonging to the basic gneiss granites. Leptite occurs, its light color indicating high silicic acid. It is related to liparite and is perhaps a transformed lava or tuff, micaceous schists being found intermingled with the leptite. Leptitic gneisses denote minerals petrographically intermediate between leptites and micaceous schists, the separation not being sharp. Masses of amphibolite occur resembling the compn. of gabbro. Small amounts of dioritoid minerals occur, more acid than and apparently related to amphibolites. The latter are almost all older than the pegmatites and perhaps older than granite. The veins of amphibolite are biotized at the boundary, being formed at the expense of the hornblende by the addition of K and the sepn. of Ca. The boundary between the extrusive complexes and granite is largely composed of cyanite, staurolite, gedrite and

albite-oligoclase The chem. relations between the minerals indicate that they represent systems in equil. and for such systems, according to the mineralogical phase rule of V. M. Goldschmidt, the max. no. of minerals (phases) to be expected is the same as that of the chem. components which are present. The gneiss complexes have an extrusive character with a large excess of alumina, indicating sedimentary origin. The origin of micaceous schists and leptitic gneiss is somewhat doubtful; they are however related to cyanite-gneiss and to leptite. Venite is genetically related to leptite or to micaceous schist. Amphibolite is somewhat more recent and preferably is to be considered as an intrusion. There are 9 figures in the text, 18 tables, 34 photographs, 36 photomicrographs, a geological chart on a scale of 1/10,000 for a distance of nearly 6 kilometers, with a bibliography of 56 references.

L. B. ETHERTON

The Cicurova granite. D. M. CADERE. *Ann. sci. univ. Jassy* 15, 81-8 (1928).—A detailed chem. and petrographic study (the results of which are given in detail) showed this to be an alk. granite belonging to a magma situated at the border of the syenite magma and alkali-granite, having an av. Al_2O_3 content, low Ca and Mg contents and high in alkalis, and forming part of the potassic facies (the rock being mega-potassic) of the Dobrogean magmatic basin. It closely resembles the Atmagéa granite (which has only been studied petrographically) and also the Caména quartz porphyric rock.

A. PAPINEAU-COUTURE

Arfvedsonite porphyry of Russian Lapland. B. M. KUPLETSKII. *Bull. acad. sci. union rep. soviet social* 1927, 579-92.—An original light-gray vein formation contg. abundant inclusions of dark amphibole has been found in the Chibin range in Laponia. The mineralogical constituents of the formation are: anorthoclase 47.31, nepheline 23.40, albite 23.75, apatite 0.23, ilmenite, rincolite, arfvedsonite, etc., 5.31%. It analyzes: SiO_2 55.41, TiO_2 1.24, Al_2O_3 20.26, Fe_2O_3 2.32, FeO 3.62, CaO 1.31, Na_2O 7.55 and K_2O 7.52%, with some MgO , MnO , H_2O and P_2O_5 . This chem. compn. compares very well with that of chibinite given by W. Ramsay and V. Hackmann ("Fennia" 1894, 11, No. 2, p. 196), only the mineralogical composition of the rock being different on account of different conditions of crystn. The amphibole inclusions contain: SiO_2 48.00, FeO 15.60, Fe_2O_3 11.90, Na_2O 9.37, Al_2O_3 7.38, K_2O 2.43, TiO_2 1.85, MnO 1.76, CaO 1.31, MgO 0.40%. This compn. shows that this amphibole is intermediate between arfvedsonite and riebeckite; its optical properties are those of arfvedsonite. The vein rock is thus an arfvedsonite nepheline-syenite porphyry.

BERNARD NELSON

A natrolite tinguaitite from Dunedin. P. MARSHALL. *Trans. Proc. New Zealand Inst* 58, 533-5 (1928).—Microscopic examn. and analysis of various samples of natrolite-tinguaitite from Dunedin, New Zealand, are given.

A. L. HENNE

Experimental investigations on the permanent magnetism of rocks subjected to heat. F. Y. LEVINSON-LESSING AND A. A. TURTZEV. *Bull. acad. sci. union rep. soviet social* 1927, 875-86 (French).—Specimens of basalt from Auvergne and from Vorontsov, and andesite from Mt. Ljalvar, were heated to various temps. up to 1000°. These treatments produced an increase in the intensity of permanent magnetization acquired by the rock on cooling in the earth's field. In general the higher the temp. the higher the intensity of magnetization. However, definite minima were observed for 400° and 700°. The results are interpreted as confirming conclusions previously announced on the atm. origin of the magnetic anomalies observed in rocks from mountain crests and isolated summits.

W. W. STIFLER

The slime of Lake Tékir-Ghiol. ADRIENNE BURADA. *Ann. sci. univ. Jassy* 15, 129-30 (1928).—The compn. was found to differ considerably from that found by Georgescu (P. Bujor, *Ann. sci. univ. Jassy* 1, 159 (1900)), but on the whole the relationship between the several constituents did not differ greatly from those in the 1st analysis.

A. PAPINEAU-COUTURE

Rock-strata gases in the Cripple Creek district and their effect on mining. F. H. DENNY, K. L. MARSHALL AND A. C. FIELDNER. *Bur. Mines, Repts. of Investigations* No. 2865, 24 pp (1928).—The pre-Cambrian rocks of this district consist of granites, gneisses and schists with intrusion of phonolite, latite-phonolite and syenite. Volcanic activity produced much breccia. Calaverite, pyrite, quartz, fluorite, calcite, dolomite, galena and celestite are found. The irrespirable gases which have resulted in occasional loss of life are a variable mixt. of N , CO_2 and usually O , and are produced by the direct chem. action of air and percolating water on sulfides and carbonates. The max. pressure measured of the rock-strata gases was 0.71" water gage and efflux of gas from the rock into the mine was somewhat parallel with fall in the barometer. The remedial measures suggested are diluting with large volumes of good air and/or sealing the ground with a cement gun.

L. B. ETHERTON

Geochemical inertia of the elements of the triads. P. VINASSA DE REGNY. *Atti*

accad. Lincei [6], 7, 23-5(1928).—A discussion of mol. nos. and the disposition of electrons (cf. C. A. 22, 1535) leads to certain general conclusions. While the first and last terms of each triad must, as with all substances in equil., be monoatomic mols., the intermediate terms must be at least biatomic mols. As a rule, substances whether simple or compd., natural or synthetic, org. or inorg., have even mol. nos. The terrestrial mass is almost completely formed of substances within the atomic no. 28, i. e., within the limits of the first triad. The geochem. inertia of the triad elements is to be ascribed to the no. and to the disposition of the electrons, which is of such a character that they are in a stable state of equil. • C. C. DAVIS

The opening, the distribution, the organization and the content of the German potassium-salt deposits (FULDA) 18. The origin, the structure and the extraction of German potassium-salt deposits (FULDA) 18. The occurrence of jarosite minerals in oxidized ores as a factor in metal losses (HEAD, MILLER) 9.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST AND R. H. ABORN

The metallurgy of the Etruscans. A. STROMBOLI. *Rass. min. met. ital.* 68, 53 (1928).—Historical. C. C. DAVIS

Siderurgical plants in Italy. A. STROMBOLI. *Rass. min. met. ital.* 68, 30-1 (1928).—A brief description and list of all plants now operating in Italy. C. C. DAVIS

New plant of the Appleby Iron Company, Limited. A. CROOKE AND T. THOMSON. *Engineering* 125, 551-3, 584-8 (1928); *Iron Steel Inst.* May 1928 (advance copy).

Iron ore, pig iron and steel in 1926. H. W. DAVIS. *Bur. Mines, Mineral Resources of the U. S. 1926*, Part I, 87-124 (preprint No. 9, published Oct., 1927). E. H.

Rare metals. Cobalt, molybdenum, nickel, titanium, tungsten, radium, uranium and vanadium in 1925. F. L. HESS. *Bur. Mines, Mineral Resources of the U. S. 1925*, Part I, 601-22 (preprint No. 24, published June 17, 1927). E. H.

The mineral industry in North Carolina for 1924 and 1925. H. J. BRYSON. *North Carolina Dept. of Conservation and Development, Economic Paper No. 60*, 4-64 (1927). E. H.

The mining industry in North Carolina during 1926. H. J. BRYSON. *North Carolina Dept. of Conservation and Development, Economic Paper No. 62*, 5-63 (1928). E. H.

The action of cyanide on metals and minerals. ROBERT HAY. *Roy. Tech. Coll. (Glasgow)* No. 5, 25-9 (1926); *J. Inst. Metals* 36, 424.—Details are given of exptl. work to det. the efficiency of Au soln. in various strengths of KCN in presence of other metals and several metallic minerals. Graphs are given of the electrolytic potential of pure Au and a no. of the common impurities in Au ores in various concns. of cyanide, the most outstanding feature being the lack of evidence of the "selective action" claimed by MacArthur and Forrest. Discussion of the results obtained show that the function of dissolved O is all-important, not only in the soln. of the gold, but also in relation to the impurities present in the ore. H. G.

Mining and treating lead-zinc-vanadium ore in northern Rhodesia. G. L. WALKER. *Eng. Mining J.* 125, 733-6 (1928).—A description of the plant of the Rhodesia Broken Hill Development Co., Ltd., in South Africa. On Dec. 31, 1926, ore reserves were calcd. as 935,000 tons of oxides averaging 30% Zn, 8% Pb and 0.9% V₂O₅; 164,000 tons of sulfides averaging 34% Zn and 20% Pb, and 38,000 tons of V ores averaging 8% Zn, 8% Pb and 3.5% V₂O₅. Over 40% of marketable constituents are secured. The process employed is an adaptation of the H₂SO₄-leach and electrolytic processes. Pilot-plant tests indicate commercial recoveries of 88-90% of the Zn and 70% of the V in the ore. Smelting of leaching-electrolytic plant residues yields a Pb bullion contg. 14 oz. of Ag (approx. 3 times the Ag content of the Pb recovered in straight smelting). Zn from the Rhodesia Broken Hill demands a high price due to the absence of Cd. The hydroelec. plant is susceptible to vast expansion. W. H. BOYNTON

The occurrence of jarosite minerals in oxidized ores as a factor in metal losses. R. E. HEAD AND VIRGIL MILLER. *Bur. Mines, Repts. of Investigations No. 2870*, 13 pp. (1928).—Plumbojarosite and argentojarosite are common in oxidized Pb and Ag ores and have probably escaped recognition in attempts to treat certain oxidized Pb ores in which these minerals are a material portion of the metal content. Often Pb and Ag

recoveries have been below 70%, leaving in the discard a material probably too low-grade to warrant treatment by any prevalent process. A mineralogical description of the jarosite minerals is given and analyses of three plumbojarosite samples are tabulated. The exptl. investigation of representative ores contg. the jarosites indicates: (1) all oxidized ores of Pb, Ag and Au reddish brown or yellow in color should be examd. for members of the jarosite group; (2) the very small size of jarosite crystals, their low sp. gr. and their micaceous character render treatment by gravity methods of concn. practically impossible; (3) these minerals do not sulfidize readily when treated at concns. used in commercial practice; (4) tailings from the treatment of oxidized Pb ores on which low recoveries of Pb and Ag are secured should be examd. for jarosite minerals; and (5) the relative low metal content and distance from transportation facilities of many jarosite ores make them of doubtful economic value. They may be benefited by a suitable pyrometallurgical treatment or in some cases by volatilization methods.

W. H. BOYNTON

Theory or practice in gray iron foundry. JOHN SHAW. *Trans. Am. Foundrymen's Assn.* 1928, 293-322.—Polemical review of previous work.

H. C. DUUS

Comments on present practice at the United Verde concentrator and smelter. IV. E. H. ROBIE. *Eng. Mining J.* 125, 729-31 (1928).—After trial, the 4-way type of scoop feeders for the ball mill have been replaced by the standard type. The ball-mill drive—by synchronous motors direct-connected through magnetic clutches—has proved excellent. A marked surge in the classifier overflow was in evidence. A trail-unit flotation unit has air at 1-1.5 lb. pressure, freely admitted in close contact with the ore longitudinally along the bottom of the machine which lifts the pulp, which cascades over the side of the lifting compartment at the top. A fine dispersion of the bubbles results from the thorough mixt. of air and ore particles. The bubbles pass under a sloping baffle and are allowed to rise in a quiet chamber at the side from which the froth is removed. Power consumption is only about 1 kw.-hr. per ton, and repairs will probably be much less than in the usual app. Some mill data are shown. Dry calcined trona is used to make the pulp alk. for pptn. of CuSO_4 and $\text{Fe}_2(\text{SO}_4)_3$. Trona gives very selective conditions in the flotation cell with less froth and little flocculation resulting. The ratio of schist to free quartz has a marked bearing on reverberatory furnace tonnage. The interpretation of assays in terms of mineralogical compn is stressed. Four times the alumina equals the amount of schist present.

W. H. BOYNTON

Revisiting Arizona mining camps. V. E. H. ROBIE. *Eng. Mining J.* 125, 773-5 (1928), cf. preceding abstract.—A ribbed arch of silica brick is a feature of the United Verde reverberatory. The silica brick ribs are laid across the roof of the furnace, between buckstays only. Sep. skewback plates are used against the ribs and the ribs project about 15 in. above. A system of offsetting the joints insures a solid roof construction and the center of the arch, at the top, is keyed when hot. This construction, it is claimed, insures additional life of the arch. Converter practice at Clarkdale follows standard lines. Cast-iron pots are used for slag, and cast-steel ladles for mat. Where a high-grade low-iron concentrate is obtained, smelting flotation concentrates in the moist condition, without roasting, results in the elimination of troubles caused by the accumulation of magnetite in the reverberatory, and lower slag losses, better furnace conditions and dusting losses almost eliminated. Disadvantages are smaller furnace capacity, higher fuel requirements and some trouble in feeding the damp material. The Verde Central is a promising property.

W. H. BOYNTON

Pearlitic iron. RICHARD MOLDENKE. *Iron Age* 121, 1241 (1928).—The method used in producing pearlitic cast iron is described. In this process the Si content of the iron is kept low and the sand molds are preheated. In order to obtain a fairly fine-grained and dense iron the metal is highly superheated in melting and is not allowed to oxidize. Good quality is also dependent upon the proper placing of the gating and risers of the molds. The disadvantages encountered in the production of pearlitic cast iron are: (1) It is necessary to install a high-temp. mold-heating oven; (2) it is almost necessary to use a sep. melting installation and a special building, since it is unwise to produce both low-Si and high-Si iron in the same building.

WILLIAM F. BHRET

Deoxidation of iron with manganese. P. OBERHOPFER AND H. SCHENCK. *Stahl u. Eisen* 47, 1526-36 (1927).—Previous papers relating to the reaction: $\text{FeO} + \text{Mn} \rightleftharpoons \text{MnO} + \text{Fe}$ are critically reviewed. When Mn is added to molten Fe, contg. FeO, some MnO is formed, which being sparingly sol. seps. from the melt. The remaining FeO is divided between the 2 phases, metal and MnO; that is, some of the FeO is taken up from the melt by the MnO. For the state of equil. between metal and slag the following equation is developed, where L is the partition coeff., K' the equil. const. $\{K'/[\text{Mn}]\} + 1 = \Sigma(\text{O})L/(\text{MnO})$, the constituents of the metal in square, those

of the slag in round brackets. K can be expressed as: $K' = \frac{[O]_{Fe}[Mn]}{[O]_{Mn}}$. The 2 unknowns K' and L were detd. by several melts at 1600°. It was shown that up to 0.35% Mn in the molten Fe, the ratio of (MnO)/(FeO) is practically a linear function of Mn. K' is not only a function of the temp. but also of the FeO content of the metal. The importance of a crucible material which does not take part in the reaction at 1600° is emphasized.

J. A. SZILARD

Steel with a high manganese content. Its manufacture and its properties. ANTONIO MANUELLI. *Ingegneria Nov.*, 1927; *Mel. italiana* 20, 113-28 (1928).—The manuf., phys. and chem. properties and uses are described, with illustrations and diagrams.

C. C. DAVIS

Arsine intoxication—a case of suspected poisoning in the steel industry. C. W. MUEHLBERGER, A. S. LOEVENHART AND T. S. O'MALLEY. *J. Ind. Hyg.* 10, 137-46 (1928).—AsH₃ is generated by the action of 5% H₂SO₄ on steel, the As being derived from impurities in both the acid and the steel, especially in acid made from sulfide ores. A sample of 25 l. of air taken at the surface of the acid in a pickling tank contained 0.006 mg. AsH₃; but 10 ft. away from the tank 473 liters of air contained only 0.001 mg. AsH₃; a quantity that was considered to be too small to cause As poisoning. The large excretion of 0.77 mg. As₂O₃ per 24 hrs. 46 days after leaving work indicates that the As was taken by mouth rather than inhaled as AsH₃. Use of acid contg. not more than 1 part per million of As₂O₃ is recommended.

C. M. SALLS

The cause of the decrease in bond strength on heating molding sands to 600° F. C. C. DE WITT AND G. G. BROWN. *Trans. Am. Foundrymen's Assoc.* 1928, 277-80.—Tests were made on molding sands to see what effect heating to 600° F. had upon the clay bond and ferric hydrogel bond constituents. Pure silica, kaolin and ferric hydrogel were used as synthetic bonding material. Silica base material and the bond material were heated separately, and then mixed with unheated bond and base material, resp. These mixts. were compared with the unheated bonded system. The results showed that heating the silica base material before mixing with bond material had no noticeable effect on the max. strength of the bonded material. Heating the silica base seems to shift the point of maximum strength toward drier mixts. from 7 to 5% water content. Heating the bond material, however, causes the mixt. to lose practically all the strength. This shows that the loss in bond on heating is due entirely to changes in the clay bond as distinct from the sand or colloidal ferric hydrogel. The tests substantiate the claim that sands bonded by ferruginous material are less affected by heating than those not so bonded.

H. C. DUUS

The influence of ferric hydrogel in the bond of natural molding sands. C. C. DE WITT AND G. G. BROWN. *Trans. Am. Foundrymen's Assoc.* 1928, 247-76.—Quant. data are given showing the relation of colloidal Fe₂O₃ absorbed on the sand grains and on the clay bonding material to the strength of bond in molding sand. The effect of colloidal Fe₂O₃ on the bond of molding sands has been detd. by analysis of natural sands and by the synthesis of molding sand from silica, kaolin and ferric hydrosol. Tests were made on permeability and breaking strength. The results showed that the presence of a natural film of adsorbed material measurably increased the strength both in the natural and artificial products which gave good agreement. The permeability of synthetic sands is more nearly constant with varying water content. The strength of both kinds is decreased to the same degree by heating to 600° F. while the permeabilities are increased to the same degree. Hydrated iron oxide films on both silica and kaolin give an increase in strength especially at the higher water contents. The permeability of silica-kaolin mixts. decreases with successive addns. of water, while the permeability of the SiO₂-Fe₂O₃ combinations shows an increase with water content.

H. C. D.

An automatic precision strength test for sand. G. G. BROWN AND C. C. DE WITT. *Trans. Am. Foundryman's Assoc.* 1928, 235-46.—An automatic testing machine for making tensile or transverse tests is described which is capable of 1% accuracy. A motor-driven wt. is made to travel along a beam which acts upon a piston compressing the sample tested. The wt. required for a definite deformation or a break is recorded by means of an elec. contact which operates a relay stopping the motor.

H. C. D.

The production of high-alumina slags in the blast furnace for the manufacture of alumina cement. T. L. JOSEPH. *Bur. Mines, Repts. of Investigations No. 2869*, 7 pp. (1928).—The operation of a 6-ton blast furnace on a charge of bauxite, limestone, iron ore and cast-iron turnings is described. The bearing which smelting of such a charge has upon the production of alumina is pointed out. The history and compn. of alumina cements are briefly reviewed and the results of operation of the 6-ton furnace are indicated. Economic considerations are noted and three cost estimates are tabulated—one each, with all-scrap burden, all-ore burden and ore-scrap-burden. It seems that

1 ton of metal and 1 1/5 tons of slag can be produced in the blast furnace for \$25-30. If 1 ton of alumina cement is worth \$30 and 1 ton of pig-iron \$20, the combined value leaves an attractive margin for grinding the slag, marketing costs and profit.

W. H. BOYNTON

Investigations of the blast furnace. GEORGE BULLÉ. *Stahl u. Eisen* **48**, 433-40 (1928).—The influence of the quality of the charge and the coke on the blast-furnace process, the reactions involved, the effect of the building construction and the problems of operation were investigated. References are given.

J. A. SZILARD

Importance of gas-solid contact in the blast furnace. T. L. JOSEPH. *Fuels and Furnaces* **6**, 635-40 (1928).—The paper is largely a review of the findings of the Bureau of Mines investigators on the distribution of charge to the rate and character of the reactions taking place in a blast furnace. Within 40 in. from the nose of the tuyères all the O₂ of the blast has been converted into CO. The rate of reduction of an ore depends on its chem. character, fineness of subdivision and uniformity of particle size. Uniformity of size in the particle of the charge decreases segregation and produces a stock column of uniform resistance to the passage of gas. Fine Misabi ore has a much greater potential surface for contact with furnace gases than have old range ores, but is too fine to permit the full passage of reducing gas. Sintering is a possible remedy for removing the disability connected with the use of very fine stock. Restricted gas flow and a faster downward movement of stock in the periphery of the furnace permit unreduced charge to reach the hearth and complicate the proper adjustment of hearth temps. for the control of S and Si content. Changes in practice providing a greater gas-solid contact in the upper part of the furnace will provide a more efficient utilization of the sensible heat of the gases as well as of their reducing power. Coke decreases the resistance of the stock column to the passage of the reducing gases. Fundamental information to guide furnace operators is as yet largely lacking.

J. W. SHIPLEY

Theoretical and practical determination of the decrease of the pressure in the new blast furnace gas pipes of the Arbed Works in Esch. MARCEL STEFFES. *Stahl u. Eisen* **48**, 441-4 (1928).

J. A. S.

Martin-Siemens furnace of the Lackner type. EUGENIO BOLSI. *Rass. min. met. ital.* **68**, 55-6 (1928).—A description, with diagrams. Its advantages are (1) a smaller consumption of coal (22 kg. per 100 kg. of steel); (2) considerable increase in production; (3) greater durability and less maintenance cost and (4) smaller cost of operation. It is suitable for the manuf. of various types of C steels, Ni steels and Cr-Ni steels.

C. C. DAVIS

The importance of spatial tensions for the testing of metals. P. LUDWIG. *Arch. Eisenhüttenwesen* **1**, 537-42 (1927); *Stahl u. Eisen* **48**, 440-1 (1928).

J. A. SZILARD

Testing materials by means of Röntgen rays. OTTO GUNTHER. *Apparatebau* **40**, 102-3 (1928).—Notes on testing castings, etc.

J. H. MOORE

Temper-brittleness of nickel-chromium steel. H. A. DICKIE. *Engineering* **124**, 595-7 (1927).—See C. A. **22**, 749.

E. H.

Improved Al alloys in the construction of apparatus and machines (SCHWERHER) **1**. The influence of flue dust on the deterioration of firebricks in the Siemens Martin furnace (SCHMITZ) **19**. Heats of transformation and fusion in C steels, cast iron, etc. (UMINO) **2**. Electrical resistance of pure metals in the molten state (MATSUYAMA) **2**. Statistics on iron (steel) mining for 1925 (HOFMANN) **13**. Vacuum flotation apparatus for concentrating ores (Brit. pat. 275,778) **1**. Shaft kiln for calcining ores (Brit. pat. 276,066) **1**. Cementation of steel (Brit. pat. 277,307) **4**. Extracting and carbonizing coal [for use as a reducing agent in metallurgical operations] (Brit. pat. 277,293) **21**.

CINISELLI, ANGELO: *Elementi di metallografia microscopica. I. Diagrammi de equilibrio e di struttura, il microscopio metallografico, la struttura dei materiali siderurgici.* Milan: U. Hoepli (C. Sironi) 295 pp. L. 54.

CONTRY, H. A. DE: *L'emploi de la tôle galvanisée ondulée comme couverture, ses avantages.* Paris: L'Usine. 88 pp.

HATFIELD, WM. HERBERT: *Cast Iron in the Light of Recent Research.* 3rd ed., revised and enlarged. London: Charles Griffin & Co., Ltd. 356 pp. 16s., net.

KLUYTMANS, CH.: *La galvanisation à chaud.* Paris: L'Usine. 86 pp.

MOOR, C. G.: *Tin Mining.* New York: Sir Isaac Pitman & Sons, Ltd. 184 pp. \$2.50.

PAINTON, EDGAR THEODORE: *The Working of Aluminium.* London: Chapman & Hall, Ltd. 214 pp.

Metal Statistics, 1928. New York: American Metal Market. 552 pp. \$2.

Precious metals from ores, etc. F. KRUPP GRUSONWERK A.-G. Brit. 277,001, Sept. 4, 1926. Ores, residues, etc., are heated together with magnetizable materials to a temp. lower than required to melt the mass, and then, after grinding if necessary, subjected to magnetic sepn.

Centrifugal apparatus for amalgamating metal values of ores. R. THAYER. U. S. 1,669,430, May 15.

Concentrating graphite and other ores by flotation. J. F. M. R. ROBILLARD. Brit. 275,673, Aug. 9, 1926. A container is used having slots or apertures in its walls through which jets or streams of water are passed carrying air with them. The apertures may be covered with gauze or other pervious material.

Reducing fine ore concentrates. D. M. CRIST. Brit. 275,791, Aug. 10, 1926. The ore together with a liquid hydrocarbon reducing agent is continuously passed through an air-tight zone heated to the dissoen. temp. of the ore, the reduced product is continuously removed and the gases generated are led off and treated for recovery of by-products. An app. is described.

Treating copper ores. I. F. CLARK. U. S. 1,670,021, May 15. Susceptibility of ores contg. Cu to flotation concn. is improved by treating the ore pulp with C_2H_2 and other oxidizable substances such as aniline or turpentine, the oxidation of which results in insol. substances, producing on the particles of the minerals a coating of cuprous acetylide and of the insol. oxidation products.

Treating tin ores, etc. H. L. SULMAN and H. F. K. PICARD. Brit. 276,743, June 2, 1926. Oxidized Sn ore, concentrates, tailings, slimes, roasted sulfide ore contg. Sn, etc., are mixed with carbonaceous material and treated with gaseous HCl, preferably under reducing conditions and in the absence of free moisture and O (suitably at a temp. of 600-700°) to form and selectively volatilize $SnCl_2$. An app. and numerous details are described.

Treating liquors containing copper and zinc. H. GROTHE and METALLHÜTTE MAGDEBURG GEs. Brit. 276,008, Aug. 11, 1926. Cupric salts in liquors such as those obtained by lixiviating chlorinated roasted pyrites are at least partly reduced to cuprous salts such as Cu_2Cl_2 by use of SO_2 , thiosulfate, sulfides or metals; the cuprous salt may be sepd. and the Cu remaining in the liquor may be pptd. by cementation with Fe. Acid in the liquor formed in the reduction of the cupric salts may be neutralized with ZnO-bearing waste products previous to the cementation. Zn and Co values present may be recovered.

Precipitating copper from metallurgical liquors. I. G. FARBERNIND. A.-G. Brit. 276,017, Aug. 14, 1926. Pptn. of Cu with $Zn(OH)_2$ is effected in 2 or more stages in the first of which the quantity of $Zn(OH)_2$ is insufficient to ppt. all the Cu so that a Zn-free ppt. is obtained; in the last stage an excess of the precipitant is used and the resulting Zn-contg. ppt. may be used as a pptg. agent in the first stage of treatment of a fresh batch of liquor; similarly, if more than 2 stages of pptn. are used, the liquor may be treated with ppt. from a succeeding stage.

Zinc from sulfide ore. H. G. S. ANDERSON. U. S. 1,669,406, May 15. Finely divided Fe and ZnS-bearing material are mixed and heated together to effect reaction and volatilization of the Zn without melting the Fe sulfide formed in the reaction and the latter is recovered in finely divided condition. An app. is described.

Reclaiming values from soldered metals or similar metallic mixtures. W. G. NORDLING and A. STEWART, JR. U. S. 1,669,485, May 15. A metallic mixt. such as corded soldered automobile radiators is heated sufficiently to melt one of the ingredients, e. g., the solder, and the molten constituent is removed from the unmelted residue; the latter is then immersed in a bath of molten material such as NaCN to melt out further quantities of the material, a portion of which has already been removed, and the molten portion is sepd. An app. is described comprising a rotating drum dipping into the heating bath.

Metal values from pyrites cinder. DUISBURGER KUPFERHÜTTE. Brit. 276,200, Nov. 18, 1926. In treating the liquor obtained by leaching chlorinated pyrites cinder, the Cu is pptd. by $Zn(OH)_2$ obtained in a previous operation, the pptn. being preferably effected in 2 or more stages so that a ppt. free from Zn is first obtained and then a ppt. rich in excess of $Zn(OH)_2$ which may be used in treating a fresh batch of liquor; any remaining Cu, together with Ni, Co and precious metals, may then be pptd. by Zn or Ca hypochlorite; most of the Na_2SO_4 is pptd. by cooling or by the addn. of salts such as alkali chlorides, or by both means; remaining sulfate is pptd. as $CaSO_4$ by $CaCl_2$ obtained in a previous operation; Zn is pptd. as $Zn(OH)_2$ by $Ca(OH)_2$, and $CaCl_2$ liquid remains from this treatment. Various other details and modifications are described.

Apparatus for granulating slag. F. SPRIGS. Brit. 277,154, Aug. 4, 1926.

Vortex system for separating ore constituents, etc. R. F. GRANT, E. B. WORTHINGTON and W. L. JACOBUS. U. S. 1,669,820, May 15.

Flux. D. C. LEFF. U. S. 1,670,459, May 22. A flux for use in forming alloys such as Babbitt-metal is formed of HCl 1 gal., Zn 3 lbs., CuSO_4 crystals 12 oz. and resin 21 oz.

Flux for welding cast iron, etc. F. POLITZ. U. S. 1,669,840, May 15. A small proportion of Fe suboxide is used with K_2CO_3 , Na_2CO_3 , NaCl and borax.

Magnetic cores. G. W. ELMEN (TO STANDARD TELEPHONES & CABLES, LTD.) Brit. 277,289, Sept. 11, 1926. Magnetic particles such as Ni-Fe alloy are formed into a compressed mass with insulating material such as that described in Brit. 269,511 (C. A. 22, 1323) and the compressed mass is heat-treated at a temp. sufficient to increase the magnetic properties.

Magnetic core material. G. W. ELMEN. U. S. 1,669,658, May 15. In forming magnetic cores, finely divided insulated particles of magnetic material such as Ni-Fe alloy having an initial permeability substantially higher than that of Fe are compressed, and the compressed mass is heat-treated at a temp. (suitably about 500–800°) sufficient to improve the magnetic properties of the core.

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Magnetic material. A. F. BANDUR. U. S. 1,669,646, May 15. In forming articles such as magnet cores for loading coils for telephone circuits particles of magnetic material, *e. g.*, Ni-Fe alloy, are used with an insulating material consisting of kaolin and a flux such as H_3BO_3 sepg. the particles. ZnO also may be used. U. S. 1,669,647 specifies placing on the particles a plurality of coatings of different insulating materials, *e. g.*, successive layers of $\text{Al}(\text{OH})_3$ and H_3BO_3 and of kaolin. U. S. 1,669,648 specifies particles of magnetic material such as Ni-Fe alloy with insulating material between them consisting of constituents of the magnetic alloy and another substance, *e. g.*, Fe and Ni oxides.

Magnetic cores for Pupin coils. FELTEN & GUILLEAUME CARLSWERK A.-G. Brit. 276,301, Aug. 21, 1926. Cores are formed from fine particles of an alloy of Fe with Ni 5–15% which are covered with an insulating layer of cellulose acetate and compressed in heated molds. The core may be immersed in paraffin.

Ingot mold. R. C. KRAUSE. Brit. 277,264, May 26, 1927.

Ingot mold. F. GRISSLER. Brit. 276,255, March 7, 1927.

Ingot-mold core box. J. E. PERRY. U. S. 1,670,594, May 22. Structural features.

Mold for ingot molds. C. WUNDERLICH. U. S. 1,670,331, May 22.

Ingot-casting apparatus (with an annular gallery encircling the furnace). LINTYPE & MACHINERY, LTD. AND A. V. BUGLER. Brit. 276,802, July 22, 1926.

Casting ingots. E. C. WASHBURN. U. S. 1,670,329, May 22. Cool air is used for cooling the lower portion of the ingot while retaining the heat at its top portion.

Apparatus for casting metals under pressure. A. S. BOWER. Brit. 277,124, June 12, 1926.

Apparatus for casting "brasses," bushings or other annular nonferrous metal articles. S. W. CRAWFORD. U. S. 1,669,694, May 15.

Casting ferrous or other metals of high melting point. R. B. DALE. Brit. 276,210, Dec. 9, 1926. The cooling of the charge is regulated while pressure is applied to it and addnl. metal is supplied to fill up shrinkage recesses. An app. is described.

Apparatus for charging blast furnaces, etc. W. MARLEY. Brit. 277,183, Oct. 12, 1926.

Rabble furnace for ore roasting. A. N. JETTE. U. S. 1,670,038, May 15.

Rabble furnace for roasting ores. D. BAIRD. U. S. 1,669,925, May 15.

Furnace-slugging apparatus. H. E. DUNKELBERGER and N. WITTMERS. U. S. 1,669,696, May 15.

Rotary furnace plant for direct reduction of oxide ores such as those of lead,

zinc and copper or for direct production of iron. J. W. HORNSEY. Brit. 277,325, Sept. 8, 1926.

Furnace for heat-treating sheets or other zinc-coated materials. H. W. THEISS. U. S. 1,670,754, May 22.

Continuous furnace for annealing and heat-treating metals. A. T. KATHNER. U. S. 1,669,902, May 15. U. S. 1,669,903, specifies a conveyor for heat-treating furnaces.

Silicon iron. V. B. BROWNE. Brit. 276,190, Oct. 25, 1926. A relatively large batch of the molten material is stored in a reservoir which can be heated externally for a time sufficient to allow inclusions to float to the surface, preferably assisted by agitation. After each tapping, the bath is replenished. The surface of the bath may be covered with a slag, preferably of lime and Ca silicate, and the Si content of the bath may be maintained slightly below that finally desired and the deficiency made up in the ladle. Cf. C. A. 21, 2116.

Pickling iron. O. VOGEL. Brit. 277,308, Sept. 8, 1926. Sulfite cellulose lye is added to pickling baths such as those described in Brit. 158,768 (C. A. 15, 1878) and Brit. 188,713 (C. A. 17, 1618) or to an ordinary acid bath together with waste acid from the washing of hydrocarbons and contg. N-ring compds. such as pyridyl-sulfuric acid. The condensation mixt. made with the addn. of sulfite cellulose lye in the synthesis of quinoline or quinaldine also may be used, as may also org. colloidal materials such as glue, agar-agar, gelatin or molasses.

Iron casting resistant to abrasion. L. J. BARTON. Brit. 277,004, Sept. 1, 1926. Grinding balls and the like are made of metal contg. Fe 95.72–98.22, C 0.8–1.3, Si 0.3–1, Mn 0.6–1.8 and up to 0.18% of S and P, or from similar metal contg. 0.5–3% Cr which replaces a portion of the Fe. Various details are given for forming and casting the metal and compns. are specified for coating the molds used.

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Manganese steel. R. A. HADFIELD. Brit. 276,048, May 11, 1926. Mn steel contg. about 11% or more of Mn contains not more than about 0.065% P and may contain C up to about 1.6%. It may be made by adding low-P ferro-Mn (with or without ordinary ferro-Mn) to a charge of C steel which has been decarburized and dephosphorized.

Steel-hardening bath. O. KRÖNING. Brit. 276,289, May 30, 1927. Acidified and chlorinated juice of onion, garlic or leeks is used. HOAc and "calcium chloride" may be added to the juice.

Copper and copper alloys. I. R. VALENTINE. Brit. 276,341, Aug. 18, 1926. Molten Cu or Cu alloy is purified by adding an alk. earth metal such as Mg or preferably a Mg-Al alloy contg. 10–15% Al. About 0.3% of the added purifying agent may suffice.

Lead alloys. H. YOSHIKAWA. Brit. 277,199, Nov. 22, 1926. Pb alloys are formed contg. up to 4% Bi and also up to 10% of other metals such as Cu, Ni, Co, Mn, Cr and Al.

Non-magnetic iron alloys. Y. KAMISHIMA. Brit. 276,874, Jan. 3, 1927. Non-magnetic Fe alloys of high elec. resistance contain Ni 9–12, Cr 15–20 and Mn 0.3–2% and are free from Si. CaF_2 , NaF or K_2CO_3 and glass may be used as fluxes in making the alloy from its component metals.

Magnetic iron-nickel alloys. C. P. BEATH and H. M. E. HEINICKE. U. S. 1,669,649, May 15. In order to embrittle Fe-Ni alloy, Fe and Ni are heated in the presence of an oxidizing agent such as O and oxides of Fe and Ni at a temp. sufficient to cause complete fusion between the elements.

Alloy of nickel, molybdenum and chromium. T. D. KELLY. Brit. 277,170, Sept.

Vortex system for separating ore constituents, etc. R. F. GRANT, E. B. WORTHINGTON and W. L. JACOBUS. U. S. 1,669,820, May 15.

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Steel. F. KRUPP A.-G. Brit. 276,615, Aug. 27, 1926. To produce a low-C steel resistant to the action of liquids such as lyes or boiler feed water or to NH_3 and other vapors and gases, molten steel is so highly deoxidized that the subsequent aging does not cause any substantial decrease in its tenacity, or the solid material is heated to above 650°, quenched and then reheated to about 730°.

Manganese steel. R. A. HADFIELD. Brit. 276,048, May 11, 1926. Mn steel contg. about 11% or more of Mn contains not more than about 0.065% P and may contain C up to about 1.6%. It may be made by adding low-P ferro-Mn (with or without ordinary ferro-Mn) to a charge of C steel which has been decarburized and dephosphorized.

Steel-hardening bath. O. KRÖNING. Brit. 276,289, May 30, 1927. Acidified and chlorinated juice of onion, garlic or leeks is used. HOAc and "calcium chloride" may be added to the juice.

Copper and copper alloys. I. R. VALENTINE. Brit. 276,341, Aug. 18, 1926. Molten Cu or Cu alloy is purified by adding an alk. earth metal such as Mg or preferably a Mg-Al alloy contg. 10–15% Al. About 0.3% of the added purifying agent may suffice.

Lead alloys. H. YOSHIKAWA. Brit. 277,199, Nov. 22, 1926. Pb alloys are formed contg. up to 4% Bi and also up to 10% of other metals such as Cu, Ni, Co, Mn, Cr and Al.

Non-magnetic iron alloys. Y. KAMISHIMA. Brit. 276,874, Jan. 3, 1927. Non-magnetic Fe alloys of high elec. resistance contain Ni 9–12, Cr 15–20 and Mn 0.3–2% and are free from Si. CaF_2 , NaF or K_2CO_3 and glass may be used as fluxes in making the alloy from its component metals.

Magnetic iron-nickel alloys. C. P. BEATH and H. M. E. HEINICKE. U. S. 1,669,649, May 15. In order to embrittle Fe-Ni alloy, Fe and Ni are heated in the presence of an oxidizing agent such as O and oxides of Fe and Ni at a temp. sufficient to cause complete fusion between the elements.

Alloy of nickel, molybdenum and chromium. T. D. KELLY. Brit. 277,170, Sept.

10, 1926. A malleable alloy contains Ni 33.3-90, Mo 5-33.3 and Cr 5-33.3% and may be formed by melting the metals under a flux of anhyd. CaCl_2 or MgCl_2 and C.

Forming sheets, wires, etc., of iron alloyed with silicon. O. H. DÖHNER. Brit. 276,953, Sept. 4, 1926. In forming transformer laminations or other articles the material is critically worked at temps. below 600° and then heated to recrystn. temp. (650 - 900°) to increase the size of grain and improve the elec. properties. Various specific details are given.

Alloys steels. CAMMELL, LAIRD & CO., LTD., J. M. ALLAN and A. P. HAGUE. Brit. 276,249, Feb. 26, 1927. *An alloy steel suitable for use at high temps. contains Fe 46.45-57.05, Ni 26-30, Cr 16-22, C 0.35-0.55 and Si and Mn each 0.3-0.5%.

Heat-resisting steel alloys. F. KRUPP A.-G. Brit. 276,317, Aug. 23, 1926. Heat-resisting steel alloys contain Cr 15-25, Ni 15-25 and C less than 0.2%.

Extracting "tin mixture" from lead and tin alloys. M. SPEICHERT. U. S. 1,669,580, May 15. "Tin mixt." (a eutectic contg. Sn 54.5-55, Sb not more than 3.6, Cu not more than 0.2% and the remainder Pb) is obtained from Pb and Sn alloys contg. Sb and Cu (and which may contain small quantities of other metals), by melting, cooling until only the "tin mixt." alloy remains fluid and drawing it off.

Coating aluminum and alloys. DR. O. SPRENGER PATENTVERWERTUNG JIROTKA and B. JIROTKA. Brit. 275,828, Oct. 27, 1926. In coating Al and alloys as described in Brit. 249,971 (C. A. 21, 888), the coating bath contains NaHCO_3 alone or mixed with Na_2CO_3 in addn. to the salts of the heavy metals. $\text{Na}_2\text{Cr}_2\text{O}_7$ also may be added to the bath.

Magnesium alloys. I. G. FARBENIND. A.-G. Brit. 275,985, Aug. 13, 1926. Mg alloys suitable for making pistons of internal-combustion engines contain up to 15% of Al and 1-6% Si.

Hard alloys containing carbides of refractory metals. W. SCHROBSDORFF. Brit. 276,011, Aug. 12, 1926. Alloys are formed of (a) W carbide, Fe carbide, Ta, Ni and Ir; (b) Ta, Nb, Cu, Pt, Mo-W double carbide, Fe carbide and Cr carbide; (c) W carbide, Pt, Ta and Nb carbide; (d) W carbide, Ta, Ni and Nb carbide; or of other similar components.

Coating metals surfaces. PETROLE SYNTHETIQUE SOC. ANON. AND A. FOLLIET. Brit. 277,211, Jan. 1, 1927. A refractory coating is produced by heating metals in contact with a powd. or granular mixt. of Al and a Si compd. such as SiO_2 or SiC , in the presence of a chloride such as NH_4Cl or a volatile salt such as a fluoride or bromide. The treatment may cover a period of 2-3 hrs. at 800° .

Coating metals with lead by hot-dipping. AMERICAN MACHINE & FOUNDRY CO. Brit. 276,208, Dec. 3, 1926. Sn 3% is added to a bath of molten Pb, and from time to time, small quantities of phosphor-Pb also are added.

Coating with metals applied in the vapor phase. AMERICAN MACHINE & FOUNDRY CO. Brit. 276,390, March 23, 1926. Sub-atm. pressure and a high-voltage elec. potential (to ionize the metal vapor) are utilized. An app. is described.

Coating the interior of pipes and tubes, etc., with metals by spraying. F. G. COZENS and METALLISATION, LTD. Brit. 277,071, June 4, 1926. Mech. features.

Metals from sulfides. A. B. BAGHDASARIAN. U. S. 1,671,003, May 22. Sulfides of Pb or other metals are chlorinated and the chlorides are reduced with H.

Recovery of "white metal" from boring of bronze, gunmetal, etc. J. SPENCE, C. E. COURTENAY and H. A. COURTENAY. Brit. 276,730, May 31, 1926. A charge of the material is spread on a tray having a wire gauze bottom and heated while at rest to a temp. above the m. p. of the white metal; the tray is then vibrated or oscillated. An app. is described.

Carburizing metal articles. G. W. HEGEL and G. R. BROPHY. Brit. 276,675, Aug. 26, 1926. Articles such as those formed of low-C steel are heated in a retort to a temp. above the recalcrescence point and a liquid contg. C (e. g., a mixt. of kerosene, bone oil and "oil of mirbane" or a similar mixt.) is supplied to the retort at such a rate as to maintain a uniform, gaseous atm. around the articles. Air is excluded. An app. and various details of procedure are described.

Case-hardening. A. LENNARTZ. U. S. 1,671,034, May 22. FeS is added to compns. for selective case-hardening to protect portions of the articles treated from the case-hardening action.

Apparatus for pickling metals tubes or bars, etc. WELLMAN, SEAVER ROLLING MRL CO., LTD. AND S. SMITH. Brit. 276,732, June 1, 1926.

Apparatus for determining tinned scrap. M. A. ADAM. Brit. 277,127, June 16, 1926.

Apparatus for bright-annealing of metal strip, etc., in hydrogen. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 276,674, Aug. 26, 1926.

Welding heating and cooling tubes to the walls of apparatus. R. SAMERSREUTHER. Brit. 276,013, Aug. 12, 1926.

Welding rod. J. B. GREEN. U. S. 1,669,660, May 15. Welding rods are coated by dipping them in a bath contg. a binder such as Na silicate and about 325 parts CaCO_3 for each 500 parts water. U. S. 1,669,661 specifies coating welding rods and other filler material in a thin coating soln. en masse, e. g., by dipping in a soln. formed of 40°Bé . Na silicate soln. 3 lbs. and water 2 gals.

10—ORGANIC CHEMISTRY

CHAS. A. ROULLER AND CLARENCE J. WEST

Organic significance and economic importance of ethylene glycol. T. H. FAIRBROTHER. *Ind. Chemist* 4, 179-80 (1928). E. H.

Control of the molecular weight of liquid hydrocarbons produced by electrical discharge in ethane. S. C. LIND AND GEORGE GLOCKLER. **J. Am. Chem. Soc.* 50, 1767-72 (1928); cf. *C. A.* 22, 1734.—Silent, corona and high-frequency discharges all cause the condensation of C_2H_6 to a liquid with the liberation of permanent gases. The av. mol. wt. of the liquid products has been regulated between 467 and 105 by controlling the time that the 1st products, either gaseous or liquid, are allowed to stay in the discharge tube—the more secondary action the higher the mol. wt., because of further condensation. C. J. WEST

Luminescence of aliphatic Grignard compounds. R. T. DUFFORD. *J. Am. Chem. Soc.* 50, 1822-4 (1928).—The reason for the discordant observations reported for the luminescence of Grignard compds. in Et_2O solns. on reacting with O probably lies in the effect of the concn. The aliphatic compds. Bu-, Pr-, *i*-Et- and even MeMgBr , gave faint light on oxidation, none at concns. as high as 1 *M* but best at about $\frac{1}{8}$ *M*; in all cases the brightnesses were very little above the threshold of visibility. While this disproves D.'s idea that it is necessary for the Mg to be attached directly to an unsatd. C atom in order to obtain luminescence in Et_2O soln., it is true that this condition is satisfied in all the cases where any great amt. of light is obtained. It is probably not true that the brightness is proportional to the mol. wt. C. J. WEST

Condensation of cyanoacetic ester with some aryl- and alkylamines. Preparation of some aryl- and alkyl-substituted cyanoacetamides. KUVIRJI GOSAI NAIK AND YESHWANT NARAYAN BHAT. *Quart. J. Indian Chem. Soc.* 4, 547-51 (1927).—The substituted cyanoacetamides were prepd. by the method described in *C. A.* 15, 2072, the conditions being varied with the basicity of the amine. The anilide, $\text{NCCH}_2\text{CONHPh}$, obtained in 60% yield by refluxing $\text{NCCH}_2\text{CO}_2\text{Et}$ with redistd. PhNH_2 at $160-70^\circ$ for 6 hrs., m. $198-9^\circ$. *p*-Toluidide, m. 180° . *o*-Isomer, m. 125° . *m*-Compd., m. 132° . α -Naphthylamide, m. 175° . β -Isomer, m. 174° . *vic-m*-Xylidide, m. 107° . Benzylamide, obtained in 90% yield by refluxing 22 g. $\text{NCCH}_2\text{CO}_2\text{Et}$ and 22 g. PhCH_2NH_2 for 7 hrs., m. 120° . Methylamide (about 25% from 50 g. $\text{NCCH}_2\text{CO}_2\text{Et}$, 45 g. of 33% MeNH_2 and 0.2 g. NaOH shaken 1 hr. at 0° and allowed to stand 12 hrs. at room temp.), m. 101° . Ethylamide (yield, 15%), m. 74° . H. W. G.

Condensation of cyanoacetic ester with some aryl- and alkylamines. Preparation of some aryl- and alkyl-substituted cyanoacetamides. KUVIRJI GOSAI NAIK AND YESHWANT NARAYAN BHAT. *Quart. J. Indian Chem. Soc.* 4, 547-51 (1927).—Cyanoacet-*o*-toluidide, m. 125° , *m*-toluidide, m. 132° , α -naphthylamide, m. 175° , β -naphthylamide, m. 174° , *vic-m*-xylidide, m. 107° , methylamide, m. 101° and ethylamide, m. 74° , are prepd. for the first time. The methods of prepn. vary with the basic strength of the amines. In the prepn. of the substituted amides of the aromatic acids, Whiteley's method, as modified by Naik (*C. A.* 15, 2072) was used. Cyanoacetanilide, m. $198-9^\circ$, is prepd. by refluxing $\text{CNCH}_2\text{CO}_2\text{Et}$ with redistd. NH_3 at $160-70^\circ$ for 6 hrs. *p*-Toluidide, similarly prepd., substituting *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ for PhNH_2 , m. 180° . Benzylamide, m. 120° . H. W. GIBSON

Dinitroethylbenzenes. O. L. BRADY, J. N. E. DAY AND P. S. ALLAM. *J. Chem. Soc.* 1928, 978-82.—Reduction of 2,4,6-(O_2N) $_3\text{C}_6\text{H}_2\text{Et}$ with $(\text{NH}_4)_2\text{S}$ in boiling EtOH gives the 4- NH_2 deriv., m. 175° (Schultz and Sander, *C. A.* 3, 2573, give 110°); elimination of the NH_2 group gives 2,6-dinitroethylbenzene, m. 57.5° . Nitration of 2,4- $\text{O}_2\text{N}(\text{AcNH})\text{C}_6\text{H}_2\text{Et}$ gives the 2,3-di- NO_2 deriv., m. 143° , and after hydrolysis of the mother liquor, 2,5-dinitro-4-aminoethylbenzene, red, m. 125° ; the 2,3-di- NO_2 deriv.,

golden yellow, m. 121.6°. Removal of the NH_2 group gives 2,3-dinitroethylbenzene, m. 58.5°. *Me* 2,3-dinitrobenzoate, m. 134°. 2,5-Dinitroethylbenzene, pale yellow, m. 59.5°. Removal of the NH_2 group from 4,3,5- $\text{H}_2\text{N}(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{Et}$ gives 3,5-dinitroethylbenzene, yellow, m. 41°.

C. J. WEST

Hydroquinonesulfonephthalein and some of its derivatives. W. R. ORNDORFF AND C. V. SHAPIRO. *J. Am. Chem. Soc.* 50, 1730-4 (1928).—Hydroquinonesulfonephthalein (I), dark red, does not m. at 300°, results in 20% yields by heating the anhydride of *o*-sulfobenzoic acid and $\text{C}_6\text{H}_4(\text{OH})_2$ at 150° until fluid and then at 130° for 18-24 hrs. The use of dehydrating agents gave excessive tar formation; with ZnCl_2 5% yields were obtained. At 22° 0.0117 g. I dissolved in 100 cc. H_2O and 0.0120 g. in 100 cc. abs. EtOH. NaOH and Na_2CO_3 give deep blue-purple solns., changing rapidly to a tan or brown; concd. H_2SO_4 gives an orange soln. and the I is partially pptd. when poured into H_2O . I does not absorb HCl gas, indicating an inner salt structure. I absorbs 3 mols. dry NH_3 and becomes blue-black in color; over concd. H_2SO_4 2 mols. NH_3 are lost; the mono- NH_3 salt dissolves in H_2O with a murky green color, due to hydrolysis. The di-Na salt of I crysts. with 1EtOH; the Ba salt seps. as brown flaky plates. The di-Bz deriv. is bright yellow; 0.015 g. dissolves in 100 cc. abs. EtOH at 22°; it is slowly sapond. by boiling with dil. NaOH. I does not yield any colorless lactoid derivs.

C. J. WEST

Absorption spectra of sulfonefluorescein and some of its derivatives. R. C. GIBBS AND C. V. SHAPIRO. *J. Am. Chem. Soc.* 50, 1755-62 (1928).—A comparative study of the absorption spectra of 2,4-dihydroxybenzoyl-*o*-benzoic acid and 2,4-dihydroxybenzoylbenzenc-*o*-sulfonic acid shows that they exist in the free state as ketone derivs. A comparison of the absorption spectra of sulfonefluorescein (I) in neutral alc. soln. with that of fluorescein in neutral and acid soln. leads to the suggestion that the former has an inner salt structure. The absorption spectra of I in concd. H_2SO_4 and in alc. alk. soln. bear a close relationship to the spectra of resorcinolbenzein and fluorescein in the same solvents. The absorption of I in strong aq. KOH changes progressively, indicating 2 successive chem. changes: the breaking of the pyrone ring and the probable disruption of the mol.

C. J. WEST

A general sulfonation process. L. GAY, M. AUMÉRAS AND P. MION. *Chimie et industrie* 19, 387-95 (1928).—Guyot's process for the complete sulfonation of hydrocarbons from H_2SO_4 of any concn. by distn. of the H_2O formed (C. A. 14, 404) is shown to be extremely laborious, if not impossible, in the case of hydrocarbons of low volatility (e. g., C_{10}H_8). Good results are obtained, however, by continuously introducing a volatile auxiliary liquid, which is practically non-miscible with H_2O , or an inert gas such as N or CO_2 . It is shown from theoretical considerations that the reaction vessel should not be provided with a rectifying column, whether the hydrocarbon being sulfonated is less volatile or more volatile than water, the small amount entrained with the auxiliary liquid being returned to the cycle with the latter. Sulfonation of 256 g. C_{10}H_8 with 210 g. 94% H_2SO_4 for 5 hrs. at 140-50°, with CCl_4 as auxiliary liquid, gave a reaction mixt. contg.: H_2SO_4 none, $\text{C}_{10}\text{H}_7\text{SO}_3\text{H}$ 94.6, sulfones 7.7, C_{10}H_8 0.5, volatile matter 1.7%, HCl trace. Similar results were obtained when a slight excess of C_{10}H_8 was used. Doubling the proportion of C_{10}H_8 and prolonging the heating increased the proportion of sulfone ($(\text{C}_{10}\text{H}_7)_2\text{SO}_2$) extremely slowly. addn. of HgSO_4 did not catalyze the formation of sulfone, but did catalyze the formation of HCl by action of the H_2O on CCl_4 . With 210 g. 94% H_2SO_4 and 128 g. C_{10}H_8 , the reaction product at the end of 3, 6.5 and 9.5 hrs., resp., at 160-5°, had the following compn.: free H_2SO_4 18.5, 11.3, 9.3; $\text{C}_{10}\text{H}_7\text{SO}_3\text{H}$ 39.5, 24.4, 19.9; $\text{C}_{10}\text{H}_8(\text{SO}_3\text{H})_2$ 33.5, 60.1, 67.6; insol. 0.4, 0.1, 0.1; H_2O (by difference) 8.1, 4.1, 3.1%. As excess H_2SO_4 increases production of HCl from the CCl_4 at high temps., ligroin was used instead (it caused some reduction of H_2SO_4), and the mixt. heated 12 hrs. at 130-40° and then 5 hrs. at 140-50°. At the end of 6, 12 and 17 hrs., resp., the reaction mixt. had the following compn.: free H_2SO_4 15.25, 8.8, 2.9; $\text{C}_{10}\text{H}_7\text{SO}_3\text{H}$ 32.4, 18.7, 6.25; $\text{C}_{10}\text{H}_8(\text{SO}_3\text{H})_2$ 45.1, 68.15, 86.4; H_2O (by difference) 7.2, 4.35, 4.45%. By using CO_2 , practically the same results were obtained in about 10 hrs. at 160-70° as with ligroin after 17 hrs.

A. P.-C.

Rubrene. New studies on rubrene peroxide. CHARLES MOUREUX, CHARLES DUFRASSE AND LOUIS GIRARD. *Compt. rend.* 186, 1027-31 (1928); cf. C. A. 20, 3166.—Rubrene peroxide (I), seps. with solvent of crystn. I.PhBr, m. 165-7°; I. $0.5\text{C}_6\text{H}_6$, m. 192-3°; I. $0.5\text{Et}_2\text{O}$, m. 192-3°. The solvent dissociates under high vacuum. Heating I below 140° causes the evolution of 74-79.5% of the calcd. O_2 , while at 180°, 4.2-6.1% calcd. O_2 is evolved as CO_2 and 15-21% is collected as condensable oxides having the odor of phenol.

D. H. POWERS

Electrolytic synthesis of tetrahydrofurylethylamine. R. TAKAMOTO. *J. Pharm.*

Soc. Japan 48, 136–41 (1928).—Windaus and Dalmer's discovery (*C. A.* 15, 1490) that furylethylamine (I) and tetrahydrofurylethylamine (II) possess a strong constricting action on the uterus resulted in many attempts to improve on the method of synthesis. T.'s electrolytic method is as follows: 20 g. furylnitroethylene* (Thiel and Landers, *C. A.* 4, 1040) is dissolved in 104 cc. of a mixt. of EtOH and AcOH (2:1) and 100 cc. of H_2SO_4 (d. 1.2) is added. An amalgamated Ni plate dipped in this soln. is used as a cathode, while a Pb plate dipped in H_2SO_4 (d. 1.1) is used as an anode. The 2 solns. are sepd. by an unglazed porcelain plate. As a promoter 1 g. $CuSO_4$ is added. The temp. of the cathode soln. is kept at 30–5° and a current of 4–4.5 amps. is used. For complete reduction 76–7 amps. of electricity was used. Yield of I, 91%. Picronate, m. 204°. Oxalate, m. 171–2°. For the prepn. of II, I is reduced with H_2 and PtO_2 . Yield, 91%. Picrate, m. 129°. Oxalate, m. 145–6°. NAO UYBI

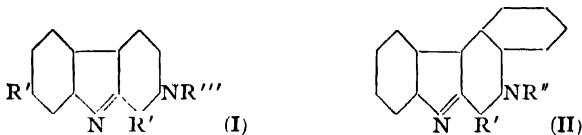
The reduction of some furan derivatives. R. TAKAMOTO. *J. Pharm. Soc. Japan* 48, 134–5 (1928).—Keimatsu and T. (*C. A.* 21, 3362) have previously reported the synthesis of tetrahydrofurfurylamine with a basic side chain. Williams (*C. A.* 22, 1155) has also reported the synthesis of the same compd. by a slightly different method. In this paper, T. comments on W.'s paper and points out the advantages of K. and T.'s method over W.'s method. NAO UYBI

Esters of α -tetrahydrofurfuryl alcohol. J. E. ZANETTI. *J. Am. Chem. Soc.* 50, 1821–2 (1928).—The following esters of α -tetrahydrofurfuryl alc. are reported: *Acetate*, b_{718} 194–5°, d_{20}^{20} 1.061; *propionate*, b_{718} 204–7°, b_2 85–7°, d_{20}^{20} 1.044; *butyrate*, b_{718} 225–7°, b_2 102–4°, d_{20}^{20} 1.012; *valerate*, b_{718} 238–40°, b_2 97–9°, d_{20}^{20} 0.999; *benzoate*, b_{718} 300–2°, b_2 138–40°, d_{20}^{20} 1.137; *furoate*, b_2 136–8°, d_{20}^{20} 1.194; the last ester becomes a thick liquid at –15° and at the temp. of solid CO_2-Et_2O it assumes the consistency of Canada balsam and at the temp. of liquid air becomes a glassy solid without any trace of crystn. Purified by distn. *in vacuo* the esters are very stable. C J WEST

Catalytic oxidation of furfural in the vapor phase. WM. V. SESSIONS. *J. Am. Chem. Soc.* 50, 1696–8 (1928).—When furfural is oxidized with air at temps. of 200–300° in the presence of V_2O_5 as a catalyst, small quantities of maleic acid and anhydride are formed, as well as $HCHO$, CO_2 and H_2O . The maleic acid formed is evidently quite pure and m. 138.5–40°. C J WEST

Syntheses in the indole series. III. Theory of anhydronium base formation and the constitution of methosulfates, with some observations on the fluorescence of 5,6-benz-4-carboline and its derivatives. WM. O. KERMAK AND R. H. SLATER. *J. Chem. Soc.* 1928, 789–97; cf. *C. A.* 22, 1355.—In support of the view that the anhydronium base formed from harmine methosulfate by the action of alkali has the constitution I (R' , OMe; R'' , R''' , Me) and is a deriv. of 4- ψ -carboline (I, R' , R'' , R''' , Me), it has been shown that the propochloride of methylharmine is not identical with the methochloride of propylharmine (*C. A.* 16, 4206), but this evidence is not quite conclusive. The anhydronium base from 5,6-benz-4-carboline methosulfate should be a deriv. of 4- ψ -carboline and should possess the constitution II (R' , H; R'' , Me) and so the methosulfate of this base ought to be identical with 1-methyl-5,6-benz-4-carboline methosulfate. This is so and proves definitely that Me_2SO_4 adds itself to the pyrrole N atom of the anhydronium base. 5,6-Benz-4-carboline, C_8H_8 and Me_2SO_4 , heated at 100° for 30 min., give the *methosulfate*, bright yellow, m. 235°, which exhibits a greenish fluorescence; solns. in H_2O , MeOH and EtOH exhibit the same fluorescence; the concd. H_2SO_4 soln. also exhibits a green fluorescence, which changes to a deep greenish blue on warming. NH_4OH in the cold gives 4-methyl-5,6-benz-4- ψ -carboline, orange, m. 205°; the EtOH and C_6H_6 solns. exhibit a brilliant green fluorescence. Both this and 1-methyl-5,6-benz-4-carboline give 1,4-dimethyl-5,6-benz-4-carbolinium methyl sulfate, chrome-yellow, m. 300°; solns. in H_2O , boiling MeOH and concd. H_2SO_4 exhibit a greenish yellow fluorescence, the last becoming greenish blue on warming. 1-Methyl-5,6-benz-4-carboline, prepd. from 3-*o*-aminophenyl-1-methylindole, forms pale pink needles, m. 142°; its solns. exhibit a brilliant green fluorescence. The HCl salt gives none of the usual indole reactions. 3-Methyl-5,6-benz-4-carboline methosulfate, bright yellow, m. 270°; solns. exhibit a vivid greenish blue fluorescence; the H_2SO_4 soln. becomes brilliant blue on warming and bluish green on diln. NH_4OH gives 3,4-dimethyl-5,6-benz-4- ψ -carboline, yellow, m. 225°; solns. exhibit a brilliant greenish blue fluorescence. This, as well as the 1,3- Me_2 deriv., gives 1,3,4-trimethyl-5,6-benz-4-carbolinium methyl sulfate, chrome-yellow, m. 292°, exhibiting a bright green fluorescence. 3-Ethyl-5,6-benz-4-carboline methosulfate, pale yellow, m. 250°; solns. exhibit a greenish blue fluorescence. A table is given showing the fluorescence of a no. of derivs. of 5,6-benz-4-carboline; a Me (or Et) group attached to the C atom in posi-

tion 3 invariably renders the fluorescence more blue. With the introduction of a Me group attached to either N atom, the fluorescence in acid soln. becomes more yellow, the effect being greater when the Me group is in position 1 than when it is in position 4. In acid soln. the effect of a Me group in position 3 is almost balanced by that of a Me group in position 4. In alk. soln. a Me group in position 1 renders the fluorescence more blue, whereas in position 4 it makes the fluorescence more green. In alk. soln. a Me group in the 4-position is much more powerful in making the fluorescence more green than 1 on position 3 is in making it blue. The compds. which contain a Me group in the 4-position fluoresce more yellow in alk. than in acid soln., whereas those compds. not possessing a Me group in this position are bluer in alk. than in acid soln. The fluorescence is usually considered stronger in acid than in alk. soln.



C. J. WEST

Action of cyanogen bromide on tertiary imidazoles. W. LANGENBECK. *J. prakt. Chem.* 119, 77-80 (1928).—1,4-Dimethylimidazole, treated with 10% BrCN in Et₂O, gives the 2-Br deriv., b_p 89-90°, m. 51-2°, HCl salt, m. 240° (decomp.); it was identified by the formation of the 5 NO₂ deriv. 2-Bromopilocarpine, oily, HCl salt, m. 240°, [α]_D¹⁸ 81.9°. 2-Bromopilocarpine-HCl, m. 201°. Pharmacol. data for 2-bromopilocarpine are given.

C. J. WEST

Rearrangements of peptide-like substances. XXIII. Histidine. Peptide formation by acyl migration. MAX BERGMANN AND LEONIDAS ZERVAS. *Z. physiol. Chem.* 175, 145-53 (1928).—When *N*-acyl derivs. of histidine are treated with amino acids the acyl migrates to the amino acid. The acyl is thus split off even more readily than by hydrolysis with H₂O. Similarly, a histidine peptide, in which the amino acid is bound to the N of the imidazole ring, loses its amino acid to a 2nd amino acid with formation of a dipeptide. Hippurylbenzoylhistidine Me ester, m. 157°, was prepd. in 50% yield by shaking benzoyl-L-histidine Me ester with BzNHCH₂COCl in dry C₆H₆. When this was shaken in CHCl₃ soln. 12 hrs. with glycine and 1 mol. *N* NaOH, 35% benzoylglycylglycine was obtained from the aq. layer and benzoylhistidine ester from the CHCl₃ layer. Acetylbenzoyl-L-histidine Me ester (I), m. 168°, was prepd. by treatment of the benzoylhistidine ester with Ac₂O. By shaking this in CHCl₃ with aq. *D*-arginine, an acyl migration occurred with formation of benzoylhistidine and 55% acetyl-*D*-arginine. In a similar manner I reacted with glycine to form 65% aceturic acid and with glycine Et ester to form Et acetate. The latter reaction occurred in the absence of H₂O. Bz migrates from benzoyltheobromine to glycine, yielding 95% free theobromine and 75% hippuric acid. The phenomenon of acyl migration observed in these expts. differs from the ordinary acyl migration in that the migration instead of being intramol. is from 1 mol. to another. It is somewhat analogous to re-esterification (*Umesterung*), except that high temp., catalyst and excess of reagent are not required. Possibly the reaction is of biol. significance. Substances other than amino acids may bring about this reaction, e.g., an acetylhistidine deriv. converted tetraacetyl- to pentaacetylglucosamine. XXIV. Note on the synthesis of a *DL*-histidylglycine. *Ibid* 154-7.—The method of peptide synthesis from acylated amino acids (C. A. 21, 61) is used in the synthesis of a histidine-glycine peptide. Acetyl-*DL*-histidine when warmed with Ac₂O is partially converted into an acetylated anhydride which unites with amino acid esters to form acetylated dipeptide esters, from which the Ac may be removed by sapon. In this manner acetyl-*DL*-histidylglycine Et ester, m. 182°, was prepd. from the acetylhistidine and glycine ester, and by refluxing with *N* HCl converted into *DL*-histidylglycine, decomp. 235°, which was isolated as the picrolonate, m. 213°. The yield was 48%. The free peptide has a sweet taste, is pptd. by phosphotungstic acid and gives a blood-red color with diazobenzenesulfonic acid.

A. W. DOX

Constitution of irigenin and iridin. I. WILSON BAKER. *J. Chem. Soc.* 1928, 1022-33.—Details are given for the isolation of iridin (I) from powd. orris root, the yield being about 18 g. from 2 kg. root. I in alc. gives with FeCl₃ a somewhat intense, dull violet color, changing to dull olive-green with excess; concd. H₂SO₄ gives a yellow soln. which, on heating to 100°, rapidly darkens and chars. Hydrolysis of 30 g. I by heating with 35 cc. H₂O, 45 cc. EtOH and 3 cc. concd. H₂SO₄ at 100° for 5 hrs. gives

17 g. irigenin (II), m. 185°; FeCl_3 gives the same color reaction as I but concd. H_2SO_4 gives a yellow soln. from which II seps. unchanged. II and an excess of BzCl give a mixt., m. 155–60°, consisting essentially of the 7,3'-di-Bz deriv. FeCl_3 gives an olive-green color (de Laire and Tiemann, *Ber.* 26, 2010, give 123–6° for the m. p.). The action of Ac_2O on II gives the *tri-Ac deriv.*, m. 127–8°; the mono-Ac deriv. of de L. and T. is really the 7,3'-di-Ac deriv., m. 169°. Alk. Me_2SO_4 and II give the *tri-Me ether*, m. 163°; decompn. with MeOH-KOH gives 3,4,5-(MeO) $_3\text{C}_6\text{H}_2\text{CH}_2\text{CO}_2\text{H}$ and 3,4,5-(MeO) $_3\text{C}_6\text{H}_2\text{OH}$. II and HI at 130° for 1 hr. gives *irigenol* (III), $\text{C}_{16}\text{H}_{10}\text{O}_8$, pale yellow, crystg. with $1\text{H}_2\text{O}$, m. 331° (decompn.); the H_2O is not lost at 140°; in the absence of air the III dissolves in aq. NaOH to a yellow, stable soln. which deposits unchanged III on acidification. In the presence of air the soln. rapidly assumes an intense crimson color and acids throw down a dark, flocculent ppt. Aq. Na_2CO_3 gives a yellow soln., turning red in the presence of air. The EtOH soln. gives an intense olive-green color with FeCl_3 , changed by excess to a deep reddish brown and when treated with a trace of Na-Hg gives green flocks. Me_2SO_4 gives the *tri-Me ether*, m. 162°; *hexa-Ac deriv.*, m. 237–8°. Soln. of III in concd. H_2SO_4 and addn. of AcOH gives the *sulfate*, orange, stable when dry at 135°, but decompd. by cold H_2O or when heated under AcOH . II (5 g.), 3 mols. MeI and 3 mols. Na in 30 cc. MeOH , heated at 100° for 16 hrs., give 1.5 g. of the 7,3'-di-Me ether, pale yellow, m. 166–7°; a trace of FeCl_3 gives an intense violet color, changing to olive-green with excess; Me_2SO_4 partially changes it into the *tri-Me deriv.*; *Ac deriv.*, m. 191°; continued methylation of II gives a *compd.* m. 154.5°, which is being examd. Alk. hydrolysis gives a mixt. of 2,4,5-(MeO) $_3\text{C}_6\text{H}_2\text{CH}_2\text{CO}_2\text{H}$ and 3,4,5-HO(MeO) $_2\text{C}_6\text{H}_2\text{OH}$. Methylation of I with CH_3N_2 , followed by hydrolysis, gives the 5,3'-di-Me ether, m. 218°, FeCl_3 gives a very faint brownish color, Me_2SO_4 gives the *tri-Me ether*. Alk. hydrolysis gives the same products as the 7,3'-di-Me ether. This work proves that II has the structure of 5,7,3'-trihydroxy-6,4',5'-trimethoxyisoflavone; the glucose in I is in the 7-position. The dyeing properties of II are very similar to those of the naturally occurring flavones and of the isoflavone genistein in particular. C. J. WEST

The formation of 2-aminopyridine from pyridine and ammonia. J. P. WIBAUT AND L. M. F. VAN DE LANDE. *Verslag Akad. Wetenschappen Amsterdam* 36, 1238–41 (1928).—When pyridine vapor is led through a quartz tube along with dry NH_3 and in presence of fine Fe as a catalyst at 550°, 2-aminopyridine is formed. Yield small.

M. ACHTERHOF

Intermolecular condensation of acetylmethylanthranilic acid by means of phosphorus pentachloride and the formation of a complex isocyanine dye. I. M. HEILBRON, S. L. HOLT AND F. N. KITCHEN. *J. Chem. Soc.* 1928, 934–41.— $\text{MeAcNC}_6\text{H}_4\text{CO}_2\text{H}$ (42 g.) in 250 cc. AcCl , treated with 25 g. PCl_5 and the reaction product esterified with EtOH , gives 62% of 3-*o*-carbethoxyphenylmethylcarbamy-1,2-dimethyl-4-quinoline (I), crystg. with $1\text{H}_2\text{O}$, m. 124° and then m. 240°; the anhyd. compd., m. 245°; the *Me ester* also seps. with $1\text{H}_2\text{O}$, m. 115° or anhyd. 244°. The intermediate chloride warmed with dil. NaOH , gives the free acid, sepg. as a hydrate, m. 130–1°; the anhyd. acid, m. 247°; *anilide*, m. 115°. The chloride and cold concd. NH_4OH give 4,4'-diketo-1,1',2'-trimethyl-1',4'-dihydro-2(3')-quinolylquinazoline, m. 260°. Acid hydrolysis of I gives 1,2-dimethyl-4-quinoline, m. 175–6°. $\text{MeAcNC}_6\text{H}_4\text{CO}_2\text{H}$ (15 g.), 150 cc. AcCl and 25 g. PCl_5 , heated until a deep red soln. resulted and then warmed with abs. EtOH , gives 50% of 4-chloro-3-*o*-carbethoxyphenylmethylcarbamy-2-methyl-quinoline-MeCl (II), m. 209° (decompn.); this also results in 66% yield from I and PCl_5 ; the free base is a yellow solid, which rapidly turns purple and forms a tar. *Methoperchlorate*, m. 244–5° (decompn.); heated, it decomp. explosively; *methiodide*, golden yellow, becomes purple-red at 210° and decomp. 215°; *methopicate*, golden yellow, decomp. 168–9°. The *Me ester*, corresponding to II, turns purple at 145°, m. 189–90°; *methiodide*, golden yellow, m. 214° (decompn.). II and PhNH_2 give 4-anilino-3-*o*-carbethoxyphenylmethylcarbamy-1-methyl-2-methylene-1,2-dihydroquinoline, orange, m. 191–2°; 4-piperidino deriv., yellow, m. 260°. 4-Anilino-3-*o*-anilino deriv., yellow powder, m. about 165°; the deep red solns. show a brilliant green fluorescence. Acid hydrolysis of II gives 4-hydroxyquinoline-MeCl. II and dil. NH_4OH in EtOH give 4'-chloro-3,3'-di-[*o*-carbethoxyphenylmethylcarbamy-1,2,1'-trimethylisocyanine iodide, brownish olive needles with a bronze reflex; the dye shows 2 well-defined bands with heads at 574 and 325 μ ; *perchlorate*, heliotrope powder; *picate*, wine-colored. 5-Bromo-methylacetylanthranilic acid, m. 204°; with PCl_5 in AcCl this gives 6-bromo-3-*p*-bromo-*o*-carbethoxyphenylmethylcarbamy-1,2-dimethyl-4-quinoline, crystg. with $1\text{H}_2\text{O}$, m. 123°, or, anhyd., m. 212°; 4-chloro-6-bromo-3-*p*-bromo-*o*-carbethoxyphenylmethylcarbamy-2-methyl-quinoline-MeCl, m. 194°; with alkali it readily gives an isocyanine dye. C. J. WEST

Cyanidin. I. Comparative investigations on cyanidin chloride and 3,5,7,3',4'-pentahydroxyflavylium chloride. T. MALKIN AND M. NIERENSTEIN. *Ber.* 61B, 791-9 (1928).—Although the work of Willstätter and his collaborators has established with certainty the presence of a pyrylium ring in cyanidin chloride (I) the orientation of the substituents in positions 2, 3 and 4 is still open to question and there are already in the literature observations that are not in harmony with the view that I and 3,5,7,3',4'-pentahydroxyflavylium chloride (II) are identical. Thus, Pratt and Robinson (*C. A.* 19, 1141) were unable to obtain from II and H_2O_2 the yellow cryst. oxidation product (III) which Willstätter and Everest obtained from I, and M. and N. have confirmed these results. They find, moreover, that III is not a flavone, as assumed by W. and R.; it is quite insol. in H_2O , its alc. soln. becomes deep red with $FeCl_3$ and it does not dye cotton mordanted with Al_2O_3 , even on addn. of alc. to the aq. suspension. I prepd. from corn flowers and from rose leaves was accordingly compared (with CHRISTINA M. FEAR) with II made by the method of P. and R. (*C. A.* 19, 2341). Qual., the substances were found to be similar to each other, but quant. methods, especially as applied to the color reactions, showed that they are different in almost all respects. That the I prepd. from rose leaves, which was used chiefly, was not contaminated with an impurity, is indicated by the similar behavior of the I from both corn flowers and from rose leaves, by the analytical results on the preps. and by the identity of the spectrum (measured by S. BARRATT and O. H. WALTERS) of the rose-leaf prepn. with that of W. and R.'s I from corn flowers and of an I from Karrer's lab. (cf. Schou, *C. A.* 22, 1101). Again, that the II did not contain an impurity (e. g., an only partially demethylated or a nucleus-methylated by-product, the possible presence of which in their synthetic anthocyanidins is suggested by P. and R.) seems to be established by the fact that the II was shown by the Zeisel method to be entirely MeO free and that a II prepd. from the AcO instead of the MeO deriv. showed the same differences from the I. The differences between I and II can hardly be ascribed to differences in mol. relations; the Menzies and Wright method of mol. wt. detns. in alc. gave 326.3 for I, 345.3 for II (calcd. for $C_{15}H_{11}O_6Cl \cdot H_2O$ 340.5), and under the ultramicroscope both I and II were found to be monomol. in $EtOH$. In view of these results, the only conclusion that can be drawn is that I has not the structure II and that the structure of other substances cannot be derived from that of I (cf. Freudenberg and co-workers, *C. A.* 20, 382, who derives the constitution of epicatechol from the reduction product of the I from cowberries). Under the microscope the crystals of I and of II are practically indistinguishable but those of II have a green, golden shimmer not possessed by those of I. X-ray photographs made (by S. II. PETER) with $Cu K\alpha$ -rays, however, show that the crystals of the 2 substances are distinctly different. The bands in the absorption spectrum of II are shifted slightly towards the longer wave lengths as compared with the bands of I. The red solns. of the ψ -base of II require much greater diln. and longer standing to become colorless than do those of the base of I; heating with HCl restores the red color in both cases. The soly. of I and II in 3% HCl after 2.5 hrs. at 90° is 18 and 68%, resp., in $EtOH$ after 4 hrs. at 18° 74 and 94%. With Na_2CO_3 I gives a pure blue color at pH 8.04, II only at pH 11.57. For the synthesis of II from the AcO deriv., 3,4-(AcO) $_2C_6H_3CO_2H$, m. 162° (obtained in 87% yield from $(HO)_2C_6H_3CO_2H$ in cold Ac_2O slowly treated with anhyd. K_2CO_3), was converted in CCl_4 with PCl_5 into diacetylprotocatechuy chloride (yield, almost quant.), m. 55° , which with CH_3N_2 in Et_2O gave 84% ω -chloro-3,4-diacetylyocatechophenone, light yellow, m. 94° ; 3 g. of this, refluxed 4.5 hrs. in $AcOH$ with anhyd. $KOAc$, cooled, treated with 2,4,6-(AcO) $_3C_6H_2CHO$ and HCl gas, allowed to stand, pptd. with Et_2O and heated with 3% HCl yielded 1.8 g. II. C. A. R.

Quinoline derivatives. VIII. Compounds of 2-phenyl-4-hydroxyquinoline. HANNS JOHN AND E. WÜNSCHE. *J. prakt. Chem.* 119, 43-8 (1928); cf. *C. A.* 22, 426.—2-Phenyl-4-acetoxyquinoline, m. 70° ; picrate. BzO deriv., m. $90-1^\circ$, picrate, 4- EtO deriv., m. $100-2^\circ$; various salts of this and the following are described. 4- PhO deriv., pale yellow, m. 252° . 4- m -Cresoxy deriv., m. $241-3^\circ$. 4- p -Nitrophenoxy deriv., m. $88-90^\circ$. 4- p -Aminophenoxy deriv., m. 81° . 4- o -Methoxyphenoxy deriv., m. 246° . 4- o -Isopropyl- m -methylphenoxy deriv., m. 252° . All but the 1st two derivs. were prepd. from the 4- Cl deriv. IX. 2-Phenyl-4-mercaptoquinoline and 2-phenylquinoline-4-sulfonic acid. *Ibid.* 49-55.—2-Phenyl-4-chloroquinoline and KHS in abs. $EtOH$ at $150-60^\circ$ for 8 hrs. give 2-phenyl-4-mercaptoquinoline, deep yellow, m. $175-6^\circ$; on standing this is transformed into di-[2-phenyl-4-quinolyl] disulfide, m. $175-6^\circ$. With MeI and $EtOH-KOH$ there results 2-phenyl-4-quinolyl Me sulfide, m. 64° ; the Et sulfide, pale yellow, m. 84.5° ; the $iso-Am$ sulfide, m. $170-1^\circ$; the allyl sulfide, m. 169° . The 4- Cl deriv. and Na_2SO_3 in H_2O , heated until the 4- Cl deriv. disappears, give 2-

phenylquinoline-4-sulfonic acid, m. above 290° ; many salts are described. The 4-HS and 4-Cl derivs., heated in EtOH-KOH at 120° for 10 hrs., give *di*-[2-phenyl-4-quinolyl] sulfide, m. 95° . X. 4-[2-Phenylquinolyl]aminobenzoic acid. H. JOHN. *Ibid* 56-60.—2-Phenyl-4-chloroquinoline and $o\text{-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ in AmOH, heated 8-10 hrs., give 4-[2-phenylquinolyl]-*o*-aminobenzoic acid, yellow, m. $232-6^{\circ}$ (decompn.); the *mesomer*, yellow, m. 273° (Et ester, m. 174°); the *p-isomer*, grayish yellow, m. 305° (Et ester, m. 92°); numerous salts of these acids are described C. J. WEST

Opening of the ring in a cyclic ammonium base. N. KISHI. *J. Pharm. Soc. Japan* 48, 141-6 (1928).—In contrast to the ease of ring rupture in *N*-methyltetrahydroisoquinoline-MeI by reduction, *N*-methyltetrahydroquinoline-MeI (I) undergoes ring rupture only with difficulty. The opening of the ring in I was studied by the following reducing reactions: (1) electrolytic, (2) Zn dust; (3) catalytic; (4) coppered Zn powder; (5) Cu_2H_2 ; (6) Na and EtOH. Among these the first 2 gave a negative result, while all the others resulted in opening the ring. Method 4, which gave the best result with recovery of $\text{Ph}(\text{CH}_2)_3\text{NMe}_2$, is described NAO UYBI

Constitution of vasicine. I. A synthesis of 2-propyl(isopropyl)-4-hydroxyquinazoline. A. K. DE AND J. N. RAY. *Quart. J. Indian Chem. Soc.* 4, 541-5 (1927).—Urethans condense readily with acylamines to give substituted quinazolines (C. A. 20, 1799). Ghose claims the active principle, vasicine (I), of *Adhatoda vasica* to be $\text{C}_6\text{H}_4\text{.N:CR.N:COH}$ (II, R = C_6H_5) (C. A. 21, 2900-1). Such a structure did not

seem very probable to D. and R. and they undertook the synthesis of II (R = Pr and iso-Pr) for comparison with the natural I. By condensing PrCONHPh with urethan in xylene, using H_3PO_4 as the condensing agent, they obtained $\text{H}_2\text{NCO}_2\text{Et} + \text{PrCONHPh} \longrightarrow \text{C}_6\text{H}_4\text{.NH CPr.N.CO} + \text{H}_2\text{O} + \text{EtOH} \rightleftharpoons \text{III}$ (II, R = Pr). The III

m. 197° ; purified natural I, m. 196° (G. gives $190-1^{\circ}$ (decompn.)); a mixt. of III and I m. indefinitely from 160° up. The picrate of III m. 184° , that of I 199° . I and III are therefore not identical. The iso-Pr analog (IV) of III m. 227° and a mixt. with I m. indefinitely from 175° ; its picrate, m. $215-6^{\circ}$ and a mixt. with that of I melts indefinitely. The crude natural I was purified by refluxing with C_6H_6 , cooling, filtering from the resinous insol. material, adding Et₂O to turbidity, again filtering, letting stand to crystallize and recrystg. from boiling alc. On dry heating it evolves a basic gas. The PrCONHPh, m. 192° , was prepd. by refluxing PrCO_2H and PhNH_2 in mol. proportions in $\text{C}_6\text{H}_5\text{N}$; 29 g. of it were gently refluxed in 50-cc xylene for 4 hrs. with 15 g. P_2O_5 , the xylene was decanted, the residue dissolved in H_2O , chilled and treated with cold NaOH and the basic ppt. (III) crystd. from boiling abs. alc. Unlike I, III forms no methiodide when refluxed in MeOH with excess of MeI. iso-PrCONHPh, prepd. like the Pr compd., m. 101° . IV does not react with MeI. The synthetic III and IV do not show the color reactions of natural I. Bischer and Lang (*Ber.* 28, 287 (1895)) give 205° as the m. p. of III, and Niemcewicz (*J. prakt. Chem.* [2], 51, 569) 240° as that of IV.

HARRIET W. GIBSON

The alkaloids of Chinese *Corydalis ambigua* Cham. et Sch. (Yen-Hu-So) I. TSAN-QUO CHOU. *Chinese J. Physiol.* 2, 203-17 (1928).—From the tubers of Chinese *Corydalis ambigua*, Cham. et Sch. (Yen-Hu-So) 5 alkaloids so far have been isolated. They are provisionally named and are described as follows: *Corydalis A*, $\text{C}_{22}\text{H}_{27}\text{O}_4\text{N}$, 6-sided prisms, m. 135° , $[\alpha]_D^{25}$ 295° ; Et sulfate, m. 162° ; HCl salt, m. 214° ; nitrate, m. 197° ; chloroplatinate, m. 227° ; methiodide, m. 228° . It is identical with corydaline. *Corydalis B*, $\text{C}_{20}\text{H}_{23}\text{O}_4\text{N}$, 6-sided plates, m. $148-9^{\circ}$, $[\alpha]_D$ 0° ; HCl salt, m. about 218° ; acid oxalate, m. 208° . It has the same m. p. as Heyl's alkaloid isolated from the roots of *Corydalis aurea*, but differs from the latter in its color reactions toward HNO_3 and Erdmann's reagent. *Corydalis C*, nodular masses or prisms, m. 201° , $[\alpha]_D$ 0° ; HCl salt, m. 248° ; acid oxalate, m. 237° ; chloroaurate, m. 195° ; HBr salt, m. 250° . This alkaloid is similar to protopine in its mol. formula, solubilities and some color reactions, but the latter m. 207° . *Corydalis D*, $\text{C}_{19}\text{H}_{17}\text{O}_4\text{N}$ (?), prisms, m. 204° , $[\alpha]_D^{25}$ -295° ; HCl salt, m. about 250° ; HBr salt, m. about 260° . *Corydalis E*, long needles, m. 219° ; HCl salt, m. 246° . *Corydalis B* has narcotic and local anesthetic properties, and increases cardiac action. *Corydalis C* is apparently a cerebral stimulant.

L. W. RIGGS

Alkaloids of Sinomenium and Cocculus. XIX. Alkaloids of *Stephania tetrandra* S. Moore. H. KONDO AND K. YANO. *J. Pharm. Soc. Japan* 48, 107-23 (1928); cf. C. A. 22, 965.—K. and Y. have isolated 3 alkaloids, i. e. *tetrandrine* (I), an Et₂O-sol. base, an Et₂O-insol. base and a phenolic base from the roots of *Stephania tetrandra*.

This paper deals with the properties of **I**, which has the compn. $C_{10}H_{22}NO_3$, *m.* 217°, $[\alpha]_D^{24}$ 263.1°; *methiodide*, decomps. 269°. It has 1 *N*-Me and 2 MeO groups. The 3rd O has a bridged structure. Wijs's reaction shows the presence of 1 double bond which resists most reducing reactions. The action of Ac_2O on **I** results in the rupture of the N ring and gives a yellow compd. *m.* 150°, $[\alpha]_D^{18}$ 55.81°. HBr on **I** gives, as a result of the demethylation of 2 MeO groups and the rupture of the O ring, *demethyltetrandriol (II)*, *m.* 228°, $[\alpha]_D^{31}$ 167.7°; *HBr salt*, decomps. 276°. Ac_2O on **II** gives *diacetyldesmethylltetrandrine*, *m.* 180°, $[\alpha]_D^{27}$ 183.8°. Zn-dust distn. of **I** gives a neutral compd., *m.* 180-5°, 3,4-(MeO)(HO)C₆H₄Me, Me₂N and a non-volatile secondary amine which resembles β -methylaminoindene. The exhaustive methylation of **I** gives an α -methine base, *m.* 196-201°, $[\alpha]_D^{18}$ 237.6° (*methiodide*, decomps. 235°) and a β -methine base, decomps. 115°, $[\alpha]_D^{18}$ 182.8° (*methiodide*, decomps. 250°). The secondary decompn. of the methine bases gives the same *non-N-compd.* $C_{13}H_{15}O_3$, *m.* 220-1°, $[\alpha]_D^{16}$ 11.69°. The fusion of **I** with KOH gives *desmonomethyltetrandrine*, *m.* 185°, while KOH fusion of **II** gives 3,4-(HO)₂C₆H₄CO₂H. The above reactions show the structure of **I** to be $C_{10}H_{14}(> NMe)(OMe)_2(> O)$. They also indicate the presence of homotetrahedral nucleus in **I**, which makes it appear that **I** belongs to the alkaloids of benzyl-tetrahydroisoquinoline type.

NAO UYEI

Further case of the spontaneous resolution of externally compensated mixtures. LEONARD ANDERSON and D. WM. HILL. *J. Chem. Soc.* 1928, 993-7. On crystal of racemized atropine sulfate from abs. EtOH several times hyoscyamine sulfate of $[\alpha]_D^{10}$ about 14° was obtained regularly and on further crystal of the collected crops of this sp. rotatory power, a sulfate of \pm about 20° was produced. The resolution is due, not to undetected traces of an optically active variety but to inoculation from the atm. The resolution could not be effected by a mixt. of MeOH and AcOH as solvent. Negative results were obtained with homatropine sulfate, atropine oxalate, atropine and tropic acid.

C. J. WEST

Volatile base in "the extract of scopolia." S. Aoyama. *J. Pharm. Soc. Japan* 48, 150-2(1928).—By distn. of Et₂O-CHCl₃ ext. of scopolia, the presence of Me₂NH was detected in the distillate. Chloroplatinate *m.* 200-3°. By steam distn. of pure atropine sulfate a volatile base was obtained which reduced KMnO₄ and its chloroplatinate, *m.* 103-8°. This was shown to be the atropamine of Schmidt (*Arch. Pharm.* 232, 430(1894)), showing that atropine (and also hyoscamine) undergoes hydrolysis by simple steam distn.

NAO UYEI

Primeveroside of salicylic acid. M. BRIDEL and P. PICARD. *Bull. soc. chim. biol.* 10, 381-5(1928); *Compt. rend.* 186, 93-9, cf. *C. A.* 19, 2514, 2838, 3289.—The primeveroside of salicylic acid is formed by the combination, with the elimination of 1 mol. of water, of 1 mol. of primeverose and 1 mol. of salicylic acid, the attachment displacing the phenolic OH of the acid. Accordingly this primeveroside has the function of a free acid. Up to the present this substance has not been found in plants. It is prepd. as the K salt by the action of KOH on monotropitoides. It crystallizes in fine colorless needles, inodorous, and with a very bitter taste, *m.* about 150°, on drying in a vacuum loses 1.42% in 3 hrs., α_D -61.6°. Chemically it is not a reducer, is acid to litmus and decomp. NaHCO₃. Its acid index in the presence of phenolphthalein is 122; theory requires 129. With oromel HCl it gives on heating the reaction of pentoses. On hydrolysis with H₂SO₄ it yields salicylic acid and an equimol. mixt. of xylose and glucose. Hydrolysis by rhamniadastase gives salicylic acid and primeverose.

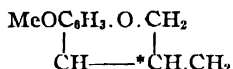
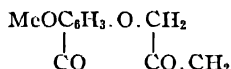
L. W. RIGGS

Saponin from *Gleditschia horrida*, Makino. Y. MATSUSHIMA and M. KUBOTA. *J. Pharm. Soc. Japan* 48, 146-50(1928).—M and K. isolated *Gleditschia saponin*, brown, softens 205°, *m.* 216-8°, from warm H₂O or dil. alc. exts. of *Gleditschia horrida* after pptg. it with 3% HCl and boiling. Its elementary analysis corresponds to C₅₀H₁₀₀O₂₀. The hydrolysis with HCl or H₂SO₄ gives arabinose and a sapogenin (*gleditschia sapogenin*), *m.* 276-8°. It has a hemolytic index of 7500, using red blood cells of the goat, and a toxicity of 40-7 mg. per kg. body wt. in dogs.

NAO UYEI

Brasilin and hematoxylin question. VII. Synthesis of trimethylbrasilone and tetramethylhematoxylylone. P. FETTER, O. ANGERN, E. HAACK and J. WILLEMS. *Ber.* 61B, 839-43(1928); cf. *C. A.* 22, 1782.—Reduction with H and Pt of the synthetic trimethylanthydrobrasilin and tetramethylanthydrohematoxylin described in papers V and VI gave the satd compds. *trimethyldeoxybrasilin (I)* and *tetramethyldeoxyhematoxylin (II)*, and oxidation of these compds with CrO₃-AcOH yielded trimethylbrasilone (III) and tetramethylhematoxylylone, identical with the products obtained

by oxidation of trimethylbrasilin and tetramethylhematoxylin. The correctness of the constitution deduced by analytical methods by Perkins and his associates for brasilin and hematoxylin has thus been proved synthetically except for the position of the alc. HO group but the whole behavior of the 2 compds. leaves no doubt that, as is generally assumed, this HO group is on the atom *C in formula I. I, begins to m. 106°, m. 107–9°, dissolves in concd. H₂SO₄ with yellow color quickly darkening and becoming greenish brown; Br vapors quickly color solid I a light pink. II, begins to sinter 147°, m. 151°, dissolves in concd. H₂SO₄ with pure yellow, in concd. HNO₃ with brown-red color, is practically unchanged by short treatment with Br vapors, becomes intensely purple on longer treatment.


 $\text{C}_6\text{H}_2(\text{OMe})_2$ (I)

 $\text{C}_6\text{H}_2(\text{OMe})_2$ (III)

C. A. R.

Dry distillation of cholesterol with activated carbon.* T. TSUKAMOTO. *J. Pharm. Soc. Japan* 48, 123–34 (1928).—Distn. of cholesterol (I) with activated C (II) gives an oil (III) mixed with crystals of chrysene (IV), m. 245° (cf. Diels, *C. A.* 21, 1649). Oxidation of IV with CrO₂ in AcOH gives chrysoquinone, m. 255°, while IV and HNO₃ give nitrochrysene, m. 207°. The distn. of the higher-boiling fractions of III with S or II also gives IV, showing that III contains hydrochrysene. In place of II, the mixt. of S and II or adsol (V) (Japanese fuller's earth) can be used in the distn. of I with the same results. A comparison of the d. of fractionated samples of III obtained by different methods with Zelinskii's data (*C. A.* 22, 89) for the product obtained with AlCl₃ showed that the product of adsol distn. resembled that of natural petroleum and that obtained without a catalyzer resembled the AlCl₃ distn. product, while the distn. product with II had the highest d. because of the dehydrogenating action of II. This fact shows that Z.'s assumption of the parallelism between the natural purification process and AlCl₃ distn. is unnecessary, but it can be assumed that fuller's earth or C might play their role in nature's process. The plotting of curves using $\Delta A/\Delta T$ (where ΔA = an increase in yield due to the rise in temp. ΔT) and temp. also showed that the product of adsol distn. resembled the fractions of natural petroleum.

NAO UYEH

The bile acids. XIX. MARTIN SCHENCK AND HENRY KIRCHHOFF. *Z. physiol. Chem.* 175, 135–44 (1928); cf. *C. A.* 22, 595. The diisoxime of bilianic acid yields 73% of a tribasic acid, C₂₄H₄₄N₂O₄, which decomps. 230–2° and is remarkable for its blue color. The reaction is not accompanied by gas formation or evolution of heat; hence the product is probably closely related to the parent substance. It differs from the diisoxime in that it contains 2 fewer H, and probably a double bond or a bridged linkage. It is probably a nitroso deriv. since it gives the Angeli and Castellana reaction (blue color with H₂SO₄ and Ph₂NH), though a not altogether typical Liebermann reaction. Further treatment with HNO₃ or with an excess of alkali converts it into a colorless substance. The diisoxime of isobilianic acid is stable to 20% HCl at ordinary temp., forming a cryst. HCl salt from which the diisoxime may be recovered, but when refluxed with 25% HCl a product, C₂₄H₃₆NO₉·HCl, is obtained which crystals with 1.5H₂O.

A. W. DOX

Röntgen rays in organic chemistry. A. KARSEN. *Chem. Weekblad* 25, 114–27 (1928).—A complete survey of the work done with Röntgen rays on structure in org. chemistry. The classes considered are carbon, graphite, hydrocarbon, fatty acids, dibasic acids, ketones and aromatic compounds. Reference is made to work done on each class.

M. ACHTERHOF

Organic substances in primitive times. OSCAR LOEW. *Z. angew. Chem.* 40, 1548–9 (1927).—It would be interesting to ascertain the 1st org. compds. which existed on the earth. Moissan, working with carbides, concluded that they must have been hydrocarbons. Metal carbides were probably formed as the nebular mass cooled. In time, when temp. conditions permitted H₂O to exist, the carbides were acted upon by it and hydrocarbons formed. By lightning, the hydrocarbon vapors and liquids were ignited and the atm. was enriched by CO₂ as a result. Evidence in favor of this theory is found in the existence of carbides and hydrocarbons in meteorites. It is possible that from CH₄, other org. compds. were produced. The oxides of Fe and Cu may have catalyzed the oxidation of CH₄ to CH₂O (I). I, reacting with NH₃, formed by the catalytic union of its elements, might ultimately have led, according to L., to the formation of

asparaginic aldehyde. This, by polymerization and condensation, might have yielded a complex which, on reduction with H_2 and H_2S , would give a substance approximating a protein in nature. It might also have polymerized to sugars, although the presence of acid vapors would have tended to make the end products simple sugars. Thus org. compds., even to the extent of relatively complex proteins, could have come into existence without the catalyzing influence of chlorophyll and light. G. A. HILL

The electron in organic chemistry. I. The electronic conception of the nature of the carbon-to-carbon bond from the standpoint of the theory of partial polarity. M. S. KHARASCH AND OTTO REINMUTH. *J. Chem. Education* 5, 404-18(1928).—A summary in simpler terms of the work already published by K. and his co-workers (cf. C. A. 19, 2297, 2483, 3081; 21, 233).

The thermal dissociation of ethane, propane, butane and isobutane. Preliminary study. R. N. PHASE. *J. Am. Chem. Soc.* 50, 1779-85(1928).—The thermal dissocn. of C_2H_6 , C_3H_8 , C_4H_{10} and Me_2CHCH_2Me has been studied at 625° and 650° and 1 atm. The total rate of dissocn. increases with the complexity of the mol. The 2 principal reactions are dehydrogenation and demethanation. The ratio of H to CH_4 decreases in the series C_2H_6 , C_3H_8 , C_4H_{10} . iso- C_4H_{10} decomp. at about the same rate as C_4H_{10} but gives relatively more H^* . The H formed undergoes no appreciable secondary reaction. The reactions seem to be somewhat more rapid than normal in the 1st few secs. but diln. expts. indicate a 1st-order reaction. The temp. coeffs. are as a min. 1.5-2 per 25°, giving a min. activation energy of 25,000-50,000 cal. An explanation of the relative rates of the reactions is given in terms of activation energies as a function of the size of the mol. and the nature of the linkages to be broken. C. J. WEST

Some derivatives of heptane. R. T. DILLON AND H. J. LUCAS. *J. Am. Chem. Soc.* 50, 1711-4(1928).—4-Heptanol results in 63% yield from 370 g. $PrBr$, 72 g. Mg , 110 g. HCO_2Et and 650 g. Et_2O , b_{740} 153.4-4.4° (cor.), m . -37.2° to -41.5°, d_4^{26} 0.8175, n_D^{20} 1.4199, n_D^{26} 1.4173. 3-Heptanol results in 40% yield from 155 g. $BuBr$, 27.5 g. Mg , 65.6 g. $EtCHO$ and 500 g. Et_2O , b_{740} 152.7-4°, n_D^{20} 1.4201. 3-Chloroheptane, b_{751} 143.4-4.4°, n_D^{20} 1.4237; 4-Cl deriv., b_{751} 143.1-4.4°; 3-Br deriv., b_7 84.5-5.5°, n_D^{20} 1.4507, 4-Br deriv., b_{72} 73.8-4.0. 1.4506. The reaction of HCO_2Et with $BuMgBr$ and $EtMgBr$ gave 2-pentanol and 4-nonanol but not 3-heptanol. The similarity in the phys. properties of the 2 pairs of isomers makes it impossible to differentiate between them. C. J. WEST

Catalytic hydrogenation of different types of unsaturated compounds. II. The hydrogenation of conjugated systems. S. V. LEBEDEV AND A. O. YAKUBCHIK. *J. Chem. Soc.* 1928, 823-37. In the catalytic hydrogenation of conjugated systems, the process may be of 4 types: I. In the 1st phase the addn. of H is directed exclusively into the 1,4-position; in the 2nd phase, which proceeds at a different rate, 2,3-addn. occurs. II. In the 1st phase the addn. of H takes place primarily in all the possible directions (1,2, 3,4 and 1,4) and subsequently until a fully satd. compd. is formed. All these reactions proceed simultaneously. The 1st phase ends with the consumption of the conjugated system at the "critical point of hydrogenation." For the several substances investigated, the critical point corresponds to 68-77% of H absorbed. In the 2nd phase are hydrogenated those monoethylenic compds. which are formed in the 1st phase. III. One mol. of a conjugated system absorbs simultaneously 2 mols. of H, giving a satd. compd. directly. IV. The addn. of H is directed exclusively into the 1,2- and 3,4-positions. The double linkages of the conjugated system are hydrogenated independently. The process of hydrogenation of $CH_2:CHCMe:CH_2$ belongs to type II. The 1st phase, which proceeds at a const. rate, embraces several processes—the addn. of 1 mol. of H in the 1,2-, 3,4- and 1,4-positions—which lead to the formation of 3 amylenes, viz., $Me_2CHCH:CH_2$, $MeEtC:CH_2$ and $Me_2C:CHMe$. At the same time some Me_2CHI is formed. The 1st phase ends at the "critical point," corresponding to the addn. of 70-1% of H necessary for complete hydrogenation, at this point the whole of the $CH_2:CHCMe:CH_2$ has been consumed. In the 2nd phase the accumulated amylenes are consecutively hydrogenated: first the $Me_2CHCH:CH_2$, then the $MeEtC:CH_2$ and finally the $Me_2C:CHMe$. The hydrogenation curve of $CH_2:CHCMe:CH_2$ is horizontal in its 1st phase, but turns upwards at the critical point, denoting an increase in the rate. In the 2nd phase the curve shows 3 more or less horizontal sections corresponding to the 3 amylenes. In the hydrogenation of $CH_2:CHCMe:CH_2$ with ethylenic compds. the critical point retains its position. C. J. WEST

Hexa-tertiary-butylethynylethane. P. L. SALZBERG AND C. S. MARVEL. *J. Am. Chem. Soc.* 50, 1737-44(1928).— $(Me_3CC:C)_tCOH$, m . 100-2.2°, gives a cryst. complex

with SnCl_4 , $\text{C}_{19}\text{H}_{23}\text{O} \cdot \text{SnCl}_4$. With H_2SO_4 there results a yellow compd., m. 109.5–10.5° (cor.), to which is assigned the structure $(\text{Me}_2\text{CC}:\text{C})_2\text{C}:\text{CHCOOCMe}_3$. *Tri-tert-butylethynylbromoethane*, m. 69–70°, from the carbinol and PBr_3 ; there is also formed an isomer, m. 177–8°; the *acetate*, m. 144.5–5.5°. The bromide and mol. Ag give 46% of *hexa-tert-butylethynylethane*, m. 130–1°, which is undissoc. at room temp. and undergoes rearrangement at 140°, giving an isomer, m. 174–5°. Cleavage by alkali metals indicates that the stability of the central ethane linkage is intermediate between that of the corresponding linkages in $(\text{PhCH}_2)_2$ and $(\text{Ph}_3\text{C})_2$. C. J. WEST

Rearrangement of the triple bond. H. H. GUEST. *J. Am. Chem. Soc.* 50, 1744–6 (1928).—True acetylenes, $\text{RC} \equiv \text{CH}$, are changed into isoacetylenes, $\text{R}'\text{C}:\text{CR}'$, in the absence of EtOH , by vapor-phase thermal rearrangement. The rearrangement of heptene into isoheptenes is described. A general method for the synthesis of the higher

homologs of C_2H_2 is: $\text{RMgBr} + \text{CH}_2:\text{CHCH}_2\text{Br} \longrightarrow \text{RCH}_2\text{CH}:\text{CH}_2 \xrightarrow{\text{Br}} \text{RCH}_2\text{CH}:\text{CHBr} \xrightarrow{\text{KOH}} \text{RCH}_2\text{C} \equiv \text{CH}$. C. J. WEST

Polymerization of acetylene. I. CHIKO FUJIO. *J. Soc. Chem. Ind. Japan* 31, 77–86(1928).—Purified C_2H_2 is passed into a glass tube filled with a catalyst such as charcoal, pumice, clay, Japanese acid clay and brick heated at 400–700°. The yield and chem. nature of the tar produced depend upon the temp., rate of passing C_2H_2 and the nature of the catalyst; the max. yield is about 82% of theory by passing 5 l. of the gas per hr. over the clay heated at 650°. The tar is fractionally distd. The fraction b. under 175° consists of C_6H_6 and other aromatic hydrocarbons and the fraction b. 175–250° mostly of C_{11}H_8 . The yield of the gasoline-fraction of the tar is greatest when charcoal is used as catalyst. When a metallic tube such as Fe, Ni, Cu, Al, Fe coated with enamel, Sn and FeS , is used instead of a glass tube, the decompn. of C_2H_2 into C, H_2 and other gaseous substances takes place more abundantly than the polymerization. The tar thus produced is quite different in its chem. nature from that obtained by using a glass tube. A porcelain tube, however, serves like a glass tube in the polymerization of C_2H_2 . The gaseous substances such as CO, CO_2 , H_2 , CH_4 and coal gas generally found in the waste gas have not only a serious effect upon the chem. nature of the tar but an advantage in carrying out the reaction smoothly. In the polymerization of C_2H_2 into tar, the catalyst and C, the latter being formed by the decompn. of C_2H_2 and piled upon the former, seem to play an important role in the reaction. K. K.

Action of nascent thiocyanogen upon isoprene and dimethylbutadiene. H. A. BRUSON AND WM. A. CALVERT. *J. Am. Chem. Soc.* 50, 1735–7(1928).—Isoprene and $(\text{SCN})_2$ (prepd. from NaSCN in AcOH with Br) give a *dithiocyano addn. product*, m. 76–7° (cor.); it possesses a faint, disagreeable odor; its solns. cause blistering of the skin and its dust creates a sickening metallic taste in the mouth when inhaled. 2,3-Dimethylbutadiene gives a similar product, $\text{C}_8\text{H}_{10}\text{S}_2\text{N}_2$, m. 130°. These addn. products may be used to characterize these hydrocarbons. C. J. WEST

Unsaponifiable matter from the oils of elasmobranch fish. IV. Establishment of the structure of selachyl and batyl alcohols as monoglyceryl ethers. I. M. HEILBRON AND WM. M. OWENS. *J. Chem. Soc.* 1928, 942–7; cf. C. A. 21, 1112.—Batyl alc., m. 69–70°, for which an improved method of prepn. is given, forms a *phenylurethan*, m. 98° and a *p-nitrobenzoate*, pale yellow, m. 53–4°. While the alc. contains an alkyloxy radical, no test could be obtained for the MeO group. Heated with HI for 1 hr., octadecyl iodide results, identified by reduction to $\text{C}_{18}\text{H}_{38}$, and the formation of *octadecyl Me ether*, m. 30–1°. While the Me_2CHI was not isolated there is no doubt but that batyl alc. is a monoglyceryl ether of $\text{C}_{18}\text{H}_{37}\text{OH}$, probably of the formula $\text{C}_{18}\text{H}_{37}\text{OCH}(\text{CH}_2\text{OH})_2$. In a similar manner, selachyl alc. would be related to oleyl alc. and chimyl alc. to cetyl alc. C. J. WEST

Catalytic preparation of methylamine from methyl alcohol and ammonia. T. L. DAVIS AND R. C. ELDERFIELD. *J. Am. Chem. Soc.* 50, 1786–9(1928).— MeNH_2 is formed when MeOH and NH_3 are passed over a hot ThO_2 catalyst. The best temp. appears to be 325–30° and the best relative concn. about 0.80–0.83 mole of NH_3 per mole of MeOH. Under the best conditions nearly 33% of the MeOH is converted into MeNH_2 . The product contains no *sec-* or *tert-*amine. C. J. WEST

The identity of "carnirine" with trimethylamine oxide. F. A. HOPPE-SYLVÉR. *Z. physiol. Chem.* 175, 300–3(1928).—"Carnirine," the base isolated by Suzuki, Inouye and Bharatkar (*J. Coll. Agr. Tokio* 5, 9(1912)) from ext. of the Japanese giant crab and assigned the formula $\text{C}_6\text{H}_{11}\text{O}_2\text{N}_2$ is believed to be Me_3NO . The HCl salts and picrates of both have the same m. ps., and the elementary compn. of the HCl salt, chloroplatinate and picrate would be practically the same for Me_3NO as for $\text{C}_6\text{H}_{11}\text{O}_2\text{N}_2$.

Both bases are optically inactive and incapable of forming esters. Me_2NO is known to be a constituent of certain marine fishes.

A. W. DOX

Optically active α -arsonocarboxylic acids. II. J. BACKER AND C. H. K. MULDER. *Verslag Akad. Wetenschappen Amsterdam* 37, 289-91 (1928).—If K_2AsO_3 is allowed to react with an α -Br fatty acid, compds. of the general formula $\text{K}_2\text{O}_3\text{AsCHRCO}_2\text{K}$ are obtained from which the acids $\text{H}_2\text{O}_3\text{AsCHRCO}_2\text{H}$ are easily sepd. by HCl . α -Arsonobutyric acid, m. 127° ; α -arsonovaleric acid, m. 119° . Both are dibasic and may be titrated with phenolphthalein. The acids in C_3 , C_4 and C_5 are optically active. Their constituents may be sepd. by crystrn. of their diquinine salts in dil. alc. These salts contain resp. 6, 5 and 4 mols. H_2O ; their solubilities in H_2O at room temp. are, resp., 0.8, 0.7 and 0.6%. The optically active acids are obtained by transforming the quinine salts into the Ba salts with $\text{Ba}(\text{OH})_2$, then treating with strong HCl . They are more stable in alk. than acid soln. The Ba salts are stable in H_2O even at 100° . The racemization is a monomol. reaction. The following are the rotations for λ 674.0, 626.5, 589.3, 560.5, 536.5, 516.0, resp.: α -arsonopropionic acid, 31.5, 36.1, 41.0, 46.0, 52.2, 58.9° ; α -arsonobutyric acid, 19.7, 22.7, 25.7, 29.1, 32.5, 36.3° ; α -arsonovaleric acid, 16.7, 19.3, 22.1, 24.8, 28.3° ; Ba α -arsonopropionate, -6.5 , -7.3 , -8.5 , -9.7 , -10.5 , -11.7 ; Ba α -arsonobutyrate, -9.4 , -10.5 , -11.9 , -13.1 , -14.3 , -15.6 ; Ba α -arsonovalerate, -10.2 , -13.7 , -15.6 , -17.7 , -20.0 , -22.0° .

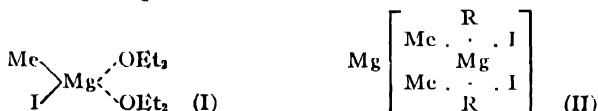
A. L. HENNE

The Grignard reaction. JAKOB MEISENHEIMER. *Ber* 61B, 708-20 (1928).—In the prepn. of alkylmagnesium halides from alkyl halides and Mg in Et_2O there is always formed some Mg dihalide; this side reaction can be repressed but never completely prevented by diln. and slow addn. of the alkyl halide. The quantity of alkylmagnesium halide can be detd. by the method of Gilman and his co-workers (titration with acid of the $\text{Mg}(\text{OH})_2$ formed by decompn. with H_2O). If, in addn., the halide ion liberated in the decompn. is titrated by the Volhard method, the extent of the above side reaction can also be detd. If it is desired to det. only the relative extents of the main and side reactions 3-4 cc. of the clear Et_2O soln. is poured into a measuring flask, decompd. with H_2O and a known quantity of HNO_3 and made up to the mark and the excess of HNO_3 is titrated in 1 aliquot and the halogen is detd. in the same or another aliquot. The ratio of HNO_3 used up to that of Ag soln. required should be 1.1 if alkylmagnesium halide has been formed exclusively. In 1 expt. with 0.9 g. Mg, 25 cc. Et_2O and 4.5 g. MeI the ratio $\text{I}^-:\text{OH}^-$ was found to be 1.10:1; with the MeI added dropwise, 1.03:1; in a EtMgI soln. prepd. without any special precautions, 1.2:1; in an EtMgBr soln., 1.1:1 (with the EtBr added dropwise, 1.05:1). With alkyl chlorides, the MgCl_2 , on account of its insoly. in Et_2O , seps. practically quant. and the Et_2O soln. contains pure alkylmagnesium chloride ($\text{Cl}^-:\text{OH}^- = 1$). Naturally, the method gives reliable results only if moisture and atm. O are rigorously excluded. Surprisingly enough, diln. of the Et_2O soln. alters the results. Thus, a soln. of MeMgI which gave an $\text{I}^-:\text{OH}^-$ ratio of 1.005:1 gave a value of 1.1:1.4 when dild. with about 20 vols. of the purest, carefully dehydrated Et_2O . The generally accepted formula $\text{RMgX} \cdot 2\text{Et}_2\text{O}$ for the alkylmagnesium halides has hitherto never been confirmed by direct analysis of cryst. compds. M. has now analyzed Ziegler's cryst. $\alpha\text{-C}_{11}\text{H}_{23}\text{MgBr}$ compd. and found it contains 3 mols. Et_2O but 1 mol. is so loosely held that the crystals deliquesce when pressed between filter paper, with effervescence and formation of a viscous oil, and lose 1 mol. Et_2O in *vacuo* in a few min., the rest of the Et_2O being given off only after several days at 100° under 20 mm. The crystals dissolve readily in Et_2O and if the soln. is allowed to evap. slowly it yields a solid glassy mass of the dietherate. In the hope of obtaining a similar cryst. deriv. of EtMgI concd. Et_2O solns. were allowed to stand in well-closed vessels; beautiful transparent crystals did, in fact, sep. after a few days but they proved to be the ethylate, often having the compn. $\text{EtOMgI} \cdot \text{Et}_2\text{O}$ but sometimes contg. less I and more Mg, i. e., they contained MgO , probably in the form of a strongly basic salt (see below). After each removal of this substance, the mother liquors yielded more crystals much more rapidly. This was at first ascribed to the introduction of O on opening the flask, but the succeeding crops of crystals did not increase in O content and numerous analyses showed that the atm. moisture, along with the O, is responsible for the more rapid crystn.; the crystals show a progressive increase of I (e. g., up to 53.8%), an increase in the ratio $\text{I}^-:\text{OH}^-$ (1.38:1) and a decrease in C and H (to 22.4 and 5.1%, resp.), i. e., the crystals gradually become contaminated with $\text{MgI}_2 \cdot 2\text{H}_2\text{O}$. On the other hand, if the EtMgI soln. was not allowed to stand quietly but was treated 2-3 hrs. with a rapid current of air, the crystals contained an excess of MgO (e. g., 1 42.2%, $\text{I}^-:\text{OH}^-$ 1:1.78). The ethylate is also obtained by adding the calcd. quantity of abs. EtOH to EtMgI or MeMgI in Et_2O . The auto-oxidation of MeMgI solns. proceeds less smoothly; rapid oxidation with a current

of air yields an oil which crystd. only once, the crystals having approx. the compn. $3(\text{McOMgI} \cdot \text{Et}_2\text{O}) + \text{MgO}$; as with the Et compd., practically no peroxide O could be detected iodometrically. Air oxidation of EtMgBr gave no products analogous to those obtained with the iodide. The Et_2O soln. on long standing yields crystals, to be sure, but these are $\text{HOMgBr} \cdot \text{Et}_2\text{O}$; when they are removed (and consequently air is admitted) the succeeding crops (which sep. more rapidly) contain increasing quantities of $\text{MgBr}_2 \cdot 2\text{H}_2\text{O}$. The $\text{HOMgBr} \cdot \text{Et}_2\text{O}$ is also formed when cold alkylmagnesium bromide solns. are treated with moist Et_2O contg. less than the calcd. quantity of H_2O . On the other hand, McMgI (and also MeMgBr) with H_2O in $\text{C}_6\text{H}_5\text{N}$ or Am_2O reacts with both H atoms of the H_2O , as found by Zerevitinov. A repetition of his expt. in Am_2O under exactly the conditions given by him yielded crystals which certainly consisted chiefly of $\text{MeI}_2 \cdot 2\text{Am}_2\text{O}$ with varying quantities of MeMgI , presumably as $\text{MeMgI} \cdot 2\text{Am}_2\text{O}$, and decompn. products; by passing dry air through an Am_2O soln. of McMgI were obtained crystals having approx. the compn. $\text{McOMgI} \cdot \text{Am}_2\text{O}$, which, of all the substances obtained, most closely resembled the product described by Z. as being $\text{McMgI} \cdot \text{Am}_2\text{O}$. With MeMgBr were obtained products consisting of $\text{MeMgBr} \cdot 0.5\text{Am}_2\text{O} + \text{MgBr}_2 \cdot 0.5\text{Am}_2\text{O} + \text{MgO}$. $o\text{-Cl}(\text{CH}_2)_3\text{C}_6\text{H}_4\text{Cl}$, $\text{Cl}(\text{CH}_2)_3\text{C}_6\text{H}_4\text{I}$, $\text{I}(\text{CH}_2)_3\text{C}_6\text{H}_4\text{Cl}$ and $\text{I}(\text{CH}_2)_3\text{C}_6\text{H}_4\text{I}$ do not react with Mg in Et_2O under any conditions (boiling for days with Mg powder or shavings, with etched Mg, in the presence of I or EtBr , in dry or moist Et_2O); in boiling C_6H_6 the di-I compd. and in boiling (iso-Am) $_2\text{O}$ all 4 of the substances do react, the di-I compd. quant., but under such drastic conditions the side reaction becomes more pronounced and after decompn. with H_2O the ratio $\text{I}^- : \text{OH}^-$ is considerably greater than 1:1 (around 3:1). $\text{Ph}(\text{CH}_2)_3\text{I}$, $o\text{-PrC}_6\text{H}_4\text{I}$ and $o\text{-BrC}_6\text{H}_4\text{CH}_2\text{Br}$ react readily with Mg, and at present the lack of reactivity of the 4 compds. above cannot be explained. The $o\text{-}[\gamma\text{-chloropropyl}]\text{chlorobenzene}$, obtained in 40–50% yield from $o\text{-Cl}(\text{CH}_2)_3\text{C}_6\text{H}_4\text{NH}_2 \cdot \text{HCl}$ in HCl with NaNO_2 and then CuCl , $b_{20} 112^\circ$, gives with NaI in boiling alc. 50–55% of the $\gamma\text{-iodopropyl analog}$, $b_{20} 142^\circ$. $o\text{-}[\gamma\text{-Chloropropyl}]\text{iodobenzene}$, from diazotized $\text{Cl}(\text{CH}_2)_3\text{C}_6\text{H}_4\text{NH}_2$ and KI (yield, 50–55%), oil quickly becoming brown, $b. 102^\circ$ in a high vacuum; $\gamma\text{-iodopropyl analog}$, golden yellow, $b. 132\text{--}4^\circ$ in a high vacuum. $o\text{-Propyl iodobenzene}$ (70% from diazotized $o\text{-PrC}_6\text{H}_4\text{NH}_2$ and KI), light brown, $b_{20} 121^\circ$. $(\text{CH}_2\text{Br})_2$ and Mg in Et_2O give under all conditions pure C_2H_4 and $\text{MgBr}_2 \cdot 2\text{Et}_2\text{O}$. C. A. R.

Molecular weight and constitution of the Grignard magnesium compounds. JAKOB MEISENHEIMER AND WALTER SCHLICHENMAIER. *Ber.* 61B, 720–9 (1928).—The structure I proposed by M. and Casper for the Grignard compds. has been attacked by Terentiev (C. A. 21, 504), who suggests the structure II ($\text{R} = \text{Et}_2\text{O}$) because in 3 mol. wt. detns. in boiling Et_2O (all at about the same concn.) he obtained values 2.2–2.3 times those corresponding to I. M. and S. believed the close agreement with each other of T.'s results to be accidental and that his high values were the result of assocn. Expt. has confirmed this view and shown, moreover, that T.'s results are unreliable for still another reason. In the 1st detns. T.'s method was followed closely, i. e., the Grignard soln. was evapd. *in vacuo*, then heated 2 hrs. at 75° *in vacuo* to remove all excess of MeI and the sirupy, turbid residue taken up in 20 cc. Et_2O and filtered through a glass filter from the flocks which deposited. With solns. so prepd. the mol. wts. found ranged in general from 1.3–1.6 times that calcd. for I in 1.5–2.0% soln. to 2.5 times in 11.5% soln. but the variations in the individual detns. were considerable. It was noticed, moreover, that on dilg. the Grignard reagent for the mol. wt. detn. it became quite turbid, even though the diluent Et_2O was dried with the greatest care with perfectly fresh Na wire or over P_2O_5 , whereas a fresh Grignard soln. prepd. in the usual way did not become turbid when dild. with the same Et_2O ; evidently, in the heating of the Grignard reagent at 75° it undergoes some change. Accordingly, for the later detns. a large excess of Mg was employed (2 g. for 2.7 g. EtBr and 15 cc. Et_2O) to insure the absence of any unchanged EtBr in the product, and the evapd. soln. was heated only 1 hr. at 25° *in vacuo*. Such a product gave only a very few flocks when taken up in 20 cc. Et_2O and dildn. of the filtrate with more Et_2O produced only a very slight turbidity. The mol. wts. now obtained increased perfectly regularly with increasing concn. from 179 in 1% soln. to 250 in 5.5% soln. (calcd. for EtMgBr , 133.3). With McMgI the turbidity produced on dilg. with Et_2O was somewhat greater; the mol. wts. found were 248, 289 and 329 for 1.343 g. in 30.33 g. solvent, 2.013 g. in 32.07 g. and 3.268 g. in 33.26 g., resp., and whereas the ratio $\text{I}^- : \text{OH}^-$ in the original soln. was almost exactly 1:1, in the (dild.) solns. after the mol. wt. detns. the ratio was shifted strongly in favor of the HO ions (see preceding abstr.). PhMgBr showed a mol. wt. of 294 in 3.6% soln. and 279 in 2.1% soln.; the solns. remained almost clear during the detns. and the ratio $\text{Br}^- : \text{OH}^-$ was shifted only from 1.10:1 to 1.06:1 on 10-fold

diln. with Et_2O . The results taken as a whole, indicate that alkylmagnesium halides are not dimol., as assumed by T., but, in not too concd. Et_2O soln., are chiefly monomol., and, as the concn. increases, become more and more associated; a very small proportion is dissociated into ions (EtMg^+ and Br^-), as indicated by the elec. cond. of the solns. Entirely similar results were obtained with $\text{MgI}_2 \cdot 2\text{Et}_2\text{O}$ (mol. wt., 296 and 392 for 0.5897 g. MgI_2 in 26.99 g. Et_2O and 1.557 g. in 31.66 g.). The fallacies in the evidence adduced by Ivanov (C. A. 21, 3893) and by Kierzek (C. A. 22, 573) in favor of the Jolibois formula, $\text{MgEt}_2 \cdot \text{MgI}_2$, for the Grignard compds. are briefly discussed.



C. A. R

Structures of convolvulinolic and jalapinolic acids. Synthesis of 11-hydroxypentadecanoic and 11-hydroxyhexadecanoic acids. LETHA A. DAVIES AND ROGER ADAMS *J. Am. Chem. Soc.* 50, 1749-55 (1928).—Me 10-aldchyddodecanoate and AmMgBr give 33% of Me 11-hydroxyhexadecanoate, b_p 183-6°, m. 40.5-1.5°; the free acid (I) m. 68-9°; oxidation with CrO_3 gives 11-ketohexadecanoic acid, m. 74-5°, identical with the acid obtained from jalapinolic acid. 11-Hydroxypentadecanoic acid, m. 63.5-4°; Me ester, b_p 166°, m. 29-32°; 11-ketopentadecanoic acid, m. 70-1°. 9-Ketohexadecanoic acid, m. 73.5-4.5°. Jalapinolic acid has been shown to be the *d*-form of I, through oxidation of both substances to the same keto acid and also by the reduction of the keto acid derived from the acid to a substance identical with the synthetic I. Convolvulinolic acid has been shown to have a structure different from that of I.

C. J. WEST

The butenoic amides. P. BRUYLANTS AND A. CASTILLE. *Bull. sci. acad. roy. Belg.* 13, 767-81 (1928).—Crotonamide (I), m. 159-60°, and isocrotonamide (II), m. 100-1°, have been prep'd. by hydrolysis with concd. H_2SO_4 of the corresponding nitriles. The lower boiling nitrile (b. 108°) gives a mixt. of I and II, and the higher-boiling nitrile (b. 121°) gives I exclusively. The spectrographic detn. in the ultra-violet of the two amides in H_2O are given. Vinylacetonitrile gives vinylacetamide (III), m. 74°, on hydrolysis with H_2SO_4 only if the acid is exactly neutralized. If excess alkali is used I is the only product obtained. Spectrographic detns. are also given, and III in alk. soln. is almost completely converted to I after 15 days at room temp. Alk. hydrolysis of cyclopropanonitrile gives cyclopropionamide, m. 123-4°. Methylacrylamide, m. 102-6°, is obtained by hydrolysis of the nitrile. On boiling in C_6H_6 it slowly polymerized to an amorphous mass.

D. H. POWERS

Resolution of racemic α -sulfonedibutyric acid. R. AHLBERG. *Ber.* 61B, 811-7 (1928); cf. C. A. 18, 2497.—It had been shown that the active $\text{SO}_2(\text{CHEtCO}_2\text{H})_2$ (I) are inactivated rapidly in H_2O but only preliminary expts. had been made on the inactivation velocity of the impure active forms and, on account of the relatively great rearrangement velocity it had not been attempted to prep. the different stereoisomeric forms of the free acid in pure form. The present paper deals with the prepn. of these active forms and with their properties. Of the Ba salts, that of the *dl*-I is the least sol., the rearrangement of the simple configurations into each other proceeds very rapidly in alk. soln. and in neutral or faintly acid soln. the different forms are relatively stable. It is best to dissolve the cryst I in moderately cooled, about 2 N $\text{Ba}(\text{OH})_2$, add $\text{Ba}(\text{OH})_2$ to strong alk., filter after a couple of days and recrystallize. In the recrystn., in order to render the free $\text{Ba}(\text{OH})_2$ harmless, not too small quantities of free I or of AcOH are added to disappearance of the alk. reaction. At around 40-50° the air-dry salt dissolves in 4 parts H_2O ; after 2-3 crystns. it seps. on cooling in (apparently rhombic) tables with 8 H_2O , stable in the air at 5-10° but losing 5 H_2O at room temp. and more at 30-40° or in very dry air; over H_2SO_4 it retains 0.5 mol. H_2O which it loses at 110°. Approx. soly. of the salt: at 12.9°, 0.25 M ; at 25.0°, 0.38 M . The *dl*-acid forms with alkaloids salts contg. 2 mols. base per mol. of I. With brucine and cinchonine, the salt of the (+)-acid is the less sol., with cinchonidine that of the (-)-acid. Resolution of the brucine salt by the method previously described but so modified as to avoid rearrangement as much as possible yielded 80% of the (+)-acid, $[\alpha]_D$ 107.7° (Et_2O at 14°), 91.1°, 88.6° (Me_2CO at 14° and 25°, resp.), 89.2°, 84.4° (EtOH at 14° and 25°), 41° (H_2O after 15 min. at 14° and 9 min. at 25°), about 44° (H_2O at 12°), soly. in 100 cc. Et_2O , 4.30 and 5.50 g. at 13° and 25°. $[\text{M}]_D$ of the

Ba salt, 63° and 55° (0.0485 *M* soln. in H₂O at 14° and 25°, resp.); after standing 3 days in the neutral soln. it regenerates a I with $[\alpha]_D^{14}$ 104°. In aq. H₂O the acid is 42% racemized after 190 days at 12–6°. (–)-I, obtained from the mother liquors of the brucine salt of the (+)-I (72% yield) or by resolution of the *dl*-I through the cinchonidine salt (yield, 11–2%), $[\alpha]_D^{14}$ –106.5°. C. A. R.

Kinetic studies on the rearrangement of the active α -sulfonedibutyric acids. R. AHLBERG. *Ber.* 61B, 817–26(1928).—The inactivation of the active α -sulfonedicarboxylic acids may be considered as a keto-enol rearrangement $\text{SO}_2(\text{CHR}\cdot\text{CO}_2\text{H})_2 \rightleftharpoons \text{SO}(\text{OH})(\cdot\text{CRCO}_2\text{H})\text{CHRCO}_2\text{H}$. The velocity of the inactivation decreases with increasing mol. wt. Thus the half-time for the inactivation of $\text{SO}_2(\text{CH}\cdot\text{EtCO}_2\text{H})_2$ (I) in H₂O at about 20° had been found to be about 4 hrs., and for $\text{SO}_2(\text{CH}\cdot(\text{CHMe}_2)\text{CO}_2\text{H})_2$ about 70 hrs.; for $\text{SO}_2(\text{CMeEtCO}_2\text{H})\text{CHMeCO}_2\text{H}$ (cf. following abstr.) it is 2.5–3 hrs. and for $\text{SO}_2(\text{CHMeCO}_2\text{H})_2$ Backer and Meijer (*C. A.* 21, 1964) found 1.9 hrs. The present investigation has confirmed the earlier observation that the rearrangement of the free I in H₂O within the range of concn. then studied increases with the diln.; as the concn. is still further decreased the velocity of inactivation passes through a max. (about 0.1 *M* soln.). For solns. 0.1 *M* with respect to I and contg. varying quantities of HCl (0.01–2.0 *M*), there is a slight max. with 0.01 *M* HCl, the inactivation velocity then decreasing steadily with increasing quantities of HCl. In 0.1 *M* solns. of I partially neutralized with NaOH a slight max. appears when the acid is $1/8$ neutralized; when more than about $1/4$ is neutralized the rearrangement velocity decreases almost linearly with the decrease in free acid and at complete neutrality becomes practically zero. The rearrangement velocity remains about the same (or is slightly increased) when the I is partly replaced by a corresponding quantity of H₃PO₄. The numerical data of the large no. of expts. made are given in full.

C. A. R.

α -Ethyl- α,α' -sulfonedipropionic acid. R. AHLBERG. *Ber.* 61B, 827–9(1928).—This work was carried out in 1923 but was not published on account of its incompleteness and is now reported because of the appearance of Backer's paper (*C. A.* 21, 1964). As in all his earlier work, the temps. given by A. for his kinetic measurements are only approx. as he did not have a reliable thermostat at that time. Oxidation of a mixt. of the *dl*-HO₂CCMeEtSCHMeCO₂H gave a mixt. of sulfone acids yielding, when worked up hot, a moderately sol. Ba salt, the free acid of which was resolved through the brucine salt (with the quinine salt is obtained another of the 4 active forms). For the 1st, α_D 2.50° for a 0.23 *M* soln. in a 1-dm tube at 18°, *k* for the rearrangement velocity at 25° was found to be 0.30 (time in hrs.); for the 2nd, α_D –2.26° for a 0.63 *M* soln. at 25°, *k* was 0.26.

C. A. R.

Configuration of pentaerythritol. J. BOESEKEN AND B. B. C. FELIX. *Ber.* 61B, 787–90(1928).—Recent Röntgenological studies indicate that in solid pentaerythritol (I) the central C atom does not lie at the center of a tetrahedron but at the apex of a pyramid. It should be comparatively easy to det. whether this is true of I in liquid (or dissolved) form, for I combines without difficulty with 2 mols. of an aldehyde or ketone or ketonic acid to form compds. of the type $\text{C}(\text{C}_2\text{H}_4\text{O}\cdot\text{CRR}')_2$, and if the central C atom is at the center of a tetrahedron the structure is asym. and should be resolvable into 2 enantiomorphic isomers, whereas if the C atom is at the apex of a pyramid then the compd. should be capable of existing in *cis-trans* isomeric forms. In 1 case Felix was able to obtain an optically active *dibenzal*pentaerythritol (II), apparently formed by spontaneous resolution of the racemate, which, by analysis, mol. wt. detn. and racemization with CHCl_3 contg. HCl, was shown with certainty to be an optical isomer of ordinary II, but it has never been possible to repeat the resolution. Nor has it ever been possible to resolve any of the acid condensation products of I with 2 mols. of an aldehyde or ketonic acid into optical components. The tetrahedral configuration is therefore possible but very labile. Similarly, no indication of *cis-trans* isomerism was ever obtained, so that the pyramidal configuration must also be very labile. The active II m. 188–9°, mol. wt. in camphor 296, mixed m. p. with ordinary II (m. 160°) 165–78°, $[\alpha]_D$ 30° (CHCl_3). *Dichloral*pentaerythritol (106 g. from 40.8 g. I and 120 g. $\text{CCl}_3\text{CHO}\cdot\text{H}_2\text{O}$ with concd. H_2SO_4 at 65–70°), m. 275°. *Di-Et diacetoacetate*-pentaerythritol, $\text{C}(\text{C}_2\text{H}_4\text{O}_2\cdot\text{CMeCO}_2\text{Et})_2$, from the components in boiling alc. HCl, *b*_D 145–50°; free acid, cryst. powder, mol. wt. (by titration) 305, loses CO₂ about 100° with quant. formation of $\text{C}(\text{C}_2\text{H}_4\text{O}_2\cdot\text{CMe})_2$, m. 115–6°. *Di-Et diacetylacetoacetate*-pentaerythritol, *b*_D 145°. mol. wt. (by sapon.) 338; free acid, m. 238°. Along with the above ester, the yield of which is 60%, is obtained a fraction *b*_D 145–65°, m. 95°, mol. wt. (by sapon.) 223 (calcd. for the monoether $\text{C}(\text{CH}_2\text{OH})_2(\text{C}_2\text{H}_4\text{O}_2\cdot\text{CMeCO}_2\text{Et})_2$, 222. *Dilevulinic acid*-

pentaerythritol, m. 186–8°, was similarly obtained, and *di-[m-benzaldehydesulfonic acid]-*, *di-[m-terephthaldehydic acid]*, and *di-[m-dimethylaminobenzaldehyde]-pentaerythritol* have been prepd. C. A. R.

Influence of groups and associated rings on the stability of certain heterocyclic systems. IV. Substituted butyro- and valerolactones. S. S. GUHA-SIRCAR. *J. Chem. Soc.* 1928, 898–903; cf. *C. A.* 21, 2877.— β -Substituted butyrolactones are prepd. by heating the dry Ag salt of a glutaric acid with I, a mixt. of the acid anhydride and the lactone with 1 less C atom than the original acid being formed; the yield is 30–40%; butyrolactone, b_{12} 89°, b. 206°; β -Me deriv., b_{12} 88°; β -Et deriv., b_{12} 99°; β -Me- β -Et deriv., b_{10} 98°; β , β -di-Et deriv., b_{12} 117°; β -cyclopentanespirobutyrolactone, b_{11} 120 1° (20% yield); β -cyclohexanespiro deriv., b_{11} 138° (45% yield). Valerolactones were obtained by reducing the anhydride with Na in abs. EtOH, the yields varied between 25 and 45% β -Methylvalerolactone, b_{12} 90°; β -Et deriv., b_{13} 104°; β -Me- β -Et deriv., b_{10} 122°, β , β -di-Et deriv., b_{15} 143–4°; β -cyclopentanespiro deriv., b_{12} 146°; β -cyclohexanespiro deriv., b_{10} 158 9°. The hydrolysis consists of these lactones in *N*/200 soln. at 25° in the presence of an equiv. quantity of NaOH are reported and show that, although the tendency is towards greater stability as each series of lactones is ascended, there are some deviations, such as the greatest stability of diethylbutyrolactone in the 1st series and of cyclopentanespirovalerolactone in the 2nd series. C. J. WEST

Preparation of *dl*-glyceraldehyde. H. A. SPOHR AND W. G. YOUNG. *Carnegie Inst. Washington Yearbook* 25, 175–7 (1925–6), *Expt. Sta. Record* 57, 817.—Synthesis was made through the following steps, which are reported in detail: The prepn. of β -ClCH₂CH₂CH(OEt)₂ from acrolein; its conversion into CH₂CHCH(OEt)₂; the prepn. from the latter of HOCH₂CH(OH)CH(OEt)₂ by a procedure specified; and glyceraldehyde from its acetal. H. G.

Ketazines of levulinic acid and of levulinic hydrazide. C. W. BENNETT. *J. Am. Chem. Soc.* 50, 1747–8 (1928).—Attempts to prep. the hydrazone of levulinic acid resulted in the formation of the *ketazine* of the acid, m. 119–20° (cor.); similarly, attempts to prep. the hydrazone of the hydrazide gave the *ketazine*, m. 219–20° (cor.). C. J. WEST

Action of organo-magnesium derivatives on some oxamides. R. BARRÉ. *Ann. chim.* 9, 204–75 (1928); cf. *C. A.* 21, 2888, 22, 579.—The chloride of oxanilide was prepd. and its action tried with EtMgBr, EtMgI, iso-BuMgCl, PhMgBr and PhMgI. The yields were very poor and the products unstable, being usually resinous. Et *N*-diethyloxamate (I), Et₂NCOCOOEt, 75% yield from (CO₂Et)₂ and anhyd. Et₂NH, b_{14} 127°, b. 250°. Condensation of I with EtMgBr gave α -ethyl- α -hydroxybutyric diethylamide (II), Et₂C(OH)CONEt₂, and propionylformic diethylamide (III), in quantities varying with the conditions of the expt. In Et₂O at 0° the yield was 70–80% of II and 20% or less of III; at -15°, 70% of III; in C₆H₆ at 70° the product was chiefly II together with a little (EtCO)₂. At -15° the action of the organo-magnesium deriv. on the ester function could be stopped at the intermediate ketone stage. The amide function was not attacked. II, b_{11} 120°, is not sapon. by acid or alkali. III, b_{11} 99–100°, sol. in concd. HCl. The following derivs. of III were prepd.: semicarbazone, α -form, m. 140–1°, obtained by prepn. in AcOH, and β -form, m. 170–1°, obtained by shaking III a long time with a concd. soln. of semicarbazide-HCl, or by adding a few drops of HCl to a soln. of the α -form in hot H₂O; phenylhydrazone, m. 101–2°; *p*-nitrophenylhydrazone, yellow, m. 124–5°. III, hydrolyzed by energetic stirring with a large excess of concd. HCl dild. with an equal vol. of H₂O, gave propionylformic acid (IV), (70% yield), m. 31–2°, b_{21} 85°. Semicarbazone of IV, m. 190°, instantaneous fusion 210°; phenylhydrazone, m. 152°, instantaneous fusion 161°; oxime, m. 161°, instantaneous fusion 167°. I with BuMgBr in Et₂O at -15° gave 90% valerylformic diethylamide (V), b_{11} 120 2°. Semicarbazone of V, m. 160°, instantaneous fusion 163°. V, hydrolyzed by HCl, gave a 60% yield of BuCOCOOH (VI), b_{14} 93–4°, m. 15°. Derivs. of VI: oxime, m. 140°; phenylhydrazone, m. 89°; semicarbazone, m. 180°, instantaneous fusion about 200°. When I is condensed with PhMgBr at -15° the products vary with the conditions of the expt, and may be either benzilic diethylamide (VII), (63% yield), or phenylglyoxylic diethylamide (VIII), PhCOCONEt₂, (63% yield). VII, m. 95 6°, with concd. H₂SO₄ gave a red color which soon changed to green. VII is not sapon. by alkalis. Hot HCl converted it into benzilic acid. VII, yellow, b_{18} 183 5°. Semicarbazone, instantaneous fusion, 204–5°. VIII is not sapon. by hot 30% KOH, is hydrolyzed by concd. HCl to BzCO₂H, m. 64–5°. Condensation of I with PhCH₂MgCl in Et₂O at -15° gave 70% of benzylglyoxylic diethylamide (IX), and 15% of dibenzylglycolic diethylamide. IX, yellow, b_7 155–7°. Semicarbazone, m. 202°, instantaneous fusion 211–2°. IX, hydrolyzed by HCl, gave PhCH₂-

COCO_2H , m. 155°. This work furnishes a general method for the prepn. of α -ketonic acids by the condensation at -15° of I with the organo-magnesium deriv. of the acid desired. The products are pure and the yields usually about 60%. From $(\text{CO}_2\text{Et})_2$ and Et_2NMgBr was obtained $(\text{CONEt}_2)_2$ (X) (70–5% yield), yellowish, m. 31–2°, b₄ 142°. The chief products formed by the condensation of X with EtMgBr were α -diethylaminobutyric diethylamide (XI) and III. Condensation in Et_2O gave 20% XI and 70% III; in C_6H_6 at 70°, 36% XI and 55% III; in PhMe at 90° in an atm. of H and with mech. stirring, 60% XI and 28% III. Condensation of X with PhMgBr in PhMe in an atm. of H and with mech. stirring gave some VII and 75% of diethylaminodiphenylacetic diethylamide, b₃ 182–4°. Organo-magnesium derivs in reacting with X attacked only 1 of the amide functions. The yields were increased by a rise in temp. and by mech. stirring.

LOUISE KELLEY

Action of cuprous cyanide on methyl iodide. H. G. J. HARTLEY. *J. Chem. Soc.* 1928, 780–1. —Very little combination between CuCN and MeI occurs at the b. p. of MeI; at 100° the compd. $(\text{CuCN})_3 \cdot \text{MeI}$, is formed, which can be dried in the air without decompu. but gradually loses MeI *in vacuo*; at 100° the CuCN is recovered almost unchanged. In the presence of excess MeCN, CuCN and MeI at 100° give almost quant. the compd. $\text{CuCN} \cdot \text{MeI}$, which may be crystd. from MeCN; this also results from MeI and CuCN at 135° but the yield is poor, because of formation of tarry products and CuI. Mol. wt. detns. indicate the formula $3(\text{CuCN} \cdot \text{MeI})$. Ag_2SO_4 decomps. the compd., giving AgI, Ag, CuSO_4 and $\text{Cu}(\text{NCMe})_2\text{SO}_4$; AgNO_3 behaves similarly. The $\text{Cu}(\text{NCMe})_2\text{SO}_4$ complex has not been isolated. CuCN and MeCN combine with evolution of heat to form the unstable compd. $\text{CuCN} \cdot \text{MeCN}$; the MeCN is gradually given off on exposure to the air. Other insol. cyanides give similar compds.; AgCN and $\text{Zn}(\text{CN})_2$ do not react in this way.

C. J. WEST

Chloroaurates of nuclein bases. F. A. HOPPE-SEYLER AND WERNER SCHMIDT. *Z. physiol. Chem.* 175, 304–10 (1928). —Guanine and hypoxanthine, like adenine, form stable cryst. AuCl_3 salts. The difficultly sol. hypoxanthine Au salt is especially easy to obtain. The recognition of adenine as Au salt along with other nuclein bases is often difficult and uncertain without analysis of the product. Guanine chloroaurate is easily distinguished from adenine chloroaurate on account of its soly. and cryst. form. However, these 2 differ in compn. by only 2 H. The regular hypoxanthine Au salt may be utilized for identification. When this is converted into the irregular salt (+HCl), the drop of 3% in Au content is a useful characteristic. A. W. DOX

Sugar cleavage by the action of very dilute alkali. F. FISCHLER AND A. F. LINDNER. *Z. physiol. Chem.* 175, 304–47 (1928). —Distn. of monoses and bioses (glucose, fructose, galactose, lactose, maltose) with dil. alkali ($M/50 \text{ Na}_2\text{CO}_3$) results in the formation of 3.8–6.5% AcCHO , the highest yields being obtained in the presence of Na_2SO_4 and an atm. of CO_2 . The loss in reducing power of the sugar and the increase in acidity are so uniform as to make it seem probable that the different sugars undergo the same type of cleavage. $\text{CO}(\text{CH}_2\text{OH})_2$, which behaves in the same way except that it is more reactive, or else the closely related glyceric aldehyde, is probably the 1st cleavage product of both monoses and bioses through the action of alkali. With all the sugars there is greater formation of acid at 0.1 N than at 0.01 N or 0.5 N alkali. For each mol. of hexose 1.35–2.00 equivs. of acid are formed, as would be expected from a cleavage of hexose into trioses. The identical behavior of $\text{CO}(\text{CH}_2\text{OH})_2$ in this respect validates the assumption of triose formation from hexose. The loss in reducing power of the sugar is not a reversible reaction, since addn. of acid has no effect after the alkali treatment.

A. W. DOX

Synthesis of cyclic compounds. II. Ethyl *dl*- and *meso*- β,γ -diphenylbutane- $\alpha,\alpha,\delta,\delta$ -tetracarboxylate. Synthesis of a truxinic acid. ISRAEL VOGEL. *J. Chem. Soc.* 1928, 1013–22; cf. *C. A.* 21, 3603. —Reduction of $\text{PhCH}_2\text{C}(\text{CO}_2\text{Et})_2$ by moist Al-Hg gives, in addn. to 50–5% of $\text{PhCH}_2\text{CH}_2(\text{CO}_2\text{Et})_2$, 35–40% of a mixt. of 2 esters of which about 40% is *Et dl-\beta,\gamma*-diphenylbutane- $\alpha,\alpha,\delta,\delta$ -tetracarboxylate (I), m. 88°, the remainder being the *meso*-ester (II), viscid red oil. Hydrolysis of I gives the *dl*-acid, m. 219–20° (decompn.); the *meso*-acid, from II, m. 182–3°. Both esters form di-Na compds., II more readily than I, on treatment with a suspension of MeONa in dry Et_2O . The di-Na compd. from I reacts with Br to give a *di-Br deriv.*, m. 180°. The di-Na compd. from II reacted with the calcd. quantity of Br to give a viscid, dark red ester, hydrolyzed to a 2,3-diphenylcyclobutane-1,4-dicarboxylic acid (truxinic acid), m. 239° (less than 1% yield), analyzed as the di-Me ester, m. 117°; this is very probably the γ -truxinic acid. The very small yield is doubtless due to stereochem. influences such as are postulated by the modified strain theory but the possibility that a polarity factor may play some part must not be overlooked.

C. J. WEST

Δ^2 -Cyclopentenylethylalkylacetic acids and their bactericidal action towards *B. leprae*. XII. J. A. ARVIN and ROGER ADAMS. *J. Am. Chem. Soc.* **50**, 1790-4 (1928); cf. C. A. **22**, 228.— **Δ^2 -Cyclopentenylethyl bromide (I)**, from the alc. and PBr_3 in PhMe, b_{16} 71-2°, n_D^{20} 1.4995, d_4^{20} 1.2869. The Grignard reagent of I, with $(\text{C}_2\text{H}_5)_2\text{O}$ gives 38% of **Δ^2 -cyclopentenylbutanol**, b_{24} 118-23°, n_D^{20} 1.4723, d_4^{20} 0.9317; **bromide**, b_8 82-6°, n_D^{20} 1.4942, d_4^{20} 1.2229 (47% yield). With $\text{CHO}(\text{CH}_2)_2\text{CO}_2\text{Me}$ the Grignard reagent of I gives **Me 9-hydroxyhydnoic acid**, b_2 177-9°, n_D^{20} 1.4720, d_4^{20} 0.9874; sapon. gives **9-hydroxy di-hydnoic acid**, m 62.0-2.8°. The following *di-Et* **Δ^2 -cyclopentenylethyl alkylmalonates**, $\text{C}_6\text{H}_7(\text{CH}_2)_2\text{C}(\text{CO}_2\text{Et})_2\text{R}$, were prepd: R = C_6H_{13} , b_2 152-5°, n_D^{20} 1.4598, d_4^{20} 0.9742 (this order will be used below); C_7H_{15} , b_1 159-62°, 1.4602, 0.9649; C_8H_{17} , b_2 178-81°, 1.4605, 0.9624; C_9H_{19} , $b_{1.5}$ 1.4609, 0.9567; $\text{C}_{10}\text{H}_{21}$, $b_{2.1}$ 183-7°, 1.4613, 0.9531; $\text{C}_{11}\text{H}_{23}$, $b_{2.1}$ 190.4°, 1.4616, 0.9486; $\text{C}_{12}\text{H}_{25}$, $b_{2.2}$ 197.201°, 1.4618, 0.9460. *Di-Et* **Δ^2 -cyclopentenylalkylmalonates**, $\text{C}_6\text{H}_7\text{C}(\text{CO}_2\text{Et})_2\text{R}$: R = $\text{C}_{10}\text{H}_{21}$, $b_{1.5}$ 180-2°, 1.4616, 0.9642; $\text{C}_{11}\text{H}_{23}$, b_1 176-80°, 1.4622, 0.9598; $\text{C}_{12}\text{H}_{25}$, b_2 193-6°, 1.4627, 0.9559. *Di-Et* **ω - Δ^2 -cyclopentenylbutylmalonate**, $\text{C}_6\text{H}_7(\text{CH}_2)_4\text{CH}(\text{CO}_2\text{Et})_2$, b_3 152-5°, 1.4598, 1.077. **Δ^2 -Cyclopentenylethylalkylacetic acids**, $\text{C}_6\text{H}_7(\text{CH}_2)_2\text{CH}(\text{CO}_2\text{H})\text{R}$: R = C_6H_{13} , $b_{2.3}$ 160.3°, 1.4679, 0.9426; C_7H_{15} , $b_{2.3}$ 166-8°, 1.4698, 0.9358; C_8H_{17} , $b_{1.5}$ 174.6°, 1.4700, 0.9315; C_9H_{19} , b_2 183-5°, 1.4701, 0.9269; $\text{C}_{10}\text{H}_{21}$, $b_{1.5}$ 186.8°, 1.4702, 0.9227; $\text{C}_{11}\text{H}_{23}$, $b_{1.3}$ 190.3°, 1.4703, 0.9196; $\text{C}_{12}\text{H}_{25}$, m 30-1.5°, $b_{1.5}$ 199.203°. **Δ^2 -Cyclopentenylalkylacetic acids**, $\text{C}_6\text{H}_7\text{CH}(\text{CO}_2\text{H})\text{R}$: R = $\text{C}_{10}\text{H}_{21}$, $b_{1.5}$ 183.6°, 1.4692, 0.9319; $\text{C}_{11}\text{H}_{23}$, $b_{1.5}$ 188.90°, m 36-8°; $\text{C}_{12}\text{H}_{25}$, b_2 202-4°, m 38-9°. **ω - Δ^2 -Cyclopentenylethylacetic acid**, b_4 125.6°, 1.4718, 0.9904; the *Bu* deriv., b_6 149-54°, 1.4740, 0.9862. The yields of the malonates were 58-60% of the acids, 90%. Those acids contg 16-18 C atoms showed a high bactericidal action towards *B. leprae*. The olefin linkage does not produce any sp. effect. C. J. WEST

The condensation of cyclohexene with some aromatic hydrocarbons in the presence of aluminum chloride. DANIEL BODROUX. *Compt rend* **186**, 1005-6 (1928).—Cyclohexene condensed in the presence of AlCl_3 gives (a) with toluene, 63% of **cyclohexyl-toluene**, d_{16} 0.938, n_D^{16} 1.527, b_{758} 255.61°; (b) with *p*-xylene, 45% of **2-cyclohexyl-1,4-dimethylbenzene**, d_{18} 0.936, n_D^{18} 1.529, b_{760} 261.2°, and a small amount of **dicyclohexyl-1,4-dimethylbenzene**, m 156.7°; (c) with *m*-xylene, 81% of **5-cyclohexyl-1,3-dimethylbenzene**, d_{18} 0.931, n_D^{18} 1.525, b_{764} 266.8°; (d) with mesitylene, 35% of **2-cyclohexyl-1,3,5-trimethylbenzene**, turns yellow on exposure to the air, d_9 0.946, n_D^9 1.535, b_{746} 283.4°; (e) with cymene, 40% of **cyclohexyl-1-isopropyl-4-methylbenzene**, d_{24} 0.916, n_D^{24} 1.517, b_{739} 279-83°, and a small amount of **dicyclohexyl-1-isopropyl-4-methylbenzene**, a thick yellowish liquid, b_{22} 210-20°. J. S. REICHERT

Some derivatives of quinitol. I. PALFRAY and B. ROTHSTEIN. *Compt. rend* **186**, 1007-8 (1928).—The pure *cis*-isomer of quinitol with AcCl or Ac_2O gives quant. a mixt. of the *cis*- and *trans*-di Ac derivs. The pure *trans*-isomer gives only the *trans*-di-Ac deriv., m. 101-2°. An attempt to prepare the mono-Ac compd. gave the di-Ac compd. and a small quantity of *bis*-[4-hydroxycyclohexyl] oxide, a colorless, viscous, liquid, b_{16} 132-3°, d_4^{19} 1.0920, n_D^{18} 1.4578, n_D^{19} 1.4574, R_D 57.91. The pure *cis*-isomer with BzCl gives 2 solids (m. 116° and 157°) at elevated temps. while in the cold the *cis*- and *trans*-compds. give only one solid each (m. 116.7° and 151°, resp.). Isomerization is not due to the halogen, since it occurs also with Ac_2O and HOAc . J. S. R.

Derivatives of butylbenzene. R. R. READ and D. B. MULLIN. *J. Am. Chem. Soc.* **50**, 1763-5 (1928).—Nitration of PhBu with HNO_3 - H_2SO_4 at 0° gives a mixt. of the *o*- NO_2 deriv., b_{15} 131-3°, d_4^{20} 1.071 and the *p*- NO_2 deriv., b_{15} 143.5°, d_4^{20} 1.065; nitration with fuming HNO_3 in AcOH gives 70% of the *p* isomer with only very small quantities of the *o*-isomer. *o*-Butylaniline, b_{12} 122.5°, d_4^{20} 0.953; *HCl* salt, m. 137°; the *p*-isomer, b_{11} 133-4°, d_4^{20} 0.945. *p*-Butylphenol, b_9 121.3°, b_{751} 746.50°, d_4^{20} 0.978; *p*-nitrobenzoate, yellow, m 67-8°. *o*-Butylphenol, b_{14} 113.5°, b_{760} 234-7°, d_4^{20} 0.975. *2-Nitro-4-butylphenylglycidide*, yellow. *m*-Butylphenol, b_{768} 247-9°, d_4^{20} 0.974. These phenols have a high phenol coeff. C. J. WEST

Melting point of *m*-dinitrobenzene. FRANCES McCAMISH and ALBERT SALATHE. *J. Am. Chem. Soc.* **50**, 1785 (1928).—The m. p. of m - $\text{C}_6\text{H}_4(\text{NO}_2)_2$ is 89.57°. C. J. W.

Derivatives of benzyl-*p*-phenylenediamine. J. REILLY and J. J. MOORE. *J. Soc. Chem. Ind.* **47**, 116T (1928).—The diazo salt from sulfanilic acid was added to PhNH Bz in AcOH , and the red dye so obtained was reduced with SnCl_2 and HCl , when benzyl-*p*-phenylenediamine (I), m. 37°, was obtained. Diazotization of I with 2

mols. HNO_2 gave a sol. nitrosodiazonium chloride, which coupled with β -naphthol to give a nitroso- β -naphthol deriv., red prisms, m. $169-70^\circ$. When I is diazotized and coupled with chromotropic acid, a dye is obtained which gives purple shades on wool.

T. S. CARSWELL

Thermal decomposition of nitrites. The nitrites of triphenylethylamine and diphenylethylamine. LESLIE HELLERMAN, M. L. COHEN AND R. E. HOEN. *J. Am. Chem. Soc.* 50, 1716-29 (1928).— β,β,β -Triphenylethylammonium nitrite (I), decomp. 128° , results from the amine-HCl and NaNO_2 ; the nitrate (II), from the HCl and 50% HNO_3 , decomp. 239° . The principal product of the action of heat upon I in aq. suspension is $\text{Ph}_2\text{C}:\text{CHPh}$; I, heated in the dry state, gives also II. An hypothesis to account for the product of thermal decompn. and to interpret the action by which it is produced has been developed. This hypothesis, which involves diazotization of the amine and subsequent formation of a transitorily existing methylene intermediate, is useful in the interpretation of various amine nitrite decompns. which have been recorded in the literature. The thermal decompn. of the nitrite of $\text{Ph}_2\text{CHCH}_2\text{NH}_2$ leads to $\text{Ph}(\text{PhCH}_2)\text{CHOH}$ or to $\text{PhCH}:\text{CHPh}$, depending upon the conditions. β,β -Diphenylethyl nitrosourethan, stable, viscous, straw-colored oil, from the urethan and nitrous gases; with EtONa at -15° this gives an impure β,β -diphenyldiazoethane; this spontaneously decomps into a yellow resinous mass at 0° ; heated with acid, stilbene results, while in alkali, $\text{Ph}_2\text{CHCH}:\text{N}_2\text{CHCH}:\text{H}$ results. The action of HgO upon I at 135° gives Ph_2CCHO in addn. to $\text{Ph}_2\text{C}:\text{CHPh}$. PhCOCH_2Ph and HgO at 100° give 74% of benzil and very little $\text{Ph}_2\text{C}:\text{CO}$.

C. J. WEST

Chloramines as halogenating agents. Iodination by a chloramine and an iodide. A. E. BRADFIELD, K. J. P. ORTON AND I. C. ROBERTS. *J. Chem. Soc.* 1928, 782-5.—The iodinating reagent (I) is formed by adding NaI (finely powd.) to dichloramine-T in glacial AcOH (HI may also be used, or HCl and I); this is added slowly to the aniline in AcOH . PhNH_2 with 1 equiv. I gives $p\text{-IC}_6\text{H}_4\text{NH}_2$; with 3 equivs. I, $1,3\text{-C}_6\text{H}_2\text{NH}_2$, $2,4\text{-Cl}_2\text{C}_6\text{H}_3\text{NH}_2$ and 2 equivs. I give $2,4,6\text{-Cl}_3\text{IC}_6\text{H}_2\text{NH}_2$ (*Ac deriv.*, m. $198-9^\circ$). $2,4\text{-ClBrC}_6\text{H}_3\text{NH}_2$ gives 2-chloro-4-bromo-6-iodoaniline, m. $95-6^\circ$; *Ac deriv.*, m. 213° . PhNHAc , heated with 2 equivs. I, 15 min., gives 80% $p\text{-IC}_6\text{H}_4\text{NHAc}$; bromination with twice the calcd. amt. of Br in 70% AcOH at 70° for 20 min gives 2-bromo-4-iodoacetanilide, m. 143° , hydrolyzed to 2-bromo-4-iodoaniline, m. $75-6^\circ$. Chlorination with dichloramine-T and HCl gives 2-chloro-6-bromo-4-iodoaniline, m. $113-4^\circ$; *Ac deriv.*, m. 221° . $o\text{-Cl}_2\text{NC}_6\text{H}_3\text{NH}_2$ and 1.5 equivs. I give the 4-I deriv. (II); further heating with more I gives the 4,6-I₂ deriv. Chlorination of II gives 2-chloro-4-iodo-6-nitroaniline, orange, m. 124° (*Ac deriv.*, straw-colored, m. 227°); 2-Br deriv., orange, m. $117-8^\circ$ (*Ac deriv.*, straw-colored, m. 222°). Heating $4,2\text{-Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{NH}_2$, 3 hrs. at 100° with 2 equivs. I gives 4-chloro-2-iodo-6-nitroaniline, orange, m. $137-8^\circ$ (*Ac deriv.*, very pale straw-colored, m. 207°); 4-bromo-2-iodo-6-nitroaniline, orange, m. $146-7^\circ$ (*Ac deriv.*, pale yellow, m. 215°).

C. J. WEST

Chlorination of anilides. III. N-Chlorination and C-chlorination as simultaneous side reactions. K. J. P. ORTON, F. G. SOPER AND GWYN WILLIAMS. *J. Chem. Soc.* 1928, 998-1005, cf *C. A.* 4, 3216.—The earlier conclusions regarding the conversion of chloramines into nuclear substituted anilides has received further confirmation by actual measurements of the velocities of the 2 individual reactions, N- and C-chlorination, in 40% AcOH . The use of a new method of analysis has shown that, in the reaction between Cl and anilides, the ratio of the quantities of chloramine and chloroanilide formed at a given moment is independent of the time. Wegscheider's test (*Z. physik. Chem.* 30, 593 (1899)) is thus satisfied and chloramine formation and nuclear chlorination are therefore simultaneous. The position of equil. in 40% AcOH allows chloramine formation to be treated as though it were an irreversible reaction. The reaction is followed by transferring known vols. of the (already acid) reacting mixt. alternately to aq. KI, which gives the Cl + chloramine concns. and aq. $p\text{-MeC}_6\text{H}_4\text{OH}$, which removes Cl, whereupon the chloramine is detd. by addn. of KI and titration. The values for k_N and k_C at 18° in 40% AcOH are reported for 7 compds.: $o\text{-ClC}_6\text{H}_4\text{NHAc}$, 286, 27.5; m -isomer, 172, 3140; p -isomer, 115, 135; $p\text{-BrC}_6\text{H}_4\text{NHAc}$, 123, 116; $o\text{-MeC}_6\text{H}_4\text{NHAc}$, 140, 1390; $p\text{-MeC}_6\text{H}_4\text{NHAc}$, 2540, 18,500; PhNHAc , 96, 11,000. IV. The significance of velocity measurements in relation to the problem of benzene substitution. A. E. BRADFIELD AND BRYNMOR JONES. *Ibid* 1006-12.—The velocity coeffs. for the chlorination of a no. of substances of the type p - and $o\text{-ROC}_6\text{H}_4\text{X}$ in 99% AcOH at 20° are reported. The velocity of chlorination of phenolic ethers increases rapidly with increasing H_2O content of the medium, the increase for an alteration from 1 to 2% of H_2O being almost as great as for a rise in temp. of 10° ; the velocity coeffs. are slightly altered by a change in the relative concns. of Et_2O and Cl. If r_1 represents the

ratio of the total *o*-compd. formed to the total *p*-compd. at the temp. T_1 , then by means of the equation $\log_{10} (r_1/2)/\log_{10} (r_2/2) = T_2/T_1$, r_2 for a temp. T_2 may be evaluated; in a similar manner the ratio *o*:*m*:*p* for a reaction yielding all 3 isomers, at any 1 temp., can be calcd. from the values at another temp. Examples are given, which suggest the adoption of the working hypothesis that the primary factor deciding the proportions of the isomers formed in aromatic substitution reactions is the energy of activation corresponding to the different positions available and not the phase relationships of the mol. A discussion of the introduction of a 3rd substitute shows that the relative directive powers of 2 groups, OR_1 and OR_2 , as measured by the ratio of the velocity coeffs., should be independent of the nature of the group X. Results are given which support this conclusion.

C. J. WEST

Semicarbazides substituted in the 1- and 2-positions. 1-Benzylsemicarbazide and 2-benzylsemicarbazide. J. BOUGAULT AND J. LEROUCQ *Compt. rend.* **186**, 957-60 (1928). The semicarbazide, m. 135°, prep'd by Curtius (cf. *J. prakt. Chem.* [2], **62**, 97 (1900)) from KCN and $\text{PhCH}_2\text{NHNH}_2$ reacts with BzH to form benzalbenzyl semicarbazide, m. 159.5-160°, and with excess KCN to form benzylhydrazodicarboxamide, $\text{PhCH}_2\text{N}(\text{CONH}_2)\text{NHCONH}_2$, m. 256°, proving it to be 2-benzylsemicarbazide instead of the 1-substituted comp'd. as stated by Curtius. This is in agreement with the idea that negatively substituted hydrazines (Ph, tolyl, etc.) yield carbazides substituted in the 2-position, whereas more positive groups (Me, Et, etc.) yield 1-substituted carbazides.

A. S. CARTER

The coupling of benzene nuclei with the aid of the diazo reaction. W. BRYD. *Roczniki Chem.* **7**, 436-45 (1927). CuCl_2 (15 g.) in 80 cc. conc'd. HCl was added at 0° in small portions and with efficient stirring to a diazo soln. prep'd. from 10 g. $m\text{-ClC}_6\text{H}_4\text{NH}_2$, 24 g. 35% HCl, 40 g. H_2O and 5.4 g. NaNO_2 . The reaction was completed in 10 min., yielding 45% $p\text{-C}_6\text{H}_4\text{Cl}_2$ and 33% $(m\text{-ClC}_6\text{H}_4\text{N})_2$. The following compds. were obtained in a similar manner: 62% $p\text{-C}_6\text{H}_4\text{ClBr}$ and 20% $(p\text{-BrC}_6\text{H}_4\text{N})_2$; 55% $o\text{-C}_6\text{H}_4\text{ClBr}$ and 28% $(o\text{-BrC}_6\text{H}_4\text{N})_2$; 45% $o\text{-ClC}_6\text{H}_4\text{Me}$ and 33% $(o\text{-MeC}_6\text{H}_4\text{N})_2$; 82% $p\text{-ClC}_6\text{H}_4\text{OMe}$; 82% $p\text{-C}_6\text{H}_4\text{ClCO}_2\text{H}$, 74% $m\text{-C}_6\text{H}_4\text{ClCO}_2\text{H}$, 87% $o\text{-C}_6\text{H}_4\text{ClCO}_2\text{H}$. The reduction of 12 g. stable $p\text{-O}_2\text{NC}_6\text{H}_4\text{N}_2\text{Cl}$ in 15 g. glacial AcOH with 30 g. anhyd HCO_2H first at room temp., then on the water bath and finally over the open flame yielded 20% PhNO_2 , 20% *p*-nitrophenol and 20% of a substance, m. 175°, probably a hydroxyazo comp'd. The brown alkali-sol. substance obtained by the reduction of $m\text{-O}_2\text{NC}_6\text{H}_4\text{N}_2\text{HSO}_4$ with $\text{Cu-HCO}_2\text{H}$ could not be identified. The reduction of $p\text{-MeC}_6\text{H}_4\text{N}_2\text{HSO}_4$ with HCO_2H and $\text{HCO}_2\text{H-Cu}$ yielded 20% *p*-cresol and a large quantity of resin. *p*-Chlorodiazofluorene was reduced by anhyd HCO_2H to 50% 2-hydroxyfluorene. Isodiazoo compds. were reduced with ale. $p\text{-O}_2\text{NC}_6\text{H}_4\text{N}_2\text{ONa}$ (prep'd. by adding at 5° to the diazo soln. from 10 g. *p*-nitroaniline 33% NaOH to an alk. reaction) was stirred with 120 cc. EtOH at 5°, then left at room temp. until the complete disappearance of the diazo reaction (R salt). Yield: 28% PhNO_2 , 44% $(p\text{-O}_2\text{NC}_6\text{H}_4)_2$. Similarly were obtained: 33% PhNO_2 and 42% $(m\text{-O}_2\text{NC}_6\text{H}_4)_2$; 51% anisole and 20% *p*-azoanisole; 22% C_{10}H_8 and 50% $(\alpha\text{-C}_{10}\text{H}_7\text{N})_2$; 22% C_{10}H_8 and 45% $(\beta\text{-C}_{10}\text{H}_7\text{N})_2$; 50% benzene and 25% Ph_2 ; 25% cinnamic acid and 50% $(m\text{-HO}_2\text{CCH}_2\text{CHC}_6\text{H}_4\text{N})_2$; 28% MeCOPh and 44% *azo-p-acetophenone* (unknown in the literature, properties not described); 77% $o\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$; 80% $p\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$; 80% $m\text{-HOC}_6\text{H}_4\text{CO}_2\text{H}$. Conclusions: The coupling of benzene nuclei is inhibited by the presence of a NO_2 group, promoted by other substituents. The behavior of unsubstituted aniline varies.

MARY JACOBSEN

New synthesis of 4-amino-3-hydroxyphenylarsonic acid. I. E. BALABAN. *J. Chem. Soc.* **1928**, 809-13. $\sim 3,4\text{-Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{NH}_2$ (51.75 g.) in 103.5 cc. conc'd. HCl and 103.5 cc. H_2O , diazotized at 0° with 21 g. NaNO_2 in 63 cc. H_2O and added to Cu arsenite soln., gives 45% of 3-chloro-4-nitrophenylarsonic acid, pale yellow, m. 200° (decompn.); Ba salt, rods; Ca and Mg salts, amorphous. Boiling 28.2 g. of this acid with 300 cc. 4 *N* KOH for 3 hrs. gives 73% of the 3-HO acid, pale yellow; Mg and Ba salts; reduction with glucose gives 68% of the 4-NH₂ acid. The following arsenobenzenes, which are all yellow, amorphous powders sol. in NaOH, were prep'd. at 55-60° by the well-known $\text{Na}_2\text{S}_2\text{O}_4$ method from the resp. phenylarsonic acid or from mixts. of 2 of them. 4-Amino-4'-acetaminino-3,3'-dihydroxy, 49% yield; 3,4'-diamino-4,3'-dihydroxy, 43.7% yield; 4,4'-diacetaminino-3,3'-dihydroxy, 37.5% yield; 3,4'-diacetaminino-4,3'-dihydroxy, 40.6% yield. 2-Nitro-4-amino-3-hydroxyphenylarsonic acid crysts. from H_2O in red plates which, dried at 100°, form a brown monohydrate, the H_2O in which is not lost at 110°. 2-Amino-4-acetaminino-3-hydroxyphenylarsonic acid, obtained in 73.8% yields by reduction with FeSO_4 at 30°, is sol. in excess 2 *N* HCl, in cold 80% HCO_2H and gives an insol. diazo-oxide, yellow. 2,4-Di-Ac deriv., silky needles. 3-

Chloro-6-nitrophenylarsonic acid, m. 250° (64.1% yield); reduction with FeSO₄ gives almost quant. the 6-NH₂ deriv., whose *Ac deriv.* (57.5% yield) is sol. in 15 parts H₂O. *6-Glycinamide-3-chlorophenylarsonic acid*, m. 195° (81% yield); soly. in boiling H₂O, 1:30. Results of toxicity tests are reported. C. J. WEST

Salts of pentaphenylchromium hydroxide (C₆H₅)₅CrOH. FR. HEIN, O. SCHWARTZ-KOPFF, K. HOYER, K. KLAR, W. EISSNER AND W. CLAUSS. *Ber.* 61B, 730-53 (1928).—Pentaphenylchromium hydroxide has the formula Ph₅CrOH·4H₂O, but when it combines with an acid, the salt obtained is of the general form Ph₄CrX. Numerous acids, chiefly org. ones, have been investigated in order to obtain the penta-Ph salt. Only the following ones have given a successful result: (Ph₅Cr)₂C₆·6H₂O; Ph₅CrCO₂H·3H₂O; Ph₅CrOAc·4H₂O; Ph₅CrO₂CCH₂Cl·HO₂CCH₂Cl·3H₂O; *o*-Ph₅CrO₂CC₆H₄NH₂·*o*-HO₂CC₆H₄NH₂; (Ph₅Cr)₂SO₄·4H₂O; Ph₅CrOPh·PhOH, m. 127°; *m*-Ph₅CrOC₆H₄Cl·*m*-HO₂C₆H₄Cl, m. 129.5°; 2(Ph₅CrOC₆H₄CN)·HO₂C₆H₄CN; *m*-Ph₅CrOC₆H₄NO₂·*m*-HO₂C₆H₄NO₂. A. L. HENNE

Organic compounds of arsenic. XI. The action of thionyl chloride on primary and secondary arsonic acids. WILHELM STEINKOPF AND SIEGFRIED SCHMIDT. *Ber.* 61B, 675-8 (1928); cf. *C. A.* 20, 2994.—The reaction between 20 g. PhAsO(OH)₂ and 200 g. SOCl₂ yields 10.5 g. PhCl and 9.5 g. PhAsCl₂. 1-Anthraquinonylarsonic acid and SOCl₂ give only 1-chloroanthraquinone, m. 162°; the corresponding dichloroarsine, C₁₄H₇O₂AsCl₂, m. 237°, is obtained from the arsonic acid and HCl in AcOH by reduction with SO₂. If the operation is carried out entirely in a CO₂ atm., Ph₂AsO(OH) and SOCl₂ give Ph₂AsCl, m. 191°. The action of 77 g. PCl₃ on 35 g. HO₂CCH₂AsO(OH)₂ in CHCl₃ yields 13-14 g. HO₂CCH₂AsCl₂, m. 123-5°, sol. in cold Et₂O, AcOEt, MeOH, Me₂CO and hot C₆H₆, ligroin and CCl₄; its Me ester, b_p 78°. XII. **Action of acid chlorides on diphenylarsine.** WILHELM STEINKOPF, ILSE SCHUBART AND SIEGFRIED SCHMIDT. *Ibid.* 678-82.—Ph₂AsAc, b_p 167-8°, is obtained from AcCl and Ph₂HAs in a CO₂ atm., its oxidation is easy and gives Ph₂AsO(OH) and AcOH. The same arsine, treated with ClCH₂COCl, COCl₂, PCl₃ or BrCH₂COBr gives only Ph₂AsCl or Ph₂AsBr. The arsine and PhSO₂Cl yield Ph₂AsCl, Ph₂S and Ph₂AsOOSO₂Ph, m. 106.8 (cloudy), 109° (completely transparent), sol. in cold alc., Me₂CO, CHCl₃ and hot C₆H₆. The same compd. (2.5 g. pure product) is obtained from 10 g. Ph₂AsO(OH) and 10 g. PhSO₂Cl. PhAsCl₂ and ClSO₂OH give pure PhSO₂Cl. Ph₂AsCl and ClSO₂OH give PhSO₂Cl, Ph₂AsO(OH)·HCl, and 2[PhAsO(OH)]·HCl, m. 114°. Ph₂AsCl and FSO₃OH give PhSO₂F and 2[Ph₂AsO(OH)]·H₂SO₄, m. 117°. The latter compd. is obtained also, with a better yield from 15 g. PhAsO(OH) and 250 cc of 50% H₂SO₄. A. L. HENNE

The action of light on diazo derivatives. A. SEYEWETZ AND D. MOUNIER. *Compt. rend.* 186, 953-5 (1928).—The decompn. of *diazobenzenesulfonic acid* and *Na 1,2,4-diazonaphtholsulfonate* by exposure in Pyrex to ultra-violet light has been studied relative to *p*_{II} of the soln. In acid soln. they are sensitive to light but relatively stable to heat; in alk. soln. sensitivity to light is decreased and the effect of heat greatly increased. The effect of light increases slightly with increase of temp. and is increased by negative substituents which decrease heat sensitivity; thus the following are in the order of decreasing sensitivity to ultra-violet: *p*-O·C₆H₄·N₂, *p*-O·SO₂·C₆H₄·N₂, *p*-

O·CO·C₆H₄·N₂, *p*-ClC₆H₄·N₂Cl, *φ*-O₂NC₆H₄·N₂Cl, PhN₂Cl. The position of the sub-

stituent has no effect in *o*-, *m*- and *p*-nitrodiazobenzene. Ultraviolet decompn. of *p*-diazobenzoic acid gives *p*-HO₂C₆H₄CO₂H and *p*-ClC₆H₄CO₂H; the diazonitrobenzenes yield *di-p*-nitrophenyl ether, and in the other examples studied, the products were the same as formed by heat.

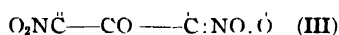
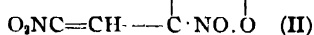
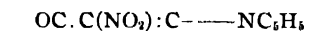
Equilibrium in the binary systems: ethylenediamine-phenols. N. A. PUSHIN AND LJUDMIR SLADOVICH. *J. Chem. Soc.* 1928, 837-43.—C₂H₄(NH₂)₂ (I) and PhOH give 2 eutectics, 35 mol. % PhOH and -14° and 88.5 mol. % PhOH and 20.2°; 2 compds. are formed, I. 2PhOH, m. 53.5° and I. 4PhOH, m. 31.6°. I and *o*-MeC₆H₄OH also show 2 eutectics: 32.5 and 85 mol. % *o*-MeC₆H₄OH and -17 and 8.5°; the compd. I. 2C₆H₇OH, m. 48°. I and *p*-MeC₆H₄OH give 3 eutectics, 27, 82 and 92 mol. % *p*-MeC₆H₄OH and -13°, 28.2° and 24°; 2 compds. are formed, I. 2C₆H₇OH, m. 54°, and I. 6C₇H₇OH, m. 31°. I and *o*-C₆H₄(OH)₂ give 3 eutectics, 15, 60 and 80 mol. % *o*-C₆H₄(OH)₂ and 2°, 60° and 64°, and a 4th, which could not be accurately detd.; 3 compds. are formed, I. C₆H₅O₂, m. 73°; I. 2C₆H₅O₂, m. 71°; I. 3C₆H₅O₂, m. 39.2°. I and *o*-MeOC₆H₄OH give 3 compds., I. 6C₇H₅O₂, m. 66.5°; I. 2C₇H₅O₂, m. 57.5°; I. C₇H₅O₂, m. 51.5°, which forms a eutectic with I at 5° and 11 mol. % of *o*-MeOC₆H₄OH. Curves are given for these systems. C. J. WEST

Acyl derivatives of *o*-aminophenol. III. R. E. NELSON, N. W. SHOCK AND W. H. SOWERS. *J. Am. Chem. Soc.* **49**, 3129-31 (1927).—The *Bu* carbonate of *isoamyl o*-hydroxycarbonyl, in 77°; the *iso-Bu* deriv., in 61.5°; the *Pr* carbonate of *benzoyl-o*-aminophenol, in 55°; *o*-isocarbopropoxyaminophenylbenzoate, m. 82°. The heavier isocarbopropoxy group replaces both the *n*- and isocarbobutoxy from the N in diacyl derivs. of *o*-H₂NC₆H₄OH. The Bz group does not behave the same with the *n*-carbopropoxy and the isocarbopropoxy groups in diacyl derivs. of *o*-H₂NC₆H₄OH; in the case of the *n*-deriv. the Bz group goes to the N, but in the case of the *iso*-deriv. the Bz group goes to the O.

C. J. Weger

The mutual exchange of aromatically bound hydroxyl and halogen. III. W. BORSCHKE AND E. FESKE. *Ber.* **61B**, 690 702 (1928); cf. *C. A.* **21**, 1639.—It had been shown that although 3,5,6-Me(O₂N)₂C₆H₂OH with *p*-MeC₆H₄SO₂Cl and PhNEt₂ gives Me(O₂N)₂C₆H₂SO₂SC₆H₄Me almost exclusively, about 70% of it can be converted into Me(O₂N)₂C₆H₂Cl by adding the ester to C₆H₅N and decomp. the pyridinium compd. with 5 *N* HCl. Styphnic acid (I), however, forms no pyridinium toluenesulfonate with MeC₆H₄SO₂Cl and C₆H₅N, but a S free 2,4,6-trinitro-3-hydroxyphenylpyridinium betaine (II or III), obviously formed by elimination of MeC₆H₄SO₃H from the C₆H₅N addn. product of the I toluenesulfonate, for 1,3,4,6-C₆H₂(OH)₂(NO₂)₂ (IV) under the same conditions gives the 2,4-dinitro-5-hydroxyphenylpyridinium betaine (V) obtained from C₆H₅N and 1,3,4,6-C₆H₂(NO₂)₂Cl₂, and 1,3,2,4-C₆H₂(OH)₂(NO₂)₂ (VI) yields an isomer (VII) of V. On the other hand, 3,2,4,6-HO(O₂N)₂C₆H₂NHPh (VIII) does not yield a pyridinium betaine but the normal pyridinium toluenesulfonate (IX), which is decompd. by hot 2 *N* HCl into MeC₆H₄SO₃H, C₆H₅N and 2,4,6-trinitro-3-chlorodiphenylamine (X), also obtained directly from VIII by Ullmann and Nadai's method (heating with MeC₆H₄SO₂Cl in PhNEt₂). Under these latter conditions the HO groups in aminopieric acid (XI) and in IV can be replaced by Cl but not in VI, which behaves like I. I, m. 174-5°, was obtained in about 100 g. yield by sulfonating 50 g. *m*-C₆H₄(OH)₂ in 300 cc. concd. H₂SO₄ on the H₂O bath and then nitrating below 10° with 100 cc. of HNO₃ of d. 1.395 and afterwards with 100 cc. of fuming acid (d. 1.54). II or III (yield, almost quant.), yellow crystals insol. in most org. solvents, sol. in about 60 parts boiling PhNO₂, darkens about 270°, m. around 330° (decompn.), sol. almost without color in concd. H₂SO₄ and HNO₃ (d. 1.4) on gentle warming and reprecip. unchanged by ice H₂O, only very slowly sol. in dil. NaOH, rapidly, with deep red color, on heating, acids pptg. red-brown amorphous flocks, readily sol. in cold fuming HCl with yellow color (presumably as the pyridinium chloride) but at once reprecip. on diln. with H₂O, alc. or 50% AcOH, gives indefinite decompn. products with 5 *N* HCl at 190°, dissolves with light yellow color in HCl-AcOH at 145° and on cautious diln. with H₂O yields yellow leaflets, m. 159-60°, having approx. the compn. of the pyridinium chloride but decompd. by NaOH like the betaine itself and possibly they are the isomeric chloride (O₂N)₃C₆H(OH)N ClCH CHCH:CHCl formed from the pyridinium chloride by rearrangement; with hot C₆H₅N it regenerates the betaine and with boiling PhNH₂ gives VIII just as readily as the betaine itself. With HCl-AcOH at 170-80°, the betaine yields impure I. With secondary aliphatic amines, NHR₂, the betaine yields salts of a substance 3,2,4,6-HO(O₂N)₂C₆H₂NH.NHR₂ClCH CHCH ClNR₂, giving HO(O₂N)₂-C₆H₂NH₂ with hot mineral acids, whereas with PhNH₂ and its homologs it forms VIII, again probably through a glutacetaldehyde deriv. The product from the betaine and piperidine in boiling MeOH is obtained in 2 forms: α, garnet-red needles, m. 124-5°, and β, orange-yellow leaflets, m. 127-8°. Both can be recrystd. unchanged from MeOH, the needles, however, only when the soln. is protected from inoculation with the leaflets, on the other hand, a hot satd. MeOH soln. of the leaflets deposits the needles when boiled with a trace of piperidine. Both forms have the compn. C₆H₁₀NH₂·HO(O₂N)₂C₆H₂NH ClCH CHCH:CHNC₆H₁₀. Neither is decompd. in MeOH by AcOH. Mineral acids (best dil. H₂SO₄) convert them first into a substance sepg. in dark red prisms with bluish surface luster, m. 139° (which does not regenerate the original compds. with piperidine), and then rapidly into XI. With *p*-MeC₆H₄NH₂, the betaine gives 4-methyl-2',4',6'-trinitro-3'-hydroxydiphenylamine (if, in decompn. the reaction mixt., too little HCl is used or it is not boiled, there is obtained, instead of the free amine, its *p*-toluidine deriv., C₂₀H₁₆O₇N₆, bright red, m. 191-3° (decompn.)). X, yellow, m. 141-2°. IX, orange, m. 206-8°. 2,4,6-Trinitro-3-chloroaniline, from XI, brownish leaflets with violet luster, m. 185-6°. VI, m. 147-8°, is obtained in about 4 g. yield from 15 g. of the di-NO deriv. slowly added to ice-cold HNO₃ (d. 1.3) and allowed to stand at 0°. 2,2-Dinitro-3-hydroxyphenylpyridinium toluene-*p*-sulfonate, from VI, C₆H₅N and MeC₆H₄SO₂Cl, yellow, m. 134°; the chief product of the reaction (the pyridinium betaine (VII)), red-brown, easily sol. in fuming HCl, blackens about

300°, decomps. explosively around 325°, gives with HCl-AcOH at 145°, 2,?-dinitro-3-chlorophenol, brownish yellow, m. 112-4°. The product, $C_{11}H_9O_3N_2$ from VII and piperidine exists in 2 forms, m. 144-6° and 171-2°, decompd. by HCl into 3,2,?- $H_2N \cdot (O_2N)_2C_6H_3OH$, m. 220-2°. 2,4-Dinitroresorcinol monololuene-*p*-sulfonate, yellowish white, m. 126-7°, slowly converted by C_6H_5N at room temp. into VII, by boiling $PhNH_2$ into 2,?-dinitro-3-hydroxydiphenylamine, brownish yellow, m. 124-5°. 3-Anilino-2,?-dinitrophenylpyridinium loluene-*p*-sulfonate, light brown, m. 216-8°. 3-Anilino-2,?-dinitrophenylloluene-*p*-sulfonate, brown-yellow, m. 151°. 3-Amino-4,6-dinitrophenol, from V with piperidine or $PhNH_2$, brownish yellow needles with violet surface luster, m. 226-7°. 4,6-Dinitroresorcinol monololuene-*p*-sulfonate, m. 135°; *N*-diethylaniline salt, yellow, m. 109-10°. With 2 mols. $MeC_6H_4SO_2Cl$ in $PhNEt_3$, IV gives a mixt. of 2,2',2'',4'-tetranitro-5,5'-dichlorodiphenyl ether, m. 232-4° and 1,3,4,6- $C_6H_2(NO_2)_4Cl_2$.



C. A. R.

A reaction of phenacetin and acetaldehyde. OTTORINO CARLETTI. *Giorn. chim. ind. applicata* 10, 66 (1928).—In the presence of concd H_2SO_4 , phenacetin gives with $AlCl_3$ a characteristic red color. If a small quantity of a sample contg phenacetin is moistened with AcH , 2-3 cc of concd H_2SO_4 are added, and the mixt. is agitated, the acid becomes red, the color being visible with only 0.001 mg of phenacetin. The intensity of the color increases on standing and is accelerated by warming. On diln., a bluish brown substance seps., which, filtered and redissolved in concd H_2SO_4 , imparts a red color to the latter. With concd. H_2SO_4 phenacetin forms 2,5- $HO(H_2N)C_6H_3SO_3H$, but *p*- $HO-C_6H_4OH$ does not give the characteristic color, nor can this color result from profound decompn. of phenacetin because *p*-phenetidine does not give the color. A colored condensation product of phenacetin and AcH is probably formed. Phenacetin gives no color with $HCHO$ and concd. H_2SO_4 , and therefore the reaction may be utilized to distinguish AcH from $HCHO$. Paraldehyde and metaldehyde also give the reaction, whereas trioxymethylene and hexamethylenetetramine give no color. C. C. DAVIS

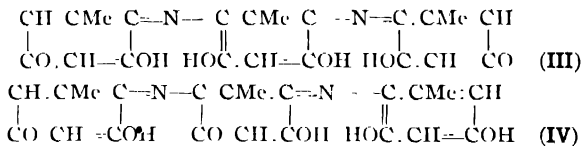
Derivatives of phenolmonosulfonyl chlorides. E. G. FULNEGG AND ALEXANDER SCHLESINGER. *Ber.* 61B, 781-4 (1928).—Aromatic phenols with $ClSO_2H$ do not give phenolmonosulfonyl chlorides which have hitherto been obtained from the carboxyphenolsulfonic acids with PCl_5 . It has now been found, however, that they can be quite generally obtained directly from the carboxyphenols with $ClSO_3H$ although not from phenols in which the HO group is protected by other substituents than OCO_2Et . Thus, *m*- $MeC_6H_4OCO_2Et$ slowly added to 5 parts cold $ClSO_3H$ and, after 3 hrs., poured upon ice gives almost quant the oily *sulfonyl chloride*, presumably 2,4- $Me(EtO_2CO)C_6H_3SO_2Cl$, identified as the *anilide*, m. 149°. From 1- $C_{10}H_7OCO_2Et$ is obtained 80% 1,4- $C_{10}H_6(OCO_2Et)SO_2Cl$, m. 83°, identical with the product obtained by Zincke from 1,4- $C_{10}H_6(OCO_2Et)SO_3H$. Treated in H_2O with $PhNH_2$ and sapond. with boiling KOH , it yields 1-naphthol-4-sulfonanilide, m. 198°; *sulfon- β -naphthylamide*, m. 204°. 2,8- $C_{10}H_6(OCO_2Et)SO_2Cl$ from 2- $C_{10}H_7OCO_2Et$ and $ClSO_3H$, m. 118°, is identical with the product obtained from 2,8- $C_{10}H_6(OH)SO_3H$ by carboxylation and subsequent chlorination with PCl_5 ; reduction with Zn dust and H_2SO_4 in Me_2CO gives the 2-naphthol 8-mercaptan, isolated as the deep yellow *Pb* salt. C. A. R.

Splitting off the dioxymethylene ring. F. MAUTHNER. *J. prakt. Chem.* 119, 74-6 (1928).—The CH_2O_2 group is readily removed by heating with $AlCl_3$ in $PhCl$. By the same reaction guaiacol-*o*-carboxylic acid yields *o*-protocatechuic acid.

C. J. WGR

Orcein-like dyes. F. HENRICH AND W. HEROLD. *Ber.* 61B, 767-70 (1928).—Amino-orcein, 2,3,5- $HO(H_2N)C_6H_3Me$ (I), in H_2O , C_6H_6 or xylene is not altered by dry air either at room temp. or at the b. p. of the solvent but in hot Me , Et or Am alc. it soon undergoes oxidation, the reaction in $AmOH$ being apparently different from that in $MeOH$ or $EtOH$; in the absence of O , the I remains unchanged in these solvents also. From 5 g. I in 150 cc. $EtOH$ on the H_2O bath was obtained about 4 g. of a dark pulverulent substance (II), sol. in faintly alk. H_2O with blue to blue-violet color, reprecipitated by acids, and having the compn. $C_{21}H_{18}O_6N_2$. The expts. of H. and H. indicate that in the 1st phase of the reaction the I is oxidized to a quinone imide, 2 mols. of which react with 1 mol. of unchanged I with elimination of 1 mol. each of H_2O and NH_3 and formation of a complex indophenol for which is provisionally suggested the structure III or the desmotropic form IV. That indophenols are really formed in this type of oxidation

is shown by 2 expts.: (1) free 5,2,4- $\text{H}_2\text{N}(\text{HO})_2\text{C}_6\text{H}_2\text{Me}$ (V) treated as above in alc. gives only the yellow indophenol dye previously obtained as an intermediate product in the formation of the phenoxazone from V in alk. soln. (C. A. 19, 2649); (2) a dil. alc. soln. of 1 mol. each of *p*- $\text{H}_2\text{NC}_6\text{H}_4\text{OH}$ and PhOH and 1 atom Na treated with air soon becomes blue-green and shows with alkalis and acids indophenol reactions. III boiled with 1:2 H_2SO_4 gives a small quantity of a yellow Et_2O -sol. compd. which it has as yet not been possible to crystallize. Conc'd HCl likewise yields no definite degradation product. Heated at 180–200° with $\text{SnCl}_2\text{-HCl}$ it yields about 10% of a mixt. of HCl salts consisting chiefly of I HCl, considerably larger quantities of another substance which soon oxidizes but then no longer gives the reaction of the original III, and a sirupy substance apparently contg. a N-free phenol. Orcem (only a small quantity of an old prepn. was available) behaves very similarly on treatment with $\text{SnCl}_2\text{-HCl}$.



C. A. R.

Synthesis of partially acylated glycerides. II. B. HELFERICH AND H. SIEBER. *Z. physiol. Chem.* 175, 311–5 (1928); cf. C. A. 22, 59.—The β -benzoylglycerol previously obtained as a sirup has now been prepd. in cryst. form and its constitution established. α, α' -Ditritylglycerol (I), m. 174–6°, was prepd. by heating glycerol with 2 mols. of Ph_3CCl in dry pyridine. When treated with *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{COCl}$ in pyridine this yielded α, α' -ditrityl- β -*p*-nitrobenzoylglycerol, m. 188°. The Ph_3C groups were then removed by shaking with HBr in AcOH and the resulting β -*p*-nitrobenzoylglycerol, m. 120–1°, finally obtained cryst. by repeated extus. with Et_2O and EtOAc and pptn. by petroleum ether. Benzoylation with BzCl and pyridine converted it into α, α' -dibenzoyl- β -*p*-nitrobenzoylglycerol, m. 89°. Treatment of I with $\text{C}_{16}\text{H}_{33}\text{COCl}$ in dry CHCl_3 gave α, α' -ditrityl- β -palmitylglycerol, m. 70–2°.

A. W. DOX

Nitrogen trichloride and unsaturated ketones. II. G. H. COLEMAN AND DAVID CRAIG. *J. Am. Chem. Soc.* 50, 1816–20 (1928); cf. C. A. 21, 3888.— $\text{PhCH}:\text{CHAc}$ (130 g.) in 500 cc. CCl_4 , treated at -10° with 500 g. of a soln. of NCl_3 in CCl_4 contg. 480 mg. moles NCl_3 during 2 hrs., the soln. filtered after 5 hrs. and then allowed to stand 3 days at room temp., gives 5% of the HCl salt, m. 176–7° (decompn.), of 1-amino-2-chloro-1-phenylbutan-3-one, the intermediate product, $\text{PhCH}(\text{NCl}_2)\text{CHClAc}$, being reduced by conc'd HCl in 30 min. or by dl. HCl after 3 days. BzCl in C_6H_6 gives the *Bz* deriv. (I), m. 160–1°; the Schotten Baumann procedure gives I and a 2nd product, m. 204° (decompn.). Reduction of I with Na-Hg in EtOH gives 67% of the *Bz* deriv., m. 150–1°, of 1-amino-1-phenylbutan-3-ol, m. 74–6° (dl. *Bz* deriv., m. 139–41°). Reduction of $\text{PhCH}_2\text{CH}(\text{NH}_2)\text{Ac}$ gives 2-amino-1-phenylbutan-3-ol, m. 62–4° (HCl salt, m. 114–6°; *Bz* deriv., m. 177–9°). The NCl_3 reaction also produces about 45% of PhCHClCHClAc , m. 93–4°, b₂₅ 159–60°; the impure product decomps. on standing, giving 1-chloro-1-phenylbuten-3-one, b₂₅ 155–6°.

C. J. WEST

Physical properties of salicylaldehyde. T. S. CARSWELL AND C. E. PFEIFFER. *J. Am. Chem. Soc.* 50, 1765–6 (1928).—*o* $\text{HOC}_6\text{H}_4\text{CHO}$, purified through the NaHSO_3 compd., b₇₆₁ 196.4–6.5°, b₂₅ 93°, crystg. pt. 1–6°, d₂₀²⁰ 1.1690.

C. J. WEST

Catalytic oxidation of aromatic hydrocarbons and their derivatives by means of air. E. B. MAXTED. *J. Soc. Chem. Ind.* 47, 161–5T (1928).— Sn vanadate is an excellent oxidation catalyst, and is prepd. by drying the pptd. salt. With *PhMe*, a 50% yield of BzOH is obtained; with *PhEt*, the yield is about 40%; the temp. of max. activity is 280–90°. The oxidation of $\text{C}_6\text{H}_4\text{Me}_2$, C_{10}H_8 and tetrahydronaphthalene all yields $\text{C}_6\text{H}_4\text{CO.O.CO}$. The oxidation of *PhCH₂OH* and *BzH* also yielded BzOH ;

in the latter case the % yield and the space-time yield were about the same as for the *PhMe* oxidation, which indicates that the limiting factor is a process inherent in the catalyst itself. Bi vanadate gives results similar to the Sn salt, although the temp. of activity is 100° higher. *o*-Cresol could not be oxidized to salicylic acid, nor could amino acids be obtained from aminotoluenes.

T. S. CARSWELL

Benzoic esters and electronic affinities of radicals. I. AHMAD ZAKI. *J. Chem. Soc.* 1928, 983–9.—Nitration of benzoic esters and estn. of the proportion of the *m*-isomers afford a convenient auxiliary method for the estn. of the electron affinities of various groups, BzOMe being taken as the standard of reference. At 0° the following

% of *m*-NO₂ deriv. was formed: Me, 72.6; Et, 69.9; Pr, 71.8; Bu, 67.9; *Am* (*b*₁₅ 138-9°), 68.3; hexyl, 63.7; *heptyl* (*b*₁₀₀ 216-7°), 62.8; octyl, 60.2; cetyl, about 52; iso-Pr, 64.1; iso-Bu, 69.4; *sec*-Bu, 65.2; *tert*-Bu, 59.4; *sec*-octyl, 59.4; at 25°: Me, 69.7; Et, 66.3; Pr, 68.6; Bu, 65.1. *tert*-*Am* ester, *b*₂₂ 127-8° (60% yield), is decompd. on nitration. These results indicate that aliphatic radicals with a branched chain produce less *m*-isomer than a normal chain radical with the same no. of C atoms and that the nearer the branching in the alkyl group to the Bz residue, the smaller is the % of the *m*-isomer. The anticipated effect that as one ascended the series alkyl esters would give a smaller % of the *m*-isomer was not realized for the 1st 5 members, a zigzag curve being obtained. The method of analysis of the nitration mixt. is given.

C. J. WEST

Sodium salts of aromatic nitriles. I. MARY M. RISING AND TSON-WU ZEE. *J. Am. Chem. Soc.* 50, 1699-707 (1928).—A new field of investigation of nitride-carbide tautomerism is outlined. The Na salt of PhCH₂CN and that of PhEtCHCN have been prepd. Their behavior with acid suggests the nitride structure (PhHC.C:N⁻)Na⁺ and (PhEtC.C:N⁻)Na⁺ for the 2 salts. The behavior of the salts in substitution reactions suggests for them the carbide structure (Ph(CN)HC⁻)Na⁺ and (PhEt(CN)C⁻)Na⁺. The double behavior of the salts indicates a tautomeric relationship between the nitride and carbide forms. The salts are considered to be unstable intermediate products in the aldol-like condensation reactions described by E. von Meyer.

C. J. WEST

Phenylbromoacetonitrile. ALEXANDER NEKRASSOV. *J. prakt. Chem.* 119, 108 (1928). cf. Steinkopf, *C. A.* 14, 3658.—Phenylbromoacetonitrile, described by S. as an oil, *b*₁₆ 137-9°, m. 25.4°.

C. J. WEST

Chemical individuality of humulene. A. CHASTON CHAPMAN. *J. Chem. Soc.* 1928, 785-9. —In this first study of humulene C. (*J. Chem. Soc.* 67, 54 (1895)) concluded that humulene (I) was not identical with carophyllene (II), which conclusion was confirmed by Kremer, Schreiner and James (*Pharm. Arch.* 1, 209 (1898)). Later Deussen (*C. A.* 6, 137) stated that I was "inactive α-II." While D. claimed that fractional distn. brought about a sepn. of the 2 forms of II, repetition on a fraction of II from clove oil showed that with rising *b. p.* the *l*-rotation showed a small but steady increase; at no point was any fraction obtained which was inactive or which did not show approx. the steady rise referred to. I does not appear to form a solid compd. with HCl, while II readily forms the cryst. di-HCl salt. While II gives a large yield of a solid alc., I, treated in the same manner, gives no solid product. The nitrosite from II, m. 115°; from I, 114°, but a m. p. of the mixt. is depressed about 20°. Other results indicate that the crude sesquiterpene from clove oil consists substantially of II with a rotation of about [α]_D -8° and that this crude hydrocarbon contains 5-10% I. D.'s α- or inactive II is neither more nor less than I.

C. J. WEST

Orientation effects in the diphenyl series. VI. Supposed isomerism of the dinitrotoluidines. R. J. W. LE FEVRE AND E. E. TURNER. *J. Chem. Soc.* 1928, 963-9; cf. *C. A.* 22, 1349.—When diacetyl-*o*-toluidine is nitrated (cf. Cain and Micklethwait, *C. A.* 8, 3416), there results the 5,5'-di-NO₂ deriv. (I), m. 268-9°, and from the mother liquors a compd., m. 200-5°, which is really an impure specimen of the 6,6'-di-NO₂ deriv., which is also formed in the nitration of 6-nitrodiaacetyl-toluidine. I, diazotized in concd. H₂SO₄ at -5° and treated with Br in HBr, gives 4,4'-dibromo-5,5'-dinitro-3,3'-dimethyldiphenyl, pale yellow, m. 271-2°; 4,4'-dipiperidino compd., bright yellow, m. 226-7°. 4,4'-Dibromo-6,6'-dinitro-3,3'-dimethyldiphenyl, m. 230-3°; this does not react with boiling piperidine. 4,4'-Di-Cl deriv., yellow, m. 211-2°. C. J. WEST

Reactivity of atoms and groups in organic compounds. III. First contribution on the carbon-chlorine bond: the rate of the reaction between diphenylchloromethane and ethyl alcohol. J. F. NORRIS AND A. A. MORTON. *J. Am. Chem. Soc.* 50, 1795-803 (1928); cf. *C. A.* 21, 3887.—A method is reported for the detn. of the velocity consts. of the reaction between Ph₂CHCl and EtOH based on the measurement of the elec. cond. of the soln. as the reaction proceeds; data are given for the % lowering of the sp. cond. of HCl in EtOH produced by non-electrolytes (C₆H₆, PhCl, PhBr, C₁₀H₈, C₈H₄Br₂, Ph₂, Ph₂CH₂ and C₁₀H₇PhCH₂). The reaction between Ph₂CHCl and EtOH is reversible; *k*₁ is 0.00301, *k*₂ 0.00250; the temp. coeff. is 4630. •IV. The rates of the reactions of certain derivatives of diphenylchloromethane with ethyl alcohol and with isopropyl alcohol. J. F. NORRIS AND CLIFFORD BANTA. *Ibid* 1804-8.—*p*-Phenyl-diphenylchloromethane, m. 71-2.5°; *p*-Cl deriv., *b*₈ 172-3°; *p*-Me deriv., *b*₂ 147-8°; *o*-Cl deriv., decomp. 90°; *p*-Br deriv., *b*₁₀ 188-91°; *p,p*-di-Me deriv., m. 41-3.5°. The following velocity consts. of the reversible reaction between EtOH and the derivs. at 25° are reported; Ph₂CHCl, 0.00266; *o*-Cl, 0.0000254; *p*-Cl, 0.00107; *p*-Me, 0.0433;

p-Ph, 0.362; *p,p'*-Cl₂, 0.00040; Ph(PhCH₂)CHCl, 0.000000112. Halogen atoms depress reactivity, the greatest effect resulting from substitution in the *o*-position. The Me and Ph radicals increase reactivity, the greatest effect resulting from substitution in the *p*-position. V. The rates of the reactions of certain derivatives of diphenylchloromethane with ethyl alcohol. J. F. NORRIS AND J. T. BLAKE. *Ibid* 1808-12.—*o*-Methyldiphenylchloromethane, m. 40-40.5°; *m*-Me deriv., oil; *o*-MeO deriv., pale pink oil; *p*-MeO deriv., red oil; *p,p'*-di-Me deriv., m. 45-6°; *p*-PhO deriv., pale orange, m. 49-50° (from the carbinol, m. 75°); *p*-Et deriv., b₁₋₂ 122° (from the carbinol, m. 33°); *m*-Cl deriv., oil, *p*-Br deriv., oil. α -Naphthylphenylchloromethane, m. 64-4.5°. The 1st-order velocity consts. of the reaction between EtOH and these derivs. at 25° are as follows: *m*-Cl, 0.0000593; *p*-Br, 0.000883; *m*-Me, 0.00554; *o*-Me, 0.00764; *p*-Et, 0.0558; *o*-MeO, 0.247; *p*-PhO, 0.843; *p,p'*-Me₂, 1.10; Ph(α -C₁₁H₉)CHCl, 0.0193. VI. The rates of the reactions of benzoyl chloride and certain of its derivatives with isopropyl alcohol. J. F. NORRIS AND D. V. GREGORY. *Ibid* 1813-6.—The 1st-order velocity consts. of the reactions of Me₂CHOH with BzCl and its derivs. at 25° are reported as follows: BzCl 0.00365, *p*-Cl deriv., 0.00559; *p*-Br, 0.00650; *p*-I, 0.00528; *o*-NO₂, 0.00694; *p*-NO₂, 0.036; *p*-Me, 0.00235. The negative atoms (Cl, Br, NO₂) increase the lability of the bond in acyl chlorides and decrease the lability of the bond in derivs. of PhCHCl; the positive Me group increases reactivity in the acyl and decreases it in the alkyl compds. C. J. WEST

Absorption spectra of hydroquinonephthalein and hydroquinonesulfonephthalein C. V. SHAPIRO. *J. Am. Chem. Soc.* 50, 1772-8(1928).—Evidence is submitted from a study of absorption spectra which provisionally confirms a conclusion previously arrived at from the chem. behavior of the compds., that hydroquinonephthalein (I) and hydroquinonesulfonephthalein (II) can exist in the *m*-quinoid state. It is also established that II has an inner salt structure. Data and curves are presented showing the absorption of I and II in neutral, acid and alk. solns. A comparison of the absorption spectra of the di-Bz derivs. of I and II shows that the latter is to be considered as a quinoid deriv. C. J. WEST

Decomposition of diacetone alcohol by NaOH in water mixtures of organic solvents (ÅKERLÖF) 2. The decomposition of *p* phenetylcarbanide on heating in aqueous solution (TAUFEL, *et al*) 2. Boiling points of the normal paraffins at different pressures (YOUNG) 2. Structure and dimensions of the benzene ring (MORSE) 3.

KARRER, PAUL: *Lehrbuch der organischen Chemie*. Leipzig: George Thieme 884 pp. M. 34; bound, M. 36. Reviewed in *Chem. Age* 18, 393(1928).

LENOBLE: *Les synthèses totales en chimie organique*. Paris: Gauthier-Villars et Cie. 186 pp. F. 50.

SWARTS, FRED: *Cours de chimie organique*. 4th ed., revised and enlarged. Brussels: Maurice Lamertin; Paris; J. Hermann. 744 pp.

Side-chain aromatic compounds. F. GÜNTHER. U. S. 1,670,505, May 22. An aromatic compd. such as C₁₀H₈ or C₆H₆ is acted on with an acid sulfuric acid ester, *e. g.*, with acid sulfuric acid Bu or Pr ester, or other similar ester of an alc. contg. at least 3 C atoms, to obtain compds. such as propylated benzenes or similar substitution products.

1,8-Aminonaphthol-3,6-disulfonic acid. I. GUBELMANN and J. M. TINKER. U. S. 1,670,406, May 22. 1-Naphthylamine-3,6,8-trisulfonic acid is fused with caustic alkali in the presence of added NH₃ which serves to facilitate the reaction.

Butyric acid, etc. SOC. DES BREVETS ÉTRANGERS LEFRANC ET CIE. Brit. 276,617, Aug. 27, 1926. Salts of alkali or alk. earth metals such as the crude Ca butyrate obtained from fermentation processes of producing butyric acid are treated with slightly less than a reaction proportion of HCl. The reaction mixt. seps. into 2 layers, the upper of which contains most of the butyric acid of about 80-90% strength, while the lower layer contains aq. CaCl₂, HOAc, etc. The upper layer may be sepd. and rectified over Al₂(SO₄)₃ or fused CaCl₂, while the lower layer may be distd. with steam. The HCl used should be free from Cl and may be preliminarily treated with Fe or Zn to remove free Cl.

2-(3',4'-Diaminobenzoyl) benzoic acid. R. ADAMS, J. M. DAVIDSON and I. GUBELMANN (to Newport Co.). Brit. 277,285, Sept. 13, 1926. This compd. is made by reduction of 2-(3'-nitro-4'-aminobenzoyl)benzoic acid with Fe powder and HOAc. Other similar compds. may be prepd. in an analogous manner from related starting materials. Cf. C. A. 22, 1693.

Hydrogenating phenols. CHEMISCHE FABRIK AUF AKTIEN, VORM. E. SCHERING. Brit. 276,010, Aug. 16, 1926. Thymol, its isomers or homologs, and their hexahydro compds. are prepd. by catalytic hydrogenation of the condensation products of alkylated phenols and ketones such as those described in Brit. 273,684 (C. A. 22, 1982) until 4 or 16 at proportions of H are taken up.

Separating mono- and di-alkyl-arylamines. R. W. EVERATT and E. H. RODD. U. S. 1,670,850, May 22. A mixt. such as that of mono- and di-ethylanilines is treated with phosgene in the presence of water, and an alkali such as NaOH is added gradually to neutralize the amine hydrochlorides formed, until all the secondary amine present has been acted upon by the phosgene and HCl is then added to dissolve the dialkyl compd.

Hydrogenated naphthylamines. SOC. ANON. POUR L'IND. CHIM. A BÂLE. Brit. 276,571, Feb. 24, 1927. *ar*-Tetrahydronaphthylamine derivs. are made by subjecting *N*-substituted naphthylamines to catalytic hydrogenation, and the hydrogenated naphthylamines themselves may be made by using an acetyl deriv. as the starting material and subsequently saponig. Examples are given for the production of *ar*-*N*-ethyl-tetrahydronaphthylamine, *ar*-acetyl-tetrahydro- β -naphthalide, *ar*-*N*-phenyltetrahydro- α -naphthylamine and acetylated *ar*-tetrahydro-*N*-ethyl- α -naphthylamine.

Hydrocyclic ω -amino compounds. H. RUPE. U. S. 1,670,990, May 22. α -Cyanocamphor or other hydrocyclic cyanoketones are reduced with H in the presence of catalysts such as Ni. Camphomethylamine, b_{11} 126–8°; its hydrochloride, m. 243°.

Basic bismuth salts of arylarsonic acids. R. W. E. STICKINGS. U. S. 1,669,542, May 15. A soln. of a Bi salt such as Na bismuthyl tartrate is pptd. with the addn. of Na *N*-phenylglycinamide-*p*-arsonate or other salt of an arylarsonic acid in excess, under the influence of heat, to form corresponding Bi compds. Cf. C. A. 21, 3711.

Methylene chloride. E. R. BRODTON, R. H. HOLLIS and H. A. MINER. Brit. 276,383, Feb. 22, 1926. "Wood alc" or a mixt. of MeOH and acetone is chlorinated and the product is rectified to produce a liquid, b. 40–60°, consisting mainly of methylene chloride and suitable for driving engines or motors, extinguishing fires or for use in thermostats.

Unsaturated aldehydes. H. RUPE. U. S. 1,670,825, May 22. In the manuf. of cyclohexylidene-acetaldehyde or other unsatd. aldehydes, acetylene alcs. such as 1-ethinylcyclohexanol-(1) which contain a free H atom in the acetylene group are treated with formic acid or other suitable sol. compd. contg. an acid radical.

Quinaldines. BRITISH DYESTUFFS CORPORATION, LTD. AND M. WYLER. Brit. 276,156, Sept. 6, 1926. Quinaldines are sepd. from the reaction mixt. obtained in the Dohner-Miller or other process for prepg. quinaldines, in the form of their ZnCl₂ double salts, which are subsequently treated with alkali to obtain the base or are subjected to distn. to distil the hydrochloride of the base.

Monobenzoyldiaminoanthraquinones. I. G. FARBENIND. A.-G. Brit. 276,692, Aug. 30, 1926. Benzoyl chloride is caused to react with a diaminoanthraquinone, which may be dissolved in an org. solvent such as PhNO₂, in the presence of an acid-binding agent such as pyridine, quinoline, Na₂CO₃ or magnesia. The products may be sepd. by fractional crystn. from an alc. soln.

2-Mercaptobenzothiazole. L. B. SEBRELL and J. TEPPEMA. U. S. 1,669,630, May 15. *o*-Nitrochlorobenzene is caused to react, under the action of heat and pressure, with an aq. soln. of a basic sulfide or hydrosulfide such as NaHS in the presence of H₂S and CS₂. Cf. C. A. 22, 1366.

Urea. L. CASALE. U. S. 1,670,341, May 22. Synthetic NH₃, immediately after its formation and while still highly heated and under pressure, is mixed with CO₂ to produce urea. An app. is described.

Mixing apparatus for polymerizing constituents of solvent naphtha, etc. S. P. MILLER. U. S. 1,670,593, May 22.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. AND R. BERLINER. Brit. 277,109, June 10, 1926. The process described in Brit. 244,462 (C. A. 21, 329) for producing stable condensation products from 4-substituted-1-aminoanthraquinones or their derivs. is carried out in H₂SO₄ soln. in the presence of metallic reducing agents such as Cu, Al or Zn. Heating is not required. Examples are given of the condensation of 1-aminoanthraquinone, 1-amino-4-hydroxyanthraquinone and 1-amino-2-bromo-4-hydroxyanthraquinone with polymerized CH₃O in H₂SO₄ with use of Cu or Zn as reducing agent. Brit. 277,110 specifies a modification of the process described in Brit. 244,463 (C. A. 21, 329) by using HNO₂, HNO₃ or a nitrite and an acid for effecting oxidation of the condensation products described in Brit. 244,462.

Benzanthrone derivatives. I. G. FARBENIND. A.-G. Brit. 277,342, Sept. 10,

1926. Benzanthrone substituted in the Bz-positions are prepd. by condensing such reduction products of anthraquinone and its derivs. as contain O in the *meso*-position with maleic acid, ester or anhydride or with fumaric acid or ester. By simple heating of the reacting compds. intermediate products are formed which may be converted into benzanthrone derivs. by further treatment with acid condensing agents. Several examples are given.

Benzanthrone derivatives. I. G. FARBENIND. A.-G. Brit. 275,927, Aug. 10, 1926. Benzanthrone or its derivs. such as 2-chloro- or 2-methyl-benzanthrone are treated with MnO_2 in the presence of "moderately dil." H_2SO_4 , which may be of a strength of 66% or higher, to produce products which are sol. in alkali and bisulfite solns. and yield anthraquinone-1-carboxylic acids by the action of alk. oxidizing agents. In some cases, CrO_3 or a chromate may also be used as oxidizing agents.

Naphthalene derivatives. I. G. FARBENIND. A.-G. Brit. 276,126, July 28, 1926. 8-Cyanonaphthalene-1-sulfonic acid, its derivs. substituted in the sulfonic group and its nuclear substitution products (obtainable from 8-aminonaphthalene-1-sulfonic acid and its nuclear substitution products by diazotizing and treating with $CuCN$, according to Sandmeyer's reaction) is treated (a) with acid sapon. agents to yield 1-sulfonaphthalene-8-carboxylic acid, its inner anhydride and their nuclear substitution products, which may be converted into 1,8-hydroxynaphthoic acid and its nuclear substitution products by treating with alkalies, or, (b) with alk. reagents to yield 1,8-aminonaphthoic acid, naphthostyryl and their nuclear substitution products. Numerous examples are given.

Naphthalene derivatives. I. G. FARBENIND. A.-G. Brit. 277,098, June 8, 1926. Naphthylalkyl ethers are aralkylated in the nucleus by treating them with aralkyl halides such as benzyl chloride or xylyl chloride, preferably in the presence of a catalytically acting metal such as Fe. The products may be sulfonated to obtain wetting agents for use on animal or vegetable fibers. An example is given of the treatment of β -naphthol-isoamyl ether with benzyl chloride in the presence of Fe filings and sulfonation of the product thus formed.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

The action of x-rays on the organism. M. T. BURROWS, L. H. JORSTAD AND E. C. ERNST. *Proc. Soc. Exptl. Biol. Med.* **24**, 311-2(1927).—In small doses x-rays stimulate the mol. disintegrations which are the source of the normal energy of life. Larger doses cause disintegration of the more important mol. constituents of the cell.

C. V. B.

Studies on the enzyme action of yeast. M. SOMOGYI. *Proc. Soc. Exptl. Biol. Med.* **24**, 320-1(1927).—An adsorption-like combination takes place between yeast and fermentable sugars as soon as they come in contact; non-fermentable sugars are not adsorbed. Substances which prevent enzyme action also prevent this selective adsorption.

C. V. B.

Arginine and its possible relation to the physiological activity of insulin. M. SANDBERG AND E. BRAND. *Proc. Soc. Exptl. Biol. Med.* **24**, 373-6(1927).—By enzymic hydrolysis, insulin yielded approx. 12% of arginine. Insulin is a protein of simpler structure than gelatin. Possibly the guanidine group of arginine is the active principle in the insulin mol.

C. V. B.

Protein and non-protein colloids as bioelectric models. R. BEUTNER AND A. MENITOFF. *Proc. Soc. Exptl. Biol. Med.* **24**, 462-4(1927).—As far as gelatin or other proteins may serve as a model for bioelec. currents, their action is identical with that of agar agar, starch paste or kaolin.

C. V. B.

A formula expressing a general relationship between blood pressure and body weight. H. K. FABER. *Proc. Soc. Exptl. Biol. Med.* **25**, 77-80(1927).—The relationship between body wt. and blood pressure was studied in 1000 approx. normal children between 4 and 16 yrs. of age. A formula was derived from these observed figures and the values found and calcd. for blood pressure were shown to be very similar.

C. V. B.

Thyroxine. BICE NEPPI. *Giorn. chim. ind. applicata* **10**, 67-72(1928).—A crit. review, from the historical point of view, of the isolation, identification and ultimate

synthesis of thyroxine, and its physiol. action. Quant. differences in the physiol. action of thyroxine and of thyroid ext. on the nervous system make it doubtful whether the thyroid hormone has a univocal action. Since the constitution of thyroxine requires an asymmetric C atom, the hypothesis is advanced that the difference between synthetic thyroxine and thyroid ext. depends upon the existence of 2 isomers with differing physiol. action, thyroxine extd. from the gland being *d*- or *l*-rotatory and the synthetic product being inactive. Analyses of the *I* content of bovine thyroid in each month of the yr. are tabulated. The following data show the av. % I (based on dry thyroid extd. with Et_2O) from Feb. to the next Jan., inclusive: 0.126, 0.130, 0.1686, 0.2020, 0.2016, 0.1825, 0.1523, 0.1510, 0.1471, 0.1781, 0.1960. A slight increase in early summertime is evident. Eleven references are included.

C. C. DAVIS

The specificity of animal proteases. XIII. The specificity and the method of action of erepsin, trypsin and trypsin kinase. ERNST WALDSCHMIDT-LEITZ AND WILHELM KLEIN. *Ber.* 61B, 640-5(1928).—The peptides are as a rule split by trypsin enterokinase but not by erepsin while opposite results were obtained with amides. Trypsin-enterokinase gave positive results with the following: β -naphthalenesulfonyl-glycyltyrosine, carbethoxyglycylleucine, acetylglycylglycine, acetyl[phenylalanyl]-alanine, benzoyldiglycine, benzoyltriglycine and phthalylglycylglycine. Erepsin caused the hydrolysis of the following: glycylleucine amide and tetraglycine amide. Benzoylpentaglycine and carbethoxytetraglycine amide gave negative results with both enzymes.

H. J. DEUEL, JR.

The specificity of peptidases. II. Comparison of the peptide-sugar condensation with the working of erepsin. ERNST WALDSCHMIDT-LEITZ AND GERTRUD RAUCHALL'S *Ber.* 61B, 645-56(1928). A condensation of glycylglycine and glucose occurred when mixed in the proportion of 1 to 50 mols. (37% after 4 or 24 hrs.) or in the ratio of 1 to 4 mols. (13% after 2 hrs. and 24% after 7 hrs.) at p_H 7.6-7.8. With leucylglycine and glucose in proportion of 1 to 5 mols., 27% was condensed after 28 hrs., while in the ratio 1:10, 28% was condensed after 17 hrs. The decreases in the amt. of peptide and glucose in these cases were the same in the solus. No condensation of leucylglycine and fructose occurred. These condensation products were entirely hydrolyzed in periods of 6-20 hrs. by intestinal erepsin preps., pancreatic erepsin and by yeast erepsin.

H. J. DEUEL, JR.

Report on plant proteases in the series of experiments begun by R. Willstätter and his collaborators. XI. On the specificity of yeast peptidase. WOLFGANG GRASSMANN AND HANNS DYCKERHOFF. *Ber.* 61B, 656-70(1928), cf. C. A. 22, 1984.—Yeast dipeptidase which had been freed from polypeptidase and protease caused the hydrolysis of *dl*-alanylserine, *l*-leucyl-*d*-glutamic acid and *d*-alanyl-*l*-tyrosine, while it was ineffective with a number of other polypeptides. Likewise dipeptidase-free polypeptidase was ineffective with the above dipeptides but was effective with a number of polypeptides, while control expts. with the same prepn. from which the polypeptidase had been removed showed no effect. The ethyl ester of glycylglycine was decomposed only slowly in water with an acid reaction. None was decomposed at p_H 5.3 in 24 hrs., while at 6.4, 2% was decomposed in 2 hrs. and 12% in 24 hrs. At p_H of 6.9, 12% was decomposed in 1 hr., 20% in 2 hrs., 28% in 4 hrs. and 43% in 24 hrs., although no free acid was formed. At p_H 9.4, 91% was hydrolyzed in 20 min., although less than 1% of free acid was formed. The polypeptidase preps. were effective in causing a sapon. of glycine, alanine, and leucine esters within 1 to 2 hrs., while polypeptidase-free dipeptidase or protease gave exactly the same results as the controls without the enzyme. The polypeptidase preps. also caused the hydrolysis of the esters of di- and polypeptides, an appreciable effect being noted in 1 hr. in many cases (esters of glycylglycine (1), glycyl-*dl*-alanine (2), glycyl-*dl*-leucine (3), leucylglycine (4), diglycylglycine (5), and *dl*-leucylglycylglycine (6)), while polypeptidase-free protease was without any action on 1, 2, 4, 5, 6, even after 24 hrs. and dipeptidase was ineffective with 6. Expts. on the other peptides were not carried out with these enzymes. Polypeptidase caused a slight hydrolysis of glycine amide-HCl (7), a pronounced effect on glycyl-*dl*-leucine (8) and *dl*-leucine amide-HBr (9), and some effect on glycyl-dicarboxyleucine (10) but was inactive with diglycyl[*p*-aminobenzoic acid] (11). Polypeptidase-free protease was inactive on 7, 8, 9, 10, as was dipeptidase on 9. Large amts. of yeast dipeptidase over long periods of time caused no certain effects on benzoylglycylglycine, glycylglycine-carboxylic acid, carbethoxyglycyl-*dl*-leucine, naphthalenesulfonylglycyltyrosine, acetyl-phenylalanylalanine or benzoyldiglycylglycine.

H. J. DEUEL, JR.

Note on the communication of Hans Fischer: about porphyrins and their syntheses. O. SCHUMM. *Ber.* 61B, 784-6(1928).—A polenic.

H. J. DEUEL, JR.

Stimulation experiments with the sucrase of *Penicillium glaucum*. Z. I. KERTESZ.

Fermentforschung 9, 300-5(1928).—The mold grows well on a medium contg. 5% glycerol as the only source of C but produces no sucrose in the absence of sucrose. With the addn. of as little as 0.01% sucrose the presence of the enzyme is demonstrable. With increasing concn. of sucrose the enzyme increases very rapidly at first, then between 1 and 30% sucrose the enzyme formation is directly proportional to the substrate concn., so that the curve is a straight line. Above 30% sucrose the enzyme formation diminishes, probably because of increasing inhibition of fungus growth. On an invert sugar medium no sucrose is formed, and on lactose only traces. Raffinose, however, gives nearly as good a yield of enzyme as sucrose. Hence the formation of sucrose is dependent on the presence of an α -fructoside grouping in the nutrient medium.

A. W. DOX

The enzymic cleavage of starch. KNUT SJÖBERG. *Fermentforschung* 9, 329-35 (1928).—A review of recent investigations by Pringsheim, Euler, Kuhn, Leibowitz, Sjöberg and others.

A. W. DOX

Behavior of oxidizing enzymes in the intermediary realm according to experiments on angiotomized dogs. N. I. SCHÖCHOR. *Fermentforschung* 9, 375-81 (1928).—All of the organs examd. (muscle, intestine, liver, pancreas, spleen and kidney) have the power both of producing and of destroying catalase. Functional exhaustion of the organ results in a diminution of the catalase content of the blood. Peroxidase originates in the blood itself. However, no relationship exists between the peroxidase content and the erythrocyte count of the blood.

A. W. DOX

Influence of acid reaction and boiling temperature on enterokinase. I. P. RASNIKOW. *Fermentforschung* 9, 382-8(1928).—Concns. of HCl up to 0.5% have no destructive action on enterokinase. Up to 0.3% the acid does not interfere with the activation of non-activated pancreatic juice. In the presence of acid the enterokinase is more resistant to boiling.

A. W. DOX

The natural porphyrins. XXII. Preparation of hemin from yeast. H. FISCHER AND F. SCHWERITEL. *Z. physiol. Chem.* 175, 248-60(1928), cf. *C. A.* 21, 591.—By plasmolyzing yeast with satd. NaCl soln., treatment of the residue with pyridine, extr. with H_2O and pptn. with H_2O , hemin was eventually obtained in crystalline form and identified by the Teichmann and other reactions. This is the first instance of the occurrence of animal hemin in the plant organism.

A. W. DOX

The anaerobic resynthesis of phosphocreatine after stimulation of isolated frog muscles. HENRIETTE GORODISSKA. *Z. physiol. Chem.* 175, 261-91(1928).—The observation of Eggleton and Eggleton (*C. A.* 22, 454) that phosphocreatine (phosphagen) diminishes when the isolated frog gastrocnemius is subjected to tetanic stimulation of brief duration is confirmed. With subsequent recovery of the muscle in O the phosphocreatine is again built up to a considerable extent. If, however, the stimulation is sufficiently moderate the resynthesis occurs also under anaerobic conditions. After less sparing stimulation where the resynthesis still occurs in the presence of O , it may fail altogether in an atm. of H_2 . The behavior of phosphocreatine is analogous in this respect to lactacidogen. If the cleavage of phosphocreatine is actually exothermic, then the resynthesis during subsequent resting of the muscle under anaerobic conditions would be an example of an intravital anaerobic process of endothermic type.

A. W. DOX

Reversibility of enzyme action. I. BUNSUKE SUZUKI AND TSUTOMU MARUYAMA. *Bull. Agr. Chem. Soc. (Japan)* 4, 10-2(1928).—Formation of isomaltose from glucose by the action of β -glucosidase free from maltase and prepd. from yeast cell was observed. Also in *Proc. Imp. Acad. Tokyo* 3, 533-5(1927).

K. GORO

Catalase. ARAO ITANO AND SATIYO ARAKAWA. *Bull. Agr. Chem. Soc. (Japan)* 4, 24-7(1928).—*Clostridium thermocellum* and thermophilic cellulose-fermenting bacteria give vigorous catalase action in the cellulose medium at 65°. The catalase action is inhibited in the glucose broth at 65°, while at 23° no action occurs. In the glucose broth, pH changes from 6.75 to 4.98 within 48 hrs. at 65°. This increase seems to be one of the inhibitory factors. The catalase action increases with the age of culture so old as 60 hrs. The catalase test by titration with permanganate is influenced by the presence of K_2H_4 phthalate in the buffer soln. while the phosphate mixt. gives uniform result. The optimum reaction for the catalase is pH 8.64. The velocity const. is proportional to the concn. of the catalase, i. e., a typical unimol. reaction. The catalase resists higher temp. than other bacterial products, viz., thirty min. heating at 60° is the optimum; even 100° does not destroy the action entirely.

K. GORO

Biological significance of the unsaponifiable matter of oils. IV. The absorption of higher alcohols. H. J. CHANNON AND G. A. COLLINSON. *Biochem. J.* 22, 391-401 (1928); cf. *C. A.* 22, 1985.—The rat absorbs the following substances in the order

given, the degree of absorption being greatest for the first: phytol, oleyl alc., cetyl alc. and cholesterol. The soly. of these substances in bile salt solns. may also be placed in this order. Unsaponifiable substances in the diet increase the unsaponifiable fraction of the liver.

BENJAMIN HARROW

Physical factors on the sandy beach. II. Chemical changes—carbon dioxide concentration and sulfides. J. R. BRUCE. *J. Marine Biol. Assocn.* 15, 553-65 (1928).—The presence of living organisms and their metabolic products introduce a further series of biochem. factors into the physical conditions of life on the sandy beach. The gaseous exchanges of animals and plants lead to changes in the p_H of the interstitial waters of the beach, but the calcareous matter associated with the sand acts as an alkali reserve, preventing undue rise of acidity, and incidentally widening the potential range of C assimilation of the surface flora. The conditions leading to the formation of the "black layer" are surveyed and discussed, with special reference to Port Erin beach. An iodometric method for the detn. of sulfides in sand is described, and is used to demonstrate the rate of oxidation when the black sand is exposed to the air. It is concluded that the formation of FeS in the beach is associated with diminished circulation of air and water in the mass of the sand, due either to gross obstruction or to fineness of grade, or both. The presence of org. detritus, usually of an algal nature, appears to be essential to the reaction, and bacteria play an important role in the sequence of changes. S, in common with other elements, passes through a cycle of reactions on the sea-bottom and in the sandy beach.

N. KOPELOFF

Clinical and experimental contributions to the lipid problem. ALBRECHT LENHARTZ. *Z. Immunitäts.* 52, 157-90 (1927).—The paper consists of a classification and a review of the chemistry of lipoids, of a report of expts. on the pptn. of lipoids with alkaloids and a discussion of the clinical application of these facts.

J. H. LEWIS

The action of luminous radiation on glucemia. G. CERUTI. *Boll. soc. ital. biol. sper.* 3, 30-2 (1928).—Albino rats were exposed to the direct rays of a mercury vapor lamp for 15, 30 and 60 min. Another lot of rats was exposed for an equal length of time to rays of the same lamp except that a Wood filter was placed between the animals and the lamp. A third lot was exposed to the direct rays of the sun. The glucemic titer was detd. before and after irradiation. In the first group there was an av. diminution of the titer of 10% for 15 min., 25% for 30 min. and 31% for 60 min. In the 2nd group the values were 8, 13 and 18%, resp. In the 3rd group the diminution was 6, 9 and 12%, resp. Rats exposed to Wood's light for one hr. for one week showed a diminution of 35%. A 4th group kept in the dark for 48 hrs. showed an increase of 9%.

PETER MASUCCI

The chlorohemoglobin reaction in the tissues of cadavers. A. DALLA VOLTA. *Boll. soc. ital. biol. sper.* 3, 37-40 (1928).—If a satd. aq. soln. of NH_2OH is injected into the subcutaneous tissues of a cadaver which has not yet putrefied, the tissues in contact with the soln. assume a reddish brown color. If the cadaver is in an advanced state of putrefaction, the injection of hydroxylamine produces a green color. The NH_2OH in the presence of NH_3 and H_2S transforms Hb into Chl-Hb, which being unstable forms sulfohemoglobin. The reaction is accelerated if $Na_2S_2O_4$ is injected before the hydroxylamine. The reaction is of practical value from the medicolegal standpoint as an index of death and invasion of putrefactive organisms.

P. M.

Protease and amylase of *Aspergillus oryzae*. KOKICHI OSHIMA. *J. Coll. Agr. Hokkaido Imp. Univ.* 19, Pt. 3, 135-243 (1928).—The optimum conditions for formation and activity of protease and amylase of *Aspergillus oryzae* are studied with reference to the industrial application. O. uses adaptations of the usual methods for testing amylolytic and proteolytic action (cf. C. A. 15, 103; 17, 2120). A study of the factors which influence enzyme production leads to the conclusions: (1) Amylase and protease are obtained on synthetic and natural culture media simultaneously and in optimum quantity after two days growth; (2) amylase and protease production on artificial culture is stimulated by a mixt. of casein or peptone and starch or glucose; (3) amylase and protease are extra-cellular after sporelation; (4) different species of *Aspergillus* show variation in activity of enzyme. The protease of *Aspergillus oryzae* is more stable at neutrality and 40° than trypsin and is most resistant to heat at p_H 6.4. It shows optimum activity at 50° and is active between p_H 3.5 and 9.0 with optimum at p_H 5.2 to 5.3. It digests natural proteins and peptones. The reaction velocity follows approx. Schütz, but not the monomol. formula. *Aspergillus* amylase shows optimum saccharogenic and amylolytic activity at p_H 4.8 to 5.2 and is most stable toward heat at p_H 6.4, is destroyed at 65° in 1 hr. but at neutrality and below 40° keeps its activity, is inhibited by NaCl and by alc. and is more stable than protease of the same source. The reaction velocity follows monomol. formula. It is

preserved best with cresol at 0.15 to 0.4%, lysol at 0.5 to 2%, phenol at 0.4 to 1.5%, thymol at 0.05 to 0.2%. A complete bibliography is included. N. M. NAVLOR

Medicinal muds of Crimean salt lakes. A. F. SAGAIACHNUII. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 5, 25-52.—Numerous tables of compn. of the waters of Moinak lakes are given. Very intensive biochem. processes are taking place without interruption by the action of the salt water of the lakes on the vegetation. The formation of the mud is due to aggregation of particles of colloidal hydroxides of Fe and Al and their mixt. with sands and org. debris. The necessary condition for the formation of the mud, as well as for its regeneration, is a low concn. of salt in the lake, which favors the development of bacterial life and the transformation of colloids into the state of gels. For the preservation of the mud it is, on the contrary, necessary that the salt concn. of the lake waters should increase so as to suppress the biochem. processes which tend to form non-colloidal CaCO_3 . The salt concn. of the lakes is lowest in spring, commences to increase in summer and to drop off in winter. BERNARD NELSON

Purification of cozymase from muscle. HANS V. EULER AND SVEN GARD. *Svensk Kem. Tids.* 40, 99-100(1928). (In German).—Fat-free muscle hash extd. with 2 parts boiling NaCl (1%) for 5 min. and deproteinized with AcOH gave a cozymase yield of 10% which retained all its activity over 18 days. **Lactic acid formation from glycogen by dried muscle activator.** HANS V. EULER AND EDVARD BRUNIUS. *Ibid* 100 2. (In German).—Enzymes in dried muscle when activated by boiling yeast press juice caused marked lactic acid formation from glycogen, also from glucose when Meyerhof's activator was present. Cozymase failed to activate these muscle enzymes. A. R. ROSE

The treatment of nursing mothers with ultra-violet rays. C. CHISHOLM AND M. MCKILLOP. *Lancet* 1927, 11, 227; *Expt. Stu. Record* 57, 793(1927).—The systematic irradiation of mothers whose breast milk had been failing was found to be of general benefit in all of the 53 cases in which the treatment was continued for some time and of aid in improving or retaining the milk supply in all but 11 of these cases. E. R. SCHIERZ

Sugar cleavage by the action of very dilute alkali (FISCHLER, LINDNER) 10. The bile acids. XIX (SCHENCK, KIRCHHOFF) 10.

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Color reactions of ergosterol and its differentiation from cholesterol. LAD. EKKERT. *Pharm. Zentralh.* 69, 276-8(1928).—An exptl. study of the color changes produced by these 2 compds. when treated with aldehydes in the presence of concd. H_2SO_4 , H_3PO_4 and Ac_2O , resp. W. O. E

Indican in urine investigations. ENGELB. SCHLECHT. *Pharm. Ztg.* 73, 567 (1928). CARL OTTO. *Ibid*—Polemical. Cf. C. A. 22, 1788, 2180. W. O. E.

Permanently saturated H electrode for the determination of p_{H} (SWYNGEDAUF) 1. Practical arrangement of apparatus for microfiltration (FONTES, THIVOLLE) 1. The pocket polarimeter of Zeiss-Ikon A. G. (SEILER) 1. Estimation of reducing sugar by the ferricyanhydric method (IONESCO-MATIU) 7.

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C—BACTERIOLOGY

A. K. BALLS

Carbohydrate-like specific substance in the colon-aerogenes group. J. TOMCSIK. *Proc. Soc. Exptl. Biol. Med.* **24**, 810-2(1927).—Protein-free hapten was isolated from a strain of *B. lactis aerogenes*. This substance consists chiefly of polysaccharides, but in spite of several attempts at further purification, its N content could not be reduced below 0.9%. Similar substances obtained from several other aerogenes strains and from encapsulated *B. coli* showed a strict individual specificity; no cross reactions were observed. C. V. B.

The influence of the concentration of the different neutral salts on the agglutinating affinity of bacteria. AKIRA ICHIKAWA. *Sei-i-kwai Med. J.* **46**, No. 8, 1-8(1927).—The greatest agglutination occurred at a definite salt concn. This concn. is approx. isotonic with univalent and bivalent cations. Only K_2SO_4 and Na_2SO_4 are effective in hypotonic solns. of the first group and $CaBr_2$ and CaI_2 of the second group while no influence was found with the concn. of $MgSO_4$. With trivalent cations the expts. were not possible since coagulation of the serum usually occurred. $AlCl_3$ gave a good result with a hypotonic soln. H. J. DEUEL, JR.

A contribution to the biochemistry of microorganisms. W. GRIMER AND H. BRANDT. *Milchwirtschaft. Forsch.* **4**, 547-563(1927).—A study was made of the action of *Bacillus mesentericus* and *Paralectrum foetidum* in symbiosis on a medium composed of casein and nutritive salts. The data cover the N distribution, volatile and non-volatile fatty acids, and also the amino acids formed by splitting of the protein.

GEORGE R. GREENBANK

The nature of the action of ultra-violet light on microorganisms. T. H. BEDFORD. *Brit. J. Exptl. Path.* **8**, 437-41(1927).—Ultra-violet light is capable under ordinary conditions of producing H_2O_2 . The destruction of microorganisms by ultra-violet light is due and is directly proportional to the production of this substance. The relative susceptibility of different microorganisms to ultra-violet light is of the same order as their relative susceptibility to H_2O_2 as tested *in vitro*. Ordinary visible light has only a very mild effect upon microorganisms. It is, however, possible to sensitize them and produce an abnormal condition in which visible light is as active as ultra-violet light. It is suggested that photodynamic sensitizers, such as fluorescent dyes, may act through the agency of H_2O_2 or some org. peroxide production, and that the typical sensitizer acts (1) by selective adsorption on to the organism concerned and (2) by peroxide formation when visible light falls upon the organism-sensitizer combination. HARRIET F. HOLMES

The permanent preservation of bacteriological nutrient solutions. WILHELM PLAHL. *Z. Untersuch. Lebensm.* **54**, 371-3(1927).—Nutrient solns. are protected from evapn. and contamination by placing the tube inside a larger tube corked and sealed with a soln. contg. 10% of gelatin and 1% of salicylic acid. WILLIAM J. HUSA

Effect of hydrogen ions and undissociated molecules on bacteria. F. TEKELENBURG. *Nederland. Tijdschr. Hyg. Microbiol. Serol.* **2**, 176-94(1927); cf. *C. A.* **19**, 91; **20**, 219.—Modern research demonstrates to an increasing extent the importance of the concn. of the undissoc. acid and the nature of the anion on the viability of bacteria. Given 2 cultures of equal H-ion concn. one in a medium of high, the other in one of low buffer capacity, the total acid concn. of the former, x , will necessarily be higher than that of the latter, y , and the following equation will obtain: $[H] = [H_1A_1]/(x - [H_1A_1]) = ([H_2A_2])/(y - [H_2A_2])$. Many results published in the literature could be easily explained with the aid of this equation. A study in this direction was made with *B. coli*, *B. pyocyaneus*, and *Staph. pyog. aureus*. The cultures were well shaken with NaCl and filtered through paper. The following acids were studied alone or in combination with their Na salts: HCl, HCO_2H , AcOH, glycine, propionic, butyric, isobutyric, valeric, isovaleric, oxalic, malonic, succinic, tartaric, malic, tartaric, citric, glycolic, α - and β -hydroxybutyric, fumaric and maleic. The temp. was 37°, the acid concn. 0.1 N, for HCl, also 0.01 N. Mixts. of acids and salts had the same concns. Buffer solns. were tested at 40-55°. For p_H 1.42-5.11 the buffers used were HCl-glycine, HCl-Na citrate, Na citrate; for p_H 8.24-13.00 the buffers used were 0.1 N NaOH + glycine, 0.1 mol. Na_2CO_3 + 0.1 N HCl and 0.15 mol. Na_2HPO_4 + 0.1 N NaOH. A slight effect of the undissocd. acid was brought out by the fact that in acid buffer solns. the p_H limit of viability was somewhat lowered for all organisms by dilg.

the soln. 10 times. However the disinfecting effect seemed to be detd. chiefly by the p_H and the temp. For the alk. buffers a certain p_H , 11.36–11.77, slightly varying with the nature of the cation, seemed to be particularly toxic. The temp. too had a decisive effect. The tabulated results demonstrate the high toxicity of the $[H]^+$ at a concn. of 0.01 *N*. At 0.001 *N* the effect is slight. The resistance to acids decreases in the order: colon, staph., pyocyanus, the last being highly sensitive. The toxicity of undissocd. acids is borne out by the expts. with solns. of a non-toxic H-ion concn., especially with acid-salt mixts. The nature of the anion seems to be of importance. α -Hydroxy acids, glycolic, lactic and hydroxybutyric acids are highly toxic. Fumaric and malic acids and the higher fatty acids (valeric and isovaleric) have also a marked bactericidal effect, the alkali salts alone showed no marked bactericidal effect within 2 hrs. The expts. demonstrate the increase in the germicidal effect of H ion by undissocd. acid and *vice versa*. By proper choice of acids sterilization can be attained at a much higher p_H value than is usually considered to be necessary. MARY JACOBSEN

Intensive bacterial oxidation; oxidation of ammonia to nitric acid. G. J. FOWLER, Y. N. KOTWAL, R. V. NORRIS, S. RANGANATHAN and M. B. ROY. *J. Indian Inst. Sci.* **10A**, 97–116(1927).—Expts. were made to det. how far intensive nitrification can be carried, by using the principle of the activated-sludge process; the possibility is also indicated of employing activated-sludge tanks for producing nitrates from various nitrogenous raw materials as a preliminary to their application for agricultural purposes. The results show the necessity of carefully cultivating organisms of special activity; the speed of nitrification decreases with increasing concns. of nitrate; with dil solns. of NH_4 salts and with $CaCO_3$ in quantity necessary to neutralize the resulting acid, but employing no nutrient salts, a concn. of 5.56% of $Ca(NO_3)_2$ was obtained, only about 96% of the nitrogen added was recovered as nitric nitrogen, potassium phosphate and $FeSO_4$ exercise a beneficial effect while $CaSO_4$ and $MnSO_4$ exert a retarding influence; the rate of nitrification could be increased by adding such substances as silt and animal charcoal which increase the area of oxidation surface during aeration; the theoretical quantity of $CaCO_3$ required to neutralize the acid produced is sufficient for efficient nitrification; the nitrifying organisms grow at a p_H from 5.8 to 8.0, but function best at p_H 7.0–8.0. N. A. LANGE

D—BOTANY

THOMAS G. PHILLIPS

The mechanical action of crustaceous lichens on substrata of shale, schist, gneiss, limestone and obsidian. E. JENNIE FRY. *Ann. Bot.* **41**, 437–60(1927).—Previous work (*Ann. Bot.* **40**, 397(1926)) being continued it is shown that swelling of the thallus or apothecial tissue produces an arching of the thallus which lifts with it a portion of the substratum. On a laminated substratum, as shale, the laminae are sepd. and lifted bodily; on schist, gneiss, obsidian and limestone, small isolated fragments of the stone are torn away by the arching of the thallus, but the hardness of these rocks greatly reduces the amt. of disintegration so produced. JOSEPH S. CALDWELL

Studies in the energy relations of plants. II. The effect of temperature on increase in area of leaf surface and in dry weight of *Cucumis sativus*. 1. The effect of temperature on the increase in area of leaf surface. F. G. GREGORY. *Ann. Bot.* **42**, 469–507(1928).—Earlier work (cf. *C. A.* **15**, 2296) showed that with const. high temp. and low light intensity the rate of increase in leaf area of the cucumber fell off with time in a definite manner. In the present expts. light intensity and humidity were held const. while the temp. was varied from supra- to sub-optimal (90.3–63° F.). The relation of these factors to leaf growth is here discussed; their relation to assimilation rate and dry weight increase is to be taken up in a subsequent paper. The expts. were continued 16 days. At sub-optimal temps., growth rate is controlled by light intensity. Reduction of light intensity reduces the leaf area. At supra-optimal temps. the leaf growth rate falls off with time, partially through depressing the rate of cell division in the leaf primordia, partially by causing a redistribution of material in the plant with resulting increase in stem growth. The growth curves of the foliage leaves at all the temps. employed conform to a simple parabolic function; those for the cotyledons do not. The results obtained at various temps. may be accounted for by the hypothesis of a photochem. action upon a nitrogenous substrate, independent of the rate of C assimilation. JOSEPH S. CALDWELL

The effect of increased atmospheric carbon dioxide on the growth of plants. I. B. D. BOLAS and F. Y. HENDERSON. *Ann. Bot.* **42**, 509–23(1928).—By using cucumber seedlings at various temps. between 27° and 36.2° and CO_2 concns. from 25.8 to 42.4

parts per 10,000, the increase in dry weight over controls in CO₂ concns. between 3.6 and 4.3 parts per 10,000 ranged from 42 to 86% in cultures continued from 8 to 14 days. An improved open system type of app. for growing plants under controlled temp., humidity and CO₂ supply is illustrated and described in detail. J. S. C.

Chemical studies in the physiology of apples. IX. The chemical composition of mature and developing apples and its relationship to environment and to the rate of chemical change in store. H. K. ARCHBOLD. *Ann. Bot.* 42, 541-66(1928); cf. C. A. 22, 1378.—Analyses of fruits of Bramley's Seedling apple were made at intervals of 2-4 weeks from June 22 (at which time the fruits were 1 month old and weighed 8 g.) to Oct. 21. The detns. included titratable acidity, total and reducing sugars, N, alc.-insol. constituents, dry wt. and sp. gr. of juice. Total wt. per fruit increased rapidly up to Sept. 15, then remained nearly const. Percentage of total solids and of sol. carbohydrate showed only a very slight increase with age up to Aug. 5, after which both increased rapidly up to Sept. 21. Alc.-insol. residue increased up to July 15, then decreased. Total N and titratable acidity were highest in aurt. on June 22 and decreased rather steadily throughout the period of development. N accumulation in the apple ceases about 7 weeks after setting of fruit; max. accumulation of starch and acid occurs in the seventh to ninth weeks, max. increase in dry wt. and in sol. carbohydrate, twelfth to fourteenth week, rapid hydrolysis of starch and accumulation of sucrose, fourteenth to nineteenth week. Comparisons of apples of the same variety from widely sepd. orchards upon various types of soil continued over several years showed large differences in dry wt., N and acid content which seemed to be characteristic of the various orchards, as they persisted from year to year. The variations in dry wt., N and acidity in the same variety from a single orchard year after year were considerable but were smaller than those between orchards. Climatic conditions affect the chem. compn., low temp. and low sunshine being productive of high acidity and low sucrose content. During storage for 100 days at 1°, the rate of loss of sugar and acid from fruits of high N content was much higher than from those having lower N, thus confirming A.'s earlier conclusion that a high respiratory rate is directly correlated with high N content (cf. C. A. 19, 1881). A further study of the relation of initial compn. to changes in storage is promised. JOSEPH S. CALDWELL

The problem of copper as a normal component of plants. A. QUARTAROLI. *Ann. chim. applicata* 18, 421-53(1928).—Previous studies have shown that when Cu is present in plants, the seeds contain a relatively high proportion. The Cu content of seeds from a large no. of various common horticultural and agricultural plants was detd. to ascertain whether Cu is a normal component of plants. Analysis of such minute quantities is only made possible by means of the new method of Q. for detg. traces of Cu (cf. C. A. 22, 927). Various soils were also analyzed for their Cu content to ascertain whether when Cu and other metals, particularly Mn, are present in the soil, the plants contain disproportionately high quantities of Cu and therefore require Cu in their normal metabolism. The method adopted for the detn. of Cu in soils was to calcine lightly 2-10 g. of soil, decomp. with hot concd. HCl contg. a little HNO₃, evap., dissolve in very dil. HCl, filter, evap., dissolve in 10 cc. of concd. HCl and 90 cc. of water, boil, pass through H₂S, filter, wash with H₂S water, incinerate the filter paper, treat the ash with HNO₃, and det. Cu by the method cited. Frequently seeds contain more Cu than Mn when the soil contains 10 times as much Mn as Cu. The Mn and Cu contents of 90 varieties of seeds and a large variety of nuts, leaves, bulbs, flowers, stems and roots of various plants are tabulated. Of the 90 seeds, 44 contained more Cu than Mn, and in cases where the Mn content was higher than the Cu content, it was because the Mn was unusually high rather than because the Cu content was low. Cereals contain in general a relatively low Cu content, in contradiction to the reports of some authors that the Cu content of cereals is high. Legumes contain a relatively high Cu content. Garden flowering plants are also particularly rich in Cu. Seeds which are of special importance to birds as foods are rich in Cu, which may be related to the high Cu content of bird feathers. In general Cu is far higher in the seeds than other parts of a plant. The expts. indicate that Cu is an element essential to the life of plants, and probably acts as an activator of oxidation processes, i. e., as an oxidase. C. C. DAVIS

Influence of caffeine on the germination of seeds. G. B. ZANDA. *Arch. farm. sper.* 44, 278-86(1928).—Addn. of caffeine in small quantities has a marked influence on the germination of seeds of *Zinnia elegans* in Sachs nutrient soln. and on the subsequent development of the seedlings. In a concn. of 0.01% it accelerates the germination and favors the development of the plant to a greater size than the control. A concn. of 0.02-0.03% hastens the initial stage of the germination but does not stimulate further growth beyond normal. A 0.1% soln. has an inhibitory effect on germination and stunts

the growth of the plants, while 0.2-0.3% solns. are decidedly toxic. However, the germinating power which has been suppressed by caffeine may be restored by transferring the seeds to a caffeine-free nutrient medium, and the normal growth of the dwarfed seedlings resumed by the same treatment. A. W. DOX

The mechanism of carbohydrate splitting during anaerobic respiration in plant organs. J. STOKLASA AND J. BARŠ. *Ann. Czechoslovak Acad. Agr.* 1, No. 1, 1-46; *Fr. and Ger. abs.*, 42-4(1926); *Expt. Sta. Record* 56, 425.—Results are given of studies carried out during 25 years on aerobic respiration in plants with references to related literature. S. and B. have not been able to confirm the view that alc. is always formed from AcH. They hold that AcH may be formed as a secondary product in the process of oxidation of EtOH. All changes in the plant cell are processes involving reduction or oxidation. H. G.

An examination of nostoc for nuclear materials. F. A. MCKERIDGE. *Brit. J. Exptl. Biol.* 4, 301-4(1927); *Physiol. Abstracts* 12, 137.—Nucleic acid itself was not found, but its constituents were extd. and identified—phosphate, pentose, adenine, guanine, cytosine and uracil. In the absence of a highly developed nucleus, nuclear materials may more readily diffuse out of the cell and promote growth, as do *Saccharomyces* and *Azotobacter*. H. G.

The acidity of root secretions (in Russian with English summary). E. G. MININA. *Bull. inst. recherches biol. Univ. Perm.* 5, 233-58(1927); *Physiol. Abstracts* 12, 189.—Roots of plants in a soil of low buffering displace the p_H value of the soil soln. As the plants develop the soil soln. first acidifies, then becomes more alk. and finally more acid. The plants investigated, placed in order of their acidifying action on the soil soln., are bean, lupine, buckwheat, cereals. Roots in distd. water for 24 hrs. excrete non-volatile buffers. This excretion takes place most vigorously when the plants are transferred to distd. water after growing for 3 to 5 weeks in nutrient soln. The plants investigated fall into the following order in respect to buffer excretion: lupine, bean, buckwheat, cereals. Titration shows that the non-volatile buffers are org. acids. The coincidence of the period of max. excretion of non-volatile org. acid buffers with that of max. acidification of the soil indicates that the acidification is due to org. acids. H. G.

Absorption of carbon dioxide by leaf material. H. A. SPOEHR AND W. NEWTON. *Carnegie Inst. Washington Yearbook* 25, 177-80(1925-6); *Expt. Sta. Record* 57, 817.—Investigations of the capacity of dried and powd. leaf material to absorb CO_2 (*Carnegie Inst. Washington Yearbook* 24, 137-69(1924-5)) were extended to include (besides sunflower) nettle, spinach, hydrangea, turnip, alfalfa, rhubarb, grass and *Ramilina reticulata*. Only sunflower and nettle leaf material gave pos. results. It appeared that the larger part of the absorption of CO_2 by *Helianthus annuus* dried leaf material and the alc. ppts. obtained therefrom could be ascribed to bicarbonate formation. The sunflower and nettle material is noteworthy because both the dried leaf material and the alc. ppts. absorb more CO_2 than can be accounted for by the soly of this gas in the water added to the dried or pptd. material. . . There is, however, no direct relation between the absorption capacity and the amt. of ash in the leaves and alc. ppts. H. G.

Some observations on the distribution of calcium oxalate crystals in plant tissues, and their probable role in plant metabolism. GIRIJA PRASANNA MAJUMDAR. *Indian Sci. Cong. Proc. [Calcutta]* 12, 187(1925); *Expt. Sta. Record* 57, 215.—Ca excess is supposed to be utilized in pptg. oxalic acid and sol. oxalates. In oxalate-free plants oxalic acid or oxalate either is not produced or is produced in a quantity insufficient to cause harm to the plant system. It is inferred from the disappearance of oxalate crystals from the lower vegetative regions of certain plants, from water culture expts., and from the study of the proportion of oxalate crystals formed and Ca salt present in certain plants, that Ca oxalate is reintroduced into the metabolic cycle and that a limited supply of Ca may be sufficient for the life of the plants. H. G.

Relations of Sphagnaceae and some submerged water plants to calcium carbonate. P. DAHM. *Jahrb. wiss. Bot.* 65, 314-50(1926); *Physiol. Abstracts* 12, 409-10.—Winkler's method can be used for detg. respiration of Sphagnaceae. O pressure has no influence on respiration. Photosynthesis of Sphagnaceae in water contg. $CaCO_3$ at first increased and then gradually declined. In phosphate soln. some Sphagnaceae endured a reaction corresponding to p_H 8.0, but not one corresponding to p_H 7.5. In 2 cases the carbonate was utilized, so that the soln. developed an alky. corresponding to p_H 9.5; such utilization was found also in other submerged plants, and cannot be invoked as the cause of the calciphobic character of Sphagnaceae. H. G.

The reactions of root saps of some plants, and alterations of reactions in various

nutrient media by the plants. GROH. *Landw. Jahrb.* 63, 483-500(1926); *Expt. Sta. Record* 57, 215-6.—Plants vary in p_H values relatively rapidly in a weak KCl soln. Apparently no physiol. influence of KCl is here involved. Acid materials are given up by peas, horse beans, lupines and wheat; basic by oats, barley, rye and mustard. Heat and soil and fertilizing are noted. Supposedly a certain role in nutrient uptake may be played by a difference in potential which has been shown to exist between soil and plant. H. G.

Preliminary report on the relations between pigment formation, leaf area and dry weight of corn grown in sand cultures. H. B. SPRAGUE. *New Jersey Sta. Report* 1925, 332-7; *Expt. Sta. Record* 57, 24.—This expt. was started for the study of relations between the formation of the pigments, chlorophyll A and B, carotin and xanthophyll, and the development of leaf area and dry wt. in strains of corn during growth. The results are detailed and tabulated for the period. Chlorophyll content was more closely related to leaf area than to wt. of leaf. On the other hand, carotin formation was more closely connected with dry wt. of leaf than with leaf area. Xanthophyll content corresponded to the values of carotin. Further expts. are planned to test the validity of these and other observations. H. G.

The effect of solutions of eosin, erythrosin and methylene blue on germination and growth of some plants. J. C. VAN DER M. MOHR. *Rec. trav. bot. Néerland.* 23, 245-62(1926); *Expt. Sta. Record* 57, 416.—The germination and further development of rice, maize, wheat, soy beans, *Arachis*, cassava and sugar cane are influenced by 0.5% solns. of eosin and erythrosin in ways which are specified H. G.

Composition of gases in tree trunks. D. T. MACDOUGAL. *Carnegie Inst. Washington Yearbook* 25, 160-2(1925-6); *Expt. Sta. Record* 57, 815.—Detns. of the compn. of the included gases were made on wood late in the season of 1925. Samples were extd. from radial bores by means of a Hg column set to give suction of 0.6 to 0.8 atms., and the pressures are tabulated of O, of CO₂ and of N with possibly other gases H. G.

The chemistry of leaves lacking chlorophyll. A. GRANDSIRE. *Ann. sci. nat. bot.* [10], 8, 221-98(1926); *Expt. Sta. Record* 57, 514.—A systematic report is given, with bibliography of more than 100 titles, on studies with higher plants more or less deficient in chlorophyll as regards material present in the fresh state, dry matter and ash. Such contents show a tendency to be characteristic, though modified at least by disease, autumnal changes, etiolation and albinism. H. G.

Physiology of *Rhizopus* species. TEIZO TAKAHASHI, KINICHIRO SAKAGUCHI AND TOSHINOBU ASAI. *Bull. Agr. Chem. Soc. (Japan)* 3, 87-92(1927); cf. *C. A.* 22, 1380.—The verification of the occurrence of either zymase or carboxylase in the *Rhizopus* species by the measurement of CO₂ evolution by Einhorn's tube ended in negative results. By the detn. of alc. produced from glucose by acetone-*Rhizopus*, i. e., fungus growth treated with acetone, the presence of zymase in this fungus was concluded. The production of alc. from AcOH by acetone-*Rhizopus*, and from malic acid ether by the fungus itself or by the dead fungus, was observed. K. Goto

Physiology of *Rhizopus* species. TEIZO TAKAHASHI AND TOSHINOBU ASAI. *Bull. Agr. Chem. Soc. (Japan)* 4, 15-8(1928); cf. preceding abstract.—The verification of the occurrence of zymase and carboxylase in *Rhizopus* species by the formation of CO₂ from glucose and pyruvic acid failed in using Einhorn's tube, but succeeded when Lohmstein's tube was used. K. Goto

Some nitrogenous constituents of the leaves of kuzu (*Pueraria hirsuta*, Matsum). RINJIRO SASAKI. *Bull. Agr. Chem. Soc. (Japan)* 4, 1-5(1928).—From the soln. after pptn. of protein by neutralizing the alk. alc. ext. of the leaves, were isolated adenine, asparagine, glutamic and butyric acids and a base yielding a chloroaurate, m. 117-8° K. Goto

The crystallite orientation of cellulose in some plants. R. O. HERZOG AND W. JANCKE. *Naturwissenschaften* 16, 238(1928).—Several x-ray diagrams were made of bast fibers of negative double refraction. In none of them any other identity period was found than that already known and explained by spiral structure, the period being tangential to the spiral. B. J. C. VAN DER HOEVEN

Respiration of the soy bean. A. L. HAFENRICHTER. *Botan. Gaz.* 85, 271-98(1928).—With 2 varieties of soy bean, Manchu and Midwest, it is shown that (1) the rate of respiration, at all temps., varies greatly during the development of the seedlings; (2) there is a great difference between the 2 varieties with respect to the intensity and the fluctuation of the rate of respiration; and (3) the max. rate of respiration occurs early in the development of the seedlings, with the exception of that of the Manchu variety at 15°. Temp. is an important factor in the degree and relative rate

of variation in respiration. Beans grown in the dark show a marked increase in the rate of respiration preceding the complete exhaustion of the plants. B. H.

Water solubility of dry matter in relation to calcium nutrition of normal orange and lemon leaves. A. R. C. HAAS. *Botan. Gaz.* 85, 334-40 (1928).—The ash of normal citrus leaves of the same age shows practically no difference in compn. for the citrus varieties examd. When the dry matter of these leaves is extd. with water, the ash and the Ca of the sol. fraction of mature normal Washington Navel and Valencia orange leaves are greater than those of Eureka lemon. The large water soly. of the K in citrus leaves and the different degrees of soly. of the Ca may throw new light on the mottled-leaf problem. •

Stimulating effect of amino acids on sugar metabolism of plant and animal cells. W. E. BURGE, G. C. WICKWIRE, A. M. ESTES AND MAUDE WILLIAMS. *Botan. Gaz.* 85, 344-7 (1928), cf. *C. A.* 21, 3393.—Optically active amino acids stimulate sugar metabolism in the plant cell, *Sparogyrus*, and the animal cell, *Paramecium*, while the optically inactive ones do not. Insulin increases the rate of utilization of the sugars. B. H.

Chemical data relative to the silver leaf disease. C. M. ALBIZZATI. *Anales soc. cient. Argentina* 103, 38-42 (1927).—Ciferri has confirmed Masee's and Petri's hypothesis that the silver leaf disease of peaches is due to hydrolysis of the pecto-cellulose complex in the middle stratum of the leaf by diastases. An analysis of normal (I) and diseased (II) leaves of *Prunus armeniaca* from the Expt. Sta. of La Plata lends support to this hypothesis: reducing sugars (I) 3.690, (II) 3.825, celluloses (I) 18.16, (II) 18.125; acids (as $C_4H_4O_6$) (I) 0.647, (II) 0.843, sol. $C_2H_2O_4$ (I) 0.647, (II) 0.056; insol. $C_2H_2O_4$ (as C_2O_4Ca) (I) 5.226, (II) 5.217. Diastases: The difference between the sugars formed by I and II increased from 0.0027 on the 1st to 0.0978 on the 6th day. Unlike Ciferri, A. has not noticed a decline of hydrolysis by (I) on the 5th day. M. J.

The seed and oil of *Jatropha curcas*. F. A. SOLIVEN. *Philippine Agr.* 16, 587-96 (1928).—The pulp and kernels of the fruit of *Jatropha curcas* contain H_2O 65.10, 6.80; ash 9.03, 4.82 and protein 2.81 and 23.35%, resp. The ashes of the pulp and kernels consist of SiO_2 3.34, 1.02, CaO 5.42, 21.03; P_2O_5 3.12, 6.03; Al_2O_3 0.66, 0.16; Fe_2O_3 0.40, 1.04, K_2O 36.91, 17.88; Na_2O 23.54, 16.59; MgO 6.00, 9.42 and SO_3 1.32 and 9.75%, resp. The av. yield of oil was 22.23% of the whole seed or 51.89% of the kernels. It has the following properties: color, light yellow; sp. gr. 0.9141 at 27.5°; n_D^{20} 1.4698 at 20.9°, m_p -9°; sapon. value 195.89; I no. (Hanus) 101.8; hydroxyl value 2.15; acetyl value 2.16; acid no. 10.2; unsaponifiable 0.5. The neutral oil contains glycerides as follows: linolenic acid none, oleic 36.79, linolic 50.50 and satd. fatty acids 13.80%.

Chemotropism in the cotton plant. F. HARDY. *Trop. Agr. (Trinidad)* 4, 102-3 (1927)—Work indicating that NH_3 and trimethylamine may be responsible for the attraction of certain insects by cotton plants is discussed. A. L. MEHRING

Quantitative variations of the products of photosynthesis in the leaves of green plants in one day (24 hours). P. P. STĂNESCU. *Ann. sci. univ. Jassy* 14, 383-510 (1927); cf. *C. A.* 21, 2292.—After a review, with bibliography of 86 references, S. gives a very detailed account of his work (particularly on mono-, di- and polysaccharides, glucosides and dextrins), including the technic used. Elaboration of starch during the daytime and its resorption at night are not continuous and progressive, but can exhibit a clearly marked rhythm, alternately increasing and decreasing a variable no. of times per 24 hrs. Disappearance of starch during the night is the more rapid according as the starch content is lower; in summer the min. is generally reached shortly after sunrise and can sometimes last till 10 o'clock or later. Fairly frequently, with certain plants the min. cannot be detected by staining with I, all the portions of the leaf removed for testing being uniformly stained blue. Diurnal accumulation of starch never begins before 7 A. M., even in summer. Max. starch content (when there is only 1 max.) is generally reached at or shortly after noon and can last 1 hr. or more, but usually till sunset; it is sometimes reached quite early in the forenoon and can then last only a short time or till well on to sunset. When there are several max., the highest and most sustained is generally the one reached shortly after noon, while the lowest min. is the one reached about noon (the only one when, as is most frequent, there are only 2 max.). At times, but only seldom, the starch content increases at night time (through recondensation of sol. carbohydrates). In all cases the individuality of the leaf is a most important factor. During warm and luminous seasons on the whole production of starch is favored by moderate rather than by strong light; but towards the end of autumn the optimum light seems to be direct insolation. At max. starch contents I stains the leaves a deep blue, while at min. contents the color is more violet-blue. Occasionally at night time degradation of the starch into erythrodextrins can

be detected. Solarization depends on light together with other factors, and can be observed even when the sky is more or less overcast and the temp. relatively low. Appearance of anthocyanins, in the spring and particularly in the fall, can decrease the formation of starch to 0, and evidently renders solarization impossible. At the higher altitudes solarization is not so easily detected as at low, and sometimes cannot be detected at all; plants growing at the summit (and in general all mountain plants, except forest trees) are typically heliophilic and do not develop properly except under high luminous intensity. Reducing matter (directly or after inversion by acids or under pressure) also undergoes rhythmic variations; the amplitude of the variations are greater in daytime during the summer, while at night time they are much smaller and even sometimes practically nil. Reducing matter after acid inversion (disaccharides) show the largest variations. In typically amylophylic plants the directly reducing substances (chiefly monosaccharides) exhibit but very slight variation (*Medicago sativa*); while in saccharophylic plants (*Polyanthes tuberosa*), the smallest variations are those of the substances inverted under pressure or by prolonged boiling with mineral acids (chiefly polysaccharides); in the other plants investigated (amylophylic) all the constituents which were detd. showed appreciable variations. The curve of the total variations of all the substances detd. resembles most the curve for the substances present in largest amts. or showing the largest variations. The curve of total variations rapidly falls towards evening, but it can also fall considerably earlier. The partial curves (for the sep. constituents) can continue to show variations during the night. The several curves of the reducing substances, both directly and after hydrolysis, can vary either in the same or in opposite direction, and in the latter case the phenomenon is particularly noticeable in the daytime. The max. of the several constituents, as well as that of the total amt. of substances investigated, is generally reached long before sunset, though at times just a short time before sunset. Conclusion: Photosynthesis is a rhythmic phenomenon, which can doubtless be related to other rhythmic phenomena such as growth, periodical variations in turgescence and respiration.

A. PAPINEAU-COUTURE

Photosynthesis. P. P. STĂNESCU. *Ann. sci. univ. Jassy* 15, 161-212(1928); cf. preceding abstr.—Condensation of starch apparently is favored by moderate luminous intensity, diffused daylight in summer and direct sunlight in fall and winter. Leaves which grow in the sunlight are stained deep blue by I, particularly at max. starch contents, while those growing in the shade are stained a more or less reddish blue. Leaves which assimilate under luminous conditions either above or below the optimum are similarly stained, and the same is true of the leaves of plants grown in pots as compared with those in the ground. In the morning, starch generally appears earlier in leaves in the sun, while the max. is generally reached earlier in leaves in the shade. As a rule, the warmer and more luminous the season, the smaller the starch content of leaves exposed to the south, as compared with those exposed to other points of the compass; but with advancing fall the reverse is true. Leaves exposed to the east are usually the first to have newly formed starch in the parenchyma. The 2 portions of leaves which are curled into a trough shape behave differently in the production of starch, as though they belonged to leaves facing in different directions. As a rule young leaves and those which have just reached their full growth produce the largest amt. of starch and the max. last longer than in others. The disappearance of starch in older leaves is more rapid, and solarization is more easily found in the older leaves. Starch disappears more rapidly at night in leaves growing in the shade; sometimes it disappears first along the principal veins, while at other times it persists longer along these veins. Very frequently, particularly during the summer, the leaves do not lose all their starch in a single night. In the morning the basal portion of the leaves can contain more starch than the tips of comparable leaves of the same species. During the summer, the largest amt. of starch is generally found immediately under the lower side of the leaves on very warm and luminous days; while the production of starch is approx. the same at both sides of the leaves when the sky is overcast in summer or as autumn advances. Leaves which are cut during the max. starch content are stained a more or less deep blue by I, while leaves cut during the min. or when the starch is being solubilized are stained a violet blue, or even reddish violet. During the night the solubilization of starch can be clearly detected by the red color (erythro-dextrins) produced by I. Starch can be recondensed from its several stages of solubilization in the same leaf during a single night. Under natural conditions temps. up to 41° seem to favor the condensation and accumulation of starch in leaves during luminous summer days. Production of starch is very slight, or negligible, in leaves which have been faded by heat. In the leaves studied, the largest amts. of starch were found in summer (June-Sept.). Towards the end of the vegetative period the differences in the amts. of starch

in leaves growing in the sun and in the shade are very pronounced, to the advantage of the former. As the season advances, it becomes increasingly difficult to distinguish a max. starch content in the leaves, which are stained a more or less uniform violet to brownish blue. The lower the temp. and the more overcast the sky, the lower the starch content, and under these conditions staining with I shows starch only along the main veins. At this season young leaves always contain more starch than adult leaves. On the whole, leaves facing towards the south are more frequently and more clearly solarized than others. Solarization is generally most pronounced in leaves showing an av. starch production. No definite relation was found between the appearance of solarization and luminous intensity: the differences in the intensity of staining of the solarized and unsolarized portions of the same leaf are nearly always less at the under side of the leaf (which is less strongly illuminated than the upper side). Leaves which remain red or violet during the whole period of growth (because of the presence of anthocyanins) always synthesize and accumulate some starch, but in much smaller quantities than in green leaves of neighboring species: if the leaves have these colors only in the spring and fall, the deeper the color the less the amt. of starch produced, and under these conditions solarization of the leaves was never observed. Sub-alpine plants, which are typically heliophylic, never exhibited a perfectly characterized solarization, and the leaves of such plants showed the highest starch contents on days in which there were sudden and considerable variations in temp. and luminous intensity and in which the atm. was highly electrified. When leaves, which have not been cut from the twigs, are emptied of their starch content by keeping in the dark sufficiently long, and are again exposed to light they assimilate and accumulate starch much more actively than normal leaves; if exposure to light has not been too greatly delayed, the transient max starch content is almost equal to that of normal leaves, is reached at the same time (or almost), and frequently lasts longer. If the leaves are re-exposed to light at a time when, under normal conditions and considering climatic and atm. conditions, the starch content of normal leaves is decreasing, the reappearance of the starch may be retarded, or, if it takes place, the small quantity of freshly elaborated starch is immediately solubilized; but the definite re-elaboration of starch starts in somewhat sooner than in normal leaves. The rate of disappearance of starch from leaves which have been cut and left to stand either in the air or on water increases as the leaves have been cut earlier, and is greater when they are left in the air than when they are placed on water. If the leaves are cut before evening, the starch disappears more rapidly than in leaves remaining on the plant, while if they are cut at night the starch frequently disappears more slowly than in leaves remaining on the plant. During the disappearance of starch from cut leaves, on staining with I the main veins frequently stand out exceptionally well as though the products of solubilization were recondensed along these veins.

A. PAPINEAU-COUTURE

Anthraquinones in Rhamnaceae. H. MAURIN. *Bull. sci. pharmacol.* **35**, 236-8 (1928); cf. *C. A.* **18**, 1878; **22**, 1289.—In the bark from the stems of 10 species of *Rhamnus* the anthraquinone derivs. ranged from 1.15% in *R. cathartica* to 2.3% in *R. frangula*. In the leaves of 8 species there was less than 1% except in *R. alternus* in which the derivs. were 2.3%. In 2 species these derivs. in the fruit were 0.9 and 1.1%, resp. Three species of *Hovenia* yield from 1.25 to 2.2% in the bark, 0.45 to 1.25% in the leaves, and *H. dulcis* gave 1.35% in the bark of the root. Species of 4 other genera yielded generally less than 1% and several species none or traces. The fruit of *H. dulcis* may be substituted for raisins in food and proves an agreeable laxative.

L. W. RIGGS

A new nitrogenous principle in plants, allantoic acid. R. FOSSE. *Rev. gén. Sci.* **38**, 635-9 (1927); *Bull. soc. chim. biol.* **10**, 301-7 (1928); cf. *C. A.* **21**, 943, 3070, 3385; **22**, 612.—Identification of allantoic acid in the leaves of *Acer pseudoplatanus*. R. FOSSE AND A. HIEUILLÉ. *Ibid* 308-9; see *C. A.* **21**, 3070. **Mercuric compound of allantoic acid identifying this ureide in the green legume Phaseolus vulgaris.** *Ibid* 310-2; see *C. A.* **22**, 612. **Estimation of allantoic acid as xanthyl urea. Applications to the leaves of *Acer pseudoplatanus*.** R. FOSSE AND (MILLÉ.) V. BOSSUYT. *Ibid* 313-50; see *C. A.* **21**, 3385.

L. W. RIGGS

Amylogenesis and amyolysis in plant cells. A. MAIGE. *Bull. soc. chim. biol.* **10**, 422-8 (1928).—The amylogenic and amyolytic actions in plant cells are 2 distinct phenomena both as to origin and cause. The first is produced by the plastids and if due to a catalytic agent, this agent is secreted by the plastids. The second is the work of the amylase which is secreted by the non-plastidal cytoplasm, and of which the dissolving action is exercised across the plastidal cortex during the hydrolysis.

L. W. RIGGS

The energy of growth. XII. Energy yield of different sugars in the development of molds. LUIGI DE CARO. *Bull. soc. chim. biol.* 10, 456-9(1928).—See C. A. 22, 1613.

Biochemical synthesis of glycerides. Reversibility of the fermentative activity of the cytoplasm of Ricinus seeds. ALBERT MOREL AND LEON VELLUS. *Bull. soc. chim. biol.* 10, 478-88(1928); cf. C. A. 22, 1176.—The synthesizing power of *Ricinus* seeds is due to the enzymic activity of the cytoplasm of the seeds. By the action of a dil. acid on the cytoplasm placed in suspension in oil it is possible to prep. an enzyme which hydrolyzes olive oil, without the addn. of electrolytes to the reacting mixt. The synthesizing power of this same agent indicates a complete reversibility of the enzymic activities.

Levulosans of the iris. H. COLIN AND A. AUGEM. *Bull. soc. chim. biol.* 10, 489-94 (1928), cf. C. A. 21, 3930.—This paper reports a study of irisin and more particularly the levulosans of *Iris pseudacorus*, *I. germanica* and *I. foetidissima*. The irisin was sepd. as a Ba compd. (cf. C. A. 21, 937). These species of *Iris* differ widely in their carbohydrate and levulosan content, also in the nature of their levulosans which appear to be different compds. in different species.

Biochemical differences between sexes in mucors. V. Quantitative determinations of sugars in (+) and (-) races. S. SATINA AND A. F. BLAKESLEE. *Proc. Nat. Acad. Sci.* 14, 308-16(1928); cf. C. A. 21, 2015.—Detns. were made in pairs, each pair contg. a (+) and a (-) race of a given species in order to compare the amts. of sugar present in the 2 sexes. The reducing sugars were detd. in 70(+) and (-) races included in 20 species and 11 genera and the total and the non-reducing sugars, in 6(+) and (-) races included in 18 species and 10 genera. The reducing and total sugars were greater in the (+) races in about 74% of the cases and the non-reducing sugars in about 66%. The av. for (+) races was higher for all kinds of sugars. The amt. of reducing sugars present, however, was not sufficient to be chiefly responsible for the reduction reaction previously demonstrated with KMnO_4 .

Preliminary study of the nutrition of the cultivated mushroom. J. F. STYER. *Am. J. Botany* 15, 246-50(1928).—*Agaricus campestris* when grown upon a paper medium, with mineral nutrients and an NH_4 salt, required the addn. of no other carbonaceous material. The addn. of various sugars and salts of org. acids gave no greater vigor of growth, and resulted in a lack of vigor when above about 0.05 M concn. NH_4 salts, urea, glycine and asparagine, peptone and proteins are all useful as sources of N, the most complex being slightly the most effective. Vigorous growth was obtained when the phosphate concn. was between 0.015 M and 0.1 M; and when the sulfate, K and Mg concns. were each between 0.005 N and 0.1 N. These, with the exception of the lower figure for P, are not definite limits, and the organism can probably tolerate concn. outside these limits.

Mineral nutrition and chlorophyll development in seedlings. C. G. DEUBER. *Am. J. Botany* 15, 271-6(1928).—The dwarfing of soy-bean seedlings grown in distd. water is accompanied by a higher concn. of chlorophyll particularly in the first leaves and to a lesser extent in the cotyledons. This condition accounts for the tops of such dwarfed seedlings appearing dark green as compared with the normal green color of seedlings better nourished. This condition probably results from the fact that the growth processes in seedlings given a low plane of mineral nutrition are impaired to a greater extent than the processes controlling chlorophyll formation.

Relation of hydrogen-ion concentration to the growth of plants. W. J. ROBBINS. Missouri Sta., *Bull.* 244, 30(1926).—Further studies of the effect of H-ion concn. of potato tuber tissues on elodea and on 3 fungi, *Gibberella saubinetii*, *Fusarium oxysporum* and *Rhizopus nigricans*, have been made. Elodea (*Anacharis canadensis gigantea*) responded in many ways as though it had an isoelec. point of p_H 6.0 to 6.2. In buffer mixts., the acid dyes, eosin and martius yellow, are more toxic to elodea in solns. more acid than p_H 6.0 or 6.2 than in more alk. solns.; the basic dyes, safranin, methylene blue and dahlia are more toxic in solns. more alk. than p_H 6.0 or 6.2 than in more acid solns. Cultures on liquid and solid media contg. uniform concns. of toxic acid or basic dyes but differing in H-ion concn. show that the toxicity of the acid dyes is markedly increased for *R. nigricans* in solns. acid to about p_H 5.0; for *G. saubinetii* in solns. acid to about p_H 6.4. The basic dyes are decidedly more toxic in solns. alk. to these points. *F. oxysporum* responds much like *G. saubinetii*. These results are correlated with the isoelec. points previously reported for the first 2 organisms but not with that found for the third.

Nitrogenous metabolism of Pyrus malus L. III. The partition of nitrogen in the leaves, one and two year branch growth and non-bearing spurs throughout a year's

cycle. WALTER THOMAS. *Plant Physiology* 2, 109-37(1927); cf. *C. A.* 21, 1994.—The march of total N, total water-sol. N, ammonia N, mono- and di-amino N, free and also combined amide N, humin N and "rest" N was followed throughout a year's cycle in the parts of a Stayman Winesap tree indicated in the title. The total water-sol. N, the non-protein N and the amino N parallel the total N in all tissues throughout the cycle, but the amide N and the "rest" N tend to vary inversely with the total N and the amino N. Amino N appears to be connected with protein synthesis and the "rest" N in protein degradation but no evidence was found to support the theory that amino acids act as catalyzers in accelerating the rate of growth. During the period of bud swelling the reserve proteins are transferred to the actively growing parts as amino acids. In the aerial parts nitric N was found only at 1 period, viz., just as the buds were opening (*C. A.* 21, 3386). The importance in metabolism of the role of the "rest" N compds. is pointed out.

WALTER THOMAS

The current mineral nutrient content of the plant solution as an index of metabolic limiting conditions. B. I. GILBERT, F. T. MCLEAN AND W. L. ADAMS. *Plant Physiology* 2, 139-51(1927).—The expressed plant soln from various tissues of spinach, beets, turnips, corn, cabbage and carrots growing in the Rhode Island Expt. Sta. plots was examd. at stated periods for nitrate N, phosphate P and K_2O ; and in spinach and beets for Mn also (*C. A.* 21, 3652). Three types of inhibited metabolism were noted, the conditions responsible for which were (1) a decreased supply of available Mn in a neutral soil, resulting in marked chlorosis in beets and spinach; (2) limiting amts. of P_2O_5 and N applied to the soil; (3) unfavorable weather conditions.

WALTER THOMAS

Growth studies on fruits. An explanation of the shape of the growth curve. F. G. GUSTAFSON. *Plant Physiology* 2, 153-61(1927); cf. *C. A.* 21, 3652.—The probable influence of nutrition in producing the S-shaped form of the growth curve of fruits is discussed. Decrease in growth is due partly to insufficiency of nutrient material for all the fruits as well as for vegetative growth, and partly to poor conduction of material to the growing parts of fruits.

WALTER THOMAS

Chemical changes accompanying the Western Yellow Blight of tomato. J. T. ROSA. *Plant Physiology* 2, 163-9(1927).—In the leaves total N, alc.-insol. N and diastatic activity decrease, but reducing sugars, sucrose, starch and alc.-sol. N increase progressively with the development of external symptoms of blight. In the stems and roots of blighted plants there is also accumulation of carbohydrates, but total N and alc.-sol. N increase, especially in the roots. Diastatic activity in healthy stems is very low and has disappeared altogether in blighted stems. Conclusion: N starvation is not the cause of blight, but inability to translocate N within the plant and inability to synthesize higher N compds. may be more directly connected with the inception of blight.

WALTER THOMAS

The fruits of kirondro and their chief constituting elements. Y. VOLMAR AND B. SAMDAHL. *J. pharm. chim.* 6, 295-9, 346-53(1927).—The seeds contain in addn. to kirondrin (A) (*C. A.* 21, 1666, 2134) 13.8% fatty oil, 11.4% reducing sugar, 1.75% sucrose, 25% starch, a resin, 18.1% proteins and 3.1% ash contg. Cu, Fe, Mn, Ca, Mg, K, Na, Cl, S, P and Si. The pericarp of the fruit is practically free from A; it contains a reddish essential oil having a slight odor of orange, (d_{20} 0.8860, $[\alpha]_D^{20}$ -4.9 (alc. soln.), n_D^{20} 1.399, probably aldehydes and non-satd. compds.); 4.4% of gum sol. in H_2O (1 in 4), and contg. about 50% of arabinogalactan; starch and 2.5% reducing sugars, a fatty oil n_D^{16} 1.4265, a resin, oxalic, tartaric, citric and malic acids and 3.5% ash devoid of Cu. The fatty oil of the seeds is viscous, slightly fluorescent, shows intensely blue luminescence in Wood's light, is feebly drying, limpid at 20°, clouding at 12°, semisolid at 5°; d_4^{20} 0.9288, f. p. + 11.5, Zeiss index at 25° 65.8, n_D^{25} 1.4733, acid no. 56.45, sapon. no. 200.35, I no. 94.06, Ac no. 0, volatile sol. acid no. (Leffmann-Beam) 2.59, volatile insol acid no. 0.49. The oil contains phytosterins 0.7%, non-volatile fatty acids 94.7% (palmitic 16.5%, oleic 58.1%, linoleic 18.8%), and very little butyric acid.

S. WALDBOTT

Mechanism of the degradation of fatty acids by mold fungi. I. T. K. WALKER AND P. D. COPPOCK. *J. Chem. Soc.* 1928, 803-9.—*A. niger* may be cultivated readily on dil. aq. solns. of Ca propionate together with the requisite indrg. salts. When incubated at 32° such cultures gave positive thiophene tests for lactic acid on or about the 9th day; thereafter this test became fainter or disappeared and about the 12th or 13th day $AcCO_2H$ was detected. The $AcCO_2H$ probably arises from the oxidation of the lactic acid and is found in the action of the mold on Ca lactate after 10 days; $(CO_2H)_2$ is also formed. In the fermentation of both pyruvic and lactic acids, $EtOH$ is detected.

C. J. WEST

WILLSTÄTTER, RICHARD, AND STOLL, ARTHUR: *Investigations on Chlorophyll. Methods and Results.* English translation by Frank M. Schertz and Albert R. Merz. Washington, D. C., 1305 Farragut St. N. W.: Frank M. Schertz. • 385 pp. \$4.50.

E—NUTRITION

PHILIP B. HAWK

New dietary deficiency with highly purified diets. II. Supplementary requirement of diet of pure casein, sucrose and salt. H. M. EVANS AND G. O. BURR. *Proc. Soc. Exptl. Biol. Med.* 25, 41–8(1927); cf. *C. A.* 22, 796.—A diet of casein, sucrose and salt mixt., supplemented by very high levels of vitamins A, B, D and E, was inadequate for normal growth of young rats. In some cases ovulation was irregular and lactation was unsuccessful. The growth and ovulation deficiencies were corrected by inclusion of small daily doses of lettuce, liver or lard in the diet. With the inclusion of lettuce, females produced good litters and weaned them successfully if the yeast dose was adequate. The second generation animals after weaning repeated the performance of their parents on the "pure" diets. Either the animals on this "pure" diet require very large amts. of one or another of the known vitamins, or else a new and unknown vitamin is lacking. The authors favor the latter view. C. V. B.

Evaluation of dry yeast with respect to its biological action. WOLFGANG WEICHARDT AND HERMANN UNGER. *Pharm. Ztg.* 73, 526–7(1928).—Protocols and curves are presented showing the successful results obtained in feeding young doves stricken with beriberi 0.1 and 0.5 g. daily of dry yeast along with their regular food. W. O. E.

Butter vs. oleomargarin in rickets control in pigs. H. L. ANTHONY. *J. Dairy Sci.* 11, 66–8(1928).—Rachitic symptoms in pigs were held in check by either oats or butter added to the ration, but not by oleomargarin (nut margarin). R. C. ERB

Basal metabolism and specific dynamic action of foods in children in various conditions of nutrition. A. F. MORGAN AND G. D. HATFIELD. *Am. J. Diseases Children* 32, 516–23(1926); *Physiol. Abstracts* 12, 168.—Out of 16 children investigated, 10 gave basal metabolisms within 10% of the weight and surface area standards of Benedict and Talbot. A protein meal produced more than twice as much increase as a carbohydrate meal in both normal and overweight children. H. G.

The value of elementary phosphorus in rickets. A. F. HESS AND M. WEINSTOCK. *Am. J. Diseases Children* 32, 483–96(1926); *Physiol. Abstracts* 12, 156.—Feeding white rats on a standard rickets-producing diet with the addn. of P dissolved in linseed oil to the extent of 0.2 mg. per day led to the production of rickets and also to a definite "P band" of abnormally dense bone near the epiphyseal lines. The P alone, or P combined with an inadequate dose of cod-liver oil, had no protective action whatever against rickets. H. G.

Fruit and vegetable juices used in infant feeding. E. M. DAVIS AND H. A. STILLMAN. *Am. J. Diseases Children* 32, 524–9(1926); *Physiol. Abstracts* 12, 157.—Feeding expts. with young white rats showed that carrot, spinach or tomato, and possibly spring cabbage juice, may be substituted for the conventional orange juice in supplementing a basal diet contg. vitamin A but not vitamin B. H. G.

Calcium balance with hydrochloric acid milk. R. G. FLOOD. *Am. J. Diseases Children* 32, 550–3(1926); *Physiol. Abstracts* 12, 158; cf. *C. A.* 20, 2006.—Feeding expts. on normal and on rachitic babies showed that the addn. of HCl to the milk increased the CaCl_2 retention in the rachitic infant, but had no effect on the Ca metabolism of the normal, thus having some prophylactic action against rickets. The probable explanation of this action is discussed. H. G.

Protein requirement as determined in diabetic children. W. M. BARTLETT. *Am. J. Diseases Children* 32, 641–54(1926); *Physiol. Abstracts* 12, 158.—The min. protein requirement in children was taken as that amt. of protein which will establish a pos. N balance, and prove adequate for growth, normal development and increase of wt. Between the ages of 4 and 14 years 0.6 to 1 g. of protein per kg. body wt. was adequate. The protein requirement varied inversely with age and with caloric intake, and was directly proportional to the rate of growth; there was no relationship to the fatty acid: glucose ratio. H. G.

The effect of various supplementary lunches on the plasma carbon dioxide capacity of children. A. F. MORGAN AND G. D. HATFIELD. *Am. J. Diseases Children* 32, 655–66(1926); *Expt. Sta. Record* 57, 689.—During the course of the investigation previously noted (*Am. J. Diseases Children* 32, 839–49(1926)) of the effect of supplementary feeding of oranges, figs or milk to undernourished children, detns. were made of the CO_2 -combining capacity of 12 of the children, 5 of whom were from 5 to 17%

underweight, one 33% overweight and 6 practically normal in wt. by the Baldwin-Wood standards. The 6 normal wt. children had alk. reserve figures of from 42 to 65% (cc. of CO₂ per 100 cc. of plasma), 4 of the 5 underweight children had values of from 38 to 51 and 1 child receiving pulled figs as supplementary lunch made more than 3 times the expected gain in wt. and showed an increase of 5.5% in CO₂-combining power of the plasma at the end of 43 days. Five children receiving oranges showed increases in CO₂-combining power of from 1.7 to 11.19, the lowest gains being for the 2 subjects who failed to gain in wt. Two of the 3 children who were changed from oranges to milk after a 28-day interval showed a decrease in alk. reserve of 3 and 7.78%. The third showed an increase of 1.37% after a 43-day interval on milk. H. G.

Iron in the diet of normal children. M. S. ROSE. *Am J Pub. Health* 17, 89-91 (1927). *Expt. Sta. Record* 57, 688-9 —A report of the study of the influence of prolonged administration of egg upon the hemoglobin content of children's blood. The Fe in the egg is efficiently utilized, but with no special stimulation of the blood-forming organs. Eggs form a very valuable reinforcement for the diet of the young child even when the diet is not lacking in any known dietary essential. H. G.

Preliminary analyses of the tissues and of the metabolism of animals suffering from dietary sterility. E. M. ANDERSON. *Anat. Record* 32, 227 (1926); *Expt. Sta. Record* 56, 664. —No differences have been revealed in the N and fat metabolism on pure-food diets, with and without wheat germ oil, which would account for the fertility of the mothers receiving vitamin E. H. G.

Amount of exchange in fasting homeothermics and notion of active mass. E. F. TERROINE, S. TRAUTMANN AND J. SCHNEIDER. *Ann. physiol. physicochim. biol.* 2, 468-87 (1926). *Physiol. Abstracts* 12, 294. —In the rabbit, guinea pig, fowl and pigeon during starvation the amt. of gaseous exchanges per kg. of body wt. shows certain differences in the initial and terminal stages. In the initial phase with low respiratory quotient (R. Q.) heat production is much diminished in the fowl and the pigeon, not in the others. In the final stage, when the R. Q. is 0.8 or more, there is generally a sharp fall in the exchanges. Over nine-tenths of the total period of survival the R. Q. is about 7.4, and heat production is remarkably const. The law of surface cannot be applied to the variations in one and the same individual, here it is the tissue mass which counts. Whether nucleoproteins preponderate in the metabolism of inanition or not, the total proteins represent the active mass, their proportion being as const. as the heat production. H. G.

Chinese diet in the light of modern knowledge of nutrition. H. WU. *Chinese Social and Polit. Sci. Rev.* 11, No 1, 56 81 (1927); *Expt. Sta. Record* 56, 793 —Discussion of the adequacy of the Chinese diet based upon the dietary studies of middle-class families in north China reported by Adolph (C. A. 19, 1728; 21, 781) and a similar study of the compn. of Peking dietaries made by W. H. G.

Nutrients required for growth production with Indian food stuffs. F. J. WARTH AND I. AHMAD. *India Dept. Agr. Mem., Chem. Ser.* 8, 211-33 (1926); *Expt. Sta. Record* 57, 169. —A continuation of work previously noted (C. A. 20, 3180). H. G.

A study of the effect of nutrition on mental growth. A. J. SMITH AND A. M. FIELD. *J. Home Econ.* 18, 686-90 (1926); *Expt. Sta. Record* 56, 897. —While this study was of too short duration and with too few subjects to be conclusive, it would indicate that the assumption that improved nutrition, as measured by gain in weight, will bring about improved mentality is at least not yet proved. H. G.

The influence of diet on the physiologic assay of insulin. A. STASIAK. *J. Lab. Clin. Med.* 12, 256-8 (1926); *Physiol. Abstracts* 12, 165 —By using the method of Shaffer and Hartmann, it was found that the actual range through which the blood sugar is lowered by insulin is approx. the same in fed rabbits and in rabbits starved for 24 hrs. H. G.

The content of vitamin C in Japan sand pear (Pyrus serotina Rehder), kaki (Diospros kaki L.) and Satsuma orange (Citrus unshiu). Y. IWASAKI. *J. Okitsu Hort. Soc.* No. 22, 1-10 (1927). *Expt. Sta. Record* 57, 197. —Forty-five cc. of the juice of the flesh of the Japan sand pear does not suffice to cure guinea-pig scurvy, but a slightly smaller quantity of the juice of the entire pear contg. the rind cures scurvy in 40 days. The ripe kaki fruit in amts. of 10 cc. daily is said to cure scurvy completely in 30 days and the Satsuma orange in amts. of 4 to 5 cc. daily in 50 days. In the expts. reported the basal diet consisted of equal vols. of wheat bran and rolled oats *ad lib.*, together with 40 cc. of milk autoclaved for an hour at 120°. H. G.

Ergosterol and its action in infantile rickets. H. BEUMER AND C. FALKENHEIM. *Klin. Wochschr.* 6, 798, 799 (1927); *Expt. Sta. Record* 57, 693. —Further evidence is given of the curative action of irradiated ergosterol in infantile rickets. Six children

from 3.5 months to 2 years of age were treated with irradiated ergosterol, dissolved in rape oil or triolein, in doses of from 2 to 3 mg. daily. Healing, both as judged by changes in the blood Ca and P and by x-ray examn., was evidenced as early as 10 days in two cases, and was rapid in all but one case. H. G.

The vitamin A content of butter under the influence of common feeds. A. SCHREUBERT. *Milchw. Forsch.* 3, 117-21(1926); *Expt. Sta. Record* 56, 472-3.—Using rats, S. has compared the amts. of vitamin A in butter from cows receiving rations contg. fodder beets with other grains, corn silage with similar grains and pasture only. In making the tests, vitamin A-deficient rations were supplemented with 0.1, 0.25 and 0.5 g. of butterfat from the different sources. The results show that the butter from the cows receiving beets was lowest in its vitamin A content, as 0.5 g. daily was not sufficient to allow normal growth in the rat after 53 days. The butter from the pasture-fed cows was the richest source of vitamin A, as normal growth was maintained with 0.25 g. of butter, while 0.5 g. of butter from the silage-fed cows was necessary for normal growth. H. G.

Color reaction of the Japanese acid clays with liver oils and vitamin A on the market. K. KOBAYASHI AND K. YAMAMOTO. *Mem. Facult. Sci. Eng. Tokyo* 4, 23-4(1927); *Analyst* 52, 553.—Japanese acid clays, Florida earths and fuller's earth gave bluish green sediments with cod-liver and many other liver oils, and with vitamin A, oils extd. from cheese, Kazunoko and eels. Japanese clay, if dried at 100-50°, gives a more intense reaction, and suitable solvents are benzene, CCl_4 and CS_2 . The relative content of coloring principle in liver oils may be detd. by dilg. 1 g. of sample with 10 cc. of benzene, and adding this soln., drop by drop, to a series of test tubes, each contg. 10 cc. of benzene, and, after mixing, adding to each 1 g. of fine clay. The min. no. of drops required to form the blue coloration is compared with the no. used for the standard cod-liver oil. Anhyd. ZnCl_2 , AlCl_3 , P_2O_5 and H_3PO_4 give the same color reactions as the Japanese clays. H. G.

The phosphorus intake of pre-school children as shown by a dietary study made by the individual method. H. MCKAY. *Ohio Sta. Bull.* 400, 387-425(1926); *Expt. Sta. Record* 56, 493-4.—The primary purpose of this study was to det. the P intake of normal healthy children. Calcs. were also made of the intake of protein, fat, carbohydrate, Ca and iron during the period under investigation, which in all cases consisted of 4 consecutive days. The subjects included 25 children from private homes and 30 from an orphanage, all selected as being in normal phys. condition and within 4% of the "commonly accepted standard of weight for height." The ages of the children ranged from 2 years to 5 years 11 months. The calcs. were made on the daily consumption of food by each child and averaged for the 4 days of the expt. H. G.

Vitamin studies in Porto Rico. D. H. COOK. *Porto Rico Health Rev.* 2, 22-3 (1927); *Expt. Sta. Record* 57, 690.—Two native Porto Rican foods, the plátano, or plantain (*Musa paradisiaca*) and the yautia, a starchy root belonging to the same family as the taro and dasheen, were tested for vitamin A and vitamin B. In comparison with other materials which have been tested by the same methods, the plátanos are equal to tomatoes, green peas and yellow sweet potatoes as a source of vitamin A, and to carrots, white potatoes and turnips as a source of vitamin B. Yellow yautias, which ranked first of the 3 materials tested in vitamin B potency, have about the same value as spinach and canned navy beans as a source of vitamin B. H. G.

Rickets in chicks. I. G. F. HEUSER AND L. C. NORRIS. *Poultry Sci.* 6, No. 1, 9-17(1926-7); *Expt. Sta. Record* 56, 869-70.—Different brands of cod-liver oil vary significantly in their vitamin content when measured by means of chicks. With plenty of Ca and P in the ration the amt. of cod-liver oil necessary to protect against rickets depends upon the antirachitic potency of the oil and the amt. of this factor stored in the body of the chick at the time of hatching. H. G.

Fat-soluble A requirements for growing chicks. S. M. HAUGE, C. W. CARRICK AND R. W. PRANGE. *Poultry Sci.* 6, 135-40(1927); *Expt. Sta. Record* 57, 368-9.—P. found that 25% of yellow corn was sufficient to meet the needs of growing chicks up to 10 weeks of age. Chicks fed a ration deficient in vitamin A began to show the results of this deficiency at about 4 weeks of age. H. G.

Mineral metabolism of the growing chick. F. E. MUSSEHL, M. J. BLISH AND C. W. ACKERSON. *Poultry Sci.* 6, 239-42(1927); *Expt. Sta. Record* 57, 664.—This test was undertaken at the Neb. Expt. Sta. to det. the effect of feeding excessive amts. of Ca and P to growing chicks. Five lots of 25 Single Comb White Leghorns each were used in the expt. All lots were irradiated twice a week for about one hour with a quartz Hg vapor lamp. The lots were fed by the all-mash method. The basal ration consisted of yellow corn meal, ground wheat, yeast, cod-liver oil, meat and bone meal

and cornstarch. The total Ca and P content of this ration was 3.018 and 2.147%, resp. A second lot received in addn. 4 parts of a min. mixt. composed of 60% raw bone meal, 20% CaCO_3 and 20% common salt. A third lot received 8 parts of raw bone meal, and a fourth and fifth lot 4 and 8 parts of CaCO_3 , resp. The feeding period lasted 8 weeks. The rate of growth in the basal ration group was quite satisfactory, indicating that it was complete for vitamins, proteins and minerals, though one case of rickets did develop. The addn. of the mineral mixt. did not improve the ration, but actually retarded growth. There were 4 deaths in this group. Adding raw bone meal still further retarded growth, and 19 cases of typical rickets and 1 death appeared. Four parts of CaCO_3 proved to be a check on the rate of growth and 8 parts showed but little growth. The mortality in these last two lots was 10 and 19, resp. H. G.

Do growing chicks require a vitamin B supplement to a mixed grain ration? T. S. HAMILTON, I. E. CARD AND C. H. KICK. *Poultry Sci.* 6, 243-8(1927); *Expt. Sta. Record* 57, 664; cf. *Illinois Sta. Report* 1925, 77-83.—The addn. of yeast and alfalfa leaves did not improve the ration for chicks grown outdoors. There was an indication that yeast improved the ration slightly for the lab. chicks, though alfalfa leaves were without appreciable effect. H. G.

Glucose as a factor in metabolism. A. N. BRONFENBRENNER. *Proc. Soc. Exptl. Biol. Med.* 24, 269-73(1926); *Physiol. Abstracts* 12, 110.—While the industrial efficiency of the feeble-minded is definitely lower than that of the mentally normal, the caloric requirements of the former are hardly lower than those of the latter. The demand of the feeble-minded for carbohydrates, especially breads and sweets, is striking. Substitution of meat, eggs and butter for bread and cereals leads to emaciation. A reduced relative quantity of carbohydrate in the diet of individuals with impaired metabolism renders their metabolic mechanism inefficient. Circulating glucose is a factor in the metabolic mechanism. The paper is fully illustrated by tables. H. G.

A study of the pellagra-preventative action of the tomato, carrot and rutabaga turnip. J. GOLDBERGER AND G. A. WHEELER. *Pub. Health Reports* 42, 1299-1306 (1927); *Expt. Sta. Record* 57, 295.—In continuation of the investigation at the Georgia State Sanitarium of the pellagra-preventing action of various foods (C. A. 20, 1431), tomatoes, carrots and rutabaga were tested. Daily supplements of either cooked carrots or cooked rutabaga in amts. equiv. to 453 g. (1 lb.) of the dressed raw vegetable were of no value as a pellagra preventive. The expressed juice of canned tomatoes in amts. of approx. 1200 g. had a well-marked preventive action. It is considered probable that if larger amts. of carrots and rutabaga could have been fed they would have shown some pellagra-preventing action in harmony with the present belief that the pellagra-preventing factor is identical with one of the constituents of vitamin B, which is known to be present in these vegetables. In localities where pellagra is endemic, a more liberal use of tomatoes, particularly during late winter and spring, is recommended as a preventive measure. H. G.

Growth on a synthetic ration containing small amounts of sodium. J. I. SR. JOHN. *J. Biol. Chem.* 77, 27-32(1928).—Rats maintained on diets, adequate except for the fact that they contained quantities of Na below 0.3%, failed to show normal growth or health. The animals grew rapidly for a few weeks but then declined in wt., many dying in 10 to 12 weeks. ARTHUR GROLLMAN

Insects as test animals in vitamin research. I. Vitamin requirements of the flour beetle, *Tribolium confusum* Duval. M. D. SWEETMAN AND L. S. PALMER. *J. Biol. Chem.* 77, 33-52(1928).—*Tribolium confusum*, a common pest of cereals, was found to be suitable for nutrition expts. by using essentially the procedure followed with ordinary lab. animals. The insect can be rapidly reared on a ration of protein, salts, dextrin and a small fraction of yeast, wheat germ or their alc. exts. The addn. of fat, with or without vitamin A, accelerates the growth rate. The distribution of the necessary growth-promoting substance is similar to that of vitamin B as defined by mammalian expts. The insect is sensitive to as low as 0.5% of a source of this substance and makes a quant. response to its addns. over a certain range. Growth on fractions of wheat, corn, oats, barley and rice indicates no absolutely limiting factor in any fraction tried. The embryo and the adjacent portion of the kernel are more abundantly supplied with this factor than other parts of wheat. ARTHUR GROLLMAN

A new differentiation between the antineuritic vitamin B and the purely growth-promoting vitamin B. H. M. EVANS AND G. O. BURR. *J. Biol. Chem.* 77, 231-40 (1928).—A differentiation between the antineuritic and the growth-promoting vitamin B was demonstrated by the use of a highly purified diet contg. only *Van Slyke* casein, recrystd. sucrose and highest purity salts, to which various vitamin-contg. substances were added. *Tikiiki*, a dil. alc. ext. of white rice polishings though rich in the anti-

neuritic vitamin B, is almost lacking in the growth-promoting vitamin. Corn-starch and casein contain both.

ARTHUR GROLLMAN

The effect of high protein diets on the remaining kidney of rats. HENRY JACKSON, JR. AND OLIVE J. MOORE. *J. Clin. Investigation* 5, 415-25 (1928).—High protein diets produced damage to the remaining kidney of unilaterally nephrectomized rats. Individual susceptibility and age detd. the degree of this damage.

ARTHUR GROLLMAN

Value of whole potato in human nutrition. S. K. KON AND ANIELA KLEIN. *Biochem. J.* 22, 258-60 (1928).—Two adults were kept in N equil. and in good health for a period of 167 days in which the N was practically solely derived from the potato. This confirms the views of Hindhede that the potato is a valuable source of N for the human adult (see Hindhede: Protein and Nutrition).

BENJAMIN HARROW

Nutritional value of tuberin, the globulin of potato. S. K. KON. *Biochem. J.* 22, 261-7 (1928).—The tuberin was prepd. by the method described by Sjollesma and Rinkes (*C. A.* 6, 1445). Its biological value was found to be equal to 71 as measured at an 8% level of intake by Mitchell's method (cf. *C. A.* 20, 2005). The protein was also fed to rats at levels of approx. 8, 10 and 12%, and a max. gain of 2 g. body weight per g. of protein ingested was found at a 7.8% level of intake by the method of Osborne, Mendel and Ferry (*C. A.* 13, 2553). Tuberin appears to be a "complete" protein.

BENJAMIN HARROW

Antineuritic yeast concentrates. III. The curative pigeon test: A critic. H. W. KINNERSLEY, R. A. PETERS AND VERA READER. *Biochem. J.* 22, 276-91 (1928); cf. *C. A.* 22, 447.—Conditions for obtaining good results with the curative pigeon test are enumerated.

BENJAMIN HARROW

Physical curd character of milk and its probable relation to infant nutrition. R. L. HILL. Utah Agr. Expt. Sta., *Circ.* 66, 1-4 (1927).—The character of the curd formed by treating milk with pepsin and CaCl₂ soln. was tested with a specially designed app. Milk from some cows formed a curd 10 times as hard as that from others. The character of the curd seemed to be uniform for any one cow and apparently permanent except at the beginning and ending of a lactation period, when it was variable. The phys. curd character of the milk was a transmitted hereditary characteristic in the few cases observed, and was unaffected by feeding and independent of the fat content. The curd from unboiled milk was approx. 3 times as hard as that from boiled milk.

A. L. M.

The influence of cholesterol feeding on the number of erythrocytes and their resistance in splenectomized guinea pigs. M. DORLE. *Biochem. Z.* 191, 95-105 (1927).—Long-continued cholesterol feeding does not cause an increase in the number of erythrocytes in splenectomized guinea pigs, nor does it increase their resistance. On the contrary, in normal animals one feeding of cholesterol is sufficient to raise the number of red cells, the hemoglobin value and the cell resistance.

S. MORGULIS

Vitamins as factors in health and in food values. II C. SHERMAN, et al. *Am. J. Pub. Health* 18, 331 (1928).—Report of committee on Nutritional Problems. Since the last report dealing with vitamins A, B and C, recognition has been made of a fat-sol. antirachitic vitamin D, and a fat-sol. vitamin E essential to reproduction. Scientific work has emphasized the need of choosing a diet with regard to its vitamin content and of conserving the vitamin values in the prepn. of foods. Vitamin A only is discussed. Expts. have indicated the advisability of using a supply of vitamin A sufficient to insure a reserve store of the vitamin. The need of vitamin A through adult life, as well as during the growth period, is demonstrated by increased vigor and longevity, resistance to lung disease and successful reproduction shown by exptl. animals fed a diet of high vitamin A content throughout a complete life cycle.

N. M. NAYLOR

Vitamin B—a question of nomenclature. S. L. SMITH. *Science* 67, 494-6 (1928).—A review of the work on vitamin B and the present confusion leads to the recommendation that the term be retained in its original sense of a water-sol., appetite-stimulating, growth-promoting substance; that the heat-labile factor (antineuritic factor, B-P, B₁) be called *vitamin F*; and that the heat-stable factor (antipellagic factor, maintenance or functioning factor, P-P, B₂) be called *vitamin G*.

AUSTIN M. PATTERSON

Nucleic phosphorus and phosphorus balance of mice deprived of the liposoluble factor. M. JAVILLIER, H. ALLAIRE AND (MLLÉ.) S. ROSSEAU. *Bull. soc. chim. belg.* 10, 294-300 (1928); cf. *C. A.* 21, 3667.—The total P per 100 g. of dry matter is much larger in the mice lacking the liposol. factor in their diet and this excess appears in the insol. fraction. Further work is in progress.

L. W. RUGGS

The development of an infant fed eight months on a soy-bean milk diet. ERNEST TSO. *Chinese J. Physiol.* 2, 33-40 (1928).—In spite of the pronounced deficiency of Ca in this diet and the occurrence of rickets which healed imperfectly until more Ca was introduced into the diet, the child in 8 months grew 20.7 cm. and gained 4.1 kg. in wt.,

a growth record which compares favorably with the av. development of breast-fed infants. **L. W. RIGGS**

The gas and sugar metabolism of the vivi-perfused stomach. TSANG-GI NI AND R. K. S. LIM. *Chinese J. Physiol.* **2**, 45-86(1928).—The vivi-perfused stomach is a stomach connected by vessel-anastomosis to the neck vessels of an unanesthetized dog by which it is perfused. An increase in blood flow is not an essential accompaniment of secretion. The quiescent vivi-perfused stomach consumes O at the rate of about 0.007 cc. per g. per min. Assuming from Lovatt Evans' measurement that the O coeff. of plain muscle is 0.002 cc. the basal coeff. of the gastric mucosa is estd. to be 0.013 cc. With secretion, the O intake increases 3 to 9 fold. Other metabolic factors were detd. but the results were too irregular to warrant conclusions. **L. W. RIGGS**

Influence of the amount of glucemia on the quantity of exchanges, the problems of specific dynamic action and the excess consumption. E. P. TERROINE AND R. BONNET. *Compt. rend.* **186**, 896-8(1928).—Expts. were made for the most part with rabbits. The sugar was given by single ingestion or injection, and by injections repeated at intervals of 1 to 5 days for about a month, with doses varying from 12.17 g. to 30.42 g. the limit of tolerance. The factors detd. were respiratory quotient and intensity of exchanges per kg.-hr. in cal., both fasting and after the absorption of sugar. A considerable increase in the glucemia did not modify these factors to any great extent. **L. W. RIGGS**

Immediate physiological action of a vitamin. N. BEZSSONOV. *Compt. rend.* **186**, 914-6(1928).—Ten adult guinea pigs were fed a scurvy-producing ration for 48 hrs., then were allowed 48 hrs. repose, and during the next 48 hrs. were fed the same scurvy-producing ration supplemented by cabbage, prepn. of vitamin C or lemon juice. During the period without vitamin the animals lost wt. or gained but little as compared with the consistent gains in wt. during vitamin feeding. The Br taken up by the urine generally was more than doubled during the 48 hrs. of vitamin feeding. Cabbage and prepn. of vitamin C were better antiscorbutics than lemon juice. The wt. increase of adult guinea pigs and the increased Br absorption by the urine may be considered measures of vitamin C efficiency. **L. W. RIGGS**

Influence of the quantity of heat output on the endogenous nitrogen metabolism. ÉMILE F. TERROINE AND (MME.) HÉLÈNE SORG-MATTER. *Compt. rend.* **186**, 1017-9(1928); cf. *C. A.* **20**, 2355.—Studies with mice and pigeons indicate that in homeotherms for all variations of external temp. involving an increase of energy consumption, there is a proportional increase in the output of endogenous N. **L. W. RIGGS**

Vitamins A, D and E and the oxidation of fats and oils. GEORGE E. HOLM. *Science* **67**, 424-5(1928).—A review. The potency of oils and fats in vitamin deficiency appears to be closely related to their unsatn. It is possible that certain oils protect the vitamins from oxidation, while others favor vitamin destruction by oxidation. **L. W. RIGGS**

Effect of fertilizers on vitamin B content of wheat. ANON. Ohio Agr. Expt. Sta., *Bull.* **402**, 93(1927).—Rations must contain 60-70% of wheat as the only source of vitamin B if reproduction and growth of rats are to be normal. Climate and other factors affect the vitamin B content of wheat. **J. J. SKINNER**

Chemical and nutritive properties of the mung bean. V. G. HELLER AND N. B. GUERRANT. Oklahoma Agr. Expt. Sta., *Rept.* 1925-26, 14 pp.; cf. *C. A.* **22**, 799.—Chem. analysis of mung beans shows that the quantity and quality of protein are good. Vitamins A, B and D are present in sufficient amts. for normal functioning of animals. Rats fed mung bean as the sole source of protein (60% of the ration) grew and matured normally and produced normal young. **J. J. SKINNER**

Vitamin content of canned spinach. E. PIERSON. South Dakota Agr. Expt. Sta., *Ann. Rept.* 1926, 23.—Canning spinach by blanching for 15 min., processing for 90 min. after placing in cans is very destructive to its vitamin C. Ten g. spinach canned by this method when fed as the sole source of vitamin C failed to delay the onset of scurvy or prolong the life of exptl. animals. Animals fed spinach merely blanched for 15 min. lived longer than those fed the pressure-canned spinach. The results suggest that the greater part of vitamin C is destroyed in the blanching process. **J. J. S.**

Antirachitic content of canned oysters. H. L. RUSSELL, F. B. MORRISON AND W. H. EBLING. Wisconsin Agr. Expt. Sta., *Bull.* **368**, 124-5(1926).—The feeding of individual doses of canned and raw oysters to vitamin-starved rats caused a deposit of lime in the growing points of the long bones of the rat, which indicates the presence of the antirachitic vitamin in oysters in appreciable amts. **J. J. SKINNER**

Changes in the composition of protoplasmic tissue by partial starvation. A. G. HOGAN, W. S. RITCHIE AND J. E. HUNTER. Missouri Agr. Expt. Sta., *Bull.* **244**, 19-20

(1928); cf. *C. A.* 21, 3636.—Two sets of samples were taken from the lean of the loin of a yearling steer and an 8-yr.-old steer, one set being removed from the left loin immediately after killing and the other from the right loin after 12 days in the cooler. Previously developed methods were used for the protein extn. and subsequent pptn. of protein fractions. The analyses are given in a table. F. F. SNYDER

ROBINSON, ANNA BELLE AND KING, FLORENCE M.: *Learning Exercises in Food and Nutrition*. Boston and New York: D. C. Heath & Co. 164 pp.

II—PHYSIOLOGY

E. K. MARSHALL, JR.

Concerning the origin of glucuronic acid. MARY ADELINE. *Proc. Soc. Exptl. Biol. Med.* 25, 8-9(1927).—Rabbits were fed menthol and various amino acids to discover the effect on glucuronic acid formation. Glycocoll, alanine and arginine had a tendency to increase the glucuronic acid output, while leucine, isoleucine, cystine and glutamic acid seemed doubtful in their action. Valine, phenylalanine and tryptophan, non-sugar-formers, had little effect on glucuronic acid increase. Tyrosine and histidine appeared to have great influence in increasing glucuronic acid output. C. V. B.

Movements of the isolated uterus and reaction of liquid containing it. GIUSEPPE TRUFFI. *Boll. soc. ital. biol. sper.* 2, 839-43(1927).—The uterus of a rabbit or guinea pig was immersed in Ringer-Locke soln. at 37.5°, and the p_H value of the bath varied by adding NaOH 0.1719 *N* and HCl 0.1644 *N*, which are isosmotic with the Locke soln. At p_H 9.1 the magnitude and frequency of contractions are normal; p_H 9.6 diminishes the magnitude of the contractions; p_H 10.3 diminished the contractions and increase in tone, return of p_H to normal restores contractility; at p_H 11.6 contractions stop and tone greatly increases; the return of the p_H values does not restore contractibility. At p_H 8.2 down to p_H 3.4 the movements are arrested, but with diminished tone and return of p_H to normal does not restore the movements. An isolated intestine reacts exactly the same way to variations in p_H values. A. W. CONTIERI

Nervous influence on assimilation and equilibrium in degenerated muscle. T. CAHN. *Ann. physiol. physicochem. biol.* 3, 4-60(1927); *Physiol. Abstracts* 12, 349.—The water content of fat-free muscle is the same in normal as in atrophied muscles. Atrophy and starvation produce a decrease in muscle mass by different processes. The mobilization of fat in the atrophied muscle is brought about by a humoral mechanism. In atrophy and in starvation there is a change in the N content of muscle albumin because of a rearrangement of the amino acid constituents. There is no trophic nerve effect which conditions the size of the muscle but the activity of the muscle itself is the regulator. H. J. DEUEL, JR.

The occurrence of ergosterol in beef blood. WILLIAM KÜSTER AND OTTO HORTH. *Ber.* 61B, 809-11(1928).—From 18 l. of blood of a 5-year ox, 0.0279 g. of almost pure ergosterol was sepd. Its identity was proved by the reaction of Salkowski, in which the chloroform layer remains colorless in distinction to cholesterol. Likewise its cryst. form (hexagonal plates) was identical with that of ergosterol prepd. from yeast. The possibility that sterols other than cholesterol exist in blood has not previously been considered. H. J. DEUEL, JR.

Cardaissin: a new cardiac accelerator extracted from the suprarenal gland. H. G. CAMERON. *Endocrinology* 10, 577-601(1926); *Physiol. Abstracts* 12, 298.—C. claims that he has extd. a new substance which he calls "cardaissin" from the adrenal body. A neutral acetone ext. of ox adrenal bodies was boiled down and the fats were removed by ether. The residue was then redissolved in alc. or acetone and purified by fractional pptn. The substance increases heart rate. It does not affect any other organ, with the possible exception of the adrenal medulla. Cardaissin and adenine differ in their phys. and physiol. properties, except that both increase heart rate. H. G.

Ovarian hormone. M. HARTMANN. *Klin. Wochschr.* 5, 2152-4(1926); *Physiol. Abstracts* 12, 116; cf. *C. A.* 21, 426.—H. describes the method he has used in an attempt to isolate the ovarian hormone from the ext. obtained by Fräkel and Herrmann's method. After removal of several inactive fractions, the residual substances were distd. in a high vacuum (b. p. about 185°). The distillate was very active. On sapon. it gave a no. of unsatd. acids of the C_{18} series. These were all inactive, but an unsapon. fraction still possessed considerable activity. In high vacuum it b. 145° and contained: C, 81.65 to 82.00%; H, 11.11 to 11.75%. It was unsatd., but its structure has not yet been detd. H. G.

Potassium and calcium in blood. L. KAUFHEIL AND F. KIRCH. *Klin. Wochschr.*

6, 1328-30(1927), *Physiol. Abstracts* 12, 483; cf. *C. A.* 22, 624.—The amt. of K in whole blood varies directly with the no. of erythrocytes. The K in the serum has no direct relation to that in the whole blood. It shows a tendency to increase with breakdown of erythrocytes, and may serve to distinguish between aplastic and hemolytic anemias. Blood Ca is almost always below normal in anemia, and it has no obvious relation to the amt. of K in the blood. H. G.

Metabolism in rats and rabbits after removal of the suprarenals. A. ARTUNDO. *Rev. soc. Argentina biol.* 3, 29-39(1927); *Physiol. Abstracts* 12, 452 3; cf. *C. A.* 21, 3667. When the animals are kept at 20° to 25°, unilateral adrenalectomy causes no modification of the basal metabolism, while with double adrenalectomy there is only a temporary fall. When kept at 15° to 18°, there is increased heat production. H. G.

The reaction against cold in suprarenalectomized rats. A. ARTUNDO. *Rev. soc. Argentina biol.* 3, 40 6(1927), *Physiol. Abstracts* 12, 453.—Rats kept at 0° produce 19.8 calories per hour per kg. of body weight, while after removal of the suprarenals they only produce 15.9 calories. H. G.

The phosphorus metabolism and the influence of the testes upon it. I. J. BLACHIER. *Trans. Lab. Expt. Biol. Zoopark Moscow* 1, No. 1, 231-4(1926); *Expt. Sta. Record* 56, 664.—The detn. of the P metabolism of 4 guinea pigs before and after castration indicated that the removal of both testicles resulted in a reduction in the amt. of phosphorus excreted. The P balances were neg. before castration but pos. after the operation. H. G.

The occurrence of labile phosphorus in various kinds of muscles. I. IRVING AND P. H. WELLS. *J. Biol. Chem.* 77, 97-113(1928).—Labile P was found in the mammalian skeletal muscle by the methods defined by its discoverers. It was not found in the striated muscle of fish, or grasshoppers, in smooth muscle generally, or in heart muscle.

ARTHUR GROLLMAN

The transformation of creatine into creatinine by the male and the female human organism. W. C. ROSE, R. H. ELLIS AND O. C. HELMING. *J. Biol. Chem.* 77, 171-84(1928).—Feeding expts. on 2 human subjects indicated that the power of transforming creatine into creatinine was independent of sex. Approx. $\frac{1}{3}$ of the retained creatine was recovered as creatinine. In the female subject creatine appeared unchanged in larger amts. following its oral administration than in the male subject. A. G.

Studies upon calcification in vitro. III. Inorganic factors determining calcification. D. H. SHELLING, B. KRAMER AND E. R. ORENT. *J. Biol. Chem.* 77, 157-70(1928).—The effect of modifying the compn. of the fluid medium on the calcification of rachitic cartilage was studied. At a p_H of normal blood the optimum results were obtained. An increase in the total ionic strength of the medium inhibited calcification. This occurred at lower concns. of either NaCl or KCl if the $[Ca^{++}]$ and $[HPO_4^{--}]$ were at the same time also lowered. Mg also inhibited calcification but its effect could be overcome by the addn. of $[HPO_4^{--}]$.

ARTHUR GROLLMAN

The variability of basal metabolism. G. M. WISHART. *Quart. J. Med.* 20, 193-7(1927).—The day-to-day variability of both metabolism and respiratory quotient, with 1 observation per day, can be expressed by a coeff. of 4 or 5, meaning that in a series of observations the max. and min. may differ as much as 30%. Three apparently healthy individuals had a metabolism rate uniformly lower than Dubois' standard.

JOHN T. MYERS

The influence of previous muscular activity and other factors on the basal metabolism. G. M. WISHART. *Quart. J. Med.* 20, 199-204(1927).—One hour of moderately severe muscular work causes an av. increase in the basal metabolic rate of the following day of 1 to 2%, with a slight lowering of the respiratory quotient. These differences are very slight as compared with normal variability. A high-protein diet will markedly increase the metabolic rate of the following day. A fairly high correlation coeff. (0.7) between the total N excretion and the metabolic rate was found in a subject whose diet was much varied in the amt. of protein component. During the first few days of starvation, despite the rapidly falling respiratory quotient, the daily variations in metabolic rate were very small. There was a closer correlation between the metabolic rate and total N excretion than uric acid excretion. J. T. M.

The fixation of calcium in the organism. C. SERONO. *Presse médicale* No. 90, 1363(1927); *Bull. soc. hyg. aliment.* 16, 33-4(1928).—See *C. A.* 21, 3662. A. P.-C.

Analysis of the effect of adrenaline upon purine metabolism. GERT TAUDMANN. *Arch. exptl. Path. Pharmacol.* 129, 43-51(1928).—In dogs a subcutaneous injection of adrenaline causes a definitely increased excretion of uric acid and allantoin, while the total N is as a rule not greatly changed. Apparently the increased purine value of the

urine is in no casual way connected with adrenaline leucocytosis. After section of the splanchnic nerves the injection of adrenaline does not augment allantoin excretion.

G. H. S.

Cholesterol and lipid phosphorus of the bile. Changes due to differences in administration, to "blockade" of the reticulo-endothelial system, and to splenectomy. SAMUEL LEITES. *Arch. expil. Path. Pharmacol.* **129**, 108-21(1928).—Administration of olive oil, olive oil and cholesterol, or oleic acid to dogs is not followed by significant changes in the cholesterol of the bile. Meat and lecithin administration moderately raise the cholesterol value within the first 6 hrs. Lecithin, or olive oil, may increase the total and lipid P of the bile during the first 4-6 hrs. Blockade of the reticulo-endothelial system augments the bile cholesterol, and splenectomy reduces both the cholesterol and lipid P of the bile.

G. H. S.

Does the thyroid secrete hormones other than thyroxine? KARL CSÉPAI AND JOSEPH FERNBACH. *Arch. expil. Path. Pharmacol.* **129**, 256-60(1928).—There is no reason for assuming that, aside from thyroxine, the thyroids secrete addnl. hormones, since along with its other effects thyroxine itself sensitizes to the action of adrenaline and pituitrin in increasing blood pressure.

G. H. S.

Behavior of the human organism during deprivation of mineral substances. II. FRIEDRICH THIELMANN. *Arch. expil. Path. Pharmacol.* **129**, 367-9(1928).—Tabulated data supplementing the paper previously published (*C. A.* **21**, 448).

G. H. S.

LAQUER, FRITZ: *Naturwissenschaftliche Reihe Band. XIX. Hormone und innere Sekretion.* Edited by Raphael Ed Liesegang. Dresden: Theodor Steinkopff. 136 pp. Paper, M. 8.50.

G—PATHOLOGY

H. GIDEON WELLS

The precipitin content of the protein fractions of immune serum. H. H. KROGER AND I. HEKTOEN. *Proc. Soc. Exptl. Biol. Med.* **24**, 352(1927).—Rabbits were immunized against crystd egg albumin. The antiserum was sepd. into protein fractions. A contact precipitin test was made on the whole serum and on each fraction. The precipitin was carried down with the euglobulin fraction, but during dialysis the pseudo-globulin was split off by hydrolysis and the precipitin remained in this H₂O-sol. fraction.

C. V. B.

An explanation of the two forms of bilirubin demonstrated by the Van den Burgh reaction. G. A. COLLINSON AND F. S. FOWWEATHER. *Brit. Med. J.* **1926**, **I**, 1081-3; *Physiol. Abstracts* **12**, 104.—Expts. with free bilirubin, which is an acid, and its alkali salts showed that all the results of the Van den Burgh reaction can be closely imitated. The pigment of fresh bile and of the serums of obstructive jaundice is readily dialyzable; the pigment of the serums of hemolytic jaundice does not pass through the membrane unless alc. is added, so that the former is in true soln. and the latter in colloidal suspension. The authors consider the substance in true soln. to be an NH₄ salt of bilirubin.

H. G.

A contribution to the nature of diabetes: A mathematical derivation of the blood glucose curve. D. M. ERVIN. *J. Lab. Clin. Med.* **12**, 318-25(1927); *Physiol. Abstracts* **12**, 165.—A math. equation for the blood glucose curve of the blood is derived from the three factors, absorption from the intestinal tract, formation of glycogen and oxidation; by detn. of these const. the effect on each function on the curve can be investigated. The curve in diabetes differs from that derived from failure to burn glucose.

H. G.

Methods of preventing agglutination of blood by glucose solutions. W. R. PENDLETON. *J. Lab. Clin. Med.* **12**, 369-73(1927); *Physiol. Abstracts* **12**, 143.—The agglutination which occurs with glucose, sucrose or glycerol may be responsible for the reaction sometimes obtained to a glucose injection. It can be diminished by using a hypertonic or a non-acid soln., or by injecting very slowly to allow of admixt. with a large vol. of blood. The addn. of NaCl, K₂NPO₄, KH₂PO₄ or alkali prevents the agglutination.

H. G.

Cause of hemophilia and its treatment. E. FRANK AND E. HARTMANN. *Klin. Wochschr.* **6**, 435-9(1927); *Physiol. Abstracts* **12**, 345.—By treating centrifuged oxalate plasma with a gelatinous suspension of Ca₃PO₄, the authors removed the proserozyyme. This prepn. they call "plasma phosphaté." It is a soln. of fibrinogen in a physiol. medium free from Ca, cytozyme and proserozyyme. If treated with cytozyme (platelet suspension or syphilitic antigen), proserozyyme (oxalate plasma minus its fibrinogen) and CaCl₂, "plasma phosphaté" clots. Bordet's observation that the change from proserozyyme into serozyyme, which is preliminary to the formation of thrombin, and takes

about 30 min., is confirmed. Cytozyme accelerates this change. In hemophilic plasma the proscrozyme is normal and the platelets are normal, but something is present which retards the conversion of proscrozyme into serozyme. "Plasma phosphaté" from a normal person brings about this conversion quickly, but "plasma phosphaté" from a hemophilic individual takes several hours to effect it. The injection of 20 cc. of normal "plasma phosphaté" in cases of hemophilia will bring the coagulation time to the normal and keep it there for 48 hours, thus enabling surgical procedures to be undertaken.

H. G.

Cause of spontaneous venous thrombosis. W. STARLINGER AND S. SAMETNIK. *Klin. Wochschr.* 6, 1269-72(1927); *Physiol. Abstracts* 12, 486.—S. and S. have attempted to find the factors which cause clumping of blood platelets, this being considered to be the prime cause of spontaneous thrombosis. By microscopic cataphoresis expts. and the use of $\text{La}(\text{NO}_3)_3$ as an agent for neutralizing the charge on the platelets, the last-named are found to be neg. charged. They have an isoelec point between p_{H} 5.4 and 4.7. The platelets have a much stronger neg. charge than the serum globulin and fibrinogen. When the latter are increased in amt. they are considered to cause lowering of the charge on the platelets and these tend to agglutinate. If this takes place along with localized stasis of the blood stream then thrombosis occurs.

H. G.

Resynthesis of lactic acid in circulatory diseases. H. PERGER. *Klin. Wochschr.* 6, 1324-6(1927); *Physiol. Abstracts* 12, 509-10.—It has been shown by Groag and Schwarz that in some patients with circulatory diseases exercise causes a greater production of lactic acid, and that its disappearance from the blood is slower than in normal persons. It is now shown that in patients who are unable to take exercise the same lag in resynthesis of lactic acid may be demonstrated by intravenous injection of Na lactate. The blood lactic acid in such cases, after the injection of 200 cc. 2% Na lactate, may increase to 3 times the initial value within 5 min., and after 20 min. is still nearly double. In a normal person the same amt. of Na lactate causes practically no change in the blood lactic acid, and in cases of compensated heart diseases only a slight increase is observed.

H. G.

The presence of hemolytic, cytolytic and complement-binding substances in extracts of Entameba histolytica. C. F. CRAIG. *Science* 65, 620(1927); *Physiol. Abstracts* 12, 463.—Alec. exts. of *Entameba histolytica* are hemolytic and cytolytic, and capable of binding complement when mixed with the serum of individuals harboring the parasite. The hemolytic properties are destroyed by heating to 80° for 1 hr., the hemolytic substance is sol. in abs. and 50% alc., but practically insol. in normal salt soln. The hemolytic substance is contained in the bodies of the ameba, and is only present in the living organisms. It is not specific for human red cells. Exts. do not contain a bacteriolytic substance. The complement-binding substance is only active when brought in contact with the blood serum of infected individuals.

H. G.

The sensitization of normal guinea pigs with serum plus tuberculin. WALTER KELLER AND WERNER DOLTER. *Z. Immunitäts.* 52, 1-24(1927).—Guinea pigs sensitized with mixts. of tuberculin (old tuberculin or dried tuberculin) and hog serum or hog serum globulin will give skin reactions and anaphylactic shock on reinjection with tuberculin alone. Such sensitized animals will also give a fatal anaphylactic shock with the reinjection of mixts. of protein and tuberculin in amts. which are too small to kill the sensitized animals when given alone.

JULIAN H. LEWIS

The role of ecto- and endoplasm of mouse typhoid bacilli. E. SPRINGUT. *Z. Immunitäts.* 52, 25-49(1927).—Two sorts of antigen can be demonstrated by agglutination and complement-fixation tests in mouse typhoid bacilli, endoplasm and ectoplasm. Accordingly in an antiserum for this organism there are 2 antibodies corresponding to the antigens. Endoplasmic antibodies are the more important in the bactericidal action of the antiserum, although mice immunized with both antigens are better protected than when immunized with endoplasm alone.

JULIAN H. LEWIS

The content of the organs of animals in heterogeneous antigen. K. A. FRIEDRICH AND F. T. GRÜNBAUM. *Z. Immunitäts.* 52, 50-60(1927).—The organs of animals of the guinea pig type contain not only the heterogeneous antigen of the sheep but also that of the chicken, turtle and cat, and if one of these antigens is missing all are missing. The organs of animals of the rabbit group contain antigen for any of the animals of the guinea-pig group.

JULIAN H. LEWIS

An augmentable substance in red cells which changes their agglutination properties. OLUF THOMSEN. *Z. Immunitäts.* 52, 85-107(1927).—In some red cells of all 4 types there is a substance that develops on standing 14-25 hrs. which permits them to be agglutinated by serum of any type. The agglutination depends on the presence in all human sera of an agglutinin which can combine only with the changed red cells. The

change is thought to be due to the development of a latent receptor which is specific for the so-called third agglutinin. Absorption tests show that this 3rd substance is independent of α - and β -agglutinin. These facts point to the error that can arise by using only Type II and III sera in grouping red cells.

JULIAN H. LEWIS
The Sachs-Georgi, the Meinicke and the Wassermann reactions. N. GASIOROWSKI. *Z. Immunitäts.* 52, 138-56(1927).—The Wassermann and Sachs-Georgi reactions are compared in 23,729 sera and the Wassermann, Sachs-Georgi and Meinicke reactions in 3408 sera. All are equal as to specificity but they differ as to sensitivity. In general the order of their sensitivity is Sachs-Georgi, Wassermann, Meinicke. In the primary stage of syphilis the Wassermann is most sensitive and in secondary and latent syphilis the Sachs-Georgi is most sensitive. In tertiary syphilis all 3 tests have about the same sensitiveness. In treated patients the Sachs-Georgi is more sensitive than the Wassermann. The Wassermann reaction disappears sooner than the Sachs-Georgi. In all 3 tests there is a great dependence on the method of prepn. of the antigen.

JULIAN H. LEWIS
The influence of the Bayer substances on anaphylactic shock. W. A. COLLIER. *Z. Immunitäts.* 52, 191-201(1927).—Animals sensitized with normal serum show a much weaker or no reaction when reinjected with serum to which is added Bayer 205. Bayer 1910 acts not only qual. but quant. more strongly. If Bayer 205 is injected into the sensitized animals before reinjection of antigen the anaphylactic shock is also inhibited. Bayer 1910 has no such action. Bayer 205 mixed with the sensitizing dose of horse serum destroys to some extent the specificity of sensitization in as much as there is also sensitization to beef serum. Precipitin reactions are not influenced by the Bayer substances.

JULIAN H. LEWIS
Further experiments on the theory of antibody formation. E. FRIEDBERGER AND S. SEIDENBERG. *Z. Immunitäts.* 52, 202-13(1927).—Small amts. of killed typhoid bacilli given intravenously to rabbits very slowly and over a long injection period (90 min.) by means of a motor-driven syringe produce considerably smaller amts. of antibodies than when the same dose is given quickly. There is no difference in the 2 methods of administration when large doses of antigen are given. These facts are explained on the basis of Pfeiffer's irritation theory. The minimal amt. of antigen in order to produce a response must exert its complete stimulative action on the body receptors, which is possible only when it is introduced in undivided amts. The fact that antibody formation proceeds after immediate removal of the site of injection as reported in a no. of papers means that in these instances the minimum active dose of antigen escapes from the site of injection before removal of the depot. It was noticed that after slow injection of antigen the agglutinin produced a fine agglutination of typhoid bacilli, while after quick injection the type of agglutination was of the coarse variety. **Influence of the period of a single injection of antigen on anaphylaxis in guinea pigs.** *Ibid* 214-20.—Guinea pigs prep'd. with small doses of antigen were much more sensitive when the antigen was given subcutaneously very slowly. The difference was not so marked with moderate doses, and with large doses the sensitization was less than when given quickly. The action of pathogenic bacteria after slow injection and the curative value of serum after protracted injections. E. FRIEDBERGER AND T. IKEDA. *Ibid* 221-6.—The protracted injection of the El Tor vibrio and typhoid bacilli produced a more severe infection than a quick injection and curative serum was more active. **J. H. L.**

Conceptions of antibodies and the constellation of serum proteins. G. KAPSENBERG AND Th. E. RISPENS. *Z. Immunitäts.* 52, 227-327(1927).—The relations of agglutinins to the globulins of antiserum were studied in a similar manner as the Wassermann and Sachs-Georgi antibody was studied in a preceding paper (*C. A.* 19, 1894). It was found that the total globulin fraction contained all and the albumin fraction none of the agglutinin. By quant. measurements it was learned that if equiv. quantities of pseudoglobulin, euglobulin and total globulin were taken, as det'd. by the N content, these fractions contained identical amts. of agglutinin. From these results a theoretical discussion of the constellation of serum proteins and the relation of antibodies to serum fractions is presented, the chief idea of which is that antibodies are the disintegration products of body cells and like other disintegration products of cells they are absorbed by the serum globulins, the various fractions of which are equally active. **J. H. L.**

The experimental production of syphilitic changes in the blood of men and rabbits. HERMANN FÖRTIG. *Z. Immunitäts.* 52, 328-33(1927).—Patients injected intramuscularly with lipoid from human serum mixed with hog serum, with milk, with aolan(?) and with an ext. of the spirochete of syphilis did not develop a positive Wassermann reaction while rabbits injected intravenously with milk, aolan and omnadin(?) did develop a positive reaction.

JULIAN H. LEWIS

The antigenic properties of anatoxin. M. ISABOLMSKII AND V. GITOVICH. *Z. Immunitäts.* 52, 334-8(1927) - -See C. A. 22, 808. JULIAN H. LEWIS

The heterogenetic complement-fixing antibodies. J. I. KRITSCHESKI AND R. E. MASSIK. *Z. Immunitäts* 52, 339-58(1927) —The heterogenetic antigen of sheep, hen, turtle and cat from red cells as well as from organs is alc.-sol. and produces complement-fixing antibodies on injection into animals. The stroma of the red cells contains all of the antigen, although some preps. of hemoglobin were active, probably in consequence of the inability completely to sep. stroma and hemoglobin. JULIAN H. LEWIS

The presence of the antigen of isoagglutinin groups in human organs. E. WIREBSKY AND K. OKABE. *Z. Immunitäts* 52, 359-69(1927).—In the alc. ext. of human organs from group A is found the same lipid antigen as is found in red cells. This lipid antigen which is sp. for group A is found not only in normal organs but also in malignant tumors of individuals belonging to this group. The antigen is found in the blood serum but it must first be extd. with alc. in order to be demonstrated. An exception among the organs is the brain which in spite of its high lipid content does not contain the group A antigen. In group B individuals the lipid sp. for this group is found only in the liver. The isoagglutinins represent not merely blood groups but cell groups. These findings extend to legal medicine the possibility of identifying the origin of individuals from organ ext. reactions as well as from red cell reactions. J. H. L.

The action of diphtheria antitoxin in vitro and in vivo. BECKER. *Z. Immunitäts.* 52, 402-20(1927) —Diphtheria bacillus growing in diphtheria antitoxin very rapidly loses its toxin-forming properties. Normal serum does not affect the infection of guinea pigs with washed toxic diphtheria bacillus, while $1/10$ unit hinders the infection slightly. One unit decreases it markedly, and 10 units completely arrest it. Antitoxin (10 units) given 20 hrs. after infection shortens the course of the disease and 40 hrs. after infection the antitoxin is yet able to cure the animal. The presence of antitoxin stimulates the auto-immunization with toxin-laden organisms. JULIAN H. LEWIS

Value of the nonspecific protein treatment of typhoid immune syphilitics of the latent stage. M. MELCZER AND O. DAHMEN. *Z. Immunitäts.* 52, 469-96(1927) —Various protein substances had no appreciable effect on the total serum proteins, the rate of settling of red cells, and on the normal agglutinins and amboceptor for typhoid bacilli in syphilitics. But if these patients were immunized with typhoid bacilli an effect was found which was different for latent syphilis and tabes. There is produced a negative phase of the agglutinins which begins in 8-10 hrs. In latent syphilis the positive phase begins on the 3rd or 4th day and in tabetics it begins on the 5th day. In latent syphilis the curve rises suddenly but in tabetics it goes up slowly. The negative phase of the typhoid amboceptor lasts 12-24 hrs. longer than that of the agglutinins. From these expts. a mode of treatment for latent syphilis is suggested and of the nonspecific substances tried omnadin(?) and turpentine given subcutaneously are considered the best. JULIAN H. LEWIS

Further studies on the metabolism of fatty substances in pathological conditions. C. CIACCIO. *Boll. soc. ital. biol. sper.* 2, 1027-9(1927) —The factors which inhibit liposis by steatogenous agents were investigated. The administration of phosphorylated oil to animals previously injected with certain suspensions did not give rise to liposis. PETER MASUCCI

FISCHER, MARTIN HENRY: *Kolloidchemie der Wasserbindung. II. Wasserbindung bei nephritis.* Dresden. Th. Steinkopff. 288 pp. M. 20; bound, M. 22.

LUGER, ALFRED, KOVÁCS, NIKOLAUS, LAUDA, ERNST AND PREISSECKER, ERNST: *Grundriss der klinischen Stuhluntersuchung. Zusammenfassende Darts. d. wichtigsten makroskop., mikroskop. und chem. Untersuchungsmethoden und ihrer diagnost. Bedeutung.* Vienna: J. Springer. 341 pp. M. 36; bound M. 39.

II--PHARMACOLOGY

A. N. RICHARDS

Pressor effect of guanidine salts on the non-anesthetized rabbit. R. DOMINGUEZ. *Proc. Soc. Exptl. Biol. Med.* 25, 57-60(1927) —The effects on blood pressure, pulse rate and other effects of guanidine salts on the rabbit are discussed. C. V. B.

Physiologic doctrine of the action of poisons which excite the nerve centers. S. BAGLIONI. *Atti accad. Lincei* [6], 6, 562-7(1927).—A crit. review of the doctrine of the selective action of various poisons, together with new expts., leads to certain generalizations concerning the effect of poisons on various centers and their progressive effects. All poisons which in a selective manner increase the irritability of the central coordinated

elements of the posterior cornua of the spinal medulla cause an abnormal increase of the reflex activity, culminating in typical tetanic convulsions of central origin. To this class of poisons belong strychnine, nicotine, hydroxynicotine, caffeine, picrotoxin and KCN. All poisons which in a selective manner increase the irritability of the central elements of the anterior cornua (motor neurons) increase the reflex irritability, culminating in clonic convulsions of central origin. To this class of poisons belong phenol, eosin, hexetone and camphorated oil. Conversely all poisons which, however administered, excite abnormally the spinal nervous system, with eventual tetanic convulsions, have a selective action in that they attack the central nervous elements of the posterior cornua, increasing their excitability. Likewise all poisons which provoke clonic convulsions of central spinal origin have a selective action in that they attack the central motor elements of the anterior cornua, increasing their excitability. This selective action of various poisons demonstrates that the neurones of the posterior and anterior cornua have specifically different functions (physiol. differentiation of the functional central elements).

C. C. DAVIS

Researches on the physiological action of alcohol. IV. Further observations on rats fed on a diet deficient in proteins and carbohydrates but hyperlipinic. Importance of the intestinal tract in resistance to fasting. A. GALAMINI. *Atti accad. Lincei* [6], 7, 251-4 (1928); cf. Baglioni and G., *C. A.* 21, 2319.—A continuation of the earlier expts. showed that EtOH diminishes the resistance of rats on a hyperlipinic diet which at the same time is deficient in proteins and carbohydrates, with gradual loss of wt. culminating in death. Rats fed only lard died after losses of 43-46% wt., whereas rats fed on a mixt. of lard and cellulose to maintain normal intestinal activity died only after 48.9-64% losses of wt. Therefore death probably depends not only on a deficiency of certain nutrients but also upon intestinal intoxication, which is rendered less intense by increasing the activity of the intestines.

C. C. DAVIS

Pharmacological researches on the mercuric salt of *p*-aminophenylarsonic acid (aspirochyl). II. Anatomic pathological alterations of some organs of animals dead from acute and subacute poisoning by aspirochyl. PIERO TESTONI. *Arch. farmacol. sper.* 44, 225-40 (1928); cf. *C. A.* 22, 458.—Autopsies performed on rabbits after intravenous and subcutaneous injections of aspirochyl showed lesions localized mainly in the kidneys, liver and suprarenals. With large doses followed by quick death the lesions were hemorrhagic; with smaller doses over a period of several days they were degenerative. The symptoms did not differ essentially from those produced by other arsenicals and mercurials.

A. W. DOX

The behavior of ethyl diethylacetacetate in the organism. EDGARDO PACE. *Arch. farmacol. sper.* 44, 265-72 (1928).—When injected into the dorsal sac of the frog, $\text{AcCF}_2\text{CO}_2\text{Et}$ has the same general effect as $\text{AcCH}_2\text{CO}_2\text{Et}$ (*C. A.* 22, 458) but its action is much more intense. When administered by stomach sound to rabbits it does not decomp. into MeAc but is conjugated with glucuronic acid and thus eliminated in the urine.

A. W. DOX

Alkaloids of cinchona and amylolytic action of the pancreas. G. M. PICCININI. *Arch. intern. pharmacodynamie* 32, 225-38 (1926); *Physiol. Abstracts* 12, 88-9.—Quinine is capable of inhibiting or exciting amylolytic activity. The inhibitory effect is the regular effect. The prolonged excitatory effect is shown only with small doses in diln. of 1/2000 to 1/500,000. Cinchonine, quinidine and cinchonidine are capable of the same action as quinine on amylolytic function. In equiv. molar doses to quinine their inhibitory action is less, while the activating effect is distinctly greater. In concns. of 0.054 millimol. (0/00) the ascending scale of activating power of the four alkaloids is thus represented: quinine 100, cinchonine 125, quinidine 128, cinchonidine 134. The exciting action of small doses of quinine should not be considered as an example of the general law by which symptoms vary in function of dose, but are to be interpreted as an effect of *subsensitive* doses—that is, doses lower than those called. to bring out the sp. effects of the drug.

H. G.

Antidotal effects between barium and sulfates. L. SCREMIN. *Arch. intern. pharmacodynamie* 32, 207-15 (1926); *Physiol. Abstracts* 12, 125.—The expts. were performed on rabbits in winter at a temp. of 5° to 8°. The toxicity of BaCl_2 in function of the velocity of injection was first ascertained. The lethal dose proved to be independent of the rate of injection. At low velocities of injection of BaCl_2 and Na_2SO_4 antidotal effects are slight. The sulfate is rapidly excreted by the kidneys, while the Ba salt is not. With intravenous injection of BaCl_2 (0.02 N) and Na_2SO_4 (0.02 N) the lethal dose of the Ba salt differs very little from that when it is used alone. With injection of BaCl_2 (0.02 N) and Na_2SO_4 (0.1 N) the dose of Ba necessary to kill the animal is about twice as great as if it were used alone.

H. G.

Clinical and experimental study of colloidal sulfur. M. MONTAGNANI. *Arch. intern. pharmacodynamie* 32, 269-310(1926); *Physiol. Abstracts* 12, 124.—Colloidal S in small intravenous or hypodermic doses causes increase of hemoglobin and of the corpuscular mass in fowls and rabbits. The increased hemopoietic activity is due especially to a stimulation of the bone marrow. It can be attributed not to the special phys. state of the drug (colloidal), but to the substance *per se*. The drug also increases oxidation in the organism, and augments the output of urea, etc. It probably liberates O from HbO, and seems to possess special anabolic function. In man also the use of colloidal S (hypodermic) has hemopoietic and oxidative effects. H. G.

The effects of anisotonic solutions on peristalsis in the small intestine of rabbits. W. F. NORTTINGEN AND T. SOILMANN. *Arch. intern. pharmacodynamie* 32, 327-339 (1926); *Physiol. Abstracts* 12, 154.—The effects of anisotonic solns. are similar inside and outside the intestine, whether excised or in the living animal. The longitudinal and circular fibers react alike. Hypotonic solns. increase tone and peristalsis. Water, coffee, etc., taken on an empty stomach are promptly laxative. In excised intestine excessive hypotonicity may cause rigidity. Hypertonic solns. affect peristaltic rate in two opposite directions: there is a short period of acceleration, and in 2-4 min. progressive slowing. The primary stimulus spreads rapidly ahead of the fluid, and tends to empty the lower intestine. If the hypertonic soln. be rapidly absorbed through the serous coat, the depression may occur without stimulation. H. G.

Comparison of mercurous with mercuric salts. P. TESTONI. *Arch. intern. pharmacodynamie* 32, 239-54(1926); *Physiol. Abstracts* 12, 124-5.—Whether *in vitro* with egg albumin or *in vivo* with rabbits, normal or previously treated with NaI, a distinct difference was always noted in chem. and toxicol. properties between mercurous and mercuric salts. The salts were injected in solns. of NaNO₃ slightly acidulated with HNO₃. The acid added plus that resulting from hydrolysis was much inferior to the lethal dose. The effects of the nitrates are attributable to the activities of the cations Hg⁺ and Hg²⁺, which can react in the circulation with proteins or with the salts of the plasma. If albuminates are formed, Hg ions coexist with them. There is a reaction with the chlorides, carbonates and phosphates. HbCl, being slightly sol., becomes colloidal, and so probably do both oxides. H. G.

The effects of anisotonic solutions on intestinal muscle. B. SIAULIS AND T. SOLL-MANN. *Arch. intern. pharmacodynamie* 32, 340-51(1926); *Physiol. Abstracts* 12, 154.—Hypo- and hypertonic solns. applied directly to intestinal nerves tend to increase the tone of the intestine, and sometimes to produce inconst. changes of rate and amplitude of peristalsis. These changes are so much smaller than those produced by contact with the intestine that it is improbable that osmotic changes in nerve fiber play an important part in the functional response of the intestine to anisotonic fluid. H. G.

The action of opium and related alkaloids on nerve and muscle preparations. J. V. SUPNIEWSKI AND D. I. MACIIT. *Arch. intern. pharmacodynamie* 32, 352-9(1926); *Physiol. Abstracts* 12, 179.—Alkaloids of the piperidine-phenanthrene group diminish slightly the irritability of frog nerve and muscle and the height of the contraction curves. The alkaloids of the benzylisoquinoline group are more toxic and markedly diminish the curves. Pantopon, a mixt. of the two groups, is more toxic than piperidine and less so than isoquinoline. Benzyl alc. has a pronounced depressor effect, probably owing to the free OH group. Benzyl phosphate causes only slight depression. Phenanthrene sulfate gave no effect, but piperidine-HCl is depressor. Isoquinoline and quinoline are both toxic. H. G.

A comparison between the action of quinine and quinidine on smooth muscle. I. The action on the uterus. E. E. NELSON AND F. W. THOMAS. *Arch. intern. pharmacodynamie* 32, 455-60(1926); *Physiol. Abstracts* 12, 181.—Quinidine, like quinine, stimulates the uterus to increased rate and amplitude of contractions in the pregnant as in the non-pregnant state. The stimulating action occurs through a relatively narrow range of concn. so far as the isolated uterus is concerned, and the toxic depressor effect is very readily obtained. A marked or persistent increase in tonus was rarely seen in isolated uterus, and not at all *in situ*. In isolated uterus quinidine stimulates in smaller dose than quinine. In the intact animal very little difference was noted. No exptl. data have been obtained to show that quinidine might be more effective as an oxytocic than quinine. H. G.

Chemical and pharmacological properties of mixtures of sodium salts of halogens and salts of strychnine. J. SIMON. *Arch. intern. pharmacodynamie* 33, 62-72(1927); *Physiol. Abstracts* 12, 307-8.—The addn. of aq. solns. of NaBr, NaI and NaCl to aq. solns. of salts of strychnine gives rise to ppts. This property of the halogen salts of Na increases with increase of the at. wt. of the halogen. The ppt. consists of the salt of strychnine,

and is due to a diminution of soly.; it is not a mol. complex. There exists no relation between the property of pptn. and the antitoxic action of the halogen salts towards strychnine in the animal organism. The NaBr is the most active in the latter respect. The pharmacol. effect of NaI is least, but its pptg. power is highest. NaCl, which pre-exists in the organism, is intermediate between the other two. H. G.

Comparative action of quassia in vertebrates and insects. A. ANTONIBON. *Arch. intern. pharmacodynamie* 33, 77-84 (1927); *Physiol. Abstracts* 12, 309.—The minimal lethal dose of quassia for the rabbit is four times greater when introduced into the stomach than that required intravenously. Its soly. is slight (1%), and it is with difficulty dissolved in and absorbed from the stomach. Comparing the lethal dose for insects like the silkworm and for the rabbit, they are found to be closely alike. The supposed greater toxicity for insects is due to an error of calcn. of the dose absorbed. The seat of action is the same in all cases. The nervous system is attacked, and, according to its development, there is torpor and muscular relaxation with rapid apparent death in the insects, while in the rabbit there is muscular tremor all over the body and later paralysis. H. G.

The pharmacology of colloidal sulfur. M. MONTAGNANI. *Arch. intern. pharmacodynamie* 33, 85-113 (1927); *Physiol. Abstracts* 12, 310.—Colloidal S more than any of the other oxygenated derivs. may in special conditions of administration exhibit the property of being anti-anaphylactic, completely annulling all signs of shock. It is necessary to give the S daily intravenously over the latent or incubation period. A single large dose given soon after the procedure detg. shock has but a very slight preventive effect. This immunity conferred by S in the desired conditions is temporary, and the animal may present typical shock if the detg. injection be made 15 to 20 days after treatment with S. H. G.

Action of mistletoe on the circulatory system. U. G. BIJLSMA. *Arch. néerland. physiol.* 11, 142-5 (1926); *Physiol. Abstracts* 12, 308.—In the cat a single intravenous injection gives a temporary fall in blood pressure, due to dilatation of the coronary vessels, and occasionally of those in the periphery, plethysmographic and perfusion expts. being almost uniformly neg.; intra-arterial injection may be followed by no fall in pressure, whereas intravenous is effective; further expts. excluding the pulmonary vessels and the cardiac muscle show that the effect must be due to coronary dilatation. Repeated injections produce a permanent fall in pressure, and finally death, due to cardiac failure. The anesthetic or the presence or absence of the nervous system is without influence on these results. In the dog similar results are obtained, but the causes of the temporary fall in pressure from a single injection are different; peripheral vasodilatation, stimulation of the vagus center, and a toxic effect on the heart all contribute. Intra-arterial injection produces a more rapid fall than intravenous. The drug acts on the vessel wall itself. H. G.

Action of α -aminopyridine and its derivatives. F. DINGEMANSE. *Arch. néerland. physiol.* 11, 160-4 (1926); *Physiol. Abstracts* 12, 308-9.—Natural nicotine is a deriv. of β -aminopyridine, from which an intermediate compd., a nicotyrine, can be synthesized. From α -aminopyridine also α -pyridylpyrrole and a nicotyrine can be formed, from which an isomer of nicotine may later be synthesized; 0.01 g. α -aminopyridine injected into frogs produced convulsions like those of strychnine, and death in a few hours; 0.5 to 1.0 mg. produced symptoms. Acetyl, benzoyl and urethan derivs. were less toxic; the acetyl had a slight anesthetic action on the cornea; 0.01 g. of the α -pyridylpyrrole and of nicotyrine was also toxic, and produced death in a day, the former with paralysis and the latter with convulsions. All the compds., including nicotine, possess a local anesthetic action on the frog skin, but neither α -aminopyridine nor the nicotyrynes have any action on the rabbit's cornea. Hence these α -compds. produce effects similar to those of the natural β -nicotine. H. G.

Sodium thiosulfate and calcium salts in prevention of the sequelae of illuminating gas poisoning. W. H. ZEIGLER. *J. Lab. Clin. Med.* 12, 109-14 (1926); *Physiol. Abstracts* 12, 183.—The delayed effects of CO poisoning can be prevented in dogs by intravenous injection of $\text{Na}_2\text{S}_2\text{O}_3$ and subcutaneous injection of Ca salts. It is suggested that the treatment might be effective for human subjects. H. G.

Adrenaline and muscle tonus. E. FREUDENBERG. *Klin. Wochschr.* 6, 634-5 (1927); *Physiol. Abstracts* 12, 348.—It has been shown by Duzar and by Sieghelm that intravenous injection of adrenaline in a condition of alkemia causes tetany. F. now demonstrates that if 0.25 mg. adrenaline be injected intramuscularly into the ball of the thumb and an alkemia be produced by hyperventilation, the muscles of the thumb develop a marked spasm which is much greater than on the opposite side. This points to a peripheral action of adrenaline on the muscles. H. G.

The zytropy and parasitotropy of arsphenamine. F. T. GRÜNBAUM. *Z. Immunitats.* 52, 61-84(1927)—Arsphenamine adsorbed on sheep erythrocytes has a higher activity than arsphenamine *per se*. It would seem that the combination of cells and arsphenamine gives rise to a product which enhances the therapeutic action of arsphenamine. These facts are thought to agree with Ehrlich's theory of the relation of organotropy and parasitotropy in the chemotherapeutic action of substances. J. H. L.

Quantitative observations on thyroxine and allied substances. I. The use of tadpoles. J. H. GADDUM. *J. Physiol.* 64, 246-54(1927) — Natural thyroxine added to the water (1 to 10 parts per ten million) in which tadpoles lived produced characteristic effects among which a decrease in the length of the tadpoles is regarded as a sp. quant. test for thyroxine. Synthetic and natural thyroxines, both in racemic condition, were equal in effect. K1 in high concns., 200 parts K1 to 1 million, resulted in a slight decrease in tadpole size, but 50 parts K1 per million had no such effect. Diiodothyroxine, which has only 2 of the 4 I atoms of thyroxine, showed about 2.5% as much activity in the test as did thyroxine. Desiodothyroxine, representing thyroxine deprived of all its I atoms, showed no specific thyroxine action. β - β -DI(3,5-diiodo-4-hydroxyphenyl)-alanine, an isomer of thyroxine, had no activity. 3,5-Diodotyrosine had little or no effect. The amines (amino acid minus CO₂) corresponding to thyroxine and diiodothyroxine seemed to have specific effects similar to that of the same concn. of the corresponding amino acid, but these results were inconclusive. J. F. LYMAN

Is digestive leucocytosis caused by the absorption of the chlorine ion? G. SOLARINO. *Boll. soc. ital. biol. sper.* 2, 1036-9(1927) — The administration *per os* of 100 cc. NaCl soln 0.85% or 20 cc. NaCl 4.25% to dogs starved for 24 hrs. gives rise to a definite, though variable, leucopenia, which reaches the max. 60-120 min. after administration. The same amt. of NaCl given intraperitoneally also causes leucopenia. Also, 1.5 mg. HCl per kg. wt. given intraperitoneally causes leucopenia, whether the blood is drawn from the heart or from the ear veins. PETER MASUCCI

Influence of temperature on the action of ferrous sulfate on red blood corpuscles. M. MESSINI. *Boll. soc. ital. biol. sper.* 2, 1043-5(1927). — In high concns. and at a temp. not higher than 17°, FeSO₄ has a fixative action; in lower concns. it changes the structure of the red corpuscles, breaks them, but does not produce hemolysis. At a temp. of 22° or above, FeSO₄ has a hemolytic action; the higher the temp. the smaller is the amt. necessary to produce hemolysis. Co(NO₃)₂ and NiCl₂ at 37° did not produce hemolysis, although they did injure the corpuscles and in large doses had a fixative action. ZnSO₄ at 37° produced neither hemolysis nor fragmentation of the corpuscles. MnCl₂ behaved likewise. PETER MASUCCI

The inhibiting action of polysaccharides on glucose hyperglucemia. G. SOLARINO. *Boll. soc. ital. biol. sper.* 2, 1039-42(1927). — Sol. rice and wheat starch in 2.5 g. doses given to dogs starved for 24 hrs. produce a variable hyperglucemia (0.012 to 0.048%). If the starch is administered soon after or one-half hr. after the glucose, the glucose hyperglucemia is inhibited—the blood sugar is always less than when glucose is administered alone. The inhibiting action of starch is, however, less than that of sucrose or fructose. PETER MASUCCI

New experimental data on the biochemistry of the heart. M. MESSINI. *Boll. soc. ital. biol. sper.* 2, 1049-52(1927). — The pharmacodynamic relations between Ca ions and certain principles known to act on cardiac innervation were studied. Physostigmine and pilocarpine were used as exciters and atropine and methylene blue as inhibitors of the parasympathetic nervous system. Physostigmine salicylate, in a dil. 1:4000 soln. which does not modify the rhythm or strength of the frog heart, has a definite negative inotropic action if the Ca is removed from the perfusing liquid. The phenomenon disappears if the heart is perfused with physostigmine in Goethlin's liquid contg. Ca. A similar phenomenon was observed with pilocarpine. In a diln. of 1:8000 there are no appreciable modifications, but if the same amt. is added in a liquid free from Ca there is a definite negative inotropic action. Likewise, negative inotropic action was obtained with atropine and methylene blue in liquids free from Ca. M. proposes that as a basis of these results, a new pharmacological test may be introduced to recognize the autonomic orientation of alkaloids, hormones and animal exts. PETER MASUCCI

The distribution of boric acid in human organs in six deaths due to boric acid poisoning. Wm. D. McNALLY and C. A. RUST. *J. Am. Med. Assocn.* 90, 382-3(1928). — Analysis of the organs of 6 infants who had received by mistake from 60 to 150 cc. of satd. H₃BO₃ (3 to 6 g. per infant) showed that the brain and liver accumulate about the same and the higher percentages of H₃BO₃. The bowel contains an intermediate amt. while the stomach, heart, lungs, kidneys and diaphragm contain lower percentages.

H_3BO_3 is distributed through the body by osmosis as well as by the circulation.

L. W. RIGGS

Mode of action of arsenic and of related elements. II. Role of oxygen in the hemolytic activity of hydrogen phosphide, or its lowest stages of oxidation. RICHARD LARBS. *Arch. expll. Path. Pharm.* 129, 150-8(1928); cf. C. A. 22, 1407.—As with AsH_3 , hemolysis with P_2H_4 is dependent upon the presence of O. **III. Hemolytic action of hydrogen sulfide under an increased supply of oxygen.** *Ibid* 159-75. Mammalian red blood cells are hemolyzed by H_2S , the action being dependent upon the supply of O. Serum exerts an inhibitory influence. **IV. Hydrogen sulfide hemolysis: action of the colloidal sulfur.** *Ibid* 176-92.—Colloidal S preps. are also hemolytic. **V. Hemolysis by salts of hydriodic acid.** *Ibid* 193-201.—Through oxidation changes I becomes hemolytic.

G. H. S.

Effect of muscular convulsions on the gas relations and reaction of the blood, in connection with the mechanism of death due to strychnine. S. DIETRICH AND H. FÜSTER. *Arch. expll. Path. Pharm.* 129, 339-53(1928).—The difference in O_2 -satd. and reduced blood as regards capacity to bind CO_2 is the same in the rabbit as in man. After cardiazole convulsions the CO_2 content, the CO_2 binding power, and the CO_2 tension of the blood are reduced. The blood becomes more acid and the acidity of the urine is increased. In strychnine tetany a paralysis of the heart occurs, and in the intoxication the suffocation effect is augmented by the acidosis consequent to muscular activity.

G. H. S.

Effect of synthalin on the physiology of metabolism: Chemical analyses of organs. A. BOEDEKER AND P. JUNKERSDORF. *Arch. expll. Path. Pharm.* 129, 354-66(1928).—Synthalin administered to adequately nourished dogs caused an initial fall in blood sugar followed by a rise in sugar and a fall in the hypoglucemic value. Individual animals showed considerable variation as to the time of occurrence, the intensity, and the duration of these changes. The most striking feature of the organ analyses was the almost complete disappearance of glycogen from the liver, with a concomitant fat infiltration. Many animals revealed an inflammatory condition of the intestinal mucosa.

G. H. S.

Antithyreoidin-Moebius. A. GURBER AND OTTO GESSNER. *Arch. expll. Path. Pharm.* 129, 370-9(1928).—The active principle of antithyreoidin-Moebius is not sol. in either EtOH or ether. It is not weakened by exposure to light or by heating at 56° , and it is not dialyzable. It is either a protein itself or is closely bound to protein as is shown by pptn. reactions, and the euglobulin fraction has by far the greatest antithyroid action. Normal sheep serum contains something which inhibits the metamorphosis of tadpoles, but its action is less marked than that of antithyreoidin. The metamorphosis of amphibia larvae is stimulated by phenol in concns. of 1:20,000 to 1:40,000.

G. H. S.

Treatment of inoperable tumors with isamin blue. H. BERNHARDT AND C. B. STRAUCH. *Z. Krebsforschung* 26, 361-9(1928).—Intravenous injection of isamin blue reduces rate of growth and decreases cachexia in some cases of inoperable cancer, especially of the ovary.

H. G. W.

Relationship of chemical structure to pharmacological action (BAUER) 17.

HANZLIK, P. J.: **Actions and Uses of the Salicylates and Cinchophen in Medicine.** Medicine Monographs. Vol. 9. Baltimore, Md.: Williams and Wilkins. London: Baillière, Tindall and Cox. 200 pp. 16s., net. Reviewed in Supplement to *Nature* 121, 382(1928).

I—ZOOLOGY

R. A. GORTNER

Advanced development of some echinoid plutei. A. R. MOORE. *Proc. Soc. Exptl. Biol. Med.* 25, 37-8(1927).—The method of rearing and details of development are described for 3 Pacific coast forms. The sea urchins, *Strongylocentrotus purpuratus* and *S. franciscanus*, developed to advanced pluteus stage and the sand urchin, *Dendraster eicentricus*, readily underwent metamorphosis.

C. V. B.

Chemical analysis of incubated non-fertile eggs. G. W. PUCKER. *Proc. Soc. Exptl. Biol. Med.* 25, 72-3(1927).—Fresh eggs from white leghorn chickens were analyzed before incubation and the non-fertile ones at various periods of time, up to 20 days, during incubation, for carbohydrate and non-protein N constituents. All (99.2%) of the free sugar of the egg white is fermentable, while 7 to 12% of the total sugar of the yolk is non-fermentable. The hydrolyzable sugar content of the white is greater than that of the yolk. The free amino acid and non-protein N content of the yolk is very much

higher than that of the white. Incubated, sterile, non-fertile eggs do not undergo any appreciable changes in free sugar, hydrolyzable sugar or non-protein N constituents, over an incubation period of 20 days. C. V. B.

Glycogen of the edible mussel, *Mytilus edulis*, L. MARGARET McDOWELL. *Proc. Soc. Exptl. Biol. Med.* **25**, 85-6(1927).—Glycogen from the edible mussel, prep'd and purified by a method described, contained about 0.035% of P_2O_5 , as compared with 0.721% of P_2O_5 found in dog-liver glycogen by previous workers. Whether the difference is due to variations in methods used or to innate differences in the glycogen is not known. C. V. B.

Are the protozoan faunae of termites specific? S. F. LIGHT AND M. F. SANFORD. *Proc. Soc. Exptl. Biol. Med.* **25**, 95-6(1927).—A colony of *Porotermes froggatti* in normal condition, but which an examn. of nearly 100 intestines showed to have lost its protozoan fauna, was studied, in an attempt to refaunate these individuals with the protozoa from species belonging to other genera of termites. All attempts to accomplish this by keeping the individuals of the various species in close assocn., by feeding defaunated *Porotermes* individuals with intestinal contents of the other species of termites, and by applying to the anal aperture a drop of the intestinal contents of the infective species, were failures. Persistence of infection for several hrs. and even days was observed in several cases when injection by pipet through the anal aperture was tried, and in 1 case apparently successful transfaunation lasting for at least 12 days was noted. C. V. B.

Action of picric acid on living protoplasm. H. POLLACK. *Proc. Soc. Exptl. Biol. Med.* **25**, 145(1927).—These expts. indicate that picric acid solns which coagulate proteins in the test tube have no such action on the interior of the living ameba. However, if there is a local injury, the picric acid will act on the injured cytoplasm, resulting in coagulation. While picric acid is non-toxic to the internal healthy cytoplasm it is extremely toxic when applied to the surface of the ameba. C. V. B.

Determination of the p_H of developing *Fundulus* eggs. P. B. ARMSTRONG. *Proc. Soc. Exptl. Biol. Med.* **25**, 146-7(1927).—By injection of indicator dyes into developing *Fundulus* eggs, the p_H values of the contents were det'd. The color of the subchorionic space indicated a p_H identical with that of sea water, if the eggs were immersed in sea water; if in dist'd. water, the p_H of the subchorionic space was found to be that of the surrounding medium. The p_H of the pericardial cavity was also found to approach that of sea water, but its p_H did not change when eggs were immersed in dist'd. water as in the former space, nor did the dye diffuse out of the embryo. The brain vesicles had the same p_H as that of the pericardial cavity. The yolk was distinctly acid to cresol red and phenol red. Since the subchorionic space changes so readily in p_H with changes in p_H of the environment but without change within the embryo, it is suggested that it is not at the membrane but at the cellular wall of the embryo that the acid-salt antagonism takes place. C. V. B.

Expulsion of injected solute by contractile vacuole of ameba. R. B. HOWLAND AND H. POLLACK. *Proc. Soc. Exptl. Biol. Med.* **25**, 221-2(1927); cf. C. A. **22**, 1192.—If aq. or alc. solns. of picric acid are injected into an ameba, some of the solute diffuses through the endoplasm into the vacuole. When large amts. of the solute are taken up, as observed by the intense yellow color, the vacuoles become very flaccid and are easily changed in shape by stress caused by endoplasmic currents. Systole of these flaccid vacuoles is delayed, and a new vacuolation center appears and functions. The original vacuole gradually becomes more turgid and spherical, and finally contracts. The yellow fluid is finally ejected until both endoplasm and vacuole have lost the yellow color. C. V. B.

Nature of pigment in intestine of the marine worm *Chaetopterus*. W. C. ALVAREZ, C. SHEARD AND G. M. HIGGINS. *Proc. Soc. Exptl. Biol. Med.* **25**, 302-3(1928).—The absorption bands produced by chlorophyll solns. and by solns. of the green pigment from the intestinal tract of the worm *Chaetopterus* were so similar as to warrant the statement that they were produced by the same pigment or related pigments, i. e., by chlorophyll a or b, or both. Histological studies of the intestine suggested that the green structures observed are primitive plants living in symbiotic relationship with the worm. C. V. B.

Aerobic and anaerobic metabolism of the common cockroach (*Periplaneta orientalis*). III. J. G. DAVIS AND W. K. SLATER. *Biochem. J.* **22**, 331-7(1928); cf. C. A. **21**, 2337.—Lactic acid accumulates during anaerobiosis and returns to the resting value slowly during the recovery process. If it is assumed that all the lactic acid is burned without recovery, then the excess lactic acid agrees with that calcd. from the oxygen debt. BENJAMIN HARROW

Anaerobic metabolism of the earthworm (*Lumbricus terrestris*). J. G. DAVIS

AND W. K. SLATER. *Biochem. J.* **22**, 338-43(1928).—For methods (cf. Slater, C. A. **21**, 2337). The oxidation process is deferred during anaerobiosis until O is readmitted, when the products of metabolism are removed by an excess of O equal to that, which would have been used had the normal metabolism continued undisturbed. These results are compatible with the breakdown of glycogen to lactic acid followed by the oxidative removal of the latter.

BENJAMIN HARROW

Guanidine determinations on some invertebrates by a colorimetric phosphotungstic acid method. M. M. ELLIS. *Biochem. J.* **22**, 353-61(1928).—Guanidine was detd. by the nitroprusside reaction and Marston's reagent (C. A. **19**, 664), as modified by Weber (*Proc. Soc. Exptl. Biol. Med.* **24**, 712(1927)). Guanidines, or substances giving the scpn., pptn. and nitroprusside reactions of guanidines, were found in the dog whelk, *Purpura lapillus*; the pelagic copepod, *Ealanus helgolandicus*; the marine isopod, *Ligia oceanica*; and the shore crab, *Carcinus maenas*.

BENJAMIN HARROW

Chemical changes in muscle. II. Invertebrate muscle. III. Vertebrate cardiac muscle. ERIC BOYLAND. *Biochem. J.* **22**, 362-80(1928); cf. C. A. **22**, 2182.—Crustacean muscle converts glycogen into lactic acid in activity, but the glycogen content of the muscle and the lactic acid formed in fatigue, in rigor or in buffer solns. are all less than are usually found in amphibian or mammalian muscle. While all the molluscan muscles examd. produce lactic acid, they show differences in behavior. The muscles of *Lumbricus* and *Holothuria* are like those of the frog in respect of the change of glycogen to lactic acid. The extra lactic acid production of mammalian cardiac muscle is not accompanied by a decrease in lower carbohydrates.

BENJAMIN HARROW

The absorption of glucose by *Ostrea edulis*. C. M. YONGE. *J. Marine Biol. Assoc.* **15**, 643-53(1928).—Normal healthy oysters with openings drilled in both inhalant and exhalant chambers remove considerable quantities of glucose from the soln. When such openings are plugged, very little or practically no glucose is removed in 36 hrs. However, at the end of 8 days such "bleeding oysters" did remove some glucose. During the exptl. period there was no evidence of bacterial decompn. of glucose. The results of this and previous investigations demonstrated that the ciliated epithelia of Lamellibranchs cannot absorb. Absorption takes place in the tubules of the digestive diverticula within the alimentary canal and in the mantle cavity, only through the agency of phagocytes, which are extruded in great numbers when Lamellibranchs "bleed" as a result of bad conditions. These conclusions are contrary to those of Ranson and Marenzin that other sol. matter is absorbed directly by the ciliated epithelia in the mantle cavity.

N. KOPELOFF

Changes in oxygen consumption during metamorphosis induced by thyroid administration in the axolotl. J. BĚLEHRÁDEK AND J. S. HUXLEY. *J. Physiol.* **64**, 267-78(1927).—The metabolic rate (O_2 consumption) in larval *Amblystoma tigrinum*, kept under slight standard anmytal anesthesia, was not affected immediately after injection of thyroid, but was increased after a refractory period of about 8 to 14 days at 23°. The increase in metabolism occurred at about the metamorphic crisis (shedding of larval skin), but a no. of morphogenetic changes and considerable wt. loss occurred before it took place.

J. F. LYMAN

Studies on the physiology of the kidneys of certain fishes. LUIGI CONDORELLI AND EDWARDS. *Boll. soc. ital. prol. sper.* **3**, 126-34(1928).—The blood and urine of two groups of fishes were analyzed for various constituents. The fishes studied were *Siganatus*, *Lophius piscatorius*, *Hippocampus* and *Muraena*. The data cover cryoscopic delta, Na, K, Ca, Mg, Cl, P and protein N. Another table includes d., urea, NH_3 , creatine, creatinine, uric acid N, creatinine N and amino acids. The Mg and P contents of the blood were much higher than in mammals; amino acids and NH_3 N were also high. The urine had a high Mg content.

PETER MASUCCI

Investigations on Cetacea. XXIV. The composition of the urine. T. ICHIMI, S. MORIMURA, Y. MASUMIZU AND T. YAZAWA. *Jap. J. Med. Sci. Sect II* **1**, 119-24 (1927); cf. C. A. **20**, 1672.—Urine samples from *Bal. borealis* and *Bal. physalus* were analyzed; the compn. seems to be rather const. It resembles the urine of carnivores. 100 cc. contained an av. of 1.75 g. total N. Of this total N, urea formed about 90%, creatinine 1 to 1.5%, amino acids 0.4 to 2.0%, NH_3 3 to 4.5%, allantoin 2.2-3.3%, hippuric acid 0.2 to 0.35%, creatine 0.05 to 0.3%, uric acid 0.03 to 0.7%. The ratio between total N and H_2SO_4 was 4 or 5:1. Of the S 25 to 30% was present as neutral S. No rare N-contg. substances could be found. No albumin was present, when analysis was done shortly after the death of the animal. XXV. The oxalic acid content of the urine of *Balaenoptera borealis*. YOSHIO OKAHARA. *Ibid* **125-6**.—About 20-40 mg. oxalic acid was found in 3 analyzed urine samples of *Balaenoptera borealis*. XXVI. Further researches on the conditions of relation between

the different species of the whale. KYO HAYASI. *Ibid* 127-9.—H examd. blood samples of *Balaenoptera physalus*, *B. borealis*, *Physeter macrocephalus*, *Delphinus delphis*, *B. musculus* and *Orcinus orca* serologically and came to the conclusion that all examd. species are related by blood. Ascoli's modification of the precipitin reaction was used for the tests. XXVII. The milk of different species of the whale. KIVOO TAKEMURA. *Ibid* 131-4. Milk of *Bal. physalus*, *Bal. borealis* and *Physeter macrocephalus* was analyz'd. It is white and of sirupy consistency. p_H (of *Bal. physalus* milk) 6.65, total N 1.420-1.887, non protein N 0.152-0.180, albumin 3.73-4.51%. The total solids were 28.59-44.63%. The fat content ranged between 23.76 and 37.38. The fat of the sperm-whale milk had acid no. 9.8, sapon. value 182.7, Hehner's no. 93.0, I value 115.0, Reichert-Meissl no. 1.0, acetyl value 35.6, ester no. 172.8, glycerol 7.5. The lactose content of the sperm-whale milk was 0.120-0.133%. XXVIII. Total base content of the urine. YUTAKA FURUHASHI. *Ibid* 135-6.—The base content of the urine of *Bal. borealis*, *Bal. physalus* and *Physeter macrocephalus* was detd. according to Fiske's method. It ranges between 0.403 and 0.443 N. Besides this, Cl, S as H_2SO_4 and total P were detd. One hundred cc contained 0.99-1.28% Cl and 0.014-0.019% inorg. S. The total P content was 0.049-0.078%, 80-90% of which was present as phosphate. XXIX. Alkalies and alkaline earths in different horny tissues. A contribution to the question of keratinization. HIROKICHI HAYASHI. *Ibid* 137-49.—In 4 specimens of *Balaenoptera borealis*, scalp, tail skin, mucous membrane of the first stomach and whalebone were analyzed for water content, fat, total N, ash, alkalies and alk. earths. In the epidermis and the mucous membrane of the first stomach, K was the chief ingredient among the bases. In whalebone very little K was found. H. believes these conditions due to the fact that the epithelium cells of the epidermis and the mucous membrane of the first stomach are in a much more active state than in the whalebone, and normally functioning cells require a considerable amt. of K. The large Ca content in the fishbone is supposed to be responsible for the dry and hard state of this tissue, as it causes the collods to gelatinize and to become firm. The Mg content is nearly the same in all tissues examd. The values for Na are rather irregular. The ratio alkalies:alk. earths in the fishbone was 0.8-1.1 (in equivs.), the ratio Na:K = 10.1 and Ca:Mg about 1.1. In the rest of the tissues examd. the ratio alkalies:alk. earths ranged between 2.1 and 7.5, while Na:K was about 1 and Ca:Mg about 1. XXX. A preliminary examination of the liver function. YUTAKA FURUHASHI and TEIJIRO YAZAMA. *Ibid* 151-2.—Report on analysis of 2 liver samples for non-protein N, glycogen and free sugar before and after autolysis. The liver was examd. 10 hrs. after the death of the animal. XXXI. Further studies on the synovial fluid. KIVOO TAKEMURA. *Ibid* 153-7.—The synovial fluid of the whale is very viscous and contains a peculiar viscous albuminous compd., $\Delta = 0.6712$. It has small reducing power corresponding to 0.008-0.0013% sugar. Analysis of the synovial fluid of a specimen of *Balaenoptera borealis* for some inorg. substances gave the following results: 201.2 mg. Na, 3.8 mg. K, 62.5 mg. Ca; trace of Mg and 371.3 mg. Cl per 100 g. fluid. H_2SO_4 could not be detected. Total N in synovial fluid from the articulation of the skull and the shoulder joint ranged between 0.27 and 0.3%. The non-protein N (proteins removed by CCl_3CO_2H) was 0.089-0.104%. Albumin N, 0.19%. The albuminous compd. characteristic of the synovial fluid is pptd. by dil. AcOH at room temp. It is easily dissolved in HCl; less easily in an excess of AcOH. The filtrate from the AcOH ppt. gave no further pptn. with NaCl in the heat or with CCl_3CO_2H . The synovial fluid, therefore, seems to contain only one albuminous substance; at least it does not contain any globulin or albumin. XXXII. Organic acids in the urine. TEIJIRO YAZAWA and TAKEO SASAKI. *Ibid* 159-62.—Large quantities of org. acids are excreted in the urine of the whale; in 3 out of 5 samples analyzed, quantities equiv. to 2400-2750 cc of 0.1 N acid were found. The detns. were made by the method of Van Slyke and Palmer. Y. and S. conclude that fats, carbohydrates and the N-free part of the protein mol. undergo a different decomposition than in the other mammals, while the N-contg. part of the protein is decompd. in the same manner. XXXIII. Glycogen content of the liver of Cetacea. YOSHITUMI MASUMIZU. *Ibid* 163-4.—Technical difficulties prevented the immediate detn. of the liver glycogen; 5 to 20 hrs. after the death of the animal values ranging between 0 and 10.0% were found. The glycogen was estd. nephelometrically; no details of the method are given. XXXV. Time of appearance of sexual maturity in the Sei whale and on the follicular fluid content of the ovary of *Balaenoptera borealis*. KYO HAYASI. *Ibid* 221-34.—The follicular fluid is colorless, scarcely viscous. Sp. gr. is 1.0395 to 1.04080 at 20°. p_H is 6.2 to 6.4. On standing a small ppt. separates, giving the reactions for albumin. Probably it is fibrinogen. Water is content 91.4-92.1%, total N 1.1%, N in CCl_3CO_2H ppt. 1%. By heat coagulation 6.2% albumin was

found. The diff. proteins were fractionated by Howe's method, with Na_2SO_4 as the pptg. agent. The ratio between albumin and globulin is about 3:1. The non-protein N was detd. by using HPO_3 or $\text{CCl}_3\text{CO}_2\text{H}$. The values ranged between 175 and 499 mg. % with the former substance, while with the latter reagent values from 87 to 232 mg. % were found. Amino acid N is 58 to 66 mg. %. Ether-sol. material was 8.3 to 9.3 mg. %. The follicular fluid contained 475-754 mg. % Na, 148-282 mg. % K; 32-51 mg. % Ca; 31-52 mg. % Mg; 152-69 mg. % Cl; 21-7 mg. % inorg. S; 13-7 mg. % inorg. P. XXXVI. Bile. MAKI TAKATA. *Ibid* 235-9.—The bile from *Bal. borealis* is watery, of brownish green color, reacts slightly alk. toward litmus and has a faint fishy odor. $\Delta = 1.683^\circ$. Sp. gr. is 1.027 at 19° . Dried residue is 3.9%. One hundred g. bile contained 0.06 g. urea, 0.003 g. creatinine, 0.002 g. creatine, 0.0015 g. S as ethyl-sulfuric acid, 0.0023 g. free and 0.025 g. bound cholesterol. The fats and phosphatides amounted to 0.5 g. Hammersten's method was used for cstg. the relative quantities of cholates. One hundred cc. bile was evapd., the residue dissolved in abs. alc. and pptd. with ether. An analysis of the ether-insol. material showed a S content of 0.13% bound as ethylsulfuric acid and 2.46% S apparently present solely as taurocholic acid. The 2.46% S would represent 41.7% taurocholic acid. The ratio between taurocholic acid and glycocholic acid is about 6:4. No scymnolsulfuric acid could be detected in the bile. XXXVII. The behavior of alcoholic heart extract against syphilis. MITSUKIYO MATSUURA. *Ibid* 241-4.—Alc. exts. of the muscle of the ventricle from *Bal. borealis* and *Berardius bairdii* St. gave a strongly positive ppt. when reacting on syphilitic serum, while the tests made with exts. from the sperm whale were only slightly positive or negative. The third modification of the Meinicke reaction was employed for the test. M. concludes that the lipoids of the heart muscle of the sperm whale are of different structure than those of *Bal. borealis* and the *Berardius*. XXXVIII. Calcium, magnesium and phosphorus content in different organs. HIYOE KUSAKARI AND HIKOYA TSUTSUI. *Ibid* 245-6.—Different organs of *Bal. physalus*, as pancreas, spleen, liver, kidneys, testicles, ovary, brain and mammary gland, were analyzed for Ca, Mg and P. XXXIX. A red dye from ambra, the ambra-porphyrin. A contribution to the spectroscopic investigation of porphyrins. YOSHIO OKAHARA. *Ibid* 247-66.—The red dye isolated by Suzuki (C. A. 20, 1671) from the ether-insol. part of ambra by means of dil. HCl, giving the spectrum of the porphyrins in amyl alc. soln., was purified by different org. and inorg. solvents, until a homogeneous substance was obtained, as seen by the constancy of the spectrum, when the process of purification was repeated. In ether soln., the dye resembled the coproporphyrin of H. Fischer; in alk. soln., however, it deviated from the latter considerably. A cryst. ethyl ester of the substance was prepd. G. SCHWOCH

12—FOODS

F. C. BLANCK AND H. A. LEPPER

The chemical composition of rice chaff. L. BORASIO. *Giorn. risicoltura* 81, 48-50(1928).—The by-product of the first milling operation on rough rice is composed of the paleacae enclosing the grains. This is 18-20% of the original wt. Analyses of 5 samples (from 4 varieties of rice) gave 9.80-11.00% H_2O , 15.68-18.24 ash, 14.50-17.50 HCl-insol. ash, 2.94-3.62 crude protein, 0.88-1.20 Et_2O ext., 41.10-42.90 crude cellulose and 24.70-27.90 non-nitrogenous ext. The ash of the chaff from *Originario* analyzed 94.50% SiO_2 , 0.25 CaO, 0.23 MgO, 1.10 K_2O , 0.78 Na_2O , 0.53 P_2O_5 , 1.13 SO_3 and traces of Cl, Fe and Mn. Rice chaff cannot be used for feeding, has little value as fertilizer or bedding for animals and is useless for making paper. It is used to some extent as fuel. The best possible utilization is for the production of gas, charcoal, tar and AcOH by dry distn. ALBERT R. MERZ

The silica content of Italian rice meals. L. BORASIO. *Giorn. risicoltura* 18, 8-10 (1928).—Av. analyses are given of "pula" from the first and second pearling machines and of "farinaccio" from the third and fourth (3 samples of each). These are compared with those of Indochinese, American and Japanese meals. Italian com. "pula," contg. 18-24% protein and fats, is always adulterated. The SiO_2 in unadulterated Italian "pula" is 1.00-1.40% and in "farinaccio" 0.30-0.40%. Com. Italian meals ("pula") contain 5.80-9.20% SiO_2 . ALBERT R. MERZ

A method for testing moisture in dried prunes. E. H. WIEGAND AND D. F. BULLIS. Oregon Agr. College Expt. Sta., *Circular* 82, 1-8(1927).—The usual methods for detn. of H_2O in fruit are inadequate for dried prunes. The app. for the proposed method

consists of a distn. flask, connected to a graduated tube serving as the receiver of a reflux condenser, 200 cc toluene and 20 g. hashed prune flesh are introduced into the flask and boiled vigorously for 30 mins. The % H_2O is read off directly from the graduations. Accuracy to within 0.25% is readily obtained. Most samples collected during 2 yrs. contained 15-25% H_2O . Of those samples given storage tests at 86 F. and relative humidities below 75%, all contg. less than 20% H_2O remained in good condition, while most samples contg. more than 20% H_2O molded.

Perfumes used in the food industry. F. SCHMITT. *Rev. prod. chim.* **30**, 161-6, 203-7, 321-6(1927).—A review. A. L. MEHRING

United States grades, color standards and packing requirements for honey. E. L. SECURIST, J. I. HAMBLETON AND H. W. SAMSON. U. S. Dept. Agr., *Circ.* **24**, 1-32(1927).—A full description of the new honey grades. C. R. FELLERS

Report on (the detection of artificial invert sugar prepared by enzyme conversion in) honey. H. A. SCHUETTE. *J. Assoc. Official Agr. Chem.* **11**, 164-6(1928).—Preliminary study of the Anerbach and Bodlander method (C. A. **18**, 2565), based on the resp. glucose: fructose ratios in honey and artificial invert sugar showed that the time of 1 reaction of glucose (3-4 hrs. required to reach equil.) should be clearly specified, and 2 hrs. is suggested. Analysis of a small no. of American honeys indicated that the 1:1.06 glucose: fructose ratio given by Anerbach and Bodlander as a min. for genuine honey is also applicable to American products. Addn. of as little as 2% com invert sugar was clearly shown. A. PAPINEAU-COUTURE

Determination of citric acid in fruits and fruit products. B. G. HARTMANN AND F. HILLIG. *J. Assoc. Official Agr. Chem.* **11**, 257-6(1928); cf. C. A. **21**, 2451.—A technique is worked out and described in detail for the application of the previously described method to fruit products, without removal of sugars. The main points are: use of a definite quantity of solids in the portion taken for conversion of citric acid into pentabromoacetone so as to make the vol. of $KMnO_4$ used const. (12.5 g. is the limit for max. recovery of pentabromoacetone); presence of at least 80 mg. citric acid (smaller quantities give unduly low results) and preferably not much over 100 mg.; deficiency of citric acid in the sample being made up by adding known amts and correcting; the above conditions allow of specifying definite and const. amts. of the several reagents; instead of correcting for the soly. of the pentabromoacetone by adding 1.7 mg. citric for every 100 cc. of reaction mixt., the citric acid corresponding to the pentabromoacetone weighed is multiplied by the const. factor 1.14. Results obtained by this method on a variety of fruits and fruit products are tabulated, and showed good agreement between the known and found citric acid in samples of known compn. Concord grape juice contained a small quantity of citric acid, confirming Nelson (C. A. **19**, 1586). A. P.-C.

Fruit jellies. III. Jelly measurements. L. W. TARR. Univ. of Delaware Agr. Expt. Sta., *Bull.* **142**, 1-33(1926); cf. C. A. **17**, 1849; **19**, 1740; **21**, 3688, 3988.—A jelly-strength tester is described. The total acid required to produce a jelly as well as the optimum jelly varied with the acid, being greatest with citric, intermediate with tartaric and least with H_2SO_4 . The strength of the optimum jelly varied with the acid in the reverse order. Increasing the concn. of acid increased the strength up to a certain optimum after which the strength decreased. The relation of H_2SO_4 , tartaric and citric acids in jelly formation was 1:2:3 which indicated a combining relation. Jelly was produced at the same pH with each acid. The H-ion concn. at which the optimum jelly formed varied according to the acid employed, which indicated a salt effect. The strength of the jelly was decreased by added sugar and increased by pectin within certain limits. Boiling the pectin with acid before adding the sugar reduced its strength. The length of boiling did not appreciably affect the strength, but it was decreased by increasing the temp. The skin effect was small in fruit jellies, probably because of the small amt. of free H_2O . A. L. MEHRING

The banana. P. DE SORNAY. *Rev. agr. Maurice* **5**, 1-4(1928); cf. C. A. **17**, 2460.—Attention is again called to the economic value of the banana. A method of sun drying is described, also another procedure with the use of an artificial drier, which is illustrated. In the prepn. of banana flour it is necessary to use fruit of the proper degree of maturity. Very green bananas give bitter flour, and those that are too ripe yield a dark colored, acid product. It is advisable to add vanilla or a similar material to improve the flavor. F. W. ZERBAN

The pineapple industry. C. A. O'CONNOR. *Rev. agr. Maurice* **5**, 4-9(1928).—A report on the culture and com. preserving of the pineapple in South Africa. F. W. Z.

Some technical phases of the ice cream improvement program. H. C. SMITH, R. W. NEWMAN AND K. W. NIELSEN. Calif. Dept. Agr., *Mo. Bull.* **17**, 239-46(1928).—California ice cream must contain not less than 1.6 lb. of food solids per gallon, not less

than 10% milk fat nor over 100,000 bacteria per g. A shipping case for ice cream samples is figured. Chem. and bacteriol. methods of lab. examn. are given. C. R. F.

Estimation of buttermilk or milk product in a mixed feed by* determination of the lactose present. M. R. COE. *J. Assoc. Official Agr. Chem.* 11, 251-7(1928).—A modification of the picric acid method for the colorimetric detn. of lactose (described in detail) was used in the analysis of a large no. of samples of dried buttermilk, which, when manufd. in warm weather (June), had high ash (10.13-14.26%) and lactic acid (3.72-8.93%) contents and low lactose (7.10-23.73%), and when manufd. in cold weather (Feb. and March) had low ash (7.79-11.76%) and lactic acid (0.77-6.00%) and high lactose (22.55-42.17%). Comparison of the picric acid and Cu reduction methods on buttermilk contg. about 30% lactose gave practically identical results (av. of 7 samples, 29.48, 29.65%, resp.). A method (described in detail) is proposed for detn. of lactose in feeds, consisting essentially in fermenting the other sugars by yeast and then detg. lactose either colorimetrically by picric acid or by Cu reduction. Apparently the only feedstuffs contg. interfering substances that render the method inapplicable are cottonseed meal and soy-bean meal, which are not generally present in buttermilk feeds. When the lactose content of the buttermilk used in the feed is known, the buttermilk content can be calcd. with reasonable accuracy, and as little as 0.5% can be detected. When the lactose content of the buttermilk is not known, the max., approx. or min. buttermilk content can be calcd. from the min. (8%), av. (26%) or max. (40%) lactose content of buttermilk powder. The usefulness of the picric acid method lies in its accuracy in detg. small quantities of lactose. A. P.-C.

Critical factors in the determination of solids in milk. G. KOESTLER AND W. LORTSCHER. *Landwirtschaftliche Jahrb. der Schweiz* 41, 822-60(1927).—K. and L. point out the variations due to the form in which the ingredients occur, such as the hydration of the sugar and the influence of the proteins on the hydrates. A valuable formula is given for detg. sp. gr. of solids-not-fat. GEORGE R. GREENBANK

A comparison of the methylene blue reduction test and the agar plate count for determining quality of milk. H. B. ELLENBERGER, M. C. BOND, A. H. ROBERTSON AND RUTH I. MOODY. Vermont Sta., *Bull.* 264, 32 pp (1927).—The methylene blue reduction test shows much less ($\frac{1}{10}$ as much) variability between check or duplicate tests than does the agar plate method. The methylene blue reduction time correlates much more closely with the keeping time of the milk than does the agar plate count. The methylene blue reduction test is a more reliable index of milk quality than is the agar plate count. E. F. SNYDER

Determination of starch in bread, particularly in so-called "gluten bread." P. MEURY AND G. BOVELDIEU. *Ann. fals.* 21, 124-30(1928); *J. pharm. chim.* [8], 7, 207(1928).—From a discussion of the relative merits of Pb subacetate and HgSO₄ as defecating agents, it is concluded that the latter gives more accurate results in bread analysis. From the results of a study of the technic of the detn., the following procedure is recommended: to 3 g. of finely ground, previously dried (to const. wt. at 100-5°) bread in a 100-cc. volumetric flask add 95 cc. of 2% (by wt.) of 66° Bé. H₂SO₄, hydrolyze 20-5 min. in the autoclave at 120°, cool, make to 100 cc. with 2% H₂SO₄, filter, to 25 cc. of filtrate add 10 cc. HgSO₄ (yellow HgO 200 g., 66° Bé. H₂SO₄ 175 cc., H₂O to 11.), nearly neutralize with 36° Bé. NaOH (about 6 cc.), cool, make to 50 cc., filter into a flask contg. 3-4 g. Zn powder, let stand 30 min. with occasional shaking, filter, det. dextrose in the filtrate either polarimetrically or (preferably) by reduction *via* Lehmann modified by F. and Boutot (*C. A.* 16, 4222). A. P.-C.

The analytical detection of the bleaching of wheat flour. HOLGER JØRGENSEN. *Separate* (Copenhagen) 1928, pp. 47-70.—This is an English summary of the Danish article on pages 1-47. Since bleaching of flour is prohibited in Denmark, a method of detecting it is important. The Pekar "water test" for color is not suitable, since it is a measure of the bran particles, while the carotin in the fat is the constituent affected by bleaching. An adaptation of the gasoline color value, developed by Winton, has proved satisfactory. If the color of a $\frac{1}{200}$ % soln. of K₂CrO₄ is given a value of 100, unbleached flour that has not been stored has a value above 95. Some weakly bleached flours may be missed by this method. Bleaching by HNO₃ is detected by the Griess-Ilosvay's color test with sulfanilic acid and α -naphthylamine. Unbleached flours may show 10⁻⁴ g. nitrite nitrogen per kg. flour. In flour bleached with Cl the Cl content of the fat detd. with NH₄CNS is more than 15 mg. per kg. Exposure of unbleached flour to salt spray does not affect this. Flour bleached with NCl₃ may give the same test. Benzoyl peroxide can be detected when first added, but soon changes to benzoic acid. Four tables and specific directions for making the tests are given. AMY LÉVESCONTÉ

Preparation of butter samples for analysis. J. A. NEWLANDER AND H. B. ELLEN-

BERGER. Vermont Sta., *Bull.* **263**, 31 pp. (1927).—The official method of prepg. butter samples for analysis gives satisfactory and accurate results if either procedure A, B or C as outlined, is used. The opening of the softened sample at a temp. of 31–34°, and the mixing of same with a malted milk mixer, results in an appreciable loss of moisture. The factory or open-cup method allows considerable moisture to escape from the sample. If butter samples are carefully prepd. and accurately tested, about 90% of the duplicate detns. of moisture should check within 0.05%. There should be few variations greater than 0.10%. Two standard methods are suggested for the prepn. of butter samples for analysis. **E. F. SNYDER**

The effect of various rations on the storage quality of eggs. **R. M. SHERWOOD.** Texas Agr. Exp. Sta., *Bull.* **376**, 12 pp (1928).—Eggs laid by hens receiving a mash contg. 20 to 30% of 43% protein cottonseed meal began to deteriorate in color at the end of 4 weeks in cold storage while 9% of 43% protein cottonseed meal produced eggs which kept a good color as long as 28 weeks in cold storage. Hens fed an all mash ration contg. approx 9 or 12% of 43% protein cottonseed meal laid eggs that deteriorated in color after being held in cold storage 4 weeks. Fresh succulent green feed improves the storage quality of eggs. **J. J. SKINNER**

Studies on the Coccaceae. VIII. A study of the cocci resisting pasteurization temperatures. **G. J. HUCKER.** N. Y. Agr. Expt. Sta., *Tech. Bull.* **134**, 1–30 (1928).—*Streptococcus thermophilus* Orla-Jensen was the predominating coccus in pasteurized milk. *S. lactis* was never found in freshly pasteurized milk. **C. R. FELLERS**

Soy-bean meal and ground soy beans as protein supplements for dairy cattle. **A. J. TOMHAVE.** Delaware Agr. Expt. Sta., *Bull.* **148**, 9 pp (1927).—Soy-bean meal when fed with a basal ration of 200 lbs. hominy, 200 lbs. bran and 5 lbs. of salt, in such proportion as to give a mixt. with a nutritive ratio of 1:3.52, was about 3% less efficient than peanut meal and gave as good physiol. results. When substituted lb. for lb., ground soy beans were about 2% less efficient than peanut meal for milk production. Soy beans are a valuable source of protein for the dairy ration. Comparing the results obtained in this expt. in feeding soy-bean meal and ground soy bean as protein supplements in the dairy ration, a lb. of digestible protein in ground soy beans is slightly more efficient for milk productions than a lb. of digestible protein in soy-bean meal. Because of the high protein content of soy-bean meal, it has a higher value per ton than ground soy beans. **J. J. SKINNER**

Bacteriology and chemistry of oysters, with special reference to regulatory control of production, handling and shipment. **A. C. HUNTER AND C. W. HARRISON.** U. S. Dept. Agr., *Tech. Bull.* **64**, 1–75 (1928).—Analyses are given of the solids, ash and NaCl content of the meats, liquor and entire sample of normal oysters from various producing localities in the U. S. The solid content of northern oysters is higher than that of southern oysters. The moisture content of unwashed oyster meats varies from 73 to 85%. Tests for heavy metals in samples of oysters from different Atlantic Coast states showed traces of Pb and appreciable quantities of As, Cu and Zn. Adulteration of oysters with excessive quantities of water may be detected by phys. examn., by a detn. of free liquor, and by the NaCl content of meats and liquor. The results indicate that oysters showing free liquor in excess of 10% by vol. are adulterated by water. Multiplication of *B. coli*, or other lactose-fermenting bacteria, does not occur when shucked oysters are stored below 50° F. Pasteurization of shucked oysters is impractical if the product is to be marketed raw, and ordinary cooking processes cannot be relied upon to sterilize oysters that may contain pathogenic bacteria. A study of the change in compn. of the meats and liquor of shucked oysters when subjected to different washing processes showed that the most efficient and safest method of washing is by use of a blower with salt water. A bibliography of 106 references is appended. **W. H. ROSS**

Some fundamental principles in food packing. **GLASS CONTAINER ASSOCIATION RESEARCH LABORATORY STAFF.** **S. HENRY AYERS, et al.** *Glass Container* **7**, No. 7, 16–34 (1928).—A popular discussion including chem., bacteriol. and engineering phases of the food-preservation industry. **C. R. FELLERS**

Chemical engineering in the meat packing industry. **C. ROBERT MOULTON.** *Chem. Met. Eng.* **35**, 296–8 (1928). **E. H.**

Report on (the detection of) stock feed adulteration. **H. E. GENSLER.** *J. Assoc. Official Agr. Chem.* **11**, 155–6 (1928).—The following method is suggested for the microscopical detection of dried buttermilk in stock feeds: on a clean glass slide mount in H₂O about 5 mg. of the portion of the feed passing through a 40-mesh sieve, dry in a warm place, immerse 1 min. in gasoline or xylene, dry, immerse at least 1 min. in 90% alc. and then in fresh aq. methylene blue soln. for 5–60 sec., rinse in H₂O, decolorize in alc. for several sec. (watching so that decolorization does not proceed too far), dry, exam.

under the microscope, using a 1.9 mm. oil-immersion objective without a cover-glass. If areas contg. many blue-stained bacilli are found, dried buttermilk is present. Collaborative results on samples of known compn. showed the method to be practical and reliable.

A. PAPINEAU-COUTURE

Report on (the determination of) moisture in feeding stuffs. G. E. GRATTAN. *J. Assoc. Official Agr. Chem.* 11, 160-2(1928).—The method outlined by Coleman (*C. A.* 21, 3092), consisting essentially in placing a 2-g. sample in a flat metal dish with tightly fitting cover, heating 1 hr. at 130°, covering and weighing when cold, gives results comparable with the vacuum-drying method for flour; but for feeds (bran, shorts, middlings and feed flour) 2-3 hrs. at 135° are required.

A. PAPINEAU-COUTURE

Report on (the determination of lime and iodine in) mineral mixed feeds. H. A. HALVORSON. *J. Assoc. Official Agr. Chem.* 11, 157-60(1928); cf. *C. A.* 21, 2341.—Collaborative results on the previously suggested method for CaO gave fairly satisfactory results, which would probably be improved by greater familiarity of the collaborators with the method. Collaborative results on the previously proposed method for I gave low results, but is considered worthy of further study. Substitution of FeCl₃ for H₂O₂ and CCl₄ for CS₂ was found unsatisfactory.

A. PAPINEAU-COUTURE

Fish meal as a food for animals and poultry, and improved continuous process. R. A. BELLWOOD. *Chemistry and Industry* 47, 433-5(1928).—A discussion of expts. carried out as to the value of fish meal as a feeding stuff, and of the results published. For many years there was a great controversy as to whether fish meal did or did not taint the meat obtained from animals. Had the fish meals been as pure as they are to-day these controversies would probably never have arisen. White fish meal is made from non-oily fish, and is in the greatest demand. For herring meal it is necessary that the oil be extd. A description in detail is given of the manuf. of fish meal in a modern plant using the latest process.

J. C. JURRJENS

The decomposition of *p*-phenetylcarbamide (dulcin) on heating in aqueous solution (TAUFEL) 2. Incinerating oven (for flour) (FORNET) 1. Mixing mill for foods (Brit. pat. 276,196) 1.

BARTHEL, CHRISTIAN: **Die Methoden zur Untersuchung von Milch und Molkereiprodukten.** 4th ed., revised and enlarged. Berlin: P. Parey. 292 pp. Cloth bound, M. 18.

Preserving foods during storage and transport. D. ROBERTSON. Brit. 276,646, Aug. 24, 1926. Foods such as milk, butter, cheese, fish and meat are enclosed in containers from which the air is exhausted. Structural features of the containers are described.

Preserving egg contents. W. MATZKA. Brit. 276,132, Aug. 6, 1926. The material is heated to 30-55° and brought into contact with Au or other noble metal and with Al. NaCl may be added.

Lining tin-plate containers for foods. J. M. C. FOX and R. J. MUNROE. Brit. 276,180, Oct. 12, 1926. Lacquers contg. cellulose esters or ethers are used to prevent discoloration. Formulas and examples are given.

Apparatus for expressing juices from fruits or vegetables. V. LORCZAK. U. S. 1,670,894, May 22.

Filter for fruit juices, etc. A. J. RECHLIN. U. S. 1,670,482, May 22.

System for treating grain alternately hot and cold to condition it and regulate its moisture content. J. A. HALL and W. F. C. GEORGE. Brit. 277,142, July 5, 1926.

Endosperm from cereals. L. BARTMANN. U. S. 1,670,015, May 15. Cereals such as barley, wheat, rye or oats are steeped at a temp. not exceeding 40° until the envelope surrounding the endosperm has become elastic and leatherlike and the endosperm is converted into a pasty mass, and the material is then treated, while still immersed in the steeping liquid, with a substance such as CH₂O of germ-paralyzing character, and is then subjected to pressure to burst the envelop and cause expulsion of the endosperm material. U. S. 1,670,016 specifies alternations of temp. during a similar treatment.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Trade terms. ANON. *Medd. Sveriges Kem. Ind.* **11**, 27-68(1928).—Useful information in Swedish chemical trade giving tolerance of quality, manner of packing, amounts in package, freight rules, etc. A. R. ROSE

Scientific research as applied to industry. ALFRED MOND. *Chemistry and Industry* **47**, 526-8(1928). E. H.

Congo industries of interest to chemists. J. VAN HOUDT. *Ing. chim.* **15**, 205-19, 245-71(1927).—A discussion dealing with N fertilizers, the brewery industry, EtOH, rubber and wood distn. A. PAPINEAU-COUTURE

Development in the heavy chemical industry. G. P. POLLITT. *Chemistry and Industry* **47**, 531-4(1928); *Chem. Age* (London) **18**, 478-80. E. H.

The chemist in modern industry. R. H. CARR. *Chemistry and Industry* **47**, 515-6(1928). E. H.

Large units result in notable economies in production. ANON. *Chem. Mct. Eng.* **35**, 270-3(1928). E. H.

Filing data in the works. F. S. KRIS. *Chem. News* **136**, 273-5(1928). E. H.

Statistics on coal, petroleum, iron (steel) and German mining for 1925. FRIEDRICH HOHMANN. *Z. physik. chem. Unterricht* **40**, 81-5(1927). M. BEHER

Modern ideas in fractional distillation. C. S. ROBINSON. *Chemistry and Industry* **47**, 405-8(1928).—A summary of the general principles of fractional distn. and methods of calcg. column sizes. T. S. CARSWELL

DEMESSE, J.: **Manuel du fabricant de produits chimiques.** L'usine des produits chimiques. Paris: J. B. Baillièrre et Fils. 288 pp.; F. 22. Reviewed in *Rev. prod. chim.* **31**, 287(1928).

Reports of the Progress of Applied Chemistry. Vol. XII. **Applied Chemistry Reports.** London: Soc. of Chem Ind. Price, 7s. 6d to members of the Society, 12s. 6d., to non-members. Reviewed in *Chem. Trade J.* **82**, 441(1928).

Representative Industries in the United States. Edited by H. T. Warshaw. Contains chapters on **The Aluminum Industry** by Robert J. Anderson; **Chemical Industries**, by Henry Wigglesworth; **The Copper Industry**, by F. E. Richter; **The Electric Industry**, by L. A. Osborne; **The Iron and Steel Industry**, by Marshall T. Jones; **Lead Mining and Smelting in the United States**, by H. T. Warshaw; **The Blue Lead and Mixed Metals Industry**, by J. R. Wettstein; **The Leather Industry**, by Allen Rogers; **The Paint Industry**, R. J. Hallett; **The American Petroleum Industry**, by George Ward Stocking; **Rubber**, by P. W. Litchfield; and **The Zinc Industry**, by Walter Renton Ingalls. New York: Henry Holt & Co 720 pp. \$5.

Sterilizing liquids. W. MATZKA. *Brit.* 276,254, July 1, 1926. The process described in *Brit.* 267,058 (*C. A.* **22**, 833) may be carried out in an app. of the form described in *Brit.* 267,377 (*C. A.* **22**, 1064) but instead of Au another noble metal or Cu or Ag is used. The elec. connection between the metals may be omitted.

Liquefaction system for separating constituents of air or other gaseous mixtures. M. FRANKL. *Brit.* 276,381, Feb. 18, 1926.

Dispersing solid substances. I. G. FARHENIND. A.-G. *Brit.* 277,048, April 12, 1926. Materials such as pigments, soot, S or BaSO₄ (but not indigoid vat dyes) are mixed with an aromatic sulfonic acid or a salt of such an acid substituted by a hydrocarbon side chain and the dry mixt. may be ground alone or with turkey-red oil or other similar sulfonated oil. Isopropylated naphthalenesulfonic acid or similar compds. may be used and several examples are given. Cf. *C. A.* **22**, 1418.

Solidifying films of material on cooling drums. APPAREILS ET EVAPORATEURS KESTNER. *Brit.* 275,952, Aug. 10, 1926. Adhesion of material to cooling and solidifying drums is avoided by coating the drums with finely powd. materials such as talc., CaCO₃ or BaSO₄, which may be blown onto the drum by an app. which is described.

Heat treatment of mineral oils or other liquids. W. G. LAIRD. U. S. reissue 16,971, May 22. See original pat. 1,546,345 (*C. A.* **19**, 2877).

Absorption refrigerating apparatus. J. O. BOVING. *Brit.* 276,088, May 21, 1926.

Absorption refrigerating apparatus. H. HAAGER. *Brit.* 276,989, Sept. 3, 1926.

Absorption refrigerating system. C. G. MUNTERS. U. S. 1,670,632, May 22.

Absorption refrigerating apparatus. SULZER FRÈRES SOC. ANON. *Brit.* 276,314, Aug. 21, 1926.

Use of methylene chloride in refrigerating systems. *CARRIER ENGINEERING CO., LTD.*, and *W. H. CARRIER*. Brit. 276,887, Feb. 21, 1927.

Electric insulation. *J. E. G. LAHOUSSE*. Brit. 275,958, Aug. 12, 1926. Porous materials such as felt, cloth or paper used for the manuf. of elec. condensers are impregnated with Zn resinate or other suitable metallic resinate, with or without other substances such as *p*-toluenesulfonamide or other amides or compns. with an amide base which increase the fluidity of the resinate when melted without impairing the insulating properties of the compn.

Impregnating insulating material of electric cables, etc. *SOCIETÀ ITALIANA PIRELLI*. Brit. 276,985, Aug. 31, 1926. Air in the insulating material is first replaced by a gas such as CO_2 , propane or C_2H_2 which is sol. in the impregnating compn. such as oil to facilitate the impregnation with the latter.

Incendiary, smoke and lachrymatory torches. *F. RANKEN AND NOBEL INDUSTRIES, LTD.* Brit. 275,830, Feb. 13, 1926. Structural features.

Device for producing lachrymatory and like gases for military purposes, etc. *F. RANKEN AND NOBEL INDUSTRIES, LTD.* Brit. 276,279, Feb. 13, 1926. Structural features.

Rubber gas-masks. *NAAMLOOZE VENNOOTSCHAP VEREENIGDE NEDERLANDSCHE RUBBERFABRIEKEN*. Brit. 275,940, Aug. 14, 1926. Structural features.

Molding gas-masks of rubber. *NAAMLOOZE VENNOOTSCHAP VEREENIGDE NEDERLANDSCHE RUBBERFABRIEKEN*. Brit. 275,931, Aug. 11, 1926. An Fe mold and an expandable core which may be formed of rubber are used.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Softening water in small quantities. *A. BATTIGE*. *Apparatebau* 40, 89–90 (1928).—Description of a small soda-lime plant. *J. H. MOORE*

Sodium aluminate as an aid to water softening. *COMMITTEE REPORT AM. RY. ENG. ASSOCN. Railway Age* 84, 560–5 (1928).—In the soda-lime treating process using 1 to 3 gr. per gal. of $\text{Al}_2(\text{SO}_4)_3$ or FeSO_4 the hydrates formed in the reaction causes the light $\text{Mg}(\text{OH})_2$ particles to settle more quickly and aids in freeing the softened water from CaCO_3 . The latter come out of soln. only slowly and cause after-pptn. and scale in pipe lines. If $\text{Al}(\text{ONa})_2$ instead of FeSO_4 or $\text{Al}_2(\text{SO}_4)_3$ is used, more rapid and complete pptn. occurs. The optimum dosage is $1\frac{1}{2}$ gr. per gal. *C. R. FELLERS*

Electroosmotic water purification. *A. H. W. ATEN*. *Chem. Weekblad* 25, 211–9 (1928).—The app. (Siemens Elektro Osmose G. m. b. H) for water purification consisting of cells divided by special diaphragms in 3 parts depends on unequal ion mobility in the porous division walls not on electroosmotic effects. The technical cells are constructed as a filter press (10 cells in series) with prepd. filter cloth; the cathode and anode spaces are washed with water to prevent excessive salt concn.; 120 v. are used, c. d. 0.2 amps. per cell, rate of flow of the water to be purified 60 cc. per min. of the washing water 8 cc. per min. for the first 8 cells, 2 cc. per min. (of purified water) for the last 2 cells. The net yield is 72 l. purified water (cond. 9×10^{-6} , p_H 4.5) per 24 hrs., 190 l. washing water required, 2.4 kw. hr. The c. d. tends to rise after a few days; it can be lowered by more wash fluid. The action of the successive cells was rather irregular as regards the decrease of salt concn. The resulting water was within the limits of the requirements for distd. water (Dutch Pharm.) for dissolved salts, the org. matter was 0.8 to 1.0 cc. 0.01 N KMnO_4 per 100 cc. solid matter 1.0 to 1.4 mg. per 100 cc.; after 24 hrs. standing (CO_2 escaped) p_H decreased to 5.5, sp. cond. dropped to 6.5×10^{-6} . The bacterial count decreased from 500 to 2 in the process (river water being used). The anodic diaphragms are strongly attacked by Cl_2 after a short time; the energy and water cost of the process compares favorably with ordinary distn. Theoretical considerations are given on the action of the cells; it is found that only a small difference in mobility of the ions through the diaphragms will suffice to give satisfactory purification; the action of the H^+ and OH^- diffusion back into the middle space of the cells will also contribute to the purification. The corrosion of the diaphragm is the most serious drawback. *B. J. C. VAN DER HOEVEN*

The chlorination of water. *L. W. HAASE*. *Gas u. Wasserfach* 71, 385–90 (1928).—The effect of chlorination on the p_H and temporary and permanent hardness of natural water and pure water to which org. matter, CaCO_3 , etc., had been added was studied experimentally. The p_H of the water was detd. by the quinhydrone electrode, with

special precautions such as igniting the Pt wire at frequent intervals and the use of sufficiently large vols. of soln. Total hardness was detd. by adding an amt. of $\text{Na}_2\text{S}_2\text{O}_8$ equiv to the Cl_2 or, by electrotitration, which was also used for temporary hardness. In water contg carbonate or bicarbonate, Cl_2 reacts in the usual way to give $(\text{CaOCl})_2$ and $\text{Ca}(\text{HCO}_3)_2$. The presence of org. matter may act as a "catalytic accelerator" by reacting with the Cl_2 , hydrolyzing and the resulting HCl reacting with CaCO_3 to give $\text{Ca}(\text{HCO}_3)_2$. A portion of the Cl_2 will also react to form chlorides. The above reactions result in the p_{H} of the water changing toward the acid side (p_{H} 8-9 to 6-7), and may result in the increase of the permanent and temporary hardness, depending on the amt. and nature of the org. matter and the amt of carbonate present. The addn. of small quantities of $\text{Ca}(\text{OH})_2$ is suggested as a means of avoiding corrosion where the quantity of carbonate is small. R. W. RYAN

Recent developments in water treatment. J. R. BAYLIS. *Water Works* 67, 37-9 (1928).—See C. A. 22, 1640. C. C. RUCHHOFF

Water treatment plant at the Philips Glow Lamp Works, Eindhoven, Holland. WILLEM RUDOLFS. *Water Works* 67, 7-8 (1928).—An unusual treatment plant the supply for which is obtained from 42 driven wells with a capacity of 2.1 million gallons per day is described. The water is aerated, filtered through lava to remove CO_2 , treated with KMnO_4 to remove Fe and Mn and filtered through sand. C. C. RUCHHOFF

Electrolysis and methods of mitigation. W. B. BUCHANAN. *Can Eng* 54, 121-2, 176 (1928).—A discussion of stray ground currents in water mains and methods for their measurement. C. C. RUCHHOFF

The p_{H} value of the water of the Black Sea as compared with that of the salt lake of Tékir-Ghiol. N. I. COSMOVICI. *Ann. sci. univ. Jassy* 15, 131-2 (1928).—The detns. were carried out colorimetrically by means of thymolsulfonephthalein during the month of July. The p_{H} of Black Sea water was 8.3-8.5, was apparently unaffected by temp. or by wind, but increased by the agitation caused by waves and by increase in the algae and plankton content; the nature of the bottom (sandy or rocky) had no apparent effect on the p_{H} . The p_{H} of the water of Lake Tékir-Ghiol was const. (8.6) and slightly higher than that of the Black Sea. As it contains considerable H_2S , Legendre's hypothesis that the lower p_{H} of Black Sea water at a depth of 180 m. (7.26) is due to the presence of H_2S is considered to be erroneous. A. PAPINEAU-COUTURE

Boiler feed water purification, the "Neckar" system. G. J. FLUX. *Hel Gas* 48, 115-22 (1928).—The "Neckar" system here described consists of a treatment with soda in the heat; the alk. used was between 5 and 10 cc. 0.1 N HCl per 50 cc. water (0.3° Bé). Deposits found in a waste heat boiler after prolonged use consisted mainly of SiO_2 (from colloidal Na_2SiO_3). It is calcd. that by a 7.2% blowdown this danger can be avoided. B. J. C. VAN DER HOEVEN

The de-oiling of condensate from steam engines. RUZANDA RĂSCANU. *Ann. sci. univ. Jassy* 15, 71-80 (1928).—A study of the optimum conditions for the elec. de-oiling of condensed steam. Lab. tests carried out on a mixt. of condensate and raw water in beakers with Fe electrodes 210 mm. long (immersed to a depth of 180 mm. by 110 mm. wide showed that: the elec. current causes formation of Fe hydroxide which holds nearly the whole of the oil; the optimum temp. is 40-50°, because the Fe is more rapidly oxidized and the time required to obtain sufficiently clear water is reduced; agitation reduces the polarizing potential and the resistance of the water; the optimum time was found to be 25 min. (for treating 800 cc.), the amt. of residual oil decreases according to the c. d., but no proportionality was observed between the two, 20-30 millamp giving satisfactory results, too high a c. d. causes the formation of an excessive amt. of Fe hydroxide, which overloads the filter. Tests on a somewhat larger scale showed that the voltage should be varied within certain limits in order to obtain max. de-oiling. Similar expts. with Al electrodes showed that even with twice the c. d. de-oiling was no better, and the use of Al electrodes would therefore not be economical. The results of the tests were applied in designing an installation which is successfully used for treating 5 cu. m. per hr. by means of 640 Fe electrodes, 20 mm. in diam. and immersed to a depth of 920 mm., with a current of 7.2 amp. and an Fe consumption of 2.6 kg. (0.15% on the wt. of the electrodes) per month. A. P.-C.

Utilizing sewage gas. F. C. VOKES AND C. B. TOWNEND. *Public Works*, 59, 47 (1928); cf. C. A. 22, 655.—It was estd. that 160,000,000 cu. ft. of gas (500 B. t. u.) per annum could be recovered from 100,000 cu. yds. of sludge at the Saltley works (primary digestion tanks) of the Birmingham, England, sep. sludge digestion plant. So far a 150 h. p. vertical gas engine, a 100 kw. 4000 v. alternator and 144 floating concrete gas collectors, each 10 ft. by 20 ft. have been installed. The above collection

system yields about 16,000,000 cu. ft. of gas per annum, and the plant has been running on full load since it was installed in 1927. C. C. RUCHHOFF

Effect of lime on sludge digestion. W. RUDOLFS, H. HEUKELERKIAN, P. J. A. ZELLER, D. PETERSON and J. R. DOWNES. N. J. Agr. Expt. Sta., *Ann. Rept.* 1926, 412-43.—The effect of lime on sludge digestion is pronounced, influencing the flora and fauna and consequently the chem. intermediate and end products. Lime also changes the physico-chem. relation in sewage solids so that the solids are differently distributed in the liquid phase with different amts. of lime or, better, with different reactions. In general, lime addns. up to a certain point stimulate the numbers of bacteria, but max. numbers do not necessarily mean max. digestion. With higher reactions (above p_H 7.6) great fluctuations in bacterial numbers occur, indicating a condition of instability. At these higher reactions (p_H 8.2 and 8.8) odors emanating from the digesting material are stronger and more offensive. The numbers of protozoa decrease markedly when the reaction of the digesting material is changed from p_H 7.2 to 7.6 and higher reactions cause rapidly alternating increases and decreases but the variations of p_H values between 7.2 and 8.8 have no limiting effect on the variety of species. If the reaction of incoming fresh solids is kept at p_H 7.3 to 7.6 odors are practically absent. Daily addns. of fresh solids kept at p_H values of 7.3 to 7.6 can be increased from 2 to 3.5% dry solids (on the basis of ripe sludge) and with careful manipulation possibly to 5%, reducing the relation of ripe sludge necessary for efficient digestion from 50 to 1 of fresh solids daily, to 30 to 1. J. J. SKINNER

Water supply, sewage treatment and refuse disposal in 1927. H. BURDETT CLEVELAND. *Public Works* 59, 14-8(1928).—A brief review of progress in the science and art of each, illustrated by notable installations during the year. C. C. R.

Cementation of strata below reservoir embankment. A. A. BARNES. *Munic. Eng. Sanit. Record* 79, 628(1927).—A method is given to stop the egress of water under the embankment of reservoirs. A series of holes was bored into which a dil. mixt. of 1 part of slow setting cement and 20 parts of water were poured. This method was twice repeated, the leakage of over a million gal. per day being finally stopped. Another method for a reservoir holding 500 million gals. was to force grout under special conditions into cleaned bore holes. Estd. savings were £68,645. C. H. BADGER

Municipal works and statistics of Spenborough (England). A. ROTHERA. *Munic. Eng. Sanit. Record* 79, 517-8(1927).—A brief description of the sewage disposal works and water supply is given. C. H. BADGER

Up-to-date sewage works. Hoscar and Pemberton installation (Wigan, England). R. B. DONALD. *Munic. Eng. Sanit. Record* 79, 544(1927).—The plants and the sewage treatment are described. The area of the Hoscar works is $27\frac{3}{4}$ acres and the area of the Pemberton works which treats storm water only is 118 acres. All sewage passes through $\frac{1}{2}$ in. bar screens and raking app. electrically driven. Sludge in the different tanks is removed automatically or by gravitation to sludge drying beds. Storm water is pumped into 4 reinforced tanks. The sewage received at Hoscar is treated with 3 to 5 grains of aluminic ferric after the removal of the rough solids. It then passes through a preliminary settling tank to 3 settling tanks, thence to a receiving chamber and on to 2 batteries of 11 bacteria beds each. The sludge beds are made of graded coke and cinders. The bacteria beds are made of specially graded slag resting on aeration tile. The effluent and the effluent from the humus tanks pass into the river Douglas. Provision is made for a D. W. F. of 3,300,000 and a W. W. F. 3 to 6 times this amt. C. H. BADGER

New sewage works at Coseley, Staffs (England). I. E. W. BERRINGTON. *Munic. Eng. Sanit. Record* 79, 574(1927).—Coseley is divided into 2 equally populated areas as regards the treatment of sewage. As all of the sewage of the north area would have to be pumped it was found to be more economical to drain in the adjoining district of Bilston. The outfall works and sewers, the purification works and the method of purification of the south area are described. Use is made of screening and detritus chambers, liquefying tanks, storm water tanks, sepg. tanks, followed by filtration through circular percolating filters, the effluent from the filters being passed through humus tanks and thence into a brook. C. H. BADGER

Dunfermline (Scotland) waterworks. J. D. CAPB. *Munic. Eng. Sanit. Record* 79, 611(1927).—The works were opened in 1924, the total cost being £400,000. The whole of the district supply is by gravitation. There are 130 miles of mains from 36 in. diam. downward. An attachment to the Venturi meters gives information when consumption rises above a certain figure. Serious bursts are therefore immediately noticed. To get rid of objectionable taste and smell from a weed "Nitella Flexilis" which grew abundantly in the reservoir in summer an application of 1 part CuSO_4

to 10,000,000 parts water was tried. The water was reported free from smell in 4 days. This treatment is repeated annually. The application of $\frac{3}{4}$ grain lime per gal. was unsuccessful. C. H. BADGER

Tenement refuse. Storage and collection. D. KENNEDY. *Munic. Eng. Sanit. Record* 79, 670(1927).—K. recommends that dust bins should be substituted for sacks and bags. They should be of a suitable size to be easily handled and be placed in accessible places for daily collection. "Dust holes" and shoots should be abolished. C. H. B.

Engineering science applied to refuse disposal. H. ARDERN. *Munic. Eng. Sanit. Record* 79, 670(1927).—A discussion on screening and sepn. of house refuse. C. H. BADGER

The law relating to smoke abatement (England). J. L. BIGH TURNER. *Munic. Eng. Sanit. Record* 79, 529(1927) Interpretation and discussion. C. H. BADGER

Medicinal muds of Crimean salt lakes (SAGAIACHNUIT) 11A. Sewage and sulfate of ammonia effluents (PLANT) 21. Apparatus for aerating water (Brit. pat. 276,495) 1.

IMJOFF, KARL: *Taschenbuch der Stadtentwässerung*. 5th ed., revised. München: R. Oldenbourg. 115 pp. Cloth bound, M. 4.60.

WILLIAMS, JESSE PERKING: *Hygiene and Sanitation. Essentials of Modern Health Care*. Philadelphia: W. B. Saunders Co. 341 pp. Cloth, \$2, net. Reviewed in *J. Am. Med. Assoc.* 90, 1400(1928).

Apparatus for aerating water in bulk. W. A. HOVEMAN, F. C. HOVEMAN and BUIRINGS FILTERS, LTD. Brit. 276,137, Aug. 12, 1926.

Apparatus for deaerating water. J. PRICE. U. S. 1,669,673, May 15

Base-exchanging materials. A. ROSENHEIM. Brit. 276,967, Sept. 1, 1926. In producing base-exchanging substances from minerals such as leucite, feldspar, nepheline, orthoclase, plagioclase, adularia, microcline, sodalite, noscan, haüyne, lapis lazuli or similar minerals or from industrial glass the initial material is vitrified or revitrified, e. g., by heating in an elec. furnace with or without addn. of fluxes such as Na_2CO_3 , Na_2SO_4 , lime or waterglass, prior to treatment (with or without sepn. of unvitrified constituents) by the process described in Brit. 266,313 (*C. A.* 22, 377). Fused Na K feldspar may be converted into granules and treated with waterglass soln. at 200° under 16 atm. pressure for 2–3 hrs.

Base-exchanging silicates. P. N. ENGEL. Brit. 277,082, June 7, 1926. Base-exchanging silicates are produced by reaction between an alkali metal silicate, a non-alk. soln. of an amphoteric metal salt such as $\text{Al}_2(\text{SO}_4)_3$ and an acid such as H_2SO_4 in such proportions that a product is produced contg. 1 mol. of alkali metal oxide, 1 mol. of amphoteric metal oxide and 10 or more mols. of SiO_2 .

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Physical characteristics and silvicultural importance of podsol soil. P. W. STICKEL. *Ecology* 9, 176–87(1928).—In regions of humid climate, where rainfall is abundant, and winters are severe, there exists a tendency toward the podsolization of forest soils. This soil formation is characterized by a leached layer, gray in color, immediately beneath the org. horizon, and an enriched horizon, burnt sienna in color, below the zone of outwashing. A phys. and chem. examn. of a typical northern podsol profile shows that more org. matter, clay particles and chem. elements are present in the enriched zone than in the leached zone. Cool temps. and acid conditions further the podsolization process because of incomplete oxidation and decompn. A tendency toward podsolization can be combated by opening up the stand and by encouraging the admixture of hardwoods such as ash, birch, maple and beech. E. F. SNYDER

Role of silicic acid as a protective colloid in the formation of Mediterranean red earths. A. REIFENBERG. *Z. Pflanzenernähr. Düngung Bodenk.* 10A, 159–86(1927).—From a comprehensive discussion of the various influences which may play a role in the formation of the red earths, and from cataphoretic and pptn. expts. on the influence of silicic acid gel on the state of the sols of $\text{Fe}(\text{OH})_3$ and $\text{Al}(\text{OH})_3$, it is concluded that the formation of red earths in the subtropical zone is due to the protective action of the silicic acid on the gels of Al and Fe hydroxide. The reciprocal pptn. of the sols of silicic acid and $\text{Al}(\text{OH})_3$ and $\text{Fe}(\text{OH})_3$ cannot explain the formation of the red earths,

but the action of silicic acid as a protective colloid can explain the formation of red earths and the accumulation of $\text{Fe}(\text{OH})_3$ and $\text{Al}(\text{OH})_3$ in these soils even when they are formed from a limestone.

R. M. BARNETTE

A critical view of the question of "fossil" soils and tropical weathering. P. W. E. VAGELER. *Z. Pflanzenernähr. Düngung Bodenkd.* 10A, 193-205(1928).—A critical review of the literature of the formation of red earths and laterites. R. M. BARNETTE

The role of microorganisms in the transformation of organic matter in forest soils. S. A. WAKSMAN, FLORENCE G. TENNEY and K. R. STEVENS. *Ecology* 9, 126-44(1928).—The org. matter of forest soils or forest "humus" should be considered in the light of the compn. of the natural plant products which contributed to its formation and accumulation, the environmental conditions under which the decompn. of natural org. matter has taken place, and the nature of the microorganisms which have been active in the decompn. processes. Forest "humus" is made up (1) of a no. of the residual constituents such as the celluloses, hemicelluloses, fats, waxes, etc., of the various plant products (leaves, twigs, roots, mosses, etc.) which are undergoing decompn.; (2) of the constituents of the plant products which are more or less resistant to decompn., such as the lignins, cutins, tannins, resins, etc.; (3) of the microbial cells (fungus mycelium, spores, bacterial cells, protozoa, worms, etc.) synthesized in the process of decompn. of the natural org. materials continuously added to the soil, and (4) of the products of decompn. of the natural materials and cell products, such as org. and inorg. acids, NH_3 , etc. A series of methods has been developed for comparing the compn. of the org. matter of forest soils with that of fresh undecompn. plant products. The use of alkalies and other reagents in detg. the various "humic acids" and numerous other acids and so-called acids in the org. matter of forest soils is altogether unjustified. R. F. S.

Dynamic relations between plant and soil, with special reference to the supply of water and oxygen. B. E. LIVINGSTONE. *Proc. Nat. Acad. Sci.* 14, 293-5(1928).—For the climatic conditions of a Baltimore summer, white clover and Kentucky bluegrass continue to appear healthy as long as the soil supplies water at the rate of 80 g. per hr. per sq. m. of absorbing surface. When the water supply is reduced to $1/2$ of these figures the plants become vegetatively dead within 2 or 3 days. O necessary for germination varies with different seeds and with the temp. The O requirement for roots of ordinary plants is 3 mg. per sq. m. per hr. This is equiv. to 2 ml. of O or 10 ml. of air.

L. W. RIGGS

The effect of dehydration of soils upon their colloid constituents. III. J. L. STENKAMP. *Soil Science* 25, 327-32(1928); cf. *C. A.* 22, 2227.—When soil material is dried distinct cementation of colloidal material increases the silt fraction for all methods of analysis. The exchangeable bases in unweathered soils and in cultivated soils contg. humus increase with drying with a corresponding increase in acid-salt-forming bases. The highest value for acid-salt-forming bases going into soln. with 0.1 N acid and the lowest figures for neutral-salt-forming bases were obtained with soil dried in CO_2 as compared with those dried in O, N and air. The absorption of salts, except PO_4 , decreases with dryness. Only air-dried soil of high humus content showed reversibility of the colloidal condition after being treated 21 days with 0.1 N NH_4Cl soln. Soil contg. very little humus showed slight recovery except when previously dried in an atm. of CO_2 when a significant recovery was obtained. A. L. MEHRING

Analyses of soils of Morgan and Oconee counties. L. M. CARTER, M. W. LOWRY, W. O. COLLINS, M. E. BRAND and G. L. FULLER. *Ga. Agr. Coll., Bull.* 327, 36 pp. (1926).—The contents of N, P, K and Ca of many of the soils of the 2 counties are given. A table of the plant food requirements of these soils and a table of the percentage compn. of the fine material are included. J. J. SKINNER

Remarks on the mechanical analysis of soils. III. A new pipet apparatus. M. KOHN. *Z. Pflanzenernähr. Düngung Bodenkd.* 11A, 50-54(1928); cf. *C. A.* 22, 2226. —A rapid method of detg. the finer fractions in the mechanical analysis of soils by a simple pipet arrangement is described. R. M. BARNETTE

The determination of the nutrient content of the soil by pot experiments. H. WIESSMANN. *Z. Pflanzenernähr. Düngung Bodenkd.* 10A, 206-8(1928).—In testing the response of a soil to fertilization, W. used a mixt. of 1500 g. soil to 5700 g. of pure sand to which a complete fertilizer was added with the exception of the particular ingredient to be tested (*i. e.*, P or K). To overcome the phys. effects of the soil on the sand, a parallel series was set up which contained only the sand and the fertilizing materials. The yields were then corrected by comparison for the phys. influence of the soil.

R. M. BARNETTE

Comparative investigations on the estimation of phosphoric acid requirements of field soil. G. HAHN. *Bot. Archiv.* 20, 223-42(1927).—The plant physiol. soil analysis of

Mitscherlich is compared with the method of Neubauer and Lemmermann for the H_2PO_4 limit factor. H. describes an improved analytical method for H_2PO_4 . G. R. G.

The rapid determination of the phosphoric ion in soils and fertilizers, by the cerulean molybdate colorimetric method. G. DENIGÈS. *Compt. rend.* 186, 1052-4 (1928).—The procedure for soils when the P is sol. in water and in mineral or org. acids is described. For fertilizers the same technic is employed, with the sole exception that where phosphatic fertilizers are concerned, the dilns. in view of the large content of this ion should be greater with soils. E. F. SNYDER

The micro-Kjeldahl method for the determination of total nitrogen in soils. IGNAZ POLLAK AND RUDOLF DIETZ. *Oesterr. Chem. Ztg.* 31, 57-8(1928).—The micro-Kjeldahl method with a slight modification is well suited for soil investigations. It gives good results in comparison with the customary method. The convenient and quick procedure, distinguished by saving of material and time, as well as the simple control in one and the same sample, makes it possible to employ, instead of the macro-method, the micro-Kjeldahl method for the detn. of total N in soils. E. F. SNYDER

Contribution to the formulation of the microbiological analyses of the soil. W. BENCKE AND H. SODING. *Z. Pflanzenernähr. Düngung Bodenk.* 10A, 129-59(1927).—Algae (*Stichococcus variabilis*) and a fungus (*Aspergillus niger*) were used in cultures to which definite quantities of soil and fertilizer constituents had been added as a means of obtaining an idea of the fertility of the soil from the growth of the organisms. From the examn. of a no. of soils which had been studied extensively by other workers, it is concluded that the biol. methods may give results which agree closely to those obtained by pot expts. and from chem. analyses. R. M. BARNETTE

The influence of physical properties and food content of different soils through tilling and plant value. S. V. BUTIAKOV. *J. Exptl. Landwirtschaftliche in Südosten E. Russland* 3, 60(1927); *Deut. Landwirtschaft. Rundschau* 1, 704(1928).—B. finds that the nitrate formation in soil is at its greatest intensity at a water capacity of 23 to 26%, air vol. 60 to 66% and a temp. of 17° to 22°. A relation exists between H_2PO_4 and nitrate formation. GEORGE R. GREENBANK

Production of nodules on different parts of the root systems of alfalfa plants growing in soils of different reaction. P. E. KARRAKER. *Soil Science* 24, 103-7(1927).—Alfalfa plants were grown in soils from limed and unlimed exptl. plots. The plants were grown in pots contg. all acid and all limed soils and in pots with acid soil in one part and limed soil in the other part. The most useful division was a horizontal one with no actual partition between the two parts. Differences in nodule development could thus be told when the acid and limed soils were (a) acting on entire root systems of plants and (b) acting on different parts of the root system of the same plant. Differences in nodule development were found to be as great in the case of (b) as (a), indicating that the effect of soil reaction is independent of any antecedent general effect of soil reaction on the host plant. The possibility was noted that the poor development of nodules in the acid soil might have been due to the effect of the acid soil on the bacteria during the interval when they were existing non-symbiotically in the soil. However, if the effect of soil reactions on the bacteria is through some first general effect on the host plant, nodule development on the roots in the limed part of the divided pots should be less than on the corresponding part of the root systems of plants grown entirely in limed soils. Such was not found to be the case. Apparently the soil reaction directly affects the bacteria in the nodule; or the antecedent effect of the soil reaction on the host plant which in turn influences no development is so localized as to affect only that part of the roots directly in the soil of the reaction in question. J. J. SKINNER

The relationship between plant growth and soil reaction under the influence of different fertilizing materials and applications of lime. K. NEHRING. *Z. Pflanzenernähr. Düngung Bodenk.* 10A, 348-66(1928).—The soil reaction especially the pH and the exchange acidity is dependent upon the time of sampling and the weather. In the soils which show exchange acidity with strongly acid subsoils, the acidity appears to be lowest in spring as a result of the leaching. In the course of the summer when evapn. is high, the acidity increases. The addition of the amt. of lime calcd. from the buffer capacity of the soil, which amts. are significantly higher than those calcd. from the exchange acidity method of Daikuhara, failed to bring the soil reaction to a pH of 7, and to neutralize completely the exchange acidity. The yields of barley seemed to depend upon the exchange acidity; the highest yields were obtained when the exchange acidity was completely neutralized. An exchange acidity of 2.5-6.0 cc. appeared to be the optimum for oats. In the presence of exchange acidity, the physiol. alk. fertilizer materials are superior for barley. If the exchange acidity is neutralized,

there is no difference in the action of the physiol. acid and alk. fertilizer materials. For oats the physiol. acid fertilizers were superior to the alk. R. M. BARNETTE

The absorption of aluminum and iron by the soil. N. D. PRYANISHNIKOV AND E. K. LUKOVNIKOV. *Z. Pflanzenernähr. Düngung Boden.* 10A, 232-7(1928).—Expts. with a podsol loam from which the absorbed cations had been removed with 0.05 N HCl and which had been satd. with Ca by treatment with CaCl₂ soln showed that solns. of AlCl₃ had a greater replacing ability for Ca than had solns. of HCl and FeCl₃ at the same H-ion concn. The absorption of Al and Fe by the soil complex did not take place at a p_H value greater than 5.00. The total absorption capacity of the soil seems to be a function of the H-ion concn. R. M. BARNETTE

Report on (the determination of the) reaction value of acid soils. H. T. WHERRY. *J. Assocn. Official Agr. Chem.* 11, 150-2(1928).—A brief summary of the present status of the various methods available. At present measurements by means of the H electrode cannot give results closer than $\pm 0.5 p_H$ units. There is no evidence that the quinhydrone electrode gives less precise results than the H electrode and its simplicity recommends it for routine work. The minor errors inherent to the indicator method seem insufficient to offset its advantages, and it can be depended on for measurements of soil reaction under all ordinary circumstances to 0.5 p_H unit. In order to make the results widely intelligible and to enable conclusions as to the relationships between plant growth and soil reaction to be drawn correctly, it is recommended that in general soil reactions be stated not in exponential p_H values but in some sort of terms expressing the H-ion concn and OH-ion concn. A. PAPINEAU-COUTURE

The determination of the phosphoric acid requirement of soils according to the soluble silica. ANTONIN NÉMEC. *Compt. rend.* 186, 1060-2(1928); cf. *C. A.* 22, 1643.—The content of P₂O₅ of the aq. exts. of the soils appears to depend on the content of SiO₂ of the same exts.; the first increases at the same time as the second, except for very calcareous soils. E. F. SNYDER

The determination of the reaction of moor soils. T. ARND AND W. HOFFMANN. *Z. Pflanzenernähr. Düngung Boden.* 10A, 219-32(1928).—Five min. is sufficient time to wait before reading in the detn. of the p_H values of either a water suspension of moor soils or a suspension of these soils in a KCl soln with the quinhydrone electrode. The p_H of N KCl filtrates of very acid soils is the same as that of the suspensions in N KCl. The p_H of suspensions of feebly acid soils is, on the other hand, smaller than that of the filtrates. Water suspensions of both very acid and feebly acid soils have a lower p_H value than the corresponding filtrates. The p_H of suspensions of acid soils is lowered and that of alk. soils increased with increasing amts. of soil in a given quantity of water. A proportion of soil to water of 1 to 10 is recommended as the widest ratio that it is safe to use. Drying moor soils at room temp. and at 105° had no appreciable influence on the p_H value of water suspensions of these soils. R. M. BARNETTE

The effect of growing plants on solubility of soil nutrients. W. H. METZGER. *Soil Science* 25, 273-80(1928).—A study was made of the effect of plants in rendering sol. the mineral nutrients of the soil. This was done by removing soil samples from close proximity to the roots and other samples at a distance of from 2 to 4 in. from the roots and measuring the relative concn. of H₂O exts. of the 2 samples. Detns. of bicarbonates proved the most satisfactory method of measurement of such solvent action. Consistent differences were secured in concn. of bicarbonates, the samples from around the roots showing the higher concn.; this was true with both greenhouse and field samples. It was shown with corn, wheat and kafir that the max. difference in concn. of bicarbonates occurred at the fruiting period of the plants. Of 66 detns. with various plants, 53 showed higher concn. of bicarbonates in samples from around roots, 4 showed equal concn. and 9 lower concn. than in samples taken at a short distance from the plant roots. It appears that plants through the CO₂ excretions from their roots are able to exert a measurable solvent action on the soil minerals. J. J. SKINNER

Reaction and lime requirements of the soils of the Somme. E. ROUX. *Compt. rend. acad. agr. France* 14, 498-501(1928).—The clays of the Somme, especially in the Vimeu and Ponthieu, are in the process of acidification; ground chalk, easily sol. in CO₂-satd. H₂O, constitutes an ideal amendment for this region. E. F. SNYDER

The influence of the structure of the soil on its fertility. A. ACHROMEIKO. *Z. Pflanzenernähr. Düngung Boden.* 11A, 36-50(1928). R. M. BARNETTE

Nitrate assimilation by soil microorganisms in relation to available energy supply. F. E. ALLISON. *Soil Science* 24, 79-93(1927).—The addn. to soils of readily decomposable materials of wide C-N ratio results in a marked increase in biological activities and a decrease in soil NO₃ due to their assimilation by the soil microorganisms. This utilization of the NO₃ causes an injury to most growing crops, almost wholly because of NO₃

starvation. The injury caused by fresh stable manure is not due to any particular toxic compd. present or to the microorganisms added, but is due to the stimulation of biological activities with the resulting NO_3 stimulation. There is no appreciable difference in the nature of the injury produced by such materials as fresh stable manure, timothy hay, straw and corn stover. The injury caused by the addn. of the materials mentioned is not permanent but continues until there is a slowing up of biological activities and until there is sufficient time for the protein in the dead bacterial cells to be made available for plants through ammonification and nitrofication. E. F. S.

The part played by British workers in the application of nitrogen to the soil. JOHN RUSSELL. *Chemistry and Industry* 47, 528-31 (1928). E. H.

Soil reaction and nitrogen fixation. P. G. KRISHNA. *J. Am. Soc. Agron.* 20, 515-8 (1928).—A good correlation between reaction of soils and their N fixation was observed. There was a progressive increase in the amts. of N fixed with decreasing acidity of the soils. About 3.0 mg. of N were fixed by soils between p_{H} 5.2 and 5.9, while between 3.6 and 4.7 mg. of N were fixed in soils between p_{H} 5.9 and 7.65. There was no correlation between nos. of bacteria and N fixation, between bacterial nos. and soil reaction or between soil reaction and the disappearance of dextrose. Soil reaction is the dominant factor influencing N fixation. I. F. SNYDER

Transformation of nitrogen in rice soil. GEORGE JANSSEN AND W. H. METZGER. *J. Am. Soc. Agron.* 20, 459-76 (1928).— NO_3 , NO_2 and NH_3 changes were studied in flooded and unflooded soils under greenhouse conditions. These soils were treated as follows: green manure, NaNO_3 , $(\text{NH}_4)_2\text{SO}_4$ and no treatment. One-half of each series was cropped to rice and the other $\frac{1}{2}$ left uncropped. Results indicate that the NO_2 content of the soil was never significant at any time. For the unflooded series to which $(\text{NH}_4)_2\text{SO}_4$ was applied NH_3 decreased from about 27.5 p. p. m. to a trace over 2 months. The NO_3 increased from 4 p. p. m. to about 27.5 p. p. m. and 1 month later decreased to 13 p. p. m. In the flooded series NH_3 decreased from about 20.5 p. p. m. to 11 p. p. m. in 2 months. NO_3 was not readable after the first analysis. For submerged soils to which NaNO_3 was added NO_3 decreased from 19 p. p. m. to a trace 2 months after cropping. For similar unflooded soils NO_3 was reduced from about 41 p. p. m. to 18 p. p. m. over 2 months. The submerged soils with green manure showed a steady increase over 2 months from 4.1 p. p. m. of NH_3 to 34 p. p. m. In the dry soils the NH_3 increased from a trace to 9 p. p. m. in 2 weeks and then decreased again to a trace after a period of 6 weeks. The NO_3 increased from 3 p. p. m. to 56.5 p. p. m. Soil reaction was changed decidedly toward alk. in flooded soils treated with green manure, with NaNO_3 and those receiving no treatment. No such change occurred where $(\text{NH}_4)_2\text{SO}_4$ was applied. I. F. SNYDER

The influence of heavy applications of dry organic matter on crop yields and on the nitrate content of the soil. A. W. BLAIR AND A. L. PRINCE. *Soil Science* 25, 281-6 (1928).—Cylinder expts. were conducted on Sassafra loam soil for a period of 3 years to study the cause of the depressing effect on germination and growth, which is often noted when dry org. matter such as straw is applied to the soil preceding the planting of crops. Rye straw was used in amts. from 2000 to 16,000 lbs. per acre, and both legume and non-legume crops were grown. In addn. to the rye straw, mineral fertilizers were used and sufficient lime was applied to bring the reaction to a p_{H} varying from about 6.4 to a little above 7.0. With non-legume crops, receiving a moderate application of available N fertilizer, the heavy application of org. matter greatly depressed germination and yield the first year. With the legume crop, both with and without N fertilizer, the yields were not appreciably less with the heavy applications of straw than the yields on the check cylinders. NO_3 detns. made on samples of soil during the summer indicate that the straw did not greatly influence the NO_3 content of the soil. The work was repeated the second year without further addn. of org. matter. This time the non-legume crops in the cylinders which had received the heaviest application of rye straw the year before gave larger yields than the check cylinders, and again the nitrate content of the soil was not influenced by the org. matter. The depressing effect which is sometimes produced by the application of dry org. matter is apparently due to the locking up of available N by organisms which use the org. matter as a source of energy. J. J. SKINNER

The acidity of rice field soils. N. NOVELLI. *Giorn. risicoltura* 18, 1-5 (1928).—Vercellese soils contain only traces of CaCO_3 . Their acidity, expressed in cc. N KOH, under dry cultivation is ordinarily less than 0.1% but after 3-4 yrs. rice cultivation this rises to 0.5-0.6% and, in established rice fields, to 1-1.2%. Bolognese soils, contg. 12.6-14.0% CaCO_3 , increase in acidity to 0.2-0.3% only. The acidity is due to deposits of org. matter from irrigation waters and to crop residues, soils contg. 2-3% org. matter

under dry cultivation increasing to 4 and even to above 10% when cultivated to rice.

ALBERT R. MERZ

Some effects of limestone and hydrated lime on bio-chemical activities in acid soils. HENRY DORSEY. Connecticut Storrs Sta., *Bull.* 141, 113-63(1926).—Hydrated lime is more effective in neutralizing soil acidity than limestone. As the time after application increases, the difference between the effect of the 2 materials decreases. Ground limestone gradually reduces the acidity of an acid soil for a period of 6 to 8 weeks and in some cases shows a tendency to give a rise in acidity at the end of 6 or 7 weeks. Hydrated lime rapidly reduces soil acidity to a minimum. After 2 or 3 weeks the acidity then gradually rises for 8 weeks. Untreated soil shows fluctuations in soil acidity during an 8-week period and these same fluctuations on lower planes are exhibited by the soil treated with limestone and hydrated lime. Of the tests used the Jones is most valuable because it can show the smaller quantity of limestone required due to acidity changes. The Truog and Iowa tests lack in sharp color changes for small variations in soil acidity. The Soiltest test is more suited to qual. field work than to lab. work. The H-ion test correlated rather well with the Jones test. The ammonifying and nitrifying power of acid soils is increased by limestone and hydrated lime. Changes brought about in field soils by lime, limestone and hydrated lime can be measured by all the tests used, but more accurately by the Jones test and the H-ion detn. There are unexplained fluctuations of soil acidity characteristic of each type of soil exhibited by the treated and untreated samples alike. With the Jones test the lime requirement indicated is influenced by the temp. of the water used.

E. F. SNYDER

The action of alkali and soil moisture studies. M. D. THOMAS AND D. S. JENNINGS. Utah Agr. Expt. Sta., *Bull.* 198, 65-8(1926).—By the addn. of Na salts to soil in cylinder expts. the concn. of the soil soln. was increased, producing toxicity to plants. The Na enters the silicate complex, replacing Ca, Mg and K and yields a soil partly impermeable to water and alk. in reaction. A no. of heavy clay soils were treated repeatedly with strong solns. of the salts of uni- and bi-valent bases and subsequently washed free of sol. salts. In wet soils satd. with Na considerable deflocculation was induced.

J. J. SKINNER

Forms and properties of water-soluble phosphorus in soils. F. W. PARKER. *Science* 67, 402-3(1928).—Previously reported results are confirmed, showing that salts solns. and exts. contain considerable quantities of org. phosphate as well as inorg. phosphate. They further indicate that there are at least 2 forms of org. phosphate.

E. F. SNYDER

Action of sulfuric acid on cultivated land. E. RABATÉ. *J. Agr. Prat.* [N. S.] 47, 215-7(1927).—A brief review of the effect of H_2SO_4 on soil fertility, reaction, etc.

E. F. SNYDER

The behavior of cultivated plants in land rich in salts. ANTONIN ROLET. *Rev. gén. sci.* 39, 175-81(1928).—This is a discussion of the subject matter and a method of removing the salt from land by lixiviation.

E. F. SNYDER

A laboratory apparatus for the measurement of carbon dioxide evolved from soils. F. W. MARSH. *Soil Science* 25, 253-61(1928).—A complete app. and method of operation for the measurement of CO_2 evolved from soils under lab. conditions are described. For details the original should be consulted. The CO_2 evolved from 500 g. of various soils as detd. with this method ranged from 23.7 to 162.4 mg. in 72 hrs.

A. L. M.

Use of sulfuric acid in agriculture. P. WAGUET. *Rev. prod. chim.* 31, 161-6, 203-7(1928).—A discussion of the action of H_2SO_4 on vegetation, particularly from the standpoint of its possible use for the destruction of weeds and for the elimination of plant diseases.

A. PAPINEAU-COUTURE

Action of lime and other chemical fertilizers. R. CHIAPPELLI. *Giorn. risicoltura* 2, 18(1928).—One hundred kg. of rice plants exts. 0.83 kg. of CaO, of which 0.78 kg. is in the straw and 0.05 in the rice. If the straw is returned to the earth less CaO is extd. KCl and K_2SO_4 also cause a strong dispersion of Ca through the formation of sol. substances: $2KCl + CaCO_3 = K_2CO_3 + CaCl_2$; $K_2SO_4 + CaCO_3 = K_2CO_3 + CaSO_4$. Every 149 kg. of KCl withdraws 56 kg. of CaO from the ground. With 300 kg. of K fertilizer per hectare 140 kg. of Ca is dispersed in the ground. This, with the absorption of 8000 kg. of rice plants, brings a loss of 163 kg. of CaO.

R. SANSONE

The delayed effect of liming. P. E. KARRAKER. *Soil Science* 24, 147-8(1928).—A delayed effect of limestone in bringing about increased growth of alfalfa on acid soils in pot expts. was noted. The interval ranged from a few weeks to about 2 months, depending on the soil. Knowledge of this delayed effect is important in indicating the desirability of liming some time ahead of seeding legume crops.

E. F. SNYDER

Calcium as a factor in soy-bean inoculation. R. W. SCANLAN. *Soil Science* 25,

313-24(1928).—Results indicate that the common soil amendments, such as crop residues, manure and K, do not significantly influence the degree of modulation of soy beans on 3 acid soils used. Acid phosphate, sodium acid phosphate and bone meal on Putnam Silt Loam, and rock phosphate and sodium acid phosphate on Gray Silt Loam did not affect, in any great measure, the modulation of soy beans. Both $\text{CaH}_4(\text{PO}_4)_2$ and sodium acid phosphate, however, gave fair increases in nodule formation on Bates Fine Sandy Loam soil. Limestone was found to increase nodulation greatly in all instances where used. That soil reaction was not the controlling factor on nodulation is shown by the fact that $\text{Ca}(\text{OAc})_2$, when used on acid plots of each soil, although not greatly altering the soil reaction, increased nodulation 1089% on the Gray Silt Loam, 1010% on the Bates Fine Sandy Loam and 433% on the Putnam Silt Loam. The nodulation of soy beans grown in distd. water and in tap water contg. CaCl_2 increased with increased concn. of the salt up to that of 1 to 1500 in the former and of 1 to 5000 in the latter. CaCO_3 , $\text{Ca}(\text{OH})_2$ and acid phosphate used separately in the field, both on the soy-bean seed and in the row, did not increase nodulation on Putnam Silt Loam. CaCO_3 supplemented with acid phosphate, however, gave indications of some benefit to nodule formation. $\text{Ca}(\text{NO}_3)_2$ and CaCl_2 , when used on soy-bean seed on Putnam Silt Loam soil, not only increased nodulation but also increased the percentage of plants having nodules on their roots. J. J. SKINNER

The action of sodium with potassium as nutrient material for plants. H. HEINRICH. *Z. Pflanzenernähr. Düngung Bodenk.* 10A, 299-323(1928).—In soil expts. with peas, the addn. of increasing quantities of Na as Na_2SO_4 to a const. application of K as K_2SO_4 gave a not insignificant increase in the total dry wt. and yield of seed. With a partial replacement of the K by Na, the total dry wt. remained the same but there was a slight increase in the yield of seed with increased replacement of the K by the Na. With small applications of Na and K salts, the Na appears to have the capacity to replace K to a large extent. A detrimental influence of high applications of Na could not be detected. By a complete replacement of K by Na in pure sand cultures, the Na increased the total wt. of plants about 65%, and the yield of seed about 100% over the culture receiving no K or Na. The favorable action of Na may be explained on 3 different bases. (a) Na works indirectly in that it makes the soil K more available and at the same time favorably influences the utilization of salts applied and the native soil K. (b) Na appears to have a second indirect action, in that it takes over a part of the function of K in the assimilation and conducting organs and thus permits a greater proportion of the K to function in the seed. (c) Na appears to be used directly by the plant in the formation of org. materials, when the available supply of K is not sufficient for the requirements of the plant. R. M. BARNETTE

Significance of the reaction for the effect of ammonium salts on the growth of Zea mays. W. MEVIUS. *Z. Pflanzenernähr. Düngung Bodenk.* 10A, 208-18(1928).—M. attributes the depressive action of NH_4 salts on the growth of corn in neutral and alk. solns. to the extraordinary rapidity of the entrance of the NH_4 ion into the plant cell and the poisonous action of the NH_4 ion within the cell, where it brings about an extraordinarily rapid change in the reaction of the cell to the alk. side. This depressive effect was not noticed in acid solns. Unfavorable conditions for growth brought by the physiol. acidity due to the absorption of the NH_4 ion by the plant are not effective until the p_H value of the soln. reaches about 3.5 or 3.6. Thus between neutrality and a p_H value of about 3.5 is the most favorable reaction range for the use of NH_4 salts. R. M. BARNETTE

The availability of nitrogen in nitrate of soda, ammonium sulfate and dried blood with varying ratios of phosphoric acid and potash. J. G. LIPMAN AND A. W. BLAIR. New Jersey Agr. Expt. Sta., *Ann. Rept.* 1926, 521-8; cf. C. A. 21, 1862.—The fourth year of the work on the availability of N with varying ratios of P_2O_5 and K is reported. The plan provides for a const. amt. of N from 3 different sources and also a combination of these 3, in connection with the use of single, double and triple portions of P_2O_5 and single and double portions of K. With the exception of 1923, when corn only was grown, 2 crops have been grown each year. The fertilizer is applied for the first crop and the second crop is grown to utilize any N not taken by the first crop. In 1925 rape was grown as the first crop and sorghum as the second. For the first crop the yields of dry matter and the percentages of N recovered with NaNO_3 , $(\text{NH}_4)_2\text{SO}_4$ and dried blood were, with slight exception, in the order named. With the double portion of K the larger amts. of P_2O_5 caused a slight decrease in percentage of N recovered. With the single portion of K the highest N recovery was with the triple portion of P_2O_5 and the next highest with the single portion. Generally the mixt. contg. the N from 3 sources gave higher recoveries than those obtained with dried blood alone, but lower

than those with NaNO_3 and $(\text{NH}_4)_2\text{SO}_4$. In most cases the first crop recovered less than 50% of the applied N. For the second crop there does not appear to be any direct relation between the N recoveries and the amts. of P_2O_5 and K used. The dried blood gave relatively higher recoveries with this crop than with the first crop. For the combined crops the double portion of K gave lower av. yields and lower av. recoveries than the single. Here also there does not appear to be any direct relation between the N recovered and the amt. of P_2O_5 used. For the combined crops the av. recoveries vary from about 36 to 61%. The summary of the 4 years' work shows that the highest av. recoveries were obtained with NaNO_3 . J. J. SKINNER

Effects of nitrates on the composition of the potato. WM P. HEADDEN. Colo. Agr. Expt. Sta., *Bull.* 325, 1-96(1928).—Nitrates may develop in Colo. soils so abundantly that potatoes as well as other plants are killed. The amt. necessary to produce toxic effect was uncertain and varied widely under different conditions. The potato grew well for a time in soil contg. 400 p. p. m. of NaNO_3 in the top 6 in. Excessive nitrates decreased the yield and cooking quality of the tubers. The nitrate plot potatoes were soggy, had a yellowish color, a strong odor and a pronounced unpleasant taste. Nitrates depressed the P_2O_5 and increased the K_2O content of the ash of potato tubers. Colo. potatoes were lower in starch and P_2O_5 content, and higher in ash, N and K_2O than potatoes grown in other producing sections. C. R. FELLERS

The effect of the constituents of alkali fertilizers, and soil amendments on the permeability of certain fine-textured soils under irrigation. C. W. BORKIN. New Mexico Agr. Expt. Sta., *Bull.* 160, 61 pp.(1927).—In working with a clay and a clay-loam soil it was found that the penetration of water was retarded by Na and K compds. Na compds. caused a greater depression of permeability than other substances, the influence decreasing in the following order: carbonate, acetate, chloride, nitrate, silicate and sulfate. With varying proportions of carbonate, chloride or nitrate of Na the depressing effect appeared to increase more rapidly than the concn. The following substances in 0.5% concn. increased the rate of water penetration into the air-dried soils, the accelerating effect decreasing in the order named $\text{Al}_2(\text{SO}_4)_3$, FeSO_4 , AlCl_3 , $\text{CaH}_2(\text{PO}_4)_2$, $\text{Fe}_2(\text{SO}_4)_3$, KHSO_4 , tannin, manure and $(\text{NH}_4)_2\text{SO}_4$. Permeability increased with the valence of the basic constituents of the compds. added to the soils. The chlorides were in general more depressing than the sulfates. Soils treated with depressing substances were more alk. after percolation and were highly deflocculated. Substances improving permeability increased the acidity of the percolates and caused flocculation both before and after percolation. The greatest lowering of the p_H value of the percolates per 0.1% of $\text{Al}_2(\text{SO}_4)_3$ occurred at the lower concns. which also produced the greatest increase in acceleration. Al was not present in percolates from soils to which as much as 1.5% $\text{Al}_2(\text{SO}_4)_3$ has been added, but Ca and other bases were displaced in combination with the sulfates; CO_2 was liberated. Fertilizers which tend to decrease soil alk., as $(\text{NH}_4)_2\text{SO}_4$, manure and acid phosphate, improve permeability and tilth. NaNO_3 had an opposite effect. $\text{Al}_2(\text{SO}_4)_3 + \text{FeSO}_4$ caused an immediate, large and permanent increase in permeability. These amendments should be useful in the reclamation of impermeable areas and in the prevention of impermeability in soils which tend to become alk. J. J. SKINNER

The examination of the Mitscherlich procedure for the determination of the fertilizer requirements of soils. M. GERLACH, E. GÜNTHER AND C. SEIDEL. *Z. Pflanzenernähr. Dungung Bodenk.* 11A, 1-29(1928); cf. C. A. 22, 1008.—The expts. carried out by the authors show that Mitscherlich cannot satisfactorily use the value of the growth factor const. and consequently the law founded on it. In the Mitscherlich equation, the total quantities of the nutrient materials used in the test must not be used, but only the part of the nutrients absorbed by the plant. The value of the growth factor const. is not const. The percent increase in yield in two expts. is only equal when, besides the material tested, other growth factors such as the basic fertilization and the water are applied in the same amts. Therefore, the use of the Mitscherlich yield tables is not generally applicable. The Mitscherlich procedure for the detn. of the fertilizer requirements of the soil gives no more than a well-conducted vegetation expt. would give. R. M. BARNETTE

Means of determining the requirements of soils for the principal fertilizers. UGO PRATOLONGO. *Giorn. chim. ind. applicata* 10, 61-6(1928).—A crit. review and discussion of the principles of fertilization and of various means of detg. the optimum doses of P and K fertilizers for various soils. A crit. examn. of biol. tests proposed for detg. soil requirements shows that even the Neubauer test is unsatisfactory, and the development of chem. methods such as those of Lemmermann is of great importance. Expts. indicate that the best solvent for detg. K is NH_4Cl , which has already

been proposed by Kellner. The soil should be extd. with 0.1 *N* NH_4Cl . Analysis of many Italian soils by this method showed a K_2O content of 2–80 mg. per 100 g. of soil. A comparison with field tests indicated that when this sol. K is below 5 mg. of K_2O per 100 g. of soil, K fertilization is usually beneficial. With 5 mg. per 100 g. fertilization is of doubtful value in some cases, and with 10 mg. or more per 100 g. the K content is in general sufficient for ordinary culture. Continued investigation on the application of chem. tests to the detn. of soil requirements gives great promise that such tests will eventually be sufficient in themselves as criteria of the need of fertilization.

C. C. DAVIS

Artificial manure from straw. R. C. COLLISON AND H. J. CONN. *N. Y. Agr. Expt. Sta., Circ.* 95, 1–3 (1928).—The method of decomp. fibrous materials such as straw depends upon the fact that certain kinds of microorganisms will use the straw as a part of their food supply if they are plentifully supplied with water and mineral nutrients. A mixt. composed of $(\text{NH}_4)_2\text{SO}_4$ 60 lbs., superphosphate 30 lbs., KCl 25 lbs. and ground limestone 50 lbs., when added to 1 ton of dry straw or similar material, will make 2–3 tons of artificial manure. The CaCO_3 (limestone) prevents the mass from becoming too acid, which condition retards microbial growth.

C. R. FELLERS

Phosphoric acid fertilizer investigation on grass. ERNST TRUNINGER. *Landwirtschaftliche Jahrb. der Schweiz* 41, 861–912 (1927).—A study of various forms of H_3PO_4 fertilizer. Data are given on yields and after-effects of chemicals and chemical analyses of the dried grasses and soils are given.

GEORGE R. GREENBANK

The value of dicalcium phosphate as phosphoric acid fertilizer. E. RITTER. *Landwirtschaftliche Jahrb. der Schweiz* 41, 787–95 (1927).—R. finds that CaHPO_4 is of the same value as the superphosphates.

GEORGE R. GREENBANK

The influence of manures and organic residues on plant growth. G. A. NEWTON AND K. D. DANILOFF. *Soil Science* 24, 95–101 (1927).—Sawdusts, pine needles and straw were used for soil treatment to det. their influence on growth and yield of oats in pot expts. Fresh and rotted manure were also used. Sawdust, pine needles and straw depress growth and lower yields below that of the control. This depressing effect was partially overcome by adding sufficient quantities of NaNO_3 . Although the residues of low N content retarded growth and yield, their depressing effect on N accumulation was sufficiently overcome during the later stages of the plants development to permit the extra N to become available. The available N in the later period of maturity was used to increase the percentage of N in the grain.

J. J. SKINNER

Burnt limestone in relation to quality of Bordeaux mixtures. R. H. CARR AND L. N. BEMILLER. *Ind. Eng. Chem.* 20, 514–6 (1928).—The quality of Bordeaux mixt. depends on the amts. of CaO and MgO in the lime. These amts. have a marked and consistent effect upon the alky. of the liquid above the ppt., the color and rate of fall of the ppt., and the length of time the Bordeaux mixt. will maintain its colloidal nature and be suitable for spraying purposes. The color changes and phys. properties of the different ppts indicate that Bordeaux mixt. is a colloid when properly made; this is evident by the change in color from dark blue to light green as the CaO content, which causes greater alky., becomes less and the MgO portion increases. As the colloidal particles become larger they cause the reflected light to appear yellow at first, then orange, red, violet, blue and green; hence the deep blue of the high-Ca lime indicates smaller particles than the light green of the MgO lime.

J. J. SKINNER

The effect of green manures and crop residues on the soil reaction. W. G. SACKETT, ALVIN KEZER, IDA W. FERGUSON AND J. C. WARD. *Colo. Agr. Expt. Sta., Bull.* 324, 1–31 (1928).—Barley used as a green manure increased slightly the p_H of a silt loam contg. 3.184% CaCO_3 , although the reaction was always well within the optimum range for N fixation and growth of *Azotobacter* (p_H 7–8). Green manures, crop residues and com. fertilizers had no value as a source of acid for increasing the p_H of a soil rich in CaCO_3 where it was necessary to increase that concn. from p_H 7.7 to 6.0 in order to retard the growth of *Azotobacter* and thus limit N fixation.

C. R. F.

Plant growth as a function of the nitrogen application and of the growth period in oats. R. MEYER. *Z. Pflanzenernähr. Düngung Bodenk.* 10A, 329–47 (1928).—A criticism of the procedure used by Mitscherlich for the calcn. of the fertilizer requirements of soils. Expts. were carried out with applications of N and P salts to oats to det. the N-P curve. The tangent of the N-yield curve decreased with increasing applications of P_2O_5 . The max. of the N-yield curve attained to values of the higher N application with increasing P_2O_5 applications. With increasing applications of N, the roots reached the max. growth first, then the straw and finally the grain. The N-time yield curve was obtained by measuring the plants at different growth intervals. During the growth period the max. of the N curves was progressive with increasing amts. of

N. The roots reached their max. earlier than the top. From the N-time rule or curves, with increasing applications of N, a curve of max. growths at different intervals is obtained and from this curve it is believed that an idea of the final yield curve and the nutrient requirements of the soil may be obtained. The errors attending the results obtained from pot expts. are discussed.

R. M. BARNETTE

Gray speck (manganese deficiency) disease of oats. GOFFREY SAMUEL AND C. S. PIPER. *J. Dept. Agr. S. Australia* 31, 696-705(1928).—Gray speck is a disease of oats in the seedling stage. It does not appear in acid soils but makes its appearance in soils of p_H 7.0 to 8.0 and increases in severity in more alk. soils. N fertilization increases the growth and yield of oats but does not check the characteristic dying of leaves. Mn treatments are very effective in reducing the disease. Applications of from 10 to 40 lbs. $MnSO_4$ per A. progressively reduce leaf-flecking, whereas 75 lbs. $KMnO_4$ almost completely prevents the appearance of the disease.

M. S. ANDERSON

Report on (the determination of) nitrogen (in fertilizers). A. L. PRINCE. *J. Assoc. Official Agr. Chem.* 11, 186-91(1928); cf. *C. A.* 21, 2350.—The Busch nitron method for nitrate N (Treadwell and Hall, *Analytical Chemistry* 2, 391, *C. A.* 18, 1963) is accurate and comparatively simple even in the presence of compds. like cyanamide and urea, but the high cost of nitron renders it unsuitable for routine work. The Arnd method (*C. A.* 12, 662) is simple and accurate when used on nitrate salts alone, but possesses no distinct advantage over the Devarda method which has already been adopted as tentative. Comparison of the official method and the Jones method (*C. A.* 21, 1324) for NH_3 and nitrate N in fertilizers contg. smaller proportions of cyanamide and urea than the ones previously used showed that both gave practically theoretical results for NH_3 N, while for nitrate N the same sources of error were apparent as previously, but to a smaller extent because of the smaller cyanamide and urea contents. It is recommended that the Zn-Fe method for nitrates be discarded, and that the reduced Fe method be marked "applicable only in the absence of cyanamide and urea."

A. PAPINEAU-COUTURE

Report on the determination of chlorine in commercial fertilizers. A. P. KERR. *J. Assoc. Official Agr. Chem.* 11, 201-2(1928).—Two methods were studied collaborately: (1) The sample was made alk. by adding $CaCO_3$ to drive off NH_3 , which might be present before washing on the filter. (2) The sample was washed on the filter with distd. H_2O and titrated direct. Method (2) seems to be more practical.

A. PAPINEAU-COUTURE

Report on the gravimetric determination of phosphoric acid (in fertilizers). W. H. ROSS. *J. Assoc. Official Agr. Chem.* 11, 180-6(1928); cf. *C. A.* 21, 2350.—A collaborative study of the relative accuracy of the present official A. O. A. C., Lundell and Hoffmann's single pptn. and double pptn. (*C. A.* 19, 800) and Jørgensen's (*C. A.* 20, 1773) method showed that: (1) Lundell and Hoffmann's single pptn. method gives slightly high results, and the other 3 give satisfactory results; (2) the slightly higher accuracy of L.'s and H.'s double pptn. method is not sufficient to justify its adoption for routine analysis in place of the present official method; (3) presence of SiO_2 causes slightly high results with the official and Jørgensen methods, and its elimination should be provided for; (4) recent controversies over methods of P_2O_5 detn. are largely due to the use of standards of variable compn. or of materials that have been standardized by chem. analysis only, and KH_2PO_4 , either alone or in admixt. with K_2SO_4 , is recommended as standard; (5) the disadvantage of an alk. MgO mixt. (action of the alkali on the glass of the container) can be eliminated by prepg. a neutral soln. and adding NH_3 just before use; (6) previous conclusions regarding ignition to produce snow-white $Mg_3P_2O_7$ are confirmed.

A. PAPINEAU-COUTURE

Report on nitrogen activity methods in fertilizers. JOHN B. SMITH. *J. Assoc. Official Agr. Chem.* 11, 191-200(1928).—Discrepancies in the results obtained by different labs. using the official A. O. A. C. method are attributed to insufficient exactness in the wording of the directions. An investigation into the various steps of the technic is described in detail, and as a result certain modifications in the wording are recommended providing for: use of 1 drop of lubricating oil of medium viscosity instead of 0.2 g. paraffin, digesting at exactly 110° instead of $100-10^\circ$, distg. in exactly 60 min. instead of 45-90 min., keeping the rate of distn. as uniform as possible throughout the whole 60-min. period, efficiently trapping the NH_3 fumes from the distn., use of freshly prepd. (not over 1 month) alk. $KMnO_4$ soln. having the proper oxidizing power (25 g. $KMnO_4$ per l.) and showing no signs of decompn.

A. PAPINEAU-COUTURE

Insecticides. Their action and constitution. H. H. CROUCHER. *Trop. Agr. (Trinidad)* 4, 183-4(1927).—A brief review.

A. L. MEHRING

Insecticidal pyrethrum. J. CHEVALIER. *Recherches et inventions* 9, 143-52 (1928).—A review of its cultivation, properties and use.

A. PAPINEAU-COUTURE

The insecticidal properties of calcium arsenate. A. PAILLOT. *Compt. rend. acad. agr. France* 14, 502-5(1928).—The insecticidal value of the products in commerce sold under the name of arsenate of lime is variable; it cannot be detd. by the chem. compn. E. F. SNYDER

Insecticidal action of some esters of halogenated fatty acids in the vapor phase. R. C. ROARK AND R. T. COTTON. *Ind. Eng. Chem.* 20, 513-4(1928).—From the standpoints of toxicity to insects, availability, cost, and freedom from fire hazard, methyl, isopropyl and ethyl monochloroacetates appear to be the most promising of the lower alkyl esters of chloroformic (chlorocarbonic), monochloro-, dichloro- and trichloroacetic, monobromoacetic, α -bromo- and β -bromopropionic and β -chloropropionic acids tested. Dosages of 1 lb. $\text{CH}_2\text{ClCO}_2\text{Me}$, 1.5 lbs. $\text{CH}_2\text{ClCO}_2\text{CHMe}_2$, and 2 lbs. $\text{CH}_2\text{ClCO}_2\text{-Et}$ per 1000 cu. ft. are effective against stored-product insects in fumigation vaults of the commercial type. The monochloroacetates injure the germination of wheat, and are not promising for the fumigation of grain intended for seed. J. J. SKINNER

Electrolytic apparatus for the determination of copper in insecticides and fungicides. E. B. HOLLAND AND G. M. GILLIGAN. *Ind. Eng. Chem.* 20, 533(1928).—The app. described as easily maintained, ready for use at a nominal cost is described. E. F. S.

Report on (the determination of unsulfonated residue in mineral oils used as) insecticides and fungicides. J. J. T. GRAHAM. *J. Assocn. Official Agr. Chem.* 11, 141-7(1928); cf. *C. A.* 21, 1345.—A collaborative study of the use of 37 N and 38 N H_2SO_4 , warming 10 and 60 min. at 60-5° and warming at 100° for 1 hr. showed that on the whole use of 38 N acid and warming 10 min. at 60-5° gave somewhat lower results (*i. e.*, resulted in more complete sulfonation) and caused less trouble from the formation of a dense, black column necessitating addn. of water for the reading. Adoption of the method as previously published is recommended, with the addn. that, if greater accuracy is required, the measured sample may be weighed and its exact vol. calcd. from the wt. and the d. of the oil. A. PAPINEAU-COUTURE

Lubricating oil emulsions for the control of pear psylla. F. Z. HARTZELL AND F. L. GAMBRELL. N. Y. Agr. Expt. Sta., *Circ.* 98, 1-4(1928).—A 3% lubricating oil emulsion applied at the late dormant period effectively controlled psylla without foliage injury. An air temp. of 18° was satisfactory. Oil was most effective when applied before psylla egg deposition occurred on the trees. C. R. FELLERS

Effect of fertilizers on vitamin content of wheat (ANON) 11E. The problem of Cu as a normal component of plants (QUARTAROLI) 11D.

HASELHOFF, EMIL, and BLANCK, EDWIN: *Lehrbuch der Agrikulturchemie. II. Düngemittellehre.* Berlin: Gebrüder Borntraeger. 216 pp. M. 13 50, subscription price, M. 12.

MASON, A. FREEMAN: *Spraying, Dusting and Fumigating of Plants.* A popular handbook on crop protection. New York: The Macmillan Co. 539 pp. \$5.

Fertilizer. F. G. LILJENROTH. *Brit.* 275,843, Aug. 13, 1926. Mineral phosphate is treated with H_2SO_4 to form $\text{H}_3\text{P}_2\text{O}_7$ and a ppt. of CaSO_4 ; the $\text{H}_3\text{P}_2\text{O}_7$ is sepd. and the CaSO_4 , as a silt in water, is treated with NH_3 and CO_2 to produce a ppt. of CaCO_3 and a soln. of $(\text{NH}_4)_2\text{SO}_4$. The $\text{H}_3\text{P}_2\text{O}_7$ is neutralized with NH_3 and mixed with the soln. of $(\text{NH}_4)_2\text{SO}_4$ and the soln. thus formed is evapd. to obtain a fertilizer.

Phosphatic fertilizer. L. ADELANTADO. *Brit.* 276,297, Aug. 19, 1926. Finely divided natural phosphate is treated with sol. sulfates in the presence of inorg. acid, preferably H_2SO_4 , in the proportion of 3 mols. of H_2SO_4 and 3 mols. of sulfates such as those of K and NH_4 to 2 mols. of tri-Ca phosphate. The product is treated with hot water and the acid soln. obtained is neutralized, concd. and crystd. The material may be used with peat or other materials in making composite fertilizers.

Device for spraying and granulating fused materials such as urea or other fertilizer materials. T. B. TURLEY, W. H. ROSS and A. R. MERZ. U. S. 1,670,831, May 22.

Ammonium and calcium nitrate and sulfates or phosphates. AZOGENO SOC. ANON. PER LA FABBRICAZIONE DELL'AMMONICA SINTETICA E PRODOTTI DERIVATI, C. TONIOLO and B. TANZI. *Brit.* 276,350, Aug. 19, 1926. A double salt less hygroscopic than $\text{Ca}(\text{NO}_3)_2$ is prepd. by mixing $(\text{NH}_4)_2\text{SO}_4$ and anhyd. $\text{Ca}(\text{NO}_3)_2$ in the presence of 2 mols. H_2O for each mol. of nitrate. In some cases more water may be used. Phosphates may be used instead of the sulfate and various other substances may also be added to form composite fertilizers.

Disinfecting seeds. G. OSVALD. U. S. 1,670,980, May 22. A finely divided

dry compn. for treating seeds comprises an inert material such as talc admixed with about 2–10% of polymerized CH_2O .

Fungicides for treating seeds. I. G. FARBERIND. A.-G. Brit. 276,033, Aug. 16, 1926. A Cu salt is mixed with a solid caustic alkali and with a tartrate, *e. g.*, a mixt. may be formed of anhyd. CuSO_4 , anhyd. Rochelle salt, NaOH and NaCl. Cf. C. A. 22, 1648, 2232.

Apparatus for carbonizing seaweed and recovering a condensate which may be used as an insecticide. G. J. B. CHAMAGNE. Brit. 275,998, Aug. 11, 1926.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Origin of aldehydes in fermentation products. III. MASAKAZU YAMADA. *Bull. Agr. Chem. Soc. (Japan)* 4, 18–21(1928); cf. C. A. 22, 841.—From the steam-distn. product of evapd saké and shoyu, an aldehyde resembling in its reaction methylfurfurole was obtained. The ethereal ext. of saké and shoyu, on the other hand, gives no Jorissen's furfurole reaction. The furfurole may then be supposed to be produced during distn. IV. *Ibid* 22–4.—The gradual increase of AcH contents of saké during storage is caused for the most part by the action on EtOH of an oxidizing agent in the material of the container, *i. e.*, *Cryptomeria* timber. The aldehyde formation according to the kind of timber is as follows: pine 0.00949%, American pine 0.00210, camphor tree 0.01961, *Quercus glandulifera* 0.00210, cherry 0.00443, *Chamaecyparis pisifera* 0.01222, American *Cryptomeria* 0.00132, *Cryptomeria japonica* 0.02860. This oxidizing power is retarded by alk. reaction. Timber boiled for thirty min. loses its oxidizing power. K. Goro

Products of fermentation by filamentous fungus. III. YUSUKE SUMIKI. *Bull. Agr. Chem. Soc. (Japan)* 4, 13–4(1928).—From the fermentation fluid produced by *Cytospora damnosus* were isolated ethyl alc., fusel oil, acetaldehyde, pyruvic acid and acetic acid. K. Goro

Influence of various concentrations of phenol on the rate of alcoholic fermentation. EMIL ABDERHALDEN. *Fermentforschung* 9, 389–91(1928).—PhOH in concns. of 0.000, 0.001, 1–0.000,000, 2 g. per 25 cc. phosphate buffer of p_H 6 accelerates alc. fermentation. Higher concns. are inhibitory. A. W. Dorr

Production of alcohol from sisal (waste). ANON. *Ann. office nat. comb. liquides* 3, 63–8(1928).—Lab. and semi-com. expts. showed that sisal waste can easily be pressed to recover 85% of the juice which, fermented by special yeasts and suitably treated, gives a wort contg. 3.7% alc. by vol. A. PAPINEAU-COUTURE

Wines of the coöperative cellars of the Hérault from the 1927 vintage. HUGUES AND PAU. *Ann. fals.* 21, 142–6(1928).—Analyses of 19 wines of known purity are tabulated and discussed. A. PAPINEAU-COUTURE

Rapid micro-determination of the phosphoric ion in wines and other fermented beverages. GEORGE DINIGES. *Ann. fals.* 21, 136–42(1928); cf. C. A. 22, 1296.—A detailed description of the technic, particularly as applied to wines. Because of the very small quantities of material used, the detn. of total P_2O_5 (including destruction of org. matter with HNO_3) can be carried out in not over 10 min. A. P.-C.

Contribution to the study of the use of sulfurous acid in wine making. II. Use of sulfurous acid as a preservative in grape musts and in sweet white wines. L. MOREAU AND E. VINET. *Ann. fals.* 21, 130–36(1928); cf. C. A. 21, 4013.—Most yeasts will not grow in must in the presence of 60 mg. free SO_2 per l. some will in the presence of 90–110 mg., but none in the presence of 150 mg. The presence of 700 mg. free SO_2 per l. kills all the yeasts in 1.5 hrs.; 300 mg., in 5 hrs.; 200 mg., in 24 hrs. Because of combination of added SO_2 with the constituents of the must, 380–500 mg. free SO_2 should be added, to ensure a min. of 150 mg. free SO_2 per l. after combination is complete. The min. quantity of free SO_2 required to prevent growth of yeasts in wine depends on the alc. content; it was found to be 45 mg. per l. with 9% alc., 30 mg. with 11% and 20 mg. with 13%. Because of slow loss of SO_2 through oxidation, sweet white on bottling should contain 60–70 mg. free SO_2 if it contains 11% alc. and 40–50 with 13%. The expts. were carried out with the yeasts generally present in white wines. A. PAPINEAU-COUTURE

Samsu from rice. R. O. BISHOP AND G. L. TEIK. *Malayan Agr. J.* 16, 14–9(1928).—The methods of fermenting and distg. rice are very crude and large losses result. The alc. content of the fermented mash is 8.5% by wt. on the 8th day and 8.9 on the 25th day. The fluidity reaches a max. on the 19th. Twenty% of unfermented

starch is left. 123.5 lbs. of pure starch yield only 4.75 gals. alc. The theoretical yield is 8.85 gals. In good practice 6.8 to 7.4 gals. can be obtained. To increase the yield, yeast should be added. The compn. of samsu is alc. 37.96, volatile acidity as acetic acid 0.097, fixed acidity —, esters as Et acetate 0.43, higher alcs. 0.043. C. N. F.

Distilling and rectifying column for alcoholic liquids. J. SCHNEIBLER. U. S. 1,670,743, May 22.

Dehydrating alcohol with addition of benzene. J. A. STEFFENS. U. S. 1,670,053, May 15. Dehydration is effected in a column still so operated as to produce a mixt. of vapors of alc., H_2O and C_6H_6 at the head of the still having a compn. such that 2 liquid layers would be formed on condensation of the mixt. The mixt. is condensed at substantially still head temp. and there is sepd. and withdrawn a minor fraction of the layer of liquid contg. the greater proportion of water, and the rest of the condensate is returned to the still. Concd. alc. is obtained at the base of the still, and the fraction of the head condensate which is sepd. is redistd. An app. is described.

Apparatus for feeding vinegar stock to generators. E. G. PFAHL. U. S. 1,670,164, May 15.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Detection of lead and copper in citric and tartaric acids, and extracts. G. FRERICHS. *Apoth. Ztg.* 43, 513-4(1928).—A critical discussion of the Ger. Pharm. tests.

W. O. E.

Distribution of saponins. L. ROSENTHALER. *Apoth. Ztg.* 43, 528-30(1928).—A list of saponin-bearing plants is presented based upon L. Kofler's monograph "Die Saponine."

W. O. E.

Rice and wheat starches of the D. A. B. 6. G. FRERICHS. *Apoth. Ztg.* 43, 543(1928).—An exptl. study of these two products based on the Ger. Pharm. requirements.

W. O. E.

Defatting preparations for the hair. A. THIEME. *Pharm. Ztg.* 73, 554-5(1928).—A discussion of the various cosmetics (powders, hair waters and soaps) designed for the removal of excess fat from the hair.

W. O. E.

An active disinfectant. H. HIERMANN. *Pharm. Zentralhalle* 69, 273-5(1928).—Of all the many disinfectants at present available, the author considers that the chloramine preps. of Heyden deserve particular attention in point of chem. and phys. properties.

W. O. E.

Chemical examination of paraffin-oil emulsions prepared with tragacanth. E. SCHULEK AND G. VASTAGE. *Pharm. Zentralhalle* 69, 275-8(1928).—In a tared 200-cc. beaker heat 20 g. of the sample 10 min. on the water bath with 50 cc. 96% alc., stirring constantly the while to promote sepn. of the emulsion, whereby the paraffin should collect at the bottom of the beaker. Add 50 cc. petroleum ether to the cooled mixt., stir with a glass rod and transfer the liquids to a separatory funnel, leaving the tragacanth in the beaker. Wash the gum by kneading with a rod with four 10-cc. portions of petr. ether, which are finally added to the liquids in the separator. Pass the paraffin-contg. petr. ether through a pledget of cotton into a 200-cc. Erlenmeyer flask, then ext. the aq.-alc. soln. with three 10-cc. portions of petr. ether. Distil the united petr.-ether exts., dry the residual paraffin at 120° and weigh. Transfer the alc. soln. to the original beaker, evap. on steam bath, dry at 105° and weigh.

W. O. E.

Testing of balsam of copaiba and Peru. H. WIEBELITZ. *Pharm. Ztg.* 73, 567(1928).—A critique of the Ger. Pharm. specifications, notably with respect to their behavior in $CHCl_3$, abs. EtOH or AcOH soln.

W. O. E.

Determination of high-boiling phenols in a coal-tar creosote-castor oil soap disinfectant. J. N. TAYLOR. *J. Assocn. Official Agr. Chem.* 11, 222-5(1928).—Using the methods described by Chapin (C. A. 3, 690) high-boiling phenols in an emulsion-producing type of disinfectant contg. a castor-oil soap were found to be more satisfactorily and accurately detd. by distg. directly than by steam distn. A. PAPINEAU-COUTURE

Farnesol from oil of palmarosa. F. ELZE. *Reichstoffindustrie* 1928, 41; *Parfums de France* 6, 112(1928).—Fractionation of the product of sapon. of the tail fractions obtained from 5200 kg. of oil gave 31.5 kg. geraniol and 34.5 kg. crude farnesol, which, on purification via the acid phthalate, gave 18 kg. farnesol, b_p 145-7°, d_4^{20} 0.897, n_D^{20} 1.461, semicarbazone of the corresponding aldehyde m. 133-134.5°. A. PAPINEAU-COUTURE

Contribution to the knowledge of the composition of oil of rosemary. B. N.

RUTOVSKII AND I. V. VINOGRADOVA. *Trav. inst. chim. pharm. Moscou* 17, 86-97(1927); *Parfums de France* 6, 112(1928).—Oil of rosemary of Crimean or Caucasian origin was found to contain *l*- and *dl*- α -pinene, camphene, cineole, borneol, *l*-camphor and probably camphylene.

A. PAPINEAU-COUTURE

Recent progress in the chemistry of perfumes. HENRI TATU. *Technique moderne* 20, 263-8(1928).—A brief review of the synthetic prepn. of borneol, terpineol, thymol, menthol, vanillin and hydroxycitronellal.

A. PAPINEAU-COUTURE

Crimean oil of anise. B. N. RUTOVSKII AND P. LEONOV. *Trav. sci. inst. chim. pharm. Moscou* 10, 64-8(1924); *Parfums de France* 6, 112-3(1928).—The oil, obtained in 0.61% yield, had f. p. $+4^{\circ}$, d_4^{20} 0.9705, $n_D^{20} +12.15^{\circ}$, $n_D^{25} +1.5405$, acid no. 0, sol. in 6.3 vol. 80% alc. The anethole sepd. by freezing, m. 17.5° , and had n_D^{20} 1.5271. Phellandrene was identified by its nitrite (m. 113.5°) and methylchavicol by $KMnO_4$ oxidation to homoanisic acid (m. 86°). No fenchone was detected.

A. P.-C.

Procedure for the extraction of amygdalin and emulsin from the press cake of bitter almonds. M. BRIDEL AND (MLLE.) M. DESMARET. *Bull. soc. chim. biol.* 10, 373-80(1928); cf. C. A. 22, 971.—Sugars and glucosides are readily extd. from bitter almond press cake by means of a rapid percolation with 70% alc., the sucrose being totally extd. in 9 hrs. and the amygdalin in 12.5 hrs. By this rapid method these constituents are extd. before the enzymes exercise their hydrolyzing action, and before these same enzymes are altered by alc. From the residue of press cake after the rapid percolation by alc. an emulsin can be extd. which has practically the same properties as the emulsin extd. from sweet almonds, the same quantity per kg. and at $1/8$ to $1/7$ of the cost. The yield of amygdalin was 30 g. per kg.

L. W. RIGGS

Results of elementary analysis of a preparation of insulin with an activity of forty units per milligram. A. BOIVIN AND R. GUILLEMET. *Bull. soc. chim. biol.* 10, 415-20(1928); cf. Abel, C. A. 21, 2912.—The procedure for prepg. the samples of insulin analyzed is described. The results were C 51.8, H 5.8, O 25.4, N 14.0, S 2.96, ash 0.

L. W. RIGGS

A new method of estimating crystalline digitalin. EM. PERROT AND P. BOURCET. *Compt. rend.* 186, 1021-4; *Bull. sci. pharmacol.* 35, 233-5(1928).—Details are given for the detn. of cryst. digitalin, m. $240-47^{\circ}$, in the dried leaves of the plant. The procedure is long and such as would be used by the manufg. chemist.

L. W. RIGGS

Fishing vessels medicines. ANON. *Chemist and Druggist*, 107, 275, 374(1927).—An official list is given of 10 formulas of medicinal mixts. for emergency use on fishing vessels. The formula for eye drops to act as a local anesthetic is cocaine 0.5%, HCl 0.033% in castor oil; concise directions are given for its application. S. warns that with the oily medium, surface anesthesia is not produced within the time stated; he recommends a soln. of 0.5-1% cocaine in 2.5% PhOH, or an aq. soln. of ethocaine borate.

S. WALDBOTT

Detection of refined olive oil in virgin olive oil. BAUD AND COURTOIS. *J. pharm. chim.* 7, 215-8(1928); cf. C. A. 22, 1051.—Prehse's observation (C. A. 19, 2278) is confirmed: Pure refined olive oils exposed in a small quartz tube to ultra-violet light filteree through a Wood's screen exhibit a characteristic tint and fluorescence which differentiatd them from virgin olive oils. Addn. of 10% of pulp oils is easily detected; the addn. of 10% of 2nd pressure oil is not so easily detected. Soy-bean oil and grape-seed oil also show strong blue fluorescence. Virgin olive oil becomes fluorescent in Wood's light after prolonged heat; the intensity varies with the length of heating and the temp.

S. WALDBOTT

Ammoresinol from ammoniacum gum-resin. P. CASPARIS AND IDA MICHEL. *Pharm. Acta Helv.* 3, 25-31, 41-52(1928); cf. C. A. 19, 2261.—The gum-resin consists largely of ammoresinol (A). To avoid resinification and obtain good yields, select a light colored drug, use excess of Et_2O in extg. A (e. g., 500 cc. for 20 g. drug), shake out A with weak NaOH soln. (1%), remove A at once from NaOH soln. with weak acid in the presence of Et_2O , evap. Et_2O in vacuo to avoid heat, then convert A into the Ac compd., from which A is recovered almost quant. by mild sapon. A is insol. in H_2O , sol. in 5% Na_2CO_3 , pptd. from this soln. by CO_2 ; sol. in alkali, difficultly in C_6H_6 , C_6H_5Me , sol. in $EtOH$, $MeOH$, Et_2O , $CHCl_3$, Me_2CO , $AcOH$, $AcOEt$, and C_6H_5N . A and its solns. in org. solvents rapidly turn yellow when exposed to light. A 10% soln. in abs. $EtOH$ is optically inactive; the alc. soln. is faintly acid to litmus. In $CaOCl_2$ soln., A is sol. with orange-red color (Plugge's test for ammoniacum). The formula $C_{15}H_{24}O_4$ for A is expanded to $C_{16}H_{17}(OH)(OMe)_2$, since 2 MeO groups are shown to be present. Degradation by oxidation with H_2O_2 in glacial AcOH yielded γ -resorcylic acid, indicating an aromatic nucleus in which 2 O atoms are in *m* position. Br is not

absorbed, but by catalytic hydrogenation H_4 is added indicating 2 double bonds in a partly hydrogenated nucleus. The following tentative formula for *A* is given: $C_6H_2(OH)(OMe).CH_2CH_2.C_6H_2(H_2)Me_2(OMe)$. It suggests a relation of *A* to polyterpenes which also tend to resinify. S. WALDBOTT

The hydrocyanic acid question. XXII. Hydrocyanic acid in the genus *Vicia*. L. ROSENTHALER. *Pharm. Acta Helv.* 3, 31-2(1928); cf. *C. A.* 22, 1995.—HCN is known to exist in *Vicia sativa*, L. (0.0008% in seeds, Bruynning and van Haarst) and var. *briannica* (0.00016%, B. and v. H.), var. *flore albo* and var. *Bernayer*; *V. hirsuta* Gray, *V. angustifolia* (Clos) Roth (0.075% in seeds, Bertrand); *V. macrocarpa* Bertol., *V. villosa* Roth (in unripe seeds). Free from HCN are *V. narbonneensis* (except in the germ, R.), *V. Cracca* L., *V. agrigenina* (?), *V. fulgens* Batt., *V. dumetorum* L., *V. villosa* Roth (in ripe seeds). By macerating the crushed seeds for 12-24 hrs. with H_2O , distg and testing for HCN in the distillate by the NH_4SCN reaction, R. finds HCN present in the seeds of *V. ambigua* Guss., *V. atropurpurea* Steud. (traces), *V. biennis* L. (traces), *V. calcarata* Desf., *V. carnigera*, *V. cassubica* L. (0.008%), *V. disperma* DC (traces), *V. Gerardii* Vill. (traces; more HCN in the germ), *V. grandiflora* Scop. (traces), *V. globosa* Retz (traces), *V. lutea* var. *pallidiflora* (traces), *V. Michauxii* Schrank, *V. multiflora*, *V. pannonica* Crantz (traces; more HCN in the germ), *V. peregrina* L., *V. pica* Fisch. et Mey., *V. polyphylla* Waldst et Kit. (traces), *V. pseudocracca* Bertol (traces), *V. striata* Bieb. (0.028%), *V. sepium* L. (traces; also in the flowering green parts, cf. R., *C. A.* 17, 1269), *V. tricolor*. No HCN was found by R. in the seeds of *V. bithynica* L., *V. cuspidata* Boiss., *V. ferruginea*, *V. hybrida*, *V. onobrychioides* L., but HCN was present in their germs. No HCN was present in the seeds or germs of *V. sylvatica* L. and *V. faba* L. XXIII. Hydrocyanic acid in grasses of Bechuanaland.

MARGUERITE HENRICI. *Ibid* 33, from Reports of the Director of Veterinary Education and Research, Pretoria, 1926.—By applying Guignard's test (*C. A.* 11, 675), HCN was found in the following grasses at the time of their withering or beginning to dry: *Antherophora pubescens*, *Aristida unipennis*, *A. congesta*, *Chrysopogon serrulatus*, *Digitaria erantha*, *Pogonarthria fulcata*, *Sporobolus fimbriatus*, *Themeda triandra*. No HCN was found in *Chloris virgata*, *Cymbopogon plurinodis*, *Eragrostis superba*, *E. lehmanniana* and *Fingerhuthia africana*. Unlike the grasses contg. HCN, those devoid of it turn red during the dry period in summer, indicating a relation between formation of HCN and that of anthocyanins. XXIV. The hydrocyanic glucoside from the seeds of the myrobalan plum. I. ROSENTHALER. *Ibid* 33-4.—In the seeds of *Prunus myrobalana* Loisel (L.), R. found 0.125% HCN, present as *l-amygdalin*. S. WALDBOTT

The centenary of the birth of Marcelin Berthelot. ANON. *Neue Zürcher Zeitung; Schweiz. Apoth. Ztg.* 65, 573-4, *Chemist and Druggist* 107, 416(1927)—Biography. S. WALDBOTT

A phase of the relationship of chemical structure to pharmacological action. C. W. BAUER. *J. Am. Pharm. Assocn* 16, 1059-61(1927)—This is a discussion of the influence on the degree of toxicity produced by an acid radical which is used to render the drug H_2O -sol. Many drugs which are useful in therapy are insol. and many attempts have been made to render them sol. by the addn of groups. SO_3H and $COOH$ and their alkali salts render many compds sol but destroy their activity. In many instances the activity may be restored by esterification. On the other hand the HCl of the NH_4 group renders a drug sol. and does not destroy its activity. L. E. WARREN

The causes of precipitation in tinctures and fluidextracts. W. L. SCOVELLE. *J. Am. Pharm. Assocn* 16, 1136-46(1927).—Four classes of drugs were selected for study (A) alkaloidal, (B) astringent, (C) cathartic and (D) miscellaneous. Of each of 31 drugs 1000 cc. of tincture were prepared. The prepn. was divided into 8 portions of 125 cc. each. They were variously subjected to different (1) intensities of light, (2) acidity, (3) alkalinity, (4) oxidation, (5) reduction, (6) strongly ionizing agents, (7) saline buffers and (8) dehydrating agents. Light is not a serious factor; acidity is important as is also the manner of its addition, i. e., whether added before or after percolation; HCl or $NaCl$ prevented pptn. in but one instance, increased it in 12 and was neutral in 18; NH_4OH caused pptn. in every case; H_2O increased pptn. in 5, decreased it in 5 and showed no effect in 21; CO_2 showed slight beneficial effect on 3 and increased pptn. in 24; H_2PO_4 showed a beneficial effect on 3, increased pptn. in 20 and was neutral in 8; $Na_2C_2H_3O_2$ benefited in 18; the use of $C_2H_5(OH)$, and of $EtOH$ in greater concns. tends to reduce pptn. by reducing the hydrolytic action. L. E. WARREN

Pharmaceutical products from mucic acid. F. F. BLICKE AND J. L. POWERS. *J. Am. Pharm. Assocn.* 16, 1146-9(1927).—Granular effervescent salts may be made with mucic acid instead of tartaric acid at some saving in cost. Other possible pharmaceutical uses are mentioned. L. E. WARREN

The effect of changes of hydrogen-ion concentration upon compound tincture of gentian. J. C. KRANTZ, JR. AND F. J. SLAMA. *J. Am. Pharm. Assoc.* 16, 1158-7 (1927).—Several tinctures were prepd. from the same specimen of ground drug. To the official menstrum varying amts. of acid or alkali were added and the effects noted on standing. The acids used were HCl, H₂SO₄, and HC₂H₃O₂. The alkali was NaOH. In each case the H-ion concn. was detd. electrometrically. The results indicated that the min. deposit is formed when the p_H of the menstrum is near the neutral point.

L. E. WARREN

Apparatus for the determination of volatile oil. J. F. CLEVINGER. *J. Am. Pharm. Assoc.* 17, 346 (1928).—The app. consists essentially of a distg. flask, a condenser and a separator for sepg. the volatile oil from the H₂O in the distillate. The separator exists in two forms, A and B. A, for oil lighter than H₂O, consists of a condenser having its lower ends drawn out to a graduated tube and provided with a glass tap at its distal end. The tube carrying the vapors enters the condenser from the side at a point above the graduated tube. A siphon leaves the condenser at a point below the graduations. This rises to a point above the graduations. It returns the se d H₂O to the distg. flask, leaving the volatile oil in the graduated tube above. B, for oils heavier than H₂O, is similar to A except that the return siphon for the H₂O leaves the separator at a point above the graduations, leaving the oil in the graduated tube below. The material contg. the volatile oil is placed in the distg. flask with H₂O. The flask is heated in an oil bath. The oil found in several drugs by the new method closely paralleled that found by the U. S. P. X method for volatile Et₂O ext.

L. E. WARREN

The assay of Ephedra vulgaris. J. B. WILLIAMS. *J. Am. Pharm. Assoc.* 17, 430-1 (1928).—*Ephedra* has been reported to contain 0.2-1% of total alkaloids. By the U. S. P. X assay method for belladonna, slightly modified samples of *Ephedra* were assayed. Gravimetrically the yields were 0.73-1.42%; volumetrically 0.48-1.25%. The factor used in the volumetric assay with Mc-red indicator is 1 cc. 0.1 N acid = 0.01659 g. of alkaloid. If a CHCl₃ soln. of the alkaloids be allowed to stand and then evap., Cl will be found in the residue. At 100° the alkaloid is almost completely volatile. Good results can be obtained by using Et₂O as final solvent and adding the 0.1 N acid before evapn. The Et₂O soln. should be filtered through wet cotton with Et₂O and not washed with H₂O.

L. E. WARREN

Medicinal muds of Crimean salt lakes (SAGIDACHNUH) 11A.

DEBREUILLE, ROGER: **Procédé rapide de dosage limite des alcaloides dans les préparations du codex.** Lons-le-Saunier: Lucien Declume. 84 pp.

FALCK, AUGUST: **Die officinellen Drogen und ihre Ersatzstoffe.** Edited by Max Baur. Leipzig: Joh. Ambr Barth. 349 pp. M. 25; cloth binding, M. 27.

Emetine. E. BURCKHARDT and M. STÄRKLE. U. S. 1,670,059, May 15. Cephaeline is methylated with phenyltrimethylammonium hydroxide.

Aldehyde compounds of diaminoacridines. G. W. RAIZISS and B. C. FISHER. U. S. 1,670,740, May 22. An addn. product is formed by 2 aromatic aldehyde mols. such as salicylaldehyde joined to the amino groups of 3,6-diamino-10-alkylacridinium compds such as acriflavine. These products are *therapeutic bactericides*.

1-Amino-3-tertiaryamino-2-propanols. I. G. FARBENIND. A.-G. Brit. 276,012, Aug. 13, 1926. 1-Amino-3-diethylamino-2-propanol is made by heating 3-chloro-2-hydroxypropylphthalimide with a soln. of diethylamine in alc. and sapon. the product or by heating the hydrochloride of 3-chloro-2-hydroxypropylamine with diethylamine and alc. Similar methods are given for the production of 1-amino-3-piperidino-2-propanol and 1-amino-3-phenylmethylamino-2-propanol. These compds. may be used as medicines or as intermediates for making other therapeutic compds.

Gold nucleic acid compounds. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Brit. 276,677, Aug. 25, 1926. Therapeutic Au compds. are made by reacting upon nucleic acid or a water-sol. nucleate with a Au compd. such as AuCl₃. In neutral or alk. soln. a water-sol. Au-alkali nucleate is obtained; in acid soln. an insol. Au nucleate is produced which is converted by alkali into the sol. Au-alkali compd.

Scarlet fever antitoxins. I. G. FARBENIND. A.-G. Brit. 276,024, Aug. 14, 1926. Anti-serums are prepd. from rod-like bacilli found in cases of scarlet fever but differ from the usual scarlet fever hemolytic streptococci. Various details and modifications of procedure are given.

Hormones. CHEMISCHE FABRIK. AUF AKTIEN, FORM. E. SCHERING. Brit.

276,994, Sept. 4, 1926. Hormones such as may be obtained from germ glands by the process described in Brit. 261,356 (C. A. 21, 3425) are obtained in water-sol. form by treatment with an alk. earth and subsequently pptg. the latter as carbonate. Cf. C. A. 22, 251.

Vegetable medicinal products similar to hormones from glands. CHEMISCHE FABRIK AUF AKTIEN VORM. E. SCHERING. Brit. 277,302, Sept. 11, 1926. Processes are described closely similar to those of Brit. 271,492 (C. A. 22, 1654).

Solvents for medicines. SOC. ANON. POUR L'IND. CHIM. A. BALE. Brit. 277,003, Sept. 1, 1926. The product for dissolving medicines insol. or difficultly sol. in water obtained as described in Brit. 218,982 (C. A. 19, 560) is modified by substituting for the carbamic acid-ester a water-sol. aliphatic acid amide or N-substituted deriv. such as acetamide or diethylacetamide.

Medicinal tablets formed of yeast and chocolate. C. DOCTOR. Brit. 276,926, May 10, 1927.

Coatings for wrapped medicines, etc. F. BLANK. Brit. 276,501, Aug. 26, 1926. Wrapped medicines, bandages, etc., are coated with a celluloid varnish or similar compn. contg. a cellulose deriv.

Cosmetic. T. HASHIMOTO. U. S. 1,670,449, May 22. A slightly acid soln. of Bengal isinglass agar is heated under about 2 atm. pressure to prevent coagulation, and there are added a soln. of *gloiopeltis furcata*, $(\text{CH}_3)_4\text{N}_4$, Li benzoate and an alc. soln. of lanolin. Cf. C. A. 21, 476.

Mixture for treating the hair. O. S. FOLTMAR. Brit. 276,500, Aug. 25, 1926. A compn. for removing grease from and curling the hair is formed of PrOH or C_6H_6 , camphor, resorcinol and water, with or without perfume and coloring.

Varnish for finger nails. L. STUDER and B. G. BAINBRIDGE. Brit. 276,834, Sept. 9, 1926. Pyroxylin and camphor are dissolved with AmOH, acetone, AmOAc and MeOH and the mixt. is colored with "carmine oil" (a cochineal prepn.).

Paper sheets treated with gums or antiseptics for "trapping" or destroying bacilli in sputum, etc. F. KOESTER and J. RHODE. Brit. 275,935, Aug. 11, 1926.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Modified circulation system improves operation of chamber plant. E. L. LARISON. *Chem. Met. Eng.* 35, 229 (1928).—In a chamber H_2SO_4 plant as ordinarily operated, the vol. of acid distributed over each Gay Lussac tower is the same as that of the nitrous vitriol fed to the Glover tower. This is often less than the amt. desirable for most efficient absorption in the Gay Lussac towers. A simple change in operating detail is described which permits continuous optimum liquid flow through the Gay Lussac towers even when the Glover tower feed is considerably less. The new circulation system results in an increase in percentage recovery in the Gay Lussac tower from 85 to 90, and a decrease in daily consumption of fresh NaNO_2 from 2500 to 1700 lbs. The plan is covered by U. S. patents Nos. 1,613,139 and 1,638,042. R. L. DODGE

Treatment of leucite with nitric acid. G. A. BLANC. *Atti II congresso naz. chim. pura applicata* 1926, 1398–405.—When HCl is replaced by HNO_3 in the treatment of leucite, pure Al_2O_3 and pure KNO_3 are obtained (cf. C. A. 19, 1616). Subsequent expts. show that the HNO_3 process is utilizable on a com. scale, in which case the leucite is treated under the same conditions as with HCl and the general phenomena are similar, solns. free of SiO_2 being obtained, even without filtration. The best method found for the sepn. of $\text{Al}(\text{NO}_3)_3$ and KNO_3 depends upon the fact that $\text{Al}(\text{NO}_3)_3$ is practically insol. in cold 65–70% HNO_3 , while the soly. of KNO_3 increases with increase in the concn. of HNO_3 . The soly. of $\text{Al}(\text{NO}_3)_3$ and of KNO_3 in HNO_3 of all concns. at 15° is shown graphically. Just sufficient HNO_3 of suitable concn. is added to the hot reaction mixt., satd. with both $\text{Al}(\text{NO}_3)_3$ and KNO_3 , to cause on cooling the sepn. of all $\text{Al}(\text{NO}_3)_3$ but no KNO_3 . Under these conditions the $\text{Fe}(\text{NO}_3)_3$ also remains in soln. with the KNO_3 and the crystd. $\text{Al}(\text{NO}_3)_3$ contains only a trace of $\text{Fe}(\text{NO}_3)_3$. The mother liquor contg. KNO_3 and $\text{Fe}(\text{NO}_3)_3$ is evapd., the nitrous-nitric vapors are condensed, and the KNO_3 and $\text{Fe}(\text{NO}_3)_3$ crystd. Al_2O_3 is obtained from $\text{Al}(\text{NO}_3)_3$ in much the same way as from AlCl_3 and its properties are the same. The H_2O in the Al_2O_3 is not H_2O of hydration but is adsorbed and can be eliminated at low temps., and the reaction is not exothermic, as with the evolution of H_2O of hydration from Bayer Al_2O_3 . The removal of H_2O is, therefore, far more economical in the Blanc process. Nitrous-nitric vapors are condensed both in the evapn. of the KNO_3 soln. and in the decompn.

of $\text{Al}(\text{NO}_3)_3$, and when granular leucite is moistened with water it has the power of fixing all these nitrous-nitric vapors, whatever their diln. in the H_2O -air distillate. Therefore, the HNO_3 is completely recovered and used for the attack of more leucite. It is best to use the vapors from the evapn. of the KNO_3 to acidify the soln. for attack of the leucite, while the vapors from the decompn. of $\text{Al}(\text{NO}_3)_3$ pass through towers filled with leucite with a counter-current of water. This great ability of leucite to fix the last traces of nitrous-nitric vapors suggests the use of leucite in the HNO_3 industry. C. C. D.

Ammonia synthesis with catalysts derived from complex cyanides of iron. A. MITTASCH AND E. KUSS. *Z. Elektrochem.* **34**, 159-70(1928); cf. following abstract.—Complex cyanides of Fe or carbides derived from these cyanides are not themselves effective catalysts for the synthesis of NH_3 . The active agent is elementary Fe resulting from the decompn. and reduction of the complex cyanide. The activity of the Fe may be enhanced by the presence of other materials that arise during the decompn. of the complex cyanides. The effective catalyst is then only a promoted Fe catalyst. This conclusion is supported by extensive chem., x-ray and magnetic studies of the complex cyanides and their decompn. products. The bearing of this research on the NH_3 catalyst patent situation in Germany is indicated. R. L. DODGE

The thermal decomposition of complex iron cyanides in connection with the ammonia synthesis. A. MITTASCH, E. KUSS AND O. LEMERT. * *Z. anorg. allgem. Chem.* **170**, 193-212(1928); cf. preceding abstract.—The complex Fe cyanides as such are not NH_3 catalysts, but the products of their decompn. and reduction are. $(\text{NH}_4)_4\text{Fe}(\text{CN})_6$ and $\text{KAlFe}(\text{CN})_6$ are decomposed at high temp. in a $\text{N}_2\text{-H}_2$ mixt. with intermediate formation of a substance corresponding in compn. to $\text{Fe}(\text{CN})_2$. The purely thermal decompn. of $\text{Fe}(\text{CN})_2$ gives Fe, C, Fe_3C , Fe nitride and N_2 , probably with the intermediate formation of FeC_2 . In $\text{N}_2 + \text{H}_2$, $\text{Fe}(\text{CN})_2$ reacts as follows: at 230° , the C and the N in the CN groups are reduced at the same rate, and the completed reaction yields Fe. At 400° the rates of reduction differ and there is obtained, probably through the intermediate formation of FeC_2 , a mixt. of Fe, Fe_3C , C and probably the 2 latter in varieties easily reduced by the $\text{N}_2\text{-H}_2$ mixt. These varieties are changed by prolonged heating above 400° , although the Fe_3C can still be reduced. Fe must always be formed first; Fe_3C could not be prepd. under any conditions without the formation of Fe, while it is possible to control the conditions so as to obtain only Fe. The NH_3 contact catalysts prepd. from complex Fe cyanides must always contain Fe, and are composed chiefly or exclusively of products of reduction. These are activated by the $\text{N}_2\text{-H}_2$ mixt. and constitute then a catalyst. Fe_3C in finely divided form is readily reduced by H_2 to a compact form, at least superficially, so that the catalytic action of Fe_3C as such has never been observed. G. CALINGAERT

The equilibrium relations in the ammonia-soda process under pressure. BERNHARD NEUMANN AND RICHARD DOMKE. *Z. Elektrochem. angew. physik. Chem.* **34**, 136-53(1928).—The app. described, for detg. the solubilities of solids in aq. solns., is capable of holding pressures up to 3 atm. for several hrs. at equil. temp. and allowing samples to be pipetted. The solubilities of combinations, such as $\text{NaCl} + \text{NH}_4\text{HCO}_3 = \text{NH}_4\text{Cl} + \text{NaHCO}_3$, are detd. at 20° , 30° and 40° (not at 40° for those contg. NH_4HCO_3) at 1.2 atm. of CO_2 , accurate to 1%, including: NaCl (I) and NH_4Cl (II), I and NaHCO_3 (III), III and NH_4HCO_3 (IV), II and IV; solns. satd. in II, III, IV and III, II, I; and solns. satd. in II and III, and, III and IV, contg. I in each. To det. the influence of pressure the expts. are repeated at 2.5 atm. of CO_2 on solns. of II, III, IV and I, II, III. From these, 9 diagrams are plotted by Löwenherz's method (*Z. physik. Chem.* **13**, 459; **28**, 453). The congruency or incongruency of the solns. is detd. by given methods and the results are discussed. The Na and NH_4 yields are calcd., from the solubilities for 1.2 and 2.5 atm. of CO_2 at 20° and 30° . The NH_4 yield is increased by lowering the temp. and increasing the pressure, while the Na yield decreases in both cases. Based on the data obtained, a technical process is outlined, the optimum temp. being 30° and the molar ratio of NaCl to NH_3 in soln. 1:1.07. The diagrams and yields are discussed. J. BALOZIAN

Attempts to obtain ammonium phosphates from secondary and tertiary calcium phosphates. CURT MÜCKENBERGER. *Z. anorg. allgem. Chem.* **169**, 81-95(1928).—M. has investigated the transformation of $\text{Ca}_3(\text{PO}_4)_2$ (pure and technical varieties) and CaHPO_4 into sol. phosphates by the action of H_3PO_4 , $(\text{NH}_4)_2\text{SO}_4\text{-H}_3\text{PO}_4$, $\text{NH}_4\text{H}_2\text{PO}_4$, $(\text{NH}_4)_2\text{HPO}_4$ and $(\text{NH}_4)_2\text{CO}_3$ at various temps. and pressures in a glass bomb app. of Askenasy and Elöd. Upon heating mixts. of 3.1 g. $\text{Ca}_3(\text{PO}_4)_2$ with 20 cc. H_3PO_4 (3.1895 g. $\text{P}_2\text{O}_5/20$ cc.) for 5 hrs. at $178\text{--}253^\circ$ under pressures of 14-17 atm. N. 75-61.8% of the P_2O_5 of the reactants was water-sol. The insol. residue was mainly CaHPO_4 . By using the same amt. of $\text{Ca}_3(\text{PO}_4)_2$ and adding 4-5 g. $(\text{NH}_4)_2\text{SO}_4$ and 20 cc.

of H_3PO_4 (0.2709–6.3790 g. P_2O_5 /20 cc.) at 180–290° and pressures of 16–14 atm. N or CO_2 it was found that at the higher temps. and the highest concn. of H_3PO_4 (40% excess) 92% of the P_2O_5 content became sol. according to the reaction $\text{Ca}_3(\text{PO}_4)_2 + 3(\text{NH}_4)_2\text{SO}_4 + 4\text{H}_3\text{PO}_4 \rightarrow 6\text{NH}_4\text{H}_2\text{PO}_4 + 3\text{CaSO}_4$. $\text{NH}_4\text{H}_2\text{PO}_4$ and $(\text{NH}_4)_2\text{HPO}_4$ effect only slight transformations of $\text{Ca}_3(\text{PO}_4)_2$ into sol. phosphates (3–4%). The solid phase remaining when $\text{NH}_4\text{H}_2\text{PO}_4$ is used is a mixt. of CaHPO_4 and $\text{Ca}_3(\text{PO}_4)_2$ at 61–215°. When $(\text{NH}_4)_2\text{CO}_3$ at about 55° is allowed to react with varying amts. of CaHPO_4 under various conditions of pressure (10–12 atm. N or CO_2) in the presence of varying amts. of NH_4Cl , NH_4NO_3 , $(\text{NH}_4)_2\text{SO}_4$, $\text{NH}_4\text{H}_2\text{PO}_4$, $(\text{NH}_4)_2\text{HPO}_4$, NH_4OH and NH_4HCO_3 , an equil. is established between the solids $\text{Ca}_3(\text{PO}_4)_2$, CaHPO_4 , CaCO_3 and traces of CaO and the soln. contg. 30–47% of the P_2O_5 of the original reactants in water-sol. form. Data giving the specific temp., pressures, concns., yields, etc., are tabulated. E. R. S.

Studies on bleaching powder. VIII. The decomposition of calcium hypochlorite by carbon dioxide. SABURO URANO. *J. Soc. Chem. Ind. Japan* 31, 53–60 (1928); cf. *C. A.* 22, 1443.— CO_2 decomposes $\text{Ca}(\text{OCl})_2$ in the presence of H_2O : $3\text{Ca}(\text{OCl})_2 = \text{Ca}(\text{ClO}_3)_2 + 2\text{CaCl}_2$. CO_2 decomposes a mixt. of $\text{Ca}(\text{OCl})_2$ and CaCl_2 in the presence of H_2O : $\text{Ca}(\text{OCl})_2 + \text{CaCl}_2 + 2\text{CO}_2 = 2\text{CaCO}_3 + 2\text{Cl}_2$. Though the formation of $\text{Ca}(\text{ClO}_3)_2$ from $\text{Ca}(\text{OCl})_2$ or the evolution of Cl_2 from a mixt. of $\text{Ca}(\text{OCl})_2$ and CaCl_2 is caused by heat only, CO_2 accelerates these reactions because HOCl is produced from $\text{Ca}(\text{OCl})_2$ by CO_2 and the HOCl oxidizes in turn $\text{Ca}(\text{OCl})_2$ to $\text{Ca}(\text{ClO}_3)_2$ or CaCl_2 to $\text{Ca}(\text{OH})_2$ and Cl_2 . As CO_2 expelled almost all Cl_2 from bleaching powder, Lunge assumed that the chem. constitution of bleaching powder had to be CaCl_2O or $\text{Ca}(\text{OCl})\text{Cl}$. But the mixt. of $\text{Ca}(\text{OCl})_2$ and CaCl_2 also sets free all Cl_2 by CO_2 similarly to bleaching powder. Even CaCl_2 itself expels Cl_2 by CO_2 in the presence of an oxidizing agent like KMnO_4 . The reaction of CO_2 expelling Cl_2 from bleaching powder is therefore no proof of the peculiar combination of $\text{Ca}(\text{OCl})_2$ and CaCl_2 , but can be explained as the common reaction between $\text{Ca}(\text{OCl})_2$, CaCl_2 and CO_2 , or simply as the inverse reaction of the formation of bleaching powder. The chem. constitution of bleaching powder cannot be deduced from the action of CO_2 . K. K.

A study of some calcium and magnesium salts of commerce. G. S. CALIN. *J. Am. Pharm. Assoc.* 16, 1053–6 (1927).—Several specimens of Mg citrate imported into Mexico from Europe were found to be adulterated with Mg tartrate. One was composed entirely of Mg tartrate. Later other substances, such as MgO , MgCO_3 and CaCO_3 were found to contain impurities. L. E. WARREN

Preparation of cyanides from calcium cyanamide. A. A. YAKOVIN and N. A. FLEISHER. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 5, 3–7.—In his 3 expts. on the prepn. of cyanides by calcining CaCN_2 with Na_2CO_3 A. Kretov (cf. *C. A.* 20, 3334) obtained a yield of 70–80% of the group CN based on the amt. of N contained in the cyanamide, but as he did not state the operating temp. and used com. cyanamide of low N content Y. and F. investigated this process. The expts. were made in a tubular elec. furnace. The materials were placed in a porcelain dish and the temp. was maintained mostly between 900° and 1000° and the operations were in a current of N. At the conclusion of each calcination the contents of not only the dish but also of the tube were washed with water and the soln. obtained was analyzed. Preliminary expts. with com. CaCN_2 contg. 12.7% N and 1.4% gypsum and free from CaCl_2 , showed that most of the N formed NH_3 and volatilized, the yield in cyanide being very small. Other expts. made with cyanamides contg. from 20.6 to 22.2% N, freshly prepd. by heating mixts. of finely pulverized com. CaC_2 with 2% CaF_2 at 1000°, showed that the yield of cyanides is noticeably increased when insignificant amts. of nitrides of either Ce, Mg or Al are used as catalyzers and that the most favorable temp. is about 950°. The duration of the operation is about 2 hrs.; if the heating is prolonged to about 6 hrs. part of the cyanide formed is destroyed and the yield is lowered. The best yield (89%) was obtained with 1.62 g. KCl for every 0.5 g. cyanamide and with 0.05 g. Mg_3N_2 as catalyzer. BERNARD NELSON

Chemical utilization of gypsum. G. GALLO. *Giorn. chim. ind. applicata* 9, 405–10 (1927); *Brit. Chem. Abstracts* 1928B, 12.—The only 2 successful processes for the chem. utilization of gypsum comprise the manuf. of (1) H_2SO_4 by the contact process from SO_2 obtained by heating a mixt. of gypsum, SiO_2 , Al_2O_3 and coal in a rotary cement furnace, the residual clinker being used for making cement, and (2) $(\text{NH}_4)_2\text{SO}_4$ and CaCO_3 , by passing NH_3 and CO_2 into an aq. suspension of powd. gypsum. Expts. show that, in the presence of water, equimol. proportions of $(\text{CaSO}_4)_2\cdot\text{H}_2\text{O}$ and MgCO_3 react at ordinary temps., a soln. contg. about 50 g. per l. of MgSO_4 being obtained after 45 days. With $\text{CaSO}_4\cdot 2\text{H}_2\text{O}$ the reaction is slower, and the resulting MgSO_4 soln. contains only 30–35 g. per l. Other uses for MgSO_4 are being sought. C. C. DAVIS

Survey of the opening, the distribution, the organization, and the content of the German potassium-salt deposits. E. FULDA. *Z. physik. chem. Unterricht.* 41, 81-6 (1928). M. BEBER

Survey of the origin, the structure, and the extraction of German potassium-salt deposits, including data on the occurrence of potassium salts abroad. E. FULDA. *Z. physik. chem. Unterricht* 41, 125-32(1928). M. BEBER

The salt series in the Vienenburger potash works. FRANKÉ AND BÜCHNER. *Kali* 22, 103-5(1928).—An exhaustive mining, microscopical and chem. study proves that the potash layer of Vienenburger represents the horizon of the Ronnenberger stratum A. L. HENNE

The reduction of sodium sulfate to sodium sulfide, particularly by hydrogen and carbon monoxide in the presence of catalysts. PETER P. BUDNIKOV AND EUGEN SHILOV. *J. Soc. Chem. Ind.* 47, 111-3T(1928); cf. *C. A.* 21, 803 and following abstract.—Both Ni and C accelerate the reduction of Na_2SO_4 by CO, but C has much greater effect because the primary reaction is reduction of Na_2SO_4 by CO, with CO_2 formation; the C then reduces the CO_2 to CO. When C is present the reduction goes as well with CO_2 as with CO. Reduction of Na_2SO_4 with H begins at 700° , and proceeds with the formation of Na_2S and H_2O ; H_2S and other decompn. products are formed by secondary reactions. Ni catalyzes the reduction, and also the decompn. At temps. of 900° and over Na_2SO_4 reacts with Na_2S to give SO_2 . T. S. CARSWELL

The reduction of sodium sulfate with carbon. P. P. BUDNIKOV AND A. N. SISOEYEV. *Z. anorg. allgem. Chem.* 170, 225-32(1928); cf. preceding abstract.—The reduction of Na_2SO_4 to Na_2S by means of C depends on 3 basic reactions: $\text{Na}_2\text{SO}_4 + 2\text{C} = \text{Na}_2\text{S} + 2\text{CO}_2$; $\text{CO}_2 + \text{C} \rightleftharpoons 2\text{CO}$; $\text{Na}_2\text{SO}_4 + 4\text{CO} = \text{Na}_2\text{S} + 4\text{CO}_2$. The temp. of incipient reaction between C and Na_2SO_4 is a function of the purity and coarseness of the coal, and also of the degree of contact between the 2 substances. The reaction starts at first between the 2 solid phases. The rate of reaction of C with Na_2SO_4 is great. Since gas phases are involved in the process, the theoretical study of the reaction must take the vol. into consideration, and not only the coexistent solid phases. G. C.

Manufacture, properties and use of iron carbonyl. ANDRAULT DE LANGERON. *Rev. univ. mines* 16, 145-61(1927). C. W. OWNINGS

Feldspar in 1926. JEFFERSON MIDDLETON. *Bur. Mines, Mineral Resources of the U. S.* 1926, Part II, 109-17 (preprint No. 10, published Oct. 20, 1927). E. H.

Fuller's earth in 1925. JEFFERSON MIDDLETON. *Bur. Mines, Mineral Resources of the U. S.* 1925, Part II, 25-8 (preprint No. 3, published Feb. 19, 1927). E. H.

Mica in 1926. B. H. STODDARD. *Bur. Mines, Mineral Resources of the U. S.* 1926, Part II, 255-71 (preprint No. 23, published Dec. 30, 1927). E. H.

Potassium and magnesium from Lake Sacki in Crimea. A. F. SAGAIACHNUII. *Trans. State Inst. Applied Chem. (Moscow)* No. 5, 18-24.—The water of Lake Sacki is unusually rich in K and Mg salts. An analysis gave NaCl 12, KCl 0.74, MgCl_2 2.43 and MgSO_4 2.43% and the sp. gr. 1.13. Expts. are being made on the most suitable method of concn. of the water to obtain comparatively pure K and Mg salts. B. N.

Silica in 1926. ESTELLE R. PHILLIPS AND J. A. DORSEY. *Bur. Mines, Mineral Resources of the U. S.* 1926, Part II, 169-73 (preprint No. 16, published Nov., 1927). E. H.

Commercial casein. A. C. WEIMAR AND J. J. TAYLOR. *Michigan Agr. Expt. Sta., Tech. Bull.* 82, 16 pp.(1927).—Commercial methods of mfg. casein were studied to det. which gave the best products. The methods studied were HCl , H_2SO_4 , rennet and sour curd. The natural sour curd method gave the most uniform low-ash casein and good yield. The time and space required for this method do not favor it for economic production. Rennet casein gives an extremely high-ash product. The H_2SO_4 and HCl caseins have the greatest uniformity. The H_2SO_4 is more economical when milk sugar is not made; the whey cannot be used for sugar manuf. J. J. SKINNER

DE JUSSIEU: Evolution de la fabrication de l'acide sulfurique par le procédé des chambres de plomb dans les dernières années. Paris: L'Industrie Chimique. 460 pp. F. 60. Reviewed in *Rev. prod. chim.* 31, 287(1928).

WIESNER, JULIUS VON: Die Rohstoffe des Pflanzenreichs. * Vol. II. Hölzer bis Zucker. 4th ed., revised. Edited by Paul Kraus and Wilhelm von Brehmer. Leipzig: Wilhelm Engelmann. pp. 1123-2253. M. 46; cloth, M. 49; half-leather M. 52.

Sulfuric acid. H. PETERSEN. *Brit.* 276,659, Aug. 28, 1926. In a tower process such as the Opl process, almost all of the nitrous oxides are set free in the first produc-

tion tower, which is of large dimensions and is intensively irrigated with nitrated acid. The tower may be fitted with atomizers, washers, rotary mixers or like devices or may be packed with acid-resisting material.

Denitration of waste acids. W. BÜSCHING. Brit. 276,972, Sept. 3, 1926. H_2SO_4 vapors from a H_2SO_4 concn. boiler are led into a denitration column in counter-current to a flow of waste acid from a preliminary heater. HNO_3 vapors escaping are washed and dried in another column with H_2SO_4 and recovered in concd. form in a cooler. Remaining nitrous fumes pass to absorption towers. An app. and various details are described.

Carbon dioxide. E. W. GREER. Brit. 276,146, Nov. 4, 1926. Solid acid substances and carbonates are mixed with wax, hydrogenated oil or fat or like substances to retard and control their reaction.

Ammonia condenser. S. O. LOKEY. U. S. 1,669,943, May 15.

Catalytic oxidation of ammonia. F. G. LILJENROTH. Brit. 276,295, Aug. 19, 1926. See U. S. 1,663,914 (C. A. 22, 1657).

Ammonia synthesis and other catalytic reactions. H. HARTER. Brit. 275,983, Aug. 10, 1926. The catalyst-holding tube is divided into sep. compartments, each supplied with reacting materials, and the reaction products from each compartment pass into a single conduit. Several alternative details of construction are specified.

Alkali hydrides. DEUTSCHE GOLD- UND SILBER-SCHNEIDANSTALT VORM. ROESSLER. Brit. 276,313, Aug. 23, 1926. H, at a temp. above 200° , is passed over alkali metal, e. g., Na, distributed on a solid diluent such as NaCl, Fe powder, Na_2CO_3 or wood charcoal. The reaction may be carried out counter-currentwise in a rotary inclined tube, and after the process is under way the hydride formed may serve as the diluent for continuing the process.

Ammonium chloride. CHEMISCHE FABRIK GROSS-WEISSANDT GES. and P. SEIDLER. Brit. 275,991, Aug. 10, 1926. Large crystals of NH_4Cl are obtained by effecting crystn. in the presence of aq. exts. obtained by the action of hot H_2O (which may contain HCl) on grasses, weeds, leaves, stalks, barks, roots, fruits, seeds, hay, dry sugar beet shreds, dried malt germs or like substances.

Calcium hypochlorite. I. G. FARBENIND. A.-G. Brit. 276,307, Aug. 18, 1926. Dibasic Ca hypochlorite of the formula $2\text{Ca}(\text{OH})_2\text{Ca}(\text{OCl})_2$, prep'd. as described in Brit. 188,662 (C. A. 17, 1694), is stored with a final moisture content of 5-15% after sepn. from the mother liquor by centrifuging.

Chromium chloride. MATHIESON ALKALI WORKS. Brit. 276,120, July 20, 1926. Cl is passed through ferro-Cr at a high temp. and under non-oxidizing conditions so that Fe is removed as FeCl_3 . An app. is described for producing and treating the ferro-Cr.

Di-ammonium phosphate. R. GRIESSBACH, O. BALZ and A. RÖSSLER. U. S. 1,670,504, May 22. See Can. 265,190 (C. A. 21, 994).

Producing finely divided lead oxide, etc. L. SCHERTEL and W. LÜTY. U. S. 1,670,049, May 15. Metalliferous material such as Pb in subdivided condition is passed through a shaft and over an extended surface of refractory material, highly heated and inert to the material under treatment, and hot gases such as O-contg. gas are passed over the material to effect volatilization and form a fume suspended in the gases; this fume is withdrawn and pptd. An app. is described.

Metallic chlorides. I. G. FARBENIND. A.-G. Brit. 275,945, Aug. 13, 1926. The process for the production of anhyd. MgCl_2 , described in Brit. 259,498 (C. A. 21, 3429) is applied to the production of other chlorides such as those of Be, Al, Ca, Cr, Fe and Ti from their oxides by treatment with Cl in the presence of substances such as coked sawdust which form a porous mass.

Metal phosphides. W. KORHLER. Brit. 276,112, June 25, 1926. See Can. 275,581 (C. A. 22, 1219).

Molybdates. A. KISSOCK. Brit. 276,155, Sept. 4, 1926. MoO_3 is mixed with $\text{Ca}(\text{OH})_2$ or other basic oxide or hydroxide (other than an alkali metal compd.) water is added to the mixt. to form a paste and the molybdate is heated to obtain a dry product.

Stable percarbonates and other persalts. F. NOLL. U. S. 1,669,997, May 15. A stable percarbonate free from non-alkali-metal silicates and free from Fe compds. is obtained by treating Na_2CO_3 or other carbonate with Na silicate, filtering and treating with H_2O_2 . Perborate is similarly made from borax.

Potassium salts from marine algae. G. J. B. CHAMAGNE. Brit. 275,999, Aug. 11, 1926. Material obtained by burning or carbonizing marine algae is finely ground, burned in pulverulent fuel burners with or without added fuel, and elec. pptn. may be employed for the recovery of volatilized salts such as KBr, KCl, KI and K_2SO_4 which may then be dissolved and sepd. An app. is described.

Zinc oxide. J. A. SINGMASTER, F. G. BREYER and E. H. BUNCE. U. S. 1,670,169, May 15. See Brit. 268,301 (C. A. 22, 1219).

Carbon black. W. K. LEWIS. U. S. 1,669,618, May 15. Air is preheated to 500–1800° and passed through a body of coke to form CO having a temp. above the decompn. point of CH₄ and the gas thus prepd. is passed through a thermally insulated passage into which CH₄ is fed without preheating, to effect decompn. of the CH₄. An app. is described. Cf. C. A. 22, 1220.

Carbon black from mixtures of acetylene and other hydrocarbons. C. S. VENABLE. U. S. 1,669,636, May 15. A mixt. of C₂H₂, another hydrocarbon such as CH₄ or gasoline in gaseous phase and air is introduced into a chamber under pressure and detonated while cooling the walls of the chamber. An app. is described.

Carbon granules. F. O. BARRALET. Brit. 277,129, June 17, 1926. C granules for telephone transmitters are prepd. by treating furfural, sugar "or other pure hydrocarbon deriv." with a carbonizing agent such as strong H₂SO₄ and subjecting the C obtained to a suitable heat treatment to give it the required density and other properties desired. Various details of the treatment are given.

Apparatus for producing carbon and generating steam from gas. I. J. McNUTT. U. S. 1,670,686, May 22.

Polishing chromium. J. C. PATTEN (TO METALS PROTECTION CORPORATION). Brit. 277,296, Sept. 9, 1926. Surfaces such as electrodeposits of Cr are polished with a compn. comprising fine-grained calcined hydrated alumina or bauxite and which may also contain various other polishing substances, stearic acid, wax, soap, petroleum jelly, etc.

Hydrogen. GEWERKSCHAFT DER STEINKOHLENZECHÉ MONT-CENIS. Brit. 276,687, Aug. 30, 1926. H or a mixt. of gases contg. H, which may be intended for use in catalytic reaction, is freed from org. compds. of S, P and As by passing it at a temp. of 200–500° and under a pressure of 100 atm. over a catalyst comprising metals other than Cu having an at. wt. between 51 and 65 or oxides of metals such as Ni and Al₂O₃. Impurities are converted into CH₄ and its homologs and inorg. S compds., which can then be removed from the gas with alkali.

Hydrogen. GEWERKSCHAFT DER STEINKOHLENZECHÉ MONT-CENIS. Brit. 276,668, Aug. 26, 1926. H or gases contg. H are first treated with alk. substances (in dissolved, solid or fused condition) for removing CO₂, H₂S, SO₂, etc., and then treated under pressure and while heated with a catalytic mass contg. finely divided metals of the Fe group such as Ni, or contg. Cr, Mn, Zn or V or their oxides, and these steps of treatment are repeated in the same sequence. The H after this purification may be used for NH₃ synthesis.

Krypton and xenon from air. A. J. A. BLARINGHEM. U. S. 1,670,014, May 15. Liquefied O contg. Kr and Xe is evapd. and the vapors are passed into contact with gas-absorbing material such as C. An app. is described.

Precipitation of nickel from solutions. A. B. BAGHDASARIAN. U. S. 1,671,004, May 22. After removal of impurities from a Ni-bearing soln., Zn is added to ppt. most of the Ni, the pptd. Ni is sep'd., the soln. is maintained at approx. the b. p. and sufficient addnl. Zn is added to complete the pptn. of the Ni.

Separating tin and arsenic compounds. W. T. LITTLE. U. S. 1,670,307, May 22. In order to sep. Na stannate from Na arsenate, a mixt. contg. them is leached with NaOH soln. or other suitable liquid at a temp. (suitably about 85.5° or higher) sufficiently high to melt the Na arsenate.

Molding phenolic condensation products. PRODUCTS PROTECTION CORPORATION. Brit. 276,440, May 28, 1926. In molding products such as mixts. contg. wood meal and phenolaldehyde condensation product, the "A" product is heated to a temp. slightly below the transition temp. to the "B" form before it is introduced into the mold. The material may be preliminarily dried over CaCl₂, then heated to slightly below 80°, introduced into molds heated to about 100° and then heated in the molds to 130° and cooled slowly in an insulated container after molding. Brit. 276,441 specifies an app. in which molding may be effected in a liquid dielectric of greater viscosity than water such as "cumar" or "halowax" (which may impregnate the surface of the molded article) under heat and pressure. The app. may include an elec. heating coil.

Molding phenol-formaldehyde condensation products. H. BURMEISTER. Brit. 275,678, Feb. 10, 1926. Products such as are obtained by mixing resorcinol and polymerized CH₂O in the proportion of about 2:1 by wt. and which may also contain a filler and a reaction-retarder such as glycerol are molded by a single hot-pressing, e. g., under pressure at 120–5° for 2–5 min. according to the thickness of the article.

Condensation products of formaldehyde with urea and thiourea. SOC. ANON.

POUR L'IND. CHIM. A BALE. Brit. 275,995, Aug. 11, 1926. CH_2O or a polymer is condensed with thiourea or with a mixt. of urea and thiourea in such proportions that 1 mol. of the urea component is present to less than 2 mols. of the CH_2O in the final product. The condensation may be effected in a single stage or in successive stages, and a condensing agent such as $(\text{NH}_4)_2\text{SO}_4$ or NH_4CNS may be used. Cf. C. A. 21, 805.

Ornamenting materials with deposits of urea-formaldehyde condensation products, etc. BRITISH BEAD PRINTERS, LTD., J. C. VREDENBURG and F. A. H. HEYNERT. Brit. 277,091, June 8, 1926. In ornamenting as described in Brit. 247,001 (C. A. 21, 503) various inert auxiliary ornamenting materials are added such as glass particles, metal or pearl dust, mica flakes, paper, wool or cotton, which may be applied so as to form a pattern.

Hardening casein. SOC. INDUSTRIELLE DES MATIÈRES PLASTIQUES. Brit. 276,542, Dec. 1, 1926. Casein is mixed and pressed with CH_2O , without heating and in the presence of EtOH or other alc. Polymerized CH_2O or a CH_2O -bisulfite compd. also may be used, and swelling agents, dyes, etc., may be added.

Articles of molded pulp. J. J. H. STURMEY. Brit. 276,395, April 19, 1926. Hollow articles of molded pulp are waterproofed and made rigid by use of a material such as Al resinate which may be fused in the mold and allowed to set.

Hard molded bodies from asbestos. H. GERDIEN. U. S. 1,670,659, May 22 In forming insulation or other articles, asbestos is heated to a high temp. (suitably about $1000-1200^\circ$) and subjected to high pressure while heated.

Bituminous and resinous compositions for road making, insulation, molded articles, etc. L. BOLGAR. Brit. 277,291, Sept. 13, 1926. Tar, pitch, asphalt, resin or their mixts. or derivs. are mixed hot with acids such as HCl , HNO_3 , H_2SO_4 , H_3PO_4 or H_3BO_3 or with acid salts such as K, Na or Ca bisulfates or AlCl_3 and may also be mixed with various fillers, tar oil, fats, wax, etc.

Stiffening material for boots and shoes. FILKO CHEMISCHE FABRIK GES. Brit. 276,929, Oct. 14, 1927. A mixt. of resin, paraffin and talc is used as an impregnating compn. for stiffening caps of boots or shoes.

Cork composition for metal bottle caps, etc. H. F. BUSCH. Brit. 276,318, Aug. 18, 1926. A compn. may be formed of granulated cork 100 lbs., glycerol 10 lbs., gelatin 5 lbs. and CH_2O 20 oz. Various structural details of caps are given.

Porous material for storing acetylene. T. G. ALLEN and ALLEN-LIVERSIDGE, LTD. Brit. 277,100, June 9, 1926. Storage receptacles are filled with a mixt. of kapok with other fibrous material such as asbestos, cotton, silk, flax or akund floss, which may be used with or without a solvent for the C_2H_2 .

Printers' inking rollers, etc. D. GESTETNER. Brit. 277,058, June 3, 1926. Rollers or impression surfaces made with a resilient body of vulcanized oil compn. are thinly coated with a flexible gelatin compn. which is rendered insol. so that it is not sensitive to temp. variations.

Material for spinning rollers, etc. D. M. PROCTOR and CARBORUNDUM CO., LTD. Brit. 275,762, June 29, 1926. Rollers are formed of or coated with hard abrasive material such as SiC or fused Al_2O_3 and a binder such as Na silicate, shellac, vulcanite or ceramic material.

Cleaning flues of bakers' ovens, etc., by combustion. G. WIED. Brit. 275,947, Aug. 14, 1926. Materials such as cartridges of S, KNO_3 and C are burned to expel deposited matter from flues.

Rail filler. A. C. FISCHER. U. S. 1,671,021, May 22. Strips are formed of bituminous material such as blown material in which are incorporated cellular flakes, e. g., mica, slate or papier maché, arranged in substantially parallel strata and spaced apart. U. S. 1,671,022 specifies strips for similar uses or for insulation, sound deadening or expansion joints, formed of waterproof material such as blown asphalt together with granular and fibrous material, e. g., cork and fiber.

Stencil sheets. S. HORII. Brit. 275,747, May 25, 1926. Esters such as cellulose nitrate or mannan acetate are used with other substances such as chlorinated $\text{C}_1 \text{H}_n$, oils, fats, waxes and solvents. Cf. C. A. 22, 1832.

Plastic composition for use in dentistry. R. M. WITCOMBE. Brit. 277,107, June 10, 1926. Molding compns. suitable for use instead of plaster of Paris are made by heating red or black Cu oxides with 1-6 times as much as S, preferably at a temp. past that of max. fluidity. The material is stated to impart germicidal properties to dentures in contact with which it is used as a molding material.

Material for artificial dentures. H. J. GRAINGE and S. W. WILDING. U. S. 1,669,557, May 15. A gum facing of material such as a condensation product of PhOH and CH_2O which is adversely affected by moisture evolved from investing material

is protected during investing by a layer of impervious material such as a rubber sheet or Sn foil which may be subsequently removed. Cf. *C. A.* 21, 3109.

Filling for roots of teeth. E. G. HEDSTRÖM. *Brit.* 276,526, Sept. 27, 1926. Syrian or other natural asphalt is dissolved in a solvent such as C_6H_6 and a Bi salt or other substance which is opaque to Röntgen rays is added.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Glasses of antiquity. BERNHARD NEUMANN. *Z. angew. Chem.* 40, 963-7(1927); cf. *C. A.* 20, 975 —Glasses representing several periods and peoples between 1500 B. C. and 500 A. D. are described. The softening points range from 880° in the earliest period to 742° for the 1st-5th century B. C. The compn. of these glasses approaches that of the 750° eutectic of the ternary system $Na_2O-CaO-SiO_2$. The low softening points observed are attributed to the presence of several minor oxide constituents. The ancients found empirically the easiest melting mixts. H. F. KRIEGE

Study of the behavior of fluoride additions to glasses and enamels. II. Röntgen ray determination of the opacifiers in fluorine-containing enamels. G. AGDE, H. F. KRAUSE AND W. M. LEHMANN. *Z. angew. Chem.* 40, 804-8(1927).—With the use of NaF as opacifying agent NaF seps from the cooling solvent and produces turbidity. When AlF_3 is used NaF is formed which seps. during cooling. Glasses contg. CaF_2 owe their opacity to both CaF_2 and NaF, the proportion of each depending upon the compn. of the glass. H. F. KRIEGE

Electric heating helps to make better glass bottles. S. D. KIRKPATRICK. *Chem. Met. Eng.* 35, 279-80(1928).

American chemical industries. General Ceramics Company. P. C. KINGSBURY. *Ind. Eng. Chem.* 20, 550-2(1928).—The history and organization chart are given. C. H. K.

The influence of the flue-dust on the deterioration of firebricks in the Siemens-Martin furnace. FRANZ SCHMITZ. *Ber. Ver. deut. Eisenhüttenleute: Werkstoffausschuss* 1926, 1-4; *J. Inst. Metals* 38, 674.—Chem. examn of worn-out siliceous bricks and samples of flue-dust show that the deterioration is principally caused by the flue-dust from the producer gases. Reduction of silicic acid by hydrocarbons is the chem. process chiefly concerned. The life of the bricks is increased by the presence of long gas conduits, as the flue-dust is then deposited. This can also be attained, if necessary, by artificial means, by introducing a collecting conduit of large cross-section, or by inserting obstacles. H. G.

Manufacture and properties of a new light fireproof brick of crystalite. E. STEINHOFF. *Ber. Ver. deut. Eisenhüttenleute: Werkstoffausschuss* 95, 1-10(1926); *J. Inst. Metals* 38, 674.—By means of a new process light useful bricks can be made from silica. The mfg. process and the properties of the bricks are described. The bricks are loose in structure, and are therefore suitable for use in the case of dry heat and slow heating, e. g., in coke-oven and gas-furnace work. H. G.

A new refractory. BERNARD KLEINSCHMIDT. *Zentr. Hütt. Wulzwerke* 30, 79-80(1926); *J. Inst. Metals* 38, 670.—The prepn. of carborundum and of carborundum-clay refractory shapes is described briefly, together with some of their properties. "Refrax" is nearly pure SiC; it has a sp. heat of 0.162, a heat cond. of 0.0275, and a tensile strength of 12.5 lb. per sq. in. "Carbofrax" contains up to 10% of clay, and the values of the corresponding properties are 0.180, 0.0243 and 14.7, resp., while its porosity is 15-20% greater than that of "Refrax." The sp. gr. of SiC is 3.7, and of carborundum bricks 2.1-2.5 (apparent). H. G.

Classifying refractory clays. E. WEBER. *Feuerfest* 1, 5, 27(1925); *J. Inst. Metals* 36, 669.—The old and newer methods of testing fireclay are discussed. Chem. analysis alone is not sufficient, but the methn. of the m. p., softening point under load, and coeff. of expansion are of importance. H. G.

The refractory nature of common high-temperature oxides. J. BRONN. *Feuerfest* 1, 25(1925); *J. Inst. Metals* 36, 668.—Nearly all high refractory materials used are in the form of oxides, i. e., Al_2O_3 , CaO , MgO , SiO_2 , and Cr_2O_3 , FeO , Fe_2O_3 , TiO_2 , ZrO_2 . The need for closer investigation of the properties under high temps. of this latter group is brought out and now made possible by the development of the elec. furnace. H. G.

Refractory nature of common oxides. J. BRONN. *Feuerfest* 1, [7], 67(1925);

J. Inst. Metals 36, 668—Curves are given plotting the m. p. of the following binary compds. in various proportions: lime-alumina, lime-magnesia, magnesia-alumina, lime-iron oxide, kaolin-magnesite, kaolin-chrome. H. G.

The importance of the silica transformations in the behavior of refractories during burning and use. K. STEINHOFF. *Keram. Rundschau* 35, 368-70(1927); cf. *C. A.* 21, 1528.—The literature on the temps. of the various SiO_2 transformations and the vol. changes accompanying the transformations is reviewed. Silica bricks for coke ovens should be burned to complete transformation of the quartz to cristobalite or tridymite. In heating furnaces up to 600° adequate room for expansion must be provided where highly siliceous refractories are used. Cracks produced by rapidly heating or cooling SiO_2 refractories afford places for the entrance of slags with consequent disruption of the brick work. Bricks of diatomaceous earth heated to 1100° or more are transformed to cristobalite and produce a refractory of light wt. very resistant to deformation under load at temps. up to 1600° . Because of the marked vol. change at 200° they are not resistant to rapid temp. change. H. INSLEY

The calculation of the melting points of silicates. W. FISCHER. *Keram. Rundschau* 35, 381-2(1927).—Van't Hoff's law for m.-p. lowering is inapplicable quantitatively to most silicate systems because of the occurrence of compds., eutectics and solid solns. with accompanying thermal and vol. changes. Quant. predictions can only be based on the experimentally detd. temp.-concn. equil diagram. H. INSLEY

A new type of kiln. M. HEINE. *Keram. Rundschau* 35, 87-9(1927).—To avoid cold spots and too rapid heating during the early stages of firing, a semi-recuperative kiln is recommended. H. INSLEY

Our knowledge of the changes taking place in kaolin during burning. K. SPANGENBERG. *Keram. Rundschau* 35, 331-6, 352-4, 370-2(1927).—After a review of the literature K. concludes: (1) that the H_2O is removed from kaolinite at or above $430 \pm 10^\circ$, the major part of the H_2O of constitution being more completely and quickly removed with lower vapor tension and less completely and more slowly with normal vapor tension; (2) that the dehydrated kaolinite cannot be considered as an ordinary mech. mixt. of Al_2O_3 and SiO_2 but that there is some systematic bond between the 2 oxides, perhaps a lamellar variation of the original structure skeleton although x-rays fail to show a true crystal lattice; (3) that the cause of the exothermic reaction near 900° during the heating of the kaolin is still not fully explained; (4) that mullite is probably only stable at high temps. and that further work is needed to det. the nature of the products of decompn. of mullite on cooling. H. INSLEY

DONATH, EDUARD: *Die Chemie des Ziegelmauerwerkes*. Vol. 30 of the "Sammlung chem. und chem.-techn. Vorträge." Stuttgart: F. Enke 74 pp. M. 6 50.

L'ARCHEVÊQUE, MARC: *Fabrication industrielle des porcelaines*. Matières premières et leurs traitements. Paris: J. B. Baillière et fils. 480 pp.

MILLER, J. B.: *Die Glasätzerei*. 5th ed., revised. Vol. 59 of chemisch.-techn. Bibliothek. Vienna: A. Hartleben. 132 pp. M. 3; bound in half linen, M. 4.

RIEKE, REINHOLD: *Das Porzellan*. 2nd ed., revised and enlarged. Leipzig: M. Jäncke. 163 pp. M. 7.50.

Glass. B. LONG. U. S. 1,669,908, May 15. A $\frac{1}{2}$ Na lime glass which is not colored by sunlight is formed of SiO_2 , Na_2O and CaO , together with 2-3% of Pb oxide.

Laminated glass. W. F. BROWN. U. S. 1,670,435, May 22. Glass sheets which are to be united with intervening non-brittle material are coated with a film of cellulosic material which is treated with a non-solvent animal oil. U. S. 1,670,436 specifies the similar use of a film of non-solvent mineral oil such as liquid petrolatum. Cf. *C. A.* 22, 1023.

Laminated glass sheets. P. H. HEAD and SAFETY GLASS & METAL PRODUCTS, LTD. Brit. 277,044, March 15, 1926. In order to prevent discoloration of the celluloid or like sheet used for reinforcing glass sheets, a bleaching agent such as $\text{C}_2\text{H}_5\text{Cl}$ or other suitable Cl deriv. is incorporated in the celluloid solvent used (which may comprise alc. and AmOAc) or otherwise applied to the celluloid. The glass sheets are coated with gelatin. Cf. *C. A.* 22, 2252.

Glass furnace and leer. J. H. O. BUNGE. U. S. 1,669,968, May 15.

Glass-melting furnace and associated apparatus for sheet glass production. P. F. GUTMANN. U. S. 1,671,073, May 22.

Continuous tank furnace for glass. W. K. BROWNLER. U. S. 1,670,098, May 15.

Tank furnace, etc., for melting and refining glass. E. J. SCHNEIDER. U. S. 1,669,676, May 15.

Apparatus for feeding "gobs" of molten glass. EUROPÄISCHER VERBAND DER FLASCHENFABRIKEN GBS. Brit. 276,558, Jan. 14, 1927.

Rotary device for feeding molten glass for manufacture of glassware. L. J. BROCHS. U. S. 1,670,058, May 15.

Apparatus for delivering charges of molten glass. R. LA FRANCE. U. S. 1,669,475, May 15.

Apparatus for delivering mold charges of molten glass. H. W. INGLE. U. S. 1,670,770, May 22.

Apparatus for drawing glass sheets or cylinders. A. E. SPINASSE. U. S. 1,670,909-10, May 22.

Forming blown glass articles. CORNING GLASS WORKS. Brit. 276,606, June 7, 1927. Mech. features of blowing portions of a glass ribbon into molds.

Mold for pressed sheet glass. F. FRASER. U. S. 1,670,110, May 15. Molds are formed of a "non-corrosive" metal alloy such as nichrome, Monel metal or stellite. Various structural features are specified.

Apparatus for forming sheet glass. E. T. FERNGREN. U. S. 1,670,246-7-8, May 15.

Apparatus for forming glass sheets. J. A. REECE. U. S. 1,670,167, May 15.

Apparatus for molding plates or sheets of glass. H. J. HAYS. Brit. 276,517, Oct. 4, 1926.

Apparatus for forming and flattening sheets of glass. A. F. FOWLE. U. S. 1,670,146, May 15.

Rolling-apparatus for plate-glass manufacture. M. BICHROUX. Brit. 276,662-3, Aug. 28, 1926.

Bending rolls or other glass-shaping apparatus formed of metal covered with fused silica. EMPIRE MACHINE CO. Brit. 277,070, June 4, 1926. Various details of structure of glass-working app. are specified.

Apparatus for annealing glassware. E. O. HILLER. U. S. 1,670,769, May 22.

Tunnel kiln adapted for burning ceramic ware. J. B. OWENS. U. S. 1,669,777, May 15.

Kiln suitable for burning ceramic ware. B. M. JOHNSON. U. S. 1,669,563, May 15.

Refractory articles. A. MARKS. Brit. 276,016, June 8, 1926. In forming molded articles from a mixt. comprising dead-burned magnesite and linseed oil or other siccativ oil, the oil is allowed to become oxidized by heating or standing to improve its binding properties. The molded articles are preferably dried slowly as described in Brit. 271,847 (C. A. 22, 1663). Driers and thinners also may be added.

Refractory and abrasive materials. FIRM OF C. POLYSIUS. Brit. 276,185, Oct. 19, 1926. Furnace linings, grindstones, etc., are made by baking a mixt. of aluminous cement and corundum.

Firing refractory blocks at softening temperatures while preventing distortion from unequal shrinkage. P. G. WILLETS. Brit. 276,903, Sept. 23, 1926. During the firing the blocks are supported on material which will shrink during the firing at least as much as the blocks themselves. Powd. or granular refractory material may be placed between the blocks and their supports to prevent sticking.

Valve-grinding abrasive paste. A. L. BROWNE. U. S. 1,669,596, May 15. SiC or other finely divided abrasive material is mixed with the reaction products of an alkali metal silicate, and a fatty acid, soap, water and glycerol.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Setting and hardening processes of cements. R. NACKEN. *Zement* 16, 1017-23, 1047-51 (1927); *Pit and Quarry* 15, 79-83 (1928).—The assumption is made that the mixing H₂O in reacting with the CaO present forms enclosing envelopes of liberated SiO₂ gel, approaching the sol. condition. The hydration processes are discussed in the light of observed colloidal behavior. H. F. KRIEGER

Soundness of cements in corrosive waters. G. HABGERMANN. *Zement* 16, 1190-2 (1927); cf. C. A. 22, 1663.—Mortar tests bore out earlier observations that cements with high SiO₂ or Fe₂O₃ content but low Al₂O₃ resist the action of sulfate solns. Cements with av. content of SiO₂, Fe₂O₃ and Al₂O₃ should have the hydraulic modulus values below 2.0. The CaO content alone is no criterion of the durability of cement.

H. F. KRIEGER

Use of shale ashes in cement manufacture. F. KILLIG. *Zement* 16, 735-7 (1927).—The compn of a series of ashes from carbonaceous shale showed close resemblance to that of a glacial clay. As a substitute for clay in cement manuf. the dryness and the ease of grinding the ashes were offset by the variations in the acid-sol. constituents and presence of CaO in the inner poorly burned portions. Burning the fresh shale with limestone did not result satisfactorily. H. F. KRIEGE

Testing of cement with plastic mortars. M. Roš. *Zement* 16, 1119-23, 1141-7, 1173-6 (1927).—The development of the tests for cement in plastic mortars is traced historically. The values obtained with plastic and earth moist mortars are compared. In general greater irregularities are found in the values of the tests on plastic materials in a series of detns. in labs. of several nations. Many data are presented in graphic form. H. F. KRIEGE

Properties of portland cement. G. HAEGERMANN. *Zement* 16, 1043-7 (1927).—During the past 80 years the compns. of cements have increased in CaO % and SO₃ and decreased in alk. and insol. residue. Other constituents have varied irregularly. Improved mixing, more complete burning, and finer grinding have aided greatly in producing cements of steadily increasing tensile and compression strengths. H. F. KRIEGE

Determination of small quantities of magnesium in the presence of large quantities of ammonium salts with special reference to the determination of magnesium in portland cements. O. KALLAUNER. *Zement* 16, 1093-5 (1927).—The pptn. as NH₄ phosphate is best accomplished in the cold. With very small quantities of Mg present the addn. of known quantities of Mg is advised to cause complete pptn. Only with excessive amts. of NH₄ salts should these be volatilized. The Mg ppt. should stand 48 hrs. before filtration if the quantities present are very small. H. F. KRIEGE

Digest of literature on nature of setting and hardening processes in portland cement. R. H. BOGUE. *Rock Products* 31, No. 10, 69-71, et seq. (1928). RAYMOND WILSON

Iron oxide vs. alumina as a fluxing agent in the manufacture of portland cement. A. J. BLANK. *Rock Products* 31, No. 11, 48-9 (1928).—Plant-scale production of normal clinker (I), high-alumina clinker (II), and high-iron clinker (III) showed that III gave the best quality of cement at a saving in fuel. Compn. of the clinkers was closely similar except for Fe₂O₃ and Al₂O₃, which averaged: I, 2.98%, 7.62%; II, 2.67%, 8.30%; III, 2.98%, 6.66%. Fuel oil consumptions per barrel of clinker were 9.8, 11.1 and 8.8 gals. Tensile strengths of 1-3 mortar at 3 days were 230, 200 and 250 lb.; at 28 days, 400, 380 and 420 lb. RAYMOND WILSON

Concrete in sea water. RICHARD GRUN. *Zement* 16, 1180-90 (1927).—The effect of sea water on concrete is due in part to the formation of CaSO₄·2H₂O and 3CaO·Al₂O₃·3CaSO₄·3OH₂O in the cement. The resistance to this attack may be increased through substitution of Fe₂O₃ for Al₂O₃, decreasing the CaO present by use of aluminous cements, or strengthening the hold on the CaO present by adding puzzolan. Dense aggregates and good placing of the concrete are essential factors. The surface of the concrete mass may be made more resistant by thorough air curing, by impregnation with some material which fixes the CaO present such as a fluoride, and by bituminous coats. H. F. KRIEGE

Gypsum mortar materials. O. F. HONUS. *Zement* 16, 1201-4, 1227-30, 1249-52 (1927).—The properties of gypsum during heating, hydration and setting as mortar are discussed. Structural formulas are given to portray the chem. changes involved in these processes. H. F. KRIEGE

Eliminating one theory as to the cause of hair checking in concrete road slabs. B. H. PETTY AND H. E. FILLINGER. *Roads and Streets* 68, 233-5 (1928).—Lack of moisture is not the primary cause of checking. L. B. MILLER

Recent developments in highway research. V. L. GLOVER. *Roads and Streets* 68, 105-9 (1928).—G. describes tests upon the following subjects: field control of quality of concrete, multiple loads, methods of proportioning concrete, tests of 6 wheel truck loads, comparison of 6 and 4 wheel trucks, truck impact tests, impact test of bars embedded in concrete, bend-pull test, special impact test on bent bars. L. B. MILLER

Recent road construction and surfacing work in a district of Birmingham (England). J. STUART KING. *Munic. Eng. Sanit. Record* 79, 546-8 (1927).—A discussion on repairing and constructing highways dealing with the use of such material as creosoted deal blocks, hard wood blocks, hot bitumen and granite chippings, cold-spray bitumen emulsions, mexphalite grouted slag and mexphalte grouted Enderby granite, tar macadam, tarred slag, rapid or semi-rapid hardening cement, granited rock asphalt, bituminous concrete, asphaltic concrete, and asphalt macadam. C. H. BADGER

Modern methods of testing road materials in France, Germany and America.

EDMOND MARCOTTE. *Technique moderne* 20, 254-9, 293-6(1928).—A description of the methods with a brief discussion of the interpretation of the results. A. P.-C.

Application of the bituminous emulsion "Colas" to municipal use. M. G. MATHIEU. *Tech. sanit. munic.* 23, 59-65(1928).—Colas emulsion proved very valuable in the treatment and resurfacing of wood-block or stone pavement. C. R. FELLERS

The production of high-alumina slags in the blast furnace for the manufacture of alumina cement (JOSEPH) 9. Paints, etc. [plasters, cements] (Brit. pat. 275,772) 26. Bituminous emulsions [for use in road-making or in cements] (Brit. pat. 276,543) 22. Shaft kiln for manufacture of lime, "gypsum," cement, etc. (Brit. 276,066) 1.

GATEHOUSE, FRANK B.: *A Handbook for Cement Works Chemists*. 3rd ed., revised. London: Charles Griffin & Co., Ltd. 180 pp. 7s. 6d., net.

KYRIACOU, V.-C.: *Aperçu de la fabrication de superciment*. Paris: Ch. Béranger. 50 pp. F. 10.

Cement. CHEMISCHE FABRIK GRÜNAU LANDSHOFF & MEYER A.-G. AND W. KIRCHNER. Brit. 275,897, April 5, 1927. Setting of cement is accelerated by adding chloride and nitrates of Ca and Al.

Cement. H. O. MORBIUS. U. S. 1,670,269, May 15. Cement-forming raw materials are burnt to form a clinker and the latter is crushed and agitated in a blast of cooling air. An app. is described.

Forming and waterproofing cement pipe. G. C. MARTIN. U. S. 1,669,768, May 15. Mech. features.

Portland cement. BRITISH PORTLAND CEMENT MANUFACTURERS, LTD., J. G. BAXTER, M. K. BAMBER AND W. J. DICKINSON. Brit. 276,438, May 28, 1926. In making fused cement in a rotary kiln, the material is discharged from the kiln through holes situated at its hottest point. The end of the kiln may be tapered to facilitate the discharge.

Building sheets of asbestos-cement composition faced with cement and stone chips, etc. A. F. E. CUCKOW. Brit. 276,815, Aug. 6, 1926.

Forming pipes from asbestos cement and similar materials. C. HERZOG. U. S. 1,670,855, May 22. Mech. features.

Concrete blocks. F. A. ROBINS and F. M. TAYLOR. Brit. 275,680, Feb. 12, 1926. Building blocks are formed of wood chips 9, port. cement 1 and ashes or similar "grit" to act as a "binder" 3 parts.

Concrete and mortar. J. HOWARD and W. J. HOWARD. Brit. 276,836, Sept. 15, 1926. Debris or spoil from iron mines is mixed with cement and a small proportion of paraffin oil and naphtha to form a facing or glazing material, for building purposes.

Device for measuring stresses such as those in concrete structures. W. A. PERKINS and W. W. GAYMAN. U. S. 1,670,981, May 22

Fibrous material for use with concrete, plaster, etc. E. M. LUNDGREN. Brit. 276,709, May 1, 1926. Cork, peat or other fibrous material may be treated with $\text{Ca}(\text{HCO}_3)_2$, and then with lime water or may be treated with a CaCl_2 soln. followed by treatment with waterglass with or without lime water or followed by alum or $\text{Al}_2(\text{SO}_4)_3$ soln.

Self-setting and self-hardening plastic material produced by wet-grinding of calcium sulfate "of any origin." R. SCHOENHOEFFER. Brit. 275,788, Aug. 5, 1926.

Material for covering floors, roofs and walls. M. H. TATE. Brit. 275,685, May 31, 1926. A sheet of rubber is attached by adhesive to a sheet of felt impregnated with bituminous material. Various details are specified.

Lime-sand bricks. C. H. THOMPSON. Brit. 276,597, May 11, 1927. Waste lime-kiln gases are used for hardening lime-sand bricks and like articles, either before, during or after treatment with steam under pressure.

High plastic "finishing lime." E. O. SCHNELL. U. S. 1,670,425, May 22. Burnt powd. limestone is hydrated with an aq. emulsion of colloidal clay and earth and there is added to the fresh hydrated lime, when cooled, a dry mixt. of colloidal clay and earth.

Heat-resistant steel columns, etc. E. R. POWELL. U. S. 1,670,378, May 22. A support such as a steel beam or column having an exposed surface is covered with a layer of cement and a hydrated cryst salt or other material of relatively high heat-absorbing capacity, and a heat-insulating and flame-resisting coating also is placed around the material.

Paving. A. F. SCHUTTE. U. S. 1,670,826, May 22. Paving material is prepd. by satg. burlap waste or other vegetable fiber with a bituminous cement, cutting the fiber into small particles and mixing with addnl. bituminous and mineral materials.

Paving. A. JANIN. *Brit.* 276,538, Feb. 27, 1926. A broken stone, gravel, slag or macadamized road is surfaced with irregular aggregate, the surface voids of which are filled with finely divided aggregate, the particles of which are coated with a thin film of bituminous material having a consistency between 30 and 125 points of penetration on the Dow testing app. Lime may be used as a filler and light hydrocarbons may be used as fluxes. *Brit.* 276,539 specifies treating mineral aggregate with a primary coat of light volatile mineral oil and a second coat of bituminous cement, with or without lime or other materials. *Brit.* 276,866 relates to similar pavements formed with "non-slip" surfaces. Cf. C. A. 22, 2254.

Asphaltic road material. J. D. FORRESTER. U. S. 1,671,070, May 22. Crushed stone aggregate is heated to drive off moisture and while it is still hot there is added to it a light oil having a flash point above the temp. of the drying heat; an asphaltic binder is subsequently added. Cf. C. A. 21, 1532.

"Non-slip" road surface. LA TRINIDAD. *Brit.* 277,216, Oct. 29, 1926. Road surfaces are separately coated with tar or bitumen and sprinkled with a comparatively thin "carpet layer" of asphalt, bitumen, tar or like material.

Bituminous emulsions for road construction. RUTGERSWERKE A.-G. AND L. KAHL. *Brit.* 275,928, Aug. 13, 1926. Liquefied bituminous material is added with stirring to paste-like substances which are naturally alk. or are rendered alk. such as waste Fe hydroxide from gas manuf. or from Al_2O_3 production, pptd. $Al(OH)_3$ or ZnO , basic Mg salts or starch paste contg. about 5% of alkali.

Preserving wood. H. W. WALKER. U. S. 1,670,086, May 15. Wood is impregnated with a combination product of a water-sol. dye such as crystal violet or malachite green and an org. constituent of the wood such as tannin, lignin or cellulose.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

The fuel industries and the work of the chemical engineer. ARTHUR DUCKHAM. *Chemistry and Industry* 47, 519-21(1928). E. H.

The fuel problem. C. H. LANDER. *Chemistry and Industry* 47, 356-60(1928).—Various types of low-temp.-carbonization plants are described, and mention is made of the Bergius hydrogenation process. T. S. CARSWELL

Low-temperature carbonization. R. P. WILSON and C. H. PARKER. *Gas J.* 182, 245(1928).—A discussion of various com. processes. F. S. GRANGER

Low-temperature carbonization (of coal). SAINTE-CLAIRE DEVILLE. *Ann. office nat. comb. liquides* 3, 43-61(1928); cf. C. A. 22, 153.—An address dealing with the utilization of the products of low-temp. carbonization. A. PAPINEAU-COUTURE

Unsaturated hydrocarbons in the gases from the carbonization of coal. Fuel Research Board's method of determination. C. H. LANDER. *Dept. of Scientific and Industrial Research, Fuel Research Technical Paper No. 19*; *Gas World* 88, 422-4(1928).—The new method involves the sepn. of the unsatd. gases as bromides and the regeneration of C_2H_4 , C_4H_6 and C_6H_6 by the Zn-Cu couple. The resulting gas is then analyzed by absorption of C_2H_4 and C_4H_6 with 87% H_2SO_4 and by combustion of a further quantity of the gas over CuO at 700°, and detn. of the vol. of CO_2 produced. Results are given illustrating the application of the method, showing, in general, an increase in total olefine content with rising temp. of carbonization from 400 to 700°. More C_2H_4 and less C_4H_6 and C_6H_6 are produced by high-temp. carbonization than by low. F. S. G.

Coals as colloid systems. L. L. FERMOR. *Nature* 121, 705-6(1928).—There is a relationship between the sp. gr. and the ash content of Indian coals. The coals from the Bokaro field can be divided into 2 series according to their macroscopical aspect in hand specimens; the series so made yields different types of density-ash curves. The vitrain-durain series, ranging from bright to dull coal, has a linear density-ash relationship. If g be the sp. gr. of the coal, k the sp. gr. of ash-free vitrain (1.26 for Bokaro) and a the ash content, the following relationship holds: $a = 100(g - K)$. The second series ranges from shaly coals to carbonaceous shales; the relationship density-ash is given by an empirical curve. The empirical data are explicable if one regards the vitrain-durain series as a series of suspensoid colloid solns., and the shaly coals, coaly shales and carbonaceous shales as a series of coarse suspensions, often with layers of vitrain. A. L. HENNE

Test on the Crozier retort. ANON. *Gas J.* 182, 236(1928).—At each of 5 levels, of the externally heated vertical retort, were 3 inclined cross flues with hooded off-take

pipes to the center between. A 34%-volatile, Scottish non-coking splint-coal was fed intermittently at the top and extd. continuously into a water-sealed chamber at the bottom. The temp. varied from 820° at the base to 280° at the top. Of the 129,000 cu. ft. of gas made during the test, 123,000 was burned in the furnace with the addn. of 15.2 cwt. of coke, or 30.6 therms per ton of coal carbonized. The av. throughput was about 4 tons per day. Considerable poking was necessitated by bridging of the charge. There were obtained 15.4 cwt. of coke, 14.6% volatile and satisfactory for domestic grates, 23.9 gas therms, 16.4 gals. of tar and 9.1 lbs. $(\text{NH}_4)_2\text{SO}_4$ per ton of coal.

F. S. GRANGER

Stack draft. M. GRELLERT. *Apparatebau* 40, 103-5(1928).—Calcns. on capacity are given.

J. H. MOORE

Recovery methods and the ammonia problem. L. H. SENSIBLE. *Gas J.* 182, 384-91(1928).—The NH_3 problem arises from competition of synthetic NH_3 and effluent restrictions. An argument is presented in favor of direct recovery processes. In these, the hot foul gas passes into the saturator, where the NH_3 is absorbed in dil. H_2SO_4 , before any aq. condensation has taken place, that is while still above its dew point, 60-80°. The NH_3 recovery is more complete, but the principal advantages are much lower costs of installation and operation, because of elimination of stills, etc. The effluent is $1/3$ that from indirect recovery, and practically the only objectionable (O_2 absorbing) substances to be removed are phenols, which can be recovered economically.

F. S. GRANGER

Sewage and sulfate of ammonia effluents. W. PLANT. *Gas J.* 182, 445-6(1928).—The system adopted at Stafford is described.

F. S. GRANGER

An interesting by-product of the lignite industry. R. GOZO. *Russ. min. met. ital.* 68, 52-3(1928).—A general description of the extn., properties and uses of wax from lignite.

C. C. DAVIS

Firing with addition of brown-coal dust. E. RAMMLER, ALBERT SCHREIBER, C. KREYSSIG, GÜTHE, HANNO ZEUNER, KIELMANN, K. WEYER, BECKER. *Braunkohle* 27, 301-41(1928).—A group of articles describing different industrial installations.

F. S. GRANGER

Definition of the concepts brown coal and peat. ED. DONATH AND A. LISNER. *Braunkohle* 27, 257-64(1928).—Investigation of several difficultly characterizable specimens showed that the two classes could be distinguished with a fair degree of certainty by the C content of the water- and ash-free material, which, for peat, normally does not exceed 60%, the cellulose and pentosan contents, and the reducing behavior of aq. peat exts. Detn. of the peat substance by means of CH_3COBr , and of adsorptive power by means of FeCl_3 failed as means of distinction.

F. S. GRANGER

Causes and prevention of auto-combustibility of brown-coal semi-coke. P. ROSIN. *Braunkohle* 27, 241-56, 282-92(1928).—Auto-combustibility is defined as the capability of heating up spontaneously to the ignition temp. This heat is produced by adsorption, oxidation and taking up of moisture. The initial temp. is important. Com. semi-coke, transported directly from the oven in sealed containers, was allowed to stand in a sealed, insulated vessel with thermometers inserted at various points and O_2 passing through it. The temp. rose gradually in spots with absorption of 20% of the gas-flow. When 80° was reached at any point, gas outflow stopped entirely with a sharp temp. rise, soon becoming general, indicating spontaneous combustion. Eventually CO_2 , which was evidently adsorbed at first, was evolved. The adsorptions of N_2 , O_2 and CO_2 , by coke, gave typical curves, as with active C, and increased in the order named. CO_2 greatly exceeded the others. N_2 developed little heat, but CO_2 heated the coke to 70°. H_2O accelerates adsorption. For air, a max. effect was obtained with 10% H_2O . Absorption of H_2O liberates heat, due to adsorption of the H_2O and of gasses in increased quantity, accelerated oxidation, and chem. combination of the H_2O with ash constituents, etc., indicated by the retention of part of it on drying. This heat reaches a max. for a certain % H_2O . The temp. rises rapidly to equil. with the heat of evapn. of the H_2O . Unless sufficient H_2O is present so that this effect lasts until the O_2 requirement of the coke is satisfied, spontaneous combustion is merely postponed until the H_2O is evapd. This usually requires too much water for practical application. This explains why spontaneous combustion occurs usually in damp weather. Chem. reaction of H_2O with the coke substance was indicated by moistening a coke previously degassed at 1000°. On reheating, a fresh quantity of gas was evolved, largely H_2 and CH_4 . The ignition temp. of coke was found to rise with the carbonization temp. but the adsorptive capacity was increased also, if air was excluded during cooling. Active C or high-temp. coke, though more adsorptive, is not spontaneously combustible, on account of lack of easily combustible substances, mainly hydrocarbons. The more

finely the coke was ground, the lower its adsorptive capacity and auto-combustibility were found to be. This was attributed to more complete oxidative satn. or aging of the smaller particles during grinding. That finer coke generally heats up more is attributed to less chance for the heat to escape because of closer packing. Adsorbed gases are displaced by other gases in higher concn. When, as in present practice, coke is first satd. with CO_2 , before exposure to air, the heat effect of the air adsorption is neutralized by the reversal of the adsorption of the CO_2 , so that practically no rise in temp. occurs. Also, the air adsorption is hindered by the escaping CO_2 . But if the coke is moistened after the CO_2 pretreatment, the protective effect disappears entirely. It is not affected by moistening the coke before CO_2 treatment. The temp., on moistening coke, rose to 140° after previous exposures to O_2 , as compared to 80° after air and 40° after N_2 , indicating the association of H_2O with oxidation. Three methods were found practical for preventing spontaneous combustion, namely, (1) artificial aging or allowing the unavoidable but irreversible oxidation, stimulated by previous moistening, to take place in an app. providing temp. control, by cooling, and agitation, to prevent nest formation, (2) pretreatment with CO_2 , and (3) addn. of MgCl_2 or NH_4Cl . F. S. G.

Illuminating gas from brown coal. F. SEIDENSCHNUR. *Braunkohle* 27, 273-80, 354-9 (1928); cf. C. A. 21, 3263.—If the primary carbonization is stopped at a low enough temp., say 400° , so that a tar residue of about 1% of the original coal is left in the semi-coke, the subsequent degasification of which is stopped at 900° , the gas obtained exceeds the established norm in calorific value. The gas obtained above 900° is small in quantity and, being mainly H_2 , lowers the volatile calorific value of the total gas. The small residuum of tar, which must be left in the semi-coke to bring the calorific value of the gas up to the norm, is of little or no value as tar. In fact, the yield of paraffin from a brown coal, whose primary carbonization was stopped at 400° , was actually greater than from the same coal carbonized free of tar to 470° . The final coke has nearly as high a calorific value as metallurgical coke and more than twice its volatile content. It is more reactive than the semi-coke and, in spite of its higher ash content, has a much higher calorific value. The process seems, on the whole, economically promising. F. S. GRANGER

The ignition temperatures of acetylene-oxygen and acetylene-air mixtures as well as the decomposition temperatures of pure acetylene. W. RIMARSKI AND M. KONSCHAK. *Acetylen in Wissenschaft u. Ind.* 31, 24-9 (1928).—A general literature survey and description of detns. by the authors. Mixts. contg. 20-70% O_2 and 50 to 90% air all gave values between 350° and 390° . On slow passage through a heated iron tube, at atm. pressure, pure C_2H_2 decomposed to the extent of 87% at 600° , 97% at 750° and 99% at 900° . No explosions occurred at 900° with over-pressures up to 1 atm., the limit of the investigation. F. S. GRANGER

A possible source of error in calculation of gas yield from calcium carbide. ADOLF FRANKEL. *Acetylen in Wissenschaft u. Ind.* 31, 1-2 (1928).—When the C_2H_2 is measured over a satd. salt soln., the error, from using the vapor tension of pure water instead of that of the salt soln., in reducing to standard conditions, is of the order of about 0.5% in the examples given. A vapor tension table for satd. NaCl and water is given. F. S. GRANGER

Determination of the raw [as extracted] and pure free sulfur in exhausted gas-purification masses. R. KATTWINKEL. *Teer u. Bitumen* 26, 189-93 (1928).—Methods in present use are reviewed. The extn. method using active C, as carried out in Holland, was exptly. tested and its applicability demonstrated. In conclusion, a new method was described. The sample is washed free of sol. sulfate with hot water, dried and the % loss in wt. noted. One-tenth g. of the product is fused in a porcelain crucible with 3 g. Na_2O_2 for $\frac{1}{4}$ hr., boiled with H_2O to decompose excess Na_2O_2 , acidified with HCl and freed from SiO_2 in the usual manner. Fe, etc., is removed with NH_4OH and the sulfate is detd. with BaCl_2 . The results check closely those obtained by the active-C extn. and HNO_3 -oxidation methods. The new method has the advantage of greater simplicity. F. S. GRANGER

The 1927 military competition for producer-gas-driven automobile trucks. ANON. *Ann. office nat. comb. liquides* 2, 809-13 (1927).—The tests, in which took part 12 3.5-ton trucks and 5 5-ton trucks, comprised bench tests lasting from April 11 to June 4 and a 2570-km. road test lasting from June 7 to July 5. Wood dried to 18% H_2O was not found satisfactory, even in a specially designed producer, because of clogging of parts of the equipment (pipes and gas purifiers) with tar and production of heavy smoke on starting the motor. Wood dried to 10-2% water content gave satisfactory results, but would require rather frequent cleaning of the motor and pipes. Charcoal and carbonite were satisfactory from the standpoint of regularity of operation and power

development and require only a weekly or semi-weekly cleaning of the gas filters and coolers.

A. PAPINEAU-COUTURE

Physiological properties of tar constituents. ANON. *Teer u. Bitumen* 26, 193-5 (1928).—A general review, with references, relating to precautions against danger to animal life from tar in industry.

F. S. GRANGER

Tar fog. A new method for its precipitation. ANON. *Gas World* 88, 424-5 (1928).—The cascade separator, operating on the shock principle, ppts. both gravity and colloid fog and can be cleaned without interruption of the flow of gas. A removable cover permits removal of the working parts from the tank without breaking pipe joints. The gas, entering laterally, strikes the surface of the outermost of 3 fixed concentric inverted truncated cones, passing downward to an opening into the cone, where its direction is reversed, throwing out most of the gravity fog, which settles to the bottom. The gas then passes upward along the 2nd cone to its base at the top where 2 concentric annular nozzles are formed by the 2nd and innermost cones with the concentric skirts of a bell member which automatically regulates the annular orifices to suit the gas flow. The gas passes down through the 1st nozzle, up along the 3rd cone and down through the 2nd nozzle, impinging, as it emerges from each nozzle, upon a bed of fine steel bristles upon which the colloid tar, etc., is deposited and runs off to the bottom. The gas finally passes upward through the central skirt and a steel wool filter, in the top of the bell, and out. Normally, about 90% of the total fog is removed.

F. S. GRANGER

Apparatus used for the distillation of coal (BORDAS) 22. Statistics on coal mining for 1925 (HOFMANN) 13. Petrographic investigation of coal on the basis of the specific gravities of the individual components (GROSZ) 8. The specific heats of amorphous carbon and semi-coke (TERRER, BIEDERBECK) 2. Vacuum flotation apparatus for concentrating coal (Brit. pat. 275,778) 1.

FRIEDMANN, WALTER: *Die Verflüssigung der Kohle nach Fr. Bergius.* Berlin: Allgemeiner Industrie-Verlag. G. m. b. H. Paper, M. 4., postage free. Reviewed in *Gas J.* 182, 237 (1928).

GIBSON, WALCOT: *Coal in Great Britain: the Composition, Structure and Resources of the Coalfields, Visible and Concealed, of Great Britain.* Revised and enlarged. London: Edward Arnold & Co. 334 pp. 21s., net. Reviewed in Supplement to *Nature* 121, 388 (1928).

KREULEN: *Über die Selbstentzündlichkeit der Steinkohlen.* Rotterdam: Laboratorium voor Brandstof en Olieonderzoek "Gluckauf." Amsterdam. D. B. Centen Wissenschaftliche Buchhandlung. 32 pp. F. 1 25. Reviewed in *Rev. prod. chim.* 31, 247 (1928).

Distilling solid fuel. F. F. HOBSON. Brit. 277,214, Jan. 10, 1927. Solid fuel is fed continuously in an annular stream around a vertically reciprocating louvered gas collector in an externally heated retort, and the residue is continuously removed. Various structural features are described. Brit. 277,215 relates to similar app.

Carbonized fuels. F. SRIDENSCHNUR. Brit. 276,455, June 8, 1926. Coal, lignite or like material is heated at about 500° with a large vol. of hot gases free from O to obtain a product contg. 21-30% volatile matter and the product is rather coarsely ground.

Fuel briquets. W. T. MILLER. U. S. 1,670,865, May 22. Coal or other finely divided carbonaceous material is treated with an adhesive formed of a glutinous substance such as dextrin dissolved in water and partially thrown out of soln. by a precipitant e. g., alc. Na silicate also is used.

Liquid fuel for internal-combustion engines. AVENARIUS, GEB. Brit. 277,326, Sept. 7, 1926. Gasoline or similar fuels are treated with "anti-knocking" agents comprising higher fatty acids or corresponding esters, aldehydes, ketones, lactones, anhydrides or other derivs. which may be treated with halogens, N, O or ozone or their mixts., e. g., there may be added 0.5% of olive or castor oil, triolein or Et or Me oleate.

Coking coal. R. TORMIN. Brit. 277,290, Sept. 8, 1926. Closed receptacles contg. the coal are rolled through a heating chamber and thence into a cooling chamber where the heat of the material is recovered. An app. is described.

Distilling coal. F. BERGIUS. U. S. 1,669,439, May 15. Coal is distd. to produce NH₃, coke, tar, a gaseous fraction relatively poor in H but of high heating value and a gaseous fraction relatively rich in H; the tar is mixed with coal and the mixt. is subjected to liquefaction and hydrogenation treatment with the gaseous fraction relatively rich in H at elevated temp. and pressure to produce NH₃, oil and a gas of high heating value and this gas is combined with the gaseous fraction relatively poor in H.

Distilling coal or like material. H. NIELSEN and B. LAING. Brit. 276,407, March 6, 1926. In a continuous process, the material is first subjected to "low-temp." distn. (at 185-580°) and then to a high-temp. distn. (at 580-1200°) and an inert gas may be passed in counter-current to the material undergoing distn. A single retort or 2 retorts communicating with each other may be used.

Extracting and carbonizing coal. A. PISTORIUS. Brit. 277,293, Sept. 8, 1926. Powd. or lump coal is extd. with a solvent such as pyridine which may be used under pressure, and is then carbonized. A voluminous residue is obtained suitable for coal-dust firing, use as an *explosive* or as a *reducing agent in metallurgical operations* as in obtaining carbides or silicides, or for *making electrodes*. It can be rendered still more porous by treatment with acids and may be treated by activating methods. The coal may be distd. without previous removal of the solvent with which it is preliminarily treated.

Gravity separation of coal from impurities. R. LESSING. Brit. 276,723, May 27, 1926. A CaCl_2 soln. may be used for gravity sepn. in an app. which is described.

Destructive hydrogenation. I. G. FARBERIND. A.-G. Brit. 277,273, March 131, 1926. In producing liquid hydrocarbons by destructive hydrogenation of coal, tars, mineral oils and like materials, both the hot and cold parts of the app. are made of meta, not reacting with CO as described in Brit. 247,217 (C. A. 21, 515) and Brit. 249,155 (C. A. 21, 1002). For the cooler portions of the app. metals of relatively low m. p. may be used such as Sn, Zn, Cd, Pb or their alloys; for the hotter portions, Cu, Ag, Al alloys, Cr, Mn, V, U or steel or alloys of Ni or Co may be used contg. about 20% or more of Mn, Ti, Cr, V, W or Mo. Reducing gases other than those contg. H and CO may be used in the process.

Destructive hydrogenation of carbonaceous materials. I. G. FARBERIND. A.-G. Brit. 276,001, Aug. 11, 1926. Catalysts are used preferably contg. not more than 10% of Ag, Cu, Zn or Cd and a larger quantity of B, Al, Si, Ti, V, Ta, Cr, Mo, W or Co; *e. g.*, a catalyst of tantalic acid with about 10% Ag may be used for treating crude cresylic acid from lignite tar in a current of H at 450° under 200 atm. pressure to form a product consisting largely of toluene, C_6H_6 and hydroaromatic hydrocarbons.

Low-temperature carbonization of carbonaceous materials. SYNTHETIC AMMONIA & NITRATES, LTD., R. E. SLADE and C. F. R. HARRISON. Brit. 276,522, Oct. 13, 1926. Carbonaceous material is treated with superheated steam, org. compds. are sepd. from the steam at a relatively high steam, and the steam is recirculated through the material. Permanent gases produced are periodically removed from the circuit. Catalysts such as Fe oxide with or without alkali may be added to the charge.

Pressing and drying peat for fuel. B. JIROTKA. Brit. 276,471, March 30, 1926. Mech. features.

Furnace for drying fuel, etc. E. W. BOWEN. U. S. 1,670,606, May 22.

Use of catalysts for promoting combustion in furnaces, etc. T. W. GRUETTER. Brit. 276,300, Aug. 23, 1926. Catalysts such as base metal oxides, *e. g.*, oxides of Cu, Ni, Co or Fe, may be applied to porous supports such as bricks or may be injected into fuels.

Operating vapor engines on aircraft with toluene or similar materials. SIEMENS-SCHUCKERTWERKE AKT.-GHS. Brit. 275,625, Aug. 6, 1926.

Treating surfaces of internal-combustion engines by the cementation-process. M. BIRKIGT. Brit. 275,986, Aug. 12, 1926.

Gas-producer furnace. H. J. TOOGOOD and R. DEMPSTER & SONS, LTD. Brit. 276,410, May 17, 1926.

Gas-fired annealing furnace or soaking-pit. DOWSON & MASON GAS PLANT CO., LTD. AND J. PATON. Brit. 277,251, April 26, 1927.

Valve system for gas producers, etc. R. THOMAS & CO., LTD. AND E. A. JONES. Brit. 275,697. April 13, 1926.

Apparatus for producing carburetted air gas. H. FOERSTERLING. Brit. 277,206, March 5, 1926.

Gas filter for use in connection with gas pipe lines. C. B. GAMBLE. U. S. 1,669,461, May 15.

Outlet pipe system for withdrawing coal gas from retorts. LOW TEMPERATURE CARBONISATION, LTD. AND C. H. PARKER. Brit. 277,079, June 7, 1926.

Retort door construction. LOW TEMPERATURE CARBONISATION, LTD. AND J. F. PARKER. Brit. 277,078, June 7, 1926.

Treating ammoniacal gas liquor. S. M. SHADBOLT and CHEMICAL ENGINEERING & WILTON'S PATENT FURNACE CO., LTD. Brit. 276,393, Dec. 1, 1926. Distn. is effected

in the presence of solvent oils such as gasoline, C_6H_6 , paraffin, naphtha or creosote, to facilitate recovery of by-products such as pyridine, phenols and oils.

Purifying gas mixtures. F. SIEMENS A.-G. Brit. 276,347, Aug. 19, 1926. Gas such as producer or coke-oven gas, contg. H_2S , is passed over a catalyst at a temp. which will form S oxides. If CN compds. are present, the temp. and catalyst are chosen to form NH_3 , and unsatd. hydrocarbons may be similarly converted into satd. hydrocarbons and washed out with the C_6H_6 . C oxides produced by cracking of the CN compds. may be converted into MeOH which may be removed in the C_6H_6 washer. The catalyst contains at least one S-binding metal such as Fe, Ni, Co, Mn, Cu, Zn, Pb, Ag, Bi, Sb or its oxide or salt or mixts. with each or with other metals or salts or metalloids such as C, B, Si or Ti. Numerous details are given.

Producer gas. H. L. DOHERTY. U. S. 1,670,102, May 15. A column of fuel is passed downwardly through a shaft and air under induced draft is introduced into the major portion of the upright sides of the column; the air supply is maintained so as to give the highest gas-making temp. in the upper portion of the column, producer gas formed is removed adjacent the top of the column and flue gases for controlling combustion are introduced into the lower part of the column, and the movement of the flue gases upwardly is controlled to cause a lowering in temp. of the fuel as it advances below the mid-portion of the column. An app. is described.

Water-gas generator. HUMPHREYS & GLASGOW, LTD. AND J. C. STELFOX. Brit. 276,753, June 4, 1926. A core is suspended centrally within the distn. chamber to increase the wall surface in contact with the fuel, promote more even carbonization and maintain the fuel in an unbroken annular mass.

Apparatus for making carburetted water gas. J. W. GIBSON. Brit. 276,065, May 17, 1926

Apparatus for producing carbureted water gas. O. MISCH. Brit. 276,630, Nov. 8, 1926.

Plant for making carburetted water gas. T. W. STONE. U. S. 1,671,093, May 22.

Valve-control devices for water-gas plants. T. W. STONE and W. BARR. U. S. 1,670,911, May 22.

Combined water-gas producer and steam generator. J. BELLAY. Brit. 275,978, Aug. 11, 1926.

Purifying tar oils. S. CAPLAN. Brit. 276,216, Sept. 22, 1926. Tar acid-bearing oils such as low-temp. and blast-furnace tars and shale oils are freed from certain impurities and thereby rendered suitable for use as disinfectants by agitating with an aq. soln. of borax or with H_2BO_3 and alkali. The treatment may be repeated and the purifying soln. may be revived by treatment with a sol. ferric salt such as $FeCl_3$ and alkali which form a black flocculent ppt. which is removed. "Oxidized copperas soln." also may be used for the revivification and the alkali may be added simultaneously or separately.

Coke. P. DVORKOVITZ. Brit. 276,181, Oct. 15, 1926. In a process of making hard coke as described in Brit. 249,901 (C. A. 21, 1002), an alkali such as lime or soda is added to the charge before or during the preliminary heating.

Horizontal coke-oven construction. FIRM OF C. STILL. Brit. 275,914, May 12, 1927. Distn. gases are withdrawn from the bottom of the oven and the supply of heat to the oven walls can be controled in a vertical direction; preferably, a slightly lower temp. may be maintained at the bottom than at the top of the flues, and by this manner of operation the plastic zone is prevented from reaching and passing the outlet duct at the bottom through which the distn. products are withdrawn before the upper part of the charge has been coked.

Rectangular sole-fired coke-oven construction. TAR & PETROLEUM PROCESS CO. Brit. 277,256, May 11, 1927.

Coke-oven discharge apparatus. NAAMLOOZE VENNOOTSCHAP SILICA EN OVENBOUW MIJ. Brit. 277,269, June 9, 1927.

Coke-oven discharge apparatus. STETTINER CHAMOTTE-FABRIK A.-G. VORM. DIDIER. Brit. 276,325, Aug. 17, 1926.

A device for discharging coke from vertical retorts. LOW TEMPERATURE CARBONISATION, LTD., and C. H. PARKER. Brit. 277,080, June 7, 1926. *

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

Apparatus used for the distillation of coal, shale and petroleum products. F. BORDAS. *Ann. fals.* 21, 146-54(1928).—A comparison of the methods and app. which are official in France, Germany, England and the U. S., from which B. concludes that, at the present time, France is the only country where standardization of app. and unification of methods have been practically accomplished. Bibliography of 10 references.

A. PAPINEAU-COUTURE

Investigation of Sakhalin crude oils. Okha oil field. S. S. NAMETKIN AND V. G. PUZILLO. *Neftyanoye Khozyaistvo* 14, 519-20(1928).—Crude oil from 4 wells was tested. "Kadzusa No. 3" had d. 0.9304, E_{40} 2.85, flash point (Abel-Penskii) 37.5°, resin 36%; "Cable No. 1" 0.9309, 2.89, 31°, 36.8%; "Cable No. 5" 0.9302, 2.88, 68° (Martin-Penskii), 40.0%; "Rotary No. 1" 0.9300, 2.85, 28.5° (Abel-Penskii), 36%. The freezing points for all samples were below -20°. Crude oil from "Cable No. 1" was further tested. Engler distn. gave: I. b. p. 175°, up to 200° 1.5%, 225° 6%, 250° 12.9%. The oil was cracked at higher temps. as a result of high contents of tar. The sample was distd. with steam, and 4 fractions were sepd.: (1) 40-213°, 14% by wt., d. 0.8403; (2) 213-240°, 14%, d. 0.8830, E_{40} 1.12; (3) 240-275° 14%, d. 0.9123, E_{40} 1.46; (4) 275-302° 22.9%, d. 0.9451, E_{40} 3.41; residue 31.6%. The first 2 fractions redistd. yielded up to 270° 20.1%. The color was slightly yellow and after treatment with H_2SO_4 a kerosene distillate was obtained: d. 0.847, flash point (Abel-Penskii) 38.5°, viscosity (Ostwald 20) 0.02137, Doctor test negative, color (Stammer) 2.6, sulfur 0.08%. This kerosene distillate is high in S but within the limit for American standards; the high sp. gr. is due to naphthenes with condensed chains present in this crude. After distn. of the kerosene fraction the remaining fuel oil had d. 0.971, flash point (Brenken) 150°, E_{40} 7.3-7.4, freezing point below -20°. By mixing the fractions 2 and 3 with the residue left in the still, in the proportion 1:1 a very high-grade fuel oil is obtained with freezing point still below -20°. The lubricating-oil fractions amount to 14-16%. Cylinder stock could not be obtained.

A. A. BOEHTLINGK

Comparison of Diesel fuel oils from Baku, Groznuii and Emba. N. CHERNOZHUKOV. *Neftyanoye Khozyaistvo* 13, 323-7(1927).—The following properties are characteristics of various oils tested on Diesel engines in the Institute for Fuel Research in Moscow.

Name of oil	I Up to 250°	II 250° 350°	III Above 350°	II I+III	% of C. Conrad- son	% of C in the C de- posit in the engine
Emba solar	4.2	69.5	26.3	2.28	0.59	31
Neftesindikar	14.8	45.5	39.4	0.85	0.85	41
Emba crude oil	22.8	42.4	34.8	0.74	0.41	41
Baku No. 1	7.4	37.6	55.0	0.60	1.66	42
Baku No. 2	18.6	36.0	45.4	0.56	1.01	40
Groznuii	26.6	41.6	31.8	0.77	2.34	60

A good Diesel oil should comply with the following specification: Distil up to 250° not more than 10%, 250-350° not less than 50%, bottoms not more than 10%. The oils tested showed more or less satisfactory results except the Groznuii oil, which forms too much carbon.

A. A. BOEHTLINGK

Present status of specifications for transformer oils. H. WEISS AND T. SALOMON. *Ann. office nat. comb. liquides* 2, 801-7(1927).—A brief general discussion showing the necessity for international action and outlining what has been accomplished in this direction.

A. PAPINEAU-COUTURE

Determination of the oxidizability of transformer oils. N. BUTKOV. *Neftyanoye Khozyaistvo* 13, 332-3(1927); cf. C. A. 21, 4058.—Testing methods for transformer oils are reviewed. B. used an autoclave with some Wood's metal on the bottom in which were immersed glass test tubes with oils under test. The autoclave was heated to 150° and O_2 led in at a rate of 4-5 l. per hr. The oils were treated afterward with H_2SO_4 , the layers sepd. and detns. made of acidity, formation of sludge and saponification.

A. A. BOEHTLINGK

Autoxidation during slow combustion. E. W. J. MARDLES. *J. Chem. Soc.* 1928, 872-85.—Exptl. evidence, using the tube and bulb methods, is obtained for answering objections to the autoxidation theory. The slow combustion of fuel-air mixts. gives

short-lived "active" O_2 , presumably as org. peroxides, which are decompd. into aldehydes and acids with no effect on the detonation. The less the time of heating these mixts., the greater the amt. of "active" O_2 formed, only a minute quantity being present after 1 min. heating. If alc., C_6H_6 , etc. are added to hexane-air and phenol or aniline to Et_2O -air mixts. the "active" O_2 decreases. Autoxidation occurs when C_6H_6 (at 500°) or aniline (at 350°) is heated with hexane-air mixts. H_2O_2 does not autoxidize the combustion, its presence being due to the hydrolysis of primary peroxides. Detonation-inducers (N_2O_5 , iso-Am nitrite, benzoyl peroxide) are efficient in lowering the spontaneous ignition temps. of fuels contg. small quantities of various org. compds., while detonation-preventers (Fe carbonyl, $Pb(C_2H_5)_4$) produce the opposite effect. Temp.-pressure curves, detd. by the bulb method, are analyzed and completely confirm the conclusions of the tube method.

J. BALOZIAN

The Dubbs cracking process in Roumania. GEOFFROY. *Am. office nat. comb. liquides* 3, 149-58(1928).—A brief description of the installation of the refinery of the Société Columbia, which was the first European Dubbs cracking plant, and of its operation.

A. PAPINEAU-COUTURE

Use of the Carius method for the determination of sulfur in the less volatile petroleum oils. J. M. DEVINE AND F. W. LANE. *J. Am. Chem. Soc.* 50, 1707-10(1928); cf. *C. A.* 22, 2261.—Sp. directions are given for the use of the Carius method to det. S in the less volatile petroleum oils. Especial care is necessary to effect complete oxidation. HNO_3 is completely removed before the $BaSO_4$ is pptd. C. J. WEST

Determination of sulfur in volatile fuels. H. T. KENNEDY. *Ind. Eng. Chem.* 20, 201-2(1928).—The fuel oil to be tested is measured in a reservoir, then admitted through an unbored stopcock with tapering channel to the vaporizing chamber where it is absorbed by a plug of glass wool. By means of a current of air heated by a nichrome coil which surrounds the chamber the oil is completely volatilized and made ready to burn at the tip provided. The gases are absorbed in standard Na_2CO_3 soln. which is then titrated with methyl orange indicator. The method is especially good for oils contg. CS_2 .

H. L. OLIN

Thermal decomposition of organic sulfur compounds. W. F. FARAGHER, J. C. MORRELL AND S. COMAY. *Ind. Eng. Chem.* 20, 527-32(1928).—Solns. of mercaptans, alkyl sulfides and disulfides, thiophene and sulfur in naphtha from Pennsylvania crude oil were subjected to heating at cracking temp. ($925^\circ F.$). Thiophene is not decomposed even at $1600^\circ F$ but H_2S , mercaptans, thiophene and elementary S were found among the decompn. products of the other S compd. Gas oil from Grosneft crude contg. org. disulfides in soln., when cracked at $819^\circ F$. and 250-lbs. pressure gave the same S products as by cracking at atm. pressure.

E. E. CRANDALL

Basis for a sound construction of dephlegmators. S. VOLOKH. *Neftyanoye Khozyaistvo* 13, 317-22(1927).—Polemical with Kostrin. Principles of dephlegmation are reviewed.

A. A. BOERTLINGK

Comparison of Soviet and American kerosenes. S. NAMETKIN. *Neftyanoye Khozyaistvo* 13, 328-31(1927).—American kerosenes are characterized by their narrow boiling range. The final b. p. is much lower than that for Russian kerosenes. Some of American kerosenes have a comparatively high content of S and unsatd. compds.; they are not very stable in color. Soviet kerosene has a wider boiling range; 70-75% is distd. off at $100-110^\circ$. This kerosene has more heavy gasoline and light solar oil fractions. The Soviet kerosenes have a high content of unsatd. compds. (5-10%). The S content is negligible. The Russian kerosene is better adapted for fuel, having more evenly distributed low, medium and heavy fractions.

A. A. BOERTLINGK

Determination of the boiling-point limits of benzine. A. W. SENSFENSIEDER-ZIG. 55, 135(1928).—The principal, and possibly single, cause of disagreeing results in testing benzine by fractional distn. lies in the lag of thermometers, which usually are not sensitive enough for the purpose.

P. ESCHER

Natural-gas gasoline in 1926. G. R. HOPKINS. *Bur. Mines, Mineral Resources of the U. S.* 1926, Part II, 159-68 (preprint No. 15, published Nov. 11, 1927). E. H.

Some autoxidation reactions of gasolines. ANDRÉ GRAETZ. *Ann. office nat. comb. liquides* 3, 69-76(1928).—From a brief crit. review of work on the subject G. concludes: (1) before any thermal disocn. reaction takes place there is autoxidation of the gasoline, which takes place mainly in the liquid phase at an optimum temp. of $120-60^\circ$; (2) the most readily autoxidizable hydrocarbons are the C_7H_8 hydrocarbons, the autoxidation of which can take place in 2 different manners to give either unstable and detonating compds. or stable compds. The presence of a fairly large proportion of C_7H_8 hydrocarbons in gasoline thus causes a more regular autoxidation of the paraffine hydrocarbons and leads to more stable or more easily hydrolyzed products. Similarly,

the anti-knock properties of terpenes are attributable to their regulation of autoxidation to produce more stable products; (3) the anti-knock properties of aromatic hydrocarbons are due to the stability of the peroxides which they form, but this stability renders them less suitable as catalyzers of the autoxidation of the paraffins. They can combine directly with compds. contg. double bonds, and act as reagents, rather than catalyzers, and the oxides which they form are very easily hydrolyzed. In order to produce a beneficial effect they must therefore be present in large proportions in gasoline (50% and over); (4) ketones and aldehydes (particularly cyclohexanone and menthone) behave like C_2H_4 hydrocarbons; (5) the 2 chief factors which destroy the peroxides formed by autoxidation are H_2O which hydrolyzes them and high temp. which decomps. them.

A. PAPINEAU-COUTURE

Lead tetraethyl in internal-combustion engines. H. S. ROWELL. *Nature* 121, 570-1(1928); cf. Mardles, *C. A.* 22, 2050.—R. criticizes M.'s statements regarding the effect of using $PbEt_4$ in gasoline. *Ibid* 571. E. MARDLES. M. replies that its use is not injurious to the engine and is beneficial to the performance. G. CALINGAERT

Detrimental properties of lubricants in use. FR. FRANK AND HANS SELBERG. *Erdöl u. Teer* 4, 215-7(1928).—It is contended that the method advanced by Hackford (*Engineering and Boiler House Review*, Sept. 1926, 152), for evaluation of lubricating oil with reference to deterioration in use, is based on a principle long well-known and is specifically nothing but the method of Haslam and Fröhlich (*C. A.* 21, 1345) according to which O_2 is passed through a large sample of the oil at 130-140° and the increasing acidity is detd. at intervals. Hackford's results, however, are considered new and unique since they indicate that paraffin base oils are more stable toward O_2 than naphthenes, which is directly contrary to scientific experience. Since the method is important because of its shortness, and Hackford bases his conclusions on insufficient data, it was checked as follows. A no. of oils of American and Russian origin were tested by the method of Haslam, but at 150°, the increased acidities and sapon. nos. being detd. after 9 hrs. Three out of the 5 Russian (naphthenic) oils showed less acid increase than any of the 7 American (paraffinic) oils. Of the other 2, one showed a much lower sapon. no. increase than any of the American oils and deteriorated less in use.

F. S. G.

Use of "Voltols" in the textile industry. W. KACZKOWSKI AND H. BORTNOWSKA. *Przemysł Chem.* 12, 99-102(1928).—Vegetable and animal fats electrically treated and then mixed with mineral oils have been recommended under the name of "Voltols" as greases suitable for lubricating textile machinery because of their relatively heavy consistency at elevated temps. They are as safe as mineral greases in regard to likelihood of their spontaneous ignition on the fabrics, but of a somewhat questionable value as regards the ease of washing out of the materials which they may happen to stain.

A. C. ZACHLIN

Use of lubricating greases for preservation of metals. M. V. BORODULIN. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 5, 53-8.—Walker and Steele's method (Cf. *C. A.* 15, 766) of testing the preservative qualities of lubricating oils by means of steel plates has been used by B. The plates covered with oils were exposed to moist air and vapors of HNO_3 or Cl_2 . The most desired characteristic of preservative oil is a good adhesiveness, *i. e.*, adsorbability of the oil by the surface of the metal; this is a more important factor than viscosity. As, however, there is no adequate method of detg. adhesiveness, viscosity is used as a standard. The higher the viscosity, the better the oil acts in forming a protective layer on the surface of the metal. Unfortunately viscosity detns. of thick oils cannot be made below 50° (with Engler's viscometer), as the oils do not run at lower temps. As to detns. of sp. gr. and flame point, they have no other importance than that of usually giving values increasing with the viscosity of oils and thus confirming the data obtained by viscosity tests. The presence of free naphthenic acids in the preservative oils is harmful to metals, as can be seen by Cu becoming green and steel darkening. Soap which is usually introduced in these oils in order to neutralize the effect of free acids does not prevent the action of atmospheric O on the metals and even has a tendency of facilitating it.

BERNARD MELSON

Oil-asphalts and tars. A. N. SAKHANOV AND N. A. VASIL'EV. *Neftyanoye Khozyaistvo* 13, 334-9(1927).—Neutral tars were extd. from fuller's earth after asphaltenes and acid sludge had been removed. The neutral sludge (tar) contains O_2 and S and is completely sol. in gasoline, etc., without forming any salts. This sludge is very unstable and is easily condensed by contact with fuller's earth. Mean mol. wt. and sp. gr. (sometimes above 1) are much higher than the corresponding oil fractions. This sludge is liquid, semi-liquid or solid; it has the formula $C_nH_{2n-m}O_p$, in which n is 19-55, m

9-33, p 2-3. These compds. are found in all fractions except gasoline; they have a highly developed polycyclic structure with not more than one double bond. They form true solns. and are not colloids. They color the solvent intensely. They are sol. in H_2SO_4 , under certain conditions forming compds. A. A. BOEHTLINGK

Problems in the manufacture of asphalt. A. N. SAKHANOV AND L. G. SHERDEVA. *Neftyanoye Khozyaistvo* 14, 513-8(1928).—American, Mexican and Russian asphalt cements are compared. The possibilities are discussed of using acid sludges obtained after treatment of the lubricating-oil fraction and heavy bottoms left after distg. off the lubricating oil. Expts. were made on non-paraffin acid sludge from Groznuii crude oil; part of the heavy fractions of lubricating oils was left; the temp. was kept as low as 220° and the amount of steam was greatly increased. The results obtained were quite satisfactory but the price was prohibitive. Expts. with Groznuii paraffin and Balakhanui products were less satisfactory. The crude oils most suitable for this purpose are from Kaluga, Kirmaki, Binagadui and Voznesenskii (heavy). The disadvantage of using heavy crude oils is the distn. of light fractions. The Kaluga crude gives an excellent product after distn. of 20% and a succeeding oxidation of the bottoms left. The next is the heavy crude from Kirmaki. About 25% must be distd. off; the bottoms have to be oxidized. The Binagadui and Voznesenskii crude oils are less satisfactory; they contain a large amount of light fractions. A. A. BOEHTLINGK

Acidic asphalts. S. GASIOROWSKI. *Przemysl Chem.* 12, 90-9(1928).—Asphaltization takes place during the refining of oils (from Boryslaw) over H_2SO_4 , and gives a product closer related to the natural rather than the artificial asphalts. This classification is based on the S content, presence of free acids and high sapon. value; low content of asphaltines, and high content of oily substances may be caused by insignificant degree of asphaltization. In asphalts of this kind there appear products of oxidation, action of S, sulfonation of hydrocarbons, sulfonic and asphaltogenic acids, etc. High % of N is striking. Longer asphaltization under the action of air proceeds like that of S-free asphalts, and polymerization predominates. The addn. of free S causes a more rapid reaction, increases S and O content of the product as well as that of acid and the saponifiable matter. A. C. ZACHIN

Statistics on petroleum mining for 1925 (HOFMANN) 13. Purifying tar oils (Brit. pat. 276,216) 21. Heat treatment of mineral oils (U. S. pat. 16,971) 13.

SCHNEIDERS, GOTTFRIED: Die Gewinnung von Erdöl, mit besonderer Berücksichtigung der bergmännischen Gewinnung. Berlin: J. Springer. 363 pp.

WESTCOTT, JAMES H.: Oil, Its Conservation and Waste. New York: Beacon Pub. Co. 213 pp.

Cracking hydrocarbon oils. W. L. GOMORY. U. S. 1,670,804, May 22. A mixt. of hydrocarbon material such as petroleum oil and H is forced through a conduit in which it is heated to about 540° under a maintained pressure of about 150 lbs. per sq. in.; about 80-85% of the mixt. is vaporized and the resulting gases, vapors and liquid are drawn off and recovered. An app. is described.

Cracking hydrocarbon oils. O. KAY. Brit. 276,947, Sept. 4, 1926. Hydrocarbon oils are atomized in a stream of air and the atomized particles are permitted to settle in accord with their d., into different collecting receptacles.

Cracking hydrocarbon oils. E. SCHULTZ. Brit. 277,042. March 9, 1926. In distg. crude petroleum or other materials as described in Brit. 254,011 (C. A. 21, 2556) the materials in the still or retort as well as the vapors are treated with purifying or converting materials such as lime mixed with ZnO or $ZnCl_2$, $MgCl_2$ or $CaCl_2$, $NaCl$, Na , montmorillonite, bentonite, bauxite or $AlCl_3$; the heavy fractions are also treated to effect conversion. An app. is described.

Cracking hydrocarbons. J. F. P. DE LA RIBOISIÈRE. Brit. 276,532, Nov. 12, 1926. Vapors from a still in which oils or mixts. of oil with coal, tar, lignite, pitch, etc., are cracked are passed through a filled tower or condensing column or like device in which an approx. const. temp. is maintained by use of liquids such as water or C_6H_6 or a mixt. of liquids of const. b. p. The condensate formed may be refluxed to the still.

Cracking petroleum oil. G. EGLOFF. U. S. 1,670,108, May 15. Oil is passed through a heating coil in which it is heated to a cracking temp. and thence passes to an expansion chamber from which vapors are removed; the vapors are subjected to a refluxing condensation and residuum is withdrawn from the expansion chamber and is recirculated back through the expansion chamber into the vapor space of the latter,

and the reflux condensate is also returned to the expansion chamber for retreatment. Cf. C. A. 21, 3267.

Cracking petroleum oil. C. P. DUBBS. U. S. 1,670,103, May 15. Oil is passed through a heating coil and thence to a plurality of enlarged chambers connected in series and vaporization is permitted in the chambers and the vapors are withdrawn; liquid residue is withdrawn from each of the chambers independently and portions of the residue are diverted back to the charging stock and mingled with it for retreatment. Cracking is effected under pressure. An app. is described.

Apparatus for cracking oil. C. P. DUBBS. U. S. 1,670,104, May 15. A system is specified comprising a battery of stills, connected with headers, aerial pipes, condensers, pressure-regulating valves, etc. Connections are provided for drawing off reflux condensate from one of the headers and returning it to any of the stills.

Apparatus for cracking petroleum oil. G. EGLOFF and H. P. BENNER. U. S. 1,670,105, May 15. A first pair of horizontal stills is mounted in the lower part of a furnace which may be heated to cracking temp. and a second pair of horizontal stills is mounted above the first pair; another single horizontal still is mounted above and between the second pair. Oil is delivered to the first pair of stills substantially to fill them without filling the other stills and connections are provided so that vapors from the first pair of stills are superheated in the other stills, which are connected with a dephlegmator and condenser. Reflux condensate is returned from the dephlegmator to one of the first pair of stills.

Apparatus for cracking oil. G. EGLOFF. U. S. 1,670,106, May 15. An annular conduit serving as a reflux app. is placed in the upper portion of a still and through this conduit raw oil may be fed and discharged into the still near the bottom of the latter.

Deemulsifying hydrocarbon oils. G. EGLOFF. U. S. 1,670,107, May 15. Oil is distd. under pressure and NaOH is simultaneously injected into the vapor space of the still. An app. is described.

Purifying cracked oils. I. G. FARBERIND. A.-G. Brit. 276,427, May 26, 1926. The more unsatd. constituents are removed from cracked oils by heating with FeCl₃ contg. water; *e. g.*, crude gasoline may be boiled under a reflux with 2% of cryst. FeCl₃ hydrate, then distd. and washed with water or dil. alkali.

Heat conversion of hydrocarbon oils. F. A. HOWARD and N. E. LOOMIS. U. S. 1,670,037, May 15. Oil such as crude petroleum is forced through a highly heated confined passage with a velocity sufficient to prevent substantial deposition of coke, to heat the oil to a cracking temp., discharged into an enlarged chamber while the heat is confined in it to maintain it at cracking temp., and the products from this enlarged chamber are passed into a second enlarged chamber into which the oil enters at a temp. of about 360-365°; an O-contg. gas such as air is supplied to the second enlarged chamber to maintain the temp. and effect combustion of parts of the material. An app. is described. Cf. C. A. 21, 3454.

Apparatus for preheating crude mineral oil preparatory to fractionation. W. L. GOMORY. U. S. 1,670,805, May 22.

Apparatus for distilling petroleum oils. M. SINGER. Brit. 276,302, Aug. 19, 1926. An app. is specified "of the sep. heater and evaporator type" adapted for producing lubricating oils.

Tube still and furnace for distilling hydrocarbon oils. R. T. POLLÖCK. U. S. 1,670,122, May 15.

Refluxing "bubble tower" for petroleum distillation, etc. R. CROSS. U. S. 1,670,762, May 22.

Refining petroleum oils and distillates. P. MCMICHAEL. U. S. 1,669,944, May 15. Oil is treated with Na hyposulfite and with a heavy metal compd. such as Na chromate in alk. aq. soln., and the oil is then further treated with a dil. aq. soln. contg. a free acidic constituent such as HCl.

Dephlegmator for petroleum oil vapors. H. S. MABEY. U. S. 1,670,118, May 15.

Manhole cover for petroleum stills. A. E. FEW, JR. U. S. 1,669,839, May 15.

Apparatus for separating oil and gas. D. G. LORRAINE. U. S. 1,670,728, May 22.

Centrifugal apparatus for degassing transformer oils, etc. SOCIETÀ ITALIANA PIRELLI. Brit. 276,987, Aug. 31, 1926.

Separating wax from lubricating oils. AKTIEBOLAGET SEPARATOR-NOBEL. Brit. 276,658, Aug. 24, 1926. Trichloroethylene or other liquid making the oil heavier than the wax is added before centrifugal sepn. An app. is described.

Magazine filter for lubricating oils, etc. F. W. MANNING. U. S. 1,669,718, May 15.

Filter for use with gasoline pumps, etc. SHELLMEX, LTD., and J. LAWSON. Brit. 275,695, April 9, 1926.

Refining hydrocarbons with sulfur dioxide. ALLGEMEINE GES. FÜR CHEMISCHE INDUSTRIE. Brit. 275,884, March 2, 1927. In the continuous treatment with liquid SO_2 of hydrocarbons obtained from the distn. of coal tars, tars from brown coal, kerosene, transformer oil, light lubricating oil or similar materials, the resulting fractions are subjected to a continuous evapn. process carried out in several stages in the last of which a high vacuum is employed. An app. is described. Cf. C. A. 22, 1470.

Bituminous emulsions. MINERAL AKT.-GES. BRIG. Brit. 276,543, Dec. 3, 1926. Material such as tar, asphalt or petroleum asphalt, preferably molten, is added to an emulsion in Na_2CO_3 or K_2CO_3 soln., of a neutral glyceride such as that of an animal or vegetable oil. The emulsions may be used in road-making or in cements or paints.

Emulsions of hydrocarbons, oils, waxes, etc. I. G. FARBENIND. A.-G. Brit. 277,277, March 10, 1926. Emulsions such as those for the treatment of fibers or fibrous materials are prepd. by the use of a sulfonic acid of a polynuclear aromatic hydrocarbon, or a salt of such an acid, which is substituted in the nucleus by an amyl, hexyl, or higher alkyl group, *e. g.*, amylated naphthalenesulfonic acid or hexylated naphthalenesulfonic acid.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 275,670, Aug. 9, 1926. In hydrogenating a middle oil from petroleum, a current of H in excess may be used at 450° and 20 atm. pressure, in the presence of a catalyst of Au, Ru, Pb or Sn on Mg, to obtain a high yield of hydrocarbons of low b. p. Magnesite or Cr oxide may also be used as carriers for the catalyst which may include Pt, Pd or Sn in various combinations. The gas may be forced through porous plates supporting the carbonaceous material.

Destructive hydrogenation of carbonaceous materials. I. G. FARBENIND. A.-G. Brit. 275,662, Aug. 7, 1926. Deposition of C on the walls of the app. is avoided, as described in Brit. 268,796 (C. A. 22, 1468) and Brit. 271,451 (C. A. 22, 1676), by lining the app. with alloys contg. Mo, W, V, Mn or Ni which also contain B, As, Sb, Si, Bi, P or Se; Cu may be used also if the reacting materials are freed from S. The alloys serve also as catalysts. Brit. 275,663 specifies destructive hydrogenations by use of catalysts which consist of elements of groups 4-8 of the periodic system or their compds. together with other elements of groups 2-7 or with Cu or Au or their compds. Molybdic acid may be used with MgO , Cu or $\text{Al}(\text{OH})_3$ and various mixts. of V oxide, Cr oxide, U oxide, etc. are also specified.

Destructive hydrogenation of carbonaceous materials. I. G. FARBENIND. A.-G. Brit. 275,664, Aug. 7, 1926. A stream of hydrogenizing gas is supplied in large excess and under a pressure of at least 50 atm. in the presence of catalysts which contain carbides, active C, or metalloids such as B, Si, P, As, Se, Te or halogens, or their compds., *e. g.*, H_3PO_4 , As_2O_3 , HF, HCl, SiO_2 , H_3BO_3 , selenious acid or its salts, SiC, alderwood charcoal soaked with H_3PO_4 and glowed at 800° , Ca phosphate, Mo phosphate, W phosphate, Fe phosphate, As_2O_3 alone or mixed with Mo or W, Fe silicide contg. 15% Si, active SiO_2 , hydrosilicates, borides of Ti or Fe, CaF_2 , Mo with 10% of AlCl_3 or CdCl_2 and molybdic acid with Na selenite. In treating crude mineral oil with Al phosphate as a catalyst a temp. of 420° and pressure of 200 atm. are suitable. Vapors of the middle oil obtained may be further hydrogenized at 460° in contact with alderwood charcoal impregnated with H_3PO_4 .

"Base powder for use in waterproofing, bonding, cementing, painting, etc. R. R. Cone. U. S. 1,670,844, May 22. A bituminous material is cooled sufficiently to render it brittle, ground to a powder and mixed with colloidal material.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Preliminary investigations on the constitution of the hemicellulose of timber. M. H. O'DWYER. *Biochem. J.* 22, 381-90(1928); cf. C. A. 21, 174.—Eighty % of hemicellulose A (obtained from beech wood 80 years old by treating in the cold with 4% NaOH, after the removal of the water-soluble constituents, the pectic substances and the protein) could be acetylated, but only 20% of the same substance from an older beech and from oak heartwood yielded to acetylation. The hemicelluloses contain a certain percentage of methoxyl of which about half exists in the form of an ester. Methylation the residue obtained after acetylating the oak revealed a rise in the methoxyl content.

BENJAMIN HARROW

Fractional precipitation and ultra-filtration of nitro-cellulose. WILHELM KUMMEL. *Kolloidchem. Beihefte* 26, 161-98(1928).—The nitrocelluloses are not simple substances because their solns. in acetone can be fractionally pptd., yielding 2 components, *A* and *B*, that differ markedly in chem. and phys. properties. They can be recognized by the difference in the functions connecting viscosity and concn. Component *B* is made up of degradation products of nitrocellulose by hydrolysis and oxidation; component *A* exhibits the reactions of very pure nitrocellulose. The N content of *A* and *B* is the same, the ash content higher in *B* than in *A* and the viscosity enormously greater in solns. of *A* than of *B*. The relation between viscosity and concn. does not follow Arrhenius' formula and the viscosity cannot be computed from the law of mixts. The soly. of *A* and *B* in ether-alc. remains the same after fractionation as that of the original mixt. For all tech. applications *A* is better than the original mixt.; *B* is unsuitable for explosive manuf. Nitrocellulose can also be sepd. fractionally by ultrafiltration through ultrafilters of graded pore size. Very fine filters remove all of the nitrocellulose, permitting only pure solvent to pass, showing that nitrocellulose is colloiddally dispersed. F. L. BROWNE

Investigations on viscose. MASAHARU NUMA. *Kunstseide* 9, 457-9(1927).—See *C. A.* 22, 2055. FREDERICK C. HAHN

Organization of rayon factories. M. DURÉ. *Kunstseide* 9, 505-8(1927).—The manuf. of rayon is discussed from an operating standpoint. Systematic superintendence and uniform working methods on all working shifts are stressed. F. C. H.

Stretching process for rayon. DURÉ. *Kunstseide* 9, 459-60(1927).—Wet rayon, before purifying, can be stretched 1.4 times in length at a rate of 40 m./min. without any unfavorable effect on the quality. Greater prolongation and higher rates are possible but are not desirable. The improvement in the quality and the appearance of the stretched rayon speak in favor of the industrial application of this so-called stretching spinning process for rayon. FREDERICK C. HAHN

Improvement of the quality of rayon fabrics. F. HENK. *Kunstseide* 9, 427-8(1927).—The increasing importance and use of rayon fabrics are not only due to sales propaganda but primarily to improvement in quality. H. discusses how careful handling of the material influences the quality of rayon fabrics and what special devices are necessary for this handling. FREDERICK C. HAHN

Cost of rayon. HEINRICH GÖLKEL. *Kunstseide* 9, 417-8(1927).—Various factors in the cost of rayon are discussed. FREDERICK C. HAHN

Review of the pulp and paper industry in 1927-1928. A. PAPINEAU-COUTURE. *Can. Chem. Met.* 12, 129-30(1928). E. H.

Modern engineering answers the call for lower costs in newsprint. A. E. BUCHANAN, JR. *Chem. Met. Eng.* 35, 285-9(1928). E. H.

Electric apparatus for determining moisture content of paper or cellulose (Brit. pat. 275,741) 4.

HAGGLUND, ERIK: *Holzchemie*. Leipzig: Akadem. Verlagsgesellschaft. 275 pp. M. 18; bound, M. 20.

Treating wood or other cellulose materials. J. G. FARBENIND. A.-G. Brit. 276,025, Aug. 13, 1926. A modification of the process described in Brit. 274,892 (*C. A.* 22, 2273) for opening up cellulose-contg. materials such as wood and straw involves treating the material with cold or warm dil. HNO_3 and then treating it with air in a tube or tower. The material may be subjected to a preliminary steaming to remove resin and facilitate diffusion of the HNO_3 .

Cellulose esters and ethers. I. G. FARBENIND. A.-G. Brit. 275,660, Aug. 6, 1926. Alkali cellulose which may be in the form of pulp or paper as obtained from a half-stuff draining-machine is esterified or etherified by gaseous reagents, e. g., treated with EtCl at 100° under 5 atm. pressure, or with MeCl at 70° under 5 atm. pressure, or with CS_2 vapor at $20-25^\circ$, or with the vapor of lauric acid chloride at 100° together with circulating N by which the temp. is maintained.

Cellulose ethers. I. G. FARBENIND. A.-G. Brit. 277,111, June 10, 1926. Insol. ethyl cellulose or similar relatively insol. ethers of cellulose or of other carbohydrates are rendered more sol. by treating them with a depolymerizing or degrading agent such as HCl , H_2SO_4 , H_3PO_4 or oxalic acid or a mixt. of ZnCl_2 and HCl . Swelling agents and solvents also may be added.

1,4-Dioxane as a solvent for cellulose esters and ethers. I. G. FARBENIND. A.-G. Brit. 275,653, Dec. 23, 1924. Cellulose acetate or other cellulose esters or ethers are

dissolved with 1,4-dioxane, with which other solvents also may be used, together with resins and dyes, for forming artificial silk, coating compns., etc.

Cellulose from sugar cane. E. C. H. VALET. Brit. 277,163, Aug. 25, 1926. Cellulose for paper-making is obtained from sugar cane bagasse by agitating it with a heated soln. contg. 3–5% lime and subsequently boiling it under pressure in a soln. contg. NaOH 6% and Na_2SO_3 or Na hyposulfite 2–3%. An app. and various details of the procedure are described.

Sugars from cellulose. R. A. KOCHER. U. S. 1,670,727, May 22. Cellulosic material such as sawdust is mixed with HCl and digested in a container closed to the atm. while maintaining the strength of the HCl at about 30% or higher; the digested product is transferred successively to 2 other containers without exposure to the air and the HCl is sepd. from the product for use with a fresh batch of material. An app. is described.

Water-soluble sulfonated cellulose derivatives. I. G. FARBENIND. A.-G. Brit. 277,317, Sept. 10, 1926. Cellulose in the form of an alk. compd. is caused to react with an alkyl-halide-sulfonic acid, e. g., mercerized cellulose is treated with an alc. NaOH soln., Na benzylchloride-*p*-sulfonate is added in alc. soln. and the mass is kneaded at 50–60°. Other examples also are given. The products can be sepd. by conversion into their Ca or Ba salts which are insol. in water. They are suitable for *impregnating textile materials as fireproofing agents*.

Bottle capsules or other decorative cellulose or cellulose derivative products. WOLFF & Co., E. CZAPEK AND E. BAUER. Brit. 276,206, Nov. 27, 1926. Molds are immersed successively in material of different character or color, before coagulation is effected.

Decorating celluloid, etc. H. MANOVILL. U. S. reissue 16,963, May 15. See original pat. 1,636,523 (C. A. 21, 2985). Fish-scale may be used in the coating.

Extruded viscose product. S. A. NEIDICH. U. S. 1,670,162, May 15. A solid core filament with an outer continuous imperforated sheath of shriveled crinkled surface is formed by coagulation of filaments in a 16.5% H_2SO_4 soln. contg. PO_4 ions.

Artificial silk. SILVER SPRINGS BLEACHING & DYING Co., LTD., AND A. J. HALL. Brit. 277,089, June 8, 1926. Resistance of "cellulose acetate silk" to hot or boiling aq. liquids is increased by stretching the fully set and finished filaments beyond their elastic limit; the material may be pre-treated with swelling agents such as acetone, alc., CH_3O or glycerol and a stretch of 15–25% is suitable.

Artificial silk from viscose. I. G. FARBENIND. A.-G. Brit. 276,679, Aug. 25, 1926. In order to improve the wetting properties of "viscose silk," there is added to the viscose soln., or to the spinning bath or other treating soln. a wetting agent such as an alkylated or aralkylated naphthalenesulfonic acid, an aminobenzenesulfonic acid, an aminonaphthalenesulfonic acid alkylated or aralkylated in the amino group, or sulfonation products such as are described in Brit. 269,942 (C. A. 22, 1419) and Brit. 271,474 (C. A. 22, 1694).

Casing, etc., for preventing dissemination of fumes from artificial silk spinning machines. J. L. RUSHTON. Brit. 276,748, June 3, 1926.

Flotation separation of fibers from backwaters of cellulose pulp mills, etc. A. M. R. KARLSTROM. Brit. 277,310, Sept. 7, 1926. An app. is described.

Beater for paper-making apparatus. J. S. BECK. U. S. 1,670,181, May 15.

Paper-making apparatus. J. S. BECK. U. S. 1,670,182, May 15.

Beater for paper pulp. J. S. BECK. U. S. 1,670,183, May 15.

Paper-making apparatus. P. ERKENS. U. S. 1,670,884, May 22.

Paper-making apparatus. J. K. HORSBURGH. Brit. 276,884, Feb. 4, 1927.

Paper-making apparatus. S. A. MACIVOR. Brit. 276,103, June 8, 1926.

Apparatus for making paper, pasteboard and cardboard. O. LEONHARDT. Brit. 276,549, Jan. 7, 1927.

Drier section for paper-making apparatus. L. M. AVENSON. U. S. 1,670,873, May 22.

Apparatus for screening paper pulp, etc. S. MILNE. U. S. 1,670,473, May 22.

Apparatus for reclaiming suspended solids from "white water" of paper manufacture. A. BANKUS and G. S. BACKUS. U. S. 1,670,874, May 22.

Apparatus for drying and calendering paper. S. MILNE. Brit. 277,181, Oct. 9, 1926.

Chromium-plated steel rolls for calendering paper or textiles. C. G. HAUBOLD AKT.-GES. Brit. 276,599, March 31, 1927.

Stock-consistency regulator for paper machines. M. DE ZURIK. U. S. 1,669,412, May 15.

Finishing paper by pressing it between fabric layers. S. W. WEBB and A. ALLEN. U. S. 1,669,885, May 15

Chemical paper stock from wood. W. H. HOWELL, JR. U. S. 1,670,156, May 15. After cooking wood in a digester with steam and a chem. liquor such as NaOH or sulfate, the spent liquor is withdrawn and immediately while still at a high temp. it is subjected to a vacuum to evap. and conc. it and is heated by indirect contact with steam withdrawn from the digester. An app. is described.

Heat-sensitive paper for recording telegraph and like apparatus. R. H. RANGFR. Brit. 276,020, Aug. 14, 1926. A heat-sensitive material for marking by a hot gas jet, elec. spark or other heating means preferably comprises a short-fiber paper impregnated with a substance which changes its appearance when heated, e. g., (a) a soln. formed of water 100, gelatin 10, salt 5 and phenolphthalein 0.5 parts, or, (b) aniline-HCl 9.8 g., water 99 cc. and KNO₃ 8 g. or other oxidizing agent, or, (c) water 100 cc., Ni nitrate 5 g., Na₂S₂O₃ 3.9 g. and NaNO₃, 1% gelatin soln., 5 cc.

24 · EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Liquid air, a new safety explosive, or the problem of safe blasting solved. ANON. *Z. ges. Schiess-Sprengstoffw.* 23, 117-8(1928) - Controversial Statistics are presented which show comparison of liquid air and ordinary blasting explosives as regards fatalities and accidents in use. C. G. STORM

Accident statistics and liquid-air explosives. H. MACURA. *Z. ges. Schiess-Sprengstoffw.* 23, 118-9(1928) C. G. S.

The burning of carbon disulfide. II. The velocity of the uniform movement of flame in carbon-disulfide-second combustible-air mixtures. A. G. WHITE. *J. Chem. Soc.* 1928, 751-63; cf. *C. A.* 21, 2385.—The exptl. methods are similar to those previously used, excepting that a new photographic app., to be described in a later paper, is devised for measuring flame speeds. Detns. are made of the flame speeds in CS₂-air and CS₂-sec. combustible (either *n*-C₄H₁₂, Et₂O, C₂H₂ or CH₄)-air mixts., contg. either a deficit or an excess of O₂. By varying the conditions of ignition, CS₂-air mixts. may be made to propagate flame at one of two widely differing speeds. In CS₂-air mixts., the low-speed flame does not propagate when the CS₂ content is below 2.20% and changes to the high-speed form above 2.35%. CS₂-air mixts. are abnormally sensitive to their O₂ content. The complex mixts. have lower flame speeds than do the simpler CS₂-air, the effect being more pronounced in those contg. insufficient O₂. The effectiveness of the sec. combustible in hindering the burning of CS₂ is in the order given above, agreeing with W.'s list. Payman and Wheeler's "law of flame speeds" (*C. A.* 20, 2750) does not hold for CS₂-air mixts. It is quite certain that the burning of CS₂ is catalyzed by a product of the combustion, this action being inhibited by other combustibles. J. BALOZIAN

Inflammability of hydrogen. VI. Influence of ethyl ether, ethyl alcohol, acetone and hydrocarbons on the limits of inflammability of hydrogen-air mixtures. YOSHIO TANAKA and YUZABURO NAGAI. *Proc. Imp. Acad. (Japan)* 4, 154-7(1928); cf. *C. A.* 22, 1854. —The addn. of a small quantity of each of Et₂O, EtOH, Me₂CO, C₆H₆ and other hydrocarbons existing in gasoline to H-air mixts. lowers markedly the upper limit of inflammability of H. The upper limit is reduced from 71 mol. % H to the values given by the % of addn. agent stated: 6.7% Et₂O, 0; 3.51% EtOH, 44; 5% Me₂CO, 27; 5.45% C₆H₆, 0; 4.6% C₃H₁₂, 0; 4.5% cyclohexane, 0, 3% of methylcyclohexane, 13; 4% of a mixt. of about 43% dimethylcyclopentane and 57% of isohexane, 0. C. J. WEST

Why not a standard initial impulse? M. WOLFF. *Z. ges. Schiess-Sprengstoffw.* 23, 120-1(1928).—W. presents arguments for the use of a single strength of *blasting cap* or *detonator*, equal to the present No. 8 (equivalent to 2 g. Hg(ONC)₂). Blasting caps of grades from No. 1 to No. 10 are still manufactured in Germany. A comparison of the results of Trauzl Pb block tests using No. 3 and No. 8 caps is shown:

Explosive	Trauzl test No. 3 caps	(c.c. expansion) No. 8 caps
Gelatin dynamite.....	345	415
NH ₄ NO ₃ explosive.....	350	407
Picric acid.....	257	305

Most explosives require a No. 8 detonator to produce max. efficiency. Weaker detonators may cause failure or partial explosion with increased formation of toxic gases. Stronger detonators (No. 9 or 10) do not show greater efficiency, probably because such increase cannot be obtained by a greater length of the primary and secondary charges of the detonator. It is suggested that greater strength may be obtained by increasing the diam. and providing for concentric arrangement of the primary and secondary charges. (Note: An editorial comment suggests 3 grades—Nos. 3, 6 and 8, and remarks that No. 1 dynamite develops its max. rate of detonation with a No. 3 cap.)

C. G. S.

The use of time fuses in war. RUDOLF KRUG. *Z. ges. Schiess-Sprengstoffw.* 23, 113-5(1928).—Describes, with illustrations, various devices used by the Allies during the World War for exploding buried charges of explosives. Some of these devices provided for electric ignition and functioned by contact, others depended entirely on chemical action and were arranged to operate in any desired time from 1 to 30 hrs. C. G. S.

The explosion of an autoclave in the preparation of anhydrous alcohol. v. KEUSLER. *Apparatebau* 40, 88-9(1928).—The explosion occurred while discharging the lime residue in the Merck process and is thought to have been due to catalytic action of the fine lime on the alc.-air mixt

J. H. MOORE

Extracting and carbonizing coal [for use as an explosive] (Brit. pat. 277,293) 21.

Explosives. A. C. SCOTT and MEXCO, LTD. Brit. 276,715, May 4, 1926. NH_4 and K salts such as the nitrates or perchlorates are formed into mixed crystals which are but slightly hygroscopic, for use with combustible substances such as paraffin oil, mono- and tri-nitrotoluene or other nitro compds, with or without other alkali metal nitrates or perchlorates or other substances such as NaCl, NH_4Cl or NH_4 oxalate. Cf. C. A. 21, 3746.

Casting explosives. H. H. OLMSTEAD. U. S. 1,670,689, May 22. Explosives are poured into molds in successive layers each about one-half in. in thickness and each layer is allowed to cool for approx. 30 min. before adding the next layer.

Igniting explosives. W. ESCHBACH. Brit. 276,962, Sept. 1, 1926. An aluminothermic mixt is used such as a mixt. of Al 40, Mg 20 and ferrosferic oxide 40% which may be forced into a cap and ignited electrically or by a fuse.

Smoke-bombs and similar devices. H. G. MASON. Brit. 276,198, Nov. 12, 1926. The smoke-producing materials are packed in felt and may comprise chlorosulfonic acid or a mixt. of this compd. and SO_3 , packed in a sealed glass receptacle, and CaO packed in layers. Various structural details are described.

Apparatus for heating cordite disks. J. H. BARKER. Brit. 275,743, May 21, 1926.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Progress in dye chemistry in 1927. F. MAYER. *Chem.-Ztg.* 52, No. 37, Fortschrittser, No. 2, 52-68(1928). E. H.

Light-proof silk dyes. GEORG RUDOLPH. *Kunstseide* 9, 461(1927).—A number of dyes (excepting indanthrene dyes) are given which are adapted to dyeing silk light-proof and which are dyed in acid baths. Examples are given of dyeing conditions.

FREDERICK C. HAHN

Dyeing of tussah. WILLY ALTERHOFF. *Kunstseide* 9, 518(1927).—For this purpose acid dyestuffs in bast soap bath are used. Directions are given for several colors.

FREDERICK C. HAHN

Dyeing and cross-dyeing celanese in the presence of other fibers. T. B. MEISENHEIMER. *Am. Dyestuff Rept.* 17, 300-1(1928); cf. C. A. 22, 1855. L. W. RIGGS

Dyeing fast vat colors. C. E. BROOKES. *Am. Dyestuff Rept.* 17, 278-9(1928).—Methods of vat dyeing with special reference to fastness to Cl are described. Also in *Textile World* 73, 3155, 3159 (1928). L. W. R.

Bleaching and dyeing coir. C. R. CARTER. *Dyer, Calico Printer* 59, 181(1928).—Directions are given for bleaching coir (coconut fiber) and for dyeing it black, red or maroon with sappan, or green with indigo.

RUBY K. WORNER

Discharging with formosul. J. HAGUE. *Dyer, Calico Printer* 59, 140-1, 166-7 (1928).—General procedures are given.

RUBY K. WORNER

The abnormal fugacity to light of some vat colors. L. RINOLDI. *Bol. assoc. ital*

tes. coloristi 9, 1-4(1928).—An abnormal fugacity to light of shades dyed on wool with indigo and certain vat colors is not caused by hyposulfite, but by colloidal S, and its decompn. when the dyeing vat becomes acid. The S is produced by some of the bath coming in contact with the warming tubes. Its presence is noted after using the vat for some time. The colloidal S deposits inside and outside the fiber, and cannot be eliminated by milling. By the action of air, sun, etc., it is oxidized to H_2SO_4 , that transforms indigo and other vat colors into sulfonates, less fast to light than the original products. A fresh vat of indigo gives faster shades than an old vat. A deficiency of NaOH or Na_2CO_3 in the vat causes lower fastness, NH_3 being insufficient for replacing them. Indophenol also causes lower fastness, that can be sometimes increased by treating with weak Na_2CO_3 .

R. SANSONE

New photographic process for printing cellulose fabrics. MARIO MICHELS. *Bull. soc. ind. Mulhouse* 94, 124-35(1928); cf. C. A. 22, 1477. Report. PIERRE BRAUN. *Ibid* 135-8.—The different stages of the process are essentially as follows: after exposure, wash to remove excess $Ag(OH)_2$, pass through a NaCl soln. (to convert residual $AgNO_3$ into $AgCl$), wash with H_2O , pass through Pb ferriocyanide soln. (to form Ag and Pb ferrocyanide), wash with H_2O , pass through a $CuCl_2$ soln. (to form cupric ferrocyanide), wash with H_2O , pass through $Na_2S_2O_4$ soln. (to remove Ag salts), wash with H_2O , pass through a reducing bath of Na_2SO_3 , Na_2CO_3 and quinone (which acts as catalyzer) to reduce the cupric to cuprous ferrocyanide which is practically colorless, wash with H_2O , dye in strongly AcOH soln., wash in soap soln. The process is in many respects similar to the Uvachrome process, but differs from it in the following respects: the Uvachrome process uses a gelatin substratum, the Febo process a substratum of cellulose fibers; the Uvachrome uses a cupric, the Febo process a cuprous ferrocyanide mordant; in the Uvachrome process dyeing is carried out in the cold, in the Febo process it is done hot; the Ag image is cryst. in the Uvachrome and colloidal in the Febo process. Using normal negatives (reproductions of paintings) with details and half-tones, proper reproduction required 30-60 min. exposure in sunlight, 3-4 hrs. in the shade, or 45-90 min. with a 1000 c. p. Hg arc, and the details do not come out very well in the lighter portions of the print; with over-exposure to bring out these details, the darker portions are not sufficiently clear. In nearly all cases the whites are slightly colored, which is evidently due to some extent to the nature of the dye selected. Exposure of the printed fabric to daylight (sky mostly overcast) for 45 days caused no appreciable fading. Fastness to alkalis was very satisfactory. The shades obtained by the Febo process with certain dyes are exceptionally bright and quite comparable to those obtained with tannin mordant.

A. PAPINEAU-COUTURE

A technical bureau for research. E. H. KILLHEFFER. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 149-52; *Am. Dyestuff Rept.* 17, 283-6.—An address followed by discussion.

L. W. RIGGS

The importance of good fulling. A. W. DAVISON. *Dyer, Calico Printer* 59, 172-3 (1928).—The finished fabric reflects its previous treatment. The advantages of sepg. the scouring and fulling processes are pointed out.

RUBY K. WORNER

Effect of wetting out agents on the chemical and physical conditions of carbonizing solutions. KURT LINDBER. *Dyer, Calico Printer* 59, 168-72(1928).—See C. A. 22, 1479.

RUBY K. WORNER

Soap problems of the textile industry. W. W. BRAY. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 152-8; *Am. Dyestuff Rept.* 17, 286-92.—The points emphasized with reference to a satisfactory soap for textile use are soly., degree of hydrolysis, degree of preferential absorption, stability of fatty acid emulsion in presence of acids, rinsibility and stability toward oxidation and reactivity.

L. W. RIGGS

Degumming silk. III. Action of hydrochloric acid upon sericin and the effect of formalin upon the action. TAKAO TAKAHASHI. *J. Soc. Chem. Ind. (Japan)* 31, 34-9, Suppl. binding 11-2B (In English) (1928); cf. C. A. 22, 873.—Raw silk was boiled 30 min. with HCl of various concns. in the range of $5.0-95.0 \times 10^{-3} N$, and the amount of HCl consumed in the treatment and the degree of degumming (i. e., the wt. loss of the fiber mass), were detd. The acidity of the bath, $2.0-3.0 \times 10^{-3} N$ HCl, was supposed to be the isoelec. point of sericin, and with regard to the above-mentioned tests, remarkable changes were observed at this acidity. The degree of degumming decreased as the acidity of the bath was increased to the above-mentioned acidity, reached a min. at this point and then increased; the amount of HCl consumed by the treatment increased as the acidity of the bath increased to the above point and the further increase of the acidity did not cause any increase of the consumption of acid. The degree of degumming did not show a min. in the presence of formalin, as the acidity of the bath increased. The two curves of degree of degumming, one in the presence and the other in the absence of

formalin, coincided at the min. point of the latter and further on. The amount of HCl consumed by the treatment in the presence of formalin increased as the acidity of the bath increased, reached a max. at the above-mentioned acidity and then decreased. From the above results, the author concluded as follows. When the acidity of the bath was less than $2.0-3.0 \times 10^{-4} N$ HCl, the sericin adsorbs H ion and is gelatinized; and when it is larger than this acidity, the sericin does not gelatinize but reacts with the HCl and forms the sol. hydrochloride. IV. Gelatinization of sericin. *Ibid* 39-45, Suppl. binding 12-3B (In English).—The viscosities of the silk boiling-off liquor produced from the degumming baths of various H-ion concn. either in presence or in absence of formalin were examd. As the H-ion concn. of the degumming bath increased, the viscosity of the boiling-off liquor increased and reached a max. at the H-ion concn. corresponding to about $3.0 \times 10^{-4} N$ of NaOH, and then decreased. This max. point corresponded to the max. point of gelatinization. The boiling-off liquor obtained from degumming liquor contg. formalin showed very small viscosities, which meant the destruction of the gelatinizing properties of sericin by the action of formalin. The degumming is mainly due to the gelatinization of sericin in the alk. liquor, but mainly due to the swelling in the acidic liquor. The author expressed his view upon the nature of gelatinization and swelling. S. O.

Silk and the iron bath. FRED GROVE-PALMER. *Dyer, Calico Printer* 59, 162-3 (1928).—Practical suggestions are given for the care of the iron bath used in the production of tan-logwood-iron black upon silk. The acidity of the bath is kept down by boiling it for an hour or two every day with clean iron shavings enclosed in a perforated wooden box. The formula for a reducing mixt. to check oxidation of the ferrous salts in the bath is given. RUBY K. WORNER

The most recent rayon. KÖLLICKER. *Kunstseide* 9, 415-7(1927).—A general discussion of the development of cellulose acetate rayon, including its dyeing and other properties. FREDERICK C. HAHN

Resistance of rayon and silk to sunlight and weather. P. M. GREMPPE. *Kunstseide* 9, 462-3(1927).—Rayon and silk fabrics are evaluated on the basis of their loss of strength when exposed to the weather. A fabric is considered practically unusable after it loses about half of its original strength. In all cases where the textile is exposed to the weather destruction takes place on the surface exposed to the light. The destruction of the fabric is caused by a combined action of water and the short-wave ultra-violet light rays from the sun. Silk and rayon fabrics exposed to the weather lasted for a half year. FREDERICK C. HAHN

Effect of starch sizing and calendering upon the physical properties of a cotton fabric. ANITA KUEHN AND RACHES EDGAR. *Am. Dyestuff Rept.* 17, 279(1928).—Samples of glazed and unglazed chintz otherwise identical were analyzed as to wt., thickness, shrinkage, percentage of gloss, yarns per inch, yarn count, yarn diam. and twist, length and diam. of fiber, petr.-ether ext., ash, wet and dry breaking and bursting strength, resistance to abrasion and fastness to light and laundering. L. W. R.

Flax, and some of its products, especially canvas hose. JAMES TRIMBLE. *Munic. Eng. Sanit Record* 79, 584(1927).—Hose should be subjected to a chem. treatment known as Burnettizing which tends to prevent rot and mildew and adds to its softness and flexibility. C. H. BADGER

A microchemical study of the structure and development of flax fibers. D. B. ANDERSON. *Am. J. Botany* 14, 187-211(1927).—Fibers originate in the meristematic region of the stem tip. The middle lamella is of pectose, and the secondary wall of cellulose somewhat modified by pectose in the region of the middle lamella. Fiber elongation is the result of both a slipping action of the cells past each other and an elongation of the fiber in harmony with the adjoining tissues. Tertiary deposition occurs through the periodic deposition of complete layers within the secondary wall. The amt. of tertiary deposition varies, often amounting to 90% of the area of the cell in cross section. The stratification visible in cross section is probably not due to alternate layers of "water-rich" and "water-poor" cellulose but represents the boundary lines between successive lamellae of cellulose. Alternate layers of spiral fibrils run in opposite directions. The fibrils are cryst. in nature and probably orthorhombic. Flax fibers are partially lignified when seen in the stem. Lignification is a change of pectic compds., and there is evidence that some change of cellulose to pectose occurs previous to lignification. Retting is accomplished not by dissolution of the middle lamella but by the destruction of the entire secondary wall. Lignification interferes with retting, and the degree of lignification is one of the detg. factors in the success of the retting process. E. F. SNYDER

Use of "Voltols" in the textile industry (KACZKOWSKI, BORTNOWSKA) 22. Cr-plated steel rolls for calendaring textiles (Brit. pat. 276,599) 23. Water-soluble sulfonated cellulose derivatives (Brit. pat. 277,317) 23.

GUENEAU, L.: *La soie artificielle*. Paris: Dunod. 232 pp. F.30.

LABRIFFE, M.: *Manuel du tissage. Matières textiles. Tissue simples*. Paris: Dunod. 288 pp. Bound, F 22.

Dyes. I. G. FARBERIND. A-G. Brit. 276,353, Aug. 19, 1926. Monoazo dyes giving fast yellow dyeings are made by coupling diazotized 2,5,6-trichloro-3-amino-toluene-4-sulfonic acid with a 1-sulfohenyl-5-pyrazolone substituted in the 3-position by a methyl, carboxyl or carboxylic ester group.

Dyes. I. G. FARBERIND. A-G. Brit. 277,275, April 12, 1926. Azo dyes or lakes from them are obtained in finely divided form by adding an aromatic sulfonic acid substituted by a hydrocarbon side chain such as propylated or butylated naphthalenesulfonic acids, or salts of such acids, alone or together with turkey red oil or a similar sulfonated oil.

Dyes. L. B. HOLLIDAY & Co., LTD., AND C. SHAW. Brit. 277,125, June 15, 1926. Dibenzanthrone or its low oxidation product obtained by treatment with HNO_3 or MnO_2 and H_2SO_4 is oxidized with a dichromate and H_2SO_4 . The products dye cotton from the vat fast gray to black shades.

Dyes. I. G. FARBERIND. A-G. Brit. 276,372, Aug. 21, 1926. Arylazodiarylamines are made by reaction of a monoaminoazo dye with an aromatic nitro compd. contg. at least one exchangeable halogen atom and at least one sulfo or carboxyl group. The products are sol. in water and dye animal fibers; those contg. not more than one sulfo group are also suitable for dyeing cellulose esters and ethers. Condensation may be effected by boiling in the presence of an acid-binding substance such as NaOAc or CaCO_3 , or under pressure of 6-12 atm. in cases where the halogen is exchanged with difficulty as in the case of mononitrohalogenaryl sulfonic or carboxylic acids. Several examples are given.

Dyes and intermediates. I. G. FARBERIND. A-G. Brit. 275,724, May 12, 1926. 1,3-Di(4'-alkyloxyphenylamino)-naphthalene and its derivs. are made by heating a naphthylaminesulfonic acid having a sulfo group in the *m*-position to the amino group with a *p*-alkoxyaniline or a deriv. The production of 1,3-di(4'-methoxyphenylamino)-naphthalene-8-sulfonic acid and the corresponding 6,8-disulfonic acid are described. These products may be used as dye intermediates and for this purpose may be condensed with an aromatic nitroso compd. or oxidized with 1,4-phenylenediamine or a deriv. which contains at least one free amino group. Dyes may be thus obtained which dye wool clear even greenish blue shades.

Hydroxyarylaminoanthraquinones. I. G. FARBERIND. A-G. Brit. 276,408, May 13, 1926. Hydroaromatic amine residues are introduced into anthraquinones by customary methods. The sulfonic acids of the products dye wool clear blue shades which are faster to light than those given by alkylaminanthraquinonesulfonic acids. Several examples are given.

2-Amino-4-nitrophenoxyethanol. O. KNECHT. U. S. 1,669,764, May 15. 2,4-Dinitrophenoxyethanol is treated with an alk. sulfide such as Na tetrasulfide to obtain the corresponding amino compd. which may be used as a *dye intermediate*. It forms yellow crystals, sol. in alc. and very difficultly sol. in C_6H_6 and easily sol. in dil. inorg. acid, forming quantitatively diazotizable solns.

2-Amino-4-nitrophenoxypropanediol. O. KNECHT. U. S. 1,670,969, May 22. 2,4-Dinitrophenoxypropanediol is treated with alkali sulfide; the product is a *dye intermediate*, forms yellow crystals, and is easily sol. in alc. and very difficultly in C_6H_6 and dissolves easily with dil. inorg. acids to quantitatively diazotizable solns.

Benzanthrone derivatives. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDILEY, A. SHEPHERDSON AND S. THORNLEY. Brit. 276,766, June 19, 1926. Benzanthrone is treated with sulfonating agents such as concd. H_2SO_4 , H_2SO_4 monohydrate, or oleum, with or without the use of catalysts such as Hg or H_3BO_3 ; sulfonic acids are produced which by caustic-alkali fusion yield dyes which dye cotton from the vat reddish blue shades.

Fiben^zanthrone dyes. BRITISH DYESTUFFS CORPORATION, LTD., AND S. THORNLEY. Brit. 276,767, June 19, 1926. The dyes obtained as described in Brit. 276,766 (preceding abstr.) are treated with hydroxylamine or its salts, with or without use of FeSO_4 . Dyes are thus formed which dye cotton gray to black shades from the hyposulfite vat. Examples are given in which the reaction is effected in H_2SO_4 soln.

Dibenzanthrone dyes. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDILEY, A. SHEPHERDSON AND S. THORNLEY. Brit. 276,768, June 21, 1926. Dyes obtained as described in Brit. 276,766 (cf. second preceding abstr.) are treated with alkylating agents, with or without preceding treatment with oxidizing agents and reducing agents; dyes are thus formed which dye cotton greenish blue.

Lakes. I. G. FARBERNIND. A.-G. Brit. 275,943, Aug. 12, 1926. Primary, secondary or tertiary aromatic amines which are not basic dyes and which are free from acid groups are treated with complex acids or their salts or with substances capable of forming such compds. as phosphotungstic, phosphomolybdic and silicomolybdic acids, and the products may be subjected to an after-treatment under pressure, with heating, and preferably with addn. of salts such as those forming other complex compds. than those first used. Substrata or dispersing agents may be used and among the starting materials specified as suitable for use are 4,4'-tetramethyldiaminodiphenylmethane, 4,4'-tetramethyldiaminobenzhydrol, and *p*-aminobenzaldehyde. Lakes of various colors are obtained.

Stable preparations of leuco compounds of vat dyes. J. R. GEIGY A.-G. Brit. 276,023, Aug. 16, 1926. Vat dyes such as Tinon scarlet G extra, indigo, thioindigo or anthraquinone dyes are mixed with a dihydric alc. such as ethylene glycol, propylene glycol, ethylene thiodiglycol or with CH_2O and converted into a leuco compd. by the action of a reducing agent such as a hyposulfite or sulfide in the presence of alkali, to form a stable product which may be dried and is readily sol. in water and suitable for use directly in dyeing or printing. Na_2SO_4 or Na ricinoleate may also be added, before drying the products.

Dyeing apparatus. J. H. GILES and D. M. GILES U. S. 1,670,067, May 15.

Dyeing. CHEMISCHE FABRIK VORM SANDOZ. Brit. 276,100, June 7, 1926. The threads obtained by the processes described in Brit. 195,619 (C. A. 17, 3613), Brit. 224,502, Brit. 241,854 (C. A. 20, 3577), and German pat. 346,883 are dyed, printed or stencilled by means of insol. or difficultly sol. dyes, used either in simple aq. suspensions or solubilized by agents other than those specified in Brit. 246,609 (C. A. 21, 501). The dyes used may be azo dyes, Cr mordant dyes, basic di- or tri-arylmethane dyes, quinonimide dyes, reduced or unreduced, azines, oxazines, thiazines, acridine, pyridine, quinoline, xanthene and indigoid dyes, anthraquinone and naphthoquinone dyes, reduced or unreduced, S dyes, nitro-aryl- or di-arylamines or -phenols, aminoanthraquinones, reduced or unreduced, and benzo- and naphtho-quinoline anilides. Among the solubilizing agents which may be used, singly or in mixt., are, aliphatic alics., aldehydes, ketones, amines, sulfonic and carboxylic acids and their derivs., and various emulsifying agents. Detailed examples are given.

Dyeing cellulose esters. BRITISH ALIZARINE CO., LTD., W. H. DAWSON, C. W. SOUTAR AND R. J. WOOD. Brit. 275,752, May 27, 1926. Yellow or orange shades are produced on material such as cellulose acetate by nitroacridine compds. such as α - or β -nitroacridine or dinitroacridine or tetranitroacridine, with or without addn. of an acid or salt.

Dyeing "viscose silk" and similar products. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDILEY, P. CHORLEY AND C. BUTLER. Brit. 276,450, June 4, 1926. Level blue, green or black shades are produced by use of secondary disazo dyes made by coupling diazotized aminosalicylic acids or their homologs with the usual middle components, further diazotizing and coupling with 1,8-dihydroxynaphthalenesulfonic acids or 1,8-aminonaphtholsulfonic acids or N-substituted derivs. of the latter. Numerous examples of suitable dyes are given.

Dyeing "viscose silk," etc. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDILEY, P. CHORLEY AND C. BUTLER. Brit. 276,757, June 7, 1926. Regenerated cellulose artificial silks such as those from viscose are dyed in level shades by using secondary disazo dyes with the same first and second components as those specified in Brit. 276,450 (preceding abstr.) but with any naphthol- or naphthylamine-sulfonic acid or N-substitution deriv. of the latter as end component; e. g., "viscose silk" is dyed a deep black in a dye bath made up with Solochrome black F, Na_2SO_4 and soap; the fastness to washing may be increased by after-treatment with Cr fluoride. Several other examples are given.

Perforated grooved former for dyeing hat bodies in marbled effects. G. CHARLES. Brit. 276,893, March 4, 1927.

Bleaching and weighting textile fabrics. J. F. KING. Brit. 275,891, March 14, 1927. Wool, silk, cotton, linen, rayon or other materials are boiled under pressure with a soln. formed from Na perborate 300 lbs., cornstarch 50 lbs., Na_3PO_4 30 lbs., Al sulfate 25 lbs., MgSO_4 75 lbs. and denatured alc. 20 lbs. for each 500 lbs. of the ma-

terial treated. The cornstarch and alc. may be omitted and the proportions varied.

Washing textile materials. HENKEL ET CIE GSS. Brit. 276,337, Aug. 17, 1926. In order to prevent running of colors, urea is added to washing liquors which may also contain soap, tryptic enzymes, O-evolving detergents, soda, waterglass and other substances. Brit. 276,338 specifies a "low-temp." process of washing, in which urea is decompd. in the washing liquid by an enzyme such as urease. Temps. of 30–70° are suitable. Brit. 276,339 specifies compns. for use in processes of this kind, *e. g.*, a compn. formed from soap 70, urea 56, NaH_2PO_4 28, Na_2HPO_4 14, "urease 42" and pancreatin 2 lb. may be used in water at a temp. of about 40°.

Purifying textile materials. H. KOHNSTAMM & Co. Brit. 276,121, July 22, 1926. About 10% of Mg oleate is added, preferably together with other soap or sol. oils, to alk. solns. which are used for boiling out waxes, fats, etc., from textile materials prior to bleaching, mercerizing or dyeing.

Apparatus for singeing fabrics. E. TURNER. Brit. 275,696, April 10, 1926.

Conditioning yarn. F. KERSHAW. U. S. 1,670,262, May 15. Hanks of yarn are conveyed through a drying compartment, then through a conditioning compartment and in the latter compartment the movement of the hanks is retarded one after the other and they are sprayed to moisten them. An app. is described.

Treating cellulosic fibers to give them the appearance of linen. ARNOLD PRINT WORKS. Brit. 276,877, Jan. 21, 1927. Fibers, yarns or fabrics of artificial silk, jute, linen, ramie, wood, cotton or other cellulosic material are treated with caustic alkali and then subjected to the superficial action of cuprammonium soln. The materials may be preliminarily mercerized and the treatment improves their smoothness, stiffness and luster and gives other fibers an appearance more nearly like that of linen. Light fabrics are rendered more transparent, and by the use of resists or other local treatment, pattern effects may be produced.

Wool-like effects on vegetable fabrics. HEBERLEIN & Co., A-G. Brit. 276,352, Aug. 19, 1926. Raw vegetable fabrics which have not been freed from their natural incrustations are treated with a swelling agent such as an alkali, a concd. inorg. acid, ZnCl_2 , $\text{Ca}(\text{CNS})_2$ or ammoniacal Cu oxide, while leaving the fabric free to contract and without placing it under tension. Soft crepon. effects may be produced by local application of the treating agents. An app. and various mech. details are described.

Artificial silk from viscose. C. M. WHITTAKER. U. S. 1,670,919, May 22. In order to produce batches of artificial silk from viscose which will have substantially the same dyeing properties, portions of the material are treated with a dyeing agent such as "direct blue 2B" which may produce uneven shades on batches which are not uniform but which can be readily modified, *e. g.*, by a hypochlorite, so as to render it colorless, and the batches are sorted into groups of like dyeing properties according to the effect of the test dyeing agent, the latter is then rendered colorless.

Films from viscose, etc. WOLFF & Co., E. CZAPEK and R. WEINGAND. Brit. 277,309, Sept. 13, 1926. The film is stripped from the base before the coagulating liquid has had time to pass through the coagulated film and wet the base.

Felt for hats. H. HAAKII. Brit. 275,939, Aug. 14, 1926. Material such as that of velour hats, after scratching, is treated with Cl or Br or with reagents such as hypochlorites or chloramines, to render it soft, glossy and inodorous.

Metallizing fur and feathers. J. VON BOSSE, K. RICHTER, K. LAUCH, H. SIEGELBERG and W. KOCI. Brit. 276,291, May 20, 1926. The material is exposed to cathode rays in a vacuum, a cathode of Au-plated Cu or other metal to be deposited being employed. High tension d. c. or a. c. may be used.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Uses of luminous colors. L. VANNINO. *Frabe u. Lack* 1927, 639–40.—Pigments must be calcined at high temperature. Clear dammar preferably should be selected as the vehicle. Molten paraffin or wax may be used. If oils are used the pigment should only be stirred in, not ground. Many household, theatrical and scientific uses are given. G. G. SWARD

Some notes on heat-resisting paints. F. T. WALKER. *Ind. Chemist* 4, 138–40 (1928).—Paints able to withstand a temp. of 250–300° were sought. The vehicles tested were: linseed oil; fish oil; bitumens, asphaltum, coal-tar and petroleum pitches; Na silicate soln., portland cement wash; shellac soln.; coal tar, rosin, etc.; cellulose

ester lacquer. Pigments tested were: graphite; pure metals and alloys; ordinary paint pigments. The tests applied were: (1) Heat test.—A 6-in. by 6-in. steel plate is painted and allowed to dry for 18 hrs. Half of the plate is given a second coat and dried. It is then heated to 260° for 23 hrs and 300° for 1 hr. (2) Hot water test.—A painted plate half immersed is boiled in water for 30 min. (3) Brushing properties.—This test is made by actual trial of the paint. (4) Weathering test.—The paint is given a trial on the heated surface to be protected. The best all around results were obtained with "Aluminum Bronze Powder" in 1 part of Japanners gold size and 2 parts of naphtha, white spirits, etc.

L. B. MILLER

Preparation of chrome green. R. HALLER. *Farbe u. Lack* 1928, 7-10.—Several formulas and working directions are given together with photomicrographs of the pigment under various conditions of illumination.

G. G. SWARD

Linseed oil foots. FELIX FRITZ. *Farbe u. Lack* 1928, 59-60, 70-1, 82-5.—A review of the sources of and methods for removal of foots.

G. G. SWARD

White lead and zinc oxide in the production of varnishes. A. MACCHI. *La med. italiana* 9, 8(1927).—An increase was noted in the intoxications caused by varnishes with white lead. The substitution with zinc white required its reduction into very small granules before use, bringing up the cost of the varnishes, where different oils were required. Besides this the varnishes with zinc white resisted less than those with white lead. Recent research seems, however, to overcome the difficulty.

R. SANSONE

Colophony varnishes. M. OPPENHEIMER. *Farbe u. Lack* 1928, 4, 18.—Rosin should be limed or esterified for use in varnish.

G. G. SWARD

Nitrocellulose and combination lacquers. JOHS. SCHEIBER. *Farbe u. Lack* 1928, 17, 26-7.—A review.

G. G. SWARD

Cellulose acetate and its solution. I. Composition of cellulose acetate lacquer for airplane dope. KATSUMOTO ATSUKI AND RYO SHINODA. *Rept. Aeronautical Research Inst. Tokyo Imp. Univ.* 3, 49-68(1928).—Various mixed solvents for cellulose acetate (A) in the prepn. of airplane dopes have been studied from the standpoints of solvent power, the viscosity of the resulting solns., and the tensile strength and elongation of the films prepd from these solns. The mixed solvent which has the highest solvent power and which gives A solns. of the lowest viscosity also gives films of the highest tensile strength and elongation. Of the common org. solvents, the optimum compn. of the mixed solvent is acetone 60%, EtOH 15-17%, benzene 19-21%, benzyl alc. 1-2%, and triphenylphosphate 1-2%; and the optimum concn. of A is 7-9%. II. Stability of cellulose acetate. KATSUMOTO ATSUKI. *Ibid* 71-88.—A prepd. with H₂SO₄ as a catalyst contains more or less AcOH and H₂SO₄ in a loosely combined form from which the acids are easily liberated spontaneously. The free AcOH does not affect the stability, but the H₂SO₄ attacks the A, lowering its stability. The H₂SO₄ may either be adsorbed by A or combined with it chemically in the form of esters. The H₂SO₄ liberated attacks A by sapon. the ester, hydrolyzing the cellulose, lowering its colloidal properties, and destroying the gel structure. If these changes occur in A in the form of film or rayon, the mechanical properties of these forms are destroyed. The H₂SO₄ retained by A decreases as the ripening proceeds, due to sapon. of the H₂SO₄ ester, and also because the coagulating power of A diminishes, allowing easier diffusion of the acid. The hydrolytic degradation products of cellulose formed during the acetylation or ripening have lower decompn. temps. than A, but they do not affect the stability of A as long as they do not contain H₂SO₄. Details are given of a no. of stability tests on A that were used in the foregoing work. These tests depend on the development of acid or charring when A is heated under specified conditions. III. Stabilizer for cellulose acetate. YOSHIO TANAKA AND KATSUMOTO ATSUKI. *Ibid* 91-100.—In the manuf. of A with H₂SO₄ as a catalyst, it is difficult to remove the H₂SO₄ entirely from A, and it is necessary, therefore, to add some stabilizer. Ca naphthenate (B) was found to be an effective stabilizer both for A and for nitrocellulose. B exerts no injurious effect on A, and it combines with the H₂SO₄. The naphthenic acid produced exerts no sapon. action on A, but improves the mechanical properties of A films by acting as a plasticizer. The amount of B to be added is calcd. from the amount of H₂SO₄ present in A, but in general 1-2% of the wt. of A will be sufficient. IV. Acetylation of cellulose. KATSUMOTO ATSUKI AND RYO SHINODA. *Ibid* 103-11.—A study is made of various factors in the acetylation of cellulose. When cellulose is acetylated extensively there occur the successive reaction stages peptization → acetylation → acetolysis → equilibrium. Cellobiose and glucose, the end products of the acetolysis, are not found in the early stages of the acetylation. When cellulose is acetylated, the sol. portion is the triacetate and the insol. portion is cellulose, the mono- and diac-

tate not being produced. In excessive acetylation, cellulose is slightly saponified, after which acetylation occurs with simultaneous acetolysis. The most homogeneous triacetate of cellulose is obtained by stopping the acetylation at a point where the soly. in acetone is a min. after the triacetate is produced. Excessive amounts of Ac_2O lower the degree of acetylation. The velocity of acetylation is doubled for a rise of 10° between 30° and 50° , but it is scarcely doubled by a rise of 20° when the temps. are higher than 50° . At these higher temps., the decompn. of cellulose is very active, thus disturbing the relation between velocity increase and temp. V. Relation of temperature and time of ripening to the viscosity of cellulose acetate. KATSUMOTO ATSUKI AND RYO SHINODA. *Ibid* 115-23.—A study is made of the ripening step in the manuf. of A, using the viscosity detns. of acetone solns as the criteria of the degree of ripening. The viscosity is governed by many factors, but when the cellulose used, as well as the compns. of the acetylation and ripening baths, are kept const., it is detd. by the temp. and time of ripening. The relation between temp. and time of ripening to produce a ripened A of a given viscosity is represented by $T = ae^{kt}$, in which T is the temp., t the time of ripening, and a and k are consts. FREDERICK C. HAHN

Glyptal and coumarone resins. J. H. FRYDLENDER. *Rev. prod. chim* 31, 241-6, 281-6 (1928); cf. *C. A.* 16, 1874.—A review of the prepn., properties and uses of artificial resins produced by condensation of polyhydric alcs. with polybasic acids, and of the present status of coumarone resins. A. PAPINEAU-COUTURE

Bituminous emulsions [for use in paints] (Brit. pat. 276,543) 22. Mixing mill for paints (Brit. pat. 276,196) 1. Starch compositions [as painters size] (Brit. pat. 276,340) 28.

ANDRÉS, LOUIS EDGAR: **Die Fabrikation der Kopal-, Terpentinöl und Spirituslacke.** 4th ed., revised and enlarged. Edited by Erich Stock Vienna: A Hartleben 428 pp. M. 9, bound, M. 10.

MARGIVAL, F.: **Laquers et vernis.** Paris: Desforges, Girardot et Cie. 165 pp. F. 16.50.

MARGIVAL, F.: **Peintures.** Paris: Dunod 230 pp. F. 22.50.

Paints, etc. A. M. SARGENT and G. W. CROWE. Brit. 275,772, July 9, 1926. Paints, plasters, cements or putty comprise ZnO or MgO or both, a sol. silicate, and a powd. metal such as Al, Zn, brass, Cu, Ni or Sn.

Metallic paints. ZÄHNHÄR & SCHIESS & Co. Brit. 276,613, Aug. 30, 1926. Finely divided Pb is used with linseed oil or other suitable vehicle and a material such as Sb, Bi, Cd, Mn, Al, Sn, Zn or Mg (which may be alloyed with the Pb) to prevent premature oxidation of the Pb powder.

Titanium pigments, etc. J. BLUMENFELD. Brit. 275,672, Aug. 9, 1926. Oxides of Ti, Th, Zr, Sn, Ce and other fourth-group metals are prepd. by hydrolysis of a soln. of a salt of the metal in the presence of colloidal particles of a compd. of the metal found in or added to the soln. before or during hydrolysis; e. g., a hot concd. crystalloidal soln. of Ti sulfate is slowly poured, while stirring, into $\frac{1}{4}$ its vol. of hot water or dil. soln. by which colloidal particles are formed and later pptd.

Lithopone. J. H. CALBECK. U. S. 1,669,857, May 15. Reactive proportions of aq. solns. of ZnSO_4 and BaS are run into a pptg. and mixing tank, the contents of which are energetically stirred, and the contents of the tank are continuously drawn off so as to maintain an approx. const. level, and lithopone is allowed to settle from the mixt. withdrawn.

Lithopone. W. H. LANDERS. U. S. 1,669,476, May 15. Undried lithopone is fed into one end of an elongated slightly inclined furnace which is rotated to cause the lithopone to move toward the other end of the furnace and a combustible gas is supplied countercurrentwise and burned with a lesser quantity of air than would be necessary for complete combustion, to effect drying, preheating and calcining of the lithopone. An app. is described.

Decorative finishes. H. E. B. GREENE and J. H. GREENE. Brit. 276,864, Nov. 8, 1926. Articles are dipped repeatedly and in reverse directions in a paint which may comprise a soln. of a cellulose ester and a pigment. Various modifications of the process may be employed to produce marbled effects, etc.

Paints, varnishes, etc. R. M. GERLACH. Brit. 277,083, June 7, 1926. Heavy, metal salts of "weak acids" such as acetates, formates, ferrocyanides, ferricyanides or fluosilicates of Pb, Cu or Hg are treated with the acid components or derivs. of resins, mineral oils or fats, such as abietic acid, naphthenic acid or the higher fatty acids,

to obtain a soln. of a complex compd. which may be used alone or with oils, varnishes, japans or pigments for painting or impregnating and preserving various materials.

Varnishes. H. BECKER and SIEMENS & HALSKE A.-G. Brit. 275,813, Sept. 29, 1926. Drying varnishes are made by the action of elec. discharges on liquid or vaporized hydronaphthalenes, *e. g.*, tetra- or deca-hydronaphthalenes, with addn. of a frothing agent such as a viscous oil. An app. is described.

Varnishes, leather polishes, etc. I. G. FARBERND. A.-G. Brit. 275,852, Dec. 23, 1924. 1,4-Dioxane is used as a solvent for fats, waxes, solid hydrocarbons, natural or artificial resins, to form compns. which may also contain dyes or other solvents such as fatty oils, mineral oils, turpentine, benzine or solvent naphtha.

Ornamenting and varnishing various surfaces. M. A. V. C. G. VILLE. U. S. 1,669,816, May 15. Ornaments cut from sheet material are applied to a surface and coated with gelatin and then with varnish.

Coloring lacquers. I. G. FARBERND. A. G. Brit. 275,969, Aug. 13, 1926. Cellulose ester or ether, oil or "spirit" lacquers are incorporated with "methyl violet B extra," "alkali blue B extra" or other basic dyes, which may also contain acid groups, and with complex acids or salts which form color lakes with the dyes, such as phosphotungstic, phosphomolybdic, silicotungstic and phosphotungstomolybdic acids or their salts.

Aqueous japan emulsions. W. P. DAVEY. Brit. 275,955, Aug. 16, 1926. To improve the quality of japan coatings, deposited electrically from an aq. emulsion of japan compn. as described in Brit. 121,533, the emulsion is prepd. by use of a metallic alkali soap such as described in Brit. 212,248 (*C. A.* 18, 2258), and NH_3 1-10% is added, *e. g.*, there may be used gilsonite 300, rosin 75, boiled china wood oil 150, boiled linseed oil 150, emulsified with water and Na_2CO_3 7.5 parts and sufficient NH_3 to bring the NH_3 content to 3.4%.

Coating with water japans. H. CHISLET. Brit. 275,960, Aug. 16, 1926. In coating metals or other articles with compns. such as the water japan described in Brit. 121,533 coagulation on the surface is effected by an electrolyte. A soln. of alkali such as NaOH or KOH or of NaCl or other salts may be allowed to dry on the surface and the latter then dipped in the japan emulsion.

Coating metal surfaces of electric condensers. R. BOSCH, A.-G. Brit. 276,635, Aug. 28, 1926. Successive layers of shellac and bakelite are applied.

Waterproofing compositions. A. ASHBY. Brit. 277,051, Feb. 5, 1927. A compn. for waterproofing brickwork, stone, tiles, paper, "fabrics" or other materials comprises turpentine or a "turpentine substitute," a drying oil such as linseed oil and paraffin wax or similar wax. A small quantity of gold size may be added.

Artificial resins. I. G. FARBERND. A.-G. Brit. 276,518, Oct. 4, 1926. Condensation is effected of mixts. such as those of cyclohexanone with *m*- or *p*-methylcyclohexanone or mixts. of several methylcyclohexanones such as are obtainable by hydrogenation of purified industrial cresylic acid and subsequent dehydrogenation and distn. or mixts. such as are obtained by passing vapors of cyclohexanol over Cu. Resins are obtained suitable for use in lacquers or cements, for making films and for other purposes. Numerous details and examples are given.

Artificial resin. C. KULAS. U. S. 1,669,831, May 15. In producing resin of the phenol- CH_2O type, the constituents are subjected to reaction while heated, then cooled and the resulting product is settled to form a liquid stratum and a partially dehydrated resin stratum; the latter is centrifuged cold and successive thin layers of the resin are subjected to rotation while supported on a heated surface and then while on a cool surface, in order continuously to produce sheet or leaf material. An app. is described.

Synthetic resins. I. LIGHT. Brit. 275,725, May 12, 1926. CH_2O is condensed with an equimol. proportion of a primary amine such as PhNH_2 in the presence of HOAc or HCl , to produce products the character of which may be varied by heating to different temps.

Plastic compositions containing artificial resins and fibrous materials. H. FRIEDLANDER. Brit. 275,795, Aug. 18, 1926.

Drying resinous condensation products, etc. M. G. SHEPARD. Brit. 276,627, Aug. 25, 1926. Products such as produced by condensation of AcH with aniline may be freed from water by melting with about 10% of a fatty acid such as stearic acid, and heating to evap. the water.

Phenol resin. C. J. ROMBEUX. U. S. 1,669,674, May 15. A mixt. of a phenol such as "crude cresylic acid" boiling above 202° and CH_2O is treated with an alkali such as NaOH in a quantity less than 0.1% the quantity of the phenol, and reaction is effected. The product may be obtained either in a fusible and sol. or an infusible and insol. state.

Coating compositions containing phenolic resin. BAKELITE CORPORATION. Brit. 276,417, May 20, 1926. Coating compns. which can be hardened by heating comprise a phenolic resin, an aq. alk. solvent and an aldehydic hardening agent which is either a liquid capable of acting as a diluent or a substance of higher mol. wt. than CH_2O and less reactive than CH_2O or $(\text{CH}_2)_3\text{N}_4$, e. g., furfural with or without other hardening agents.

Acid-proof receptacles, pipes, etc. I. G. FARBENIND. A.-G. Brit. 276,697, Aug. 30, 1926. A reinforcing support of wide-meshed fabric is impregnated with a synthetic resin compn. and the latter is then hardened. Numerous details of temp. treatment, mech. manipulations, etc., are given.

Purifying rosins. HERCULES POWDER CO. Brit. 275,862, Jan. 22, 1927. The process of converting low-grade rosins into high grade as described in Brit. 253,082 (C. A. 21, 2568 where the number is erroneously given as 253,081) is modified by removing the coloring matters by a phenol, a chlorohydrin, furfuryl alc., SO_2 or aniline.

Floor-covering compositions. A. JONES. Brit. 275,949, Aug. 13, 1926. Material such as linoleum may be printed with colored nitrocellulose lacquers for which various formulas are given including such ingredients as EtOAc, castor oil, pigments, BuOAc, toluene, Et lactate, triphenyl phosphate, ester gum, diacetone alc., manila gum, and Bu phthalate, in various admixtures. An app. for printing with the lacquers is also described.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Solidification temperature of fat mixtures. G. G. POVARNIN AND G. ARBUSOV. *Vestnik* (Organ of the All-Russian Leather Synd.) 1925, No. 1, 143-5; *Collegium* 1927, 549.—Solidification temps. of mixtures of tallow with seal oil, mineral oil and birch tar are tabulated.

H. B. MERRILL

Saponification of fats in a heterogeneous system. L. LASCARAY. *Rev. gén. colloïdes* 6, 32-44 (1928).—Sec. C. A. 22, 175.

E. H.

The use of catalysts in the saponification of fats by alkalies. D. ROSHDESTVENSKI. *Seifensieder-Ztg.* 55, 127-8, 166-7 (1928).—The speed of sapon. of the various fats is inversely proportional to their content of unsatd. glycerides. The speed is greatly increased by the addn. of 1% of certain aromatic hydrocarbons. Of 10 reagents tested hydroquinone, naphthalene and Na naphthalenesulfonate exert no influence upon the reaction; phenol, eugenol and "constant reagent Petroff" accelerate emulsification but cause no temp. increase; cresols, naphthols and thymol increase the temp. from 34° to a max. of 50°; 600 g. cottonseed oil with 1% β -naphthol finished sapon. in from 25 min. to 2 hrs. at 70° to 23°. At 100° no reaction occurred because at that temp. no permanent emulsion could be obtained. Activation is probably due to the formation of absorption compds. at the double C bond of unsatd. fatty acids, causing surface orientation of the hydrocarbon chains and weakening of the mol., thereby allowing easier attack by NaOH.

P. ESCHER

Determination of oleic and linoleic acids contained in an oil; new method of determining the bromine number. Y. VOLMAR AND BJ. SAMDAHL. *J. pharm. chim.* 7, 106-9 (1928).—The I no. of a mixt. of oleic (A) and linoleic acids (B), e. g., in the oil of kirondro (cf. C. A. 21, 1666, 2134; 22, 2394) does not permit calcn. of the quantities of A and B. The results compared with those of the direct Br method of Eibner and Muggenthaler (cf. C. A. 7, 903) are too high for B and too low for A. A new method of detg. the Br no. and calcg. the constituent quantities of A and B is given. Dissolve about 0.5 g. of the mixt. of unsatd. fatty acids in 15 cc. dry Et_2O cooled to -10°, then add Br drop by drop while stirring, until the brown color persists. Allow to stand for 2 hrs. at -10°, then remove excess of Br by washing with 5% $\text{Na}_2\text{S}_2\text{O}_3$, then with H_2O . Decant, then distil off the Et_2O , dissolve the residue in 95% EtOH and complete the vol. to 100 cc. Remove 20 cc., add 5 cc. aq. 60% KOH and heat for 5 hrs. under reflux on a water bath. Cool, add 30 cc. H_2O , 1 cc. HNO_3 , then det. Br by the AgNO_3 method. This gave a Br no. $I_{\text{Br}} = 70.68$. If x and y are % of A and B, resp., and i_1 and i_2 are the calcd. Br nos. of A and B, then x and y may be calcd. from the equations: $x + y = 100$, and $(x \cdot i_1 + y \cdot i_2)/100 = I_{\text{Br}}$. This method applied to the oil of kirondro gave for A 75.54, for B 24.46%. The result agrees closely with that obtained by the E. and M. method.

S. WALDBOTT

Composition of normal oleins. A critical consideration of the applicability of the thiocyanate method in olein analysis. M. DITTMER. *Seifensieder-Ztg.* 55, 141-3,

150-2(1928).—Kaufmann's thiocyanate method for the direct detn. of linolic acid is not applicable in the evaluation of oleins because a no. of unknown factors make the results unreliable, such as the behavior of thiocyanate toward linolenic acid, anhydrides and unsapon. matter. A normal olein of the candle industry (furnished by J. G. Siegert, Neuwed) was sepd. into solid and liquid acids by the lead salt alc. method: the presence of much iso-oleic acid permitted the use of only $4\frac{1}{2}$ g. olein instead of 10 g. per 100 cc. alc. and together with sep. isolation of the unsapon. plus neutral fat yielded the following data: 1 nos. (Hanus) olein 88.02, solid acids 80.20, liquid acids 91.44; unsapon. + neutral fat 85.58. These results calc. the following compn: satd. fatty acids 3, iso-oleic acid 27, oleic acid 61, linolic acid 1.5, unsapon. + neutral fat 0.7%. The low percentages of both satd. and unsatd. fatty acids are in direct contrast to Kaufmann's results, obtained with his thiocyanate method and thus throw doubt upon the general applicability of his method. The speed of oxidation of oleins can at present be measured only approx. by Mackey's test and resinification test, until accurate detns. of the oxidizability of the individual fatty acids are available. P. ESCHER

Lime stability of hexalin soaps. K. LÖFFL. *Seifensieder-Ztg.* 55, 133-4(1928).—Soaps made with sulfonated oils form sol. Ca compds. and can be used with hard water. Hexalin and methylhexalin, which dissolve Ca compds. when used alone, cannot prevent Ca pptn. in soap solns. of the laundry, which are too dil. and contain insufficient solvent for the amt. of Ca in the water. P. ESCHER

Fishoil and its adulteration. S. SALM. *Ledertech. Rundschau* 20, 76-7(1928).—The kinds of fish oils are briefly discussed. Fish-oil preps. often contain 80 to 90% of mineral oil. I. D. CLARKE

Head and blubber oils of the sperm whale. I. Quantitative determinations of the mixed fatty acids present. T. P. HILDITCH AND J. A. LOVERN. *J. Soc. Chem. Ind.* 47, 105-11T(1928).—Each oil appears to consist of a mixt. of higher alc. esters (waxes) and glycerides; the wax constituents are 65-75% of the whole oil. The head oil is less unsatd. than the blubber oil, but neither contains any great amt. of acid less satd. than monoethylenic; the alcs. present are parallel with the acids in their respective contents of unsatd. compds. and in their relative mean mol. wts., cetyl alc. being the main component of the head oil alcs., while C_{18} alcs. predominate in those from the blubber. The fatty acids in the two oils differ markedly between themselves and with other marine animal oils. Those from the blubber contain a high % of palmitoleic acid, and considerable amts. of mildly unsatd. acids of the C_{20} series; but highly unsatd. derivs. of this series characteristic of ordinary whale oil are absent. The acids from the head oil are distinctly abnormal for a marine animal oil, over 50% being of lower mol. wt. than palmitic acid. Capric acid occurs to the extent of 3 to 4%, and in addition to lauric (16%) and myristic (14%) acids, there are present the corresponding monoethylenic lauroleic (4%) and myristoleic (14%) acids. There is reason to believe that the monoethylenic acids present in these oils are not in all cases identical with the forms found most commonly in other animal and vegetable fats. E. SCHERUBEL

Absorption and fluorescence of grapeseed oils. ANDANT. *Ann. office nat. comb. liquides* 2, 821-4(1927).—As regards absorption of light from the Hg arc, grapeseed oil behaves similarly to oxidized castor oil. Fluorescence obtained either with the total light radiations of a Hg arc or with light filtered through a Wood screen (which passes only light of $\lambda = 3560$ Å. U.) has a characteristic reddish violet shade. Photographs of the fluorescence spectra of different oils varied considerably in intensity and showed that there are differences in constitution. A. PAPINEAU-COUTURE

Contribution to the study of grapeseed oil. L. MARGAILLAN AND (MRS.) A. RABELLE. *Ann. office nat. comb. liquides* 2, 825-34(1927); cf. C. A. 21, 3278; 22, 176.—Analysis of 31 samples of grape seed gave: H_2O 9.5-20.0, oil 8.5-14.8, crude protein 8.8-11.3, fiber 28.0-41.7, ash 1.9-5.3, N-free ext. 25.1-35.0%. The oil content is considerably lower than that of previous years, where 14-5% oil contents were quite frequent. Analysis of the oil gave: d_{40} 0.912-0.945 viscosity at 61.5° in c. g. s. units 0.116-0.156, n_D^{15} 1.4717-1.4775, sapon. no. 181-198, acid no. 0.3-70, I no. (Hanus) 125-138, Ac no. (Lewkowitsch) 4.0-49.2, resinous matter 3.1-5.9%, unsaponifiable 0.5-2.7%. The oil is not naturally oxidized but readily becomes so if the seeds have not been kept with sufficient care or if the oil is not extd. immediately after crushing of the seed, and on oxidation the acidity, Ac no. and I no. can exceed the above-mentioned max. values. In no case was an Ac no. found even approaching that of castor oil. There is no systematic difference between oils extd. with petroleic ether and oils extd. with C_2H_5Cl . Distn. of the skins before sepn. of the seed has only a slight effect on the const. of the oil. Seed which has been allowed to stand in heaps for some time gives

a more highly oxidized oil, while seed which has been dried at 100° gives a less acid and less oxidized oil than air- and sun-dried seed
A. PAPINEAU-COUTURE

Physico-chemical study of the unctuousness (oiliness) of grapeseed oil. A. AUBERT AND A. PIGNOT. *Ann. office nat. comb. liquides* 2, 815-21 (1927).—A study of the orientation, dissymetry and mol. dimensions of grapeseed oils from different varieties of grapes showed that some of the oils having high Ac nos. more or less approach castor oil in these respects, and some of the oils could be used for lubrication, at least in admixt.

A. PAPINEAU-COUTURE

Properties of "yamagobo" oil. MIYO OGURA. *J. Soc. Chem. Ind. (Japan)* 31, 60(1928). The oil, obtained from the seed of "yamagobo," *Phytolacca acinosa* Roxb., has light orange color and the following properties. d_4^{15} 0.9148, n_D^{20} 1.4713, sapon. value 186.2, I value 104.6 and unsapon. matter 1.73%. The fatty acids sepd. from the oil are orange-colored liquids, with neutralization value 198.5, I value 105.7, contain 92.3% liquid acids and 7.7% solid acids. The acids give 35.9% solid bromide, m. at 113-4°, which corresponds to that of tetrabromostearic acid.
K. K.

Soy-bean oil. I. The component acids. KORO HASHI. *J. Soc. Chem. Ind. (Japan)* 30, 849-55, Suppl. binding: 221-2B (In English) (1927); cf. C. A. 22, 1864.—The acids of the soy-bean oil were sepd. into two parts, one a solid (10.6%) and the other a liquid (85.4%) by means of the lead-salt-alcohol method of Twitchell. The solid acids were esterified with MeOH and were sepd. into fractions by vacuum distn. They consist of much palmitic acid, an appreciable quantity of stearic acid and a little arachidic acid. The liquid acids were brominated and were further sepd. into fractions by the difference of soly. of their brominated products. From the results, the following compn. was computed for the acids of soy-bean oil: linolenic acid 2.9%, linolic acid 51.5%, oleic acids 35.6% and solid fatty acids 11.1%. **II. Isolation of the oleodipalmitin.** *Ibid* 856-8, Suppl. binding: 222-3B (In English).—The oleodipalmitin was extd. with acetone from soy-bean oil, was purified by means of recrystn. (10 times) from acetone and was identified.
SHUMPEI OKA

The components of unsaturated acids of chrysalis oil. WASABURO KIMURA. *J. Soc. Chem. Ind. (Japan)* 30, 856-65, Suppl. binding: 223-6B (In English) (1927).—The unsatd. acids were sepd. from the satd. acids by means of the Ph-salts-alc. method and they were brominated. The hexabromide, the tetrabromide and the dibromide were sepd. by the difference of their solubilities, and identified by means of their Br contents, their Br- or H-absorbing power, their mol. wt. and the oxidation products of the debrominated acids. The unsatd. acids are oleic, linolic and linolenic acids as formerly reported by other investigators, but the content of linolic acid is not so small as formerly reported. The same conclusions were reached from the identification of the products of the oxidation, by means of $KMnO_4$, of the mixed acids. The oxidation products were dihydroxystearic acid, α - and β -sativic acid and linisic acid.

SHUMPEI OKA

Spectroscopic determination of the constitution of the fatty acids of tung oil. W. MANECKE AND F. VOLBERT. *Farben-Ztg.* 32, 2829-31, 2887-9 (1927).—M. and F. give a review of the various methods for detg. the constitution of the eleostearic acid in tung oil. They det. the spectroscopic absorption of this acid with the method of V. Henri (cf. C. A. 7, 3071) and find an absorption figure which is higher than that of linolic acid. Considering the fact that an increase in the absorption goes parallel with an increase in double bonds, they conclude that the eleostearic acid contains more than 2 double bonds.
J. SCHALCH

Gelatins of different origin as emulsifying agents. J. C. KERNOT AND J. KNAGGS. *J. Soc. Chem. Ind.* 47, 96-100T (1928).—Gelatins from which org. and inorg. impurities have been removed are more efficient emulsifying agents than the same gelatins with the impurities. The source from which the gelatin is obtained and the treatment to which it is subjected before the gelatin is extd. has a marked effect on the emulsifying power of the gelatin. Gelatins which have been previously treated with alkali are more efficient as emulsifiers. Oils contg. double or triple linkings are more easily emulsified than satd. hydrocarbon oils.
T. S. CARSWELL

Behavior of beeswax with trichloroethylene at ordinary temperatures. GEORG BUCHNER. *Chem.-Ztg.* 52, 319 (1928).—At ordinary temp., beeswax is 30% sol. in CH_2Cl_2 , small quantities of the free acids and esters and most of the hydrocarbons being dissolved. Sol. part: m. 54.5°; acid no. 3.45; ester no. 24.36; sapon. no. 27.8. Insol. part: m. 67.5°; acid no. 15.6; ester no. 54.0; sapon. no. 69.6. Calcd. to cerotic acid and ester, the ratio in the original wax is 1.65, in the sol. portion 1:12, and in the insol. 1:6.3. *Java (Ghedda) wax* is also partially sol. in CH_2Cl_2 ; stearic acid, paraffin, tallow

and *pitch* are completely sol.; *carnauba wax*, *ozocerite* and *cerasin* are difficultly sol. Mixts. of these compds. with beeswax give insol. fractions having characteristic phys. properties.

Soap films. W. BASTINÉ. *Z. physik. chem. Unterrichts.* 40, 1-3(1927).—Surface forces in soap films are demonstrated by the use of differently shaped models made from wire.

The how and why of silicate of soda. J. C. VAILL. *Soap* 3, 25-7, 77-81(1928).—This article discusses the position of $\text{Na}_2\text{Si}_2\text{O}_5$ in soap manuf., in the washing operation and in incidental plant operations

A. S. CARTER

M. BEBER

E. SCHERUBEL

The seed and oil of *Jatropha curcas* (SOLIVEN) 11D. Soap problems of the textile industry (BRAY) 25.

ALSBERG, CARL LUCAS AND TAYLOR ALONZO E. **The Fats and Oils, a General View.** Stanford Univ. Calif.: Food Research Inst. 103 pp.

Separating animal and vegetable oils from aqueous solutions of proteins and glues by centrifuging. AKTIEBOLAGET SEPARATOR. *Brit.* 277,311, Sept. 8, 1926. The "glue" or "fruit" water is centrifuged before the glues or proteins coagulate and sep. as solids and while the temp. is about 80° or above.

Destructive hydrogenations. J.-M. F. D. FLORENTIN, A. J. KLING and C. MATIGNON. *Brit.* 276,007, Dec. 17, 1925. Animal and vegetable oils are heated in liquid phase under a min. pressure of 45 kg. per sq. cm. and temp. of $350-480^\circ$ in the presence of H and dehydrating catalysts such as thoria, Al_2O_3 , clay or SiO_2 , to form hydrocarbons of low b. p.

Detergent. E. McNAIR. *Brit.* 276,645, Aug. 26, 1926. Soap is mixed with sawdust, wood powder or wood pulp.

28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

Some application of physico-chemical determinations to the control of sugar manufacture. R. H. HURST. *Trop. Agr. (Trinidad)* 4, Sugar supplement. 32-3 (1927).—Surface tension and cond. measurements of sugar solns. are discussed. The coagulation of suspended colloids is largely due to changes in the surface tension at the colloid-liquid interface.

A. L. MEHRING

The real acidity in sugar manufacture, its determination with indicators, and its effect on the product. P. HONIG. *Arch. Suikerind.* 36, 212-22(1928).—The advantages of p_{H} detn. over the titrimetric method are pointed out and it is explained why the drop method is preferable. During the crop of 1927 several difficulties appeared. The indicators used were bromothymol blue (BTB) and *p*- α -naphthol (PAN). It happened sometimes that in turbid juices the p_{H} with one indicator was higher than with the other. In juices clarified by the sulfitation process the p_{H} with PAN was higher than with BTB. After filtration of these juices with kieselguhr or norit the BTB p_{H} showed only a very small change, but the PAN p_{H} gave too high results. Different explanations of this fact are discussed. The influence of the temp. on the p_{H} will have to be studied. Juices entering the evaporators neutral in several instances yielded return waters decidedly alk., while juices which were certainly not oversulfitated gave return water contg. SO_2 . This shows that the juices contain substances which at high temp. have a tendency to lower the p_{H} . The influence of the concn. of the juices is another point to be studied. The p_{H} of sirups and molasses was detd. at different concns., but definite conclusions are not possible so far. There are indications that the unknown losses are greatly reduced by working throughout the process at p_{H} 7, measured at low temp. and without dilm. The colloids are affected not only by the H ions but by other ions also. Several non-sugars go again into true soln. with a slightly acid or slightly alk. reaction, and even if they are not entirely pptd. during clarification, their bad effect on crystn. is lessened. The influence of the Ca ion on clarification and crystn. is of great importance and will have to be studied, also the influence of the anions on colloids. The coagulating effect of the anion is of quite as great importance as that of H-ion effect.

P. R. P.

Report on polariscopic methods of (sugar determination). F. W. ZERBAN. *J. Assoc. Official Agr. Chem.* 11, 167-75(1928); cf. *C. A.* 21, 2393.—The sucrose of the

blackstrap molasses sirup was inverted with invertase. Results obtained on mixts. of this sirup and sucrose by different inversion methods lead to the following conclusions: (1) In the plain acid method, the influence of the free acid on the rotation of levulose tends to give high results, hydrolysis of the reversion products tends to give high results, and changes in rotation caused by the effect of the acid on the amid-amino-acid mixt tends to give low results. (2) In Jackson and Gillis' method No. II (C. A. 14, 2561) the influence of free acid on the rotation of levulose has no effect on the results, hydrolysis of reversion products tends to give high results, and hydrolysis of any asparagine present tends to give low results. (3) In Jackson and Gillis' method No. IV (C. A. 14, 2561) the influence of free acid on the rotation of levulose has no effect, hydrolysis of reversion products tends to give high results, and change in rotation of the amides and amino acids caused by the free acid tends to give low results, which effect is greater than that caused by hydrolysis of asparagine followed by neutralization, so that method No. IV gives lower results than method No. II. With high sucrose and low invert sugar, reversion products, amides and amino acids the disturbing influence of the latter may fall within the limits of error of saccharimetric analysis. With complex mixts. (like many sugar-cane products) the only safe procedure for detn. of sucrose is the invertase method; but in special cases the 2 Jackson and Gillis methods, or even the plain acid method, may, by a compensation of errors or by a negligible magnitude of the errors, give correct results.

A. PAPINEAU-COUTURE

The experimental and instructional cane sugar factory crop 1927. W. SCOTT. *Trop. Agr. (Trinidad)* 4, Sugar Supplement 27-31(1927); cf. C. A. 22, 1247.—The sucrose extn. from whole cane, and from pieces cut into 3 in. and $\frac{3}{4}$ in. lengths was 86.41, 84.18 and 75.06%, resp. Four hrs. after being cut cane had lost 2.91% in wt. The sucrose content of different varieties ranged from 9.45 to 11.70%. The mill was run in various ways to obtain the best possible clarification. Pectin, phosphate, silicate and colloidal matter were most completely eliminated by overliming. Liming had no apparent effect upon removal of pentosans. Const. heating at 215° F. removed pentosans effectively. Nitrogenous substances were removed more completely both by under- and overliming than by normal defecation. Additions of H_3PO_4 produced a clarified juice of great brilliance. From an economic standpoint, centrifuging seemed to be the most promising method of clarification.

A. L. MEHRING

Chemical research problems in cane sugar production. F. HARDY. *Trop. Agr. (Trinidad)* 4, Sugar Supplement 41-6(1927).—Sugar production in the cane and its recovery by manufg. processes are reviewed step by step with numerous references to the literature.

A. L. MEHRING

Report on meetings of technical advisers in the Java sugar industry, Feb. 22 to 24, 1927. ANON. *Arch. Suikerind.* 35, IV (1927); cf. C. A. 21, 1892.—Joint meeting of the three sections. 3-27.—A round table discussion on weighing of cane; estn. of sugar yield for different cane varieties, particularly by the Djombang method; analyses to det. ripeness of cane, milling qualities of cane varieties; effect of P_2O_5 in soil and cane on settling of defecated juices; new POJ varieties and their effect on factory capacity. Joint meeting of chemical and technical sections. 29-144.—Similar discussion on crushers and shredders; mills and milling; bagasse sampling and analysis; weighing and measuring devices; hot maceration; relation between Djombang method and mill control; fuel economy and control; returning of press mud to mills; Vallez and Sweetland presses; cleaning of evaporators; corrosion; centrifugals; washing sugar with sirup or steam; diln. of run-offs; drying of sugar; crystal breakage; effect of microorganisms in the mill, in the factory, in the sugar. Meeting of chemical section, 145-66.—Discussion on juice clarification; effect of pH ; evapn. and boiling; Lafeuille crystallizer; molasses purity; factory control. Meeting of technical section, 167-246.—Discussion on Bruyn mill; turn plates; electrification of sugar factories; central condensation; boilers, economizers and steam accumulators; steam turbines; Meeting of agricultural section, 247-308.—Discussion on distance between plants; time of planting; optimum length of growth; fertilizers; green manuring; molasses as fertilizer; liming; new varieties; seed cane supply; value of practical plot tests; vascular bundle disease; root rot; white louse; borers; mosaic. Index, 309-16. F. W. Z.

The determination of the true polarization sugar in the beet by aqueous digestion and the errors caused by the marc. VL. STANEK AND J. VONDRAK. *Z. Zuckerind. Cechoslov. Rep.* 52, 165-74(1927); cf. C. A. 21, 3481.—The present beet-digestion methods, adopted 1890-1895, are based on a vol. for marc and Pb ppt. of 0.6 cc. and of 23 cc. of juice in 26 g. of pulp. Recent investigations have shown that the marc vol. is several times that of 0.6 cc., resulting therefore in a less juice vol., which in addn. is still more reduced because of the much higher sugar content of the beets of today

compared with that 35 years ago. These factors unite to produce a higher polarization than corresponds to the facts. The authors attacked the problem of detg. the true vol. of marc and juice by producing absolute extn. of the pulp with the centrifugal method. This resulted in a very dil. ext. necessitating concn. by boiling under high vacuum, which, however, caused no destruction of sucrose. App. used and method of procedure are illustrated and described. The results proved that the present method of analysis gives too high values. Av. vol. of marc was found to be 1.3 cc. and that of the juice in 26 g. of beet pulp 21.78 cc. Av. marc content of ripe beets was 4.79, of unripe beets 3.7%. Av. errors in polarization by the normal wt. pipet digestion method was 0.19%; that of the $\frac{1}{2}$ normal wt. pipet method was 0.17%. For the normal wt. flask digestion method 0.197, for the $\frac{1}{2}$ normal wt. flask digestion method 0.065%. The authors suggest the following procedure: *Flask digestion method:* 52 g. of pulp are transferred with boiling water to a 403 cc. flask. Add 8 cc. of lead acetate. Destroy foam with alc. or Et_2O . Make up to mark with hot H_2O and place for 30 min. in a bath of 80–85°. From time to time stir with a bent wire. Cool to 20°, rinse the wire, make up to the mark, filter and polarize in a 400-mm. tube. *Pipet digestion method:* Transfer 52 g. of beet pulp with 356.4 cc. of dil. basic lead acetate into a 500-cc. digestion can with cover and place for 30 min. in a bath at 80–85° (Note: In California, on account of very high polarizing beets the marc and juice volumes were found to be even further from the proportions which S. and V. have detd. Instead of using 177 cc. of lead water which the original Sachs-Le Docte method requires, or the 178.2 cc. which S. and V. propose, the writer has been using for the evaluation of beets 178.4 cc. for the last eleven years.)

F. R. BACHLER

Microorganisms which cause inversion of raw beet sugar. VOJTECH MAREŠ. *Z. Zuckerind. Cechoslov. Rep.* 52, 177–92(1927).—Raw beet, like raw cane sugar, will show signs of decompn. during storage, made manifest by absorption of H_2O , inversion and loss of alkyl. M. shows that inversion is caused by invertase excreted by vegetative micellae. This has the purpose of prepg. the otherwise difficultly digestible substrate for assimilation. The hygroscopicity of invert sugar causes gradual additional diln. of the inverted substrate, which facilitates additional and more energetic bacterial growth; this in turn causes rapid increase of the quantity of invert sugar. The alkyl. of a sample is no criterion of the resistance of a raw beet sugar against microbial decompn. nor can a conclusion be drawn from the no. of mold spores present. Only the no. of spores of *Aspergillus glaucus* and of *Penicillium crustaceum*, which M. has found to possess greatest inverting power, can be taken as an indication of the degree of harmful infestation that can be expected. Drawings and photomicrographs of these and similar molds are given and mode of procedure is described in great detail. F. R. BACHLER

Study of the speed of solution of sugar. K. ŠANDERA. *Z. Zuckerind. Cechoslov. Rep.* 52, 154–60(1927).—The factors which influence soly. conditions of sucrose are of the greatest importance for the entire sugar industry. Š. detd. first the speed of soln. of single crystals and of pellets of amorphous sugar. He placed a weighed crystal, or pellet, on a fine copper screen which was then submerged below the surface of quiet H_2O of 20°. The time necessary for complete soln. was measured. On crystals, probably on account of their anisotropy, speed of soln. varied somewhat because of different speeds of soln. in their diverse directions. Pellets, however, being isotropic, gave closely agreeing results. The speed of soln., expressed in g. per sec. per sq. cm., is a const., $K = 1.6 \times 10^{-4}$, and is for sugars of different shape and kind approx. the same. It is a function of structure and surface. In another series of expts. Š. detd. the speed of soln. of white sugar crystals of different size during washing. He placed on a screen with glass bottom 10 g. of crystals, over which 100 cc. of H_2O of 20° was permitted to flow; within 1 min. the wash liquid was polarized. The crystals of diff. size showed the following % of soly.: coarse 11.8, medium 27.6, fine 59.0, flour 86.0. This shows, in conformance with previous detns. and the experience of practice, that a given quantity of H_2O will dissolve, in the same time, the more sucrose the finer and more uneven is the grain, or the larger the surface of the grain. Similar expts. were made with raw sugars, in which, besides degree of soly., it is also of interest to know what amount of impurities a given quantity of H_2O will remove in a given time. Great differences in soly. and removal of non-sugars were found to exist in raw sugars of different grain size and quality.

F. R. BACHLER

The relation between alkalinity and electric conductivity of carbonation juices. V. STANĚK AND K. ŠANDERA. *Z. Zuckerind. Cechoslov. Rep.* 52, 209–13(1927).—The alkyl. of a carbonation juice is principally due to dissolved CaO and it falls as CaO is removed. With the decrease of CaO there is a decreased elec. cond. However, there is

also the influence to be considered due to variations in sol. salt content of the diffusion juice and the diffusion battery supply water. The authors made elec. cond. measurements in first carbonation juices, diffusion juice and battery supply water and deduct from their results that a direct proportion exists between alk. and cond.; that the influence of varying amt. of salts in diffusion juice and battery supply water during widely differing parts of campaigns is within the limit of exptl. error (0.01–0.02% CaO) and therefore negligible; and that elec. cond. measurements give the promise of making possible the detn. of the end point of first carbonation. F. R. BACHLER

Defecation by adding raw juice to milk of lime to the desired final reaction. G. H. DE VRIES. *Arch. Suikerind.* **36**, 263–7 (1928).—To get a better clarification, it is proposed to add raw juice to milk of lime instead of the ordinary practice where milk of lime is added to raw juice. By starting with a strongly alk. medium a part of the non-sugars is pptd. which remains in soln. when alky. is not reached. Several lab. tests were made by defecating raw juice in both ways. With the same amt. of lime used in both cases and with a neutral final reaction, the vol. of the mud was larger with the new method, and the color and brilliancy of the clarified juice were better. W. APPEL. *Ibid* 355–6.—Besides the improvements mentioned by de Vries, the new method also has the following advantages (1) a large range of p_H ; (2) the final reaction can, with varying quality of raw juice, be accurately adjusted within less than 0.1 p_H , (3) the final reaction can be selected with regard to min. mud vol. and low Ca salts content; (4) there is no difference between the p_H of limed raw juice and that of clarified juice; (5) simplicity of controlling the p_H which can be adjusted in accordance with the quality of the raw juice. P. R. P.

Supplementary note on the Peck strainer. L. BAISSAC. *Rev. agr. Maurice* **5**, 16–7 (1928); cf. *C. A.* **21**, 1203.—The strainer with a 60-mesh screen, made of Monel metal, has continued to give satisfactory service, with the method of cleaning described previously. The method recommended by Peck is not satisfactory in Mauritius. The gum-producing organism is not *Leuconostoc mesenteroides*, but is a staphylococcus. In another factory an organism similar to *Bacterium gelatinosum* has been found, which also produces a gum. F. W. ZERBAN

Cellulose from sugar cane (Brit. pat. 277,163) **23**.

A Comprehensive Survey of Starch Chemistry. Compiled and edited by Robert P. Walton. New York: Book Dept. of "Sugar." \$10, post paid.

Sugar. RAFFINERIE TIRLEMontoise Soc ANON. Brit. 276,527, Sept. 20, 1926. The fine grain is removed from sugar sirups or molasses by the surface action of articles of material such as kieselguhr, paper or sugar crystals and by use of high centrifugal force. Cf. *C. A.* **22**, 2288.

Sugar. RAFFINERIE TIRLEMontoise Soc ANON. Brit. 276,611, Aug. 26, 1926. Raw sugar, after-product sugar and like products, before further treatment such as by centrifuging, are stored for a time under condition of temp. and humidity which cause the sirup surrounding the crystals to attain as low a purity as possible, e. g., 60% or less of sugar in the total dry content of the sirup.

Centrifugal apparatus for washing sugar, etc. C. L. CARLSON. U. S. 1,669,927, May 15.

Apparatus for filtering sugar sirups, etc. R. J. SWEETLAND. U. S. 1,670,319, May 22.

Anhydrous powdered glucose. W. H. DICKERSON. U. S. 1,670,101, May 15. A glucose sirup is sprayed or atomized and brought into contact with a current of gas which is initially highly heated but which falls in temp. as the dehydration proceeds so as to avoid melting of the glucose. An app. is described.

Starch compositions. HENKEL ET Cie GRS. Brit. 276,340, Aug. 17, 1926. Halogen-Ca starch preps. such as are described in German pats. 308,616 and 406,820 are treated with an alc.-water mixt. contg. 50–80% alc. by which the halogen Ca component is largely eliminated. The product may be used as an adhesive or size and may be mixed with resin or resin size to form a dry painters size. Cf. *C. A.* **21**, 339.

29—LEATHER AND GLUE

ALLEN ROGERS

Prof. Dr. Roberto Lepetit. LEOPOLD POLLAK. *Gerber* 54, 55-6(1928).—An obituary.

Report of work of the German research laboratory for the leather industry at Freiberg for the year 1927. ANON. *Ledertech. Rundschau* 20, 45-9, 57-62(1928).—Report of analyses of tanning materials and defective leathers. I. D. CLARKE

Recent work on the mechanism of vegetable tanning and the influence of p_H value. A. DEFORGE. *Halle aux Cuirs* 1928, 100-5.—A review of the work of Parker and Gilman (C. A. 21, 3140) and Schiaparelli and Bussino (cf. following abstract).

H. B. MERRILL

The chemical nature of vegetable tannin. CESARE SCHIAPARELLI AND GIOVANNI BUSSINO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 343-61(1927); *Conceria* 35, No. 1018, Pt. Tec., 28-35(1928).—Small samples of beef hide were tanned with a tannic acid soln. (about 2%) contg. varying amts. of lactic acid. From observations of the process of tanning at different H-ion concns., S. and B. conclude that it is necessary in practice to survey the p_H of the soln. because below p_H 2.6 the leather obtained in their expts. was of poor quality. The more acid the bath is, the larger is the quantity of washable substances and the smaller is the resistance toward warm water. In a 2% tannic acid soln. at a p_H higher than 2.50 and at ordinary temp., 100 parts dry protein combine irreversibly with 60 parts tannin.

GUENTHER SCHWOCH

An extractor for vegetable tanning materials. B. SCHWARZBERG. *Collegium* 1928, 151-4.—The Proctor extractor has been modified by adding a second vessel similar to that contg. the tanning material and from which H_2O at the temp. of the extrn. is automatically siphoned on to the material. The H_2O level in this vessel is kept const. by an inverted flask contg. H_2O .

I. D. CLARKE

Specific gravity of vegetable tannins and of the skin. D. SHURAVLIEV AND D. ARBUSOV. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, No. 12, 41; *Collegium* 1928, 44-5.—Dry, ashless tannins from different sources do not have the same densities. The sp. gr. of pyrogallol tannins is (generally) higher than that of catechol tannins. The sp. gr. of dry, ashless collagen was detd. as 1.42, which agrees well with previous detns.

H. B. MERRILL

Absorption of vegetable tannins by hide powder under different conditions. G. W. SCHILLER AND B. SCHWARZBERG. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, No. 1, 45-7. *Collegium* 1928, 112-3.—Hide powder was tanned with solns. of different tanning exts., with and without sulfitation or addn. of acid. Total material absorbed and "tannin irreversibly fixed" are calcd. as % of original hide powder wt. Acid addn. increases both total and "irreversible" fixation. Sulfitation decreases total, but has no effect on irreversible, fixation. Fixation increases with increase of ratio tannin:hide powder (vol. const.), and is independent of this ratio when the concn. of the soln. is const.

H. B. MERRILL

Tanning materials of Bahia (Brazil). ANON. *Ledertech. Rundschau* 20, 49-53 (1928).—The most important tanning materials of Bahia are barks of angico (*Piptadenia*) which contains 17-22% of tannin, and red and white mangrove. Muricy bark, which contains about 25% tannin, babatenom (15-25% tannin) and a few less important materials are briefly described.

I. D. CLARKE

The utilization of poplar bark as a tanning material. G. A. BRAVO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 387-402(1927).—Three samples of fresh bark of *Populus nigra*, *P. alba* and *P. canadensis*, resp., were kept in a dry room for 2 months thus losing 32-34% H_2O , but still contg. an av. of 10.65% H_2O . Then the bark was ground and estd. according to Proctor's method; the extrn. is complete when a temp. of 95° is employed. The liquid obtained is of reddish color and gives the typical reactions of tannins. The quantity of the tannins in the soln. was 4.3-5.3%; besides this, the analysis yielded 3.1-4.2% sol. non-tannin substances and 78.4-81.3% insol. material. The tannin content of poplar wood was found to be 1.08% in 1 sample analyzed. An aq. ext. of poplar bark was concd. under reduced pressure to a density of 20° Bé. The quantity of tannin was 20.50% at this stage. By evap. to dryness a residue of 85 g. was obtained from 1 kg. bark. The compn. of this product was 42.00% tannin, 36.09% sol. non-tannin substances and 9.83% insol. substances. The most satisfactory way to bring the insol. material into soln. was by adding sulfite cellulose or the synthetic tannin, "Coritan." These combinations have excellent tanning properties. Numerous references are given in the paper.

G. S.

Value as tanning material of two barks from Indo-China. F. HEIM DE BALSAC. *Halle aux Cuirs* 1928, 117-24.—"Gie'-Mit" (*Actinodaphne* sp.) showed on analysis of bark H_2O 11.6%, tannin 6.4%, sol. non-tannin 3.6%, insol. matter 78.4%. The tannin is of the catechol type. "Re'Bau" (*Machilus* sp.) showed on analysis H_2O 13.0%, tannin 13.0%, sol. non-tannin 7.7%, insol. matter 66.3%. The tannin is of the pyrogallol type. Analyses were made by the I. S. L. T. C. method. Neither material is especially promising commercially. H. B. MERRILL

Outlook for a rational investigation and utilization of pine bark. P. YAKIMOV AND B. ANIKIN. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, No. 8/9, 68-79; *Collegium* 1927, 546.—Pine bark, a most important material to the Russian tanner, is one of the least investigated tanning materials. Preliminary investigations have led to the following conclusions: Exposure to rain causes little direct tannin loss by leaching, but storage in the damp state causes a notable loss through mold growth. Water transportation of logs does not materially reduce tannin content. Total sol. matter decreases with increasing age of the tree, and with increasing size of tree for a given age. Ratio of tannin: non-tannin is practically independent of these influences. H. B. MERRILL

Formaldehyde as a tanning material. B. A. TARACHOVSKII. *Vestnik* (Organ of the All-Russian Leather Synd.) 1925, No. 2, 102-3; *Collegium* 1927, 542-3.—Skins are placed in a closed drum with 80 lbs. H_2O per 100 lbs. skin, and 10 lbs./100 lbs. of a slightly alk. soln. of $HCHO$ is introduced. The concn. of $HCHO$ during tanning is 0.5-3.5%. It is essential that slight alk. be maintained. Coloring and fat-liquoring are carried out as for Cr-leather. H. B. MERRILL

Status of synthetic tannins. A. A. CLAFLIN. *Shoe and Leather Reporter* 170, No. 4, 49-51, No. 5, 14-8 (1928).—The high cost of raw materials from which true synthetic tannins might conceivably be made inhibits any attempt toward their com. manuf. *Syntans* are condensation products of sulfonated phenols with $HCHO$ which combine with hide substance. Their history and method of prepn. are reviewed. While syntans have not attained wide use as tanning agents *per se*, they are widely used in combination with other tanning materials. H. B. MERRILL

The tanning process. P. I. PAVLOVICH. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, Nos. 10 / 11, 60-65; *Collegium* 1927, 543.—The hypothesis is advanced that the max. tannin fixation observed by Thomas and Kelley at $p_H = 7-8$ was due to subsequent washing of the hide powder with H_2O at $p_H = 5.8$, the dispersity of the tannin decreasing with increasing p_H value. On the basis of these observations, a procedure for tanning was devised wherein the skins are tanned first in strong exts. at $p_H = 7-8$, the p_H value gradually lowered to 2-3, and tanning completed with strong exts. at this acidity. Tests showed that no hydrolysis occurred in the p_H range 7-9 in 1 week. To prevent oxidation during the alk. pretannage the operation was carried out in vacuum or in an inert gas. Best results were obtained with pretannage at $p_H = 7-8$ and retannage at the natural p_H value of the ext. (about 5.5). H. B. M.

Dry chrome tanning. N. KOTELNIKOV AND I. BASS. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, Nos. 2 / 3, 45-7; *Collegium* 1927, 542.—Skins soaked and limed as usual but not pickled are completely neutralized by washing with a soln. contg. 1 lb. HCl (d. 1.15) per 100 lbs. skin. The skins are placed in a drum and enough of "Steir's soln." (d. 1.42, basicity = 72, $NaCl = 10\%$) is run in to give 1.8 lbs. Cr per 100 lbs. skin. After tanning is complete (1-1.5 hrs.) the stock is washed with 35 lbs. H_2O per 100 lbs. skin. It is not advisable to horse the stock prior to washing. Utilization of Cr and quality of the leather are said to be good. H. B. MERRILL

One-bath tanning. VITTORIO CASABURI. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 380-2 (1927).—Preliminary report on expts. done for the purpose of observing the chem. and phys. changes in hide and liquor. G. S.

The chemical processes of combined tanning. CESARE SCHIAPARELLI AND LUIGI CAREGGIO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 362-7 (1927).—I. Turney-Wood (cf. *Collegium* 1908, 261; cf. *C. A.* 2, 2173.) had made the statement that chromated gelatin when immersed in a tannic acid soln. absorbed just as much tannin as gelatin not chromated. S. and C. checked this statement using beef hide as the starting material. The hide was chromated in a 5% chrome alum soln. and then tanned in 1.8% tannic acid soln. From the expts. of Schiaparelli and Bussino (cf. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 343-61 (1927); *C. A.* 22, 1494), the following equation was expected: 100 g. protein + 60 g. tannin + 6.76 g. $Cr_2O_3 = 166.76$ g. leather. The equation found was: 100 g. protein + 61.43 g. tannin + 6.18 g. $Cr_2O_3 = 167.61$ g. leather, which result confirmed Turney-Wood's hypothesis. G. S.

Tanning experiments with naphthalene derivatives. Y. BUNIMOVICH. *Vestnik*

(Organ of the All-Russian Leather Synd.) 1926, No. 4, 12; *Collegium* 1927, 543.—Sheepskins tanned with mixts. of quebracho and naphthalene acids were brighter and softer and required no further bleaching, as compared with skins tanned with quebracho alone.

H. B. MERRILL

The employment of the hydrostatic balance in the study of the tanning process. GIOVANNI BUSSINO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 421-7(1927).—The employment of the hydrostatic balance for the purpose of detg. the dry wt. of a hide sample when immersed in a soln., is described.

G. S.

The retarding action of the tannins on the atmospheric oxidation of alkaline bisulfites. ANDREA PONTE. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 403-15 (1927).—By aeration of a tannin-SO₂ soln., practically all SO₂ is expelled and little is found retained as SO₃. In a soln. of neutral sulfite, tannin limits the oxidation of sulfite to sulfate to a considerable extent. In alk. bisulfite soln., the retarding action of tannin is still greater; at the same time the tannin holds a large part of the bisulfite firmly in soln., despite violent aeration. P. concludes from his expts. that in alk. soln., the tannin forms an additive compd. with the bisulfite, similar to the type of the additive compds. of aldehydes and ketones with bisulfite. This reaction does not occur in neutral sulfite or SO₃ soln.

G. S.

Analytical control of the sulforicins employed in the tanning industry. II. Sulforicinoles. MARIO GERONAZZO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 416-20(1927).—Sulforicinoles of good quality should be clear, homogeneous and straw-colored or golden; its reaction may be acid, neutral or alk., according to its prepn. It may contain NH₃ or Na, which is used for neutralizing. The emulsive power is estd. by shaking 2 cc. sulforicinoles with 20 cc. H₂O for 2 min. and examg. the stability and the degree of opalescence of this emulsion. The emulsive capacity is estd. by detg. the stability of an emulsion of a certain amt. of some other substance and sulforicinoles. The quality of the sulforicinoles is directly proportional to the emulsive capacity and the stability of an emulsion of this substance. The sulforicinoles-water emulsion should become perfectly clear after addn. of NII, soln. The titer of the sulforicinoles is detd. by placing 25 cc. of the substance in a graduate and adding 25 cc. of dil. H₂SO₄. The mixt. is shaken for 1 min. and allowed to stand for 12 hrs. The number of cc. of the upper layer times 4 equal commercial titer. The lower layer of the mixt. is tested for the presence of Fe with ferrocyanide.

G. S.

Preparation of pure collagen and its utilization for determination of tannins in tanning materials. V. S. SADIKOV. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 6, 64-81.—Standard hide powder presents the defect of not being a definite and uniform chem. substance. It principally consists of collagen, but it also contains elastin, keratin, proteins and mucoids. The use for analytical purposes of pure collagen instead of hide powder has been adopted by the State Institute of Applied Chemistry in Moscow and the results obtained were found very satisfactory. Pure collagen is obtained as follows: Fascia of an ox, after careful removal of the remains of other tissues, and after washing with water, is finely pulverized. The powder is agitated for 6 hrs. with 0.35% soln. of NaOH at room temp. (or else digested with the soln. for 24 hrs.), the soln. is poured off, replaced by a fresh soln. with which the powder is again agitated, then the new soln. is poured off and the powder is agitated for the third time with fresh NaOH soln. These treatments remove albuminoids, mucoids, etc. Then the strongly swelled mass is washed with water by decantation, coagulated either by CH₃COOH or by a current of CO₂ gas, pressed out, suspended in water and pressed out again. The mass is suspended in water again and submitted to agitation with frequent change of water; these treatments are necessary for the complete removal of sol matter. Finally collagen is strongly compressed so as to form thin leaves and the latter, after being dried first by a current of cool air (or by acetone, or by alc.), is thoroughly dried in a thermostat at 40°, after which it is either reduced to a fibrous mass or pulverized. S. gives the results of numerous comparative analytical tests made by the use of this collagen.

BERNARD NELSON

Difference of resistance of treated and untreated collagen to enzymes. V. S. SADIKOV. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 3, 82-8.—Untreated collagen and collagen which has been treated physically or chemically behave differently toward collagen-decompn. enzymes. When collagen becomes hydrolyzed either by water, or by rise in temp., or by hydrolase, its trypsin resistance gradually decreases; pulverization of collagen has a similar effect. Thus, hides and fascia are very resistant to enzymes in comparison with the behavior of pure collagen obtained from fascia (cf. preceding abstract); but if hides and fascia are pulverized and subjected to the action of weak NaOH soln., they too become less resistant to enzymes. B. N.

Influence of degree of tannage on water-impermeability of leather. G. G. POVARNIN AND AKULININ. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, Nos. 5/6, 27-8; *Collegium* 1927, 544-5.—Permeability of skin to H_2O increases with extent of tannage, particularly if the skin is previously swollen with H_2SO_4 . H. B. M.

Swelling, degree of tannage, and mechanical properties of leather. G. O. POVARNIN AND M. I. RUBICH. *Vestnik* (Organ of the All-Russian Leather Synd.) 1925, 10/11, 115-8; *Collegium* 1927, 545.—Strips of skin were swollen with 0.04 N solns. of the following acids: H_2SO_4 , HCl , H_2SO_4 followed by $HCHO$, acetic, oxalic and lactic acids. Testing the strips after tanning gave the following results (1) Swelling decreases strength of leather to a certain min. The greatest diminution of strength occurred with strong acids, the least with acetic acid. It is possible that the % decrease in strength is a function of the degree of swelling, independent of the nature of the acid. (2) With increasing swelling, the "tanning coeff." increases to a max. and thereafter declines. The "filling coeff." increases regularly with swelling. (3) Fixing swollen skins in $HCHO$ increases roughness of leather, is without influence on strength, lowers "tanning coeff." and raises "filling coeff." (4) There is no direct connection between chem. compn. and strength. (5) Strong mineral acids in concns. technically employed have a distinct weakening effect of leather. H. B. MERRILL

Determination of total acid in tan liquor. N. MICHAILENKO-MALENKO. *Vestnik* (Organ of the All-Russian Leather Synd.) 1925, No. 9, 52-4; *Collegium* 1928, 41.—Treat tan liquor with a soln. made by dissolving 50 g. $NaCl$, 8 g. gelatin and 4 g. gum arabic in 250 cc. hot water and neutralizing with $NaOH$. Filter. Titrate an aliquot of filtrate with 0.01 N $NaOH$, using hematin. H. B. MERRILL

Role of non-tannin. P. I. PAVLOVICH. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, Nos. 5/6, 16-9; *Collegium* 1927, 548.—Addition of non-tans to tan liquor with the aim of producing an acid liquor by their fermentation is uneconomical, since much tannin is simultaneously destroyed. Regulation of acidity by adding acid is preferable. If this is done, non-tans are positively harmful, since they diminish the effect of the added acid by their buffering qualities. Non-tans prevent drawing of the grain, act as filling materials and reduce the astringence of the tanning ext. Leathers tanned with exts. in which the ratio of tannin : non-tannin was varied from 60 : 40 to 80 : 20 were practically identical in properties and compn. H. B. MERRILL

Ways of improving leather manufacture. N. KOTELNIKOV AND I. BASS. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, Nos. 10/11, 70; *Collegium* 1927, 493-5.—A discussion of tannery control in the light of the colloid chemical concept of tanning. H. B. MERRILL

Properties of leather (testing impermeability of) retan sole leather. AUG. C. ORTHMANN. *J. Am. Leather Chem. Assn.* 23, 184-7 (1928).—Two tests are described: (1) immerse a strip 2 in. \times 4 in. in water and det. the increase in wt. after 0.5 hr. and after 3 hrs. (2) Cut soles from leather and attach to the feet of a man weighing about 145 lbs. Det. the no. of min. required for the subject to obtain wet feet when walking on water-covered floor at 120 strides per min. The 2 tests do not give the same relative results for series of different leathers. The performance test means more than the absorption test. H. B. MERRILL

Resistance of leathers to hydrolysis. G. ARBUJOV. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, No. 4, 29-31; *Collegium* 1928, 40-1.—Resistance to hydrolysis was measured by Fahrion's method before and after extn. with aq. $MeOH$. Resistance increased with "true tanning coeff." In some leathers resistance was lowered by $MeOH$ extn., showing that in unextd. leather some sol. matter is fixed during the hydrolysis test. In other cases resistance to hydrolysis was increased by $MeOH$ extn., for which no explanation is offered. H. B. MERRILL

Effect of acid concentration in plumping on the mechanical and chemical properties of leather. G. G. POVARNIN AND SHIMANOVICH. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, No. 7, 7-10; *Collegium* 1927, 543-4.—Calfskin strips were treated with different concns. of H_2SO_4 before tanning or with different concns. of lactic acid during tanning. Tests on the vegetable-tanned strips led to the following conclusions: (1) H_2SO_4 decreases tensile strength and resistance to stretch and increased roughness of leather. Loss of tensile strength is noticeable at acid concns. giving negligible swelling; per cent loss increases to max. at concn. giving max. swelling, and is thereafter const. for higher concns. Roughening is noticeable only at acid concns. giving excessive swelling. (2) Lactic acid in concns. used had no influence on roughness or tensile strength. (3) The "true tanning coeff." and "true filling coeff." increased with increasing swelling. (4) Swelling that is accompanied by hydrolysis decreases tensile strength and increases roughness of leather. H. B. MERRILL

Action of free sulfuric acid on leather. A. KUKARKIN. *Vestnik* (Organ of the All-Russian Leather Synd.) 1925, No. 1, 150-5; *Collegium* 1928, 41.—Small quantities of H_2SO_4 added to sole leather decrease H_2O -sol. matter and increase apparent % tannage; this is due to pptn. of otherwise sol. tannin as phlobaphenes. H. B. M.

Chemical and microscopic investigations on the soaking of leather and hides. VITTORIO CASABURI. *Boll. ufficiale staz. sper. ind. pelli mat. concianti supplemento tecnico* 5, 205-22(1927); *Conceria* 35, No. 1028, Pt. Tec., 27-34(1928).—Dry beef hides were immersed in pure water, neutral and alk. solns., resp., and the chem. and histological changes of the hides and the chem. changes of the liquids were examd. The expts. were carried out at 24° and 15°. About 50 g. of hide was placed in the respective solns. and from time to time a small piece of it was dyed and examd. under the microscope. After the max. swelling had occurred, dry residue, p_H and N content of the liquid were estd. In pure water, the gain in wt. of the hides was about 100% after 96 hrs., the dry residue was less than 0.2%, the loss of hide substance (calcd. from the N content of the liquid) was 1.8%. The p_H stayed around 6. The histological examn. showed 3 stages of swelling; (1) mechanical, (2) chem. absorption of water, (3) hydrolysis. Expts. with artificial hard water (0.06% $CaCl_2$ soln.) yielded similar results, while with 0.02 N NaHS putrefaction began after 96 hrs., the p_H dropped from 9.6 to 6.7 and the loss of hide substance was about 5.8%. The loss of hide substance was less in 0.2 N NaHS than in NaOH and much less in 0.02 N sodium citrate and 0.02 N sodium arsenite. In these two latter solns. losses were the 0.8% and 0.7%, resp. but with 0.02 N KCNS, the loss was practically zero; with 0.02 N NaCl, 2.9% of the hide substance was hydrolyzed. The p_H remained nearly const. in each of the latter expts. and the gain of wt. of the dry hides was around 100% in all expts. Chem. and microscopic tests showed that the KCNS soln. gives results most satisfactory for the process of soaking, while sodium arsenite and sodium citrate were found to be next best. G. S.

Improved methods for soaking and unhairing. N. KOTELNIKOV AND I. BASS. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, Nos. 10/11, 78; *Collegium* 1927, 492.—Green salted skins are tumbled intermittently in 3 changes of water in a drum for 3.5-4 hrs. Unhairing is carried out in the same drum by adding 2.5 lbs. Na_2S , 3.5 lbs. $CaCl_2$, 1.5 lbs. $Ca(OH)_2$ and 70 lbs. H_2O per 100 lbs. skin. The drum is rotated 15 min. and intermittently thereafter for 2.5-3 hrs. The liquor is drained off, the skins are tumbled in the empty drum for 10 min., and washed in running H_2O 20 min. All hair is said to be removed and the skins are little swollen. The quality of the resulting leather is said to be good. H. B. MERRILL

Contribution to the study of the pickling of hides. ENRICO SIMONCINI. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 383-6(1927).—A preliminary report on a series of expts. concerning the changes in the acid and salt retention of the hide in the pickling process by varying the vol., the acid and salt content of the soln. employed. G. S.

Determination of sulfato groups in chrome leather. HENRY B. MERRILL, J. G. NIEDERCORN AND ROLF QUARCK. *J. Am. Leather Chem. Assocn.* 23, 187-208(1928).—The pyridine digestion method (C. A. 21, 1027), wherein acid sulfate in leather is detd. before and after digestion with 4% aq. C_5H_5N , yields results that are much too low. The content of H_2SO_4 left in leather is (approx.) independent of time of digestion with pyridine, but this is due to the establishment of equil. between sulfate in soln. and sulfate in leather, and not to sepn. of protein-bound from Cr-bound acid. The % H_2SO_4 left in leather depends upon % originally present and upon concn. of SO_4 in soln. The % H_2SO_4 left in leather at $p_H = 4.5$ is no greater than at $p_H = 8.0$, with the same concn. of C_5H_5N , indicating that removal of SO_4 is a specific replacement by C_5H_5N and not by OH. The "diffusion-neutralization" method, wherein H_2SO_4 is detd. after the leather is suspended in H_2O maintained at $p_H = 5$ by titration with NaOH until equil. is attained, gives results for Cr-bound acid that are much nearer the truth. Absolute equil. is never attained, because slow hydrolysis of Cr-bound acid occurs. Results obtained are, therefore, always slightly low. Procedure: Soak 2 g. Cr leather in 100 cc. H_2O for 18 hrs. Agitate and titrate to $p_H = 5.2-5.4$ (methyl red) using 0.02 N NaOH at 15 min. intervals for 2 hrs., at 30 min. intervals for the rest of the day, and 4 times at intervals of 1 hr. the following day. Wash 1 hr. in running distd. water, and det. residual sulfate in the leather by the phosphate displacement method. H. B. MERRILL

Cheapening of chrome extracts. I. BASS AND M. BOYARSKII. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, Nos. 2/3, 44-5; *Collegium* 1927, 548-9.—The reduction of dichromate may be begun with cheap materials such as wood shavings

and completed with more expensive materials such as $\text{Na}_2\text{S}_2\text{O}_8$ or glucose. The initial reaction is so violent that the wood is completely oxidized to CO_2 and hence no undesirable by-products are left in the liquor, as would be left if the reduction were completed with shavings.

Utilization of waste chrome liquors. I. B. BASS. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, No. 7, 10-11; *Collegium* 1928, 39.—Part of the spent Cr liquor can be used in making up fresh stock liquor, part added to color baths and part to pickle liquors. The remainder can be evapd., the residue subjected to destructive distn. and a no. of valuable products recovered.

Salt stains in green salted pelts. A. SEREGIN. *Vestnik* (Organ of the All-Russian Leather Synd.) 1925, Nos. 10/11, 140-3; *Collegium* 1927, 541.—Adoption of a uniform procedure for salting calfskins is claimed to have reduced the no. of skins showing salt stains to 3-4% for summer stock and 7-8% for fall stock. Procedure: (1) every salt shipment is examd. in the lab.; (2) salt is screened to remove lumps; (3) salted skins are piled not over 25-30 deep; (4) skins are repiled and excess salt is shaken off after 7-10 days; (5) temp. is maintained at 10-12° C.

Red spots on green salted calfskins. ANON. *Vestnik* (Organ of the All-Russian Leather Synd.) 1925, Nos. 10/11, 143-5; *Collegium* 1927, 541-2.—Red spots noted in raw salted skins, which are coextensive with damaged spots in grain after finishing, are due to a proteolytic organism.

Lime analysis (in the tannery). M. SERGÉE AND S. BRESSLER. *Vestnik* (Organ of the All-Russian Leather Synd.) 1926, Nos. 8-9, 79 *et seq.*; *Collegium* 1928, 39.—The method of Proctor is recommended as the best of several investigated.

The Sicilian "agrocotto" in the leather industry. VITTORIO CASABURI. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 374-6(1928).—The possibility of using "agrocotto," i. e., concd lemon juices as a tanning material is discussed. The agrocotto is a liquid of yellowish brown color, contg. besides citric acid, albuminoid, gummy and pectin substances, sucrose and glucose. A sample analyzed had d_{25} 1.345, dry residue 60.5%, free acid (calcd. as citric acid) 47.25%, true citric acid 45.40%, reducing substances (calcd. as glucose) 11.10%, N content 0.3%. For tanning purposes the liquid must be neutralized with NaOH. The sample described above required 310 g. NaOH for neutralizing 1000 cc.

"Sea leather" and the capture of the sharks. GIOVANNI LUCCO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti, supplemento tecnico* 5, 195-203(1928); *Concneria* 35, No. 1008, Pt. Tec., 29-32(1928).—An account is given of the situation in the industry using the skins of sharks as a source of leather.

The examination of colloidal substances by means of optical methods. GIACINTO BALDRACCO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 5, 330-42(1927); *Concneria* 35, No. 1008, Pt. Tec., 24-9(1928).—A brief summary of recent important papers dealing with the examn. of tanning exts. and dermic substances by means of spectroscopic, fluoroscopic and polarimetric methods. The phenomena of double refraction and some phys. and chem. principles of colloidal behavior are discussed.

Gelatins of different origin as emulsifying agents (KERNOT, KNAGGS) 27. Solidification temperatures of fat mixtures (POVARNIN, ARBUSOV) 27. Varnishes, leather polishes (Brit. pat. 275,652) 26.

Tanning compositions. J. R. GEIGY A.-G. Brit. 276,014, Aug. 16, 1926. Salts of hydrofluosilicic acid are added to salts of synthetic tanning agents obtained by the condensation of aromatic sulfo acids and CH_2O .

Leather substitute. RESPRO, INC., AND R. K. ABBOTT. Brit. 276,392, April 7, 1926. A sheet of unwoven fabric of loose texture is impregnated with rubber or like compn. and then coated with a nitrocellulose compn. or the like; varnish, gums, wax, borax, soap and other substances may be used in the coating and solvents are preferably used which will affect the impregnating compn. first applied.

36—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Applied science in the service of the American rubber industry. F. KIRCHHOFF. *Kautschuk* 1928, 57-60; cf. C. A. 22, 2077.—A further review and description of important features and developments.

C. C. DAVIS

Progress in the chemistry, physics and technology of rubber and its most important compounding ingredients. F. KIRCHHOFF. *Kautschuk* 1928, 61-3.—Brief reviews in abstract form, with the original references. C. C. DAVIS

The development of the rubber industry in the last fifty years, with special reference to the German industry. FRIEDRICH DIETELMEIER. *Kautschuk* 1928, 68-73. C. C. DAVIS

Rubber research in the year 1927. MARIANNE PIECK. *Gummi-Ztg.* 42, 1632-3, 1690-2, 1743-4(1928); cf. C. A. 21, 2199.—Many original references accompany the review. C. C. DAVIS

Organic colors for use in rubber compounding. M. P. PARKER. *Rubber Age* (N. Y.) 23, 135-6(1928).—A description of the properties and uses of certain red, yellow, orange, green, blue and brown org. coloring ingredients. C. C. DAVIS

Patent review. C. BÖHM. *Kautschuk* 1928, 65-6; cf. C. A. 22, 2077.—Numerous patents of different countries on the production of latex, raw rubber, mixing, vulcanization and the manuf. of rubber goods are itemized, with their essential features. C. C. DAVIS

Rubber compounding practice. WEBSTER NORRIS. *India Rubber World* 78, No 1, 59-61; No. 2, 55-7(1928); cf. C. A. 22, 1251.—The properties and methods of testing ZnO, TiO₂, lithopone, Sb reds, Fe oxides, HgS, ultramarine blue, Cr green and various yellow pigments are reviewed. C. C. DAVIS

Open mill mixing vs. internal mixers. P. P. CRISP. *Rubber Age* (N. Y.) 23, 131-2(1928). C. C. DAVIS

Experiences with mixing-mill roll speeds, speed ratios and batch sizes. E. C. ZIMMERMAN. *Rubber Age* (N. Y.) 23, 144-5(1928). C. C. DAVIS

Power variables in milling and mixing rubber. P. S. SHOAF. *Rubber Age* (N. Y.) 23, 142-4(1928). C. C. DAVIS

Design of properly cooled rubber machinery. A. P. LEWIS. *Rubber Age* (N. Y.) 22, 533-4(1928). C. C. DAVIS

Factors in supply and use of cooling water (in the manufacture of rubber). P. S. SHOAF. *Rubber Age* (N. Y.) 22, 531-2(1928). C. C. DAVIS

Chilled iron rolls in the rubber industry. N. W. PICKERING. *Rubber Age* (N. Y.) 23, 137-41(1928). C. C. DAVIS

Gutta-percha as a dielectric material. ST. REINER. *Kautschuk* 1928, 55-6; cf. C. A. 21, 1567, 3767.—A review of present developments. C. C. DAVIS

Rubber jar rings for preserving. H. SERGER. *Konservenindustrie* 1928, 129; *Gummi-Ztg.* 42, 1480-1(1928).—Specifications for the quality and behavior of rings are described. C. C. DAVIS

An experiment on heavy tapping on Tjiseroe Estate. Investigation of the rubber and some remarks on the composition of the latex. W. SPOON. *Arch. Rubbercultuur* 12, 207-16(1928). (In English 217-9).—Heavy tapping in the case cited resulted in a latex with low rubber content and rubber which vulcanized rapidly and had a low viscosity compared with rubber obtained under normal conditions on the same estate. C. C. DAVIS

Effect of heat on raw rubber. C. R. PARK, C. M. CARSON AND L. B. SEBRELL. *Ind. Eng. Chem.* 20, 478-84(1928).—Various types of raw rubber were heated in steam at 158° in the absence of air to det. the influence of such treatment on the plasticity and chem. properties before vulcanization and on the quality after vulcanization, with and without an accelerator. Under these conditions the plasticity, the acetone ext., the acid no. and the rate of vulcanization increased, while the total N decreased. An increase in acetone ext. may result from partial depolymerization of the rubber or from hydrolysis of proteins. An increase in acid no. probably results from hydrolysis of fatty acid esters and proteins. The total N decreases because of the evolution of volatile N compds. In comparative vulcanization tests before and after heat treatment, the rate of vulcanization was increased with some accelerators but not with others by preheating the rubber, and the stress-strain curve became more convex toward the strain axis, i. e., a tendency toward softer products, a difference which persisted after aging. Preheating rubber did not impair the aging of its vulcanizates. To det. why heating rubber increases its rate of vulcanization, protein decomp. products were added to different mixts., and also the water ext. of heated rubber was analyzed. The most active products in mixts. contg. ordinary accelerators were the least complex compds., e. g., glycine, whereas in unaccelerated mixts. those with a strongly basic group and no acid group were most active. The aq. ext. of acetone-extd. rubber contained no substance which reduced Fehling soln., no tannin and no free amines, but did contain saponin, proteins, alkaloids and other N bases. Fractionated products from the

alc. extn. of rubber (previously extd. with acetone and water) were also tested. These compds., though not identified exactly, included a compd. of the approx. compn., $C_6H_7O_2N$, monoamino acids, diamino acids and dicarboxylic acids. The alc. ext. activated accelerated mixts. The results show that only the simplest amino acids have any effect in unaccelerated mixts., that amines and N bases activate accelerated mixts. and that alkaloids have certain accelerating and activating effects. All 3 types are probably present in rubber, and the alterations brought about by heating rubber are attributable at least in part to changes in these non-rubber components. C. C. D.

Experiments on stretching raw rubber. P. ROSBAUD AND E. SCHMID. *Z. tech. Physik* 9, 98-106(1928).—The stretching of raw rubber (smoked sheet) was examd. in a Schopper app. between 5 and 100 kg. stress and in a Polanyi wire-stretching app. The sheet thickness was 2.0 to 2.5 mm., the length of the exptl. strips 6 mm. From expts. on the influence of rate of stretching (0.025% per sec. up to 50% per sec.) on the stress-strain curve, it was found that the tensile strength increased from 12 to 317 g. per sq. mm., while max. elongation was influenced less (360 up to 1280%). One expt. in which stretching periods were alternated with rest periods of several hrs. (total duration of expt. 350 hrs.) proved that the rubber flows in the rest periods, and that with continued stretching small stresses of the order of 10 g. per sq. mm. are sufficient to bring about rupture. At temps. from -20° to $+80^\circ$, the tensile strength decreases for rapid or slow stretching rapidly with increasing temp.: for a 14% per sec. rate, it drops from 3100 g. per sq. mm. (5900 at -185°) at -20° to 24 g. per sq. mm. at $+80^\circ$. The max. elongation increases slightly with temp. (1000% to 2000% roughly); at very low temps. (liquid air) it is negligible, and at -80° it is about 50%. At the more elevated temps. especially from 60° on local contractions of the rubber occur, which on continued stretching spread all over the strip. Polanyi's observations of increased strength at -185° after preliminary stretching at a higher temp. were confirmed. The results are represented in a space diagram. tensile strength vs rate of stretching vs. temp.

B. J. C. VAN DER HORVEN

"Normal" aging of compounded rubber. R. H. MCKEE AND H. A. DEFEW. *Ind. Eng. Chem.* 20, 484-91(1928).—Nine widely different types of cured rubber mixts. were aged for 4 yrs. (1) outdoors protected from direct light but subject to normal variation of temp. and humidity (-17.8 to 37.8° and 40-100% humidity), (2) indoors in darkness (10 - 29.4° and 25-100% humidity); (3) in darkness in a continuous current of dried air, and (4) in darkness in a continuous current of humidified air. The mixts. stored in a damp atm. showed "softer" stress-strain curves than the same mixts. kept dry. Judged by tensile strength, overcured mixts. deteriorated more rapidly in a dry atm. than in a wet atm., whereas the reverse was true of undercured mixts. Judged by gain in wt., underground mixts. oxidized at about the same rate whether the atm. was wet or dry, whereas overcured mixts. oxidized more rapidly in a dry atm. than in a wet atm. The change in wt. of mixts. kept dry proved to be a good criterion of their deterioration, each 1% gain (based on the rubber) corresponding to a decrease of about 50% in reinforcing properties. The mixts. were then aged under strains of 50 and 20% outdoors in sunlight and indoors in darkness. In sunlight, overcured mixts. became surface-checked sooner than the corresponding undercured mixts., whereas in darkness the reverse was the case. The effect was, however, confined to the surface. Paraffin and Zn oxide retarded this action of light, and there is probably a close relation between the protection of paint and of rubber from deterioration by light. When the uncured mixts. were stored, their rate of vulcanization became notably slower, perhaps because of oxidation of S to SO_2 and H_2SO_4 . Some of the uncured mixts. became tacky.

C. C. DAVIS

Diffusion experiments with rubber solutions. D. KRÜGER. *Gummi-Ztg.* 42, 1471 4(1928).—Acetone extd. and unextd. samples of various rubbers and balata were swollen in solvents in darkness and with agitation, and were then centrifuged. With the exception of balata, soln. was practically complete. There was no change in viscosity after the solns. were kept for 2 weeks (cf. van Rossem, *Kolloidchem. Beih.* 10, 83(1918)). Diffusion coeffs. of rubber-hexane, rubber- Et_2O and rubber- CaH_2 were detd. by the Oeholm method (*Z. phys. Chem.* 50, 309(1905)) and the Scheffer-Kawalki tables (*Ann. Physik* [3] 52, 185(1894)), 4 superimposed strata being measured. The results are tabulated in detail. The influence of temp. was very slight. Unlike the case of a chem. homogeneous substance with uniform particles, the diffusion const. of rubber increased from the bottom to the uppermost layer. Highly masticated rubber, in spite of its relatively concd. solns., showed smaller differences among the 4 strata than did unmilled rubber. The rubber content of the second layer deviated so much from the Fick law that the Scheffer-Kawalki tables were inapplicable. The variation of the

diffusion coeff. with increasing concn. and with decreasing time of diffusion might have resulted from (1) a mixt. of chem. different substances of different mol. wt., not, however, by the resins, or (2) different degrees of aggregation of the same substance. The data obtained are not adequate for a mathematical analysis of the variations of the diffusion coeffs. There were indications that a readily diffusible component was distributed uniformly throughout the 4 strata, while a difficultly diffusible component remained for the most part in the lowest layer. The diffusion coeff. depends upon the concn., and furthermore different results were obtained depending upon whether the soln. was allowed to diffuse immediately after prepn. or was let stand. Diffusion coeffs. are therefore not characteristic constns. but mean values which depend upon the relative quantities of small and large particles in the individual layers. The nature of the solvent also influenced the coeff., probably because different liquids differ in their ability to disaggregate the rubber to simpler units.

C. C. DAVIS

Tensile properties of soft rubber compounds at temperatures ranging from -70° to $+147^{\circ}$. R. F. TENER, S. S. KINGSBURY AND W. L. HOLT. *Bur. Standards, Tech. Paper No. 364*, 367-77 (1928).—Elongation and tensile strength tests of 6 widely different types of cured rubber mixts. at 147° , 130° , 100° , 70° , 40° , 23° , 10° , -10° , -30° , -50° , -60° and -70° show that these properties vary greatly with variation in the temp. In all cases the elongation was a max. around 100° and diminished both above and below this range. From -50° down, it diminished very rapidly and at -70° the mixts. were rigid and inelastic. The tensile strengths were a max. at -70° and diminished continuously up to 147° , at which point there remained almost no strength. The various rubber mixts. behaved essentially in the same way and differences resulting from compounding ingredients were in degree rather than in kind. The results are shown graphically, including the stress-strain curves of the various mixts. The results are of great importance in connection with the design of products contg. rubber which are to be used under very cold or hot conditions. Cf. van Rossem and van der Weijden, *C. A.* 22, 1059.

C. C. DAVIS

Prevention of scorching of rubber mixtures during the mixing operation. WERNER ESCH. *Kautschuk* 1928, 51-5.— PbO_2 is very effective in preventing the scorching of various types of rubber mixts. accelerated with tetramethylthiuram disulfide. About 0.25% (based on the rubber) gives good results. Pb oleate and golden Sb also have a favorable influence. Such addns. also reduce the tendency to scorch in mixts. accelerated otherwise, e. g., by mercaptobenzothiazole and diphenylguanidine. C. C. D.

The absorption of hydrogen by rubber at elevated pressures and the behavior of the rubber after the pressure is lowered. G. TAMMANN AND K. BOCHOW. *Z. anorg. allgem. Chem.* 168, 322-4 (1928).—When rubber, Zn and dil. H_2SO_4 are subjected to high pressures, e. g., 550 or 1150 kg. per sq. cm., the rubber becomes satd. with H_2 , so much being absorbed that when the pressure is released the rubber is porous, and some time afterwards is still several times its original vol.

C. C. DAVIS

Some features of sulfur in rubber manufacture. D. F. TWISS. *Trans. Inst. Rubber Industry* 3, 386-400 (1928).—A crit. review of the properties of S and its use in rubber, including the different allotropic forms of S and their properties, the soly. of S in rubber, "blooming," the phys. effects on rubber induced by S, and possible explanations of these effects. Influences which favor internal crystn. of S in rubber inhibit blooming and the latter may be minimized by (1) cool conditions during milling to prevent complete dissoln. of S, the undissolved particles acting as nuclei for internal crystn.; (2) not too fine S; (3) a high enough proportion of S to furnish a residue of undissolved S; (4) the addn. of a relatively insol. cryst. substance isomorphous with rhombic S to act as permanent nuclei for crystn., e. g., Se, and (5) the use of S flowers contg. insol. S. Measurements by various investigators of the vapor pressure of S from 125° to 225° do not agree closely. A vapor pressure-temp. curve constructed from calcs. based on the Ramsay and Young law and the vapor pressure of Hg gave results which agree satisfactorily with the best exptl. data and are continuous over the range of temp. From this curve and with the assumption that below 300° S vapor is octatomic, the max. wt. of S which can vaporize into a given vol. of gas at different temps. can be calcd. A crit. review of theories which assume that S_8 or S_6 is the form which induces vulcanization shows that these theories are inadequate to explain the phenomena (cf. T., C. A. 11, 2973; T. and Thomas, C. A. 15, 1421), and new exptl. evidence is given to support this view. The earlier evidence in conjunction with the new expts. leads to certain important conclusions. S_8 is not appreciably more active than S_6 as a vulcanizing agent, and in the expts. described the rates of vulcanization were substantially the same. At ordinary vulcanization temps. S_8 changes very rapidly into S_6 . This tendency is so great that a mixt. of rubber, S_8 , ultra-accelerator and ZnO in a solvent

forms a gel nearly as soon as a similar mixt. contg. S_λ in place of S_μ . The regularity of the increase in the rate of vulcanization with increase of temp. indicates that between 60° and 188° the increasing proportion of S_μ and S_τ relative to S_λ has no marked accelerating action on the rate of vulcanization. This latter fact also controverts the theory of L. E. Weber (*Chemistry of Rubber Manufacture* p. 88) that only S_λ mols. bring about vulcanization. Evidence in general shows that whatever allotropic forms may be present in equil. in S under normal conditions, their activity toward rubber is practically the same. Evidence against the Dannenberg theory of vulcanization (cf. C. A. 21, 3764) is very great and exptl. evidence is given to show that the theories of Dannenberg (C. A. 21, 3764) and of Scholz (C. A. 21, 2399) are extremely improbable. A mixt. of rubber with 10% S_μ shows no tendency to vulcanize. Vulcanization proceeds at substantially the same rate with S_λ and S_μ in a given mixt. S_μ cannot exist under vulcanizing conditions, for it is converted at 120° to S_λ and S_μ is not formed from S_λ to any appreciable degree below 170°. If combined S consisted solely of S_μ , treatment of vulcanized rubber with hot alkalis would remove combined S. The active, unstable form of S in the Peachy process is probably also formed when a rubber-S mixt. is exposed to sunlight or ultra-violet light, and this active form accounts for vulcanization under these conditions. Evidence is offered in support of the rubber sulfide reinforcement theory of T. (cf. C. A. 19, 1964). C black changes the course of the stress-strain curve of a cured rubber-S mixt. in the same direction and in the same way as an increase in the state of cure, but a greater change can be brought about by C black than by longer vulcanization without an extreme overcure. In this connection a comparison of stress-strain curves of a rubber-S mixt. contg. C black and the same mixt. without C black but cured to higher states indicates that an ingredient like C black alters the phys. condition of the rubber in the same way as does further vulcanization but to a greater extent than is possible without undesirable effects. Therefore C black reinforces in the same manner as the curing process within a certain range of cure. Expts by Bierer and Davis (C. A. 20, 2092) which showed that the proper use of Se improves the resistance to abrasion of rubber mixts. contg. C black could not be confirmed. A general discussion follows the paper.

C. C. DAVIS

Specifications for the construction of rubber goods and service requirements. WERNER ESCH. *Kautschuk* 1927, 75-83; cf. Bierer and Davis, C. A. 22, 883.—A discussion of various aspects of the subject. Comparative tests are tabulated of the resistance to abrasion on 2 different abrasion machines (N. J. Zinc Co. and B. F. Goodrich Co.) of mixts. contg. C black with and without Se. The resistance to abrasion depended upon the quantity of accelerator and of S, upon the presence or absence of Se and upon the state of cure. Near the optimum cure the 2 methods gave concordant results, but when mixts. were overcured, or undercured discordant results between the 2 methods were obtained. Se increased notably the resistance to abrasion (cf. Bierer and Davis, C. A. 20, 2092; Twiss, *Trans. Inst. Rubber Industry* 3, 386 (1928)) and this superiority of the mixts. contg. Se was still manifest after aging in air at 70°. The improvement through Se illustrates the importance of non-rubber components in detg. the quality of rubber goods and the fallacy of specifying the chem. compn. of rubber goods as a criterion of quality. In further abrasion tests, mixts. in which rubber was partially replaced by a greater proportion of reclaim resisted abrasion better than the corresponding mixts. contg. no reclaim, and the addn. of Se increased the resistance still more. Other data show the quality of mixts. suitable for soles and the superiority of C black over ZnO in mixts. designed to resist abrasion.

C. C. DAVIS

Aldol- α -naphthylamine. H. KLOPSTOCK. *Kautschuk* 1928, 64.—Polemical (cf. Esch, C. A. 22, 2078).

C. C. DAVIS

Aldol- α -naphthylamine. WERNER ESCH. *Kautschuk* 1928, 64.—A reply (cf. preceding abstr.).

C. C. DAVIS

Recent scientific advances in connection with guayule. DAVID SPENCE. *Rubber Age* (N. Y.) 23, 133-4 (1928); cf. C. A. 20, 3841; 22, 333.—Further biochem. and chem. research on guayule is described. Most important is the discovery that rubber in guayule shrub does not exist in the cells in the form in which it is recovered but is present chiefly as a colloidal suspension in the plant juices. Within the cells the suspended globules are in rapid Brownian movement and their agglomeration and subsequent coagulation by ordinary reagents can be followed microscopically. The shrub contains about 10% water-sol. substances (tannins, carbohydrates, N substances, etc.), 10-15% substances sol. in water after hydrolysis (pectins, proteins, etc.), besides cellulose and resins. By fermentation of the carbohydrates into sugars, org. acids and CO_2 , and by putrefactive decompn. of the protein, the acetone ext. of guayule rubber can be reduced 60-70% and the vulcanizing properties improved. Only a small part of the acetone-sol. sub-

stances is resinous, and by retting the shrub, the acetone ext. can be reduced from 25-30% to 9-10%, with consequent improvement in properties when vulcanized. The com. product is termed *Ampar rubber*.

C. C. DAVIS

X-ray investigations of rubber and related substances. P. ROSBAUD AND E. A. HAUSER. *Z. Elektrochem. angew. physik. Chem.* 33, 511-13(1927).—This is a recapitulation of results obtained by this method. "Frozen" rubber, even unstretched, shows distinct Debye-Sherrer rings, which disappear when the rubber is thawed. When stretched, it gives a point diagram. Balata and gutta percha are very similar to frozen rubber. At higher temps. they can be stretched and then give typical fiber diagrams of identical character. At high tension, a point diagram is produced, giving a characteristic interval of 9.35 Å. U. in agreement with Clark's (*C. A.* 20, 3837) value of c . His values $a = b = 5.40$ Å. U. are not substantiated; but the unit cell is certainly small, contg. between 2 and 8 mols. Racked rubber is analogous to stretched balata and gutta percha, giving a very distinct x-ray diagram and indicating extensive orientation of the particles. Rubber fractionated by Pummerer's method shows clear point diagrams in the sol, gel and total fractions, whether stretched or cold-vulcanized.

A. W. KENNEY

C black from mixtures of C_2H_2 and other hydrocarbons (U. S. pat. 1,669,636) 18.
C black (U. S. pat. 1,669,618) 18.

Treating latex. A. BIDDLE. *Brit.* 277,194, Nov. 10, 1926. See *Can.* 267,166 (*C. A.* 21, 1031).

Concentrating rubber latex and similar latices. A. PETERSON. U. S. 1,670,900, May 22. A thin layer of latex is spread on a moving surface such as that of the inner surface of a rotating drum and moisture is removed from the layer without coagulation, the latex thus treated is returned to the bulk supply and this operation is continued until the bulk of material under treatment has reached the desired concn. An app. is described.

Containers (lined with unvulcanized rubber) for shipping rubber latex. E. HOPKINSON. *Brit.* 277,074, June 7, 1926.

Rubber articles from latex. S. D. SUTTON. U. S. 1,670,598, May 22. In forming gloves, bulbs or other articles, liquid latex is applied to and dried upon a former or mold, thickened or concd. latex is then applied to the surface of the dried latex, and the material is heated so that the outer skin or surface only of the thick or concd. latex is dried; the article is then subjected to the action of C_2H_2 or other suitable rubber solvent or softening agent to produce a superficial effect or design.

Rubber composition. F. C. DYCHER-TEAGUE. U. S. 1,670,599, May 22. A reinforcing agent and filler for rubber consists of C produced by reaction of CO in the presence of Ni and Fe powder or other metal catalyst, together with the catalyst on which it is deposited. Cf. *C. A.* 22, 1498.

Aging rubber. H. W. ELLEY (to E. I. DUPONT DE NEMOURS & Co.). *Brit.* 276,968, Aug. 31, 1926. Aging of rubber is improved by treating it with secondary aromatic amines such as phenyl- α -naphthylamine, ditolylamine, dixylylamine and tolyl- α -naphthylamine in soln. or vapor form, either before or after vulcanizing.

Coating metal surfaces with rubber. DUNLOP RUBBER CO., LTD., A. LAKEMAN AND F. C. MACABE. *Brit.* 276,705, April 29, 1926. Gutters, structural iron work, automobile bodies or other surfaces are covered with a vulcanized compn. about 75% of which may be formed of tire scrap and which, in various mixts. and proportions, may also include uncured rubber scrap, S, mineral oil, "brown substitute," PbO, lime, whitening, stearic acid and $MgCO_3$.

Coloring rubber. I. G. FARBERNIND. A.-G. *Brit.* 277,034, Sept. 4, 1926. Insol. metal salts of triarylmethane dyes having a sulfo group in o -position to the methane C atom, or of a sulfonic acid or carboxylic acid of an anthraquinone deriv. having at least one free or substituted amino group, are mixed with rubber before vulcanizing. Several examples are given.

"Non-skid" patterns on crepe rubber surfaces. ST. HELENS CABLE & RUBBER CO., LTD. AND H. C. HARRISON. *Brit.* 276,763, June 17, 1926. A frame of woven wire or the like may be heated and pressed into the rubber or the rubber itself may be heated and the frame pressed in cold. Various details are given.

Planographic printing surfaces formed of rubber. W. C. HUEBNER. U. S. 1,669,416, May 15.

Condensation system for recovery of volatile solvents from rubber, etc. A. BORCLER. *Brit.* 276,694, Aug. 30, 1926.

Regenerating waste rubber. SYNDICAT FRANCO-NEERLANDAIS. Brit. 276,626, Aug. 25, 1926. Material of tire casings or the like is impregnated with oil obtained by distg. waste rubber, further treated with HCl to polymerize the oil and swell the material, washed with water, slitted and sepd. from the hard core and then further treated to effect regeneration.

Apparatus for making vulcanized fiber sheets. G. W. TEMPLE. U. S. 1,669,429, May 15.

Rubber vulcanization accelerators. C. M. CARSON (TO GOODYEAR TIRE & RUBBER Co.). Brit. 277,338, Sept. 7, 1926. Mercaptobenzothiazyl disulfide or other sulfides of the thiophenols, aminothiophenols, thiazoles, etc. are prepd. by treating the mercaptan or its salts with S chloride. The products may be used as accelerators alone or with amino compds.

Vulcanizing rubber tubes and other articles. L. A. LAURSEN. Brit. 276,430-1, May 27, 1926. Mech. features.

Vulcanizing rubber. C. O. NORTH and C. W. CHRISTENSEN. U. S. 1,670,312, May 22. The reaction product of aniline and crotonaldehyde is used as an accelerator.

Vulcanizing rubber. E. I. DUPONT DE NEMOURS & Co. Brit. 276,435, May 28, 1926. Accelerators are prepd. from an aldehyde, an amine and CS₂ or from an anhydroaldehyde amine and CS₂ or from an aldehyde and the substituted NH₄ salt of a mono-substituted dithiocarbonic acid. The mol. proportions of aldehyde, amine and CS₂ may be 1:1:1, 2:1:1, 2:2:1 or 4:2:1. Aldehydes such as CH₂O, AcH, propionaldehyde, butyraldehyde or benzaldehyde may be used and among the suitable amines are: methylamine, ethylamine, hydroxyethylamine, *n*- or iso-propylamine, *n*- or iso-butylamine, aniline or *o*- or *p*-toluidine. Several detailed examples are given.

Vulcanized pitch. W. SAVAGE. U. S. 1,669,490, May 15. A soft rubber-like compn. adapted for use on roads, tanks or roofs, etc., is formed from fatty acid "still bottoms" residue vulcanized with S and an accelerator such as PhNH₂, thiocarbanilide, ZnO or MgO. U. S. 1,669,491 specifies a vulcanizing agent contg. an active alk. substance such as basic Mg carbonate.

CHEMICAL ABSTRACTS

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No. 14

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Improved laboratory condenser. E. S. WEST. Washington Univ. *Ind. Eng. Chem.* 20, 737(1928). F. J. CRANE

A new chemical laboratory fume duct system. F. C. VILBRANDT AND J. T. DOBINS. Univ. of North Carolina. *J. Chem. Education* 5, No. 5, 589-94(1928). F. H.

Autoclaves in the chemical industry. A. LINK. *Z. Farben-Ind.* 20, 14-6(1928).—A discussion of materials suitable for the construction of autoclaves for different purposes FREDERICK C. HAHN

A new adiabatic calorimeter for high temperatures. WALTER KANGRO. *Z. Elektrochem.* 34, 253-6(1928).—The calorimeter is built inside an electric oven. A regulating device operated by a Pt resistance thermometer inside the calorimeter enables the oven to follow instantaneously any change in the temp. It is thus possible to carry on measurements at 800-900°. A. L. HENNE

An inexpensive desiccator. J. E. DAY AND J. W. WALKER. Ohio State Univ. *J. Chem. Education* 5, No. 5, 597(1928). E. H.

Universal extraction apparatus. KARL ZIFF. *Biochem. Z.* 193, 207-10(1928)—This app is suitable for the extn. of solid matter with liquids of low or high sp. gr. or for the extn. of fluids with similar extractants (ether or chloroform). S. M.

Ionocolorimeter, an apparatus for measuring the ionic acidity of solutions. M. CAILLE. *Bull. soc. chim. biol.* 10, 590-601(1928).—The ionocolorimeter is an arrangement of cylinders, cells and a mirror designed particularly for estg. color in the Clark and Lubs detns. of p_H . The instrument can also be used as an ordinary colorimeter. L. W. RIGGS

Two new rotating furnaces for the laboratory. V. TAFEL. *Metall Erz* 25, 158-60(1928)—Details are given for constructing two gas-fired, rotating furnaces, the tube of one being 37 cm. long and of the other 2.2 m. J. BALOZIAN

New vacuum stopcock. A. P. H. TRIVELLI. *Chemistry & Industry* 47, 496(1928).—A Hg-sealed vertical stopcock is obtained by making the stopper hollow and open at the top and bottom. For greater security a Hg ring may be put about the middle of the stopcock. Also in *J. Optical Soc. Am.* 16, 367-9(1928). T. S. CARSWELL

Guarantees of capacity for condenser-water coolers. W. OTTE. *Arch. Wärmewirt.* 9, 1-4(1928).—Tests of cooling towers should be confined strictly to the towers. Curves for correcting the test results to the conditions of the guarantee are given (but not explained). ERNEST W. THIELE

Devices for increasing accuracy in weighing. F. C. GUTHRIE. *Nature* 121, 745-6(1928).—The rider should be supported on one point instead of resting on the beam by contact at 2 or more places. The inconsistency noticeable when working to the limit of sensitiveness of the balance is due to the lateral shift of the whole beam to left or right each time the beam is released from its fixed supports. This gives a perceptible shift in the zero when observing swings on the fixed scale at the base of the main pillar. To avoid parallax in reading the position of the rider a paper scale can be pasted off to the glass front or back of the balance case. It is useful to have a simple device by means of which a puff of air can be obtained on the under side of one pan; the amplitude of the swingings is thus easily controlled. A. L. HENNE

Frederking apparatus. A. BUNTROCK. *Z. Farben-Ind.* 20, 16-8(1928).—A critical discussion of this apparatus in which superheated water is used as a source of heat for chem. reactions. FREDERICK C. HAHN

A new apparatus for automatically recording the amount of combustible vapors in the air. V. EIBEL. *Zentr. Gewerbehyg. Unfallverhütung*, 14, 291-3(1927); *Bull. Hyg.* 1, 236(1928).—The app. is based upon the measurement of the difference in the viscosity of the gases in comparison with their sp. wts. It can be arranged to sound a warning. GEORGE R. GREENBANK

Modifications of the apparatus of Desgrez for the total carbon with reference to alkalimetric microestimation. L. LESCOEUR AND T. TUROBINSKI. *Bull. soc. chim. biol.* 10, 606-16(1928); cf. Desgrez and Vivario, *C. A.* 19, 1837.—The principal modifications consist in the use of Pyrex app., the substitution of an air condenser for a water-circulating cooling app. and the addn. of Ag_2CrOH to the $\text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4$ oxidizing mixt. L. W. RIGGS

A photoelectric turbidity meter. L. W. HAASE AND HEINRICH THIELE. *Gas u. Wasserfach* 71, 414-7(1928)—The water, of which the turbidity is to be measured, is placed in a cylinder 300 mm. long and 35 mm. in diam., provided with a Se cell at one end and a flashlight lamp at the other. A storage battery or step-down transformer may be used to supply the lamp, which is maintained at a const. brightness by maintaining a const. current. The change of the resistance of the Se cell is measured by means of a slide-wire bridge. Methods of operation are described which eliminate the usual errors due to the slow recovery of the cell after illumination. The cell is calibrated with definite percentages of SiO_2 in suspension. Typical calibration curves are shown. R. W. RYAN

A new electrically heated apparatus for fat and oil Soxhlet extractions. F. GOGOLEV. *Masloboino-Zhirovoye Delo* 1928, No. 3, 18-9.—The usual extn. app. heated with elec. carbon bulbs has a jacket for water circulation to prevent the overheating of the elec. part of the equipment. A Liebig condenser keeps the water at low temp. The flasks as well as the box contg. the bulbs are shielded by asbestos boards to keep a uniform temp. A. claims economy of elec. current and very uniform temp. A. A. BOEHTLINGK

Photoelectric photometers. C. J. YOUNG (to General Elec. Co.). U. S. 1,672,671-2, June 5.

Psychrometer. E. J. CARROLL and G. W. JOHNSON (to American Laundry Machinery Co.). U. S. 1,671,103, May 29.

Pyrometer of the expansion rod type. R. C. PAIRMAN. U. S. 1,672,229, June 5.

Thermometer and protecting frame. M. E. MOELLER (to A. E. Moeller Co.). U. S. 1,672,851, June 5.

Wet and dry bulb thermometer apparatus for determining humidity. R. LANQUETIN. Brit. 278,380, Oct. 2, 1926.

Thermometer for automobile radiators, etc. W. J. STALLAN and A. W. FREESTONE. Brit. 277,906, May 17, 1927. Structural features.

Torsionometer. SIEMENS BROS. & Co., LTD. AND F. TURNER. Brit. 277,416, June 15, 1926.

Air filter. W. E. SNAMAN. U. S. 1,671,383, May 29.

Filter for gasoline or other liquids. J. ZWICKY. Brit. 278,099, July 6, 1926. A filter is described which is suitable for attachment to a hose.

Filter for oils, etc. L. W. WILLIAMS (to Central Union Trust Co. of N. Y.). U. S. 1,671,958, May 29.

Rotary filter (with radial filtering leaves) for filtering liquids. H. A. VALLEZ. Brit. 277,546, Feb. 1, 1927.

Endless travelling band strainer or filter for liquids. R. A. BLAKEBOROUGH, H. TART and J. LINDSAY. Brit. 278,175, Sept. 29, 1926.

Röntgen-ray apparatus. SIEMENS-REINIGER-VEIFA GES. FÜR MEDIZINISCHE TECHNIK. Brit. 277,945, Sept. 25, 1926.

X-ray anodes. E. G. GILSON (to General Electric Co.). U. S. 1,671,953, May 29. One end of a metal stem which may be formed of Mo or W is surrounded with refractory material such as W powder and the latter is subjected simultaneously to heat and pressure to effect sintering.

* **X-ray tube shield.** A. F. PIEPER. U. S. 1,672,423, June 5. Mech. features.

Mercury condenser filled with sponges. E. K. PETERS. U. S. 1,672,499, June 5.

Acetylene generator. P. DORSEY (to Imperial Brass Mfg. Co.). U. S. 1,672,606, June 5.

Acetylene generator of the drip-feed type. J. DUNGAVEL. Brit. 278,414, July 1, 1926.

Carbide-feed control for acetylene generators. T. J. SULLIVAN. U. S. 1,671,751, May 29.

Apparatus for aerating liquids in bulk. H. SILBERBERG. Brit. 277,638, Sept. 20, 1926.

Mixing and emulsifying apparatus for treating paints, foods or other substances. J. MCGOUGAN and J. HUNTER. U. S. 1,671,868, May 29.

Apparatus for distilling tars and oils. W. RUNGE (to International Combustion Engineering Corp.). Brit. 277,952, Sept. 21, 1926.

Heat-exchange apparatus. W. LONSDALE (to Foster Wheeler Corp.). U. S. 1,672,850, June 5.

Heat-exchange apparatus. G. CAHILL (to Winchester Repeating Arms Co.). U. S. 1,672,708, June 5.

Heat-transfer apparatus adapted for use with water, steam, etc. J. E. ERKANBRACK. U. S. 1,671,631, May 29.

Heat-exchange apparatus for generating steam or for other purposes. W. D. LA MONT and A. F. ERNST (to La Mont Corp.). Brit. 278,704, Oct 7, 1926.

Closed evaporating apparatus with internal heating tube systems. H. HILLIER. Brit. 278,075 and 278,299, June 29, 1926.

Safety gas valve. I. L. SAUVEY and S. DE FRANCE. U. S. 1,672,504, June 5.

Gas cooler and purifier (with fixed and rotating disks arranged in pairs). RICHARDSON, WESTGARTH & CO., LTD. AND F. G. INGLIS. Brit. 278,118, July 21, 1926.

Portable apparatus for testing gases. R. E. TERHUNE. U. S. 1,671,795, May 29.

Apparatus for removing gases from liquids. L. D. MILLS (to Merrill Co.). U. S. 1,671,601, May 29.

Vertical gas washer with baffle disks on an endless chain. E. L. PRASE. Brit. 278,105, July 7, 1926.

Apparatus for desulfurizing gases by suspended iron oxide or hydroxide. E. RAFFLOER (one-half to W. E. Leuchtenberg). U. S. 1,672,778, June 5.

Device for supplying nitrogen or other inert gases to oil-filled transformers or similar apparatus. M. E. SKINNER (to Westinghouse Elec. & Mfg. Co.). U. S. 1,671,492, May 29.

Volumetric displacement apparatus for controlling the supply of gas for chlorinating water or similar processes. B. BRAMWELL. Brit. 277,869, March 16, 1927.

Apparatus and method for testing the tensile strength of gas mantles and similar fragile articles. J. T. ROBIN. U. S. 1,672,077, June 5.

Apparatus for testing the hardness of materials. C. H. WILSON. Brit. 277,517, Oct. 15, 1926.

Apparatus (with a pivoted pendulum hammer) for testing hardness of materials. E. VON LEESEN. Brit. 277,855, Jan. 17, 1927.

Electrically heated bright annealing furnace. AKT.-GES. BROWN, BOVERI, ET C^{IE}. Brit. 277,379, Sept. 10, 1926.

Furnace recuperator assembly. J. LUNDBORG (to Surface Combustion Co.). U. S. 1,672,864, June 5.

Tunnel annealing-furnace with flared burner ports in the floor and side walls. R. SCHUBERT and C. PLETSCHE. Brit. 277,541, Jan. 26, 1927.

Firing system for muffle furnaces. W. J. HARRIS, JR. (to Surface Combustion Co.). U. S. 1,672,862, June 5.

Regenerative air heaters for furnaces. B. LJUNGSTRÖM and B. A. LJUNGSTRÖM. Brit. 278,396-7, April 12, 1926.

Apparatus for casting solutions of celluloid or other materials into sheets. E. R. ARMSTRONG (to E. I. duPont de Nemours & Co.). U. S. 1,672,403, June 5. The material is spread on a continuous sheet of electrolytically deposited Ni at least 0.01 in. thick. This layer of Ni may be formed on a cylindrical cathode.

Electric discharge device (rectifier). F. MEYER and H. J. SPANNER. Brit. 277,364, Sept. 9, 1926. A rectifier of the general type described in Brit. 275,552 (C. A. 22, 2084) has an incandescent cathode comprising a compd. of an alkali or alk. earth metal with an amphoteric oxide such as a nickelite, cobaltite or aluminate or zirconiate, a filling of a gas other than an inert gas, and highly absorbent bodies such as activated C, charged with gas, or materials such as azides of alkali or alk. earth metals capable of evolving H, N or other gas or metal vapors to prevent a decrease in gas pressure due to overloading.

Electric discharge tubes. J. DEMOULIN. Brit. 277,739, June 18, 1926. Electrodes connected in parallel comprise a spirally wound plate of metal such as W or Mo which are freed from occluded gases prior to mounting in a luminous tube by passing a discharge between them in a sep. tube filled with N until; after repeated replacement of the N, the spectrum of the N shows that the electrodes no longer liberate gases. K is placed so as to absorb gases such as NH₃ and N oxides formed by reaction between the N and gases liberated from the electrodes. The electrodes are mounted in tubes filled with N, subjected to an elec. discharge, and O and H are absorbed by an auxiliary electrode of Pd. The N is then replaced by Ne or He.

- Electric cut-out for stills or other apparatus.** L. F. BOSS. U. S. 1,672,800, June 5.
- Apparatus for separating benzene and water or other liquids of different specific gravities.** W. LINNEMANN, JR. U. S. 1,671,115, May 29.
- Degreasing metal articles, etc., with trichloroethylene or other volatile solvents.** J. SAVAGE. Brit. 278,061, June 23, 1926. An app is described.
- Apparatus for drying paper or other materials.** S. A. STAEGE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,671,493, May 29.
- Whistling alarm or signal device operated by the flow of gas to burners.** A. GOODSTONE. U. S. 1,671,578, May 29.
- Antimicrophonic shield for thermionic valves.** I. R. McDONALD. Brit. 278,067, June 28, 1926. Shields are formed of rubber loaded with Pb oxide or of Pb
- Thermionic valves.** ALLGEMEINE ELEKTRICITÄTS-GESELLSCHAFT. Brit. 277,997, Sept. 23, 1926. A cathode comprises one or more alk. earth or other electron emitting oxides supported by other oxides such as those of Cb, W, Mo, Cr or U which do not volatilize or dissociate at working temp. Various details of manufacture are given
- Thermionic valves.** M-O VALVE CO., LTD. AND C. W. STOPFORD. Brit. 277,754, June 25, 1926. The filament is secured to its supports by a solder consisting of a mixture in powder form, of C, a metal such as Mo, W or Ta having a higher m. p. than the normal temp. of the joint, and a metal such as Cu having a lower m. p. Various structural details also are specified.
- Bimetallic thermostatic elements.** H. SCOTT (to Westinghouse Elec. & Mfg. Co.). U. S. 1,671,490, May 29. One element is formed of a ferrous alloy containing about 15% Mn and the other is formed of a Ni-Fe alloy. U. S. 1,671,491 also relates to the use of similar alloys. Cf. C. A. 22, 1710.
- Thermostatic electric switch.** E. GREY. Brit. 277,383, Sept. 13, 1926.
- Thermostatic electric switch.** P. MCILVENNEY. Brit. 278,234, Dec. 14, 1926
- Thermostatic electric switch control.** J. C. GOOSMANN. U. S. 1,671,985, June 5.
- Thermostatic control for electric circuits.** S. E. SKINNER (to Landers, Frary & Clark). U. S. 1,672,854, June 5.
- Thermostatic control system for electrical heating systems.** A. J. KERCHER and W. W. HICKS. U. S. 1,671,593, May 29.
- Thermostatic furnace control device.** J. W. DRAKE. Brit. 278,108, July 12, 1926.
- Combined thermostatic regulator and thermometer for use with heating apparatus.** H. PRAUD (to American Radiator Co.). U. S. 1,671,934, May 29.
- Thermostatic regulator for coal stoves, etc.** R. T. WILLIAMS (to H. M. Sheer Co.). U. S. 1,671,915, May 29.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

- The history of science and Ferdinand Hoefer.** E. A. EYBUX. *Bull. soc. chim. ind.* 1927, Oct.-Dec., 7-12. E. H.
- Josiah Willard Gibbs, an appreciation.** JOHN JOHNSTON. U. S. Steel Corp. *J. Chem. Education* 5, No. 5, 507-14 (1928). - E. H.
- Thomas Green Clemson, LL.D., the chemist.** II. R. N. BRACKETT. Clemson College. *J. Chem. Education* 5, No. 5, 576-85 (1928); cf. C. A. 22, 1878. E. H.
- Svante Arrhenius.** P. WALDEN. *Naturwissenschaften* 16, 325-33 (1928).—A biography. B. J. C. VAN DER HOEVEN
- Biographical notes on the pioneers of the Russian platinum industry.** N. I. STEPANOV. *Ann. inst. platine* 5, 75-84 (1927).—Biographical sketches with bibliographies are given for P. G. Sobolevskii, I. I. Varvinskii and V. V. Lyubarskii. E. H.
- Historical observations on the Russian platinum industry.** E. KH. FRITZMAN. *Ann. inst. platine* 5, 23-74 (1927). E. H.
- The centenary of the Russian platinum industry.** O. E. ZVYAGINTZEV. *Ann. inst. platine* 5, 5-22 (1927). E. H.
- The place of research in the college.** H. N. HOLMES. Oberlin College. *Science* 67, 539-43 (1928). E. H.
- Physical chemistry the doorkeeper.** H. P. CADY. *Chem. Bull.* 15, No. 5, 165-6, 191 (1928). E. H.
- Chemical microscopy.** III. Its value in the training of chemists. E. M. CHAMOT AND C. W. MASON. Cornell Univ. *J. Chem. Education* 5, No. 5, 536-48 (1928); cf. C. A. 22, 1503. E. H.

Progress in microchemistry in the years 1915–1924. A. BENEDETTI-PICHLER. Tech. Hochschule, Graz. *Mikrochemie* 4, 202–8(1926). Cf. *Ibid* 21. H. G.

Standards of length, weight, and volume in the U. S. W. A. NOVES. Univ. of Illinois. *J. Chem. Education* 5, No. 5, 586–8(1928). E. H.*

Illinium—element number 61. L. L. QUILL. Univ. of Illinois. *J. Chem. Education* 5, No. 5, 561–68(1928). E. H.

Chemical atomic weight determination and actual atomic weight. G. KIRSCH. *Naturwissenschaften* 16, 334–5(1928).—It is suggested on the basis of slight discrepancies in at. wt. values for "uranium Pb" and Ra that in the at. wt. detn. by chem. means ($\text{RaCl}_2 : \text{Ag}$ or AgCl) an error of the order 0.01% is possible, due to imperfection of the crystals of the compds. prepd. Excess atoms of one of the components can be present in sufficient amt. in the Smekal crevices to cause this effect. B. J. C. VAN DER HORVEN

The mutual influence of the two atoms of hydrogen. S. C. WANG. Columbia Univ. *Physik. Z.* 28, 663–6(1928).—Mathematical discussion. A. L. HENNE

Molecular number. PAOLO VINASSA. *Gazz. chim. ital.* 58, 178–80(1928); cf. *C. A.* 21, 1907; 22, 192, 1535, 2314.—In drawing the general conclusion that nearly all compds., whether natural or synthetic, org. or inorg., have even mol. nos. (recorded in *C. A.* 22, 1535, erroneously as the same mol. no.), certain important exceptions must be recognized. Among inorg. compds. with uneven mol. nos., compds. of Mn, Co, Cr, Cu, Ce, Mo and Fe predominate, with a few compds. of Ti, Ir, Hg, Cl, P, N, Sn, Ni, Ru, Va, W, U, Ga, Nd and Pr. Only a small proportion of the elements form compds. with uneven mol. nos. Extremely few org. compds. have uneven mol. nos.

Crystal structure of potassium. R. POSNJAK. *J. Phys. Chem.* 32, 354–9(1928).—Normal x-ray diffraction effects were obtained for K by the powder method. The failure of previous expts. to show these effects is attributed to oxide and moisture films on the surface. The sample was very carefully prepd. and the method is described in detail. The available data indicate K to be body-centered cubic with $a_0 = 5.333 \text{ \AA. U.}$; the calcd. d is 0.851. Na and Li show $a_0 = 4.30 \text{ \AA. U.}$ and 3.51 \AA. U. in agreement with earlier results. R. L. HERSHEY

The study of micas containing fluorine by means of x-rays. CH. MANGUIN AND L. GRABER. *Compt. rend.* 186, 1131–3(1928).—Although the no. of O and of F atoms in a cryst. unit of mica varies with the type, the sum, $O + F$, is const. at 12. There are thus always 12 electronegative atoms per unit which are not necessarily all O. It is probable that the substituted F takes up the positions of the displaced O. The difference in valence does not impair the similarity of structure. The loss of a negative charge necessitates the loss of a positive; e. g., Li^+ may be substituted for Mg^{++} whenever F replaces O. It is not difficult to imagine a total substitution of LiF for MgO . Micas of the same type show identical x-ray patterns, though the F content varies. Some cell dimension detns. are tabulated. R. L. HERSHEY

Further observations on isomorphism in the cubic crystals of hexamine- and pentamine-aquo complex salts. O. HASSEL. *Norsk Geol. Tids* 10, 92–6(1928).—X-ray diffraction exams. of $\text{Co}(\text{NH}_3)_6(\text{ClO}_4)_3$ and $\text{Co}(\text{NH}_3)_5\text{H}_2\text{O}(\text{ClO}_4)_3$ show a striking similarity between the two structures and that of $\text{Co}(\text{NH}_3)_6\text{I}_3$. All are face-centered cubes with 4 mols. per unit cell. The hexamine perchlorate structure may be obtained from the luteoiodide structure* by substitution of ClO_4 for I. The similarity between the hexamine and pentamine-aquo structures suggests that H_2O may be substituted for NH_3 without changing the space group (cf. *C. A.* 22, 1507). $\text{Co}(\text{NH}_3)_5\text{H}_2\text{OI}_3$, however, shows reflections which distinctly differentiate it from $\text{Co}(\text{NH}_3)_6\text{I}_3$, the structure being definitely not face-centered. R. L. HERSHEY

Crystal structure of lithium iodide trihydrate. S. B. HENDRICKS. *Am. J. Sci.* 15, 403–9(1928).—Laue and spectral photographs were used in the analysis of $\text{LiI}(\text{H}_2\text{O})_3$. The unit cell is hexagonal and contains 2 mols. The spacings are: $d_{110} = 7.45 \text{ \AA. U.}$; $d_{001} = 5.45 \text{ \AA. U.}$. The space group is $6e-4$. The parameters were not detd. R. L. H.

Crystal structure of *p*-nitrotoluene. B. N. SREENIVASIAH. *Indian J. Physics* 2, 151–60(1928).—Powder and Laue x-ray photographs of *p*-nitrotoluene indicate the crystal to be simple orthorhombic, $a = 10.1 \text{ \AA. U.}$, $b = 11.18 \text{ \AA. U.}$, $c = 12.3 \text{ \AA. U.}$, with 8 asymmetric mols. per unit cell. The space group is Q_b^1 . *R. L. HERSHEY

Influence of the mother liquid upon the crystal form. MITUO YAMADA. *Japan. J. Phys.* 4, 159–63(1928).—In previous papers Y. investigated the surface energy of crystals relative to the vacuum, to det. cryst. forms theoretically. The effect of the mother liquid is now discussed, with the assumption of a simple law of at. action. The essential point lies in the assumption of regularity of at. arrangement in the liquid near

the cryst. surface. By this assumption the appearance of faces of high indices, so-called vicinal faces, is explained. The effect of magnetic field upon the cryst. form, observed in NiCl_2 , is also explained.

C. J. WÆST

Physical purity and powder röntgenogram. N. H. KOLKMEIJER. *Proc. Acad. Sci. Amsterdam* 31, 151-4 (1928).—See *C. A.* 22, 1066.

E. H.

Supposed allotropy of zinc. M. VAN DE PUTTE AND H. THYSSSEN. *Rev. univ. mines* 14, 49-57 (1927).—An investigation was made of the allotropy of zinc, by means of the Chevenard app. and the expansion method. Pieces of electrolytic, commercial and fonte d'art (artistic casting) zinc were rolled in one direction and ground to a thickness of 10 mm. The method used does not permit of a conclusion as to the existence of different allotropic forms of pure Zn. When heated, from 300 degrees there is a much less marked expansion of the rolled Zn, the expansion being less pronounced in the direction perpendicular to the rolling than parallel to it. This is caused by the physical form of Zn and not by its chem. nature. The Zn possesses a coeff. of expansion greater perpendicular to the rolling direction than parallel to it. Tempering increases the elastic limit in all cases. The elastic limit is always greater in the direction of the rolling. In brief, it is concluded that Zn presents only one variety of allotropy. C. W. OWINGS

Polymorphism. K. LOSKIT. Dorpat Univ. *Z. physik. Chem.* 134, 156-9 (1928).—The soly. curves of monotropic polymorphic compds. show a break and are constituted by 2 different parts. This was ascertained by the following mixts.: resorcinol and H_2O ; benzophenone and benzene; salol and benzene. The measurements are tabulated. The polymorphism is chiefly due to a polymerization. The phenomenon of polymerization and depolymerization in soln. is comparable to electrolytic disson.

A. L. HENNE

Triglycerides. K. LOSKIT. Dorpat Univ. *Z. physik. Chem.* 134, 135-55 (1928).—L. investigates the polymorphic modifications and the crystn. factors of the following glycerides: tristearin, tripalmitin, trimyristin, trilaurin, tricaprinn, tricaprylin, tricaproin, tributyrin and triacetin. He detcs. 22 soly. curves of these compds. in customary solvents; never did the solvents combine with the solutes. The triglycerides are polymerized and present a colloidal character. The polymorphism is to be attributed to differences in the degree of polymerization. The triglycerides may change from cryst. aggregates to colloidal aggregates; the process is entirely reversible. A. L. HENNE

Enantiotropy, monotropy and pseudomonotropy. I. NOBORU NAGASAKO. *Bull. Chem. Soc. Japan* 3, 90-5 (1928).—A theoretical discussion permits N. to define enantiotropy at const. pressure by the 2 following conditions: there should be an equil. temp. between the 2 modifications *A* and *B* of one component; in the neighborhood of this temp., *A* should be stable above it, *B* being stable below it, or *vice versa*. The dimorphism which does not satisfy the above conditions at const. pressure is defined to be monotropy, if only one of the 2 modifications is stable. Thus monotropy is included in the following cases: (1) the dimorphism without any equil. temp.; (2) the dimorphism with equil. temp. only in the unstable domain of *A* and *B*; (3) the dimorphism with equil. temp., however, only *A* (or *B*) is stable except there. Consequently the terms enantiotropy and monotropy not only serve to express the abs. stability, but also express the mutual stability of the 2 modifications in 1 component. The thermodynamic relations connected with them and the cases of pseudoequil. are considered, and various theories are brought into conformity.

A. L. HENNE

Vapor pressure and chemical constant of chlorine. P. HARTECK. Tech. Hochschule, Breslau. *Z. physik. Chem.* 134, 21-5 (1928).—The following are, resp., the abs. temp. and the vapor pressure of Cl in mm.: 162.7, 2.6; 165.7, 3.4; 169.5, 6.1; 170.3, 7.2; 170.9, 7.7; 172.7, 9.9; 178.8, 17.4; 179.5, 18.5; 180.2, 19.6; 181.7, 22.9; 183.7, 26.9; 185.8, 31.8; 197.6, 76.0; 198.1, 78.1; 199.6, 86.4; 210.3, 169; 210.9, 175.5; 211.3, 181.4; 219.5, 288.0; 219.9, 295; 220.4, 302.4; 234.5, 611; 234.7, 619; 234.8, 624; 235.1, 630; 245.2, 634. The m. p. -100.5° , b. p. -33.95° . The chem. const. is 1.67 ± 0.07 or -0.12 .

A. L. HENNE

Measurements of the vapor pressure of silver, gold, copper, lead, gallium, tin and calculation of the chemical constants. P. HARTECK. Tech. Hochschule, Breslau. *Z. physik. Chem.* 134, 1-20 (1928).—H. describes an app. based on the Knudsen method, by which vapor pressures as low as 10^{-4} mm. Hg can be measured at 1000° . For Ag (temp. in degrees abs.; p. in mm. $\times 10^4$): 1196, 7.6; 1200, 8.0; 1216, 13.3; 1224, 15.3; 1230, 15.5; 1232, 15.8; 1238, 22.4; 1240, 19.5; 1263, 22.0; 1266, 41; 1269, 55; 1271, 54; 1273, 42; 1278, 39; 1308, 64; 1333, 90; 1319, 108; 1339, 124; 1344, 145. For Au (temp. in $^\circ$ abs.; p. in mm. $\times 10^4$): 1436, 60; 1451, 40; 1451, 65; 1457, 80; 1463, 90. For Cu (temp. in $^\circ$ abs.; p. in mm. $\times 10^4$): 1420, 1.16; 1445, 1.26; 1449, 1.63; 1463, 2.2; 1421, 1.1; 1419, 1.1; 1430, 1.1. For Ga (temp. in $^\circ$ abs.; p.

in mm. $\times 10^4$); 1198, 4.2; 1199, 4.0; 1206, 4.2; 1210, 6; 1216, 6; 1226, 7; 1247, 12; 1264, 17; 1266, 30; 1239, 14.3; 1311, 40; 1306, 40; 1322, 100; 1326, 75; 1346, 160; 1351, 120; 1358, 130; 1391, 230. For Sn (temp. in $^{\circ}$ abs.; p. in mm. $\times 10^4$): 1264, 0.5; 1281, 0.5; 1297, 0.75; 1329, 1.3; 1333, 1.3; 1339, 2.45; 1349, 2.1; 1367, 2.9; 1377, 3.6; 1386, 3.8; 1389, 3.4; 1400, 6.5; 1434, 8.5. The vapor tension of Pb was detd. by a b. p. method and the results are compared with the literature. For Pb (temp. in $^{\circ}$ abs.; p. in mm.): 1353, 3.9; 1392, 6.5; 1427, 10.0; 1477, 16.5. The chem. const. of each metal has been calcd.; it is of the general form: $j_p = -1.59 + \log M^{1/2} + k$, the values of k being: 0.39 \pm 0.36 for Pb; +0.65 \pm 0.40 for Ag; -0.10 \pm 0.40 for Cu; +0.56 \pm 0.40 for Au; +0.00 \pm 0.50 or -0.20 for C. The discrepancies from the theoretical values are discussed. The Trouton const. 22.5 may be used for high boiling metals. The Langmuir method of measuring small vapor pressures is likely to introduce considerable errors.

A. L. HENNE

Polar interpretation of the coordination valencies. E. J. W. VERWEY. Univ. Amsterdam. *Chem. Weekblad* 25, 250-4(1928).—A survey in simple terms.

A. L. HENNE

Capillarity. IX. KARL SCHULTZE. *Kolloid-Z.* 44, 120-7(1928); cf. C. A. 21, 3291.—This is a theoretical paper attempting a general formulation of capillary systems with the aid of a novel symbolic representation which is explained in detail. F. L. B.

The parachor and chemical constitution. IX. Boron compounds. J. J. ETRIDGE AND SAMUEL SUGDEN. *J. Chem. Soc.* 1928, 989-92; cf. C. A. 22, 2153.—Me and Et borates are prepd. by modifying Schiff's (*Annalen*, 1867, Suppl. 5, 158) and Coupax's (*Compt. rend.*, 127, 719(1898)) methods, repeated fractionations giving the 99.9% esters (b_{765} , 68.7 $^{\circ}$ and b_{710} , 117.2 $^{\circ}$ resp.). The max. bubble pressure method of Sugden (*C. A.* 16, 2627; 18, 1771) is used in detg. the surface tensions, the air entering the bubbler being previously dried by passing over P_2O_5 . The liquid ds. are detd. in sealed tubes with calibrated floats, the vapor ds. being calcd. according to the method in C. A. 19, 2926. The parachor is detd. from the expression: $P = M \gamma^{1/4} / (D - d)$, M being the mol. wt. and γ the surface tension in dynes/cm., the av. value for Me borate being calcd. as 243.7 and that for Et borate as 363.1. From these values and that calcd. from the data of Mills and Robinson (*C. A.* 21, 3507) for BCl_3 , the av. value of the parachor of B is detd. as 16.4. Thus, the at. parachors pass through a sharp min. at C. Incidentally, it is found that Me alc. and Me borate form a mixt. of max. vapor pressure, boiling at 55 $^{\circ}$ and contg. 30% ester.

J. BALOZIAN

Phenomena of adsorption. G. TESTONI. *Rev. gen. colloides* 6, 8-15(1928).—After observing the color changes in a grain of wheat produced by the adsorption of certain coloring substances a study of the debated question of the pre-existence of gluten in flour was made. The action of Ca salts as already observed in coagulation of blood and milk is stressed and the formation of gluten in the presence of Ca salts through the interagency of a protein substance is considered the more probable. The diminution of sensibility showed by an indicator, after absorption, was used for measuring the adsorption no. of each protein. The dissimulation of Cu and Fe salts after adsorption by gluten and gliadin is described and explained on the basis of formation of chem. combinations.

H. M. McLAUGHLIN

Bubbles, drops and Stokes' law. W. N. BOND AND D. A. NEWTON. *Phil. Mag.* [7], 5, 794-800(1928); cf. C. A. 22, 522.—B. showed that spherical drops or bubbles surrounded by a more viscous fluid might have a terminal velocity as great as one and a half times that of a solid sphere of equal size and mass. B. and N. now show experimentally and theoretically that the surface-tension of the surface of the drop or bubble decreases the terminal velocity. For any radii appreciably less than a certain crit. value the drop or bubble behaves almost like a rigid sphere. After a fairly rapid transition, for all radii appreciably larger than the crit. the effect of surface tension is small. Expts. on the terminal velocity for air in water-glass, air in sirup, Hg in sirup, and water in castor-oil, all give crit. radii of the order predicted; but the different media show appreciably mutual disagreement, the cause of which is not yet certain.

G. G.

The preparation of chloride-free colloidal ferric oxide from ferric chloride. C. HARVEY SORUM. *J. Am. Chem. Soc.* 50, 1263-7(1928).—The sols were prepd. by adding 1 M $FeCl_3$ soln. drop by drop to boiling H_2O and purifying by hot dialysis for 7 to 10 days. They were wine-red, clear to transmitted light, and stable for at least 12 months. The Fe content was from 2.07 to 3.60 g. per l. Seven methods of testing for Cl gave neg. results although the tests were positive when as little as 0.0001692 g. HCl per l. was added directly to the sols. The results do not accord with Thomas' "solution link" theory of Fe_2O_3 sols and other theories assuming that the Fe_2O_3 micelle is a definite chloride compd.

F. L. BROWNE

The reduction of gold chloride in the presence of lyophilic colloids. J. TRAUBE AND DOROTHEE JACOBY. *Z. anorg. allgem. Chem.* **170**, 85-98(1928).—AuCl₃ was reduced in aq. soln. with a number of reducing agents in the presence of many lyophilic colloids. Nearly all the colloids had a marked peptizing influence in concd soln. Usually the peptizing effect increased with the protective power of the colloids. The degree of dispersion of the Au was greatest in the most concd. solns. of colloid. In some cases coarse dispersity and pptn. were found at intermediate concns. of colloid. Often when the soln. contg. no colloid yielded stable Au sol. small amts. of lyophilic sol caused pptn. In other cases when the colloid-free soln. gave a ppt. of Au, small amts. of lyophilic colloid exerted protective action. F. L. BROWNE

The preparation of silver hydrosols of uniform particle size without the aid of protecting colloids. II. J. VOIGHT AND J. HEUMANN. *Z. anorg. allgem. Chem.* **169**, 140-50(1928); cf. *C. A.* **21**, 3512.—The sols were prepd. by reducing 0.001% or 0.005% Ag₂O soln. with hydrazine hydrate in the presence of Au or Ag nuclei. Best results were obtained with 0.001% Ag₂O soln. There must be no alkali (Na₂CO₃) present during the reduction because it gives rise to a pseudonucleus formation that interferes with the proper function of the Au or Ag nuclei. This action of alkali is so pronounced that Ag sols can be prepd. in solns. contg. it without adding Au or Ag nuclei. F. L. B

Silver nucleus sols containing no protective colloid. A. GALECKI. *Z. anorg. allgem. Chem.* **170**, 45 8(1928).—Ag sol reduced with P was made as follows. To 100 cc. of thrice-distd. H₂O 1.5 cc. of 0.1% AgNO₃ soln. and 0.5 cc. of NH₄OH (d. 0.925) were added. The soln. was heated to the beginning of boiling and 5 to 6 cc. of P dissolved in ether added dropwise with stirring. A yellow, amicroscopic Ag sol formed at once. Ag nucleus sols reduced with HCHO were made as follows: To 100 cc. of thrice-distd. H₂O 2.5 cc. of 0.1% AgNO₃ soln. and 0.5 cc. of NH₄OH (d. 0.925) were added followed by 5 cc. HCHO soln. (0.3%). Some of the Ag sol reduced with P was then added and the soln. heated to about 80°. Bluish green, fluorescent Ag sol was obtained. Au nucleus sols may be used in place of Ag. F. L. BROWNE

The preparation of a lead selenide hydrosol. J. BROOKS. *J. Phys. Chem.* **32**, 698-708(1928).—PbSe sols with gelatin as protective agent were prepd. from Pb(C₂H₃O₂)₂ and from a mixt. of Pb(C₂H₃O₂)₂ and PbCO₃. "With the first method the percentage transformation into colloidal PbSe rapidly decreased as the initial concn. of Pb(C₂H₃O₂)₂ was increased above a certain limit. This effect could be attributed to the presence of acetate ion or acetic acid into which the acetate ion is mainly transformed. As these had no pptg. action on the colloid when once formed it was concluded that the effect was exerted during the process of formation. It is suggested that acetate ion or acetic acid decreases the velocity of formation of nuclei while leaving unaltered the velocity of growth of the nuclei. Above a certain concn. the disparity in these velocities is sufficient to produce particles of non-colloid (macroscopic) dimensions. A quant. treatment has been attempted. With the first method of prepn. the rate of stirring had a small effect on the amt. of colloid formed. With the second method a very rapid rate of stirring decreased markedly the yield of colloid." F. L. BROWNE

Colloid syntheses with titanium trichloride. VI. Colloidal palladium. A. GUTBIER AND H. WEITHASE. *Z. anorg. allgem. Chem.* **169**, 264-6(1928); cf. *C. A.* **21**, 3511.—The colloids were prepd. by reducing a 1% PdCl₂ soln. with 15% TiCl₃ which was previously almost neutralized with NaOOCCH₃, heated to boiling, and cooled. The sol consists of colloidal TiO₂ with adsorbed Pd. The sol is very stable toward acids. On dialyzing for 10 to 12 days it formed an irreversible jelly, which still yielded Cl on further dialysis. By wetting the jelly with HCl it could be reprecipitated in H₂O. The jellies exhibit thixotropy. F. L. BROWNE

Peptization of ferric hydrate in solutions of arsenic trioxide. A. BOUTARIC AND G. (MLE.) PERRAUD. *Rev. gen. colloides* **6**, 1-7(1928).—A quant. study of this phenomenon has been made by detg. the different wts. of hydrate peptized under various influences. The effect of variation of (1) time, (2) concns. of solns. of As₂O₃ with a const. quantity of hydrate, (3) quantities of hydrate with the same soln. of As₂O₃, (4) age of the hydrate and (5) temp. was detd. Peptization was a rather slow process, completed only after approx. 24 hrs. With a quantity of hydrate corresponding to 80 mg. of Fe₂O₃ and increasing concns. of As₂O₃, the amt. of hydrate peptized increased rapidly at first and then decreased without ever being completely peptized; with 380 mg. of Fe₂O₃ the amt. of peptized hydrate attained a max. but did not decrease after the first rapid increase. With increasing quantities of hydrate and the same soln. of As₂O₃, when p/P (wt. of peptized hydrate per g. of initial hydrate) was represented as a function of σ/P (wt. of As₂O₃ per g. of initial hydrate) the curve rose rapidly from 0 to a max. (considerably flattened) and then decreased somewhat less rapidly to 0.

The quantity of hydrate peptized decreased in proportion to the age of the hydrate used. Temp. did not seem to have any influence on the phenomena. H. M. McL.

Advances in the preparation of colloidal solutions of the metalloids and their compounds as well as a survey of the most important protective colloids and the procedures for purification of colloids. J. REITSTÖTTER. *Oester. Chem.-Ztg.* **31**, 47-51 (1928).—A table is given contg. a list of 43 protective colloids and the sols for whose prepn. each protective colloid is especially suited. References to the original literature are given.

H. M. McLAUGHLIN

The behavior of deaminized gelatin. Z. C. LOEBEL. *J. Phys. Chem.* **32**, 763-78 (1928).—The behavior of deaminized gelatin was compared with that of gelatin. "The isoelec. point of deaminized gelatin is found by the dye technic at p_H 4.0. The optical rotation, viscosity, surface tension and foaming of the solns., are studied as functions of H-ion concn. The optical rotation at 10° and the foaming at room temp. are at a max. at the iso-elec. point. Surface tension is at a min at this point. Whether the solns. were effected at 50° or at 75° , or whether the viscosities were run at 10 , 25 or 50° , the viscosity- p_H curve of deaminized gelatin was of the same shape, showing two min., at p_H 4.0 and 7.3. Ordinary gelatin solns. effected at 75° gave viscosity- p_H curves at 25 and 50° similar to those obtained by Loeb at 25° with a min. at the iso-elec. point. Titration of deaminized gelatin and gelatin with NaOH indicates that the hydroxy groups which replace the amino groups in deamination are acidic in character. The difference in the base combining capacity of the two substances is equiv. to their difference in N content. The results indicate that the base-combining capacity of deaminized gelatin is 9.7×10^{-4} equiv. per gram. The second point of abrupt change in properties is discussed."

F. L. BROWNE

Membranometric studies of colloidal solutions. WOLFGANG OSTWALD AND MARTIN MEISSNER. *Kolloidchem. Beihefte* **26**, 1-57 (1928).—Membranometry is a procedure for observing the formation of skins at the meniscus of capillary threads of liquid. More uniform results are obtained when the area of the skins is reduced to less than 1 sq. mm. instead of the area of many sq. mm. used in previous work. Quant. measurements of solns. of saponin and peptone usually vary less than 10% from the av. Skin formation was observed on solns. of proteins, soaps, dyes and alkaloids. Soap solns. gave skins that were clearly elastic, dyestuffs gave inelastic skins. A graphical method of characterizing the membrane effect is described, based upon the differences in behavior in a capillary tube between ordinary liquids and liquids that form skins. The "foaming power" and the depression of the capillary rise are also expressed in simple terms. The close connection usually assumed between surface tension, membrane formation, and foaming power is true only for solns. that are closely related. For certain dye solns. the 3 properties are symbatic, while for certain soap and protein solns. they are not symbatic but uniform relations are observed between them. The principles governing the formation of skins on solns. of different substances vary widely and the skins may differ greatly.

F. L. BROWNE

Gum arabic. A. W. THOMAS AND H. A. MURRAY, JR. *J. Phys. Chem.* **32**, 676-97 (1928).—Gum arabic was studied as a typical colloidal polysaccharide. It was purified by pptn. with alc. and by electrodialysis. The electrometric titration curves with HCl, NaOH, and $Ba(OH)_2$ and an electrometric study of the amt. of NaOH bound in solns. contg. widely varying concns. of gum and varying ratios of gum to NaOH show that the gum is a strong acid, having a p_H of 2.70, and that it is not amphoteric. The equiv. wt. is 1000 to 1200. The reaction between the gum and alkalies is a simple chem. neutralization. The calcd. values of osmotic pressure agree with observed values (collodion membranes) fairly well, provided that the solns. are not too alk. The qual. application of the Donnan theory of membrane equil. accounts for the observed osmotic pressures and viscosities in solns. of varying p_H and of varying content of NaCl.

F. L. BROWNE

The theory of the electrical charge and the coagulation of colloids. HANS MÜLLER. *Kolloidchem. Beihefte* **26**, 257-311 (1928).—Smoluchowski's theory of rapid coagulation is extended by the assumption that particles of different size will coalesce more readily than particles of the same size. New equations are developed that more nearly represent exptl. facts. The relation between the concn. of electrolyte added to a hydrophobic colloid and the electrokinetic potential of the particles is discussed, the electric double layer being considered as a diffuse layer. A graphic method of calcg. the potential gradient for spherical particles is given and the results of expts. on As_2S_3 are explained by assuming a change in electrokinetic potential alone. In general, however, a change in the charge on the particle must be assumed.

JAMES G. McNALLY

The state of polarization of the Tyndall light from colloids. B. LANGE. *Z. physik.*

Chem. 132, 1-26(1928).—An app. is described for the spectral study of the polarization of Tyndall light. The *depolarization* is used to describe the state of polarization; it is defined as the ratio of the intensity of the vector of natural light vibrating horizontally to the intensity of the vector vibrating vertically, provided that the vertical vector does not come from the natural light. The depolarization for a single particle of a colloid is characteristic and can be computed from measurements of the depolarization at two concns. by means of a math. formula which was verified for several sols. The depolarization increases as the particle size increases and particle size can be detd. by depolarization measurements under certain conditions. For sufficiently small spherical particles the depolarization is 0; that is, the light is completely polarized. Gamboge, mastic, As_2S_3 , and CeO_2 sols belong to this class. Sols of Fe_2O_3 , Al_2O_3 , and V_2O_5 , whose particles are known to be non-spherical, give depolarization values greater than 0. Sols of V_2O_5 on aging change in depolarization in such a way as to indicate that the particles become larger and more markedly rod-shaped. H_3AsO_4 prevents the aging. Depolarization increases on solidification of the thixotropic CeO_2 sols and decreases again when the jelly is broken up by shaking, indicating that the particles become longer during gelation.

F. L. BROWNE

Depolarization and absorption of light by colloidal gold solution. B. LANGE. *Z. physik. Chem.* 132, 27-46(1928).—Au sols of uniform particle size varying from 6 to 160μ were prepd. carefully by the nucleus method in such a way as to avoid formation of Au_2O as far as possible. The consts. for the light absorption agree with concns. based on Mie's theory, assuming spherical particles. The absorption is a max. for particles of moderate size. The particle size detd. by light absorption differs from that obtained by ultramicroscopic count because a small amt. of the Au is present in a very finely divided state. The particle size detd. by sedimentation agrees with that computed from the light absorption. In sols of very fine subdivision, Mie's theory indicates that the absorption is independent of particle size but expt. shows that it still changes. The discrepancy is attributed to dependence of optical consts. on the thickness of the layer of sol observed. L.'s formula for depolarization (see preceding abstract) holds for Au sols. The depolarization is not zero for very small particles as Gans' theory demands, indicating that a small portion of the particles are rod-shaped. Other workers find evidence to that effect in the anisotropy of Au sols in the elec. field and during flow. The depolarization diminishes during coagulation; whence it follows that the particles remain spherical but become larger. The color change during coagulation depends upon change in particle size as Mie's theory indicates. The content of Au_2O in a sol reduced with P was shown to be 1.26% by a newly devised microanalyt. method.

F. L. BROWNE

Some chemical reactions in the presence of lyophilic colloids. T. IRO. *Z. anorg. allgem. Chem.* 170, 99-106(1928).— $AgNO_3$ was reduced with such reagents as hydroquinone, hydrazine hydrate, $NaHSO_3$, Na_2S and tannin in the presence of gelatin, dextrin, gum arabic, starch, agar and colloidal Fe_2O_3 . Numerous metathetical pptns. were made in the presence of gelatin. In general a considerable amt. of the lyophilic colloid exerted a pronounced peptizing action, but slow pptn. took place when the amt. of lyophilic colloid was small.

F. L. BROWNE

The electrokinetic and chemical behavior of the aluminosilicates. SANTE MATTHEWSON. *Soil Science* 25, 289-311(1928).—On mixing increasing quantities of Na silicate with an $AlCl_3$ soln., an electropositive sol, an isoelectric ppt., and finally (with an excess of silicate) an electronegative sol are successively formed. The electropositive sol may be pptd. isoelectrically by alkalization and the electronegative sol by the addn. of acid provided that the proportion of silicate is not greater than the quantity which the alumina is able electrically to neutralize. Each proportion of silica and alumina forms, within certain limits, isoelectric precipitates at definite H-ion concns. ranging in p_H values from somewhat below 5 to about 7, at which the alumina is itself isoelec. The nearer a p_H of 7 the greater must the proportion of alumina be for an isoelec. pptn. The mol. ratio SiO_2/Al_2O_3 in the isoelectric precipitates decreases with an increase in p_H , approaching zero at a p_H of 7. At p_H values somewhat below 5 the ratio reaches a max. but remains always smaller than 3. The proportion of alumina in the isoelec. ppts. is increased by the action of multivalent anions, whereas the proportion of silica is increased by the presence of cations. In the latter case isoelec. ppts. may be formed in which the ratio SiO_2/Al_2O_3 considerably exceeds a value of 3. Mixts. contg. so much silica as to render the sol electronegative at any p_H may be pptd. by adding bases of the bivalent cations, but the ppts., which contain a large proportion of silica and bases, remain electronegative and exhibit no ampholytoid character at any p_H . The isoelec. ppts. are, like kaolinite, ampholytoids, becoming electropositive when acidified and elec-

tronegative when alkalinized. Evidence obtained by the electro dialysis of feldspar indicates that the kaolinite cation $(\text{AlSiO}_2)^+$ is stable and may be formed at certain H-ion concns. The conditions governing the formation of the different soil gels in nature are discussed in this connection. The base-exchange capacities of the several ppts. prepd. were found to increase with the ratio of silica to alumina and to be of the same order of magnitude as those of the natural gels. The adsorption of base by the natural gel has been shown to embrace the adsorption of both ions, the OH as well as the cation, indicating true adsorption instead of the neutralization of an acid. The mechanism of adsorption and exchange is discussed. The conclusion is reached that the acidoid behavior of adsorbents is associated with a polar orientation of the interfacial layer of water mols. Twenty references are appended.

A. L. MEHRING

Constitution of the colloidal micelle. ALBERTO SCALA. *Staz. sper. agrar. ital.* 59, 75-98 (1926).—Cabbage leaves, yellow turnip roots and potato tubers were cut into very thin slices or ribbons and treated with successive (25-52) 200-cc. portions of distd. H_2O at approx. 0° for 12-24 hrs. The decanted liquors, evapd. to eliminate CO_2 and conc. to small vol., were titrated with 0.01 *N* acid or alkali (to phenolphthalein). In every expt. occurred a series of changes from acidity to alky., or *vice versa*, in these wash waters, which indicates not only that there exist in vegetable tissues free acids, bases or basic salt but also that the alternations are caused by anions or cations of salts combined with the tissue itself. The forces holding these combined ions vary and this variation is necessary for the evolution of life in different conditions and seasons so that

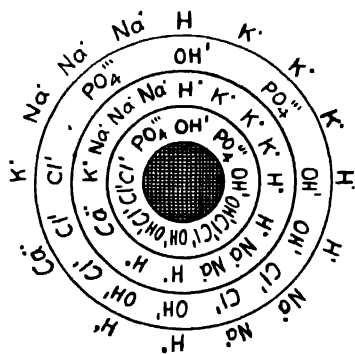


Fig 1.

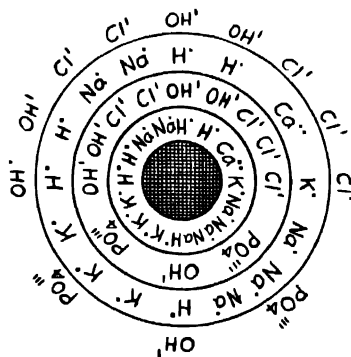


Fig 2.

the tissues and their complex combinations never have identical compns. at different times. The longer acid periods in the expts (the initial alk. periods only were long) is perhaps due to the greater mobility of the anions and also to the slow elimination of cations in periods of acid hydrolysis with their transformation into neutral salts. The expts. strengthen van Bemmelen's hypothesis of the constitution of hydrocolloids and furthermore indicate that the micelle is combined with electrolytes which are split into their respective ions arranged in an arbitrary number of concentric spherical strata about the micelle. Extn. at higher temps. increased the hydrolytic action, the acidity of the 35th ext. from 50 g. potato tuber at 45° for 15 min. rising to 11.5 cc. 0.01 *N* KOH (required) from 3 cc. for the 34th ext. at 0° . Successive exts. at the higher temp. gradually decrease in acidity to reach an equil. dependent on the temp. Previous expts. (*Ann. Igiene* 31, 214 (1921)) showed that heating at various temps. up to 100° when alk. exts. were being given at 0° caused the formation of acid exts. (max. acidity at 60°). Heating horse or human blood serum gives a similar increase in acidity (max. at 30° for horse blood) which reverses, however, to alky. at 70° . ALBERT R. MERZ

The solubility diagram of cobalttriethylenediamine chloride. A. P. ROSTKOVSKI. *J. Russ. Phys.-Chem. Soc.* 59, 347-50 (1927).—The prepn. used by Bergman (*C. A.* 20, 1344), whose soly. in water at 25° was 29.3% (after recrystn. 29.2%), was dried at 105° . Soly. detns. were carried out in a thermostat regulated to $\pm 0.1^\circ$; duplicate detns. agreed within 0.2%. The soly. curve of ice was detd. by the cooling method, solns. of known concn. being used. The eutectic lies at -2° and 12.5% of the salt by wt. (0.6% molar). Between -2 and $+110^\circ$ the curve is continuous, thus proving the presence

of a single solid phase (trihydrate). The compn of this phase possibly changes gradually, solid solns of tri- in the monohydrate and of the monohydrate in the anhyd. salt being formed with increasing temp.

BASIL C. SOVENKOFF

A cryoscopic study of benzene solutions. J. M. PETERSON and W. H. RODEBUSH. *J. Phys. Chem.* **32**, 709-18(1928).—The app. originally designed by Hovorka and R. was modified because of the peculiar waxy nature of solid benzene and was used to measure the f. p. depressions of benzene solns. of MeOH, EtOH, toluene, AcOH, BzOH and H₂O. The f. p. lowering was linear except for AcOH and MeOH. The molal f. p. const. for benzene is 5.10, accurate to 1%. P. and R. emphasize the fact that a mol. wt. as detd. by f. p. method depends only upon the vapor d. of the solute and not upon the vapor d. of the solvent.

ARTHUR FLEISCHER

Some physical properties of aqueous hydroxybenzene solutions. L. E. SWEARINGEN. *J. Phys. Chem.* **32**, 785-93(1928).—The surface tensions, ds., viscosities, and *n*'s of aq. solns. of phenol, catechol, resorcinol, hydroquinone, pyrogallol, and phloroglucinol were measured by standard methods at 25°. The ds. referred to concns. may be represented by straight lines. Increase in OH groups increased the viscosities. The surface tension lowering was greatest in the case of phenol and increased for the dihydric phenols in the order of their m. ps.

ARTHUR FLEISCHER

The dissociation constant of naphthylaminesulfonic acid. I. M. KOLTHOFF. *Chem. Weekblad* **25**, 234(1928).—The dissocn. consts. of naphthylaminesulfonic acid are to be considered as hydrolytic constns. of the amphoteric ion ${}^+\text{NH}_3\text{RSO}_3^-$. For a measured acid const. (Ibersbach) of 10^{-4} at 20° the true K_b of the amino group is 10^{-10} . The true K_a of the sulfonic group is probably of the order 10^{-1} .

B. J. C. V. D. H.

The velocity coefficient for bimolecular reactions in solution. L. S. KASSEL. *Nature* **121**, 746-7(1928).—A few reasons are tentatively suggested why the coeff. *P* proposed by Norrish and Smith (*C. A.* **22**, 1518) should be small.

A. L. HENNE

The oxidation of the mixture of stannous hydroxide and sodium sulfite in sodium carbonate solution with air. SUSUMU MIYAMOTO. *Bull. Chem. Soc. Japan* **3**, 95-8(1928); cf. *C. A.* **22**, 1889.—M. studies the kinetics of the oxidation of mixts. of Na₂SO₃ and Sn(OH)₂ in Na₂CO₃ soln. The reaction is an example of a negative induced reaction; the oxidation of Sn(OH)₂ has an inhibiting action on the oxidation of Na₂SO₃. The mechanism of the reaction is discussed.

A. L. HENNE

The solution velocity of oxygen into sodium hydroxide, sodium carbonate and hydrochloric acid solution. SUSUMU MIYAMOTO. *Bull. Chem. Soc. Japan* **3**, 98-101(1928); cf. preceding abstract.—The soln. velocity of O when air is passed through NaOH, Na₂CO₃ and HCl solns. is calcd. from the oxidation velocities of Na₂SO₃, Sn(OH)₂ and SnCl₂. The mechanism of some negative induced reactions is discussed.

A. L. H.

Chemical dynamics in a rigidly coherent phase. D. H. BANGHAM. *Phil. Mag.* [7], **5**, 737-49(1928); cf. *C. A.* **18**, 1933.—The equations of the form $s = \text{const.} \times l^2/m$ found empirically to govern in many cases the rate of the sorption process are not peculiar to this phenomenon alone, but are somewhat widely applicable to the time-course of processes involving the disturbance of the "linear equilibrium" of solid substances (either by mech. deformation or by other phys. or chem. means), provided the solid after disturbance remains rigidly coherent. It is shown that the rate of such a change may be limited by conditions which do not apply in a liquid reaction medium, and which are not concerned in any way with the distance of the reaction from completion. Because of the incongruity of the initial and final stages of the groups of atoms undergoing transition, the partial occurrence of the reaction disturbs the balance of elastic forces, and therefore influences the internal work that must be done before further groups of atoms can rearrange themselves. On the hypothesis that the condition for rearrangement is the momentary occupation by the groups of a vol. considerably greater than the av. calens. are made of the mode of variation during the progress of the reaction of the force restraining their thermal movements. A tentative explanation of the form of this variation is offered as an alternative to the linear variation required by an extension of Hooke's law to the conditions in the interior of the solid. According to this the intensity of the internal stress set up by the partial occurrence of the reaction is given by the difference between the hydrostatic pressures with which the initial and actual states of the solid would be in complete equil. On this basis it is shown that the index-const. of the "power"-time equation is given by the ratio $[(V_A - V_2)/(V_1 - V_2)]$ where $(V_A - V_2)$ is the difference of vol. between the activated and final states of the at. groups, and $(V_1 - V_2)$ the difference between their initial and final vols. Application of these ideas to the sorption problem provides an immediate explanation of the dependence of the activity of the sorbent on its past history, and leads to a revised conception of the mutual relations of sorbent and sorbate in cases where the "power" time-

equation holds. The sorbed mols. are regarded as distending the rigidly coherent structure of the sorbent, which consequently becomes stressed. This distension may occur even if the structure is a sufficiently open one to permit easy penetration by the gas mols. in their free state.

GEORGE GLOCKLER

Inertia phenomena and chemical reactions. E. PUXEDDU. *Gazz. chim. ital.* **58**, 95-103(1928).—When an inorg. reaction does not proceed instantaneously but exhibits an inertia or induction period, the latter is usually attributed to 2 or more successive reactions or to low ionization. Thus in the reduction of HIO_3 by SO_2 , I does not appear immediately, and in the reaction of aq. HgCl_2 and NaHCO_3 a red ppt. is formed only after a period of inertia. If individual reactions occur instantaneously, it is illogical to assume that the sum of 2 such reactions should require a disproportionately long time. Moreover, the increase in the inertia period with decrease in concn. has not been explained satisfactorily. In all chem. reactions there is probably a period of inertia which under ordinary conditions is extremely short. This period is independent of the velocity of the subsequent reaction, but varies with the temp. and the concns., the lower the temp. and the greater the diln. the longer this period of inertia. When reactions are apparently instantaneous, it is because the temp. and concns. are such that, for the particular reaction, the period of inertia is negligible in magnitude. The inertia is comparable with a state of dynamic equil., with limits of temp. and concn. beyond which the time becomes too short to measure. This condition represents some preparative stage or state of adjustment of the mols. and it ends abruptly and not gradually when the reaction begins. The periods of delay in complex reactions where intermediate products are actually formed represent the summation of the inertias of the reactions where the conditions are favorable for at least one of the reactions to show a notable period of delay. To confirm these points of view, 5 reactions were studied experimentally: (1) $\text{Na}_2\text{S}_2\text{O}_3 + \text{H}_2\text{SO}_4$; (2) $\text{Na}_2\text{S}_2\text{O}_3 + \text{HCl}$; (3) $\text{Sr}(\text{NO}_3)_2 + \text{H}_2\text{SO}_4$; (4) $\text{CaCl}_2 + \text{H}_2\text{SO}_4$, and (5) $\text{BaCl}_2 + \text{H}_2\text{SO}_4$. Each reaction was carried out at various temps. and concns. with const. vols. of the solns., and the periods of delay were judged from the moment of mixing to the first visible evidence of the insol. product. The variation of the period of delay with the temp. and with the concn. is illustrated by the following typical results. With equal vols. of N $\text{Na}_2\text{S}_2\text{O}_3$ and N H_2SO_4 , S appears after 15 sec. at 0° , after 5 sec. at 15° , after 1.5 sec. at 30° and instantaneously at 50° . With 0.5 N solns. it appears after 25 sec. at 0° , after 10 sec. at 15° , after 2 sec. at 30° and instantaneously at 60° . As the diln. becomes greater, the periods become longer. With 4 N CaCl_2 and 4 N H_2SO_4 , CaSO_4 appears after 1.5 sec. at 0° , after 0.5 sec. at 30° and instantaneously at 60° . With 2 N solns. it appears after 35 sec. at 0° , after 12 sec. at 20° and after 5 sec. at 30° ; with N solns. after 180 sec. at 0° , after 100 sec. at 50° , after 30 sec. at 70° , etc. Similar results were obtained with $\text{Sr}(\text{NO}_3)_2$ except that the periods of delay were notably shorter for given concns. On the contrary, pptn. of BaSO_4 was instantaneous above 0.1 N concns. and only at 0.02 N concn. is the delay even 1.5 sec. The reaction of 2 N CaCl_2 and 2 N H_2SO_4 at 0° is particularly satisfactory as a demonstration, for the soln. remains absolutely clear for 35 sec., when suddenly it becomes filled with a white ppt.

C. C. DAVIES

Formation and decomposition of sodium salicylate. I. A. DAVIES. *Z. physik. Chem.* **134**, 57-86(1928).—The thermic decompn. of Na salicylate occurs in two steps. Above 140° , CO_2 and Na phenolate are formed. The equil. is unilateral. Subsequently disodium salicylate and phenol are formed by double decompn. of sodium salicylate and sodium phenolate. This reaction has been studied in the range 220 - 160° and is completely reversible. The p - t curve of this tricomponent system presents a break at 190° and 4.15 atm. This point is a quintuple point; below it, the system Na salicylate, di-Na salicylate, Na phenolate, gas is stable; above it Na salicylate, di-Na salicylate, soln., gas represent the stable system. The synthesis of Na salicylate from Na phenolate and CO_2 is obtained through 2 intermediary products, called ester salt I and II. Both exhibit appreciable disson. tensions. Ester salt I is metastable with regard to ester salt II; the latter is metastable with regard to Na salicylate, but the transformation is not favored by a pressure reduction because an integral transformation of Na phenolate + CO_2 into Na salicylate cannot occur.

A. L. HENNE

Sodium salicylate and salicylic acid and the unilateral equilibrium. EMIL BAUR. Eidgen. Technische Hochschule of Zurich. *Z. physik. Chem.* **134**, 87-91(1928).—Criticism of Davies (preceding abstract.)

A. L. HENNE

Equilibrium of the reduction of tungsten bisulfide by hydrogen. N. PARRAVANO AND G. MALQUORI. *Atti accad. Lincei* [6], **7**, 189-92(1928).—The expts. were carried out in the same way as those with MoS_2 (cf. C. A. **22**, 2091). The equil. are established much the more rapidly by starting with WS_2 and H. Only at the highest

temps. did the reaction: $2\text{H}_2\text{S} + \text{W} \longrightarrow 2\text{H}_2 + \text{WS}_2$ proceed at a rate sufficient to be used in the measurements. The solid phases comprised only W and WS_2 . No other phase contg. less S than WS_2 being found. The Q values were 73400, 73500, 73700 and 73000 cal. at 795° , 895° , 985° and 1065° , resp., an av. of 73400 cal. A comparison of these values with those of MoS_2 shows that WS_2 is more easily reduced than MoS_2 . C. C. DAVIS

The equilibria in certain binary mixtures of trinitrocresol. N. N. LEFREMOK AND A. N. PIKHOMIROVA. *J. Russ. Phys. Chem. Soc.* 59, 373-90 (1927).—Most of the cooling curves were plotted with the aid of the Kurnakov registering pyrometer, although in the later expts. an ordinary thermogalvanometer and thermocouple (nichrome-constantan) were used. Liquid trinitrocresol (m. 101.2°) tends to supercooling; when cooled rapidly, a viscous mass is obtained which may not crystallize for 3-5 days. Reproducible results are obtained with the aid of repeated inoculation and stirring, as well as choosing the optimum velocity of cooling. With acenaphthene (m. 96.2°) a compd. $\text{C}_{12}\text{H}_{10}\cdot\text{C}_7\text{H}_4\text{OH}(\text{NO}_2)_3$ results, m. 117.9° ; the first eutectic is at 9.1% by wt. of acenaphthene and 88.2° ; the second at 79.8% and 84.8° . This system is most suitable for crystallizations, supercooling being more marked on the cresol portion of the curve above the first eutectic. The compd. is bright orange-red and can be heated above the m. p. without charring. Phenanthrene (m. 99°) similarly combines with 1 mol. of the cresol. The eutectics are at 13.5% (85.6°) and 77.5% (84.2°). The compds. m. 113.1° , is brown-red, stable and crystallizes readily. The fluorene (m. 112.3°) compd. (1:1) (m. 107.2°) is brown in the liquid state, gray when solid; decomp. above $140-50^\circ$. One eutectic is at 13.8% fluorene and 85.4° (crystallizes with difficulty); another at 67.4% and 90.5° . Retene (m. 95.2°) forms with 1 mol. of the cresol a compd. m. 118.3° ; the eutectics are at 6.7% (89.5°) and 88.6% (73.5°). The color is brown-violet in the fused, lilac-gray in the cryst. state. The mixts. as well as retene solidify slowly and with difficulty; they char easily on superheating. The system $\text{C}_7\text{H}_4\text{OH}(\text{NO}_2)_3$ —anthracene could not be completely examined, because of the high m. p. of some of the mixts., violent decompn. occurring before the liquid state was reached. No compds. of $\text{C}_7\text{H}_4\text{OH}(\text{NO}_2)_3$ with $\text{C}_6\text{H}_5\text{OH}(\text{NO}_2)_3$ (m. 122.4°), tetryl (m. 126.8°), T. N. T. (m. 78.8°) and $m\text{-(NO}_2)_2\text{C}_6\text{H}_4$ (m. 90.1°) were found: the eutectics are very low. The liquid mixts. are viscous and very hard to crystallize, especially at the eutectic points. The tetryl and T. N. T. mixts. with the cresol are the worst, the coordinates of the second eutectic having been found only after repeated expts. The eutectic mixts. of tetryl and the cresol, m. 64.4° , contains 42.3% tetryl by wt. (as previously detd. by interpolation, it was expected at 68° and 63%). Because of the low heat cond. and sp. heats of the mixts. heating curves do not exhibit abrupt changes of slope. Faulty technic may cause fictitious discontinuities to appear. Traces of the solvent (AcMe) impede crystn. Solid solns. were not formed. $\text{C}_7\text{H}_4\text{OH}(\text{NO}_2)_3$ and $\text{C}_6\text{H}_5\text{OH}(\text{NO}_2)_3$ form a eutectic at 52.5° and 35.6% of the latter; no solid solns. $\text{C}_7\text{H}_4\text{OH}(\text{NO}_2)_3$ and $m\text{-(NO}_2)_2\text{C}_6\text{H}_4$ exhibit a distinct eutectic at 55.4° and 44.8% by wt. of the $m\text{-(NO}_2)_2\text{C}_6\text{H}_4$. The solidified mixts. are very dense and hard; a plastic mass is obtained upon sudden cooling with freezing mixt. which can be drawn into threads. The solns. are quite stable when heated above m. p. $\text{C}_7\text{H}_4\text{OH}(\text{NO}_2)_3$ and T. N. T. form difficultly crystallizable mixts., especially between 30 and 50% of the latter. Repeated inoculations are necessary. No solid solns. were found to exist. The eutectic is at 41.3° and 42.3% of T. N. T. The mixts. are fairly stable, although resinification may occur when the cresol content is large. A slight amt. of charring will prevent crystn. Tables of m. ps. are included. BASIL C. SOVENKOFF

The synthesis of water over nickel and copper catalysts. The mixture effect and promoter action. F. E. SMITH. *J. Phys. Chem.* 32, 719-33 (1928); cf. C. A. 19, 1219.—The synthesis of water from hydrogen and oxygen (with an O_2 concn. of 2.4% at temps. from 75° to 180°) was studied over Cu, Ni, mixts. of Cu and Ni, and Cu- Al_2O_3 catalysts. The most efficient catalysts are those which tend to form the greatest amount of oxide and which suffer the least change in physical structure on reduction and heat treatment. Heating to 444° decreased the efficiency of all but the Ni catalysts. The Cu- Al_2O_3 catalyst had the highest efficiency in the final steady state. The most probable mechanism of catalysis by Ni and Cu is the activation of O_2 mols. or atoms with resulting formation of indefinite oxide, by which they are opened to attack by H_2 . This mechanism is much more rapid than can be accounted for by the reduction of stable oxide. ARTHUR FLEISCHER

The heats of solution and dilution of salts from extreme dilution to saturation. IV. Lithium bromide. F. LANGE AND E. SCHWARTZ. *Z. physik. Chem.* 133, 129-50 (1928); cf. C. A. 22, 905.—LiBr was prepd. from the carbonate and fused in an atm.

of HBr, N_2 , and H_2 . The calorimeter was improved with several modifications. The above heats were detd. at 25° up to the satd. soln., which contained 32.26 mols. $LiBr/100$ mols. H_2O . The differential heat curve resembles that of $LiCl$. A. F.

Studies on metal crystals. VI. The temperature law for the thermal resistance of regular metals. E. GRÜNEISEN. *Z. Physik* 46, 151-9(1927).—The thermal resistances of various Cu, Al, and Au specimens, differently worked, are closely expressed by the equation: $w = [w] + \zeta/ZT$; where w is the total resistance; $[w] = w_i + [w_m]$, where w_i is the non-metallic resistance, and $[w_m]$ is proportional to $(1/Z)(C/\theta/T)$. Since $w_i/w_m = k\theta/T$, $[w]$ is proportional to $(1/Z)[1 + (k\theta/T)C(\theta/T)]$. In these equations ζ , Z , θ , and k are considered as const. T is the abs. temp.; and $C(\theta/T)$ is a Debye at. heat function. Expt. indicates that θ , ζ , and Z are not truly independent of temp. R. L. HERSHEY

Molecular weight of nitrocellulose in camphor. C. TROGUS AND M. ABDEL SHAHID. *Naturwissenschaften* 16, 315(1928).—From the m. p. diagram of nitrocellulose in camphor the mol. wt. of nitrocellulose is found to be between 280 and 315 (calcd. 286). The nitrocellulose was prepd. from nitrated paper, recrystd. from acetone to a white powder of 13.5% N (2.76 NO_2 groups per $C_6H_{10}O_5$). The mol. m. p. depression of camphor was detd. with naphthalene at 40° in agreement with Rast; its m. p. was 179° . B. J. C. VAN DER HOEVEN

Important sources of error in the determination of the heat of combustion of organic substances. ENDRE BERNER. *Tids Kemi Bergvesen* 7, 17-20, 31-4, 47-9(1927).—Incomplete combustion can be detected and eventually corrected by weighing the amt. of soot found in the bomb and by passing the residual gas through a soln. of $PdCl_2$ to det. any traces of CO by pptn. of metallic Pd. Incomplete combustion is sometimes caused by too high or too low O_2 pressure. The CO test is very sharp when carried out as follows: The gas residues from the bomb are introduced into a 2-l. flask contg. 10-15 cc. of a dil. soln. of $PdCl_2$ and shaken thoroughly. If very small amts. of CO are present the flask should be set aside for a few hrs. The pptd. Pd will then appear as a brilliant shining film on the surface of the liquid. In this way 0.3 cc. of CO can be detd. with a calorific value of about 1 cal. Impurities in the oxygen are always present. Electrolytic O_2 contains H_2 and cannot be used. Atm. O_2 contains amts. of CH_4 and other combustible gases depending on the purity of the air at the place of manufacture. Every new O_2 flask should be tested before use by detg. the (known) water equiv. of the calorimeter. Combustible impurities in the O_2 can be detected and detd. by passing the O_2 on the way to the calorimeter bomb through a thick-walled narrow heated Cu tube filled with pieces of Pt sheet and Pd asbestos. An increase in the water equiv. of the calorimeter will then be found corresponding to the heat of combustion of the impurities now removed. In one case Berner found a difference of 14 cal. with a good com. brand of air-distd. O_2 using a bomb pressure of 35 atm. The ignition by an Fe wire is a source of various errors. For exact detns. it is much better to use a thin Pt wire. The N_2 content of the O_2 is partly oxidized to HNO_3 , the amt. of which has to be detd. The effect is small when pure O_2 is used, often less than 1 cal. The temp. cannot be detd. with a greater accuracy than 1-2 per thousand by means of the best Hg-in-glass thermometers. For exact measurements Pt resistance thermometers must be used; by these the temp. can be detd. with an accuracy of 0.0001° . With regard to the detn. of the correction for the exchange of heat between the calorimeter and its surroundings reference is made to H. C. Dickinson, *Bulletin of the Bureau of Standards* 11, 189 (1915). An insufficient purification of the substance to be analyzed will often render the results less accurate and much stress must be laid upon a careful purification if very exact detns. have to be made. Some substances have a tendency to keep in soln. or adsorption small amts. of the solvent from which they have been crystd. which cannot be removed by repeated crystn. nor by the usual drying methods. In such cases when there is no way to remove the last traces of the solvent it is recommended to make use of solvents which have very nearly the same heat of combustion as the substance itself. C. A. ROBAK

Studies on oxidation-reduction I-X. W. M. CLARK, BARNETT COHEN, *et al.* Hyg. Lab., *Bull.* 151, 1-363(1928).—A compilation in 1 vol. of the oxidation-reduction studies carried on in the Hygienic Lab. for the past several years. C. R. FELLERS

The entropy and thermodynamic potentials of real gases and mixtures of real gases, and a mass action law for chemical reaction between real gases. I. General thermodynamic relations. J. A. BEATTIE. *Phys. Rev.* 31, 680-90(1928).—From the two assumptions that at infinitely low pressures, the energies of real gases are additive and that the equil. pressure is given by the product of the total pressure into the mol. fraction, there are deduced general thermodynamic equations for the energy, heat content,

entropy, thermodynamic potentials of gas mixts. and the chem. potential of a gas in a mixt. in terms of the independent variables p and T and V and T . Two forms of the mass-action law are deduced, depending upon the choice of p and T or V and T as the independent variables.

BERNARD LEWIS

The application of the third law of thermodynamics to some organic reactions. G. S. PARKS AND K. K. KELLEY. *J. Phys. Chem.* **32**, 734-50 (1928).—The equil. between iso-PrOH, acetone, and H_2 was used to check the third law for org. reactions. The sp. heats were measured for iso-PrOH and acetone for the range $70^\circ K$ to $290^\circ K$. For iso-PrOH the sp. heat varied from 0.172 to 0.308, for acetone from 0.218 to 0.510. The heats of fusion found were: isopropyl alc 21.08 cal.; acetone 23.44. P. and K. carried out the equil. measurements by the dynamic method, using as catalyst finely divided Cu, which had been subjected to 20 oxidations and reductions, the final reduction being at 100° . The temp. varied from 184.3° to 201.8° . The change of entropy for the reaction at 25° from the equil. measurements was 35.9 cal/deg.; from the third law 36.0 cal/deg. The data from the hydroquinone-quinone reaction showed a similar agreement.

ARTHUR FLEISCHER

Observations on the passivity of metals. E. S. HEDGES. *J. Chem. Soc.* **1928**, 969-78, cf. *C. A.* **21**, 1217. —Expts., in which the metal is not removed from the acid, show that Fe passivated by concd. HNO_3 has a protective film of Fe_2O_3 . At 30° , the min. concn. of acid in which Fe becomes passive is 86%. If passive Fe is whirled (3000 r. p. m.) in HNO_3 it becomes active, the "induction period" (about 30 sec.) being the time required for the removal of the film. When heated in the acid the passive metal becomes partially active at 74.5 – 75.5° , and in a sec. transition, occurring at a higher temp., the film is completely destroyed and the metal dissolves violently. The temp. of the first transition is independent of the acid concn., while that of the sec. decreases with decrease in it. No allotropic change takes place during the destruction of the film. Freshly ignited Fe_2O_3 dissolves appreciably at the first transition temp. Cathodic polarization and increase in temp. give periodic phenomena during the activation of passive Fe. Under the proper conditions passivity is shown by all metals, Co, Ni and Cu becoming passive at -11° in 1.42 HNO_3 , while Zn and Mg fail to show it under these conditions, indicating by their behavior that they were between the transition temps. at -11° . When produced by chem. or electrochem. means, passivity is due to the same causes and is exhibited to different degrees dependent upon the protection offered by the film under the conditions. A theory to account for anodic polarization is advanced, being similar to that of Muller (*C. A.* **21**, 3536, **22**, 347; Muller and Noack, *C. A.* **21**, 3784).

J. BALOZIAN

Note on the purity of effluent gas from simple gas generators. J. H. HODGES AND A. M. WHITE. Univ. Michigan. *J. Chem. Education* **5**, 595-6 (1928).—By the method given, the purity at any time can be calcd. as a function of the total vol. of gas that has been delivered. Calcs. show that after a vol. of gas equal to 3 times the vol. of the generating system has been delivered, the issuing gas is 95% pure; after 5 vols. 99.3% pure, etc.

E. H.

Viscosity factor in emulsification. R. CHRISTIE SMITH. *Phil. Mag.* [7], **4**, 820-6 (1927).—Solids giving good emulsifiability have, as a rule, high interfacial viscosities.

GEO. GLOCKLER

Osmosis of ternary liquids. Experimental parts I and II. F. A. H. SCHREINEMAKERS AND B. C. VAN BALEN WALTER. *Proc. Acad. Sci. Amsterdam* **31**, 113-24, 169-78 (1928).—See *C. A.* **22**, 1885.

E. H.

The influence of pressure on the electrical conductivity of gold up to 1000 atmospheres. A. MICHELS AND P. GEELS. *Proc. Acad. Sci. Amsterdam* **31**, 50-5 (1928).—See *C. A.* **22**, 1268.

E. H.

The change of the dielectric constant of liquid helium with the temperature. Provisional measurements. M. WOLFFKE AND W. H. KEESOM. *Proc. Acad. Sci. Amsterdam* **31**, 81-9 (1928). See *C. A.* **22**, 1896.

E. H.

Electric conductivity of flames. P. LÉNARD. *Ann. Physik* **85**, 730-44 (1928).—A review.

A. L. HENNE

Metallic complexes of cellulose nitrates. A. APARD. *Rev. gén. colloïdes* **6**, 69-73 (1928).—See *C. A.* **22**, 1511.

E. H.

ALLEN, CHARLES M.: **Exercises in General Chemistry.** 2nd ed. New York: JOHN WILEY & SONS, INC. 63 pp. \$1.75. Reviewed in *J. Chem. Education* **5**, 499 (1928).

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PRESTON, HAYDN. **Theoretical Chemistry for Junior Forms.** London: E. Arnold. 96 pp. 1s. 9d.

Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry, 1927, Vol. XII. London: Soc. Chem. Ind., Central House. 7s. 6d. net to members, 12s. 6d. to nonmembers. Reviewed in *Gas J.* 182, 376(1928).

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

The fundamental vibration quantum of the mercury molecule. H. KUHN. *Naturwissenschaften* 16, 352-3(1928).—Rayleigh (*C. A.* 22, 541) has described a Hg_2 absorption spectrum (2340 to 2297 A. U.) consisting of 50 edges at 20 per cm. distance. Kuhn suggests an explanation of this spectrum. the small edge distance represents vibrational quanta of the normal mol. the larger periods (four times the smaller ones) are due to vibrations of the excited mol., several series of each type overlapping. The fundamental vibration quantum of Hg_2 is apparently 20 per cm., in agreement with estd. figures from other mols.

B. J. C. VAN DER HOEVEN

The angular momentum of the nitrogen nucleus. R. DE L. KRONIG. *Naturwissenschaften* 16, 335(1928).—From measurements of Ornstein and van Wijk on the intensities in the N_2 band spectrum it follows that the wt. of the even rotation levels of the higher electron terms has to be multiplied by 2.0 as compared with the wt. of the odd levels. This conclusion gives an angular momentum of the N nucleus of $sh/2\pi$ with $s = 1$. Because this result does not agree with the odd no. (21) of constituents (protons and electrons) of the nucleus each with $s = 1/2$, it is assumed that the identity of these is not completely preserved. An assumption of several N nuclei, all of at wt. 14, is improbable.

B. J. C. VAN DER HOEVEN

Lead isotopes and the problem of geologic time. C. S. PIGGOT. Carnegie Institution of Wash. *J. Wash. Acad. Sci.* 18, 269-73(1928).—The intention is to measure by means of the mass-spectrograph the amt. of Pb produced by radioactive disintegration for the estn. of geologic time. Pb was converted into $Pb(CH_3)_4$. Aston identified isotopes 206, 206, 208 in ratio 4, 3, 7. He also found very small amts. of 203, 204, 205 and 209. $Pb(CH_3)_4$ was prepd from Norwegian bröggerite. The material being lost in transit, more will be prepd. and tried in the mass-spectrograph this summer.

L. D. R

A lecture experiment on radioactivity. F. Y. HERRON. Univ. of Pittsburgh. *J. Chem. Education* 5, No. 5, 598-9(1928).

E. H.

Radioactive haloes. Possible identification of hibernium. A. S. RUSSELL. *Nature* 120, 545-6(1927).—The unexplained haloes discovered by Joly and called hibernium haloes can be accounted for in two ways. First, isolation of radioactive products from minerals by chem. means; second, feeble radioactivity of some of the "end" products.

L. D. ROBERTS

Precision methods in radioactivity. L. BASTINGS. *J. Sci. Instruments* 5, 113-22 (1928).—The gold-leaf electroscope is investigated. Errors caused by certain factors are pointed out and corrections suggested. Consistency in measurements of 1 in 1000 is shown to be possible.

L. D. R.

Theory of subelectrons. THADER PECZALSKI. *Compt. rend.* 185, 49-51(1927).—Beginning with Langevin's equation, a mathematical development is given. L. D. R.

Scattering of electrons by crystals. HANS BETHE. *Naturwissenschaften* 16, 333-4(1928); cf. *C. A.* 22, 538.—The explanation of electron scattering by crystals previously given (with refractive index μ) (cf. *C. A.* 22, 538) is now modified. For electron energies between 160 and 370 v. the value of V (potential energy of electrons inside crystal) is an irregular function of the incident wave-length λ ; the sometimes "grazing" electron beams are in disagreement with the theory; the V values found are too high and not negative. Therefore, instead of relating the electron reflection to the next larger x-ray wave-length it is related to the next shorter one, giving a μ smaller

than unity and V negative (around -15 v.), *i. e.*, acceleration of the electrons instead of retardation on entering the crystal. B. J. C. VAN DER HOEVEN

Catalysis as a mechanical action of electrons. L. V. PISARZHEVSKII. *Ukrainskii Khim. Zhurnal* 1, Sci. part. 1-18(1925).—Catalytic activity of metals is due to freely moving electrons. Adsorption of gases by metals is the result of electrostatic forces between gaseous mols. and a film of free electrons on the surface of metals. Impacts of these electrons on the adsorbed mols. produce their dissocn. and ionization and cause thereby chem. reactions. To a similar action are subjected also the mols. of dissolved gases so that catalytic reactions may take place also within the metallic particles. It has been shown in the lab. of P. that illumination by ultra-violet light of a Pt foil accelerates the catalytic combination of H_2 and O_2 . This is due to photoelectrons which activate not only adsorbed, but also free gaseous mols. Charging of a Pt foil positively or negatively diminishes its catalytic activity by destroying the favorable equil. between negative (O_2) and positive (H_2) ions of adsorbed gases. The thermal decompn. of $KClO_3$ is accelerated not only by metallic oxides but also by metals. Ultra-violet light promotes this catalyzed decompn. at room temp. The activity of metallic oxides and metals is primarily due to an activation and ionization of adsorbed gases which, when desorbed on heating, act on $KClO_3$ by destroying the electronic equil. in its mols. Therefore, as expts. show, the catalysts are active even when placed at a distance of 14 cm. from a sample of $KClO_3$. P. assumes that the catalytic actions of enzymes are due to free electrons within their mols. Confirming are the observations made in his lab. that Pt foil, illuminated by ultra-violet light, causes the inversion of sugar and decomposes albumin into albumoses and peptones. Photoelectrons are the cause of these actions. G. B. KISTIAKOWSKY

The liberation of electrons from a metal surface by positive ions. F. M. PENNING. *Proc. Acad. Sci. Amsterdam* 31, 14-23(1928).—See C. A. 22, 1097. E. H

A novel photoelectric effect of thin alkali metal films. RUD. SUHRMANN. *Naturwissenschaften* 16, 336(1928).—From satn. curves it is shown that on illumination of alkali metal films with Hg 240 μ light satn. appears at a few v. anode potential; on illumination with Hg 436 (close to the red limit of the sensitivity range), however, satn. could not be obtained. The current continued to increase with the potential applied (high vacuum). The effect is more considerable for thin films than for visible compact films. Apparently the electrons excited near the red limit become only partly free, whereas by shorter wave light they are completely liberated. It is assumed that the former are in thermal equil. with the atoms. B. J. C. VAN DER HOEVEN

Effect of the surface conditions on the intensity of reflection of x-rays by quartz. YOSHITARO SAKISAKA. *Japan. J. Phys.* 4, 171-81(1928).—The effects of grinding, polishing and etching of the surface of quartz plate upon the intensity of x-ray reflection from various net-planes were investigated. The surface condition has a great influence on the intensity whether the reflection from a surface or through a plate is concerned; a thin surface layer plays a main role in the reflection even for the latter cases. The change of reflecting power by the surface treatment is interpreted as due to the variation of primary extinction in the surface layer. C. J. WEST

Dispersion and absorption of Röntgen rays. J. A. PRINS. *Z. Physik* 47, 479-98(1928).—P. uses the "equivalent resonators" theory to calc. the dispersion and absorption of Röntgen rays as a function of λ^3 . By means of the Fresnel formula, he shows the influence of the absorption on the reflection. Actual investigations of reflection on a steel mirror give results agreeing with his theoretical expectations. A. L. H.

Spectrochemical studies of hydroxyazo compounds. VI. TAKU UEMURA AND SHOZO Tabei. *Bull. Chem. Soc. Japan* 3, 105-7(1928); cf. C. A. 22, 61.—In hydroxyazo compds., the *o*-hydroxyl group gives rise to 2 bands in their absorption curves, whereas the Me group does not seem to influence the shape of the curve. The expts. included the examn. of benzeneazo-*p*-cresol, *p* nitrobenzeneazo-*p*-cresol, *o*-, *m*- and *p*-tolueneazo-*p*-cresol and *o*- and *m*-nitrobenzeneazo-*p*-cresol. A. L. HENNE

The origin of the helium spectrum. I. S. ORNSTEIN AND H. C. BURGER. *Physica* 8, 111-8(1928).—The intensity of the He spectrum, excited in a capillary (2 mm. diam., 1 cm. long) by hot or cold cathode (440 to 1200 v., 0.3 to 40 mm. pressure, 0.03 to 250 milliamps.) was examd. by a thermoelement. From the 3P lines at low c. d. it was found that the no. of quantum jumps ending at this level was only 5.6 to 24% of the no. of transitions initiating at this level. Curves are shown of the intensity I of $^3P^4S$ ($\lambda = 108,300$) as a function of pressure (p) and c. d. (i); at high p (30 mm.) it reaches a const. level (self absorption). The I/i versus i curve at 30 mm. slopes down at $i > 2$ milliamps.; also for $i < 2$ milliamps. except for the very smallest pressures. The abs. intensity perpendicular to the capillary per unit spatial angle is 1.48×10^6 erg

per sec. and sq. cm. for $p = 1$ mm. Hg, $i = 10$ milliamps; i. e., per atom 80 quanta per sec. This figure corresponds to a ratio of 3P and ground level atoms of 10^{-4} . From the heating up of the capillary was derived a potential drop through the capillary of 45 to 75 v. per cm. At very low pressures the ratio of intensity of triplet and corresponding singlet lines decreases considerably below 3 (previously found). At sufficiently low pressure the triplet spectrum will probably be absent. It is assumed that the triplet lines are brought about by collisions with ground level atoms. At higher pressures (ratio 3) the duration of the mean free path of an excited atom will become of the order of the radiation period (10^{-8} sec.).

B. J. C. VAN DER HOEVEN

Missing lines in optically excited iodine fluorescence band spectra. PETER PRINGSHEIM. *Naturwissenschaften* 16, 315-6(1928).—The dropping out of every other line in the I_2 -He spectrum excited by Hg λ 5461 found by Wood and Loomis (C. A. 22, 1729) can be related possibly to a restriction on quantum transitions formulated by Hulthén (C. A. 22, 1100). Both phenomena depend on the improbability of transitions between conditions characterized by symmetric and antisymmetric proper functions.

B. J. C. VAN DER HOEVEN

Relative intensity of spark and arc lines in the spark spectra of various elements. GISABURO NAKAMURA. *Japan. J. Phys.* 4, 165-9(1928).—The relative intensity of spark and arc lines in the spark spectra of various elements was studied in relation to the variation of the material used as the opponent electrode. The intensity measurement was made with a registering microphotometer of the Moll type. The results show that the magnitude of intensity ratios of the arc to the spark lines is generally in the order of the no. of the outermost electrons in Bohr's atom model of the element used.

C. J. WEST

Molecular velocities, states of excitation and probability of transition into a degenerate gas. II. E. PERSICO. *Atti accad. Lincei* [6], 7, 235-7(1928); cf. C. A. 22, 1880.—Mathematical. In the earlier work formulas are given for the distribution of forces between mols. and the distribution of the mols. in various quantic states. These formulas are now applied to the 2 extreme cases of *slight degeneration* and *complete degeneration* and to the detn. of the way in which the Einstein law must be modified to show the probability of transition from one-quantic state to another.

C. C. DAVIS

Correction and addition to "Refraction in gases in the visible and infra-red (6.76μ) and determination of the characteristic vibration of calcite at 6.76μ ." MARTIN RUSCH. *Ann. Physik* 85, 581-6(1928); cf. C. A. 17, 2234.—The wave lengths of the lines Hg 1, Hg 2, Hg 3 and H α are corrected to vacuum. The center of gravity of the calcite oscillation field is located at $\lambda_{10} = 760\text{mm.} = 67,628.5$ A. U. The values for the refractive indices in air and A in the region 546 to 6763μ are 0.02 to 0.03% higher than those previously reported. Dispersion consts. in the Helmholtz-Ketteler formula vary with the spectral region.

J. E. SNYDER

A method for measuring spectral photographs. WILHELM HIRSCHHEL. *Z. Physik* 48, 293-4(1928).

W. F. MEGGERS

The line spectra of oxygen. C. MIHUL. *Ann. phys.* 9, 261-379(1928).—The complete results of wave-length measurements, Zeeman-effect observations, and spectral-line classifications are given for the O II and O III spectra (cf. C. A. 22, 359, 541). The sepn. of lines belonging to different spectra of O is obtained by studying the variations of the lines as a function of the elec. discharge through Geissler tubes contg. the gas. By varying the pressure of the gas a further subdivision of lines into 2 groups is possible in each spectrum, one group consists of sharp lines and the other of diffuse lines. Altogether 428 lines of the O II spectrum (2072.23 A. U. to 6910.75 A. U.) and 315 of the O III spectrum (2045.41 A. U. to 5592.21 A. U.) are measured, and a third list of 76 lines (2449.36 A. U. to 3411.76 A. U.) belonging to still higher-order spectra, probably O IV, is given. The Zeeman effect is studied for 111 lines of the O II spectrum and 19 of the O III spectrum. The structure of the O III spectrum is established with the identification of singlet, triple and quintet terms, combinations among which account for 112 lines. The classification of O II lines has been extended, 220 lines are accounted for by doublet and quartet terms. Discovery of the doublet-quartet inter-combinations confirm the assignment by Bowen of certain "nebular" lines to the O II spectrum. The electron configurations responsible for the terms in both spectra, O II and O III, are discussed.

W. F. MEGGERS

The influence of energetic factors on the structure of spectra. TR. NEGRUSCO. *J. chim. phys.* 25, 308-19(1928).—The general characteristics of flame, arc and spark spectra are reviewed and a contribution to the study of condensed and oscillating spark discharges is made with the aid of a cathodic oscillograph. The disappearance of

high-potential lines when self-induction in the elec. circuit is increased is simply explained by the diminution of the effect of the initial discharge. W. F. MEGGERS

Pressure broadening of absorption bands. M. C. TEVES. *Z. Physik* **48**, 244-58 (1928).—The effect of mixing an inert foreign gas with a mol. vapor upon the absorption spectrum of the latter is studied with N_2 up to 150 atm. pressure as the foreign gas and C_6H_6 and *o*- and *p*- $C_6H_4Cl_2$ as the vapors. Four phenomena were noted: (1) At 5 atm. N_2 pressure the rotation lines of the vapors broaden. (2) The band heads widen also; they are measurably displaced redward by 20 atm., and at 150 atm., they are shifted 30 cm^{-1} . (3) A progressive increase of the absorbed energy is seen with pressure, *e. g.*, in benzene with 150 atm. N_2 the absorption is what one would find in pure vapor at about 5 times greater partial pressure. (4) New bands not observed in pure vapor make their appearance with the addn. of high-pressure N_2 . For these effects up to pressures of 10 atm. the collision-damping theory of Lorentz gives a satisfactory explanation, but the effects occurring with higher pressures appear to be more or less analogous to the Stark effect on atoms, although no definite statements as to the nature of their actions can be made. W. F. MEGGERS

The variation of the absorption coefficient of fluorite and quartz with temperature in the short wave infra-red. O. REINKOBER AND H. KIPCKE. *Z. Physik* **48**, 205-15 (1928).—The absorption coeffs. of fluorspar are measured in the wave-length interval 8 to 12.5μ and of quartz in the region 3 to 6.5μ , to det. their dependence upon temp. in the range from room temp. to that of liquid air. The absorption decreases with lowering temp. but in such a way that extrapolation to zero abs. would still give an absorption coeff. different from zero. W. F. MEGGERS

Investigations of the anomalous dispersion of excited gases. IV. Anomalous dispersion of hydrogen; true intensity ratio of the hydrogen lines H_α and H_β . AGATHA CARST AND RUDOLF LADENBURG. *Z. Physik* **48**, 192-204 (1928).—Anomalous dispersion at H_α and H_β produced by strong excitation of atomic H with direct current of 0.2 to 1 amp./cm.² is photographed and studied by the Puccianti method of horizontal interference bands in a Jamin interferometer as modified by Rogestwensky (cf. *Z. Physik* **48**, 151 (1928)). The ratio of the number of dispersion electrons N_α/N_β is found to be 4.7. This ratio is equiv. to that of the transition probabilities according to the quantum-theory dispersion formula but this theoretical ratio is 5.37. The difference is thought to be somewhat greater than the error of measurement; it may be ascribed to the effect of negative dispersion, which may be appreciable with strong excitation of H. W. F. MEGGERS

The development of the quantum theory. B. TRUMPY. *Tids. Kemi Bergv.* **7**, 113-6, 123-8, 139-41 (1927).—A review. C. A. ROBAK

The copper country Katanga [radium and uranium] (KROLL) 9.

BRESSOLLES: Contribution à l'étude des sels de bismuth radioactif. Paris: N. Maloine. 94 pp. F. 6.

KISTIAKOWSKY, GEORGE B.: Photochemical Processes. Am. Chem. Soc. Monograph No. 43. New York: The Chemical Catalog Co., Inc. About 256 pp. \$5.50.

SENFLEBEN, HERMANN: Nachweise einer direkten, durch Bestrahlung bewirkten Dissoziation zweiatomiger Gase. Heft 13. Bd. 62 of Sitzungsberichte d. Gesellschaft zur Beförderung d. gesamten Naturwissenschaften zu Marburg. Berlin: O. Elsner Verlagsges. M. 1.25.

WOLFERS, F.: Eléments de la physique des rayons X. Paris: Hermann. 336 pp. F. 25.

Radioactive materials. A. FISCHER. *Brit.* **278,347**, Sept. 29, 1926. Ra or mesothorium or their salts are incorporated with metals or alloys such as Pt or Au which are not easily oxidized and the composite material may be hammered, rolled or drawn into sheets or wires for use in therapeutic application or for other purposes. The metal may be preliminarily highly heated and the radioactive material added in the form of a salt together with reducing agents such as glycerol, sugar or citric acid. Various modifications are described.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electrochemistry and electrometallurgy. W. W. F. FRENCH. *J. (Brit.) Inst. Elec. Eng.* **66**, 537-58(1928).—A detailed review. C. G. F.

Yearly review on the electrical developments in the iron and steel industry. W. H. BURR. *Iron Steel Eng.* **5**, No. 6, 211-7(1928). F. H.

Molybdenum resistance furnace. P. W. DÖHMER. *Z. Ver. deut. Ing.* **72**, 556 (1928).—A Mo wire winding is used in this tube furnace, protected from oxidation by MeOH vapor. Temps. of 1500° and more are maintained for several hrs. without oxidation of the winding. H. STOERTZ

Electrical conductivity of aluminum. M. BOSSARD. *Schweiz. elektrotechn. Ver. Bull.* **18**, 113-22, *Science Abstracts* **30B**, 351(1927).—The influence of small additions of Fe, Si, Ti, Cu, Zn and Cd upon the cond. of Al is considered. Results are also given showing the effect of heat treatment and cold work. H. STOERTZ

Duriron as an insoluble anode for gold cyanide solutions. M. DEKAY THOMPSON, COSGROVE, SARROS, HAUSEISEN AND DINAN. *Mass. Inst. Tech. Trans. Am. Electrochem. Soc.* **54** (preprint), 5 pp.(1928).—Duriron was found to withstand corrosion well in the cyanide soln., and would make a better anode than Pb in the electrolytic extn. of gold. The corrosion of Duriron was also detd. in solns. of chloride, chlorate, hydroxide, chromium sulfate and manganate, but was not found suitable for use in any of these. C. G. F.

Electrolytic detinning of copper wastes. V. V. STENDER AND A. A. IVANOV. *Z. anorg. allgem. Chem.* **169**, 399-404(1928).—Tinned Cu waste such as cable or wire can be electrolytically detinned in NaCl or HCl solns., the material to be detinned being the anode. With a 1.2% NaCl soln. and a c. d. of 50 amp./sq. m. the Cu_2Cl_2 formed after the Sn is removed adheres to the anode. The process lasts for about 4 min., the voltage starting at 1.3, rising slowly to 1.75 in 3 min. and rapidly to 2.04 in 4 min. Best results are obtained in a 3% HCl soln. with a c. d. of 500 amp. per sq. m., the energy consumption being about 0.01 to 0.04 kw hr. per kg. of detinned material. About 75% of the Sn is found in the soln. and is easily recovered as SnCl_2 . The detinned Cu is quite pure. The voltage varies from 2.4 to 2.65. H. STOERTZ

The future significance of electrolysis in zinc production. ALFRED MARCUS. *Metall u. Erz* **25**, 133-1(1928).—A discussion. J. BALOZIAN

Maxima on current-voltage curves. I. Electrolysis of nickel salt solutions with the mercury dropping cathode. N. V. EMELIANOVA AND J. HEYROVSKY. **II. The maxima on the polarization curves of uranyl salt solutions.** P. HERASYMENKO. **Electroreduction of uranyl salts by means of the mercury dropping cathode.** P. HERASYMENKO. *Trans. Faraday Soc.* **24**, 257-79(1928); cf. *C. A.* **22**, 1282, 1283. Joint discussion of the above papers. *Ibid.* 279-81. —In answer to a question regarding the gradual increase in applied e. m. f., Heyrovsky stated that the cathodic potential between the soln. and the Hg drops was constantly and regularly increased with increasing applied e. m. f.; the sudden increase in current caused by very small changes of applied e. m. f. was due to an increase in the deposition of cations, which formed a very dil. amalgam necessary to maintain the reversible potential at the cathode, given by $\pi = (RT/nF) \log (C_{\text{amalg.}} K_{\text{Me}} / [Me^n])$. The flat parts of the curve were "satn. currents" due to diffusion of cations through the exhausted soln. layer at the cathode; at these e.m.f.s. the amalgam concn. could not increase any further and the cathode potentials were there due to "concn. polarization." Herasymenko pointed out that the sensitivity of estn. of small quantities of ions could be increased by an increase of temp. and an increase in the rate of dropping. H. STOERTZ

Preparation of catalyst by electrolytic corrosion of nickel. SADA OIKI. *Ind. Eng. Chem.* **20**, 472-3(1928); cf. *C. A.* **22**, 1282. —A very active catalyst for oil hardening and hydrogenation of naphthalene is prepd. by electrolyzing a soln. of NaOH with a Ni anode, black nickelic hydroxide being pptd. The best concn. of electrolyte is between 0.1 and 0.05N, for NaOH, KOH, Na_2CO_3 and K_2CO_3 , and the efficiency is increased by addition of 5-10 cc. alc. per l. A current density of 0.01 amp./sq. cm. at 4 to 7 v. gives good results. H. STOERTZ

Electrodeposition of tellurium. FRANK C. MATHERS AND HOMER L. TURNER. *Indiana Univ. Trans. Am. Electrochem. Soc.* **54** (preprint), 8 pp.(1928).—Te can be electrodeposited in a firm, smooth condition upon Pb cathodes from solns. of TeO_2 in mixts. of HF and H_2SO_4 . Solns. of TeO_2 in HNO_3 or in HCl give much less satisfactory deposits. All Te deposits are brittle; consequently they offer little encourage-

ment for use in commercial electroplating. The deposited Te is free from Se, thus giving a method of refining metallic Te. The Se remains as a slime on the anode.

C. G. F.

P. The common properties of addition agents in electrodeposition. V. Application of the complex cation theory of crystalloidal addition agents to base metals. (Lead) 1. GIICHIRO FUSEYA AND KWANJI MURATA. *J. Soc. Chem. Ind. (Japan)* 31, 323-31 (1928); Suppl. binding 79-80 (In English.); cf. *C. A.* 20, 2793; 21, 1597.—The formation of complex cations between glyocoll added as addition agent and Pb or Zn ions, was studied by means of a spectroscopic method (cf. *C. A.* 16, 2075, 3588) and an electro-metric method. It was found by the spectroscopic method that the mixed soln. of PbSiF_6 or $\text{Pb}(\text{ClO}_4)_2$ and glyocoll extended its absorption bands toward longer wave lengths in the ultra-violet zone than its components did, which indicated that there was complex formation in the both of these mixed solns. With the mixt. of ZnSO_4 and glyocoll no such greater absorption occurred. $\text{Fe}_2(\text{SO}_4)_3$ and $\text{Cr}_2(\text{SO}_4)_3$ form complex compds. with glyocoll, but none was detected spectroscopically in the case of NiSO_4 and CoSO_4 . From the measured values of e. m. f. of the cells of the types: Pb, $\text{Pb}(\text{NO}_3)_2$ (0.1N), $\text{Pb}(\text{NO}_3)_2$ (0.1 N) + glyocoll(M), Pb, and the degree of ionization of salt solns. calcd. from cond. ratios, the degrees of complex formation were computed. About 94% of Pb and about 75% of Zn were in complex form in their 0.1N solns. on addition of 1 mol. of glyocoll. The complex ions formed were found to be cations by the migration expts. VI. Application of complex-cation theory of crystalloidal addition agents to base metals. 2. GIICHIRO FUSEYA AND RYOJI YUMOTO. *Ibid* 331-42 (1928); Suppl. binding 80-1 (In English.).—No increase of the wt. of the deposits and no decrease of the crystal sizes was found in the electrodeposition of Pb and Zn from $\text{Pb}(\text{NO}_3)_2$, PbSiF_6 and ZnSO_4 solns. with the addition of glyocoll. The author concluded that in the electrodeposition of these base metals, the glyocoll does not behave as an addition agent, though it forms complex cations with these metallic ions.

SHUMPREI OKA

Electroplating on aluminum and its alloys. HAROLD K. WORK. *Metal Ind. (N. Y.)* 26, 261-3 (1928).—See *C. A.* 22, 1915.

E. H.

The electrolysis of water by alternating current. A. P. ROLLET. *Compt. rend.* 185, 457-60 (1927).—R. studied the behavior of different polished metals during the electrolysis of H_2O using a. c. of 50 cycles. Figures and curves for the limiting current density that may be used with various metals and electrolytes of a given concn. are given. Further studies are being made.

A. D. SPILLMAN

Storage batteries in relation to modern supply of electric lighting and power. I. C. MCKINNON. *J. Inst. Elec. (Brit.) Eng.* 66, 453-500 (1928).—A very full description of installation requirements, maintenance, etc.

C. G. F.

The origin of voltaic electricity: the contact vs. chemical theory before the concept of electromotive force was developed. C. J. BROCKMAN. Univ. of Georgia. *J. Chem. Education* 5, No. 5, 549-55 (1928).

E. H.

Experiments which contradict the Féry theory of the lead accumulator. ERNESTO DENINA AND ARTURO FRATES. *Notiz. chim.-ind.* 3, 211-5 (1928); cf. D., *C. A.* 20, 3135.—A series of expts. was carried out to det. the potential of some couples of Pb compds. in H_2SO_4 , where the Pb was in different states of oxidation. The couples: $\text{PbO}_2/\text{PbSO}_4$ and PbSO_4/Pb are stable, whereas the couple PbO_2/Pb cannot exist in equil., and its potential can be detd. only by calcn. The causes of errors which influence the measurements are discussed, and the influence of local couples and of impregnation by acid are pointed out. These latter factors account for the contradictory results often encountered in such measurements. The true potentials of the couples: $\text{PbO}_2/\text{PbSO}_4$ and PbSO_4/Pb correspond to those of the plates of the Pb accumulator. The potential of the couple: $\text{PbO}_2/\text{PbSO}_4$ in H_2SO_4 (d. 1.22) at 23° with respect to a normal $\text{Hg}-\text{Hg}_2\text{SO}_4$ electrode in N H_2SO_4 is 1.03 v., which is identical with the positive plate of the Pb accumulator under the same conditions. The couple: Pb/PbSO_4 , under the same conditions has a potential of about 1.03 v., corresponding to the negative plate of the Pb accumulator. The expts confirm the measurements of Streintz (*W. A.* 41, 344 (1890)), Strecker (*Elektrotechn. Z.* 40, 624 (1891)), Joubert (*Trans. Am. Electrochem. Soc.* 37, 641 (1920)) and Liagre (*Bull. soc. chim. ind.* Jan. 26, 1927) and the calcs. of Allmand (*Applied Electrochemistry*, *C. A.* 20, 1567, 233), which seem to be an incontrovertible proof of the constitution of the plates of the Pb accumulator. The expts. therefore confirm the theory of double sulfation (cf. Mazza, *C. A.* 21, 3026).

C. C. DAVIS

Calcing coke (U. S. pat. 1,671,673) 21. Device for supplying N or other inert

gases to oil-filled transformers (U. S. pat. 1,671,492) 1. Coating metals with Al or Mg or their alloys (Brit. pat. 278,415) 9. Apparatus for casting solutions of celluloid or other materials into sheets (U. S. pat. 1,672,403) 1.

Electric battery. A. N. HAZLEHURST. Brit. 277,798, Sept. 13, 1926. In a cell with electrodes of PbO_2 and Cu immersed in an electrolyte of H_2SO_4 or a sulfate soln., the Cu may be coated with solder where it emerges from the electrolyte or otherwise protected from contact with the air at the surface of the electrolyte.

Dry-cell electric battery. A. T. BALDWIN (to National Carbon Co., Inc.). U. S. 1,671,566, May 29. Structural features.

Electrolytic cell for producing hydrogen and oxygen from caustic soda solution. A. E. KNOWLES. Brit. 278,447, July 9, 1926. The cell cover has ventilating traps which permit passage of air either way but remove CO_2 from entering air, *e. g.*, by use of soda lime in the traps. Various structural features are described.

Light-responsive electric cell. P. H. GRIGER (to Westinghouse Brake & Saxby Signal Co.). Brit. 277,610, Sept. 14, 1926. A plate of Cu coated with a layer of Cu_2O may be connected with terminals and placed under a glass plate through which the light impinges.

Storage-battery separator. T. A. WILLARD. U. S. 1,671,335, May 29. Structural features.

Apparatus for dipping storage-battery plates in acid. H. W. LORMOR (to Willard Storage Battery Co.). U. S. 1,672,327, June 5.

Depolarizer for electric dry-cell batteries. A. J. BRIGGS (to National Carbon Co., Inc.). U. S. 1,671,401, May 29. Structural features.

Electrodeposition of repeat designs on metal coatings for walls, doors, furniture, etc. S. DELANGE. Brit. 278,405, June 4, 1926. An app. is described.

Electroplating apparatus suitable for producing continuous metal strips. E. R. ARMSTRONG (to E. I. du Pont de Nemours & Co.). U. S. 1,672,402, June 5.

Salt. E. G. R. ANGEL. Can. 277,095, January 17, 1928. Pure table salt is made from the saliferous caustic liquor resulting from electrolysis of alkali chloride solns. by evapg. the electrolyzed liquor, sepg. the resulting salt crystals from the liquor and washing and drying the crystals.

White lead by electrolysis. R. S. CARRERAS. Brit. 277,723, May 17, 1926. A soln. of $NaClO_2$ or other suitable salt, satd. with CO_2 , is electrolyzed in a single-chamber cell; the electrolyte is withdrawn slowly, resatd. with CO_2 and returned to the cell. Details of size and spacing of the electrodes, etc., are given.

Beryllium and its alloys. SIEMENS & HALSKE A.-G. Brit. 278,723, Oct. 7, 1926. Be and its alloys are obtained by electrolysis of a molten mass contg. Be fluoride or oxyfluoride or both, further quantities of which are added as the electrolysis proceeds. Details are given for the production of alloys. The process may also be used for plating.

Electrolytic condenser. E. W. ENGLE (to Fansteel Products Co.). U. S. 1,672,714, June 5. A filmed electrode such as Al is used with an electrolyte comprising an "ionogen" such as $NaHCO_3$ dissolved in glycerol or other suitable alc.

Obtaining aluminum electrolytically. METALLBANK UND METALLURGISCHE GRS., A.-G. Brit. 277,640, Sept. 18, 1926. In the electrolysis of Al_2O_3 in a flux such as cryolite, Al_2O_3 is used which has been obtained by rapidly cooling the molten material, *e. g.*, after preliminary heating to 1300–2000°. The product dissolves easily in the flux even when in granules as large as 3 mm.

Thermostatically controlled electric annealing furnace. AKT.-GRS. BROWN, BOVERI, BT CRE. Brit. 278,352, Sept. 30, 1926.

Electric induction furnace. SIEMENS & HALSKE A.-G. Brit. 277,361, Sept. 11, 1926. The induction coil is enclosed in a refractory casing which may be formed of zircon, carborundum, corundum or highly burnt clay and immersed in the furnace charge. Various structural features are described.

Electric induction furnace. SIEMENS & HALSKE A.-G. Brit. 277,352, Sept. 11, 1926. The induction coil is placed in an annular depression in the furnace hearth.

Electric melting furnace. E. G. T. GUSTAFSSON. Brit. 278,006, Sept. 27, 1926. A furnace suitable for producing Fe or Fe alloys such as an alloy of Fe with 13–15% Cr employs a slag bath and is provided with adjustable electrodes so that the combined arc and slag resistance per electrode is at least 0.02 ohms. The compn. of the charge may be varied to give a conductive slag to enable long arcs to be used. Ferro-Si, ferro-Al-Si or Al, with or without C, or C alone, may be used as reducing agents. Al, Zn and other metals also may be produced in the furnace.

Electric resistance furnace. D. L. SUMMEY. U. S. 1,671,794, May 29. Structural features.

Electric resistance furnace. H. L. WATSON (to General Electric Co.). U. S. 1,672,667, June 5.

Electric vacuum furnace. G. D. BAGLEY (to Kemet Laboratories Co., Inc.). U. S. 1,671,461, May 29.

Electric vacuum furnace. M. D. SARBAY (to Kemet Laboratories Co., Inc.). U. S. 1,671,451, May 29.

Electric resistance. G. EGLY (to Gebrüder Siemens & Co.). U. S. 1,671,469, May 29. A resistor is formed of silit with a layer of Ag on its contact terminals, a coating of Cr-Ni alloy on the Ag and a layer of Al on the Cr-Ni alloy.

Electric oven. F. H. McCORMICK (to Edison Electric Appliance Co.). U. S. 1,672,724, June 5. U. S. 1,672,725 also specifies structural features of elec. heaters.

Electric tunnel kiln. T. C. PROUTY and W. O. PROUTY. U. S. 1,671,742, May 29.

Rectifier for alternating current. M. SINGELMANN. Brit. 278,731, Oct. 6, 1926. Layers of substances such as Cu pyrites crystals and zincite crystals are placed between pairs of metal plates.

Rectifiers for alternating currents. G. F. MARTIN (to Metropolitan-Vickers Electrical Co., Ltd.). Brit. 277,684, Sept. 16, 1926. In a device of the Cu-Cu oxide type, a neutral contact with the oxide coating on the Cu elements is formed by reducing a portion of the oxide coating to form a cond. element of reduced Cu. Details of procedure are given.

Rectifiers for alternating current. S. RUBEN. Brit. 277,405, June 9, 1926. Dry surface-contact rectifiers are formed with electropositive elements in solid integral form and electronegative elements in pulverulent form. The former may comprise Ta, Cb, Sb and Bi and the latter Mn oxides, Fe oxides, V oxides or PbO₂. The electropositive element is preferably provided initially with an oxide coating which may be formed electrolytically by use of NH₄ borate as electrolyte. Cf. C. A. 22, 1736.

Use of copper-copper oxide rectifiers for supplying high-tension direct current to gas-purifying plants. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 278,710, Oct. 5, 1926.

Loaded electric signaling conductors. V. E. LEGG (to Electrical Research Products, Inc.). Brit. 278,705, Oct. 6, 1926. The central conductor and the loading material are spaced apart by an intervening layer of inert material such as fused Al₂O₃, SiC, kaolin, quartz or dehydrated talc.

Electric system for protecting surface condensers or other metallic parts from corrosion. F. VON WURSTEMBERGER. U. S. 1,671,173, May 29.

Electric system for preventing corrosion of water mains, etc. E. CUMBERLAND. Brit. 277,417, June 15, 1926.

Electric vacuum tubes. A. LEDERER. Brit. 278,019, Sept. 27, 1926. To reduce the potential drop in tubes contg. rare gases, a mixt. of compds. of alkali metals with reducing agents is introduced into the tube and heated, before or after sealing, so that alkali metal vapor is freed and deposited on the wall of the tube. A mixt. of K₂O and Mg may be heated on a Ni electrode.

Ozone. SIEMENS & HALSKE A.-G. Brit. 277,651, Sept. 14, 1926. Ozone is formed by an elec. discharge in a tube filled with glass beads or other pulverulent or granular material which is inert to the gas.

Precipitating metals on an incandescent body. A. E. VAN ARKEL and J. H. DE BOER (to Naamlooze Vennootschap Philips' Gloeilampenfabrieken). U. S. 1,671,213, May 29. Hf may be pptd. on W wire by heating the latter to incandescence in an atm. of Hf iodide; similarly, other metals such as Zr may be deposited on W.

Electric incandescent lamps. F. ECKHARDT and M. HOHNKAMP. Brit. 278,348, Sept. 30, 1926. In devices for maintaining the circuit when one of a no. of lamps connected in series fails, a resistance is used composed of ores such as pyrites, glances or blends, which may be mixed with metal oxides or other suitable substances.

Electric incandescent lamps. M. PIPKIN (to British Thomson-Houston Co., Ltd.). Brit. 277,695, Sept. 20, 1926. A diffusing coating applied to bulbs may comprise metallic oxides, sulfides, silicates or other compds. which can be dissocd. by heat to form a substance of the desired color, e. g., ferric or chromic chlorides or hydroxides. These may be applied to etched surfaces of bulbs or similar articles.

Filaments for electric incandescent lamps. R. STEWART (from Neue Glühlampen Ges.). Brit. 277,634, Sept. 18, 1926. Non-sagging filaments are produced by mech. deforming wire of single-crystal or long-crystal structure, either at sepd. points or continuously, partially to destroy the grid structure. The wire is treated cold and does not require heat treatment.

Resistances for use with electric incandescent lamps. F. ECKHARDT and M. HÖHNKAMP. *Brit.* 277,961, Sept. 27, 1926. A resistance element for use in devices for maintaining the circuit when one of a number of lamps connected in series fails is formed of a metal oxide such as Fe_2O_3 , which is not decompd. when heated.

Mercury vapor lamp with high emission of ultra-violet rays. H. GEORGE (to Hanovia Chemical & Mfg. Co.). U. S. 1,671,109, May 29. Structural features.

5—PHOTOGRAPHY

C. E. K. MEES

Contribution to the theory of photographic exposure. I. SILBERSTEIN. *Phil. Mag.* [7], 5, 464-89(1928).—Discussion of the quantum or light dart theory of photographic exposure (*C. A.* 16, 3441; 17, 2392) and Toy's criticism (*C. A.* 17, 1597). Since the quantum theory cannot explain the expts. (*i. e.*, the number of grains of a given size made developable by a given exposure) completely, S. also investigates the implications of theories based on essentially different assumptions and concepts (nuclear theories). Here the chance factor which in the quantum theories is thrown upon the incident light, making the development of a grain of silver halide depend upon the chance of it being hit by one or more light-darts, is transferred to the grains themselves, which are assumed to contain, before the exposure, certain heterogeneities of a foreign substance (Ag_2S), accompanied by some free Ag atoms, or incipient nuclei distributed haphazardly among them with respect to number as well as size. The part played by the incident light (whose possibly discrete structure becomes irrelevant) consists, then, in maturing or completing these nuclei by depositing upon them and around them further free Ag atoms and thus increasing them until they become large enough (*i. e.*, developable). The mathematical treatment of these ideas is developed and by comparison with expts. is favorable to the nuclear theory (cf. Sheppard, Trivelli and Loveland, *C. A.* 19, 2456).

GEORGE GLOCKLER

Tentative hypothesis of the latent image. I, II. A. P. H. TRIVELLI. *J. Frank. Inst.* 204, 649-62(1927); 205, 111-22(1928); cf. *C. A.* 22, 547.—Based on the investigations of Gudden and Pohl concerning photoelectric conduction in crystals, also on the work of Wightman and Quirk on the action of H_2O_2 on high-speed plates, and on Clark's expts. on sensitivity and latent image, which indicate that the sensitizing speck of high-speed photographic emulsions, as well as the latent image, may consist of both Ag and Ag_2S , a possible elementary photoelectric cell on the surface of the Ag halide grains is pictured. A mechanism of the action of this cell in producing sensitivity is described. Assuming that optical sensitizing is due to the increasing of photo-conductivity for longer wave lengths, a mechanism is suggested by which either certain dyes or silver sulfide could act as an optical sensitizer to increase the sensitivity of Ag halide for wave lengths greater than blue. This mechanism is based on the assumption that dye specks, or finely divided Ag, or Ag_2S , lying in the field of the photoelectric cell $\text{Ag}-\text{AgBr}-\text{Ag}_2\text{S}$, increases its photo-conductivity above that of such a cell without one of these substances present, to wave lengths longer than the blue. The range and intensity of the color sensitivity are dependent not only on the absorption of light of given wave lengths, but also on the size and distribution of the specks of impurity. Also in *Phot. J.* 68, 14-20(1928).

E. P. WIGHTMAN

The latent image and development. II. J. VOGLER and W. CLARK. *Brit. J. Phot.* 74, 670-1(1927).—It is generally accepted that the latent image consists of metallic Ag with perhaps Ag_2S . Since both these are possibly present in the unexposed grain, light must alter their proportions and possibly their condition. V. and C. suppose that light forms a stable space lattice of reduced Ag upon which Ag liberated by the developer is able to deposit. Peptization by the developer and adsorption contribute to the effect. The stability of the light-produced Ag lattice is increased by the presence of AgBr . Development after fixation requires longer exposure because the stabilizing grain surface is no longer present to repress peptization of the latent image by the developing agent.

G. E. MATTHEWS

The law of photographic blackening for a spark source. M. HANOT and H. GUILLEMET. *Compt. rend.* 186, 1048-50(1928).—At the single intensity used in the expt. the gamma for nonintermittent as well as intermittent (spark) exposure is the same in the wave-length band 415 to 537 $\mu\mu$.

G. CHAMBERS

The ripening process. LÜPPO-CRAMER. *Z. wiss. Phot.* 24, 291-8(1926); *Science Abstracts* 30A, 279; cf. *C. A.* 19, 1230; 20, 23; 21, 3568, 3839.—The prepn. of AgBr

emulsions by using bromides other than KBr is described. Ag_2SO_4 was used also in several emulsions and their behavior studied during ripening. In all cases the result was an emulsion with very low speed. Possible explanations are suggested for this lower sensitivity by adsorption of gases on the AgBr surface. E. R. BULLOCK

Application of copper salts in the carbro process. F. J. TRITTON. *Phot. J.* 67, 140-5(1927).—Cu salts may replace the ferricyanide of the usual carbro bleach yielding good prints except for difficulty in sepp. the bromide from the tissue. The formula contains CuCl_2 , NaCl and $\text{K}_2\text{Cr}_2\text{O}_7$. CuCl is formed, which is sol. in the salt and can disperse into the tissue where it reacts with the $\text{K}_2\text{Cr}_2\text{O}_7$, giving possibly basic cupric chromate. K. C. D. HICKMAN

The addition of photographic densities. G. A. TIKHOV. *Bull. acad. sci. union rep. soviet social* 1927, 511-32.—T. develops a method of finding the photographic magnitude of stars by means of two extra-focal star photographs. The two plates are exposed for the same time but at different distances from the focal point of the telescope and the magnitudes based on the difference between the densities of the unknown star as compared with the differences in the case of a star of known magnitude. From these he develops a method of calcg. the magnitude from the densities of overlapping images and also from the characteristic curve of the photographic plate. The article is in French. V. C. HALL

Testing gelatin. R. LUTHER. *Phot. Ind.* 25, 494-5(1927).—A colorimetric method is described using alkaline lead oxide for the detn. of the S content of gelatin. L. comments on Sheppard's investigations and states. "It is well known to many of my colleagues, that independently of the investigations of the Kodak Laboratory, on the role of Ag_2S formation in the ripening process, for some time I have had the idea that the chem. reactions in the ripening of gelatino-Ag halide emulsions consisted of a very slight sulfurization of the AgBr grain, sufficient only for the formation of solid solns. of Ag_2S in the bromide." M. A. YERGER

Hypersensitizing and ultrasensitizing of positive plates. P. GUILLEMINOT. *Rev. franc. phot.* 8, 190-1(1927); *Bull. soc. franc. phot.* 69, 234-7(1927).—If an ammoniacal soln. of AgCl is added to the regular hypersensitizing bath of alc. and dye, the color sensitivity of the emulsion is greatly increased. A very slow positive non-color sensitive emulsion, thus treated, becomes as sensitive as a rapid negative emulsion. Pinaverdol and chlorochrome give the best results. C. E. IVES

Molecular constitution of organic desensitisers. TUNBO SUZUKI AND SHINNOSUKE FUKUSHIMA. *J. Soc. Chem. Ind. (Japan)* 31, 257-64, Supplemental binding (In English.) 67-68B(1928).—Many derivs. of diphenylamine have strong desensitizing action. Exams. of desensitizing action of many org. compds. showed that the fundamental mol. constitution of org. desensitisers is the Ph_2N group, and that the introduction of an amino or a nitro group strengthens the desensitizing power. 4- or 10-Hydroxy-aminodiphenylamines are desensitizer-developers; they show desensitizing action in weak solns. and developing action in concd solns. The desensitizing action was considered to be due to oxidation of AgBr, which is induced by the oxidation of desensitizer by the atm. O. The curves of desensitizing degree plotted against the concn. of the desensitisers were of exponential form, contrary to the result of Crabtree and Dundon. Y. NAGAI

Mercury prints. A. STEIGMANN. *Phot. Ind.* 25, 390-1(1927); *Phot. Rundschau* 64, 163-4(1927).—Carefully selected and sized paper is sensitized with a mercuric chloride-iron oxalate prepn., developed in a mercuric chloride-metol developer, and toned in Senol. S. suggests the process as a substitute for Pt prints. It is of interest from theoretical considerations. M. A. YERGER

Silver xanthate. A. REYCHLER. *Bull. soc. chim. Belg.* 37, 165-7(1928).—Silver xanthate is obtained as a yellow ppt. from AgNO_3 and K xanthate. It is also obtained by leaving AgBr, AgCl or AgI for a day in a soln. of K xanthate. H_2O hardly wets it. Dil. HCl or H_2SO_4 does not act upon it, even at 100° . HNO_3 oxidizes it, yielding black Ag_2S . $\text{HNO}_3 + \text{HCl}$ yield AgCl. Concd alk. solns. blacken it. It is not acted upon by $\text{Na}_2\text{S}_2\text{O}_3$. KCN dissolves it, but it is reprecip. therefrom by acids. The Ag of a photographic negative is easily transformed into xanthate by a 2% soln. of K xanthate. A. L. HENNE

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

The formation of ammonia in the preparation of phosphorus. EDOUARD URBAIN AND VICTOR HENRI. *Compt. rend.* **186**, 1207-8(1928); cf. *C. A.* **21**, 2361.—In the prepn. of H_3PO_4 by the oxidation of P_4 by H_2O in the presence of a halogen acid, at temps. above 600° the halogen acid ceases to act as a catalyst. Under these conditions, however, N_2 is reduced to NH_3 . A quartz tube was filled with charcoal impregnated with H_3PO_4 and through it was circulated N_2 , while heated at temps. varying along its length from 240° at one end to 900° at the other. At 900° H_3PO_4 is reduced to P_4 and N_2 is reduced to NH_3 , the latter combining as $\text{NH}_4\text{H}_2\text{PO}_4$ in the cooler portions of the tube.

A. S. CARTER

Preparation of boric acid anhydride and its efficiency as a drying agent. J. H. WALTON AND C. K. ROSENBAUM. *J. Am. Chem. Soc.* **50**, 1648-50(1928).—In prepg. boric oxide for drying purposes the acid should be dehydrated at about 800° . Pouring the fused oxide into CCl_4 at 0° helps prevent the formation of a glass and the resulting powd. material is a very efficient drying agent up to a moisture content of about 25%.

S. G. SIMPSON

Chlorides of ruthenium. H. REMY AND A. LÜHRS. *Ber.* **61B**, 917-25(1928); cf. *C. A.* **21**, 1418.—Pure RuCl_3 is prepd. in H_2O soln. It is sol. in pure H_2O on long standing to a Cr-green soln. AgNO_3 ppts. Cl from this soln., and Na_2CO_3 gives a violet color destroyed by heat. In the air the sol. RuCl_3 slowly takes up H_2O and splits off Cl. RuCl_3 prepd. by the dry method is insol. in H_2O , but the authors conclude there is no difference in compn. in these 2 forms. Amalgam titration indicates the Ru is trivalent. *Potassium pentachlororuthenate*, $2\text{K}_2\text{RuCl}_5 \cdot 3\text{H}_2\text{O}$, is prepd. by warming the hydroxy-trichloride with a soln. of HCl , KCl and alc. in H_2O on a water bath for 5 hrs. After the soln. has become rose-red, the alc. is driven off, the soln. is filtered and crystallized. Ru is also trivalent in this salt. *Potassium oxydecachlorodiruthenate*, $\text{K}_4(\text{Ru}_2\text{Cl}_{10}\text{O})$, is prepd. by recrystn. of the hexachlororuthenate from moderately concd. HCl or by oxidation of $2\text{K}_2\text{RuCl}_5 \cdot 3\text{H}_2\text{O}$ with Cl. It is cryst., dark brown in color and sol. in H_2O . In this compd. Ru is quadrivalent. The hydroxy-trichloride is prepd. by the action of concd. HCl upon RuO_4 : $\text{RuO}_4 + 7\text{HCl} = \text{Ru}(\text{Cl})_3\text{OH} + 3\text{H}_2\text{O} + 2\text{Cl}_2$. In this compd. Ru is quadrivalent. By amalgam titration to a blue soln., indicating complete reduction Ru^{II} is formed. The green compd. formed as an intermediate in reduction in strong HCl soln. is derived from Ru^{III} .

H. STOERTZ

The existence and preparation of certain oxides of the platinum metals. (With a supplement regarding amorphous oxides.) CULBRAND LUNDE. *Z. anorg. allgem. Chem.* **163**, 345-54(1927).—Attempts to prep. Ru_2O_3 by heating Ru in O_2 at 800° , or by igniting dried $\text{Ru}(\text{OH})_3$ in CO_2 , gave RuO_2 and Ru. Therefore, Ru_2O_3 could not be prepd. by previously described methods in an anhydrous, cryst. condition, and apparently does not exist. RuO_2 was prepd. by heating $\text{Ru}_2(\text{SO}_4)_3$ at 600° in air, and by heating RuCl_3 in O_2 at 600 - 700° , these methods having been previously described. It formed glistening, blue crystals having the following lattice dimensions (rutile type): $a = 4.51$ A. U., $c = 3.11$ A. U., $c/a = 0.689$ A. U. Rh_2O_3 was formed by heating either metallic Rh 1.5 hrs. at 1000° in O_2 , or RhCl_3 1.5 hrs. in O_2 at 800° . It is a gray powder, crystd. in the corundum type, having for the elementary cell, $a = 5.47$, and for the rhombohedral angle, $\alpha = 55^\circ 40'$. An attempt to prep. RhO_2 by fusing RhCl_3 with NaNO_3 and Na_2CO_3 gave a yellowish brown powder whose analysis corresponded to RhO_2 and having the properties assigned by previous authors. The Debye-Scherrer diagram did not give a definite result, but neither Rh nor Rh_2O_3 was present. Pure PdO was prepd. by the method of Shriner and Adams. According to the Debye-Scherrer diagram, it crystallizes in the tetragonal system and seems to be isomorphous with PbO and SnO . The lattice constants are $a = 3.029 \pm 0.005$ A. U., $c = 5.314 \pm 0.005$ A. U., $c/a = 1.754$ A. U. Calcd. d. is 8.31. Finely divided Pd, heated 1 hr. at 830° in O_2 gave a mixt. of Pd and PdO according to the x-ray examn. IrO_2 was obtained by heating IrCl_3 1 hr. in O_2 at 800° . It formed blue crystals of a metallic luster, and of the rutile type, $a = 4.49$ A. U., $c = 3.14$ A. U., $a/c = 0.700$ A. U. An attempt to prep. Ir_2O_3 by the method of Claus gave a mixt. of IrO_2 and very finely divided Ir. The product obtained by dehydrating the hydrate of PtO_2 at 200° gave no interference lines on a Debye-Scherrer diagram. At 600 - 700° only the lines of Pt were observed. Therefore, PtO_2 cannot be prepd. in cryst. form by heating its hydrate, because of its decomp. into Pt and O_2 . PtO_2 forms no cryst. hydrate. On dehydrating $\text{Au}(\text{OH})_3$, the first lines indicating crystn. appeared after 6 hrs. heating at 111° , and were those of

Au. No other lines were noted. The existence of Co_2O_3 is doubtful, and it cannot be prepd. in cryst. form by the previously described methods. Products prepd. by these methods gave lines of CoO or of Co_3O_4 . Careful heating of $\text{Ni}(\text{NO}_3)_2$ gave a black product having an analysis nearly that of Ni_2O_3 , but the Rontgen diagram showed only the lines of NiO . CrO_2 prepd. by heating $\text{Cr}(\text{OH})_3$ several hrs. in O_2 at 330° gave no x-ray lines. In certain cases above, the oxide in question may have formed in its amorphous form; and the inability to prep a cryst. form may have been due either to the instability or to the slow rate of formation of the cryst. form at temp. below which the oxide was chemically stable.

R. H. LOMBARD

Sodium alum. HENRY LEFFMANN AND LESTER W. STROCK. *Bull. Wagner Free Inst. Science* 3, 19-22 (1928).—Gehlen discovered sodium alum in 1815. In 1816, Zellner published his very comprehensive study of this double salt, detd. its percentage compn., and named it Na alum (Natrumsalum). L. and S. find that cryst. Na alum is not readily obtained by slow cooling of its boiling satd. aq. soln., possibly because of the somewhat eccentric behavior of hydrated Na_2SO_4 , which undergoes dehydration at a temp. far below 100° . However, on evapn. at a moderate temp. or on spontaneous evapn. at room temp. crystals are obtained which are isotropic to polarized light. Perfect, clear, brilliant octahedra have been produced, approx. 1 cm. on the edge. The most common form is the octahedron modified by the cube; at times, true cubes and also monoclinic crystals are obtained. Na alum effloresces readily; exposure to the atm. for a few min. produces a white powdery material on the edges of the crystals. The refractive index has been of service in the study of these crystals. A picture of the crystals is given.

JOSEPH S. HEBURN

Univalent manganese. II. W. MANCIOT AND H. GALL. *Ber.* 61B, 1135-40 (1928); cf. *C. A.* 21, 869.—*Sodium manganese cyanide*, $\text{Na}_4\text{Mn}(\text{CN})_6$, is prepd. from $\text{Na}_4\text{Mn}(\text{CN})_6$. Ten g. of this is dissolved in 2% NaOH and 8 g. of Al powder is quickly added in small portions. After about 5 min., when the soln. has acquired a golden brown color, it is filtered and the filtrate run into a soln. of 30 g. NaOH and 60 g. NaCN, satd. with $\text{NaC}_2\text{H}_3\text{O}_2$. A white, finely divided ppt. is formed; this is removed by centrifuging. Analysis gives good agreement with the formula $\text{Na}_4\text{Mn}(\text{CN})_6$. The salt is a microcryst. colorless substance, extremely sol. in H_2O and turned blue by alc. and acetone as a result of dehydration. On standing in the air for a short time it is oxidized to $\text{Na}_4\text{Mn}(\text{CN})_6$ with sepn. of MnO_2 . It is strongly reducing. On heating the soln. in H_2O , H is liberated, while I soln. oxidizes it quant. to Mn^{++} . The K salt, $\text{K}_4\text{Mn}(\text{CN})_6$, is prepd. by reducing the Na compd. $\text{Na}_4\text{Mn}(\text{CN})_6$ as above, the filtrate being added to 200 cc. 10% KOH, then digested with 100 cc. of 20% KCN soln. and finally filtered and washed with 700 cc. of ice cold H_2O . The product is a white, cryst. powder, only very slightly sol. in H_2O , splitting off H when heated in H_2O . Indications of univalent Mn compds. contg. other proportions of Mn to K, such as $\text{K}_3\text{Mn}(\text{CN})_4$ and $\text{K}_2\text{Mn}(\text{CN})_3$, are mentioned, but these have not been isolated.

H. SROERTZ

System: lithium perchlorate-water. J. P. SIMMONS AND C. D. L. ROFF. *J. Am. Chem. Soc.* 50, 1650-3 (1928).—Soly. measurements of LiClO_4 in water were made from 0° to 170° and density values of the satd. solns. from 0° to 40° . The existence of a monohydrate (m. 149°) and a trihydrate (m. 95.1°) was established but there was no evidence of a dihydrate. The transition point between the tri- and monohydrates is 92.53° ; that between the monohydrate and anhyd. salt is 145.75° .

S. G. S.

The ternary system, manganous phosphate-phosphoric acid-water; and diphosphatomanganous acid. G. GRUBE AND M. STAESCHE. *Z. physik. Chem.* 130, 572-83 (1927).—Transference expts. showed that in solns. contg. $1/2$ to $1/10$ g.-atom of Mn per l. of 35N to 45N H_3PO_4 there is present a complex acid whose anion contains Mn. Isotherms of the ternary system $\text{Mn}_3(\text{PO}_4)_2\text{-H}_3\text{PO}_4\text{-H}_2\text{O}$ were detd. at 25° and 55° , whence, by means of Schreinemaker's indirect method, it was shown that this acid is *diphosphatomanganous acid*, $\text{H}_4[\text{Mn}(\text{PO}_4)_2]\cdot 3\text{H}_2\text{O}$. It is the stable, solid phase formed when 15.25N to 44.79N H_3PO_4 is satd. with $\text{Mn}_3(\text{PO}_4)_2$ at 25° , and it consists of faintly rose-colored crystals. When dried in a desiccator over H_2SO_4 it goes to $\text{H}_4[\text{Mn}(\text{PO}_4)_2]\cdot\text{H}_2\text{O}$. It is decompd. by H_2O to form $\text{Mn}_3(\text{PO}_4)_2\cdot 2\text{H}_2\text{O}$; but this decompn. is so slow that the monohydrate of the acid may be prepd. fairly pure by freeing the crystals from mother liquor, washing quickly with H_2O , and drying over H_2SO_4 . The salt, $\text{K}_4\text{H}[\text{Mn}(\text{PO}_4)_2]\cdot 5\text{H}_2\text{O}$, was prepd. by adding to a satd. soln. of the acid in 30N H_3PO_4 sufficient KOH to reduce the acidity to about 12N. After a time a rose-colored, cryst. powder separated, which could be recrystd. from H_2O as long, rose-colored needles. The salt, $\text{Na}_2\text{H}_2[\text{Mn}(\text{PO}_4)_2]\cdot 4\text{H}_2\text{O}$, was prepd. by adding anhydrous Na_2CO_3 to 30N H_3PO_4 , satd. with diphosphatomanganous acid, until the acidity was reduced to 7N

to 10N. The Na salt sepd. as finely divided, faintly rose-colored crystals, which could be recrystd. from H_2O . In the ternary system, from 25° to 55°, the only solid phases which are stable are $Mn_3(PO_4)_2$, $MnHPO_4$, and $H_2[Mn(PO_4)_2] \cdot 3H_2O$. • R. H. L.

Studies of the system: $Na_2O-BaO-SiO_2-CO_2$. 1. **Reactions between Na_2CO_3 , $BaCO_3$ and SiO_2 in the solid state.** H. F. KRAUSE AND W. WEYL. *Z. anorg. allgem. Chem.* **163**, 355-66(1927).—The authors studied the reactivity of powdered quartz with $BaCO_3$, with and without the addition of Na_2CO_3 , and before the mixts. began to melt. When mixts. of quartz and $BaCO_3$ are heated in a stream of CO_2 , evolution of CO_2 begins noticeably at about 700°. For mixts. in which $BaO \cdot SiO_2 > 2:1$, the ratio $BaO \cdot SiO_2$ in the reaction product is 2:1. In mixts. richer in SiO_2 the $BaCO_3$ reacts with a greater proportion of SiO_2 , but not in stoichiometrical ratios. Thus, when the % SiO_2 is greater than for $BaO \cdot 3SiO_2$ the amt. of SiO_2 which reacts may be greater than that required by the ratio $1BaO:SiO_2$. Explanations are suggested for the difference in reactivity of mixts. high and low in silica. The addition of Na_2CO_3 to mixts. of BaO and SiO_2 lowers the temp. of noticeable CO_2 evolution to about 400°, and the compn. of the reaction product depends on the compn. of the mixt. heated. For the isothermal heating of $BaCO_3 \cdot SiO_2$ mixts., at 750°, 850° and 950°, the amount of CO_2 evolved is closely proportional to the logarithm of the duration of heating. This also holds for mixts. contg. Na_2CO_3 . R. H. LOMBARD

The reduction of columbic acid. I. S. J. KIEHL AND DAVID HART. *J. Am. Chem. Soc.* **50**, 1608-20(1928).—By the method of Balke and Smith (*C. A.* **3**, 520) columbite contg. 53% Ch_2O_6 and 21% Ta_2O_6 was converted successively into $K_2C_2F_7$, $K_2C_2O_6 \cdot H_2O$, Ch_2O_6 (in H_2SO_4 soln.) and Ch_2O_6 (by pptn. with NH_4OH and drying the product). The final substance contained 17.5% H_2O . A satd. soln. of Ch_2O_6 in concd. H_2SO_4 (at 25°) was analyzed for Ch_2O_6 and H_2SO_4 , giving 8.34% and 88.11% resp., showing that approx. 15 g. of Ch_2O_6 dissolves in 100 cc. of concd. H_2SO_4 . Upon diln. such a soln. hydrolyzes, and it was detd. that a 0.038M soln. of Ch_2O_6 did not ppt. within 3 days if the final concn. of the H_2SO_4 was 3N or greater. With higher concns. of acid larger proportions of Ch_2O_6 remained dissolved. If 2 cc. of a $Ch_2O_6 \cdot 0.00032 M$ soln., in the presence of relatively high concns. of Ta (which remains colorless) be treated with 1 cc. concn. H_2SO_4 , 7 cc. H_2O and about 1 g. of mossy Zn and allowed to react 5 min., a pale green color develops. With greater concns. the soln. turns blue. By an ingenious app. designed to reduce Ch_2O_6 solns. with a Hg cathode, in an atm. of purified H_2 , and then to deliver the reduced soln. to a vessel contg. a known excess of $KMnO_4$ in O_2 -free soln., thus allowing back titration with $FeSO_4$ soln., the extent of reduction of Ch_2O_6 in a 0.025 M soln. was detd. (a) for periods of 4 to 16 hrs., (b) with H_2SO_4 of 3, 6 and 10 M concns., and (c) with a current density of 3 milliamps. per sq. cm. cathode area. In all cases, whether the reduced soln. was blue or brown in color, the valence in the reduced form was found to be 3. The limiting error claimed is 2 parts in 1000, and the measured reduction amounted to 99.80 to 99.96% of theory. In the presence of 3 M H_2SO_4 the reduced soln. is blue, increasing in intensity from start to finish of the reaction. With 6 M and 10 M H_2SO_4 reddish brown solns. are obtained, and these become blue upon diln., thus indicating the formation of complexes, but not giving evidence of valence change when examd. with $KMnO_4$ as above. W. C. EBAUGH

The deposition of alkaline earth sulfates. L. A. BHATT AND H. E. WATSON. *J. Indian Inst. Sci.* **10A**, 117-29.—The behavior of $CaSO_4$, CaS and $CaSO_3$ on heating alone and in the presence of SiO_2 has been studied at temps. of about 1100°. The effect of adding reducing agents to the $CaSO_4 \cdot SiO_2$ mixt. causes the SO_3 to be evolved at a lower temp. but the temp. for complete decompn. is higher, because of formation of CaS . A quant. decompn. of $CaSO_4$ is obtained in lab. expts. by heating with excess SiO_2 for 4 hrs. at 1100° in a slow current of air. SiO_2 accelerates the decompn. of $MgSO_4$ but to a less extent than $CaSO_4$. Similar expts. with $SrSO_4$ resulted in only 2.3% decompn. with 1 mol. SiO_2 in 1 hr. at 1100°. With $BaSO_4$ the decompn. was 5.4%. J. H. PERRY

Ferrous-ferric cyanides. I. CAMBI AND A. CLERICI. *Gazz. chim. ital.* **58**, 57-64 (1924).—Substantially the same as C. A. **21**, 1769. The formula of ferric ferrosulfopentacyanide is now given as $Fe_3(CN)_{15}(SO_3)_3 \cdot nH_2O$. The work of Reihlen and Zimmermann (*C. A.* **21**, 3324) is a confirmation of that of C. and C. C. C. DAVIS

The purification of potassium dihydrogen phosphate. R. HOLCOMB AND R. R. MCKIBBEN. *J. Am. Chem. Soc.* **50**, 1695-6(1928).—The deposits found in reagent bottles contg. phosphates of alkali metals is not derived from the bottles but is due to the sepn. of Al and Fe colloidi ally aggregated compds. No Si is in it. No salts contg. NH_4 , e. g., $Na(NH_4)_2PO_4$, form such ppts. To purify KH_2PO_4 make up a 0.2 M soln. of the salt, let it stand, sealed in a flask, for 24 hrs. at 75-85°. Filter and recrystallize

the residue obtained upon evapn., or ppt. the salt from cold satd. soln. by adding an equal vol. of cold 95% EtOH.

W. C. EBAUGH

Mercuric ammonium chloride. Facts concerning its formation and properties. F. G. GERMUTH. *Am. J. Pharm.* 100, 285-93(1928).—The addn. of an excess of NH_4 to a mixt. consisting of pptd. HgO and MgCl_2 produces an acceleration of the sublimation process due to a chem. combination of NH_4Cl with HgCl_2 resulting in the formation of the double salt, $\text{HgCl}_2 \cdot 2\text{NH}_4\text{Cl} \cdot 2\text{H}_2\text{O}$, as the sublimate. A drawing illustrating the app. employed in producing this salt is shown consisting of a bell-jar contg. an opening at its base sufficiently large to accommodate a medium-size porcelain crucible (Gooch), in which is placed the material (HgO and MgCl_2) with the excess of NH_4Cl , thoroughly incorporated. The whole rests upon a large tripod, under which a Bunsen burner is placed. To the bell-jar is affixed a movable lid, held in position by gasket, which permits the entrance of the 500-cc. Florence flask, filled with ice. The Florence flask is suspended by wires attached to supports on the under surface of the lid. The side tube of the bell-jar is connected by stout rubber tubing to a filter-flask of one l. capacity, possessing a tubular arrangement on each side. This in turn is attached to the siphon. In this manner a high vacuum is procured. A low flame is introduced under the Gooch crucible, the base of which projects to a slight extent through the opening in the bottom of the jar; sublimation of the reacting substances readily takes place on the cold surface afforded by the Florence flask. In this manner a higher yield of the compd. at a lower temp is attained; tending also to obviate the risk of contamination by volatile substances existing in the air of the lab. Some of the more important phys. properties of the salt have been detd.: m. p. (755 mm. pressure) $210-212^\circ$; sublimation temp (755 mm. pressure) $220-223^\circ$; soly in H_2O (20°) 24 parts in 100 H_2O , (90°) 69-70 parts in 100 H_2O , soly. in alc. (20°) 18 parts in 100 EtOH (60°) 29 parts in 100 EtOH; d_{20} 3.06-3.09.

W. G. GAESSLER

Preparation of the mercuriammonium iodide $\text{Hg}_2\text{N}_4\text{I}_6$ in the crystalline state. MAURICE FRANCOIS. *Compt. rend.* 186, 1205-7(1928); cf. *Ibid* 130, 571.— $\text{Hg}_2\text{N}_4\text{I}_6$ exists in weak ammoniacal solns. as an equil. product of $3\text{HgI}_2 \cdot 4\text{NH}_3$ according to the equation $3(\text{HgI}_2 \cdot 4\text{NH}_3) + n\text{NH}_3 \rightleftharpoons \text{Hg}_2\text{N}_4\text{I}_6 + 12\text{NH}_4\text{I} + (n-4)\text{NH}_3$. To obtain the compd. in the cryst. state, the equil. soln. contg. $3\text{HgI}_2 \cdot 4\text{NH}_3$, NH_3 and NH_4I was prepd at const. temp. (21°) and added to an NH_3 soln. of the same concn.; the cryst. salt pptd. in short, purple, hexagonal prisms. This method was previously applied to the prepn. of crystn. *amercurammonium iodide*, Hg_2NI . A. S. CARTER

DEDE, LOUIS: **Komplexchemie.** Einführg. in die Chemie d. komplexen Verbindgn. Berlin: W. de Gruyter & Co. 116 pp. Cloth-bound, M. 150.

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7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Potentiometric titration and its application to analysis. OSCAR COLLEMBERG. *Svensk Kem. Tids.* 39, 249-65(1927).—A review. A. R. ROSE

Objectives in the teaching of qualitative analysis. J. SAMUEL GUY. *Emory Univ. J. Chem. Education* 5, No. 5, 573-5(1928). E. H.

New method for the qualitative analysis of mixtures containing complex compounds of cyanogen. MICHELE COPPOLA. *Ann. chim. applicata* 18, 65-7(1928).—The method replaces the long and cumbersome Fresenius method of treatment with concd. NaOH and Na_2CO_3 and subsequently with concd. H_2SO_4 . Boil the part of the original substance which is insol. in water with dil. HCl , and filter (*residue A*). Pass H_2S through the filtrate (*ppt. B*). *B* contains all Hg and Fe , $\text{Hg}_3[\text{Fe}(\text{CN})_6]_2$ being very sol. in HCl . $\text{Hg}_3[\text{Fe}(\text{CN})_6]_2$ is also sol. in $\text{K}_4\text{Fe}(\text{CN})_6$ soln., which is of great importance in the latter procedure. *B* also contains sulfides of As and other elements which are not present as cyanides insol. in HCl . Evap. the filtrate from *B* to dryness, mix the residue with *A*, add 4 times the wt. of NH_4NO_3 , deflagrate, cool, add a very little concd. HNO_3 , dissolve in hot dil. HCl (this process destroying the metalocyanide complexes and org.

compsd.). An insol. residue after dissolving the deflagrated product is analyzed for BaSO_4 , AgCl , PbCl_2 , PbSO_4 and SiO_2 . Treat the HCl soln. of the deflagrated product with H_2S , filter on the filter contg. *B* and analyze the residue for metals of the 5th and 6th group of Fresenius. The filtrate contains all other metals and is analyzed by standard methods. If the presence of *K* and *Na* is proved or disproved in other ways and a higher temp. of deflagration is desired, NH_4NO_3 may be replaced by NaNO_3 or by KNO_3 . C. C. DAVIS

An improved rapid method for the determination of gases in metals, especially of oxygen in steel. W. HESSENBRUCH AND P. OBERHÖFFER, *Arch. Eisenhüttenwesen* 1, 583-603(1927); *Stahl u. Eisen* 48, 486-7(1928); cf. Walker and Patrick, *C. A.* 6, 3380; 7, 314, 2579.—The temp. necessary to transform all of the oxides present in steel to CO is 1600° . At this temp. the max. amt. of *O* is obtained. The investigation of secondary reactions disclosed the fact, that the presence of metals whose oxides have a higher heat of formation than FeO are causing errors in the detn. of *O*, unless very high vacuum is used. High vacuum cannot be obtained if crucibles made of refractory oxides are being used, because the reduction of the oxides present in steel comes to an end as soon as the partial pressure of *O* equals the *O* pressure of the refractory materials. The amt. of the oxides remaining in the melt is proportional to the concn. of the metals present in the steel. The disturbing influence of *Al* and *Mn* on the detn. of *O* by the hot extn. method was shown previously. In the new method their influence is not noticeable, because of the high vacuum employed. The formation of H_2O occurs only below 1000° . A normal *S* content is without any effect; with 0.050% *S* the error was 0.003% *O*. At higher *S* content H_2S and CS_2 were formed. The largest part of the gases contg. *S* is decomposed before leaving the furnace. Tests with various crucible materials disclosed the fact that only graphite could be used without being reduced. The graphite crucible used must be degasified and kept in a vacuum. The above considerations were used in the construction of the equipment, consisting of a high-frequency melting furnace in which a quartz tube is placed as the vacuum vessel. In this is placed a magnesia tube, to prevent radiation and finally the graphite crucible. The furnace is heated up and evacuated by a *Hg* diffusion pump, next a drop pump is connected before the diffusion pump and the sample which is already under vacuum is dropped into the graphite crucible which is at the required temp., by a special arrangement. The test piece melts and the gases are immediately carried away by the diffusion pump, in order to prevent secondary reactions between the gases and the metallic parts of the furnace. The gases collected by the drop pump in the analyzer are analyzed for CO_2 , CO , *H* and *N*. Reduction tests with pure oxide indicate that at 1400 – 1500° 70% of the oxides is reduced and that at 1600° there action is practically complete. The surface per g. of the sample has an influence on the results. Instead of drillings the sample should consist of one piece. The crucible has to be degasified for 3-4 hrs. before each series of 10-15 tests. The method can be adapted for the analysis of non-ferrous metals. References are given. J. A. SZILARD

The gas volumetric determination of nitrogen in ammonia, urea and ammonium salts. P. RISCHBIETH, *Z. physik. chem. Unterricht* 41, 132-3(1928).—The substance is decomposed with $\text{NaBr} + \text{NaBrO}$ and the N_2 evolved is measured. When only a part of the *N* contained in a substance is liberated, a factor is used. M. B.

Report on (the analysis of) liming materials. W. M. SHAW, *J. Assoc. Official Agr. Chem.* 11, 152-4(1928); cf. S., MacIntire and Underwood, *C. A.* 22, 1453.—Description of a device for filtering *Ca* succrate solns. out of contact with the atm.

A. PAPINEAU-COUTURE

Analysis of the residual acid from nitroglycerin manufacture. W. YOUNG, *J. Soc. Chem. Ind.* 47, 126-30T(1928).—In the examn. of waste acid, the usual practice has been to det. the total acidity, the total *N* acids and the nitrous acid but the values thus obtained show more acid than is actually present. Expts. with synthetic mixts. and an interesting app. have served to develop a more accurate method of analysis. First, the H_2SO_4 is detd. The substance is placed in a denitrification tube contg. CaCl_2 soln. in an outer compartment. The latter is heated to 120 – 150° and steam is introduced until all nitroglycerin is hydrolyzed leaving behind sulfuric and oxalic acids. The latter is oxidized by careful treatment with KMnO_4 soln. and allowance made for the diminution of acidity resulting from the formation of sulfates of *K* and *Mn*. Then 5 cc. of 3% H_2O_2 in 50 cc. of water are added and the acid is detd. by titration with standard NaOH , methyl orange being used as indicator. In another sample the total *N* acids are detd. by treating 2.5 g. of the waste acid with 10 cc. of 2.5% CrO_3 soln. The *N* acids are distd. off with the aid of steam and titrated with NaOH , methyl orange being used as indicator. In a third sample the actual HNO_3 content is detd. by the well-known

FeSO₄ method or by detg. the quantity of K₂Cr₂O₇ reduced by heating in 50% H₂SO₄. The nitroglycerin content is detd. from the difference between the K₂Cr₂O₇ reduced in this way, and the KMnO₄ reduced by similar treatment or by wet combustion with CrO₃. The values given indicate that the accuracy of the method is satisfactory. The original paper should be consulted for further details. W. T. H.

Spectrographic analysis. E. F. SCHUMACHER. *Bell Labs. Record* **6**, 289-92 (1928).—The usefulness of the Hilger quartz spectrograph is explained with reference to the detection of small quantities of certain elements and to the examn. of Pb-Su alloys. W. T. H.

Determination of chlorine, bromine and iodine in organic compounds. H. TER MEULEN. *Rec. trav. chim.* **47**, 698-700 (1928).—The method described depends upon the formation of NH₄ salt by heating the substance in a stream of H₂ which has passed through concd. NH₃ soln. The vapors are then passed over a hot spiral of Ni wire and then over some hot BaCO₃ from which Ba halide is formed. The contents of the boat contg. the Ba salt are treated with water, the tube is rinsed out, the aq. soln. made acid with HOAc and boiled to remove cyanide. The halide is then detd. gravimetrically or by means of the Volhard reaction with AgNO₃. In the latter case, the ferric soln. serving as indicator should contain no sulfate. W. T. H.

A new identity test for β -naphthol. K. REBER. *Schweiz. Apoth. Ztg.* **65**, 589 (1927).—Heat 1 cc. of a mixt. of 25% HCl (1 part) + 25% HNO₃ (3 parts) with 5 cc. of aq. β -naphthol (A) soln. to 55-60° in a water bath. Soon a crimson color forms, sol. in AmOH. The test is sp. for A and sensitive to 1:6000 aq. diln., but is negative in presence of other phenols, also when H of OH is replaced by Me. *Another test.*—To 2 cc. of 0.03% NaNO₂ soln., add 5 cc. of A and 1 drop of dil H₂SO₄, then warm to 55-60°, a yellow color turning to red, is formed, this, however, is not sol. in AmOH. S. WALDROTT

What constitutes an adequate sample? J. C. MUNCH AND G. L. BIDWELL. *J. Assoc. Official Agr. Chem.* **11**, 220-1 (1928).—A brief discussion of the considerations to be taken into account in judging of the "adequacy" of sampling. A. P.-C.

Determination of iron and aluminum in the presence of calcium, magnesium and phosphoric acid. A. J. PATTEN AND O. B. WINTER. *J. Assoc. Official Agr. Chem.* **11**, 202-8 (1928); cf. *C. A.* **17**, 3146.—Further data are given confirming previous conclusions and showing that: Fe⁺⁺⁺ and Al phosphates are pptd. from solns. below p_H 5.3, while Ca is not pptd. below p_H of about 6.5; NH₄OAc is a suitable buffer for keeping the reaction of the soln. within the range necessary for sepg. Fe⁺⁺⁺ and Al phosphates from Ca₃(PO₄)₂; Fe⁺⁺⁺ and Al can be completely pptd. as phosphates; when Fe is detd. as phosphate the results are slightly high, but the increase is practically within the exptl. error; Fe⁺⁺⁺ and Al phosphates are slightly sol. in hot 5% NH₄NO₃, but when washed 10 times the loss is practically compensated by the slight increase in the wt. of the FePO₄. The microchem. method for detn. of Al in blood described by Mull, Morrison and Myers (*C. A.* **21**, 2908) is being developed for the detn. of small quantities of both Fe and Al. A. PAPINEAU-COUTURE

Iodometric determination of small quantities of copper. C. DAHL. *Tids Kemi Bergvesen* **7**, 8-10 (1927).—The accuracy of the titration was studied in detg. amts. about a few tenths of a mg. of Cu. The titrations were carried out in a vol. of 10 cc. with 0.02 N thiosulfate from a 1-cc. buret graduated in hundredths of a cc. Portions less than 0.01 cc. could be taken out by means of a glass rod. A suitable amt. of KI was found to be 0.2 g. Known amts. of Cu in the form of a dil. soln. of CuSO₄ or Cu(NO₃)₂ were taken out by a pipet with an accuracy of 0.0005 mg. Addn. of HCl or H₂SO₄ caused too high results. Accurate detns. of amts. from 0.1 to 0.2 mg. Cu were obtained with addn. of 0.24-5.0 cc. of pure AcOH, that is even up to 50% AcOH in the titration liquid. The max error was 0.009 mg., the results being 0.001-0.009 mg. higher than the exact values. All the titrations in acetic acid soln. were finished in 1-3 min. and the limit was very sharp. If the vol. is increased or if less KI is used the titration time will be increased and the limit will be less sharp. Filtrations in neutral soln. gave the same results as in acetic acid soln. The presence of reasonable amts. of NH₄NO₃ does not interfere with the accuracy, but the titration time is a little increased. Considerable amts. of AcONH₄ will make the reaction incomplete. C. A. ROBARK

The iodometric determination of phosphorous acid and the use of sodium bicarbonate in iodometry. P. CARRÉ. *Bull. soc. chim.* **43**, 461-4 (1928).—See *C. A.* **22**, 1298. E. H.

Report on (the analysis of) fluorine compounds. G. A. SHUBY. *J. Assoc. Official Agr. Chem.* **11**, 147-9 (1928).—Berzelius' method (*Pogg. Ann.* **1**, 1169 (1824)),

as modified by Rose (*Liebig Ann.* 72, 343(1849)) and by Treadwell and Koch (*Z. anal. Chem.* 43, 469(1904)), gives low results owing to the soly. of CaF_2 in H_2O and AcOH . Schucht and Möller's volumetric method (*C. A.* 1, 279) and modifications thereof give fairly accurate results with pure fluosilicates, but in presence of impurities such as traces of alkalis, Na_2CO_3 or CaO , preliminary treatment of the sample is necessary to prevent reaction with the fluosilicate. Considerable work has been done (cf. following abstr.) on Offerman's "volatilization" method (*Z. angew. Chem.* 3, 615(1890)), modified by Wagner and Ross (*C. A.* 12, 29). Several trials of Steiger (*C. A.* 2, 1104) and Merwin's (*C. A.* 3, 2919) colorimetric method indicated that it merits further consideration in regard to its adaptability to the analysis of fluosilicates. A. P.-C.

Volatilization method for the determination of fluorine with special reference to the analysis of phosphate rock. D. S. REYNOLD, W. H. ROSS AND K. D. JACOBS. *J. Assoc. Official Agr. Chem.* 11, 225-36(1928); cf. preceding abstract.—The volatilization method (mixing the sample with SiO_2 and heating with concd. H_2SO_4 to evolve SiF_4) is the only one applicable in presence of large amts. of P_2O_5 . An investigation of the technic of the method showed that: (1) in the analysis of pure compds. as good results are obtained by digesting the sample with 95% H_2SO_4 at 200–50° as with 98–98.5% at 300°, but with phosphate rock the highest and most consistent results were obtained with 98–98.5% H_2SO_4 at 300°; (2) with pure fluorite grinding to pass an 80-mesh sieve was sufficient, but phosphate rock should be ground to a fineness of about 200-mesh; (3) approx. the same recovery was obtained when the quantity of F in the sample taken varied from 0.0121 to 0.0484 g., but with larger quantities of F the percentage recovery decreases slightly; (4) presence of Fe_2O_3 , Al_2O_3 , Na_2O , P_2O_5 and As_2O_3 do not affect the results, but $\text{Na}_2\text{B}_4\text{O}_7$ greatly reduces the recovery of F, probably due to the formation of volatile BF_3 which is appreciably sol. in concd. H_2SO_4 ; (5) org. matter can be destroyed without loss of F by mixing 2 parts of the samples with 1 of CaO and igniting 2 hrs. at 500–600° while igniting at 750–800° without CaO or at 900–25° with CaO causes considerable loss of F. The method proposed (the technic of which is described in detail) consists essentially in mixing the sample (contg. 30–40 mg. F) with CaO , igniting 2 hrs. at 500–600° to destroy org. matter, mixing with 200-mesh SiO_2 , introducing into a specially designed reaction flask placed in an elec. furnace (type 84, multiple unit, elec. crucible furnace is suitable), treating with 40 cc. 98–98.5% H_2SO_4 , heating rapidly to 250° and then to 300° in 45 min., and drawing a fairly rapid current of air through the app. consisting of a gas-washing bottle contg. concd. H_2SO_4 , a cylinder loosely packed with glass wool and P_2O_5 , the reaction flask, a Bowen potash tube contg. 98–98.5% H_2SO_4 , a Schmitz H_2SO_4 tube contg. a 10% Ag_2SO_4 soln. in 98–98.5% H_2SO_4 (to absorb any HCl that may be evolved), 2 Bowen potash tubes contg. a suspension of CrO_3 in 98–98.5% H_2SO_4 (to absorb SO_2 , HNO_3 and N oxides), a glass tube filled with glass wool (for efficient removal of SO_3) and a Meyer tube contg. 50 cc. distd. H_2O and 10 cc. 0.1 N HCl . Digestion is continued till the scum disappears (about 1 hr.) and aeration is continued 15–20 min. longer. The contents of the S tube are titrated hot with 0.1 N NaOH and the results corrected for SO_2 and SO_3 by oxidizing with Br water and detg. SO_3 nephelometrically. Duplicate detns. easily agree within 0.1% and usually to within less than 0.05% of F. A 92–4% recovery of F is obtained. A. PAPINEAU-COUTURE

The fluorine content of phosphate rock. K. D. JACOB AND D. S. REYNOLDS. *J. Assoc. Official Agr. Chem.* 11, 237–50(1928); cf. preceding abstract.—A study of the F content of the various commercial grades and types of phosphate rock from deposits in the U. S. and several foreign countries, carried out by the above-described method, gave the following results: Florida land pebble, Tennessee brown rock, Idaho phosphate rock, Wyoming phosphate rock, British-Columbia phosphate rock, North African phosphate rock and fluoroapatite, 2.64–4.24%; Norway chloroapatite 0.17%; wavellite and amblygonite 4.0%; triplite 7.72% fish teeth 3.5%, animal teeth 1.8%, animal bones 3.3%, Florida superphosphate 1.9%, etc. About 25% of the F present in phosphate rock is volatilized in the manufg. process; and the quantity thus volatilized annually in the U. S. represents a potential source of approx. 25,000 tons of pure F, most of which can be recovered as fluosilicate. Bibliography of 22 references.

A. PAPINEAU-COUTURE

The influence of impurities from glass containers on the titer of caustic soda solutions (fixanal solutions). W. BOETTGER. *Schweiz. Apoth. Ztg.* 65, 549–53. K. SEILER. *Ibid* 577–8(1927); cf. S., *C. A.* 21, 3847; B., *C. A.* 20, 1188 and *Schweiz. Apoth. Ztg.* 63, 145–7; S., *Ibid* 147–8(1926).—Polemical. S. WALDBOTT

Effect of silica dishes in the determination of potash. L. D. HAIGH. *J. Assoc. Official Agr. Chem.* 11, 219–20(1928); cf. *C. A.* 21, 2348.—If H_2O -sol. P_2O_5 is present

when the K_2O residue is ignited in SiO_2 dishes, greater variations in the results are to be expected than when the ignition is made in Pt dishes. When the phosphates are removed, the variation between the results obtained when Pt and SiO_2 dishes are used is minimized. Probably the phosphates (or free H_3PO_4 formed) attack the SiO_2 dishes and render some of the K_2O insol. A. PAPINEAU-COUTURE

Analysis of the sodium sulfate used in glass works. Direct determination of sodium sulfate. A. BESOMBE. *Bull. soc. chim. Belg.* 37, 164-5(1928).—Commercial Na_2SO_4 usually contains free acid, NaCl, and Fe, Al, Ca and Mg sulfates as impurities. In order to titrate Na_2SO_4 directly add a little excess of Na_2CO_3 of known concn.; the free acid is thus neutralized, whereas the heavy metals precipitate; filter; neutralize the excess of Na_2CO_3 with H_2SO_4 ; evaporate and calcine in a weighed crucible; subtract the weight of NaCl and of the Na_2SO_4 formed by the neutralization of the carbonate. Titrate the free acid and NaCl separately. A. I. HENNE

Precipitation of copper sulfide by sodium thiosulfate. M. G. RAEDER. *Tids. Kemi Bergvesen* 7, 94-5, 105-7(1927).—Cu is pptd. quant from mineral acid solus. by adding $Na_2S_2O_3$ and boiling. H_2SO_4 is the most suitable acid. HCl tends to delay the pptn. a little but causes no greater consumption of $Na_2S_2O_3$. HNO_3 has no harmful effect up to a concn. of 0.5 N if the boiling is not carried on too long, 3-5 min being sufficient. The ppt of Cu_2S should be washed with cold dil. SO_2 soln. Considerable amts. of Fe present (1.5-3.0 g. in the usual vol. of 300 cc.) may cause an oxidation and dissolving of some Cu_2S , if there is not an excess of $Na_2S_2O_3$, particularly if HNO_3 is present and if the boiling is carried on too long. If Fe and HNO_3 are present an excess of $Na_2S_2O_3$ has to be used. C. A. ROBAK

Electrolytic determination of zinc. M. GIORDANI. *Ann. chim. applicata* 18, 63-5(1928).—In the new method of Belasio and Mellana for detg. Zn (cf. C. A. 21, 3580), a Pt anode is used to avoid dissolving Pb by part of the H_2SO_4 formed during electrolysis. Expts. to find substances capable of destroying the H_2SO_4 as soon as formed show that the addn. of EtOH or glucose to the electrolyte accomplishes this object. Though the mechanism of their action is not explained, they are of great advantage in the analysis, a coherent deposit of PbO_2 on a Pb wire being obtained. Glucose gave the best results. The electrolyte (250 cc.) contg. $ZnSO_4$ (prepd. from 0.6 g of pure Zn) is neutralized with NH_4OH , 20 cc. of 0.5N H_2SO_4 , 5 g. of Na_2SO_4 , 12 g. of glucose are added and the soln. is made up to the vol. The current is 0.3 amp., with a cathode c.d. of 0.6 amp. The anode is a Pb wire spiral of 2 mm. diam and 18 cm. long. At the surface of the liquid the wire should be parafined. With this simplification of the B. and M. method, the results are very precise. C. C. DAVIS

Desulfurizing action of silica gel and the failure of the lamp for determination of sulfur (in oils) in the presence of mercaptans. H. I. WATERMAN AND M. J. VAN TUSSEN-BROEK. *Tech Hochschule Delft. Brennstoff-Chem.* 9, 37-9(1928); cf. C. A. 21, 1540.—The following pure S compds. were mixed with kerosene in known quantities and tested for S removal by silica gel: $(C_2H_5)_2S$, $(C_2H_5)_2S_2$, $(C_3H_7)_2S_2$, C_4H_9SH , $(CH_3)_2CHSH$, C_4H_9SH and $(CH_3)_2CH(CH_2)_2SH$. With the sulfides 10 to 50% of the S was removed by 7 hrs. treatment, removal being greatest with sulfides with lowest mol. wt. Mercaptan S was diminished, but the extent of removal was not detd. S in the purified liquids was detd. by burning in a lamp and subsequent absorption of S in the products of combustion. In the presence of mercaptans this gave low results. This was thought to be due to polymerization and retention in the lamp and wick of mercaptans. J. D. D.

Standardization of silver nitrate solutions used in chemical studies of sea water. T. G. THOMPSON. *J. Am. Chem. Soc.* 50, 681-5(1928).—In the abstract of this paper in C. A. 22, 1296, the last part of the fourth line should read "to convert Cl^- per l. (Cl_2) to Cl per kg. (Cl_w).". L. C.

Oxidation of alkaline cyanides with permanganate. H. GALL AND G. LEHMANN. *Ber.* 61B, 670-5(1928).—Oxidation of KCN to KCNO by $KMnO_4$ is quant, only in the presence of a Cu salt. The titration may be carried out at high or room temp. In the first case: add 20 cc of a 30% KOH soln. and 20 cc. of a 5% $CuSO_4$ soln. to the cyanide soln; add an excess of $KMnO_4$ which will make the soln. green; heat at 60° for 5 min.; the soln. must remain green; otherwise add more $KMnO_4$. If the soln. then does not become green, use the titration at room temp. Titrate the excess of $KMnO_4$ with strongly acid $H_2C_2O_4$ at 70°. For titration at room temp.: add KOH and $CuSO_4$ as described before and enough $KMnO_4$ to render the soln. blue. Titrate the excess with acid $H_2C_2O_4$ or $FeSO_4$. In both cases it is advisable to make blanks. Providing a Cu salt is present, KCN may be also titrated by means of permanganate. To prepare pure KCNO: dissolve 5 g. KCN and 5 g. KOH in as little H_2O as possible;

add $\text{Cu}(\text{OH})_2$ freshly pptd. from 10 g. $\text{CuSO}_4 \cdot 10\text{H}_2\text{O}$ and thoroughly washed; add 10 g. KMnO_4 dissolved in as little H_2O as possible. Heat for 2 hrs. at 60° ; eliminate slowly the KMnO_4 excess with H_2O_2 ; filter MnO_2 ; evap. the filtrate and cool it in an ice-salt mixt. KCNO ppts.; it is recrystallized from 80% alc. contg. 10% MeOH . The yield is 5 g. of pure KCNO . A. L. HENNE

Report on chemical methods for reducing sugars. R. F. JACKSON. *J. Assoc. Official Agr. Chem.* 11, 175-8(1928).—From a discussion of the present official A.O.A.C. methods it is suggested that the Meissl method be dropped as it serves no useful purpose that is not covered by the Munson and Walker method. Reliable methods are required for low sugar concns. (less than 50 mg. per 50 cc.), and Scales' iodometric method (*C. A.* 13, 1990) for concns. of 1.5-20 mg. per 10 cc. and Benedict's modification (*C. A.* 20, 3472) of Folin and Wu's method for quantities down to 0.1 mg. are suggested as suitable. A. PAPINEAU-COUTURE

The destruction of chloroform during animal putrefaction. G. SENSI AND D. SIRI. *Ann. chim. applicata* 18, 78-86(1928).—Toxicological studies on CHCl_3 have been confined to methods for its detection and have not taken into consideration its destruction as a possible explanation of failures to obtain a positive test. Therefore the behavior of CHCl_3 during putrefaction was studied by allowing mixts. of various organs of the calf and CHCl_3 -water to putrefy and detg. the CHCl_3 by a modified form of the method of Perrin, Lallemand and Duroy. The most important improvements were the bubbling of air through the mixt. and a more efficient absorption system. Control detns. were also made of the org. mixts. and of the CHCl_3 -water. The quantity of CHCl_3 in the org. mixt. diminished progressively until after about 52 days there was none detected. The mixts. of organs and CHCl_3 -water contained more CHCl_3 than would be present in medico-legal cases, and therefore the complete disappearance of the CHCl_3 shows that CHCl_3 in medico-legal cases is doubtless destroyed even sooner. This emphasizes the necessity for the earliest possible analysis. C. C. DAVIS

Analysis of opal and alabaster glasses (CAUWOOD, *et al.*) 19. Analysis of opal glasses (SINGLETON, CHIRNSIDE) 19.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Contributions to determinative mineralogy. III. P. C. PUTNAM, E. J. ROBERTS AND D. H. SELCHOW. *Am. J. Sci.* 15, 423-30(1928); cf. *C. A.* 22, 1558.—The preferred microchem. test for Fe is the red color of $\text{Fe}(\text{CNS})_3$, for Ga the gelatinous ppt. of $\text{Ga}_4(\text{FeCaN}_8)_3$, for In the cryst. ppt. of Cs_3InCl_6 , and for Pd the cryst. ppt. of $\text{Pd}(\text{C}_4\text{H}_7\text{N}_2\text{O}_2)_2$ produced by dimethylglyoxime. L. W. RIGGS

The determination of minerals, ores and some industrial products with the x-ray. RENÉ VAN AUBEL. *Rev. ind. minerale* 1928, 163-70, 189-95. C. W. OWINGS

Microscopic study of certain metallic minerals of Peru. J. ORCEL AND G. R. PLAZA. *Compt. rend* 186, 769-72(1928).—Three classes of ores are distinguished: (1) those principally Cu, (2) Cu and Pb, (3) Ag. Brief descriptions are given of enargite, bornite, chalcopyrite, "panabase," sphalerite, etc. L. W. RIGGS

The constituents and genesis of a few minerals produced from hot springs and their vicinities in Japan. III. Calcium carbonate minerals deposited from effervescent springs. ICHIZO SUGANUMA. *Bull. Chem. Soc. Japan* 3, 87-9(1928); cf. *C. A.* 22, 2126.—It is generally admitted that CaCO_3 ppts. as aragonite above 50° and as calcite below that temp. In fact, when the pptn. occurs in an alk. system, aragonite is formed, even at low temp.; an excess of CO_2 will form calcite. The presence of gelatin favors the aragonite form, and prevents it from transforming into the calcite form. CaCO_3 found in shells or deposited by algae is of the aragonite form. The ρ_H of native aragonite boiled with H_2O is 8.2-8.4, whereas it is only 7.6-8.0 for calcite. Aragonite powder suspended in H_2O is colored violet by a dil. soln. of $\text{Co}(\text{NO}_2)_2$; calcite becomes sky-blue. Aragonite is colored green by FeSO_4 . Sea water and effervescent springs contain Mg salts, are slightly alk., and have a tendency to form aragonite. The oolitic shape of the ppt. probably arises thus: the nucleus of the granule is deposited first with the evolution of CO_2 gas; edges or tops of crystals are mostly dissolved by CO_2 or are ground by mechanical revolution in H_2O current; thus the grains become spherical and grow gradually through the decompn. of $\text{Ca}(\text{HCO}_3)_2$. A. L. HENNE

Chemical investigations on the roosterite of San Piero in Campo (Island of Elba)

and on beryls in general. FERRUCCIO ZAMBONINI AND VINCENZO CAGLIOTTI. *Gazz. chim. ital.* **58**, 131-52(1928).—Earlier investigations on the rosterite of San Piero have left doubt about its exact compn. (cf. Grattarola, *Riv. sci. ind.* **19**, (1880)) and whether it is an altered beryl (cf. Dana). Crystallographic examn., complete details of which are given, of samples of rosterite from Facciatoia and San Piero confirmed in general the data of Grattarola, and showed that in crystallography it is identical with beryl. The *d.* was 2.761-2.768. Chem. analysis, the results of which are given in full detail, showed the following av. % compn. of rosterite, and for comparison of Siberian beryl, Pisek beryl and Muso emerald, resⁿ: SiO₂ 60.42, 65.25, 65.87, 65.26; Fe₂O₃ 0.77, 0.13, 0.06, 0.09; Al₂O₃ 15.65, 17.84, 17.83, 17.60; Cr₂O₃ —, —, —, —, 0.077; BeO 13.21, 13.29, 13.05, 13.20; MgO 0.14, 0.16, 0.14, 0.77; MnO 0.74, 0.02, 0.03, 0.06; CaO 0.39, 0.83, 0.67, 0.69; BaO 0.19, 0.21, 0.15, 0.16; SrO 0.02, 0.06, 0.01, 0.015; Na₂O 4.22, 0.63, 0.43, 0.50; Li₂O 0.43, 0.10, 0.11, 0.105; K₂O 2.25, 0.18, 0.26, 0.22; Cs₂O 0.91, 0.13, —, —, H₂O 0.84, 0.98, 1.36, 1.84. The compn. of the rosterite differed notably from that reported by Grattarola, particularly in the alk. metals, and in conjunction with the crystallographic examn. the high content of the latter shows that rosterite is beryl which is particularly rich in alk. metals. Grouping Be, Mg, Mn, Ba, Ca, Na, Li, K and Cs, the formula is approx. 4RO.Al₂O₃.6SiO₂, instead of the 3BeO.-Al₂O₃.6H₂O commonly accepted for beryl. Many analyses of beryl reported in the literature approach the former compn. more closely than the latter, and it is concluded that the constitution of beryl is not 3BeO.Al₂O₃.6SiO₂. New analyses of beryls and emeralds are tabulated. The presence of Sr and Ba is particularly noteworthy, and it is the first time that Li has ever been reported in emerald. The high proportion of MgO in emerald shows that Be and Mg are isomorphous (cf. Z and Carobbi, *C. A.* **20**, 694). A review and discussion of the literature in conjunction with expts. on the evolution of water from beryls heated at different temps. leads to the conclusion that the water is in some cases simply an inclusion, in other cases represents an incipient alteration which is not far enough advanced to affect the homogeneity and the transparency of the crystals, and in still other cases it is an essential constituent (water of constitution) of the original compd. C. C. DAVIS

Note on a manganeseiferous anthophyllite asbestos from the Jacobeni-Arsita mine. FR. SLAVIK. *Ann. sci. univ. Jassy* **15**, 133-5(1928).—The sample examined evidently formed the filling of a small vein passing through compact, blackish brown oxide ore and belongs to the group of anthophyllite asbestos. It differs from most of the asbestoses of this class by fusing more easily in the blowpipe, giving a blackish mass which is not colored in a flame, and by being manganeseiferous instead of magnesian. It is apparently the same as the asbestic anthophyllite of Chvaletice, Eastern Bohemia. It is probably the 1st known variety of anthophyllite of which MnSiO₃ is an essential constituent.

A. PAPINEAU-COUTURE

The petrography of coal-mining and industrial applications. RENÉ VAN AUBEL. *Rev. ind. minerale* **171**, 69-80(1928).

C. W. OWINGS

Geology and oil and gas prospects of northeastern Colorado. K. F. MATHER, JAMES GILLULY AND R. G. LUSK. U. S. Geol. Survey, *Bull.* **796-B**, 65-124(1928).—The area covered extends from near Denver to the State lines on the north and east. Both oil and gas have been found in this area.

L. W. RIGGS

Petroleum at Martinique. LOUIS BARRABÉ. *Ann. office nat. comb. liquides* **3**, 7-42(1928).—Report of an investigation on the probability of the occurrence of petroleum in the sedimentary formations in the south and east of the island of Martinique. From a discussion of the geology of the district (which is described in detail), of previously observed or reported indications of the presence of petroleum, and of the situation of the island as compared with that of neighboring islands, B. concludes that, though the presence of petroleum is not impossible, it is very improbable.

A. PAPINEAU-COUTURE

Liquid silicate immiscibility in the laboratory and in the rocks of Agate Point, Ontario. J. W. GREIG. *Am. J. Sci.* **15** [5], 375-402(1928); cf. *C. A.* **21**, 1240; Tanton, *C. A.* **20**, 3412.—The criticisms by T. of G.'s paper on the immiscibility of silicate melts are discussed.

L. W. RIGGS

Geology and petrology of the Sulitelma District. THOROLF VOGT. *Norg. Geol. Undersökelse* No. **121**, 1-447, English summary 449-580, plates 40(1927).—In this extensive paper 35 analyses of the rocks studied are tabulated, and 26 photomicrographs shown.

L. W. RIGGS

An exceptional vein of augitic porphyrite in the triassic dolomites of the high valley of Neva (Ligurian Alps). S. FRANCHI. *Atti accad. Lincei* [6], **7**, 192-4(1928).—Chiefly geological. The veins are characterized by their newness compared with rocks of the

same family which have undergone more profound metamorphism to glaucophane and lawsonite rocks.

The geochemistry of iodine and its importance as a biogenic element. C. C. DAVIS, BRAND LUNDE. *Tids. Kemi Bergvesen* 7, 57-61, 67-72 (1927); cf. *C. A.* 22, 1785.—I seems to be present everywhere. Higher concns. are found in org. nature and in vadose mineral deposits. Upon the first phase sepn. of the earth, the I was distributed in all the 4 phases, though mostly in the atmophile and lithophile phases. In the eruptive rocks the concn. is about 0.2-0.3 mg. I per kg. and in the magmatic sulfides about 0.2 mg. In the Fe kernel the concn. can be estd. at 0.1-0.15 mg. per kg. I is present in meteoric Fe and in all manufd. Fe. It is also present in all living organisms. The relation of I insufficiency to goiter is discussed. Fish contain much I, and are good prophylactics against goiter. C. A. ROBAK

The El Teniente copper mine (KUNTZ) 9. Researches on the practicability of dressing silver-rich ores as well as the complex lead-zinc ores at Klein-Voigtsberg (QUITTKAT) 9. The copper country, Katanga (KROLL) 9.

GOLDSCHMIDT, VICTOR AND GORDON, SAMUEL G.: *Crystallographic Tables for the Determination of Minerals*. Sp. Publication No. 2. Philadelphia: The Academy of Natural Sciences. 70 pp. \$1.50.

WEIGEL, OSKAR AND BEZNER, EMIL: *Die Aufnahme von Quecksilber, Quecksilberoxyd, Sublimat, Brom und Schwefelkohlenstoff durch Chabasit*. Heft 3. Bd. 62 of *Sitzungsberichte Gesellschaft zur Beforderung gesamten Naturwissenschaften zu Marburg*. Pp. 57-111. Berlin: O. Hsner Verlagses.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST AND R. H. ABORN

Applied x-rays in the metal industry. H. R. ISENBURGER. *Metal Ind.* (N. Y.) 26, 271-2 (1928). E. H.

Size and productivity of the metal industry of the United States. H. LOFFR. *Metall u. Erz* 25, 107-10 (1928).—A review. J. BALOZIAN

Chemistry in mining. Chemistry now leads in the development of methods for the production of metals from minerals. C. S. PARSONS. Dept. of Mines, Canada. *Can. Chem. Met.* 12, 166-8 (1928). E. H.

The mining industry of Norway in 1926. C. C. RIBBER. *Tids. Kemi Bergvesen* 7, 91-3, 121-3, 137-8 (1927).—A review. C. A. ROBAK

Gold, silver, copper, lead and zinc in Arizona in 1925. V. C. HEIKES. Bur. Mines, *Mineral Resources of the U. S. 1925*, Pt. I, 563-600 (preprint No. 23, published June 14, 1927). E. H.

Silver, copper, lead and zinc in the Central States in 1925. J. P. DUNLOP AND H. M. MEYER. Bur. Mines, *Mineral Resources of the U. S. 1925*, Pt. I, 255-89 (preprint No. 16, published March 10, 1927). E. H.

Gold, silver, copper, lead and zinc in Idaho and Washington in 1925. C. N. GERRY. Bur. Mines, *Mineral Resources of the U. S. 1925*, Pt. I, 517-62 (preprint No. 22, published June 7, 1927). E. H.

Mercury in 1926. J. W. FURNESS. Bur. Mines, *Mineral Resources of the U. S. 1926*, Pt. I, 125-40 (preprint No. 10, published October 20, 1927). E. H.

The extraction and utilization of molybdenum. G. M. DYSON. *Chem. Age* (London) 18, No. 458, Monthly Metallurgical Sec., 25-7, No. 462, 33-4 (1928).—A review. E. H.

Uniform notation and formulas for the mathematical comprehension of ore-dressing. H. MADEL. *Metall u. Erz* 25, 77-82 (1928).—A summary of formulas used in ore dressing, with a uniform notation, compiled by the professional committee of the *Gesellschaft deutscher Metallhütten- und Bergleute*. These are explained by M. J. BALOZIAN

Researches on the practicability of dressing silver-rich ores as well as the complex lead-zinc ores of the "Alte Hoffnung Gottes" mine at Klein-Voigtsberg i. Sa. GORRHOLD QUITTKAT. *Metall u. Erz* 25, 1-7, 32-9 (1928).—The geological and mineralogical characteristics of the "Heinrich" and "Christliche Hilfe" mines of the "Alte Hoffnung Gottes" are studied. Chem. and microscopic analysis of the ores from the first show that the galena (4%) contains 240 g. Ag/ton of ore, the Zn blend (10%) contains 1230 g. Ag/ton and pyrite (7%) contains 28 g. Ag/ton, the remaining 40% of Ag being com-

bined in Ag-rich ores (pyrargyrite and proustite). In the "Christliche Hilfe" the ore contains, 16% PbS, 18% ZnS and 10% FeS₂, and shows that nearly all the Ag (0.0594% to 0.06%) is present in these minerals. Eleven photomicrographs of the ores of the two mines are given. The Ag content of various sizes of grains is detd. by chem. and microscopic methods, from screen analyses. Various methods of dressing the ore are discussed. Wet methods of dressing proved unsuccessful because of a large loss of metal. The dry methods used at the mines are unsatisfactory because of the insufficient concn. Ag-rich mixed concentrates are prepd. and the Ag-contg. Pb and Zn compds. are sepd. in flotation expts. J. BALOZIAN

The new central ore-dressing plant in Bad Ems of the "Aktiengesellschaft" for mining; lead and zinc production at Stolberg and Westphalia. O. KALTHOFF. *Metall u. Erz* 25, 125-32(1928).—The new dressing plant is described. The methods of flotation, classifying, thickening of slimes, filtering and clarifying the wash-waters are outlined. J. BALOZIAN

Trend of flotation. A. J. WEINIG AND I. A. PALMER. *Quart. Colorado School Mines* 23, No. 2 (1928); cf. *C. A.* 21, 1080.—The classification of all reagents as to uses is given. The theory of flotation is briefly discussed. The practice of flotation at several mills is outlined. This quarterly contains comprehensive information concerning the present methods of flotation. L. D. ROBERTS

Metal recovery from bronze-foundry slags. E. R. DARBY. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 113, 3 pp.(1928).—D. points out by means of 2 illustrations the desirability of metal recovery from bronze-foundry slags either by concn. or smelting. A. W. COFFMAN

The solubility in citric acid of the phosphoric acid from Thomas slag. AUGUST SÜLLWALD. *Arch. Eisenhüttenwesen* 1, 565-70(1927), *Stahl u. Eisen* 48, 547-8(1928).—No change in the soly in citric acid of P₂O₅ from the slag during the transfer of the slag from the converter to the silos was observed. The spraying of slag with water has no influence. Annealing of the slag contg. some SiO₂ causes a reduction in the soly. J. A. SZILARD

The smelting industry in 1927. VICTOR TAFEL. *Metall u. Erz* 25, 101-6(1928).—A review. J. BALOZIAN

The smelting industry in 1927. C. MATZEL. *Metall u. Erz* 25, 208-10(1928).—Various points in Tafel's article (preceding abstract) are criticized. Tafel answers these criticisms. J. BALOZIAN

The firing of smelteries from a central producer-gas plant, with special regard to conditions in zinc smelteries. HUGO WIDMANN. *Metall u. Erz* 25, 173-5(1928).—Zn smelteries are described in which the firing of a no. of ovens from single producers is found to be profitable. J. BALOZIAN

Suggested improvements for smelting copper in the reverberatory furnace. G. L. OLDRIGHT AND F. W. SCHROEDER. *Am. Inst. Mining Met. Eng., Tech. Publ.* No. 49, 20 pp.(1928).—Preheating the solid charge and using powd. coal or oil as fuel has increased the intensity of the firing and made it possible to charge the furnace more rapidly and increase its capacity over that in practice a few years ago. The use of a finely divided charge has made the smelting easier. Preheating the air, extending the length and increasing the temp. of the smelting zone are suggested as means of increasing the capacity of the modern reverberatory furnace. More refractory bricks in the "hot zone" of the arch would permit the use of higher temps. The authors describe in detail the condition of the brick lining at various parts of the furnace, the slag penetration of the bricks and the compn. of slag drips and the "zoning" of the fluid slags penetrating the bricks in the arch. Water-cooling the silica bricks is not considered feasible in lengthening their life. The max. practical temp. for the operation of the furnace is detd. by the fusion point of the silicates made by the interaction of the "dust" of the charge with the brick lining above the fire zone. J. W. SHIPLEY

Copper extraction by the cementation process in the Huelva district of Southern Spain. G. HOPPE. *Metall u. Erz* 25, 197-204(1928).—A description. J. B.

The copper country Katanga. FRANZ KROLL. *Metall u. Erz* 25, 49-53, 150-8 (1928).—A description of the geography, geology and mineralogy of the district is given. The principal Cu mines are owned by the Union Minière Co. and contain for the greatest part oxide and sulfide ores. In 1925 1,390,000 tons of ore was produced, giving 90,100 tons of Cu; in Dec. 1926 the ore reserves were calcd. as 77,000,000 tons, contg. 5,250,000 tons of Cu. The methods of grinding, wet-dressing and flotation of the ores are outlined, flow sheets being given. A description is given of the methods used, direct smelting or lixiviating and electrolyzing, for extg. Cu from the oxide ores. CoO occurs in some of the ores and is sepd. from CuO by metallurgical methods. In

1926, 20 g. of radium was produced, uranium being a by-product. *Sn, Au and Pt* are also found in the district. J. BALOZIAN

The El Teniente copper mine of the Braden Copper Co. Ltd., Rancagua, Chile. J. KUNTZ. *Metall u. Erz* 25, 25-32(1928).—The geography, geology, nature of the deposits, means of obtaining power and H₂O and methods of mining, dressing, smelting and transportation used, are described. In 1927, the output of Cu was 250 tons daily. J. BALOZIAN

Effect of melting and pouring conditions upon the quality of No. 12 aluminum alloy sand castings. T. W. BOSSERT. *Trans. Am. Foundrymen's Assocn.* 1928, 427-38; *Metal Ind.* (London) 32, No. 21, 520-1; No. 22, 542(1928).—Drawing and cracking can be minimized by changes in the molding methods but the tendency increases with the coarseness of the cryst. structure of the casting Expts. indicate that control of both melting and pouring temp. are important. The effect of a high pouring temp. is more harmful than that of a high melting temp. alone. Allowing the metal to remain in the furnace in the molten condition is harmful. When this is unavoidable, the temp. should be kept as low as practical. The detrimental effect of a high melting, pouring or soaking temp. can be removed by casting and remelting, provided proper precautions are taken on the remelt. The general effects of time and temp are not altered by variations in the Fe or Si content from 0.5 to 1.5%. J. W. BOESCK

The formation of complex silicates in the roasting of blends. V. HASSEIDTER. *Metall u. Erz* 25, 53-5(1928).—In the roasting of blends contg. Cu, it is assumed that all the CaO, MgO and BaO are converted into the corresponding sulfates or are already present as such. Actually, there is much uncertainty as to the degree of sulfatization of Pb and MgO, only CaO and BaO being completely sulfatized. The silicates of CaO and MgO, present in the ore not decompd. by HCl, or very difficultly so, are changed, in the presence of Pb at the roasting temp., to complex Pb, Ca and Mg silicates. These are much more easily decompd. by HCl than are the unroasted blends. Contradictions in the analytical results on raw and roasted ores are explained by this. J. B.

British blast-furnace and cupola practice. J. E. FLETCHER. *Fuel Econ. Rev.* 6, 43-5(1927); cf. *C. A.* 21, 2112. E. H.

The cleaning of blast furnace gas. II. A. J. BOYNTON. *Blast Furnace Steel Plant* 16, 623-8(1928); cf. *C. A.* 22, 2131.—A comparison of German methods. The disintegrator and its operation are briefly described. All types have a similar basic principle, consisting of the passage of a mixt. of gas and water between rapidly rotating and stationary bars. Power and water consumption in disintegrators are discussed, also sludge disposal. Bag filter systems and elec. pptn. with the variations in elec. devices employed are also discussed. Activity is shown in the development of methods of dry sepn. of dust prior to wet washing. A plant is under construction in Germany, proposing the centrifugal sepn. in a plurality of parallel horizontal pipes about 18 in. in diam., within which the gas is given a whirling motion by means of stationary screws. These pipes open on the lower side into a chamber without inlet or outlet, excepting for dust removal, the gas being carried through the chamber within the pipes. While in the U. S. the disintegrator method is regarded as the simplest, cheapest and most flexible of the thoroughly tried-out Continental systems, broad experience which is indicated in the near future in Germany may lead to a considerable application of elec. pptn. W. H. BOYNTON

Gas analysis index of furnace operation. HUGO BANSSEN. *Ber. No. 86, Hochofen.* Ver. deut. Eisenhuettenlaute; *Blast Furnace Steel Plant* 16, 615-6(1928).—An outline of work in Germany towards the evaluation of the blast-furnace gas analysis in terms of the operating conditions of the furnace. The method consists of calcg. instantaneous heat and material balances from a knowledge of the gas analysis and of the vol. of air blast. Gas analysis as performed is reduced to a basis of the actual combustion reactions. By subtracting the C equiv. of CO₂ from the total mols. of C leaving the furnace, it is possible to set up a heat balance showing the instantaneous disposition of the C charged as coke to the furnace. This permits calcg. the rate at which coke is burning at the tuyeres and the rate at which heat is being supplied. The rate of ore reduction can be calcd. and a balance made between the heat available and the heat required for the metallurgical purposes. Any discrepancy indicates improper functioning, such as C deposition, increased direct reduction, or oxidation of the scrap by CO₂, which is ascertained immediately after showing the calcd. effects of factors such as blast temp., gas temp., etc., on the coke consumption per ton of pig iron. W. H. BOYNTON

Recording and controlling instruments in the iron and steel industry. C. C. EAGLE AND R. M. WALKER. *Iron Steel Eng.* 5, No. 6, 263-77(1928). E. H.

Fuel requirements in iron and steel production. E. C. EVANS. *Fuel Econ. Rev.* **6**, 39-43 (1927). E. H.

Variables in steel-foundry practice. F. A. ΜΕΛΜΟΙΗ. *Trans. Am. Foundrymen's Assoc.* **1928**, 323-58.—The major variables influencing the production of steel castings are the human element, molding operations, metallurgical behavior of the steel and heat treatment after casting. The human element can be reduced by the introduction of standard methods, machines, etc., on repetition work, and by the satisfactory training of the operator on other classes of work. The construction of the pattern, position of the runners and feeding heads and molding materials are considered. For small and medium-size sand castings extreme refractoriness is not vital. The main variables are moisture and permeability. For large, heavy castings, the silica-base sands are not suitable and are replaced by mixts. of old crucible pots, used fire bricks, fire clay, sand and coke dust, ground and moistened so as to produce the necessary bond. The most likely variables attributable to mold materials are listed. The effects of variations in chem. compn. are discussed. In plain C steels the C content is the controlling factor of the phys. properties. Si is present to assist soundness by the removal of oxides and has little effect on the phys. properties. High Si appears to increase the soly. of mold gases. Low Si, in the absence of other deoxidizing agents, allows free oxide of Fe to exist in the steel at the time of casting, which reacts with the C, producing unsound castings. Mn functions primarily as a deoxidizer and assists soundness greatly. Tensile strength and yield point are materially increased without great loss of ductility. An ample percent of Mn by the formation of MnS prevents the formation of FeS, the latter being very detrimental to the phys. properties. In the presence of a reasonably high Mn content S, present in the usual amts., is unlikely to be the cause of serious trouble. High S causes red shortness. P has very little effect on the phys. properties when in normal amts. The belief that an increase in P causes an increase of fluidity is not confirmed. M. is rather of the opinion that the increased fluidity is due to melting conditions, which coincidentally produce high P. The various types of furnaces and the use of deoxidizers, such as Al, ferro-titanium and Ca silicide are discussed. The necessity of correct heat treatment after casting is emphasized. In the majority of cases a suitable anneal is all that is necessary. In special cases, especially with alloy steels, further improvement is obtained by a quench and draw. Typical phys. properties and micrographs are given. J. W. BOECK

Sand control and sand conservation in a gray-iron jobbing foundry. T. F. KILEY. *Trans. Am. Foundrymen's Assocn.* **1928**, 359-76.—The value of sand tests as found in control, conservation and reclamation is discussed. Sands are tested for relative moisture, permeability and bonding strength. The app. and procedure are described. Methods of reclaiming, difficulties met with in rebonding sands and methods used for overcoming them are discussed. Reclaimed sand mixts. for both light and heavy work are given. The results obtained by using different types of clays to rebond sand over a period of time are tabulated. J. W. BOECK

Waste-heat recovery from open hearth. T. J. ESS. *Blast Furnace Steel Plant* **16**, 646-8 (1928).—A brief study from theoretical and practical viewpoints, of the service rendered by waste-heat boilers. Heat available, boiler heating surface required, velocity of gases, and testing of boilers are taken up. "Every plant presents a different problem and should be subjected to an individual investigation." W. H. B.

Carbons to meet tensile specifications. J. R. MILLER. *Blast Furnace Steel Plant* **16**, 629 (1928).—A table provides for the ready application of open-hearth melts at the mill on the ladle test figures against the usual run of structural requirements. A margin of safety makes allowance for the usual variations met with in mill practice. W. H. BOYNTON

Standardization of a small impact test. FR. P. FISCHER. *Stahl u. Eisen* **48**, 541-7 (1928).—Discussion of the impact tests in use. The Mesnager test is proposed to be used as the small impact test beside the large Charpy test. J. A. S.

Re-heating and heat treatment furnaces. F. G. BELL. *Fuel Econ. Rev.* **6**, 46-51 (1927).—A review. E. H.

A metallographic study of the path of fatigue failure in copper. H. F. MOORE AND F. C. HOWARD. Univ. Ill., Eng. Expt. Sta., *Bull.* **176**, 27 pp. (1928).—The study of failure of metals under repeated stress, usually carried on by means of mechanical tests of strength, was made in this case by use of metallographic technic. By etching with concd. HNO₃ rolled copper showed an intra-granular structure consisting of laminae sepd. by planes especially sensitive to chem. attack. Specimens of rolled copper subjected to repeated flexure until a fatigue crack developed showed a surface disturbance of the metal in the vicinity of the crack, which seems analogous to that

found by Lucas in Armco iron but which is more clearly marked. This same copper etched after the development of a fatigue crack showed no evidence of change in crystal structure. H. L. OLIN

The structure of metals and its significance in foundry practice. J. CZOCHRALSKI. *Giesserei-Ztg.* 24, 1-12(1927); *J. Inst. Metals* 38, 467.—A description with many illustrations is given of the use of the microscope in examining the grain structure and microstructure of metals and in detecting the presence of objectionable impurities. The variation of the structure of Al alloys and white metals with the casting temp. is described, together with the effect on Cu and Al of melting in different oxidizing and reducing atms. H. G.

Characteristic graphite crystallization in pig iron and cast iron. HANS PINSL. *Stahl u. Eisen* 48, 473-7(1928).—Peculiar forms of graphite crystn. and segregation are discussed and illustrated with photomicrographs. J. A. SZILARD

Growth of cast irons. I. MORGAN. *Bull. Brit. Cast Iron Research Assoc.* 20, 7-17(1928).—Reference is made to the most extensive investigations published concerning various agents contributing to and retarding the growth of gray cast iron. Any recommendations for heat-resisting irons must be made for each particular case. DOWNS SCHAAF

Test results for centrifugally cast iron pipe. H. KOESTER. *Gas u. Wasserfach* 71, 391-3(1928).—Test results for ordinary and for centrifugally cast iron pipe show that the latter are much stronger. R. W. RYAN

Malleableizing hard iron in tunnel kilns. J. H. HRUSKA. *Fuels and Furnaces* 6, 611-2(1928).—Malleableizing hard iron is affected by chem. compn., time and temp. conditions and the thickness and design of the castings. In American practice the iron should be within the following approximate limits: Total C 2.20-2.80, Si 0.70-1.20, Mn 0.20-0.35, S max. 0.06, P max. 0.18%. The only effect of compn. upon the tensile strength of properly malleableized material is due to changes in C content. The tensile strength ranges from an av. of 57,000 for 2.20% total C to 43,000 for 3.00% C. The most important factor in satisfactory malleableizing is the proper relationship between time and temp. conditions. A time-temp. and a tensile strength-carbon content chart accompany this paper. J. W. SHIPLEY

Effect of various elements on malleable cast iron. L. E. GILMORE. *Trans. Am. Foundrymen's Assoc.* 1928, 287-92.—The elements present in ordinary malleable iron are: Fe, P, Mn, S, Si and C. In solu. P is harmless, but Fe phosphide causes brittleness and loss of strength. The Mn-S ratio must be carefully controlled with Mn in slight excess, but the abs. amts are not so important. Low C with high Si makes the strongest and most ductile Fe. Ti, Ni, U and Zr act like Si in pptg. C. Inhibitors of graphitization are abnormal amts. of S or Mn, and Sb, B, Ce, Cr, Mo, Se, Te, Sn and V. Malleable Fe should be regarded as a mixture of compds and interacting elements, which, when properly balanced, det. the quality of the Fe. H. C. DAVIS

The removal of iron from old zinc. RICHARD THEWS. *Metallhölse* 15, 1183, 1407-8(1925); *J. Inst. Metals* 36, 565.—The importance of refining of old zinc melted in Fe vessels is discussed. Various preventive precautions to be observed during the melting of Zn are dealt with. If steel vessels are used, and if the temp. is kept as low as possible, then the Fe content in the remelted Zn can seldom reach 0.1%. The use of S and some other media for the refining of Zn is considered. H. G.

Cementation of iron, steel, nickel and cobalt with boron and beryllium. J. FETCHENKO-TCHOPIWSKI. *Collected Papers from Przeglądu Technicznego* 1926, 525-30, 545-7, 657-60, 692-4, 705-7; 1927, 73-8, 787-92, 832-6; *J. Inst. Metals* 38, 460.—[In Polish, with French summary.] Expts. on the diffusion of B and Be into Fe, steel, Co and Ni show that diffusion is more rapid the greater the difference in at. vol., the greater the difference in the m. ps., and the simpler the crystallographic symmetry of the solvent metal. Data on the depth of penetration at varying temps., together with analytical and micrographical examn. of the cemented layers, indicate that the limit of soly. of B in Ni below 1140° is 7% and is independent of the temp.; the soly. of Be in solid γ -Fe decreases from 30% at the eutectic temp. (1155°) to about 24% at 650°, at which point the Fe reverts to the α phase. Be appears to be completely insol. in solid Co below 1300°, but dissolves to a limited extent in solid Ni; B, likewise, dissolves to a limited extent in Co. The surface layers formed by cementation in most cases display age-hardening phenomena after quenching from suitable temps. H. G.

Oxygen in iron and steel. P. OBERHOFFER, H. J. SCHIFFLER AND W. HESSENBRUCH. *Arch. Eisenhüttenwesen* 1, 67-8; *Stahl u. Eisen* 47, 1540-3(1927).—The effect of O on the primary and secondary structure of Fe was investigated. Electrolytic Fe and FeO were melted *in vacuo*. All samples showed after etching with alc. CuCl₂

a dendritic structure, which is caused by segregation of the O retained in solid soln. The limit of soly. of O is between 0.05 and 0.06%. Fe-FeO solid soln. has a more positive potential than pure Fe; therefore etching with primary etching agents is slower. There is a sudden increase in the rate of etching if the limit of the soly. of O in Fe is passed, because of the higher potential of the FeO particles sepd. from the solid soln.; the primary structure appears faded as the solid soln. is also attacked.

J. A. SZILARD

Examination and properties of steel with physical peculiarities. F. STABLEIN. *Z. tech. Physik* 9, 145-7(1928).—A short review is given, with curves, of the relations between the compn. of steels and their magnetic qualities, thermal expansion and specific resistance.

B. J. C. VAN DER HOEVEN

Defects in soft, non-silicon steels due to methods of production. K. VON KERPELY. *Mitt. staatl. tech. Versuchsanst. (Wien)* 16, 108-17(1928).—Defects are usually the result of using low-grade materials, although sometimes the rolling process introduces irregularities into the material. Failure is most often due to (1) non-metallic inclusions which have their origin in the deoxidation process, (2) differences in grain size, (3) local coarsely cryst. areas, (4) oxide inclusions. Detailed directions are given for the production of boiler-tube steel. Since non-siliceous steel has a greater tendency to release gases than siliceous steel, it is advisable to give the former a uniform preheating before rolling. The best rolling temp. is 1300°. Elec. furnace steel is uniformly better than open-hearth steel for tubes, since a higher temp. is reached in its production. As a means of deoxidizing, ferro-C-titanium with Al is recommended. W. F. H.

Behavior of unalloyed and alloyed boiler plate at elevated temperatures and in respect to aging and recrystallization. FRIEDRICH KÖRBER AND ANTON POMP. *Mitt. Kaiser-Wilhelm-Inst. Eisenforsch. Dusseldorf* 9, 339-400(1927).—Fourteen specimens of boiler plate were examd. In the unalloyed plate, C varied between 0.06 and 0.29%, Mn between 0.42 and 0.64%, P between 0.016 and 0.037%; S between 0.024 and 0.046%, Cu between 0.11 and 0.21%, with only 2 samples contg. 0.12 and 0.18% Si, the others traces. In the alloyed plate, 2 types were studied, one contg. 3% Ni, the other 5% Ni, each with about 0.10% C, 0.06% Mn, 0.10 to 0.20% Si, 0.02% P, 0.016% S and 0.05 to 0.12% Cu. In all specimens, elastic limit (0.01 and 0.03% permanent deformation), limit of stretch, tensile strength, elongation and reduction in area were detd. between 20 and 500°, fatigue strength at 300, 400, 500°, and notch test between 0 and 500°. In varying the testing temp. from 20 to 500° the following effects were obtained: Elastic limit and limit of stretch decrease only slightly up to 200° and then decrease rapidly. Tensile strength increases up to 200°, falls off slightly to 300°, and then rapidly above 300°. Elongation and reduction in area fall off up to 200° and then rise again. The values for notch test increase up to 50 or 100° and then fall off. In natural aging, the specimens after cold working were loaded to about 4 kg./sq. mm. above the lower limit of stretch and allowed to stand at room temp. for 3, 14, 30, 90 and 270 days. Except for a decrease in the notch test on the unalloyed steels, little change took place in natural aging. In artificial aging, the specimens were heated in an oil bath at 200° for 2 hrs., and the notch test was then made at 20°, 50°, 100° and 200°. To produce recrystn. the unalloyed steels were heated for 1 hr. at 780° and slowly cooled while the Ni steels were heated for 1 hr. at 650°. Both mech. tests and photomicrographs indicated better properties in the 5% Ni steel after recrystn. than before. H. SROGRTZ

Electrical resistance of molten metals and alloys. YOSHII MATSUYAMA. *Kinzoku no Kenkyu* 3, [9], 439-55(1926); *J. Inst. Metals* 37, 480.—[In Japanese.] The object of the investigation was to measure the elec. resistance of binary systems in their liquid state, and from the resistance-concn. curves to decide the question whether an inter-metallic compd. exists as such in its molten state or whether it exists in at. state being completely dissoed. The exptl. method was the same as that given in a previous paper (C. A. 22, 2309) and the results of the investigation may be summarized as follows: (1) In binary alloys, the components of which form no compds. with each other in the solid state, the resistance-concn. relations can be expressed by a curve bending slightly from one component to another without showing any max. or min. (2) In binary alloys, the components of which form one or more intermetallic compds. with each other, the resistance-concn. curve shows a max. in the concn. of the compd.; and the temp. coeff.-concn. curve shows a min. in the same concn. (3) Usually the max. and min. are very sharp; but in some cases they are more or less rounded, showing some degree of disso. of the compd. (4) From the above results, it is concluded that in the Fe-C system the cementite (Fe₃C) is present as such in the molten alloys, though some degree of disso. may result. H. G.

Heat treatment of aluminum-alloy castings. R. J. ANDERSON. *Am. Metal Market* 35, 5-12, 44(1928).—The reasons for the improvement in hardness and strength of Al alloys upon heat treatment are given with reference to the equil. diagrams. The heat-treating process usually consists in (1) heating the casting to a suitable temp. (about 500°) and "soaking," (2) quenching in cold, hot or boiling water or in oil, and (3) aging, by warming to some temp. between 20 and 230°. The various factors of importance in the technical heat treating of Al alloys are discussed at length. Detailed drawings are shown of an electrically heated and operated soaking furnace and of a similar type of furnace for aging.

WILLIAM F. EHRET

Aluminum alloys. HUGO MAINZ. *Metallbörse* 15, 2357-8, 2414(1925); *J. Inst. Metals* 36, 431.—The phys. and chem. properties of Al and its alloys are discussed. The remelting of Al shavings is dealt with.

H. G.

Various kinds of aluminum alloys. MASAJI GOTÔ AND TOKUSHICHI MISHIMA. *Nihon-Kôgyôkaishi* 41, [477], 1-17(1925); *J. Inst. Metals* 38, 410-1[In Japanese.].—Molten Al-Mn alloy separates into two layers in the range from 90% to 55% Al, and also 5% to 10% Al; this is contrary to Hindric's view. Compds. such as Al₃Mn, AlMn, and Al₂Mn were observed in this alloy. In investigating various ternary alloy systems, such as the Al-Cu-Fe, Al-Si-Cu, Al-Si-Ag and Al-Cu-Ag systems, their modifying temps. were measured and diagrams of their compns. and temps. were obtained. In the Al-Cu-Ni system the authors did not recognize the line at 55° which was observed by Gwyer.

H. G.

Aluminum alloys and their significance in industry. WILLI HAAS. *Zentr. Hütt.-Walzwerke* 31, 115-7(1927); *J. Inst. Metals* 38, 571.—The compn. and some of the phys. and mech. properties of all the light Al alloys that have been developed within the last few yrs. are described briefly, and some indication is given of their uses in industry.

H. G.

New light aluminum alloys C6 and MC. TOMOJIRÔ TANABE. *J. Soc. Mech. Eng. Tokyo* 28, [102], 820-35(1925); *J. Inst. Metals* 38, 410[In Japanese.].—T. prepd. two new series of strong light Al alloys by special heat and mech. treatment. One of them, called C6 alloy, contains Cu 6% and Al 44% (?). The other, called MC, contains Cu 1.2%, Mg 0.5-1%, and Al remainder. T. claims for these alloys mech. qualities that are not inferior, but rather superior, to those of Duralumin.

H. G.

Investigation of special hard aluminum alloys and theory of temper hardening of aluminum alloys. TOMOJIRÔ TANABE. *Tetsu-to-Hagane* 11, [6], 437-57(1925); *J. Inst. Metals* 38, 411[In Japanese.].—The special hard alloy contained 5% Mn and 0.5-2.0% Si. A good alloy was obtained by rolling after aging at ordinary temp. or by tempering at 200°, in both cases the alloy having been quenched at 500° or 600°. The quenching might be done by air-cooling. To explain the temper hardening, a systematic study was carried out with Al-Cu and Al-Mg alloys, and some new facts were found from curves showing elec. resistance and heat-expansion. Conclusion: The temper hardening might be explained by the colloidal chem. theory.

H. G.

The aluminum bronzes. R. GUERIN. *Rev. Aluminium* 3, 172-4(1926); *J. Inst. Metals* 36, 439.—The properties of the aluminum-bronzes were described by Sainte-Claire Deville as far back as 1859, but difficulties in manuf. hindered their general use. These have now been overcome by the Durville process. The properties of the 10% "aluminum-bronzes" are outlined, and the effects of tempering the quenched alloy illustrated by photomicrographs. A number of engineering details for which these alloys have been found suitable are listed.

H. G.

Aluminum-copper-tin alloys of high aluminum content. MASA HARU GOTO AND TOKUSHICHI MISHIMA. *Nihon-Kôgyôkaishi* 39, 714-21(1923); *J. Inst. Metals* 36, 433[In Japanese.].—With regard to Al-Sn alloys, contrary to Gwyer's view, Al makes a solid soln. by dissolving 2% Sn. The hardness of Al-Cu-Sn alloys increases (at about 200°), but again decreases rapidly; this appears to be due to the transformation of Sn at 200°. The decrease of hardness at 230° may be attributed to the fact that Sn is not absorbed in the alloy either as a solid soln. or a compd., but exists as a eutectic.

H. G.

Aluminum-tin alloys. KYOSUKE KANEKO AND MIYOICHI KAMIYA. *Nihon-Kôgyôkaishi* 40, [472], 509-16(1924); *J. Inst. Metals* 36, 436[In Japanese.].—The Al-Sn equil. diagram has been completed and the eutectic point found to be at 1.3% Al and 98.7% Sn. The hardness of these alloys is max. at 5% Sn; on approaching pure Sn it decreases suddenly. The sp. gr. increases with Sn content. This does not differ greatly from the calcd. value, and shows that there is no special contraction or expansion, whatever the proportions. The max. soly. in acids occurs at 5% Sn,

and gradually decreases as the Sn content increases, pure Sn being practically insol.

H. G.

Heat treatment of aluminum and its light alloys. R. J. ANDERSON. *Fuels and Furnaces* 6, 617-18(1928); cf. C. A. 22, 1941.—Al alloys are heated to about 500° and quenched in water, oil or an air blast. The time period at the soaking temp. prior to quench permits the solid soln. of such intermetallic compds. as CuAl₂ and Mg₂Si. In general the higher the quenching temp. the greater the hardening on aging. Heating in the case of castings should be longer than for wrought metal. Transferring from the furnace to the quench should be as rapid as possible. Rapid quenching produces hardness, while a slow quench is required for metal used in annealing processes.

J. W. SIMPLEY

Influence of aluminum on white metal with lead base. YOSHIO FUKUTANI. *Suiyo-Kwaishi* 4, [9], 1289-99(1925); *J. Inst. Metals* 38, 422.—[In Japanese.] By adding Al to lead-base white metal the hardness was increased, blowholes were removed, the compd. of Sb-Sn became uniformly distributed, the compressive strength and toughness were increased, and the friction loss was reduced. These facts show that white metal contg. Al is a suitable material for use as bearing metal.

H. G.

Cobalt and its alloys. RICHARD THEWS. *Metallhorse* 15, 1799-1800, 1854-5, 1910-11(1925); *J. Inst. Metals* 36, 586.—The origin, production, impurities, working, properties, and application of Co and its alloys are described. Co electroplating is considered.

H. G.

Copper and copper alloys. W. H. BASSETT. *Mining and Metallurgy* 9, 170-4; *Metal Ind.* (London) 32, No. 21, 517-20(1928)—B. discusses in a general way the optimum conditions for copper refining and considers briefly the alloys of copper with zinc, tin, silicon, manganese, cadmium, nickel, and their use for various purposes.

A. W. COFFMAN

Effect of heat treatment on some mechanical properties of 87:7:5:1 copper-zinc-lead alloy. R. J. ANDERSON. *Am. Metal Market* 35, No. 71, 1-4(1928).—The alloy 87 Cu - 7 Sn - 5 Zn - 1 Pb was sand-cast into suitable test bars, annealed for various periods of time up to 700°, and quenched in H₂O from various temps. Mechanical tests showed that, in general, annealing this alloy has the effect of improving the ductility. Quenching in H₂O from temps. above 500° has very harmful effects on the tensile properties. The alloy may be annealed for the release of casting strains with simultaneous improvement of ductility. The alloy machines and casts well and is useful as a general casting bronze.

S. G. SIMPSON

Experimental researches on alloys of iron, chromium, and nickel. P. CHEVENARD. Reprint from *Trav. et Mém. Bureau Internat. Poids et Mesures*, 12, 144 pp(1927); *J. Inst. Metals* 37, 471; cf. C. A. 22, 1752.—The various transformation points in Fe, Ni, and Cr and in binary and ternary alloys of these metals, have been investigated by differential dilatometric methods, with Pyros alloy (82% Ni, 3% Fe, 4% W, 3% Mn, and 8% Cr) as a standard. Fe-Ni alloys may be divided into two classes—those contg. less than 27.3% Ni and those contg. more; the former may be regarded as Ni steels, and the latter as ferro-nickels. Ni widens the temp range of the allotropic change in Fe and rapidly depresses the Ar₃ point, which reaches 0° with 27.3% Ni; the A₂ curve of Fe falls slowly with addn. of Ni up to 3.6%, then follows the Ar₃ curve down to -20° with 28% Ni, and finally rises in a smooth parabola to 600° at 70% Ni, falling again to 360° with pure Ni. Dilatometric analysis confirms the existence of the compd. Fe₃Ni. The min. coeff of expansion of Fe-Ni alloys at 0° occurs with 35.6% Ni (Invar), but the properties of all these alloys are appreciably affected by cold-work and by quenching, because of the effect of these treatments in lowering the magnetic change point and increasing the magnitude of the anomaly in the expansion. Cr, up to at least 40%, forms solid solns. with both Fe and Ni with a slightly lower d. than the theoretical. The A₂ point of Fe rises to 775° with 6% Cr, then falls in a straight line to 0° with 80% Cr, whereas 5.4% Cr is sufficient to lower the magnetic change point of Ni to 0°. Addn. of Cr to Ni steels lowers the allotropic transformation point of those poor in Ni, increases the thermal hysteresis, and tends to restrain the spontaneous physicochemical changes of alloys having a high Fe content, i. e., it extends the region of austenite stability. In the ferro-nickels the higher the Cr content for a constant Ni content the lower is the magnetic change point and the feebler are the expansion and elasticity anomalies; this action of Cr appears to be due to the formation of the compd. Ni₃Cr₄.

H. G.

Alloys of lead and antimony. KYÔSUKE KANEKO AND MORITARÔ FUJITA. *Nihon-Kogyôkwaishi* 40, [471], 439-49(1924); *J. Inst. Metals* 36, 445.—[In Japanese.] Two kinds of solid solns., α and β , exist at both extremes of Sb content, say from 0 to 5%

and from 97 to 100%. In the equil. diagram an arrest line was located at 243° in the range 30–97% Sb, and an unstable compd. Sb_2Pb was recognized at that point. The hardness at the extreme point of the solid soln. of Sb (5% content) increases slowly, but at 97% Sb it decreases suddenly, and there is a point of change at 63% Sb in the hardness curve. The soly. of these alloys in acids increases with the addn. of the other component, and reaches the max. point at 45% Sb, between them two scarcely sol. points being observed. H. G.

Alloys of lead, cadmium and tin. KYÔSUKU KANEKO AND AKIRA ARAKI. *Nihon-Kôgyôkwaishi* 41, [482], 437–55 (1925); *J. Inst. Metals* 38, 422.—[In Japanese.] The eutectic temp. was detd. at the eutectic point, which is at 6.28% Sn. At the eutectic temp. very faint unstable changes were observed at 162° and 148°, but it seemed that such transformations did not occur in alloys which were annealed completely. These alloys are stable in the following cases: Tin-side, up to 1% Pb, when they are solid solns., and in the lead-side up to 18% by 181° and up to 15% in the cold state. A Pb-Sn compd. was observed at 36.3% Sn. The hardness changes greatly at about 36.3% and 99% Sn. Regarding their soly. in a 0.1 N soln. of HCl, pure Pb has a min. soly. gradually increasing up to 18% Sn, and then remains nearly const. up to pure Sn. The soly. in concd. HCl is nearly uniform in the range from pure Pb to 20% Sn, and gradually increases up to 50% Sn, then again becoming const. up to pure Sn. H. G.

Sand-cast manganese-aluminum alloys. W. HAAS. *Giesserei-Ztg.* 23, 328–9 (1926); *J. Inst. Metals* 36, 435.—Mn-Al alloys generally offer a higher resistance to the corrosive action of sea-water than any of the common Al alloys. For making castings an alloy contg. 2.0% Mn is recommended; it has a tensile strength of 30 kg. per sq. mm. with an elongation of 5%. For rolling purposes the alloy should contain 1.25% of Mn, when a tensile strength of 29 to 81 kg. per sq. mm. and an elongation of 25 to 1%, according to heat and mech. treatment, is obtained. A stronger alloy for casting purposes and one that resists sea-water better than Duralumin contains 4.5% Cu, 1% Si and 0.75% Mn; this alloy is susceptible to aging treatment (cf. Daniels, C. A. 20, 733). H. G.

Profound alteration of an alloy of nickel-copper in superheated steam at 350° to 400°. J. P. SAFFY. *Compt. rend.* 186, 1116–8 (1928).—In an attempt to discover a cheap and satisfactory material for the construction of turbine blades, the action of water vapor under operating conditions upon a large no. of alloys was noted. An alloy of C 0.2, Mn 1.6, Ni 68.6 and Cu 28.9% gave especially important results. A treatment of 17 months in satd. vapor at a pressure of 6 kg./sq. cm. and at 150° which sufficed to produce corrosion fissures in other metals and alloys, did not destroy the excellent mech. (bending) properties. Higher temps. (475°) induced intercrystalline attack, fracture on bending always occurring between the crystallites. Expts. at intervening temps. are given showing a gradation in behavior. ROBERT F. MEHL.

Study of the nickel-zinc alloys with a low nickel content. PIERRE CHARRIER. *Compt. rend. assoc. sci.* 47, 330–3 (1924); *J. Inst. Metals* 36, 452.—At the m. p. of Zn, Ni and Zn combine to form the crystalline compd. $NiZn_3$. These crystals were found cemented together by Zn when pure Zn was melted in a Ni crucible; after remelting in a great excess of Zn their compn. remained unchanged. H. G.

Silver, gold and copper amalgams. ALEKSANDER WERYHA. *Compt. rend. soc. polonaise phys.* 7, 57–63 (1926); *J. Inst. Metals* 37, 469–70.—[In German and Polish.] Examn. of the mechanism of diffusion of Hg into Cu, Ag and Au by means of the Debye-Scherrer x-ray app. indicates that diffusion is not a phys. process at all but a purely chem. one assocd. with the formation in every case of a series of compds. The compd. Ag_3Hg_4 appears to be the final product of the action of Hg on Ag. It crystallizes in hexagonal needles belonging to the regular system. Its lattice parameter is 10.09 Å. U. Apparently two other Ag-Hg compds exist, and at least one Au-Hg compd. with characteristic lattice structures. H. G.

Electrical conductivity of silver alloys. M. HANSEN AND G. SACHS. *Z. Metallkunde* 20, 151–2 (1928).—The elec. cond. of Ag alloys with Cd, Zn, Mg, Mn, Sb, Al and Sn was detd. by means of a Thomson bridge. The wires were drawn from 1.8 mm. diam. to 0.70 to 0.72 mm., and tempered at 500° for 1/2 hr. Hardness tests run about parallel to elec. resistance, except for Ag-Mg, which gives the greatest hardness while its resistance is about av. The decrease in elec. cond. with added metal is greater the farther removed in the periodic system is the added metal from the Cu, Ag, Au column. H. STROETZ

Action of zinc, tin, aluminum and magnesium on copper containing cuprous oxide. O. BAUER AND H. ARNDT. *Giesserei-Ztg.* 23, 671–7 (1926); *J. Inst. Metals* 37, 380–1.—Zn and Mg diffuse readily into Cu at temps. well below their m. p., but Sn and Al

not only do not diffuse into Cu below their m. p., but even when molten diffuse only relatively slowly. On the other hand, solid Cu dissolves slowly in molten Zn, more rapidly in molten Al, and extremely rapidly in fused Sn or Mg. The differences are ascribed to differences in the lattice structure, metals of widely varying structures diffusing into each other more rapidly than do those with the same or similar structures. Diffusion of liquid Zn into Cu containing Cu_2O effects reduction of the latter with the formation of loose, dusty inclusions of ZnO; under the same conditions reduction with Sn proceeds by zones somewhat slowly, and with Mg rapidly throughout the metal. Al diffuses only slowly into Cu containing O, as the Al_2O_3 produced by reduction of the Cu_2O forms thin, scaly, almost impervious layers which tend to retard diffusion.

H. G.

Effect of the testing method on the determination of corrosion resistance. H. S. RAWDON AND E. C. GROESBECK. *Bur. Standards, Tech. Paper No. 367*, 409-46 (1928).—A series of com.-grade Cu-Ni alloys from all Cu to all Ni were tested in normal solns. of the following. HCl, HOAc, NaOH, NH_4OH , NaCl and $\text{K}_2\text{Cr}_2\text{O}_7$. The methods used were simple immersion both aerated and non-aerated, repeated immersion both continuous and intermittent, spray and electrolytic. Considerable variation in the relative corrodibilities was found by the various test methods, indicating that the essential features of the corrosive conditions to be met must be incorporated in the test. Conclusion: The degree of aeration of the corroding soln. was one of the most important factors; the formation of protective films may be a controlling factor in some cases; in general, binary metallic solid solns. corrode at rates intermediate between those of the 2 components.

J. K. ROBERTS

Application of electric resistance measurements to the study of the atmospheric corrosion of metals. J. C. HUDSON. *Proc. Phys. Soc. London* **40**, 107-31 (1928).—A description of a quant. exposure test of non-ferrous wires to atm. corrosion. Measurements of the elec. resistance of wires were made by the Wheatstone bridge method and the percentage increase in resistance correlated with increase in wt. Sufficiently good agreement was found that the test was concluded to be applicable as a quant. test for atm. corrosion. Details of the method are given, including prepn. of the specimens, elec. connections, wt. measurements, etc. Data are given for Cu, 80/20 Cu-Ni, Ni, 60/40 brass and several silicon bronzes.

J. K. ROBERTS

Relative corrodibilities of ferrous and non-ferrous metals and alloys. I. Results of 4 years' exposure in the Bristol channel. J. NEWTON FRIEND. *J. Inst. Metals* advance copy, No. 456, 23 pp. March, 1928; *Iron Steel Can.* **11**, 102-11; *Metal Ind.* (London) **32**, 449-54, 522-5 (1928); cf. *C. A.* **22**, 373.—Bars of Ni, Sn, Pb, Zn, Al, various coppers and bronzes, bare and galvanized steel and iron, cast iron and stainless steel were immersed for 4 years in sea water. The rack was covered with water about 93.5% of the time, being exposed for short intervals at some low tides. Detailed descriptions of drawing and analyses of the bars are given. After the test, the bars were cleaned, weighed (both before and after cleaning), measured, tested for tensile strength (simultaneously with unexposed bars) and closely examd. A description of the appearance of each bar is given. Of the non-ferrous metals common tin was best, the resistance varying through Ni, Pb, Cu, bronzes and Zn to Al which was worst. Galvanized Armco iron was fair, while steel and wrought iron were approx. equal. Stainless steel pitted badly.

J. K. ROBERTS

Influence of the thermal and mechanical treatment of aluminum on its resistance to corrosion. W. WIEDERHOLT. *Korrosion Metallschulz* **2**, 126-33 (1926); *J. Inst. Metals* **36**, 459; cf. *C. A.* **21**, 2420.—When technical grades of Al sheet are annealed the max. sepn. of the Fe and Si impurities occurs at 300°. Annealing above 300° causes the Si especially to go into solid soln. to a degree depending on the temp. and duration of anneal, whereas annealing below 300° results in the slow sepn. of the impurities at a rate proportional to the time of annealing. Corresponding differences are noticed in the resistance of annealed metal to corrosion as judged by the Mylius oxidizing salt test, metal annealed at 300° having the smallest resistance to this test. Annealing above 300° in N increases the resistance to corrosion; a similar anneal in O still further increases the resistance, in consequence of the formation of a tenacious oxide film on the surface of the metal. Coarsely crystallized sheet resists the salt test better than that having a fine cryst. structure; hence the amt. of cold-work to which the sheet has been subjected before annealing has a decided influence on its resistance to corrosion.

H. G.

The corrosion of aluminum alloys. H. SUTTON. *Metallurgist* (Supp. to *Engineer* **143**, No. 12) 36-7 (1927); cf. *C. A.* **21**, 3883.—A review with brief bibliography. Uniformity of structure, purity and soundness are most important in the production of

Al alloys of high corrosion resistance. Intercryst. corrosion in Duralumin and related alloys is due to penetration of corrosion from the surface along the crystal boundaries of the metal. Al alloys can be protected against corrosion by anodic oxidation, treatment with Na_2SiO_3 or electroplating with Cd. D. B. DILL

Influence of salt-water on Duralumin. TORD ÅNGSTRÖM. *Aéronautique* 1925, [69], 77; *J. Inst. Metals* 38, 436; cf. *Ingeniörs Vetenskapsakademien. Hand* 1927, No. 51, 5-30.—Results are given of expts. carried out with a view to detg. the behavior of Duralumin in salt-water. The most striking facts observed after immersion of test-pieces of Duralumin in salt-water for 1 to 6 months were the considerable reduction in tensile strength and elongation of the samples half immersed; 50% reduction in elongation being obtained after 1 month. Analogous results were obtained with Aludur, a Swiss alloy. Comparison was also made with steel samples. Expts. on Duralumin covered with a layer of varnish showed that this did not secure immunity from deterioration, even in the case of samples well protected from water. A comparison with wooden samples showed that there was no appreciable diminution of tensile strength. It appears to be Å.'s opinion that the method of construction of mixed steel and Duralumin, upheld by Dornier, reserving steel for the essential parts, is to be recommended in the construction of sea-planes. H. G.

The resistance of Duralumin to corrosion. DORNIER. *Aérotechnique* 1927, [51], 80-1; *J. Inst. Metals* 38, 437.—The firm of Dornier, after carrying out systematic expts. over many years, has come to the conclusion that Duralumin is, up to the present, under certain conditions, the alloy which, of those manuf. industrially, best resists corrosion in salt water. Expts. are described which showed that a fuselage of Duralumin remained unaltered after three years. A hydroplane kept in fresh water for 5 years showed no sign of corrosion. A sheet of Duralumin 1 mm. thick remained unaltered after immersion in salt water for 149 days. Diagrams are given showing the influence of corrosion on the tensile strength and elongation of Duralumin in the case both of samples as originally manufd. and also after heat-treatment. After immersion for 40 days in salt water in both cases the elongation was reduced, but in the Duralumin as originally manufd. there was no change in the tensile strength. Photographs are given of portions of floaters which were immersed for 39 days in the Mediterranean Sea, the rivets which were immersed remaining unaltered, while those which were not immersed were attacked. Tests on samples from different parts of another floater immersed for 144 days showed that the mech. properties of the Duralumin had not altered. H. G.

Effect of corrosion upon the fatigue resistance of thin Duralumin. R. R. MOORE. *Proc. Am. Soc. Testing Materials* 27, Pt. II, 128-33 (1927).—A study has been made of the corrosion of sheet duralumin as affecting its fatigue resistance. The machine developed for this purpose is described. The specimens (short tubes of thin sheet metal) were corroded in a salt spray (20% NaCl), some for 5 days, the rest for 10 days. Fatigue and tension tests were made on corroded and uncorroded specimens. Corrosion had no effect on tensile strength; ductility was decreased about 25%; and the fatigue endurance limit decreased about 35%, the 5-day and 10-day corrosion periods having about the same effect. It is suggested that corrosion during stress would probably be more severe than prior corrosion because of the progressive nature of the intercryst. corrosion. J. K. ROBERTS

Corrosion of copper and brass in reference to the condenser-tubing problem. V. DUFFEK. *Korrosion u. Metallschutz* 4, 56-8 (1928).—Distd. and natural waters, in the presence of air cause the formation on Cu of an initial protective layer of lower oxides. This layer then becomes darker and porous, permitting attack underneath. In sea water, the behavior of Cu is irregular but corrosion proceeds rapidly once a crust of CuCl is formed. In air up to 300° oxide films form. Above 700° the attack by oxidation is rapid but decreases as the oxide scale is built up. In presence of air, Cu is readily attacked by even very dil. acids. Aq. solns. of KOH and NaOH attack Cu in presence of air. In partly immersed specimens corrosion takes place rapidly at the air-liquid boundary; localized aeration causes pitting. Brasses behave in the same manner as Cu. In cases of brasses contg. both α and β crystals, the latter are attacked first. Additions of 0.01 to 0.02% arsenic to the alloy prevent localized attack. Brasses are subjected to localized corrosion by stray currents. Grain size is found to have little effect on the corrodibility. J. K. ROBERTS

Research on an accurate determination of corrosion, and on the influence of carbon on the rate of attack of structural steel by acids. V. DUFFEK. *Korrosion* 3, 9-11, 13-14 (1928).—Descriptions of 4 series of tests in 2% solns. of H_2SO_4 , HNO_3 , HCl and $\text{H}_2\text{C}_2\text{O}_4$, with 6 cuts, 2 charts and 1 table of results. J. H. MOORE

Rust and rust prevention. M. SCHULZ. *Farben-Ztg.* 33, 329-32(1927).—A review. J. S.

Rapid and practical method of applying the ferroxyl test to protective coatings. KARL PITSCHNER. **Proc. Am. Soc. Testing Materials* 27, Pt. II, 304-9(1927).—The ferroxyl test for detecting pinholes in platings on steel or iron is modified by applying the reagents ($K_3Fe(CN)_6$ and NaCl) in a soln. to paper. When used the paper is moistened and spread over the surface. After spots are formed, the paper is removed, washed free from reagents and dried, a permanent record resulting. This method is applicable to plating shops. J. K. ROBERTS

Doubtful transformation point of aluminum at about 575°. A. MÜLLER. *Z. Metallkunde* 19, 414-5(1927); *J. Inst. Metals* 38, 366.—Earlier work is briefly reviewed. Thermal differential curves which were taken with Al (0.17% Si, 0.20% Fe), and with Al-Zn alloys with 5, 10 and 20% Zn, resp., showed no break from room temp. up to nearly the m. p. H. G.

Some observations on the creep of metals. D. HANSON. *Metallurgist* (Suppl. to *Engineer* 143, No. 13) 54-6(1927).—Creep tests on 99.5% Al at 250° showed failure in 6 min. with a tensile stress of 2.3 tons per sq. in. and in 84 to 86 days with tensile stress of 1.5 and 2.0 tons per sq. in. Hardness increased 40% in the parallel portion of the broken creep test piece. Specimens tested in the annealed condition showed no recrystn. but there was recrystn. in the "as-rolled" specimens. It appears that the effect of increasing temp. "is to increase the effects of slight amounts of strain and to render them greater than when the deformation is carried out at lower temps." D. B. D

The swelling in hydrogen of metals and alloys containing a little oxide. M. GUICHARD, CLAUSMANN and BILLON. *Compt. rend.* 186, 1121(1928).—When an alloy of Ag and Cu contg. some oxide is heated in a current of H, at the pt. of fusion bubbles form on the surface. Maintaining the alloy below the pt. of fusion produces a progressive loss in wt. and an increase in vol. Once melted in H, the metal no longer shows this behavior. Expts. are described which show that the variation in vol. increases with the amt. of Ag even though the alloy richer in Ag is the less oxidized. The mech. resistance of the metal appears to be an essential factor. Partially oxidized Cu without Ag gives rise to the same swelling observed in the above expts. Without oxide the metals and alloys do not show changes in appearance or changes in dimensions. The following explanation is advanced: H diffuses to the interior of the metal, where it reduces the Cu_2O and forms Cu and H_2O vapor. The H_2O vapor diffuses in the opposite direction, but more slowly. The mech. strength of the metal prevents the easy escape of the H_2O vapor bubbles resulting in the observed swelling. At the m. p. these bubbles escape suddenly, producing the observed projections. ROBERT F. MEHL

Metallic grains and crystal lattices. ADOLF SMEKAL. *Mitt. staatl. tech. Versuchsanst. (Wien)* 16, 72-83(1928).—The matter of improving the phys. properties (tensile strength, etc.) of metals and alloys to be used for technical purposes is discussed. Improvement is shown to depend, in the last analysis, upon our ability to improve the properties of each individual crystal or grain. Metals used in practice are composed of crystals ("real crystals") which do not possess a perfectly regular lattice of atoms throughout. This accounts for (1) the fact that they can be plastically deformed, and (2) the fact that the tensile strength of technical metals is much below the calculated "molecular" tensile strength of metals possessing an ideal, highly regular lattice of atoms in each crystal. To demonstrate the existence of abnormal or "loose" atoms with very easily removable electrons and their connection with plastic deformation and tensile strength a crystal of rock salt was irradiated with ultra-violet, x-rays or γ -rays, resulting in a coloration which gradually disappeared upon subsequent exposure to daylight. This coloration, due to Na atoms, has its origin in changes occurring in the "loose" atoms which behave as though on the free edges of a crystal. Plastic deformation of a colored rock salt crystal leads to a very rapid decolorization when exposed to daylight. Deformation is shown to increase the actual number of loose places about ten-fold. A grain is thought to be made up of crystalline areas possessing about 10,000 atoms and the ideal lattice structure. These areas interpenetrate in such a way as to leave occasional "loose" regions. The influence of the presence of foreign atoms upon the structure and deformability is usually to increase the tensile strength and decrease the tendency to slip. WILLIAM F. EHRET

Recrystallization process of 800 silver. R. GLOCKER and H. WIDMANN. *Z. Metallkunde* 20, 129-31(1928); cf. *C. A.* 21, 1615.—In the heat treatment of an alloy contg. 80% Ag and 20% Cu, recrystn. commences at a very low temp. (200°), but it cannot be detected microscopically below about 500° because of the extreme fineness of the crystals (less than 2μ). It is best detected by means of the x-ray spectrum,

the sharpening of the lines in the doublets being the first indication of recrystn., this being very clear at about 400°.

Tensile strength and conductivity changes in hard-drawn wires of copper, bronze, aluminum, Aludur and Aldrey, under the influence of rapid heating. HANS BOHNER, *Z. Metallkunde* 20, 132-41(1928).—The metals and alloys examd. were 99.5% Cu, bronze contg. only small quantities of Sn and Mg, Al contg. 0.17% Fe and 0.14% Si, Aludur and Aldrey. Two methods of heating were employed; high elec. currents for a short time, and heating in a KNO₃ bath for somewhat longer intervals. The materials were previously subjected to at least 99% hot and cold working. With elec. heating, increase in temp. results in a steady increase in cond. and decrease in tensile strength for Cu, bronze and Al. With the Al alloys on the other hand, there is first an increase in cond., the highest values being reached around 350° and then a rapid decrease with increase in temp., with finally another slight rise as the temp. rises. The results show that at sufficiently high temps. a fraction of a sec. is enough time for complete recrystn. In the Al alloys and pure Al the lowest tensile strength and highest cond. are obtained when the impurities are completely sepd. from the mixed crystals. This sepn. is better obtained on slower heating, which explains the better results secured in the KNO₃ bath.

H. STOERTZ

Increasing the strength of lead-base bearing metals. O. W. ELLIS, *Am. Metal Market* 35, 1-4, 44(1928).—The possibility of using Pb-base bearing metal in place of Sn-base is discussed. Expts. show that the pouring temp. as well as the mold temp. must be carefully regulated in making Pb-base alloys. Photomicrographs are introduced to show that the higher the pouring temp. the more coarse is the structure. The same is true of the mold temp. only in a more marked degree. The length of time taken to cool from 270° to 240° is important in detg. the size of the resulting γ -cubes and the coarseness of the matrix. High pouring and mold temps. also lead to a segregation of the γ -constituent which rises to the top. The results of expts. indicate that the addition of Tl to Pb-base alloys improves their resistance to deformation markedly. Yield point and ultimate strength tests show that an alloy contg. Pb 72, Sb 15, Sn 5 and Tl 8 is superior to the best Sn-base bearing alloy.

W. F. E.

Effect of quenching and tempering on the mechanical properties of standard silver. A. L. NORBURY, *J. Inst. Metals* 1928 (advance copy) No. 448, 17 pp.—Standard Ag (92.5% Ag, 7.5% Cu) as ordinarily annealed, contains a considerable amount of Cu in which some Ag is dissolved, distributed in the form of small particles throughout the Ag solid soln. matrix. By suitable heating, about half an hour at 770°, and quenching, these Cu particles can be dissolved and retained in supersatd. solid soln. On tempering quenched specimens, structures reminiscent of martensite, troostite, and pearlite are obtained. The alloy, when in the quenched condition, is 20 to 30% more ductile than when in the annealed condition. On suitably tempering the quenched alloy, that is about half an hour at 300°, its hardness increases 300%, while the ductility falls 50%. These effects are due to the decompn. of the supersatd. soln. of Cu in Ag. The hardening obtained by tempering is uniform and is consequently superior to the hardening obtained by cold work, which sets up stresses and strains in the alloy. It is possible to harden the quenched alloy by cold work and then further to harden it by suitable tempering. The alloy is more resistant to oxidation and tarnishing when in the quenched and tempered condition than it is when in the annealed condition.

J. W. BOECK

Viscosity (of metals) at high temperatures. JEAN COURNOT AND MACEDO SAARES SILVA, *Rev. métal.* 25, 82-6(1928); cf. *C. A.* 20, 568; 21, 1090, 2454; 22, 375.—Tests were carried out by the previously described technic on Ni wire (1 mm. in diam.), "Calypso" brand Al wire (1 and 2 mm.), Duralumin (1 and 2 mm.), and refined drawn Alpac wire (1 mm.). The results are given in tabular and graphical form and show that: (1) the period of uniform viscosity was reached very rapidly after applying the load; (2) the low value of the practical viscosity limits as compared with the usual breaking loads is clearly brought out, though Ni is somewhat better in this respect than the other metals and alloys tested; (3) Al exhibits a striking inferiority as regards the viscosity limits and is greatly improved by alloying (particularly in the case of Duralumin); (4) at 500-700° Ni behaves better than mild steel. Pomp and Dahmen's proposed definition of the practical limit of viscosity (*C. A.* 21, 1959) is criticized and an alternative one suggested.

A. PAPINEAU-COUTURE

Comparative manufacture of large-diameter bars by forging and by rolling. J. ΚΟΥΚΗΝΘΟΥ, *Rev. métal.* 25, 76-81(1928).—Comparative forging and rolling tests on 4 diff. grades of shaft steel showed that the elastic limit and elongation of rolled bars, whether or not they were subjected to a subsequent annealing treatment, were higher

than those of forged bars, annealed or not. Annealing slightly decreased the elastic limit and tensile strength and slightly increased the elongation of rolled bars. Annealing appreciably improved the forged bars, but had no appreciable effect on the rolled bars, showing that the quality of the latter is max. without requiring subsequent heat treatment. **Note on the preceding article.** E. DE LOISY. *Ibid* 81.—L. successfully manufd. shafts by rolling without any forging treatment at any stage of the manuf.

Annealing of copper. N. R. STANSEL. *Gen. Elec. Rev.* 30, 276-80(1927); *Sci. Abstracts B* 30, 405.—Annealing at the proper temp. will restore the original properties to a metal whose grain shape and properties have been altered by cold work. The essential conditions for Cu annealing are: temp. limits of 315-400°, a uniform distribution of heat flux, and a neutral atm. in the furnace. The metallic resistor type of furnace with an atm. of low-pressure superheated steam is satisfactory. With charges of 10,000 lbs. (4545 kg.), the output is 29 lbs. (13.2 kg.) per kw.-hr. Labor and maintenance costs are very low.

Oxidation phenomena during the annealing of malleable cast iron. H. A. SCHWARTZ. *Trans. Am. Foundrymen's Assoc.* 1928, 385-96.—A correlation of the researches of Schenck and others with commercial annealing conditions. It is shown that by applying the available data as to the equil. conditions in the Fe-C-O system it is possible to explain many of the phenomena which occur in the surfaces of the castings rendering machining difficult.

Annealing experiments for the improvement of transformer plates. M. VON MOOS, W. OERTEL AND R. SCHERER. *Stahl u. Eisen* 48, 477-87(1928).—Transformer plates (0.35 mm.) from melts with 0.04, 0.12 and 0.18% C were annealed at temps. from 700 to 1000°, for 1/2 to 6 hrs. either packed or in a current of H. Next to the C content the O content has a decided influence on the magnetic characteristics of the plates. Melts high in O have an irregular structure; O, therefore, has an indirect influence on the watt losses of the plates, as the latter is a function not only of the grain size, but also of the quality of the grain structure. Low watt losses are obtained only if the structure is uniform. All transformer plates can be improved by annealing in a current of H. The value of the watt losses depends also on the quality of the raw materials. Good results were obtained by annealing 4 hrs. at 900°. Annealing for more than 2 hrs. at 1100°, increases the watt losses. With short annealing periods, it should be possible to obtain good results even at 1100° and 1200°. Numerous graphs and references are given.

Refractories for brass-foundry furnaces (St. JOHN) 19. Cupola refractories (SKERL) 19. Open-hearth steel-works refractories (GREEN) 19. Silica and magnesite bricks in metallurgical furnaces (WOLFF) 19. Brick or tile for use in steel furnaces (U. S. pat. 1,672,524) 19.

CHAMPLY, R.: *Traitements thermiques et essais des métaux*. Paris: Ch. Béranger. 242 pp. F. 18; bound, F. 23.

FRANKENSTEIN, C.: *Die Erzeugung von Eisen und Stahl (Mit schemat. Darst.)*. In Verb. mit d. Geschäftsstelle d. deutschen Ausschusses f. techn. Schulwesen. Berlin: Deutscher Ausschuss f. techn. Schulwesen. 12 pp. M. 70.

MICHEL, FRITZ: *Tabelle spezifischer gewichte der gebräuchlichsten Gold-Silber-Kupfer-Legierungen, Silber-Kupfer-Legierungen und Weissgoldlegierungen*. 2nd revised ed. Berlin: J. Springer. 10 pp. M. 3.

Froth-flotation of ores. C. H. KELLER (to Minerals Separation North American Corporation). U. S. 1,671,590, May 29. Frothing agents are used together with Ca or other alk. earth metal xanthate.

Concentrating oxidized ores by froth flotation. T. S. CARNAHAN (to Union Minière du Haut-Katanga). U. S. 1,671,698, May 29. Palm oil 1-4 and oleic acid 1 part are used together as frothing agents.

Cyanide treatment of ores, etc. S. B. McCLUSKEY. Brit. 278,742, Oct. 8, 1926. In treating ores contg. Au and Ag together with other metals such as Fe and Mn, a cyanide pulp is fed into a gas-tight agitator tank and thence to another tank to which SO₂ or other suitable acidifying agent is also supplied so that HCN is liberated and drawn off and sulfites of Fe and Mn are formed. The Fe and Mn are then pptd. with CaCO₃ or other reagent and the HCN is further used to dissolve Au and Ag. An app. is described.

Reducing iron ores. I. G. FARBERIND. A.-G. Brit. 278,167, March 29, 1926.

Reduction is effected by gases prepd. from powd. fuel and O or air enriched with O either in a sep. producer or by blowing the fuel and O on to the liquid Fe previously produced, and the reduced Fe may be melted preferably by bringing the hot gases from the producer before employing them for the reduction. A revolving or shaft furnace may be used for the reduction. Gases from the furnace may be treated with steam in the presence of Fe oxide or other suitable catalyst and may then be used in NH_3 synthesis, MeOH production or other reactions.

Zinc from ores. R. T. D. WILLIAMS and S. W. ROSS (to Electrolytic Zinc Co. of Australasia, Ltd.). U. S. 1,672,016, June 5. A ZnSO_4 sol'n. such as is obtained from a Zn ore is agitated with Zn dust under non-oxidizing conditions to ppt. impurities in the soln.

Washing apparatus for recovering gold and other metals from ores, etc. D. W. KELLY, A. H. ASHBOLT and R. A. J. ELLIOT. Brit. 278,561, Jan. 10, 1927.

Ingot mold. J. C. BECKFIELD. U. S. 1,671,806, May 29.

Ingot mold. E. R. WILLIAMS (to Vulcan Mold & Iron Co.). U. S. 1,672,479, June 5. A mold having low dilatation under repeated heating and cooling is formed of a ferrous alloy composed of ferrite plus C and other metalloids in such proportion as to produce a combined C of 0.70–1.10%.

Ingot mold with refractory sides and a chill bottom. C. A. PARSONS and H. M. DUNCAN. Brit. 278,032, April 29, 1926.

Hot tops for ingot molds. E. J. TURNER. U. S. 1,672,662–3, June 5.

Heat-regulating system for casting ingots. C. A. PARSONS and H. M. DUNCAN. U. S. 1,671,253, May 29. An app. is described.

Centrifugal apparatus for casting metals. SAND SPUN PATENTS CORPORATION. Brit. 278,560, Jan. 8, 1927.

Granulating small bodies of molten metals in liquids. E. PODSZUS (to Hartstoff-Metal A.-G.). U. S. 1,671,683, May 29. Mech. features. Tetralin covered with CO_2 may be used as a "retarding liquid."

Centrifugal apparatus for casting metals. A. POSSENTI and C. SCORZA. Brit. 277,996, Sept. 23, 1926.

Rimmed steel ingots. A. T. CAPE (to Midwest Metallurgical Corp.). U. S. 1,672,446, June 5. In order to improve the character and surface appearance of rimming steel, 1–6 oz. of a fluoride such as CaF_2 is added to each 3000 lbs. of steel, while molten and subsequent to tapping it from the furnace.

Aluminum-melting furnace. P. H. ROMPH. U. S. 1,671,546, May 29.

Rabble furnace with superposed hearths for roasting and calcining. D. BAIRD (to Nichols Copper Co.). U. S. 1,671,395, May 29.

Furnace and melting pot for melting lead or other metals. A. N. OTIS (to General Elec. Co.). U. S. 1,672,728, June 5. Structural features.

Regenerative open-hearth furnace. S. J. CORT, T. BURNS, R. S. A. DOUGHERTY and C. E. LEHR (to Bethlehem Steel Co.). U. S. 1,671,100, May 29.

Semi-muffle forge furnace. W. M. HEPBURN (to Surface Combustion Co.). U. S. 1,672,863, June 5.

Annular rotary hearth furnace for drying, distilling or gasifying loose material in a thin layer. TROCKNUNGS-, VERSCHWELUNGS- UND VERGASUNGS-GES. Brit. 278,207, Nov. 23, 1926.

Metallurgical "soaking pit" furnace. T. F. BAILY. U. S. 1,671,337, May 29.

Hearth for stereotype founding, etc. J. RABATE (to Soc. Le Matin). U. S. 1,672,142, June 5.

Apparatus for continuous annealing of sheet metal. E. G. CAUGHEY. U. S. 1,671,810, May 29.

System for annealing sheet metal plates in piles under pressure. W. REUSS (to Joh. Moritz Rump. A.-G.). U. S. 1,672,172, June 5.

Hardened cast iron. K. SPP. Can. 276,815, January 3, 1928. A hardened gray cast iron, which has a low content of C and Si, is characterized by fine evenly distributed grains produced by the reheating and cooling of a gray cast iron of uniform pearlite structure with finely divided and evenly distributed graphite.

Silicon iron. V. B. BROWNE. Brit. 277,537, Jan. 10, 1927. In making Si Fe for magnetic purposes, a bath of molten Fe is refined and the C content is lowered by means of ore; the C is still further lowered by overblowing in a converter in the presence of SiO_2 or by passing air or O into the molten metal (preferably in an elec. furnace) and P and S are removed by the action of suitable slags. Si or ferro-Si is then added in a ladle. Various other details are specified. Cf. C. A. 22, 2351.

Pickling metals such as iron and steel. J. H. GRAVELL. Brit. 278,398, April 29,

1926. Pickling baths such as those formed with H_2SO_4 are used with a "regulator" comprising the distillate produced by distn. of animal or vegetable material such as gelatin, hair, gristle or hides, which may be mixed with a small proportion of animal or vegetable fat. After pickling the metal it is treated with lime or other substance to neutralize the acid. Cf. C. A. 21, 2456.

Cleaning and pickling metals. G. D. CHAMBERLAIN (to R. T. Vanderbilt Co.). U. S. 1,671,627, May 29. H_2SO_4 is used with a small quantity of a thiazole which inhibits attack of the metal itself.

Joining manganese steel to ordinary carbon steel. C. L. DELACHAUX. U. S. 1,671,572, May 29. The materials are welded by the action of an alumino-thermic mixt. contg. 18-20% Ni.

Manganese steel. V. C. MEKEEL (to Taylor-Wharton Iron and Steel Co.). U. S. 1,671,870, May 29. The strength and wear-resisting properties of Mn steel are improved without impairing its toughness and ductility by case-hardening the shape during the regular heat treatment, and quenching with but a "minimum" exposure to air.

Alloys. W. S. SMITH, H. J. GARNETT and J. A. HOLDEN. Brit. 278,454, July 10, 1926. Alloys having high elec. resistance and high initial permeability comprise a preponderating proportion of Ni together with Fe 6-17, Al 1-5 and Cr, Mo, V, W or Si 1-5%. Mn, Cd or Mg may be used as deoxidizing agents. Fine wire or thin stampings of the alloys may be annealed for 2 min. at 880° in an inert atm. such as N and then rapidly cooled.

Alloys for valves. T. COLES. Brit. 277,381, Sept. 16, 1926. The valve member and spindle of a pressure-regulating valve are formed of an alloy of Ni 72, Fe 1.5, and Cu 26.5%, rolled, forged and annealed to restore its fibrous character; the valve seat is made from an alloy of Cu 75 and Zn 25% treated in a bath of molten solder to increase its density. Comps. of suitable solder baths and some modifications of proportions of the valve alloys are also described.

Alloy for welding rods. R. FRANKS (to Oxyweld Acetylene Co.). U. S. 1,671,417, May 29. An alloy suitable for welding rods or electrodes comprises Fe together with W 1-12, Cr 25-35, B 0.1-1.0, C 1-3.5, Si 0.5-3% and sufficient Mn to deoxidize the alloy. The ratio of Si to Mn is at least 0.9.

Welding alloy. W. P. STROONY. U. S. 1,671,384, May 29. An alloy suitable for making welding rods contains Fe together with Cr 15-35, Si 1-4 and Mn 4-16%.

Aluminum alloy. H. SCHORN. Brit. 277,701, Sept. 18, 1926. An alloy resistant to sea water contains Al together with Mg 1-6 and Ti 0.05-1.0%. Brit. 277,702 specifies Al together with Ti 0.05-1.0%.

Aluminum alloy. L. R. BRINK (to Barnhart Bros. & Spindler). U. S. 1,671,952, May 29. An alloy suitable for making printing type comprises Al 90, Cu 5 and Ni 5%.

Coating metals with aluminum or magnesium or their alloys. R. HOFFELT and C. P. NOLDEN. Brit. 278,415, July 1, 1926. Coating may be effected by spraying or electrolysis or the powd. coating metal may be mixed with Si compds. such as SiO_2 or waterglass and with an inorg. material such as kaolin or MgO and applied as a paste to the metal to be coated and the materials then subjected to heat treatment at $800-2200^\circ$.

Alloy containing copper and manganese. M. G. CORSON (to Electro Metallurgical Co.). U. S. 1,671,408, May 29. An alloy which is suitable for die-casting contains Cu together with Mn 15-25, and P and Si 0.1-3%.

Heat-treating copper alloys. M. G. CORSON. Brit. 278,355, Oct. 4, 1926. Cu-base alloys contg. Si 3.7-6.7% are heated to $500-800^\circ$ to form a solid soln. of Cu and Si which will be supersatd. at room temp. and the metal is then quenched to preserve the condition of solid soln. The metal may be hot-worked at 500° after the heat treatment and quenched from a temp. above 500° . The alloy may contain small quantities of other metals such as Sn 2% or less, Zn 5% or less and Al 3% or less.

Iron-silicon alloys. N. B. PILLING (to Westinghouse Elec. and Mfg. Co.). U. S. 1,671,484, May 29. Fe-Si alloys contg. 4-8% of Si are heated to temps. above 30° and below a "visible heat" (suitably to about 200° or lower) and subjected to hammering or other mech. treatment while heated, to avoid brittleness.

Purifying aluminum. A. KIRCHHOFF. Brit. 278,164, Sept. 16, 1926. Al is purified and rendered weldable by adding to the molten metal powd. mollusc shells and removing the scum which forms on the metal.

Coating for aluminum. W. C. PETERSON (to Packard Motor Car Co.). U. S. 1,672,280, June 5. A coating suitable for use on Al castings to close their pores is prepd. by heating PhOH and CH_2O to obtain a material of about the consistency of

molasses and of about half the vol. of the original materials, and then adding about 10% of an Al silicate (which may be in the form of kaolin).

Desilvering lead bullion. B. M. O'HARRA (to American Smelting & Refining Co.). U. S. 1,672,465, June 5. A mixt. comprising Pb, Zn and Ag, after melting, is treated with a metal halide such as ZnCl_2 capable of dissolving oxides and after dissolution of the oxides and formation of a slag the mixt. is allowed to sep. into 2 layers having a well-defined dividing line, the upper layer consisting largely of Zn and Ag and having a high m. p. as compared to Pb, and the lower layer largely of Pb. The layers are sepd. and further treated.

Heat treatment of wire rope. W. A. SCOBLE. Brit. 278,233, Feb. 7, 1927. After manuf., in as nearly as possible its final size, wire rope is given a high fatigue range of strength by heating to $780-900^\circ$ and quickly cooling it and then reheating to a lower temp., such as $200-500^\circ$ and cooling in air. The wire may be made from a C steel or alloy steel.

Treating zinc waste. E. BURY. Brit. 278,411, March 24, 1927. Zn waste such as that obtained in smelting operations or from the manuf. of Zn or galvanized products is leached with H_2SO_4 and then treated with excess of NH_3 ; the Zn sulfate soln. is thus converted to sol. $\text{Zn}(\text{OH})_2$ and Fe and Al and the like present as impurities are converted into insol. hydroxides, which are removed by sedimentation together with gelatinous silica, and by filtration. The residue is boiled down and ppts. $\text{Zn}(\text{OH})_2$ and liberates NH_3 , which is recovered. $(\text{NH}_4)_2\text{SO}_4$ is crystd. from the remaining soln.

Treating metal surfaces to prevent corrosion. W. SMITH (to Expanded Metal Co.). U. S. 1,672,180, June 5. Metal surfaces such as those of steel are subjected while heated (suitably at a temp. of about $600-700^\circ$) successively to the action of air and of CS_2 .

Protecting ferrous metals from corrosion. F. M. BRACKET (to Electro-Metallurgical Co.). U. S. 1,672,444, June 5. In order to form a coating comprising Cr and Si on ferrous metal articles, there is applied to the article an excess of a powd. ferrochrome-Si having a higher Cr:Si ratio than is to be present in the coating and the materials are then maintained at a cementing temp. to form an integral coating.

Welding. R. PALMER. Can. 277,014, Jan. 10, 1928. A method of welding oxidizable metals consists in uniting adjoining regions of the parts to be welded by fusion in the presence of atomic H and excluding deleterious gases and vapors.

Arc welding. I. LANGMUIR and P. P. ALEXANDER. Can. 277,010, January 10, 1928. A method of fusing metals by the electric arc process consists in maintaining the arc in a gaseous medium contg. N_2 and an amt. of H_2 which is so related to the traces of O_2 present that the harmful effects of N_2 in the presence of O_2 are neutralized.

Arc welding. N. B. PILLING and J. G. SCHOENER. Can. 276,842, January 3, 1928. A method of arc welding with Ni or Ni alloy electrode consists in supplying Ti and Ca to the melt.

Arc welding. I. THOMSON. Can. 277,011, January 10, 1928. Around the arc and molten portion of the work is maintained an active reducing gaseous medium composed of CO and H_2 .

Arc welding. E. THOMSON and P. P. ALEXANDER. Can. 277,012, January 10, 1928. Vapor of an alc. is supplied so as to exclude atm. air from the arc and molten portions of the work while the vapor is dissoed. in the arc to produce H_2 and CO.

Aluminothermic pressure welding. F. LANGE. U. S. 1,671,730, May 29. Mech. features.

Forming slag-free thermite welds. JOHN H. DEPPLE (to Metal & Thermit Corporation). U. S. 1,671,412, May 29. Mech. features. U. S. 1,671,413 (D. C. DICKSON) also relates to similar subject matter.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Theory of mesostructure of organic compounds. I. I. KOTYUKOV. *Bulletin of the Siberian Institute of Technology* 48, No. 1, 1-35 (1927).—The more stable the link between two C, the more weakly the H is bound with C and, consequently, the greater the residual affinity. This residual affinity is called *mesovalency*. Halogens are, on the contrary, the more strongly bound to C the stronger the mutual links between the C atoms. This explains the formation of links between halogens and H. The link formed as a result of mutual satn. of mesovalencies is called *mesolink*. Cl in benzene hexachlorides

is bound not to C, but to H. When substitution reactions take place, the mesolinks formed in the primary product of addn. remain unchanged in the product of reaction. Explanations are offered of a whole series of problems, such as the speed of reactions of substitution, difference of stability of radicals in the kernel, etc., and the structures of mesoformulas are given for each case. Isomerism of ethylene derivs. is based not on the presence of a double link as such and on its rigidity, but on the presence of H atoms having mesovalency and on some atoms having an affinity to the double link. Isomerism takes place only when there are several different possibilities of formation of mesolinks. The ethylenic isomerism is never observed when the radicals at the double link are aliphatic and unsatd.; this is explained by the absence in such radicals of H atoms with mesovalencies. Substitution of H atoms with mesovalency by other radicals destroys the phenomenon of isomerism despite the presence of a double link and of different radicals. K. examines particular cases of isomerization of a large no. of org. compds. and assigns to them mesoformulas.

BERNARD NELSON

Spectrochemical investigation of the esters of selenious and selenic acids. W. STRECKER AND W. DANIEL. *Ann.* **462**, 186-94(1928).—*Di-Me selenite*, b_{16} 69°, $d_{18}^{18.3}$ 1.7084, $n_D^{18.3}$ 1.48078, 1.48398, 1.49187, 1.49843 for α , β , and γ (this order will be used below), from the chloride and MeONa. *Di-Et ester*, $b_{14.5}$ 82-3°, $d_{14}^{23.1}$ 1.4961, $n_D^{23.1}$ 1.46247, 1.46547, 1.47273, 1.47877. *Di-Pr ester*, b_{16} 109°, d_{14}^{16} 1.3428, $n_D^{14.6}$ 1.46166, 1.46316, 1.47111, 1.47675. These 3 esters were also prepd. by using the Ag salt and the corresponding iodide; since the optical consts. of the 2 preps. agree, it is probable that the esters have the formula $OSe(OR)_2$. *Di-Me selenate*, b_{16} 68-8.5°, $d_{14}^{19.6}$ 1.7305, $n_D^{19.6}$ 1.44103, 1.44358, 1.44967, 1.45466. *Di-Et ester*, b_{16} 76°, $d_{14}^{19.9}$ 1.4979, $n_D^{19.9}$ 1.43942, 1.44227, 1.44817, 1.45327. *Di-Pr ester*, b_{16} 83-4°, $d_{14}^{19.3}$ 1.3359, $n_D^{18.3}$ 1.45308, 1.45581, 1.46222, 1.46771. *Di-Me selenide*, b_{16} 54-5°, $d_{14}^{14.6}$ 1.4077, $n_D^{14.6}$ 1.47990, 1.48406, 1.49398, 1.50381; *di-Me diselenide*, b_{145} 150-1°. C. J. WEST

Action of amines on bromoanthral. ALBERT KIRRMANN. *Compt. rend.* **186**, 701-2(1928); cf. *C. A.* **22**, 1325.—The Br, as well as the aldehyde-group of α -bromoaldehydes, is very reactive. Bromoanthral (I) and Et_2NH give $Et_2NH \cdot HBr$ and 55% of *diethylaminoanthral*, $C_6H_{11}CH(CHO)NEt_2$ (II), b_{11} 106-7°, d_{22}^{22} 0.853, n_D^{22} 1.4352. II reacts with the Schiff reagent, Fehling soln., alc. $AgNO_3$, and $NaHSO_3$. Its *HCl salt*, m. 73°, can be distd. *in vacuo*. Oxidation of II by NH_4Ag_2O and KOH gives $C_6H_{11}CH(OH)CO_2H$ (III) and $C_6H_{11}CO_2H$. III m. 65° and gives $(C_7H_{15}O_3)_2Ba$, 0.5H₂O. I and Me₃N give $C_6H_{11}CH(CH_3)NMe_3Br$, m. 126°. This reaction is much slower than the reaction of I and Et_2NH ; probably the mechanism is different.

MARGARET W. MCPHERSON

The preparation of acetone. J. D. DONATH. *Chem.-Ztg.* **51**, 924(1927).—The following reaction for the prepn. of acetone was discovered by D. in 1888, *viz.*, $2EtOH + 8MnO_2 \rightarrow MeCOMe + 4Mn_2O_3 + 3H_2O + CO_2$. Alc. vapors were led over pyrolusite previously heated to drive off H₂O. If $BaO(MnO_2)_2$ be present (considered as analogous to Weldon mud) the EtOH is changed easily to AcOH, forming Ba and Mn acetates.

W. C. EBAUGH

Separation of stereoisomeric unsaturated ketones. R. LOCQUIN AND R. HEILMANN. *Compt. rend.* **186**, 705-7(1928).—Each of the stereoisomers: $RC.CO.R'$ and

R'CH

$RC.CO.R'$ could give 2 oximes, semicarbazones, etc. Two of the 4 possible derivs.

$\begin{array}{c} \parallel \\ HCR' \end{array}$

have often been obtained. In each of 2 cases L. and H. proved that 2 semicarbazones were derived from 2 forms of a ketone, and by means of the semicarbazones the 2 forms of the ketone were sepd. $MeCH:C(CH_2Me)COMe$ (I) and $MeCH_2CH:C(CH_2Me)COMe$ (II) were obtained by the dehydration of the corresponding ketones, $(RCH_2)_2C(OH)COMe$. Crude I gives a semicarbazone separable into 2 semicarbazones, $C_8H_{15}ON_3$, III m. 201° and IV m. 161°. Upon hydrolysis III gives the ethylenic ketone, $C_7H_{12}O^*(V)$, b_{147} 150-1°, d_{14}^{12} 0.8718; IV gives the ethylenic ketone, $C_7H_{12}O$ (VI), b_{147} 153-4°, d_{14}^{11} 0.8789. Upon reconversion into the semicarbazone V gives only III, and VI gives only IV. With $N_2H_4 \cdot H_2O$, V and VI give the same pyrazoline $EtCH.CMe:N.NH.CHMe$, b_{10} 72-3°; *benzenesulfonate*, m. 29-30°; *p-bromobenzene-sulfonates*, m. 110°, then 125° after resolidification, and m. 90-1° resp. Crude II

bromide, sol. in hot, insol. in cold C_6H_6 , m. 220° ; *clupanodonoarachidonozoomarin bromide*, sol. in AcOEt but not in hot C_6H_6 , m. 105° ; *clupanodono-I-arachidonin bromide*, insol. in all the above solvents, m. 240° (decompn.); *linoleodizoomarin bromide*, oily.

C. J. WEST

Nucleus synthesis of γ,γ -dimethyl- δ -methylcyclohomotetronic acid. RICHARD ANSCHÜTZ AND HARRY QUITMANN. *Ann.* **462**, 97-104 (1928).— α,α -Dimethyl- β -acetoxybutyryl chloride, pale yellow oil, b. 101° ; with $NCCHNaCO_2Me$ in abs. Et₂O (heating 18 hrs. on the H_2O bath), this gives *Me* α,α -dimethyl- β -acetoxybutyrylcyanooacetate, b. 108° ; $FeCl_3$ gives a deep red-violet color; NH_4 salt, very hygroscopic; *Ag* salt. *Et* ester, b. $110-2^\circ$; *Ag* salt. The above chloride and $CHNa(CO_2Me)$ give 48% of *Me* γ,γ -dimethyl- δ -methylcyclohomotetronic acid carboxylate, b. $112-4^\circ$; sapon. of this ester and the action of HCl on the above esters give the free acid, b. $116-7^\circ$, m. 106.5° , which cryst. with 1 H_2O ; $FeCl_3$ gives a red-violet enol reaction; *Ag* salt. With 1 mol. $HCHO$ to 2 mols. acid there results *methylene-bis- γ,γ -dimethyl- δ -methylcyclohomotetronic acid*, m. 191° ; the corresponding ethylidene deriv. m. 154° (decompn.); the *trichloroethylidene deriv.* m. 143° (decompn.).

C. J. WEST

The enzymic breakdown of polypeptides of various composition. EMIL ABDERHALDEN AND HANS BROCKMANN. *Fermentforschung* **9**, 446-61 (1928).—A series of peptides (I, II, III, IV) was obtained by lengthening the chain step by step according to the Fischer synthesis. *d*-Alanine + $ClCH_2COCl \rightarrow$ *chloroacetyl-d-alanine*, m. $90-1^\circ$, $[\alpha]_D^{20} -44.5^\circ$, \rightarrow *glycyl-d-alanine* (I), m. $235-6^\circ$ (decompn.), $[\alpha]_D^{20} -50^\circ$, + *d*-Me₂-CHCH₂CHBrCOCl \rightarrow *d- α -bromoisocaprolylglycyl-d-alanine*, m. $132-3^\circ$, $[\alpha]_D^{20} 31.2^\circ$, \rightarrow *l-leucylglycyl-d-alanine* (II), m. $245-6^\circ$, $[\alpha]_D^{20} 19.5^\circ$, + *d*-MeCHBrCOCl \rightarrow *d- α -bromopropionyl-l-leucylglycyl-d-alanine*, m. $157-8^\circ$, $[\alpha]_D^{20} -27.95^\circ$, \rightarrow *d-alanyl-l-leucylglycyl-d-alanine* (III), decomp. 240° , $[\alpha]_D^{20} -28^\circ$, + $ClCH_2COCl \rightarrow$ *chloroacetyl-d-alanyl-l-leucylglycyl-d-alanine*, m. $143-7^\circ$, $[\alpha]_D^{20} -45.5^\circ$, \rightarrow *glycyl-d-alanyl-l-leucylglycyl-d-alanine* (IV), decomp. 232° , $[\alpha]_D^{20} -70.6^\circ$. In the prepn. of II, a small quantity of *d- α -bromoisocapronamide*, m. 118° , $[\alpha]_D^{20} -48.3^\circ$, was obtained as a by-product. The pentapeptide IV was finally obtained cryst.; it gave a red biuret reaction, a white ppt. with phosphotungstic acid sol. in excess of reagent, and was salted out by $(NH_4)_2SO_4$ soln. Erepsin readily attacks II, doubling the quantity of amino N, and changing the direction of rotation. The cleavage products are therefore *l*-leucine and glycyl-*d*-alanine. III is less readily attacked by erepsin, and IV is attacked scarcely at all. Trypsin-kinase, on the other hand, leaves II unaltered, has a slight action on III and attacks IV readily. The change in rotation in this case affords no clue as to the products of hydrolysis. *N* NaOH at 37° causes considerable cleavage of IV, whereas the effect of *N* HCl is very slight. Erepsin, as prepd. by Waldschmidt-Leitz free from trypsin, thus attacks the lower peptides and pure trypsin-kinase the higher peptides.

A. W. DOX

Further studies on the enzymic breakdown of polypeptides of various composition. EMIL ABDERHALDEN AND HANS SICKEL. *Fermentforschung* **9**, 462-84 (1928); cf. preceding abstr.—The pentapeptide IV was built up step by step through the intermediate di-, tri- and tetrapeptides (I, II, III). *d*-Valine + *d*-Me₂CHCH₂CHBrCOCl \rightarrow *d- α -bromoisocaprolyl-d-valine*, obtained in 2 fractions, m. 144° , $[\alpha]_D^{19} 21.8^\circ$, and m. 139° , $[\alpha]_D^{19} 17^\circ$, resp., \rightarrow *l-leucyl-d-valine* (I), m. 273° , $[\alpha]_D^{19} 18^\circ$, obtained optically pure by prepn. of the difficultly sol. Cu salt. I + MeCHBrCOCl \rightarrow *d- α -bromopropionyl-l-leucyl-d-valine*, m. 165° , $[\alpha]_D^{20} 34.1^\circ$, \rightarrow *d-alanyl-l-leucyl-d-valine* (II), 2 isomeric forms: 60% *a*, m. $243-5^\circ$, $[\alpha]_D^{19} -60.2^\circ$, and 30% *b*, m. 243° , $[\alpha]_D^{20} -79.5^\circ$; *b* is 10 times as sol. in H_2O as *a*. IIa + $ClCH_2COCl \rightarrow$ *chloroacetyl-d-alanyl-l-leucyl-d-valine*, m. $204-5^\circ$, $[\alpha]_D^{20} -69.6^\circ$, \rightarrow *glycyl-d-alanyl-l-leucyl-d-valine* (III), m. 240° (decompn.), $[\alpha]_D^{21} -98^\circ$, + *d*-Me₂CHCH₂CHBrCOCl \rightarrow *d- α -bromoisocaprolylglycyl-d-alanyl-l-leucyl-d-valine*, m. 187° (decompn.), $[\alpha]_D^{19} -34.8^\circ$, \rightarrow *l-leucylglycyl-d-alanyl-l-leucyl-d-valine* (IV), m. 205° (decompn.), $[\alpha]_D^{16} -60.4^\circ$. The products up to and including III are all cryst., but the pentapeptide is amorphous. It contains 2.5 H_2O , is acid to litmus, gives a red biuret reaction and is partially salted out of soln. by satn. with $(NH_4)_2SO_4$. Its solns. resemble protein solns. in their tendency to foam. I is readily hydrolyzed by erepsin but not attacked by trypsin-kinase. Of the 2 isomeric tripeptides II, one is almost completely hydrolyzed by erepsin and the other not attacked. III is partially hydrolyzed by erepsin but scarcely at all by trypsin. IV is hydrolyzed

by both erepsin and trypsin, the hydrolysis being still more vigorous if both enzymes are present simultaneously. Probably the 2 enzymes attack the pentapeptide in different places.

A. W. DOX

Deaminized polypeptides. I. The action of erepsin on deaminized polypeptides. II. The action of expressed yeast juices on deaminized polypeptides. RYO MURACHI. Kyoto Univ. *Acta Schol. Med. Univ. Imp. Kioto* 9, 269-78, 279-84 (1927).—*Glycolylglycine* (I) was prepd. by adding with shaking the calcd. amt. of 30% NaNO_2 and AcOH to 5 g. *glycylglycine* (II) in H_2O , keeping below 20° , evapg. *in vacuo*, dissolving the residue in H_2SO_4 - MeOH , filtering and repeating this operation until free from Na , evapg. the filtrate *in vacuo*, dissolving in H_2O , adding Ba(OH)_2 to remove H_2SO_4 , removing the excess Ba(OH)_2 with CO_2 and then quant. with H_2SO_4 , evapg. *in vacuo*, extg. the residue with MeOH , then EtOH , removing the ales. from the ext. by distn., dissolving the residue in MeOH , pptg. with Et_2O , filtering and drying the ppt. *in vacuo* over H_2SO_4 ; it forms a white, amorphous powder, sol. in H_2O or EtOH and insol. in Et_2O ; a better method of prepn. is to treat II with AcOH and $\text{Ba(NO}_3)_2$ (prepd. by neutralizing Ba(OH)_2 with gaseous HNO_3), evapg. to dryness *in vacuo*, dissolving the residue in H_2O and quant. pptg. the Ba with H_2SO_4 , filtering, evapg. the filtrate *in vacuo*, dissolving the residue in MeOH , adding abs. EtOH and pptg. with Et_2O ; aq. I neutralized with KOH , EtOH added, allowed to stand in a desiccator for several weeks, gave prismatic crystals of the K salt. *Glycolylglycylglycine* (III) and *glycolyl-diglycylglycine* (IV), prepd. in a similar manner from the corresponding polypeptides, formed white, amorphous powders. When these deaminized polypeptides (0.1-0.2 g.) are dissolved in H_2O , neutralized with Na_2CO_3 , dild. to 50 cc., a 5-cc. portion of this added to 5 cc. alk. borate soln. (12.404 g. boric acid in 100 cc. N NaOH , dild. to 1000 cc., and adjusted to pH 8.02 by adding 44 cc. 0.1 N HCl to 56 cc.), 1 cc. erepsin soln. (a well-scraped beef intestine was ground in 2.5 parts of glycerol, after standing 24 hrs. was filtered through cloth and dild. with 5 parts H_2O), a little PhMe added and then incubated at 37° , it was found that IV was partially split into amino acids but I and III remained unchanged. Beer yeast was ground with an equal amt. of purified quartz sand and forced through a Buchner press. This liquid was added to solns. of I, III and IV neutralized with Na_2CO_3 , a little PhMe added and then incubated at 37° . It was found that I, III and IV are split into amino acids. N. A. LANGE

Synthesis of diethyl β -methyl- α,γ -dicyanoglutaconate. YOSHIYUKI URUSHIBARA. *Bull. Chem. Soc. Japan* 3, 102-5 (1928).— $\text{MeC(OEt):C(CN)CO}_2\text{Et}$ (I) is obtained easily by the condensation of 1 mol. MeC(OEt)_3 and 1 mol. $\text{NCCH}_2\text{CO}_2\text{Et}$ under the influence of 2 mols. of Ac_2O . The condensation of I and $\text{EtO}_2\text{CCH(CN)Na}$ in abs. alc. yields EtOH and $\text{EtO}_2\text{CC(CN)NaCMe:C(CN)CO}_2\text{Et}$; the latter treated with dil. HCl yields $\text{EtO}_2\text{CCH(CN)CMe:C(CN)CO}_2\text{Et}$. Its Ag deriv. is obtained by treatment with AgNO_3 . A. I. HENNE

The reduction of α -eleostearic acid. The 10,12-linoleic acid and the 11-oleic acid. J. BORSEKEN AND J. VAN KRIMPEN. *Proc. Acad. Sci. Amsterdam* 31, 238-40 (1928).—See C. A. 22, 1953. E. H.

The constitution of C-methylasparagine (homoasparagine). D. MIGLIACCI AND M. FURIA. *Gazz. chim. ital.* 58, 103-10 (1928).—Homoasparagine (I) (2 g.) and urea (2-3 g.), heated 10-12 hrs. at $125-30^\circ$, extd. with hot water, filtered, concd., then evapg. *in vacuo* over H_2SO_4 , the ppt. filtered, washed free of urea, and recrystd. from hot water with evapn. *in vacuo* (if crystn. does not ensue, the soln. was too concd. and evapn. too rapid, in which case add 3-4 vols. of hot water or hot 50% EtOH and if possible inoculate with crystals), yields 1.7 g. of *anhydroureidohomoasparaginic monoamide*, $\text{H}_2\text{NOCCH}_2\text{CMe.NH.CO.NH.CO}$ (II), m. $266-7^\circ$ (decompn.), monoclinic.

Homoasparaginic acid (III) (2 g.) and urea (2-3 g.) heated 10-12 hrs. at $125-30^\circ$, and treated as before, yield 1.8 g. of *anhydroureidohomoasparaginic acid*, $\text{HO}_2\text{CCH}_2\text{CMe.NH.CO.NH.CO}$ (IV), m. $264-5^\circ$ (decompn.); its aq. soln. is acid

and decomp. carbonates. II (1 g.) refluxed 1 hr. with 15% HCl (3-4 cc.) yields 0.9 g. of IV. The phys. and chem. properties of II and IV are very similar to those of *anhydroureidosuccinic amide* and acid, so that probably here too a CH_2 group seps. the groups, thus explaining a structure which has long been in doubt (cf. *Compt. rend.* 81, 325 (1875); *Gazz. chim. ital.* 7, 404 (1877); 17, 185 (1877); Lippich, C. A. 3, 59). The formation of II and IV from I and III, resp., shows that the amino and amido groups of asparagine are sepd. by a CH_2 group, and therefore that of the 2 formulas of I given by Beilstein without preference (cf. *Beilstein* [IV] 4, 495 (1922)), $\text{H}_2\text{NOCCH}_2\text{C(NH}_2)_2\text{MeCO}_2\text{H}$ is the correct one. This confirms the opinion of Piutti (*Gazz. chim. ital.*

18, 147(1898)) and of Schiff (*Gazz. chim. ital.* 29, 285(1899)). The best method for the prepn. of I remains the autoclave method with alc. NH_3 (cf. Piutti, *loc. cit.*). It cannot be prepd. by the action of liquid NH_3 (VIII) on citraconic anhydride (IX) as the following expts. will show. IX (5 cc.) agitated 48 hrs. with VIII (4-5 cc.) in a sealed tube (4-5 cc. of VIII may be condensed on IX in the tube immersed in CO_2 snow and Et_2O in a Dewar flask and the tube then sealed), the product washed out with hot water, residual NH_3 expelled by heating, filtered and the ppt. crystd. from water, yields NH_4 citraconate (X). When I and II are heated 3 hrs. at $50-60^\circ$ or 8 hrs. at $65-70^\circ$, sealed as before, X is again obtained.

C. C. DAVIS

The reactivity of *o*-diketonic groups placed between two nitrogen atoms. P. K. DE AND A. C. SIRCAR. *Quart. J. Indian Chem. Soc.* 4, 531-4(1927).—This investigation was intended for the prepn. of azine derivs. by the condensation of diphenylthioparabanic

acid with *o*-diamines: $\text{SC} \begin{array}{c} \text{NPh} \cdot \text{CO} \\ | \\ \text{NPh} \cdot \text{CO} \end{array} \text{ (I)} + o\text{-C}_6\text{H}_4(\text{NH}_2)_2 \rightarrow \text{SC} \begin{array}{c} \text{NPh} \cdot \text{C:N} \\ | \\ \text{NPh} \cdot \text{C:N} \end{array} \text{C}_6\text{H}_4$

+ $2\text{H}_2\text{O}$. But both *o*- $\text{C}_6\text{H}_4(\text{NH}_2)_2$ and 1,2- $\text{C}_6\text{H}_6(\text{NH}_2)_2$ gave condensation products contg. no S. It is evident that *o*-diketo groups placed between N atoms behave quite differently than those placed between two C atoms, as in phenanthraquinone. The search was then made to cover other *o*-diketo compds.: dinitrodiphenylthioparabanic acid, diphenylparabanic acid, *N,N*-diphenyl- α,β -diketopiperazine and dimethylxanilide. None of these yields an azine. The parabanic acids behave similarly toward the *o*-diamines; while the other 2 compds. do not react with them. The reaction with I

probably proceeds as follows: $\text{I} + \text{C}_6\text{H}_4(\text{NH}_2)_2 = \text{C}_6\text{H}_4 \begin{array}{c} \text{NH} \cdot \text{CO} \\ | \\ \text{NH} \cdot \text{CO} \end{array} \text{ (II)} + \text{SC}(\text{NPh})_2$;

$\text{SC}(\text{NPh})_2 + \text{C}_6\text{H}_4(\text{NH}_2)_2 = \text{SC}(\text{NH})_2\text{C}_6\text{H}_4 \text{ (IV)} + \text{PhNH}_2$. II and PhNH_2 were identified in the reaction mixt. and that the 2nd part of the reaction can occur was proved by a blank expt. In the case of diphenylparabanic acid, the 2nd reaction does not take place; both II, does not m. 300° , and $\text{OC}(\text{NPh})_2$, m. 238° , were isolated and no PhNH_2 could be detected. IV, sol. in alkalis and insol. in acids, m. $294-7^\circ$.

H. W. GIBSON

Attempts to synthesize sucrose. J. C. IRVINE, J. W. H. OLDHAM AND A. F. SKINNER. *Chemistry & Industry* 47, 494-5(1928).—Attempts to synthesize sucrose have included 3 general methods: (1) Condensation of tetraacetylchloro(or bromo)glucose with γ -tetraacetylfructose; (2) Condensation of tetraacetylglucose with tetraacetylchloro-fructose; (3) Condensation of tetraacetylglucose with γ -tetraacetylfructose. Poor yields of disaccharide were obtained from the 1st of these methods. The 2nd method gave mainly pentaacetylglucose, together with a disaccharide isomeric with sucrose, which m. $129-30^\circ$, $[\alpha]_D^{20} 19.2^\circ$ in CHCl_3 . The 3rd method yielded a product which contained reducing sugars together with the disaccharide mentioned above. T. S. CARSWELL

Cyclopentanic compounds. A new preparation of 1,2-dimethylcyclopentane. GEORGES CHAVANNE AND MILE. LUCIENNE DEVOGEL. Brussels Univ. *Bull. soc. chim. Belg.* 37, 141-52(1928).—Tertiary methylcyclopentanol (I), m. 36° , b_{760} (cor.) $135-6^\circ$ (allophanate, m. 157°), is obtained with a 65-75% yield from cyclopentanone and MeMgI . Sometimes a mixt. of H_2O and 1-methylcyclopentene (II) is obtained. II m. -127.2° , b_{760} (cor.) $75.5-76^\circ$, $d_4^{20} 0.7979$, $n_D^{15} 1.4319$, $n_D^{16} 1.4347$, $n_D^{16} 1.4416$, $n_D^{16} 1.4512$; its constitution is ascertained by its oxidation with 2% KMnO_4 , which gives $\text{MeCO}(\text{CH}_2)_3\text{CO}_2\text{H}$, m. $14.5-6.5^\circ$, $b_{10} 149-51^\circ$, whose oxime m. $103.5-4.5^\circ$ and semicarbazone m. 180.5° . II treated with nascent HOCl (Detoeuf, *C. A.* 16, 1395, 2113) yields at least 2 compds., of which one m. $35-7^\circ$, $b_{10} 75^\circ$, the other one showing $d_4^{20} 1.1240$, $d_4^{20} 1.1039$, $n_D^{20} 1.4764$, $n_D^{20} 1.4785$, $n_D^{20} 1.4853$, $n_D^{20} 1.4970$; the theory admits 4 isomeric chlorohydrins. The mixt. of these chlorohydrins with KOH powder in Et_2O gives the oxide (III) of II (43% yield), $b_{760} 110.8-111^\circ$, m. -80.5° , $d_4^{13} 0.9266$, $d_4^{19} 0.9212$, $n_D^{16} 1.4290$, $n_D^{15} 1.4311$, $n_D^{15} 1.4364$, $n_D^{15} 1.4407$. III treated with MeMgI gives exclusively a mixt. of the stereoisomer of 1,2-dimethyl-1-cyclopentanol (IV) (yield 40%). IV very easily loses H_2O , yielding 82% of 1,2-dimethyl-1-cyclopentene (V) by distn. over $p\text{-HO}_3\text{SC}_6\text{H}_4\text{Me}$. The hydrogenation of V with Pt black yields 99% of 1,2-dimethylcyclopentane, $b_{760} 94-99^\circ$, $d_4^{20} 0.764$, $n_D^{20} 1.417$. During the prepn. of V, α -methylcyclopentanone has been isolated as a by-product; its presence could not be explained.

A. L. HENNE

The *o*-cyclohexylcyclohexanols. VAVON AND V. M. MITCHOVITCH. *Compt. rend.* 186, 702-5(1928).—V. and M. predict 2 *o*-cyclohexylcyclohexanols on the basis of the

Baeyer theory, and many more on the basis of the Sachse theory. Formerly they prepd. *cis*- (I) and *trans*-*o*-cyclohexylcyclohexanol (II) (C. A. 21, 375). Although other forms are recorded in the literature, they have not been able to prep. any other form. Hydrogenation of *o*-PhC₆H₄OH with Pt black gives I. The reaction of C₆H₁₁MgCl with *o*-chlorocyclohexanol or with cyclohexene oxide gives an alc., C₁₂H₂₂O (III). Following are the m. ps. of I, II and III and their derivs: 60°, 54°, and 34°; *phenylurethans*: 148°, 132° and 122°; *acid phthalates*: 126-7°, 123-4°, and 92-3°; *dinitrobenzoates*: 122.5-3.5°, 124-5° and 102°; *p*-nitrobenzoates: 112-3°, 87° and 96-7°, and 49-50°. The velocities of sapon. of the acid phthalates at 69° in 96% alc. are: 0.20, 2.2, and 0.16, resp. CrO₃ and I or II give *o*-cyclohexylcyclohexanone (IV). CrO₃ and III give a ketone whose velocity of sapon. is ¹/₂₆ that of IV. III is *cyclopentylcyclohexylcarbinol*, C₅H₉CH(OH)C₆H₁₁, formed by the rupture of a C₅-ring, analogous to the rupture which Godeliot and Cauquil established for the C₇-ring. $\text{CH}_2(\text{CH}_2)_4\text{CHCHO}$ and $\text{CH}_2(\text{CH}_2)_5\text{CHMgCl}$ give III.

MARGARET W. MCPHERSON

Several cyclic α -nitroketones. H. WIELAND, P. GARBSCH and J. J. CHAVAN. *Ann.* 461, 295-308(1928) —K (4 g.) in 30 cc. abs. EtOH and 70 cc. abs. Et₂O, cooled to -10° to -15°, treated with a soln. of 10 g. cyclohexanone and 9.3 g. EtNO₂ in 150 cc. Et₂O, gives 12-15 g. of the *K* salt (of which about 50% is lost during purification, light yellow needles, decomp. 215-20° and gives an intense brownish red color with FeCl₃) of *aci*-nitrocyclohexanone, m. 37°, but often obtained as an oil; FeCl₃ gives a brownish red color, which disappears on the addn. of Br; NaOH and Na₂CO₃ give yellow solns. The *Br* deriv. is an oil. *Semucarbazon*, m. 184° (decompn.); FeCl₃ gives no color. PhN₂Cl gives light yellowish brown prisms, decomp. 118°, which may be HO₂C(CH₂)₄C(NO₂):N₂IHPh. A phenylhydrazone or oxime could not be obtained but PhNHNH₂ gives an *osazone* of cyclohexane-1,2-dione, yellow, m. 150°. From twice the quantity of K and EtNO₂ there results the *di*-K salt of the *dinitro*-cyclohexanone, m. 110.5°; with 4 *N* H₂SO₄ the aq. soln. of the *di*-K salt gives a *mono*-K salt, red, decomp. 221°. Cyclopentanone yields an α,α' -*dinitro* deriv., crystals quickly changing to an oil; *di*-K salt, deep yellow, m. 241-5° (decompn.); *mono*-K salt, orange-yellow, decomp. 154-8°. Nitrocyclohexene dibromide, m. 100-1°; with MeOH-KOH this splits off KBr and gives the *aci*-K salt, pale yellow; aq. solns. give with FeCl₃ an intense dark olive-brown color; with HNO₂ it gives an *isonitroso* compd., pale yellow, decomp. 122.5°. The pseudonitrosite, suspended in abs. EtOH and treated with NH₃, gives 10% of *di*-[α -nitrocyclohexyl]amine, m. 96.7°; *HCl* salt, m. 163°; *nitrosamine*, m. 145-50° (decompn.). α -Hydrazonitrocyclohexane, m. 138-40°, in 25% yield from the pseudonitrosite and N₂H₄·H₂O in EtOH.

C. J. WEST

The preparation of vanillin from safrol. ALFRED WAGNER. *Chem.-Zig.* 52, 379(1928).—A claim for priority over F. Boedecker's process English (Patent 285,156 (1928)) of making vanillin from safrol

W. C. EBAUGH

Catalytic actions of mercury and bismuth. J. B. MENKE. *Rec. trav. chim.* 47, 668-72(1928).—Benzene can be nitrated at 80° with a mixt. of Ac₂O and a nitrate, but in general not with a mixt. of AcOH and a nitrate. With Hg nitrate and also to some extent with Bi nitrate, AcOH as well as Ac₂O can be used, but in these cases nitrophenols as well as PbNO₂ are formed. The action of the Hg salt on the nitrophenols gives rise to the formation of complex Hg compds. which, however, are different with HgNO₃ and Hg(NO₃)₂. On passing a mixt. of benzene vapor and N-O compds. over Bi oxide or through Hg vapor at about 400° PbNO₂ and nitrophenols are formed. The formation of complex compds. of the nitrophenols takes place with the Hg vapor but not with Bi oxide and the amount of PbNO₂ obtained with Hg vapor far exceeds the amount obtained with Bi oxide. H₃PO₄ destroys the catalytic action of Bi and therefore Hg cannot be replaced by Bi in the Kjeldahl process; in the process of Gunning and in the oxidation of C₁₀H₈ to phthalic acid this replacement is possible.

C. F. VAN DUIN

Velocity measurements of intramolecular changes in arylacylhalogenoamines. CORNELIA CH. J. FONTEIN. *Rec. trav. chim.* 47, 635-67(1928).—Expts. previously carried out by Blankma (*Verslag. Akad. Wetenschappen Amsterdam* 1902, 159, 378; *Rec. trav. chim.* 21, 366(1902); 22, 290(1903)) have shown that the conversion of arylacylhalogenoamines into *o*- and *p*-halogenoacylamines is a monomol. reaction, HCl acting as a catalyst, the velocity of the reaction being nearly proportional to the square of the quantity of HCl added. Further it was shown that the reaction is accelerated by sunlight and that the velocity was largely dependent on the solvent, addn. of water to the solvent slowing down the velocity of the reaction. In the present investigation the influence of light, the solvent, the acyl, halogen and aryl groups was investigated.

A. *The influence of the solvent and of light on the velocity of intramol. change of phenyl-acetylchloroamine into p-chloroacetanilide.*—In these investigations the concn. of the HCl was kept const. (0.2 N), the temp. being 25°. Results obtained:

Vol. % MeOH	Vol. % EtOH	Vol. % AcOH	K in MeOH	K in EtOH	K in AcOH
0	0	0	0.0037	0.0037	0.0037
...	1.92	...	.....	0.0042	.....
...	4.8	...	.....	0.0044	.....
9.3	9.6	10	0.0050	0.0051	0.0053
18.7	19.2	20	0.0062	0.0065	0.0086
28.8	28.8	30	0.0075	0.0097	0.0136
37.3	38.4	40	0.0151	0.0161	0.0234
46.6	48.0	50	0.0200	0.0264	0.0538
57.6	57.6	60	0.0351	0.0454	0.1450
67.2	67.2	70	0.0646	0.0873	0.5260
76.8	76.8	80	0.1471	0.2791	.....
86.4	86.4	90	0.5528	0.7860	.....
...	96.0	100	.....	1.8530	.....

From these results it appears that the reaction velocity in MeOH, EtOH and AcOH decreases by the addn. of water and that, for equal %, the reaction velocity increases in the order MeOH, EtOH, AcOH. Comparative investigations in the dark and in sunlight showed that the reaction is greatly accelerated by sunlight. B. *The influence of the acyl group on the velocity of intramol. change of the arylacylhalogenoamines.*—The results of the measurements carried out with the formyl-, acetyl-, propionyl-, butyryl- and benzoylphenylchloroamines at 25° in the presence of 0.2 N HCl are given in the following tables:

Vol. % EtOH	0%	19.2%	38.4%	57.6%	76.8%
Phenyl-formyl-chloroamine	0.0027	0.0056	0.0142	0.0365	0.1089
" -acetyl- "	0.0037	0.0065	0.0161	0.0454	0.2791
" -propionyl- "	0.0025	0.0040	0.0077	0.0254	0.1345
" -butyryl- "	0.0028	0.0046	0.0017	0.0259	0.1290
" -benzoyl- "	0.0134	0.0315	0.0521	0.1287	0.4562

Vol. % AcOH	0%	20%	40%	60%	80%
Phenyl-formyl-chloroamine	0.0027	0.0086	0.0182	0.0757	0.3598
" -acetyl- "	0.0037	0.0086	0.0234	0.1450	.....
" -propionyl- "	0.0025	0.0040	0.0125	0.0662	.....
" -butyryl- "	0.0028	0.0056	0.0144	0.0859	.....
" -benzoyl- "	0.0134	0.0163	0.0554	0.3313	.....

These figures show that the reaction velocity increases in the order EtCO, PrCO, HCO, Ac, Bz, and that with all these compds. the velocity is greater in AcOH-H₂O mixts. than in alc.-water mixts. of the same strength. C. *The influence of the halogen atom on the velocity of conversion of arylacylhalogenoamines into halogenoacylamines.*—PhAcNBr is converted far more easily into p-BrC₆H₄NHAc than the corresponding chloroamine into p-ClC₆H₄NHAc. Under otherwise similar circumstances, in order to obtain reaction velocities of the same order of magnitude, the quantity of HCl must be 10,000 times as great as the quantity of HBr. D. *The influence of the aryl group on the isomeric change discussed in this paper was investigated with m-methyl-, m-chloro- and m-bromophenylacetylchloroamine in the presence of 0.2 N HCl at 25°.*

Vol. % EtOH	0%	19.2%	38.4%	57.7%
phenylacetylchloroamine	0.0037	0.0064	0.0158	0.0455
m-methyl- "	0.0061	0.0134	0.0316	0.0845
m-chloro- "	0.0183	0.0308	0.0969	0.4102
m-bromo- "	0.0105	0.0347	0.1157	0.3778

Vol. % AcOH	0%	20%	40%	60%
phenylacetylchloroamine	0.0037	0.0086	0.0234	0.1449
m-methyl- "	0.0061	0.0131	0.0371	0.5674
m-chloro- "	0.0183	0.0334	0.1118	0.8244
m-bromo- "	0.0105	0.0354	0.1342	.....

These figures show clearly that *m*-Me, *m*-Cl and *m*-Br groups increase the velocity of the reaction, the acceleration brought about by the Cl and Br atom being much greater than that of the Me group.

C. F. VAN DUIN

The position occupied by the acetatomercuric groups in anilines which contain a halogen group and a hydrocarbon residue in the nucleus. II. L. VECCHIOTTI. *Gazz. chim. ital.* **58**, 181-90(1928); cf. *C. A.* **22**, 231.—In continuation of the previous expts., the action of $\text{Hg}(\text{OAc})_2$ (I) on *m*-BrC₆H₄NH₂ (II) was studied. I (32 g.) in water (100 cc.) (filtered), EtOH (100 cc.) and a few drops of glacial AcOH, let stand 48 hrs. with II (34 g.) in EtOH (100 cc.), filtered, washed and recrystd. from EtOH, yields 4-acetatomercuri-*m*-bromoaniline, 3,4-Br(AcOHg)C₆H₃NH₂ (III), m. 181°. Let stand 24 hrs. with excess Ac₂O, III forms an *Ac deriv.*, 3,4-Br(AcOHg)C₆H₃NHAc (IV), m. 215°. III let stand 24 hrs. with 50% aq. KOH, greatly dild. with water, filtered, washed and recrystd. from EtOH, yields the hydroxide, 3,4-Br(HOHg)C₆H₃NH₂, m. 170°. III and NaBr in the min. quantity of boiling EtOH let cool after some hrs. ppt. the bromide, 3,4-Br(BrHg)C₆H₃NH₂, m. 215°. III let stand 24 hrs. with 50% aq. Na₂S₂O₃, filtered and washed with water, yields 4-monomercuri-*bis-m*-bromoaniline, [2,4-Br(H₂N)-C₆H₃]₂Hg, m. 185°. Br in glacial AcOH added to IV (calcd. proportion) in glacial AcOH, let stand 24 hrs., greatly dild. with water, and the ppt. recrystd. from EtOH, yields a dibromoacetanilide, Br₂C₆H₃NHAc (V), m. 158°. V sapond. by refluxing 8 hrs. with abs. EtOH and HCl (calcd. proportions), the solid product dissolved in water, KOH added and the ppt. recrystd. from EtOH, yields 3,4-Br₂C₆H₃NH₂, which establishes the constitution of III. II (17 g.) added to I (32 g.) in water (100 cc.), filtered, the filtrate let stand 48 hrs., the semigelatinous ppt. washed repeatedly, dissolved in hot glacial AcOH, reprecipd. by diln. with water, and the purification repeated several times, yields after drying *in vacuo* over H₂SO₄, 2,4,6-triacetatomercuri-*m*-bromoaniline, 3,2,4,6-Br(AcOHg)₃C₆H₃NH₂ (VI), m. 229°. Digested 3 days with excess Ac₂O and the product purified with glacial AcOH as before, it yields an *Ac deriv.*, 3,2,4,6-Br(AcOHg)₃C₆H₃NHAc, m. 240° (decompn.). Br (7.5 g.) in glacial AcOH agitated with VI (10 g.) suspended in glacial AcOH until the reaction mixt. is clear, let stand 24 hrs., greatly dild. with water, filtered, the residue thoroughly washed with water and recrystd. from EtOH, yields a tetrabromoacetanilide, Br₄C₆H₃NHAc (VII), m. 128°. VII in EtOH refluxed 10 hrs. with fuming HCl (calcd. proportion), filtered, washed with EtOH, dissolved in water, concd. aq. KOH added, filtered, washed and recrystd. from EtOH, yields 2,3,4,6-Br₄C₆H₃NH₂, m. 116-7°, which establishes the constitution of VI.

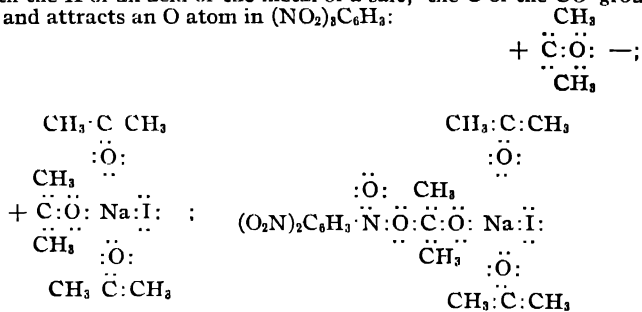
C. C. DAVIS

The Michler "sulfones." F. BERGEL AND H. DÖRING. *Ber.* **61B**, 844-5(1928).—Lecher and D. (D., *Diss. Freiburg*, 1928) obtained from *p*-MeC₆H₄SH and *p*-ClC₆H₄NO₂ the sulfide MeC₆H₄SC₆H₄NO₂, which, on reduction, methylation and oxidation gave the sulfone *p,p'*-MeC₆H₄(SO₂)C₆H₄NMe₂, m. 209-11°, while Michler describes (*Ber.* **12**, 1793 (1879)) under the same name a compd., m. 95°. The *p,o'*-sulfone, prepd. in the same way, m. 95.5°, but depresses the m. p. of M.'s compd. to 66-74°. Accurate combustions on the latter compd. now showed that it has the compn. not C₁₆H₁₁O₂NS but C₁₄H₁₀O₂NS and direct comparison proved that as a matter of fact the substance is identical with the *p*-MeC₆H₄SO₂NMePh obtained by Otto (*J. prakt. Chem.* [2], **47**, 369) from MeC₆H₄SO₂Cl and PhNHMe. The same is true of the other "sulfones" obtained by M. from arylsulfonyl chlorides and PhNMe₂; in this reaction the sulfonyl chloride apparently first splits off one Me (probably by oxidation) from the PhNMe₂, and then reacts with the PhNHMe so produced to give the final product RSO₂NMePh; as noted by M., there are formed in large amounts, as by-products, Me violet and CH₂-(C₆H₄NMe₂)₂, whose methane C atom can come only from the Me groups split off.

C. A. R.

The complexes of the aromatic polynitro compounds with unsaturated compounds and certain salts. B. V. TRONOV, L. N. D'YAKONOVA-SCHULTZ AND E. ZONOVA. *J. Russ. Phys.-Chem. Soc.* **59**, 333-46(1927).—A mixt. of C₆H₃(NO₂)₃ or its derivs. with compds. contg. a CO group assumes a red or brown coloration when an iodide is added. The color disappears on diln., and no I can be detected. The formation of a complex compd. is therefore evident. Among the aldehydes, AcH and EtCHO are colored brown-red; BzH and AmCH₂CHO pale yellow, AcMe is intensely colored, AcPh and AcCH₂CO₂Et distinctly so, more complex ketones to a lesser extent. CO₂H acids do not form colored compds., while some amides (fused ACNH₂, MeCH₂CONH₂) do. Esters are only slightly colored. Ac₂O behaves like AcMe; AcCl produces no change. MeCN, MeSCN and MeNCS exhibited a coloration of medium intensity; MeCH(OH)CN, MeCH:NOH are faintly tinged. The most intense color develops with C₆H₅N and α-MeC₆H₄N. Quinoline resembles AcMe, isoquinoline is paler. CH₂:-

CHCH₂OH becomes dark yellow. The stability of the complexes, as measured by the quantity of EtOH added before the color disappears, decreased with the color intensity (greatest for C₆H₅N, least for MeOAc). PhAc forms an intensely colored compd., however, although the coloration is discharged easily. Among the nitro compds., PhNO₂ develops only a trace of color upon the addn. of ketones and iodides. Dinitro compds. react better, while among the trinitro compds. trinitrophenols are followed by (NO₂)₃C₆H₃ and (still weaker) C₆H₂(NO₂)₃Me. Here also deeper color is associated with greater stability. Phenols form salts with amines instead of the colored complexes. Among the iodides those of K, NH₄, Ca and Ba can be used. MgI₂, CdI₂, CuI₂ and Me₄NI did not react, possibly because of their low soly. Bromides of the alkali metals are less active than the iodides. The addn. of chlorides, nitrates and sulfates does not produce any color. KCNS and NH₄CNS from colored complexes with AcMe and (NO₂)₃C₆H₃. Salts of weak acids sometimes produce a dark red coloration because of their alk. reaction. The complex could not be crystd. without decompn. The color is most intense when (NO₂)₃C₆H₃ and NaI are added to MeAc in equimol. proportions. Equimol. quantities of NaI and (NO₂)₃C₆H₃ were dissolved in AcMe, excess of the solvent evapd. and the residue weighed; its compn. roughly corresponded to (NO₂)₃C₆H₃ + NaI + 3AcMe. Similarly, BaI₂ combines with 2 mols. of C₆H₃(NO₂)₃ and 6 mols. AcMe. The complex of MeC₆H₂(NO₂)₃ + NaI + 3C₆H₅N was pptd. with petroleic ether and analyzed, found I 19.99, 21.78% (calcd. 20.67%); C₆H₅N 42.7, 40.58% (calcd. 38.8%). The secondary valences of O in CO compds. cause them to unite with the H of an acid or the metal of a salt; the C of the CO group now becomes unsatd. and attracts an O atom in (NO₂)₃C₆H₃:



BASIL C. SOYENKOFF

The styphnates of nitroanilines. N. N. EFREMOV. *J. Russ. Phys.-Chem. Soc.* **59**, 391-404 (1927).—Mol. compds. of (NO₂)₃C₆H₂OH and (NO₂)₃C₆H(OH)₂ with nitroanilines are known. Diphenylamines also are formed on heating, especially in the presence of dehydrating agents, which may account for the difference in m. p. of the mol. compds. reported by various investigators. A mixt. of equimol. amts. of PhNH₂ and (NO₂)₃C₆H(OH)₂ decomps. violently below fusion temp. The compd. (1:1) seps. in pale yellow prisms when a hot soln. of the acid in a mixt. of 1 part EtOH and 3 parts EtOAc is added to a similar soln. of PhNH₂. Yield 68%; C 42.78% (calcd. 42.59%), H 2.76% (calcd. 2.99%), N 16.33% (calcd. 16.53%), (NO₂)₃C₆H(OH)₂ 72.59% (calcd. 72.48%). In the presence of an excess of PhNH₂, the crystals are contaminated with the latter. The compd. begins to decomp. 120°. No other styphnates of PhNH₂ were found. The acid does not combine with *o*-O₂NC₆H₄NH₂; the mixts. can be melted once without decompn. and crystallize readily. The eutectic lies at 45.6° and 64.2° of the aniline by wt. No solid solns. were found. With *m*-O₂NC₆H₄NH₂ a compd. is formed m. 156.2° (50% mol. of the aniline) and one m. 106.8° (66.67% of the aniline). The eutectics are at 140.2° (17.7% by wt.) and 98.6° (76.4% by wt.). The compds. were recrystd. and the compns. detd. from m.-p. curves confirmed by titrations with Ba(OH)₂. A styphnate of *p*-O₂NC₆H₄NH₂ (1:1), m. 129.8°, exists; the eutectic is located at 124.7° (28.3% of the aniline by wt.). Solid solns. are not formed. The 2nd eutectic m. 112.2° (62.3% of the aniline). The compd. was recrystd. and titrated with Ba(OH)₂; found (NO₂)₃C₆H(OH)₂ 64.27%, calcd. 63.97%. B. C. S.

Mobile-anion tautomerism. I. Preliminary study of the conditions of activation of the three-carbon system and a discussion of the results in relation to the modes of addition to conjugated systems. HAROLD BURTON AND CHRISTOPHER KELK INGOLD. *J. Chem. Soc.* **1928**, 904-21.—This is the 1st paper dealing with a general investigation on the effect of groups in promoting anionotropic change, presenting results for the

systems $\text{ArCHXCH:CH}_2 \rightleftharpoons \text{ArCH:CHCH}_2\text{X}$ and $\text{ArCHXCH:CHAr}' \rightleftharpoons \text{ArCH:CHCHXAr}'$, where the potentially mobile anion, X, is OR or Hal. In the system PhCH(OH)CH:CH_2 (I) $\rightleftharpoons \text{PhCH:CHCH}_2\text{OH}$ (II), the degree of mobility is not very great, for the 2 alcs. can be obtained as sep. individuals; I *p*-nitrobenzoate, m. 45–6°; Valeur and Luce (*Bull. soc. chim.* 27, 611(1920)) claim to have transformed I into II by dil. H_2SO_4 but this result could not be confirmed; however, I is smoothly and completely transformed into the acetate of II by boiling with Ac_2O . I and II are converted into the same cryst. bromide (cf. Moureu and Gallacher, *C. A.* 16, 714); the correctness of this structure was proved by the action of O_3 . α -*p*-Tolylallyl alc. (III), b_{10} 120–2°, yields a *p*-nitrobenzoate, m. 82°; III is completely converted into the acetate, b_{10} 140°, of 4-methylcinnamyl alc. (IV), m. 51–2°; *p*-nitrobenzoate, m. 131–2°. III or IV with HBr gives 4-methylcinnamyl bromide, m. 64–5°; the constitution was established by the action of O_3 . PhCH(OAc)CH:CHPh and Br in CCl_4 give a bromide, m. 176–7°, an isomer, m. 122° and a viscous oil. γ -Phenyl- α -*p*-tolylallyl alc. (V), m. 78–9°; with alc. 20% KOH it gives almost quant. $p\text{-MeC}_6\text{H}_4\text{COCH}_2\text{CH}_2\text{Ph}$; Ac_2O gives a mixt. of the *Ac* derivs. of V and of α -phenyl- γ -*p*-tolylallyl alc., b_{11} 210–1°, whose constitution was proved by the action of O_3 and alc. KOH. The action of $p\text{-ClC}_6\text{H}_4\text{MgI}$ upon PhCH:CHCHO gave a mixt. of the 2 isomeric alcs., α -phenyl- γ -*p*-chlorophenylallyl and γ -phenyl- α -*p*-chlorophenylallyl; the mixed *Ac* derivs. b_{11} 225–6°; Br gives 2 isomeric bromides, $\text{C}_{17}\text{H}_{15}\text{O}_2\text{ClBr}_2$, m. 193–4° and m. 180°. The constitution of the mixt. was established as above. The following reference compds. were prepd.: *Et p*-chlorobenzoylbenzoylacetate, b_{12} 240°, m. 54–5°, from $\text{BzCHNaCO}_2\text{Et}$ and $p\text{-ClC}_6\text{H}_4\text{CH}_2\text{Br}$; hydrolysis with dil. H_2SO_4 or Ba(OH)_2 gives *Ph* β -*p*-chlorophenylethyl ketone, m. 58° (oxime, m. 117–8°). *Et p*-chlorobenzoylacetate, b_{11} 181–2°, m. 36°; benzyl deriv., b_{14} 228–33°, m. 65°; *p*-chlorophenyl β -phenylethyl ketone, m. 78° (oxime, m. 111–2°). *Et* benzyl-*p*-tolylacetate, b_{11} 232–3°; hydrolysis gives $p\text{-MeC}_6\text{H}_4\text{COCH}_2\text{CH}_2\text{Ph}$, whose oxime m. 101–2°. *Et p*-methylbenzylbenzoylacetate, b_{10} 223–5°; hydrolysis gives *Ph* β -*p*-tolylethyl ketone, waxy solid, whose oxime m. 85–6°.

C. J. WEST

Monoacyl derivatives of quinic acid. II. KARL JOSEPHSON. *Ber.* 61B, 911–7 (1928); cf. *C. A.* 22, 411.—Under certain conditions, the lactone ring in benzoylquinide (I) can readily be opened with acids without appreciable splitting off of BzOH and 4-benzoylquinic acid (II) can be obtained directly in good yield from acetone-benzoylquinide (III) in 1 operation. That no migration of the acyl radical takes place during the hydrolysis is shown by the fact that with dry Me_2CO contg. 1.5% HCl II regenerates III. 4-Cinnamoylquinic acid (IV) is obtained in the same way. The III, m. 140°, is obtained in 81% yield from acetone-quinide in cold dry $\text{C}_6\text{H}_5\text{N}$ with BzCl ; 5.3 g. in 40 cc. Me_2CO at 55° warmed 40 min. with 20 cc. 4 N HCl, then another 40 min. with 20 cc. more of acid, gives 1 g. I and 3 g. II, prisms with H_2O , $[\alpha]^{20}_{\text{D}} -3.9^\circ$ (95% alc.), m. (anhyd.) 188° (cor.). Acetone-4-cinnamoylquinide (yield, 73%), m. 189° (cor.). 4-Cinnamoylquinide (3.75 g. from 6.2 g. of the acetone compd. with aq. HCl and Me_2CO at 55°), m. 165° (cor.), $[\alpha]^{20}_{\text{D}} -18.3^\circ$ (Me_2CO); the mother liquors yield 1.12 g. IV, m. 188° (cor.), $[\alpha]^{20}_{\text{D}} 5.9^\circ$ (95% alc.). Acetone-4-acetylquinide, from acetone-quinide and $\text{Ac}_2\text{O}-\text{C}_6\text{H}_5\text{N}$, m. 109°, $[\alpha]^{20}_{\text{D}} -4.4^\circ$ (CHCl_3). Acetone-4-carbethoxyquinide (60% from acetone-quinide in $\text{CHCl}_3-\text{C}_6\text{H}_5\text{N}$ with ClCO_2Et at 0°), m. 108°, $[\alpha]^{20}_{\text{D}} -4.7^\circ$ (CHCl_3).

C. A. R.

Condensation products of diethylsuccinylsuccinic esters with primary arylamines. D. MIGLIACCI AND R. GARGULO. *Gazz. chim. ital.* 58, 110–21(1928).—Di-Et succinylsuccinate (I) (1 g.) in EtOH (10 cc.) heated gently 4–5 min. with *o*-phenetidine (II) (2 g.) in concd. AcOH (5 cc.), cooled, the ppt. dissolved in C_6H_6 and repptd. by ligroin, yields 1.25 g. (66%) *di-Et p*-di-*o*-phenetidide- $\Delta^{1,4}$ -dihydroterephthalate, $\text{CH}_2\text{:C(NHC}_6\text{H}_4\text{OEt).C(CO}_2\text{Et).CH}_2\text{:C(NHC}_6\text{H}_4\text{OEt).C(CO}_2\text{Et)}$ (III), light violet,

m. 200–1°. It is also formed by agitating II (3 g.) with I (1 g.) in warm glacial AcOH (5 cc.) for some min. at 50–70°, filtering when cool, and drying *in vacuo* over KOH, in which case it is white and m. 201°. In a similar way were prepd. *di-Et p*-di-*p*-phenetidide- $\Delta^{1,4}$ -dihydroterephthalate, m. 197°, and *di-Et p*-di-*p*-anisidine- $\Delta^{1,4}$ -dihydroterephthalate, m. 191°. I (1 g.) in EtOH (80 cc.) boiled with II (5–6 g.) in glacial AcOH (8 cc.) for 10–15 min. in a current of air, cooled, the ppt. dried, dissolved in C_6H_6 and repptd. by ligroin, yields 1.3 g. (70%) of *di-Et p*-di-*o*-phenetidide- $\Delta^{1,4}$ -dihydroterephthalate, $\text{CH}_2\text{:C(NHC}_6\text{H}_4\text{OEt).C(CO}_2\text{Et).CH}_2\text{:C(NHC}_6\text{H}_4\text{OEt).C(CO}_2\text{Et)}$ (IV), orange-red, m.

152°. I (1 g.) heated 4–6 hrs. at 125–30° with II (5–6 g.), and the ppt. treated as before yields 1.25 g. (66%) of IV. I (1 g.) refluxed 4–6 hrs. with II (5–6 g.) in *p*-xylene

(8 cc.), distd. *in vacuo*, the residue dissolved in hot concd. AcOH (25 cc.), cooled and the ppt. treated as before yields 1.25 g. (66%) of IV. I (1 g.) heated 6-8 hrs. at 140-5° with II (5-6 g.), hot concd. AcOH (30 cc.) added, cooled, the ppt. (2.5 g.) filtered, washed with C_6H_6 , the C_6H_6 soln. concd. and ligroin added, ppts. IV. On the filter remains a little V (see below). I (1 g.) heated some hrs. at 180-200° with II (5-6 g.), cooled, dissolved in hot C_6H_6 (30 cc.), filtered, washed with EtOH, and recrystd. from $PhNO_2$, yields 2.8 g. (64%) of *di-o-phenetidineurea* (*di-o-ethoxydiphenylurea*) (V), m. 222°, is not attacked by mineral acids and alkalis. By concn. of the C_6H_6 mother liquor a little IV is obtained. In a similar way were prepd. *di-p-phenetidineurea* (*di-p-ethoxydiphenylurea*), m. 220°, and *di-p-anisidineurea* (*di-p-methoxydiphenylurea*), m. 234°. I (2 g.) heated for some hrs. at 130-40° with II (2-3 g.), and the cooled mass extd. with C_6H_6 (30 cc.) yields (1) a portion insol. in C_6H_6 ; (2) a portion slightly sol. in C_6H_6 , and (3) a portion very sol. in C_6H_6 . Thoroughly washed with C_6H_6 and recrystd. from hot concd. AcOH (1) yields 0.2-0.3 g. of V. Evapd. to about $\frac{2}{3}$ its vol., the original C_6H_6 soln. deposits a yellow cryst. *compd.* (VI) which, recrystd. from various solvents, m. 178-83°, insol. in acids, sol. in boiling aq. KOH. Addn. of ligroin to the remaining C_6H_6 soln. ppts. 0.5-0.6 g. of IV, which is extremely sol. in C_6H_6 . I (2 g.) heated 6-8 hrs. at 125-30° with II (1 g.) and *p*-xylene (15 cc.), evapd. *in vacuo*, and the product treated as in the preceding prepn., yields 0.5-0.6 g. of VI, m. 177-9°, 0.1-0.2 g. of V and a little IV. In the same way, only heating at 140-50°, there are obtained 0.2-0.3 g. of VI, m. 180-1°, and 0.3-0.4 g. of V. From I and *p*-phenetidine is prepd. in a similar way an unidentified yellow cryst. *compd.*, m. 163-8°, and from I and *p*-anisidine a yellow cryst. *compd.*, m. 182-7°. IV (0.5 g.) refluxed 10-15 min. with $BzCl$ (5 cc.), steam-distd. to remove $BzOH$, the residue dissolved in hot C_6H_6 (15 cc.), animal charcoal added, filtered, and reprecipd. with ligroin, yields 0.6 g. (84%) of *di-Et p-dibenzoxy-p-di-o-phenetidinetetraphthalate*, $CH_3C(NBzC_6H_4OEt).C(CO_2Et).CH_3C(NBzC_6H_4OEt).C(CO_2Et)$ yellowish, m. 249°.

51°. IV (1 g.) in hot EtOH refluxed 0.5 hr. with 10% aq. KOH (5 cc.), dild. with water, acidified with HCl, filtered, and the residue purified by washing, drying and crystg. from boiling $PhNO_2$, yields almost 100% of *p-di-o-phenetidinetetraphthalic acid*, violet with metallic reflection, m. 273° (decompn.), dibasic. *Na salt*, greenish yellow. *K salt*, greenish maroon. *Li salt*, greenish maroon. *Ba salt*, greenish maroon. The work is closely related to that of Knorr (*Ber.* 17, 545(1884)), Liebermann (*C. A.* 8, 2150) and Kauffmann (*C. A.* 9, 2651) and earlier expts. of M. (*C. A.* 22, 1766).

C. C. DAVIS

Method of hydrogenating with sodium amalgam. RICHARD WILLSTATTER, FRANZ SEITZ AND ERWIN BUMM. *Ber.* 61B, 871-86(1928).—The nature of hydrogenation with Na-Hg is still puzzling; to obtain more thorough information as to the mechanism of the reaction, it must be followed quant. and the authors describe a method in which the total H liberated is detd. by titration of the NaOH formed and that not used up by combustion and weighing as H_2O , the difference being the H added by the *compd.* reduced. The measurements must be carried out in the absence of O; if O is present no H is set free. The effectiveness of the Na-Hg depends on its purity. With ordinary Na-Hg *p*- $C_6H_4(CO_2H)_2$ gives only the $\Delta^{2,3}$ -dihydro acid, which is itself not reducible until it has been rearranged (into the $\Delta^{1,3}$ - and $\Delta^{1,4}$ -acids), when reduction continues to the Δ^2 -tetrahydro acid and this in turn is still further reduced to the hexahydro acid only after rearrangement to the Δ^1 -tetrahydro acid. With pure Na-Hg, however, the $C_6H_4(CO_2H)_2$ in the cold gives the Δ^2 -tetrahydro acid, and of the 2 tetrahydro acids it is not the Δ^1 - but the Δ^2 -acid which is much more easily further hydrogenated (in the cold in 20-5 min., 60-70% hexahydro acid is formed, with a utilization of 90% of the H, when the pH is adjusted to 9-10.5 with glycolcol). Pure Na-Hg does not react at all appreciably with H_2O ; it evolves no H. The behavior of Na-Hg indicates that the reduction of an org. *compd.* by it consists in the addn. of Na at the position of partial affinity of the mol. and the replacement of the Na atoms by H under the influence of H_2O . The reactivity of the Na-Hg towards O and CO_2 is also to be considered as due not to the action of liberated H but to a direct action of the Na-Hg on the O and addn. of Na to the CO_2 . The coeff. of utilization is decreased by impurities in the Na-Hg because they catalytically accelerate the decompn. of the Na-Hg by H_2O , with liberation of H, a reaction which competes with the addn. of the Na atoms to the unsatd. groupings. The addn. of Na to org. *compds.* obeys other laws, is subject to other influences than the addn. of H, and it is easy to understand why in the reduction with Na-Hg there should be obtained intermediate products different from those obtained in catalytic hydrogenation, and why in many reductions with Na-Hg the

Na cannot be replaced by some other metal which liberates H. Reductions with Na-Hg are subject to various disturbing factors, especially the alkali formed, or, if it is neutralized, the resulting increased salt concn. The authors have made a beginning in the study of the influence of the p_H on the course of reductions with Na-Hg. Nucleus-hydrogenation of $p\text{-C}_6\text{H}_4(\text{CO}_2\text{H})_2$ takes place at p_H 12–5, but if the p_H is kept const. at 9–9.8 with phosphate or $\text{H}_2\text{NCH}_2\text{CO}_2\text{H}\text{-NaOH}$, there is obtained 50% $p\text{-MeC}_6\text{H}_4\text{-CO}_2\text{H}$; apparently the Na can add in 2 ways to $\text{C}_6\text{H}_4(\text{CO}_2\text{H})_2$ —in the 1,4-positions on the C_6H_4 ring and in the 1,2-positions on the C:O group of the CO_2H . Comparative expts. showed that a Na-Hg prep. in Fe crucibles is decompd. by H_2O about twice as fast as that prep. in an earthen crucible and 30–50 times faster than electrolytic Na-Hg. A product as pure as the latter can be prep. by adding 24 g. Na (kept under Et_2O and trimmed with a glass knife) to 350 cc. Hg at 120° in a porcelain casserole provided with a glass cover having 2 holes—1 for the introduction of the Na and the other for the admission of a rapid current of N. Addn. of 0.001 part of various metals accelerated the decompn. of such a product by H_2O (Cu and Ag relatively little, Mg and Zn more, Al still more, Sn and especially Pb most). If the H_2O was previously distd. through a quartz tube heated to a high temp. and boiled in a vigorous current of N (cf. Baker and Parker, C. A. 8, 1247) it did not react at all with the Na-Hg prep. as described above.

C. A. R.

Genetic relationships in the sylvestrene group. OSSIAN ASCHAN. *Ann.* 461, 126(1928).—The di-HBr and the di-HCl salts of diprene and carvestrene are identical, but the hydrocarbons, b. $170\text{--}1.5^\circ$ and $176\text{--}8^\circ$, are different; diprene does not give the blue color reaction with Wallach's reagent, but carvestrene does. Diprene, therefore, probably belongs to the terpenes with the *m*-cymene nucleus, i. e., to the sylvestrene series. The isomer of carvestrene, b. $183\text{--}6^\circ$, now termed *carveprene*, also shows the color reaction and belongs to the sylvestrene group. Data are given for the distn. of a Finnish pine oil, a balsam turpentine oil and a sulfate turpentine oil, the values of d , and n being given for each fraction. Isodiprene, b. $167\text{--}70^\circ$, d_{20}^{20} 0.8561, $[\alpha]_D^{20}$ 5.37° , n_D 1.47536, gives with HCl in Et_2O a *mono-HCl deriv.*, $\text{C}_{10}\text{H}_{17}\text{Cl}$, b. $77\text{--}83^\circ$, d_{20}^{20} 0.9755, $[\alpha]_D$ 0.82, n_D 1.48175; with PhNH_2 the chloride gives sylvestrene. The *di-HCl deriv.* of isodiprene forms only gradually and incompletely and m. $70\text{--}1^\circ$; it does not depress the m. p. of sylvestrene di-HCl. The fraction of the mono-HCl deriv. b. above 100° contains dipentene di-HCl. The nitrosate of isodiprene is identical with that from Δ^3 -carene of Simonsen, thus establishing their identity. The fraction b. $163\text{--}7^\circ$ consists of pinonene (Δ^4 -carene), d_{20}^{20} 0.857, d_{20}^{20} 0.861; the mono-HCl deriv. b. $75\text{--}80^\circ$; PhNH_2 gives sylvestrene. Carveprene gives a di-HBr deriv., m. $48\text{--}9^\circ$, identical with that obtained from diprene.

C. J. WEST

Oxidation products of compounds of the camphane, fenchane and camphenilane series with chromic acid. IV. Preparation of *p*-ketocamphenilone, *p*-ketofenchone, *p*-ketocamphor, *dl*-*p*-ketobornyl acetate and *p*-ketobornyl chloride. Action of bromine upon these ketones and decomposition of the bromination products by alkali. J. BREDT AND P. PINTEN WITH H. GERMAR, TH. LIESER AND H. DE GREIFF. *J. prakt. Chem.* 119, 81–107(1928); cf. C. A. 21, 1109.—Oxidation of *dl*-camphenilone in AcOH by adding solid CrO_3 in small quantities during 2–3 weeks gives about 10% of *dl*-ketocamphenilone, b. 118° , m. 56° ; about 50% of the starting material is recovered. Oxidation of a camphenilone with $[\alpha]_D^{20}$ -58.65° gives an active ketocamphenilone, m. 74° , $[\alpha]_D^{20}$ -90.03° (11.4% yield after 7.5 weeks). A slightly active camphenilone gave a product which could be fractionated into products m. from 56° to 74° . *Monosemicarbazone*, m. $201\text{--}2^\circ$ (decompn.). The *monobromide*, m. 84.5° , $[\alpha]_D^{23}$ -353.64° . The bromide (11.5 g.), 50 g. NaHCO_3 and 120 cc. H_2O , warmed until soln. resulted, gave 2.4 g. ketocamphenilonic acid, m. 156° ; semicarbazone, m. 225° (decompn.); there also result a satd. acid, m. $218\text{--}9^\circ$, and 2 other products, m. $232\text{--}5^\circ$ and 251° . Ketofenchone results in from 9.4 to 15.8% yields; the *Br deriv.* m. 132° , $[\alpha]_D^{25}$ 324.05° ; with 10% KOH there results ketofencholenic acid, m. $126\text{--}7^\circ$; oxime, m. 160° (decompn.); semicarbazone, m. $212\text{--}6^\circ$ (decompn.). The acid adds Br, giving a *mono-Br deriv.* m. $156\text{--}7^\circ$, and dibromide, m. $136\text{--}7^\circ$, probably the above Br deriv. With KMnO_4 the keto acid gives $\text{Me}_3\text{C}(\text{CO}_2\text{H})_2$ and a mixt. of acids, m. $156\text{--}75^\circ$; the fraction m. $175\text{--}6^\circ$ analyzes for $\text{C}_{10}\text{H}_{14}\text{O}_4$ and titrates for a dibasic lactone acid. *p*-Ketocamphor gives a *mono-Br deriv.*, m. $144.5\text{--}5^\circ$, and 2 dibromides, m. $128\text{--}9^\circ$ and above 190° . Splitting off HBr from the mono-Br deriv. gives the acid $\text{C}_{10}\text{H}_{14}\text{O}_4$, m. 124.5° ; semicarbazone, m. $216\text{--}8^\circ$ (rapid heating), decomp. $188\text{--}9^\circ$ (slow heating). *dl*-*p*-Ketobornyl acetate, b. $136\text{--}7^\circ$, b. $140\text{--}1^\circ$, b. 147° , m. $73\text{--}5^\circ$; semicarbazone, m. 238° .

The *Br* deriv. m. 100–1°; this easily splits off HBr but a cryst. product could not be obtained. *p*-Ketobornyl chloride with $[\alpha]_D^{25}$ 70.66° yields a *bromide*, m. 184°, with $[\alpha]_D^{25}$ 98.35°; with $[\alpha]_D^{22}$ –46.34°, the bromide has $[\alpha]_D^{17}$ –85.66°. Even after long heating with KOH (1.1) no Br was split off.

C. J. WEST

Preparation of auramine by Sandmeyer's method. A. M. LUKIN. *J. Chem. Industry (Moscow)* 5, 34–7 (1928).—The process of formation of auramine begins with the reaction between $\text{CH}_2(\text{C}_6\text{H}_4\text{NMe}_2)_2$ and S with formation of $\text{CS}(\text{C}_6\text{H}_4\text{NMe}_2)_2$ and H_2S . Then the thioketone formed reacts with 3 mols. NH_3 to give $\text{HN} \cdot \text{C}(\text{C}_6\text{H}_4\text{NMe}_2)_2$ and $(\text{NH}_4)_2\text{S}$. Finally the base reacts with NH_4Cl , giving auramine-HCl. NaCl facilitates the reaction but does not take part in it. Thirty expts. of auramine prepn. under various conditions have been made and the conditions of reaction giving best yields were found to be as follows: (1) Uninterrupted operation; (2) slow and uninterrupted rise of temp. (use of Frederick's kettle for very exact control of temp.); (3) energetic and careful stirring; (4) use of absolutely dry raw materials, as water hydrolyzes thioketone; (5) purity of NaCl, as traces of MgCl_2 and CaCl_2 are very harmful; (6) sufficiently strong current of NH_3 to keep O and moisture out of the sphere of reaction; (7) fine division of all reacting materials. The slightest neglect of these conditions strongly affects the yield.

BERNARD NELSON

The oxidation of the stilbenes with peracids. J. BORSEKEN AND G. EISEN. *Rec. trav. chim.* 47, 694–7 (1928).—The oxidation of *stilbene* with BzO_2H yields *stilbene oxide*, m. 69.5–70.3°, which, however, could not be hydrated, by means of dil. acids, the oxide being too stable, and therefore the oxidation of the stilbenes was carried out with AcO_2H . Stilbene was prepd. by heating the Na salt of $\text{PhCH}(\text{NO}_2)\text{CN}$ with alc. KOH and by dehydrating $\text{PhCH}(\text{OH})\text{CH}_2\text{Ph}$, while *allo*-stilbene was obtained by careful reduction of tolane with activated Zn powder in alc. in absence of light. The oxidation of *stilbene* by means of AcO_2H yields a mixt. of acetates, which on sapon gives a mixt. of hydrobenzoin, contg. an excess of the *dl*-compd., while *allo*-stilbene, by means of the same course of reactions, gives a mixt. of hydrobenzoin, in which the *meso*-compd. preponderates.

C. F. VAN DUIN

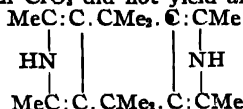
Compounds of the type 2-naphthol-1-sulfonic acid. Sulfonation of 2-hydroxy-3-naphthoic acid and its anilide. R. DZIEWONSKI AND A. LOEWENHOFF. *Bull. intern. acad. Polonaise* 1927A, 521–39.—By the action of concd. H_2SO_4 or ClSO_3H on β -naphthol at moderate temps. a substance is obtained originally called naphthylsulfuric acid and later 2-hydroxynaphthalenesulfonic acid. D. and L. investigate this reaction and also the sulfonation of some β -naphthol derivs. at moderate temps. to elucidate the influence of substitution of the hydroxyl H by an acid residue and of the *o*- CO_2H group in β -naphthol on the point of entry of the sulfo group during gentle sulfonation. From the action of ClSO_3H on β -naphthol and its derivs. at lower temps. it appears that in spite of acid substituents in the β -naphthol mol., sulfonation takes place as in β -naphthol, i. e., in the 1(α)-position. Thus, ClSO_3H with β - $\text{C}_{10}\text{H}_7\text{OAc}$ gives 2.1. $\text{C}_{10}\text{H}_6(\text{OAc})\text{SO}_3\text{H}$, which may also be obtained by acetylating 2.1- $\text{C}_{10}\text{H}_6(\text{OH})\text{SO}_3\text{H}$. 2,3- $\text{C}_{10}\text{H}_6(\text{OH})\text{CO}_2\text{H}$ and its anilide also behave thus, giving the 1- SO_3H derivs. with even greater facility than β -naphthol itself. The substituted derivs. are more stable than the mother substance, 2.1- $\text{C}_{10}\text{H}_6(\text{OH})\text{SO}_3\text{H}$, since water splits off the sulfo group much less easily and unlike the mother substance, they show no tendency to isomerize to the 8- or 6-sulfo deriv. When heated in soln., especially in the presence of mineral acids they lose the sulfo group as H_2SO_4 . Oxidized with CrO_3 , both give phthalonic or phthalic acid and thus the sulfo group is isonuclear with OH and CO_2H . On boiling with aq. alkalis or, more easily, on alkali fusion, the sulfo group is removed without replacement by OH. With diazo compds. they couple up like 2.1- $\text{C}_{10}\text{H}_6(\text{OH})\text{SO}_3\text{H}$, the sulfo group is removed, being replaced by the diazo residue with the production of azo dyes. Hence there is no doubt that the sulfo group of both compds. is in the 1-position. But many other reactions point to the contrary. Thus, 2.1,3- $\text{C}_{10}\text{H}_6(\text{OH})(\text{SO}_3\text{H})\text{CO}_2\text{H}$ gives 1,2,3- $\text{C}_{10}\text{H}_6\text{Br}(\text{OH})\text{CO}_2\text{H}$ with aq. Br and 2.1,3- $\text{C}_{10}\text{H}_6(\text{OH})(\text{SO}_3\text{H})\text{CONHPh}$ behaves similarly. Analogous reactions with concd. HNO_3 on the acetylated form give the 1-nitro deriv. for both acid and anilide. HNO_2 acid with the sulfo acid gives the 1-NO deriv., the reaction being complicated in the case of the anilide by the intermediate formation of the nitrosamine deriv. 1-Sulfo derivs. of 2,3- $\text{C}_{10}\text{H}_6(\text{OH})\text{CO}_2\text{H}$ and its anilide can be sulfonated without migration of the sulfo group already present, as distinct from the action of concd. H_2SO_4 on 2.1- $\text{C}_{10}\text{H}_6(\text{OH})\text{SO}_3\text{H}$, where isomerization migration occurs, and also when the 1-sulfo compd. is exposed to the action of ClSO_3H at 50–60°. Under these conditions it gives a sulfonated product which on the basis of the behavior on alkali fusion is proved to be 2,3,1,6-

$C_{10}H_6(OH)(CO_2H)(SO_3H)_2$ or its anilide. If the alkali salts are fused with KOH they pass into 2,6,3- $C_{10}H_5(OH)_2CO_2H$ with splitting off of one sulfo group and substitution of the other by OH. This change shows that the sulfo group removed on alkali fusion was attached to the $C_{10}H_5$ nucleus and the other, which is substituted by the OH group, is in the 6-position. The sulfonated product of 2,3- $C_{10}H_6(OH)CONHPh$ on alkali fusion gives 2,6,3- $C_{10}H_5(OH)_2CO_2H$ by splitting off an aniline residue. Hence it may be concluded that the sulfonated product is 2,6,3- $C_{10}H_5(OH)(SO_3H)CONHPh$. The prepn. of the following substances is given: 2-Naphthol-1-sulfonic acid and its Na salt; 2-acetoxy-1-naphthalenesulfonic acid and its Na salt; 1-bromo-2-naphthol m. 84°; 2-hydroxy-1-sulfo-3-naphthoic acid, m. 182°; Me 2-hydroxy-3-naphthoic acid-1-sulfonate, m. 122°; 1-benzeneazo-2-hydroxy-3-naphthoic acid, m. 232°; 1-nitro-2-acetoxy-3-naphthoic acid, m. 235°; 2-hydroxy-1,6-disulfo-3-naphthoic acid; 2,6-dihydroxy-3-naphthoic acid, m. 225-6°; 2-hydroxy-1-sulfo-3-naphthoic anilide, m. 198-9°; 1-benzeneazo-2-hydroxy-3-naphthoic anilide, m. 204-5°; nitrosamine of 2-hydroxy-1-sulfo-3-naphthoic anilide; 1-nitroso-2-hydroxy-3-naphthoic anilide; 2-acetoxy-3-naphthoic anilide, m. 152°; 2-acetoxy-1-sulfo-3-naphthoic anilide; 1-nitro-2-acetoxy-3-naphthoic anilide, m. 236-8°; 1-bromo-2-hydroxy-3-naphthoic anilide, m. 161-2°; 2-hydroxy-1,6-disulfo-3-naphthoic anilide; 2,6-dihydroxy-3-naphthoic acid, m. 225-7°; 2-hydroxy-6-sulfo-3-naphthoic anilide, m. 225-7°; phenylphthalazonecarboxylic acid, m. 221-2°; 1-bromo-2-hydroxy-3-naphthoic acid, m. 229°. S. L. B. ETHEKTON

β -Methylnaphthalene. II. Synthesis of hydrocarbons of the benzantracene group. KAROL DZIEWONSKI AND EUGENJUSZ RITT. *Bull. intern. acad. Polonoise*, 1927A, 181-92.—Pyrogenic transformation are described of several α - $C_{10}H_7$ Me derivs. from which 1,2-benzanthracene (I) and its Me derivs. may be obtained. The action of $PhCH_2Cl$ on β - $C_{10}H_7$ Me in the presence of anhyd. $ZnCl_2$ gave a colorless or yellow liquid which, distd. over red-hot Zn dust, gave cryst., yellow, fluorescent I, m. 158-9°. The 2,3-isomer (II), an orange or bronze-yellow cryst. substance, m. 335-6°, was obtained as a secondary product. $BzCl$ with $C_{10}H_7$ Me in the presence of $AlCl_3$ gave 1,2- $C_{10}H_6BzMe$, which, pyrogenically distd. with H over Zn dust, gave a good yield of I without the formation of II. These reactions indicate that the $PhCH_2$ group in the $C_{10}H_6(CH_2Ph)$ Me occupies the 2-position to the Me group. The following explanation is given of the formation of II: the $PhCH_2$ group in the starting substance migrates from the α - to the β -position at the elevated temp. and the 3,2- $C_{10}H_6(CH_2Ph)Me$ first formed loses H with the production of II. The pyrogenic transformation of 1,2- $C_{10}H_6BzMe$ into I possesses general application in the formation of hydrocarbons of the benzantracene group. E. g., by the action of α - or p - MeC_6H_4COCl on $C_{10}H_7$ Me in the presence of $AlCl_3$ 2-methyl-1- α - and 2-methyl-1- p -toluyl-naphthalene are obtained. On pyrogenic distn. over Zn dust in a stream of H each is smoothly transformed into the corresponding 8- or 6-Me deriv. of I oxidation of both the latter with CrO_3 produces the corresponding Me deriv. of 1,2-benzanthraquinone. Oxidation of benzoyl-2-methylnaphthalene with CrO_3 mixt. gave 1,2,5,6- $C_{14}H_8BzMe(CO_2H)_2$, whose structure is deduced from the production of anthracene on distn. with Zn dust. The prepn. of the following substances is described: 1-benzyl-2-methylnaphthalene, b. 221-20° (*sic*). I (naphthantracene). II (naphthacene). 1,2-Benz-9,10-anthraquinone, m. 168°. 1-Benzoyl-2-methylnaphthalene, m. 74°. 3-Benzoyl-4-methylphthalic acid (1-benzoyl-2-methylbenzene-5,6-dicarboxylic acid), m. 184°. 1- p -Toluy-2-methylnaphthalene, m. 127°. 6-Methyl-1,2-benzanthracene, m. 127°. 6-Methyl-1,2-benz-9,10-anthraquinone, m. 174°. 1- α -Toluy-2-methylnaphthalene, b. 238-9°. 8-Methyl-1,2-benzanthracene, m. 145°.

S. L. B. ETHEKTON

The condensation of certain homologs of pyrrole with ketones. B. V. TRONOV AND P. P. POPOV. *J. Russ. Phys.-Chem. Soc.* 59, 327-32 (1927).— α, α_1 -Dimethylpyrrole was prepd. by heating $(AcCH_2)_2$ with alc. NH_3 in an autoclave in boiling water for 1.5 hrs. (yield 51.9%). To 7.5 cc. of the pyrrole in 25 cc. of $AcMe$ was added 4 drops of concd. HCl (red coloration, evolution of heat); after 5 min. the mixt. was poured into water and the red crystals of $C_{18}H_{26}N_2$ recrystd. from 50% $EtOH$ (yield 72.8%). The product m. 174°, was sol. in $EtOH$, $AcMe$, PhH , Et_2O , $CHCl_3$, insol. in water, mol. wt. in $CHBr_3$ 243, 268. Oxidation with CrO_3 did not yield any definite products. The structure formula is proposed:



To a mixt. of 3 cc. of α, α_1 -dimethylpyrrole, 4 cc. of cyclohexanone and 90 cc. $EtOH$ was added 2 drops concd. HCl . No ppt. resulted on the addn. of water after 20 min.

In 12 hrs. rosy crystals sepd and were recrystd. from 80% EtOH (yield 21%). Found C 81.99%, H 9.64% (calcd. for $(C_{12}H_{11}N)_n$, C 82.28%, H 9.72%). The condensation of the pyrrole with AcEt and PhCOEt yielded only tar. The expts. with α,β_1 -dimethylpyrrole (prepd. by the reduction of a mixt. of the acetoacetic with isonitrosoacetoacetic ester) and ketones including AcMe were similarly unsuccessful. The difference in the behavior of α,α_1 - and β,β_1 -derivs. is explained as due to the asym. structure of the

latter, which precludes the formation of stable nuclei. Similarly, $\overbrace{CH_2.(CH_2)_2}^{\bullet}$ CO and $\overbrace{MeCH.(CH_2)_2.CO.CH_2.CH_2}^{\bullet}$ condense rapidly with pyrrole to sparingly sol. compds.

m. 269° and 283°, resp.; $\overbrace{MeCH.(CH_2)_2.CH_2}^{\bullet}$ forms a more sol. product, m. 172°, of the same type: 2(pyrrole) + 2(ketone) — 2H₂O. $\overbrace{MeCH(CH_2)_2.COCH_2}^{\bullet}$ and

$\overbrace{MeCHCH_2(CH_2)_2.CO}^{\bullet}$ condense slowly to a tarry residue. These differences in chem. behavior correspond to differences in the symmetry of the 5 ketones with regard to the line connecting CO and Me. (Cf. Tronov, *Proc. Univ. Tomsk* 75, 250.)

BASIL C. SOYENKOFF

Rubiadin. I. Synthesis of 1-methyl-2,4-dihydroxyanthraquinone. P. C. MITTER, MONOMHAN SEN AND P. K. PAUL. *Quart. J. Indian Chem. Soc.* 4, 535-40(1927).—Rubiadin, C₁₅H₁₀O₄, was first isolated from madder root by the hydrolysis of rubiadin glucoside by Schunck and Marchlewski (*J. Chem. Soc.* 63, 969(1893)). It m. 290° and is unchanged by further heating. It is an anthraquinone deriv. closely resembling purpuroxanthin (1,3-dihydroxyanthraquinone), and its properties would indicate that it is either 2-methyl-1,3-dihydroxyanthraquinone (I) or the 1,2,4-isomer (II). For the synthesis of I, see Schunck and Marchlewski (*J. Chem. Soc.* 65, 183(1894)), who found it m. 282° and its Ac deriv. m. 217-8° (the Ac deriv. of rubiadin m. 225°) and therefore concluded that the structure II must be assigned to rubiadin. The present authors undertook to verify this by synthesizing II. An effort was made to prep. by Fritsch's method from 2,3,5-Me(MeO)₂C₆H₂CO₂Me the corresponding phthalic acid, Me(MeO)₂C₆H(CO₂H)₂. The phthalide, Me(MeO)₂C₆H₂.CH₂O.CO, was suc-

cessfully prepd., but all attempts to oxidize it to the corresponding phthalic acid failed. However, by condensing 2,3,5-Me(HO)₂C₆H₂CO₂H with BzOH in the presence of concd. H₂SO₄ it was definitely established that rubiadin has not the structure II. The acid (cresorselenic acid) was prepd. by a slight modification of the method of Jacobsen and Wierss (*Ber.* 16, 1960(1883)) by heating 50 g. *o*-toluic acid and 200 g. fuming H₂SO₄ (65% SO₃) 12 hrs. at 160-70°, sepg. the di-SO₃H acid from the H₂SO₄ as the sol. Ca salt with CaCO₃, freeing from Ca with K₂CO₃, evapg. to dryness, fusing with 3 parts KOH, making into a paste with ice, treating with concd. HCl and extg. with Et₂O; it m. 237-9°. Di-Me ether, prepd. with Me₂SO₄ in the usual way, m. 160°; its *Me ester*, m. 289-91°, gives with chloral hydrate and cold 90% H₂SO₄ 6-methyl-3,5-dimethoxy-2-trichloromethylphthalide, m. 176°, converted by boiling 20% NaOH into the 2-carboxylic acid, m. 218-9° (*Et ester*, m. 134°), which at 225-35° loses CO₂, giving 6-methyl-3,5-dimethoxyphthalide, m. 249°. 1-Methyl-2,4-dihydroxyanthraquinone (II), from 2,3,5-Me(HO)₂C₆H₂CO₂H, BzOH and H₂SO₄ at 125-30°, orange, m. 265-6°; diacetate, yellowish, m. 181-2°.

H. W. GIBSON

Action of ethylglycolyl chloride on magnesylpyrroles. ANDREA SANNA AND GIOVANNI CHESSA. *Gazz. chim. ital.* 58, 121-7(1928).—The syntheses are another example of the use of magnesyl derivs. as developed by Oddo in his extensive researches. EtOCH₂COCl (I) was prepd. by the method of Heintz (*Poggendorf's Ann.* 109, 331, 489(1870)) except that distn. was carried out *in vacuo*, which gave an increased yield. EtOCH₂CO₂H was purified through its Cu salt. I (10.5 g.) in anhyd. Et₂O added slowly with agitation to cold α -magnesylpyrrole (prepd. from 2 g. Mg, 10.9 g. EtBr and 10.7 g. pyrrole in anhyd. Et₂O), let stand at room temp., then heated 0.5 hr. on a water-bath (blackening can be avoided by an atm. of H), cooled, ice added, neutralized with aq. NaHCO₃, extd. with Et₂O, the combined Et₂O exts. filtered, dried over Na₂SO₄, refiltered, and evapg., yields a thick, brown liquid, agreeable odor, b. above 200° (decompn.), b₁₀₀ around 173°, the distillate being colorless but becoming yellowish and ultimately black and becoming thick even when kept out of contact of air and light. The liquid has the compn. C₈H₁₁NO₂ and is probably the pyrrole- α -ketomethylcarbinol *Et ether* (II), and is formed thus: HNC₄H₂MgBr + I \longrightarrow MgBrCl + HNC₄H₂COCH₂OEt. Its aq. soln. soon becomes greenish, ppts. white compds. with HgCl₂ and

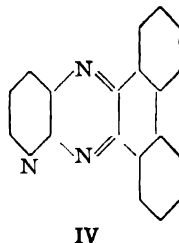
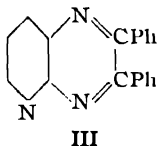
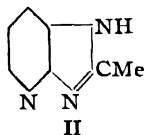
with HgNO_3 , which become brown on boiling. It also slowly ppts. *comps.* with I soln., with tannic acid and with picric acid. It is very resistant to alkalis and could not be sapond., but is resinified by mineral acids. Thus HI immediately forms a black resin insol. in all org. solvents, which decomp. without fusion. **II** heated 0.5 hr. on the water bath with PhNHNH_2 in 50% AcOH , and the black product recrystd. repeatedly, yields the *phenylhydrazone* of **II**, $\text{C}_{14}\text{H}_{17}\text{ON}_3$, greenish brown, m. 163° . By the same procedure, **I** (10.6 g.) and magnesiylmethylketole (from 1–2 g. Mg, 5.4 g. EtBr and 11.3 g. α -methylindole) yield, after crystn. from boiling water, the *cryst. compd.* $\text{C}_{13}\text{H}_{14}\text{NO}_2$ (**III**), m. 157° , probably $\text{C}_6\text{H}_5\text{NH.CMc.CCOCH}_2\text{OEt}$. With

HgNO_3 , its alc. soln. ppts. a red *compd.* **III**, is not attacked by prolonged boiling with alc. KOH , nor by cold mineral acids. Heated 2 hrs. on the water bath with PhNHNH_2 in 50% AcOH , **III** forms a *phenylhydrazone* $\text{C}_{13}\text{H}_{15}\text{ON}_3$, m. 90° . **I** (6 g.) heated 2 hrs. on the water bath with magnesiylcarbazole (from 1 g. Mg, 4.87 g. EtBr in anhyd. Et_2O and 6.86 g. carbazole), ice added, neutralized with NaHCO_3 , extd. with Et_2O , the combined exts. evapd. yields a large proportion of carbazole and a small proportion of a *cryst. substance*. The mixt. dissolved in AcMe , pptd. with water, the ppt. washed, dried, extd. with ligroin and the ext. evapd., and the product recrystd. from abs. EtOH , yields the *N-ketoethylcarbinol Et ether*, $\text{C}_{14}\text{H}_{18}\text{NO}_2$, m. 70° , hydrolyzed in boiling dil. EtOH by a trace of KOH to carbazole and $\text{EtOCH}_2\text{CO}_2\text{H}$. This tendency to hydrolyze accounts for the low yield. Its solns. in AcMe , EtOH and Et_2O have a blue fluorescence; its soln. in concd. H_2SO_4 gives an intense green color with $\text{K}_2\text{Cr}_2\text{O}_7$. C. C. D.

Behavior of dixanthylene on heating. F. ARNDT AND L. LORENZ. *Ber.* **61B**, 869(1928).—In the paper (C. A. **19**, 515) commented on by Schönberg and Schütz (C. A. **22**, 1974) dixanthylene was not "described" but merely compared with the intensely colored dipyrlylene; in such a comparison it may well be spoken of as "almost perfectly colorless." The observations of A. and his coworkers on the color of the compd. and its solns. at room and high temps. are given by Lorenz, *Diss. Breslau*, 1927. C. A. R.

2,3- and 2,5-Diaminopyridine. A. E. CHICHIBABIN AND A. V. KIRSANOV. *J. Russ. Phys.-Chem. Soc.* **59**, 405–18(1927).—2,5-(H_2N) $_2\text{C}_5\text{H}_4\text{N}$ prepd. by the reduction of 2,3- $\text{C}_5\text{H}_3\text{N}(\text{NH}_2)\text{NO}_2$ with Sn and HCl , is stable towards air and light, possibly because of the absence of impurities catalyzing oxidation. When treated with HNO_2 , the 3- NH_2 group is diazotized first, and the resulting 2,3- $\text{C}_5\text{H}_3\text{N}(\text{NH}_2)\text{Cl}$ is identical with the chlorination product of 2- $\text{H}_2\text{NC}_5\text{H}_4\text{N}$. In the prepn. of 2,3-(H_2N) $_2\text{C}_5\text{H}_4\text{N}$ from the nitro compd., the Cl deriv. of the former also results; it is less sol. in H_2O , m. $131\text{--}2^\circ$ and must have the Cl in the 2 or the 4 position since the 3-Cl deriv. (obtained by the action of Sn and HCl on 2,3,5- $\text{C}_5\text{H}_3\text{N}(\text{NH}_2)(\text{NO}_2)\text{Cl}$) m. $164.5\text{--}165^\circ$. $\text{Cl}_2(\text{H}_2\text{N})_2\text{C}_5\text{H}_3\text{N}$, m. $165\text{--}6^\circ$, also is formed with the Cl atoms in positions 6,5 or 5,4. Pt prevents the formation of Cl compds. but reduces the yield of 2,3-(H_2N) $_2\text{C}_5\text{H}_4\text{N}$. While 2,5-(H_2N) $_2\text{C}_5\text{H}_4\text{N}$ does not behave like *p*-(H_2N) $_2\text{C}_6\text{H}_4$, 2,3-(H_2N) $_2\text{C}_5\text{H}_4\text{N}$ forms bicyclic compds. similar to those of *o*-(H_2N) $_2\text{C}_6\text{H}_4$. The reduction of 2,5- $\text{C}_5\text{H}_3\text{N}(\text{NH}_2)\text{NO}_2$ is accelerated by small quantities of PtCl_4 ; the yield is little changed. To a soln. of 112 g. of the compd. in 1 l. of HCl (d. 1.19), 381 g. Sn is added at once and the mixt. shaken continuously for 0.5 hr., warmed to 60° on a water bath until no more heat is evolved, heated on the water bath for 2 hrs. and refluxed to complete soln. of Sn (about 6 hrs.). $\text{C}_5\text{H}_7\text{N}_3\text{H}_2\text{SnCl}_4$ seps. on cooling and is recrystd. from hot 20% HCl (yield 85%); it begins to decomp. 190° , m. 208° . A 96% yield of $\text{C}_5\text{H}_7\text{N}_3\text{H}_2\text{SnCl}_4$ results on treating the chlorostannite with H_2S and is recrystd. from hot 80% EtOH . Aq. solns. are colored purple on the addn. of FeCl_3 , in the absence of H_2S or an excess of HCl . 2,5-(H_2N) $_2\text{C}_5\text{H}_4\text{N}$ is obtained by treating the HCl salt with NaOH in H_2O and extg. with PhH and Et_2O . Its aq. soln. undergoes rapid oxidation; recrystd. from hot PhH , it changes slightly after a month in contact with air. The Ac_2O compd. recrystd. from boiling water m. $289\text{--}90^\circ$ (uncor.). To a soln. of 3.2 g. of the pyridine in 25 cc. *N* HCl , at 0° , was added during 10 min. 6.1 cc. of 10% NaNO_2 ; the color changed from red to light yellow during the reaction; 3.6 g. of CuCl and 10 cc. H_2O were added next. When the evolution of N_2 ceased, the mixt. was heated on the water bath and made alk. with NaOH . The 2,5- $\text{C}_5\text{H}_3\text{N}(\text{NH}_2)\text{Cl}$ was steam-distd., crystd. by satg. the distillate with KOH and recrystd. from hot PhH (m. $134\text{--}5^\circ$; yield 0.6 g.). 2,5- $\text{C}_5\text{H}_3\text{N}(\text{NH}_2)\text{I}$ was prepd. by diazotization in 2 *N* H_2SO_4 at -4° and subsequent addn. of KI . The mixt. was slowly heated to boiling, neutralized upon cooling with KOH and extd. with Et_2O . The crude product (70% yield) was steam-distd. and recrystd. from hot PhH (m. 128.5°). To obtain the 5- NaO_2As compd. 4.55 g. of the HCl salt was diazotized in dil. HCl at 0° and 2 *N* NaOH (25 cc.) and 18.75 cc. 2 *N*

Na_2HAsO_3 added. The mixt. was heated to boiling, filtered on cooling and evapd., the residue extd. with boiling 90% EtOH. The salt crystd. with 6 mols. H_2O , dissolved easily in H_2O , less readily in EtOH, not at all in Et_2O and PhH. $\text{C}_6\text{H}_7\text{N}_2\text{AsO}_3$ results on the addn. of HCl in water, it m. $137-40^\circ$ on rapid heating, $124-40^\circ$ when heated slowly. The aq. solus. have an acid reaction and form salts (blue ppt. with Cu^{++} , brown with Fe^{+++} , white with Ag^+). 2,3- $(\text{H}_2\text{N})_2\text{C}_6\text{H}_3\text{N}$ (I) was prepd. by adding to 7.5 g. 2,3- $\text{C}_6\text{H}_3\text{N}(\text{NH}_2)\text{NO}_2$ 100 cc. HCl (d. 1.19) and 25.7 g. Sn. The mixt. was refluxed with cooling when necessary) for 2 hrs., 50 cc. more of HCl added, the mixt. boiled to complete soln. and evapd. The residue was dissolved in 50 cc. hot H_2O and 75 g. NaOH in 150 cc. of soln. slowly added. The mixt. was now extd. with Et_2O , the exts. dried over KOH and the solvent distd. off. The residue was extd. with 5-10 cc. water; the insol. portion was twice recrystd. from hot water. It consisted of the Cl deriv. (see above) m. $132-3^\circ$ (yield 1.5 g.). The sol. portion was satd. with KOH and the ppt. (I) recrystd. twice from hot PhH. Yield 3 g., m. $112-3^\circ$. Neutral and slightly acid solns. are colored red on the addn. of FeCl_3 , the color being discharged by H_2S . I can be distd. *in vacuo* without decompn.; it changes slightly on a week's contact with air. To 0.22 g. of I in 20 cc. 0.25 N H_2SO_4 was slowly added 20 cc. 0.1 N KNO_3 . After 1 hr., 2 g. NaCl was added, the soln. evapd. and the residue extd. with boiling Et_2O . After recrystn. from H_2O , 0.11 g. of 2,3-aziminopyridine, m. 195° (decompn.), sol. in H_2O , alkalies and Na_2CO_3 , insol. in dil. acids, was obtained. The compd. is thus more acid than aziminobenzene, whose *p*-Br deriv. is decompd. by CO_2 in NaOH soln. Refluxing with Ac_2O yields the anhydride base (II), which was distd. *in vacuo* and re-



crystd. from PhH (m. $189.5-190.5^\circ$; yield 0.3 g. from 1.09 g. of the pyridine). Heating with Bz_2 results in III. When recrystd. thrice from 75% EtOH, III m. $136-8^\circ$; yield 1.5 g. from 1.09 g. of I. A red color develops on the addn. of concd. H_2SO_4 , yellow with HCl and HNO_3 . The color is discharged on diln. III is easily sol. in dil. acids being liberated unchanged on the addn. of alkali. The condensation of 0.31 g. of I with phenanthrenequinone in the presence of AcOH yields 0.56 g. of IV, m. $217-8^\circ$ (uncor.) and sparingly sol. in H_2O , etc. Strong mineral acids form salts easily decompd. by H_2O . $\text{Cl}(\text{H}_2\text{N})_2\text{C}_6\text{H}_3\text{N}$ (V), from 2,3- $\text{C}_6\text{H}_3\text{N}(\text{NH}_2)\text{NO}_2$, is easily sol. in EtOH, hot H_2O and PhH and in acids. It does not distil on heating. A soln. of 0.14 g. of V in 10 cc. 0.25 N H_2SO_4 was treated with 10 cc. 0.1 N KNO_3 and allowed to stand for a day. The cryst. ppt. of the azimino deriv. ($\text{C}_6\text{H}_3\text{N}_4\text{Cl}$) recrystd. from hot H_2O m. $271-2^\circ$ (uncor.) (darkens at 195°). Yield 0.06 g.; easily sol. in alkali solns. and Na_2CO_3 . When heated with 2.5 g. Ac_2O , 0.5 g. of V is converted into the anhydro base $\text{C}_7\text{H}_5\text{N}_3\text{Cl}$. When recrystd. twice from EtOH, the product melted at $176-7^\circ$, the yield being 0.48 g.; it is sol. in alkali solns., and the free base seps. on the addn. of acids. The condensation of 0.14 g. of V with phenanthrenequinone in hot AcOH results in 0.29 g. $\text{C}_{19}\text{H}_{10}\text{N}_4\text{Cl}$, sol. in strong mineral acids, the colored salts being decompd. by water. To 3.2 g. 2,3,5- $\text{C}_6\text{H}_3\text{N}(\text{NH}_2)(\text{NO}_2)\text{Cl}$ were added 37 cc. of HCl (d. 1.19) and (upon soln.) 8.8 g. Sn, the mixt. being refluxed until the Sn was dissolved and then evapd. to dryness. The residue was extd. with 20 cc. hot H_2O and neutralized with 50% NaOH (40 cc.). The ppt. was extd. with Et_2O , dried over KOH and recrystd. from H_2O and PhH 4 times. $\text{Cl}_2(\text{H}_2\text{N})_2\text{C}_6\text{H}_3\text{N}$ was obtained m. $155-6^\circ$, easily sol. in hot H_2O , PhH and mineral acids. $\text{Cl}(\text{H}_2\text{N})_2\text{C}_6\text{H}_3\text{N}$ was recovered from the residual liquors (0.15 g.). To 0.11 g. of the Cl_2 compd. in 5 cc. AcOH was added 0.14 g. phenanthrenequinone in 15 cc. AcOH; 0.19 g. of $\text{C}_{19}\text{H}_{10}\text{N}_4\text{Cl}_2$, m. $252-4^\circ$ (uncor.) (decompn.), resulted. It forms brown solns. in mineral acids and is repptd. on diln. 2,3,5- $\text{C}_6\text{H}_3\text{N}(\text{NH}_2)_2\text{Cl}$, m. $164.5-5^\circ$, is easily sol. in hot H_2O and PhH as well as mineral acids. B. C. S.

Doebner's reaction. A. CREMONINI. *Gazz. chim. ital.* **58**, 127-30(1928).—Earlier researches by various investigators have shown that the yield of cinchoninic

acid by the condensation of a primary aromatic amine with BzH and AcCO_2H varies greatly with the type of amine. To throw further light on the relation between the yield and the nature of the amine, an aminoazo deriv. was chosen, *viz.*, *p*-aminoazobenzene (I). The method of Simon (*Compt. rend.* 144, 138, 1275; *Ann. chim. phys.* [8], 13, 361) was chosen in preference to that of Doebner for the synthesis. I was therefore first converted to benzyldeneaminoazobenzene (II) (cf. *Ann.* 329, 221). II (28.5 g.) in 95% EtOH (250 cc.) refluxed 6 hrs. with AcCO_2H (8.8 g.), filtered, washed with EtOH, extd. with NH_4OH , the ext. concd., a slight excess dil. AcOH added, and the ppt. purified by resolu. in NH_4OH and pptn. by dil. AcOH, yields 1 g. (3%) of α -phenyl-4-benzeneazocinchoninic acid (III), red-yellow, m. 248° (decompn.), with mineral acids is an indicator of similar behavior to Me orange; its solns. in aq. alk. hydroxides and carbonates and in NH_4OH are ruby-red and become violet-red when greatly dild. with water. Addn. of a mineral acid to its dil. alk. solns. turns them to a violet-red color, which again becomes yellow when made alk. The violet-red color results from the formation of salts, and if dil. HCl is added to concd. alk. solns. of III, a ppt. of the *HCl* salt of III, $\text{C}_{22}\text{H}_{15}\text{O}_2\text{N}_3 \cdot \text{HCl} \cdot 1.5\text{H}_2\text{O}$, is formed, red, m. 210° ; its solns. in aq. alkalies are yellow. It was not proved whether the change of color involved a change of constitution or was merely simple halochromism. The chief product of the reaction between II and AcCO_2H is the part insol. in NH_4OH . Washed with water, dried, and crystd. from PhMe, it yields the *compd.* $\text{C}_{24}\text{H}_{26}\text{ON}_2$, dark yellow, m. 238° , formed by a reaction corresponding to the pyrrolidine condensation of Borsche (*C. A.* 3, 433; 4, 319). In a similar way 1-aminonaphthalene-4-azo- α -naphthalene (IV) and 2-amino-naphthalene-1-azobenzene (V) were condensed with BzH and AcCO_2H . From IV was obtained 0.75% of the *compd.* $\text{C}_{28}\text{H}_{19}\text{O}_2\text{N}_3$, chestnut color, m. 238° , has acid properties, probably α -naphthaleneazocinaphtho- α -phenylcinchoninic acid. From V was obtained the *compd.* $\text{C}_{26}\text{H}_{19}\text{N}_3$, light red, m. 197° ; its compn. suggests a styrylphenyl-naphthotriazine. It was not studied further.

C. C. DAVIS

The Doebner reaction. VI. R. CIUSA AND A. CREMONINI. *Gazz. chim. ital.* 58, 153-9 (1928); cf. C. and Barattini, *C. A.* 17, 1478; 20, 2331.—Earlier researches have shown that β - $\text{C}_{11}\text{H}_7\text{NHCH}_2\text{Ph}$ (I) is formed as a by-product of the Doebner reaction with β - $\text{C}_{10}\text{H}_7\text{NH}_2$, AcCO_2H and BzH (cf. C. and Zerbini, *C. A.* 15, 2285; C., *C. A.* 17, 1478), but a study of some of its reactions was reserved for the present paper. I refluxed with BzCl until HCl is no longer evolved, Na_2CO_3 added, the solid mass dissolved in EtOH, purified with animal charcoal and the boiling soln. allowed to crystallize, yields the Bz deriv. of I, m. 115° . A mixt. of boiling concd. alc. I and picric acid allowed to cool ppts. the *picrate* of I, golden yellow, m. $140-1^\circ$. Concd. HCl added to hot alc. I ppts. on cooling the *HCl* salt of I, m. 219° . Aq. NaNO_3 (3 g.) added slowly to I (5 g.), concd. H_2SO_4 (1.5 g.) and EtOH (60 cc.), and the product purified repeatedly with EtOH and animal charcoal, yields the *NO* deriv. of I (II), m. $111-2^\circ$, gives a striking Liebermann reaction. II (4 g.) in EtOH heated 3-4 hrs. with Zn dust (6 g.) and glacial AcOH (14 g.) until the Liebermann reaction is negative, cooled, filtered, made strongly alk., extd. with Et₂O, evapd., excess concd. HCl added, filtered, the residue washed with concd. HCl, and recrystd. from dil. HCl, yields benzyl- β -naphthylhydrazine-HCl (III), m. 177° . Excess AcONa added to aq. III, then NaCl, the ppt. dissolved in boiling EtOH and recrystd. by diln. with water, yields benzyl- β -naphthylhydrazine, $\text{C}_{10}\text{H}_7\text{N}(\text{CH}_2\text{Ph})\text{NH}_2$ (IV), rose-colored, m. 79° ; in EtOH it reduces energetically Fehling reagent and $\text{NH}_3\text{-AgNO}_3$. IV is also readily formed from III by the aid of 10% KOH. Aq. Na picrate added to aq. III and the product recrystd. from dil. EtOH yields the *picrate* of IV, yellow, m. 152. IV reacts easily with aldehydes and ketones, forming the corresponding hydrazones. The AcMe deriv. was prepd. from aq. III and AcONa, the other derivs. directly from the AcOH liquor obtained by the reduction of II with Zn after sepn. of the $\text{Zn}(\text{OAc})_2$. There were thus prepd. the following *hydrazone* derivs. of IV, the data giving the deriv., its color, the solvent used in its purification and its m. p. resp.: *AcMe*, pale red, EtOH, 104° ; *BzII*, yellowish, EtOH, 178° ; *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$, vermilion, glacial AcOH, 137° ; *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$, orange-red, glacial AcOH, 160° ; *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$, yellow, glacial AcOH, 168° ; vanillin, white, glacial AcOH, 170° ; *p*-peronal, white, glacial AcOH, 156° ; *anisaldehyde*, white, glacial AcOH, 150° ; *cinnamic aldehyde*, yellow, glacial AcOH, 214° . I (0.5 g.) in EtOH added below 10° to PhN:Cl (from 2 g. of PhNH₂) in water, the ppt. washed with a min. of EtOH, and recrystd. from EtOH and then from glacial AcOH, yields 2-benzylaminonaphthalene-1-azobenzene α,β - $\text{C}_{10}\text{H}_8(\text{N:NPh})\text{NHCH}_2\text{Ph}$ (V), vermilion with green reflection, m. $138-9^\circ$. Concd. H_2SO_4 (10 g.) and subsequently I (23.5 g.) in EtOH and NaOH (4 g.) added very slowly to a soln. prepd. by adding NaNO_2 (7 g.) in water to sulfanilic acid (17.3 g.) in 10% NaOH (40 cc.) with addn. of ice (200 g.), and the ppt. recrystd. from

dil. AcMe, yield Na 2-benzylaminonaphthalene-1-azobenzene-*p*-sulfonate, β , α -C₁₀H₈(NHCH₂Ph)(N.NC₆H₄SO₃Na) 3.5H₂O, red, dyes wool an orange-red color. I (10 g.) in EtOH added to a soln. prepd. from *p*-O₂NC₆H₄NH₂ (6 g.), NaNO₂ (4 g.) and concd. HCl (14 g.), the ppt. washed with EtOH, and recrystd. from AcMe, yields 2-benzylaminonaphthalene-1-azo-*p*-nitrobenzene, violet-black, with golden reflection, m. 199°. In the same way was obtained 2-benzylaminonaphthalene-1-azo-*o*-nitrobenzene, violet, with bronze reflection, m. 165°. Similarly from I (10 g.) in boiling EtOH and α -C₁₀H₇NH₂ (6.14 g.), crystg. from EtOH, was obtained 2-benzylaminonaphthalene-1-azo- α -naphthalene, violet, with golden reflection, m. 168°. These derivs. are to be studied further.

C. C. DAVIS

Formation of asymmetric $\alpha\beta$ - $\alpha'\beta'$ -dinaphthazine. I. M. KARIAKIN AND V. A. LENKHOLOD. *J. Chem. Industry (Moscow)* **4**, 996(1927).—On heating α -C₁₀H₇NH₂ with cast-Fe turnings to 300–400° the surface of the latter becomes covered with yellow needle-like fluffy crystals of *asym*- $\alpha\beta$ - $\alpha'\beta'$ -dinaphthazine. The reaction is analogous to that of the formation of phenazine on heating aniline in an Fe tube. The yield, calcd. on the C₁₀H₇NH₂ used up, is 3%. The product, recrystd. 3 times from benzene, m. sharply 284.6°. Water formed in the reaction decomp. part of C₁₀H₇NH₂ into naphthol and NH₃. On heating 7.7 g. of previously calcined sand with 1 g. C₁₀H₇NH₂ and 0.5 g. K₂Cr₂O₇ in a glass flask, dinaphthazine was obtained in 2% yield calcd on the amount of C₁₀H₇NH₂ used up.

BERNARD NELSON

Bivalent triazenes. HANS KLEINFELLER. *J. prakt. Chem.* **119**, 61–73(1928).—EtMgBr (from 13.3 g. EtBr) and 8 g. *m*-C₆H₄(N₃)₂ in a freezing mixt. give 6.4 g. *bis*-[ethyltriazeno-1,3]-benzene, yellow, m. 104°; explodes on rapid heating, decomp. in cold AcOH with vigorous evolution of N. *Bis*[phenyltriazeno-1,3]-benzene, yellow, m. 161°; Ag compd., brownish powder, which explodes on heating; with PhCNO there results a urea, m. 230°; the N is practically quant. split off on heating with 20% H₂SO₄. *Bis*[phenyltriazeno]acetylene (I), m. 170° (Ag compd., citron-yellow; urea, C₂H₁₇N₇O, yellow, m. 197°), sep'd from the isomeric compd. C₄H₁₂N₆ (II), m. 156°, by the greater soly. of the latter in Et₂O; II is transformed into I by shaking the CHCl₃ soln. with concd. NH₄OH or 33% NaOH or more rapidly by warming an EtOH soln. with 33% NaOH. On heating to boiling with 20% H₂SO₄ there results 50% of a compd. C₈H₈N₄, m. 107°, which may be 2-phenyl-1,2-dihydro-1,2,3,4-tetrazine. II gives an analogous compd., m. 172°. *Bis*-[4-bromophenyltriazeno]-acetylene, brownish leaflets, m. 215°; Ag compd., brown powder, m. 153°; with Br it gives a yellow compd., C₄H₁₁N₆Br₂, which, crystd. from EtOH, gives the compd., C₄H₁₁N₆OBr₂, m. 204°; the Et₂O-sol. *by-product*, C₄H₁₀N₆Br₂, m. 198° (Br gives the compd. C₄H₁₁N₆Br₂, yellow, m. 176°; boiling with 96% EtOH gives the compd. C₄H₁₀N₆Br₂(OH), m. 186°). The action of *m*-C₆H₄(N₃)₂ upon BrMgC:CMgBr gives the compd. C₈H₈N₄, amorphous yellow product, which explodes on heating.

C. J. WEST

1,3,4-Oxidiazines. J. VAN ALPHEN. *Rec. trav. chim.* **47**, 673–82(1928).—On adding 3.5 g. (COCl₂)₂ in 15 cc. benzene to 3.5 g. PhNHNHAc and letting stand at room temp. for 2 hrs., Δ^1 -2-methyl-4-phenyl-5,6-diketo-1,3,4-oxidiazine, CO . O . CMe (I),

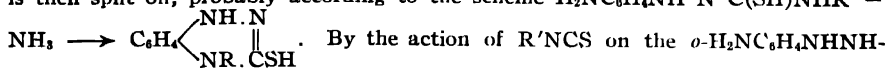
CO.NPh.N

m. 141°, is formed. On dissolving I in water an acid soln. is obtained which, however, does not contain any (CO₂H)₂; on keeping the soln. overnight (CO₂H)₂ is formed together with PhNHNHAc. On boiling alc. I with strong NH₄OH a ppt. of oxamide, m. 217°, is formed in a few min., with MeNH₂; with aniline (CONHPh)₂, m. 245°, with hydrazine (CONHNH₂)₂; and with PhNHNH₂ (CONHNHPh)₂. On evapg. a soln. of I in abs. alc. α -ethoxyoxalyl- β -acetylphenylhydrazine (II), m. 95°, is obtained. This substance was synthesized from EtO₂CCOCl and PhNHNHAc by boiling 6.8 g. of the ester chloride in 20 cc. benzene for 1 hr. with 7.5 g. of the hydrazine compound. In the same way in which I was prepared from PhNHNHAc Δ^2 -2,4-diphenyl-5,6-diketo-1,3,4-oxidiazine (III), m. 175°, was prep'd. from PhNHNHBz. III behaves in the same way as I when treated with water, aniline, PhNHNH₂ and alc., in the latter case α -ethoxyoxalyl- β -benzoylphenylhydrazine, m. 154° (IV), being formed. Again in the same way Δ^2 -2-diphenylmethyl-4-phenyl-5,6-diketo-1,3,4-oxidiazine (V), m. 167–8°, was prep'd. by means of PhNHNHCOCHPh₂. V has the same properties as I and III and, on boiling with absolute alc. yields α -ethoxyoxalyl- β -diphenylacetylphenylhydrazine (VI), m. 189°.

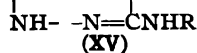
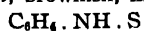
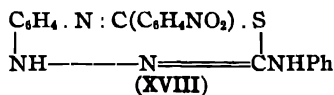
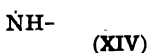
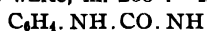
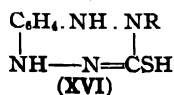
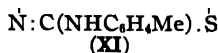
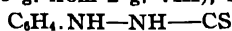
C. F. VAN DUIN

o-Aminophenylhydrazine and some interesting heterocyclic compounds derived from it. III. Lengthened *o*-derivatives of benzene and their ring closure. PRAFULLA CHANDRA GUHA AND TEJENDRANATH GHOSH. *Quart. J. Indian Chem. Soc.* **4**, 561–72(1927); cf. C. A. **21**, 2132.—*o*-O₂NC₆H₄NHNH₂ has been condensed with tolyl,

xylyl and allyl mustard oils to the 4-substituted-1-nitrophenylthiosemicarbazides I, II, III ($\text{O}_2\text{NC}_6\text{H}_4\text{NHNHCSNHR}$, $\text{R} = \text{MeC}_6\text{H}_4$, $\text{Me}_2\text{C}_6\text{H}_3$, and $\text{CH}_2\text{:CHCH}_3$, resp.). I and II on reduction with Sn and HCl give 2 compds. each, I yielding 1-aminophenyl-4-tolylthiosemicarbazide (IV) and 1-tolyl-2,3-benzo-6-thiol-1,4,5-triazine (V), and II the corresponding xylyl compds. (VI and VII). The triazine structure of V and VII follows from the fact that both are sol. in cold dil. alkali, give disulfides with I and insol. mercaptides with HgCl_2 . IV, VI and the corresponding Ph deriv. (VIII) give the triazines with Ac_2O and concd. HCl, showing conclusively that during reduction with Sn and HCl the NO_2 group in the corresponding NO_2 derivs. is first reduced to NH_2 and NH_2 is then split off, probably according to the scheme $\text{H}_2\text{NC}_6\text{H}_4\text{NH N C(SH)NHR} \rightarrow$



CSNHR are obtained compds. of the type $o\text{-R}'\text{NHCSC}_6\text{H}_4\text{NHNHCSNHR}$ (IX). 1-Tolylthiocarbamido-2-phenylthiosemicarbazidobenzene (X) (IX, $\text{R} = \text{Ph}$, $\text{R}' = \text{MeC}_6\text{H}_4$) with concd. HCl yields 2-tolylamino-4,5-benzo-8-thio-1,3,6,7-octathiotriazine (XI). VIII reacts readily with KOON and PhNCS to yield 1-carbamido-2-phenylthiosemicarbazidobenzene (XII) and the 1-phenylthiocarbamido analog (XIII), both of which on ring closure with cond. HCl or 20% KOH give the same 2,3-benzo-6-phenylamino-9-keto-1,4,5,7-octatetrazine (XIV), which is acidic in character (possibly because of the presence of the grouping $-\text{CO.NH}-$) and dissolves in NaOH to form a Na salt. With FeCl_3 the $\text{H}_2\text{NC}_6\text{H}_4\text{NHNHCSNHR}$ yield 3,4-benzo-1,2,5,6-thioheptatriazines (XV), and with $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ 3,4-benzo-7-thiol-1,2,5,6-heptatetrazines (XVI), all of which give the characteristic reactions of a mercaptan. The *o*-nitrobenzal deriv. (XVII) of VIII with FeCl_3 gives 2-anilino-5,6-benzo-8-nitrophenyl-1,3,4,7-thiooctatriazine (XVIII). By a modification of the earlier method of reduction of the NO_2 compd. (10 g.) the yield of VIII.HCl has been increased to 3 g. instead of 1.5 g. and that of the thioltriazine from 0.4 g. to 1 g. The free VIII (0.5 g. from 1 g. of the HCl salt), brownish white, m. $102-3^\circ$. Thioltriazine, m. 151° ; disulfide, yellowish white, m. $175-6^\circ$. 1-*o*-Nitrophenyl-4-*p*-tolylthiosemicarbazide (I), obtained almost quant., m. 176° . IV, m. $252-3^\circ$ (decompn.), becomes reddish brown in the air. V, light yellow, m. 182° ; disulfide, m. $97-8^\circ$ (decompn.). 4-1,3,4-Xylyl homolog (II) of I (19 g. from 10 g. $\text{O}_2\text{NC}_6\text{H}_4\text{NHNH}_2$), m. 112° . VI, m. $255-6^\circ$ (decompn.). VII, m. $173-4^\circ$. 4-Allyl analog (III) of I, yellow, m. 160° , sol. in alkalies with bluish violet color; amino deriv., m. $247-8^\circ$ (decompn.). 1-Ph homolog (IX, $\text{R} = \text{R}' = \text{Ph}$) of X, m. above 290° , sol. in cold concd. alkali; yield, 2 g. from 2 g. VIII. X (2 g. from 2 g. VIII.HCl), does not m. 290° . 1-Xylyl homolog, does not m. 290° . 1-Allyl compd., does not m. 290° . 1-*p*-Tolylthiocarbamido-2-*p*-tolylthiosemicarbazidobenzene, m. $281-2^\circ$. XI, m. 200° , dissolves readily in cold dil. alkali. XII (0.8 g. from 1 g. VIII.HCl), brownish white, does not m. 290° . XIV (1.3 g. from 2 g. XII), brownish white, m. 145° . XIII, m. above 290° . 3,4-Benzo-7-phenylamino-1,2,5,6-thioheptatriazine (XV, $\text{R} = \text{Ph}$), isolated as the *HI* salt, red, m. 140° ; 7-*p*-tolyl homolog-*HI* salt, reddish brown, does not m. 290° . 1-Phenyl-3,4-benzo-7-thiol-1,2,5,6-heptatetrazine (XVI, $\text{R} = \text{Ph}$), m. $83-4^\circ$, sol. in cold dil. alkali, forms with I an amorphous yellow disulfide and with HgCl_2 a yellowish white mercaptide; 1-allyl analog, m. $81-2^\circ$. 1-Benzal deriv. of VIII (1.5 g. from 2 g. VIII), m. $168-9^\circ$. XVII (1.5 g. from 2 g. VIII), brownish white, m. 260° . XVIII.*HI* salt, brownish, m. $216-7^\circ$.



H. W. GIBSON

Correction (synthesis of evodiamine). Y. ASAHINA AND T. OHTA. *Ber.* 61B, 869(1928).—The attention of A. and O. has been called to the fact that *N*-methylisatoic anhydride, the starting material in their synthesis (*C. A.* 22, 1777) had already been described by Houben (*C. A.* 3, 2953).

C. A. R.

Constitution of thebenine. J. M. GULLAND AND C. J. VIRDEN. *J. Chem. Soc.* 1928, 921-34.—From stereochem. considerations and from the fact that thebenol (the product of exhaustive methylation of thebenine (I)) is converted into pyrene when distd. with Zn or reduced by HI and P, it seems probable that the side chain of I is in position 5;

the work here reported shows beyond doubt that this is actually the case. Schöpf and Borkowsky (*C. A.* **21**, 2698) explain the formation of I from codeinone by 1,4-addn. of H_2O to the conjugated system produced in an enolic form of codeinone, followed by the codeine-pseudocodeine transformation; 14-hydroxycodeine is quite unaffected by boiling HCl (d. 1.07, the strength used in the prepn. of I) and prolonged action of Ac_2O yields no tri-Ac deriv. of I but a mixt. of 2 bases, 1 m. 304° and the other amorphous, this seems to indicate that S.'s theory is improbable. The *Me ester*, m. $149-51^\circ$, of 3,4,8-trimethoxyphenanthrene-5-carboxylic acid (m. $236-7^\circ$) and $N_2H_4 \cdot H_2O$ in EtOH gives the *hydrazide*, m. 177° ; $NaNO_2$ and AcOH give the *azide*, decomps. 65° (heated slowly) but explodes at 80° if immersed in a bath at that temp. The Me_2CO filtrate from the prepn. of the acid gives *5-aldehyde-3,4,8-trimethoxyphenanthrene*, m. 151° ; *semicarbazone*, m. $243-6^\circ$ (decompn.); *oxime* (II), crystg. with 0.5 mol. C_6H_6 , m. 153° . With $AcONa$ and Ac_2O , II gives the *5-cyano deriv.*, pale brown, m. $145-6^\circ$ and a small quantity of a base, probably *3,8-dimethoxythebenidine*, orange, m. $229-30^\circ$; the dil. HCl soln. is orange-yellow and the base ppts. unchanged on addn. of alkali; HCl solns. exhibit a green, concd. H_2SO_4 , an intense emerald-green and $CHCl_3$ a blue fluorescence, *picrate*, orange, m. 255° (decompn.). The *lactone of 4-hydroxy-3,8-dimethoxyphenanthrene-5-carboxylic acid*, pale yellow, m. $246-7^\circ$, results from the above azide by heating at 65° , from the hydrazide and $MeNO_2$ or $AmNO_2$ in EtOH- HCl , from the nitrile and concd. HCl and AcOH or by satg. a $MeOH-C_6H_6$ soln. with HCl . *6-Methoxy-3-ethylbenzaldehyde*, b. $261-2^\circ$; *semicarbazone*, m. $226-7^\circ$. With hippuric acid this gives *5-keto-2-phenyl-4-[6'-methoxy-3'-ethylbenzylidene]-4,5-dihydrooxazole*, bright yellow, m. 159° ; hydrolysis gives $MeOC_6H_3EtCH_2COCO_2H$, whose *Na salt* crysts. with 0.5 H_2O . The *acid*, yellow, m. 185° , was analyzed as *3-hydroxy-2-[6'-methoxy-3'-ethylbenzyl]quinoxaline*, m. $184-5^\circ$. Oxidation with H_2O_2 gives *6-methoxy-3-ethylphenylacetic acid*, m. $68-9^\circ$. Condensation with 2-nitroveratraldehyde gives a mixt. of *trans- α -[6'-methoxy-3'-ethylphenyl]-2-nitro-3,4-dimethoxycinnamic acid* (III), pale lemon-yellow, m. $193-4^\circ$, and *trans-2-nitro-3,4-dimethoxycinnamic acid*, m. 229° (*amino deriv.*, m. $173-8^\circ$ (decompn.)); HCl salt, m. 253° (decompn.); Ac_2O and H_2SO_4 give *7,8-dimethoxycarbostryl*, m. $166-8^\circ$. Reduction of III gives the *2-NH₂ deriv.*, lemon-yellow, m. $151-2^\circ$; with $NaNO_2$ this yields *3,4,8-trimethoxy-5-ethylphenanthrene-9-carboxylic acid*, m. 207° ; elimination of CO_2 from this acid or reduction of 3,4,8-trimethoxy-5-vinylphenanthrene from thebaine gives *3,4,8-trimethoxy-5-ethylphenanthrene*, m. $112-3^\circ$; in the 1st method of prepn. there also results a yellow compd., m. 165° , which may be the *lactone of 8-hydroxy-3,4-dimethoxy-5-ethylphenanthrene-9-carboxylic acid*.

C. J. WIST

Porphyryn syntheses. XIII. Synthesis of porphinmonocarboxylic acids and several of their complex salts. H. FISCHER, H. GROSSEFINGER and G. STANGLER. *Ann.* **461**, 221-44(1928), cf. *C. A.* **22**, 1362.—Heating $\dot{I}tC \cdot Me : CBr \cdot NH \cdot CCH \cdot$

$C \cdot N : CBr \cdot CMe : CEt$ (I) and $MeC \cdot C(CH_2CH_2CO_2H) \cdot CMe : NC : CHC \cdot NH \cdot CMe \cdot CEt \cdot C$

Me (II) with $AcOH \cdot HBr$ gives only about 11% of an impure ester; heating an equimol amt. with $CH_2(CO_2H)_2$ gives 25%, while 3.5 g. of the mixt. of I and II with 7 g. $CH_2(CO_2H)_2$ and 15 cc. concd. HBr , followed by esterification, give 35% of the *ester* (III), $C_{34}H_{40}N_4O_2$, brownish red with bluish black luster, m. 216° (cor.), of *1,4,6,7-tetramethyl-2,3,8-triethyl-5-propionic acid porphin* (IV), $C_{38}H_{48}O_2N_4$, asbestos-like needles; the HCl salt crysts. from 20% HCl as red prisms; *Cu salt*, light red, m. 280° , from IV and $Cu(OAc)_2$ in $AcOH$. Heating III with $Fe(OAc)_2$ and a little $NaCl$ in $AcOH$ gives the *hemin* of III, brown rhombs with 1 $AcOH$, which is lost at 110° . $MeMgI$ and III give the *phyllin* of III, brown tablets with bluish violet luster; this is completely decompd. by 15% HCl ; the spectra in Et_2O are given. The *Cu salt* of III forms light red needles. *Me 1,4,5,8-tetramethyl-3,6,7-triethylporphin-2-propionate*, needles, m. 263° , results in 20% yield from 0.6 g. [2-bromomethyl-3-ethyl-4-methylpyrryl]-[2-bromomethyl-4-methyl-3-propionic acid pyrrolenyl] methylene- HBr and 0.57 g. bis-[2-bromo-3-ethyl-4-methylpyrryl]methene- HBr (V), with 5 g. $CH_2(CO_2H)_2$ 1 hr. at 200° , followed by esterification; *Fe salt*, m. above 270° . [2,4-Dimethyl-3-ethylpyrryl]-*Me 2,3-dimethyl-4-propionate pyrrolenyl*methene- HBr , red, m. 180° , in 0.3 g. yield from 0.18 g. *Me hemopyrrolecarboxylate* and 0.15 g. cryptopyrrolaldehyde in 2 cc. $MeOH$ and 0.5 cc. HBr ; with Br in $AcOH$ this gives the *di-[2-bromomethyl] deriv.* (VI), dark red, decomps. 225° . VI (0.27 g.), 0.24 g. V and 2 g. $CH_2(CO_2H)_2$, heated 1 hr. at 200° , and the product transformed into the ester, give 30% of *Me 1,3,5,8-tetramethyl-2,6,7-triethylporphin-4-propionate*, needles, m. 220° ; this also results from VI and bis-[2-bromo-3-methyl-4-ethyl-5-pyrryl]methene- HBr ; *Fe salt*, dark, glistening needles,

m. 263°; *phyllin*, m. 200°. Cryptopyrrolecarboxylic acid (0.5 g.) and 0.45 g. hemopyrrolaldehyde give 0.8 g. [2,4-dimethyl-3-propionic acid pyrrol]-[2,3-dimethyl-4-ethylpyrrolenyl]methene-HBr, reddish yellow, decompd. 176°; Br in AcOH gives the di-[2-bromomethyl] deriv. (VII), red needles. VII (0.27 g.), 0.24 g. V and 2 g. $\text{CH}_2(\text{CO}_2\text{H})_2$, heated at 200° for 0.5 hr. and the product esterified, gives 37% of *Me* 1,3,5,8-tetramethyl-2,4,7-triethylporphin-6-propionate, m. 238° (cor.); *Fe* complex, dark glistening needles, m. 258°. [*Me* 2,3-dimethyl-4-propionate pyrrol]-[2,3-dimethyl-4-ethylpyrrolenyl]methene-IBr, prisms with green surface luster, m. 185°; di-[2-bromomethyl] deriv., red prisms; with V this gives 20% of *Me* 1,4,6,7-tetramethyl-3,5,8-triethylporphin-2-propionate, m. 214°; *Fe* salt, dark prisms, m. 254°. A thorough comparison of phylloporphyrin, pyrrorporphyrin and III shows that they are not identical. XV. Synthesis of β,β' -substituted pyrroles and porphyrin syntheses from simple pyrroles. H. FISCHER, E. STURM and II. FRIEDRICH. *Ibid* 244-77.—F. and Wiedemann (C. A. 20, 3455) have shown that β -methyl- β' -carbethoxypyrrole does not yield porphyrins. The same is true of β -methyl- β' -acetylpyrrole (VIII). The condensation of 8.4 g. aminoacetone and 12.5 g. oxalacetone according to Piloty (C. A. 7, 1193) gives 1.5-2 g. β -methyl- β' -acetylpyrrole- α' -carboxylic acid (IX) (*Me* ester, m. 100°), 0.5-1.0 g. of the *Et* ester of X, m. 124°, and 0.8-1.0 g. of the isomeric acid (probably 2,4-dimethylpyrrole-3-glyoxylic acid) (X). IX or its ester and PhNHNH_2 in 60% AcOH give β -methylpyrrole-1-phenyl-3-methyl-6-keto-1,6-dihydropyridazine, yellow, m. 297° (cor.). IX and $\text{N}_7\text{H}_4 \cdot \text{H}_2\text{O}$ with EtONa, heated 6 hrs. at 180°, give only a little opsoyrrole, the principal product being a compd., $\text{C}_8\text{H}_5\text{ON}_3$, sublimes above 400°. Heating IX in 10% NaOH at 140° for 2 hrs. gives 60-70% of VIII, m. 117°. VIII condenses with Me_2CO , AcH and HCHO but the products show no porphyrin spectra and were not further investigated. Reduction of VIII with $\text{N}_2\text{H}_4 \cdot \text{H}_2\text{O}$ and EtONa by heating 8 hrs. at 160-80° gives 70% of β -methyl- β' -ethylpyrrole (XI). Removal of CO_2 from X gives a compd. $\text{C}_7\text{H}_5\text{ON}$, m. 88-9°, which may be a dimethylpyrrolaldehyde; reduction gives 70% of an oil, $\text{C}_7\text{H}_{11}\text{N}$, b_{D}^{20} 74-5°, termed *iso-opsoyrrole*; $\text{HO}_3\text{SC}_6\text{H}_4\text{N}_3\text{X}$ gives a yellow azo dye, $\text{C}_{15}\text{H}_{11}\text{O}_3\text{N}_5\text{S}$, m. 240-50°; attempts to form porphyrins failed. XI and HCO_2H 1 hr. at 160° give etiopyrphyrin. XI, condensed with an excess HCO_2H , gives opso-pyrrolemethene-IBr, $\text{C}_{15}\text{H}_{21}\text{N}_7\text{Br}$, which yields a di-Br deriv., m. 175-6°, identical with the product from hemocarbethoxypyrrole. 2,5-Dimethyl-3-carbethoxypyrrole (6 g.) and 24.5 g. SO_2Cl_2 in 175 cc. Et_2O give 30-5% of 2,5-diformyl-4-chloro-3-carbethoxypyrrole, m. 131°; from the free acid, there results 38% of the acid, decomp. 237°. 2,4-Dimethyl-3,5-dicarbethoxypyrrole (15 g.) and 51 g. SO_2Cl_2 in 250 cc. Et_2O give 86% of 2,4-di[trichloromethyl]-3,5-dicarbethoxypyrrole (XII), m. 72°, monoclinic, prismatic, $a:b:c = 1.4041:1.16005$; β 111° 20'; other crystallographic data are given; this is decompd. by KOH (2:3) at 60-70°. Oxidation of XII with $\text{CrO}_3\text{-AcOH}$, cold HNO_3 or concd. H_2SO_4 gives a pentachlorohydroxypyrrole, m. 110°, while reduction with Zn and AcOH gives 70% of 2-hydroxymethyl-4-methyl-3,5-dicarbethoxypyrrole, m. 116°. Two mols. SO_2Cl_2 (1.6 g.) and 1 g. 2,4-dimethyl-3-carbethoxypyrrole give 23-4% of [2,4-dimethyl-3-carbethoxypyrrol]-[3-carbethoxy-4-methyl-5-chloropyrrol]methene-HCl, red, m. 143°. 2,4-Dimethyl-3-carbethoxypyrrole Ph 5-sulfide, rose, m. 111°, in nearly quant. yield from the pyrrole and PhSCl in Et_2O ; 2,4-dimethyl-5-carbethoxypyrrole Ph 3-sulfide, m. 157°; 2,5-dimethyl-3-carbethoxypyrrole Ph 4-sulfide, m. 134°. The action of 2 mols. SO_2Cl_2 upon 2-methyl-3-ethyl-4-methyl-5-carbethoxypyrrole gives the 2-chloromethyl deriv., m. 130° (cor.); heating with H_2O splits off HCHO and gives bis-[3-ethyl-4-methyl-5-carbethoxypyrrol]methane. Boiling the product of the action of 3 mols. SO_2Cl_2 with H_2O gives a mixt. of 4-methyl-3-ethyl-5-carbethoxypyrrole-2-carboxylic acid (XIII), m. 211°, and 2-formyl-3-ethyl-4-methyl-5-carbethoxypyrrole (XIV); the use of 2.5 mols. SO_2Cl_2 gives about equal quantities of the 2 products, while 4 mols. give 70% of XIII. XIII, Ac_2O and AcONa give the pyrocoll of XIII, $\text{C}_{22}\text{H}_{22}\text{N}_4\text{O}_6$, pale yellow, m. 150° (cor.). Heating XIII at 215-20° gives opso-carbethoxypyrrole (XV), b_{D}^{20} 135-45°, m. 25°; with HCN and HCl this gives XVI. The oxime of XVI, heated with Ac_2O and AcONa, gives the nitrile, $\text{C}_{11}\text{H}_{11}\text{O}_2\text{N}_3$, m. 131°. Sapon. of XIV gives the free acid (XVI), m. 199° (cor.); the dicarboxylic acid, $\text{C}_9\text{H}_{11}\text{O}_4\text{N}$, m. 222° (cor.). XIII and Br in AcOH give the 2-Br deriv., m. 103° (cor.), CO_2 being split off (62% yield); this also results from XV and Br. Methene-HBr derivs. were formed from XIV and cryptopyrrole, m. 160° (decompn.); Me hemopyrrolecarboxylate, m. 168° (decompn.); and cryptopyrrolecarboxylic acid, m. 197° (decompn.); 80-90% yields. No porphyrin is formed on heating cryptopyrrole or a mixt. of this with the corresponding acid with HBr-AcOH; with HCO_2H and HClO₄, there results cryptopyrrolemethene. A porphyrin does result from Et cryptopyrroleglyoxylate or bromocarbethoxycryptopyrrole and HBr-AcOH. 2-Bromomethyl-4-methyl-5-carbethoxypyrrole-3-propionic acid and HBr-

AcOH, heated 2 hrs. at 180°, give, after esterification, a mixt. of tetra-Me coproporphyrin and isocoproporphyrin, m. 239°; the corresponding 2-Me deriv. also gives a porphyrin with HBr-AcOH. XVI. Synthesis of porphyrins with nitrile functions. H. FISCHER AND HANS WESENEGGER. *Ibid* 277-95.—2-Bromomethyl-3-[ω -cyano- ω -carbethoxy]-ethyl-4-methyl-5-carbethoxypyrrrole, m. 129°; warming with MeOH gives the 2-methoxymethyl deriv., m. 113°; EtO deriv., m. 123°; anilino deriv., m. 138°. Warming the Br deriv. with H₂O for 6 hrs. gives nearly quant. bis-[2-carbethoxy-3-methyl-4-(ω -cyano- ω -carbethoxy)-ethylpyrrol]-5-methane (XVIa), m. 172°; Br deriv., m. 131° (40% yield). Sapon. with 10% NaOH gives the free acid corresponding to XVIa, m. 220°; upon melting, there results a poor yield of bis-[2-carbethoxy-3-methyl-4-propionitrile-pyrrol]-5-methane (XXII), m. 194°. 2-Bromomethyl-3-propionitrile-4-methyl-5-carbethoxypyrrrole, m. 185°; 2-MeO deriv., m. 140°; 2-EtO deriv., m. 113°; 2-anilino deriv., m. 188°; heating with H₂O 8 hrs. gives XVII. Sapon. of XVIa with EtOH-HCl gives bis-[di-Et 3- β -methylmalonate-4-methyl-5-carbethoxypyrryl]-2-methane, m. 126°. Sapon. of XVII with NaOH gives a mixt. of bis-[3-propionic acid-4-methyl-3-carbethoxypyrryl]-5-methane and the free acid. Bromination of 2,4-dimethyl-3-[ω -cyano- ω -carbethoxy]vinyl-5-carbethoxypyrrrole gives a sticky mass; the 2-MeO deriv., m. 101°; the 2-EtO deriv., m. 120°; AcOH-HBr and the EtO compd. give the 2-bromomethyl deriv., m. 135°. 2,4-Dimethyl-3-formylpyrrole-5-carboxylic acid and NCCH₂CO₂Et are condensed by PhNH₂ in EtOH, giving 2,4-dimethyl-3-[ω -cyano- ω -carbethoxy]vinylpyrrole-5-carboxylic acid, m. 242°; the pyrocoll, C₂₂H₂₄O₆N₄, m. 276°. 2,4-Dimethyl-3-[ω -cyano- ω -carboxyl]vinylpyrrole, yellow, m. 210°, by sapon. of the Et ester; with HCN the Et ester (XVIII) gives 2,4-dimethyl-3-[ω -cyano- ω -carbethoxy]vinyl-5-formylpyrrole, m. 200°; oxime, m. 185°; semicarbazone, m. 253°; azlactone, m. 185°. The aldehyde condenses with XVIII (HCl) to give the methene, dark red, sinters 250°. With cryptopyrrolaldehyde XVIII gives the methene, C₂₁H₂₆O₂N₄, dark red, m. 132°; HCl salt, orange, m. 220°. XVIII and formalin give bis-[2,4-dimethyl-3-(ω -cyano- ω -carbethoxy)vinylpyrrol]-5-methane (XIX), m. 217°; the free acid, m. 268°, does not cryst. With Br in AcOH there results from XIX the methene-HBr, m. 215°. 2,4-Dimethyl-3-[ω -cyano- ω -carboxyl]vinyl-5-formylpyrrole, m. 240°, by sapon. of the Et ester with a little NaOH; with KOH (1:1) there results 2,4-dimethyl-3,5-formylpyrrole, m. 166°.

C. J. WEST

Bios. V. BUNSUKE SUZUKI AND YASUJI HAMAMURA. *Proc. Imp. Acad. (Japan)* 4, 158-60(1928); cf. *C. A.* 22, 1362.—From the mother liquor of the γ -acid there have been isolated nicotinic acid, ferularic acid, *p*-HOC₆H₄CO₂H and the β -acid.

C. J. WEST

Work preliminary to hemin syntheses. I. H. FISCHER AND KARL ZEILE. *Ann.* 462, 210-30(1928).—Syntheses of pyrroles with unsatd. and HO groups are described as a preliminary step to hemin syntheses. 2,4-Dimethyl-3-vinyl-5-carbethoxypyrrrole (I), adds Br in petrol. ether, giving 2,4-dimethyl-3-[α,β -dibromoethyl]-5-carbethoxypyrrrole, m. 133°. With 3 mols. Br in AcOH I gives 2,4-dimethyl-3-bromo-5-carbethoxypyrrrole (II), decomps. 166° (about 15% yield). I and CS₂-HCl or I and dry HCl in petrol. ether, give 2,4-dimethyl-[α -chloroethyl]-5-carbethoxypyrrrole (III), m. 95°; MeOK in MeOH gives the α -MeO deriv., m. 115°, also obtained from I and MeOH-HCl; oxidation gives a mixt. of I and the 3-CO₂H deriv.; bromination gives II. 2,4-Dimethyl-3-formyl-5-carbethoxypyrrrole and MeMgI give 2,4-dimethyl-3-[α -hydroxyethyl]-5-carbethoxypyrrrole (IV), m. 100.5° (80% yield); PCl₅, followed by MeOK, gives the above Me ether. Heated to melting *in vacuo* IV gives a dimol. I, C₂₂H₂₀O₄N₂, m. 187° (about 20% I sublimes during the operation); this also results by heating III several hrs. in petrol. ether. 2,4-Dimethyl-3-[β -nitrovinyl]-5-carbethoxypyrrrole in MeOH and MeOK give a red K salt, which is easily hydrolyzed; the Br deriv. of the pyrrole, yellow, m. 177°; several hrs' heating with H₂O gives the 3-CHO deriv. 2,4-Dimethyl-3-formyl-5-bromopyrrole, red, m. 149° (decompn.), from the pyrrole (V) and AcOH-Br. V and 40% HCHO in EtOH give bis-[2,4-dimethyl-3-formylpyrrol]methane, m. 286°; the PhNH₂ condensation product m. 165°; the Wursters' base product, C₂₁H₂₄N₄, m. 145°, quickly turns yellow in the air and then red; oxidation with Br in AcOH gives the methene-HBr, blue needles; the free base, brown, sinters 207°, decomps. 255-60°. V and MeNO₂ give 2,4-dimethyl-3-[β -nitrovinyl]pyrrole, dark yellow, m. 149°; with HCHO it yields bis-[2,4-dimethyl-3-[β -nitrovinylpyrrol]methane, red needles. V and CH₃(CN)₂ give 2,4-dimethyl-3-[β -dicyanovinyl]pyrrole (VI), yellow, m. 148°; cooking with alkali regenerates V. The corresponding 5-[β -dicyanovinyl] deriv., yellow, m. 148°. Bis-[2,4-dimethyl-3-[β -dicyanovinylpyrrol]methane, yellow needles; alkalis give the aldehyde. VI and HCN-HCl in CHCl₃-Et₂O give the 5-formyl deriv., m. 207°; with NaOH this gives 2,4-dimethyl-3,5-diformylpyrrole, m. 165°. 2,4-Dimethyl-5-

carbethoxypyrrole, $\text{ClCH}_2\text{CH}_2\text{COCl}$ and AlCl_3 in CS_2 give the 3-[β -chloropropionyl] deriv., m. 138° (55% yield). 2,4-Dimethyl-3-chloroacetyl-5-carbethoxypyrrole and Me_2NH in EtOH give 50% of 2,4-dimethyl-3-[β -dimethylaminoacetyl]-5-carbethoxypyrrole-HCl, m. 214° ; the free base does not cryst. well and m. $87-8^\circ$. The corresponding 3-[β -dimethylaminopropionyl] HCl salt m. 184° (65% yield); the free base m. 78° . 2,4-Dimethyl-3-[β -hydroxyacetyl]-5-carboxylic acid, m. 231° , from the 3- ClCH_2CO deriv.; heated 24 hrs. at $210-30^\circ$, it yields 30% of 2,4-dimethyl-3-[β -hydroxyacetyl]-pyrrole, m. 143° . Bis-[2,4-dimethyl-3- β -hydroxyacetylpyrrol]methane, m. 252° . 2,4-Dimethyl-3-[β -methoxyacetyl]pyrrole, m. 127° (65% yield). 2,4-Dimethyl-3-ethoxyacetyl-5-carbethoxypyrrole, m. $113-4^\circ$ (quant. yield). C. J. WEST

Hydrolysis of polypeptides by *N* alkali and by enzymes of the pancreas (ABDERHALDEN, BROCKMANN) 11A. Conversion of CII_4 into H and CO (FISCHER, TROPSCH) 21.

AUWERS, KARL VON: Über die Bestimmung der Konfiguration raumisomerer hydroaromatischer Verbindungen—über den Goldschwefel und einige Salze der Thioantimon- u. d. Thioarsensäure by WILHELM STRECKER—Studien über die Alkaloidbildung 2 by JOHANNES GADAMER Heft. 4. Bd. 62 of Sitzungsberichte d. Gesellschaft zur Beförderung d. gesamten Naturwissenschaften zu Marburg. Berlin: O. Elsner Verlagsges. Pp. 113-164. M. 4.

KEMPF, RICHARD AND KUTTER, FRITZ: Schmelzpunktstabellen zur organischen Molekular-Analyse nebst einer Einführung. Braunschweig: Friedr. Vieweg & Sohn Akt.-Ges. 766 pp. RM. 64; bound, 68.

THIEL, ALFRED AND DIEHL, R.: Über Phenolphthalein und Phenolphthaleinderivate. Mitteilg. 11, 11eft. 15, Bd. 62 of Sitzungsberichte d. Gesellschaft zur Beförderung d. gesamten Naturwissenschaften zu Marburg. Berlin: O. Elsner Verlagsges. Pp. 471-546. M. 4.

VANINO, LUDWIG AND SEITTER, F.: Der Formaldehyd. 2nd ed. Completely revised by Arthur Menzel. 248th Vol. of Chemisch-technische Bibliothek. Vienna: A. Hartleben. 330 pp. M. 7.50; Cloth bound, M. 8.50.

Unsaturated organic compounds. FRICH FREUND (to Chemische Fabrik auf Aktien (vorm. H. Schering). U. S. 1,672,378, June 5. In the formation of compds. such as tetrahydrobenzene, an org. compd. such as cyclohexanol which carries H and OH on 2 adjacent C atoms in an aliphatic system is heated with a "bleaching earth" such as frankonite as a catalyzer, and the unsatd. compd. thus formed is sepd., e. g., by distn. Acrolein may be made from glycerol and camphene from borneol.

Methane and other hydrocarbons. H. C. J. AARTS (to General Carbonalpha Co.). Brit. 278,745. Oct. 7, 1926. Active C is heated with H or gases contg. H at $150-600^\circ$ with or without a catalyst at ordinary or only slightly increased pressure. Reduced Ni is a suitable catalyst. At $150-400^\circ$, satd. hydrocarbons are mainly produced, and at $400-600^\circ$ unsatd. hydrocarbons. Coal, peat, wood, brown coal or like materials may be gasified to produce a gas contg. CO, which is then heated to $300-500^\circ$. The decompn. may be started by a catalyst such as Fe, Ni or Co oxide. Hydrocarbons adsorbed in C may be used as fuel in internal-combustion engines.

Hydrocarbons and phenols. I. G. FARBENIND. A.-G. Brit. 277,394, March 13, 1926. Aromatic hydrocarbons or phenols, or tar fractions contg. them, are converted into lower hydrocarbons or phenols by passing their vapor together with more than twice their vol. of water vapor at a high temp. (suitably $300-500^\circ$ or higher) over catalysts possessing both hydrogenating and dehydrogenating properties, among which are specified: Ni, Co, Fe, Cu, compds. of light metals such as those of the alkali, alk. earth or earth metals, Zn and its compds., and the difficultly reducible oxides of metals belonging to the fourth to seventh groups such as Ti, V, Cr and Mn. Several examples are given.

Organic arsenic compounds. R. W. F. STICKINGS AND MAY & BAKER, LTD. Brit. 278,444, July 8, 1926. 1,4-Arylisoxazinearsonic acids are prepd. by condensing an *o*-aminohydroxyarylarsonic acid with an α -halogenacyl halide. The α -halogenacylaminohydroxyarylarsonic acid is first formed and, by elimination of H halide, condenses to the isoxazine although the process may be carried out as a one-stage process without isolation of the intermediate product. The first reaction is preferably effected by the Schotten-Baumann reaction and the second by boiling with alkali. Examples are given of the production of 3-hydroxy-1,4-benzisoxazine-6-arsonic acid and 8-acetamido-3-hydroxy-1,4-benzisoxazine-6-arsonic acid. 3-Acetamido-4-hydroxy-5-amino-

benzenearsonic acid (used as a starting material in making the last-mentioned product) is made by nitrating 3-acetamido-4-hydroxybenzenearsonic acid and reducing the nitro compd. thus formed.

Catalyst for partial oxidation of benzene. C. R. DOWNS. U. S. 1,672,308, June 5. A metal oxide catalyst such as V or Mo oxides is carried on pieces of Al having rugged scraggy prominences and depressions.

Benzanthrone derivatives. I. G. FARBENIND. A.-G. Brit. 277,670, Sept. 20, 1926. Benzanthronecarboxylic acids are made by oxidizing alkylbenzanthrone in the presence of alk. agents such as caustic alkalies; the reaction may be applied to compds. contg. the alkyl group either in the benzene ring or in the anthraquinone nucleus. Examples are given.

Benzanthrone derivatives. J. Y. JOHNSON and I. G. FARBENIND. A.-G. Brit. 278,047, May 31, 1926. 2,2'-Dibenzanthronyls are made by treating with alk. condensing agents ("under moderate conditions") mixts. of 2-halogenbenzanthrone with benzanthrone having a free 2-position. The reaction takes place more readily than that of Brit. 203,533 (C. A. 18, 756) and renders possible the production of unsym. substituted 2,2'-dibenzanthronyls. Condensation is effected in a current of N. Examples are given for the production of 2,2'-dibenzanthronyl, 6-methyl-2,2'-dibenzanthronyl, 6- or 7-chloro-2,2'-dibenzanthronyl and 6,6'- or 7,7'-dichloro-2,2'-dibenzanthronyl. 2,6-Dichloro- and 2,7-dichlorobenzanthrone are obtained by condensing 2,6- and 2,7-dichloroanthraquinone with glycerol in the presence of H₂SO₄ and a reducing agent.

Naphthalene derivatives. I. G. FARBENIND. A.-G. Brit. 278,100, July 6, 1926. Dinaphthylidicarboxylic acids and their substitution products are obtained by treating diazo compds. derived from *o*- or *peri*-aminonaphthoic acids or their derivs. with suitable reducing agents such as an ammoniacal soln. of Cu₂O or a neutral soln. of Na₂SO₃ or a ferrous salt. Examples are given of the production of 1,1'-dinaphthyl-8,8'-dicarboxylic acid, 2,2'-dinaphthyl-3,3'-dicarboxylic acid, 1,1'-dinaphthyl-2,2'-dicarboxylic acid, 2,2'-dinaphthyl-3,3'-dicarboxylic acid diethyl ester, 1,1'-dichloro-2,2'-dinaphthyl-3,3'-dicarboxylic acid, 4,4'-dibromo-1,1'-dinaphthyl-8,8'-dicarboxylic acid, 4,4'-dichloro-1,1'-dinaphthyl-8,8'-dicarboxylic acid, 1,1'-dinaphthyl-4,4'-disulfo-8,8'-dicarboxylic acid, 5,5'-dimethoxy-1,1'-dinaphthyl-8,8'-dicarboxylic acid and the corresponding diethoxy compd. Cf. C. A. 23, 2380.

Derivatives of 3- and 5-iodopyridine. C. RATH. U. S. 1,672,340, June 5. Chlorination of β -iodopyridine yields an iodochloride m. 128-30° and only slightly sol. in the usual cold org. solvents. α -Chloro- β -iodopyridine yields a corresponding iodochloride m. 104-6°. α -Chloro- β -iodochloropyridine yields α -chloro- β -iodosopyridine, which decomposes at about 200-205°. When steam is blown through an aq. suspension of α -chloro- β -iodosopyridine α -chloro- β -iodoxypyridine is carried off and may be crystd. as white needles from the steam distillate. This compd. detonates, with sepn. of I, at 210-5°.

2-Amino-5-iodopyridine. C. RATH. U. S. 1,671,256, May 29. See Brit. 246,842 (C. A. 21, 415).

Hydrazinopyridine compounds. C. RATH. U. S. 1,671,257, May 29. In forming a β -hydrazinopyridine compd. such as β -hydrazinopyridine or α -chloro- β -hydrazinopyridine the corresponding β -aminopyridine is diazotized and the diazonium compd. is reduced, *e. g.*, by use of SnCl₂.

***p*-Alkyloxyphenylglycinamides.** J. ROSIN (to Merck & Co.). U. S. 1,672,689, June 5. A *p*-alkyloxyaminobenzene such as *p*-phenetidine is condensed with a halogenated deriv. of HOAc such as Et chloroacetate, *e. g.*, by heating in alc and adding NaHCO₃ to neutralize the acid formed. *p*-Ethoxyphenylglycinamide is a white cryst. solid m. 142-5°, slightly sol. in cold water and C₆H₆, more sol. in hot water and very sol. in alc. and acetone. It forms salts with acids and is decompd. by alkalies. Me, Pr, Al and other corresponding derivs. are mentioned as being capable of production from their corresponding starting materials but are not described in detail.

Anthraquinonesulfonic acids. J. THOMAS (to Scottish Dyes, Ltd.). U. S. 1,671,455, May 29. Hg sulfate 4.8 and benzoyle-*o*-benzoic acid 325 parts are mixed with 70 parts of anthraquinone recovered from a previous melt and this mixt. is added to about 450 parts of a 65% oleum, at such a rate that the temp. does not rise above 100°; after the addn. is complete the temp. is slowly raised to about 150° and maintained at this point for about 45 min., the melt is worked up for isolation of anthraquinone-sulfonic acid and anthraquinone is recovered.

Bismuth salts of arylarsonic acids. A. HAYTHORNTHWAITHE and MAY & BAKER, Ltd. Brit. 277,774, July 16, 1926. Stable solns. of Bi salts of 3-acetyl-amino-4-

hydroxyphenylarsonic acid or similar arylarsonic acids are prepd. by the addn. of a base such as piperazine, NaOH or NH_3 soln. to a suspension of the salt to render it sol. and of a salt of an aliphatic hydroxypolybasic acid such as K tartrate or citrate.

2-Hydroxy-4-formylaminophenylarsonic acid. ÉTABLISSEMENTS POULENC FRÈRES AND E. FOURNEAU. Brit. 277,586, Oct. 29, 1926. 2-Hydroxy-4-aminophenylarsonic acid is heated with formic acid. The Na and NH_4 salts of the product are described.

Acetaldehyde. I. G. FARBENIND. A.-G. Brit. 278,324, Sept. 28, 1926. Gaseous mixts. contg. C_2H_2 (such as are obtained by decompn of CH_4 by elec. or catalytic treatment) are treated under pressure (suitably 3 atm.) with acid solns. contg. Hg salts. A temp. of about 80° is preferred.

Butyraldehyde. M. MUGDAN and J. WIMMER. Can. 276,824, January 3, 1928. Butyraldehyde is produced by treating crotonaldehyde in the liquid phase with H_2 at elevated temp. and pressures up to 30 atms. in the presence of a hydrogenating catalyst.

Butyrene. H. DOLTER (to F. Germain). Brit. 277,975, Sept. 22, 1926. Ca butyrate is heated in an app. (which is described) by a current of hot inert gas which carries off the vapors produced.

Chlorinated amines. I. G. FARBENIND. A.-G. Brit. 278,729, Oct. 6, 1926. 3-Chloro- and 5-chloro- or 3,5-dichloro-1-amino-2,4-dimethylbenzene are produced by the reaction of 1 or 2 mols., resp. of Cl on a soln. of 1-amino-2,4-dimethylbenzene. The 3,5-dichloro compd. forms a sulfate sparingly sol. in concd. H_2SO_4 by which it may be sepd., or it may be sepd. by addn. of water. Catalysts such as I or FeCl_3 may be used.

Ethylidene diacetate. M. J. L. LÉDRU and E. J. BACHMANN (to Soc. chimique des usines du Rhone). U. S. 1,672,646, June 5. See Can. 269,818 (C. A. 21, 2274).

Purifying carbazole. C. J. THATCHER. U. S. 1,672,630, June 5. A solvent such as CCl_4 , C_6H_6 or toluene is used in such quantity as to dissolve only a portion of the carbazole together with substantially all the impurities.

Inactive menthol. K. SCHÖLLKOPF (to Rheinische Kampfer-Fabrik G. m. b. H.). U. S. 1,672,346, June 5. The racemate of natural menthol, m. $34-6^\circ$, with isomeric menthols, is obtained by hydrogenation, solidifiable menthol is sepd. from liquid constituents of the mixt., the sepd. solidifiable menthol is converted into an ester such as the acid phthalic acid ester and the latter is crystd. from alc. or other suitable solvent, sapond., and the menthol produced is distd.

Methyl ether. F. R. BICHOWSKY (to Delcolight Co.). Brit. 278,353, Sept. 28, 1926. A mixt. of CO and H is passed at an elevated temp. and pressure (suitably 500° and 125 atm.) over a hydrogenation catalyst (suitably ZnO and reduced Cu or Cr salts, but excluding Fe) and then over a dehydration catalyst or over a mixt. of both catalysts; or, MeOH may be passed over a dehydration catalyst. Alumina prepd. by partially dehydrating $\text{Al}(\text{OH})_3$ at 300° , partially dehydrated Ti hydroxide, Th hydroxide or silica gel may be used as dehydration catalysts. Various details are given and an app. is described.

Aromatic nitriles. I. V. GILES (to American Cyanamid Co.). U. S. 1,672,253, June 5. In forming nitriles such as benzonitrile a halogenated aromatic hydrocarbon, e. g., PhCl , is treated with a mixt. of Cu cyanide and NaCN or other alkali-forming metal cyanide and the mixt. is heated (suitably to about 325°). An app. is described.

Symmetrical diarylized guanidine compounds. H. SCHOTTE (to Chemische Fabrik auf Aktien, vorm. F. Schering). U. S. 1,672,431, June 5. See Brit. 262,155 (C. A. 21, 3625).

Aminoguanidines and their alkyl derivatives. M. HEYN (to C. A. F. Kahlbaum Chem. Fabrik, G. m. b. H.). U. S. 1,672,029, June 5. In forming compds. such as aminobutylene(or pentylene)guanidine sulfate, an S-alkylthiourea is used to react with tetramethylenediamine or other similar compds. contg. at least 1 amino group. The quantity of the S-alkylthiourea used (e. g., S-methylisothiurea sulfate) does not substantially exceed that required for introducing guanidine in a single amino group. The reaction may be effected in aq. soln.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

The enzymic origin of hexose phosphate. H. VON EULER, KARL MYRBACK AND D. RUNEHJELM. *Archiv Kemi, Mineral. Geol.* 9, No. 49, 6 pp.(1928).—Hexose diphosphate arises as a product of fermentation. The hexose monophosphates arise from the diphosphate in fermentation. The hexose monophosphate of Neuberg is completely decomposed to CO_2 and H_3PO_4 by fermentation while from the 2 mols. of the monophosphate of Robinson, hexose diphosphate and CO_2 but no free H_3PO_4 originate. A new monophosphate has been prep'd. from 5 l. H_2O , 500 g. very active yeast, 500 g. glucose, 175 g. KH_2PO_4 , and Na_2HPO_4 . After 3 hrs the hexose monophosphate is purified and isolated by pptn. as the Ba salt with EtOH. The Ba salt has a specific rotation of $+33^\circ$ while the free hexose monophosphate has a rotation of $+63^\circ$. By starting with 4 l. H_2O , 400 g. glucose, 140 g. KH_2PO_4 , 120 g. Na_2HPO_4 , 400 g. dry yeast and some hexose diphosphate, and allowing the mixt. to stand at room temp. for 7.5 hrs. a hexose monophosphate was prep'd. with the properties of the Robinson comp'd with a specific rotation of $+15^\circ$ instead of one of $+12-14^\circ$ as previously described. It is believed that there are a number of different hexose monophosphates.

H. J. DEUEL, JR.

Contribution on the knowledge of mutase. HANS VON EULER AND ELSA GRABER. *Archiv Kemi, Mineral. Geol.* 9, No. 50, 6 pp.(1928); cf. C. A. 22, 1984.—A study of the Cannizzaro reaction with furfural and formaldehyde which is brought about by dried yeast or with washed yeast to which is added a boiled yeast ext. or purified coenzyme. The index of the rate of reaction was taken as the rate of disappearance of the aldehyde. Furfural in 30 mins. was broken down 50%. Formaldehyde was rapidly acted on at first but the action ceased within an hr. when 30% had been changed. It is assumed that the formaldehyde reacts with the enzyme system and inactivates it. HCN had little effect in causing inactivation in 0.0001 N soln. but 0.005 N CdCl_2 or ZnCl_2 was very potent in preventing the enzyme and so in checking the Cannizzaro reaction. 0.1 N CaCl_2 , KI, KF and KCl caused only a slight retardation in enzyme action. In obtaining further data on the distribution of mutase it was found to be present in fresh wheat embryo, in fresh wheat embryo ext., in dried wheat embryo, and in the ext. of the latter in amts. comparable with yeast as det'd. by its effect on acetaldehyde.

H. J. DEUEL, JR.

Asymmetrical ester hydrolysis through enzymes. I. RICHARD WILLSTATTER, RICHARD KUHN AND EUGEN BAMANN. Bayer. Akad., Munich. *Ber.* 61B, 886-895 (1928).—It was previously shown that when racemic ethyl mandelate is hydrolyzed by liver esterase, more *d*-mandelic acid is formed than *l*-mandelic acid. However, when the isomers were acted on separately under like conditions, more of the *l*-mandelic acid was set free in a given time than of the *d*-comp'd. (cf. C. A. 18, 3390). In further investigating the cause of this, it was found at a concn. of sepd. ester of 0.001 N about the same amts. of the 2 isomers were hydrolyzed, at a concn. of 0.0001 N 1.7 times as much of the *d*-acid was formed as the *l*-acid, and at 0.025 N there was 1.6 times more of the *l*-acid set free. The value of $Q = \text{disappearance of } l\text{-ester} \div \text{disappearance of } d\text{-ester}$, is less than 1 at low ester concns. and greater than 1 (max. 1.6) at high concns. of substrate. The affinity of the esterase for the *d*-mandelic acid was 3.2 times that for the *l*-acid. Conversely the *l*-esterase-ester comp'd. decomposes 1.6 times faster than the *d*-comp'd. This explains the contrary results between the racemate and the sepd. esters. Although the *l*-ester is more quickly split than the *d*, in the mixt. the *d*-comp'd. is favored because its affinity for the esterase exceeds that of the antipode in the ratio of 3.2 to 1. The rate of decompn. depends on the H-ion concn. and the amt of enzyme present.

H. J. DEUEL, JR.

The mechanism of oxidation processes. XIII. About oxidases and peroxidases. HEINRICH WIELAND AND HERMAN SUTTER. Bayer. Akad., Munich. *Ber.* 61B, 1060-8(1928); cf. C. A. 22, 1065.—A prepn. was previously isolated from a fungus which caused the autoxidation of hydroquinone to quinone with the concomitant formation of H_2O_2 . This prepn. was thermostable and little sensitive to HCN and appeared to be a mixt. of salts of org. acids (cf. C. A. 20, 2981). In further investigation, an unsuccessful attempt has been made to duplicate the above expts. An oxidase was prep'd. from the juice of the *Lactarius vellereus* (expressed at 200 atm.) by pptn.

in 68% EtOH. From 10 kg. of fungi, 6 l. of juice was obtained, which yielded 20–30 g. of crude enzyme. The enzyme was further purified by dialysis against distd. H_2O . The concn. of oxidase was increased 130 times from the juice to the crude prepn. and 4 times in the purified product. The total concn. was 630. About 33% of the total enzyme of the fungi was isolated, the chief loss being in the first operation. Addn. of H_2O to the press cake followed by a second expression removed a considerable proportion of the enzyme which had been retained. One mg. of purified oxidase caused the complete oxidation of 4 mg. of hydroquinone in 10 min. When a H_2O soln. of enzyme was heated for 3 min. at 100° it was completely destroyed. The activity did not reappear on standing as claimed by Bach and Sharsky (*C. A.* 6, 99). HCN (0.002 *M*) reduced the activity of oxidase 33% and it was completely checked by a 0.01 *M* soln. However, when compared with an oxidase prepd. from potato skins, it was shown to be much less sensitive. The oxidation of hydroquinone proceeds best at a p_H of 4.6 and less at higher or lower H-ion concn. The action is independent of substrate concn. This oxidase is ineffective in catalyzing the oxidation of iodides. The properties of a peroxidase prepd. from horse-radish according to Willstätter (*C. A.* 15, 543) were also studied. It was a brown powder, sol in H_2O with a purpurogallin no. (*C. A.* 13, 454) of 280 (no. of mg. of purpurogallin formed from pyrogallol by 1 mg. of vacuum-dried substance). The normal purpurogallin no. of 280 was reduced as follows by HCN: 0.0000025 *M*, 185; 0.000005 *M*, 130; 0.00001 *M*, 66 and 0.00002 *M*, 37. The effect of HCN was not removed by evacuating and admission of air. The effect of H_2S was more marked. control, 280; 0.00000125 *M*, 160; 0.0000025 *M*, 85; 0.000005 *M*, 45 and 0.00001 *M*, 20. 0.0005 *M* NH_3NH_2 reduced the purpurogallin no. to 150 and 0.001 *M* reduced it to 120. 0.0005 *M* NH_2OH gave a result of 190 and 0.001 one of 120. Neither $(NH_4)_2SO_4$ in 0.002 *M* soln. nor 0.001 *M* alanine-HCl had any retarding effect on the peroxidase. H_3AsO_3 was also inactive. H_2O_2 , O_2 and N had no effect. Satn. with CO only reduced the purpurogallin no. to 270. Aeration (*C. A.* 20, 363) with neutral gases did not affect the peroxidase. Since all the reagents found to be deleterious react with aldehydes, these results support the conception of Woker that the active constituent of peroxidase is an aldehyde group through which H_2O_2 is activated.

H. J. DEUEL, JR.

Effects of ultra-violet light on parathyroidectomized rats. F. T. JUNG, Northwestern Univ. *Endocrinology* 12, 81–3(1928).—Ultra-violet light in daily doses 50 times that used in the unhabituated human subject was beneficial to parathyroidectomized white rats. Unless the expt. is carefully controlled, the beneficial effect obtained is overshadowed by the unfavorable result of handling and of the bright light on an animal in latent tetany. The parathyroids probably have some function secondarily related to Ca metabolism and some way connected with the photochemical function of the skin.

H. J. DEUEL, JR.

Kinetics of the tyrosinase of the potato. HUGO HAEHN AND JEANNOT STERN. *Fermentforschung* 9, 395–402(1928).—The tyrosinase-tyrosine reaction is monomol. when the H-ion concn. and the temp. remain const. and O is present in excess. The const. is independent of the tyrosine concn. but varies with the amt. of enzyme. A formula is derived for the oxidizing power of tyrosinase.

A. W. DOX

A simplified method of phagocytosis investigation in vitro. V. V. PRÁVDICZ-NEMINSKII. *Fermentforschung* 9, 411–20(1928), *Zhurnal expil. biol. Med.* 9, 74–83.—The method is a modification of the Radsma-Hamburger procedure. The blood sample is dild. with 0.9% NaCl soln., rice starch added and the mixt. kept in a thermostat at 37° . At the end of 15 min. the red corpuscles are hemolyzed by addn. of AcOH, the phagocytes stained with Bismarck brown, and a count is made of those that have ingested starch grains. Detns. can be made with 0.02 cc. of blood. The results may vary as much as 20% according to the purity of the NaCl used. No relationship was found between the degree of phagocytosis and the catalase or hemoglobin content of the blood.

A. W. DOX

Phagocytosis of tuberculosis bacteria in vitro after ingestion of fat. V. V. PRÁVDICZ-NEMINSKII WITH K. SHMAIN. *Fermentforschung* 9, 421–9(1928).—By the simplified method of phagocytosis study in vitro (cf. preceding abstr.) the phagocytosis of dead tuberculosis bacteria was observed in a drop of dild. blood. A diet confg. fatty food, e. g., butter, increases the phagocytic power of the blood. This increase varies, however, with different individuals. With an incubation time of 30 min. the % increase varied from 22 to 109. A double portion of fat in the diet increased the lymphocytes so markedly that there appeared to be a decrease in phagocytes, until a corrected count was obtained from which the lymphocytes were excluded. The tuberculosis bacteria when attacked by the leucocytes undergo a lipolysis of their lipid coating and become

less resistant to acid; then they disintegrate into sep. granules, which finally undergo digestion. Also in *Zhurnal expil. biol. Med.* 9, 131-9(1928). A. W. Dox

Comparative studies on the hydrolysis of polypeptides by *N* alkali and by the enzymes of the pancreas. EMIL ABDERHALDEN AND HANS BROCKMANN. *Fermentforschung* 9, 430-8(1928).—A no. of new tripeptides were prepd. by the usual method of coupling a dipeptide with an α -halogenacyl halide and then replacing the α -halogen by NH_2 . *dl*- α -Aminobutyryl-*dl*- α -aminobutyric acid (I) + $\text{ClCH}_2\text{COCl} \rightarrow$ *chloroacetyl-dl*- α -aminobutyryl-*dl*- α -aminobutyric acid, m. 136-7°, \rightarrow *glycyl-dl*- α -aminobutyryl-*dl*- α -aminobutyric acid (II), m. 241-2°. I + $\text{MeCHBrCOBr} \rightarrow$ *dl*- α -bromopropionyl-*dl*- α -aminobutyryl-*dl*- α -aminobutyric acid, m. 157-8°, \rightarrow *dl*-alanyl-*dl*- α -aminobutyryl-*dl*- α -aminobutyric acid (III), m. 254-5° (decompn.). I + $\text{BzCl} \rightarrow$ *benzoyl-dl*- α -aminobutyryl-*dl*- α -aminobutyric acid (IV), m. 189-90°. I + *d*- $\text{Me}_2\text{CHCH}_2\text{CHBrCOBr} \rightarrow$ *d*- α -bromoisocaprolyl-*dl*- α -aminobutyryl-*dl*- α -aminobutyric acid, m. 150-2° (decompn.), $[\alpha]_D^{20} -33.20^\circ$, \rightarrow *d*-leucyl-*dl*- α -aminobutyryl-*dl*- α -aminobutyric acid (V), m. 240° (decompn.). *dl*-Leucyl-*dl*- α -aminoheptylic acid (VI), + $\text{ClCH}_2\text{COCl} \rightarrow$ *chloroacetyl-dl*-leucyl-*dl*- α -aminoheptylic acid, m. 147.5°, \rightarrow *glycyl-dl*-leucyl-*dl*- α -aminoheptylic acid (VII), m. 240° (decompn.). I is stable to *N* alkali at 37°, but the tripeptides II and III split off the glycine and alanine, resp., while V is more resistant. IV hydrolyzes more readily than I, but the Bz group remains attached to the amino acid. VI is not attacked, but from VII part of the glycyl is split off. Pancreas ext. decomp. the dipeptide I, showing that although 2 pairs of isomers are possible, the pair actually present is *dd* and *ll* rather than *dl* and *ld*. Likewise the tripeptides II and III undergo hydrolysis by pancreatic enzymes, but not the Bz deriv. IV.

A. W. Dox

The fermentative breakdown of polypeptides containing *l*-hydroxyproline. EMIL ABDERHALDEN AND WILHELM KÖPPEL. *Fermentforschung* 9, 439-45(1928).—Two dipeptides were prepd. by the usual method. *l*-Hydroxyproline + $\text{ClCH}_2\text{COCl} \rightarrow$ 30% *chloroacetyl-l*-hydroxyproline, m. 160°, \rightarrow *glycyl-l*-hydroxyproline (I), m. 215°, $[\alpha]_D^{20} -50.79^\circ$. *l*-Hydroxyproline + $\text{Me}_2\text{CHCH}_2\text{CHBrCOBr} \rightarrow$ 38.3% *dl*- α -bromoisocaprolyl-*l*-hydroxyproline, m. 155°, \rightarrow *dl*-leucyl-*l*-hydroxyproline (II), m. 234°, $[\alpha]_D^{20} -36.97^\circ$. Neither of these dipeptides is attacked by pepsin or trypsin. Erepsin at p_H 7.8 and 37° hydrolyzes I (56% in 10 days), but not II. *N* NaOH at 37° hydrolyzes I (93% in 3 days) but its effect on II is extremely slow. A. W. Dox

The influence of natural and synthetic thyroxine, also 3,5-diiodotyrosine and thyroid substance on the rate of autolysis and on the action of erepsin and trypsin. EMIL ABDERHALDEN AND KURT FRANKIE. *Fermentforschung* 9, 485-93(1928).—Small amts. of thyroxine added to an aq. suspension of fresh liver pulp and phosphate buffer increase the rate of autolysis as detd. by increase in amino N. If the concn. of thyroxine exceeds 0.1 mg. per 200 cc. mixt the autolysis is retarded. The effect of 3,5-diiodotyrosine and thyroid substance is similar to that of thyroxine. No difference was noted between natural and synthetic thyroxine. Hydrolysis of *dl*-leucylglycine by erepsin and of silk peptone and gelatin by trypsin-kinase was also accelerated or retarded according to the concn. of thyroxine used. In the higher concns. where inhibition was noted a cloudiness developed and it is possible that enzyme was thus adsorbed and removed from contact with the substrate. Possibly the effect of thyroxine in speeding up metabolism may be due to this acceleration of enzyme action. A. W. Dox

The action of erepsin and trypsin on polypeptides containing *d*-glutamic acid. EMIL ABDERHALDEN AND ERNST ROSSNER. *Fermentforschung* 9, 494-500(1928).—*d*- α -Bromoisocaprolylglycyl-*d*-glutamic acid, $[\alpha]_D^{20} 24.6^\circ$, was prepd. in 78% yield from glycyl-*d*-glutamic acid and *d*- $\text{Me}_2\text{CHCH}_2\text{CHBrCOCl}$, and converted into the tripeptide *l*-leucylglycyl-*d*-glutamic acid (I), $[\alpha]_D^{20} 25.4^\circ$, by treatment with NH_4OH . In addn. to this, the dipeptides glycyl-*d*-glutamic acid (II), *dl*-leucyl-*d*-glutamic acid (III) and *l*-leucyl-*d*-glutamic acid (IV) were used as substrates in detg. the action of erepsin and trypsin-kinase. Erepsin hydrolyzes I and II, but not III and IV. Trypsin has practically no action on I, III and IV, but slowly hydrolyzes II. *N* NaOH at 37° hydrolyzes III and IV only very slowly, but I and II more readily. 5 *N* HCl at 37° hydrolyzes I and II. A. W. Dox

The question of the specificity of polypeptidases. EMIL ABDERHALDEN AND ERNST SCHWAB. *Fermentforschung* 9, 501-15(1928); cf. *C. A.* 22, 95.—The action of erepsin and trypsin-kinase was tested on a no. of PhNCO - and $\beta\text{-C}_{10}\text{H}_7\text{SO}_2$ -derivs. of di- and tri-peptides and on several new polypeptides. The *PhNCO*-derivs. of the following di- and tri-peptides were not attacked by erepsin but were all hydrolyzed by trypsin-kinase: *dl*-leucylglycine, *glycyl-dl*- α -aminoheptylic acid, m. 181°, *glycyl-dl*-

α-aminocaproic acid, m. 185°, glycy-l-tyrosine, glycy-l-d-serine, *dl*-leucylglycylglycine, *l*-leucylglycy-l-leucine. β -C₁₀H₁₇SO₂-derivs. of the following dipeptides were not attacked by erepsin: *glycy-l-d-phenylalanine*, decomp. 260°, *glycy-l-tyrosine*, glycy-l-leucine, *dl*-leucylglycine, glycylglycine. Trypsin-kinase hydrolyzed the first 3 of these, the 4th slightly, and the 5th not at all. Both enzymes were inert toward carboethoxyglycylglycine ester. Several new polypeptides were prep'd. and tested with the 2 enzymes. By coupling pyridonyl chloride with *l*-tyrosine ester in CHCl₃ *glutaminy-l-tyrosine* and its anhydride *pyrridonyl-l-tyrosine* were obtained. The dipeptide was partially hydrolyzed by both erepsin and trypsin. The pentapeptides, *dl*-leucyltriglycy-l-tyrosine and *dl*-leucyltriglycy-l-d-serine, decomp. 175°, were prep'd. by coupling *dl*- α -bromoisocapronylglycylglycyl chloride with glycy-l-tyrosine and glycy-l-d-serine, resp., in CHCl₃ and subsequent treatment with NH₄OH. The first of these was hydrolyzed by trypsin-kinase but not by erepsin; the 2nd by erepsin but not by trypsin-kinase.

A. W. Dox

Comparative studies on the enzymic breakdown of polypeptides by erepsin and trypsin-kinase. Polypeptides containing *l*-cystine. EMIL ABDERHALDEN AND WILHELM KÖPPEL. *Fermentforschung* 9, 516-23(1928).—The synthesis of these derivs. up to the nonapeptide (IV) was performed in successive steps by the usual procedure of coupling the amino acid or peptide with a halogenacyl halide and treating the product with NH₄OH. *l*-Cystine + *d*-MeCHBrCOCl \rightarrow 60% *di*(*d*- α -bromopropionyl)-*l*-cystine, m. 145°, $[\alpha]_D^{20}$ -97.55°, \rightarrow 73% *di*(*d*-alanyl)-*l*-cystine (I), decomp. above 200°, $[\alpha]_D^{19}$ -138.5°. I + Me₂CHCHBrCOCl \rightarrow 62% *di*(*d*- α -bromoisovaleryl-*d*-alanyl)-*l*-cystine, m. 155°, $[\alpha]_D^{18}$ -18.6°, \rightarrow 55% *di*(*d*-valyl-*d*-alanyl)-*l*-cystine (II), decomp. above 200°, $[\alpha]_D^{19}$ -102.6. II + *d*-MeCHBrCOCl \rightarrow 54% *di*(*d*- α -bromopropionyl-*d*-valyl-*d*-alanyl)-*l*-cystine, m. 163°, $[\alpha]_D^{20}$ 13.4°, \rightarrow 47.9% *di*(*d*-alanyl-*d*-valyl-*d*-alanyl)-*l*-cystine (III), does not melt, $[\alpha]_D^{20}$ -79.4°. III + *d*-Me₂CHCH₂CHBrCOCl \rightarrow 53.7% *di*(*d*- α -bromoisocapronyl-*d*-alanyl-*d*-valyl-*d*-alanyl)-*l*-cystine, m. 164°, $[\alpha]_D^{19}$ 34.3° \rightarrow 45.7% *di*(*l*-leucyl-*d*-alanyl-*d*-valyl-*d*-alanyl)-*l*-cystine (IV), does not melt, $[\alpha]_D^{18}$ -74.6°. The cleavage of these peptides during a 216-hr. digestion, expressed in % of 1 CONH linkage, by erepsin was I, 95; II, 151; III, 58; IV, 0; by trypsin-kinase it was I, 0; II, 60; III, 174; IV, 112. The tripeptide was thus resistant to trypsin and the nonapeptide to erepsin. The intermediate penta- and heptapeptides were attacked by both enzymes, but the extent of hydrolysis was in the reverse order for the 2 enzymes. None of these was hydrolyzed appreciably by *N* NaOH at 37° in 240 hrs. Di(*l*-leucylglycyl)-*l*-cystine and di(*l*-leucyl-*d*-alanyl)-*l*-cystine were attacked by both enzymes, but especially erepsin, whereas the tripeptide, di(*l*-leucyl)-*l*-cystine, like I, was attacked by erepsin only.

A. W. Dox

The enzymic breakdown of polypeptides of various composition and their behavior toward *N* alkali. Polypeptides containing *l*-leucine exclusively. EMIL ABDERHALDEN AND RICHARD FLEISCHMANN. *Fermentforschung* 9, 524-33(1928).—Polypeptides built up of a single amino acid, e. g., *l*-leucine, are resistant to hydrolysis by alkali. Glycine is the outstanding exception. Not only are the glycine peptides readily hydrolyzed by alkali, but the addn. of a terminal glycy-l group renders an otherwise resistant polypeptide amenable to hydrolysis by alkali. In such cases the glycy-l group breaks off leaving the remaining peptide chain intact. In some cases the PhNCO deriv. undergoes hydrolysis while the parent peptide itself is resistant. *Benzoyl-l-leucyl-l-leucine*, m. 133°, $[\alpha]_D^{20}$ -49.14°, was prep'd. in 70% yield from *l*-leucyl-*l*-leucine and BzCl. *Phenylisocyanate-l-leucyl-l-leucine*, m. 198°, $[\alpha]_D^{20}$ -68.66°, was obtained by addn. of PhNCO to *l*-leucyl-*l*-leucine. A no. of leucine peptides, with and without a terminal glycy-l, were prep'd. in the usual way. *l*-Leucyl-*l*-leucine (I) + ClCH₂-COCl \rightarrow 70% *chloroacetyl-l-leucyl-l-leucine*, m. 180-2°, $[\alpha]_D^{20}$ -51.72°, \rightarrow 60% *glycy-l-leucyl-l-leucine*, m. 232-4° (decompn.), $[\alpha]_D^{20}$ -67.01°. I + *d*-Me₂CHCH₂-CHBrCOCl \rightarrow 80% *d*- α -bromoisocapronyl-*l*-leucyl-*l*-leucine, m. 212°, $[\alpha]_D^{20}$ -38.04°, \rightarrow *di*(*l*-leucyl)-*l*-leucine (II), $[\alpha]_D^{19}$ -51.36°. II + ClCH₂COCl \rightarrow *chloroacetyl-di*(*l*-leucyl)-*l*-leucine, m. 193° (decompn.), $[\alpha]_D^{20}$ -76.19°, \rightarrow 60% *glycyldi*(*l*-leucyl)-*l*-leucine, $[\alpha]_D^{20}$ -78.63°. II + *d*-Me₂CHCH₂CHBrCOCl \rightarrow 70% *d*- α -bromoisocapronyl-*di*(*l*-leucyl)-*l*-leucine, m. 224°, $[\alpha]_D^{20}$ -70.55°, \rightarrow 60% *tri*(*l*-leucyl)-*l*-leucine (III), $[\alpha]_D^{20}$ -89.95°. III + ClCH₂COCl \rightarrow 50% *chloroacetyltri*(*l*-leucyl)-*l*-leucine, $[\alpha]_D^{20}$ -83.89°, \rightarrow 60% *glycytri*(*l*-leucyl)-*l*-leucine, $[\alpha]_D^{20}$ -118.1°. III + *d*-Me₂CHCH₂CHBrCOCl

→ 50% *d*- α -bromoisocapronyltri(*l*-leucyl)*l*-leucine, $[\alpha]_D^{20}$ -95.56°, → 60% tetra-(*l*-leucyl)*l*-leucine. A. W. DOX

The action of various amino acids on yeast peptidase. A. FODOR and REINHOLD COHN. *Z. physiol. Chem.* 176, 17-28(1928).—The conversion of yeast peptidase from its zymostable to its zymolabile form by transfer of the zymohaptic group to a secondary carrier is extended to include a no. of amino acids as secondary carriers. The zymolabile enzyme is characterized by its greater activity. The increased hydrolysis of silk peptone after addn of the amino acid is therefore taken as evidence that the amino acid has functioned as a secondary carrier. The expts. include glycine, *d*-alanine, *dl*-leucine, *d*-leucine, *l*-leucine, *l*-tyrosine, *l*-cystine, *d*-arginine, *l*-histidine, *d*-lysine and *d*-glutamic acid. All of these amino acids, with the exception of tyrosine, exerted approx. equal activation, when compared on the basis of equimol. concn. The activation cannot be due to a single group such as NH_2 or COOH . It is probable that a much larger grouping, e. g., $-\text{CH}(\text{NH}_2)\text{COOH}$, is concerned. The activation of yeast maceration by aging is based on the same principle, i. e., the amino acids liberated in the autolysis function as secondary carriers. This view is further supported by the fact that the activation of yeast maceration by addn. of leucine diminishes in proportion to the extent of aging. A surprising observation is that *d*- and *l*-leucine have practically the same effect. Considering the strict specificity of the enzyme toward peptides contg. the naturally occurring *l*-leucine it would appear that the activation process of elution consists merely in dislodging the zymohaptic group by means of a non-sp. substance, the active portion of which represents a comparatively simple grouping. A. W. DOX

Lactic dehydrogenase. A cell-free enzyme preparation obtained from bacteria. MARJORY STEPHENSON. Univ. Cambridge. *Biochem. J.* 22, 605-14(1928).—By autolyzing washed bacterial suspensions (*B. coli*) in phosphate buffer pH 7.6 a dehydrogenase is extd. In the presence of methylene blue the enzyme dehydrogenates lactate, and, more slowly, α -hydroxybutyrate. The enzyme is unaffected by cyanide. BENJAMIN HARROW

Medical laboratory in a children's hospital. M. G. PETERMAN. *Arch. Pediatrics* 45, 226-32(1928).—A paper of biochem. interest. JOSEPH S. HEPBURN

Address read before the 1st meeting of the Dutch Biochemical Society, Feb. 4, 1928. B. SJOLLEMA. *Chem. Weekblad* 25, 146-52(1928).—Brief summary of modern biochem. research, with special reference to physiol. micromethods, the constitution of proteins and Van Slyke's work on the distribution of electrolytes. M. J.

Glucolysis in blood samples. A. R. ROSE and F. SCHATNER. *Am. J. Physiol.* 84, 103-9(1928).—Certain halogenated hydrocarbons, particularly PhCl and PhBr , inhibited glucolysis in blood samples, but did not entirely prevent it. NaF and thymol did not check the decrease in glucose in sheep blood but did inhibit glucolysis in human blood almost as well as did PhCl . J. F. LYMAN

Cataphoresis of blood corpuscles of certain vertebrates and invertebrates. O. M. BERNARDI. *Arch. sci. biol.* 8, 1-16(1926).—Cataphoresis expts. were made on the red blood corpuscles of certain animals by the Michaelis technic. The corpuscles of mammals and batrachia in isotonic solns. of electrolytes and nonelectrolytes (sugars) showed a gradual but const. movement toward the anode. Only rabbit corpuscles remained stationary in isotonic solns. of MgCl_2 , MgSO_4 , CaCl_2 and CaSO_4 . The corpuscles migrated faster in hypertonic solns. than in isotonic solns. of NaCl and sucrose. The current facilitated sedimentation and morphological alterations. The velocity of migration was as follows: pig > man > guinea pig > sheep > cat > bull > frog > toad > rabbit. The velocity of migration of several species of invertebrates was: *Thysanozoon brockii* > *Sipunculus nudus* > *Strongylocentrotus lividus* > *Phallusia*. The velocity of migration of vertebrates and invertebrates within certain limits varied according to the nature of the menstruum. PETER MASUCCI

The application of the Donnan effect to nucleic acid compounds. EINAR HAMMARSTEN. *Acta Med. Scand.* 68, 189-98(1928).—Expts. show that nucleic acid owing to its relatively strong acidity and the non-diffusibility of its anion can produce considerable variations in H-ion concn. in the cell nucleus under the alternating influence of CO_2 and of neutral salts. S. MORGULIS

Studies on microchemical reactions. I. Compounds of protein nucleic acid compounds with dyestuffs. EINAR HAMMARSTEN, GRETA HAMMARSTEN and TORSTEN TSORELL. *Acta Med. Scand.* 68, 219-26(1928).—Nucleic acid is stained by basic dyestuffs at pH 2-10. The compd. resulting was insol. only in an acid medium except for that with malachite green, which is also insol. in alkali. Acid dyes gave only a

surface coloration. Proteins were stained by acid and basic dyes in an acid or basic medium, resp. The compds. formed are sparingly sol., but lose color continuously on washing. Protein nucleic acid mixts. stain like protein. Even minute amts. of protein prevent the staining of nucleic acid in acid media. In cell cultures the cells are stained by acid dyes in a strongly acid medium, while the nuclei were not stained by basic dyes either in an acid or neutral medium. II. Precipitation of protein nucleic acid with lanthanum and sulfosalicylic acid ions. EINAR HAMMARSTEN AND TORSTEN TEORELL. *Ibid* 226-38.—Proteins are pptd. by sulfosalicylic acid and nucleic acid by $\text{La}(\text{NO}_3)_3$. However, protein-nucleic acid mixts are pptd. by both reagents. With buffered solns. of these 2 reagents it could be shown that the red blood cells of lizards in a certain functional condition, presumably that of division, possess nuclei which are free or at any rate poor in protein, whereas the nuclei actually in the process of division are rich in protein. S. MORGULIS

The acidity of taurine. BERTIL JOSEPHSON. *Acta Med. Scand.* 68, 284-6(1928).—Solns. of pure taurine of 5×10^{-2} M concn. were prepd. in NaOH of various concns. (5×10^{-3} - 20×10^{-3} N) dissolved in KCl (0.02-0.10 M). The H-ion concn. of these solns. was detd. at 18° against a 0.1 N calomel electrode. The dissociation const. was detd. from the formula $K = \text{HC}_1^-/\text{C}_1$, where C_1^- and C_1 are the concns. of dissociated and undissociated taurine. The value of $K = 5.77 \times 10^{-10}$. This acid dissocn. const. is about $1/3$ that found by previous investigators. S. MORGULIS

The permeability of artificial collodion membranes. I. The effect of acid-base swelling on the permeability of gelatin and agar membranes. K. J. ANSELMINO. *Biochem. Z.* 192, 390-425(1928).—Gelatin membranes can be made permeable for glucose, or for capillary inactive nonelectrolytes in general, by increasing the swelling of the membrane colloid by changes in H-ion concn. The min. permeability is at the isoelec. point of the gelatin. The curve of swelling and permeability runs the same course. It is concluded that the H_2O in the swollen gelatin is in such combination that it no longer can serve as a diffusion medium. In studies of the diffusion of dyestuffs through the gelatin membrane, the mutual relationships of the elec. charges of both membrane and dye acquire a predominating influence. On the contrary, in the case of agar membranes it is possible to eliminate capillary elec. forces and to study the influence of H and OH ions on the dispersion of the membrane colloid and the diffusion of various org. substances. S. MORGULIS

Note on the reduction of hemin by cysteine. WERNER CREMER. *Biochem. Z.* 192, 426-7(1928).—If cysteine and hemin are mixed in a CO atm. the reduction of the latter can be demonstrated. A mol. CO is absorbed per mol. hemin. S. M.

Studies on diastase. IV. The content of extractable and non-extractable α -diastase in various kinds of grain. VIKTOR SYNIEWSKI. *Biochem. Z.* 192, 457-62(1928).—The larger the size of the grain the greater is the α -diastase content. S. M.

The transformation of α -diastase into β -diastase. F. POLAK AND A. TYCHOWSKI. *Biochem. Z.* 192, 463-78(1928).—The optimum activity for α -diastase is $p_{\text{H}} = 5.1$ and for β -diastase 4.3. A normal barley ext. has a $p_{\text{H}} = 6.30$. By changing the p_{H} to 4.30 there is an increase (17 times) in the rate of disappearance of the I_2 reaction of amylopectin and of dextrin I, which is ascribed to β -diastase. Barley which has been leached out with a papayotin soln. yields exts. which at the optimum p_{H} has twice the amt. of β -diastase. It is assumed that the α -diastase changes to β -diastase through an alteration in H-ion concn. S. MORGULIS

Studies on lipase. I. The optimum activity of stomach lipase. KENSUKE GYOROKU. *Biochem. Z.* 193, 18-26(1928).—The optimum activity of stomach lipase from rabbits and man is at about $p_{\text{H}} = 6.0$. Following purification the optimum is at $p_{\text{H}} 7.6-7.8$. The optimum for pig-stomach lipase is generally on the alk. side, and rarely at neutrality or even on the acid side, but here also the optimum p_{H} shifts after purification. In pig-stomach lipase preserved dry the p_{H} of the optimum activity approaches 6.0-6.5, but this shifting of the optimum p_{H} is not found in human, dog or rabbit stomach lipase thus kept. If the lipase is kept several days as a soln. the optimum shifts to the alk. side, this shift being favored by an alk. reaction, while an acid reaction or a low temp. slows this up considerably. It is supposed that stomach lipase is accompanied by other substances which activate the enzyme in acid and inhibit its action in alk. media. II. Organ lipases and their resistance to acids and alkalies. *Ibid* 27-38.—Stomach lipase is more resistant to acids than to alkalies, a phenomenon which is more pronounced in human and dog than pig and rabbit preps. This behavior does not depend upon the fact that it is found in an acid medium of the stomach since the same holds true for the pig lipase with an optimum activity on

the alc. side and in a stomach with a const. alk. reaction. Pancreas and liver lipase, though much more resistant towards alkali, are still more sensitive than stomach lipase, which thus has a greater stability than other organ lipases. Purified gastric lipase loses its greater resistance towards acids and is not different from the enzyme prep'd. from the pancreas. Strong acids and alkalies exert a more potent effect on the lipase than the weak acids and alkalies, the lipase being protected by the presence of substances capable of combining with the acid or base (protein, peptone). III. The effect of quinine on the organ lipase. *Ibid* 39-52.—Pancreas lipase is sensitive to quinine, while liver lipase has a variable response. The stomach lipase from various pigs behaves in the same manner towards quinine, the observed differences being only quant. The refractory lipases become also sensitive to quinine when they have been purified, their activity being inhibited. There is no difference then between the pancreas and stomach enzymes, so that the difference in behavior must be attributed to admixtures. Organ lipase preps. which have been preserved for months in the dry state are very much less sensitive than fresh preps. and pig pancreas lipase is then even activated by the addn. of quinine. Upon purification this property is again lost. The activating action increases in the arithmetic ratio when the quinine concn. increases in a geometric ratio, in other words, in accordance with the adsorption isotherm. The effect is the composite of the action of the quinine on the lipase itself and on the admixtures. The organ lipases of man and dog are much more susceptible to the action of quinine than those of the rabbit, pig, cat, guinea pig, etc. However, it is not possible to differentiate organ lipases according to their sensitivity against quinine. S. M.

Spectrophotometric studies of the two components of trypan blue. N. OKUNEV. *Biochem. Z.* 193, 70-84(1928).—Aq. solns. of trypan blue have a definite light absorption const. (max. = 0.911) and an absorption max. at 580-590 μ . Although this const. does not vary within the limits of diln. 1:5000 to 1:100,000, it is quite different in different commercial preps. When strips of filter paper are placed in dil. solns. of trypan blue, the paper becomes blue, while the soln. gradually turns red. Spectrophotometric studies show a diminution of the absorption const. and a shifting to the left of the absorption max. Similar effects, of course, are observed in the filter paper strip, and a study of the kinetics indicates that these changes bear a relationship to time which resembles very much an adsorption process. The paper also adsorbs the red component of the dye but only in very slight aints. On the addn. of gelatin to a dil. soln. of trypan blue the adsorption const. increases, the max. shifting to the right, and the soln. becomes more blue. Similar results are obtained with albumin, plasma colloids or other colloids, and are explained on the basis of selective adsorption. The different behavior, therefore, of the 2 components of trypan blue in the organism cannot be attributed to differences in diffusibility but to differences in adsorption by the proteins. S. MORGULIS

Purification of the lactic acid-forming enzyme. KARL MEYER. *Biochem. Z.* 193, 139-60(1928); cf. *C. A.* 21, 2281.—The purification of the lactic acid-forming enzyme of muscle is carried out by (1) repeated pptn. at p_H 5 with acetate soln. and subsequent leaching out with dil. phosphate of p_H 7.5-8.0; or (2) by adsorption with $Al(OH)_3$ and subsequent leaching with phosphate. The first method gives good but not easily reproducible results while the second method gives very uniform results. Solns. are thus obtained with 20 times the activity of the original ext. This, however, takes out only the heat-sensitive part; so that the thermolabile co-enzyme must always be added. The purified enzyme is more stable than the muscle ext., and loses $1/2$ of its activity in 24-48 hrs.; it is very much less affected by NaF showing that this must act indirectly by affecting the protein impurities. The effect of arsenate is the same in both pure enzyme and in muscle ext. S. MORGULIS

Behavior of proteins towards alkali and some deductions from this as to their constitution. J. TILMANS AND P. HIRSCH. *Biochem. Z.* 193, 216-36(1928).—The acid and basic characteristic of proteins and their derivs. is a property easily defined quant. and finds expression in the typical I-curves. Both egg albumin and gliadin possess small I-curves in the unaltered condition, and especially the gliadin has a very slight binding capacity for acid or alkali, giving very large equiv. wts. for the acid or basic action. This indicates that the mol. must be large, or very long in case it is a peptide chain. The I-curves are greatly modified through the action of NaOH on the proteins, especially the egg albumin, where the I-value increases very rapidly. This is not due to adsorption of unaltered protein and its liberation during the subsequent titration. Under the influence of NaOH new acid or basic groups must originate from the protein, probably from the peptide linkage. However, since it is known that peptides are acted upon by NaOH with difficulty it is suggested that the free

COOH and NH_2 groups must come from a diketopiperazine ring, which is easily and quickly split open by alkali.

The distribution of the respiratory enzyme between carbon monoxide and oxygen. OTTO WARBURG AND ERWIN NEGELEIN. *Biochem. Z.* 193, 334-8(1928).—If E-O_2 and E-CO are the combinations of enzyme with O_2 and CO , A_0 is the respiration in air and A the respiration in a CO-O_2 mixt., then $A_0/A = n$, and $\text{E-O}_2/\text{E-CO} = n/(1 - n)$.

S. MORGULIS

The effect of wave length on the distribution of the respiration enzyme. Absorption spectrum of the respiration enzyme. OTTO WARBURG AND ERWIN NEGELEIN. *Biochem. Z.* 193, 339-46(1928).—The distribution of the respiration enzyme of yeast kept in a CO-O_2 mixt. between CO and O_2 is greatly affected by radiation. S. M.

The effect of carbon monoxide and light on hemin catalysis. H. A. KREBS. *Biochem. Z.* 193, 347-9(1928).—Hemin catalysis, *i. e.*, the transfer of O_2 to cysteine with the aid of hemin, behaves similarly to the respiration of living substance towards CO and light.

S. MORGULIS

Biological effects of the Wiesbaden hot-spring waters. III. Studies on the biological significance of the heavy-metal catalysis. KARL HARPUDER. *Biochem. Z.* 193, 372-9(1928); cf. *C. A.* 21, 2280.—Dialysis of serum against Wiesbaden spring water results in increased peroxidase and oxidase action while the catalase activity and the methylene blue reaction are inhibited. The dialysis also causes a demonstrable increase in Fe content of the serum. Treatment with the Wiesbaden water, which is a salt soln. contg. catalytically active heavy-metal salts, does not induce the oxidation of amino acids or of carbohydrate cleavage products in serum, red cell stroma or in inactive C . IV. The influence of ferrous and manganous ions on enzymes. *Ibid* 380-3.— Fe^{++} and Mn^{++} ions in concns. ranging from 1×10^{-3} to $0.5 \times 10^{-3} M$ have a definite effect on enzymes. Salivary diastase and pepsin are inhibited by the larger concns. and stimulated by the lower concns. Trypsin showed only a slight inhibition through high Fe concns.

S. MORGULIS

Surface tension of aqueous solutions of salts with large molecular weight. G. ETTISCH AND R. KOGANEL. *Biochem. Z.* 193, 390-2(1928).—Na glycocholate and taurocholate surface tension curve at different concns. shows a very distinct min. Na oleate under similar conditions shows no min. in the surface-tension curve.

S. MORGULIS

The biology of uranium. JULIUS STOKLASA, JOS. PÉNKA, FILZ, ZDOBNICKÝ, SEBOR, ŠTRUPL AND ŠTRÁDAL. *Biochem. Z.* 194, 15-76(1928).—Minute amts. of U in the form of $\text{UO}_2(\text{NO}_3)_2$ stimulate the assimilation of elementary N and formation of new protoplasmic substance in N -fixing bacteria. This occurs very strikingly in the presence of O_2 . The NH_3 production is not influenced by the UO_2 ions. Starting with a U quantity of 0.000003125 g. atom per l. of nutritive soln., the toxicity rises with increasing amts., and in a concn. of 0.0005 g.-atom U per l. collagen is no longer decomposed. Denitrification is not affected by the UO_2 ion. Within the limits of concn. indicated above UO_2 stimulates the process of germination of seeds and development of the embryo. Larger concns., however, depress the process, producing a toxic effect upon the protoplasm, especially marked in the root system. The photosynthetic CO_2 assimilation is improved. In the presence of KHCO_3 increased photosynthetic CO_2 assimilation does not occur in the presence of UO_2 ions, which is attributed to an antagonism between the radioactivity of U , Ra and K , since the same was found to hold for radioactive waters. Plants grown in the presence of the radioactive U transpire much larger quantities of H_2O than otherwise. This increased transpiration together with the improved absorption of individual ions from the nutritive medium results in greater growth. The medium contg. 0.0014-0.0042 g. $\text{UO}_2(\text{NO}_3)_2$ turns slightly alk. owing to the increased absorption of the anions. The interesting point is that whereas these concns. stimulate growth in the light, they produce an injurious effect in the dark, where also death is caused sooner than in light. It follows therefore that small U concns. stimulate growth only in the light. A further interesting observation is that plants showing the greatest increase in mass also assimilate the largest amt. of H_2PO_4 . Contrariwise, where the growth had been depressed there was a diminution in the P content while the assimilation of Si ions and other anions (Cl , SO_4) has increased. Soil fertilization with $\text{UO}_2(\text{NO}_3)_2$ leads to luxurious plant growth. The expts. show further that the β and γ radiations (also pure γ -rays) have a depressing action on the germination and development of the plant; they stimulate photosynthesis and growth (γ -rays in large doses depress the vital activity of the protoplasm). In plants grown in the shade radiation with 15 g. $\text{UO}_2(\text{NO}_3)_2$ has an injurious effect, this effect being somewhat offset if the plants are also exposed to ultra-

violet radiation. The β and γ radiations have their beneficial influence only in the presence of intense sunlight. $\text{UO}_2(\text{NO}_3)_2$ in glass tubes inserted inside the plant (about 71.1 g. U per 100 g. dry substance) causes complete destruction of the living plant. The β rays of U penetrate the cell wall and permeate the cytoplasm and karyoplasm and stimulate in small doses the reduction and photosynthetic processes in the chlorophyll portions. The γ -rays act very much in the same way. The α -rays stimulate the oxidation processes in the cells. The result is that U radiation causes a more intense oxidation and reduction to take place in the chemistry of metabolism. A fact of great importance is that the addn. of relatively small amts. of U (2-10 kg. per hectare, depending upon the individual plant) gives to the cultivated plants greater resistance against parasites.

S. MORGULIS

Studies in the colloid chemistry of hemoglobins. I. BR. JIRGENSONS. *Biochem. Z.* 194, 140-50(1928).—In the presence of org. substances the visible spectrum of hemoglobin instead of the usual 3 bands (525-550; 575-585; and 629-639 μ) shows only 2 bands at 520-550 μ and 560-580 μ . Capillary inactive org. substances produce the effect more slowly than active substances and only at higher temp. salts (KCl or MgCl_2) have no effect on the absorption bands of hemoglobin.

S. MORGULIS

The carbon monoxide combination with ferrocysteine and its decomposition by light. WERNER CREMER. *Biochem. Z.* 194, 231-2(1928).—The compd. formed when cysteine and FeSO_4 are mixed reacts with CO , 2 mols. of the latter being combined with 1 mol. Fe. Like the hemin- CO , this compd. is broken up by light. The orange yellow ferrocysteine- CO compd. differs from the CO combination with the respiration enzyme or with hemin by its absorption spectrum.

S. MORGULIS

Studies on the catalytic decomposition of hydrogen peroxide by blood. I. The chemical dynamics of blood catalase. KADZUE NOSAKA. *J. Biochem. (Japan)* 8, 275-99(1928).—The catalytic decompn. of H_2O_2 in concns. of 0.009-0.036 N by blood solns. was studied. The kinetics of the reaction does not follow the monomol. equation but corresponds closely to Yamazaki's formulation, $-dc/dt = kEC$, and $-dE/dt = k'EC$, from which $k = (\Delta \ln C / \Delta t)_t = 0$ can be calcd. (E = concn. of catalase; C = concn. of H_2O_2). With variable enzyme quantities there is no strict proportionality in the k values, which increase somewhat more than E . This discrepancy can be corrected thus, $k_1/k_2 = (E_1/E_2)^m$, the value of the exponent m remaining const. (1.07) under different temps. Blood serum has no catalytic action but it does exert a protective effect on the blood catalase against the H_2O_2 . The H-ion concn. plays a considerable role in the reaction but the optimum concn. for blood catalase is about $p_H = 7.0$ with a distinctly wide range. The H-ion concn. has practically no influence on the destruction of catalase by the H_2O_2 . **II. The effect of temperature on blood catalase.** *Ibid* 301-9.—It is impossible to study the effect of temp. on blood catalase without due consideration of the very potent influence of temp. on the simultaneous destruction of catalase by H_2O_2 . The temp. curve of blood catalase has a very wide optimum range in the neighborhood of 40° , and for the temp. range between 0° and 20° the temp. coeff. is 1.49 per 10° and the temp. const. $A = 6430$. On the contrary, the temp. curve of the destruction of catalase by H_2O_2 is very steep and has no optimum. For the range between 0° and 35° the temp. coeff. is 2.22 per 10° and $A = 14600$. The velocity of heat inactivation at $p_H 7.0$ was studied at 40° , 50° , 60° , 65° and 70° , but this does not follow the monomol. reaction.—Blood catalase is completely inactivated by heating 30 min. at 65° or 15 min. at 70° . **III. The catalytic activity of the red cells.** *Ibid* 311-30.—A suspension of red blood cells in physiol. NaCl soln. decomposes H_2O_2 , but the process is quite different from that effected by a blood catalase soln. (laked blood). The blood cell catalase in dil. H_2O_2 solns. (0.0057-0.0228 N) follows exactly the mass-action law, $-dC_{\text{H}_2\text{O}_2}/dt = kC_{\text{H}_2\text{O}_2}C_{\text{cells}}$. Both the serum and plasma have a distinctly stimulating influence on the red-blood cell catalysis. The reaction in all concns. of NaCl soln. is monomol. so long as there is no hemolysis. In the presence of hemolysis, however, the reaction proceeds much more rapidly and is no longer monomol. The red-cell reaction is regarded as a special case of H_2O_2 catalysis without the intervention of catalase. **IV. The so-called heat-activation and the influence of some organic substances on the red-blood cell catalysis.** *Ibid* 331-40.—Heating the red-cell suspension to 45° increases considerably its catalytic effect on H_2O_2 , which is due to the resulting hemolysis. Likewise, the activation by various protoplasmic poisons (ether, chloroform, toluene) is similarly occasional.

S. MORGULIS

Application of the ultramicroscopic method to the study of changes in dispersion of protein solutions under the influence of electrolytes. V. N. SHREDER. *Zhurnal expil. biol. Med.* 8, 301-13(1928).—A systematic study of a series of anions and cations

of physiologically important salts by means of the ultramicroscope shows that these shift the reaction where the max. number of ultramicroscopic particles appears (iso-electric point) either to the acid or to the alk. side.

S. MORGULIS
Peroxidase properties of leucocytes. K. NICOLAJEV. *Zhurnal expl. biol. Med.* 8, 33-41(1928).—Leucocytic exts. have peroxidase properties which disappear on boiling. The intensity of the oxidation process has no relation to the Fe content.

S. MORGULIS
The role of the iodine component of the thyroxine molecule. B. ZAVADOVSKII, N. RASPOPOVA, T. ROLITCH AND E. UMANOVA-ZAVADOVSKII. *Zhurnal expl. biol. Med.* 8, 600-11(1928).—Implantation of I_2 surrounded by moist cotton has been found the most reliable and certain method for inducing metamorphosis in axolotls. By this method relatively large amts. of I_2 can be introduced without causing damage to surrounding tissues. Placing axolotls in a soln. of I (0.00001) calls forth peculiar shivering. The min. quantity of cryst. I_2 necessary to produce metamorphosis in axolotls weighing 8-15 g. is 0.5 mg. so that this is about 80 times as potent as thyroxine, of which 0.003-0.010 mg. was found necessary. Obviously the I_2 must first form an org. complex before it becomes effective in producing metamorphosis, this synthesis apparently being the function of the thyroid gland. Expts. by the implantation procedure with diiodothyroxine show that this cannot replace thyroxine, and that the cryst. I_2 is a very much more effective agent than the diiodothyroxine, making it doubtful if the latter is really an intermediate step in the synthesis of thyroxine.

S. M.
Digestibility of racemized casein and egg albumin. KUO-HAO LIN, HSIEN WU AND TUNG-TOU CHEN. *Chinese J. Physiol.* 2, 131-8(1928).—Like denatured protein racemized egg albumin is sol. in dil. acids and alkalies but is precipitable by bringing the reaction of the soln. to its isoelec. point, which is about p_H 4.45. Racemized protein may be considered as a kind of denatured protein. Contrary to the findings of Dakin and Dudley and of Dakin, racemized casein and egg albumin are digestible by pepsin and trypsin and racemized egg albumin is susceptible to putrefaction. It is therefore concluded that loss of digestibility of a protein does not follow its racemization. The loss of the antigenic power of racemized egg albumin is due probably not to racemization but rather to the same changes which decrease the antigenicity of alkali-denatured albumin.

L. W. RIGGS
Ultra-violet radiation from sunlight and incandescent lamps—its transmission through window glass and substitutes. H. N. BUNDESEN, H. B. LEMON, I. S. FALK AND E. N. COADE. *J. Am. Med. Assoc.* 89, 187-9(1928); *Expt. Sta. Record* 57, 792-3.—The variations in the limits of the solar spectrum during the year were detd. by means of calibrated photographs. Comparatively little ultra-violet of known physiol. value is in the sunlight of Chicago during the winter months. Incandescent 300 w. lamps with ordinary glass bulbs emitted radiations comparable to sunlight in the winter months, and Vitaglass bulbs emitted radiations as far as the region of 2800 to 2900 A. U. Sunlight spectra through Vitaglass and through a sample of M. G. Co. glass were practically the same, both glasses transmitting the sunlight available at the time to 3000 A. U.

L. W. RIGGS
The sulfonated proteins. I. The action of the proteolytic enzymes on the sulfonated proteins. AKISUKU MATSUMOTO. *Acta Schol. Med. Univ. Imp. Kioto* 10, 219-27(1928).—M. examd. the digestive power of pepsin, pancreatin and erepsin on β -naphthalenesulfocasein, using the liberation of amino N as a quant. measure of the process. The β -naphthalenesulfocasein was found to be more resistant toward these enzymes than casein. Pepsin had no effect at all. Pancreatin split it to a considerable extent, but less than when acting on casein. Erepsin alone was without effect; it was ineffective also, when applied after the β -naphthalenesulfocasein had been treated with pepsin. A previous digestion of β -naphthalenesulfocasein with pancreatin caused the erepsin to split the sulfocasein to a certain degree; yet its activity was smaller than when acting on casein. II. The effect of erepsin on the sulfonated polypeptides. *Ibid* 229-33.—For the expts., β -naphthalenesulfoglycylglycine (I) and β -naphthalenesulfodiglycylglycine (II) were prepd. I (from glycylglycine and β -naphthalenesulfonyl chloride), m. 178-80°, is not attacked by erepsin, while II (from diglycylglycine and β -naphthalenesulfonyl chloride), m. 233-5°, is slightly hydrolyzed by it.

G. SCHWOCH
Manna. E. M. HOLMES. *Chemist and Druggist* 107, 429(1927).—Tamarisk manna (cf. C. A. 18, 2724), recently again observed in Palestine, is probably not the manna of Scripture. A substance described by A. J. Swann, of African origin (between Tanganyika and Nyassa lakes), more nearly agrees with it. It resembles coriander seed, is white, sweet, melts in the sun, and when kept overnight is full of worms in

the morning. "Baking" it will cause the material to keep better. It is evidently a fungus probably as yet unknown and cultivated by ants. S. WALDBOTT

Properties of the bactericidal substance in milk. F. S. JONES. *J. Exptl. Med.* **47**, 877-88(1928); cf. *C. A.* **21**, 1136.—The bactericidal substance is present in the colostrum and milk of the first few days of lactation as well as later. Its concn. varies in the secretion from various quarters of the same cow. Its activity is diminished by heat and cannot be restored again by the addn. of active milk. The principle is present in whey and readily passes through the coarsest Berkefeld filter although a considerable portion is retained by N candles. The finest filter (W) completely retains it. It is adsorbed by animal charcoal but not by kaolin, kieselguhr or bolus alba. It can be desiccated and its presence has been demonstrated in one brand of dried milk. C. J. WEST

The geochemistry of iodine and its importance as a biogenous element (LUNDE) 8.

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Human Biology (New Journal). RAYMOND PEARL, editor. Vol. I, No. 1 will appear Jan. 1929. Published quarterly by Charles C. Thomas, Springfield, Ill.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Manometric method for determination of lactic acid. J. P. BAUMBERGER AND JOHN FIELD, II. *Proc. Soc. Exptl. Biol. Med.* **25**, 87-9(1927).—A method for detn. of lactic acid is described which gives very good agreement of detns. of lactic acid in a total quantity of less than 1 mg. C. V. B.

Determination of blood p_H without transferring the sample. L. MCQUARRIE. *Proc. Soc. Exptl. Biol. Med.* **25**, 134-6(1927).—An app. and the procedure are described which permit detn. of p_H of blood without transferring the blood sample and without using mineral oil. C. V. B.

New method for the identification of blood in the insoluble state. FRANCESCO PISANI. *Arch. farmacol. sper.* **44**, 260-4(1928).—The blood stains are extd. with 50% KOH and the soln. is treated with a satd. soln. of $(NH_4)_2SO_4$ and shaken with a few drops of pyridine. By this treatment the hemoglobin is broken up into globin and hematin, the globin salted out and the hematin extd. by the pyridine. With actual blood stains the pyridine layer thus obtained has a red color which may be identified spectroscopically, or the solvent may be evapd. and the residue treated with AcOH and a trace of NaCl for the prepn. of characteristic hematin crystals. A. W. DOX

Method of determining trypsin in pancreatic juice. BORIS GOLDSTEIN. *Fermentforschung* **9**, 322-8(1928).—The method is based on a measurement of the time interval between the beginning of proteolysis and the first evidence of free tryptophan. The reagents required are (1) a 5% casein soln. prepd. by dissolving 2.5 g. casein in 16 cc.

0.1 N NaOH and 20 cc. H_2O and dilg. to 50 cc., (2) 3% AcOH, (3) 0.5% Br soln., (4) a buffer soln. prepd. by adding 9 cc. $N/3 Na_2HPO_4$ to 1 cc. $N/3 NaH_2PO_4$ ($pH = 7.73$). To 15 cc. of the casein soln. add 2 cc. of the phosphate buffer and a definite vol. of the soln. to be tested for trypsin. Mix thoroughly and place 1.5 cc. portions in each of 10–11 test tubes of colorless glass. Place the tubes in a thermostat and every 5 min. remove one tube for the tryptophan test. To perform this test add 10 drops of the 3% AcOH which gives a white ppt. of casein, and 1 drop of the 0.5% Br water. The first tube to give a rose-violet color represents the end point. The color may be brought out more distinctly by centrifuging 0.5 min. The time interval between the addn. of enzyme soln. and the first appearance of the tryptophan reaction is inversely proportional to the trypsin content. The tryptic unit is arbitrarily taken as the amt. of trypsin required to give an incipient tryptophan reaction with 15 cc. of 5% casein and 2 cc. of phosphate buffer in 100 min. Instead of detg. the time interval as above, the series may be made up with enzyme soln. in progressive dilns. and all incubated the same length of time. The lowest concn. giving a positive tryptophan reaction would then be taken as the end point.

A. W. DOX

Processes in the sulphydryl titration with starch iodide and sodium nitroprusside. R. BIERICH AND K. KALLE. *Z. physiol. Chem.* 175, 115–34(1928).—Both the starch iodide and the Na nitroprusside spot method for detn. of SH entail certain errors requiring correction. The latter method is the more accurate when the appropriate diln. factor is applied. With either method the SH values of tissue exts. tend to be high in proportion to the diln. with H_2O . Acids do not alter the diln. factor appreciably. The I consumption of a tissue ext. increases with increase in the temp. at which the titration is performed. After fixation of the tissue by CCl_3CO_2H the I consumption decreases on exposure of the tissue to air, due to oxidation of the SH group. On the other hand, the I consumption of a tissue ext. increases with exposure of the fresh tissue to air, due probably to a splitting off of cysteine from the SH complex.

A. W. DOX

The determination of minute quantities of metals in biological material. I. The determination of lead in urine. H. B. TAYLOR. *J. Proc. Roy. Soc. N. S. Wales* (reprint) 61, 315–36(1928).—The lead in this method is sepd. from the urine sample by means of adsorption on CaC_2O_4 . The lead is then brought into soln. by HCl and the soln. made faintly acid to methyl red. The detn. is made by comparing the opalescence produced on the addn. of 1 cc. of a freshly prepd. 10% $NaHSO_4$ soln. to 5 cc. of the Pb-HCl soln., with that of standards contg. known amounts of Pb. The method is suitable for detecting as little as 1 part of Pb in 50 millions of urine. Samples which were acid to methyl red contained on the av. slightly more Pb than neutral or alk. ones.

RUSSELL C. ERB

Histochemical detection of nucleins. J. VERNE. *Bull. his. appl. physiol. path.* 4, 110–22(1927); *Physiol. Abstracts* 12, 193.—The methods hitherto applied are very inadequate. Important progress has recently been reported by using a hydrolytic reaction which liberates from the nuclear complexes one of their essential constituents, thymic acid, which is easily recognized by Schiff's reaction (violet with H_2SO_4 fuchsin). Verne gives a precise study of this nuclear reaction describing the technic minutely.

H. G.

The determination of sugar in normal urine. M. R. EVERETT AND M. O. HART. *J. Lab. Clin. Med.* 12, 579–89(1927); *Physiol. Abstracts* 12, 375.—The methods of Benedict and Osterberg, of Folin and Berglund, and of Sumner give somewhat different sugar values; this may be due to the presence in urine of substances which alter the amt. of color given by the sugar. Irregular changes, not prevented by antiseptics, occur in the sugar content after the sample is voided; these are affected by the H-ion concn.

H. G.

Estimation of acetone in urine. M. RUDOV. *Klin. Wochschr.* 6, 1359–60(1927); *Physiol. Abstracts* 12, 500.—The method is based on Legal's test. Ten g. Na nitroprusside is dissolved in 170 cc. water, and 20 cc. glacial AcOH added. To 1 cc. urine or dild. urine 1 drop 50% $(NH_4)_2SO_4$ soln. is added, and 1 to 2 drops of the above reagent; the soln. is mixed and covered with a layer of NH_3 . A definite bluish violet ring appears within 3.5 to 4 min. when the urine (or diluted urine) contains 0.85 mg. % acetone. If the ring appears sooner than this dilns. are made, and the test is repeated until that diln. is found which causes definite ring formation in $3\frac{1}{2}$ to 4 min. The diln. multiplied by 0.85 gives the acetone concn. in the original urine in mg. %.

H. G.

The determination of bilirubin in blood. L. JENDRASSIK AND A. CZIKE. *Deut. med. Wochschr.* 54, 430(1928).—A modification of the van den Bergh method for detg. bilirubin is described. To 2 cc. of the serum or plasma are added 0.5 cc. of 50% caf-

feine-sodium benzoate and 1 cc. of the diazo mixt. After 5 to 10 min., 6.7 cc. of 96% alc. are added and the pptd. proteins removed by filtration. The filtrate is compared colorimetrically with a standard of known concn. ARTHUR GROLLMAN

The determination of cholesterol in blood. D. ACEL. *Deut. med. Wochschr.* 54, 431-3(1928).—A rapid method for the detn. of the cholesterol in 0.5 cc. of blood is described. Results on 18 clinical cases are given. ARTHUR GROLLMAN

Estimation of the diamino nitrogen in the products of hydrolysis of proteins. J. C. KERNOT AND JOHN KNAGGS. *Biochem. J.* 22, 528-34(1928).—The percentage of N pptd. by phosphotungstic acid depends upon the concn. of N in soln., the temp. of pptn. and the temp. of the soln. while the ppt. is settling, the concn. of the acid used for the hydrolysis of the protein, and the period of contact of the protein with the cold acid before hydrolysis. BENJAMIN HARROW

Purification of secretin. EINAR HAMMARSTEN, OLOF WILANDER AND GUNNAR AGREN. *Acta Med. Scand.* 68, 239-47(1928).—The Dale-Laidlaw method of prepn. was improved so as to produce a better yield in a shorter time. The crude secretin was extd. with 95% alc. The active principle seps. between water and CHCl_3 and under certain conditions goes into soln. in benzene. This soly. is apparently conditioned on the presence of a water-sol. lipid. The greatest concn. of the active principle was obtained by adsorption of the ppt. formed at the junction of H_2O and CHCl_3 . S. MORGULIS

Automatic gas analysis for respiration experiments. M. KLEIBER AND A. WIRTH. *Biochem. Z.* 192, 241-9(1928).—An automatic gas analysis app. for respiration expts. is described. The method consists in recording photographically the difference in pressure between a measuring and a compensation buret. S. MORGULIS

Monomolecular layer spreading as a method for determining blood fat. E. GORTER AND F. GRENDL. *Biochem. Z.* 192, 431-56(1928).—The detn. is carried out essentially with the procedure of Langmuir-Adams. The fat is extd. from about 0.2 cc. blood with a mixt. of ether and alc. (1:3). This is heated to boiling and filtered. The dry residue of the filtrate is taken up in petr. ether and made up to a 5 or 10 cc. vol. Of this 0.1 or 0.2 cc. is used for the detn. S. MORGULIS

The availability of the quinhydrone electrode for measuring the pH of whole blood and serum. JULIUS GEWYCKE. *Biochem. Z.* 193, 181-6(1928). S. MORGULIS

Calculation of results of a calorimeter experiment with animals. PAUL HÄRI. *Biochem. Z.* 194, 91-5(1928). S. MORGULIS

A micromethod for determining dihydroxyacetone in blood. F. SILBERSTEIN AND F. RAPPAPORT. *Biochem. Z.* 194, 105-10(1928).—The Hagedorn-Jensen microsugar method is applicable for the detn. of dihydroxyacetone if this is carried out in the cold. Glucose under these analytical conditions causes no reduction. In blood, the preliminary boiling in the deproteinization process does induce a small loss of dihydroxyacetone. This is limited by diminishing the time of boiling to $1\frac{1}{2}$ min. and an empirical correction is suggested for the slight loss still occurring. S. MORGULIS

A new method for the preparation of collodion tubes and membranes. TH. HUZELLA. *Biochem. Z.* 194, 128-31(1928).—The essential feature of this method is the use of a sugar sirup as the support for the membranes. A concd. soln. of sucrose is boiled with a few drops of AcOH , caramel formation being avoided. The thick sirup is poured into an enameled dish and on cooling gives a perfectly smooth surface. The collodion is poured over this and after evapn. of the ether is covered with distd. water. This causes the collodion membrane to sep. neatly, and it is now possible to cut it in various shapes. Collodion tubes are prepd. by dipping glass rods or test tubes of desired diam. into the sirup and after allowing this to dry in a smooth coating, dipping into the collodion soln. The tubes are again very neatly removed upon dissolving the sugar with water. Very fine, capillary collodion tubes can also be made by drawing out fine threads of the sugar sirup and dipping them in collodion. These capillary collodion tubes can be sterilized by boiling, and may be wound on a spool and kept sterile in boiled out distd. water to which a few drops of CHCl_3 had been added. The permeability of the tubes, sacs or membranes is regulated by their water content, by the alc./ether ratio of the solvent (up to 3:1), and by the collodion concn. (2-8%). With increasing permeability the articles become more fragile, the permeability not being much influenced by the thickness of the collodion. The shorter the time of drying in the air the more permeable is the membrane. S. M.

Notes on the determination of cholesterol. H. DAM. *Biochem. Z.* 194, 177-87(1928).—The cholesterol pptd. with an alc. soln. of digitonin varies in compn., depending upon the excess of digitonin. Washing with alc. removes appreciable amts. and

should therefore be made with a satd. alc. soln. of cholesterol digitonin. The calcn. of the results should be made in accordance with a previously prepd. standardization curve. In detg. the total cholesterol in the presence of a small ester fraction, the free cholesterol should be first pptd. with digitonin and the esters detd. colorimetrically in the filtrate.

S. MORGULIS

Determination of bismuth in urine. H. BAGGESGAARD-RASMUSSEN, K. A. JACKEROTT AND S. A. SCHOU. *Biochem. Z.* 193, 53-61(1928); cf. *C. A.* 21, 3643.—The detn. of Bi in urine is based upon its reaction with I_2 which in acid soln. gives a complex yellow salt: $Bi^{+++} + (3 + n)I^- \rightleftharpoons BiI_{3+n}^{n+}$. The light absorption of this compd. was detd. with the spectrophotometer, the blue Hg line at 4359 Å. U. being used. The light absorption is found from the formula $E = \log \lg \alpha - \log \lg \beta$, where α and β are the 2 angles measured with the spectrophotometer. As the standard a soln. contg. 0.1 mg. Bi per cc. is used which is prepd. by the following method. A g. of Bi subnitrate is dissolved in 10 cc. dil. HNO_3 and poured into 200 cc. 1% NH_4OH . The ppt. is washed with boiling water and ignited to const. wt. 0.115 g. of the Bi_2O_3 are dissolved in a few drops of hot dil. HNO_3 which is then boiled off after the addn. of 10 cc. 4 N H_2SO_4 , and finally dild. to 1 l. with N H_2SO_4 . In urine analyses the org. matter must first be destroyed and this is done by the Neumann wet combustion procedure, the last traces of HNO_3 being driven off by boiling with 10 cc. satd. $H_2C_2O_4$. By proper choice of acid concn. the final sample has practically the same acidity as the standard. To 20 cc. soln. are added 1 cc. of 10% KI, 1 cc. of a 15% Na citrate (to remove Fe salts) and 1 cc. of 10% Na_2SO_3 (to destroy the slight yellow color resulting from the mixt. of KI, SO_2 and H_2SO_4), and 2 cc. H_2O . The standard is prepd. similarly with 1 cc. of Bi soln., 1 cc. of each reagent and dild. to 25 cc. The colors are then compared in a colorimeter. The Bi concn. in the urine is detd. from the formula: mm. standard/mm. unknown \times 0.1 mg. per 100 cc.

S. MORGULIS

The isolation of various natural phosphoric acid compounds and the problem of their identity. K. LOHMANN. *Biochem. Z.* 194, 306-27(1928).—The true inorg P is detd. as follows: to 5 cc. of soln. contg. 0.1-0.6 mg. P_2O_5 is added 1 cc. of a 5-10% NH_3 soln. and 2 cc. of Mathison's Mg citrate reagent (*C. A.* 4, 1997). The pptn. is made in a narrow centrifuge tube. The NH_4MgPO_4 is allowed to crystallize out at least 20 hrs., and centrifuged off. The ppt. is now washed with 8 cc. 1% NH_4OH , dissolved in 5 cc. molybdate reagent and transferred to a 25 cc. volumetric flask. The P is detd. colorimetrically. The phosphagen-phosphate is detd. by the Fiske-Subarow method, and is the difference between the 2 detns. The total P was detd. by washing the material in a 25 cc. Kjeldahl flask with a 1:5 mixt. of 2 N HNO_3 and H_2SO_4 . The phosphagen phosphate detn. depends upon the fact that this substance is unaffected in a neutral or alk. soln. but is completely hydrolyzed in 5-8 min. at 37° in an acid medium contg. molybdic acid. Embden's hexosemonophosphoric ester and creatine phosphoric acid (phosphagen) are found in the water-sol. fraction of the alk. earth salts obtained from the trichloroacetic acid ext. from fresh muscle. Their sepn. is accomplished by fractional pptn. of the Ba salt with dil. alc. and the final removal of Embden's ester from the phosphagen by pptn. with $Cu(OH)_2$ in $Ba(OH)_2$ soln. The kinetics of the acid hydrolysis of the H_3PO_4 from the org. combination (Embden and Robison, and the Neuberg esters) leads to the conclusion that the 2 are different, and that the Embden-Robison esters contain an aldose while the Neuberg ester contains a ketose component. The hydrolysis of the creatinephosphoric ester always shows a monomolecular course.

S. MORGULIS

Micromethod for determining blood sugar. KURT DRESEL. *Biochem. Z.* 194, 466-72(1928).—On the av. 2.5% of the sugar is lost from blood preserved 24 hrs. in dry condition on filter paper. If the papers are not kept in a thoroughly dry atm. the loss is much greater in consequence of glucolysis. It is also pointed out that the 3 min. boiling in the Hagedorn-Jensen method is often not sufficient, and even after 30 min. the results are only 6% too high. It is assumed that 3 min. is not always sufficient time completely to ext. the sugar from the blood cells.

S. MORGULIS

A method for the preparation of a succinodehydrogenase free from fumarase. NILS ALWALL. *Skand. Arch. Physiol.* 54, 1-5(1928).—Since fumarase, the enzyme which reduces fumaric acid, is much more temp.-labile than succinodehydrogenase, warming a suspension of washed ground muscle substance to 50° for 30 min. causes complete destruction of the former practically without affecting the latter. In this way a pure succinodehydrogenase can be prepd.

S. MORGULIS

Micromethod for determining sugar in blood. L. M. KRASNYSKI. *Zhurnal expl. biol. Med.* 8, 154-60(1928).—Various analytical conditions are discussed in

connection with the Hagedorn-Jensen blood-sugar detn. essential in securing accurate results. S. MORGULIS

Invertase. I. Preparation and purification of the enzyme. B. N. SASTRI AND ROLAND V. NORRIS. *J. Indian Inst. Sci.* 11A, 1-13(1928).—A study of the steps involved in the prepn. of invertase led to the following method: Brewers yeast is autolyzed under toluene for about 34 days, filtered through folded filter-papers, and concd. by freezing. This liquor is treated with kaolin; the protein and other impurities adsorbed upon the kaolin are removed by filtration; the invertase is pptd. with solid $(\text{NH}_4)_2\text{SO}_4$ (90% mtn.); the water soln. of the ppt. is dialyzed and then treated with $\text{Al}(\text{OH})_3$, upon which the invertase is adsorbed. The enzyme is eluted by means of 1% Na_2HPO_4 in 1% glycerol and is obtained in soln. by filtration through kieselguhr. The prepn. is white, odorless, gives neither the Molisch nor Millon test but positive biuret and xanthoproteic test, low in nitrogen and ash content and free from other enzymes. II. A simple method for concentrating enzyme solutions. *Ibid* 14-7.—A concd. enzyme ext. is obtained by subjecting a dil. soln. to freezing temp. under mech. stirring and subsequent filtration of the ice crystals. N. M. NAVLOR

Preparation of colloidal gold for biological investigations. G. REBIÈRE. *Colloides biol. clin. therap.* 1, 213-7, 229-31(1928).—In order to obtain colloidal Au of uniform quality and properties it is essential to use Zsigmondy's technic. von Veimarn's modification (consisting essentially in the use of less pure reagents, KOH instead of K_2CO_3 and longer boiling) does not give satisfactory results for biol. investigations. The precautions to be taken are described in detail and consist essentially in the use of specially distd. H_2O (ordinary distd. H_2O redistd. in an all-glass Pyrex still) and freshly prepd. pure reagents (AuCl_3HCl $4\text{H}_2\text{O}$, K_2CO_3 and recently prepd. 40% CH_2O), and scrupulously clean app. A. PAPINEAU-COUTURE

Nephelometric estimation of peptones in a solution of sodium chloride at 1 to 1000. H. SURMONT AND (MLLE.) R. PROVINO. *Bull. soc. chim. biol.* 10, 406-12(1928).—A 30% soln. of $\text{CCl}_3\text{CO}_2\text{H}$ ppts. a max. of albuminoid substances. This ppt. is stable at the end of 20 min. and remains const. for 4 hrs. after the pptn. The index of diffusion is proportional to the concn. of proteins only when the latter is greater than 1 in 1000. The concn. of the soln. should not be greater than 3 in 1000. By taking account of these statements, it is possible to make a gross quant. analysis of com. samples of peptone by the nephelometric method and by aid of $(\text{NH}_4)_2\text{SO}_4$ to det. the quantity of its separate constituents. Nephelometric estimation of albuminoid material in the gastric liquids. *Ibid* 413-4. L. W. RIGGS

Method of volumetric estimation of urea by oxidation of xanthylurea. HENRI CORDEBARD. *Bull. soc. chim. biol.* 10, 461-71(1928).—The method depends on the oxidation of xanthylurea by means of a mixt. of $\text{K}_2\text{Cr}_2\text{O}_7$ and H_2SO_4 . L. W. RIGGS

Distilled water in biology. E. CANALS AND M. MOUSSERON. *Bull. soc. chim. biol.* 10, 472-7(1928); cf. *C. A.* 21, 1664.—In prepg. "conductivity water" the app. should be of hard glass or better of Pyrex glass. The quality of the water was not improved by replacing a Pyrex tube with one of quartz. The findings of Bordas and Touplain (cf. *C. A.* 20, 1929) on the diminution of cond. of distd. water on standing were confirmed. This diminution of cond. is greater if the water is again distd. The period of repose may be shortened by rapid cooling of the freshly doubly distd. water from 22° to 4° and allowing the temp. to return to 22° in 3 hrs. To obtain water with a cond. of about $1.2 \times 10^{-6} \omega/\text{cm.}$ and a p_H 5.6 to 5.8 it is recommended to use app. of Pyrex glass and to allow the water thus obtained to stand in closed Pyrex vessels. A sheet of Pt covered with Pt black immersed in the water favors the diminution of cond. during repose. A third distn. is of no advantage, nor are distns. with $\text{K}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{SO}_4$ or $\text{Ba}(\text{OH})_2$. L. W. RIGGS

Estimation of glucose in the presence of proteins. P. FLEURY AND G. BOYELDIEU. *Bull. soc. chim. biol.* 10, 568-75(1928).—In the estn. of glucose in the presence of proteins the albumoses and peptones appear to diminish the reducing power of the glucose. Amino acids and actual albumins do not show this property. In the elimination of albumoses and peptones before detg. glucose, HgSO_4 should be used instead of $\text{Pb}(\text{AcO})_2$. L. W. RIGGS

Improvement of the technic of mercurial defecation of blood for the estimation of glucose. GEORGES FONTES AND LUCIEN THIVOLLE. *Bull. soc. chim. biol.* 10, 581-9(1928); cf. *C. A.* 21, 2712.—The defecating liquid of Bierry and Moquet is modified and made up as follows: To 400 g. $\text{Hg}(\text{NO}_3)_2$ is added 700 cc. of H_2O and the mixt. is warmed to 40°, concd. HNO_3 is added in a quantity for complete soln., then concd. KOH is added drop by drop until a permanent ppt. forms. This mixt. is made up

to one l. with H_2O . In the defecation procedure $AcOH$ is replaced by $H_2C_2H_3O_4$.

L. W. RIGGS

Estimation of uric acid in biologic liquids. RADU VIADESCO, *Bull. soc. chim. biol.* 10, 602-5(1928).—The blue color produced by the addn. of phosphotungstic acid to solns. of uric acid is discharged by titration with Cl water instead of being read colorimetrically.

L. W. RIGGS

Colorimetric determination of biliary salts in the duodenal liquid. M. CHIRAY AND L. CUNY. *J. pharm. chim.* 7, 97-106(1928); cf. *C. A.* 21, 3211.—A modification of the method of Herzfeld and Haemmerli (*C. A.* 19, 2965) is used. Into a tube graduated to 5 and 10 cc., put 1 cc. of duodenal liquid and 95% alc. to 5 cc. Heat to boiling in a hot water bath to ppt. protein, cool, fill up again to 5 cc. and filter. Collect 1 cc. and have ready for comparison of color 1 cc. each of 4 standards contg. resp., 0.20, 0.10, 0.05 and 0.025% of pure cholic acid in 80% alc. soln. Into each of the 5 tubes put 0.5 cc. of 1% furfural and sufficient H_3PO_4 (d. 1.710) to bring to 5 cc. Shake each glass well, then keep all the tubes in boiling H_2O for 5 min., then in cold H_2O , and allow to stand 5 min. Into each tube put 50% alc. to bring the vol. to 10 cc., cork and mix well; after 2-3 min. compare the color in a Dubosq app. with that nearest to it among the 4 standards. Multiply the inverse proportion of heights by 10, 5, 2.5, 1.25, resp., to obtain g. of biliary salts per l. The method is sensitive to 1:16,000; the biliary salts are not carried down by the protein ppt., and bilirubin under the conditions of the detn. does not disturb the reaction.

S. WALDBOTT

C—BACTERIOLOGY

A. K. BALLS

The aldehyde mutation of acetic acid bacteria. KARL MYRBÄCK, H. VON EULER AND ERIK SANDBERG. *Z. physiol. Chem.* 175, 316-20(1928).—The $AcOH$ bacteria examd. dismute AcH rapidly and this property is destroyed by boiling. The heated ext. contains a cozymase which activated fermentation by cozymase-free yeast.

A. W. DOX

Nitrogen fixation by *Azotobacter chroococcum*. S. RANGANATHAN AND R. V. NORRIS. *J. Indian Inst. Sci.* 10A, 79-96(1927).—The vitality and vigor of *Azotobacter* cultures are better preserved in soil extract-agar medium contg. 1% mannitol than in mineral salts-mannitol-agar-medium; CO_2 , $EtOH$, AcH , HCO_2H , $AcOH$, lactic and tartaric acids are formed when dextrose is fermented; N fixation increases in proportion to amt. of sugar fermented, 50% or more of N fixed being assimilated within the first few days; phosphates do not economize sugar consumption but do accelerate the rate of N fixation; probably NH_3 is the first product of N fixation being subsequently converted into more complex compds. through mono and diamino intermediates; cells of the organism appear to contain about 30% protein and considerable fat and phosphatide material.

N. A. LANGE

The role of pyocyanin in the metabolism of *Pseudomonas pyocyanea*. A. A. STREEMAN. *Biochem. Z.* 191, 320-36(1927).—The current views on the significance of bacterial pigments are criticized. It is shown that the decolorizing of pyocyanin and the subsequent regeneration of the pigment through oxidation in air has a biol. importance. The change of the pyocyanin into the leucobase is attributed to its function as a H acceptor. The oxidation of the leucopyocyanin to pyocyanin is not affected by HCN . It is concluded that pyocyanin acts as a H transmitter in cellular metabolism.

S. MORGULIS

The so-called "Kombucha." T. SIEGWART HERMANN. *Biochem. Z.* 192, 176-87(1928).—"Kombucha" is a culture of microorganisms. It produces large quantities of gluconic acid. It represents a dark, thick, slimy skin which grows on sweetened Chinese tea. A 0.5% tea infusion contg. 7.5% sucrose yields at room temp. a good growth. The infusion becomes acid to litmus. The culture is kept until the acidity is such that 20 cc. requires 26 cc. 0.5 N $NaOH$ for neutralization. Tannin and methylxanthine are unaffected. Apart from acetic there was formed only *d*-gluconic acid, which was demonstrated as its Ca salt. Chemically pure glucose is converted largely into gluconic acid; levulose is fermented chiefly to $AcOH$; lactose is not fermented at all; maltose gives only traces of $AcOH$. Dextrin, *t*-mannitol and glycerol promote the growth but yield only traces of fixed or volatile acid. $EtOH$ yields only acetic acid. Sugar is tolerated up to concns. of 30%. II. *Ibid* 188-99.—Bacterial examn. of "Kombucha" shows that the isolated organism is unlike any other described. It must, therefore, be regarded as a new and hitherto entirely unknown bacterium which is designated *B. gluconicum*.

S. MORGULIS

Oxidation of waxes by microorganisms. W. O. TAUSSON. *Biochem. Z.* 193, 85-93(1928).—*Aspergillus flavus* can utilize as a source of C the esters of higher fatty acids with glycerol or higher alcohols. The oxidation proceeds similarly to that of paraffins with an alkalization of the medium, so that no intermediate free acids are formed. The absolute amt. of wax oxidized by this mold varies more or less directly with the age of the culture. The suggestion that in the oxidation of paraffins, esters are formed as intermediate compds. is supported by several quant. results. S. M.

Quantitative metabolism of paratyphoid B, colon and pyocyanus bacilli. FRANZ FRIEDLEIM. *Biochem. Z.* 194, 273-91(1928).—K, Na and Cl are dispensable if they are absent singly from the lactic acid-NH₄ nutritive medium. Mg and H₂SO₄ are not essential to life but stimulate growth. C, N and phosphate are essential to life. No marked differences were observed between the different bacteria in this matter. Na lactate serves as a source of C and of energy as efficiently as does glucose or Na pyruvate. NH₄ salts are a suitable source of N; Na asparaginate is not preferable to NH₄Cl. S. MORGULIS

Formation of hydroxylamine in the reduction of nitrates by microorganisms. A contribution to the problem of amino acid formation by microorganisms. JAKOB BLOM. *Biochem. Z.* 194, 392-409(1928).—Evidence is presented to show the formation of NH₂OH by microorganisms in nitrate-contg. media. The origin and significance of the NH₂OH are fully discussed. S. MORGULIS

Influence of the medium on the growth of tubercle bacilli. V. M. KULIKOV AND Z. I. NIKOLSKAJA. *Zhurnal expl. biol. Med.* 8, 73-7(1928).—The reaction of the nutritive medium has a marked effect on the growth of tubercle bacilli in the presence of various poisons. Cu ions are much more toxic in an alk. than in an acid medium, but the toxicity of thymol does not depend upon the p_H. Guaiacol is 300% more toxic in an alk. than in acid culture. S. MORGULIS

Specific gravity of bacteria. I. F. LEONTIEV. *Zhurnal expl. biol. Med.* 8, 418-21(1928).—The sp. gr. of *Micrococcus pyogenes albus* at 15° is 1.089. The av. sp. gr. of bacteria is estd. at 1.055. S. MORGULIS

Pigment formation in cholera and certain other vibrios. F. ONOLOV. *Zhurnal expl. biol. Med.* 9, 95-7(1928).—It was observed that a cholera-vibrio strain obtained at Rostov on the Don when cultured on a peptone bouillon produced pigment which was not observed with other strains. S. MORGULIS

Growth of mold fungi on coals (FISCHER, FUCHS) 21.

D—BOTANY

THOMAS G. PHILLIPS

Respiration of iron-deficient beans (*Phaseolus multiflorus*). HANS v. EULER AND SVEN STEFFENBURG. *Arkiv. Kemi Mineral Geol.* 9, No. 48, 1-6(1928).—The intensity of respiration per g. dry wt. is higher in green leaves than in chlorotic leaves. Also the respiration intensity per mg. Fe in the green leaves is higher than in the chlorotic leaves. Chlorotic leaves are higher in Fe content than green leaves. Possibly if the cytochrome bound Fe were detd. it would be higher in the green leaves than in the chlorotic leaves. H. R. KRAYBILL

Osmotic values in the cell sap of some salt desert plants. A. V. BLAGOVESHCHENSKI, V. A. BOGOLYUBOVA AND T. A. CHERNOVA. *Bull. Univ. Asie Centrale (Tachkent)* 1926, 4-8.—High osmotic value is not a characteristic property of inhabitants of "physiologically arid" soils. Under similar conditions plants with the same ecological characters have very different osmotic values. Osmotic value is regarded as a characteristic physiol. const. of the plant. H. R. KRAYBILL

Cause of blueing in red roses. G. S. CURREY. *J. Proc. Roy. Soc. N. S. Wales* 61, 307-14(1927).—Studies were made to det. why certain red roses like Hadley tend to become blue and others like Lady Maureen Stewart show little tendency to blue. Ash analyses of the petals of the two varieties were similar. The Hadley contained 1.26% Cryst. pigment based on dry wt. and the Lady Maureen Stewart 2.39%; the Hadley showing signs of blueing contg. 6.33% tannin, the Hadley with true color 7.58% and the Lady Maureen Stewart 11.62%. The anthocyanin pigment in the two roses is diglucoside cyanin and the tannin of both is identical. The blueing is due to insufficient tannin in the cell sap of the petals. H. R. KRAYBILL

Analytical studies of pollen in Switzerland. ERNST FURRER. *Vierteljahrssch. naturforsch. Ges. Zurich* 72, Beibl. No. 14, 1-37(1927).—Results of the amount and kind of pollen on various soils of Switzerland are given. H. R. KRAYBILL

Respiration of stored seeds. P. NEKRASSOV. *Nauchno Agron. Zhurnal* 4, 545-59 (1927); *Deut. landw. Rundschau* 1, 821(1928).—A study of the respiration of stored seed and the effect of various moisture contents. The CO_2 production increases with temp., reaching a max. at 40° . With higher temps. the CO_2 decreases. A valuable table is given on optimum moisture content of various seeds. GEORGE R. GREENBANK

The influence of sulfur on the nitrogen and phosphoric acid utilization of plants. A. KALUSHKII. *Nauchno Agronomicheskii Zhurnal* 4, 643-56(1927); *Deut. landw. Rundschau* 1, 819(1928).—By the addn. of 0.03 to 0.04% by wt. of S the p_{11} of the soil is changed from 7 to 6.6-6.8. The utilization of H_3PO_4 is increased 150 to 200 times. The influence on N utilization is in a positive direction. GEORGE R. GREENBANK

Nitrate reduction through plant roots. A. SCHMUCK. *Nauchno Agronomicheskii Zhurnal* 4, 155-70(1927); *Deut. landw. Rundschau* 1, 817-8(1928).—The root substrate is very strong in reducing nitrates and aromatic N compds. One g. of root mass will reduce 1 mg. of nitrite N or 75 mg. of NaNO_3 N. An increased concn of nitrite is found in the root zone. It is simultaneously abounding in acid and of a low nitrate concn. GEORGE R. GREENBANK

Semipermeability of seed coverings and stimulation of seeds. FELIX KOTOWSKI. *Plant Physiology* 2, 177-86(1927).—The effect of 16 hrs.' soaking in 1.50% solns. of KNO_3 and $\text{MnSO}_4 \cdot 4\text{H}_2\text{O}$ was studied for viable, carefully selected uninjured seeds of *Spinacia oleracea inermis*, *Cucumis sativus*, *Capicum annuum*, *Triticum vulgare*, *Secale cereale* and of *Hordeum distichum* and in addn. non-selected com. seed of the three cereals mentioned. The intake of the salts by, and the diffusion from the seeds in subsequent soaking was detd. by elec. cond. measurements of the external solns. The intake of the salt depends on the kind of seed and on the cation and anion of the salt, but the limiting factor is apparently the seed coverings. The seed coverings exercised a distinct check in the intake of KNO_3 , especially by cereals. When the seed coverings were intact, absorbed salts were held superficially. Hence, in the selected seeds there is little probability that the cation and anion could act on the protoplasm and stimulate growth. The partially injured seeds of the cereals had a high intake of salt and slight losses due to washing, owing to the permeability of spots deprived of seed coverings. WALTER THOMAS

The use of ethylene, propylene and similar compounds in breaking the rest period of tubers, bulbs, cuttings and seeds. G. A. VACHA AND R. B. HARVEY. *Plant Physiology* 2, 187-92(1927); one plate.—A mixt. of C_2H_4 and air (1:1000 by vol.) breaks the rest period and hastens the sprouting of potato tubers by 7 to 15 days, depending upon the variety. The growth rate of the treated tubers was also increased. An aq. soln. of $\text{C}_2\text{H}_4\text{O}$ (1:1000) was toxic to both potato tubers and gladiolus. C_2H_4 is effective in securing germination of seeds of buckthorn, high bush cranberry, Tartarian honeysuckle and snowberry. Both C_2H_4 and C_3H_4 were found equally effective in breaking dormancy. WALTER THOMAS

The p_{11} values of plants and corresponding soils (BLAGOVESHCHENSKII, *et al*) 15. The relationship between ethereal oils and resins (FIGULEVSKII) 17.

E—NUTRITION

PHILIP B. HAWK

Acceleration of lipase activity by substances containing vitamin A. B. L. JOHNSON. Iowa State College. *Iowa State Coll. J. Sci.* 2, 145-53(1928).—*Pancreatic extract increases the rate of hydrolysis of ethyl butyrate* to such an extent that distillable amts. of butyric acid can be obtained in a few hrs. The activity of the lipase can be calcd. from the amt. of butyric acid produced. Specially treated sea sand or specially treated sea sand covered with a film of cottonseed oil has no effect, or a slight depressing effect on the activity of the lipase. When vitamin A concentrates from butter fat, cod-liver oil, lard and cottonseed oil were added, the rate of formation of butyric acid was found to increase as much as 50% above that in lipase-sea sand-ethyl butyrate mixts., identical except for the presence of the vitamin A concentrates. There is no accurate parallelism between the lipase stimulating activity of the vitamin A concentrates and their anti-xerophthalmic activity. *Sodium oleate and sodium palmitate accelerate lipase activity.* Nine tables of data are presented. F. E. BROWN

The effect of an excess of vitamins A and B on the nourishment of growing animals. ARTURO MAGLIANO. *Riv. biol.* 7, 619-26(1925); *Chem. Zentr.* 1926, 11, 3098.—No effect is evident. H. G.

Lipoids and metabolism. HANS REITER AND WILFRIED REISSMANN. *Klin.*

Wochschr. 7, 306-7(1928).—N excretion is increased on a diet deficient in lipoids. A normal N excretion is promptly reestablished when lipoids are added to the diet. Lipoids spare protein. MILTON HANKE

Water retention in the organism after a diet rich in fat. W. V. MORACZEWSKI. *Klin. Wochschr.* 7, 359(1928).—The protein content of the blood is lower, after a diet rich in fat, than it is after a mixed diet or one rich in protein. The output of urine is decreased and its acidity increased after a fat-rich diet. Organic acids are increased. Ingestion of fat leads to a swelling of, and a water retention by, all body tissues including the blood. MILTON HANKE

The assay of the antirachitic vitamin D. K. M. SOAMES AND J. C. LEIGH-CLARE. *Biochem. J.* 22, 522-7(1928).—Vitamin A is supplied either by 20 percent wheat embryo or 50 percent hog millet (see *C. A.* 19, 2067). BENJAMIN HARROW

Vitamins of commercially concentrated orange juice. S. G. WILLIMOTT. *Biochem. J.* 22, 535-44(1928); cf. *C. A.* 21, 3938; 22, 2188.—Five cc. of orange concentrate (obtained from the California Fruit Growers' Exchange), which represents orange juice evapd. *in vacuo* at 37° until the vol. has been decreased approx. from 7 to 1), dild. to the strength of the original juice, was adequate in vitamin A for the rat. Ten cc. of the dild. orange concentrate was needed for vitamin B. BENJAMIN HARROW

The present state of our knowledge of vitamins. R. F. HUNWICKE. *Food Manuf.* 1, 97-8(1927). E. H.

Inhalation of irradiated oils in therapy. L. M. SPOLVERINI. *Pediatria Rivista* 35, 1112(1927).—The inhalation cured rickets in 2-5 months and caused a prompt and marked increase in the milk secretion of women. The beneficial effect frequently continued for a period after discontinuation of treatment. MARY JACOBSEN

Action of ions on the metabolism of the sugars. O. KAUFFMANN-COSLA. *Bull. soc. chim. biol.* 10, 397-404(1928).—Conclusions: Ca is an indispensable factor in the oxidation of sugars in the organism. In the same dog on a complete ration the resorption of Ca is invariable. In different dogs on the same complete and const. ration the metabolism of Ca varies with the individual. By the increase of alimentary glucose, without reaching the physiol. limit of cellular oxidation, there is a mobilization of the stored Ca and the quantity of Ca mobilized is directly proportional to the quantity of glucose administered and oxidized. L. W. RIGGS

Increase of the volume, weight and total nitrogen of the liver under the influence of a diet rich in nitrogen. CL. GAUTIER AND H. P. THIERS. *Bull. soc. chim. biol.* 10, 537-52(1928); cf. *C. A.* 21, 3668.—In the frog (*Rana esculenta*) during summer fed abundantly on cheese, the vol. of the liver increased notably and its wt. increased from 2 to 5 times. The total N per unit of fresh tissue was greater in starved animals than in those abundantly fed, but the total N content of the liver of the latter was 2 to 4 times that of the starved animals. L. W. RIGGS

Growth of rats on vegetarian diets. HSIEN WU AND DAISY YEN WU. *Chinese J. Physiol.* 2, 173-93(1928).—Four week old albino rats were placed on strictly vegetarian diets consisting of cereals, legumes and vegetables common in North China. NaCl and sesame oil were added to improve the palatability but no other supplement was used. Many of the diets were rachitic, although no other deficiency disease occurred. The rate of growth of these rats was about $\frac{1}{2}$ that of the stock rats on a diet consisting of $\frac{2}{3}$ ground whole wheat and $\frac{1}{3}$ whole milk powder (Klim). Some of the diets, in which "small cabbage," Yu Ts'ai (colza), Kan Lan Ts'ai or Kai Ts'ai were used to supplement the cereal-legume ration, supported normal growth and no sign of deficiency disease. However, the young of the second generation of these animals were undersized. No known vegetarian diet affords optimum nutrition for the omnivorous animal, the albino rat. L. W. RIGGS

Effect of diet low in calcium on fertility, pregnancy and lactation in the rat. D. MACOMBER. *J. Am. Med. Assocn.* 88, 6-13(1927); *Expt. Sta. Record* 57, 65.—Low-Ca diets do not produce sterility in the rat, but they do affect fertility by increasing the intrauterine mortality. The young are born normal in wt. and Ca content. The fetus receives Ca at the expense of the mother and this loss of Ca by the mother is intensified during lactation. The young during this period still show lack of Ca by stunting, weakness and often death. L. W. RIGGS

Deriving the formula for a diabetic diet. W. S. COLLENS AND D. H. SHELLING. *J. Am. Med. Assocn.* 88, 396(1927); *Expt. Sta. Record* 56, 797.—The authors have devised a chart for the rapid calcn. of diabetic diets from the caloric requirements of the patient and the percentage of total calories to be given in the form of protein. The diets are based on the Woodyatt ketogenic-antiketogenic ratio of 1.5 to 1. L. W. R.

Changes in composition of blood in pernicious anemia treated by a diet rich in liver.

W. P. MURPHY, R. T. MONROE AND R. FITZ. *J. Am. Med. Assocn.* 88, 1211-4(1927); *Expt. Sta. Record* 57, 297; cf. *C. A.* 21, 3657, 3658.—Analyses of the blood of 10 patients receiving the dietary treatment showed a prompt and rapid remission of the anemia in every case. No changes were noted in the non-protein N of the plasma or in the plasma protein, but the protein of the corpuscles increased notably and in almost direct proportion to the increasing hemoglobin concn. L. W. RIGGS

Malabsorption in deficiency diseases. F. L. BURNETT AND P. R. HOWE. *J. Am. Med. Assocn.* 88, 1705-9(1927); *Expt. Sta. Record* 57, 295-6.—This paper is a review and discussion of the literature on malabsorption in exptl. vitamin deficiency diseases and in human deficiency disorders. L. W. RIGGS

The malnourished child: an individual, intensive method of treatment. L. W. SAUER. *J. Am. Med. Assocn.* 89, 931-4(1927); *Expt. Sta. Record* 57, 898.—The method of treatment is based upon a properly adjusted 5-meal diet rich in vitamins, a restricted daily routine and ample bed rest. The av. gains were 5 lbs. for the first month, 3.5 for the second month and 2.9 for the third month. L. W. RIGGS

Correlation of eye soreness with vitamin A deficiency among the Nez Percés Indians. C. A. BROWNE. *Science* 67, 510-1(1928).—In the report of the Lewis and Clark expedition of 1804-6, C. states that the Nez Percés Indians then living within the bounds of the present state of Idaho were afflicted with sore eyes, scrofula and rheumatism and suggests that the disorders were brought on by a too exclusive vegetable diet. At that time the diet of these Indians consisted largely of roots which are notably deficient in vitamin A. L. W. RIGGS

F—PHYSIOLOGY

R. K. MARSHALL, JR.

Filtration through living membrane. S. AMBERG AND L. G. ROWNTREE. *Proc. Soc. Exptl. Biol. Med.* 24, 309-10(1927).—The mesentery of the urethaneized bullfrog (*Rana catesbiana*) was used. The rate of filtration varied with the p_H , the temp., the NaCl concn., and the pressure. The mesentery was permeable to hemoglobin and Congo red and other dyes. Substances from the blood stream appeared in the filtrate. C. V. B.

The importance of the carbonate ion in physiological activity. A. B. HASTINGS AND H. B. VAN DYKE. *Proc. Soc. Exptl. Biol. Med.* 24, 831-2(1927).—In the course of a study of the response of the guinea-pig uterus to pituitrin when the ionic environment of the uterus was varied, the CO_3 ion was found to be of importance. It seemed to exert its influence of itself, not merely reflecting a change in Ca - or H -ion activity. Whenever the CO_3 -ion activity was increased there was a diminished response of the uterus to pituitrin. When CO_3 -ion activity was decreased there was an increased response of the uterus, while if the CO_3 -ion activity was kept const., there was no change or only a slight change in response, sometimes positive, at other times negative. C. V. B.

Bile stimulation of pancreatic secretion. A. C. IVY AND H. C. LUEBT. *Proc. Soc. Exptl. Biol. Med.* 24, 837(1927). C. V. B.

Duration of electrogram and of mechanical response of turtle ventricle. R. HOFKESBRING AND R. ASHMAN. *Proc. Soc. Exptl. Biol. Med.* 24, 883-5(1927).—The important factor detg. the duration of the electrogram appears to be the chem. condition or degree of recovery of the muscle at the instant the stimulus is applied. The degree of filling influences the duration of the electrogram very slightly, if at all. The mechanical phases are detd. not only by the degree of recovery, but also by the extent of filling of the ventricle. C. V. B.

The effect of a meal upon the titratable alkalinity of blood. R. S. HUBBARD. *Proc. Soc. Exptl. Biol. Med.* 25, 71-2(1927).—The effect of a carbohydrate tolerance test meal upon the titratable alk. of the blood was studied in 47 human subjects. The majority of the cases showed an increased amt. of titratable alkali after the meal, but the av. difference was slight. These differences may represent part of the process of the adjustment of the organism to the secretion of HCl by the stomach. C. V. B.

Resistance and capacity of stimulated and unstimulated muscle at varying electric current frequencies related to chronaxie. J. F. McCLENDON. *Proc. Soc. Exptl. Biol. Med.* 25, 202-4(1927).—The relation of chronaxie to the frequency of alternating elec. currents capable of stimulating muscle was studied. The threshold of duration of current from oscillator is about 0.05 of the chronaxie in case of fish and frog. With crab and scallop muscle the results are uncertain because of the uncertainty of the detn. of such long chronaxies by the condenser method. The resistance always decreased

on stimulation, suggesting a decrease in resistance of the individual muscle fibers. Changes in capacity were not so regular. C. V. B.

Further experiments on the fate of taurine in dogs. C. L. A. SCHMIDT AND L. R. CERECEDO. *Proc. Soc. Exptl. Biol. Med.* 25, 270-1 (1928).—A modification of the Bergell method is described for isolation of taurine from urine. Taurine when fed to dogs is excreted unchanged, and not in the form of taurocarbamic acid. C. V. B.

A relationship between phosphorus, creatinine and acidity in urinary excretion. G. J. RICH. *Proc. Soc. Exptl. Biol. Med.* 25, 307-9 (1928).—A study was made on 171 24-hour urine specimens furnished by 57 students. The correlation between the total titratable acid and the creatinine content of the urine was the highest, and was relatively independent of concomitant variation with the phosphorus content. There seems to be a tendency for these 2 elements in the urine to be high or low at the same time. The correlation between acidity and P content was the lowest of the 3 and was in large measure dependent upon a concomitant variation in the creatinine of the urine. There was a significant relationship between amts. of P and of creatinine in the urine. C. V. B.

Modifications in blood accompanying gastric secretion. III. Carbon dioxide. T. G. NI AND A. C. LIU. *Chinese J. Physiol.* 1, 355-62 (1927).—Expts. with fistula, Pavlov-pouch and Heidenhain-pouch dogs have shown that the prolonged loss of gastric secretion induced by repeated injections of histamine results in an increase in the CO₂ content of the arterial blood, the change occurring in the corpuscles as well as in the plasma. The increase in alkali reserve observed after great loss of gastric secretion is not equiv. to the loss of HCl involved. B. C. A.

Is cephalin necessary for the activation of prothrombin? C. A. MILLS. *Chinese J. Physiol.* 1, 435-8 (1927).—Exptl. evidence is cited in agreement with Bordet (cf. C. A. 15, 888) that Ca and cephalin, together with prothrombin, are the necessary precursors to the formation of thrombin. B. C. A.

The physiology of the heart. The humoral regulation of the cardiac work; direct and reciprocal effects of the "active" substances and the "vagal" substances. J. DEMOOR AND P. RYLANT. *Bull. acad. roy. med. Belg.* [5], 7, 669-92 (1927).—The hormone which causes the heart to beat has been investigated independently by Demoor C. A. 17, 1500; 18, 3648; *Archiv. intern. physiol.* 20, 29, 444, 21 (1923) and 24 (1924) and by Haberlandt (*Klin. Wochschr.* 3, 1631 (1924)). O. Loewi (C. A. 16, 592) has investigated a different type of heart regulators, *viz.*, the "vagal" substances, these are obtained by perfusing an isolated heart of a cat to which the vagus is still attached and by stimulating this vagus. The soln., thus obtained, slows down the beat of the isolated heart of a cat or of isolated auricles of a rabbit. The type of slowing is the same as that with vagus stimulation. If the isolated heart or auricles are left in this soln. of "vagal" substances, they take up beating, after a while, although these substances are neither decompd. nor inactivated. The "vagal" substances will again exert their inhibiting action if the heart is transferred to Locke soln. and then returned. The heart-beat hormones are called "active" substances by D and R; they are prepd. by extg. endocardium of fresh beef heart by means of NaCl soln. The mutual relation of these "active" and of "vagal" substances is investigated. When immersed in a soln. of "active" substances, isolated auricles become insensible to the stimulation of their own vagus, but they are still inhibited by the addn. of "vagal" substances. The "active" and the "vagal" substances do not destroy or antagonize each other. Even the isolated left auricle, which fails to beat in Locke soln. and requires the addn. of active substances for starting to beat, is normally inhibited by "vagal" substances. The "active" substances prevent, therefore, the formation of "vagal" substances, but, do not antagonize them. R. BEUTNER

The oxygen-carrying ability of the blood. KATSUO YABUKI. *Acta Schol. Med. Univ. Imp. Kyoto* 10, 25-32 (1927).—The O₂-carrying ability of the red corpuscles in defibrinated horse blood was detd. under conditions in which a portion of the serum was replaced by various solns. Replacement by isotonic NaCl caused a reduction in O₂-carrying ability proportional to the extent of replacement. Ringer-Locke soln. reduced the O₂-carrying ability still more. Addn. of gum arabic to the saline soln. had no influence, but the addn. of NaHCO₃ favored the O₂-carrying ability of the corpuscles. It was concluded that, with respect to the O₂-carrying ability of the red corpuscles, Ringer-Locke soln. contg. NaHCO₃ is the best material for intravenous transfusion, in order to secure a person from a severe hemorrhage. J. B. BROWN

Influence of the pancreas on the serum amylase. I. C. TUMMO. *Boll. soc. ital. biol. sper.* 2, 333-4 (1927).—The quantity of amylase present in a dog's body before and after removal of the pancreas was detd. by adding 1 cc. of blood serum, taken before and after the operation, and detg. how much glucose it will hydrolyze. A de-

crease of about 60% was noted in all cases; *i. e.*, whereas 15.6 mg. was hydrolyzed before removal of pancreas, only 9.0 mg. was hydrolyzed after. II. *Ibid* 335-7.—When pancreatic ext. is given to a dog whose pancreas has been removed the power of the blood serum to hydrolyze glucose is only partly restored.

A. W. CONTIERI

The amylase in saliva of a normal dog and after intravenous injection of pancreatic fluid. A. TOMASINO. *Boll. soc. ital. biol. sper* 2, 341-4 (1927).—Dogs were given injections of pancreatic fluid as well as human saliva (6 cc. per kg. wt.) and its saliva was tested for digestive power on amides. The digestive power of the dog's saliva is not increased much in either case, most of the injected fluid being recovered in the urine unchanged.

A. W. CONTIERI

Different content of "phosphogen" of striated muscles rapidly contracted and slowly contracted. G. MARTINO. *Atti accad. Lincei* [6], 7, 79-82 (1928).—Because more lactacidogen is present in active than in inactive muscles, it was thought that the recently discovered phosphogen (cf. Eggleton and Eggleton, *C. A.* 21, 2278; Fiske, *C. A.* 21, 2311) might also vary in the active and in the inactive muscles of individual animals. Inorg. P and phosphogen were detd. by the colorimetric method of Briggs (*C. A.* 16, 3493) and the technic used by E. and E. (*loc. cit.*). In rabbits, active and inactive muscles contained 22.5-24.0 and 24.5-32 mg.-% inorg. P and 25-28 and 10.5-14.5 mg.-% phosphogen. In pigeons, active and inactive muscles contained 35-39.5 and 36-42 mg.-% inorg. P and 23.5-27 and 10-12 mg.-% phosphogen. The results resemble those found for lactacidogen. Muscles capable of rapid contraction contain far more phosphogen and a little less inorg. P than more slowly contracting muscles. C. C. D.

The excretion of phosphates by the kidney and the regulation. LUCIEN BRULL. Univ. Liege. *Arch. intern. physiol.* 30, 1-69 (1928).—The excretion of phosphates in the urine depends on the inorg. P of plasma, the threshold of excretion and the concn. of phosphates by the kidney. Diuresis does not affect the excretion except with a very small urinary vol. as in narcosis when it is reduced. The increase in value of inorg. P in plasma after injection of phosphate is transitory. Injection of Ca causes an increase in plasma P. In narcosis there is a rise in plasma P followed by a lowering to the initial level. Hypophysectomy, which may retard P excretion, does not change plasma P. The threshold of excretion is higher in anesthetized animals and is increased after hypophysectomy and after Ca injection as well as after P injections. In general it follows variations of the plasma. These variations do not depend on the degree of permeability of renal endothelium or on the power of concn. by the secreting cells of the kidney but probably on changes in the proportion of P in crystalline and colloidal state in the plasma. It is assumed that a variable part of the inorg. P in the plasma is not excretable by the kidney being in colloidal state and that injected inorg. P may pass into this state. Likewise, after the injection of Ca there is an increase in the non-excretable portion. The colloidal state is possibly in the form of colloidal $\text{Ca}_3(\text{PO}_4)_2$. Alterations in the threshold are therefore only the expression of a dual physicochemical state of the inorg. P in the plasma. The degree of concn. of phosphate by the kidney is unalterable in a single animal and varies but little in different animals. It is only affected in renal anesthesia while the effect of general anesthesia is entirely on the threshold.

H. J. DEUEL, JR.

Adrenaline sensitiveness at the menopause. J. H. HANNAN. *Endocrinology* 12, 59-64 (1928).

H. J. DEUEL, JR.

The permeability of fatigued muscle. SHUNICHI MITSUYA. *Jikeikai Med. Coll. Sci-i-Kwai Med. J.* 47, No. 2, 5 (1928).—The permeability of the muscle membrane as detd. by the method of vital staining was shown to be much increased in fatigue. In spindle muscles as the gastrocnemius the permeability is increased more intensively at the end of the muscle while with muscles of the type of the sartorius the greatest permeability was found in the central portion.

H. J. DEUEL, JR.

Studies in carbohydrate metabolism. I. General considerations and conclusions from established facts. HEINRICH SCHUR AND ARTUR LÖW. *Wiener klin. Wochschr.* 41, 225-9 (1928).—Notwithstanding the accepted fact that decompn. and resynthesis of glycogen are involved in muscular activity, all heat-producing reactions should be considered possible sources of energy. Resynthesis of glycogen from its decompn. products does not necessarily take place in the muscle. The necessary quantity of carbohydrate involved in metabolism is much less than is generally assumed. II. **Fat depots and carbohydrate metabolism.** *Ibid* 261-6.—Fatty tissue contains a considerable quantity of carbohydrate. It is suggested that such tissue serves as a depot for taking up carbohydrate and converting it to fat. Carbohydrate feeding increases the carbohydrate content of the fat depots, especially of the omentum fatty body. Hunger decreases the carbohydrate content of this latter depot. Sugar formation from fat thus is indicated

when the need for sugar arises. The assumption that the insular tissue is concerned in deposition of absorbed foods and following this function, the formation and maintenance of depot tissues, especially of fatty tissues, explains all the phenomena of hyper- and hypoinsulin and conflicts with no known facts. D. B. DILL.

The breakdown of internal secretory glands in climacteric and puberty bleeding. Investigations by means of the Abderhalden reaction. LEO MELAMED. *Fermentforschung* 9, 306-21(1928).—The Abderhalden reaction was performed with blood discharged by women at the climacteric and at puberty. using ovary, thymus, pancreas, adrenal and hypophysis as substrates. With climacteric bleeding the reaction was positive for ovary and adrenal in twice as many cases as with puberty bleeding, while for pancreas and hypophysis it was $1\frac{1}{2}$ times as frequent and for thymus less frequent than with puberty. In several cases the reaction to ovarian tissue remained positive 16-20 days after total extirpation of the uterus and both ovaries. A. W. DOX

Regulation of carbohydrate metabolism. Lactic acid as activator of the liver prodiastase. ALEXANDER PARTOS. *Fermentforschung* 9, 403-10(1928).—Intravenous injection of lactic acid in quantities too small to cause any appreciable glycogen formation results in hyperglucemia. The cause of the glycogen mobilization lies in the activation of the liver prodiastase by lactic acid. In support of this view is the fact that glycogen decompn. can be brought to a standstill by CaCO_3 or ZnO and then the process resumed by removal of the CaCO_3 . A. W. DOX

Ammonia formation by illumination of the retina. HANS RÖSCH AND W. T. KAMP. *Z. physiol. Chem.* 175, 158-77(1928).—If both eyeballs of the frog are isolated and the cornea, iris, lens and vitreous body removed, the resulting capsules contain approx. the same amt. of NH_3 after being kept in the dark 10 min. The greatest variation between left and right capsule was 13%, the av. being less than 10%. If, however, one capsule is left 10 min. in the dark and the other strongly illumined, the latter invariably shows a large increase in NH_3 , the increase varying between 74 and 582%. Illumination thus results in NH_3 formation. The pulp obtained from fresh retina also forms NH_3 on standing, a max. being reached within 2 hrs. Addn. of adenosinephosphoric acid leads to increased NH_3 formation, as much as 90% of the amino N being liberated as NH_3 . Guanosinephosphoric acid, on the other hand, does not form NH_3 under these conditions. Addn. of urea to the retina pulp is also without effect. The NH_3 -forming substance of the retina cannot be the same as that of muscle, viz., adenosinephosphoric acid, since the addn. of muscle ext. to retina pulp in which the enzyme has been destroyed by 1% HCl does not result in NH_3 formation, although the same ext. gives a strong cleavage of adenosinephosphoric acid. The nature of the substance which forms NH_3 when the retina is illumined has not yet been detd. A. W. D.

Uric acid and creatinine in the urine of infants. O. S. ROUGICHURCH. *Am. J. Diseases Children* 31, 504-13(1926); *Physiol. Abstracts* 11, 426, cf. following abstract.—Detns. were made in the urine from 22 male infants varying in age from 1 to 22 months; uric acid was detd. by the microchem. colorimetric method of Folin and Denis, total N by the Kjeldhal method, and the creatinine by Folin's colorimetric method. The diet was purine-free. A fairly const. daily excretion of uric acid was found for the individual and a value of 14 to 25 mg. of uric acid per kg. of body wt. for the whole group. The creatinine varied from 10 to 15 mg. per kg. of body wt., being highest in malnourished infants due to their relatively large mass of active tissue. H. G.

Uric acid in the urine of infants. O. S. ROUGICHURCH. *Am. J. Diseases Children* 32, 530-5(1926); *Physiol. Abstracts* 12, 163; cf. preceding abstract.—The urinary uric acid 3-hour diurnal and nocturnal excretion in 5 healthy boys of 6 to 12 weeks was studied. In spite of the difficulty in obtaining the samples, it was found that the purine metabolism was remarkably regular throughout the 24 hrs., in contrast to the diurnal max. and nocturnal min. in uric acid excretion in adults. H. G.

Calcium and retinal currents. T. P. FEENSTRA. *Arch. néerland. physiol.* 11, 139-40(1926); *Physiol. Abstracts* 12, 305-6.—A frog was artificially perfused with the required modification of Ringer soln. or the excised eye was immersed in this soln.; the elec. responses were led off by non-polarizable electrodes. Removal of Ca destroys both the resting and action currents, in about 10 min. in the case of perfusion, in 3 or 6 min. in the case of the excised eye, according as the optic nerve is cut short or long. Both currents reappear on replacing the Ca. Increase of Ca or diminution of K is without effect. Withdrawal of Ca by means of a glucose soln. also produces the same reversible destruction of the elec. responses. H. G.

Uric acid and renal functions. H. LUCKE. *Klin. Wochschr.* 6, 1275(1927); *Physiol. Abstracts* 12, 500.—Detn. of the excretion of uric acid is recommended as the best test of the functional activity of the kidney. For 3 days the patient receives a

purine-free diet, and on the morning of the 4th day 1500 cc. of water is given. The urine is collected half-hourly for 4 hrs., then during longer periods until 24 hrs. have elapsed. Uric acid is estd. in the sep. portions. Disturbances of renal function are indicated by inability to conc. uric acid. In normal cases, after the preliminary diuresis, a concn. of 80 to 120 mg. % is obtained. If a concn. of 80 mg. % is not reached, then the renal function is deficient. Data for 3 cases are given. H. G.

The dielectric constant in physiology. J. GICKLHORN. *Protoplasma* 1, 124-42(1926); *Physiol. Abstracts* 12, 85.—In this review emphasis is laid on the great lack of quant. data for the dielec. consts. of biol. material. Since the dielec. const. of the medium affects the degree of ionization and the soly. of the electrolytes dissolved in the medium, and in colloidal solns. is intimately connected with the state of imbibition, viscosity, surface tension, etc., it is clear that this const. is of profound importance for the understanding of the cell. Not only does the dielec. const. probably vary from tissue to tissue, but it is likely that in the individual cell there are localized electrostatic fields. H. G.

Variations in the blood sugar and glycogen and the action of insulin in rats deprived of the suprarenals. A. ARTUNDO. *Rev. soc. Argentina biol.* 3, 47-67(1927); *Physiol. Abstracts* 12, 447; cf. *C. A.* 21, 3667.—Two weeks after double adrenalectomy the blood sugar is normal in rats. The liver glycogen is diminished on the third day, but returns to normal after 30 days. The muscle glycogen is at first raised, then falls, and returns to normal in the same time. Insulin is more toxic to adrenalectomized rats than to normals. H. G.

Fixation of glucose by red corpuscles in the presence of insulin. KARL HARPUEDER. *Klin. Wochschr.* 7, 266(1928).—The presence of insulin does not lead to an increased glucose fixation by red corpuscles. Cf. Häusler and Loewi, *C. A.* 21, 1470). M. H.

Estrual hormone in the blood of man. HANS HIRSCH. *Klin. Wochschr.* 7, 313-4 (1928).—A substance that leads to typical estrual changes in the vagina of mice can be regularly isolated from 35 cc. of human (male) blood. MILTON HANKE

The hormone-like effect of glucose on the production of insulin. E. GRAFE AND F. MEYTHALER. *Klin. Wochschr.* 7, 358(1928); cf. *C. A.* 21, 3941.—Glucose, injected into the Art. pancreatico duodenalis, leads to a secretion of insulin by the pancreas. The contradictory results of E. Geiger-Pécs were due to improper technic. M. H.

Preparation of female sexual hormone from urine, particularly from the urine of pregnant women. BERNARD ZONDEK. *Klin. Wochschr.* 7, 485-6(1928).—The method of prepn. is outlined but is not given in detail. A detailed description is to appear later. MILTON HANKE

The nature of the oxidation-stimulating action of thyroxine. KURT DRESGL. *Klin. Wochschr.* 7, 504-5(1928).—The tissue respiration method of O. Warburg was used. Thyroxine markedly increases the oxidative rate of liver and kidney tissue. The effect upon the liver is most marked; values 200% in excess of normal are obtained 3 days after a single injection of 1 mg. thyroxine into rats. MILTON HANKE

The substance that controls automaticity of the heart. R. RIGLER AND F. TIENANN. *Klin. Wochschr.* 7, 553(1928).—The substance extd. from the sinus tissue of mammalian hearts according to the method of Demoor is pharmacologically and grossly chemically identical with histamine. It contracts the excised virgin guinea-pig uterus, but not that of the rat. It lowers blood pressure and leads to respiratory distress or failure by contracting the bronchi. The ext. gives a positive Pauly reaction. It reactivates the heart that has stopped because of K deficiency (as does histamine). It is easily sol. in water, dialyzable, thermostable and easily adsorbable. M. H.

Copper in human serum. H. A. KREBS. *Klin. Wochschr.* 7, 584-5(1928).—Normal human serum contains 0.62 to 1.24×10^{-3} mg. Cu per cc. The concn. remains very const. for a given individual and does not, ordinarily, change in disease. The av. value in pregnancy is 1.94×10^{-3} mg. per cc. and in nephrosis is 0.22×10^{-3} mg. per cc. MILTON HANKE

Biological effects of the female sexual hormone. E. STEINACH, M. DORN, W. SCHÖLLER AND W. HOHLWEG. *Arch. ges. Physiol.* (Pflüger's) 219, 306-24(1928).—The authors have prepd. active placenta exts. which are sol. in water and which can be kept for at least two months at a temp. of 3-4°. The addn. of tricresol preserves the material for a much longer time. The water-sol. prepn. is free from protein, resistant to moderate changes in p_H and remains uninjured even at a temp. of 100°. Expts. on the mammary app. and on the uterus are described. BENJAMIN HARROW

Reactivation of the senile ovary and the whole female organism by means of hormone treatment. E. STEINACH, H. KUN AND W. HOHLWEG. *Arch. ges. Physiol.* (Pflüger's) 219, 325-36(1928).—By using the water-sol. hormone (cf. preceding abstract)

results were obtained which coincided with results obtained from the transplantation of ovaries: a full reactivation of sterile, senile female rats that had failed for many months to display any rut. The effect of this reactivation is shown by a resumption of ovulation, by the disappearance of the symptoms of age, and by a normal pregnancy and fecundity.

BENJAMIN HARROW

Vasodilator constituents of tissue extracts. Isolation of histamine from muscle. W. V. THORPE. *Biochem. J.* 22, 94-101(1928).—The method of extn. of the vasodilator constituents was that adopted by Best, etc (see *C. A.* 21, 2140). The whole of the depressor activity of an alc. ext. of muscle seems to be due to histamine. B. H.

Reduction of nitrates in animal tissues. FREDERICK BERNHEIM AND MALCOLM DIXON. *Biochem. J.* 22, 125-34(1928).—The nitrate-reducing system in muscle, and the corresponding system in the liver, are not identical with any of the hitherto described reducing enzymes. The reduction is prevented by the addition of *M*/500 cyanide.

BENJAMIN HARROW

Chemical changes taking place in the proteins of muscular tissue when passing into rigor. H. R. HEWER, HATTI JAIRAM AND S. B. SCHRYVER. *Biochem. J.* 22, 142-3(1928).—It has been shown that gelatin on treatment with acids yields a larger amt. of the diamino-N fraction than does untreated gelatin (cf. *C. A.* 22, 968); and now it is shown that lactic acid produced during the contraction of muscular tissue causes changes in the proteins of the tissue similar to those produced when gelatin is treated with acid.

BENJAMIN HARROW

Quantitative study of the oxidation of phenyl fatty acids in the animal organism. H. S. RAPER AND E. T. WAYNE. *Biochem. J.* 22, 188-97(1928).—Normal phenylpropionic, phenylbutyric, phenylvaleric and phenylcaproic acids when administered to dogs yield amts. of benzoic or phenylacetic acid which indicate that the fatty acid side chain is oxidized quant. in accordance with the theory of β -oxidation. Under the same conditions, phenylnonoic and phenyldecoic acids yields smaller amts. of benzoic and phenylacetic acids, resp., than would be expected if quant. β -oxidation of the side chain takes place; this suggests some other mode of oxidation, in addition to β -oxidation. Cinnamic and phenylisocrotonic acids yield the same amts. of benzoic and phenylacetic acids, resp., as the corresponding satd. acids.

BENJAMIN HARROW

Studies in purine metabolism. V. The nuclear-plasmic ratio of frogs. RICHARD TRUSZKOWSKI. *Biochem. J.* 22, 198-200(1928), cf. *C. A.* 22, 615.—The ratio has a value of approx. double that of mammals.

BENJAMIN HARROW

Studies in creatinine and uric acid metabolism. II. Ingestion of proteins and amino acids and the hourly elimination of creatinine and uric acid. HARRY ZWARENSTEIN. *Biochem. J.* 22, 307-12(1928); cf. *C. A.* 21, 437. Creatinine excretion was not affected by either protein or amino-acid ingestion. The ingestion of 200 g. of Cheddar cheese or of 250 g. boiled egg white had no influence on the uric acid excretion. After meat ingestion, however, a large increase occurred in both creatinine and urea excretions. This is ascribed to the presence of creatinine and uric acid, or their immediate precursors, in the meat. The elimination, then, of both uric acid and creatinine is independent of the amount of purine- and creatine-creatinine-free protein in the diet.

BENJAMIN HARROW

Nature of the action of pancreatic extract on the inhibition of lactic acid formation in muscle. D. R. McCULLAGH. *Biochem. J.* 22, 402-6(1928).—The pancreatic ext. added to an ext. of muscle prevents the formation of lactic acid and of carbohydrate causes an increase in free phosphate content and prevents the esterification of phosphate even in presence of fluoride.

BENJAMIN HARROW

Sexual glands and metabolism. V. Influence of lipid extracts of the testes and prostate on the nitrogen metabolism of rabbits and on the development of the genital organs of rats. VLADIMIR KORENCHESKII. *Biochem. J.* 22, 482-90(1928).—The method of extn. was based on Doys's procedure (*C. A.* 19, 319). None of the fractions from the prostate or testes, injected singly or mixed, was able to prevent the atrophy of the penis, seminal vesicle and prostate of castrated rats, or was able to produce hypertrophy of the genital organs of normal rats. There was an increase (sometimes as high as 20%) in the N metabolism with the simultaneous injection of a particular fraction from the testes and from the prostate. VI. The influence of water-soluble testicular and prostatic extracts fractionated at various isoelectric points upon the nitrogen metabolism of rabbits and the development of the genital organs of rats. VLADIMIR KORENCHESKII AND MARJORIE SCHULTESS-YOUNG. *Ibid.* 22, 491-503.—The methods employed for extn. were based on the one used by Collip for the extn. of the parathyroid hormone (*Trans. Roy. Soc. Canada* 19, 25(1925) and that used by Dudley and Starling

for extg. insulin (C. A. 18, 1361). The results were similar to those recorded above.

BENJAMIN HARROW

Anatomy, physiology and chemistry of Nasmyth's membrane. J. B. STEIN, C. F. HINCH, JR. AND MARGARET M. HOSKINS. New York Univ. *Dental Cosmos* 70, 592-9(1928).—For chem. study, Nasmyth's membrane was sepd. from the teeth by treatment with dil. HCl, followed by washing with distd. water until free from acid. The membrane responded to the Molisch, Millon, xanthoproteic and biuret tests. At times, the test for unoxidized S was positive; after oxidation with HNO_3 , BaCl_2 produced a ppt. of BaSO_4 ; most of the S was probably present in the unoxidized state. After hydrolysis with HCl, Fehling soln. was reduced by some specimens, while a positive reaction for reducing sugar was given by all specimens when the Folin and Wu procedure was used. Nasmyth's membrane is a mixt. of proteins including glucoprotein.

JOSEPH S. HEPBURN

Influence of the work of cows on the composition of the milk. FRIEDRICH HAUN. Z. *Untersuch. Lebensm.* 54, 337-41(1927).—On days when cows were used for work the fat content, sp. gr. of milk and of serum, and the refraction of the milk were higher than on days of rest; ash content and total protein varied within narrow limits.

WILLIAM J. HUSA

Variations in the reducing power (sugar) of normal human blood. H. F. PIERCE AND E. L. SCOTT. *Arch. Internal Med.* 41, 586-600(1928).—The following conclusions are drawn from 141 detns. in several groups by the Shaffer-Hartmann and Folin-Wu methods. The blood sugar of young healthy men and women under basal conditions varied between 80 and 115 mg./100 cc. The true value probably lies between 95 and 99 mg. "The probability is about 95% that the mean of any such series consisting of 25 or more observations made on as many persons will not differ more than 3 times its mean deviation from the true mean. Conclusions based on series contg. fewer than 25 observations are of doubtful significance when the observations pertain to the blood sugar of man. The slightly greater precision which is attained by making many observations on a single person is more than offset by the loss in representative characters of the series."

MARY JACOBSEN

Basal metabolism. I. Correlation of basal metabolic rate and basal pulse rate. J. H. SMITH. *Arch. Internal Med.* 41, 663-6(1928); cf. C. A. 16, 2351, 18, 2202; Sturgis and Tompkins, C. A. 14, 3716.—The relation between basal metabolism and basal pulse rate is confirmed for hyperthyroidism.

MARY JACOBSEN

A hyperglucemia-producing substance from the pancreatic juice and the pancreas of the dog. G. MARTINO. *Arch. sci. biol. (Italy)* 10, 408-37(1927)—See C. A. 22, 1395.

MARY JACOBSEN

Excretory function of the stomach. I. The uric acid, creatine and creatinine content of the gastric juice of normal children. GIOVANNI DE TONI AND ITALO MARCIALIS. *Biochim. terap. sper.* 14, 353-8(1927); cf. Cipriani and Lucca, *Minerva Medica* 1927, 557; Steinitz, *Klin. Wochschr.* 1927, 949.—The total N in the juice of normal children was 30-60 mg./100 cc. In a case of acute gastritis it rose to 143 mg. Gastric juice removed by the Einhorn tube 1 hr. after a test meal of 150 g. rice mucilage boiled in sweetened water contained in mg./100 cc. (ages 8 months to 3 years); preformed creatine (I) 0.71-3.06, total creatinine (II) 3.5-10.5, creatine (III) 3.5-10.4, uric acid (IV) 1.0-4.9, Cl (as NaCl) (V) 142-592. The juice removed from fasting children 3-6 years old 0.5 hrs. after 0.5 mg./kg. histamine had the p_{H} 2.8-3.2 and contained 0.78-1.30 I, 2.73-5.60 II, 2.48-5.70 III, 0.84-1.86 IV and 628-726 V. Neither juice contained glucose. The variations show no direct relation to the age. M. J.

Passage of hemolytic amoceptor through the placenta. F. DE CAPUA. *Pediatrica rivista* 35, 1104(1927).—The blood of young rabbits whose mothers were injected with sheep erythrocytes during pregnancy showed considerable hemolytic power, which, however, was lower than that of the maternal blood.

MARY JACOBSEN

Effect of ultra-violet irradiation of the nitrogen metabolism in the second stage of childhood. U. FERRI. *Pediatrica Rivista* 35, 1110(1927).—A series of irradiations caused only a slight increase (intense irradiation) or decrease (weak irradiation) of N metabolism. All cases, however, presented an increase of urinary NH_3 and amino acids with a parallel decrease of urea.

MARY JACOBSEN

Effect of inhaling ultra-violet rays on the glucose-regulating apparatus of children. P. GORINI. *Pediatrica rivista* 35, 1110(1927).—Direct or indirect inhalation of small doses of ultra-violet rays enhances the glucose metabolism, while large doses depress it.

MARY JACOBSEN

The presence of amino acids in human milk. C. GIAUME. *Pediatrica Rivista* 35, 1114(1927).—Amino acids are always present in colostrum and milk and are secreted

as such. In colostrum the content is 9.86 mg./100 cc. and decreases to 6.12 mg. between the 7th and 12th day after birth. Milk contains 3-9 mg., av. 5.5 mg./100 cc.; the content bears no relation to the stage of lactation or the protein content. It probably depends upon an incomplete synthesis by the mammary gland of proteins from simpler blood constituents.

MARY JACOBSEN

Morphological studies of the liver, especially of its lipoidal substances. S. NUNOSÉ. *Japan Med. World* 8, 8-11(1928).—From a study of 28 still-born and 77 new-born babies it is concluded that lipoids, especially neutral fat, differs markedly in quantity and distribution in these two groups. This fact suggests a rule of metabolism of lipoids in the liver of both still-born and new-born babies, although the chem. nature of the lipoids remains relatively unchanged as tested by microchem. methods even after the death of the baby. The importance of these facts in the medicolegal detn. of still-births is emphasized.

N. KOPPELOFF

Experimental studies on the oxidase reaction of nervous tissue and its significance. K. KUMAGAI. *Japan Med. World* 8, 508(1928).—Death of animals by air embolism, by loss of blood, etc., seems not to affect the oxidase reaction of the nerve tissue. The section of a peripheral nerve on one side produces a reduction of the oxidase granules in the corresponding central nucleus, but the reduction is slight. Under lumbar anesthesia by tropococaine, the oxidase reaction of the nerve cell of the gray matter of the lumbar enlargement becomes most marked in the motor cells of the anterior horn, and only a thin ring of oxidase granules may be seen around the nucleus. Strychnine acting directly on the eyeball brings about a strong oxidase reaction in the retina. Subcutaneous injections of lethal doses of strychnine produce no change in the oxidase reaction of the nerve tissue, but intravenous injections give rise to a slight reduction in cerebral cortex and motor cells of the anterior horn of the spinal cord. Deep anesthesia by subcutaneous injections of morphine produces no change in oxidase reaction of nerve tissue. Slight reduction of the reaction is detected in cerebral cortex after intravenous injection of lethal doses. Generally the more active the function of nerve cells, the stronger their oxidase reaction seems to appear, and the extent and rapidity of the action of a depressing agent on the nerve cell seem to parallel the changes in the oxidase reaction.

N. K.

The influence of yeast on gastric secretion. R. S. ALLEN AND G. E. BURGET. *Am. J. Physiol.* 84, 98-102(1928).—In dogs with Pavlov pouches and in normal human beings yeast did not exert a gastric secretagog action as great as that brought about by a synthetic test meal or by soda crackers and water.

J. F. LYMAN

The carbon dioxide tension of alveolar air during pregnancy. G. TESAURO. *Arch. sci. biol. (Italy)* 8, 69-79(1926).—During later pregnancy, the CO_2 tension of alveolar air corresponds to an av. of 32.6 mm. Hg in contrast to the av. of 40.1 mm. in non-pregnant women. The low CO_2 tension in pregnant women is due to acidosis and is an index of such. Twenty-four hrs. after parturition the CO_2 tension reaches its normal value.

PETER MASUCCI

The action of blood serum on intestinal peristalsis. G. VIALE. *Boll. soc. ital. biol. sper.* 2, 219-21; *Rev. soc. Argentina biol.* 3, 129-33(1927).—There is present in the blood serum of animals a substance which increases the tone and contractions of an isolated intestinal segment. V. showed that this substance is thermostable and alc.-sol.; its action is inhibited by atropine.

PETER MASUCCI

The respiratory exchange of the thyroid gland. A. CHIATELLINO. *Boll. soc. ital. biol. sper.* 2, 228-30(1927).—The respiratory exchange of the thyroid gland is greater than that of any other organ. The av. O_2 consumption for one set of expts. was 22.39 cc. and for another 25.83 cc. per 100 g. gland in one min.

PETER MASUCCI

A demonstration "in vivo" of the gaseous exchange by means of indicators. C. PULCHER. *Boll. soc. ital. biol. sper.* 2, 235-6(1927).—Phenol red and cresol red were injected into the dorsal lymph sac of frogs in order to study the reaction of tissues by means of these indicators. Observations showed that the arterial blood had a p_{H} of about 7-7.2, and the venous blood a p_{H} of about 7.6. The same values were found in the interdigital membrane and in the mesentery exposed to the air.

PETER MASUCCI

The parathyroid hormone. LUIGI CONDORELLI. *Boll. soc. ital. biol. sper.* 2, 250-2(1927).—The behavior of K, Na, P, Cl and Ca in the blood of rabbits treated with parathyroid hormone was studied. There was a decrease in K after 12 hrs. of 2 to 10 mg. % in 9 out of 11 animals. There was a decrease in Na in 8 animals. The decrease in Cl was not const. There was a decrease in inorg. P in 7 out of 11 rabbits. Ca always increased after the injection of the hormone but individual animals reacted differently to the injection of the same quantity of hormone.

PETER MASUCCI

The vasomotor action of carbon dioxide and sodium bicarbonate and hydrogen-ion concentration. GIUSEPPE RUSSO. *Boll. soc. ital. biol. sper.* 2, 756-9(1927).—R. aimed

to show if at const. p_H the tone of the blood vessels was more sensitive to the action of CO_2 (vasodilation) and to $NaHCO_3$ (vasoconstriction) than to other acid or basic substances. By using Trendelburg's technic on toads, R. was able to show (1) that the vasomotor action of CO_2 and $NaHCO_3$ depends on the concn. of H and OH ions of the perfusing fluids and not on any sp. chem. radical; (2) therefore, there is no specificity in the action of these two substances in regulating the tone of the vessels. P. M.

The variations in the iodine number of liver fats under aseptic autolysis. U. LOMBROSO AND A. DI FRISCO. *Boll. soc. ital. biol. sper.* 2, 809-11(1927).—Beef fat and linseed oil were administered to dogs orally to det. the effect on the iodine number of liver fats. A table is given showing the I no.; the variation in the % of fatty acids; and the variation in the % of I no.

PETER MASUCCI

The presence, distribution and manner of elimination of the thyroid hormone (thyroxine) in experimental hyperthyroidism and analogous observation on the behavior of adrenaline and other hormones. E. GIACOMINI. *Boll. soc. ital. biol. sper.* 2, 995-1001(1927).—Chickens, ducks, guinea pigs and dogs were fed various amts. of fresh and dried thyroid gland. The urine and feces were collected and dried. Later, the animals were killed and the blood was collected and dried. Various other organs were ground and desiccated. The dried substances were fed to tadpoles and to axolotl (*Amblystoma tigrinum*). Either complete or accelerated metamorphosis was obtained. These expts. indicate that the thyroid hormone when introduced in large doses into the intestinal tract of birds and mammals enters the circulation, is distributed to the various organs, and the organism tends to eliminate the excess hormone as rapidly as possible through the various ways at its disposal. Adrenaline behaved similarly to thyroid. Suprarenal substance fed to chickens and guinea pigs made it possible to detect adrenaline in the bile and urine by the usual chemical tests *in vitro*. Thus, there is a similarity of behavior between the hormones and certain alkaloids, between hormones and vitamins that also pass into the urine (vitaminuria).

PETER MASUCCI

Further contributions in regard to the inhibiting action of certain sugars on glucose hyperglucemia; with special regard to the mechanism determining the phenomenon. C. CIACCIO. *Boll. soc. ital. biol. sper.* 2, 1029-32(1927).—Normal and starved dogs were given intraperitoneally small doses of fructose and glucose; 30 min. after large doses of glucose were given by mouth. Blood sugar detns. made at intervals show clearly that fructose exerts a definite inhibiting action on glucose hyperglucemia. The inhibiting action is probably connected in some way with the internal secretion of the pancreas.

PETER MASUCCI

Relation between lymph and suprarenal glands. G. VIALE. *Boll. soc. ital. biol. sper.* 3, 5-8(1928).—The injection of dog lymph into other dogs produces a slight hypoglycemia. Normal dog lymph added to Ringer soln. in the proportion of 1 to 20% increases the amplitude and rhythm of the contractions of the perfused frog heart. The lymph of animals without suprarenals is inert. Normal dog lymph injected intravenously into dogs in amts. of 2-20 cc. produces a definite increase in pressure comparable to that of adrenaline. The lymph of animals without suprarenals is inert. Normal dog lymph has a mydriatic action on the isolated frog eye; lymph from animals without suprarenals has not. There are two types of lymph: one having adrenaline action, the other a choline action. Under the control of the suprarenals, the organism forms more of one or the other according to necessity. Also in *Rev. sud-americana endocrinol. immunol. quimioterap.* 11, 96-115(1928).

PETER MASUCCI

The nature of the "vagal substance." G. VIALE. *Boll. soc. ital. biol. sper.* 3, 16-7(1928).—Blood was taken from the right heart of a dog under artificial respiration and tested on an isolated intestinal strip of a guinea pig in a dil. 1:20. The vagus was stimulated for 2 min. Another sample of blood was taken from the right heart and again tested. The activity of the blood greatly increased, even tripled. The stimulation of the vagus increased in the blood of the right heart, the vagotropic substance, which has the same pharmacodynamic and chemical properties of Loewi's "vagal substance."

PETER MASUCCI

Physical and physico-chemical changes in the blood and urine in relation to sea bathing. R. MARGARIA AND A. CHIATELLINO. *Boll. soc. ital. biol. sper.* 3, 24-6(1928).—The density, viscosity, total solids, red blood corpuscles and hemoglobin were detd. on whole blood; lowering of f. p., cond. and η were detd. on the serum before and after bathing. Samples of urine also were tested for quantity, density, cryoscopy, cond., acidity and chlorides. The length of bathing was 15-30 min. and temp. of water 18-20°. There was an increase of 8.5% in the protein content of the serum, an av. increase in density of 6%, viscosity 10.8%, total solids 3.7%, red blood corpuscles 16%, hemoglobin 6.8%. The quantity of urine was increased.

PETER MASUCCI

Investigations on the variations of certain principal factors in the blood under loss of water due to perspiration from work. A. CHIATELLINO AND R. MARGARIA. *Boll. soc. ital. biol. sper.* 3, 12-4(1928).—The viscosity, n , total solids, sp. gr., lowering of f. p., cond., red blood corpuscles, hemoglobin and blood mass were detd. in exptl. subjects before breakfast and after a march of 2 to 6 hrs. without drinking. The loss of wt. was 1.6-3.5%. In general the modifications of the blood tended towards a concn. The increase in concn. was slight for osmotically active substances and electrolytes, marked for plasma proteins, and very marked for the corpuscles. There was a diminution in blood mass.

PETER MASUCCI

The action of the lactate ion on the vessel tone in relation to the hydrogen-ion concentration. G. RUSSO. *Boll. soc. ital. biol. sper.* 3, 49-52(1928).—Ringer soln buffered with phosphates but without bicarbonate was divided into 2 parts; one was tested as such, and to the other was added 0.1% Na lactate and also tested for its effect on the tone of the vessels by the Trendelenburg technic. The presence of the lactate ion in the perfusion liquid does not modify the tone of the vessels. It seems unlikely that lactic acid plays a special part in vasomotor action distinct from the equil. $[H]/[OH]$.

PETER MASUCCI

The influence of the pancreas upon protein and hydrochloric acid hyperglucemia. S. RACCHIUSA. *Boll. soc. ital. biol. sper.* 3, 101-5(1928).—The effect of HCl, peptone, and meat was studied on partly and completely depancreatized dogs before and after the operation. The results are given in a table. There was found no relation between protein hyperglucemia, HCl hyperglucemia and the external secretion of the pancreas.

PETER MASUCCI

The effect of pancreatic secretion on the alkali reserve in the blood and on the hydrogen-ion concentration in the gland. EINAR HAMMARSTEN AND ERIK JORPES. *Acta med. scand.* 68, 205-14(1928).—Protracted secretion from the pancreas caused by secretin injection causes an accumulation of H-ions in the gland but the alk. reserve of the blood is unaffected.

S. MORGULIS

The pentose content of the dog pancreas following ligation of the ducts. EINAR HAMMARSTEN, GRETA HAMMARSTEN AND HERBERT OLIVECRONA. *Acta med. scand.* 68, 215-7(1928).—Expts. lead to the conclusion that the pentose-nucleic acid compd. is found chiefly in the secreting epithelium of the pancreas.

S. MORGULIS

Coagulation of hemoglobin in the presence of organic substances. BR. JIRGENSONS. *Biochem. Z.* 193, 109-21(1928), cf. *C. A.* 22, 967.—Coagulation of hemoglobin by KCl or $MgCl_2$ is affected in a definite way by certain org. substances. Capillary active substances with a small dielec. const. (ether, $CHCl_3$, amyl alc., isobutyl alc., acetone, methylurethan) have a sensitizing effect in small doses; in large doses they have the same effect if the salt concn. is low, but produce a stabilizing effect in the presence of large salt concns. Capillary inactive substances (mannitol, glucose) have a slight stabilizing action.

S. MORGULIS

The physiology of plasmalogen. I. Resorption of plasmalogen and the conditions necessary for alimentary plasmalogenemia. R. FEUGEN, K. IMHAUSER AND M. WESTHUES. *Biochem. Z.* 193, 251-63(1928).—Plasmalogen, which is found abundantly in animal food, produces an alimentary plasmalogenemia. Plasmal does not have this effect either because the sucrose is impermeable to it or because it is at once combined or otherwise chemically altered upon entering the blood stream. Whereas plasmalogen intravenously injected can be detected in the blood for an hr., the organism does not tolerate the free plasmal which almost at once disappears from the blood stream. However, this disappearance is due to the effect of the tissues as it does occur in blood *in vitro*.

S. MORGULIS

The effect of gastric juice on the vessels of the isolated ear. M. F. NESTURCH. *Zhurnal exptl. biol. Med.* 9, 34-8(1928).—The isolated ear of the rabbit was perfused with normal gastric juice of the dog, the neutralized juice and with HCl solns. of the same strength in dilns. of 1:250-1:10000. The vasomotor response was most pronounced with the normal gastric juice dild. 1:250, 1:500 and 1:7000 which gave constriction and dilatation was obtained in dild. of 1:5000. With neutralized juice dilns. of 1:250, 1:1000, 1:5000, 1:7000 and 1:8000 produced vasodilatation, while the same effect was obtained with HCl in dilns. 1:250 and 1:500.

S. MORGULIS

Determination of body surface of pigeons. S. N. MAZKO AND O. P. MOLCHANOVA. *Zhurnal exptl. biol. Med.* 9, 37-43(1928).—The body surface of pigeons was detd. by spreading without stretching the entire skin over paper, the area of the tracing being measured by counting the sq. mm. covered. The surface calculated from Meeh's formula $S = K^3 \sqrt{W^2}$ gives an av. value for $K = 9.6$, $\pm 2.7\%$ deviation from the mean.

Respiration expts. show that the heat production of the pigeon per hr. and sq. m. is 46.8 cal. S. MORGULIS

Sugar consumption of tissue cultures of pure strains of fibroblasts. A. A. KRONTOVSKII AND U. JAZINUISKA-KRONTOVSKA. *Zhurnal ekspl. biol. Med.* 9, 140-50(1928).—A pure culture of fibroblasts from the chick embryo heart changes the sugar concn. of the medium from 0.13 to 0.05% in 48 hrs. during which the transplant has grown from 0.45-1.1 sq. mm. to 6.1-11.4 sq. mm. S. MORGULIS

Value and physiological variations in the alkali reserve of nurslings and children. E. LEENHARDT AND J. CHAPTAL. *Rev franç pédiatrie* 3, 641(1927); *Bull. soc. hyg aliment.* 16, 32-3(1928).—Measurement of the alkali reserve of the blood is at the present time the most important element in appreciating conditions of acidosis. L. and C. carried out detns on 74 normal subjects *via* Van Slyke, which allows of detg the total bicarbonates by extn of total CO₂. During the 1st few days after birth the alkali reserve is relatively high, reaching an av. of 55.8 cc. %; it gradually falls from the 2nd to the 5th month to an av. of 49 cc. %, while from 5 to 15 yrs. it rises from 55.80 to 63.68 cc. which is comparable to that of adults. To explain these variations L. and C. consider that at birth the infant receives alkali from the mother, and it generally falls off thereafter. On the other hand, growth and the high heat losses which occur during childhood cause an increase in nutritive exchanges, these may produce an increase in acid wastes, and their neutralization requires a greater amt of alkali salts than at other periods of life; in addn., there are the requirements of the bones for basic mineral salts. The basal metabolism and alkali reserve curves vary in opposite directions, so that the alkali reserve would seem to be a function of the intensity of nutritive exchanges. Diet also has a considerable effect on the alky of the blood, very distinct differences being noted, in particular, between breast-fed and bottle-fed infants. These results allow one readily to imagine the possible influence of troubles in nutritive exchanges on the alky. of the blood in children. This throws additional light on the already proven hypothesis of the existence (and at time of the function) of acidosis in states of dysnutrition. Finally, the beneficial effects of ultra-violet rays on the alkali reserve (which is also found in normal physiol. conditions) enables one to explain how this treatment acts in dystrophic conditions and constitutes a further proof of the function of acidosis in these conditions. A PAPINEAU-COUTURE

The sulfur wastes of hemolysis and their fate in the organism. M. LOEPFER, R. GARCIN, A. LESURE AND J. TONNET. *Bull. soc. chim. biol.* 10, 316-21(1928); cf. C. A. 21, 2311, 3948.—The circulating S wastes on arriving at the liver by the portal vein are either oxidized, combined, fixed or eliminated. The S is fixed by the liver cells and pigment; it is oxidized and combined as sulfoconjugates in toxic aromatic substances; and it is eliminated through the bile as taurine. The normal S content of the circulating blood or *themia* is from 0.07 to 0.10 g. per l. of which about 20% is neutral S. This ratio of oxidized to neutral S is very const. in health but may be radically changed in liver disease. Along with the liver the suprarenals regulate the *themia* by both thiopexic and thiooxidizing action. The role of S in melanin formation and skin pigmentation is discussed. L. W. RIGGS

Buffer power of gastric liquids. MICHEL, POLONOVSKI AND J. SYWNGEDAUV. *Bull. soc. chim. biol.* 10, 443-9(1928).—See C. A. 22, 621. L. W. RIGGS

Mineral composition of the tissues of man and of animals. L. LEMATTE, G. BOINOT AND E. KAHANE. *Bull. soc. chim. biol.* 10, 553-67(1928); cf. C. A. 21, 2914; 22, 2177.—P is not the sp. metalloid of the cerebral functions. In farm mammals the thymus contains more P per unit than the brain and the testicle of the bull contains nearly as much. In man P is slightly greater per unit of dry matter in the brain than in the spleen or liver. Fe is more abundant in the spleen than in any other organ and is probably of importance in the genesis or reserve of the erythrocytes. The quantity of I in organs other than the thyroid is infinitesimal. The ratios between S and N vary within large limits in the same organ in the different species. This indicates a difference in the mol. compns. of their proteins. L. W. RIGGS

Relation of clumping and disintegration of platelets to body metabolism. C. A. MILLS, H. NECHELES AND MAO-KENG CHU. *Chinese J. Physiol.* 2, 219-27(1928).—With the technic used the time of complete clumping of the platelets corresponds closely with the first appearance of fibrin in the blood. Protein food or glycooll causes more rapid platelet clumping and fibrin formation, as well as a rise in metabolism. Even when the sp. dynamic action of protein or glycooll is not greater than that of carbohydrates or fats there is a shortening of clotting time and platelet clumping. Carbohydrates or fats do not cause a quickening of these processes. Increasing the metabolic rate by thyroid feeding does not speed up platelet clumping or blood clotting. Therefore the blood

changes cannot be directly due to changes in general metabolism. Very rapid platelet clumping may be brought about by the subcutaneous injection of tissue fibrinogen, without any metabolic change. Exercise and adrenaline injections quicken platelet clumping and fibrin formation, although adrenaline is without influence on platelets or blood clotting *in vitro*. L. W. RIGGS

The hypophysis and the urinary excretion of inorganic phosphate, sulfate and chloride. PING-CHI TUNG, HSI-CHUN CHANG AND SCHMORL M. LING. *Chinese J. Physiol.* 2, 231-45(1928).—In 6 dogs the elimination of phosphate continued uninterruptedly after hypophysectomy. In 5 acute expts. there was a typical fall of the urinary chloride output after the operation. The phosphate output usually showed a preliminary rise followed by a fall up to the 4th to 5th hr. and followed by a normal recovery. The temporary disturbance of the inorg. phosphate secretion is attributed to the absorption of a hypophyseal hormone during manipulation of the gland at its removal, for the application of fresh pituitary ext. to the brain surface of dogs with hypophyses intact, duplicated the change in the urinary inorg. phosphate following hypophysectomy. L. W. RIGGS

Relation of the mitochondrial-Golgi complex to secretion. I. The pancreatic acinar cell of the toad. WEN-CHAO MA. *Chinese J. Physiol.* 2, 247-54(1928). L. W. RIGGS

Oxidation-reduction power of the kidney in the course of diuresis. Elimination of colors used for the measure of r_H . L. JUSTIN-BESANÇON AND R. WOLFF. *Compt. rend. soc. biol.* 98, 756-8(1928).—The colors eliminated in the urine following the administration of methylene blue, thionine, toluidine blue, janus green, indigo, Nile blue, phenosafranin or neutral red indicate a r_H of the renal cells ranging from 3 to 15. In the case of methylene blue the color in fresh urine was compared with that of a standard soln. of methylene blue, the color of the latter being adjusted to that of urine by the addn. of bromothymol blue. The color in the fresh urine indicated the *preformed blue*. To a second sample of the same urine was added AcOH and H_2O_2 , when after boiling the color developed was estd. as *total blue*. The ratio total blue/preformed blue is the ratio of reduction. Of the colors named above, methylene blue, toluidine blue, thionine, and neutral red color the urine and are adapted to this test; the remaining colors named are not. The substances in normal urine do not cause oxidation-reduction reactions comparable to those caused by passage through the kidney. The p_H of the urine was measured electrically using the quinhydrone or H electrode. Influence of the p_H . *Ibid* 758-60.—A total of 34 observations on 5 subjects with the p_H of the urine ranging from 5.13 to 8.0, showed that the proportion of chromogen was independent of the concn. of methylene blue. When the p_H of the urine was above 6.3 all the blue was eliminated as a leuco base. With a p_H below 6.3 there is eliminated varying proportions of blue and the leuco base. L. W. RIGGS

Functional excitation of the normal kidney by the ingestion of milk serum. MAURICE RENAUD, J. MULLER AND A. MIGET. *Compt. rend. soc. biol.* 98, 832-4(1928).—Milk serum, prepd. by removing the fat and albumins, was fed during 2 days of fasting to 80 subjects representing sound and diseased kidney conditions. Each subject ingested a measured quantity of distd. water on the first day and an equal vol. of milk serum on the following day. The emission of urine was observed by 15-min. periods during the 90 min. following the ingestion of water or milk serum. During this period the output of urine following the ingestion of milk serum was nearly 3 times that following the ingestion of an equal vol. of water, and the output of urea during the same period was often 3 or 4 times greater. Accordingly milk serum is an actual kidney stimulant and diuretic. L. W. RIGGS

Reply to B. Gayet and M. Guillaumie "on the regulation of the internal pancreatic secretion." JEAN LABARRE. *Compt. rend. soc. biol.* 98, 859-61(1928); cf. C. A. 22, 984.—It is maintained that physiol. insulinemia is under the control of the central nervous system, since the insulino-secretory function is arrested immediately after section of the pneumogastric nerves. L. W. RIGGS

Digestion of raw starch by the pancreatic juice of the dog. E. POZERSKI. *Compt. rend. soc. biol.* 98, 1196-8(1928); cf. C. A. 21, 2727.—Raw untreated starch is not digested by the pancreatic juice of the dog, but if the starch is ground or acidified with HCl and then s^{m} made alk. it is slightly digestible. If the starch is both ground and acidified and then is made alk. it is even slightly more digestible. L. W. RIGGS

Functioning of the anterior lobe of the hypophysis. F. GRUETER. *Compt. rend. soc. biol.* 98, 1215-7(1928).—The relations of the hypophysis to the organs of generation are discussed. L. W. RIGGS

Digestion of fats and proteins after excision of the stomach. I. GAVRILA AND

J. DANICICO. *Compt. rend. soc. biol.* 98, No. 9, Séance Jan. 31, Cluj, 627-9(1928).—In 13 cases of excision of the human stomach the coeff. of absorption of fats averaged 78.9%, the normal figure being about 95%. In 5 of the cases the coeff. of absorption of proteins was 90.5 to 95%, the same as in normal subjects. In the 8 other cases the coeff. of absorption of proteins ranged from 72.4 to 87.1%. L. W. RIGGS

Extraction of the hormone of the yellow body. PIERRE GLEY. *Compt. rend. soc. biol.* 98, No. 9, Séance Mar. 3, Paris, 564-5(1928).—The yellow bodies obtained from sows are ground and allowed to macerate in water acidulated with $H_2C_4H_2O_4$. The maceration contains the hormone which is sol. in water. This ext. is treated with $Pb(AcO)_2$ which ppts. various toxic substances but not the hormone. The latter is pptd. by $Cu(OH)_2$ and the ppt. is redissolved in acid. After elimination of the Cu by H_2S and neutralization, the soln., which is free from proteins, may be injected into the animal. This prepn. causes congestion of the female genital tract and inhibits the estrus. It is not toxic in doses sufficient to show its physiol. properties. L. W. RIGGS

Regulation of the glucemia of diabetic dogs by the transplanting of varying quantities of pancreatic tissue. RENÉ GAYET AND (MLLE.) M. GUILLAUME. *Compt. rend. soc. biol.* 98, No. 9, Séance Mar. 3, Paris, 584-6(1928); cf. C. A. 22, 984.—The findings show that the tissue transplanted is the seat of a process of internal secretion of insulin which is remarkably regular and precise, and in all respects comparable to that, which under physiol. conditions, the pancreas furnishes for the regulation of the glucemia. L. W. RIGGS

Metabolic changes in the body of female pigeons at ovulation. OSCAR RIDDLE. *Proc. Am. Phil. Soc.* 66, 497-509(1927).—In female doves induced to ovulate repeatedly in rapid succession the ova normally respond by the storage of addnl. material. This change in the germ-cell represents a reduction in its metabolic level and is of importance to sex theory. A series of bodily changes begins at the same time that one of the small ova suddenly attains a new rate of growth (perhaps 26 times its former rate) about 108 hrs. before this ovum is released from the ovary. Within the 108 hrs., or slightly more, the oviduct increases in wt. by 1000%, the suprarenals hypertrophy by a variable but notable amt., the blood sugar is raised 20% and the blood Ca more than 100%. Within a period of 50 hrs. the blood fat increases 35% and the lipid blood P 50%. Manoilov blood tests indicate a change toward a "male" reaction, and this is tentatively interpreted as indicating an increased somatic metabolism. L. W. RIGGS

The amide nitrogen on the blood. SIDNEY BLISS. *Science* 67, 515-6(1928); cf. C. A. 20, 2358.—The kidney contains an enzyme that is capable of liberating NH_3 from its combinations in the blood. Ammonia formed in the tissues is the source of the amide N of the blood. The amide N of the blood is to be carefully distinguished from the conception of an "ammonia-precursor" or "ammonia mother substance." L. W. RIGGS

Liquid exchange. VI. Decline of tissue swelling produced by local asphyxia in man with sound and with diseased kidneys. TOMOTKA YAMAGUCHI. *Tōkokū J. Exptl. Med.* 10, 350-69(1928); cf. C. A. 22, 984. L. W. RIGGS

The origin of indican in the fetal blood. KŌICHI SHIBAYAMA. *Japan J. Med. Sci.* Sect. II, 1, 111-7(1927).—The indican and amino acid N content of the blood of the fetus is larger, the non-protein N content is smaller than that of the mother's blood. The amount of indican and amino acid N diminishes in the following order: fetal blood, blood from the placental hematoma, blood from the cubital vein. *Bacillus coli communis* was not detected in the feces of the new-born child until 12 to 24 hrs. after delivery. S. believes that the indican in the fetal blood is originated by the metabolism of the fetus as well as of its mother; therefore, the accumulation of indican in the fetal blood. Both intestinal and extra-intestinal formation of indican occur in the human body. G. SCHWOCH

Physical basis of muscle function. I. Apparatus for determination of the elasticity and the internal friction of muscle. FRIEDRICH RICHTER. *Arch. ges. Physiol.* (Pflüger's) 218, 1-16(1927).—Description of app. used. II. Changes in the elasticity and in the internal friction of muscles during chemical contraction. *Ibid* 17-36.—Study of contraction, as induced by KCN, acetylcholine, NH_4OH , and caffeine, upon the elasticity. G. H. S.

Metabolism of birds and metabolism in general. Relation between gas metabolism and respiratory rate. FRANZ GROEBBELS. *Arch. ges. Physiol.* (Pflüger's) 218, 98-114(1927).—Study of the metabolism of 70 birds, belonging to 17 different species, showed that they could be divided into 2 categories, the distribution being unrelated to the type of food utilized or to the type of reserve substance developed. The first class is characterized by a true chem. heat regulation, a relatively low nutritional requirement, a

great resistance to hunger, a slight inclination to activity, a relatively low body temp. and a low relative O_2 utilization. The second class regulate their temp. through the specific dynamic action of their food and by bodily activity, have a relatively high nutritional requirement, slight resistance to hunger, a rapid rate of digestion, show marked activity and have a high body temp. and a high relative O_2 utilization. In birds the increase in O_2 use caused by activity is more than 20%. Specific dynamic action in pigeons is 20–30% and falls considerably with protracted hunger. Physical heat regulation appears in birds of different species at different temps., and when it becomes manifest the gas metabolism falls while the respiration and temp. increase. During brooding O_2 use is augmented, in pigeons up to 30%, and the temp. is elevated. From the standpoint of the physiology of metabolism apparently mammals may also be divided into two types. G. H. S.

Muscle contraction. VI. Reduction in volume and the action current. Ion theory of stimulation. E. ERNST. *Arch. ges. Physiol.* (Pflüger's) **218**, 137–47(1927).—The action current and the reduction in vol. taking place during muscle contraction show approx. parallel curves. G. H. S.

Regulation of metabolism. IX. Effect of the sympathetics on muscle. AUGUSTE HOFFMANN AND ERNST WERTHEIMER. *Arch. ges. Physiol.* (Pflüger's) **218**, 176–97(1927); cf. *C. A.* **22**, 109.—Study was made of the influence of the sympathetics on the utilization of glycogen by muscles. During strychnine intoxication of frogs more glycogen is used by stimulation of the sympathetic than through motor stimulation. The seasonal changes in glycogen content are also to some degree controlled by the sympathetics. The administration of adrenaline, which causes a reduction in glycogen, is less effective in the muscle deprived of its sympathetic innervation. In strychnine poisoning, which is associated with a strong sympathetic stimulation, the muscle lacking sympathetic connection shows fatigue and attendant phenomena more slowly than does a control muscle with normal innervation. G. H. S.

Connection between blood sugar content and blood coagulation time. ALEXANDER PARTOS AND FRANZ SVEC. *Arch. ges. Physiol.* (Pflüger's) **218**, 209–15(1927), cf. *C. A.* **22**, 617.—The speed of blood coagulation is directly related to the amt. of sugar present in the blood. As the sugar content is increased the coagulation time is shortened. These conclusions are based upon the changes induced by adrenaline, theobromine, morphine, novirudin, normal horse serum and glucose, through altering the Ca content, the production of alimentary hyperglucemia and through studies on animals subjected to laparotomy. G. H. S.

Respiration of fatty tissues. M. N. SHATERNIKOV, O. P. MOLCHANOVA AND M. T. TOMME. *Arch. ges. Physiol.* (Pflüger's) **218**, 216–21(1927).—See *C. A.* **22**, 982. G. H. S.

Graphic methods of determining the total gas metabolism of man in work experiments. J. G. DUSSER DE BARENNE AND G. C. E. BURGER. *Arch. ges. Physiol.* (Pflüger's) **218**, 222–38(1927); cf. *C. A.* **21**, 3659.—Description of 3 methods that may be utilized. G. H. S.

Gas metabolism of man in static work. J. G. DUSSER DE BARENNE AND G. C. E. BURGER. *Arch. ges. Physiol.* (Pflüger's) **218**, 239–60(1927). G. H. S.

Influence of the central nervous system on the deposition of fat in the liver in animals maintained in a rarified atmosphere. A. LOEWY AND J. MOSONYI. *Arch. ges. Physiol.* (Pflüger's) **218**, 285–90(1927).—Existence in a rarified atm. leads to certain changes, particularly as regards fat, in the liver of rabbits and cats, and the influence of the central nervous system on the character of these changes was detd. by section of the spinal cord in the cervical region. No clear-cut chem. differences could be detected attributable to section of the cord, although a distinct effect upon histology was readily apparent. G. H. S.

Equalization of the chloride concentration between red blood cells and sodium chloride solutions and its relationship to "osmotic resistance." E. SKUJIN. *Arch. ges. Physiol.* (Pflüger's) **218**, 343–53(1927).—Within a period of 24 hrs. a complete equil. between the chlorides of the NaCl soln. and those of the red blood cells suspended in it does not become established. The divergence from an equalization is max. in 0.6% NaCl and it appears in all hypotonic solns. At the limiting concn. (0.6%) a break in the curve appears, and as the hypotonicity increases the divergence from a state of equil. becomes less. At this limiting concn. hemolysis begins. The maintenance of this failure to establish an equil. is a property of living cells, for with dead cells a complete equalization with hemolysis takes place. Treatment with CO_2 , simple aging and narcosis tend to reduce the difference between the chloride concns. of the cells and the surrounding fluid. G. H. S.

Irradiation substances in the heart. H. ZWAARDEMAKER. *Arch. ges. Physiol.* (Pflüger's) **218**, 354-73(1927).—See *C. A.* **21**, 3628. G. H. S.

Formation of urine in the frog kidney. XIII. Mechanism of purine diuresis. WILLI WOHLBERG. *Arch. ges. Physiol.* (Pflüger's) **218**, 448-68(1927); cf. *C. A.* **22**, 108.—With the surviving artificially perfused frog kidney caffeine and theophylline cause a marked diuresis, one which is always reversible if high concns. are used. Low concns. of caffeine (1.5 or 10,000) and theophylline (below 1.100,000) have no effect on the tubules, but act rather upon the glomerulus. Suffocation and narcosis are inhibitory, but these inhibitory effects can be overcome by higher concns. G. H. S.

Blood-sugar values after ligation of the pancreatic duct. O. GALEHR, P. LADURNER AND L. UNTERRICHTER. *Arch. ges. Physiol.* (Pflüger's) **218**, 477-87(1927).—Following atrophy of the pancreas consequent upon ligation of the duct it was found that normal sugar levels were maintained, and the usual course of the "hypoglycemic reaction" took place. Such animals do, however, show a diminished tolerance for glucose. G. H. S.

Absorption of phenol red by the blood of different animals. L. BRAUN. *Arch. ges. Physiol.* (Pflüger's) **218**, 523-7(1927).—The absorption of phenol red by blood does not correlate directly with the capacity of the bloods to cause a breaking down of acetylcholine. From a dyestuff soln. having a concn. of 0.35 mg. per cc. human and rabbit bloods absorb about 74% of the dye, cat and dog bloods about 65%; of the sera, human and rabbit absorb about 21%, cat and dog 13-15%. G. H. S.

Oxygen utilization of Purkinje's fibers. W. KOLMER AND W. FLEISCHMANN. *Arch. ges. Physiol.* (Pflüger's) **218**, 530-1(1927).—Results of work with the hearts of sheep and calves showed that the trabecular substance utilized about 10 times as much O_2 per unit of wt. as did the Purkinje fibers. G. H. S.

Heart vagus. II L. OTTO. *Arch. ges. Physiol.* (Pflüger's) **218**, 532-4(1927).—The vagus appears to have a direct action on the dog heart, as is revealed by expts. involving the use of atropine and pilocarpine under diverse conditions. G. H. S.

True acidity of the surviving testis and epididymis of the steer. T. VON LANZ AND G. MALYOTH. *Arch. ges. Physiol.* (Pflüger's) **218**, 535-52(1928).—By means of a micro-electrode the p_H of the testis was found to be 6.7, of the epididymis 6.1. The values differ slightly from those obtained in living, as contrasted with surviving, tissue. G. H. S.

Secretion of pancreatic juice—a glucolytic factor in the blood. E. B. BOLDUREV. *Arch. ges. Physiol.* (Pflüger's) **218**, 553-67(1928).—In the healthy fasting animal fluctuations in blood sugar occur at regular time intervals. During periods of pancreatic secretion the sugar content is lower than during the intervening intervals. Furthermore, suppression or inhibition of secretion, or a removal of the secreted material through a fistula causes the blood sugar to rise. With intense gastric secretion the blood sugar becomes greater. Pancreatic juice contains a glucolytic enzyme and there is a direct parallelism between the appearance of this enzyme in the blood and the amt. of sugar in the blood. Some chem. compds. and drugs which stimulate pancreatic secretion also reduce the blood sugar. G. H. S.

Effect of the anterior lobe of the hypophysis upon sexual characters in the male. H. E. VOSS AND S. LOEWE. *Arch. ges. Physiol.* (Pflüger's) **218**, 604-9(1928).—The hormone of the anterior lobe is in no way species specific in its action, as is shown by the fact that the implantation of very small amts. of the tissue from the sheep has a very marked effect upon sexual development in mice. The action involves primarily changes in the testis, other changes being secondary. G. H. S.

Behavior of different protein decomposition products in intermediary metabolism in angiotomized dogs. NINA KOCHNEVA. *Arch. ges. Physiol.* (Pflüger's) **218**, 635-41(1928).—The intestinal wall is permeable for complex amino acids as well as for the simpler ones. In fasting animals there are slight but definite differences in amino N and polypeptide N between the blood entering and that leaving the different organs. In fasting animals the spleen is chiefly involved in yielding polypeptide N to the blood. During digestive periods polypeptide formation takes place not only in the liver (0.62 mg. %), but also in the spleen (0.5 mg. %), intestine (0.42 mg. %), muscles (0.14 mg. %) and kidneys (0.56 mg. %). G. H. S.

Phosphorus in intermediary metabolism in angiotomized dogs. A. J. CHARIT. *Arch. ges. Physiol.* (Pflüger's) **218**, 642-6(1928).—In the intermediary metabolism of P 5 organs are involved; inorg. P is absorbed by the intestine and a portion of this is retained by the liver and through the action of the hormones of the adrenals and the pancreas is transformed into org. compds. That portion which is not held back by the liver is removed by the kidneys and excreted in the urine. G. H. S.

Potassium and dialyzable and non-dialyzable calcium in intermediary metabolism in angiotomized dogs. S. V. NEDSVEDSKII. *Arch. ges. Physiol.* (Pflüger's) 218, 647-54(1928).—When mixts. of K and Ca are introduced into the intestine, K is the first to be absorbed. In the intestinal wall the Ca enters into combination with colloidal substances. In the liver this process is reversed, and the Ca then becomes dialyzable. In this state the Ca, together with the K, is carried through the tissues by the blood, and during its passage through the intestinal wall a portion of the Ca again enters into colloidal combination. A large part of the K is excreted through the kidneys, while but little of the Ca is disposed of in this way. The spleen retains some of the K. G. H. S.

Formation and fate of creatine and creatinine in angiotomized animals. W. O. MOCHNATSCH. *Arch. ges. Physiol.* (Pflüger's) 218, 655-60(1928).—Studies upon creatine metabolism in angiotomized animals do not indicate a strict connection between these processes and the liver. In fasting animals both the liver and the kidneys are involved, although during digestion the liver seems to be the organ concerned. Creatine thus formed passes into the circulation from which it is withdrawn by the other organs, the intestinal wall retaining relatively large amts. G. H. S.

Formation and distribution of sugar in the organs in angiotomized dogs, both during fasting and in digestion. NINA KOCHNEVA. *Arch. ges. Physiol.* (Pflüger's) 218, 661-6(1928).—In fasting dogs sugar is continuously being thrown into the circulation from the liver and reaches its highest concn. in the blood leaving this organ. From the blood it is taken up by the other organs, in largest quantities by the small intestine, duodenum and pancreas. Muscle also takes a large amt. of sugar, the kidneys but little, and practically none is withdrawn by the spleen and the adrenals. In animals on an exclusively protein and fat diet all vascular beds have the same sugar content during digestive periods. Contrasted with the fasting animal, after the administration of sugar the blood of the portal and pancreaticoduodenal veins contains the highest concns. of sugar. Most of the carbohydrate is retained by the liver while the balance that remains in the circulation is taken up by the kidneys and the muscles. The spleen is but little involved. G. H. S.

Water content of the blood of different circulation beds in angiotomized dogs. L. I. KRYŽANOVSKII. *Arch. ges. Physiol.* (Pflüger's) 218, 667-9(1928).—After the administration of moderate amts. (200 cc.) of water contg. 10-20% of solids to dogs the amt. of water to be taken up fluctuates between 0.15 and 0.95 cc. per 100 cc. of blood. On the av. absorption amts. to 0.4-0.5%. In fasting animals the water content of the portal vein is the same as that of the femoral artery. There is undoubtedly a direct connection between the rate of absorption of water from the intestine and the rate of excretion by the kidney. The excess of water taken up from the intestine is retained by the liver, as is the case after feeding with milk. G. H. S.

Origin and distribution of ammonia in angiotomized dogs. A. D. CHOLOPOV. *Arch. ges. Physiol.* (Pflüger's) 218, 670-6(1928); cf. *C. A.* 21, 1142.—The NH_3 of the blood of dogs is derived from 3 sources, bacterial decompn. being of primary importance. Portions are also assocd. with the action of the internal secretions of the kidneys and with digestive processes in the intestine. The liver retains NH_3 , but does not act upon amino acids to produce NH_3 for delivery. Pancreas, spleen and muscle neither deliver NH_3 to the blood nor remove it from the blood. G. H. S.

Oxygen deficit of arterial blood under diminished atmospheric pressure. ALFRED FLEISCH. *Arch. ges. Physiol.* (Pflüger's) 218, 690-7(1928).—In rabbits it was found that the progressive reduction of the atm. pressure from 730 to 330 mm. Hg causes the percentage O_2 satn. of the arterial blood to fall from 92 to 59%. When the pressure is reduced suddenly to 330 mm. the O_2 satn. falls to but 40.6% (av.) There is no evidence that such reductions in pressure cause an active secretion of O_2 in the lung. G. H. S.

Effect of feeding spleen on hemopoiesis. A. ZIII. *Arch. ges. Physiol.* (Pflüger's) 218, 736-48(1928).—The feeding of spleen may lead to hemopoiesis or to a reduction in blood cells. The effect of spleen feeding is detd. by the quantity fed and the individuality of the animal fed. In general, large doses reduce cell counts, small doses increase them. In anemic animals spleen feeding has but a slight effect in reducing the no. of cells, but the hemopoietic action may be very pronounced. On the contrary, animals with high counts react to large doses with a definite increase in cells; to small doses with but a very slight, or no, hemopoiesis. Tests on man indicate that only those with anemia show an increased cell count. The activity of the spleen is not lost by desiccation, and aq. exts. are effective. G. H. S.

The regulation of the acid-base balance of the body. NOAH MORRIS AND STANLEY GRAHAM. *Glasgow Med. J.* 28, 239-60(1928).—A review. M. H. SOULS

The thyroid gland and thyroxine. GEORGE BARGER. *Pharm. J.* 119, 609-14, 623; *Chemist and Druggist* 107, 700-2(1927).—A detailed review of hormones in general, of the functional history of the thyroid gland, the chem. history of thyroxine and its structural formula, and a discussion of the I content of the thyroid gland. S. W.

Calcium and inorganic phosphorus in the blood of rabbits. III. Periodic and progressive variations in normal rabbits. WADE H. BROWN AND MARION HOWARD. *J. Exptl. Med.* 47, 637-62(1928); cf. *C. A.* 22, 1800-1.—Detns. of Ca and inorg. P were made on the blood of 5 groups of normal animals over a period of 4-8 months. The material included animals from recently acquired stocks as well as animals that had been living under laboratory conditions for long periods of time. The results were analyzed with especial reference to the occurrence of periodic and progressive variations in the abs. amt. of Ca and inorg. P and the relations between the 2 substances. Among animals living in the lab., both Ca and inorg. P, as well as all expressions of the equil. between the 2 substances, exhibited a definite tendency to a progressive increase or decrease, as the case might be, and clearly defined periodic variations occurred in all classes of animals. The progressive change was most marked in the case of inorg. P, the periodic change in the case of Ca, while both conditions were clearly shown by various expressions of the relation between Ca and inorg. P. C. J. WEST

Electrophoresis of the blood platelets of the horse with reference to their origin and to thrombus formation. H. A. ABRAMSON. *J. Exptl. Med.* 47, 677-83(1928).—The cataphoretic velocity of blood platelets (horse) in plasma is between 0.40 and 0.51 μ per sec. per v. per cm. The mean velocity obtained from 5 horses is 0.45 μ . The velocity of polymorphonuclear leucocytes in similar specimens is practically identical with that of the platelets. With spontaneous agglutination of platelets, white cells and red cells, there is no change in the cataphoretic velocity incidental to aggregation. The possible surface composition of platelets and white cells is briefly discussed and the bearing of these findings on the origin of blood platelets and the mechanism of thrombus formation is demonstrated. C. J. WEST

Relative reactions within living mammalian tissues. X. Litmus constituents as vital stains: their preparation and relative usefulness. ROBERT ELMAN, D. R. DRURY AND P. D. McMASTER. *J. Exptl. Med.* 47, 777-96(1928).—Methods have been devised for the sepn. and isolation of the important constituents of litmus, azolitmin and erythrolitmin, with a view to employing them as vital stains. Analysis of the color intensities of these dyes shows slight differences in them, azolitmin being the weaker pigment, wt. for wt. Study of a 3rd coloring matter, erythrolein, which exists in litmus has shown it to be an unsatisfactory indicator and toxic for animals. Analyses with the spectrophotometer of the absorption of light by erythrolitmin and azolitmin, prepd. by the indicated methods and tested over a wide acid-alkali range, show them to be pure substances, comparable in this respect with synthetic indicators. The errors in the interpretation of the indicator phenomena on vital staining, which are incident to changes in the concn. of the dyes, are so slight as to be negligible. The salt and protein errors on the other hand are large. The factors responsible for the Donnan equil. fail to influence the distribution of the indicators between fluid and gelatin. Erythrolein was found useless when employed for vital staining and azolitmin proved unsatisfactory since it colors poorly and is toxic. But erythrolitmin can be used to great advantage. It is readily absorbed and in non-toxic doses stains intensely. The range of p_H at which it changes from red to blue fits it for the demonstration of changes in the reaction of living tissues. By reason, however, of the salt and protein errors to which it is liable, the p_H cannot be accurately ascertained. Intravital staining with erythrolitmin yields results similar to those following injection of purified "whole litmus." XI. The intracellular reaction of the kidney epithelium and its relation to the reaction of the urine. P. D. McMASTER AND ROBERT ELMAN. *Ibid* 797-820.—The tubules of the mammalian kidney, vitally stained with erythrolitmin, show a significant color pattern, the cells of certain regions appearing bright blue and others brilliant red. The dye is segregated within the cytoplasm, staining fine granules diffusely. Under normal circumstances of renal function erythrolitmin is stored in the lining cells of the glomerulus and the epithelial cells of the proximal convoluted tubules in the blue, alk. form. In the cells of the final portion of the distal convoluted tubules the dye is red. Alterations in the relative reaction of certain regions of the tubules as disclosed by the color of the dye within the cells can be induced by means that alter the reaction of the urine. C. J. WEST

Studies in blood glycolysis. I. General consideration of glycolysis in relation to the blood cells, and the production of lactic acid and carbon dioxide. ICHIRO KATAYAMA. *J. Lab. Clin. Med.* 12, 239-54(1928).—These results were obtained from extensive studies of glycolysis in animal and human bloods: The sugar of shed blood

gradually decreases on standing without bacterial contamination, under aerobic or anaerobic conditions. This decrease is greatest at 38° and least in the ice box. Plasma, serum and hemolyzed blood show no loss of sugar on standing. Satn. of whole blood with CO does not inhibit glycolysis. When washed blood cells are added to Ringer soln. or physiologic salt soln. contg. glucose, fructose or galactose, glycolysis occurs. The decrease in sugar concn. is greatest with glucose and least with galactose. The rate of glycolysis depends upon the blood cell vol. There appears to be no demonstrable difference between the rates of glycolysis in diabetic and nondiabetic bloods. Insulin therapy or insulin *in vitro* has no effect upon the rate of glycolysis. The decrease in sugar concn. is accompanied by a production of lactic acid, but the increase in lactic acid does not account for the total amt. of sugar lost. Other acids than lactic acid are evidently produced during glycolysis. There is no production of CO₂. E. W. WICKWIRE

G—PATHOLOGY

H. GIDEON WELLS

Parathyroid hypercalcemia and anaphylactic shock. S. A. LEVINSON AND S. A. MATHEWS. *Proc. Soc. Exptl. Biol. Med.* **24**, 350-1 (1927) —Anaphylaxis in dogs sensitized to egg albumin was not altered by the presence of hypercalcemia induced by the injection of Collip Para-thormone. C. V. B.

The production of immune sera for tissues. K. LANDSTEINER AND J. VAN DER SCHEER. *Proc. Soc. Exptl. Biol. Med.* **25**, 140-1 (1927) —Immune sera were obtained easily by intravenous administration of small quantities of cell or organ suspensions, *i. e.*, by 3 weekly injections of 10 mg. each of the fresh material suspended in saline. The following materials (from the ox) were used as antigens: tracheal epithelium, thymus cells, kidney and washed sperm cells. The resulting sera differentiated clearly in complement fixation tests between these 4 materials. On testing, however, with a large number (19) of other tissues group reactions were obtained, more frequently with some sera than with others, also in cases where there is neither histological nor embryological relationship, *e. g.*, trachea immune serum on brain. Only the sperm immune serum was entirely organ-specific. The immune sera were Wassermann negative and varied from none to moderate hemolytic activity for ox blood. C. V. B.

An unknown reducing urinary substance in myasthenia gravis. G. MEDES, H. BERGLUND AND A. LOHMANN. *Proc. Soc. Exptl. Biol. Med.* **25**, 210-1 (1927)

C. V. B.

Urea and creatinine concentration in the blood; a statistical study. R. S. HUBBARD. *Proc. Soc. Exptl. Biol. Med.* **25**, 261-3 (1928) —The relation was examd. between urea and creatinine concn. in the blood of patients studied over a period of 8 yrs. In the large series, composed almost wholly of chronic cases, with acute nephritis very meagerly represented, urea and creatinine concns. in the blood paralleled each other; not infrequently there was evidence of rather sudden changes in urea concn. probably associated with variations in the rate of urea formation, there was a small number of cases where some additional factor seemed to be affecting the results. C. V. B.

The change in surface tension of plasma with time. GEORGE HOMÈS. *Bull. sci. acad. roy. Belg.* **13**, 555-72 (1927) —A new app. for measuring surface tension, σ , is described, operating on the principle of the du Nouy instrument, but so arranged that the liquid can be held in an enclosed space. The plasmas of guinea pigs, rabbits and dogs were studied. Whether observed in an enclosed space or not, σ decreases as time passes after first establishment of the surface. Evapn., therefore, has nothing to do with it. Extrapolation of the σ - t curve to 0 time always gives a value less than σ measured by dynamic methods. The static σ of the plasma of guinea pigs subjected to anaphylactic shock is lower than σ for normal plasma by a characteristic amt., although the dynamic σ remains the same. The subject is developed thermodynamically in a theoretical part.

F. L. BROWNE

The theory of the colloidal reactions of cerebrospinal fluid. WILLY SCHMITT. *Kolloidchem. Beihefte* **26**, 58-160 (1928), cf. *C. A.* **21**, 2500 —The pptn. and protective reactions of cerebrospinal fluid with colloidal Au, mastic, and gum benzoin depend upon the quantities of the reacting sols present, their charge, particle size, and H-ion concn. Four types of coagulation are involved, (1) adsorptive coagulation of colloids of like sign uninfluenced by electrolytes, (2) the same influenced by electrolytes, (3) coagulation at the isoelectric point, and (4) coagulation of colloids of opposite sign. To study these reactions albumins and globulins were prepd. very carefully and purified by electrodiagnosis. A bibliography of 228 references is given.

F. L. BROWNE

The iodine content of the blood in ordinary goiter and in cretinism. F. DE QUER-

VAIN AND W. E. SMITH. *Endocrinology* 12, 177-89(1928).—The av. I content of peripheral blood in normals was 13.12 mg. %, in cases of simple goiter, 9.322 mg. %, and in cretins, 6.38 mg. %. After the administration of KI the av. blood I was 15.36 mg. % in the normals and 6.42 mg. % in the cretins. The cretins excrete I faster in the urine than normals.

H. J. DEUEL, JR.

Rickets and radiation. A. ADAM. *Fortschritte Med.* 46, 229-32(1928).

H. J. DEUEL, JR.

Experimental investigations on the interferometric and chemical demonstration of the Abderhalden serum enzymes. E. KUSTER AND K. KOULEN. *Fermentforschung* 9, 265-99(1928).—An increase in amino acid content (autolysis) occurs in sterile natural serum at 37°, but a measurable increase in the interferometer value is not observed. Addn. of kaolin to a serum, even with 40 hrs' incubation, does not intensify perceptibly the natural autolysis. Dialysis of serum against distd. water leads to a stronger ninhydrin reaction in the dialyzate than dialysis against physiol. NaCl soln. This, however, does not imply an abs. increase in amino N as compared to the amino-N content of a serum incubated the same length of time without dialysis. With the original method of interferometer measurement considerable decompn. is almost invariably found. Sera of pregnant and non-pregnant individuals, active and inactive sera, cannot be distinguished with certainty. In the decompn. as indicated by the interferometer, the swelling of the substrate is shown to be an important factor. The swelling of a single substrate is not const. but is dependent on the nature of the added serum, and is not amenable to simple calcn. The action of placenta substrate on serum frequently gave an increase in residual N without any relation to the interferometer reading taken simultaneously, even when the error due to swelling was avoided experimentally. The customary sterilization of rubber stoppers with EtOH leads to appreciable errors which may be avoided by using stoppers of gray Para rubber sterilized by boiling in water. Even when all known errors, including substrate swelling, are avoided, the interferometer method shows variations when the same substrate is tested with different sera or when the same serum is tested with different substrates. The results obtained by this method are of no diagnostic value.

A. W. DOX

The nature of the Abderhalden reaction. SEVERIAN BUADZE. *Fermentforschung* 9, 362-74(1928).—No evidence could be obtained in support of the view held by numerous investigators that the Abderhalden reaction is a complement fixation. The assumption that the reacting substance is an amboceptor and requires a complement for the occurrence of the reaction should be abandoned.

A. W. DOX

Further contribution to the nature and technic of the Abderhalden reaction. EMIL ABDERHALDEN. *Fermentforschung* 9, 392-4(1928), cf. *C. A.* 22, 260.—Slight modifications are recommended. When the dialysis is performed at room temp. the time should be extended to 3 hrs., especially in winter when the lab temp. is 15°. For the isolation of protein from placenta tissue the thoroughly washed and dissected tissue is heated 5 hrs. at 100° with a 50% LiBr soln., the soln. filtered and dialyzed, 1/3 vol. EtOH added and the protein coagulated at 90°, washed with EtOH and Et₂O and dried. The photomicrographic method of detg. the action of serum on placenta protein shows little change in 10 hrs. but an almost complete disappearance of the protein in 48 hrs. when the reaction is positive.

A. W. DOX

The origin of malignant tumors. V. The free cysteine content of normal and tumor tissues. R. BIERICH AND K. KALLE. *Z. physiol. Chem.* 175, 292-9(1928); cf. *C. A.* 21, 1842.—Normal epithelial and muscle tissues after direct fixation give a negative Sullivan reaction; only kidney tissue gives a positive reaction. If the tissues have aged for some time in the air the reaction then becomes positive. An exception is the suprarenal which gives a negative Sullivan reaction even after aging. The malignant human tumors thus far examd. behaved like normal tissue. Baker's yeast under ordinary conditions gives no Sullivan reaction. Suprarenal ext. contains besides glutathione another substance which in acid soln. consumes I.

A. W. DOX

The treatment of one hundred and five cases of acid intoxication with buffer solutions. F. A. HÆCKER. *J. Lab. Clin. Med.* 12, 467-72(1927); *Physiol. Abstracts* 12, 345.—H. gives details of his method for intravenous administration of a buffer soln. in cases of acid intoxication with depletion of blood buffers. No ill effects followed, and many cases were definitely benefited. H-ion detns. of the urine were used to observe the progress of the treatment.

H. G.

The antigenic character of bacterial lipoids. F. WEIGMANN AND W. LIESE. *Klin. Wochschr.* 7, 313(1928).—An alc. ext. of tubercle bacilli, that does not give a test for either protein or N, possesses antigenic properties. It is highly specific in the complement-fixation reaction and produces a sensitization such that reinjection leads to

fatal anaphylactic shock. The sensitiveness can be transmitted, with the animal's blood, to a normal animal. MILTON HANKE

Biochemistry of scurvy. A. ABRAHAM. *Klin. Wochschr.* 7, 353-5(1928).—One case of scurvy was studied. The osmotic resistance of the erythrocytes was reduced. Cholesterol and Ca were reduced and K was increased (in the blood). The peroral administration of glucose led to a protracted elevation of the blood sugar concn. which developed slowly and subsided slowly. MILTON HANKE

Demonstration of isoprecipitins in human blood. Demonstration of four blood groups by means of isoprecipitation. H. DOLD AND RAHEL ROSENBERG. *Klin. Wochschr.* 7, 394-5(1928).—A clear ext. can be prepd. from the stroma of erythrocytes that contains isoprecipitins characteristic of the 4 blood groups. Exts. from stroma of blood group o do not ppt. with serums of either A or B. Ext. A ppts. with type B but not with type A serum. *Vice versa* for ext. B. Ext. A B ppts. with both A and B serums. These stroma exts. can be preserved for months in a cold place without deterioration. MILTON HANKE

The mechanism of alimentary hyperglucemia. ISTVAN HETENYI AND JOHANN POGANY. *Klin. Wochschr.* 7, 404-6(1928).—Glucose, administered orally, irritates the sympathetic nerve endings in the liver which leads to a demobilization of glycogen and hence to a hyperglucemia. Ergotamine paralyzes the sympathetic nerve endings which paralyzes the mechanism that leads to glycogen demobilization or mobilization. Ingestion of glucose does not lead to hyperglucemia in patients that have been treated with ergotamine. Injected glucose remains in the circulation for a protracted period in ergotamine-treated patients. MILTON HANKE

The mode of action of liver diet in pernicious anemia. PAUL JUNGSMANN. *Klin. Wochschr.* 7, 441-5(1928).—The liver diet treatment of pernicious anemia is symptomatic and does not remove the cause of the disease. The active substance is contained in meat and in kidney as well as in liver. It does not lead to blood regeneration, but retards the rate of blood destruction. It acts upon the reticuloendothelial metabolism app., not upon the blood. This treatment is, therefore, useful in all of the many disturbances that are assocd. with a dysfunctioning of the reticuloendothelial system. MILTON HANKE

Action of ether narcosis on liver function. KURT BOSHAMER. *Klin. Wochschr.* 7, 445-7(1928).—The liver is always injured by an ether narcosis. An impaired liver may be seriously injured. MILTON HANKE

Sensitiveness of the cancer cell to heat. BRUNO MENDEL. *Klin. Wochschr.* 7, 457-8(1928).—Cancer cells, whose glucolytic action has been reduced 70-80% by exposure to heat, die. This requires 3 hrs. at 44°, 5 hrs. at 43°, 7 hrs. at 42.5°, 10 hrs. at 42° and 20 hrs. at 41.5°. The body temp. can be elevated to 41.5° to 42° without causing death. The suggested treatment is obvious. Spirochetes are less heat stable than are cancer cells. MILTON HANKE

The colloidal structure of the plasma during pregnancy. HEINRICH EUFFINGER. *Klin. Wochschr.* 7, 492-4(1928).—The stability of the plasma colloids is progressively reduced during pregnancy and reaches its greatest degree of instability during the week following delivery. The total protein content decreases steadily from 8.5 to 7.2%; the euglobulin content increases from 0.09 to 0.5% and the fibrinogen content increases from 0.15 to 0.21%. The cholesterol content increases from 120 mg.% to 297 mg.%; but the fraction that is directly extractable with ether decreases from 80 to 73.7%. MILTON HANKE

Sensitization against chemically defined substances. I. Neoarsphenamine in man. WILHELM FREI. *Klin. Wochschr.* 7, 539-42(1928).—The intracutaneous injection of small quantities of neoarsphenamine into normal individuals may, in some cases, lead to a hypersensitiveness of the skin as a whole. Syphilitics that are undergoing treatment with neoarsphenamine do not, as a rule, react in this way. M. H.

Blood urea in scarlet fever and angina. FRIEDRICH WAHLIG. *Klin. Wochschr.* 7, 542-3(1928).—Blood urea is not increased in mild cases of scarlet fever. The av. blood urea concn. is 16.3 mg.% in angina. MILTON HANKE

Is the sugar-tolerance test of use in the diagnosis of pregnancy? O. BOKELMANN AND J. ROTHFELT. *Klin. Wochschr.* 7, 543-5(1928).—The sugar-tolerance test is not trustworthy as a means of diagnosing pregnancy. MILTON HANKE

The isoagglutinin content of tissue juice and its relation to tissue transplantation. GEORG LENART AND JULIUS KÖNIG. *Klin. Wochschr.* 7, 549-50(1928).—See C. A. 22, 1190. MILTON HANKE

Hyperfunction of the Islands of Langerhans. D. E. ALFERN AND W. P. BESUGLOW. *Klin. Wochschr.* 7, 586-9(1928).—Ligation of the ductus pancreaticus or of a portion of

the tail of the pancreas leads to changes in the metabolism of carbohydrate, fat and minerals that are identical with those produced by a hyperfunction of the pancreas. The islands of Langerhans are hypertrophied. MILTON HANKE

Lipoid nourishment and infection. HANS REITER. *Klin. Wochschr.* 7, 589-90 (1928).—The addn. of lipoid (promonta) to the normal diet of mice increases the ability of the animal to produce agglutinins against mouse typhoid and appears to enhance the resistance of the animal against infection with this microorganism. M. H.

Excess sugar in spinal fluid as an important diagnostic factor in pernicious malaria of infancy. G. A. PIANA. *Pediatria Rivista* 36, 24-38(1928).—The sugar content of the cerebrospinal fluid is consistently and markedly raised in proportion to the concurrent hyperglucemia in all cases of malaria with meningeal symptoms. It does not exceed the highest physiol. values when the disease runs a normal course. M. J.

Old and new studies of infantile paralysis. F. L. O. PRESTI-SEMINARIO. *Pediatria Rivista* 36, 143-55(1928).—Review. MARY JACOBSEN

Alimentary fevers. A. LAURINISCH. *Pediatria Rivista* 36, 257-65(1928). MARY JACOBSEN

Modifying the toxicity of acidified zootoxins and phytotoxins by the addition of bile. A. CLEMENTI AND DE GAETANI. *Boll. soc. ital. biol. sper.* 3, 34-5(1928).—HCl (0.2%) was added to tetanus and diphtheria toxins and to ricin, followed by 6% bile. The solns. were centrifuged and the ppt. was recovered. The supernatants and also the ppts. dissolved by the aid of a little NaOH were injected into guinea pigs. The animals receiving the ppts. invariably died, showing that a part of toxin is carried down by the flocculation caused by the acid and bile. PETER MASUCCI

The relation between Thomsen's phenomenon and autohemoagglutination by cold. LEONE LATTES AND CARLO CREMA. *Boll. soc. ital. biol. sper.* 3, 52-5(1928).—The supposed Thomsen agglutinin agglutinates fresh corpuscles at 0°; the supposed cold agglutinin agglutinates Thomsen's corpuscles at 19°. There is no substantial difference between Thomsen's agglutination and cold agglutination. PETER MASUCCI

The specificity and behavior of the double ring in precipitation tests. C. CREMA. *Boll. soc. ital. biol. sper.* 3, 56-8(1928).—The formation of the double ring is a specific characteristic for species identification. The observation should be limited, otherwise, if extended to one hr the double ring is obtained with heterologous serums. Attempts to make the reaction entirely specific by centrifugation and absorption were negative. The double ring reaction properly read is a valuable diagnostic test. PETER MASUCCI

The behavior of total lipoids, lipid phosphorus, and adrenaline of the suprarenal capsules in late deaths from burns. C. CREMA. *Boll. soc. ital. biol. sper.* 3, 59-62 (1928).—The dorsal side of guinea pigs was immersed in boiling water for 30-60 sec. The animals either died eventually or were killed. The total lipoids and phosphorated lipoids in the suprarenal capsule of the burned animals showed a marked diminution. The ratio of P to total lipoids was smaller in burned animals than in normals. The chem. findings confirm the microchem. findings of Esposito, namely, that the lipid content of the capsule phosphatides, cholesterol and fats is rapidly diminished as a result of the burns, and this may account for the sudden death in numerous cases. The adrenaline content is also reduced. PETER MASUCCI

Cholesterol in the blood of lepers. GIUSEPPE BORGATTI. *Boll. soc. ital. biol. sper.* 3, 84-6(1928).—Cholesterol detns. were made at various times on the blood of 8 lepers. There was a diminution of cholesterol content in most cases. P. M.

Further investigations on the metabolism of fatty substances under pathological conditions. II. Conditions in which colloidal silver inhibits infiltration liposis by phosphorus. C. CIACCIO AND G. TRIMARCHI. *Boll. soc. ital. biol. sper.* 3, 106-8(1928); cf. C. A. 22, 2406.—White mice were treated with 10 mg. colloidal Ag and with 1 cc. 0.1% phosphorated oil under various conditions. The animals were killed 24 hrs. later and the liver, kidneys and heart were fixed in formaldehyde and examd. for fatty substances. While the animals treated with phosphorated oil alone showed massive liposis, those treated with colloidal Ag and phosphorated oil did not show a trace of liposis. The colloidal Ag exerts a "blocking" action as well as a catalytic action on the fats or P. PETER MASUCCI

The calcium and potassium content of the blood serum of normal and epileptic subjects. VITO LONGO. *Boll. soc. ital. biol. sper.* 3, 112-4(1928).—Ca and K detns. were made on 20 normal and 20 epileptic subjects. The blood was withdrawn before breakfast; Ca and K were detd. by the Kramer-Tisdall methods. The Ca in the blood of normals varied from 9.5 to 12.70 mg. with an av. of 11.3 mg. per 100 cc. of blood; in the blood of epileptics it varied from 9.68 to 12.00 mg. with an av. of 9.68 mg. per 100 cc. In normals, K varied from 18.00 to 53.50 mg. with an av. of 22.32 mg. per

100 cc.; in epileptics it was 21.30 to 38.70 with an av. of 34.06 mg. per 100 cc. For normals the ratio $\text{Ca} \times 100/\text{K}$ had an av. value of 53.44; for epileptics it was 29.50.

PETER MASUCCI

The effect of tuberculin on erythrocytes. K. V. BERESHIN, N. D. ABRAMOVA AND A. U. SIMSKII. *Zhurnal eksptl. biol. Med.* **8**, 540-9 (1928).—Incubation of erythrocytes from healthy or sick rabbits and guinea pigs with tuberculin results in many cases in the adsorption of the sp. substances of the tuberculin. At the same time the erythrocytes lose N in the form of non-protein N.

S. MORGULIS

Content of chlorine and of nitrogenous substances in the duodenal liquid of uremics. C. AUGUSTE. *Bull. soc. chim. biol.* **10**, 386-96 (1928).—The duodenal liquid of uremics is much increased in vol. and decreased in concn. as compared with that of normal subjects. The Cl is increased and surpasses the Cl concn. of the urine. The content of N substances decomposable by hypobromite is increased parallel to the progress of N retention and maintains a level slightly below the azotemia.

L. W. RIGGS

Plasma acid-base equilibrium in malaria. SHIH-HAO LIU. *Chinese J. Physiol.* **2**, 151-5 (1928).—Acid-base equilibria in 13 cases of malaria were studied. The measurements included p_{H} , total base, CO_2 content, chlorides and proteins. All the values obtained were within normal limits. During the febrile paroxysm the p_{H} remained unchanged, but there was a slight increase in total base and a slight decrease in bicarbonate and chloride. All these changes tend to increase the residual base and the excess of residual base during fever is probably bound by org. acids of undetd. nature. All these variations are considered to be the result of fever, and are not due to the sp. effects of malarial infection.

L. W. RIGGS

Plasma lipids. I. Aliphatic acids of blood plasma in diabetes and nephrosis. SCHMORL M. LING AND SHIH-HAO LIU. *Chinese J. Physiol.* **2**, 157-61 (1928). The aliphatic acids of normal blood are highly unsatd. with an av. I value of 156.6, while in diabetes mellitus and nephrosis they are much less unsatd., their I value being 45 to 98 in the former and 59 to 87 in the latter.

L. W. RIGGS

Variations of blood phosphorus in glucose tolerance tests. HSIAO CH'EN CHANG. *Chinese J. Physiol.* **2**, 195-201 (1928).—The results of the present and of previous work indicate that P plays an important but temporary role in one of the intermediary stages of carbohydrate metabolism. The mobilization of P during, and its release after, the formation of the hypothetical compd. hexose-phosphate, is shown by prompt changes in the P content of both blood and urine, namely, a temporary diminution followed by a compensatory increase. Inability, partial or complete, on the part of the organism to metabolize sugar can be detected by the absence or attenuation of this phenomenon. While the abnormality of the behavior of P always accompanies that of the blood sugar, it is usually of smaller magnitude, and in the diagnosis of mild or potential diabetes it may be easier to interpret the sugar than the P curve.

L. W. RIGGS

Variations of the uric acid content of the blood following the state of the respiratory function. Asphyxial hyperuricemia. LÉON BINET AND RENÉ FABRE. *Compt. rend.* **186**, 973-5 (1928).—Mech. asphyxia by stoppage of the trachea in the dog was followed by an av. rise of 17 to 18% in the uric acid content of the blood. The hyperuricemia varies with the degree and duration of the asphyxia and is general, in that it affects both plasma and corpuscles. It is transient and the content of uric acid returns to its former value 15 min. after normal respiration is restored. It is not a function of the no. of red corpuscles, and is observed with the same characters in splenectomized dogs, or in dogs in which both liver and spleen are deprived of their vascular connections. Pulmonary hyperventilation for 30 to 45 min. in normal dogs did not modify the uric acid content of the blood.

L. W. RIGGS

Influence of alkalosis on the urinary elimination of nitrogen and ammonia. R. RAFFLIN. *Compt. rend. soc. biol.* **98**, 763-4 (1928); cf. *C. A.* **21**, 1144-5.—The logarithmic formulas developed in preceding papers are applied in this study. The absorption of NaHCO_3 generally lowers the output of total N. When the output of N is unchanged or increased there is always a notable increase in the hourly vol. This form of alkalosis where K_1 and K_2 are always lowered with a sufficient dose of NaHCO_3 is sharply distinguished from the alkalosis of hyperpnea in which K_1 and K_2 are raised. **Ammonia and real acidity of the urine.** *Ibid.* 765-6.—Further applications of logarithmic formulas are made. The lowering of K_1 and K_2 below normal limits in the course of the evolution of nephritis shows a deficiency in the ammonogenic function of the kidney.

L. W. RIGGS

Mechanism of uremia. A. OZORIO DE ALMEIDA. *Compt. rend. soc. biol.* **98**, 766-8 (1928); cf. *C. A.* **22**, 2204.—Expts in which nephrectomized dogs were intravenously injected with a soln. made up with P_2O_5 2.98 g., CaCO_3 0.538, MgCO_3 0.452, K_2CO_3

2.347, Na_2CO_3 1.993, 0.1 N H_2SO_4 499.7, N HCl 42.3, H_2O up to 1 l., confirmed the idea that uremia is produced by the salts of the urine L. W. RIGGS

Urea and creatinine contents of the blood in renal diseases. A statistical analysis of 5000 observations. F. S. PATCH AND I. M. RABINOWITCH. *J. Am. Med. Assoc.* 90, 1092-5(1928).—In some cases the general relationships between the urea and creatinine concns. of blood were absent. In these cases, high urea values were found assocd. with normal or nearly normal creatinine values. Notwithstanding high urea values, symptoms of uremia were usually absent when the creatinine values were about normal. Although high creatinine values and symptoms of uremia were accompanied by positive diazo color reactions, this was not necessarily so with high urea values. Since the different creatinine values could not be explained wholly on the basis of different rates of creatinine excretion, it is suggested that the greater part of what is regarded as creatinine is probably not creatinine. Blood urea values unaccompanied by observations on the "creatinine" and the diazo color reaction are unreliable for estg. progress or prognosis.

L. W. RIGGS

Inflammation. V. Acetone bodies in the blood of inflamed tissues. F. BRICKER. *Arch. expl. Path. Pharm.* 129, 285-7(1928). cf. *C. A.* 22, 2213.—In the venous blood from the inflamed rabbit ear the content of acetone bodies is very considerably greater than in the blood of normal ear

G. H. S.

Photosensitization of animals after the ingestion of buckwheat. CHARLES SHEARD, H. D. CAYLOR AND CARL SCHLOTTHAUER. *J. Exptl. Med.* 47, 1013-28(1928).—Following the ingestion of buckwheat (plant or seed) vari-colored guinea pigs, white swine and goats exhibited symptoms of photosensitization, the degree being in the order given. Rabbits, dogs, white mice and rats did not manifest symptoms of photosensitization. Irradiation by a quartz Hg vapor lamp apparently develops a resistance to photosensitization, probably because of increased pigmentation induced by ultra-violet light. From the nature of the physiol. and path. reactions produced under various filters and from a consideration of the % of transmission of solar energy in the visible spectrum, it would seem that the region of photosensitization lies between 580 millimicrons (yellow) and the red end of the spectrum, this is substantiated by the fact that irradiation by a quartz Hg vapor lamp produces no symptoms or reactions. Spectrophotometric detns. of alc. exts. of grass (non-toxic) and of buckwheat (toxic) show the presence of 2 additional bands in the absorption spectra of buckwheat with max. at about 540 and 600 millimicrons, resp., together with the common absorption zones at 430 to 490 and 630 to 690 millimicrons. Spectrophotometric detns. of blood serums of sensitized animals show, besides the usual absorption bands peculiar to oxyhemoglobin 2 zones with max. at 600 and 660 millimicrons, resp. The fluorescence of chlorophyll *per se* is not, in all probability, the cause of the sensitization nor is hematoporphyrin the photodynamic substance. Phylloporphyrin may be the photodynamic substance but the possibility of cholehematin is not ruled out.

C. J. WEST

Antigenic complex of Streptococcus hemolyticus. IV. Anaphylaxis with two non-type-specific fractions. REBECCA C. LANCEFIELD. *J. Exptl. Med.* 47, 843-55(1928); cf. *C. A.* 22, 1620.—The anaphylactic reactions of 2 non-type sp. fractions of hemolytic streptococcus exts. parallel the precipitin reactions. The nucleoprotein, P, is a true antigen, in that it stimulates antibody production in rabbits, as shown before, and produces anaphylactic shock in guinea pigs actively as well as passively. The probable carbohydrate, C, on the other hand, does not induce antibody formation in rabbits, so far as known at present, but does produce typical anaphylactic shock in guinea pigs passively sensitized with antibacterial serum provided the serum shows a high titer of C precipitins. This is an instance of a hapten, probably carbohydrate in nature, causing anaphylactic shock in passively sensitized guinea pigs. **V. Anaphylaxis with the type-specific substance.** *Ibid.* 857-75.—Type-sp. anaphylactic shock was produced with HCl exts. of *Streptococcus hemolyticus* in guinea pigs sensitized with antibacterial sera. With occasional sera and certain HCl exts., type-sp. shock was not produced unless the serum was first absorbed with heterologous bacteria or unless the guinea pigs were desensitized with heterologous exts. before testing with the homologous ext. The findings indicated that this was due to the presence of the non-type sp. substance which has been provisionally designated as Y. Tryptic digestion destroyed the ability of HCl exts. contg. the type-sp. M substance and the non-type-sp. Y substance to produce anaphylactic shock in passively sensitized guinea pigs. Active sensitization was not accomplished with the type-sp. M. It seems probable, therefore, that this substance is a hapten reacting with antibodies, but not stimulating their production after sepn. from the bacterial cell.

C. J. WEST

H—PHARMACOLOGY

A. N. RICHARDS

Liver injury in acute alcohol poisoning. R. P. WALLACE. *Proc. Soc. Exptl. Biol. Med.* **24**, 598-9(1927).—The bilirubin in the blood serum and urobilinogen in the urine of 17 cases of acute alc. poisoning were studied. The increase of both was proportionate to the severity of the poisoning. This affords definite evidence of liver injury. C. V. B.

Note on the pharmacology of ergothioneine. M. I. TAINTER. *Proc. Soc. Exptl. Biol. Med.* **24**, 621(1927).—Contrary to the statement of Barger and Ewins ergothioneine had no well marked pharmacological action when tested on the rabbit and the cat. C. V. B.

Effects of anesthetics on osmotic resistance of erythrocytes: I. Ether and chloroform. C. D. LEAKE, CHARLOTTE BACKUS, HOBART BURCH AND KATHARINE O'SHEA. *Proc. Soc. Exptl. Biol. Med.* **25**, 92-3(1927).—After about 10 min. of ether anesthesia, an apparent increased resistance was noted on the part of the erythrocytes of the dog blood to the hemolyzing action of hypotonic fluids. After 30 min. of ether anesthesia, the osmotic resistance of the red cells was much below normal. With CHCl_3 , there was a prompt and marked lowering of the osmotic resistance of the erythrocytes. II. Nitrous oxide or ethylene with oxygen. C. D. LEAKE, HARRY LAPP, JANE TENNEY AND R. M. WATERS. *Ibid* 93-4.— NO or C_2H_4 with O_2 caused a slight reduction in the osmotic resistance of the red cells to hypotonic fluids, which, even after an hour's anesthesia, was not nearly as marked as that noted under ether or CHCl_3 . When ethylene was pushed to asphyxiation after 20 min. without O_2 , the red cell resistance was reduced considerably in the lower dilns. of hypotonic Simmel's fluid (0.4%), but in the higher dilns. (0.7% and 0.6%) it was only slightly below the normal levels. III. Carbon dioxide with oxygen. *Ibid* 94-5.—A mixt. of 25% CO_2 with 75% O_2 was administered to dogs without rebreathing. The amplitude of respiration was greatly increased, the pulse was greatly retarded, and convulsions occurred quickly, being stopped by giving pure O_2 . The osmotic resistance of the erythrocytes to hypotonic solns. was greater than normal. The administration of CO_2 caused very rapid clotting of the blood. C. V. B.

Modification of adrenaline effect with functional status of stomach. S. ARQUIN. *Proc. Soc. Exptl. Biol. Med.* **25**, 97-8(1927).—In a starving dog, during the period of relative quiescence between periods of active hunger contractions, the administration of adrenaline intracutaneously resulted (after complete absorption) in a rapid increase in gastric tonus and forcible hunger contractions. In a starving dog with active hunger contractions, the giving of adrenaline resulted in marked gastric dilatation, lasting for 20 to 30 min. Stomachs in active digestive contractions were not influenced by adrenaline. It appears that adrenaline may produce opposite reactions in the stomach muscle depending on the pre-existing state. C. V. B.

Effect of intravenous injection of Dakin's solution on cholecystectomized dogs. J. P. BURGESS AND A. C. IVY. *Proc. Soc. Exptl. Biol. Med.* **25**, 101-2(1927).—The intravenous injection of Dakin's soln. is somewhat more toxic in cholecystectomized than in normal dogs. C. V. B.

Antagonistic action of anesthetics and alkali metal ions on permeability of cell. J. F. McLENDON. *Proc. Soc. Exptl. Biol. Med.* **25**, 116-7(1927).—Isotonic solns. of NaHCO_3 and of the nitrates of Ca and Na were made and mixed so as to reproduce the cations in about the same concns. as in sea water. In this soln. or in distd. H_2O practically no Cl diffused out of *Fundulus* eggs. It appears that Na and OH ions increase the permeability of the egg membrane and Ca and H ions inhibit their action. Alc. has a similar effect to Ca ions. C. V. B.

The influence of amytal upon blood sugar content. F. P. UNDERHILL AND D. H. SPRUNT. *Proc. Soc. Exptl. Biol. Med.* **25**, 137-8(1927).—In a series of 10 expts. on rabbits, 8 gave evidence of a distinct hyperglucemia during amytal narcosis. It is induced by doses from 50 to 100 mg. of amytal per kg., whether given by mouth, subcutaneously or intraperitoneally. C. V. B.

Concentration of arsenic in blood subsequent to serial administration of neoarsphenamine. D. P. UNDERHILL AND M. HORN. *Proc. Soc. Exptl. Biol. Med.* **25**, 138-9(1927).—With increasing injections of neoarsphenamine into dogs there is a slight but definite tendency toward a "lag" in the elimination of arsenic from the blood. C. V. B.

The effect of hypercalcemia on the creatine output in myasthenia gravis. H. BERGLUND, G. MEDES AND A. LOHMANN. *Proc. Soc. Exptl. Biol. Med.* **25**, 204-5(1927).—An expt. was performed to study the effect of hypercalcemia on the creatine output

in a patient with myasthenia gravis. The blood Ca showed no increase on intravenous administration of CaCl_2 alone. On subcutaneous administration of parathyroid hormone in combination with large doses of Ca lactate by mouth the blood Ca slowly rose from 10–11 mg. to 13.3 mg. per 100 cc. serum. At no time did the creatine or creatinine output in the urine show any significant changes. C. V. B.

Effect of glucose on the ketone body excretion in fasting depancreatized dogs. I. L. CHAIKOFF AND J. J. WEBER. *Proc. Soc. Exptl. Biol. Med.* 25, 212–3 (1927).—The antiketogenic action of carbohydrate does not occur in the animal organism in the complete absence of insulin; since glucose stimulates the secretion of insulin in the normal animal, the antiketogenic action of carbohydrate fed in diabetes mellitus and in phlorhizin poisoning may possibly be due to the ensuing secretion of insulin, which lowers the ketone bodies of the blood when injected into fasted, depancreatized dogs. C. V. B.

Effect of radium on pharmacological properties of mercurochrome. D. I. MACHT AND G. F. REDDISH. *Proc. Soc. Exptl. Biol. Med.* 25, 299–300 (1928).—Radium radiations do not effect the potency of mercurochrome, as tested for pharmacol. effect on animals and toxicity for *Bacillus typhosus* and living seedlings of *Lupinus albus*. Mercurochrome is very stable as far as these radiations are concerned. C. V. B.

Insulin and the diabetic pancreas. WILLIAM SUSMAN. *Edinburgh Med. J.* 35, 206–13 (1928).—Report of the histological examn. of the pancreas of 13 diabetics, undergoing insulin treatment, 11 of whom died in diabetic coma despite the insulin. S. suggests that while insulin probably causes a hyperplasia of islet tissue, the tissue is not functionally active. Some other substance is required by the diabetic to restore him to normal. H. J. DEUEL, JR.

Thyroxine as a depressant of cell division; its effect on the cleavage and early development of sea urchin and ascidian. H. B. TORREY. Cornell Univ. *Endocrinology* 12, 65–80 (1928).—Thyroxine retards cleavage rate and differentiation in the eggs of *Echinometra* and *Phallusia* to a like degree, the effect varying with the thyroxine content. It is not due directly to the I. Since thyroxine depresses cell division in such widely different organisms, it is believed that it may act as a cell depressant throughout the animal kingdom. H. J. DEUEL, JR.

The storage of sulfur in the adrenal glands. MARK LURIE. United Israel Zion Hosp., Brooklyn. *Endocrinology* 12, 84–8 (1928).—The av. S content of the organs of 5 normal white rats (1) and of 10 animals which were given daily inunctions of S ointment for a month by rubbing on the skin of the back for 15 min. (2) was as follows: liver (1) 0.736%, (2) 0.893%; spleen (1) 0.856%, (2) 1.14%; kidney (1) 0.832%, (2) 0.941% and muscle (1) 0.72%, (2) 0.891%. The av. S content of the adrenals of 28 normal animals amounted to 1.52% while the av. of the 10 receiving the S ointment was 3.526%. The S in the adrenal is presumably not stored as a constituent of protein. It is probably stored in the cortical portion. H. J. DEUEL, JR.

The effect of adrenaline on sugar metabolism. W. E. BURGE, G. C. WICKWIRE, A. M. ESTES AND L. D. SEAGER. Univ. Ill. *Endocrinology* 12, 157–60 (1928).—Under conditions of expt *Paramesicium caudatum* used 39% of sugar in its medium in 12 hrs. With adrenaline in dilns. of 1:1,000,000 the sugar utilization increased to 43%, at 1:24,000,000, to 57%, and at 1:40,000,000, to 58%. At higher dilns. the results were the same as the control. At lower dilns., the carbohydrate metabolism was checked, at 1:200,000 the value being 22% and at 1:100,000, 19%. H. J. DEUEL, JR.

Observations on the oral administration of the estrus-producing autacoid. JOHN H. HANNAN. London. *Endocrinology* 12, 193–8 (1928).—The estrus-producing hormone is active when introduced by mouth. The dose required is 60 times that required when injected as detd. by expts. on oöphorectomized virgin female rats. H. J. D., JR.

The effect of duodenal secretin upon the secretion of insulin by the pancreas. R. N. SANTOS. *Endocrinology* 12, 199–202 (1928).—The injection of insulin produces a much more pronounced effect on the blood sugar of normal animals than does the injection of secretin. In depancreatized dogs, the injection of secretin was entirely ineffective, proving that any activity it possesses in the case of normal animals is by virtue of its effect on the pancreas and not on the blood sugar directly. H. J. DEUEL, JR.

Fatal action of scopolamine per os and injected potassium cyanide. A. H. SCHIRM AND D. H. WEBSTER. *Arch. Pharm.* 266, 283–9 (1928).—A discussion of the findings of an apparently criminal case. W. O. E.

Localization of injected potassium cyanide, its action and that of scopolamine as antagonist. A. H. SCHIRM AND D. H. WEBSTER. *Arch. Pharm.* 266, 200–9 (1928).—An exptl. study of the toxicology of injected KCN and scopolamine as applied to rabbits and cats in an endeavor to throw additional light on the preceding case, where death occurred following administration of scopolamine and KCN. Injected KCN acts more

quickly than when given orally, but the lethal dose is in both cases the same. The cause of death in the above cited case was the KCN, not scopolamine. W. O. E.

Action of very minute doses of mercury on the differential blood picture. KURT LÜDDICKE. *Klin. Wochschr.* 7, 398-401(1928).—Hg, in very minute quantities, is absorbed from Cu amalgam fillings or from the atm in rooms contg. reservoirs of Hg (either as liquid metal or as Hg ointment). The urine of persons exposed in this manner contains demonstrable amts of Hg. The metal, even in these small concns., is poisonous. The subjective symptoms are lassitude, headache, lack of self confidence and of ambition. The objective symptoms are stomatitis, salivation, colitis and tremor. Persons whose urine contain demonstrable amts. of Hg always show an increased concn of lymphocytes in the differential count. MILTON HANKE

Comparison of the effects of glucose and dihydroxyacetone in metabolism. M. W. GOLDBLATT. *Biochem. J.* 22, 464-73(1928).—Following the administration of dihydroxyacetone (A) there is a much greater O₂ intake and higher R Q than when glucose is administered. A is not effective as an antiketogenic substance. The question of preferential oxidation and the mechanism of the production of carbohydrate intolerance in starvation are discussed. BENJAMIN HARROW

Iodine compounds. Their selective absorption by the hyperplastic thyroid gland of the dog. H B VAN DYKE. *Arch. Internal Med.* 41, 615-21(1928), cf. C. A. 19, 3128.—The intervals between intravenous injection and a definite increase of I in the thyroid were: KI 5 min, KIO₃ 12 min, I₂ 1 hr., non-titratable traces 1-2 hrs. after the injection of thyroxine. Complete bilateral ligation of both adrenals 6-7 hrs. before the injection had no effect on the absorption. MARY JACOBSEN

The effect of narcosis on the urinary C:N quotient. Dysoxidative carbonuria following narcosis. A A GOLDBLOOM. *Biochem. Z.* 192, 298-302(1928).—Ether anesthesia produces a rise in the C:N ratio of the urine of dogs which can be regarded as a case of dysoxidative carbonuria not caused by excretion of reducing substances. The N excretion is diminished, while the C excretion is frequently increased. S. M.

The influence of arsenious acid on respiration models, particularly the oxidation of tartaric acid in the presence of iron. KURT DRESEL. *Biochem. Z.* 192, 358-68(1928), cf. C. A. 21, 1680.—As₂O₃ inhibits the oxidation of tartaric acid which takes place under the influence of Fe⁺⁺⁺. S. MORGULIS

Comparative studies on the effect of arsenate and of organic arsenic acid compounds on the alcoholic sugar cleavage. A contribution to the analysis of the action of arsenic. PAUL MAVER. *Biochem. Z.* 193, 176-80(1928).—Organic arsenic compounds possess in common with arsenic acid the characteristic property of promoting the fermentation of hexose diphosphate esters. S. MORGULIS

Enzymic processes as the cause of the Gottlieb phenomenon of detoxication of digitalis substances in the heart. O A STEPPUHN AND J. NOLLE. *Biochem. Z.* 193, 409-15(1928).—Active digitalis substances left with heart muscle pulp undergo a loss of toxicity during the process of autolysis. This is attributed to an enzymic cleavage of the digitalis substances. It is suggested that the renewal of activity of the frog heart temporarily stopped through intoxication with digitalis (Gottlieb's detoxication) may also be explained on the assumption of an enzymic decompn in the myocardium. S. MORGULIS

An insulin-like substance from yeast. ULF VON EULER. *Biochem. Z.* 194, 197-203(1928).—A yeast ext. prepd with 25% alc. contg. 1% HCl produces the typical insulin effect in the system: fresh muscle pulp + methylene blue + glucose + buffer (phosphate), with a max influence in a concn of 10⁻⁸ g./cc. Injected subcutaneously in an amt. of 50 mg., it failed to produce a noticeable lowering of the blood sugar in rabbits, but this is attributed to the low concn. of the active principle. S. MORGULIS

Experimental studies on the effect of parasympathetic poisons on the blood sugar. II. Further studies on the lowering of blood sugar by parasympathetic poisons. TORAO SAKURAI. *J. Biochem. (Japan)* 8, 365-70(1928).—The combined effect of ergotoxin and pilocarpine is to lower the blood sugar, which can be prevented by atropine. S. MORGULIS

The affinity of veratrine for the autonomic nervous system. GUNHILD BERGSTRÖM. *Skand. Arch. Physiol.* 53, 208-35(1928).—Veratrine has a variable action on the frog heart, causing contraction in 2/4 but inhibition in the last third. Veratrine suppresses completely the stimulating effect on the frog's heart of parasympathetic drugs like acetylcholine, arecoline or pilocarpine, but this influence is reversible. The sympathetic stimulus, adrenaline, is likewise without action on the heart intoxicated with veratrine. In large doses veratrine causes a great increase in tone of the rabbit intestine followed by a loss of tone even below normal; the contractions become irregular and less frequent,

It also greatly diminishes the motor effects of parasympathetic drugs on the rabbit's intestine, or the inhibitory effects of adrenaline. Large doses of veratrine almost completely suppress the effect of BaCl_2 on the musculature.

S. MORGULIS

Studies on the pharmacological properties of cumarin on the isolated and surviving organs. ERIK BERGSTRÖM. *Skand. Arch. Physiol.* 53, 236-58(1928).—Cumarin exerts an inhibitory action on the isolated frog heart, diminishing the amplitude of its beat, and finally arresting it in diastole. Cumarin, in sufficiently large doses, diminishes or even suppresses the motor effect of adrenaline or acetylcholine on the rabbit uterus. In equiv. doses, cumarin can inhibit the motor effect of pituitrin or BaCl_2 , so that it must actually diminish the excitability of the smooth muscle cells. In relatively small doses cumarin increases the adrenaline effect on the rabbit intestine which indicates that it probably has a certain affinity for the inhibitory portion of the sympathetic nervous system.

S. MORGULIS

A study of the effect exerted by cinnamic acid and certain of the cinnamic esters on the formed elements of the blood and especially on the platelets. BO CLARSON. *Skand. Arch. Physiol.* 53, 259-77(1928).—Na cinnamate provokes a primary thrombopenia followed by a secondary thrombocytosis accompanied generally by a lymphocytosis. Conclusion. Cinnamic acid depresses the function of the bone marrow. The esters of cinnamic acid behave similarly.

S. MORGULIS

A pharmacodynamic study of agaric acid. ERIK BERGSTRÖM. *Skand. Arch. Physiol.* 53, 278-315(1928).—Agaric acid in very small doses has a motor effect on the rabbit uterus, but in larger doses it causes a fall in tone and a weakening of the automaticity. It inhibits and practically suppresses the action of parasympathetic stimulants (acetylcholine, arecoline, pilocarpine). The action of BaCl_2 upon the uterus is not interfered with by agaric acid except in very large doses, so that the inhibition of the parasympathetic stimulants may be due partly to a lowered excitability of the terminal parasympathetic nerve organs. Agaric acid greatly prolongs the effect of a single adrenaline dose in the uterus, because of the increased excitability of the terminal sympathetic nerve organs. On the rabbit intestine agaric acid has a motor effect, and often in small doses it reinforces the motor action of acetylcholine or arecoline. This effect cannot be obtained with pilocarpine. In most cases, a relatively large dose of agaric acid causes inhibition or even complete suppression of parasympathetic stimulants on the intestine. Agaric acid in small quantities must, therefore, increase the excitability of the parasympathetic terminal organs in the intestine and decreases it in large doses. Small doses of agaric acid likewise reinforce and prolong the adrenaline effects on the intestine. On the isolated frog heart agaric acid does not act regularly: in small doses there is a slight motor effect and large doses cause paralysis. Small doses increase the cardio-inhibitory action of acetylcholine, and larger doses diminish this effect. No evidence was obtained of a change in the adrenaline action on the heart. Conclusion. Agaric acid has a special affinity for the terminal nerve organs of the autonomic, increasing the excitability of the inhibitory sympathetic organs in the intestine and of the parasympathetic in the intestine and heart. It can therefore augment the effect of adrenaline and of alkaloids acting on the parasympathetic. Larger doses diminish the excitability of the parasympathetic and organs, while still larger doses paralyze the smooth muscle fibers.

S. MORGULIS

The effect of alcohol in solutions of varying concentration on mechanical precision and the alcohol content of the blood. P. I. TUOVINEN. *Skand. Arch. Physiol.* 51, 287-304(1927).—Alc. in quantities of 40-60 cc. definitely diminishes the capacity for doing work requiring precision (threading sewing needles) in a subject unaccustomed to alc. Ten % alc. acts more quickly and more powerfully than 60% though with the dil. solns. the effect was proportional to the concn. The absorption of 4-10% alc. solns. is much quicker than that of the stronger solns. as is shown by the alc. content of the blood.

S. MORGULIS

The intramuscular quinine depot. A. B. KHAVKIN. *Zhurnal ekspl. biol. Med.* 9, 45-9(1928).—Following intramuscular quinine injection the alkaloid is retained in the muscle at the site of injection, 10% still being found there after 24 days. S. M.

The peripheral action of chloroform, ether and alcohol. I. SVERTZEN. *Zhurnal ekspl. biol. Med.* 8, 142-52(1928).— CHCl_3 , ether and alc. act locally on the blood vessels. High concns. of CHCl_3 produce generally vasoconstriction, while low concns. produce dilation of the vessels of isolated organs. Large concns. of ether (1:25-1:50) dilate the vessels of the liver. Amyl and isoamyl alc. dilate the liver vessels, while ethyl alc. produces no uniform action.

S. MORGULIS

Pharmacology of autooxidation products of ethyl ether. J. CH. NOLLE. *Zhurnal ekspl. biol. Med.* 8, 271-86(1928).—Light, temp., O_2 and age are important factors

detg. the autoxidation of Et_2O . Narcosis ether which has been kept for a long time undergoes autoxidation with the production of peroxides but not of aldehydes. Ordinary ether contg. aldehydes also develops peroxides on standing. The aldehyde contg. ether has no toxic effect on the isolated heart or nerve-muscle prepn. whereas the peroxide contg. ether is toxic. S. MORGULIS

The action of adrenaline on the isolated frog heart. S. V. TSIGANOFF. *Zhurnal expl. biol. Med.* 8, 437-49 (1928).—The isolated heart of *Rana esculenta* was perfused with dil. sea water. The isolated heart is very sensitive to adrenaline provided the entire heart serves as object. This sensitivity manifests itself even in a diln. of $1:5 \times 10^9$. The frequency of the beat increases; the systolic and diastolic alteration in the heart are considerably diminished, resulting in a reduced pulse vol. The action of the adrenaline is much stronger at $18-23^\circ$ than at $7-15^\circ$. S. MORGULIS

Passage of bismuth from the blood into the cerebrospinal fluid and nerve centers under various physiological and pathological conditions. G. KASSIL AND E. S. LOKSHINA. *Zhurnal expl. biol. Med.* 8, 503-14 (1928).—Bi injected intravenously into rabbits was not detected either in the cerebrospinal fluid or in the brain. In acute and subacute poisoning with alc. or illuminating gas, blockading of the reticuloendothelial system with massive doses of India ink, in the hypothermy phase of diphtheria intoxication or in acute chilling Bi passes through. On the contrary, in chronic poisoning with alc. or gas, in anaphylactic shock, in blockading the reticuloendothelial system with small doses, and in the hyperthermic phase of diphtheria intoxication Bi does not pass into the cerebrospinal fluid. S. MORGULIS

Pharmacological action of fluid from isolated mammary glands. M. P. NIKOLAEV AND V. V. HERBST. *Zhurnal expl. biol. Med.* 8, 551-60 (1928).—Ringer-Locke soln. perfused through the isolated mammary gland causes increased tonus and greater frequency in the contraction of the uterine horn of the cat. Dilg. this perfusion fluid increases the action of the isolated heart and vasoconstriction in the ear; the coned fluid depresses the heart action but practically has no effect on the ear vessels. Intravenous injection causes a rise in blood pressure over the normal level which lasts several minutes; in female dogs it has a hyperglucemic effect (28-77%) lasting several hrs. No toxic effect was noted even with amts. up to 20 cc. when injected intravenously. S. M.

Effect of urotropine on liver autolysis. A. V. TRUFANOV. *Zhurnal expl. biol. Med.* 8, 582-90 (1928).—The inhibiting effect of urotropine on autolysis at the acid reaction is attributed to the formation of formaldehyde. In alc. medium certain concns. (0.025%) of urotropine accelerate while larger or smaller concns. inhibit the autolysis. After feeding urotropine the postmortem autolysis of the liver in alk. medium is less than in controls. S. MORGULIS

Contribution to the physiology of the respiratory bulbar centers. Effect of the application of lobeline to the floor of the fourth ventricle. A. CLEMENTI. *Boll. soc. ital. biol. sper.* 3, 32-4 (1928).—The local application of lobeline to the floor of the 4th ventricle of dogs does not excite the bulbar centers of the vagus. The alkaloid has a selective exciting action on the respiratory bulbar centers. PETER MASUCCI

Modifying the toxicity of acidified alkaloidal solutions by the addition of bile or bile salts. A. CLEMENTI AND E. PISTORIO. *Boll. soc. ital. biol. sper.* 3, 36-7 (1928).—The addn. of bile or bile salts to a soln. of strychnine or curare causes a ppt. which carries with it a part of the alkaloid. PETER MASUCCI

Pilocarpine glucemia. GIULIO BUCCIARDI. *Boll. soc. ital. biol. sper.* 3, 70-3 (1928).—The intraperitoneal injection of pilocarpine into guinea pigs in doses less than 0.013 g. and more than 0.12 g. per kg. wt. does not influence the glucemic titer; doses injected between these limits always give rise to a variable hyperglucemia, which reaches its max. value 60-90 min. after and is later followed by a hypoglucemia lasting for 24 hrs. Since pilocarpine exerts a selective action on the parasympathetic system it is undeniable that the parasympathetic system influences the equil. of blood sugar. Small doses stimulate too little, large doses paralyze; hence, there is no influence; medium doses are very effective. PETER MASUCCI

Further work on the action of pilocarpine on the glucemic titer. GIULIO BUCCIARDI. *Boll. soc. ital. biol. sper.* 3, 73-6 (1928).—If after the injection of a medium dose of pilocarpine capable of producing hyperglucemia, there is injected, 50 min. later, a large dose of pilocarpine, the hyperglucemia diminishes or disappears. If after obtaining hyperglucemia, 50 min. later, there is injected a small dose, the hyperglucemia is increased. After the injection of a small dose insufficient to change the glucemic titer, a succeeding small dose slightly increases the blood sugar. If the injection of pilocarpine in either a small dose or large dose incapable of changing the blood sugar is followed by the injection of insulin, a hypoglucemia is obtained equal to that obtained in animals

under normal conditions. In animals in which pilocarpine caused hyperglucemia a successive injection of pilocarpine does one of 3 things (a) if the hyperglucemia is small, the injection of insulin brings about a hypoglucemia less marked than the same dose of insulin under normal conditions; (b) if the hyperglucemia is large, the successive injection of insulin diminishes it or even produces hypoglucemia; (c) in cases where the pilocarpine hyperglucemia is very intense, the injection of insulin has no effect; e. g., 20 clinical units fail to reduce the hyperglucemia. Hypoglucemia due to insulin is not influenced by any dose of pilocarpine if injected during the hypoglucemia phase.

PETER MASUCCI

Ergotamine glucemia. GIULIO BUCCIARDI. *Boll. soc. ital. biol. sper.* 3, 77-80 (1928).—Ergotamine has a tendency to abolish the hyperglucemia provoked by preceding exciting substances whether on the sympathetic or parasympathetic system. In guinea pigs injected with ergotamine, subsequent injection of adrenaline produces hyperglucemia but subsequent injection of pilocarpine produces instead a hypoglucemia. Ergotamine does not modify insulin hypoglucemia but insulin loses its hypoglucemic action if it is preceded by an injection of a large dose of ergotamine. PETER MASUCCI

The action of insulin and adrenaline in guinea pigs. GIULIO BUCCIARDI. *Boll. soc. ital. biol. sper.* 3, 81-4 (1928).—Insulin causes hypoglucemia when injected into guinea pigs. The hypoglucemia is not modified by subsequent injections of ergotamine. The effects of ergotamine on insulin under various conditions and in various doses are summarized. Likewise the effect of adrenaline on insulin is discussed. An injection of adrenaline diminishes or causes to disappear completely the symptoms from a lethal dose of insulin; yet it diminishes the hypoglucemia only slightly. This leads to the supposition that the antagonistic action of insulin is not manifested entirely on the regulation of blood sugar, but also on other organs and tissues. PETER MASUCCI

Biochemical modifications in the blood produced by histamine. G. DE TONI. *Boll. soc. ital. biol. sper.* 3, 87-92 (1928).—14 babies of various ages were bled from the ear vein and then injected with histamine $\frac{1}{30}$ mg. per kg. Detns. were made of glucose, uric acid, chlorides, and albumin before and after injection. The results were variable but certain facts could be deduced. Histamine modified the aq. equil. of the blood with a tendency towards diln.; there was an increase of blood sugar in most cases; uric acid increased; the chlorides were variable. PETER MASUCCI

The inhibiting action of inulin on glucose hyperglucemia. G. SOLARINO. *Boll. soc. ital. biol. sper.* 3, 108-11 (1928).—Inulin produces in dogs a variable but definite hyperglucemia; it has an inhibiting action on glucose hyperglucemia not as marked as starch, but comparable to that of levulose. PETER MASUCCI

Curarization and phosphogen content of striated muscles. G. MARTINO. *Boll. soc. ital. biol. sper.* 3, 114-6 (1928).—Curare 1:40 in Ringer soln. was injected in various doses into the dorsal lymph sacs of *Bufo viridis*. Before the injection, the normal phosphoric acid and phosphogen contents of one of the gastrocnemii were detd. Four to five hrs. after the injection the same detns. were made on the other gastrocnemius while completely paralyzed. The phosphogen content after curarization increased from 2.5 mg. % to 8 mg. %. There was a corresponding decrease in phosphoric acid. PETER MASUCCI

Hyperglucemia by pilocarpine. ANTONIETTA ORRU. *Boll. soc. ital. biol. sper.* 3, 135-7 (1928).—Pilocarpine in doses larger than 5 mg. per kg. produces constantly a hyperglucemia; within certain limits it varies in intensity and duration directly with the dose. Hyperglucemia is rapid; it is observed 15 min. after injection. P. M.

The effect of morphine and some of the other opium alkaloids on the muscular activity of the alimentary canal. III. Action on the stomach in unanesthetized dogs. O. H. PLANT AND G. H. MILLER. *J. Pharmacol.* 32, 413-35 (1928).—Dogs with a permanent gastric fistula were used. A balloon was introduced, and the contractions of the stomach were recorded on a drum. Doses of morphine from 0.02 mg. to 16 mg. per kg. were given hypodermically. With doses above 0.1 mg. there resulted a decrease in tone of the stomach, and a diminution in amplitude and frequency of the peristaltic waves, these finally disappearing altogether. With smaller doses there was sometimes an increase in amplitude, but diminution in frequency. The duration of the effect parallels the size of the dose. With larger doses the effect sometimes lasted 18 hrs. or more. An experiment on one cat gave similar results. Fluoroscopic pictures after morphine also showed the absence of contractions. Similar results were obtained with opium (as Pantopon), codeine, papaverine, narcotine, and heroine, although the effects were less with all except heroine and Pantopon. IV. Action of morphine on the colon of unanesthetized dogs and man. *Ibid* 437-50.—The dogs used had permanent fistulas opening into the colon, made by fastening the appendix into the belly wall. A rubber balloon

was introduced and the movements were recorded on a moving drum. Morphine sulfate, 0.01 to 5 mg. per kg., was given hypodermically. With moderate doses (0.25 to 1 mg. per kg.) there was an increase in tone, lasting many hrs. With larger doses the duration of the increase was somewhat less. Peristaltic activity was increased. There was no influence on the small rhythmic contractions. With very small doses (less than 0.2 mg.) the effects were the same, but less marked. In three cases of colostomy studied, the effect of small doses of morphine was found to be the same on the human colon.

C. RIEGEL

Antagonism of adrenaline by ergotamine. R. MENDEZ. *J. Pharmacol.* **32**, 451-62(1928).—The action of ergotamine on isolated rabbit uterus was very slow, and M. suggests leaving the ergotamine in contact with the tissue for 10 min. and omitting the washing out of ergotamine before applying adrenaline. Tissues studied other than rabbit uterus (guinea pig vas deferens, pregnant uterus of guinea pig, sheep carotid) were found not as suitable for standardization of ergotamine. Ergotamine had no effect on the inhibitor action of adrenaline.

C. RIEGEL

The antagonism between adrenaline and ergotamine. A. J. CLARK. *J. Pharmacol.* **32**, 462-4(1928).—Clark suggests the formula (concn. Ac Ch. — min. concn. Ac Ch) ÷ concn. Atr = constant (where min. concn. Ac Ch represents the concn. of acetylcholine producing action in the absence of atropine) to express the antagonism of acetylcholine by atropine. The same formula expresses the relation between the concns. of adrenaline and ergotamine acting on rabbit uterus. For the vas deferens of guinea pig the following formula is suggested (concn. adren. — min. effective concn. adren.) ÷ (concn. ergot.)^{1/2} = const. = 0.14.

C. RIEGEL

Pathologic signification of variations of free and latent acidities in the gastric liquids. H. SURMONT AND J. SWYNGEDAUF. *Bull. soc. chim. biol.* **10**, 450-5(1928).—See C. A. **22**, 620.

L. W. RIGGS

Influence of adrenaline on the human spleen and blood picture. CHI SHIH YANG. *Chinese J. Physiol.* **2**, 163-71(1928).—There was a marked decrease in the size of the spleen in all cases with splenic enlargement after subcutaneous injection of 0.5 to 1.0 cc. of 1 to 1000 adrenaline. There was a definite increase of hemoglobin of from 4 to 20%, of erythrocytes from 430,000 to 1,100,000 and of leucocytes of 5000 to 27,000. In splenectomized patients there was no increase in hemoglobin or erythrocytes after adrenaline injection, but an increase of leucocytes of 2000 to 10,000, with a marked increase of the lymphocytes. The increase of the blood cellular elements in the normal individuals was not nearly as great as in those with the enlarged spleen. It is assumed that this increase of the blood cellular elements was produced by the mech. squeezing of the contracted spleen following the adrenaline injection.

L. W. RIGGS

Auto-digestion. III. Anti-trypsin and insulin. H. NECHELES. *Chinese J. Physiol.* **2**, 229-30(1928), cf. C. A. **21**, 596.—Insulin in physiol. concns. does not play a role as "antitryptic" agent in dog blood.

L. W. RIGGS

Influence of insulin on the blood sugar content in nephrectomized animals. H. GNOINSKI. *Compt. rend. soc. biol.* **98**, 785-6(1928).—Nephrectomized dogs react to insulin in the same manner as normal animals, except that the latter return to their normal state within 24 hrs., while in the nephrectomized dogs a hyperglucemia still persists. The nephrectomized dogs were more sensitive to the consequences of hypoglycemia than were the normal animals. The action of insulin was slower and less in dogs with the ureters ligated and sectioned. These also showed a hypoglycemia 24 hrs. after the injection of insulin.

L. W. RIGGS

Direct stimulating action of adrenaline upon the islets of Langerhans. EDGARD ZUNZ AND JEAN LABARRE. *Compt. rend. soc. biol.* **98**, 858-9(1928).—By using the technic of Delezenne, Hallion and Gayet (cf. *Ann. physiol. physicochem. biol.* **3**, 508-11) it was found that adrenaline was a physiol. excitant of the insulin secretion, acting even in a pancreas in a purely humoral connection with the perfusing animal.

L. W. RIGGS

A propos the paper of A. Tournade and H. Hermann entitled "The adrenaline secretion during the course of shock caused by the intravenous injection of peptone."

JEAN LABARRE. *Compt. rend. soc. biol.* **98**, 861-3(1928).

L. W. RIGGS

Does an ephedrine-chloroform syncope exist? JEAN LABARRE. *Compt. rend. soc. biol.* **98**, 863-6(1928).—With cats ephedrine administered at the same time as CHCl₃ did not lead to that kind of intoxication presented by chloroformed animals treated with adrenaline. In these tests the ephedrine-chloroform syncope was not attained. Ephedrine is much less toxic than adrenaline for the heart muscle.

L. W. RIGGS

Hypotonic action of ultra-violet rays on the parasympathetic system. LUCIEN GAROT. *Compt. rend. soc. biol.* **98**, 867-9(1928); cf. C. A. **21**, 2333.—Prolonged treatment of 8 children 6 to 14 years old by ultra-violet rays generally led to a lowering of the

parasympathetic tonus. **Influence of ultra-violet ray treatment on the cardiac test with atropine.** *Ibid* 869-70.—Further expts. with children showed that after a single treatment with ultra-violet rays the hypotonus of the vagus was transitory and disappeared within 48 hrs. After prolonged treatment (10 to 15 irradiations) the hypotonus of the vago-sympathetic became stabilized, and the vagus recovered, in a new equil., its usual reacting powers. **Do ultra-violet rays modify the blood pressure?** *Ibid* 871-2.—From tests with children it was concluded that in the doses used, ultra-violet treatment did not modify the blood pressure. L. W. RIGGS

Action of amino acids, biliary salts, papaverine, cocaine, caffeine and derivatives of cinchona bark on the chronaxie of smooth muscle fibers. MARCEL FLORKIN. *Compt. rend. soc. biol.* 98, 872-3(1928).—The chronaxie of the isolated cloaca of the frog is prolonged by glycocoll or *D*-alanine at 1 to 5 per 100, by Na glycocholate, 1 to 1000 and 1 to 100, by Na taurocholate 1 to 1000, papaverine 1 to 100,000, cocaine 1 to 1000, caffeine 2 to 1000 and quinine 5 to 1000. The chronaxie is reduced by cocaine 1 to 20,000, quinine 1 to 1000 and quinidine 1 to 10,000. The findings of Lapicque were generally confirmed. L. W. RIGGS

Influence of the active substances of the ureters on the bladder of mammals. W. VAN SLIJPE. *Compt. rend. soc. biol.* 98, 874-7(1928).—There exists in the ureters of the guinea pig a substance which acts on the bladder of that animal. This substance is not adsorbed by sand; it dialyzes; the dialyzate resists a temp. of 100°, but its activity is totally destroyed on keeping 72 hrs. L. W. RIGGS

Irritability of the isolated heart of the frog under the influence of magnesium chloride. W. DULIERE AND L. DEBORGRAFF. *Compt. rend. soc. biol.* 98, 883-5(1928); cf. *C. A.* 22, 1627.—Mg may replace in part the Ca ions in a perfusing liquid without marked change in the irritability. The replacement of K by Mg is not so well tolerated. L. W. RIGGS

Action of synthalin on the respiratory quotient in the totally depancreated dog. L. HÉDON AND G. VERTZMAN. *Compt. rend. soc. biol.* 98, 1093-4(1928).—Synthalin is incapable of raising the respiratory quotient of the diabetic dog as does insulin, and thus gives further support to the conclusion that the mechanism of action of synthalin is essentially different from that of the internal secretion of the pancreas. L. W. R.

Fluorosis. NICOLA SETTE. *Compt. rend. soc. biol.* 98, 1094-6(1928); cf. Christiani, *C. A.* 21, 1666, 3404.—Cattle living in the vicinity of a fertilizer factory showed alterations in bone tissue similar to those observed by Christiani in cattle living near an Al factory. From expts. with guinea pigs living under the same conditions as the cattle, it appears that the symptoms are not due solely to the F contained in the superphosphates but more to the vapors of HNO₃ and H₂SO₄ which cause a general acid intoxication. L. W. RIGGS

Elimination of phenolsulfonephthalein after ingestion of lactoserum. MAURICE RENAUD, J. MULLER AND A. MIGET. *Compt. rend. soc. biol.* 98, 1127-8(1928).—The elimination of color substances depends upon the same rhythm as that of urea and salts, and the stimulation of renal parenchyma by lacto-serum increases in general all of the constituents of the urine. L. W. RIGGS

Toxicity of the bile. D. ANTITCH. *Compt. rend. soc. biol.* 98, 1145-8(1928).—The results of this study confirm those of Bouchard as to the high toxicity of intravenously injected bile. L. W. RIGGS

Diuretic and cholagogic actions of sodium thiosulfate. J. LEDUSKA. *Compt. rend. soc. biol.* 98, 1171-3(1928).—Expts. with dogs proved that Na₂S₂O₃ has a strong diuretic action on the kidney epithelium. When administered by mouth it causes an increase in the biliary secretion. L. W. RIGGS

Mechanism of the diminution of blood sugar under the action of insulin. B. MATSUOKA. *Compt. rend. soc. biol.* 98, 1178-9(1928).—Expts. with rabbits indicated that the diminution of blood sugar by insulin was due to the production of lactacidogen in the liver (perhaps also in the muscles) and the transformation of lactacidogen into glycogen. L. W. RIGGS

Cholagogic properties of lacto-serum. MAURICE RENAUD, J. MULLER AND A. MIGET. *Compt. rend. soc. biol.* 98, 1211-2(1928).—Lacto-serum may be classed among the better cholagoges. Various suggestions are made as to the mechanism of its action. **Purgative and laxative action of lacto-serum. Its mechanism.** • The principles of the hepato-duodenal purgations. MAURICE RENAUD. *Ibid* 1213-4. L. W. RIGGS

Venesection hyperglucemia in rabbits deprived of suprarenals. HIROSHI TACHI. *Tohoku J. Exptl. Med.* 10, 307-18(1928); cf. *C. A.* 22, 2003.—The hyperglucemia caused by venesection occurs in long-surviving rabbits deprived of suprarenals. Although the hyperglucemia was less than in normal rabbits, it was greater than in doubly

splanchnectomized animals. **Influence of different blood-replacing liquids on the hyperglucemia of venesection in rabbits.** *Ibid* 319-43.—From 20 to 25 g. of blood per kg. of body wt. was withdrawn from rabbits and the same quantity of replacing liquid was injected intravenously. Ringer-Locke soln., Ringer-Locke-gum arabic soln. as well as blood plasma fail nearly or completely to suppress the occurrence of venesection hyperglucemia. Notwithstanding these injections, an increase in the blood sugar concn. occurs. Defibrinated blood and 50% erythrocyte Ringer-Locke liquid nearly or completely suppress the evolution or venesection hyperglucemia (Cf. following abstr.)

L. W. RIGGS

Influence of the administration of alkali upon hemorrhagic hyperglucemia. HIROSHI TACHI *Tohoku J. Exptl. Med.* 10, 344-9(1928), cf. preceding abstr.—The increase in the blood sugar concn. after bleeding has a relation to the loss of blood corpuscles. Such hyperglucemia is a form of asphyxia diabetes. Intravenously injected NaHCO_3 soln. immediately after bleeding reduces the intensity of the ensuing hyperglucemia

L. W. RIGGS

Pancreatic hormone and mineral metabolism. I. Influence of the pancreatic hormone on the excretions of different urinary constituents (particularly inorganic salts) by normal and by pancreas-diabetic dogs. SOSUICHI TAKEUCHI *Tohoku J. Exptl. Med.* 10, 388-407(1928).—In normal dogs under a controlled diet, subcutaneous injections of the pancreatic hormone caused an increase in the daily excretion of Cl, K and total N. The results for the other inorg. constituents in the 3 subjects studied are variable and may depend on the different doses of the hormone administered in each case. In 2 depancreatized dogs the daily quantity of urine, P, Cl, Ca, Mg, K, Na, total N, SO_4 and Na/K were decreased and $\text{P}_2\text{O}_5/\text{N}$ was increased by the injection of the pancreatic hormone. The conclusions of this study fill several pages.

L. W. R.

Fate of acetylcholine in the blood. I. O. GALEHR AND F. PLATTNER *Arch. ges. Physiol.* (Pflüger's) 218, 488-505(1928).—Because of the fact that both vagus substance and acetylcholine become deprived of their influence on the frog heart by exposure to blood they are assumed to be probably identical. In blood acetylcholine is broken down into its components, the cleavage taking place with great rapidity (at 20° in 24 sec., at 40° in 15 sec.). Whole blood, and blood cells, with or without hemoglobin, have approx. the same effect while serum or other extd. blood are less effective. Activity appears to reside in the albumin fraction; globulin and red cells structurally damaged are inert. Cleavage of acetylcholine in blood is regarded as a surface catalytic phenomenon. Since vagus substance is the same as, or is closely allied to, acetylcholine probably its introduction into the circulation is followed by the same course of events as attend injections of acetylcholine. **II. Destruction in the blood of different mammals.** *Ibid* 506-13.—From a qual. standpoint the bloods of different mammals break down acetylcholine as does human blood, but from a quant. point of view different bloods show considerable differences in the rate at which the change takes place. Arranged according to rates, the bloods are, human, pig, cow, dog, horse, rabbit, cat, that of man being the most active.

G. H. S.

The use of sanocrysin in tuberculosis. D. MURRAY LYON *Edinburgh Med. J.* 35, 125-40(1928).—Sanocrysin was injected intravenously into tuberculosis patients. A series of definite responses, both focal and general, were elicited. These reactions were usually followed by a rapid return to the previous state or to an improved condition. Sanocrysin seemed to have a selective affinity for tuberculosis lesions and the administration of the drug produced at least temporary improvement. Therefore, further extended trial and exptn. with this drug are desirable.

M. H. SOULE

A pharmacological note on Baptisia tinctoria. D. I. MACHT AND J. A. BLACK. *J. Am. Pharm. Assoc.* 16, 1056-59(1927).—Exts. of *Baptisia tinctoria* are used in mouth washes. The ext. is bitter and causes a tingling of the tongue similar to that produced by aconite preps. Infusions and decoctions of the plant injected intraperitoneally produced death in white rats. In rabbits the infusion by stomach tube produced some paralysis of the hind legs and some narcotic effect. Subcutaneous injections of the solns. in cats produced violent poisoning. The drug was tested for local anesthetic effects by the usual methods but the results were negative.

L. E. WARREN

I—ZOOLOGY

R. A. GORTNER

The gustatory sense of bees. K. v. FRISCH. *Naturwissenschaften* 16, 307-15(1928).—The minimum sucrose concn. accepted by bees varies individually and depends on their degree of starvation. It lies around 17% for normal animals but can go as low

as 8 or 4%. The latter value is probably the threshold value for their sweet taste. For glucose the normal value was 18%; the action of various sugar mixts. is additive. The taste of bees for "sweet" substances is less general than that of man; saccharin and dulcin are not accepted, neither glucine, eupatorin, or glycyrrhizic acid. The sugars, glucose, fructose, sucrose, maltose, trehalose and melezitose, are accepted; other sugars act indifferently. A table is given of hexoses, sexivalent alcs., glucosides, pentoses, tetrahydric alcs., disaccharides and trisaccharides with their degree of sweetness for man and bee. No regularity on a structural basis in either case has been found as yet.

B. J. C. VAN DER HOEVEN

The effect of iodized spleen and liver of lamb and of organs of chicken treated with such substances upon the metamorphosis of axolotl. E. GIACOMINI. *Boll. soc. ital. biol. sper.* 3, 92-7(1928).—Iodized spleen and liver of lamb were fed to chickens which were later killed, their organs dried and ground, and fed to axolotl. There was complete metamorphosis, indicating a perfect parallelism to the effects obtained with thyroid. Apparently the influence of these substances on metamorphosis is not due to inorg. I, but to org. I compds. (iodoproteins) formed either outside or inside the organism, which by transformation after absorption form an active hormone. PETER MASUCCI

Bufodesoxycholic acid in the bile of *Bufo vulgaris Japonicus*. I. TAKEJI OKANURA. *J. Biochem. (Japan)* 8, 351-60(1927).—A desoxycholic acid of the composition $C_{24}H_{46}O_4$ was found in the bile of *Bufo vulgaris*. It has a strong stimulating effect on the lipase action and is hemolytic in a diln. of 1:3200. S. MORGULIS

Ionic antagonism in the regeneration of *Hydra fusca*. M. P. KOZAK. *Zhurnal expil. biol. Med.* 8, 515-24(1928).—A toxic soln. of NaCl can be detoxicated by the addn. of $CaCl_2$, and a toxic soln. of KCl can be detoxicated with $CaCl_2$ or NaCl. When the KCl concn. exceeds 0.024 N it can no longer be detoxicated. When the concn. is below this max. level the detoxication can be accomplished with half quantities of NaCl or $CaCl_2$ provided both are used simultaneously. S. MORGULIS

The role of tryptophan in the animal organism. S. J. DEMIANOVSKII. *Zhurnal expil. biol. Med.* 8, 526-31(1928).—Silk worms in pathological condition or under unfavorable living conditions produce silk with a higher tryptophan content. Also in *Biochem. Z.* 193, 245-50 (1928). S. M.

Insect scatology. S. W. FROST. *Ann. Entomol. Soc. Am.* 21, 36-46(1928).—Discharges from the alimentary tract of insects are of 3 classes: (1) material which enters the mouth but does not pass through the alimentary canal; (2) excretions by the alimentary canal or its appendages including excretions from salivary glands, malpighian tubules, and secretions of honey dew by some insects; (3) fecula or true excrement which is voided in the form of pellets or as a semi-liquid. This paper treats the true excrement of insects. The conservation, utilization and disposal of the excrement by a no. of species of insects are considered. Fecula is the proper term to use for the excrement of insects. C. H. RICHARDSON

The formation of d-lactic acid during the incubation of hen eggs. AKISUKE MATSUMOTO. *Acta Schol. Med. Univ. Imp. Kioto* 10, 265-9(1928).—Small amts. of glycerol were introduced in eggs through a hole, the hole was covered with paraffined paper and incubated for 3 days at 39.5°. In the yolk, the lactic acid seemed to be very slightly increased; in the white of the egg, it stayed the same as in the controls. G. SCHWOCH

12—FOODS

F. C. BLANCK AND H. A. LEPPER

The chemistry of bread. D. W. KENT-JONES. *J. Soc. Chem. Ind.* 47, 143-9T (1928).—An attempt is made to trace the manuf. of bread through all stages: chemistry of flour, varieties of wheat, wheat blending, milling, flour treatment and breadmaking.

J. A. KENNEDY

Chemistry in the dairy industry. G. A. RICHARDSON. *World's Butter Review* 2, No. 4, 13-4(1928). F. H.

Phosphorus compounds in milk. IV. Presence of adenine nucleotide in milk. H. D. KAY AND P. G. MARSHALL. *Biochem. J.* 22, 416-8(1928).—The sepn. was based on Jackson's method (*C. A.* 18, 2178). The adenine nucleotide is present in milk in the order of 3 mg. nucleotide to 100 cc. milk. It is associated with some other phosphoric ester with similar pptn. reactions and solubilities. BENJAMIN HARROW

Direct microscopic examination of milk. LEROY FORMAN AND I. H. SHAW. *N. J. Dept. of Health. Milk Plant* 17, No. 4, 36-40(1928). H. F. ZOLLER

The preservation of milk samples for fat estimation. P. MARSCHEW. *Milch-wirtschaft. Zentr.* 57, 85-8(1928).—A study of HCHO , K_2CrO_7 and HgCl_2 as preservatives. Their effect on the analysis by different methods and means of overcoming difficulties are described.

GEORGE R. GREENBANK

Methods and standards for the production of certified milk, adopted by the American Association of Medical Milk Commissions, Inc., revised May 17, 1927. *Certified Milk Conferences* 1927, 311-22.—The standard butterfat content is an av. of 4.0% and a min. of 3.5%. Other av. values are permitted provided the % of butterfat is stated on the seal of the container.

JOSEPH S. HEPBURN

Study of "flaky" milk. F. S. JONES AND R. B. LITTLE. *Certified Milk Conferences* 1927, 109-15.—The tiny elongated tenacious floccules, which appear irregularly in the milk of certain cows, are composed of mucus, leucocytes, and bacteria (hemolytic staphylococci, and both hemolytic and non-hemolytic streptococci). The milk has a relatively high blood protein content and leucocyte count. The cause is a mild prolonged mastitis.

JOSEPH S. HEPBURN

The handling and marketing of unpreserved cream. L. J. LORD. *Food Manuf.* 3, 343-4(1928).

J. A. KENNEDY

Preparation of lactic acid milk mixtures for infant feeding. MCK. MARRIOTT. *J. Am. Med. Assoc.* 89, 862, 863 (1927); *Expt. Sta. Record* 57, 893.—A simple and convenient method for prepg. lactic acid milk from evapd. milk and lactic acid is described.

L. W. RIGGS

Homogenization and freezing time of ice cream mix. W. H. E. REID. *Univ. Mo. Ice Cream Trade* 24, No. 1, 71-2(1928).—Expts. showed it always to be impossible to incorporate 100% over-run in unprocessed ice cream mix. With increase of homogenization pressure the percentage incorporation of air increased in a like period of freezing time. See also *Milk Plant* 17, No. 2, 111-24(1928) for more complete data.

H. F. ZOLLER

Sherbet crustation remedies. L. K. ROWE. *Univ. of Neb. Ice Cream Trade* 24, No. 2, 43-4(1928).—The following influences on crustations were studied: (1) exposure of the surface of the frozen product to the air, (2) effect of percent of sucrose, (3) effect of sweetening materials other than sucrose and (4) effect of different stabilizers, i. e., tragacanth, arabic and Indian gum, gelatin and agar. The surface should be kept covered. Corn and invert sugar reduces crustation but must be used in small amounts to prevent too great lowering of freezing point. Gelatin or India gum or both in best stabilization.

H. F. ZOLLER

The manufacture of margarine. P. S. ARUP. *Food Manuf.* 1, 73-5(1927).

F. H.

Utilization of the soy bean. II. YOSHITARO TAKAYAMA. *J. Soc. Chem. Ind. (Japan)* 31, 319-22(1928); Suppl. binding 77-8(1928) (In English).—The bean was ground to powder after the removal of oil and bran, was digested with H_2SO_4 of various concns. in the range of 1-0.025 *N* at 100° for various durations in the range of 1-19 hrs. The amount of dissolved protein and that of the reducing sugar increased as the total amount of H_2SO_4 added increased; the concn. of the acid did not effect the amts. eventually dissolved, but lessened the time required for solution.

SHUMPEI OKA

Tests of method for the commercial standardization of raisins. R. M. CHACE AND C. G. CHURCH. *U. S. Dept. Agr., Tech. Bull.* 1, 1 23(1927).—Mech. and chem. methods for grading raisins are offered as substitutes for the visual methods previously used. Meatiness or plumpness is graded by a method depending upon the relation between wt. and vol. Moisture is measured by the compressibility of a given vol. of the berries under a given pressure for a given length of time. Traces of mold are detected by means of H_2O_2 . Sand is detd. by brushing the fruit submerged in water and allowing the sand to settle in a calibrated measuring device. Sunburn is detected by viewing the berries through selected color screens. A description of other methods for moisture and data on the compn. of raisins of different grades are included.

R. M. CHACE

The successful cider mill of today. H. F. MACMILLAN. *Fruit Products J. and Am. Vinegar Ind.* 7, No. 9, 9-11(1928).—Suggestions to those who are about to start a new apple cider enterprise or revive an old one.

J. A. KENNEDY

Crushed peaches—a new canned peach product. W. V. CRUESS AND J. H. IRISH. *Food Products J. and Am. Vinegar Ind.* 7, No. 9, 20-21(1928).—The process of prepg. and cannng this product which utilizes the under-sized fruit, and its many uses are given.

J. A. KENNEDY

Scientific control in the sugar confectionery industry. R. H. MORGAN. *Food Manuf.* 1, 127-8(1927).

R. H.

The cause of musty odor in cooling plants. W. JURGES AND O. REICHARD. *Gesundh. Ing.* 51, 304-8(1928).—It was noticed that foods such as meat, butter, etc., showed moldy odors after storage in certain cooling rooms. Tests revealed that the cause was molding of insulating material (cork). In order to prevent this decompn., all of the bacteria, etc., in the cork must be killed and the nutritive value present in the cork must be destroyed. This is best accomplished by application of dry heat. WAYNE L. DENMAN

A new combined method to titrate the volatile, soluble and insoluble fatty acids of butter and fats (TCHÉTCHEROFF) 27. Properties of the bactericidal substance in milk (Jones) 11A. Mixing and emulsifying apparatus for treating foods (U. S. pat. 1,671,868) 1.

BLYTH, ALEXANDER W. AND BLYTH, MEREDITH W.: **Foods: Their Composition and Analysis.** For analytical chemists and others. 7th ed. revised. London: Griffin. 645 pp. 38s. net.

KNOCH, C.: **Das Trocknen kolloidaler Flüssigkeiten insbesondere der Milch.** Berlin: Paul Parey. 226 pp. Reviewed in *Expt. Sta. Record* 58, 112(1928).

Food. A. L. VOGEL. U. S. 1,672,046, June 5. Dehydrated Paullinia fruit or its extd. tonic principle is used with other materials such as cocoa or chocolate for prep. beverages.

Cooking cereals by high compression, heating and forcing water into the mass. R. T. ANDERSON (to V. D. Anderson Co.). Brit. 278,653, Oct 9, 1926. An app. is described.

Preservative coating of fruit. B. C. SKINNER (to Brogdex Co.). U. S. 1,672,736, June 5. Fruits such as oranges are heated and then treated with a film of waxy material such as paraffin to retard drying out of the fruit. An app. is described. U. S. 1,672,737 also relates to app. for similar processes.

Preparing oranges or other fruits for market by brushing with deodorized kerosene or other non-aqueous liquids. E. M. BROGDEN (to Brogdex Co.). U. S. 1,671,923, May 29. An app. is described. U. S. 1,671,924 relates to treatment of fresh fruits with an atomized wax soln. to form a thin protective film, and also describes an app. Cf. C. A. 21, 2157.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Industrial laboratories and laboratories for scientific research. H. POMMERENKE. *Bull. soc. chim. Belg.* 37, LXXXIII-XCIV(1928).—A lecture. A. L. HENNE

American chemical industries—Monsanto Chemical Works. L. A. WATT. *Ind. Eng. Chem.* 20, 662-4(1928). E. H.

Economic aspects of chemical distribution. WILLIAMS HAYNES. *Ind. Eng. Chem.* 20, 571-5(1928); cf. C. A. 22, 999. E. H.

Changes in the chemical industry during the past twenty-five years. ANNA HAZEL SWIFT. Chem. Division, Bur. of Foreign and Domestic Commerce, Washington, D. C. *Ind. Eng. Chem.* 20, 657-62(1928). E. H.

Remote control—Industry's magic carpet. D. H. KILLEFFER. *Ind. Eng. Chem.* 20, 683-6(1928). E. H.

"Foam" fire-extinguishing plants in the chemical industry. J. HAUSEN. *Chem.-Ztg.* 52, 348-9(1928).—A lay-out for a "Foamite" plant using NaHCO_3 , $\text{Al}_2(\text{SO}_4)_3$, and saponin as active agents, designed to protect a works producing coal-tar derivs. Illustrated. W. C. EBAUGH

Wetting agents. S. R. TROTMAN. *Ind. Chemist* 4, 201-4(1928).—A comprehensive review of the nature of wetting agents and of the detn. of wetting power. T. S. C.

The mechanical basis of filtration. J. A. PICKARD. *Ind. Chemist* 4, 186-90(1928).—Attempts to develop the theory of filtration on a mathematical basis have little practical value, since slight differences in the nature of the particles or the manner in which they are deposited on the cloth have considerable effect on the rate of filtration. When the particles in the filter cake are inelastic, the structure of the cake is the same, no matter what filtration pressure is employed. When the particles are deformable, a dense cake is obtained at the face of the cloth and a soft cake at the prefiltered side. With particles of this nature, the rate of filtration is not increased proportionately with increase in pressure. T. S. CARSWELL

The manufacture of insulators and molded products. H. SAGET. *Rev. gén. mat. plastiques* 4, 279-83(1928).—A description of the manuf. of such products from natural and from artificial resins
A. PAPINEAU-COUTURE

Industrial poisoning by hydrocarbons of the aromatic and aliphatic series. F. FLORET. *Zentr. Gewerbehyg. Unfallverhütung*. 14, 257-61, 369-72(1927); *Bull. Hyg.* 1, 234(1927).—The chemistry and symptoms of poisoning by CH_4 , C_2H_6 , CCl_4 , CH_2Cl_2 , CH_3COCH_3 , petroleum and benzine, C_6H_6 and its homologs. A description of skin diseases resulting. The toxic effects increase with the ability to dissolve fats.
GEORGE R. GREENBANK

BALCKE, HANS: *Die Abwassertechnik. Bd. I. Grundlagen.* Munich: R. Oldenbourg 290 pp. M. 13.50, cloth bound M. 15.

Otto Wenzel's *Addressbuch und Warenverzeichnis der chemischen Industrie des deutschen Reichs.* 16th ed. Berlin: Rudolf Muckenberger. M. 73. Post free (foreign). Reviewed in *Chem. Trade J.* 82, 507(1928)

Absorption refrigerating apparatus. SULZER MACHINES SOC. ANON. Brit 278,678, Oct. 7, 1926

Refrigerating system. A. LENNING (to Electrolux Servel Corp.) U. S. 1,672,265, June 5th

Rectifying and condensing apparatus for refrigerator systems. A. LENNING (to Electrolux Servel Corp.). U. S. 1,671,949, May 29.

Decolorizing sirups and other aqueous liquids. BRITISH DYESTUFFS CORP., LTD. C. HOLLINS and E. CHAPMAN. Brit 278,485, Aug. 24, 1926. Decolorization by adsorbent materials such as C or silica gel is effected in the presence of small quantities of wetting-out agents such as alkyl-naphthalenesulfonic acids, substances prepd. from mineral oil fractions by sulfonation and condensation with isopropyl alc., ligninsulfonic acids, naphthenic acids and sulfonated higher fatty acids

Treating waste acid liquors. C. A. KLEIN and R. S. BROWN. Brit 277,769, July 8, 1926. Waste liquors contg. H_2SO_4 and which may also contain Fe salts such as are obtained in the prepn. of Ti pigments as described in Brit. 243,081 (*C. A.* 20, 3826) may be preliminarily decolorized with C, SO_2 or by pptn., and are then treated with a Ba compd. such as BaO or BaCO_3 to obtain BaSO_4 (without completely neutralizing the liquor) so that a ppt. free from Fe is formed. The reaction may be facilitated by the addn. of a small quantity of an acid or sol. salt adapted to form a sol. Ba salt, e. g., HCl , HNO_3 or HOAc or their alkali salts.

Separating various materials from liquids and gases. A. H. PETERSON. Brit 278,722, Oct. 7, 1926. Tar, mercaptans from pulp, or metallic compds. may be condensed from vapors and the condensation may be assisted by injecting or spreading water, tar, lye or tailings from the pulp industry into or on the charge. Lignin can be recovered from pulp tailings as a coating on wood chips, sawdust, peat or the like. If peat is used the product may form a binder for briquetting ore, coal, etc.

Insulating and filtering material. W. ZIMMERMANN. Brit 277,577, April 28, 1927. Mg-contg. minerals such as hornblende, dolomite, magnesite or steatite, with or without addn. of fluorspar, are fused and converted into threads by blowing with compressed air or steam.

Composition for absorbing gases. L. A. LEVY. Brit. 277,540, Jan. 25, 1927. A compn. for use in gas analysis app. or in respirators consists of a mixt. of hydrated Ba(OH)_2 , Ca(OH)_2 or the like, KOH or NaOH , with or without activated C.

Electric hot-plates (refractory insulation). F. C. WÜTHRICH. Brit. 277,432, June 18, 1926. A refractory material suitable for embedding resistance wires is formed of a mixt. of ordinary clay, fireclay and quartz sand. Various structural features also are specified.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Proposed classification of Indiana public water supplies. L. S. FINCH. *J. Am. Water Wrks. Assoc.* 19, 534-41(1928)

Public ground-water supplies in Illinois. G. C. HABERMAYER. Illinois State Water Survey, *Bull. No.* 21, 710 pp.(1928)

Wells and springs for Somerset. L. RICHARDSON AND W. WHITAKER. *Dept.*

Sci. Ind. Research Mem. Geol. Survey England 1928, 270 pp.—Analyses and a bibliography are given. E. H.

Iodine content of some water supplies in goitrous regions. G. H. BECKWITH. *Proc. Soc. Exptl. Biol. Med.* 25, 117(1927).—Detns. of iodine in drinking water of several towns and cities in Illinois and in several other goitrous regions showed a very low content in I_2 . C. V. B.

Water supply and hydroelectric plant at Spartanburg, South Carolina. H. F. WIEDEMAN. *J. Am. Water Works Assoc.* 19, 511-21(1928).—South Pacolet River is the supply; it is dammed above the plant. Lime and alum are used. Details of the first ten months' operation are available. D. K. FRENCH

The filtration of Lake Ontario water. J. M. CAIRD. *J. Am. Water Works Assoc.* 19, 526-33(1928).—A discussion with tabulated data of the results of ten yrs.' treatment of the Rochester city supply. $Al_2(SO_4)_3$ and liquid Cl have been used. When phenol odors have appeared, $KMnO_4$ has been successfully used. D. K. FRENCH

New rapid sand filter plant, Washington, D. C. P. O. MACQUEEN. *J. Am. Water Works Assoc.* 19, 483-502(1928).—The Potomac River at the head of Great Falls is the source of supply. Alum can be added to the water both before and after passage to the mixing chambers as well as to settled water before filtering. A control chamber where alum and Cl can be added as well provides the limit of flexibility. Sirup of alum is used and is manufd. at the plant by the Hoover process from bauxite and H_2SO_4 . There is a hydroelec. plant combined. D. K. FRENCH

Chemical engineering applied in new St. Louis water plant. C. W. CUNO. *Chem. Met. Eng.* 35, 230-1(1928). J. A. KENNEDY

Water-softening plant and pumping station improvements at Fostoria, Ohio. J. F. LABOON. *J. Am. Water Works Assoc.* 19, 503-10(1928).—This will be a "lime-soda" type plant combining the functions of clarifier and settling basins in one unit. Cl will be applied in the clear water main and in the suction of the raw water pumps when pre-chlorination is necessary. Aeration equipment is provided and a minimum detention period of 5 min for carbonation is also planned. D. K. FRENCH

Iron-removal plant at Champaign, Illinois. F. C. AMSBARY, JR. *J. Am. Water Works Assoc.* 19, 522-5(1928).—This is an outline of successive problems met and solved. Aeration and Cl together were necessary. D. K. FRENCH

A small filter for water softening. E. QUITMANN. *Gesundh. Ing.* 51, 340-2(1928).—Zeolite filtration is probably the simplest process for small plants. A small zeolite softener using a material known as "Natrolith" as the active softening agent is described. The water softened by this process has zero hardness, whereas the "Soda lime" process yields a water which has a hardness of 2-3°. "Natrolith" is able to remove Fe, Mn, Pb and NH_4 compds. to a certain extent, also many colored substances such as methylene blue combined quant. with it, whereas other solns. such as methyl orange filter through unchanged. In order to obtain a satisfactory effluent it is necessary to use an unobjectionable feed water low in Fe and Mn, to use a good grade of salt in regenerating the "Natrolith" and to keep the softener well cleaned in order to prevent the growth of noxious organisms. WAYNE L. DENMAN

Modern aspects of chlorination of water. N. J. HOWARD. *J. Am. Water Works Assoc.* 19, 546-52(1928).—A very interesting survey of the history of the use of Cl, the development and use of chloramine compounds, super-chlorination and the problem of destroying or removing taste-forming substances. D. K. FRENCH

Water sterilization by chlorine. F. DIENERT. *Tech. sanit. munic.* 23, 50-8(1928).—The lethal dosage of Cl for the cholera bacillus in water was 0.2 mg. per l. The dysentery bacillus required approx. twice the dosage of Cl necessary to destroy *B. coli*. The Flexner dysentery bacillus required a dose of 0.18 mg. per l.; the Shiga bacillus 0.15 while *B. paratyphosus* required 0.2 mg. Similar results were obtained with both liquid Cl and $NaOCl$ in H_2O treatment. The Cl in ClO_2 was fully as efficient as the Cl in $NaOCl$ or in liquid Cl. Various theories of microbial destruction by Cl are discussed. The Cl treatment of H_2O must be conditioned on the amt. of org. matter present, the nature of the bacteria and the clearness of the water. C. R. FELLERS

Test for phenolic tastes and odors in water after chlorination. F. W. SPERR, JR., W. H. FULWEILER, F. E. DANIELS AND O. O. MALLETS. *U. S. Public Health Repts.* 43, 881-2; *J. Am. Water Works Assoc.* 19, 605-6(1928).—The above committee has proposed the following tentative method. Acidulate 500 cc. of the material with H_2SO_4 until acid to litmus, and distil off 250 cc. Catch the distillate in a 500-cc. volumetric flask, make to the mark with distd. H_2O and dil. as follows: 1 to 10, 1 to 100, 1 to 1000, etc., prepg. as many dilns. as may be necessary. Take 200 cc. of the distillate in the volumetric flask after making to the mark (this representing the original material

undild.) and a like amt. of each successive diln. Treat with a slight excess of chlorine water (a total of 0.3 p.p.m. of Cl is usually sufficient). Let stand 15 min. and then boil until the excess Cl is removed as evidenced by test with *o*-tolidine. Make the odor test by smelling the hot liquid. Make the taste test after the liquid has cooled. In the taste test, swallowing a small quantity of the liquid is the best method for revealing the presence of taste-producing substances. Results shall be expressed as the lowest diln. in which the taste and odor are negative.

J. A. KENNEDY

Report of Committee No. 1 on Standard Methods of Water Analysis. R. C. BARDWELL, *et al.* *J. Am. Water Works Assoc.* 19, 553-73(1928).—In particular are considered brilliant green lactose bile medium, the detection of phenols, the detn. of iodine and the *o*-tolidine test for free Cl; recommendations and methods are included. There is much other material in the form of progress reports.

D. K. FRENCH

Standard methods of water analysis. HAROLD FARMER, *et al.* *J. Am. Water Works Assoc.* 19, 587-91(1928).—The work for the past year has been confined to the detn. of dissolved O and CO₂. The present methods are not considered satisfactory and further work will be done.

D. K. FRENCH

Determination of oxygen in water. F. LIEBERT AND W. M. DEIRNS. *Chem. Weekblad* 25, 226-8(1928).—The accuracy of several methods (Winkler, Romijn, Smit) for detn. of O₂ in water was studied. The Winkler method gave very satisfactory results accurate in 0.008 cc. per l., if not too much org. matter is present (fresh water). The results are tabulated.

B. J. C. VAN DER HOEVEN

Notes on practical water analysis. W. D. COLLINS. U. S. Geol. Survey, *Water-Supply Paper* 596-H, 235-61(1928).—The methods described are those used by the U. S. Geol. Survey for the analysis of waters of moderate mineral content in order to learn their suitability for industrial use. The analyses so made have little or no reference to the sanitary condition of the water. Unless the compn. of the water is approx. known, a preliminary examn. should be made by titration for alky, Cl and NO₃ and for Ca by turbidity or soap-destroying power. The results of the preliminary examn. may show that a more complete analysis is unnecessary. Eleven analyses are tabulated, the constituents detd. being total solids, SiO₂, Fe, Ca, Mg, Na, K, (HCO₃), (SO₄), Cl and (NO₃). Samples should be analyzed soon after being taken, and reagents kept freshly prepd., since a common source of error is material dissolved from glass.

L. W. RIGGS

Treatment of feed water. W. G. CAREY. *Fuel Econ. Rev.* 6, 36-9(1927).—A review.

E. H.

Deconcentrators and continuous blow-down apparatus. R. C. BARDWELL, *et al.* *J. Am. Water Works Assoc.* 19, 579-86(1928), cf. *C. A.* 22, 128.—After a description of and pointing out both the advantages and disadvantages of the deconcentrator system, the stabilizer system and the continuous blow-down idea, further study is recommended.

D. K. FRENCH

The law relating to the pollution of rivers (England.) ALFRED HEBBINGTON. *Munic. Eng. Sanit. Record* 79, 436-7(1927).—Comment on the Rivers Pollution Prevention Act, 1876, West Ridings of Yorkshire Rivers Act, 1894, and Salmon and Fresh-water Fisheries Act, 1923.

C. H. BADGER

Pollution of streams in Illinois. A. M. BUSWELL. Illinois State Water Survey, *Bull.* No. 24, 33 pp.(1928).

E. H.

Pollution problems in the state of Washington and their solution. H. W. NIGHTINGALE. *Trans. Am. Fish. Soc.* 57, 294-300(1927).—Domestic sewage free from trade wastes is not harmful to fish life unless it reduces the O₂ content to less than 30% satn. Sulfite wastes from pulp mills are very destructive, since the wastes from a fifty-ton sulfite mill equal the sewage from a city of 81,000. No special toxic action with sulfite wastes has been found. The wastes from a mill using the lime soda process have proved very destructive to young fry. Black ash wastes are very destructive to seed clams. A discussion of the legal control of industrial wastes is included.

C. M. McCAY

Toxicity experiments with fish in reference to trade waste pollution. D. L. BEIDING. *Trans. Am. Fish. Soc.* 57, 100-19(1927).—The factors that must be considered in studying the effects of pollution of water upon fish are the species of test fish, the hardness of the individuals, the age and the size. The environment factors that must be controlled are the chem. characteristics of the water, the size of containers, the oxygen content and the temp. of the water. Brook trout, rainbow trout, chinook salmon, carp, goldfish and suckers were studied. Brook trout of about 200 g. wt. are the most satisfactory. HNO₃, HCl and H₂SO₄ produce the same symptoms of loss of equil. and irregular respiration at a *p*_H of 4-5. M. L. D. is 1:100,000. Org. acid

presents greater diversity of actions. Trout can survive after immersion in 1:200 of AcOH. Phenol is marked by its irritating action but produces no evidence of O₂ hunger. Tannic acid injures the gills and produces O₂ hunger. NH₄OH, NaOH and KOH differ only in degree of toxicity. KOH is less marked in activity. Lead arsenate produced no characteristic symptoms. Ca(OCl)₂ produces characteristic head-balancing motions. CuSO₄ shows wide variations in toxicity. Fish once poisoned do not recover in fresh water. FeSO₄ has a low toxicity. HgCl₂ kills fish, leaving them with pale gills and auricles filled with blood. KMnO₄ will color fish yellow but they promptly recover in fresh pure water. H₂S produces respiratory paralysis. Fish can recover in fresh water. The author includes tables comparing his data with those of previous workers.

C. M. MCCAY

Treatment of the sewage from Paris. W. J. MULLER. *Gesundh. Ing.* 51, 342-3 (1928).—In past years much of the sewage from Paris was disposed of by irrigation on to fields. In recent years such methods no longer sufficed and other biol. processes were employed. Partial treatment is obtained by settling basins which remove the readily removable solids and the suspended material is removed by irrigation on to fields. The fields take care of 40,000 cu. m. of sewage per ha. per year. Further treatment is obtained at some stations by filter basins. Treatment with three processes using activated sludge was tried. The "Simplex process" was the most economical. Satisfactory disposal of sludge was obtained by burning after drying on sludge beds followed by a drier. The burning of the combustible matter furnishes enough heat to operate the drier. Other methods of sludge disposal under consideration are biol. decompn. and drying by centrifugal force.

W. L. DENMAN

Effect of salt on sludge digestion. WILLEM RUDOLFS. *U. S. Public Health Repts.* 43, 874-81 (1928).—The effect of increasing amts. of NaCl upon the rate of decompn. of org. matter in sewage sludge by bacteria is, progressively, (a) indifferent, (b) stimulating, (c) retarding and (d) toxic. There is a comparatively large number of sewage-disposal plants where salt is received as mine water, brine, or soil leachings. When rather concd. salt solns. are received continuously or temporarily a number of questions arise: (1) How much salt can be handled by a tank without upsetting the biological equil.? (2) What is the effect upon gas production? (3) Is the compn. of the gas changed? (4) How much larger should the digestion capacity be? The effect of salt upon the rate of decompn. of sewage sludge was only slightly noticeable with addns. of 5 g. per l. of sludge, but with larger quantities the destruction of volatile matter and total gas production decreased markedly. The compn. of the gas changed greatly with the salt addns. With the largest quantities of salt practically no CH₄ was produced. Mixts. of NaCl and SO₄ appear to be somewhat stimulating. Methods and material used are given and the results are tabulated, and discussed with the aid of graphs.

J. A. KENNEDY

Effect of certain trade wastes on sludge digestion. WILLEM RUDOLFS. *U. S. Pub. Health Repts.* 43, 945-51 (1928).—This preliminary study shows laundry waste somewhat detrimental to digestion of sludge. A dye waste containing 1.2% sulfur black, 2.0% NaCl, 1.6% Na₂S and Na₂SO₄ and 0.6% Na₂CO₃ was markedly detrimental and H₂S was liberated. Sepn. of the clear upper layer of dye from the settled solids after 6 hrs. gave somewhat better results but with 1% of dye waste the H₂S odor disappeared after more than 5 weeks. 500 p. p. m. of H₂SO₄ were not markedly detrimental but 1000 p. p. m. retarded digestion. Both gave H₂S. Retardation by 500 or 1000 p. p. m. of NaOH was not great. Neither 500 p. p. m. of H₂SO₄ and NaOH together nor 0.3% FeSO₄ showed any important effect.

FOSTER DEE SNELL

Burley-in Wharfedale and Menston joint sewerage board (England). ANON. *Munic. Eng. Sanit. Record* 79, 473-4 (1927).—The works and the method of purifying the sewage are described.

C. H. BADGER

Hertford (England) sewage-disposal works. CHARLES DUCKWORTH. *Munic. Eng. Sanit. Record* 79, 496 (1927).—The works, designed for a max. of 2 million gal. per day, and the process of purification are described. Activated sludge is employed. Chem. analyses of the crude sewage after passing through the detritus tanks, and the effluent are given.

C. H. BADGER

The operation of activated-sludge plants. H. T. CALVERT. *Munic. Eng. Sanit. Record* 79, 276-7 (1927).—The causes of troubles in these plants are summarized. In the discussion which followed W. H. Hoyle told of successfully overcoming a mass of filamentous growth of *Sperothilus natans*. It was agitated in the tank for several hrs. with a thin paste made of 8 cwt. of screened rich soil and 1½ cwt. of lime to gain the necessary humus in the aeration plant. Shutting off the flow and aerating until the next day, and the addn. of precipitants to wt. the sludge did not help.

C. H. B

The problem of the projection of the sedimentation slot in two-storied treatment plants. MORGENROTH. *Gesundh. Ing.* 51, 290-1(1928).—The characteristics of such installations are briefly discussed.

WAYNE L. DENMAN

House refuse collection and disposal (Willesden, England). F. WILKINSON. *Munic. Eng. Sanit. Record* 79, 503(1927).—Discussion and costs.

C. H. BADGER

Automobile exhaust gas in streets and repair shops of large cities. J. J. BLOOMFIELD AND H. S. ISBELL. *U. S. Public Health Repts.* 43, 750-65(1928).—Air samples analyzed by the I_2O_5 method with liquid air cooling tube to eliminate gasoline vapor showed a dangerous concn. of CO in repair shops, but almost no hazard in congested city streets and in autobuses. The av. for 102 tests in 27 repair garages was 2.1 parts in 10,000, 59% of them being over 1 part and 18% over 4 parts. The av. for 141 tests in heavy street traffic was 0.8 part CO in 10,000; only 24% being over 1 part, and in only one location, a covered passageway, was there as much as 2 parts CO in 10,000 of air.

C. M. SALLS

Fumigation tests with ethylene dichloride-carbon tetrachloride mixture. L. F. HOYT. *Ind. Eng. Chem.* 20, 460-1(1928).—Because of its low cost, ease and comparative safety of application, and easy removal following fumigation, coupled with its satisfactory killing effect on insects when used in a dosage of 14 lb. per 1000 cu. ft for 24 hrs. at 70° F. or higher, this new non-burnable $(CH_2Cl)_2-CCl_4$ mixt. appears to be a valuable, safe fumigant.

C. M. SALLS

Colliery surface and mine waters (SIMPKIN) 21. A photoelectric turbidity meter (HAASE, THIELE) 1. The ash content of brown coal [water-softening compound] (FISCHER, FUCHS) 21. Volumetric displacement apparatus for controlling the supply of gas for chlorinating water (Brit. pat. 277,869) 1. Purifying tannery wastes (U. S. pat. 1,672,586) 29. Electric system for preventing corrosion of water mains (Brit. pat. 277,417) 4.

Apparatus for softening water by base-exchange materials. T. B. CLARK (to Ward-Love Pump Corporation). U. S. 1,671,699, May 29.

Softening water and similar exchange reactions. E. B. HIGGINS (to United Water Softeners, Ltd.). U. S. 1,671,864, May 29. The exchange material is maintained in suspension in the liquid under treatment by the upward flow of the liquid. An app. is described.

Valve system and construction for water-softening apparatus. L. G. DANIELS. U. S. 1,671,672, May 29.

Purifying sewage and other polluted liquids. J. T. TRAVERS (to Travers-Lewis Process Corp.). U. S. 1,672,587, June 5. The OH concn. of the liquid is increased (e. g., by adding lime) sufficiently to force substantially all colloids present in the liquid to become completely negatively charged, and an electrolyte-producing material such as $CaSO_4$ is then added. Coagulants also may be used.

Treating domestic sewage and industrial wastes. J. T. TRAVERS (to Travers-Lewis Process Corp.). U. S. 1,672,584, June 5. Waste dust collected from precipitators in the manuf. of cement is added to sewage or the like in order to ppt. colloids. $FeSO_4$ and lime also may be used. U. S. 1,672,585 specifies the addn. of solid waste material which has been pptd. from the waste solns. discharged during the manuf. of Cl_2 , "chloride of lime" and NaOH.

Apparatus for sterilizing small articles by heat and antiseptics. D. G. WILL. U. S. 1,672,592, June 5.

Closed chamber apparatus for disinfecting clothes or other articles. W. H. DODWELL and W. G. DUNNING. Brit. 277,750, June 24, 1926.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Content of barium in arable soil. GABRIEL, BERTRAND AND L. SILBERSTEIN. *Bull. soc. chim.* 43, 458-61(1928).—See C. A. 22, 1643.

E. H.

Soil erosion. HERBERT ASIPLANT. *Bull. Rubber Growers' Assoc.* 10, 265-73 (1928).—The paper deals chiefly with the prevention of erosion by cultivation, but in an appendix are estd. losses in N, P and K fertilizer from typical soils through erosion and in latex. The loss in latex is insignificant.

C. C. DAVIS

The influence of soil reaction on flax and oats. M. DOMONTOVICH AND G. ABOLINA. *Nauchno Agronomicheskii Zhurnal* 4, 346-54(1927); *Deut. landw. Rundschau* 1,

815.—Yields on oats show a maxima at p_H 4.1 and 8.1. Neutral and alk. soils produced a larger percentage of N than acid soils; there was little difference in the H_2PO_4 content. In contrast the optimum for flax was p_H 6. The N content was not influenced by the soil reaction.

GEORGE R. GREENBANK

The p_H values of plants and corresponding soils. A. V. BLAGOVESHCHENSKII, N. I. SOSEDOV AND A. G. TOSHCHEVIKOVA. *Bull. Univ. Asie Centrale (Tachkent)* 1926, 9-16.—The p_H values of alk. soils in the salt desert of West Ferghana were studied. The p_H values of the soils at 10-20 cm. depth are very const. (p_H 7.8 \pm 0.003). The p_H values of press-juice of leaves of various plants are more diverse and range from 3.0 to 8.2.

H. R. KRAYBILL

The variation presented in the hydrogen-ion concentration of the soil in adjacent points. CL. FROMAGEOT. *Compt. rend.* 186, 787-90(1928).—The acidity as ordinarily measured on large samples represents only an av figure, and one has, then among other things, an explanation of the fact why certain soils, very clearly of av. acidity, can present still distinctly the phenomenon of nitrification although the nitrous and nitric bacillus do not appear to be able to function below a slight acidity. E. F. SNYDER

The effect of soil acidity on the growth and composition of leguminous plants. ARTTURI I. VIRTANEN. *Biochem. Z.* 193, 300-12(1928).—Diminished acidity of the soil leads to a considerable increase in the N content of the plants (at p_H 6.0 it is 30% higher than at p_H 5.0). The P content diminishes with increasing acidity, which is true also for the K though not to the same degree.

S. MORGULIS

The relation between soil reaction and plant growth. H. OSKIERSKI. *Botan. Arch* 20, 22-42(1927), *Deut. landw. Rundschau* 1, 703(1928).—A study of p_H and buffer level of soils on the plant growth of oats and mustard. O. also shows that there is no relation between Ca deficiency and p_H or buffer level.

GEORGE R. GREENBANK

The influence of chemical constitution on the hygroscopicity of the soil. F. GIESICKE. *Chem. Erde* 3, 98-136(1927); *Deut. landw. Rundschau* 1, 702(1928).—Other authors consider the hygroscopicity to be due to physical structure. G. finds that the Fe and Al oxides modify the effect of the physical properties.

G. R. G.

The use of Lundegarth's bell apparatus for measuring the carbon dioxide production of the soil. D. FEHER. *Biochem. Z.* 193, 350-5(1928).

S. MORGULIS

Air electrification and electroculture. Investigations in the ionization of plants. E. A. TSCHERNIAWSKY. *Bull. Univ. Asie Centrale (Tachkent)* 1926, 235-76.—Electroculture is a process of increased action of atmospheric ions built up under the influence of different natural or artificial conditions.

H. B. KRAYBILL

Experiments on the fertilizing of fruit trees. I. T. WALLACE. *J. Pomology Hort. Sci.* 4, 117-40(1925).—The effect of deficiency of each of the essential plant food elements was studied by growing Orange Pippin apple trees in various nutrient soils. The soln. for series A contained N 110, Ca 30, Mg 20, K 126, Na 175, P 18, S 40 and Cl 86 p. p. m. In series C, D, E, F and G the quantities were the same except that N, K, P, Ca and Mg. resp., were lacking. Series H plants were grown in rain water. The kind and quantity of foliage and roots were different in each series. Lack of N and P resulted in delayed opening of buds and greatly reduced the number of blossoms. Premature defoliation preceded by various colored tinting of the leaves occurred in series C, E, G and H. The barks were lighter in color and the fruits were more highly colored and harder in texture in series G and H than in the others. The fruits of series E were soft and of very poor quality. II. *Ibid* 5, 1-33.—Results of expts. with gooseberry, currant, raspberry and strawberry plants similar to those above are given. Deficiency of any of the essential plant food elements produced characteristic effects on the various plants and the view is expressed that some of these may be used for diagnostic purposes in the field. The N/K and K/Mg ratios in the diet of plants are shown to be important. For instance plants will show symptoms of Mg starvation in the presence of an excess of K when the quantity of Mg present would have been ample with a normal amt. of K. Twenty references are appended.

A. L. M.

The influence of pulverulent materials on the solubility of lime and on the absorption by the soil of nitrogen from ammoniacal fertilizers. J. BRAVARD AND RENÉ DUBRISAY. *Compt. rend. acad. agr. France* 14, 572-7(1928).—The presence of argillaceous or siliceous pulverulent products should favor in arable land (1) the absorption of N contained in ammoniacal fertilizers and (2) the decalcification of the soil by the solns. from the fertilizers.

E. F. SNYDER

The fertilizing action of sulfur. Recent experiments performed by the Institute of Agricultural Research. DEMOLON. *Compt. rend. acad. agr. France* 14, 616-21(1928).—S alone provokes an increase in yield in soils rich in org. material, even though these soils contain appreciable amts. of SO_4 .

E. F. SNYDER

Tea and Indigofera endecaphylla. T. H. HOLLAND. *Trop. Agr. (Ceylon)* **70**, 67-76(1928).—In connection with studies of *Indigofera* as a cover crop for tea, partial mechanical and chem. analyses of soils were made. Thirteen samples averaged 0.094 and 0.087% N and 4.06 and 4.30% org. matter before planting and 2 yrs. later, resp.

A. L. MEHRING

Fertilizers and insecticides. ANON. *Chemist and Druggist* **107**, 448-50(1927).—Review of a Report, Rothamstead Experimental Station, September, 1927. S. W.

Use of lubricating oils as insecticidal material for spraying. SCHIFFELE. *Petro-leum Z.* **24**, 147-8(1928).—Most lubricating oils have insecticidal properties but the fraction 240-300° is most effective. It is not known whether most effective results are obtained by the use of the oil as vapor, liquid or in emulsions, but it is known that the action is not through the respiratory organs. The toxicity of oils does not depend on the viscosity. Lighter-colored oils are most efficient. M. B. HART

Turpentine oil as an attractant of the wheel bug (*Arilus cristatus* L.). F. W. METZGAR. *J. Econ. Entomol.* **21**, 431-2(1928).—Turpentine U. S. P. has a strong attraction for this insect. C. H. R.

Lime and sodium fluosilicate. S. MARCOVITCH. *J. Econ. Entomol.* **21**, 436-7(1928).— $\text{Ca}(\text{OH})_2$ has often been recommended as a carrier for Na_2SiF_6 in insecticide dusts. In the absence of moisture, $\text{Ca}(\text{OH})_2$ carbonates and acts as a neutral carrier. When plants are wet with dew at the time of dusting, the $\text{Ca}(\text{OH})_2$ dissolves and reacts with the Na_2SiF_6 to form sol. CaSiF_6 which may cause foliage injury. Under these conditions, an inert carrier (flour, talc, S. infusorial earth) is much safer. Several light preps. of Na_2SiF_6 , suitable for dusting, and mixts. of Na_2SiF_6 , S and infusorial earth are now manufactured by American companies. C. H. R.

Oil sprays and oil injury. W. E. BRITTON. *J. Econ. Entomol.* **21**, 418-21(1928).—Cont. miscible oil preps. and home-made oil emulsions are briefly described. The effects of oil sprays on various deciduous fruit and shade trees and on coniferous trees are discussed. C. H. R.

Extermination of earwigs. ANON. *Chemist and Druggist* **107**, 452(1927); cf. C. A. **21**, 4010.—Muggeridge (*J. Agr. (New Zealand)* 1927) uses As compds. (Paris green, Na_2HAsO_4 , As_2O_3); Fultton (Oregon Agr. Expt. Sta., *Bull.* 207) NaF in 2 formulas: (1) NaF 1 lb., molasses 4 lbs., H_2O 1.5 gallons, wheat bran 16 lbs.; (2) NaF 1 oz., molasses 5, glycerol 5, H_2O 5 oz., ground oat hulls 1 lb. S. WALDBOTT

Report of committee to formulate plans for investigations of the codling moth from biologic and control standpoints. B. A. PORTER. *J. Econ. Entomol.* **21**, 31-8(1928).—This is a report of investigations recently made and contemplated by state and federal entomologists on the control of the codling moth. The following subjects are discussed: As residues on fruits sprayed with PbHAsO_4 ; As residue removal by mech. means; avoidance of excessive As residues by shortened spray schedules and by the use of dusts, petroleum oils, nicotine sulfate, pyrethrum, derris, As compds. other than PbHAsO_4 , and inorg. and org. non-arsenical compds.; use of chemically treated bands to trap and kill the larvae; use of trap baits for the adult moth; parasitic control; orchard and packing sheds sanitation. Biol. studies are also discussed. C. H. R.

Codling moth control in Georgia apple orchards. C. H. ALDEN AND M. S. YEO-MANS. *J. Econ. Entomol.* **21**, 319-24(1928).—Control of the codling moth in Ga. can be obtained with 6 PbHAsO_4 sprays. The As residues on fruit sprayed according to this schedule are within the British tolerance (1.429 mg As_2O_3 per kg. fruit). Mg arsenate was less effective than PbHAsO_4 but gave better control than com. Ca arsenate, $\text{Ca}_3(\text{AsO}_4)_2$, Al arsenate, Zn arsenate, Mn arsenate and scorodite. PbHAsO_4 dusts were inferior to sprays against this insect. Cloth bands dipped in petroleum oil contg. β -naphthol were effective as traps for the larvae. Other biol. and mech. control data are given. C. H. RICHARDSON

Relative resistance to arsenical poisoning of two codling moth strains. W. S. HOUGH. *J. Econ. Entomol.* **21**, 325-9(1928).—Codling moth larvae (*Carpocapsa pomonella*) from Grand Junction, Colorado and from Shenandoah Valley, Va. were compared in respect of their ability to enter apples sprayed with PbHAsO_4 (4 lbs. in 100 gals.). The Colo. larvae showed a much greater capacity to enter the sprayed fruit than the Va. larvae. The strains were cross bred and the first generation of each cross was less resistant to PbHAsO_4 than the pure Colo. larvae but more resistant than Va. larvae. C. H. RICHARDSON

Some results of three years' experience seeking better control measures for the codling moth in the Yakima Valley, Wash. W. S. REGAN AND A. B. DAVENPORT. *J. Econ. Entomol.* **21**, 330-8(1928).—The addn. of petroleum oil emulsion to sprays contg. PbHAsO_4 aids materially in the control of the codling moth. The effectiveness of

oil sprays is discussed from the standpoints of degree of refinement, volatility, oil penetration, emulsification and residue removal from sprayed fruit. C. H. R.

The significance of nicotine in plant protection and preparation of the extract. D. SCHERPE. *Obst. Gemusebau*. 16, 253-4 (1927); *Deut. landw. Rundschau* 1, 753 (1928).—A study of various species of tobacco for the production of nicotine, the best being *Nicotiana rustica*. S. mixes 1 kg. of dried tobacco with 24 kg. H₂O and stirs for 24 hrs. This gives a good extn. and a rich ext. GEORGE R. GREENBANK

The solubility in citric acid of the phosphoric acid from Thomas slag (SÜLLWALD) 9. Working up chrome-leather scrap for glue or fertilizer (STADLINGER) 29.

BLANCK, E.: *Lehrbuch der Agrikulturchemie. I. Pflanzenernährungslehre*. Berlin: Borntraeger Bros. 207 pp. Reviewed in *Expt. Sta. Record* 58, 9 (1928).

FRANK, E.: *Über Bodenazidität im Walde*. Friburg i. Br.: Speyer & Kaerner. 155 pp. Reviewed in *Expt. Sta. Record* 58, 17 (1928).

FRITSCH, J.: *Emploi des engrais chimiques en horticulture*. 2nd ed. revised and enlarged. Paris: Amédée Legrand. 256 pp. Reviewed in *Expt. Sta. Record* 58, 20 (1928).

PIETERS, A. J.: *Green Manuring—Principles and Practice*. New York: John Wiley & Sons; London: Chapman & Hall. 356 pp. Reviewed in *Expt. Sta. Record* 58, 19 (1928).

Vacuum, heat and poisonous fume treatment to destroy borer, larvae, beetles, etc., in timber. A. M. KOBIOLKE. U. S. 1,672,326, June 5. An app. is described, in which fumes such as those of tobacco may be used.

16 - THE FERMENTATION INDUSTRIES

C. N. FREY

Manufacture of butyl alcohol, acetone and methanol from corn. H. TROPSCH. *Brennstoff-Chem* 9, 1-2 (1928).—A description of the Commercial Solvents Co. Process at Peroria, Ill. (cf. C. A. 21, 980, 250, 3702). J. D. DAVIS

Potassium pyrosulfite in wine preparation. W. DIEMAIR AND K. SICHERT. *Weine Rebe* 9, 394-404 (1928); *Deut. landw. Rundschau* 1, 737 (1928).—D. finds that 25 to 50 g. of K₂S₂O₅ per hectoliter limits or prevents the souring of wine without objectionable flavor, depending upon the variety. A larger amount causes poor flavor. GEORGE R. GREENBANK

Pasteurization of vinegar. HANS EGGBRECHT. *Deut. Essigind.* 32, 149-51 (1928).—A discussion of certain turbidities of vinegar and their prevention through pasteurization or other suitable treatment. W. O. E.

Alkoholometrische Reduktionstafel zur Bestimmung der Menge reinen Alkohols in Litern (Hektolitergrade, alkohol) f. d. normaltemperatur 15 Grad Celsius aus d. wahren Stärke von 65 bis 100 Volumprozent u. aus d. Sichtgewichte 1. Branntweinquantums nebst einer Tafel zur Bestimmung d. wahren Stärke u. 1. Tafel II z. Bestimmung d. wahren Volumens 2nd revised ed. Edited by vom Bundesamt f. Eich-u. Vermessungswesen in Wien. Vienna: Staatsdruckerei österr. Verlag. 163 pp. Bound in half linen, öst. Sch. 7.

Fermenting vessel. M. A. ADAM. U. S. 1,672,743, June 5. Vessels for fermentation to produce acetone and BuOH or for other purposes are formed of riveted steel plates lined with rubber vulcanized *in situ*.

Butyl alcohol-acetone fermentation. W. J. EDMONDS. Can. 276,823, January 3, 1928. In a process for the production of BuOH, acetone and fermenter gas, fermenter gas is displaced in a fermenting vessel by a carbohydrate mash, and the mash is then caused to be fermented by butyl alc.-acetic bacilli in an atm. of fermenter gas under pressure. The gas generated by the fermentation is lead off and the fermented mash is displaced by fermenter gas. Cf. C. A. 22, 1433.

Butyl-acetone fermentation. D. A. LEGG (to Commercial Solvents Corp.). Brit. 278,307, Oct. 1, 1926. See U. S. 1,668,814 (C. A. 22, 2235).

Acetone and butyl alcohol by fermentation. G. W. FREIBERG. U. S. 1,672,487, June 5. In fermenting a carbohydrate mash with bacteria capable of producing butyl

alc. and acetone, the water used in the process is softened by reagents such as zeolites or by NaOH, lime and Na_2CO_3 to reduce the content of Ca and Mg compds which have a tendency to stimulate acid formation.

Glycerol by fermentation of sugar. K. LÜDECKE and N. LÜDECKE. Brit. 278,086, June 30, 1926. In producing glycerol by fermenting sugar in alk. soln., the volatile fermentation products are distd. off when the fermentation is entirely or partially finished, so that when more sugar is added fermentation continues. Ni or Co sulfates may be used as catalysts, and the yeast may be filtered off before the distn. and may be mixed with fresh yeast or regenerated before readdition. Na_2SO_3 , Na phosphate, $(\text{NH}_4)_2\text{SO}_4$ and MgSO_4 may be added in small proportions and fermentation may be allowed to proceed for 2 days at 30-35° before filtering off the yeast and distg. the volatile products.

Distilling alcoholic liquids. U. S. INDUSTRIAL ALCOHOL CO. Brit. 278,211, Nov. 29, 1926. Weak alc. liquid such as beer is distd. to sep. strong alc., fusel oil and light-boiling products such as aldehydes. An app. is described.

Distilling vinasses, etc. NOUVELLES INDUSTRIES CHIMIQUES, SOC. ANON. Brit. 277,932, Sept. 21, 1926. Distillery vinasses, sugar refining molasses or similar nitrogenous residues are distd. for recovery of nitrogenous substances and acetone in the presence of excess of lime or other alk. earth and in a current of inert or reducing gas such as N, H or CH_4 , which may be satd. or not with water vapor. Gases produced in the distn., after sepn. of constituents such as acetone, NH_3 and amines, may be used in the distn.

Purifying glycerol. K. LÜDECKE and N. LÜDECKE (to Vereinigte chemische Werke A.-G.). Brit. 278,703, Oct. 11, 1926. Glycerol produced by fermentation is deodorized by treatment with oxidizing agents such as hypochlorites, permanganates or H_2O_2 .

Yeast. FLEISCHMANN CO. (to International Yeast Co., Ltd.). Brit. 277,476, Aug. 24, 1926. Wort of low gravity such as 2° Balling contg. water, seed yeast and nutrient sufficient to increase the seed yeast by one-half is fermented, in either an open or a closed fermenter, at about 31-33°, with aeration, to effect increase of the yeast content by one-half. One-third of the yeast-contg. liquid is then removed and water and nutrients are added to compensate for evapn. and utilization of nutrient. Over 20 successive yields may be taken in this manner. A fermenter 11 ft. high and 4 feet in diam. is suitable and the nutrient may be formed from sugar, grain and NH_4 compds such as the phosphate, sulfate and hydroxide.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Estrogen, a new sex hormone: its clinical use with case reports. FRED FIRESTONE. *Endocrinology* 12, 151-6(1928).—Estrogen, prepd. from human placenta, contains the ovarian hormone. In 6 cases it relieved the nervous functional manifestations of ovarian deficiency.

H. J. DEUEL, JR.

Molecular compounds of the veronal series. P. PFEIFFER and R. SEYDEL. *Z. physiol. Chem.* 176, 1-16(1928).—The compds. obtained by uniting 1 mol. of veronal with 1 mol. of pyrimidone, antipyrine or sarcosine anhydride are due to the satn. of secondary valences between the CO of the pyrimidone component and both NH groups of the veronal. "Veramon," which is claimed to be a compd. of 1 veronal with 2 pyrimidone, is in reality a mixt. of the 1:1 compd. with 1 pyrimidone. When $(\text{NH}_4)_2\text{SO}_4$ is added to a soln. of veramon the 1:1 compd. crystallizes out. If one imide H of the veronal is substituted by alkyl the product is no longer capable of forming a mol. complex with pyrimidone. *N*-Methylveronal and *N*-phenylveronal do not yield compds. with antipyrine, pyrimidone or sarcosine anhydride, as shown by a total lack of irregularity in the m. p. and thawing p. curves. Homologs of veronal, and the parent barbituric acid itself, form mol. complexes with pyrimidone, provided both imide groups are unsubstituted. Cryst. compds. were prepd. contg. 1 luminal + 1 pyrimidone* and 2 luminal + 1 sarcosine anhydride, m. 132° and 127°, resp. The m. p. curves show the existence of the compds.: 1 barbituric acid + 1 antipyrine and 2 barbituric acid + 1 sarcosine anhydride, but the products have not been obtained cryst.

A. W. DOX

Orthosiphon stamineus Benth. W. PEYER and W. LIEDISCH. *Apoth. Ztg.* 43, 555-7(1928).—A morphological treatment of this drug, official only in the Dutch

Pharmacopeia, in connection with certain data on its active constituents. These latter consist mainly of essential oil, tannin, K salts and a glucoside "orthosiphonin." W. O. E.

Estimation of condurangin. LUDWIG ZECHNER, FRITZ WISCHO AND HUGO WAGNER. *Pharm. Monatsh.* 9, 79-82, 102-3(1928).—After reviewing methods previously suggested for the evaluation of the various official condurango preps., as also for the isolation of its active principle condurangin, the authors outline a procedure in great detail for the estn. of condurangin in such preps. Briefly, this procedure in the case of the ext. involves diln. of 25 cc. with H₂O after previous evapn. of the alc., satn. of the resulting liquid with NaCl, then extn. with 5 portions of CHCl₃. The united chloroformic ext. is decolorized, clarified and filtered. An aliquot thereof is then dild. with petr. ether and the pptd. condurangin isolated, dried and weighed. W. O. E.

Limits of error in German pharmacopeial methods from a physico-chemical standpoint. J. EISENBRAND. *Pharm. Ztg.* 73, 582-3, 597-8, 613-5, 626-8(1928).—In a former paper (cf. *C. A.* 22, 1213) the general viewpoints of the theme are discussed in connection with a critical consideration of the analytical findings. In the present series a study has been made of the accuracy to be desired and reasonably expected in such methods. Numerous examples are cited illustrative of the proper interpretation of values obtained. W. O. E.

Simple ampoule-filling device. C. STICH. *Pharm. Ztg.* 73, 584(1928).—Two types of burets are illustrated with rubber pinch-cock and bulb control. W. O. E.

Some reactions of pharmacology on pharmacy. H. H. DALE. *Am. J. Pharm.* 100, 299-317(1928).—An address. W. G. GAESSLER

The reliability of preparations of ergot and the necessity for standardization. W. B. GARNER. *Am. J. Pharm.* 100, 318-32(1928).—A compilation of the present-day information on ergot with the following summary and conclusions: (1) The U. S. P. method is the only suitable method at present for prep. liquid ext. of ergot. (2) The ergot should be of Spanish origin. (3) The medical profession engaged in obstetric work should give more careful attention to the results of the use of ergot. (4) Careful notes of the results obtained should be taken. (5) It is possible that a combination of ergotoxine and histamine together may eventually prove to be the most satisfactory method of administering ergot. (6) Continued efforts are necessary to make the estn. for the active principles of ergot chem. instead of biological. W. G. GAESSLER

Pharmacy in relation to science. EDWARD MAYHEW. *Am. J. Pharm.* 100, 333-43(1928).—An address in which M. presents an outline of the development of pharmacy which in effect is an account of the early development of the science of chemistry. W. G. GAESSLER

Naturally occurring anthraquinone drugs and coloring matters. L. J. HOOLEY. *Z. Farben-Ind.* 20, 12-3(1928).—A review. FREDERICK C. HAHN

The essential oil from *Gastrochilus panduratum* Ridl. A. J. ULTEE. *Proc. Acad. Sci. Amsterdam* 31, 62-4(1928).—See *C. A.* 22, 2236. E. H.

Manufacture of phytin in Kharkov. K. A. KRASUSKII. *Ukrainskii Khem. Zhurnal* 1, tech. part, 11-28(1925).—K. suggests, on the basis of the available literature on the subject, that phytin is not a single compd., but rather a group of compds. and may differ in compn. depending on the origin and the method of sepn. Comparison of the Russian phytin with the product made in Basel (Switzerland) shows that the former contains somewhat less phosphorus ($C:P = 1.3-1.4$ instead of $C:P = 1.0$), but is free from iron, contains some magnesium instead of calcium, has no taste and is not hygroscopic. K. reviews the historical development and the present economical situation of the extn. of phytin from hemp in Kharkov. G. B. KISTIAKOWSKY

Determination of nicotine and ammonia in tobacco. YUZURU OKUDA. *J. Biochem. (Japan)* 8, 361-4(1928).—The principle of the method is to distil the substance (about 3-6 g. tobacco in 50 cc. H₂O) over magnesia with steam and to collect both the ammonia and nicotine in standard acid. In an aliquot the sum of the 2 is detd. by titration with standard alkali while in another portion the NH₃ is detd. by a formal titration. Another method depends upon the fact that NH₃ but not nicotine liberates N₂ from HNO₃. The total N and the NH₂N are detd. (Van Slyke method) in the tobacco distillate. S. MORGULIS

Application of the metamorphosis reaction of the axolotl to the standardization of the thyroid hormone. B. ZAVADOVSKII AND L. P. LIPCHINA. *Zhurnal expl. biol. Med.* 8, 591-9(1928).—The reduction of the dorso-caudal fin of the axolotl serves best for the purpose of standardizing the thyroid hormone, although other signs of meta-

morphosis must also be considered. A series of pictures is given in the text for guidance in judging the phases of metamorphosis
S. MORGULIS

The relationship between ethereal oils and resins. G. V. FIGULEVSKIĬ. *J. Russ. Phys.-Chem. Soc.* **59**, 299-303 (1927).—Appreciable quantities of resin are found during the first days of a conifer's growth and only traces of the ethereal oils (C. A. **18**, 1366; **19**, 2222, 2223). The formation of the latter continues for several weeks after the period of intensive growth. Flavitskiĭ (1883) regarded galipot as a complex compd. of terpenes and resin acids which broke down in the presence of water or at high temps. P. postulates the formation of esters which decompose into the resp. hydrocarbons and acids: $C_{10}H_{17}OOC_{20}H_{39} \rightarrow C_{10}H_{16} + C_{20}H_{39}O_2$, or the galipot should contain 31% turpentine, which is true in the case of *Pinus maritima* (Dupont) and *P. silvestris* (Arbu-ov). Similarly for sesquiterpenes: $C_{15}H_{25}OOC_{20}H_{39} \rightarrow C_{15}H_{24} + C_{20}H_{39}O_2$, or 40.5% turpentine. The exudates of *P. cembra* contain 32% of ethereal oils which is a mixt. of pinene and cadimene (7.3). The esterification no. of resin shows it to contain 68-75% of the acids of mol. wt. $C_{20}H_{39}O_2$. Hence the terpenes form 42.2-38.4% of the mixt. of resin acids and hydrocarbons (theory 33.4%). The ethereal oil of *P. strobus* is composed of 9% esters; the resin (84.1% of the total secretion) contains 42.1% acids. The ratio of ethereal oils to acids is about 29:71 (theory 31:69). The secretions of *Abies sibirica* consist of 27.7% of ethereal oil (sapon no. 126-70, or 44-59% of bornyl esters). The resin contains 55-65% acids. Hence the terpene content of the hydrocarbon-acid mixt. is 25.7-26.5% (theory 31%).
B. SOYENKOFF

Types of bath salts. ANON. *Chemist and Druggist* **107**, 539-40 (1927).—Of the 3 salts chiefly used as bath salts, solns. of crystd. Na_2CO_3 are more alk. than those of borax, and these slightly more alk. than solns. of Na_2HPO_4 , as seen by their p_H values. Borax has special, favorable properties; p_H of borax solns. is but slightly affected by concn., varying from 9.19 to 9.30 at 18° for concns. from 0.19% to 9.55% and from 8.89 to 9.00 for the same concns. at 60°. When mixing at 38-40° a 0.5% borax soln. (p_H 9.10) with a 5.0% soap soln. (p_H 10.25 in a blank test) p_H of the mixt. is 8.8, proving that addn. of borax to soap soln. reduces its alk. This explains the well known fact that the presence of borax will prevent the irritation and unpleasant dryness of the skin caused by soap rich in alkali. Besides, crystd. borax has the highest m. p. (75.5°) of the 3 salts, indicating greater stability and better appearance. On account of the lesser soly. of borax in H_2O . (8.79%), suspend the salt in a muslin bag in the running water underneath the tap.
S. WALDBOTT

Cineole determination. JOHN ALLAN. *Chemist and Druggist* **107**, 615 (1927); cf. C. A. **18**, 1031, 1730—Abstr. of a committee report recommending for adoption in the next Brit. Pharm. the *o*-cresol method which consists of the detn. of the f. p. of a mixt. of 3 g. of the oil previously dried by shaking with a small quantity of dry, granular $CaCl_2$, and 2.1 g. of *o*-cresol. The cineole % is then read from a scale prepd. from the f. p. of *o*-cresol with mixts. of known cineole content. The table and method of procedure are given.
S. WALDBOTT

Solid perfumes. W. A. POUCHER. *Chemist and Druggist* **107**, 669 (1927).—To replace EtOH and Me_2CHOH as vehicles in perfumery, P. gives a general formula for non-greasy, solid perfumes: Mix 20 g. Japan wax, 20 g. white beeswax, 40 cc. ethyl phthalate and 20 cc. concd. perfume. In the prepn. of the latter, a list of suitable materials to select from in blending is given in each case for carnation, heliotrope, jasmin, lilac, rose, treffe and violet.
S. WALDBOTT

Gold compounds for medicinal use. F. R. GREENBAUM. *J. Am. Pharm. Assoc.* **17**, 232-8 (1928).—A review of the Au compds. used in medicine. Structural formulas are given. Attention is called to the fact that those with a S linking exceed those which do not contain S.
L. E. WARREN

Radioactive materials [for use in therapeutics] (Brit. pat. 278,347) 3.

LAPIERRE, G. Pianta aromatiche medicinali ed industriali: coltivazione, raccolta e preparazione. Florence: G. Ramella e Co. 31 pp.

Pharmaceutical compounds. F. HOFFMANN-LA ROCHE & Co., A.-G. Brit. 278,672, Oct. 9, 1926. Diphenolisatin treated with Me_2SO_4 yields dianisolisatin or N-methyldianisolisatin; the dianisolisatin, which yields an N-acetyl deriv. with HOAc, may also be converted into N-methyldianisolisatin. These and similar products possess laxative properties. Diphenetolisatin is prepd. by interaction of diphenolisa-

tin with EtI; by use of isopropyl bromide, the di-O-isopropylidiphenolisatin is obtained and from this N-acetyl-di-O-isopropylidiphenolisatin may be obtained by acetylation. Di-O-benzyl-diguaiacolisatin is made by treating diguaiacolisatin with benzyl bromide.

Medicines comprising scopolamine. W. MERCK, K. MERCK, L. MERCK, W. MERCK and F. MERCK (trading as the Firm of E. Merck). Brit. 278,693, Oct. 11, 1926. A prepn. comprising scopolamine and ephedrine is an anesthetic without undesirable effects on the heart, breathing or blood pressure. Scopolamine may also be used with camphor, caffeine or adrenaline.

Medical compound. G. C. MILLER. Can. 277,180, January 17, 1928. An agar liquid petrolatum emulsion is produced by adding a H₂O soln. of an acid to agar agar, boiling the mixt., adding a preservative and a flavoring, combining the soln. with a mineral oil, and agitating the mixt. so prepd. until cool.

Solid alcoholic solutions of iodine. K. JUNGMANN and O. KOLBERT. Brit. 277,953, Sept. 21, 1926. An antiseptic solid compn. is prepd. by adding I or a soln. of I to solidified alc. in a melted state and also adding a stabilizing substance such as Na alcoholate and NaI. Reaction of the I may also be restricted by immediate cooling and solidification of the compn. after the I is added to it.

Ointments for preventing insect bites. I. G. FARBERNINO, A.-G. Brit. 277, 710, Sept. 20, 1926. Lanoline, vaseline or other ointment bases are used with oils such as cedar oil, juniper oil, thuja oil and templin oil. Mucilages such as tragacanth or carrageen mucilage may also be used as vehicles.

Camphoric alkaloids. W. SCHOELLER and H. SCHOTTE (to Chem. Fabrik auf Aktien, vorm. E. Schering). U. S. 1,672,000, June 5. Equimol. proportions of the camphoric acid radical and of an alkaloid such as hyoscyamine, scopolamine or atropine are combined to form a salt which has a vigorous therapeutic paralyzing effect on the nervous vagus. Cf. C. A. 22, 1366.

Urease. HENKEL ET CIE GES. Brit. 277,644, Sept. 15, 1926. In order to obtain a solid urease prepn. an aq. ext. of plants such as soy beans or jack beans is filtered or centrifuged, atomized in a current of dry heated air or other suitable gas (which may be at a temp. above 100°) and substances such as Na₂HPO₄, KH₂PO₄ or a mixt. of these may be added, before atomizing the ext., to render the product more readily sol. in water.

Metal salts of the N-methylenesulfonic acids of diaminodihydroxyarsenobenzene or sulfoarsenol. F. LEHNHOFF-WYLD. U. S. 1,671,141, May 29. ZnCl₂ or other sol. salt of a non-alk. metal is first combined with arspenamine and the product is treated with formaldehyde Na bisulfite to obtain a complex therapeutic compd. of low toxicity. Cf. C. A. 21, 916.

Alkyl mercuric derivatives containing sulfur. M. S. KHARASCH. U. S. 1,672,615, June 5. CH₃HgCl by reaction with thiosalicylic acid in alc. and in the presence of NaOH yields methylmercurithiosalicylic acid which is a white solid m. about 171° and sol. in alc. and ether, forming a Na salt by reaction with NaHCO₃ or NaOH. Its K salt, alkyl-ammonium salts and Ca and other alk. earth salts also are referred to. Methylmercuric hydroxide also may be used as a starting material, as may also other compds. such as the ethylmercuric, propylmercuric, butylmercuric, amylmercuric or allylmercuric salts or hydroxides or their isomers, and, instead of thiosalicylic acid there may be used: thioglycollic acid, *p*-mercaptophenylacetic acid, *p*-mercaptobenzenesulfonic acid, *β*-mercaptopropionic acid, *α*-mercaptobutyric acid and cysteine. Among the products mentioned or described are: ethylmercuri-*p*-sulfobenzenesulfonic acid, a white solid, not melting up to 300°, and its salts; ethylmercurithiosalicylic acid, m. about 110°; ethylmercuri-*m*-sulfobenzoic acid, m. about 105°; isoamylmercuri-*β*-sulfopropionic acid, m. (decompn.) about 215°; isoamylmercuricysteine hydrochloride, m. about 95°; allylmercuricysteine hydrochloride, m. (decompn.) about 93°; methylmercuri-*α*-sulfobutyric acid, m. about 73°; allylmercuri-*p*-sulfobenzenesulfonic acid, not melting up to about 300°; methylmercurithioglycollic acid, m. about 87°; ethylmercurithioglycollic acid, m. about 79°; propylmercurithioglycollic acid, m. about 73°; butylmercurithioglycollic acid, m. about 68°; ethylmercuri-*β*-sulfopropionic acid; butylmercuri-*α*-sulfopropionic acid; ethylmercuri-*α*-sulfobutyric acid; butylmercuri-*α*-sulfobutyric acid; ethylmercuricysteine hydrochloride; butylmercuricysteine hydrochloride; ethylmercurisulfosuccinic acid; butylmercurithiosalicylic acid; ethylmercuri-*m*-sulfobenzoic acid; butylmercuri-*m*-sulfobenzoic acid; ethylmercuri-*p*-sulfobenzoic acid; butylmercuri-*p*-sulfobenzoic acid; isoamylmercuri-*p*-sulfobenzoic acid; ethylmercuri-*p*-sulfophenylacetic acid; methylmercuri-*p*-sulfobenzenesulfonic acid; allylmercurithiosalicylic acid; ethylmercuri-*p*-sulfoalicylic acid; and butylmercuri-*p*-sulfoalicylic acid. These compds.

possess *germicidal properties* and some of their salts are suitable for intravenous injection as *therapeutic agents*.

Synthetic drugs and dye intermediates. BRITISH DYESTUFFS CORP., LTD., G. M. DYSON, F. A. MASON and A. RENSHAW. Brit. 278,037, May 25, 1926. Carbazides and thiocarbazides of the naphthalene series are obtained by the action of phosgene or thiophosgene on hydrazines such as those which may be obtained by condensing nitro-arylolefinic-carboxylic acid chlorides, nitroaryl fatty acid chlorides, nitroacyl chlorides, nitroarylsulfo chlorides, nitronaphthoyl chlorides, nitronaphthalene sulfo chlorides or their substitution products with naphthylaminesulfonic acids or their substitution products, followed by reduction of the nitro group, diazotization and further reduction. Before diazotization, the amino compds. formed by the first reduction may be again condensed with nitroacidyl halides and reduced, and this process may be repeated several times if desired, before converting into the hydroazines by diazotization and reduction. Numerous examples are given. The products may be used as therapeutic agents for the destruction of blood parasites or as intermediates for the manuf. of dyes.

Denicotinizing tobacco. T. SCHLOESING. U. S. 1,671,250, May 29. A mixt. of steam and gaseous NH_3 is circulated through tobacco in a closed system, nicotine is removed from a condensate which is formed and the mixt. is repeatedly used. An app. is described.

Paper handkerchief treated with glycerol, ammonia and hydrogen peroxide. H. CHONLA. U. S. 1,672,803, June 5.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Ammonia synthesis with electrically heated wire catalysts. W. FLÖRKE. *Z. physik. chem. Unterrichts*, 39, 283 (1926), cf. *Ibid* 80-1.-A simple expt. showing $\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$ is described. M. BEBER

Ammonia synthesis by means of catalysts. H. VALENTIN. *Z. physik. Chem. Unterrichts* 40, 271-2 (1927).—Ammonia prepared according to method of Florke (cf. preceding abstract) is formed by reduction of traces of N_2O . N_2 freed from the N_2O forms no NH_3 after $1/2$ hr. M. BEBER

Causticization of sodium carbonate by ferric oxide. XI. Heat of solution of sodium carbonate. MOTORARO MATSUI, SUKEO NAKATA, KENICHI AKIYAMA and KATASHI HIRO. *J. Soc. Chem. Ind. (Japan)* 31, 140-7, Suppl. binding 53-6B (In English) (1928).—The heat of soln. of Na_2CO_3 in water was measured by means of a const.-temp. calorimeter with an elec. heating device, and was found to be: Na_2CO_3 [solid] + H_2O [1000 mol] = Na_2CO_3 [aq] + 5606.7 ± 22.1 cal. at 25° . S. O.

Chemistry and technology of zirconium oxide. HANS TRAPP. *Chem.-Ztg.* 52, 365-6 (1928).—Zr is sepd. best from SiO_2 , Fe_2O_3 , TiO_2 , etc., by fractional crystn. of its (a) double alkali oxalates (especially NH_4) or (b) double sulfates. General directions for such sepn. are given. For making Zr products technically the process of Lench ($\text{ZrOCl}_2 \rightarrow \text{ZrO}_2 \cdot 0.4\text{SO}_3$ aq) is not as desirable as that of the German patent 434,987, according to which $2\text{ZrO}_2 \cdot 3\text{SO}_3 \cdot 3\text{H}_2\text{O}$ is made. This sulfate is said to be more stable than others with either a higher Zr or SO_3 content. As a second phase of the process the above sulfate is hydrolyzed in dil. soln., yielding ZrO_2 . W. C. E.

The technology of water-glass manufacture. M. VON REIBOLDT. *Chem.-Ztg.* 52, 345-6 (1928).—A general discussion of the construction and operation of a 15-ton water-glass plant. W. C. EBAUGH

Lead and zinc pigments and salts in 1925. J. A. STADER and A. STOLL. *Bur. Mines, Mineral Resources of the U. S. 1925*, Pt. 1, 149-56 (preprint No. 10, published December 29, 1926). E. H.

Lead and zinc pigments and salts in 1926. A. STOLL. *Bur. Mines, Mineral Resources of the U. S. 1926*, Pt. 1, 217-26 (preprint No. 13, published December 22, 1927). E. H.

Gypsum in 1926. R. M. SANTMYERS and JEFFERSON MIDDLETON. *Bur. Mines, Mineral Resources of the U. S. 1926*, Pt. II, 141-50, (preprint No. 13, published November 10, 1927). E. H.

Separation of potassium sulfate from crude potassium ferricyanide by crystallization. V. P. IL'INSKII and N. P. LAPIN. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 5, 8-17.— K_2SO_4 is the principal impurity of technical $\text{K}_3\text{Fe}(\text{CN})_6$ obtained by calcination of animal matter with K_2CO_3 and Fe. Technical $\text{K}_3\text{Fe}(\text{CN})_6$, sometimes

contains up to 10% of this impurity, which is due to oxidation of the S of org. matter, and also contains a little chloride and carbonate. The only practical method of purifying this $K_4Fe(CN)_6$ is by crystn. from H_2O . The dissolved system $K_4Fe(CN)_6$ - K_2SO_4 is found to be remarkable in this respect that the line of sepn. of crystn. fields is almost a straight line parallel to the axis of abscissas; this circumstance is particularly favorable to the sepn. of the 2 salts. Tables of solubilities of mixts. of $K_4Fe(CN)_6$ and K_2SO_4 at 25°, at 40°, at 55° and at the b. p. temps. are shown. If the admixt. of K_2SO_4 is small, the recommendation is to sep. it by cooling the satd. soln. of the 2 salts made at high temp. If the proportion of K_2SO_4 is large, it is necessary to allow it first to cool moderately, then sep. the part of K_2SO_4 which crystallizes and finally cool the satd. soln. for the sepn. of $K_4Fe(CN)_6$.

BERNARD NELSON

Separation of aluminum salts from iron by recrystallization. S. ZABICKI. *Przemysl Chem.* 12, 77-90(1928).—A critical review of patents from 1878 to 1922 on processes for freeing aluminum ammonium alum from Fe is given. A method of doing this by recrystn. without the use of any reagents is described. An 86% yield of alum is obtained with an Fe_2O_3 content of only 0.002% after two recrystns. The effect of the no. of recrystns. on the purity of the product is shown graphically. It is found economically expedient to work with solns. of 65-68% concn. The rate of cooling and of stirring must be adjusted to produce small crystals (0.1-0.2 mm.), as larger crystals contain more impurity. The electrolytic method may be used for further purification of alum down to 0.004% Fe_2O_3 (cf. Wasilewski and Mantel, *C. A.* 22, 1915).

A. C. Z.

Graphite. ANDRÉ DUBOSC. *Caoutchouc & gutta-percha* 25, 13930-1(1928); cf. *C. A.* 22, 1217.—The characteristics of graphite from various localities are described.

C. C. DAVIS

Graphite in 1926. JEFFERSON MIDDLETON. *Bur. Mines, Mineral Resources of the U. S.* 1926, Pt. II, 91-7 (preprint No. 8, published October 17, 1927).

E. H.

Sulfur and motive power in Sicily. GIULIO BUOGO. *Giorn. chim. ind. applicata* 10, 131-5(1928).—One of the causes of the economic position of the Sicilian S industry is the limited distribution and uneconomical production of energy. It is proposed to abandon present methods and establish a uniform system of power supply, a scheme of which is described in detail, with calcns. of its efficiency. In brief, the S is fused in autoclaves with simultaneous production of motive power. To this end steam is generated at 25-30 atm. pressure to drive turbines for elec. and mech. power, the exhaust steam heating the autoclaves contg. the S. ore.

C. C. DAVIS

Preparation of carbon from carbon monoxide. F. WAUGENHEIM. *Brennstoff-Chem.* 8, 385-8(1927).—An attempt was made to prepare pure C by passing CO over a pure Fe_2O_3 catalyzer at temps. under 650°. The reduced Fe was removed from the prepd. C by vaporization in a current of Cl. The recovered C was not entirely iron-free, but it was non-magnetic. It was a good conductor of electricity.

J. D. D.

Preparation of pure carbon at low temperatures. F. FISCHER AND P. DITTHEY. *Brennstoff-Chemie* 8, 388-91(1927); 9, 24-30(1928).—C is prepd. by passing CO with H_2 (see preceding abstract) over reduced alkalized Fe_2O_3 at temps. around 500°. The catalyst is prepd. by moistening 10 g. Fe_2O_3 with 1 cc. water glass + 15 cc. H_2O and painting this on an iron spiral made from a strip of Knepp soft sheet 70 cm. × 4 cm. This was heated in an Al retort similar to that used for low temp. assay of coal, the preheated supply gas passing in at the bottom and out at the top of the retort chamber. A contact mass of this size (active Fe 6.8 g. Fe_2O_3) will take gas at about 40 l. per hr. and give 47% of the theoretical yield of C. The yield falls off in time, possibly because of conversion of active Fe_3C into higher inactive carbides. S is a contact poison; both the gas and iron used must be free from S. A used contact mass could be repeatedly regenerated by dipping into 5 N KOH. The optimum temp. for CO reduction was 480° to 490°, and the optimum ratio CO: H_2 3:1. An app. is shown for moderately large-scale work in which the C formed can be renewed continuously. The form of C recovered was investigated by x-ray and chem. methods but no definite conclusion was reached. Its reactivity was found to be high. This, however, diminished on removal of Fe.

J. D. DAVIS

Annual review for 1927 of progress in the manufacture of plastic materials with casein and similar albumoids as a base. OTTO MANFRED. *Caoutchouc & gutta-percha* 25, 13978-9(1928).—Patented processes are reviewed, with a bibliography of new publications.

C. C. DAVIS

Chemical technology of artificial horn. OTTO MANFRED. *Caoutchouc & gutta-percha* 25, 13904-5, 13940-4(1928); cf. *C. A.* 22, 1018.—Various app. and equipment are described, with diagrams and patent references.

C. C. DAVIS

Protection against fire in the chemical industry. RAYMOND DELABY. *Chimie et industrie* 19, 754-64(1928).—A general discussion of fire hazards in the chem. industry and of the precautions to be taken to minimize them. A. PAPINEAU-COUTURE

Use of carbon tetrachloride as a fire extinguisher. LUCIEN MAUGÉ. *Industrie chimique* 15, 186-9(1928).—A brief review of its properties from the standpoint of its use as fire extinguisher. A. PAPINEAU-COUTURE

CRIVELLI, E. L'industria chimico-metallurgica del solfato di rame e le miscele cupriche fungicide ed anticrittogamiche. Milan: Ulrico Hoepli, Editore Libraio della Real Casa. 321 pp. L. 35. Reviewed in *Chem. Trade J.* 82, 507(1928).

Phosphoric acid and hydrogen from phosphorus and steam. E. URBAIN. *Brit.* 278,578, Dec. 7, 1926. P vapors are mixed with HCl (which serves as a catalyst) and steam and the mixt. is passed over carbonaceous material maintained at about 350°; or, the P may first be adsorbed and the material then treated with HCl and steam. HBr or HI also may be used as catalysts. H_3PO_4 is obtained by washing the carbonaceous material.

Sulfur dioxide and sulfuric acid. R. VON ZELEWSKI. *Brit.* 277,382, Sept. 13, 1926. In producing sulfurous gas suitable for use in H_2SO_4 manuf., by roasting sulfide ores or other suitable S-bearing materials in a Dwight-Lloyd or similar app., in which the materials are passed in an even thin layer through a heating zone, air under pressure is forced though the material from above. The resulting gases may enter the Glover tower without cooling.

Carbon dioxide. P. E. HAYNES. *Brit.* 277,938, Sept. 27, 1926. $CaCO_3$ is passed through a furnace-heated retort in countercurrent to a stream of steam. Waste heat from the furnace is used to generate steam under pressure which drives a compressor to liquefy the CO_2 produced and the exhaust steam is used in the process. An app. and various details are described.

Carbon dioxide. B. LUNDIN. *Brit.* 278,304, Sept. 28, 1926. Solid $NaHCO_3$ is fed into an aq. soln. of $NaHSO_4$ in an app. which is described and the gas-outlet of which is provided with a pump or compressor to regulate the pressure at which the CO_2 generated is discharged. The app. may be lined with Pb or formed of rustless Fe, and steam may be used to remove air from the gas-generating chamber. Na_2SO_4 may be recovered from the residual soln. by crystn.

Reduction of alkali salts of chromic acid. R. CASPARI. *Can.* 277,173, January 17, 1928. Alkali metal salts of CrO_3 are heated in aq. soln. with carbohydrates at temps. above 110°.

Recovery of alkali iodide by absorption of the iodine. NAAMLOOZE VENNOOTSCHAP MIJNBOUW EN HANDELSMAATSCHAPPIJ "SOEMMER ASSIN". *Dutch* 17,807, March 15, 1928. Iodine is recovered from I-contg. water by absorption on starch and treatment of the starch by the calcd. amt. of soln. of alkali sulfite and carbonate or hydroxide and subsequently washing it with water.

Alumina, etc. J. C. SEAILLES. *Brit.* 277,697, Sept. 18, 1926. A hydrated alk. earth aluminate is made by treating a mixt. of pulverized halogenated ore of Al with an alk. earth base in the presence of water and is converted into Na aluminate by addn. of Na_2CO_3 or Na_2SO_4 ; alumina may then be prepd. by pptn. with CO_2 .

Alumina free from iron. HEINRICH SPECKETER (to I. G. Farbenind. A.-G.). U. S. 1,672,788, June 5. A mixt. comprising $AlCl_3$ and $FeCl_3$ such as is obtained by treating potter's earth with HCl is heated with sufficient water to effect hydrolysis of the $AlCl_3$ to form alumina and in the presence of a reducing gas such as H_2S capable of preventing the oxidation of the $FeCl_3$, at a temp. (suitably about 300° or somewhat higher) which will effect the hydrolysis but will not decomp. or volatilize the $FeCl_3$ and the latter is then selectively dissolved out of the resulting mass.

Antimony pentasulfide. H. NUHS and L. H. BLOOD (to Antimony Products Corp.). U. S. 1,671,203, May 29. Steam is employed to atomize a soln. of thioantimoniate and an acid gas such as SO_2 .

Alkali metal cyanides. C. P. DAVIS and G. B. FROST (to American Cyanamid Co.). U. S. 1,672,449, June 5. A carbonate such as Na_2CO_3 is heated in contact with HCN gas to progressively higher temps. (suitably about 200-500°) below the m. p. of the resulting mixt. but sufficiently high to convert most of the carbonate into cyanide. An app. is described.

Cyanides, etc. R. GOLDSCHMIDT and S. COULIER. *Brit.* 277,714, Sept. 20, 1928. Peat mixed with alkali, alk. earth or other metal compds. is subjected to wet or dry carbonization to form mixts. which on treatment at high temps. with N or NH_3 or

amines yield cyanides, cyanamides or nitrides and a residue of C having absorbent and decolorizing properties. Catalysts such as Fe, Mn, Cr, Ni or Co or their oxides may be present and substances for activating the C also may be added such as ZnCl_2 , ZnO , Mg phosphate or Ti compds. The nitrogenization may be effected under 1-2 atm. pressure at 950-1000° in a vertical or inclined furnace in the upper part of which the carbonization is effected. Brit. 277,715 specifies a similar process in which carbonized wood, spent malt, oil cake or the like may be used.

Cyanamide solution from calcium cyanamide. A. N. ERICKSON (to Union Carbide Co.). U. S. 1,671,183, May 29. A cyanamide soln. practically free from dicyanodiamide is obtained by treating Ca cyanamide with water and CO_2 while the temp. of the soln. is maintained sufficiently low (suitably about 10-20°) to prevent the formation of substantial quantities of dicyanodiamide while promoting the pptn. of substantially all the N as a carbonated lime-nitrogen compd., sepg. at least a portion of the water from the ppt. and moderately heating the residue in the presence of CO_2 to decompose the lime-nitrogen compd. into cyanamide and CaCO_3 and sepg. the latter. An app. is described.

Hydrogen peroxide, etc. OESTERREICHISCHE CHEMISCHE WERKE GES. Brit. 277,628, Sept. 16, 1926. Solns. of peroxides, peracids and persalts are rendered stable and suitable for use after diln. for bleaching straw, wool, felt or other materials by adding a substance which increases the stability and also substances which increase the activity; among the substances which may be used are: Na pyrophosphate, Na chloride, chlorinated hydrocarbons, and protective colloids such as Turkey red oil, waterglass or soap. H_2SO_4 or H_3PO_4 may be added to restore acidity.

Iron oxide catalyst. GEORGES CLAUDE (to Lazote, Inc.). U. S. 1,671,345, May 29. In forming a catalyst suitable for use in NH_3 synthesis, fused Fe oxide is heated upon a support contg. MgO , and MgO from the support is absorbed into the fused mass.

Lead carbonate. S. C. SMITH and CHEMICAL & METALLURGICAL CORP., LTD. Brit. 278,003, July 2, 1926. CO_2 is passed into a suspension of Pb chloride in a soln. of NH_3 at such a rate that it passes into the form of Pb carbonate as nearly as possible coincident with its introduction so that the presence of free CO_2 in the soln. is avoided so far as possible. Pb carbonate substantially free from Pb chloride is thus obtained.

Nitrates. B. F. HALVERSON. Can. 277,046, January 10, 1928. Solid products contg. $\text{Ca}(\text{NO}_3)_2$ and NaNO_3 are produced by evapg. a soln. of such nitrates, adding NH_4NO_3 to the product and cooling the mixt.

Zinc oxide. J. F. CREGAN. Can. 276,800, January 3, 1928. A body of Zn vapor at relatively high temp. is divided into a number of small streams and air is mixed with the streams, while the vapor is flowing through a restricted space, in vol. sufficient to oxidize all of the Zn vapor. The mixt. is then passed into a burning chamber to oxidize the Zn. Cf. C. A. 21, 2173.

Zinc and sodium sulfates. METALLBANK UND METALLURGISCHE GES. A.-G. Brit. 278,747, Oct. 7, 1926. A liquor contg. sulfates of Zn and Na is concd. until the content of Na_2SO_4 may be not more than a half g. mol. per kg. of liquor so that on cooling to 10-20° ZnSO_4 crystallizes free from Na. Excess Na_2SO_4 may be removed by cooling to 40-60° so that Na and Zn sulfates sep. as a double salt and the soln. then further treated as specified. The process may be applied to the liquor obtained by lixiviating chloridizing-roasted burnt sulfide ores after removal of Cu as insol. Cu_2Cl_2 by digestion with Cu and if desired removal of Fe and Co by lime and Zn dust. H_2SO_4 may be added to the soln.

Apparatus for drying and neutralizing ammonium salts, etc. F. BINSWANGER (to International Cement-Gun Co., Ges.). Brit. 277,652, Sept. 14, 1926.

Evaporating pan and associated scrapers for evaporating salt solutions. VEREINIGTE SCHWEIZERISCHE RHEINSALINEN. Brit. 277,639, Sept. 15, 1926.

Centrifugal process of forming globular sodium bisulfate from molten material. C. P. LINVILLE and C. E. MENSING (to Calco Chemical Co.). U. S. 1,671,866, May 29. An app. is described.

Active carbon. E. H. MEEZE (to J. S. Daniels). Brit. 277,987, Sept. 22, 1926. Wood, peat, lignite, brown coal, etc., is destructively distd. at reduced pressure in the presence of steam or inert gases or both or of oxidizing and other active gases; the C is then cooled and may be ground and treated with catalytic materials and subjected to another heat treatment. Various details are given and an app. is described. Compounds of Zn, Cd and Sn may be used as the catalysts, e. g., ZnCl_2 and CdCl_2 and ZnO with NH_4Cl . In the final heating, temps. up to 1000° may be used.

Dissolving aluminum from argillaceous materials. I. G. FARBENIND. A.-G. Brit. 278,370, Sept. 29, 1926. A mass of material such as clay, kaolin or bauxite which is

to be treated with HCl or other acid is kept covered with the acid in a stationary container throughout the treatment, and the supply of acid and outflow of soln. is regulated to maintain a temp. of $105\text{--}120^\circ$ in the reaction zone; the temp. increases from the top to the bottom of the charge.

Catalyst for producing hydrogen from carbon monoxide and steam. H. E. HEISLER (to Atmospheric Nitrogen Corp.). U. S. 1,672,528, June 5. A catalyst for producing H from CO and steam at temps. of $500\text{--}600^\circ$ consists of an oxide material contg. Fe as a major ingredient and K and Mn as minor ingredients. The catalyst may be formed from Fe, HNO_3 , magnesite and KMnO_4 and may be exposed to a temp. of 800° prior to its use.

Apparatus and system for separating nitrogen and carbon dioxide by compression and use of a selective solvent. H. BLAU. Brit. 278,712, Oct. 5, 1926. Sepn. of mixts. of hydrocarbon gases also is described.

Silica gel. E. B. MILLER and G. C. CONNOLLY (to Silica Gel Corp.). U. S. 1,672,768, June 5. In prepg. a hard high adsorbent silica gel, solns. of an acid and a silicate are mixed with gel "fines," with vigorous agitation, in such concns. and proportions that the liquid mixt., after a time, without pptn., sets to a hydrogel, and the latter is thereafter nearly dehydrated.

Filling for storing and transporting acetylene. J. POMMER. U. S. 1,672,688, June 5. A filling suitable for use with C_2H_2 dissolved in acetone consists of fritted and granulated punnee gravel which is placed in a pressure-resisting receptacle.

Treating phosphate rock. G. T. HARNED (to Phosphate Mining Co.). U. S. 1,671,765, May 29. Crude phosphate rock is calcined and while still hot is directly mixed with a proportion of wet rock to dry the latter and increase its percentage content of "bone phosphate of lime."

Phonograph records. F. G. MITCHELL. U. S. 1,671,437, May 29. A sheet of celluloid or similar material is coated with thermoplastic material, the materials are united under pressure and a record impression is formed in the coating. Cf. C. A. 22, 2037.

Phonograph records. F. E. SINCERE. U. S. 1,671,788, May 29. Inflexible fibrous material such as stiff paperboard is impregnated with a filling material, and immersed in a nitrocellulose soln., withdrawn and freed from surplus soln. and dried; this treatment may be repeated to obtain a coating of the desired thickness for sound records. ZnO and black pigments, etc., may be added.

Sound record. O. A. CHERRY (to Cutler-Hammer Mfg. Co.). U. S. 1,671,228, May 29. A sulfur-naphthalene resin is mixed with a waxy material such as ozokerite and with a suitable filler, and the mixt. is molded under pressure.

Diaphragms for acoustic instruments. T. B. SMITH. Brit. 277,908, May 20, 1927. Thin C diaphragms such as those of microphones are protected by a layer of Au, Ag or other metal foil adhering to the outer surface of the diaphragm by use of gelatin or other adhesive.

Phonograph needle. N. H. HOLLAND. U. S. 1,671,426, May 29. A wire is coated with a mixt. of beeswax 25, resin 25 and graphite 50%.

Composition for coating book cloth. H. V. DUNHAM. U. S. 1,671,856, May 29. A mixt. of casein 60, borax 10 and bentonite 30 parts is used to form a substantially transparent coating.

Adhesive. W. O. HERRMANN and W. HAEHNEL. Can. 277,169, January 17, 1928. An adhesive contains polymerized vinyl ester and softening materials.

Plastic composition. ALPHONS POLLER (to De Trev Bros., Ltd.). U. S. 1,672,776, June 5. A plastic compn. suitable for making dental impressions comprises rubber finely distributed in a reversible hydro-colloid obtained from mucilaginous vegetable matter such as "hai-thao" or "dschin-dschen" and substances such as resins, fats, fibers, etc.

Cold molding plastic composition. C. F. CHOSA (to Cutler-Hammer Mfg. Co.). U. S. 1,671,229, May 29. A compn. suitable for making molded articles is formed of Fe oxide 22, asbestos 1100, stearine pitch 100, a solidifiable oil such as castor oil 10, C_6H_6 or other solvent at least 25 and about 66 parts of a substance such as S which will act as a hardener under the influence of heat; the product is indurated by strong heat treatment (suitably at a temp. of about $95\text{--}260^\circ$). U. S. 1,671,230 relates to similar compns. in which stearine pitch and asphalt are used together.

Thermoplastic compositions for shoe toe stiffeners, etc. UNITED SHOE MACHINERY CORPORATION. Brit. 277,719, March 22, 1926. Thermoplastic stiffening compns. are rendered resilient by addn. of substances such as rubber or gutta percha. Various examples and formulas are given.

Friction material. I. J. NOVAK (to Raybestos Co.). U. S. 1,672,538, June 5. A friction material suitable for brake linings or clutch facings comprises an asbestos base with a binder of a phenolic condensation product and a "gum" such as rosin or other varnish gum. The phenolic condensation product remains in fusible form in the product as manufactured. U. S. 1,672,539 specifies satg. a preformed asbestos material with a waterproof binder such as gilsonite dispersed in an aq. vehicle so that the dispersed binder particles are smaller in size than the pores of the fibrous mass and have a negative elec. charge.

Friction material for brakes, etc. BRITISH DYESTUFFS CORPORATION, LTD., C. J. T. CRONSHAW, J. BADDILEY and E. CHAPMAN. Brit. 278,495, July 21, 1926. In order to counteract the effect of moisture on brakes, pulleys, etc., the surface is treated with water-sol protective colloids or wetting-out agents of the sulfonic acid class, which may be added to asbestos compns. or the like during their manuf. or may be subsequently applied. Several examples are given.

Stencil sheets. POLYGRAPHISCHE GES. Brit. 278,647, Oct. 8, 1926. A negative of the original is produced photographically on printing paper coated with a film of gelatin and having a Ag colloid layer; the negative is developed and together with its support is squeezed while wet onto a porous stencil sheet such as Japanese paper, and dried, the negative is then tanned with dichromate soln., the gelatin film is softened by pouring warm water onto the original paper support so that the latter can be removed, and the untanned parts are washed out.

Stencil sheets. A DE WAELE. Brit. 278,445, July 8, 1926. A coating for stencil sheets for use on duplicating devices comprises a gelatinizing org. colloid such as gelatin dispersed in water and a tempering agent consisting of a hydroxy fatty acid ester of a mono- or dihydric alc. such as the ricinoleic esters of ethyleneglycol, trimethyleneglycol or EtOH. Substances such as bentonite, a Ti pigment and sulfonated sperm oil also may be added to the compns.

Urea-formaldehyde condensation products. I. G. FARBENIND. A.-G. Brit. 278,698, Oct. 8, 1926. In effecting condensation as described in Brit. 258,289 (C. A. 21, 3109), materials capable of furnishing acids during the heat treatment required for hardening are added to the condensation products before the hardening. Among the substances which may be used are: $MgCl_2$, formic esters and formamide.

Printing surfaces and matrices formed of paper pulp or like material and synthetic resins. F. S. HOLE. Brit. 278,460, July 16, 1926. In prep. the impregnating material, substances such as $PhOH$ and CH_3O with a small quantity of alk. condensing agent such as KOH are boiled together and a strip of Al or a small quantity of H_2BO_3 may be added to increase the seething and indicate more clearly the end of the reaction when no more CH_3O is evolved. Cold water is then added and the mixt. is again boiled, and an aq. soln. of NH_4 chromate or dichromate and a small quantity of Cu hydroxide are added. Methylated spirits and glycerol and Ca chromate or borate may be added. Numerous other details are given.

Composition for preventing obscuration of windows by frost, rain or snow. K. DEUBEL. U. S. 1,672,604, June 5. Paraffin oil 3 grams, "kandabalsam" 3 g., xylene, toluene 3.5 g., melted celluloid 1 g., $EtOAc$ 1 oz., acetone 1 oz. and coloring material.

Compositions for cleaning and polishing metals. F. E. GENGE. Brit. 278,078, June 29, 1926. Pyridine is used in whole or in part to replace the usual cleansing substances in metal polishes which may also contain various mixts. of paraffin oil, oleic acid, NH_3 , oil of mirbane, Fe_2O_3 and kieselguhr or similar substances.

"Anti-slip" composition for coating tool handles. O. W. JARRED. U. S. 1,672,813, June 5. Beeswax 60, paraffin 30 and carnauba wax 5 parts are used with a solvent thinner such as naphtha or turpentine.

Oiled wiping paper for removing ink from printing plates. T. M. ROYAL. U. S. 1,671,612, May 29.

Ink eradicator for removing drawing inks. F. N. STEIGLEDER. U. S. 1,672,790, June 5. An alkali metal hypochlorite is used in water together with CO_2 and Cl water.

Dental cement. N. E. EBERLY (to S. S. White Dental Mfg. Co.). U. S. 1,671,104, May 29. In order to form a translucent cement with H_3PO_4 at room temp., 70-98% of a finely ground basic glass contg. Si and Al oxides fused together is mixed with 30-2% of finely ground calcined basic oxides such as ZnO or a mixt. of oxides of Zn, Mg and Bi. Cf. C. A. 21, 806.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON. C. H. KERR

The founding of the glass industry in Norway. P. R. SOLLIED. *Tids. Kemi Bergv* 7, 97-100, 116-9, 129-32, 142-4(1927).—Historical. C. A. ROBAK

The Hartman formula for the dispersion of glass. H. W. LEE. *Trans. Opt. Soc. (Brit.)* 28, 161(1927); *J. Soc. Glass Tech.* 11, 334A. D. F. SHARP

Stained glass of the Renaissance period. WALTER BUTTERWORTH. *Pottery Gazette* 53, 789-92(1928).—An historical sketch. R. A. HEINDL

Analysis of opal and alabaster glasses. J. D. CAUWOOD, J. H. DAVIDSON AND VIOLET DIMBLEBY. *J. Soc. Glass Tech.* 12, 7-16(1928).—The presence in these glasses of F, PO₄, Sn and Zr in addn. to the usual constituents makes necessary a few changes in their analysis. The qual. analysis should precede. (A) *F-contg. glasses, PO₄ absent.* Fuse 1 g. powd. sample in 5-6 g. Na₂CO₃ at low temps. to avoid volatilization of F. Ext. the resulting cake with hot H₂O, filter, wash and save the residue (ppt. A.) Nearly neutralize the filtrate contg. the alk. F with HCl, add 4-5 g. solid (NH₄)₂CO₃ and digest for several hrs. at about 40°. Filter the voluminous ppt., wash with warm H₂O and save (ppt. B). To remove slight amts. of SiO₂, evap. the filtrate to dryness, take up with H₂O and neutralize carefully with 2N HNO₃, using phenolphthalein, with repeated heating and acid addn. until less than 1 cc. acid is used to discharge the color. Ppt. the traces of SiO₂ with 2 cc Berzelius soln. (freshly pptd. Zn(OH)₂ dissolved in NH₄OH), filter, saving the residue as pptg. C. Neutralize the filtrate contg. all the F and then add 2 cc. of 1N Na₂CO₃ soln. Boil with an excess of CaCl₂. Filter the ppt. of CaF₂ and CaCO₃, wash and dry. Reject the filtrate. Transfer the ppt. to a Pt crucible and ash the paper separately. Heat the crucible slowly to dull redness. Add dil. HOAc to dissolve the CaCO₃ and CaO, digest, evap. to dryness, faintly acidify with dil. HOAc and filter off the CaF₂. Dry, ignite gently after separately ashing the paper. Moisten with H₂SO₄, evap. and ignite to const. wt. as CaSO₄. The other constituents are detd. in the reserved ppts. A, B, and C and the filtrate from the CaF₂ residue. (B) *Phosphate glasses. Fluorine absent.* The usual fusion in Na₂CO₃ is followed by soln. in HNO₃ and evapn. to remove the SiO₂. The final washing of the SiO₂ consists of warm dil. NH₄OH to remove contaminations of PO₄. This filtrate is evapd. separately to recover the SiO₂ dissolved, taken up in dil. HNO₃ and filtered. The combined SiO₂ ppts. are ignited and treated with HF and HNO₃. The HNO₃ soln. contg. the constituents other than SiO₂ is analyzed as usual. PO₄ is detd. directly as phosphomolybdate or sepd. from the soln. as Ag₃PO₄ by the addn. of solid Ag₂CO₃. The PO₄ content may be detd. in a fresh sample opened up by HF and HNO₃. (C) *Glasses contg. both F and PO₄.* The outline for F-contg. glasses is followed until the PO₄ must be removed from the SiO₂ filtrate, as Ag₃PO₄. F is detd. in the filtrate from the AgCl ppt. representing the excess Ag reagent used. (D) *Milky glasses contg. Cl or SO₄.* The usual detn. in the Na₂CO₃ fusion soln. is used. (E) *Alabaster glasses.* Similar procedures are used since the opacifying constituents are the same, but present in smaller quantities. (F) *Very dense white opal glasses contg. SnO₂.* Fuse as before, taking up the residue in HNO₃. Evap. to dryness twice, filter off SiO₂ and SnO₂, treat with HF and HNO₃, and ignite. Fuse the Sn-contg. residue with Na₂CO₃, take up in HCl and det. Sn by the usual means. H. F. K.

Analysis of opal glasses. W. SINGLETON AND R. C. CHIRNSIDE. *J. Soc. Glass Tech.* 12, 18-24(1928).—With glasses having less than 5% F the ordinary SiO₂ detn. is sufficiently accurate for general work, Pb can best be removed from the SiO₂ filtrate by H₂S in a faintly acid soln. and is converted to PbSO₄ for weighing. Al₂O₃, Fe₂O₃, CaO and MgO are detd. as usual. No difficulty was observed in the Zn sepn. or detn. Zn and Pb interfere with the B₂O₃ detn. while F up to 5% does not. Zr was detd. as PO₄ and Ti alone interferes. As is sepd. from the filtrate of SiO₂ and Pb by H₂S and is detd. volumetrically. F is sepd. as CaF₂ and the alkalis are found by the J. L. Smith method. H. F. K.

Three fundamental principles of ceramics. H. H. STEPHENSON. *Trans. Ceram. Soc. (Eng.)* 26, 21-2(1928).—Accepting the term thixotropy for the phenomenon Freundlich observed while agitating and thus liquifying Al(OH)₃ and Fe(OH)₃ colloids, S. sets forth as fundamental these three principles: (a) The chemistry of glazes deals with finished reactions while reactions in bodies are arrested reactions. (b) The conduct of a pottery body under and after heat is a function of the SiO₂ inversion.

(c) Clay is a thixotrope; its properties are altered by mechanical treatment. Credit is given to Mellor, Le Chatelier, and the author, resp. H. F. K.

Ceramic processes with special reference to heating practice. S. R. HIND. *Fuel Econ. Rev.* 6, 53-65(1927).—A review. E. H.

Characterization of clay. A. F. JOSEPH. *Trans. Ceram. Soc. (Eng.)* 27, 1-5 (1928); cf. C. A. 22, 1021.—Attention is called to the progress made in the classification and characterization of clays and heavy soils by soil scientists. Several soils and 12 ceramic clays were sepd. by alk. deflocculation and elutriation into sizes between 0.2 and 0.02 mm., 0.02 and 0.002 mm., and the "true clay" fraction 0.002 mm. and zero. In place of a mechanical measure of plasticity the detn. of "imbibitional H_2O " capacity is used. This capacity is the moisture equiv. as detd. by centrifuging a wet clay sample for 40 min. at 1000 gravities less the interstitial space measured under similar conditions of draining with an inactive liquid like xylene. The partial chem. analyses of 9 clays of widely different plasticities are given to indicate that plasticity and related properties increase with the SiO_2/Al_2O_3 ratio of the "true clay" fraction. J. believes that all "true clay" can be dispersed to true colloidal size if flocculating conditions and tendencies are minimized. H. F. K.

Effects of temperature on the mechanical properties of silica products. A. J. DALE and A. SCOTT. *Trans. Ceram. Soc. (Eng.)* 27, 23-59(1928); cf. C. A. 22, 1661.—A modified Mellor and Moore load test was made on $3.5 \times 2 \times 2$ -in. test pieces of refractories contg. over 92% SiO_2 . A const. temp. rise of 50° per 5 min. was used. The degree of SiO_2 conversion and the homogeneity of conversion were found highly important. The higher the load the less the low-temp. and high-temp. local expansions; also the lower the temp. at which vertical expansion ceases. The relation between ordinary refractoriness, porosity, or compn. and the behavior of SiO_2 bricks under stress at different temps is very indefinite. Mixing, making, heat history and especially the nature of the bond are factors of greater importance. The high temp. expansion is caused by the conversion of residual quartz to cristobalite, while the disintegration under high stress is due to weakness caused by the crystalline rearrangement of the conversion or to the internal stress associated with the change. Clay bondings up to 5% were successful when used with certain SiO_2 rocks, decreasing the disintegrating tendencies at both high and low temps. Lime bonding impeded the conversion rate but such brick had greater rigidity at high temps. With well-graded SiO_2 rock a lime-clay bond gives a moderately fired SiO_2 brick enough rigidity at high temps. to resist the high temp. conversion stress plus a considerable mechanical stress if the clayey material is not an excessive amount. When the probable thermal and mechanical conditions of use are known two modified Mellor and Moore tests (50 and 4 lb. per sq. in.) will suggest the fitness of brick for that purpose; also they suggest the precautions necessary to get the maximum service from the refractory. H. F. K.

Electromagnetic separators for the pottery trade. W. I. BOX. *Pottery Gazette* 53, 781 3(1928).—Removal of magnetic iron from dry and wet material by means of rotary and chute separators is described. R. A. HEINDL

Electrical pottery firing. B. J. MOORE and A. J. CAMPBELL. *Trans. Ceram. Soc. (Eng.)* 27, 12-9(1928).—Some notes are given on the construction and operation of the Moore and Campbell elec. enamel tunnel kiln. H. F. K.

Silica and magnesite bricks in metallurgical furnaces. GERHARD WOLFF. *Metal Ind. (N. Y.)* 25, 489 92(1927).—For silica brick the best material consists of quartzite with 0.5-1% Fe_2O_3 and less than 1.5% Al_2O_3 . The presence of more Al_2O_3 increases the porosity and decreases the softening point 125 - 175° for 2-6% Al_2O_3 . Fe_2O_3 acts as catalyst for the quartz-tridymite transformation. Silica and magnesite bricks are more sensitive to thermal shock than the other refractories used generally. Magnesite brick should contain 5-7% impurities, chiefly Fe_2O_3 to form $MgO.Fe_2O_3$ and the sintered condition. Methods used in the Pb, Cu, etc., metallurgical practices to protect the magnesite brick from sudden temp. change are described. H. F. KRIEGE

Refractories for brass-foundry furnaces. H. M. ST. JOHN. *Am. Foundrymen's Assocn.* 1928, 439-52.—This paper supplements a previous report by the Joint Comm. on Foundry Refractories—1926. The qualities required from the refractory structures depend upon the type of furnace and fuel used. The following list of furnaces and the refractory experience with each are discussed: crucible pit furnace using coke or hard coal; crucible pit furnace using gas or oil; open flame furnace using gas or oil; indirect arc electric furnace and induction electric furnace. J. W. BORCK

Open-hearth steel-works refractories. A. T. GREEN. *Trans. Ceram. Soc. (Eng.)* 27, 63-90(1928).—See C. A. 22, 1662. H. F. K.

Cupola refractories. J. G. A. SEERL. *Bull. Brit. Cast Iron Research Assoc.* 20,

18-21(1928).—The properties and care of refractory brick for cupola linings, the use of ganister for patching, and the making of monolithic linings are briefly outlined.

DOWNES SCHAAF

Ceramic materials resistant to cooking processes. FELIX SINGER. *Z. angew. Chem.* **40**, 1295-6(1927).—Recent improvements in stoneware have resulted in a product of low absorption, with resistance to thermal shock about equal to that of porcelain, while still suitable to be worked into large shapes.

H. F. KRIEGE

Abstrasive materials in 1926. A. T. COONS, B. H. STODDARD AND J. A. DORSEY. *Bur. Mines, Mineral Resources of the U. S. 1926*, Pt. II, 245-53 (preprint No. 22, published December 28, 1927).

E. H.

Analysis of the sodium sulfate used in glass works (BESOMBE) **7**.

SCHMIDT, ALFRED: **Die Brennöfen der Grob-und Feinkeramik und der Mörtelindustrie mit bes. Berücks. d. Wärmeerzeugung, d. Brennstoffe und Feuergn.** 1st ed. Leipzig-Probstheida: Selbstverlag. 112 pp. Halfline, M. 4.50.

Drawing tubes or rods of glass. NAAMLooZE VENNOOTSCHAP PHILIPS' GLOEILAMPENFABRIEKEN. *Brit.* **277**, 807, Sept. 30, 1926. Mech. features.

Mold for shaping glassware. L. FITHIAN (to Hazel-Atlas Glass Co.). *U. S.* **1,671,674**, May 29. Structural features.

Coating glass surfaces. H. D. BLAKE AND J. E. STONE (to General Elec. Co.). *U. S.* **1,672,857**, June 5. Surfaces such as incandescent lamp bulbs are treated with a mineral body material such as French chalk, china clay and ZnO mixed with an alk silicate binder, the coating is dried, and is then subjected to the action of a fixing soln contg. a halogen compd. such as Na bifluoride or NH₄Cl or NaCl and H₂SO₄. Cf *C. A.* **21**, 863.

Bricks. E. M. DOMF. *Brit.* **278**, 461, July 17, 1926. Sand 4 is used with 1 part each of cement, yellow or red oxide of Fe and Ca(OH)₂.

Refractory bricks. F. L. DUFFIELD. *Brit.* **278**, 120, July 26, 1926. Bricks or similar articles are formed by molding under pressure a fused or sintered mass of dolomite or magnesite and allowing the material to cool in the molds; temps. of 1200-1700° may be employed, fluxes such as Fe₂O₃, clay or slag may be added, and steel or cast Fe molds may be used.

Brick or tile for use in steel furnaces. H. B. GRONINGER. *U. S.* **1,672,524**, June 5. Premolded blocks of non-acidic material such as magnesite are enclosed in a sheath of thin Fe or steel or other suitable metallic material.

Refractory crucibles. M. UNGER (to British Thomson-Houston Co., Ltd.). *Brit.* **278**, 367, Oct. 1, 1926. Pores of fireclay crucibles are filled with C by impregnation with coal-tar pitch and baking. The treatment may be repeated.

Fine perforations in ceramic material. J. F. SCHEID, V. TONNDORF AND Firm of C. ZEISS. *Brit.* **278**, 097, July 3, 1926; *U. S.* **1,673,269**, June 12. In order to form fine openings for spinning artificial filaments by extrusion, or for other purposes, steel needles are introduced into ceramic material after molding and while still plastic, and are removed before the material is fired.

Flue system, etc., for pottery kilns and the like. H. WEBSTER. *U. S.* **1,671,559**, May 29.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Cement in 1925. B. W. BAGLEY. *Bur. Mines, Mineral Resources of the U. S., 1925*, Pt. II, 255-79 (preprint No. 24, published February 23, 1927).

E. H.

The cement industry in Brazil. M. TEIXEIRA DE CASTRO. *Bol. soc. chim. S. Paulo* **1**, 47-60(1928).

E. H.

Condition of field specimens of concrete exposed to alkaline soils and waters examined in December, 1927. C. J. MACKENZIE. *Eng. J. Can.* **1928**, Preprint.—This committee report contains the results of observations made on the action of alkali on 240 test specimens of concrete of various cements and aggregates partially buried in alkali soils in 1921 and finally examd. in 1927. The tests were carried out at Deacon, Man., Grandora, Sask., Cassils and Antelope Creek, Alta. Many of the specimens were subjected to special treatments or contained in the mix substances commercially

recommended to withstand alkali action. The results are in accord with field exposure tests obtained in other field investigations and very few new data have been acquired by these tests. A chem. analysis of the soil waters in which the specimens were buried and tables contg. the compn. of the test pieces and the observations made on the alkali action accompany the paper.

J. W. SHIPLEY

Relative resistance of various cements to the action of sulfate waters. T. THORVALDSON. *Eng. J. Can.* 1928, Preprint.—Neat cement bars of portland cement and of super-cement subjected to immersion in solns. of Na_2SO_4 and of MgOSO_4 expanded considerably and eventually cracked and fractured. Some of the cracks appeared on the edges of the bars within a year while large transverse cracks were observed in 2 yrs. time and at the end of 4 yrs. many of the bars had crumbled to pieces. Control tests in pure H_2O and other salt solns. showed no damage. The SO_4 content of the solid remaining material of the damaged bars was always found to be higher, sometimes almost twice as high, as that in the original cement. The fracture of field specimens exposed to alkali action in soils is attributed by T. to the uneven expansion caused by the absorption of sulfates near the surface of the ground. Rapid and extreme changes of temp. would also contribute to the disintegration. Concrete specimens prepd. from portland cement and super-cement and subjected to sulfate action in the lab. on the av. showed no difference in resistance. No distinction could be drawn between the behavior of the test pieces made from the 2 cements. Slag cements and natural cements showed a wide range in their resistance to sulfate action. As a rule concretes made from slag cements are more permeable and although showing high resistance in the lab. tests may fail during one season's exposure to field conditions. High alumina cements were found to be more resistant to SO_4 action in moderately rich mixes than any portland cement. Tension and compression tests give no indication of the sulfate resistance of a cement.

J. W. SHIPLEY

Requirements for a durable concrete as observed from structures in service. R. B. YOUNG. *Eng. J. Can.* 1928, Preprint.—A review of the knowledge and opinions held regarding the disintegration of concrete structures in sea water, alkali soils, fresh water and by mechanical agencies, vol. changes and by frost and crystn. Means of securing a durable concrete from cements and aggregates in common use are reviewed by Y. and examples of durable concrete structures given.

J. W. SHIPLEY

Some considerations in reinforced concrete. J. H. SOUTHERN. *Munic. Eng. Sanit. Record* 79, 253(1927).—A method of testing reinforced concrete beams or road slabs is described.

C. H. BADGER

Reinforced concrete with special reference to municipal and county engineers. EDDIE TASKER. *Munic. Eng. Sanit. Record* 79, 434-5(1927).—The concrete surface of a wall while still green may be brushed with a wire brush with water or a soln. of 1 part HCl to 6 parts of water until the surface cement is removed. This exposes the aggregate and gives relief to a flat surface. It is then washed with clean water. A sandblast surface can be obtained similar to that of a natural sandstone but more irregular due to the aggregate. Tooling is a more costly process. The color of sand particularly affects the finished colored concrete. The aggregate, usually not exposed, has little effect. The pigments added should be fast. There should be no greasy material present to prevent the bond between the steel and the cement, and no material which would reduce the tensile strength. Ordinary round mild steel bars appear the best to use; specially shaped bars are not often economical.

C. H. BADGER

Why concrete in the industrial plant? J. C. WITT. *Industrial Power* 1928, May, 63 5.—The developments and demands of industry, the characteristics of concrete, and plant facilities for concrete work account for the increasing use of concrete around industrial plants. The desirable qualities of the material include relatively low cost, availability, hardness, resistance to abrasion, and chem. inertness to most substances.

J. C. WITT

Painting of plasters and cements (GILES, *et al.*) 26.

BAUER, EDWARD E.: **Highway Materials.** New York: McGraw-Hill Book Co. Reviewed in *Rock Products* 31, 49(1928).

Coloring cement or other building materials. G. N. WHITE. *Brit.* 277,380, March 8, 1928. Cement, plaster, lime, asbestos and the like are colored with vat dyes or coloring agents which may be used dry or in suspension, *e. g.*, in colloidal soln. The coloring materials may be ground or a soln. of the leuco compd. may be oxidized in the presence of a dispersing agent. Several examples are given.

Composition for treating floors of magnesite cement and similar materials. R. DE WOLF. Brit. 277,444, June 24, 1926. A mixt. of American spindle oil with a small proportion of an aniline color is rubbed into the floor to prevent cracking and to lay dust.

Curing concrete. R. B. GAGE. U. S. 1,672,380, June 5. After placement of concrete, its surface is temporarily covered with a non-absorbent bituminous felt until even curing is effected.

Expansion joints for concrete roads, etc. D. L. IRWIN AND RUBBEROID CO., LTD. Brit. 277,513, Oct. 9, 1926. Expansion joints are formed of granulated cork or other resilient material bound by asphalt or like material and molded into strips or slabs with a high percentage of voids.

Bituminous material for use on roads. COLAS KALTASPHALT GES. Brit. 277,356, Sept. 9, 1926. Bituminous emulsions with only a small proportion of emulsifier, such as are described in Brit. 202,021 (C. A. 18, 326) are rendered suitable for coating aggregate for macadamized roads by adding substances such as glycerol or other polyhydroxy alc., a light mineral oil or a salt which increases the viscosity of the emulsion and retards its tendency to disruption on being mixed with the aggregate.

Bituminous material for roads. VERKAUFSVEREINIGUNG FÜR TEERERZEUGNISSE GES. Brit. 278,679, Oct. 7, 1926. Tar or tar oil is subjected to mild oxidation before mixing with stone, e. g., by heating at 150° with 5% of HNO₃ or by use of chromic acid, KMnO₄, H₂O₂ or air. The oxidized tar or tar oil may be mixed with petroleum residues or natural bitumens.

Bituminous paving material. O. H. BERGER (to W. P. McDonald Construction Co.). U. S. 1,672,361, June 5. A compn. suitable for cold laying when mixed with aggregate is composed of hard asphalt having a penetration not substantially in excess of 1 at a temp. of about 46°, 100 g., 5 sec., and a "fresh oil" flux contg. a substantial proportion of light volatiles. Cf. C. A. 21, 3115.

Bituminous pavement. J. W. FRAZIER (to Uvalde Rock Asphalt Co.). U. S. 1,672,408, June 5. Crushed rock and mineral particles such as sand are heated and coated with a thin film of asphaltic oil, mixed with about 10% by vol. of pulverized rock asphalt and the mixt. is agitated and further mixed at a temp. of about 1450°.

Impregnating unpaved roads. R. LICHTENSTERN. U. S. 1,671,218, May 29. A layer of material insol. in water and impervious to oil is formed in the road, e. g., by reaction of a naphthenic soap with a Ca compd., and an oily dust-binding medium is then applied.

Magnesitic artificial stone. R. H. ALLISON (to Royal Muralite Corp.). U. S. 1,672,293, June 5. Portland cement, calcined American magnesite, pulverized alum and silica are mixed in dry form and a soln. of water, H₂SO₄, MgCl₂ and a pigment is added.

Building and insulating material. P. A. BECH. Can. 277,217, January 17, 1928. A building and insulating material is made by mixing sawdust, wood chips, etc., with cement and Ca oxychloride, in dry condition, and then adding H₂O.

Cellular building blocks formed of gypsum compositions, etc. H. S. ASHENHURST (to Insulux Corp.). U. S. 1,671,216, May 29. Structural features.

Felted waterproof sheet material. L. KIRSCHBAUM. U. S. 1,672,262, June 5. Sheets suitable for roofing comprise wood or grass fiber or other fibrous material with an asphalt binder coating the fibers in the form of a substantially continuous film contg. a dispersing agent such as colloidal clay. In forming the sheet, the fibers are felted in the presence of the binder. Cf. C. A. 21, 1526.

Heat-exchange cylinder adapted for drying felt roofing, etc. J. W. OLTMAN (to Barrett Co.). U. S. 1,672,036, June 5.

Roofing tiles. A. E. E. CROCKOW. Brit. 278,592, March 26, 1927. Asbestos cement tiles are provided with a surface to promote growth of vegetation by facing them with materials such as sand, brick, dust or kiln dust.

Roofing, etc., formed with impregnated paper sheets and a core of asphaltic composition. T. ROBINSON (to International Copperclad Co.). Brit. 278,691, Oct. 5, 1926. Mech. features.

Composition floors, roofs or walls. W. K. NELSON. U. S. 1,671,995, June 5. A cast layer of porous material such as a gypsum compn. carries a thin coating of pitch and paraffin or other suitable water-repelling agent and a surface layer of portland cement or the like all united in a monolithic construction.

Floor covering. I. J. NOVAK (to Raybestos Co.). U. S. 1,672,537, June 5. A base sheet may be formed from a mixt. of chrome leather shavings 30, cotton or jute 70, wood flour or cork 125, coloring pigments 50, wax tailings 500, clay 250, Na silicate 50 and alum 80 parts, emulsified with water and sheeted in the same manner as paper.

stock. This base sheet may be united with a surface sheet similarly formed and which may be composed of chrome leather shavings 60, cotton or jute 40, wood flour or cork 125, coloring pigments 50, a linseed oil and copal varnish 500, clay 200, Na silicate 50 and alum 70 parts, also emulsified with water before sheeting.

Plaster. L. E. CHASSEVENT. U. S. 1,672,638, June 5. See Brit. 266,335 (C. A. 22, 491).

Plaster. C. IMMERHEISER, F. KNEBEL and H. SCHAUDER. Can. 276,833, January 3, 1928. An inorg. filler of scaly structure is incorporated with a cellulose plastic to produce a high-grade plaster.

Thin wood veneers impregnated with paraffin or the like and stamped with ornamental patterns. J. BRÜNING & SOHN A.-G. Brit. 278,699, Oct. 5, 1926

Wood preservation. L. P. CURTIN. Can. 277,103, January 17, 1928. Wood is impregnated with an aq. soln. contg. H_2O -sol. components capable of reacting, on exposure to the atm., to deposit $\text{Zn}(\text{AsO}_3)_2$ within the body of the wood. Cf. C. A. 21, 3726.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

The buying and selling of industrial fuel on a calorific value basis. A. H. TIS-
SINGTON. *Fuel Econ. Rev.* 6, 11-6 (1927). E. H.

Preparation of coal for the market and its purchase on a basis of the calorific value.
F. S. SINNATT. *Fuel Econ. Rev.* 6, 9-11 (1927) E. H.

Coal treatment and its effect on atmospheric pollution. J. S. OWENS. *Fuel Econ. Rev.* 6, 75-81 (1927).—A review. E. H.

Revision of thermic values. V. P. IZHEVSKII. *Ukrainskii Khim. Zhurnal* 1, tech. part, 29-39 (1925).—A review of the modern technic in utilization and economy of fuels and combustibles. G. B. KISTAKOWSKY

A rapid method for the determination of moisture in solid and liquid fuels. J. TAUSS AND H. RUMM. *Gas u. Wasserfach* 71, 417-20 (1928).—A new distn. method for detg. moisture in fuels is described which uses $\text{C}_2\text{H}_2\text{Cl}_4$ in a special app., permitting the rapid and easy sepn. and measurement of the water distd. over with the $\text{C}_2\text{H}_2\text{Cl}_4$. About 50 g. sample is used and this is covered with about 150 cc. $\text{C}_2\text{H}_2\text{Cl}_4$. It is only necessary to distil over 20 to 40 cc. of the $\text{C}_2\text{H}_2\text{Cl}_4$. Comparative moistures for coals were detd. by this method and by drying at 110° for two hours. The results for the new method were distinctly higher, but corresponded very closely with the moisture content obtained by drying in a vacuum at 60° to const. wt. Detns. may be carried out in 15 to 20 min. $\text{C}_2\text{H}_2\text{Cl}_4$ is not inflammable so that danger of fires occurring from breakage of app. is avoided. R. W. RYAN

Notes on the Franz Fischer low-temperature coal assay method. HEMPEL. *Brennstoff-Chem.* 9, 3-6 (1928).—The method (C. A. 20, 658) is said to give high tar yields with moist coal. H. finds the increase not greater than 0.4% when his modification of the method is used. This consists in warming the combined water and tar distillate in a bath at 70° , whereby the tar is completely melted and can be sepd. from the water. J. D. DAVIS

A comparison between the German and Dutch methods for determination of volatile matter in coal. D. J. W. KREYLEN. *Brennstoff Chem.* 9, 2-3 (1928).—German chemists use the Bochumer method, Dutch chemists the American. In the former case dried coal is used, in the latter "air-dried." K. compares the methods using "air-dried" samples of 8 different coals and finds that the Bochumer method gives results from 0.4 to 0.7% low. J. D. DAVIS

Comparative study of coal. G. A. BRENDER A BRANDIS AND J. C. VLUGTER. *Het Gas* 48, 183-6 (1928).—The Bauer method (Litinsky variation, *Messstechnik* 185 (1926)) for detn. of gas, tar, NH_3 , C_6H_6 , yield of coal, etc., by distn. is unreliable for several reasons. The authors use for the purpose of evaluation of important coal qualities a quartz tube (30 cm. long) open on both ends, filled for 10 cm. with 5 g. dry coal and for another 10 cm. with fireclay granules. These parts of the tube are heated in a Fletcher oven to 900° (thermocouple). A second quartz tube filled with cotton wool is ground to the first joint (just inside the oven) and serves for tar removal. The gas is collected over acid water satd. with CO_2 and H_2S . Calorific values (Union calorimeter) and compn. of the gas, (C_2H_2 , C_2H_4 and C_2H_6 sep. by Tauber method) are detd. The coke is weighed in the first quartz tube. The distn. takes 40 min. The app. is filled with H_2 initially. A table of analytical data: ash, volatile matter, coke yield, heating

value of gas per cu.m. and per ton of coal is given for 7 coal species (Bismarck nut, Constantin der Grosse nut, Barrow double nut, South Yorkshire nut, Emma semi-bituminous, German bituminous, cannel coal).

B. J. C. VAN DER HOEVEN

The ash content of brown coal. F. FISCHER AND W. FUCHS. *Brennstoff-Chem.* 8, 291-3(1927).—Cassel brown was extd. with EtOH-C₆H₆ soln. 1:1 to remove bitumens; the residue was then treated with 2 N NaOH, which dissolved the humic acids. On pptn. of these with dil. HCl it was found that they contained approx. as much ash as the original coal (10%). Further investigation showed that the original ash was mainly Ca, combined with the tetrabasic humic acids which apparently had a mol. wt. of 1400. The Ca could be replaced by Fe, Al, K or Na. Water could be softened by the sodium humates.

J. D. DAVIS

Growth of mold fungi on coals. F. FISCHER AND W. FUCHS. *Brennstoff-Chem.* 8, 231-3, 293-5(1927).—Molds of the genus *Penicilium* were found to propagate on Cassel brown, Union and Ilse briquets both in the raw state and after extn. with EtOH-C₆H₆ soln. Growth was favored by a nutrient soln. consisting of 2 l. H₂O, 50 g. (NH₄)₂SO₄, 1.5 g. K₂HPO₄, 1.5 g. MgSO₄ and several g. NaCl. Further work showed growth (slower) on bituminous coal and even on semi-coke. The presence of undecomposed cellulose was therefore not essential to propagation. Several other varieties of fungi (*Aspergillus*, *Mucor* and *budding fungus*), also bacteria were grown on coals both under aerobic and anaerobic conditions. Gases and humic acids were formed in the growth process, this being one of oxidation of the coal substance.

J. D. DAVIS

Some characteristics of colliery surface and mine waters. N. SIMPKIN. *J. Soc. Chem. Ind.* 47, 114-6T(1928).—S. briefly surveys the waters available at collieries.

J. A. KENNEDY

The flow of heat through furnace hearths. J. D. KELLER. *Fuels and Furnaces* 6, 743-56(1928).

E. H.

Heat transfer in heating tubes. WERNER EICKMANN. *Arch. Warmewirt.* 9, 5-8 (1928).—Tests were made on a two-pass waste heat boiler in use, only the flue gases being measured. The water temp. was about 180°; the gas temp. 220-400° at the inlet, 190-320° at the outlet, the velocity of the gases (*w*) 1.5 to 23.2 m. per sec. The formula derived was: $k = 98 \times 10^{-10} d^{0.4} + 88w/d$, where *k* is the heat transfer in kg. cal per sq. m. per hr. per degree, and *d* the temp. difference between gas and water.

ERNEST W. THIELE

Fuel briquets in 1926. F. G. TRYON. *Bur. Mines, Mineral Resources of the U. S.* 1926, Pt. II, 1-8(preprint No. 1, published June 20, 1927).

E. H.

The turbo-burner. ALBERT HERBERHOLZ. *Arch. Warmewirt.* 9, 15-6(1928).—The Eickworth gas burner is described. The entering gas turns the vanes of a fan which sucks in the air. Tests show that the burner holds the CO₂ const. over a wide range of combustion rates.

ERNEST W. THIELE

The Bergius process for liquid fuels. H. W. STRONG. *Chem. Eng. Mining Rev.* 19, 449-50(1927).—A good brief description of the Bergius process, describing the raw materials, app., procedure, products, yields, etc.

ALDEN H. EMERY

Chemical decomposition of sphagnum by pressure hydrogenation. H. I. WATERMAN AND J. N. PERQUIN. *Brennstoff-Chem.* 9, 57-9(1928).—Earlier work (C. A. 20, 3560; 21, 1705, 4062) showed that pressure hydrogenation of cellulose at 450° converted the most of it into oil. Sphagnum moss was now treated and likewise converted mostly into oil. Parallel tests were made and material balances obtained. As in the berginization of bituminous coal, oils apparently entirely fluid at first contained visible colloidal ppts after several days' standing. The colloids were of asphaltic character. It is important in berginization to keep colloids dispersed by suitable oil media (e. g., Edelnau-extract). Otherwise, they will be pptd. on the container walls and form coke which is resistant to hydrogenation.

J. D. DAVIS

Conversion of methane into hydrogen and carbon monoxide. F. FISCHER AND H. TROPSCH. *Brennstoff-Chem.* 9, 39-46(1928).—Mixts. of methane with CO₂ and methane with coke-oven gas and coke-oven gas with water vapor were decomposed by various catalysts (Fe, Co, Ni, Cu, Mo and W) supported on clay, silica and MgCO₃ or mixed with Al₂O₃. Temps. 840 to 920° were used with various space velocities (throughput in cc. per hr. divided by catalyst vol. in cc.); the best space velocity for decompn. of oven gas-steam mixts. was 800. In no case was CH₄ completely decomposed. An example of good conversion of an oven gas-CO₂ mixt. at 860° is given by the following analyses of original gas and the products, resp.: CO₂ 18.0, 1.4%; heavy hydrocarbons 1.0, 0.0; O₂ 1.7, 0.2; CO 5.1, 33.2; H₂ 41.7, 56.6; CH₄ 19.0, 1.4; N₂ 12.9, 7.2. The catalyst was Ni supported on silica. Fe, Cu, Mo and W were poor catalysts. Co proved as good as Ni, contrary to the literature. Activity of Ni and

Co was increased by addn. of Al_2O_3 . Clay proved best as a carrier for active metals.

Producer gas. A. T. GRISENTHWAITE. *Fuel Econ. Rev.* 6, 26-9(1927).—A review for 1926. J. D. DAVIS
E. H.

Gas-producer operation. VICTOR WINDETT. *Proc. Eng. Soc. West. Penn.* 44, 11-46(1928).—W. reviews the operation of a Wellman-Seaver-Morgan Type L mech. gas producer, over a period of 2 yrs., compiling thorough records of gasification performance. The following data, among others, are of especial interest. Coal analysis: moisture 1.54, volatile 34.57, fixed C 55.63, S (in volatile) 1.06, ash 8.26. Ultimate analysis: C 76.31, H 4.97, O 7.89, N 1.51, S 1.06, 14,155 B. t. u. at 62° F. Av. gas analysis: CO 25.0, CH_4 2.27, C_2H_4 0.87, H_2 14.49, CO_2 4.69, O_2 less than 0.14, N_2 56.68, B. t. u. 153.9, air temp. 123.4° F., gas temp. 1395° F. Tables indicate only slight seasonal effect on operation, radiation representing only 4% of the total heat. The air blast temp. for max. calorific value of the gas (174 B. t. u. at 62° F.) was 125° F. and the gas temp. range from 1250° to 1450°, with a max. at 1390° representing 162.3 B. t. u. Rise in temp. above this point gives a slight rise in CO and decrease in CO_2 and a marked decrease in H_2 . Tables of heat balances show an operating efficiency of 88.3% for hot, raw gas and 69.64% for cold, washed gas. Discussion of the paper before the society is included. A. S. CARTER

A combined boiler and producer plant. CHARLES LONGENECKER. *Blast Furnace & Steel Plant* 16, 642-5(1928).—At the Sharon (Pa.) Steel Hoop Co., the 2 boilers and 4 producers are all housed under one centrally located roof, simplifying their care and operation. Labor and coal-handling costs have been cut. W. H. BOYNTON

The effect on the gas-making value of gas oil of its previous use for the removal of naphthalene from coal gas. H. H. THOMAS. *Gas J.* 182, 538-40(1928).—The spent oil may be used in the water-gas plant with results inferior to those from new oil. This is recommended as the most economical method for its disposal. The flash point must be detd. and new oil added to bring it above 72° F. F. S. GRANGER

Dry purification at the Berlin-Tegel gas works. CRONACHER. *Gas u. Wasserfach* 71, 390-1(1928).—Purifier practice is discussed. R. W. RYAN

Activity of purification oxide. S. DE JONG. *Het Gas* 48, 195-201(1928).—A review. B. J. C. VAN DER HOEVEN

Carbon-sulfur complex and carbon disulfide formation. W. J. HUFF AND J. C. HOLTZ. *Ind. Eng. Chem.* 20, 226(1927).—Polemical (cf. *C. A.* 22, 1228) H. L. O.

Variation of viscosity of tars with temperature. H. SPIERS. *Brennstoff-Chem.* 9, 77-9(1928).—Controversial with Mallison and Soltau (*C. A.* 22, 494) as to whether the formula $\log(C_1/C_2 = K(T_2 - T_1))$ proposed by S. (*C. A.* 21, 4052) gives the true relation between temp. and viscosity of tars. J. D. DAVIS

Review of coke-oven technology in 1926. G. F. FOXWELL. *Fuel Econ. Rev.* 6, 23-6(1927). E. H.

High-temperature carbonization in 1926. E. V. EVANS. *Fuel Econ. Rev.* 6, 18-23(1927).—A review. E. H.

Low-temperature carbonization. C. H. LANDER. *Fuel Econ. Rev.* 6, 16-8(1927).—A review. E. H.

Study of elements in coal carbonization. F. M. REITER. *Blast Furnace & Steel Plant* 16, 635-7(1928).—The distribution of the elements in the substances formed by distn. is outlined in tabular form and discussed. W. H. BOYNTON

Low-temperature carbonization. F. SCHWERS. *Chimie et industrie* 19, 583-8(1928).—A brief description of the installations and performances of Salerni low-temp. carbonization retorts at the Gand plant of the Centrales Electriques des Flandres (in a steam-elec. central power station using a high-volatile, caking coal), in the Zagreb district of Tzchecoslovakia (for the carbonization of a moist xyloid lignite), and at Resiutta (Frioul), Northern Italy (for the treatment of highly bituminous shale), bringing out particularly the attention which must be given to apparently insignificant details in order to obtain successful and efficient operation. A. PAPINEAU-COUTURE

The coking quality of bituminous coal and its determination. R. KATTWINKEL. *Teer u. Bitumen* 26, 245-7(1928).—A bibliographical review and discussion. In general, neither the total bitumen nor volatile is a criterion of the sintering quality on coking. This is associated, rather, with certain portions of the bitumen which are extd. by various solvents. With their extn. the coal loses its sintering ability, which it regains when they are returned to it. For detn. of relative coking quality, the Meurice method is recommended. One g. of powd. coal is coked with 17 g. of sand, and the crushing strength of the resulting cake is detd. by a suitable machine. K.'s app. for this purpose is described. F. S. GRANGER

The laboratory method for determination of yields of coke and by-products from coal. K. BRÜGGEMANN. *Brennstoff-Chem.* 9, 59-61(1928).—The lab. method involving 15-25 g. of sample proposed by Muschenbone (*C. A.* 21, 3122) is criticized. This method if carefully applied will give yields of coke gas and NH_3 agreeing closely with plant practice, but is very unreliable for detn. of tar and light oils. This is because coke oven heating conditions cannot be closely simulated in the small-scale test and, furthermore, accurate estn. of the very small amts. of tar and light oils recovered is impossible. J. D. DAVIS

The carburite process. FELIX BRAUNEIS. *Montan. Rundschau* 20, 253-6(1928).—The carburite process is a low-temp. distn. process for lignite and bituminous coals either yielding "carburite" when broken off after the exothermic decompn. of coal around 350° or "carburite coke" when continued to a more completely coked state of the coal. The coke has 200 to 400 Cal higher heating value than the carburite; the latter has 15 to 20% volatile, 6000 to 7500 Cal. heating value. The carburite tar is a low-temp. tar. The process consists of a preliminary drying out to 10 to 20% water and subsequent carbonization in a vertical shaft furnace externally heated by producer gas and continuously run. Figures are given on costs of a carburite plant using lignite with 50% water and on the probable yields. B. J. C. VAN DER HOEVEN

Color and free acid in coke-oven ammonium sulfate. H. SCHRAMM. *Brennstoff-Chem.* 9, 46-7(1928).—Color in the sulfate is caused mainly by metal carbonates, sulfides, and cyanides formed by corrosion of pipes leading to the saturator. These ppt. and mix with the salt when this is neutralized. Pyridine and amine compds. also contribute color. Free acid in the salt is best neutralized by gaseous NH_3 . J. D. DAVIS

Dry quenching of coke. WALTER SEYNNHAUSER. *Iron & Steel Eng.* 5, 184 9(1928).—A brief illus. description of the Sulzer system of dry quenching. Losses of sensible heat resulting from wet quenching are pointed out and the following advantages claimed for dry quenching: (1) steam generation from heat otherwise wasted, (2) better quality coke demanding a high price, (3) sometimes greater income due to higher proportion of coarse coke, (4) advantages in blast-furnace producer and water-gas plant operation, (5) reduction in transportation cost due to lower water content, and (6) reduction in maintenance costs, due to absence of wet corrosive quenching vapors. At present there are 12 plants in operation and 2 under construction. Discussion tended to discount some of the claims for dry quenching, as applied to American blast furnace practice, due to the usual addn. of some water in the furnace charge. W. H. B.

The firing of smelters from a central producer-gas plant (WEIDMANN) 9. Geology and oil and gas prospects of northeastern Colorado (MATHER, *et al.*) 8. Fuel requirements in iron and steel production (EVANS) 9. CH_4 and other hydrocarbons (as fuel in internal-combustion engines) (Brit. pat. 278,745) 10. Apparatus for separating benzene and water (U. S. pat. 1,671,115) 1. Apparatus and method for testing the tensile strength of gas mantles (U. S. pat. 1,672,077) 1.

HERBERG, GEORG: *Handbuch der Feuerungstechnik und des Dampfkesselbetriebes unter des Bericks der Wärmewirtschaft.* 4th revised ed. Berlin: J. Springer. 447 pp. Cloth bound M. 23.50.

GROSSMANN, HERMANN: *Moderne Methoden der Kohleverwertung. Ferngas u. Kohleverflüssigung.* Berlin: Polytechn. Buchhandlg. A. Seydel. 16 pp.

Taschenbuch für Gaswerke, Kokereien, Schwelereien und Teerdestillationen. Edited by Heinrich Winter. Halle (Saale). W. Knapp. 604 pp. Cloth bound, M. 7.20.

Distilling solid fuels in permeable layers by use of gases and steam. M. KULZINSKI. Brit. 278,740, Oct. 7, 1926. The hot gases circulate in a direction transverse to that of the movement of the fuel and are reheated before reentering the fuel; the distn. products and heating gases are passed from one cross-section of the fuel to the next in a heating chamber or tunnel.

"Fuel saver" composition for sprinkling on fuel. A. CIVIER. Brit. 277,864, Feb. 28, 1927. Water 30, NaCl 30, tallow 1 and waste thick machine oil 1 part are boiled together repeatedly and water 70 parts are then added.

Fuel for internal-combustion engines. E. G. E. MEYER. U. S. 1,671,158, May 29. Hydrocarbon fuels are mixed with ether and with a highly volatile basic material such as NH_3 . Cf. *C. A.* 22, 1671.

Liquid fuel. I. G. FARBERIND. A.-G. Brit. 278,341, Nov. 5, 1925. Alcs. such as MeOH are mixed with products, consisting mainly of liquid hydrocarbons, obtained by the destructive hydrogenation of coals, tars, or mineral oils, etc. *Gasoline or C_6H_6 may be added, or the destructive hydrogenation product may be added to various fuels to lower their f. p. and reduce knocking. Cf. C. A. 21, 3448.

Liquid fuel from coal and oil. F. LAMPLOUGH and A. E. HODGSON. Brit. 277,419, June 15, 1926. Finely divided coal is intimately mixed with a heavy mineral oil such as an asphaltic fuel oil and the mixt. is heated to 400–500° under pressure (suitably 100–600 lbs. per sq. in.) to prevent vaporization; undissolved ash may be sepd. by settling and the liquid product may be used as fuel or may be distd. to sep. hydrocarbon fractions. Superheated steam may be admitted to the material during the settling stage. An app. is described.

Liquid hydrocarbon. F. WINKLER, R. WIETZEL and E. LINCKH. Can. 276,832, January 3, 1928. Liquid hydrocarbons, of low b. p., are produced by subjecting carbonaceous materials to pyrogenic decompn. with H_2O vapor. The resulting gases contg. olefins are exposed to heat in the absence of materials giving rise to the sepn. of C.

Distilling coal with superheated steam. SYNTHETIC AMMONIA & NITRATES, LTD. AND R. E. SLADE. Brit. 278,577, Feb. 21, 1927. The dirty steam from the retort is cooled only to a temp. well above its dew point by oil or other suitable scrubbing agent in a packed tower so as to sep. oil without condensing the steam. The residual steam is directly used as a source of heat for generating fresh steam or may be compressed and superheated for reuse.

Destructive hydrogenation of coal, tar, etc. A. L. H. SPILKER, C. ZERBE AND GES. FÜR TREERVERWERTUNG. Brit. 277,974, Sept. 23, 1926. Materials such as coal, tar, pitch or hydrocarbons are cracked and hydrogenated by treatment with H in the presence of a small quantity of I or material capable of yielding I or HI at the temp. of the process (e. g., FeI_2 may be used). Temps. of 200–500° or higher and pressures of 50–200 atm. may be used. Examples are given of the hydrogenation of crude $C_{10}H_8$ and coal-tar pitch.

Carbonizing and gasifying powdered coal. W. E. TRENT (to Trent Process Corp.). Brit. 277,660, Sept. 14, 1926. Carbonized coke particles are obtained by slowly heating pulverized coal to below its fusion point to promote a max. evolution of volatiles before a fusion temp. is reached, and then raising the temp. without causing agglomeration of the particles. Heating flues or heating rods may extend through the charge of material and air or steam may be supplied for gasification, or the powd. coke obtained may be gasified in a sep. producer. An app. is described.

Utilizing anthracite coal dust and like fuels in steam boiler and gas-producer furnaces. F. G. BREYER (one-half to J. A. Singmaster). U. S. 1,672,405, June 5. Fuel for use on continuous travelling grates is formed by loosely compressing the fuel dust into adhering particles which are fed directly to the furnace. An app. is described.

Fuel of coal dispersed in oil. W. E. TRENT (to Trent Process Corp.). Brit. 277,659, Sept. 14, 1926. Finely divided coal may be mixed with benzene, alc. or a petroleum oil and heated to about 400° under pressure while agitated.

Retort construction for low-temperature distillation of coal, etc. D. BRETHERICK and G. J. GLOSSOP. Brit. 277,819, Jan. 5, 1927.

Vertical retort apparatus for distilling comminuted wood, peat, coal or similar materials. F. E. HOBSON and J. F. SHELTON. U. S. 1,672,860, June 5.

Retort (with superposed annular carbonizing chambers) for carbonizing coal or similar materials. J. PLASSMANN. U. S. 1,671,448, May 29.

Conversion of carbonaceous substances. C. KARUCH and M. PIER. Can. 276,834, January 3, 1928. Carbonaceous liquids are converted into more valuable compds. by subjecting such liquids to a heat treatment in the presence of catalysts, and passing the resulting products in the vapor state and under a high pressure over catalysts.

Apparatus for cracking, catalyzing and hydrogenating carbonaceous materials. A. E. BIANCHI and G. GUARDABASSI. Brit. 277,404, June 8, 1926. An app. for treating oils, tar, naphtha, schists, ground coal and like materials at atm. pressure comprises a series of heated troughs provided with agitators for agitating material passing through the troughs; the latter are also provided with reticulated screens from which chains depend which may be vibrated by the revolving agitators. The chains and other parts of the app. contacting with the vapors may be coated with a catalyst such as reduced Ni, MgO, Fe oxide, Cu oxide or other suitable metal oxide mixed with silicate jelly or Ni oxide or nitrate or powd. glass may be incorporated with a suitable varnish or thin gummy substance. Various other structural details are described. The process is particularly adapted for carrying out the process of Brit. 278,041, according to which

the chains serve to retain in the reaction chamber dust and C formed by decompn. of vapors of the carbonaceous materials under treatment, and H may be used for hydrogenating with N_2 as a catalyst or removal of H may be effected by a catalyst such as Mg or Fe oxide.

Distributing valve for heating and distilling carbonaceous materials by gas currents. L. MOURGEON. Brit. 277,726, May 21, 1926. Structural features.

Apparatus for supplying oxygen to combustion chambers. A. O. HIGGINBOTHAM. U. S. 1,672,316, June 5.

Combustion apparatus for supplying a continuous stream of combustion gases. H. JEZLER. Brit. 277,957, Sept. 23, 1926.

Heating air supplied to furnaces by mixing it with hot combustion products of the furnace. W. H. BADAMS and J. FORGAN-POTTS. Brit. 278,549, Dec. 10, 1926. An app. is described.

Gas. A. E. BOURCOUD. Can. 276,732, January 3, 1928. In the production of a highly combustible gas, atomized carbonaceous fuel is gasified by suspending it in an oxidizing gaseous medium contg. a higher concn. of O_2 than air and also contg. H_2O in atomized form, the concn. of atomized carbonaceous fuel in the commingled suspension being substantially equal to the theoretical amt. of C which would be required to convert all of the O_2 present in either free or combined form into CO.

Gas. A. E. BOURCOUD. Can. 276,733, January 3, 1928. Atomized carbonaceous fuel is gasified to form a reducing gaseous mixt. by bringing such atomized fuel into intimate contact with a blast of air at normal temp. to form a suspension of such fuel in the air. The suspension thus formed is sent into a reaction chamber contg. air enriched with O_2 , such air being preheated to a temp. sufficient to supply the necessary heat to take care of radiation and other losses to enable the desired endothermic reaction to take place with a max. production of CO and a min. production of CO_2 .

Gas making. H. R. BERRY. U. S. 1,672,052, June 5. One of 2 beds of solid fuel is brought to incandescence by an air blast and the heat thus produced is utilized for distg. volatiles from the fuel of the second bed; the volatiles thus produced are conducted away from the combustion zone of the first bed, the air blast into the first bed is discontinued and, with air excluded, steam is delivered together with the distd. volatiles mentioned into the first fuel bed to produce a combustible gas. An app. is described.

Gas-making apparatus. WOODALL-DUCKHAM (1920), LTD., E. W. SMITH and T. C. FINLAYSON. Brit. 278,486, Aug. 25, 1926. Duplicated app. is provided for treating with liquor the gases generated in each retort of a plant comprising a plurality of continuously operated retorts, one or more of which may be used for the production of water gas as described in Brit. 253,702 (C. A. 21, 2552). Various structural details are described.

Carbureted water gas. C. W. ANDREWS. U. S. 1,672,109, June 5. In producing mixed carbureted water gas and coal gas, carbonized residue is air-blasted to heat it, the blast gases are carried off through a heat-absorbing structure surrounding a coking retort, steam is passed into the heated residue to generate hot water gas, the latter is further heated in the structure heated by the blast gases, and the hot water gas is passed through coal in a sep. coking retort to coke and distil coal in the retort; enriching material is added to the mixed water gas and coal gas and the mixt. of gases is passed through a cracking and fixing chamber at a temp. to effect efficient cracking of the enriching medium, which may be tar or oil. An app. is described.

Scrubbing gas. SOC. DU GAZ DE PARIS. Brit. 278,700, Oct. 11, 1926. Successively to remove HCN and H_2S by a mixt. of a ferrous salt soln. and milk of lime, the treatment is carried out in 2 stages and liquid for the second stage is intermittently regenerated by exposure to air. Fe_2O_3 and S are formed and may be sepd. as required.

Recovery of sulfuric acid from waste acids. Firm of C. STILL. Brit. 277,619, Sept. 20, 1926. Material such as acid tar obtained in purifying benzene with H_2SO_4 is heated with a concd. soln. of $(NH_4)_2SO_4$; residual benzenoid hydrocarbons are vaporized and resins sep. out as a floating fused mass which on cooling hardens into a cake which can be removed. The sulfate liquor contg. the H_2SO_4 is used in an NH_3 saturator to form $(NH_4)_2SO_4$. The sepd. resins may be admixed with coal tar to increase its pitchy content or may be distd. together with coal.

Coking coal to obtain an improved tar. S. W. PARR and T. E. LAYNG (to Urbans Coke Corp.). Brit. 277,955, Sept. 21, 1926. An improved tar contg. a high proportion of cresylic and tar acids is obtained from coal which is first heated close to the crit. temp. at which it becomes plastic (about 300°) and then heated so that it

passes quickly through the pasty stage and up to a temp. of 650–850°. An app. is described. Cf. C. A. 22, 156.

Calcing coke. V. C. DOERSCHUK and F. C. FRARY (to Aluminum Co. of America). U. S. 1,671,673, May 29. In a continuous process for calcing a large vol. of coke, a vertical column of coke of elongated cross-section is passed downwardly and an intermediate portion of the column is heated by passing an elec. current through it in the direction of its major axis. An app. is described. Cf. C. A. 22, 1286.

Coke-oven construction and operation. J. BECKER and J. VAN ACKEREN (to Koppers Co.). Brit. 278,012, Sept. 27, 1926. During the charging of high-chambered regenerative coke ovens, forced draft is applied to the gas or smoke offtake on both sides of each charge which is entering an oven and pressure above that of the atm. is maintained in the gas collecting system of the battery of ovens. Various other details of operation and construction are described.

Coke-oven or retort door construction. STETTINER CHAMOTTE A.-G. VORM. DIDIER. Brit. 278,269, April 9, 1927.

Firing system for heating coke ovens and like apparatus. H. KOPPERS (to Koppers Development Corp.). U. S. 1,671,194, May 29.

Retort oven construction. H. KOPPERS (to Koppers Development Corp.). U. S. 1,671,195, May 29.

Apparatus for removing coke from vertical retorts. F. J. WEST and E. WEST. U. S. 1,672,442, June 5.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

A brief quality survey of California natural gasoline on the basis of Engler curves. R. W. GARMAN. *Petroleum World (Los Angeles)* 12, No. 12, 146–7, 152, 154, 156, 158, 160 (1927); cf. C. A. 22, 681.—Report of Specifications Committee of California Natural Gasoline Association. M. B. HART

Unusual type of crude oil found in Wyoming. H. L. KAUFFMAN. *Oil Weekly* 48, No. 13, 108, 110 (1928).—Simpson Ridge (Wyo.) crude oil has the characteristics of Gulf-Coastal crude, having 22° gravity (A. P. I.). A 15,000-cc. fire and steam distn. gave the following results: gasoline blending naphtha (47.2° A. P. I.) 3.6%; gas oil (29.9° A. P. I.) 27.2%; lubricating oil (22.9° A. P. I.) 48.6%; bottoms (15.2° A. P. I.) 20.0%. M. B. HART

Handling Winkler County crude oil. GEORGE REID. *Refiner Natural Gasoline Mfr.* 7, No. 3, 92, 94 (1928).—Winkler County (West Texas) crude oil is no more corrosive or difficult to handle than Smackover or Panhandle crude oils. Straight-run gasoline is acid treated with 8–10 lbs. 66° H₂SO₄ per bbl. Pressure distillate is treated with 10 lbs. 66° H₂SO₄, neutralized with caustic and charged to the rerun still battery. Anhydrous ammonia is introduced into the vapor line to render the gasoline slightly alk. and the gasoline so treated is given a 4° Bé. caustic wash to finish. The gasoline from the Liberty Oil Co. plant is 53° A. P. I. and is treated by a caustic wash and doctor treatment. At the Chalmette Petroleum Corp. plant 16° caustic is charged to the stills with the crude oil. M. B. HART

The composition of products obtained by the petroleum synthesis. F. FISCHER AND H. TROPSCH. *Brennstoff-Chem.* 9, 21–4 (1928).—The compn. of gases (gasols) varied with the catalyst and conditions of the expt. A gas obtained with a Fe-Cu catalyst showed the following compn. by condensation analysis: C₂H₄ 42.5, C₃H₆ 19.5, C₄H₁₀ 2.0, C₂H₂ 6.0, C₄H₂ 21.0, and C₄H₆ 9.0%. Benzene, b. 60° to 185°, recovered by adsorption in active charcoal and steaming out at 250° contained 30% paraffins, for the most part octane, nonane, and isononane, which were positively identified. The remaining 70% of the benzene were olefins. There were no diolefins present. Heavier products were examd. only for unsatn. by the Wijs I method. The degree of satn. could be varied by varying the catalyst or exptl. conditions; e. g., doubling the gas space-velocity increased the unsatn. of the oil 3 times. Water-sol. oxygenated products (aldehyde and acetone) amounted to 2% of total products recovered. There was no trace of compds. of ring structure found. All products could be converted into paraffins by hydrogenation in contact with Ni. The mechanism of the catalytic petroleum synthesis is discussed. J. D. DAVIS

Clays—and their application in refining. GEO. W. CUPITT, JR. *Refiner Natural Gasoline Mfr.* 7, No. 4, 69–71 (1928).—A discussion of the general practice in burning,

testing, and regenerating fuller's earth. The use of magnesite in distn. of oil produced a clear oil having a lower Conradson carbon content, a fine lace formed by steaming, and a S content about $1/2$ that of oil distd. without the use of clay. The action appears to be an actual prevention of discoloration perhaps by the action of CO_2 formed.

M. B. HART

Advancement in refinery technology. WALTER MILLER. *Oil & Gas J.* **26**, No. 41, 121, 196(1928).—A survey of 1927 developments.

M. B. HART

Knocking characteristics of gasolines. H. K. CUMMINGS. *J. Soc. Automotive Eng.* **22**, 448-57(1928); cf. *C. A.* **22**, 1674.

M. B. HART

Methods of measuring detonation. NEIL MACCOULL. *J. Soc. Automotive Eng.* **22**, 457-67(1928).—An attempt to correlate measurements of the antiknock values of gasolines as detd. by 10 labs. has for its chief object the detn. of the effect of volatility on antiknock value in multi-cylinder as compared with single-cylinder engines. The results are shown in tables and charts.

M. B. HART

News of the cracking industry. LEOPOLD SINGER. *Petroleum Z.* **24**, 175-93 (1928).—A review containing 203 references.

M. B. HART

Flash system aids cracking operation. C. O. WILLSON. *Oil & Gas J.* **26**, No. 47, 140-1(1928).—The Dubbs process is applied at the Derby Oil Co.'s Wichita plant so that a flash still is positioned to receive residuum from the reaction chamber. Yields claimed are gasoline 10%, fuel oil 32%, coke 1%, loss 8-9%.

M. B. HART

Cracking investigation by the Dubbs process by distillation of Hannover petroleum. RICHARD HEINZE. *Petroleum Z.* **24**, 237-41(1928).—Gas oil (gr. 0.846) from a normal distn. of Hannover crude, and a 50% (by vol.) residue (gr. 0.968) from the same crude were cracked by the Dubbs process at various pressures.

M. B. HART

Simplification of oil-testing procedures. H. SCHLÜTER. *Chem.-Ztg.* **52**, 367 (1928).—The use of measuring bulbs for the Engler viscometer with two marks ("to contain" and "to-deliver") is recommended, and changes in the wording of the official (German) directions are suggested. Such vessels could be used both for calibrating and making actual tests with viscometers.

W. C. EBAUGH

Fluorescence of low-temperature distillation products of oil shales. W. WITTLICH. *Brennstoff-Chem.* **8**, 309-10(1927).—Oils distd. from Estonian and Manchurian shales were dild. with CaH_2 and studied for fluorescent colors under light from a quartz lamp. Characteristic differences were observed. One Estonian distillate gave colors, light bluish green mixed with violet changing to light blue (like benzidine); another gave grayish violet (first light, then dark) to blue, then light green. Manchurian oil was first grayish violet changing to bluish violet, to violet then blue and finally greenish blue. Phenols, neutral oils, carboxylic acids and light oils sep'd from the crudes also gave characteristic colors. With all the higher fractions (up to 500) the color was blue in various shades.

J. D. DAVIS

Oil shales and their distribution in Tyrol. GUIDO HRADIL. *Petroleum Z.* **24**, 87-100(1928).

M. B. HART

Pressure of paraffin wax and other oil products at various temperatures and constant volume. L. SELSKII. *Azerbeydj Neft. Khos* **1928**, No. 4, 69-73.—In the thermodynamic equation $dt = [AT(\sigma - S)/S]dp$, t is temp., T absolute temp., p pressure, A thermic factor of work $1/426$, S latent heat of change from solid to liquid state, σ specific vol. of the liquid phase, S specific vol. of the solid phase of the melting material. For paraffin wax ($\sigma - S$) is positive, for water negative. Therefore, by increasing the pressure the m. p. is raised. Small increases in temp. increase the vols. greatly. This has been proved by the following expts. An autoclave to withstand a pressure up to 270 atm. was used. It was filled with paraffin wax and all air pockets were eliminated; the tube connecting the gage was filled with a semiliquid paraffin solar oil. For paraffin wax the following data were obtained. At 24°, pressure 0 atm.; 31°, 30 atm.; 38°, 140; 45°, 200; 46°, 250, 1.3% solid paraffin wax released; 55°, 270 atm., 1.58% semi-solid paraffin wax released; 59°, 250 atm., 1.44% semiliquid paraffin wax released; 63°, 250 atm., liquid paraffin released (1.6%); 65°, 260 atm., 1.7% released; 71°, 250 atm., 1.64% released; 86°, 250 atm., 1.75% released. After each release of paraffin wax the pressure dropped to 0. The temp. of the wax was measured with a thermometer inserted in a pocket in the autoclave filled with oil. The temp. in the autoclave was 2° below that of the water bath. Similar expts. were carried out with 2 parts by wt. of paraffin wax m. 54° and one part of gasoline d. 0.775 (the mixt. m. 45°); paraffin mazout f. p. 32°; semi-paraffin mazout f. p. 17°; kerosene d. 0.809. Check runs were made with H_2O up to 95.5°. Amara's table for H_2O agrees with this expt. only at lower temps.; this is probably due to defective app. used by S. for his expts.

A. A. BOERTLINGER

Transformer oils. MAURICE VAN RYSELBERGE. *Federation des industries chimiques de Belgique* 7, 149-78(1928).—A technical review with special reference to the artificial aging of oils. A. L. HENNE

Testing of the sludging tendencies of transformer oils. F. BEUVELOT. *Bull. soc. alsac. const. mécan.* 5, 60-76(1927); *Chimie et industrie* 19, 661(1928).—After a discussion of the constitution of transformer oils and the factor affecting the sludging test, B. recommends using an oil bath electrically heated to $150 \pm 0.2^\circ$, provided with a small agitator and covered with an atm. of CO_2 . It contains 3 receptacles (Union des Syndicats de l'Electricité type) each contg. 18 Pyrex tubes 15 mm. in diameter by 150 mm. deep and filled with oil to a depth of 105 mm. The sludge formed is detd. as usual. A. PAPINEAU-COUTURE

Continuous treatment of lubricating oils with ammonia for neutralizing. D. F. GERSTENBERGER. *Nat. Petroleum News* 20, No. 15, 111-2(1928).—In a continuous lubricating-oil-treating plant, heated oil and 16° acid are passed together through a mixing column and into the first of a series of agitators, oil from the first agitator overflowing into the next, while the acid settles into a cone at the bottom. The acid-treated oil is washed in the final agitator and ammonia is introduced and the oil blown bright. Where NaOH is used for neutralizing, a small amt. of oleic acid may be added to help break up any emulsion which may be formed. M. B. HART

Refining lubricating oils. P. TRUESDELL. *Nat. Petroleum News* 20, No. 16, 61-3(1928).—The Marland Refining Co.'s procedure in the manuf. of lubricating oils is described. M. B. HART

Notes on the dry distillation of lignin from beech, oak, and birch woods. G. SZELENYI AND A. GÖMÖRY. *Brennstoff-Chem.* 9, 73-7(1928).—Abundant data are found in the literature on distn. products yielded by lignins from soft woods such as pine, fir and aspen, but few are available on hard woods. The authors prepd. lignins from oak, birch and beech by first removing resins through extn. with $\text{EtOH}-\text{C}_6\text{H}_6$ and then hydrolyzing cellulose with HCl of 1.225 sp. gr. These were dry-distd. in Jena glass to 530° and the yields of products detd. The content of methoxyl was detd. for lignin and its distn. products, that recovered in the latter being about 10% of the total in the lignin which contained 15% methoxyl. Yields from the hard woods were all of the same order. Those from oak were 2.98, 1.29, 1.47, 0.21 and 53.0% resp. for tar, AcOH, MeOH, Me_2O and residue. Corresponding figures reported in the literature for fir lignin are: 13.33, 1.26, 0.83, 0.18 and 45.7. J. D. DAVIS

Critical study of the analysis of Bordeaux spirits of turpentine by the increase in temperature on mixing with sulfuric acid. (Miss) MARCELLE BARRAUD. *Bull. inst. pin* No. 47, 73-6(April 15, 1928); *Chimie et industrie* Special No. 565-7(April, 1928).—Excessive breakage of the flask due to the considerable rise in temp. can be avoided by using a small Dewar flask made of Pyrex glass. The rise obtained with freshly made spirits of turpentine and H_2SO_4 ($d_{18} 1.72$, contg. 79% H_2SO_4) is const. with products of the same origin, but increases very rapidly with aging of the turpentine (increased from 110.5° when freshly made to 142.5° after 30 days' exposure to the atm.). Addn. of 10% white spirit can therefore easily be passed unnoticed in the case of oxidized products. The first 20% fraction obtained on distg. spirits of turpentine gives a fairly const. rise, irrespective of whether or not the sample is oxidized, never falling below 113° , so that it can readily detect an addn. of as little as 2.5% white spirit, particularly when comparing the rise of the original sample and of the head fraction. The following increases were observed with pure products: spirits of turpentine consisting essentially of α - and β -pinene alone (*P. maritimus*, Aleppo pine, American turpentine, Austrian black pine) 115.5 - 116.5° ; spirits of turpentine consisting essentially of pinene and carene (*P. sylvestris*, *P. longifolia*) 108.5 - 110° ; redistd. terpinolene 86° ; spirits of turpentine consisting essentially of limonene (*P. pinea*) 91° ; redistd. Swedish pine oil 78° ; French pine oil 71.5° . A. PAPINEAU-COUTURE

The nature of the dextrorotatory constituent of the tail fraction of Bordeaux spirits of turpentine. G. DUPONT AND (Miss) M. BARRAUD. *Bull. inst. pin* No. 45, 76-7 (April 15, 1928); cf. D., C. A. 16, 4339-40.—The constituent is shown to be *d*-limonene, identification of which is complicated by the presence of a large proportion of dipentene. A. PAPINEAU-COUTURE

Geology and oil and gas prospects of northeastern Colorado (MATHER, et al.) 8. Desulfurizing action of SiO_2 gel and the failure of the lamp for determination of S in oils in the presence of mercaptans (WATERMAN, TUSSENBROEK) 7. Petroleum at Martinique (BARRABÉ) 8. Apparatus for distilling oils (Brit. pat. 277,952) 1. Filter for

gasoline (Brit. pat. 278,099) 1. Apparatus for cracking, catalyzing and hydrogenating carbonaceous materials (Brit. pat. 277,404) 21. Filter for oils (U. S. pat. 1,671,958) 1.

CROSS, ROY: **Handbook of Petroleum, Asphalt and Natural Gas.** Revised and enlarged. Kansas City, Mo.: Kansas City Testing Laboratory. 830 pp. Library ed. \$7.50; Pocket ed. \$10.

Cracking hydrocarbons. H. J. JANSEN. U. S. 1,672,459, June 5. The material to be cracked is passed in an extended horizontal path through molten Pb with an overlying layer of $ZnCl_2$; vapors and suspended C are sepd. from the materials. An app. is described.

Catalytic cracking of heavy hydrocarbons. F. ERLBACH (one-fourth to Sinclair Refining Co.). U. S. 1,671,573, May 29. Cracking is effected by heating to a cracking temp. in a still contg. a body of catalytic material such as activated C which extends across the still and divides the liquid body into 2 portions; liquid is withdrawn below the catalytic body and returned above it so that it circulates through the catalyst. An app. is described.

Cracking hydrocarbons by passing them through molten lead covered by molten zinc chloride. H. J. JANSEN. Brit. 278,235, Feb. 7, 1927. An app. is described in which the material treated passes horizontally through the molten metal. C formed is carried away with the other materials.

Cracking hydrocarbon oils. C. B. BUEGER (to Gulf Refining Co.). U. S. 1,672,801, June 5. In a cracking process in which pressure-still tar or residuum tends to clog the draw-off line, the latter is intermittently treated with a solvent such as gasoline or solvent naphtha which is forced through the line in reverse direction to that of usual flow. An app. is described.

Apparatus for cracking hydrocarbon oils. F. W. WELLMAN. U. S. 1,672,668, June 5. A vertical retort is provided with a discharge for taking off vapors near its top and with a draw-off for residuum and an oil supply at different points near its bottom, the connections to which may be reversed.

Apparatus and system for cracking oils. W. J. PERELIS. Brit. 277,983, Sept. 23, 1926. A stream of a petroleum oil is subjected, while under turbulent flow in a tubular heater, to increase, decrease and increase of temp. in succession while the pressure is correspondingly decreasing, increasing and decreasing. An app. is described.

Fractionating hydrocarbon oils. W. K. LEWIS and A. A. WELLS (to Standard Oil Development Co.). U. S. 1,672,849, June 5. In sepg. kerosene hydrocarbons from a gas oil distillate, vapors are bubbled through progressively cooler zones counter-currently into washing contact with condensate produced by the cooling of the vapors further along the course, while maintaining an operating pressure of about 30 mm. Hg.

Conversion of hydrocarbons. H. NIELSEN (one-half to B. LAING). U. S. 1,672,081, June 5. Hydrocarbons such as CH_4 (to produce formic acid) are passed in gaseous form over a Cu suboxide at a temp. of 250–800°.

Catalytic conversion of heavy into lighter hydrocarbons. L. EDELEANU (to Allgemeine Ges. für chemische Industrie). U. S. 1,671,517, May 29. Mineral oils (such as a Calif. gas oil) are mixed with liquefied SO_2 , undissolved constituents are sepd. and $AlCl_3$ is dissolved in the latter at temps. below the conversion point (suitably at a temp. of about 30–90°) to obtain a material which is suitable for use as a catalytic converting agent.

Catalytic conversion of hydrocarbon oils into products of lower boiling point. G. I. PRICHARD and H. HENDERSON (to Gulf Refining Co.). U. S. 1,672,339, June 5. Oils such as gas oil are distd. in the presence of anhyd. $AlCl_3$, used $AlCl_3$ is withdrawn when its activity is partially spent and the withdrawn material is heated and the volatile products of this heating are passed into the vapor space above the mixt. of oil and $AlCl_3$ in the conversion chamber. An app. is described.

Refining hydrocarbon oils. J. R. NELLER and G. M. VANCE (to Texas Co.). U. S. 1,672,621, June 5. Color-stabilization of an acid-treated and neutralized oil is effected by washing it with a relatively small quantity of alc. alkali soln. to remove potential color-forming substances.

Purifying and fractionating mineral oils. AKT.-GES. FÜR KOHLENSÄURE-INDUSTRIE and E. B. AUERBACH. Brit. 277,946, Sept. 25, 1926. Petroleum or its fractions are treated with liquid CO_2 ; e. g., crude paraffin oil or spindle oil or motor lubricating oil may be treated with 5 times its quantity of liquid CO_2 in a steel receptacle, the soln. sepd. and the CO_2 vaporized.

Bituminous composition. L. KIRSCHBAUM. Can. 276,936, January 10, 1928. An infusible compn. comprises a major portion of a normally fusible bitumen pitch type base and a minor portion of bentonite.

Agglomerating bituminous shales. PATENTAKTIEBOLAGET GRÖNDAL-RAMEN. Brit. 278,378, Oct. 2, 1926. Balls or nodules suitable for distn. or for use as fuel are formed by partial drying in a rotating drum of a mixt. of grains of material crushed to about 10 mm. with about 23% of water (about 18% of which may be left in the agglomerate).

Digestion of bituminous shale. H. D. RYAN. U. S. 1,672,231, June 5. Ground bituminous shale or similar material is digested with a hydrocarbon oil such as a heavy shale oil fraction at a temp. (suitably about 315–370°) sufficiently high to liquefy the shale bitumens; vaporization is limited to obtain a final product or digestion mixt. which is fluid, and residual solids are sepd. from the mixt.

Tunnel oven with travelling grates for distilling oil shale. PATENTAKTIEBOLAGET GRÖNDAL-RAMEN. Brit. 278,694, Oct. 7, 1926. Steam may be used to assist the distn.

Oil and alcohol emulsions. J. KIRSCHNER. Brit. 277,357, Sept. 9, 1926. Stable emulsions of mixts. of mineral oils or their distillates and alc. are treated with nascent H (which may be generated by adding oxalic or formic acid or HCl and bringing into contact with metals such as Ni and Pb or Zn while heated) in an app. which is described. Emulsions for use as motor fuels, detergents, treating leather or for other purposes may be thus prepd.

Apparatus for sulfonating oils. A. HORWITZ. U. S. 1,671,586, May 29. An oil tank is provided with a cooling coil and with an agitator operated by a shaft extending through the bottom of the tank; main and supplemental acid tanks are mounted above the oil tank with a valved connection between the acid tanks, and a plurality of discharge nozzles supply acid from the supplemental acid tank to the oil tank.

Nitrogenous-base oils from hydrocarbon materials. H. K. IHRIG (one-half each to Sumner E. Campbell and to Associated Oil Co.). U. S. 1,671,721, May 29. Hydrocarbon material such as a Calif. petroleum oil or distillate is treated with liquid SO₂ to sep. an oil ext. contg. impurities including the nitrogenous compds. originally present in the raw material; this ext. is then treated with a reagent such as 25% H₂SO₄ soln., which will combine with the nitrogenous compds. and the latter are sepd., *e. g.*, by adding excess of alkali and distg.

Preventing sludging of oils used for insulating electric transformers. D. C. COX (to British Thomson-Houston Co., Ltd.). Brit. 278,365, Sept. 28, 1926. A body of fullers' earth is immersed in the oil. Cf. C. A. 22, 1848.

Oil gas generator. E. BECKER and BECKER OIL GAS, LTD. Brit. 278,478, Aug. 12, 1926. Oil is injected through a nozzle into a rotating conical vessel.

Liquid fuel. M. MULLER-CUNRADI and W. WILKE. Can. 276,831, January 3, 1928. A liquid fuel contains between 2% and 1/10 of 1%, by wt., of a metal carbonyl compd., such as iron carbonyl.

Filter for gasoline, etc. SOC. ANON. DES NOUVELLES INVENTIONS MECANIQUEES ET ELECTRIQUES. Brit. 278,349, Sept. 30, 1926.

Filters for gasoline, etc. E. F. PIERCE (to Bassick Mfg. Co.). U. S. 1,671,606–7, May 29.

Mineral lubricating oils. M. L. CHAPPELL, G. J. ZISER and E. L. MOYER (to Standard Oil Co. of Calif.). U. S. 1,672,304, June 5. After acid treatment of the oil and removal of the sludge thus formed, the oil is repeatedly treated with a soln. of an alkali such as NaOH contg. over 90% by vol. of EtOH and sepd. from the mixt. by gravity.

Purifying used lubricating oils from internal-combustion engines. W. A. STREET and H. HEY. Brit. 278,434, July 6, 1926. The used oil is dild. with a volatile solvent such as gasoline, water and solids are pptd. by adding any of the sulfonated oils or fatty acids or their soaps described in Brit. 176,540 (C. A. 16, 2377), the sepd. oil is treated with concd. H₂SO₄ to ppt. deteriorated oil as acid sludge, and the oil is neutralized, sepd. from the volatile solvent added and decolorized. Numerous details are given.

Lubricants for fibrous materials, etc. A. E. BECKER and DEV STONAKER (to Standard Development Co.). Brit. 277,637, Sept. 14, 1926. A lubricant suitable for use on fibers such as those of artificial silk consists of a hydrocarbon lubricating oil contg. a small proportion of a water-sol. soap such as Na stearate or oleate.

Lubricants for fibers and threads. G. ZEMMERLI. Brit. 277,649, Sept. 16, 1926. A water-free neutral mixt. is formed of liquid petrolatum or paraffin oil or the like and a wetting material such as hydrogenated phenols, hydrogenated naphthalenes or hydrogenated terpenes.

Lubricants suitable for use in apparatus for condensing benzene and like hydrocarbons from gaseous mixtures. GES. FÜR LINDE'S EISMASCHINEN A.-G. Brit. 277,378, Sept. 13, 1926. Lubricants, suitable for app. in which benzene and like hydrocarbons are condensed by expanding cooled compressed gases, contain a substance of low vapor pressure, a substance of high lubricating power and low point of solidification and a substance which is a solvent for the ice, C_6H_6 , $C_{10}H_8$ and other substances condensed as solids; e. g., a mixt. of "ice-machine oil" 1 and toluene 1 part and another mixt. of equal quantities of toluene and ethylene glycol may be fed into the app. through sep. inlets. Xylene, petroleum, decahydronaphthalene, a ketone, isopropyl alc. and other alcs. may also be used in various mixts.

Metallizing bituminous and other surfaces. A. I. G. WARREN and PRECIOUS METAL INDUSTRIES, LTD. Brit. 278,437, July 7, 1926. The process described in Brit. 196,063 (C. A. 17, 3809) for producing metal surfaces on rubber contg. S by first producing a sulfide coating and then reducing the sulfide by electrolysis or otherwise is applied to tarry or bituminous compns. contg. S, e. g., to a compn. comprising asphalt, wood pulp and slate dust; and may also be applied to metallic bodies contg. S such as articles of Spence's metal.

Candle. J. MORCZEWSKI. U. S. 1,672,463, June 5. Paraffin 87 is used with oil of wintergreen 1, kerosene 1, aq. NH_3 8, glycerol 1 and banana oil 2%. Various perfumes may be added.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Paper qualities in the government service. W. HOLWECH. *Tids. Kemi. Bergevesen* 7, 1-5(1927).—A committee has studied the measurements which might be taken for securing uniform and appropriate qualities in paper purchased for use in the Norw. government offices. The article contains an abstract of a report on the exams. carried out in order to establish efficient and reliable chem. and phys. testing methods. No substantially new methods are suggested.

Paper industry of Canada. SIGURD STECHMEST. *Papir-Journalen* No. 18, 225 (1927).—A review of the development of the newsprint industry in Canada, with tables showing mfg. costs.

History of sulfate pulp manufacture. L. J. DORENFELT. *Papir Journalen* No. 21, 268(1927).—A detailed account of European practice, with a translation of C. F. Dahl's "Vorschriften für die Cellulosefabrikation" as given to the author in 1884.

Proposed standard method for strength testing of unbeaten pulp. O. M. HALSE, KR. MORCH, A. BORRESEN and S. SAMUELSON. *Papir Journalen* No. 21, 266(1927).—A criticism of the T. A. P. P. I method, proposed by the Association of American Wood Pulp Importers as an international standard method. The Norwegian committee recommends that acceptance of the method as an international standard be deferred until Scandinavian mills have thoroughly proved its usefulness and reliability. More definite information is required as to (1) whether the method is for control or specifications or both, (2) whether wet or dry pulp is to be used and if the latter, what time of wetting is to be allowed before testing, (3) what types of pulp does the method apply to, (4) more specific details of procedure in sheet formation, and (5) duplicability of results on the same pulp in various mills and countries.

Furfural and carbon dioxide from wood before and after chlorination. G. J. RITTER and L. C. FLECK. *Ind. Eng. Chem.* 20, 371-3(1928).—During the chlorination used for isolating cellulose from wood, no furfural-producing compds. are formed; a considerable amt. of CO-yielding material is formed which differs from oxycellulose by the facts that it dissolves in sulfite and yields no furfural. Most of the CO-yielding material is formed during the first chlorination, when 56.6% of the unstable pentosans are rendered sol. in sulfite. CO equiv. to 0.86% is liberated from the original wood by boiling HCl. There is no formation of oxycellulose during the analysis by the chlorination method.

Apparatus for drying paper (U. S. pat. 1,671,493) 1. **Apparatus for casting solutions of celluloid into sheets** (U. S. pat. 1,672,403) 1.

Preliminary treatment of cellulose to be converted into various derivatives. W. KERSHAW, F. L. BARRETT and BLEACHERS ASSOCIATION, LTD. Brit. 277,722, April

23, 1926. Low-grade cotton waste, flocks, linters or the like is boiled with caustic alkali, bleached with hypochlorite liquor, further boiled with caustic alkali, rinsed and dried, and may be then subjected to an addnl. bleaching treatment.

Cellulose derivative. W. H. GLOVER and C. DIAMOND. Can. 277,024, January 10, 1928. Cellulose derivs. are produced by treating an ethylcellulose, which is insol. in H_2O and in dil. alkali and in the common org. solvents, with an acetylation agent contg. Ac_2O .

Coloring "soluble cellulose." E. C. DESTUBNER. Brit. 277,989, Sept. 23, 1926. Material for use in the manuf. of lacquers, enamels or celluloid or similar products is colored with a colloidal soln. of a pigment so that the latter is deposited on the cellulosic compn., e. g., by use of a pptg. agent after admixt. with the colloidal prepn. of the coloring agent. Numerous examples are given.

Sizing cellulosic materials. L. BRADSHAW. U. S. 1,672,705, June 5. A sizing suitable for use on paper is prepd. with peanut meal and casein.

Treating regenerated celluloses. I. G. FARBERIND. A.-G. Brit. 278,684, Oct. 5, 1926. The tendency to swell shown by regenerated celluloses is reduced by treating them with substances such as S-phenol- CH_2O resins sol. in water or alkali or S-phenol resins or with the substances which react together to form such resins. Examples and details are given.

Preparing cellulose for making viscose. J. UMBACH. Brit. 278,131, Aug. 5, 1926. Material such as colored cotton rags is treated with superheated steam and alkalis (suitably at 4-5 atm. pressure and a temp. of 240-250°) so that after washing but without subsequent bleaching a clean cellulose is obtained suitable for conversion into viscose. A 1% NaOH soln. may be used.

Esterification of cellulose. C. DIAMOND. Can. 276,825, January 3, 1928. Cellulose acetate is produced by treating cellulose, which has been treated with NaOH, with a phenolic body and then with an acetylating agent.

Modified cellulose for use in manufacture of cellulose acetate. M. CUSIN and P. A. CHEVALET (in part to Soc. Lyonnaise de soie artificielle). U. S. 1,671,513, May 29. See Can. 273,732 (C. A. 21, 4069).

Cellulose acetate solutions and plastics. I. G. FARBERIND. A.-G. Brit. 278,735, April 24, 1925. The compns. described in Brit. 251,303 (C. A. 21, 1320) are modified by substituting cellulose acetate instead of cellulose nitrate. Various examples are given.

Cellulose ethers. H. DREYFUS. Brit. 277,721, March 26, 1926. In an improvement on the process described in Brit. 166,767 (C. A. 16, 830) the quantity of water present during the substitution reaction is reduced by the addn. of water-binding agents to a quantity not exceeding 4 times the wt. of the cellulose or cellulosic compd. used (preferably not more than half the wt. of this material). Oxides of alkali or alk. earth metals may be used, as may also hydrides of Ca or Mg, alkali metals and alk. earth metals, sodamide and NaOEt powder. Various details and modifications are given.

Treating scrap celluloid. RHEINISCHE GUMMI- UND CELLULOID-FABRIK. Brit. 277,626, Sept. 18, 1926. Finely divided scrap celluloid is mixed with 2% or more of a non-volatile solvent of nitrocellulose such as triphenylphosphate, acetanilide, Et acetanilide, "palatinol" or "plastol" and molded under the action of heat and pressure into sheets, rods or other forms.

Apparatus for forming threads from cellulose acetate or similar solutions by extrusion. C. F. TORHAM (to Courtaulds, Ltd.). U. S. 1,671,878, May 29.

Applying tension to artificial silk filaments during their manufacture. J. L. RUSHTON. U. S. 1,671,785, May 29. Mech. features.

Artificial silk. S. I. VLES and M. P. A. BOUMAN (to Naamlouze Venootschap Nederlandsche Kunstzijdefabriek). U. S. 1,672,665, June 5. In the dry or evaporative method, filaments are extruded into a slowly ascending medium, the temp. of which increases gradually in an upward direction. An app. is described.

Artificial silk. R. CLAVEL. Brit. 277,602, Sept. 17, 1926. Artificial silk is weighted in a bath which contains together 2 or more substances which normally interact to form an insol. product; premature pptn. is prevented by maintaining a sufficient acidity or by use of protective colloids and a protective colloid may also be applied to the material before it is passed through the weighting bath. Different baths may also be used successively.

Artificial silk, artificial horsehair, artificial straw, films, etc., from viscose. KÖLN-RORRWEN. A.-G. Brit. 277,716, March 16, 1926. Substances are added to the spinning bath which depress the rate of diffusion of the acid into the viscose, the quantity of the substances added being detd. by preliminary tests. With a H_2SO_4 bath, the rate

of diffusion may suitably be reduced about 10-25% and substances which may be used comprise: naphtholsulfonic acid condensation products with CH_3O , "phenol wood resin" solubilized with H_2SO_4 , sulfite pulp lye, carbazolesulfonic acid, sulfonated cumarone resin, naphthalenesulfonic acid condensation products with CH_3O , "sulfonated machine oil," sulfonated lignite tar oil, sulfonic acids of aromatic hydrocarbons heated until the first formed insol. products become sol., hydroxymethylnaphthalenesulfonic acid and water-sol. sulfonic acids of the products obtained by fusing phenols with S, or salts or the specified acids. The addns. are especially suitable when use is made of immature viscose prepd. from immature alkali cellulose.

Artificial silk from viscose. I. G. FARBENIND. A.-G. Brit. 278,716, Oct. 5, 1926. Pptg. baths are satd. with Na_2SO_4 and also contain a high proportion of H_2SO_4 such that on crystn. tri-Na H sulfate first seps. Suitable concns. of H_2SO_4 are: at 20° , 16%; at 46° , 17-18%; and at 60° , 19%. Cf. C. A. 22, 2465.

Pump, pipe system and spinning nozzles for making artificial silk from viscose. E. LUNGE (to Courtaulds, Ltd.). U. S. 1,672,070, June 5.

Apparatus for spinning artificial silk. J. L. RUSHTON. U. S. 1,672,691, June 5.

Nozzle for spinning artificial threads. H. HOFFMANN, H. MARK and R. O. HERZOG. U. S. 1,672,644, June 5. Structural features.

Acid proportioning and control system for sulfite pulp plants. C. O. SISLER. U. S. 1,671,656, May 29.

Wood pulp. G. A. RICHTER. Can. 276,817, January 3, 1928. Wood chips are soaked in a soln. contg. about 20% Na_2SO_3 , and are then cooked under pressure at an elevated temp. in an acid sulfite soln. of much lower combined SO_2 content.

Apparatus and system of operation for making boards or sheets from fibrous pulp stock. G. H. ELLIS. U. S. 1,672,249, June 5.

Paper-making apparatus. AKT.-GES. DER MASCHINEN-FABRIKEN ESCHER, WYSS, ET CIE. Brit. 277,661, Sept. 20, 1926.

Removable colored coating on paper. H. C. MITCHELL. Brit. 277,733, June 15, 1926. Paper or similar material is first coated with china clay, blanc fixe or the like and then with an ink or other coloring material which can be removed with a pen to produce markings on the surface.

Controlling humidity while drying paper on heated cylinders. G. S. WITHAM, JR. U. S. reissue 16,990, June 5. Original pat. 1,646,515 was issued Oct. 25, 1927.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Propagation of flame in mixtures of natural gas and air. H. F. COWARD AND H. P. GREENWALD. Bur. of Mines, *Tech. Paper No. 427*, 28 pp. (1928).—By quantitatively comparing the ease of ignition and rate of propagation of flame for natural gas with those of each of its combustible components it is shown that some properties of natural gas are such that each of such components contributes to the flame properties in almost exact proportion to the relative amt. of it present. Then the known values of the property for each individual hydrocarbon can be used to calc. values for the natural gas which agree well with exptl. values found. Natural gas is ignited for certain ranges more readily than CH_4 either by the hot walls of a quartz tube, a hot metal bar, or an elec. spark. In a quartz tube the ignition temps. of the natural gas mixts. were 15° to 50° lower than those of CH_4 but much higher than those of other paraffin hydrocarbons. The time lag was markedly less than for CH_4 . With the hot Ni bar the ignition temp. of natural gas throughout the range of inflammable mixts. was 30° lower than CH_4 . The natural gas mixt. most easily ignited by an elec. spark contained somewhat less of natural gas than the most easily ignitable CH_4 mixt. did of CH_4 and it required a somewhat weaker spark for ignition. The lower limit of ignitability of a natural gas mixt. in air may be calc. almost exactly, and the higher limit approx. from the limits of the component. The speed of uniform movement of flame hydrocarbons may be calc. from the known speeds of the individual hydrocarbons. Of all mixts. of natural gas and air that one which propagates flame fastest does so somewhat more rapidly than the fastest burning CH_4 + air mixt. and it contains somewhat less of the combustible gas than the fastest CH_4 mixt. does.

Effect of alkali metal compounds on combustion. C. A. THOMAS AND C. A. HOCHWALT. *Ind. Eng. Chem.* 20, 575-7 (1928).—Aq. solns. of alk. salts atomized on a gasoline fire have the power to extinguish it. This property is due neither to a cooling effect,

nor to a mechanical removal of the O. Of all the salts tested, only those contg. an alkali metal have an effect upon fire. The effectiveness increases with the mol. wt. of the cation, and in general, with the O content of the anion. A method has been developed by means of which it is possible to compare quant. the action of various materials upon a standard oil fire. The main features are as follows: the fire temp. is controlled and standardized; the aq. soln. is directed on to the fire from a fixed distance by means of a const.-pressure device; the diln. of the soln. is increased until fire is no longer extinguished. Practical application of this extinguishing property makes use of K salts.

A. L. HENNE

The influence of temperature on the formation of the explosive wave. P. LAFITTE. *Compt. rend.* 186, 951-3(1928).—Mixts. of $2H_2 + O_2$ and $CH_4 + 2O_2$, at 1 atm. and heated at varying temps. from 20° to 350° , were ignited in a tube by means of an electric spark and the wave studied photographically. Increasing the temp. of the gaseous mixt. before ignition retards the formation of the explosive wave.

E. G. VANDENBOSCHE

Analysis of the residual acid from nitroglycerin manufacture (YOUNG) 7.

Explosives. R. I. SROOPS (to Hercules Powder Co.). U. S. 1,671,792, May 29. An explosive salt, an oxidizing salt and a salt contg. water of crystn., e. g., a mixt. comprising $Ca(NO_3)_2 \cdot 4H_2O$ and NH_4NO_3 or KNO_3 or NH_4ClO_4 is fused, absorbed by material such as sawdust or similar material and the product is cooled. U. S. 1,671,793 specifies the use of a carbonaceous material such as balsa wood sawdust together with similar salts.

Toy torpedo with a casing of pitch composition or similar bituminous material. K. KOHN. U. S. 1,672,460, June 5.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

1,8-Aminonaphthol-4-sulfonic acid. K. BRANDT. *Z. Farben-Ind.* 20, 5-6(1928).—Detailed conditions are given for the manuf. of this dye intermediate (Chicago Blue-monosulfonic acid) from naphthalene.

FREDERICK C. HAHN

Columbia Black FB. Wm. H. STEFFENS. *Z. Farben-Ind.* 20, 6-7(1928).—Detailed procedures are given for the prepn. of Columbia Black FB from *p*-nitroaniline, Cleve's acid and gamma acid as intermediates.

FREDERICK C. HAHN

Naphthol Blue Black. M. TURREL. *Z. Farben-Ind.* 20, 7-8(1928).—A description is given of the manuf. of Naphthol Blue Black (black agalma).

F. C. H.

Tartrazine. G. NORTON. *Z. Farben-Ind.* 20, 8-9(1928).—A description of the manuf. of tartrazine from Et oxalacetate and sulfanilic acid.

FREDERICK C. HAHN

1-Naphthylamine-8-sulfonic acid and its related dyes: sulfone cyanine, sulfone cyanine black and sulfone acid blue. I. MARTIN. *Z. Farben-Ind.* 20, 9-11, 76-8(1928).—A description is given of the manuf. of this intermediate and its related dyes.

FREDERICK C. HAHN

The dyeing of wool with vat dyes. FERNAND GIOT. *Tiba* 6, 431-5(1928).—Practical directions for obtaining even and uniform results are given.

A. P.-C.

Degreasing textile fibers by means of terpene complexes. M. VARINOIS. *Tiba* 6, 425, 427(1928).—Brief discussion of their merits, bringing out their advantages over the use of alkalis alone, with directions for the treatment of different kinds of fibers.

A. PAPINEAU-COUTURE

Rules to be observed to obtain even dyeing of cotton and rayon stockings and circular-knit goods. H. LAMERTZ. *Tiba* 6, 565, 567(1928).—Practical operating hints are given.

A. PAPINEAU-COUTURE

Dyeing of loaded fabrics. A. KUNZE. *Russa* 3, 375-9(1928). (In French and German).—Practical operating hints are given.

A. PAPINEAU-COUTURE

Theories of dyeing wool. ALBERT P. SACHS. *Bull. Natl. Assoc. Wool Manufrs.* 57, 243-51(1927); *Dyestuffs* 29, 1-6(1928).—The various theories are discussed. "The reaction between wool and dyestuff is probably similar in general nature to, but different greatly in detail from, the reactions between other textile fibers and dyestuffs. The process of dyeing wool is strictly a colloid-chem. phenomenon, involving adsorption of the dyestuff by the fiber, due to differences in elec. potential and the formation of a chem. compd. (a salt of wool and dyestuff) which causes the dyeing to be fast and

prevents the reversal of the adsorption. The colloid-chem. theory of dyeing wool reconciles the facts previously observed which formed the basis of rival and mutually contradictory theories of dyeing." CHAS. E. MULLIN

Relation of practice to theory. CHAS. E. MULLIN. *Am. Dyestuff Rept.* 17, 206-8 (1928).—An address upon conditions as existing in the textile plants and the relation of plant practice to theory.

The production of multi-colored effects (on wool). J. S. HEUTHWAITE. *Dyer, Calico Printer* 59, 184-5 (1928).—The usual methods, including the Vigoureux method of printing, are described. RUBY K. WORNER

Materials resistant to acids and alkalis used in the dye industry. FRED HORST. *Z. Farben-Ind.* 20, 13-4 (1928).—A discussion of the resistance of various metallic and non-metallic materials and protective coatings to the action of dil. and concd. inorg. and org. acids and alkalis. FREDERICK C. HAHN

Application of vat colors to animal fibers. T. F. McDERMOTT. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 164-7; *Am. Dyestuff Rept.* 17, 322-5.—An address and discussion. L. W. RIGGS

Dyeing horse hair for linings and stiffening fabrics. GEORGE RICE. *Am. Dyestuff Rept.* 17, 312-3 (1928).—Directions for prep. horse hair for dyeing are given. L. W. RIGGS

Use of formic acid in dyeing silk and rayon. FRED GROVE-PALMER. *Am. Dyestuff Rept.* 17, 314, 329 (1928).—The advantages of HCO_2H over AcOH are discussed. L. W. RIGGS

Ultra-violet rays and their applications in industrial laboratories. The Wood light. Q. HIRSCH. *Tiba* 6, 541-57 (1928).—An address dealing with the properties and production of ultra-violet light and their applications in the textile industry (acceleration of chemical reactions for artificial aging tests, analysis by fluorescence exemplified by a no. of possible applications). A. PAPINEAU-COUTURE

Textile research at M. I. T. ANON. *Textile World* 73, 3448 (1928).—The subjects studied during the past four years and those under investigation at present are listed. RUBY K. WORNER

Modern humidifying methods. W. B. HODGE. *Textile World* 73, 2993-4, 2998 (1928).—Application to textile mills. RUBY K. WORNER

Silk avivage. KARL WOLFGANG. *Kunstseide* 9, 517-8 (1927).—The special "feel" imparted to silk by the usual avivage often diminishes after a short time and even disappears completely. The addn. of oleic acid to the potash-olive oil soap usually employed imparts a much more durable "feel" to the silk without exerting any disadvantageous influence on the elasticity and durability of the silk fiber. The addn. of small quantities of materials such as hydroquinone, anthraquinone, or other compds. to the olive oil results in improved avivage. FREDERICK C. HAHN

Bleaching silk-cotton hosiery with hydrogen peroxide. H. G. SMOLENS. *Am. Dyestuff Rept.* 17, 309-12 (1928); cf. *C. A.* 21, 3748. Most of the silks used in silk-cotton hosiery are practically white when the gum is removed; hence the problem is to bleach the cotton without injuring the silk. This end is attained in bleaching with H_2O_2 by having a max. of total alk. possible within the safe limit of free alk. In the formulas given the alk. constituent of the bath is furnished by about 25 lbs of Na_2SiO_3 to 400 gallons of water, although these proportions are varied to suit particular conditions. L. W. RIGGS

A modified stoving test. F. L. GOODALL AND A. T. KING. *J. Soc. Dyers Colourists* 44, 145-7 (1928). L. W. RIGGS

Does formaldehyde protect wool against moths? C. O. CLARK. *J. Soc. Dyers Colourists* 44, 144-5 (1928).—Wool treated with HCHO as described by Trotman (cf. *C. A.* 22, 1858), and then subjected to the standard moth grub test as employed in testing Eulanized materials in the Zool. Lab. of the I. G. Farbenindustrie at Leverkusen, was not protected from grub moths in the slightest degree. L. W. RIGGS

Growth and use of the Mexican sisal plant. L. C. SCOTT. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 161-4; *Am. Dyestuff Rept.* 17, 319-22.—An address. L. W. RIGGS

Synthetic drugs and dye intermediates (Brit. 278,037) 17.

Artificial Silk Handbook. Manchester, Eng.: John Heywood, Ltd. New York: Bragdon, Lord & Nagle Co. 140 pp. \$1.50. Reviewed in *Textile World* 73, No. 20, 99 (1928).

DYER, ELIZABETH: *Textile Fabrics*. Revised ed. Boston: Houghton. 378 pp. Cloth bound \$1.75.

KRAIS, PAUL AND GENSEL, HERBERT: *Die Schlichterei der Baumwolle*. Dresden: Deutsches Forschungs. Institute f. Textilindustrie. 80 pp M 4.

SEDLACZEK, E.: *Die Mercerisierungsverfahren*. Berlin: Julius Springer. 269 pp. Cloth, R. M. 18. Reviewed in *J. Soc. Dyers & Colourists* **44**, 83(1928).

Year Book of the American Association of Textile Chemists, 1927. New York: Howes Publishing Co., Inc. 264 pp. Reviewed in *J. Soc. Dyers & Colourists* **44**, 83(1928).

Dyes. I. G. FARBENIND. A.-G. Brit. 278,651, Oct. 8, 1926. Dibenanthrone dyes are obtained from the nitrobenanthrone described in Example 2 of Brit. 12,518 of 1906 by exchanging the nitro group for an alkyloxy group and treating the products with alk. agents; a green dye is obtained, similar to that of Example 2 of Brit. 181,304 (C. A. 16, 3762).

Dyes. L. J. HOOLEY AND SCOTTISH DYES, LTD. Brit. 278,417, July 2, 1926. The 1-halogen-2-amino-3-chloroanthraquinones described in Brit. 264,916 (C. A. 22, 244) are condensed with primary aliphatic or aromatic amines, *e. g.*, with aniline, *p*-toluidine or methylamine, and the products are then treated with H_2SO_4 ; with concd. acid or oleum, sulfonic acids are produced which can be used for dyeing and printing silk, wool and cellulose acetate; with weaker sulfuric acid and the arylamino compds. products are obtained which may be acridines and which dye wool. Examples are given of dyes producing reddish shades.

Dyes. MORTON SUNDOWN FABRICS, LTD., J. MORTON, B. WYLAM, J. E. G. HARRIS and J. I. M. JONES Brit. 278,399, May 3, 1926. The process described in Brit. 251,491 (C. A. 21, 1360) in which vat dyes are treated, in the presence of a metal or a tertiary base, with chlorosulfonic acid or its salts, SO_3 or salts of pyrosulfuric acid, is carried out in the presence of a diluent such as acetone or $PhNO_2$. The products can be used for dyeing and printing as described in Brit. 251,491 (C. A. 21, 1360). Examples are given of the treatment of dimethoxydibenanthrone and of flavanthrone.

Dyes. SOC. ANON. POUR L'IND. CHIM. A BAILE. Brit. 278,728, Oct. 6, 1926. Anthraquinone vat dyes contg. cyanuric rings, such as those formed as described in Brit. 205,525 (C. A. 18, 1056), Brit. 231,688 (C. A. 19, 3597), Brit. 234,086 (C. A. 20, 829) and Brit. 237,872 (C. A. 20, 1721), are purified by treatment with aq. hypochlorites. When thus purified they produce much brighter colors than the untreated dyes. Several examples are given.

Dyes. W. SMITH, J. THOMAS AND SCOTTISH DYES, LTD. Brit. 278,039, May 26, 1926. 1-Halogenanthraquinone-2-urethans are treated with a metal such as Cu powder, with or without a diluent such as $PhNO_2$ or $C_{10}H_8$. At high temps. such as 160° , especially in the absence of a diluent, the products comprise mainly flavanthrones, but at lower temps. 1,1'-dianthraquinonyl-2,2'-diurethans are obtained. The latter can be purified by dissolving in org. solvents such as $PhNO_2$ or $PhCl$ and converted into flavanthrones by hydrolysis and ring closure. Several examples are given. Cf. C. A. 22, 1691.

Dyes and intermediates. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDILEY, P. CHORLEY and R. BRIGHTMAN. Brit. 277,756, June 25, 1926. Unsym. ureas are made by treating with phosgene an equimol. mixt. of 2,8,6-aminonaphtholsulfonic acid or its salts with an aminoacetanilide or a sulfonated amine of the C_6H_5 or $C_{10}H_7$ series (other than an aminonaphtholsulfonic acid or a sulfonated diamine or a mono-formyl deriv. of the latter), in the presence of an alk. acetate, carbonate or hydroxide. Examples are given for the production of acetamidophenyl-8-hydroxy-8-sulfo-2-naphthylurea, 8'-hydroxy-1,2'-dinaphthylurea-4,6'-disulfonic acid and 8-hydroxy-2,2'-dinaphthylurea-6,6'-disulfonic acid. By coupling these ureas with various specified diazo compds. dyes suitable for dyeing viscose silk in bordeaux, even red, claret and blue shades are obtained.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 277,372, Sept. 11, 1926. 2,5,6-Trichloro-3-aminotoluene-4-sulfonic acid is made by treating 2,5,6-trichlorotoluene with a nitrating agent such as H_2SO_4 and HNO_3 and then reducing the nitro compd. formed.

Dye intermediates. BRITISH SYNTHETICS, LTD. AND E. B. HIGGINS. Brit. 278,463, July 20, 1926. Chlorides of *o*-hydroxycarboxylic acids are made by the action of thionyl chloride on salts such as the Na, Ca or Mg salts of 2,3-hydroxynaphthoic or similar acids (suitably in a ball mill). SO_2 is removed by use of a stream of dry air and any unchanged thionyl chloride may be decompd. with Na_2CO_3 or $CaCO_3$. The thionyl

chloride may be used in liquid form or suspended in air or other inert gas or as a vapor. The 2,3-hydroxynaphthoic acid may be used for producing intermediates for making dyes as described in Brit. 262,958 (C. A. 21, 3906).

Azo dyes. JOSEF HALLER (to Grasselli Dyestuff Corporation). U. S. 1,671,422, May 29. Aminonaphthol ethers such as 7-methoxy-1-aminonaphthalene or 1-methoxy-8-aminonaphthalene (which may be used in the form of their hydrochlorides) are diazotized and coupled with a 2,3-hydroxynaphthoic acid arylide such as 2,3-hydroxynaphthoic acid- β -naphthalide or β -hydroxynaphthoyl-2-amino-1,4-hydroquinone dimethyl ether. Dyes are obtained which give clear violet shades fast to Cl, light and boiling. The coupling may be effected in substance or on the fiber.

Perylene dyes. F. BENSA. Brit. 278,325, Oct. 2, 1926. A metal cyanide such as that of Cu is heated in the presence of a solvent such as pyridine or quinoline with Me or Et halogenperylene ketones with or without pressure. The Cu may be removed with NH_3 and the pure dye obtained by forming a vat and reoxidizing. The dyes give red shades on cotton which change to red-violet on exposure to the air. Diacetyldichloroperylene (which may be used as an intermediate) is prepd. by adding AcCl to a mixt. of anhyd. AlCl_3 and dichlorperylene in CS_2 . Dipropionylchloroperylene is similarly made from propionyl chloride.

Pyranthrone dyes. BRITISH DYESTUFFS CORP., LTD., A. SHEPHERDSON and A. HAILWOOD. Brit. 278,102, July 7, 1926. Pyranthrone is treated with oxidizing agents, e. g., with MnO_2 , in H_2SO_4 soln. or suspension. The product dyes cotton from the vat brown shades which are not fast but after alkylation (if desired after sepn. from unchanged pyranthrone or treatment with reducing agents) the product dyes cotton fast red to brown shades.

Colloidal dispersion of dyes. C. E. J. GOEDECKE. U. S. 1,672,454, June 5. Auramine, sulfur green or other dyes are colloiddally dispersed in a quantity of solvent insufficient to dissolve all of the dye present, in the presence of a protective agent for the dispersion. The products may be used for dyeing, printing or for making lakes.

Soluble derivatives of vat dyes, etc. B. WYLAM, J. E. G. HARRIS, H. A. I. DRESCHER, J. THOMAS and SCOTTISH DYES, LTD. Brit. 277,398, April 9, 1926. Quinones, including vat dyes such as those of the indigo, thioindigo and anthraquinone series, are converted into sol. derivs. by interaction with a metal, a tertiary base, a substance which in the presence of the tertiary base yields a sulfuric anhydride deriv. of the base (such as SO_3 , oleum, chlorosulfonic acid or alkyl chlorosulfonates) and an "assistant" which may be the anhydride or imide of phthalic or succinic acid, or an org. acyl chloride such as phosgene, ethyl chloroformate, AcCl , benzoyl chloride or *p*-toluenesulfonic chloride. The products may be used for dyeing or printing by processes such as those described in Brit. 247,787 (C. A. 21, 654). Several examples are given.

Benzanthrone derivatives. R. F. THOMSON, J. THOMAS and SCOTTISH DYES, LTD. Brit. 278,112, July 13, 1926. The process described in Brit. 251,313 (C. A. 21, 1361) is modified by effecting the oxidation at low temps. (suitably 0° or lower). Various details are given.

Benzanthrone derivatives. R. F. THOMSON, J. THOMAS and SCOTTISH DYES, LTD. Brit. 278,496, April 22, 1926. Benzanthrone derivs. having the 2- and Bz-1- positions free are treated in H_2SO_4 with an oxidizing agent such as MnO_2 to form corresponding substituted dibenzanthronyls together with substituted oxybenzanthrone; the treatment is similar to that of benzanthrone itself as described in Brit. 251,313 (C. A. 21, 1361). Examples are given of the treatment of 6-chlorobenzanthrone, β -chlorobenzanthrones, α -chlorobenzanthrones, 6-methylbenzanthrone and β -methylbenzanthrone. The substituted dibenzanthronyls can be purified by pptn. from H_2SO_4 and yield vat dyes of the dibenzanthrone type by alkali fusion; the substituted oxybenzanthrone can be alkylated and the alkyloxy compds. also converted into vat dyes by alkali fusion.

Lakes. I. G. FARBENIND. A.-G. Brit. 277,371, Sept. 11, 1926. Org. dyes contg. acid salt-forming groups are combined with org. bases such as dicyclohexylamine, guanidines, trisubstituted melamines and diethyl- β -naphthylamine which will yield with the dyes stable salts which are insol. or but sparingly sol. in water. Various substrata also may be used and the products may be used in varnishes or for printing etc. Numerous examples are given.

Dyeing wool and silk. L. B. HOLLIDAY & CO., LTD. AND C. SHAW. Brit. 277,833, Nov. 26, 1926. 1,4-Dihydroxy-2,5-dichloro (or dibromo)-benzoquinone is used with or without a mordant for dyeing wool or silk or both. After dyeing from an acid bath, the material may be afterchromed or immersed in a boiling soln. of a metal salt such as FeSO_4 or CuSO_4 .

Pattern effects on fabrics. BRITISH CELANESE, LTD., G. H. ELLIS and R. J.

MANN. Brit. 277,414, June 15, 1926. Fabrics formed at least in part of cellulose acetate threads are locally treated with protective agents such as org. acids and then subjected to the delustering action of hot or boiling aq. liquids or steam. Formic, acetic, propionic, butyric, chloroacetic, aminoacetic, glycollic, lactic, citric and succinic acids may be used for the preliminary treatment and thickening agents such as starch, flour or gums may be added.

Softening natural silk. S. S. SADTLER and E. C. LATHROP. U. S. 1,671,786, May 29. After treatment of a batch of silk in a softening bath such as an aq. soap and oil bath the silk is removed after it has become softened, sufficient fresh liquor is added to make up for that carried away from the soln. with the silk and a sufficient quantity of an alk. soln. such as NaOH or Na_2CO_3 is added to bring up the p_H to a point (suitably about 7.5-9) which will avoid injury of a fresh batch of silk when treated with the bath.

System for producing composite threads or yarns comprising natural and artificial fibers. C. W. PALMER (to Celanese Corp. of America). U. S. 1,672,083, June 5. Mech. features. An app. is described.

Wetting and degreasing agent. G. ZIMMERLI. U. S. 1,672,292, June 5. A wetting and degreasing agent suitable for use on textile materials consists of a neutralized mixt. of a highly sulfonated fat which may be prepd. from castor oil and which has a sulfonic acid content of at least 40%, together with hydrogenized raw cresol or other hydrogenated cresol insol. in water.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

The story of paint and varnish. I. E. C. HOLTON. Sherwin-Williams Co. J. Chem. Education 5, No. 5, 515-30(1928). E. H.

Inter-relations of paint, varnish and lacquer industries with chemical engineering. HARRY McCORMACK. Chem. Met. Eng. 35, 25-7(1928).—A review. R. J. MOORE

Analysis of paints and varnishes, according to the German association for testing technical products. ANON. Farben-Ztg. 33, 560-1(1927).—Detn. of the volatile diluent. Fifty g. of the well-mixed paint are submitted to steam distn. The oil layer is weighed. If water-sol. diluents are present a second sample is distd. directly. The distillate is taken up in water and from the contraction of its vol. the amt. of water-sol. diluent can be found. Detn. of the pigment content. Five g. material are extd. 4 times with 50 g. of ether. In the presence of ether-insol. products, such as linoxyn, the extd. pigment is treated with an ether soln. of HCl. For the detn. of the linoxyn the ether is removed and the residue heated with alc. KOH and filtered. The fatty acids of the filtrate are liberated with HCl, taken up in ether, dried over dry Na_2SO_4 and weighed when freed from the solvent. Detn. of the non-volatile vehicle. The ether solns. obtained by the above extns. are heated on a water bath in a stream of CO_2 until constancy in wt. is obtained, or the ether residue is heated on an oil bath to 180° in *vacuo*. In certain cases, e. g., in the presence of Paris blue, the vehicle is sepd. as follows. Five g. of the paint are heated to boiling with 50 cc. 0.5 N alc. KOH under reflux and with repeated shaking, for $\frac{1}{2}$ hr. Upon diln. with 50 cc. H_2O the mixt. is filtered and washed several times with 50% alc. The latter is removed, the filtrate is acidified with HCl and extd. with ether. The filter residue, too, is treated with HCl-ether. The combined ether fractions are washed 3 times with a 15% NaCl soln. and dried over desiccated Na_2SO_4 . The fatty acids are liberated as indicated. In order to obtain the correct values for the oil, the figures thus found are multiplied by 1.05. The pigment content can be calcd. by deducting the sum of vehicle and diluent from 100. J. SCHALCH

Accelerated tests of organic protective coatings. P. H. WALKER and E. F. HICKSON. Ind. Eng. Chem. 20, 591-6(1928).—An accelerated weathering app. is described. The factors used are an enclosed carbon arc light, water spray, refrigeration, and ozonized air. A cycle of these factors is described which gives results comparable to actual exposure. Various methods for quant. measuring of film failure are discussed. R. J. MOORE

Rust-preventive coatings. A. V. BLOW. Farben-Ztg. 33, 500-3(1927).—The structure of a paint film and the fineness of the pigment particles control the quality of the film. The degree of dispersion of the pigment is difficult to det. under the microscope; results are more easily obtained by sedimentation expts. as the settling curves as well as the sediment vols. are characteristic for a certain size of grain. The sediment

vols. are inversely proportional to the heat of adsorption and have a certain relation to the heats of vaporization. The following table gives the sediment vols. or ordinary (A), non-settling (B), and disperse minium, make "Rodleben" (C), expressed in cc. per kg. when suspended in various dispersion media, and the corresponding heat of adsorption (a) as compared with clay. Methanol: A 230, B 280, C 360, a 11.0. Alc.: A 240, B 290, C 430, a 10.8. Acetone: A 420, B 540, C 720, a 8.0. Benzene: A 500, B 640, C 760, a 5.8. CCl₄: A 530, B 690, C 700, a 1.8. The sediment vols. of C and the corresponding heat of adsorption (compared with Cu) are in kerosene contg. 1% linoleic acid 200, 22 resp.; in linseed oil 270, 14 resp.; in petroleum 540, 6 resp.; in paraffin oil 560, 4 resp. Minium of a paint film which consists originally of cryst. PbO and amorphous Pb plumbate changes its compn. inasmuch as the plumbate disappears and the PbO slightly increases. J. SCHALCH

Influence of negative catalysis on the structure of protective paints. JOHANNES SCHEIBER. *Farben-Ztg.* 33, 680-2(1927).—The preventive action of products such as phenols, amines, derivs. of hydroxylamine, hydrazine and urea toward oxidative decomposition of a linseed oil film in the presence of a drier may be fully utilized by applying paints which contain besides linseed oil and driers an antioxidant and oils, such as tung oil. In such a compn. the linseed oil is the continuous phase and is protected from oxidation by an excess of an antioxidant. The tung oil, capable of coagulation without the aid of O₂, but under the influence of a catalyst, such as is formed by a drier, represents the disperse phase. J. SCHALCH

Adhesions of films. H. A. GARDNER AND A. W. VAN HEUCKEROOTH. *Int. Eng. Chem.* 20, 600-1(1928).—The adhesion of films to metal, glass and wood surfaces is quant. measured by means of the silk strip method in conjunction with the Gardner-Parks mobilometer. A table is given showing adherence of different types of nitro-cellulose lacquers on various surfaces including galvanized Fe, Sn and Al. In general, adhesion of films to metal increases with the amt. of resin, up to a certain percentage. Tests should be carried out under const. temp. and humidity conditions to secure comparative results on different days. R. J. MOORE

Painting of plasters and cements: new and old. GODFREY GILES, et al. *J. Oil Colour Chem. Assoc.* 11, 124-49(1928).—This report of a joint discussion between the Institute of Brit. Decorators and the Oil & Colour Chem. Assoc. covers the use of various types of finishes over different varieties of plasters and cements. R. J. M.

Mill and laboratory experiments on tung oil production from 1927 American crop. H. A. GARDNER. *Am. Paint Varnish Manufs. Assoc. Circ.* No 329, 318-44(1928).—Results are tabulated on lab. extns. made on 20 samples of tung-oil seed from trees treated with different types of fertilizer, or from trees which bear either single or cluster type fruit. Oil and moisture contents are given. Various plant size hulling and oil crushing tests on the 1927 tung oil fruit are described. R. J. MOORE

Mineral spirits. HANS WOLFF. *Farbe u Lack* 1928, 177-8. —It was impossible to detect any differences in drying times or elongation of films of varnishes due to the use of varying amounts of the fraction b. 200-220°. G. G. SWARD

Emulsions as paint vehicles. FRIEDRICH WAGNER. *Farbe u Lack* 1928, 20, 30. —Stability is the most important property of emulsions. "Grundin" emulsions have stood for years without any sepn. Only casein-oil emulsions have succeeded as outside emulsion paints. G. G. SWARD

Linseed oil and its earlier use. CORNELIUS HEBING. *Farbe u Lack* 1928, 144-6 156-7, 166—Historical. G. G. SWARD

Vehicles for paint and varnish. JOHANNES SCHEIBER. *Farbe u Lack* 1928, 68-9, 80-1, 93-4. —S classifies vehicles as follows: aq. reversible-glue; aq. irreversible-water glass; non-aq. reversible-spirit varnishes; non-aq. irreversible-oleoresinous varnishes; and finally emulsions. He also classifies them as gel, associated colloid, resins, raw oils and processed oils. Wood oil dries by polymerization at its conjugated double bonds and the product is stable toward oxidizing compds. Linseed oil dries by oxidation and breaks down more rapidly than wood oil. Negative catalysts should be added in one of two different ways: to dried film, which is difficult or in a passive condition to the original oil, becoming active after the film is dry. Dried at 100° wood oil sets in 8-12 min. while perilla, linseed and poppyseed oils require 1-6 hrs. When dry the changes in wt. are, resp., 0, 3-7, 14 and 30%. Linseed-oil films are affected by water on account of the water-sol. products of oxidation. To overcome this, bases forming water-insol. products may be added. Rust-preventive paints usually contain pigments which combine with the decompn. products of the oil. Acid-resisting coatings are easier to prep. than alkali-resisting ones as most materials are saponif. by alkali. G. G. SWARD

Nature, effect and determination of the viscosity of printing varnishes. K. WÜRTH. *Farben-Ztg.* 33, 269-72(1927).—A review. J. SCHALCH

Benzine and turpentine as solvents for varnishes. HANS WOLFF. *Farben-Ztg.* 33, 420-1(1927).—W. compares the surface tension, the viscosity and the effect of diln. on the viscosity of varnishes made up with benzine, "resilvestrol" (a terpene similar compd.) and turpentine. The surface tension is the same for the 3 samples; it is therefore dependent on the constitution of the varnish base. When examg. the viscosity with Vollmann-Mallison's viscometer the highest viscosity was found with the turpentine, the lowest with the benzine varnish, the latter showing thus the lowest spreading power. Upon diln. the viscosity curve showed the expected features for the turpentine varnish, but not for the resilvestrol and less for the benzine varnish. From a certain point the viscosity of the latter increased slightly with an increase in diln., effected probably by coagulation of the disperse phase. W. shows with this example that the phys. properties of a varnish may vary with a change in diluents. J. SCHALCH

Bleaching of lac. M. VENUGOPALAN. *Indian Inst. Sci., Bangalore.* *J. Indian Inst. Sci.* 11A, 17-22.—Several methods for the bleaching of lac are described. The best method consists in dissolving powd. lac in 2.5% Na_2CO_3 soln. and bleaching with NaClO soln. The latter is easily prepd. by bubbling Cl through a soln. consisting of 2.5% Na_2CO_3 and 12.5% NaOH until a concn. of 6 to 8% available Cl is reached. The lac soln. after 20 hrs. treatment with hypochlorite is bleached and is then pptd. by slow addn. of 1:20 H_2SO_4 . One lb. of lac requires 40 to 50 cc. of the hypochlorite soln. for bleaching. L. B. MILLER

China wood oil in lacquer. W. E. FLOOD, D. E. BOOTH AND W. H. BEISLER. *Ind. Eng. Chem.* 20, 609-11(1928).—China wood oil, raw, heat treated and combined with ester gum was incorporated in nitrocellulose lacquers, film properties were studied and exposure tests made. Lacquers contg. the oil were more durable than corresponding samples without oil. R. J. MOORE

Brief review of lacquer solvents. W. W. WILSON. *Paint, Oil, Chem. Rev.* 85, No. 23, 14-5, 19(1928).—A wide range of lacquer solvents is reviewed. Prepn., advantages, disadvantages and evaluation are discussed. R. J. MOORE

Solvent specifications a necessity. W. C. WILSON. *Paint, Oil, Chem. Rev.* 85, No. 23, 10-1(1928).—The growing need for lacquer-solvent specifications is stressed and the following tests are advised and methods given: toxicity, evapn. rate at some temp. between 65° and 95°, temp. lowering during evapn., soly. of water in the solvent, diln. coeff., resin soly., stability, odor. R. J. MOORE

The role of solvents and diluents in lacquers. B. SCHEIFELE. *Farben-Ztg.* 33, 207-8(1927).—S. discusses the process of dissolving nitrocellulose in a solvent, the structure of the soln. and the mechanism of film formation. J. SCHALCH

Pigments in nitrocellulose lacquer enamels. H. A. NELSON AND W. C. NORRIS. *Research Bull. N. J. Zinc Co.* 1927, 24 pp.—A no. of lacquer pigments are considered with reference to particle size, oil absorption, hiding power and tinting strength, photochem. and chem. stability, ultra-violet penetration and other factors. Methods for detg. these factors and a reference bibliography are given. A supplement reviews the uses of the Zn pigments in lacquers. R. J. MOORE

Solubility of pigment colors in lacquers. HANS WAGNER AND J. KESSELRING. *Farben-Ztg.* 33, 619-21(1927).—A table is given which shows the soly. of dyes and lake colors in lacquer solvents and plasticizers. J. SCHALCH

Aging of nitrocellulose lacquer films and stability of the nitrocellulose. OTTO MERZ. *Farben-Ztg.* 33, 209(1927).—M. finds the accelerated testing methods in which the plasticizer is evapd. at higher temp. give results differing from the actual conditions as the high evapn. temp. lowers the stability of the nitrocotton. J. SCHALCH

Lacquer plasticizers. P. M. MOWEN. *Paint, Oil, Chem. Rev.* 85, No. 23, 12(1928).—Advantages and disadvantages of the usual plasticizers are described. R. J. MOORE

Detection of coumarone resins in varnishes. HANS WOLFF. *Farbe u Lack* 1928, 85.—The unsapon. matter is destructively distd. in a test tube and the distillate collected in a vial of glass wool in the mouth. The distillate is dissolved in Ac_2O and subjected to the Storch-Morawski reaction. A reddish yellow to orange color indicates coumarone resin. The color remains even after the characteristic color of rosin disappears. G. G. SWARD

Phenol-formaldehyde and allied compounds. A. JACKSON. *Dyer, Calico Printer* 59, 164-5, 192-3(1928).—A general discussion of resins, their properties and uses. RUBY K. WORTER

Acetone-condensation resins. H. A. GARDNER AND C. A. KNAUSS. *Ind. Eng. Chem.* 20, 599-600(1928).—Certain condensation resins of acetone with acetaldehyde, paraldehyde, aldol and furfural were prep'd. and tested in nitrocellulose lacquers. One variation used rosin in the mixt. All these gave a durability comparable to ester gum and damar but the color was darker. One modification contained nitrocellulose dissolved in the acetone and then condensed with aldol. This type gave good durability and pale color. R. J. MOORE

Resins from chlorinated cymene. P. H. GROGGINS. *Ind. Eng. Chem.* 20, 597-9 (1928).—Certain resins, prep'd. from *p*-cymene by chlorination, are described. The mechanism of the reaction, effect of catalysts and possible applications in coating compns. are discussed. R. J. MOORE

Malayan varnish resins. T. H. BARRY. *J. Roy. Soc. Arts* 76, 106-28(1927).—Present aspects of the industry in Malay are discussed and the gathering and treatment are described with photographic illustrations. Considerable data are given for the 2 principal damars, Mata Kuching (Cat's eye) and Penak. Other damars described are Saraya, Hitam or Sengal, Daging, Kepong, Kelulot, Siput, dead damar, Minyak and dragon's blood. R. J. MOORE

Less familiar aspects of plastics industry. CARLETON ELLIS. *Chem. Met. Eng.* 35, 18-9(1928).—Some recent work on synthetic resins is briefly reviewed. R. J. M.

Luminous colors. ANON. *Farben-Ztg.* 33, 24-5, 87-8(1927).—A review of the manuf. and use. J. S.

Standardizing dry testing of colors. ALBERT GRUNDER AND R. S. SHEPHERD. *Paint, Oil, Chem. Rev.* 85, No. 22, 10-1, 25(1928).—Methods commonly used for testing pigments are described and criticized; standard methods requiring standard app. and nomenclature are suggested. R. J. MOORE

Iron cyanide colors, especially milori-blue. ARNO MÜLLER-MAGDEBURG. *Chem.-Ztg.* 51, 923-4(1928).—A review of the chemical reactions and technical prepn. R. J. MOORE

Chemical and physical characteristics of red lake pigments. C. A. HENLEIN AND SEVIER BONNIE. *Paint, Oil & Chem. Rev.* 85, No. 20, 10-2, 22(1928).—Red lake pigments are reviewed. The dyes used, methods of manuf. and certain good and bad characteristics are described. R. J. MOORE

Studies on the hygienic manufacture of titanium dioxide and titanium white. K. B. LEHMANN AND LUDWIG HERGET. *Chem.-Ztg.* 51, 793-4(1927).—Prepn. of the 2 principal pigments is reviewed and methods of analysis are given. R. J. MOORE

Scattering of light by graded particles in suspension. T. M. LOWRY AND M. C. MARSH. *J. Oil & Colour Chem. Assoc.* 11, 3-15(1928).—A sample of barytes was sep'd. into 13 fractions by elutriation at water velocities of 0.5 to 12.5 mm. per sec. The diams. of the particles were measured and proved the validity of Stokes' law within the limits of the expt., on the assumption the particles behaved as spheres of slightly larger diam. than the mean width of the particles. The diam. of the elutriator has an effect on the const. in Stokes' formula. The various fractions were suspended in paraffin and the light-transmission was measured by means of a Hilger sector-photometer. The optical density is proportional to the surface-concn. of the powder, but increases slowly as the diam. is reduced to 50 μ , and much more rapidly when the diam. is reduced below 30 μ . The results indicate that a max. of covering power must exist for a given surface-concn. of the powder, but that this max. lies well beyond the limits of fineness that can be obtained by the methods of pigment grinding now in general use. A discussion follows. R. J. MOORE

Linnoxyn and linoleum. A. D. LUTTRINGER. *Caoutchouc & gutta-percha* 25, 13,900-3, 13,944-5(1928); cf. C. A. 22, 1050.—Various formulas and processes are reviewed, with a bibliography of 14 books. C. C. DAVIS

Pb and Zn pigments (STOLL) (STRADER, STOLL) 18. Purification of vegetable oils [for varnish] (ZINOV'EV) 27. Non-liquid disperse systems of fatty oils (AUER) 27. The relationship between ethereal oils and resins (PIGULEVSKI) 17. Treating waste acid liquors (Brit. pat. 277,769) 13. Mixing and emulsifying apparatus for treating paints (U. S. pat. 1,671,865) 1. Coloring "soluble cellulose" (Brit. pat. 277,989) 23. Lakes (Brit. pat. 277,371) 25.

Waterproof paint. C. N. EXLEY. U. S. 1,672,377, June 5. A paint suitable for spraying or use with a brush is formed of Na resinate soap 6, lithopone 60, raw rosin 9, turpentine 7 and water 18 parts, emulsified together.

Pigments, etc. E. C. DESTUBNER. Brit. 277,947, Sept. 23, 1926. Pigments

formed by pptn. in aq. media are dehydrated by adding a fluid miscible with water and compatible with the paint, printers' ink, lacquer, celluloid, artificial leather or other compn. in which the product is to be used as a coloring agent; the ppt^e is washed and preferably filter-pressed or centrifuged and then treated with the fluid; for coloring lacquer, 86-95% alc. may be used; for paint, enamel or printers' ink, acetone or pyridine; for cellulose formate, pyridine; for cellulose triacetate or triethyl cellulose, alc. or acetone. Several examples are given.

Coating compositions comprising cellulose esters or ethers, starch acetate or similar carbohydrate derivatives. J. D. MCBURNEY and E. H. NOLLAU (to E. I. duPont de Nemours & Co.). Brit. 278,696, Oct. 5, 1926. Livering or gelling is prevented by adding 0.1-5.0% of substances such as oxalic, phosphoric, tartaric, citric, malic, formic or acetic acids.

Apparatus for treating varnished surfaces with ultra-violet rays to dry the varnish. R. D. MAILEY (to Cooper Hewitt Elec. Co.). U. S. 1,672,331, June 5.

Condensation products of alcohols and ketones with urea. I. G. FARDENIND. A.-G. Brit. 278,390, Oct. 4, 1926. Oily or resinous products suitable for use as softening agents for cellulose esters or ethers, as resins, or as "water-swelling substances" are obtained by prolonged heating of urea or a deriv. such as acetylurea, thiourea or urethan with an excess of an alc. or ketone such as benzyl alc. or butylene glycol, EtOH, acetophenone, glycerol or the cyclic acetal produced by treating glycerol with AcH. Catalysts may be used (of which glycerol is mentioned as an example) and the process may be carried out under pressure.

Resinous reaction product of urea and formaldehyde. F. LAUTER (to Rohm & Haas Co.). U. S. 1,671,590, May 29. Products free from methylene urea are obtained by adding hot urea to a boiling soln. of CH₂O.

Resinous reaction product of urea and formaldehyde. F. LAUTER (to Rohm & Haas Co.). U. S. 1,672,848, June 5. Condensation is effected in the presence of an aromatic sulfonamide such as *p*-toluenesulfonamide which serves to stabilize and soften the product.

Synthetic resin composition. R. SCHROEDER, M. SCHROEDER, S. LEVIS and E. JAROSLAW (trading as Jaroslaw's Erste Glimmerwaren-Fabrik). Brit. 278,038, May 26, 1926. A moldable material is prepd. by impregnating paper or fabric with synthetic resin, scutching and mixing with addnl. powd. synthetic resin.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Report of the Smalley Foundation Committee. H. C. MOORE, *et al.* *Oil Fat Ind.* 5, 146-51 (1928).—Tables are given showing the results of oil and NH₃ analysis of meal by the collaborators. The av. of the efficiencies for both oil and NH₃ on the 29 samples for the 10 highest collaborators for the year was 99.888 as against 99.862 for the previous year. The object of the Smalley Foundation is to improve the quality and standard of the analytical work of analysts in this industry. E. SCHERUBEL

Report of Moisture Committee. W. H. IRWIN, *et al.* *Oil Fat Ind.* 5, 124-9 (1928).—The Kingman distn. method was further modified, as the first modification did not give good results. Weigh 40 g. of sample into 500-cc. Erlenmeyer flask. Add 125 cc. C₂H₅Cl₄, connect with Kingman distn. tube and distil as follows: Heat with a Bunsen flame 1 to 1 1/4 in. high placed so that the flame strikes the gage under the flask. A thermometer calibrated at each degree should pass through the stopper of the flask with its bulb above the liquid. When the temp. rises to 135° take the temp. readings at 1-min. intervals. Draw off the solvent when the Kingman tube gets too full. When 3 successive temp. readings at 1-min. intervals show the same, shut off the flame and allow to cool. The const. b. p. is about 142° and should be reached in 30 min. After cooling wash down the condenser and tube into the graduated tube of the app. with a little benzene, removing any drops of H₂O adhering to the upper part of the condenser tube with a looped Cu wire. Read the column of water and calc. the %. The results are in better agreement than those of the previous year. They are somewhat higher than the oven method figures. The Committee does not feel that it would be practical to use a distn. method except in special cases, and recommends that a double-walled oven contg. glycerol in the jacket be used, and that the drying time be fixed at 3 hrs. The max. range of the cooperative work sent out in which the jacketed oven was used was 0.51%; the minimum 0.29% and the av. 0.40%. E. SCHERUBEL

Report of committee on crude mill operations. A. K. SCHWARTZ, *et al.* *Oil Fat Ind.* 5, 134-45(1928).—The object of the expt. was to det. if the slight preheating of seed without previous addition of H_2O had any effect upon the crude oil. The meats gave a better oil extn. The color of the refined and bleached oil was worse, showing an increase of 0.4 and 0.1 red, resp. Expt. 2 was made to det. the effect of the continuous addition of direct steam during the cooking process. It affected the standard of extn. but little. The quality of the crude was materially changed, the losses averaged a 0.6% improvement between max. and minimum application. The color of the crude was lighter. Expt. 3. By the production of 41.8% and 48.7% protein meals it was sought to det. if increased addition of hulls detrimentally affected the oil. The reverse is the case. Expt. 4. With addition of H_2O as steam before cooking and without any H_2O addition it was sought to det. the effect of increased cooking time. If enough H_2O was present increased cooking improved the extn. as represented by the standard of meals; to decrease the refining loss; to darken the color of refined and bleached oil and to lighten the color of crude oil. Where no H_2O is added the length of cooking time is limited and an increase of time decreases the extn., increases the loss on refining and reddens both refined and bleached oils, but lightens the crude. Expt. 5. It was sought to det. if the form of H_2O whether as steam or H_2O introduced before cooking affected the refining loss. The addition of steam shows increasing loss. Expt. 6. By allowing the moistened meats to stand 1 hr. in the bins the loss was increased 2.1% while the refined and bleached color remained the same. Expt. 7. The addition of H_2O to meats before cooking under 30 lb. jacket pressure showed that the best extn. is obtained when the meats contain 10% H_2O . With 70 lb. jacket pressure the best extn. was obtained with 9% H_2O content in the meats. Expt. 8. The use of high- and low-temp. cooking was tried. Lower loss in favor of low jacket pressure was shown. Expt. 9. The object of this expt. was to det. if there was any difference in the oil flowing from the press at different stages of pressing. The first oil gives a lower loss than the last flowing from the press. The committee hesitated to advance any theories on the correct cooking of cottonseed meals at this time.

E. SCHERUBEL

Report of Cake Color Committee. A. S. RICHARDSON, *et al.* *Oil Fat Ind.* 5, 132-3 (1928).—It is recommended that the meal to be graded should be placed in the center of a gray sheet or board 8 in. square; it should be flattened out to make a circle 3 or 4 in. across, and a 1 in. square of the color standard laid on the center of the meal. Both should then be observed in good daylight from a position directly above and at least 36 in. distant. Optionally use may be made of a horizontal rotating cylinder of clear glass contg. meal at the bottom and a strip of color standard above the meal. The width of the color standard, also of the band of meal exposed to view, should be not less than 1 in. The inside diam. of the cup should be about 2 in. All gradings should be made in good daylight with a speed of rotation sufficient to blur the individual particles of meal. For cake a portion should be ground so that 85% will pass a 20-mesh screen. The ground sample should be graded as for meal. Any samples of meal should be ground to the standard for cake and so stated in the report.

E. S.

Report of the Color Committee of A. O. C. S. J. D. EVANS, *et al.* *Oil Fat Ind.* 5, 130-2(1928).—The committee recommends that the Greiner or some modification of it, or the Bailey Tintometer be made standard, and that not more than 3 glasses be used. The $\frac{3}{4}$ -in. glass tube should be used rather than the 4-oz. bottle and the 75-watt lamp instead of the 150-watt one.

E. SCHERUBEL

Use of the rapid percolation procedure for the extraction of raffinose from cottonseed press-cake. M. BRIDEL AND (Mlle.) M. DESMARET. *Bull. soc. chim. biol.* 10, 510-21(1928); cf. *C. A.* 20, 1302; 22, 971.—Five hundred g. of press-cake contg. 36.464 g. of raffinose was extd. by percolation with 250-cc. portions of 60% alc. In 105 min. 54.23% of the raffinose was extd., in 5 hrs. 92.93% and in 10 hrs. 100%. In the first 2 fractions the raffinose was 50% of the dry residue, in the later fractions the raffinose decreased. Yield, 3.3% of the wt. of the press-cake.

L. W. RIGGS

Extraction of castor oil from the seed with gasoline. A. SLASHCHEV. *Maslo-boino-Zhrovoye Delo.* 1928, No. 3, 9-11.—According to A. G. Hoppe and contrary to other authors castor oil could be easily extd. with (hot) gasoline. In expts. carried out in the extn. plant of "Khimzhir" in Krasnodar the following results were obtained: Benzene, which is an excellent solvent, darkens the oil. A mixt. of gasoline and benzene, which is a fair solvent, spoils the color to some extent depending on the proportion of benzene. Gasoline, giving a bright oil, does not yield a complete extn. (loss 1.5-2%). Thirteen extns. were made with the same gasoline by distg. it off from the extd. oil. The first extn. was made with hot gas, the following with cooled. The app. was heated and the seed was slightly warm. The seed used contained 10% of

dirt and was of an inferior quality. No filters were used during the extn. The table shows the results obtained:

Color	Standard	Gasoline-Extd. Oil	Pressed Oil
	Colorless or faint yellow	Dark-yellow	Faint yellow
Sp. gr.	0.961-0.973	0.9655	0.963-0.964
Engler 50°	15	18.75	16.5-16.8
Engler 90°	3	3.5	3.2-3.5
Flash M. Penskii	240°	260°	252-235°
Acidity in % oleic acid	1.5	10	1.91-2.2
Tarry substances	none	none	none
Ash	0.01%	0.05%	0.001-0.009%
Sapon. number	176-183	180	182-187
Iodine number	82-85	80.3	91.4-93.1
Freezing point	below -16°	-17°	-16°
Soly. in 96% alc.	complete	complete	complete
Soly. in gasoline	insol.	insol.	20/60
Moisture		0	0.35

Extn. with cold gasoline was not satisfactory. Another batch with higher quality seeds was extd. and only 4.49% fatty acids obtained. This acid was neutralized with NaOH, leaving 0.2% acid. The soap stock could be separated. No details are given.

A. A. BOEHLING

Purification of vegetable oils. A. ZINOV'EV. *Masloboino-Zhirvoye Delo*. 1928, No. 3, 11-5.—Methods for treating vegetable oils to obtain oils suitable for varnishes are reviewed. To eliminate the slime always present in crude vegetable oils, the oil was heated in a kettle at 80-100° for 20-30 min. and a stream of dry air was blown through it; this destroys the slime and prevents its formation at higher temps. No further treatments are required such as H₂SO₄, fuller's earth, etc. To destroy the pigment the higher temps. used for blowing, etc., are sufficient. This new method cheapens the production to a very great extent. Linseed oil was treated this way. Similar expts. with CO₂ gave the same results. Oil in 4 flasks was heated, the first to 100°, 2nd to 150° and 3rd to 200°. The oil was heated for many hrs.; the corks had one hole each; and the oil was not agitated. In the 4th flask, which had a stirrer, the oil was kept at 150°. This method did not prevent the formation of slime. Blowing H₂ and N₂ through the oil gave the same results as blowing air. Wet air when preheated up to 100-120° is also a good dryer. The appearance of H₂O drops on the containers when air or gas was blown through led to the conclusion that the slime contains water which is evapd.

A. A. BOEHLING

Non-liquid disperse systems of fatty oils. LASZLO AUER. *Furben-Ztg.* 33, 682 (1927).—A. treated various oils with formic acid. Upon settling, 3 layers were formed, the bottom layer consisting of formic acid, the middle layer mainly of the dispersion medium and the top layer of the coagulated disperse phase. The following oils are classified according to a decreasing content of the disperse phase: Chinese wood oil, linseed, sunflower, poppy-seed, nut, olive and castor oil. Oil varnishes show a greater disperse phase than the corresponding oils. The relatively slow drying of stand oils and thick oils which contain a higher amt. of disperse phase than the tung oil can be explained by considering the difficulty with which the gas, necessary for the film formation (according to the gas coagulation theory), penetrates the very viscous and partly coagulated oil.

J. SCHALCH

Composition of hydrogenated rape oil. T. F. KITAEV. *Ukrainskii Khem. Zhurnal* 1, tech. part 40-9(1925).—The compn. of fatty acids in industrial hydrogenated rape oil is: behenic acid 10, stearic acid 32.8, erucic acid 43.2, rapinic acid (C₁₈H₃₄O₂) 10%. The characteristics of the oil analyzed were: I value 48-48.5, coeff. of sapon. 188, d₁₀₀ 0.850, m. 47°, av. mol. wt. 312-15, neutralization value 177.5.

G. B. KISTAKOWSKY

The effect of various compounds on the rate of development of rancidity in fats and oils. W. J. HUSA AND LYDIA M. HUSA. *J. Am. Pharm. Assoc.* 17, 243-7(1928).—The Krels test was used for detecting rancidity, the odor of the test samples serving as a confirmatory test. Hydroquinone reduces the rate of development of rancidity in oil of sweet almonds. The addn. of 0.5% of hydroquinone to lard reduces the rate of development of rancidity about 50%. The following compds. have no effect: salicylic acid, acetylsalicylic acid, β-naphthol, liquefied phenol, dl-alanine, pyrogallol acid and resorcinol.

L. E. WARREN

The seed of *Euphorbia verrucosa*, Jacq. PAUL GILLOT. *Mat. grasses* 20, 8166-8 (1928).—The av. compn. of the seed is: H_2O 8.84, fat 25.74, crude protein 21.12, N-free ext. 1.30, ash 5.80, crude fiber 37.20%. The oil obtained by cold pressing has α (200 mm. tube) $+10'$, d_{16}^{20} 0.9356, n_{22} 1.4829, n_{18} 1.4855, Crismer no. (alc. of d. 0.7967) 65°, f. p. -24° , acid no. 2.4, acidity (as oleic) 1.24%, sol. fatty acids (Planchon) 0.7 cc. 0.1 N KOH per 150 cc., sol. fatty acids (as butyric) 0.12%, Hehner no. 95.60%, sol. volatile fatty acids (Reichert-Wollny) 0.2 cc. 0.1 N KOH, insol. volatile fatty acids (Reichert-Wollny) 0.3 cc. 0.1 N KOH, sapon. no. 190.4, acid no. (Wijs) 209.0, Ac no. (André) 10.4, unsaponifiable 1.04%, Et_2O -insol. brominated glycerides (Hehner and Mitchell) 60.56%, degree of oxidation (Bishop) 21.20%; the elaidin, Bellier (CH_2O), arachidic acid tests were all negative; Halphen's Br reaction immediately gave a ppt.; Bellier's resorcinol tests gave a deep violet oil and yellow acid. The total fatty acids have n_{22} 1.4740, I no. (Wijs) 218.1, neutralization no. 197.5, solid fatty acids 2.5%, liquid fatty acids 97.5%. The liquid fatty acids have n_{22} 1.4745, I no. (Wijs) 222.3. The oil is very similar to that of *Mercurialis annua* (C. A. 20, 1258) and is one of the most highly drying oils. The oil content of the seed varies considerably from year to year. The compn. of the oil does not vary appreciably with the extn. process (pressure or extn. with petroleic ether), nor with the age of the seed. A. PAPINEAU-COUTURE

Variations in the constants of the oils of certain Leguminosae. G. HALDEN. *Mat. grasses* 20, 8168-71 (1928).—A discussion of variations in the published constants of the oils of various Leguminosae, which H. attributes to variations in the strains of the plants, botanical variations, variations in the methods of extn. of the oil and in the portion of the oil examd. A. PAPINEAU-COUTURE

A new combined method to titrate the volatile, soluble and insoluble fatty acids in butter and fats. E. TCHÉTCHEOFF. *Bull. soc. chim. Belg.* 37, 153-63 (1927).—Complete exptl details are given of a new method by which it is possible to det. the Reichert-Meissl, the Polenske, the xylene and the sapon. indexes in a sample of only 5 g. of butter. The principle of the method is as follows: only the lower fatty acids are distd. after decompn. of their sol. soaps, alc. being eliminated by distn., and the non-volatile fatty acids by filtration of their insol. Mg soaps. A. L. HENNE

Determination of degumming power of soaps (boiling-off soaps). R. TSUNOKAE. *J. Soc. Dyers Colourists* 44, 142-4 (1928).—The soaps were tested by 4 methods, viz., salting out, titration, toluene and elec. cond., of which the titration method by $H_2C_2O_4$ with phenolphthalein indicator was the most satisfactory. The degree of hydrolysis was calcd from the amt. of free alkali found. The degumming power varied with the degree of hydrolysis. L. W. RIGGS

A new electrically heated apparatus for fat and oil Soxhlet extractions (GOGOLEV) 1. Preparation of catalyst by electrolytic corrosion of Ni (Ikt) 4. Filter for oils (U. S. pat. 1,671,958) 1.

Fats and Oil Studies of the Food Research Institute. Stanford Univ., Calif.: Food Research Institute. Published as books and pamphlets of different lengths. Prices \$1, \$1.50 and \$2. Reviewed in *Oil & Fat Industries* 5, 88 (1928).

Countercurrent extraction system for recovery of wool grease from wool in a series of vats with intermediate squeeze rolls. J. L. TURTS. U. S. 1,672,289, June 5

Fatty acids and other substances from "tall-oil." OEL- UND FETT-CHEMIE GES. Brit. 278,097, Oct. 11, 1926. "Tall-oil" is sepd. into fatty acids and resin acids by distg. and fractionating, or by esterifying so as to leave the resin acids unaffected, and distg. "Sulfite alc." and H_2SO_4 may be used for effecting the esterification.

Extracting oils from seeds, etc. C. DOWNS and R. A. BELLWOOD. Brit. 278,145, Aug. 23, 1926. A thin layer of the crushed material is passed along within an enclosed chamber and repeatedly sprayed with solvent and subjected to suction to effect withdrawal of the solvent. An app. is described.

Refining cottonseed oil. D. McNICOLL (to British Oil and Cake Mills, Ltd.). U. S. 1,671,834, May 29. The oil is treated with sufficient of an aq. soln. of a borate such as borax or Mg borate to ppt. gossypol from the oil; the soln. also contains an added substance such as H_3BO_3 or glycerol which largely reduces the OH concn. normally possessed by the borate soln., so that coloring matter is pptd. without substantial neutralization of the fatty acid present.

Use of sulfonic acids as detergents. I. G. FARBERNIND. A.-G. Brit. 277,391, March 10, 1926. Sulfonic acids of cyclohexylnaphthalene and of isomeric methyl-

cyclohexylnaphthalenes, or similar sulfonic acids of aromatic polynuclear hydrocarbons substituted in the nucleus by a hydroaromatic hydrocarbon radical with at least 5 C atoms (directions for making which are given) are used instead of soap for washing, fulling or cleaning (e. g., removing spots from) fibers or fibrous materials.

Soap. J. R. POWELL (to Armour & Co.). U. S. 1,672,657, June 5. Soap is stabilized against rancidification by use of a condensation product of an aromatic amine such as aniline, toluidine or xylydine with CH_3O , AcH or other aliphatic aldehyde.

28—SUGAR, STARCH AND GUMS'

F. W. ZERBAN

The British beet sugar industry. A. J. V. UNDERWOOD. *Food Manuf.* 1, 76-77 (1927). E. H.

The algebraic theory of the extraction of juice by milling. NOEL DEBERR. *Intern. Sugar J.* 30, 247-59 (1928).—The development of the algebraic expressions obtaining in systems of simple and compd. imbibition is given and also expressions which may be useful in establishing standards of comparison whereby the operation of a milling plant can be studied and controlled, and the results of different mills can be compared.

W. L. OWEN

Notes on the method used to obtain seedlings of sugar cane in Hawaii. J. A. VERRET, A. J. MANGELSDORF, W. TWIGG SMITH AND U. K. DAS. *Intern. Sugar J.* 30, 80-2 (1928).—The freshly cut tassel-bearing stalks are preserved in a soln. of SO_2 until the seed becomes mature enough to plant. Selfing takes place in the SO_2 soln., and in a no. of instances it has been observed that the tassel had not emerged before the stalk was placed in soln. and isolated. The strength of soln. used is 0.03% of SO_2 in water, but Lahaina cane keeps longer in a soln. of 0.5 that strength.

W. L. O.

Determination of available sugar in cane. G. SYLMANS. *Algem. Synd. Suikerfabr. Nederland.-Indie, Handel. 10th congres, 1st Gedeelte, 15th Aftn.* 31 pp.—To get an idea of the sugar losses which take place between the cutting of the cane and the end of the milling operation, and also to calc. probable yields of fields to be cut, a method of cane sampling in the field is proposed, based on probability considerations and on actual tests. A field of about 8 bouws is divided into 200 plots. Cane samples are taken from 25 of these plots, distributed systematically. Each sample consists of 20 stalks; 4 of these samples are taken from every plot, and each is analyzed separately. For smaller or larger fields the system of sampling must be modified somewhat. The samples are ground in a power-driven lab. mill, juices and bagasse are weighed and analyzed, and the available sugar is detd. by the usual formulas. Examples of analyses are given. These show that precautions must be taken to prevent evapn. and loss of juice by spattering during the grinding operation. The sampling method may also be used to det. the degree of ripeness of cane in the field.

F. W. ZERBAN

Rapid and accurate determination of ash electrically using the "Salometer." ANON. *Intern. Sugar J.* 30, 205 (1928).—The detn. of ash in the different products, and at different stages of the sugar-manufg. process, is very important, but because of the time required for such analyses, these data have not been obtained as frequently and as systematically as they should. Recently, however, the detn. of ash by cond. methods has made great progress (cf. *C. A.* 21, 1025, 2569, 2394). An app. for detn. of ash, known as the "Salometer" has been recently devised. It consists of a bridge, giving direct readings in ohms, a pair of telephones, a hummer, 2 small dry cells and a pair of dipping electrodes of special construction.

W. L. OWEN

Determination of sulfur dioxide in sugars, golden sirup, glucose, etc. ANON. *Intern. Sugar J.* 30, 259-62 (1928).—In their investigation of the methods of SO_2 detn. in food products the Committee of Chemists in the Manufg. Confectioners Alliance had first distributed samples of confectioners glucose and starch among the members of the committee for analysis. The specified method consisted in the ordinary distn. with H_3PO_4 , collection of the distillate in I soln., using an ordinary still head and condenser. Some of the analyses were low, which was attributed to oxidation in the distg. flask, and to the escape with air in the receiving flask. Oxidation in the flask could be greatly decreased by boiling very rapidly but this necessitated the use of a special still head, and a bubbler form of adapter. A description of the special still head and adapter and of the method of operation is given.

W. L. OWEN

The Clerget coefficients in diastatic inversion. The point of easy filtration and the p_H of the reducing sugars formed. EMILE SAILLARD. *Chimie et industrie* 19, 599-601

(1928).—The work of various investigators on the detn. of the Clerget divisor is briefly reviewed. The amts. of SO_2 and of AcOH which must be added to beet juice to obtain easy filtration are chemically equiv. and correspond to a p_H value of 4.05. The amt. of inversion produced by this acidity in 1 hr. at atm. temp. is nil or negligible, while in 30 min. at 85° it may reach 0.27% reducing sugars.

A. PAPINEAU-COUTURE

A comparative standard for factory efficiency. S. S. PECK. *Intern. Sugar J.* 30, 198-201(1928).—Efficient factory operations depend principally on the results in 7 directions, viz., (1) a high extn. of sucrose from the cane by the mill, (2) clean mills, juice pans, etc., with a min. of deterioration of the expressed juice, (3) efficient clarification with the highest possible removal of non-sugars, (4) correct reaction of the juice to minimize inversion losses, (5) good equipment and no mech. losses as by entrainment, (6) low losses at the filter press station both as regards sucrose left in the cake, and destructive losses, and (7) a low-purity final molasses. The basis of comparison should begin with the sucrose % cane, which should be detd. by weighing the sucrose in the extd. juice, and adding this to the sucrose in the calcd. bagasse. The first juice expressed from the milling train, being the only one free from possibilities of deterioration, should be taken as the basis of the purity of the liquor to be treated. W. L. O.

Observations on the value of balancing the total soluble solids of the cane sugar factory. E. E. BATTELL. *Intern. Sugar J.* 30, 89-92(1928).—It is the general custom to base lab. reports of sugar-mill operations on a detailed account of the polarization losses at the several stations throughout the factory. The sum total of these losses and the polarization recovered in com. sugars is presumed to represent a balance of polarization % cane. For the purpose of ascertaining the actual relative technical value of different factories, this method may be improved upon by extending the balance sheet to include the total sol. solids. B. reconstructs the solids in the several products and by-products into terms of cane, and also calcs. the composite purity of the com. sugars plus the final molasses. The application of this system of control is illustrated by the example of 2 factories reporting yields of 12 and 11% of com. sugars, resp., from cane having the same % fiber, Brix of undild. juice, and purities of com. sugars and final molasses. Both factories report the same aggregate polarization loss % polarization of the cane. Evidently the factory obtaining 12% of com. sugar on cane is operated to better technical advantage than the other either by reason of more efficient equipment, or more skilful manipulation or a combination of these factors. The lab. reports based upon polarization balance do not disclose this variation in technical efficiency and it is of great technical importance for the cane sugar industry to adopt a system of reports which will include a balance of the total sol. solids received in the cane.

W. L. OWEN

Raw-juice strainer and unstrained juice pumps. W. J. DIEM AND CHAS. COWAN. *Intern. Sugar J.* 30, 72-5(1928).—The ordinary chain and slat type of juice strainer has always been regarded as a source of infection of mill juices and of much trouble otherwise, because of its inaccessibility, and the difficulty of repairing it. Before this type of strainer could be dispensed with, it was first necessary to elevate the juices intended for return maceration, and no pump has heretofore been found which would handle the unstrained juice holding a large amt. of cush-cush. In recent yrs. a pump has been developed which is capable of handling the unstrained juice from modern mills. These pumps are steam driven and direct acting, are self-cleaning, and there are no dead pockets in which juice may remain and become inverted. In a series of tests on the increase of acidity per 100 Brix through both tandems of a factory, the increase in acidity was much lower with the unstrained juice pump than in the mill equipped with the usual strainer. Juices from the 1st and 2nd mills are elevated by an unstrained juice pump, into the maceration juice distributor. These juices are distributed over a set of screens just below the distributor. The angle of these screens is adjustable, although the angle of 37.5° has been found to be best for the self cleaning of the screens. Four figures are given illustrating the design of the pump, and method of circulating the juices over the straining screens.

W. L. OWEN

The Gilchrist process of clarification. J. J. SEIP. *Intern. Sugar J.* 30, 82-4(1928).—While it cannot be stated positively that elec. neutralization, dehydration and adsorption are all involved in the customary defecation of cane juice with lime and heat, it is quite probable that they are. It is probable that adsorption of colloids by Ca phosphate plays a very prominent if not the largest part. The question is often raised of whether a greater elimination of colloids and non-sugars would result in the production of better grades of raw sugars. It has been conclusively demonstrated that cold liming of juice is subject to wide variations, from a p_H of 3.1 (burnt cane) to 9.5 and more. Even with the most modern methods of mixing it is not possible to distri-

bute the lime evenly in the raw juice and as a result alk. and acid zones exist. The Gilchrist process is designed to overcome the defects of cold liming and irregular mixing of lime in cane juices. When raw juices are heated to the isoelec. point of 5.0–6.1 p_H , the complex org. substances are coagulated. The 3 factors necessary for the efficient coagulation or flocculation of any liquor are (1) temp. control; (2) very slight excess of reagent (lime); (3) controlled agitation to build the flocs to their max. size. The advantages of hot liming with sucrate soln. are (1) it gives larger flocs, and inclusion of finer particles within the flocs; (2) better flocculation; (3) greater colloidal elimination as proved by dye values; (4) lighter colored juices; (5) better and uniform p_H control; (6) reduction of lime salts; (7) better quality of sugars; (8) greater recovery; (9) improved defecation of sirups.

W. L. OWEN

The removal of gums by various methods of clarification. MAURICE BIRD. *Intern. Sugar J.* 30, 196–7(1928).—A comparison is made of the gum content of the juices of 2 factories, one of which employed the superheating method of juice treatment, while in the other the juices were limed cold, and then heated to only 212° F. More gums were eliminated, by sodium phosphate treatment, from the juice which had not been clarified by superheating. With "superheat" the rise in recovery of sugar % sugar in the juice and the increase in filterpress cake % cane were very marked, and convincing of the removal of appreciable quantities of deleterious non-sugars by this treatment.

W. L. OWEN

Treatment of beet-sugar-factory effluents. O. SPENGLER. *Intern. Sugar J.* 30, 267–72(1928).—The simplest method of avoiding press and diffusion waste water effluents consists in their reutilization in the freshest state possible either separately or jointly after depulping and settling. But the org. acids increase in these effluents and contribute to the corrosion of the Fe app. The reutilization process is used in only a few places in Germany, and most factories are forced to discharge both kind of effluents, after clarifying them, into the rivers. Certain methods such as the Proskowetz process, and the Heinhold process in which the waste water is treated with milk of lime and then run into settling ponds, from which it is later discharged to a shallow drained irrigation field, and then stored in tanks, are no longer employed. The Moller-Folsche process depends upon the fermentation of the effluents in special ponds followed by the addn. of lime and then treating on irrigation fields, but this process has great disadvantages also. It is now generally considered advisable and cheapest to treat the various effluents separately, the particular method to be adopted depending upon local conditions. Some of the German factories store the diffusion and pulp press water in ponds of sufficient capacity to receive all the water used during the campaign. A factory with a daily production of 1750 tons should have ponds with a capacity of 140,000 cu. ft. According to the latest developments there are 2 methods for the disposal of the most troublesome effluents, the pulp press and diffusion waste water, the double fermentation or Hildesheim process, and the fermentation and putrefaction or Salzwedel process. The double fermentation process consists of a repeated fermentation process during which the carbohydrates are decomposed and transformed.

W. L. OWEN

Treatment of effluents from beet sugar factories. B. J. OWEN. *Intern. Sugar J.* 30, 75–80(1928).—The normal sugar factory in Great Britain operating the diffusion process for 3 months in the yr. at the rate of 1000 tons per day discharges approx. 3.5 million gallons of effluent daily from all of its processes. This consists of: (1) conveying and washing water; (2) diffusion waste water; (3) pulp press water; and (4) general waste water from the washing of floors, etc. The conveying and washing water, which is by far the greatest portion of the effluent, and which contains besides earth, small roots, etc., considerable amts. of dissolved and suspended org. matter, is now regarded as the most objectionable of the effluents. The 1st step in the disposal of these effluents is the removal of the suspended matter before any decompn. can take place. Further treatment of the bright effluent is then necessary in order to reduce the org. matter in soln. to such an extent as to render it innocuous. This may be done by 2 methods, viz., (1) treatment either biol. or chem. so as to bring the whole of the effluent to a condition which insures its discharge into any river without objectionable results, (2) a system of recirculation of the clear bright effluent so that only a small proportion if any need be discharged into the river. The plant used in the expts. was a Brackett 2-stage cup-type screen and a Pennell Wyllie filter. Uniformly successful results were obtained. With the normal effluent from the beet wash the screen removed all but the fine mud. The larger mesh retained the whole of the beet tails and leaves in a cleaned wash condition. Trials with the filter consisted in pumping the screened effluent at the rate of 600 gallons per hour through the 4 strainers and 2

scrubbers. With the addn. of 90 grains of lime per gal. a clear bright effluent was obtained, colorless and contg. no suspended matter. W. L. OWEN

Extracts from a laboratory note book. J. P. OGILVIE. *Intern. Sugar J.* 30, 120-6 (1928).—There are 2 classes of *decolorizing vegetable carbons* on the market at the present time, viz., (1) very expensive and powerful carbons which are not intended to be revived, and (2) less expensive carbons, which are less active, and which require a special installation for their revivification. The method used in detg. the decolorizing power of these substances is to compare their effects upon a standard molasses soln. with that of a standard C, e. g., Carboraffin or one of the grades of Norit. After mixing the carbons in the soln. to be treated, the latter are placed in a water bath at 95° for exactly 15 min. Among the carbons giving the highest decolorizing power are "Carboraffin," "Anticromos," "Supra Norit 5X," "Supra Norit 3X" and other grades of Norit, "Suchar," "Radit," etc. The desideratum of refiners is a C which is cheap enough to throw away, after one use, and which will adsorb 10-20 times as much color as bone black. Comparisons of the decolorizing values of some infusorial earths have shown that a German sample has an equivalent of 8, as referred to "Superior Norit" as a standard. The value of $\text{Na}_2\text{S}_2\text{O}_4$ in sugar manuf. makes its analysis of considerable importance. Of the various methods used the iodometric titration method is to be preferred, because results are not vitiated by the presence of bisulfites. When the cost of hyposulfites and bisulfite is considered in reference to their comparative decolorizing powers it would seem that the latter would prove the cheaper decolorizing agent. From analyses of many samples of lime, it has been found that many of them are too high in org. impurities. The quality of kieselguhr can best be detd. by the estn. of its apparent d., its performance under the subsiding test, and the observation of its microscopical appearance. The detn. of As in materials used in the manuf. of sugar is desirable especially as regards lime, coke, S and superphosphate. W. L. OWEN

Distilling vinasses (Brit. pat. 277,932) 16. Decolorizing sirups (Brit. pat. 278,485) 13.

THIEME, JOHANN GOTTFRIED: *Studies in Sugar Boiling*. Translated from the Dutch by O. W. Willcox. New York: Facts about Sugar. Price \$3 00.

Refining sugar. RAFFINERIE TIRLEMONTAISE SOC. ANON. Brit. 278,302, Sept 30, 1926. Sugar crystals which are practically freed from adhering sirup but which are not quite colorless are decolorized by mashing with a satd. or nearly satd. colorless sugar soln. The soln. is removed after decolorization of the sugar is effected and may be then decolorized for treating another batch of sugar.

Apparatus for bleaching saccharine solutions by gases from burning sulfur. C. G. SONGY and P. G. SONGY. U. S. 1,671,844, May 29.

Saccharifying wood. INTERNATIONAL SUGAR & ALCOHOL CO., LTD. Brit. 278,450, July 9, 1926. Highly concd. HCl such as 40% acid and HCl gas are employed and sufficient HCl is used to convert only a portion of the cellulose; the acid-moistened mass is then treated in a second stage of the process with HCl of somewhat lower concn. (suitably about 38%) to complete the saccharification.

Saccharification of wood. E. FARBER and T. W. M. POND. Can. 276,843, January 3, 1928. Wood is converted into sugar by first treating the wood with concd. HCl and HCl gas in quantities insufficient to effect the complete conversion into sugar, and then completing the conversion by treatment with HCl of medium concn.

Starch from corn. PENICK & FORD, LTD. Brit. 277,400, April 19, 1926. The bulk of the water which has passed over the starch tables and has afterward been sepd. from the gluten is sterilized to avoid fermentation, and is reused with make-up water to treat fresh starch-bearing material. Numerous details are described and a flow-sheet of the process is given.

Starch from corn. CORN PRODUCTS REFINING CO. Brit. 277,572, April 8, 1927. Corn or other starch-bearing material is steeped and disintegrated, germs, bran and fiber are sepd., the starch is tabled to remove gluten and water, filtered with fresh water to remove solubles and the water from the gluten is used for treating further material (a part in the steeping and a part in the germ and coarse slop prepn.), while the filtrate from the starch is preferably heated and used in the fine slop sepn. An app. and numerous details are described.

29—LEATHER AND GLUE

ALLEN ROGERS

Critical study of the biochemistry of soaking. I. Study of the changes occurring within the skin. E. R. THREIS AND E. L. McMILLEN. *J. Am. Leather Chem. Assocn.* 23, 226-33(1928).—Cured domestic hide, cut into $\frac{1}{8}$ in. cubes, was soaked from 0 to 120 hrs. at 25°, and changes in distribution of N, according to the methods of Hausmann and of Van Slyke, were detd. Amide and melanin N remains constant, N of non-basic amino-acids increases, and N of basic amino acids decreases, due to decompn. of arginine, lysine, and histidine by bacterial or enzyme action. Amino N of monobasic acids increases, and imino N decreases.

H. B. MERRILL

Depilation by means of the enzymes of the mold. GIORGIO ABT. *Conceria* 35, No. 1000, Tech. Pt. 33-37(1927); cf. *C. A.* 22, 1056.—The protease produced by *Aspergillus oryzae* causes a very efficient depilation. The hide is immersed for 24 hrs. in a 1% infusion of "Piltan," a dry powder contg. the enzyme. The temp. must be above 20°, as the protease loses its activity below 18-19°. As an antiseptic, 0.4% boric acid and 0.4-0.8% NaHCO_3 are added. The optimal p_H for the protease to act on hides is around 8.0.

GUENTER SCHWOCH

New method for determination of insolubles in tanning extracts. ANDREW TURNBULL. *J. Am. Leather Chem. Assocn.* 23, 224-5(1928).—The liquor, dild. to the usual analytical strength, is filtered on a Buechner funnel provided with a fretted glass filter disk with the aid of kaolin. Results yielded are somewhat lower than those yielded by the filter candle, and considerably lower than those yielded by the filter paper method.

H. B. MERRILL

Utilization of tanning materials containing a large amount of soluble nontannins. V. S. SADIKOV AND P. A. YAKIMOV. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 6, 40-63.—While the bark of badan (*Saxifraga crassifolia*, *Bergenia crassifolia* Engl.) is as rich in tannins as quebracho, it gives an aq. ext. which is so rich in substances which cannot be absorbed by hides that its utilization in tanning is impracticable unless the tannins and the non-tannins are sepd. from one another. To effect this sepn. 2 methods have recently been proposed, namely that of A. I. Smetkin and that of P. A. Yakimov. An investigation has shown that both methods have serious defects and a new method, which is based on the methods of Smetkin and Yakimov, has been worked out by the authors. The finely powdered bark of badan is treated in the cold with the calcd. quantity of Ca(OH)_2 needed to bind only the most sol. part of tannins which is capable of dissolving in cold water. Then the mass is treated with cold water in closed vessels under a layer of water so as to prevent the oxidation of tannins, which is very apt to take place in alk. soln. Almost the total amt. of non-tannins, which consists of crystalloids, diffuses through the cells of the bark and dissolves. Next comes the treatment of the solid mass with hot water in the presence of oxalic acid or of NaHSO_4 taken in the quantity necessary to decompose the Ca tannate formed, which adheres to the cells. A series of lab. expts. shows that it is possible in this hot-water extn. to obtain valuable exts. contg. tannins and non-tannins in the ratio 5:1 instead of the ratio 0.9:1 obtained by an ordinary aq. extn.; the ext. contains over 60% of the tannins originally present in the bark. The cold-water ext. which belongs to the first treatment by this method contains 30% of all the tannins and about 6% of the sugar. The new method has been applied also to other Russian tanning materials, particularly to *Skalice gmelini*, which contains tannins and nontannins in the ratio 2:1, *Polygonum alpinum*, *Rheum tataricum*, *Rumex confertus*, *Salix acutifolia* (ivy), pine bark. The results obtained on a lab. scale were very satisfactory. Numerous tables and detailed exptl. data are given. The method has not yet been tried on a factory scale.

BERNARD NELSON

Russian resources in tanning materials. P. A. YAKIMOV. *Trans. State Inst. Applied Chem. (Moscow)* 1927, No. 6, 5-39.—In 1925 U. S. S. R. has consumed 34 thousand tons of tanning materials of which 80% were imported from abroad. In view of this unsatisfactory position Y. made a study of the possibility of greater utilization of indigenous Russian plants for tanning purposes. Practically all these plants contain a very high proportion of non-tannins extractible together with tannins, thus lowering the value of exts.

BERNARD NELSON

Titration of tannic acid. S. KRISHNA AND NATHU RAM. *Ber.* 61B, 771-ON(1928).—Tannic acid gives an orange ppt. with an excess of acid TiCl_3 soln. The excess of TiCl_3 may be titrated back with a known ferric alum soln. Gallic, salicylic and mandelic acids also ppt. with TiCl_3 but the ppt. is sol. in dil. HCl , whereas the tannate is dissolved

only by HCl more concd than 2N This new method shows that the titration with hide powder gives only 90% of the tannates present, and that this titration should not be used when gallic acid is present, because the latter is adsorbed on the hide substance. The $TiCl_3$ method has been successfully used to titrate the tannins in the extracts of various barks containing tanning and non-tanning hydroxy acids.

A. L. HENNE

Working up chrome-leather scrap for glue or fertilizer. HERMANN STADLINGER. *Chem.-Ztg.* 52, 305-7(1928).—A review of patent literature.

H. B. MERRILL

Flexing tests for leather. LLOYD BALDERSTON. *J. Am. Leather Chem. Assocn.* 23, 221-3(1928).—Flexing tests are used as a means of estg. the relative longevity of different belting leathers. Test pieces are secured at their lower ends to a bar free to move in vertical guides and at their upper ends to a bar which oscillates through a total angle of 270° at a rate of about 100 flexes per min. After 1,000,000 flexes the loss in tensile strength is detd. by comparison with an unflexed strip. Loss in tensile strength varies from 0 to 75%. Correlation of results with the probable life of a belt is difficult, due in part to the excessively small radius of curvature of a flexed portion of test strip, which makes the test much more severe than actual working conditions, particularly for thicker leather.

H. B. MERRILL

A theory of leather dyeing. H. SALT. *J. Soc. Dyers Colorists* 44, 134-6(1928).—An address and discussion in which recent work on the theories of leather dyeing are reviewed. Leather dyeing is a chem reaction and can be explained from the chem. point of view.

L. W. RIGGS

Purifying tannery wastes. J. T. TRAVERS. U. S. 1,672,586, June 5. Reaction is effected between acid and alk. wastes and the waste is freed from suspensoids pptd. as a result of such reaction, after removal of these suspensoids, the waste is treated with a reagent such as $FeSO_4$ or $Al_2(SO_4)_3$, capable of pptg colloidal and finely suspended materials and liberating nascent O and the latter is permitted to effect further purification and the pptd. colloids are coagulated.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Rubber inventions and processes. ANON. *Bull. Rubber Growers' Assoc.* 10, 237-9(1928)—Seven British patents are described

C. C. DAVIS

The Italian rubber industry. H. B. NEWMAN. *Rubber Age* (N. Y.) 23, 203-4 (1928).—A survey of present developments.

C. C. DAVIS

Use of "Moac" in the rubber industry. RUDOLF DITMAR. *Caoutchouc & gutta-percha* 25, 13,968(1928)—"Moac" is a very finely divided form of mica which when used as a dusting agent gives a silky luster resembling that of Al powder. Because of its ability to increase the dielec. const. of rubber when used as a filler, it is also useful in rubber goods for elec. use. When the surface of rubber is swollen slightly with C_6H_6 and "Moac" is rubbed in, the rubber is protected from subsequent oxidation.

C. C. DAVIS

Earlier observations and new hypotheses on (the structure of) rubber. J. DUGUÉ. *Rev. gén. caoutchouc* 1928, No. 40, 3 9.—A review of various aspects of the subject is followed by the development of a new hypothesis to explain the tackiness, plasticity, elasticity, hysteresis and structure of raw rubber. This is based on chem. activity resulting from a peculiar spatial arrangement of the atoms in the rubber mol., a unique structure which is most comprehensible by reference to the original spatial diagrams.

There are no double bonds and the mols. are constructed of $\begin{matrix} H_2C & & CH_2 \\ & \diagdown & / \\ & C & \\ & / & \diagdown \\ H_2C & & CH_2 \end{matrix}$ nuclei.

Within the mols these nuclei are united through the CH_2 groups, but on the extremities or on the exterior (depending on the spatial structure), certain CH_2 groups are unsatd. and exert forces of attraction which, in the presence of other similar groups, are manifest as tackiness. With this as a basis, the other characteristic properties are explained

C. C. DAVIS

Investigations of sodium fluosilicate. I. R. VAN DILLEN, C. KNAUS, G. M. KRAAY AND R. REHL. *Arch. Rubbercultuur* 12, 61-125(1928). (In shorter form in English 126-54.)—The investigations include a study of the most economic method of coagulation with Na_2SiF_6 , the corroding action of Na_2SiF_6 on Al, the relation between the pH value and coagulation, the influence of Na_2SiF_6 on the phys. properties of rubber, and the in-

fluence of Na_2SiF_6 on the tendency of rubber to become moldy. Though too close a comparison between the small and large scale expts. is not justified, owing to certain variables in the methods and technic on different plantations where the expts. were made, the large no. of expts. warrant certain general conclusions. Coagulation with Na_2SiF_6 of latex contg. more than 15% dry rubber was nearly always incomplete, the serum remaining milky, and contg. rubber even on standing 24 hrs. after a large dose of Na_2SiF_6 . Latex with only 12% rubber was completely coagulated in 24 hrs. and sometimes in a shorter time. In all expts. 8–10 g. of Na_2SiF_6 per kg. of dry rubber were required for the satisfactory coagulation of latex contg. 12% rubber, and even then the serum was sometimes milky. In general the coagulating power of Na_2SiF_6 was very sensitive to small variations in the state or compn. of the latex, e. g., its p_H value. Expts. showed that Na_2SiF_6 solns. have an acid reaction (cf. *J. prakt. Chem.* 32, 300 (1885)) because of hydrolysis, e. g., 0.1 and 0.5% aq. solns. showed p_H values of 3.1 and 3.4, resp., at 30.5°. The clearness of the serum and its p_H value were closely related, the most complete coagulation, without loss of rubber, occurring in the range p_H 4.4–4.5. This range is most readily controlled by diln. of the latex. This acid reaction causes aq. Na_2SiF_6 to attack Al, so that Al equipment is impracticable. Comparative tests of the loss of wt. of Al in different solns. for 24 hrs. showed the following % losses: water, 0.0; 0.5% Na_2SiF_6 , 0.2; 0.1% Na_2SiF_6 , 4.6; Na_2SiF_6 serum, —0.9; 5% MgSiF_6 , 0.1; 0.1% MgSiF_6 , 2.8; 2.5% HCO_2H , 0.2; HCO_2H serum, 0.0; 5% AcOH , 0.1; 5% NaHSO_3 , 2.6. The gain in wt. with Na_2SiF_6 serum was due to a deposit on the Al. This Na_2SiF_6 serum subsequently ppts. a white flaky substance contg. 43% ash. The variable losses with different concns of Na_2SiF_6 and of MgSiF_6 depend upon the deposition of products on the Al, which temporarily protect the latter from further attack. The influence of Na_2SiF_6 on the formation of air bubbles remained unsettled, though evidence indicated that it tends to diminish bubble formation. Aside from a tendency to retard the rate of vulcanization, Na_2SiF_6 had no material effect on the phys. properties of rubber. An advantage of Na_2SiF_6 was found to be its bleaching action, as a result of which only about 0.5 the usual quantity of NaHSO_3 need be used for producing pale crepe. On the other hand Na_2SiF_6 caused a temporary stickiness during creping of the coagulum, but this was no longer manifest in the dried crepe. Used as a coagulant alone or in combination with acid, Na_2SiF_6 had no influence on the tendency of rubber to become moldy, whereas immersion of sheeted rubber for a short time in concd. aq. Na_2SiF_6 greatly diminished any subsequent growth of mold. Certain evidence, however, showed that this immersion increased the formation of air bubbles, in which case the economy of Na_2SiF_6 as a disinfectant is seriously impaired. The advantages of Na_2SiF_6 as a coagulant rest on its use in the solid form, its tendency to reduce air bubbles, and its economy compared with HCO_2H ; its disadvantages are the necessary diln. of the latex and the consequent larger app., and its corrosive action on Al app. Though coagulation by Na_2SiF_6 is cheaper than by HCO_2H , its general use is not recommended at present, and only where abnormal air bubble formation is encountered is it recommended as a coagulant, and only in cases of serious moldiness is immersion in aq. Na_2SiF_6 recommended. C. C. DAVIS

The behavior of Prussian blue and some other ferrocyanides in rubber. J. R. SCOTT. *India Rubber J* 75, 549–50 (1928).—The investigation includes (1) the effect of Prussian blue (I), Turnbull's blue (II), $\text{Pb}_2\text{Fe}(\text{CN})_6$ (III) and $\text{Zn}_2\text{Fe}(\text{CN})_6$ (IV) on uncured rubber; (2) the behavior of I and II during mixing and (3) the effect of I, II, III and IV on the phys. properties of cured rubber. The particle size of III and of IV were 1.3 and 3.5 μ , resp. I and II had a particle size of approx. 0.25 μ , but whereas I dispersed easily and completely, II dispersed only with difficulty and incompletely, the reverse of their behavior in water. Their dispersion was not influenced by the presence of S in the rubber. However, rubber contg. I but no S became soft and sticky when milled, whereas rubber-I-S mixts. were too tough and elastic to sheet. The latter effect was not a result of incipient vulcanization, for analysis showed the absence of combined S. When stored for a few weeks or heated to 90° for 1 hr., rubber-I mixts. became very soft and fluid, while rubber-I-S mixts. became tougher and more elastic, changes probably identical with those occurring during mixing. When immersed in C_6H_6 , rubber-III and rubber-IV mixts. became viscous and diffused slowly, and in general they behaved like masticated raw rubber. On the other hand, rubber-I and rubber-II mixts. retained their structure, swelled at a continuously diminishing rate and in general behaved like slightly vulcanized rubber or rubber-C black mixts. Rubber-I, rubber-II, rubber-III and rubber-IV mixts. with and without S, and in turn with and without quinol (as antioxidant) were stored in air and *in vacuo*. In air and without S or antioxidant, I and II accelerated oxidation so that the rubber-I and rubber-

II mixts. became tacky and resinous, whereas **III** and **IV** were without influence, showing that ferrocyanides as a class do not accelerate the oxidation of rubber. The oxidation induced by **I** and by **II** is greatly retarded, though not inhibited, by **S** and by an anti-oxidant. Rubber-**I** and rubber-**II** mixts. appeared black by reflected light, and the n values of **I** and **II** were found to be 1.55 and 1.54, resp., the same as rubber, so that the mixts. appeared black for this reason. With the addn. of a white pigment, however, the mixts. became blue. On hot vulcanization, rubber-**S** mixts. contg. **I** and **II** became green and brown-green, resp., as a result of decompn. of **I** and **II** by heat, rubber, rubber resin and **S**. **I** and **II** did not have a reinforcing effect in keeping with their fineness, but no evidence could be found that this was a result of agglomeration. C. C. D.

The rotatory power and the melting point of the resins in gutta-percha, balata and allied gums. S. MINATOYA AND H. KANEKO. *Researches Electrotech. Lab.*, Tokyo, Japan, No. 223, 18 pp. (1928).—The authors collected 26 kinds of gutta-percha, 8 kinds of balata and 3 varieties of allied gums, such as African flake, jelutong and re-boiled jelutong. Their resinous substances were sep'd into the following 3 groups by means of soly. differences in abs. alc.: (1) fluavil, (2) spherical alban, (3) needle alban. The rotatory power and the m. p. of these 3 groups of resins in all the samples were det'd. The results of the expts are summarized as follows. The m. ps. of fluavils of gutta-percha lie between 37° and 90° and they can never be found in liquid form at room temp. Fluavils of balata, on the other hand, are always obtained in liquid form at room temp. with only 1 exception, the fluavil of F. A. Q. Iquitos reboiled block balata has a m. p. of 43°. The m. ps. of spherical alban of gutta-percha lie between 54° and 200°. The needle alban content in gutta-percha is generally so small that the m. p. detn. is difficult, but 2 kinds of gutta-percha, i. e., Kamper white and Siam white, contain just enough of the needle alban to measure the m. ps., which were 192° for Kamper white and 90–96° for Siam white. Generally speaking, the m. ps. of needle alban are higher than those of spherical alban. The quantity of spherical and needle alban in balata is insufficient to det. the m. p. The $[\alpha]$ values of fluavils of gutta-percha lie between 32.23° and 58.33°, with 2 exceptions, Bagen Seen and Pokan Seen. The $[\alpha]$ values of the resins of the latter 2 kinds are very low, like with those of balata; i. e., 21.66° for Bagen Seen and 18.00° for Pokan Seen. The $[\alpha]$ values of fluavils of balata, however, are generally low and lie between 13.83° and 37.33°. The $[\alpha]$ values of spherical alban of gutta-percha lie between 39.20° and 56.75°, while those of balata lie between 20.00° and 35.00°. The needle alban of gutta-percha and balata are not only insufficient in quantity to det. the specific rotation, but are difficult to dissolve in solvents, such as C_6H_6 , for the purpose of measuring optical rotation. W. OGAWA

Puncture proofing pneumatic tires. CHAS. E. MULLIN. *Textile Recorder* 45, No. 538, 65(1928).—A discussion of the products offered and the results obtained.

Automatic regulator for vulcanizers. ANON. *Engineering* 125, 406(1928).—The app. which is described and illustrated (Drayton Regulator and Instrument Co., W. Drayton, England) automatically controls the rate of increase of temp. to a max., maintains the temp. const. at this max. point for the desired period of time and at the termination of the cure shuts off the steam supply, signalling the completion of the operation. C. C. DAVIS

Studies of the aging of vulcanized rubber. IV. Relation between wave length of light and the deterioration of vulcanized rubber. TAKEJI YAMAZAKI. *J. Soc. Chem. Ind. Japan* 30, 804–13(1927).—Samples of vulcanized rubber were exposed to sunlight filtered through 1 of 4 glass plates, which were transparent down to 2900 Å. U., 3130 Å. U., 3300 Å. U. and 4360 Å. U., resp. Since heating of the sample by the light was unavoidable, the effect of heating alone was exam'd. in control expts., in which the sample was kept at 70–71° for 150 hrs. in darkness. The color of the rubber became darker by mere heating, but when the rubber was exposed to sunlight at 60–70°, the change in color was far more remarkable. The higher the degree of vulcanization, the greater was the change in color. Moreover, the rubber was hardened by the action of light. The shorter the wave length of the light and the higher the temp., the sooner did hardening occur. The action of light of 4300 Å. U. was very weak, except for over-vulcanized rubber, which was noticeably hardened even by light of longer wave length. The acetone ext. increased with the time of exposure, the rate of increase being less when light of longer wave length was used. In some cases, the acetone ext. reached a max. and then decreased. It was considered that increase in acetone ext. was due principally to the oxidation of the rubber, and that the decrease in acetone ext. by the further exposure was due to a change in part of the oxidized products into substan

insol. in acetone. A remarkable decrease in free S by the action of light and heat was also noticed. Y. NAGAI

Soil erosion [in rubber cultivation] (ASHPLANT) 15. Thermoplastic compositions for shoe toe stiffeners (Brit. pat. 277,719) 18.

Rubber. G. H. CARNAHAN (to Intercontinental Rubber Products Corporation). U. S. 1,671,570, May 29. Guayule plant or similar material is ground in successive stages with different proportions of water, to sep. rubber, bagasse and "cork." An app. is described.

Coagulating latex. BATAAFSCHE PETROLEUM MAATSCHAPPIJ AND F. R. MOSER. Brit. 278,395, April 7, 1926. Natural emulsions such as rubber latex are coagulated by the method described in Brit. 245,418 (C. A. 21, 319). Rubber latex contg. NH_4 is added to a soln. of AlCl_3 and the colloidal $\text{Al}(\text{OH})_3$ formed produces a protected dispersion of the latex. Fillers, vulcanizers, accelerators, preservatives and the like may be added.

Treating latex, etc. K. D. P., LTD. Brit. 277,373, Sept. 10, 1926. Latex or similar material (which may be mixed with fillers) is dried while continuously exposing new surfaces and heating the mass, *e. g.*, on rollers or endless belts or by slitting and folding a rolled sheet.

Compounding latex with fillers. K. D. P., LTD. Brit. 277,374, Sept. 10, 1926. In compounding latex with active fillers such as lampblack the filler is added while the latex is manipulated continuously to expose fresh surfaces and with simultaneous drying. A mixt. may be formed of rubber as latex 100, tar 5, ZnO 20, S 3, and palm oil 0.6 parts and 200 parts of gas black may be added to this gradually while drying.

Rubber coatings. K. D. P., LTD. Brit. 277,375, Sept. 10, 1926. Surfaces such as those of wood, metal, stone or leather are sprayed with latex and water is simultaneously evapd. from the latex by application of heat. The compn. of the latex may be varied during the spraying to produce films of varying characteristics.

Molded rubber articles from latex. E. A. HAUSER (to K. D. P., LTD.). Brit. 277,376, Sept. 10, 1926. Latex is sprayed onto the surface of a mold and water is simultaneously evapd. by heating. Artificial dispersions as well as natural latex may be used and auxiliary ingredients may be added and reinforcing fabrics or the like may be embedded in the material for making tires or other articles.

Composite rubber sheet patches for tires, etc. R. D. KAMDM and J. LEADBITTER-SMITH. Brit. 278,192, Oct. 25, 1926. A glass plate or former is dipped into rubber soln. to form a layer and a sheet of vulcanized rubber previously treated with rubber soln. until tacky is pressed on the layer. Subsequently the materials are stripped from the glass.

Fiber-reinforced rubber articles. W. B. WESCOTT (to Rubber Latex Research Corporation). U. S. 1,671,914, May 29. Fibrous material such as a "fabric," felt or bat is passed through a latex bath into an acid bath, coagulation is permitted, the article is pressed to remove water, washed, and dried *in vacuo* to a subnormal moisture content at about 65° and compressed while still warm.

Polymerized vinyl alcohol. W. O. HERRMANN and W. HAEHNEL (to Consortium für elektrochemische Industrie). U. S. 1,672,156, June 5. Vinyl esters such as the acetate or propionate are polymerized, *e. g.*, by use of benzoyl peroxide, and the polymerized esters are treated with an alk. reagent such as KOH and alc. Cf. C. A. 21, 3369; Whitby, McNally and Galloway, C. A. 22, 2079.

Rubber-like polymerized terpene product. W. B. PRATT (to Dispersions Process, Inc.). U. S. 1,671,314, May 29. A polymerized terpene of the general type formula $(\text{C}_5\text{H}_8)_n$, capable of reacting with S and which may be formed from isoprene is dispersed in particles of colloidal size coated with hydrophilic protein films such as albumin or casein and the latter are tanned, *e. g.*, by use of tannin, to increase their strength and toughness, the particles are coagulated and the coagulated mass is sep'd. and dried. The product thus obtained is suitable for some uses similar to those of rubber.

Vulcanizing balls, tire tubes or other closed hollow rubber articles. W. L. FAIRCHILD. Brit. 277,410, June 14, 1926. Mech. features.

Apparatus for vulcanizing rubber tires. AKRON STANDARD MOLDING CO. Brit. 277,851, Jan. 6, 1927.

Apparatus for vulcanizing tire tubes, etc. O. J. KUHLEK (to Kuhlke Co.). Brit. 277,934, Sept. 21, 1926.

Vulcanizing rubber. W. P. TER HORST (to Rubber Service Laboratories Co.).

U. S. 1,672,548, June 5. A tetrasubstituted guanidine such as dipiperidylguanidine is used as an accelerator.

Vulcanizing rubber. L. B. SEBRELL (to Goodyear Tire & Rubber Co.). Brit. 278,689, Oct. 8, 1926. Vulcanization accelerators comprise reaction products of mercaptans or their derivs. and basic N compds. such as NH_3 or di-Et, Pr and Bu amines, e. g., the reaction product of mercaptobenzothiazole and ethylenediamine or the diphenylguanidine salt of mercaptobenzothiazole. Cf. *C. A.* 22, 512.

Vulcanizing rubber. L. B. SEBRELL and C. W. BEDFORD. Can. 277,225, January 17, 1928. Rubber is vulcanized in the presence of a metallic salt of mercaptothiazole.

Vulcanizing rubber. P. M. PAULSON. Can. 276,866, January 3, 1928. Rubber is combined with a vulcanizing agent and an accelerator consisting of a guanidine substituted on but 1 N atom and whose substituents contain a total of more than 6 C atoms.

Vulcanizing rubber. LIVERPOOL RUBBER CO., LTD. AND F. AMENDE. Brit. 278,064, June 26, 1926. An app. is described comprising a vulcanizing chamber heated by steam pipes or the like and also by preheated air or other gas which is circulated through the chamber.

Preventing adhesion of unvulcanized rubber sheets. K. MEDGYES. Brit. 277,928, Sept. 25, 1926. Dusting preps. are used which lose their antiohesive properties when the sheets are die-stamp welded with hot tools, so that there is no weakening of the welded seams. Among the substances which may be used are: C_{10}H_8 , acetanilide (in alc. soln.), $(\text{CH}_3)_6\text{N}_4$, thiocarbonylurea (in aq. suspension) and org. metal salts such as fatty acid salts of Pb or Zn.

Rubber-like vulcanized polymeric vinyl compounds. W. O. HERRMANN and W. HAEHNEL (to Consortium für elektrochemische Industrie). U. S. 1,672,157, June 5. Polymerized products such as may be obtained from vinyl alc. or vinyl acetate are vulcanized with S chloride. Cf. *C. A.* 21, 3767; Whitby, McNally and Gallay, *C. A.* 22, 2079.

Reclaiming and dispersing vulcanized rubber. T. G. RICHARDS and G. P. F. SMITH (to Dispersions Process, Inc.). U. S. 1,671,316, May 29. The material is heated under pressure with an alkali such as NaOH soln. and with "cumar" or other softener and resin oil to produce a plastic mass contg. sufficient soap, formed *in situ*, to permit dispersion by manipulation in water, and dispersion in water is then effected, to obtain a product which is suitable for use as a reclaimed rubber.

CHEMICAL ABSTRACTS

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1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

"Greasy" burets. W. LOWSON. *Nature* 121, 14(1928).—Inaccuracy due to "greasiness" is avoided by the addn. of a trace of saponin to standard acid. R. C. A.

Laboratory thermostat. MARIO COPPOLA. Reale Scuola d'Ingegneria Napoli. *Ann. chim. applicata* 18, 97-8(1928).—The const.-temp. thermostat which is described and illustrated is heated electrically or is cooled by brine; and is equipped to carry numerous flasks on revolving wheel supports, thereby furnishing agitation. Numerous other accessories add to the efficiency and convenience of the thermostat. E. C. D.

Automatic apparatus for the determination of small concentrations of sulfur dioxide in air. MOYER D. THOMAS AND ROBERT J. CROSS. *Ind. Eng. Chem.* 20, 645-7(1928).—An automatic app., in both stationary and field types, has been constructed to analyze continuously air contg. SO_2 in concn. from 0.1 to 60 p. p. m. The method checks satisfactorily with the Selby method. Expts. have also been made to det. the stability of *I soln.* and its efficiency in absorbing SO_2 . T. S. CARSWELL

Design of equipment for measuring the specific volume of carbon dioxide vapor. C. H. MEYERS. Bur. Standards. *Refrigerating Eng.* 15, 157-8(1928).—The most authoritative data on sp. vol. of CO_2 vapor are accurate to only 0.5%. This is not sufficiently accurate for calcg. tables of thermodynamic properties of CO_2 . M. choses essentially the equipment which was used for detg. sp. vol. of superheated NH_3 . The containers are of Monel metal brazed with silver solder, one 600 ml. capacity for lower pressures and the other 60 ml. capacity for higher pressures. The bath liquid is circulated by a centrifugal impeller. A Pt resistance thermometer measures the temp. of the bath liquid while thermocouples will be used to measure the temp. of the CO_2 in the tube connecting the container with the manometer. A diagram of the app. is shown. H. F. ZOLLER

Apparatus for determining melting points. S. AVERY. *Ind. Eng. Chem.* 20, 570(1928).—A Thiele tube is lengthened and the branch which does not carry the thermometer is modified to carry a propeller agitator, with which the liquid in the tube is circulated. T. S. CARSWELL

An apparatus for demonstration of heat conductivity of hydrogen. E. SOKOLOWA. *Z. allgem. anorg. Chem.* 170, 128(1928).—A carbon lamp is so arranged that either CO_2 or H_2 may be admitted or mixts. of the 2 gases. The glow observed indicates relative heat capacities of the gases. A figure of the app. accompanies the article. R. H. LAMBERT

A simple apparatus for the determination of water in bleaching powder, jelly, etc. T. SOMIVA. *J. Soc. Chem. Ind. (Japan)* 31, 213-6; *Suppl.*, 59B(1928). [In English].—S. has improved the app. for water detn. devised by Dean and Stark (*C. A.* 14, 2145) and by Kafuku, by attaching a 3-way cock and a siphon to the bottom of the graduated tube to return the solvent automatically to the flask. With this app. H_2O was detd. in bleaching powder and millet-jelly, with such solvents heavier than H_2O as CCl_4 , C_2Cl_4 , etc. The accuracy of this method is nearly the same as that of the methods already known; the simplicity of the app. and the procedure and the shortness of the time required for the detns. are the merits of this method. Y. TOMODA

Laboratory apparatus for fractionating mixed liquids. THEODOR HÖPNER. *Chem.-Ztg.* 52, 389-90(1928); 3 cuts.—The atm. condenser is fused on the side of the neck and is provided with an elec. heater for high-boiling oils. The app. is suitable for the distn. of tar oils. J. H. MOORE

A mold for casting cylinders of fine powders. J. K. MORSE. *J. Optical Soc. Am.* 16, 380-1(1928). E. J. C.

Cover-glass for conducting microchemical reactions in the Zeiss quartz cell. J. JOCHIMS. *Z. wiss. Mikroskop.* 44, 214-6(1927). H. G.

Stirrer for rapid electroanalysis. H. ROM. *Chem.-Ztg.* 51, 985(1927).—The

stirrer consists of a rod covered with vulcanite and provided with means for attaching any type of electrode at its lower end and with 3 driving pulleys of different diams. at its upper end, the whole being mounted on a suitable support. A no. of stirrers connected together with a common driving belt may be operated by 1 motor.

B. C. A.

Electrocolorimeter. F. STOCKHAUSEN AND F. WINDISCH. *Wochschr. Brau.* **45**, 231 (1928).—A new photoelec. malt-color measuring app. is described. A. SCHULTZ

Return cooler for wide-mouth vessels. KURT SCHMIDINGER. *Chem.-Ztg.* **52**, 390 (1928); 2 cuts.—A galvanized sheet Cu cooler with flat top and cone bottom is designed to stand in the mouth of the vessel. The bottom has concentric corrugations to prevent condensed H₂O from the burner from entering the vessel. J. H. M.

Spray for washing and absorption towers. PAUL MAHLO. *Chem. App* **15**, 97-9 (1928); 4 cuts.—Ott's spray consists of 4 perforated disks of different sizes mounted on the delivery pipe in the top of the tower so that the whole top of the filling material is sprayed. J. H. MOORE

Normal slip-joint make-up piece with tube for introducing gas and with cock funnel. J. FRIEDRICH. *Chem.-Ztg.* **52**, 390 (1928); 5 cuts.—The tube has a ground slip-joint on each end and is inserted between the cooler and boiling flask to introduce gas or liquid into the flask. J. H. MOORE

A rotating tube drying furnace. J. A. L. ORTLEPP. *J. Chem. Met. Mining Soc. S. Africa* **28**, No. 9, 210-3 (1928).—A complete description and test results are given. The rotating tube has an 8-in. diam. and the length of its heated surface is about 8 ft. The furnace is wood-fired. It is used for drying tin concentrate. D. GORDON

The thermal investigation of metallurgically important reactions in a calorimeter operating at elevated temperatures (TOTH, CHALL.) **2**. Sensibility of the thermobalance (SOMIYA) **7**.

Air filter. C. P. HEGAN (to Reed Air Filter Co.). *Brit.* 279,102, Oct. 15, 1926.

Apparatus for straining or filtering. F. C. FULCHER and W. R. BELDAM. U. S. 1,673,743, June 12.

Filter for liquid fuels or other liquids. SOC. DU CARBURATEUR ZENITH. *Brit.* 279,382, Oct. 23, 1926.

Retorts. SOUTH METROPOLITAN GAS CO. AND R. H. B. LAMPREY. *Brit.* 279,201, Aug. 21, 1926. Gas-fired retorts and like app. are protected from erosion at the parts which are most highly heated, by application of a paste or tiles of a highly aluminous material, e. g., a paste formed of plastic refractory clay 20, calcined Al₂O₃ 60 and grog 20%.

Device for separating oil and water from compressed air. E. H. STEPHAN. *Brit.* 279,321, March 28, 1927.

"Bubble cap" for towers such as those used for distillation. E. BURKE (to Crane Co.). U. S. 1,674,464, June 19.

"Bubble cap" for gas and liquid contact apparatus. C. M. ALEXANDER. U. S. 1,673,895, June 19. A cap is described suitable for use in fractionating or scrubbing towers.

Continuous slab-heating furnace. F. W. MANKER (to Surface Combustion Co.). U. S. 1,673,771, June 12.

Reheating continuous furnace hearth. E. D. WRIGHT. U. S. 1,674,147, June 19. Structural features.

Valve for reversing furnaces. H. C. PERDUE (one-half to William R. Wilson). U. S. 1,673,018, June 12.

Temperature indicator and controller for furnaces. T. A. REID (to Westinghouse Elec. & Mfg. Co.). U. S. 1,673,591, June 12.

Heat-exchange apparatus. G. H. KELLEY (to Winchester Repeating Arms Co.). U. S. 1,673,409, June 12.

Devices for governing the output and steam supply for heating rectifying columns for distilling ammonia, alcohol or other substances. WILLIAM A. PETERS, JR. (to E. I. duPont de Nemours & Co.). U. S. 1,673,373-4, June 12.

Distilling apparatus employing molten metal or similar baths heated by a submerged burner. C. F. HAMMOND and W. SHACKLETON. *Brit.* 278,985, April 15, 1926.

Apparatus for distilling hydrocarbons or similar heat treatment by use of molten metals, etc. C. F. HAMMOND and W. SHACKLETON. *Brit.* 278,768, April 15, 1926.

Rotary hearth annular ovens for dry distillation, etc. TROCKNUNGS-VERSCHWELGUNGS- und VERGASUNGS-GES. and F. BARTLING. *Brit.* 279,343-4, May 26, 1927.

Apparatus (with funnel-shaped rotating plates over which the material spreads) for low-temperature carbonization and hydrogenation processes. R. FEIG. Brit. 279,120, Oct. 15, 1926. Elec. discharges may be passed between the rotating parts and fixed surrounding parts, to expedite the reactions.

Apparatus for dehydrating milk or other liquids by spraying. S. M. DICK. U. S. 1,673,066, June 12.

Apparatus for sterilizing or pasteurizing milk or other liquids by the "holding" method. WILLIAM G. TARBET (to Aluminium Plant and Vessel Co., Ltd.). U. S. 1,673,215, June 12.

Mixing valve for water or other liquids. A. E. HOHMEISTER (to John Douglas Co.). U. S. 1,674,365, June 19.

Safety electric cut-out for Röntgen-ray apparatus. W. OTTO. Brit. 278,757, Oct. 9, 1926.

Cathode-ray, Röntgen-ray or rectifier tubes. W. D. COOLIDGE (to British Thomson-Houston Co., Ltd.). Brit. 279,444, Oct. 20, 1926. Structural features.

Vacuum tubes. E. Y. ROBINSON and METROPOLITAN-VICKERS ELECTRICAL CO., LTD. Brit. 278,787, July 7, 1926. A straight W or Mo filament is drawn through a paste of insulating material such as kaolin and water with or without feldspar, lime or other material to facilitate sintering and increase the strength of the material and the coating is dried naturally or by artificial heating and is then sintered or vitrified; 2 or more coats may be applied, and a metal coat forming the equipotential surface is then applied either as a sep. Ni tube or as Ni or Pt foil or Pt strip or by chem. or elec. deposition; this may be provided with an alk. earth oxide coating. Various structural features are described.

Acetylene generator. E. MENZ. Brit. 278,977, April 29, 1927.

Safety device for acetylene distributing pipe systems. W. GOERG (to Air Reduction Co.). U. S. 1,674,172, June 19.

Apparatus for gas analysis. A. B. CUNNINGHAM. Brit. 279,319, March 24, 1927. Numerous structural details are specified of an app. for taking measured samples of combustion gases for analysis, passing them through liquid for absorbing CO₂ and recording the analysis on a revolving chart.

Recording apparatus for analyzing gas. F. J. BAST (to Charles J. Tagliabue Mfg. Co.). U. S. 1,673,898, June 19.

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Apparatus for proportioning flow of gases or liquids. K. HUESSENER. U. S. 1,673,872, June 19.

Electrically operated valve for controlling the flow of gas to burners, etc. E. J. PACE (to Payne Furnace and Supply Co.). U. S. 1,674,021, June 19.

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Thermostatic electric switch. G. O. WILMS (to Reliance Co.). U. S. 1,674,078, June 19.

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2—GENERAL AND PHYSICAL CHEMISTRY

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Boerhaave's account of Paracelsus and Van Helmont. TENNY L. DAVIS. *J. Chem. Education* 5, 671-81(1928). L. C.

Marinus Getaldus (Marin Getaldic), 1568(?)–1626. S. MOHOROVIĆIĆ. *Archiv. hem. farm.* 1, 49-54(1927).—A description of the life and work of the early Yugoslav mathematician and physicist. JAROSLAV KUČERA

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Minimum equipment for high-school chemistry. J. H. JENSON AND J. H. NORTON. *J. Chem. Education* 5, 749-54(1928). L. C.

The professional spirit among high-school chemistry teachers. LOUIS W. MATERN, et al. *J. Chem. Education* 5, 747-9(1928). L. C.

A night in alchemy. R. D. BILLINGER. *J. Chem. Education* 5, 715-24(1928).—A pageant presenting the spirit of alchemy. L. C.

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Proof of the presence of boron in the sun. SETH B. NICHOLSON AND NICOLAS G. PERRAKIS. *Compt. rend.* 186, 1523-4(1928). E. H.

Chemical composition, form, function and colloidal phenomena. E. MENEGHETTI. *Biochem. terap. sper.* 15, 77-95(1928).—Summary. MARY JACOBSEN

Ozone measurements of the high atmosphere during the year 1927. H. BUISSON. *Compt. rend.* 186, 1229-30(1928).—Measurements made daily at Marseilles during 1927. A. S. CARTER

The theory of crystal growth. W. KOSSEL. *Nach. Ges. Wiss. Göttingen. Math. physik. Klasse* 1927, 135-43. —K. discusses the growth of a crystal of the NaCl type from the standpoint of the energy released in the deposition of an ion upon different surface positions. Thus the relative energies released by depositing an ion upon a

100 face, upon the 010 edge between two parallel 100 faces, separated by one ionic layer, and upon the end of an uncompleted row, lying along such an edge are, resp.: 0.0662, 0.1807 and 0.8738. Hence, on 100 faces, uncompleted rows will first be completed, then new rows started, and so on. The energy of deposition upon a complete 110 face is 0.2077 and upon the end of a row in the direction of a cube edge is 0.9009. However, for the deposition of an ion beside such a row, the energy is -0.02702 , because such an ion must be placed next to an ion of like charge. Thus a true 110 face will not be expected, but instead a step-wise development of rows parallel to the cube edge. Observation seems to verify this expectation. The examn. of other planes in the zone of the cube edge shows that the electrostatic forces play the important role in detg. growth, and not the planar distances or point d. Thus, the 210 plane will, like the 100, grow as a true planar face.

R. L. HERSHEY

The crystal structure determination of the alkali metals and strontium. F. SIMON AND E. VOHSEN. Univ. of Berlin. *Z. physik. Chem.* 133, 165-87(1928); cf. C. A. 21, 2406—A vacuum, low-temp. Debye-Scherrer camera was used to det the crystal structure of Na, K, Li, Rb, Cs and Sr. The features of the camera are: a Cu frame for supporting a cellophane film, suspended and metallicly connected to the liquid-air reservoir of a metal Dewar flask, and a small built-in oven for evapg. the metal sample to be deposited on the cellophane film. The procedure was to mount the cellophane, place the freshly cut metal in the oven under ether, evacuate the camera, cool the frame by placing liquid air in the Dewar, and deposit metal on the cellophane by heating the oven. Li and Sr could not be evapd.; so thin films of these had to be mechanically prepd. The alkali metals at liquid-air temp. are all body-centered cubic and have the following dimensions: Li, $a = 3.46$ A. U.; Na, $a = 4.24$ A. U.; K, $a = 5.25$ A. U.; Rb, $a = 5.62$ A. U.; Cs, $a = 6.05$ A. U. K and Na were examd. at room temp. and showed the same lattice. Sr rolled into a film at liquid-air temp. showed a face-centered lattice, with $a = 6.03$ A. U. and it retains this type lattice at room temp. Sr prepd. by evapn. showed the lines of this lattice and some other unidentified lines. It is suggested that there are two modifications, a cubic at room temp. and an hexagonal at higher temps. X-ray examn. of Zn and Cd at room and higher temps. showed no transformation points. Phenomena suggestive of these are ascribed to change of crystal size.

R. L. HERSHEY

A strongly birefringent crystal species. P. TERPSTRA. *Physica* 8, 95-100(1928).—Crystals of 1,6,8-trinitro-2-ethylaminonaphthalene were examd. crystallographically. The crystals are monoclinic, $a, b, c = 2.2013 : 1 : 1.1027$; $\beta = 106^{\circ}29'$. The planes observed were $\{100\}$, $\{001\}$, $\{111\}$, $\{110\}$, $\{010\}$ and $\{201\}$; the crystals are often stretched along the b axis, platelets are formed on 100; the crystals cleave well along (010). The refractive indices (D light) are $\alpha = 1.5177$, $\beta = 1.854$, $\gamma = 2.316$.

B. J. C. VAN DER HOEVEN

The relation between chemical constitution and x-ray diffraction in liquids. I. Mono- and di-substituted benzene derivatives. P. KRISHNAMURTI. Calcutta Univ. *Indian J. Physics* 2, 355-64(1928).—Examn. of a no. of o -disubstituted C_6H_4 derivs. shows that 2 substituents in the o -position invariably give rise to 2 distinct rings clearly sepd. from each other. The outer ring increases in brightness as the sizes of the substituting groups are increased. In the m compds. examd., 2 rings are present; they have shrunk in size slightly as compared with the o ; the outer ring increases in brightness relatively to the inner more than in the corresponding o -compds. The p -substituted compds. give only one broad ring, which diffuses outwards. Benzene derivs. with a single long side chain show a similarity to the corresponding aliphatic deriv. PhCOOEt is somewhat similar to AcOH since both of them show a faint inner ring.

A. L. HENNE

An x-ray study of the heat motions of the atoms in a rock-salt crystal. R. W. JAMES AND ELSIE M. FIRTH. *Proc. Roy. Soc. (London)* A117, 62-87(1927).—A brief introductory review is given of the theoretical consideration of the temp. coeff. of the intensity of reflection of x-rays. To provide exptl. data for testing these, a series of observations was made with rock salt at the temp. of liquid air, and compared with the results at room temp. The temp. factor has the form e^{-m} where $m = (hf(T) - \sin^2\theta)/(h^2\lambda^2)$, where b is a const. which depends on the reflecting atoms. For corresponding angles, the temp. factor is considerably larger for spectra of the type Cl + Na than for the type Cl - Na. These results, combined with those at still higher temps., agree fairly well up to 500° K. with the theoretical expression derived by Waller, rather than with Debye's, though at the higher temps. the decrease in intensity is more rapid than the theory indicates, as might be expected, since the assumptions on which the theory is based are less valid. The abs. value of the integrated reflection

for the (200) spectrum from rock salt has been detd. for both MoK_α and RhK_α and an estimate has been made of the extinction for Mo radiations. The integrated value for the (200) spectrum with Mo K_α is 0.000492 and for Rh K_α 0.000544. The reflections from a no. of faces of the rock-salt crystal have been compared with the (200) spectrum, and their abs. values thus detd. These enable the F factors, or at scattering factors, of the atoms of Na and Cl to be calcd. at 0° , 86° , 290° and 900° K. By means of Fourier's analysis, the distribution of electrons between the (111) planes was then calcd. at different temps., and from the broadening of the peaks in the distribution curves, the mean amplitudes of the at. vibrations have been estimated as about 0.20 A. U. at 290° K. and 0.58 A. U. at 900° K. This estimate appears to be consistent with other considerations of interatomic forces.

A. W. KENNEY

The temperature factors of x-ray reflection for sodium and chlorine in the rock-salt crystal. IVAR WALLER AND R. W. JAMES. *Proc. Roy. Soc. (London)* **117A**, 214-23 (1927), cf. preceding abstract.—In rock salt the intensities of reflection for the two kinds of atoms for a given spectrum are proportional to $F_1 e^{-M_1}$ and $F_2 e^{-M_2}$ resp., where F_1 and F_2 are the at. scattering powers of the atoms, and M_1 and M_2 are temp. functions. Over a considerable range the following expression is valid: $M_k = (8\pi^2 \sin^2 \theta) (1/\lambda^2) (\alpha_k + \beta_k T + \gamma_k/T + \delta_k/T^3 + \dots)$. α_k is zero if Planck's value of the zero-point energy be assumed, γ_k and δ_k may be calcd. from at. consts. β_k depends on interatomic forces and cannot be detd. directly, though a weighted mean can be calcd. in terms of the elastic consts. From the formula given above and the exptl. results of James and Firth (cf. preceding abstract), β is calcd. as 5.8×10^{-21} . From Voigt's values of the elastic consts., β is calcd. as 5.7×10^{-21} . By assuming zero-point energy, M can be calcd. for each atom, and at corresponding temps. and angles is greater for Na than for Cl, implying that equal forces do not act on each. At 290° K. the root-mean-square amplitude of vibration for Na is 0.242 A. U. and for Cl 0.217 A. U. From the M values, curves showing the variation of intensity of reflection of x-rays with temp. are drawn for the (400), (600) and (800) spectra of rock salt, and are found to agree well with the observed values up to 500° K. Waller's theoretical formula for the temp. coeff. is thus verified by expt. in the case of rock salt from 86° K. to 500° K., if allowance is made for the different values of M for the two atoms.

A. W. KENNEY

The atomic arrangement in the crystal of orthorhombic iodine. PRESTON M. HARRIS, EDWARD MACK, JR., AND F. C. BLAKE. *J. Am. Chem. Soc.* **50**, 1583-1600 (1928).—Five differently prepd. samples of solid iodine, analyzed by the Laue and oscillated-crystal methods, were found to possess a unit cell of 8 atoms and orthorhombic bipyramidal symmetry, which is that of space group V_h^{18} having atomic arrangement (f). The cell dimensions calcd. from powder-photograph data were $a_0 = 4.795$ A. U., $b_0 = 7.255$ A. U.; $c_0 = 9.780$ A. U.; corresponding to an axial ratio of 0.661:1:1.348 to be compared with Mitscherlich's value, 0.6644:1:1.3653, as given by Groth and a d. of 4.913/cc (using axes according to Groth). The atoms were grouped in mols. of I_2 , with a distance of 2.70 A. U. between centers of two atoms in a mol. The ionic radius of I was suggested as 3.54 or 4.35 A. U. There was no indication of a monoclinic variety of iodine. The values of the two parameters, detd. from intensity data by the structure factor method and the Duane Fourier-series method, were: $u = 0.150$ and $v = 0.117$. The abnormal absorption effects due to crystal perfection were shown to be negligible. Intensity data, diagrams and lattice-structure drawing are given.

H. W. WALKER

Orientation of aluminum mono crystals determined by optical methods. J. WEERTS. *Z. tech. Physik* **9**, 126-36 (1928).—On observing in polarized light, etched Al single crystals HF and HCl, the cubical crystal faces can be distinguished by their unchanged perpendicularly reflected interference color on rotation of the crystals (cf. Sachs, *Z. Metallkunde* 299 (1925)). On this principle an app. was built to study the orientation of uncrystals in wires. The wire is suspended in a Cardanic ring with 3 scales, illuminated by parallel polarized light; the reflected light is observed in a microscope perpendicular to the illuminating beam. A glass plate at an angle $< 45^\circ$ reflects the returning light into the microscope and transmits the irradiating light. The microscope is provided with analyzer and gypsum plate so as to give the sensitive violet of first order. Details and examples of the method are discussed at length. The etching was performed by 45 sec. in HF, 30 sec. in HCl for preliminary observation; final 3 to 4 mins. in HF and HCl. In 40 crystals measured in 99.70% Al wire, drawn to 3.5 mm. and recrystd., the rhombic dodecahedral orientation is preferred by the faces. The new method is compared with that of Bridgman (*Proc. Am. Acad.* **60**, 313 (1925)) and with x-ray results.

B. J. C. VAN DER HOEVEN

The structure of cyanite. W. H. TAYLOR AND W. W. JACKSON. Manchester Univ. *Proc. Roy. Soc.* (London) **119A**, 132-46(1928).—The crystal structure of *cyanite*, Al_2SiO_5 , has been detd. by means of a qual. investigation based on data from x-ray photographs obtained by the rotating crystal method. There are 4 mols. in the unit cell, which is triclinic, with the following axial lengths and angles: $a = 7.09$ A. U., $b = 7.72$ A. U., $c = 5.56$ A. U.; $\alpha = 90^\circ 51\frac{1}{2}'$, $\beta = 101^\circ 2'$, $\gamma = 105^\circ 44\frac{1}{2}'$. The structure is based on a slightly distorted cubic close packing of O atoms, the Si and Al atoms being distributed in a uniform manner among the interstices of the O arrangement in such a way that independent tetrahedral SiO_4 groups are formed, while each Al atom is at the center of an octahedral group of 6 O atoms. The existence of densely packed at planes, separated by a wide spacing, parallel to (100), explains the existence of the very perfect cleavage parallel to this direction. In a similar way, planes parallel to (010), densely packed with Si and Al atoms, and widely spaced, account for the less perfect but clearly marked (010) cleavage. The variation of hardness on the (100) face is explained as being due to the existence of this cleavage. It is apparently possible to extend this explanation to include the examples, which frequently occur, of hardness variation of much smaller amount.

R. L. HERSHEY

X-ray diffraction in carbon tetrachloride (liquid). C. M. SOGANI. *Indian J. Physics* **2**, 377-86(1928); cf. *C. A.* **22**, 1098.—The diffraction in liquid CCl_4 is studied with $\text{Cu K}\alpha$ rays. The pattern shows a sharp inner and a diffuse second ring sep'd. by a very clear space. The sharpness of the inner ring is quite compatible with the highly symmetric tetrahedral shape of the mol. Two alternative explanations are discussed for the 2nd ring: (1) that it may be a second-order effect which becomes important in this case on account of the compact shape of the mol.; (2) that it may be due to shape of the mol. F curve, which must obviously be considered in any complete discussion of x-ray diffraction. The first view is preferable, as Hg and liquid A which are monoatomic also show a similar second ring. The analogies between the x-ray diffraction in liquids with spherical mols. and the optical haloes observed with homogeneous chromatic emulsions are pointed out.

A. L. HENNE

Molar weights of saturated vapors of pure liquids and of mixtures by the air-saturation method. M. S. VREYSKII. Leningrad Univ. *J. Russ. Phys.-Chem. Soc.*, Chem. Part, **59**, 593-7(1927); *Z. physik. Chem.* **133**, 357-61(1928).—From the values of the vapor pressure of the pure substance, detd. by the usual b. p. method, and of the vapor pressure of the pure satd. vapor or of its aq. soln. detd. by the air-satn. method (cf. *C. A.* **19**, 2292) substituted in the following formula $[V(B - b)/(B - b - P)] = V + m_1[(RT)/(B + b)] + m_2[(RT)/(B + b)]$, V. proposes to calc. the molar wt. M_1 of the dissociated vapor and the partial pressure of the constituents. V = vol. of air in l., $(B + b)$ the total pressure (atm. + hydrostatic of the liquid column); P = total vapor pressure of both liquids; $m_1 = (g_1/M_1)$, $m_2 = (g_2/M_2)$ (g = wt. in g., M = mol. wt., m = no. of moles for each component). When $m_2 = 0$ then M_2 refers to pure liquid the partial pressure of each can be calc'd. from the ratio m_1/m_2 .

E. R. SCHIERZ

The dissociation of acetic acid vapor and the equilibrium between its aqueous solutions and their vapors. M. S. VREYSKII, K. P. MISŤCHENKO AND B. A. MUROMTSEV. Leningrad Univ. *J. Russ. Phys.-Chem. Soc.*, Chem. Part, **59**, 598-607(1927); *Z. physik. Chem.* **133**, 362-9(1928).—The authors have found that between 30° and 90° satd. AcOH vapor follows the same laws that were detd. for unsatd. vapors by Gibbs. The vapor pressure (P) of pure AcOH, purified by repeated freezing (m. p. 16.63°), was detd. by the usual dynamic method at various pressures (the ebullioscope heated electrically in a thermostat). The pressure of the satd. vapor was detd. by the air-satn. method and the mol. wt. (M_v) and the d. (D) of the vapor by a formula (cf. preceding abstr.).

t°	P	D	M_v
30.05	20.8 mm.	3.81	110.5
42.00	38.5	3.79	109.9
50.05	57.3	3.73	108.1
59.65	89.0	3.71	107.5
80.09	208.3	3.59	103.9
85.20	250.8	3.54	102.7
90.00	299.0	3.44	99.7

At const. temps. 42.00° and 80.09° the vapor pressures of aq. solns. of AcOH of various concns. (4.84-49.6%) are also in accord with the Gibbs equation. The partial pressures of AcOH (p_1) and H_2O (p_2) for varying concns. are: at 80° (18.45%) $p_1 = 12.3$ mm.,

$p_2 = 339.8$ mm., (96%), $p_1 = 171.9$, $p_2 = 74.8$ mm.: at 42° (18.35%), $p_1 = 1.9$, $p_2 = 55$ mm. (95.12%), $p_1 = 30.8$, $p_2 = 16.4$ mm. The av. ratio $[K = p''_1/(p'_1)]$ of the partial pressure p''_1 of $(\text{AcOH})_2$ to p'_1 (AcOH) at 80° is 0.0414; at 42° is 0.707.

E. R. SCHIERZ

The dissociation of formic acid vapors and the equilibrium between its aqueous solutions and their vapors. M. S. VREVSKII AND A. A. GLAGOLEVA. Leningrad Univ. *J. Russ. Phys.-Chem. Soc.*, Chem. Part, **59**, 608-16(1927); *Z. physik. Chem.* **133**, 370-6 (1928).—Using the method previously applied to AcOH (cf. preceding abstrs.), V. and G. have detd. the d. (D_g), the vapor pressure (P), the mol. wt. (M_x) of the satd. vapor of pure HCO_2H purified by repeated freezing (m. p. 8.40°).

t°	P	D_g	M_x
25.0	42.5	2 962	85.8
40 0	82.3	2 889	83.7
50 0	127.5	2.835	82.1
60 0	190.3	2 767	80.2
80 0	397.9	2.628	76 1

These values together with those of the vapor pressure of aq. solns. of HCO_2H at various concns. (4-98.5%) at 60.0° and 80.0° were found to be in accord with those calcd. from the Gibb's equation which was derived for unsatd. vapors. The mixts. which boil unchanged at 60° and at 80° contain 69 and 73% acid, resp. The degree of association of the acid into double mols. decreases for any given acid content of soln. as the temp. rises, but is always smaller than that for solns. of AcOH of equal (percent) acid content. The partial pressures of HCO_2H (p_1) and H_2O (p_2) vary with temp. and concn. At 80° (21.3%) $p_1 = 13.5$, $p_2 = 324.8$ mm.; (98.5%) $p_1 = 376.4$, $p_2 = 14.2$ mm.; at 60° (22.9%) $p_1 = 6.2$, $p_2 = 132.7$ mm.; (85%) $p_1 = 95.0$, $p_2 = 40.5$ mm. The av. ratio ($K = p''_1/(p'_1)^2$) of the partial pressure of $[\text{HCO}_2\text{H}]_2$ (p''_1) to HCO_2H (p'_1) is 0.013 at 80° and 0.058 at 60°.

E. R. SCHIERZ

The equilibrium between vapor and liquid in solutions of formic acid in benzene. M. S. VREVSKII, N. A. GELD AND S. A. ŠHČHUKAREV. Leningrad Univ. *J. Russ. Phys.-Chem. Soc.*, Chem. Part, **59**, 617-30(1927); *Z. physik. Chem.* **133**, 377-89(1928).—The authors have investigated the general characteristics of const-boiling heterogeneous mixts. of HCO_2H and C_6H_6 as well as the vapor pressures of HCO_2H vapor in the presence of C_6H_6 . Both reagents were purified by repeated freezing (m. ps. C_6H_6 , 5.5; HCO_2H 8.4°). The satd. vapors were obtained by the air-satn. method (cf. preceding abstrs.) and analyzed after having been condensed by means of solid CO_2 . The vapor-pressure was detd. by boiling the solns. at reduced pressures. The acid contents of the solns. which boiled without change in concn. at 25°, 59.95°, 65.0°, 70.0° and 71.8° were 31, 31.5, 31.6, 32.6, 35.5%, resp. At lesser concns. the vapor is richer in acid; in greater concns. the vapor is poorer in acid. With increase in temp. the compn. of the liquid and gaseous phases of the homogeneous systems approach each other. In the heterogeneous system of $\text{HCO}_2\text{H}-\text{C}_6\text{H}_6$ the following conditions obtain. In the region where the liquid contains more acid than the vapor, increase in temp. causes the compn. of vapor to approach that of the liquid. In the region to the left of the point indicating the compn. of the mixt. which boils unchanged, increase in temp. has the opposite effect. In the vapors from practically all of the solns. the no. of associated $[\text{HCO}_2\text{H}]_2$ mols. exceeds that of single mols. In the soln. containing 2% acid the no. of each kind is equal. This is in agreement with the associating action of C_6H_6 . By the cryoscopic method the mol. wt. of HCO_2H in C_6H_6 is practically two times the value obtained in water. The partial pressures of HCO_2H (p_1) and C_6H_6 (p) vary with temp. and concn. At 59.96° (3.08%) $p_1 = 61.0$, $p = 126.8$ mm.; (91.41%) $p_1 = 173.1$, $p = 254.2$ mm. At 25.00° (8.52%) $p_1 = 29.8$, $p = 90.2$ mm.; (96.52%) $p_1 = 39.1$, $p = 40.2$ mm. The ratio ($K = p''_1/(p'_1)^2$) of the associated $[\text{HCO}_2\text{H}]_2$ (p''_1) to the non-associated HCO_2H (p'_1) is 0.063 at 59.96° and 1.36 at 25.00°. Below 73.2° HCO_2H and C_6H_6 are not miscible in all proportions.

E. R. SCHIERZ

Vapor equilibrium of aqueous glycerol solutions. D. F. STEDMAN. *Trans. Faraday Soc.* **24**, 289-98(1928).—An app. is described in which the compn. of the vapor in equil. with glycerol solns. is detd. from 50° to 200° and from 760 to 60 mm. pressure. Thus at 50° and 60 mm. there is 0.014% glycerol in the vapor (w) with a partial pressure (p) of 0.0016 mm. Hg. At this pressure and 100°, w is 1.525% and p is 0.3807 mm.; at 150° w is 27.36% and p is 4.119 mm.; at 200° w is 94.18% and p is 45.6 mm. At 360 mm. and 90°, w is 0.037% and p is 0.0261 mm.; at 150° w is 5.230% and p is 3.846 mm.; at 200° w is 41.06% and p is 43.19 mm. With a pressure of 760 mm., at 110°

w is 0.072% and p is 0.1071 mm.; at 150° w is 2.135% and p is 3.231 mm.; at 200° w is 22.98% and p is 41.93 mm. At const. temp. the partial vapor pressure of glycerol regularly increases as the pressure decreases, and by extrapolation the vapor pressure of pure glycerol is obtained at any desired temp. From these values the heat of evapn. is calcd. as follows in calories per mol.: at 195°, 18,170; 155°, 19,740; 105°, 19,300; 55°, 21,060. In this work the stronger distillates are analyzed by means of a Pulfrich refractometer, but for solns. contg. less than 6% glycerol a Rayleigh interferometer is used.

H. STOERTZ

The compressibility and pressure coefficient of resistance of ten elements. P. W. BRIDGMAN. Harvard Univ. *Proc. Am. Acad. Sci.* 62, 207-26(1927).—The elements investigated were Pr, La, Ce, Be, Ba, Th, for both compressibility and elec. resistance, and Cr, V, S and P (both red and black) for compressibility only. The temps. were 30° and 75° and the pressures varied from 0 to 12,000 kg./sq. cm. The Pr was prep'd by electrolysis of salts contg. 0.02% Nd and 0.01% La. At red heat it was readily drawn through dies of Cr-V steel into wires. At 30°, $\Delta V/V_0 = -33.8 \times 10^{-7}p + 13 \times 10^{-12}p^2$. At 75°, $\Delta V/V_0 = -34.6 \times 10^{-7}p + 13 \times 10^{-12}p^2$. The second term is not highly accurate. The elec. resistance decreased with pressure. The mean coeffs. of resistance to 12,000 kg./sq. cm. are: for 30°, -3.1×10^{-7} ; for 75°, -8.3×10^{-7} . The sp. resistance at 30° is 6.9×10^{-6} , and the temp. coeff. at 0° is 0.00165. The low temp. coeff. may be due to absorbed impurities, probably gases. La melted sharply at 826° (accepted m. p. = 810°). Wires were easily made by extrusion through dies. At 30°, $\Delta V/V_0 = -35.13 \times 10^{-7}p + 14.7 \times 10^{-12}p^2$. At 75°, $\Delta V/V_0 = -35.13 \times 10^{-7}p + 17.1 \times 10^{-12}p^2$. The temp. coeff. of compressibility is abnormal for La in that it is negative. The abs. sp. resistance of La at 0° is 5.76×10^{-6} . The temp. coeff. of resistance at atm. pressure is 0.00213. The change in resistance at 30° is represented by the equation $\Delta R/R(1 \text{ kg., } 30^\circ) = -1.199 \times 10^{-6}p$. $\Delta R/R(1 \text{ kg., } 75^\circ) = -1.810 \times 10^{-6}p + 9.7 \times 10^{-12}p^2$. Ce was readily drawn into wires. It was polymorphic at high pressures. The transition points are at 7600 kg./sq. mm. at 30° and at 9400 kg./sq. cm. at 75°. Because of this transition, compressibilities were measured up to only 4000 kg./sq. cm. At 30° $\Delta V/V_0 = -45.63 \times 10^{-7}p - 161.4 \times 10^{-12}p^2$. At 75° $\Delta V/V_0 = -45.03 \times 10^{-7}p - 151.5 \times 10^{-12}p^2$. These results are anomalous in 2 respects. The temp. coeff. of compressibility is negative, and compressibility increases with increasing pressure. Polymorphism might account for these anomalies. Change of resistance through a range of 3000 kg./sq. cm. at 30° is represented by $\Delta R/R(1 \text{ kg., } 30^\circ) = +4.42 \times 10^{-6}p$. Change of resistance through a range of 6000 kg./sq. cm. at 75° is represented by $\Delta R/R(1 \text{ kg., } 75^\circ) = 2.77 \times 10^{-6}p$. The sp. resistance of the low-pressure modification at 30° is 7.48×10^{-6} . The temp. coeff. of resistance, 0-75°, is 0.00097. The change in resistance with change of pressure for the high-pressure modification between 9000 and 12,000 kg./sq. cm. at both 30° and 75° is linear and the pressure coeff. is -1.42×10^{-6} within exptl. limits of error (about 10%). Be was very hard to work and a cast rod 4.6 mm. in diameter was used. The compressibility at both 30° and 75° is represented by the equation, $\Delta V/V_0 = -8.55 \times 10^{-7}p + 3.88 \times 10^{-12}p^2$. The sp. resistance at 30 is 10.6×10^{-6} . The temp. coeff. of resistance at 0° is 0.00328. At 30°, $\Delta R/R(1 \text{ kg., } 30^\circ) = -1.11 \times 10^{-6}p + 12 \times 10^{-11}p^2$. At 75°, $\Delta R/R(1 \text{ kg., } 75^\circ) = 1.58 \times 10^{-6}p + 2.6 \times 10^{-11}p^2$. The density of Be at 20 ± is 1.820. The Ba was formed into wire by cold extrusion under oil through a steel die. At 30° $\Delta V/V_0 = -101.9 \times 10^{-7}p + 129 \times 10^{-12}p^2$. At 75° $\Delta V/V_0 = -106.3 \times 10^{-7}p + 149 \times 10^{-12}p^2$. The resistance of Ba decreases with increasing pressure up 8000 kg./sq. cm. at 0° and up to 10,000 kg./sq. cm. at 75°, and thereafter increases with increasing pressure. A table gives relative resistances for 0°, for 30°, and for 75° at 1000-kg. intervals up to 12,000 kg./sq. cm. The relative resistances at 1 kg./sq. cm. are 0°, 1.0000; 30°, 1.1520, 75°, 1.4380. The min. relative resistances and the corresponding pressures are: for 0°, 0.9705 at 8000 kg./sq. cm.; for 30°, 1.1100 at both 8000 and 9000 kg./sq. cm.; and for 75°, 1.3565 at 10,000 kg./sq. cm. The relative resistances at 12,000 kg./sq. cm. are: for 0°, 0.9764; for 30°, 1.1144; for 75°, 1.3620. The temp. coeff. of resistance for Ba at atm. pressure is represented by the equation $\Delta R/R_0 = 0.004795t + 5.71 \times 10^{-7}t^2 + 1.119 \times 10^{-9}t^3$. The compressibility of Th at 30° is represented by the equation, $\Delta V/V_0 = -18.18 \times 10^{-7}p + 12.78 \times 10^{-12}p^2$. At 75°, $\Delta V/V_0 = -18.46 \times 10^{-7}p + 13.29 \times 10^{-12}p^2$. The variations in resistance for 30° are expressed by the equation, $\Delta R/R(1 \text{ kg., } 30^\circ) = -2.787 \times 10^{-6}p + 1.89 \times 10^{-11}p^2$. At 75° $\Delta R/R(1 \text{ kg., } 75^\circ) = -2.966 \times 10^{-6}p + 2.18 \times 10^{-11}p^2$. The av. temp. coeff. of resistance at atm. pressure for the range, 0-100° is 0.00239. The compressibility of Cr at 30° is represented by $\Delta V/V_0 = -5.187 \times 10^{-7}p + 2.19 \times 10^{-12}p^2$. At 75° $\Delta V/V_0 = -5.310 \times 10^{-7}p + 2.19 \times 10^{-12}p^2$.

The purity of the sample was doubtful. The V was 95.02% V and 0.07% C . At 30° , $\Delta V/V_0 = -6.090 \times 10^{-7}p + 2.58 \times 10^{-12}p^2$. At 75° , $\Delta V/V_0 = -6.117 \times 10^{-7}p + 2.55 \times 10^{-12}p^2$. The red P was made from white P at 4000–12,000 kg./sq. cm. in the presence of Na as a catalyst. The density of the red P was 2.348 at room temp. The linear compressibilities in two directions differed by 14% at 30° and by 12% at 75° . For red P at 30° , $\Delta V/V_0$ varies from 0.0101 at 2000 kg./sq. cm. to 0.0469 at 12,000 kg./sq. cm. At 75° , $\Delta V/V_0$ varies from 0.0100 at 2000 kg./sq. cm. to 0.0476 for 12,000 kg./sq. cm. This is much less than Richards' value and the d of this sample is greater than that of ordinary commercial red P (2.296). Some unchanged white P may be included. For black P at 30° , $\Delta V/V_0$ varies from 0.0052 at 2000 kg./sq. cm. to 0.0205 at 12,000 kg./sq. cm.; at 75° from 0.0052 at 2000 kg./sq. cm. to 0.0209 at 12,000 kg./sq. cm. The compressibility of rhombic S was measured along three axes at both 30° and 75° , and the values at 2000-kg. intervals are recorded. At 30° , $\Delta V/V_0$ varies from 0.0233 at 2000 kg./sq. cm. to 0.0949 at 12,000 kg./sq. cm.; at 75° from 0.0258 at 2000 kg./sq. cm. to 0.1027 for 12,000 kg./sq. cm. The compressibilities of these 10 elements generally follow the curves formed by plotting log to the base 10, plus 7, of the compressibility against the at nos. La , Ce and Pr are not quite as expected, since Ce , the intermediate element, has the highest compressibility. The new data on elec. resistances only increase the confusion, and strengthen the belief that elec. cond. is not due to one simple type of mechanism.

F. E. BROWN

The viscosity of mercury under pressure. P. W. BRIDGMAN, Harvard Univ. *Proc. Am. Acad. Arts Sci.* 62, No. 8, 187–206 (1927). The viscosities of Hg at 30° and at 75° under pressures up to 12,000 kg./sq. cm. were detd. The app. was composed of 2 Cu reservoirs connected by a Cu tube. The app. was tipped through an angle and an elec. contact recorded the flow of a definite vol. of Hg to the lower reservoir. Corrections are large and include change of pressure during the flow, kinetic energy correction, and the compressibility of Hg , of the petroleum ether, and of the Cu vessels and capillary. The density of petroleum ether at 30° varied from 0.683 at 1 kg./sq. cm. to 0.889 at 12,000 kg./sq. cm. Petroleum ether was used, because H_2O decomposed under the sparking at high pressures to give some conducting substance. At low pressures such a change does not occur. The abs. viscosities at 30° and at 75° , resp. are: for 1 kg./sq. cm. 0.01516 and 0.01341, for 2000 kg./sq. cm. 0.01588 and 0.01399 for 4000 kg./sq. cm. 0.01663 and 0.01463, for 6000 kg./sq. cm. 0.01742 and 0.01528 for 8000 kg./sq. cm. 0.01825 and 0.01599, for 10,000 kg./sq. cm. 0.01913 and 0.01675 for 12,000 kg./sq. cm. 0.02008 and 0.01757. The data agree in general with those of previous investigators. Viscosity increases at an accelerated rate with increasing pressure. The curve for 75° could be found by shifting the curve for 30° along the pressure axis about 5750 kg./sq. cm. The vol. of 1 g. of Hg at 75° and 2000 kg./sq. cm. is the same as that of 1 g. at 30° and 1 kg./sq. cm., but the viscosity at 75° and 2000 kg./sq. cm. is 0.0140 and that at 30° and 1 kg./sq. cm. is 0.0152. The pressure coeff. of viscosity would need to be nearly 3 times as large as it is found to make viscosity a function of vol. only. It is of considerable significance that Hg , a monat. liquid, should depart so far from the results expected on the assumption that viscosity is a function of vol. only. There must be some sort of interlocking mechanism between the mols. of a liquid.

F. E. BROWN

The system: sodium tin. WILLIAM HUME ROTHERY, *J. Chem. Soc.* 1928, 947. 63.—The equil. diagram of the Na - Sn system is detd., over 60 samples being investigated under varying conditions of annealing and quenching. All alloys are mounted in fusible metal for microscopic examn., the grinding, polishing and photography of the Na -rich being carried out under oil. The compds. found were Na_4Sn (in 408°), Na_3Sn , Na_2Sn (m. 487°), Na_4Sn_3 (m. 479°), $NaSn$ (m. 578°), $NaSn_2$, $NaSn_3$, $NaSn_4$, and $NaSn_6$. All were metallic but decompose on melting, excepting where the m. p. is given. Na_4Sn_3 is stable only above 357° , splitting into Na_2Sn and $NaSn$ below this temp., the reverse taking place above. Na_3Sn exists only as a solid, decomposing into a mixt. of Na_4Sn and Na_2Sn on heating above 377° . $NaSn_2$ is formed from a reaction between $NaSn$ and liquid Sn at 307° , $NaSn_3$ from $NaSn_2$ and liquid 289° , $NaSn_4$ from $NaSn_3$ and liquid at 229° , and $NaSn_6$ from $NaSn_4$ and liquid 226° . The diagram is further discussed, the probable electronic structure of $NaSn_6$ and $NaSn_4$ being indicated. No evidence could be obtained for the existence of solid solns.

J. BALOZIAN

Critical temperature measurements on carbon dioxide in small capillaries. H. T. KENNEDY and CYRIL H. MEYERS, Bur. Standards, *Refrigerating Eng.* 15, 125–30 (1928).—An improved purifying train for CO_2 is illustrated and described. Detns. of crit. temps. were made on purified CO_2 in two small capillary tubes whose internal diams. were 0.004 mm. and 0.060 mm., resp., as measured microscopically and cor. for

the magnifying power of the glass. The temp. $30.96 \pm 0.01^\circ$ appears to be the crit. temp. of CO_2 as measured by this app., independent of the diam. of the tube in which measured. Whether or not this is true for tubes whose diam. is of the same order as the pores in charcoal, etc. is conjectural. The point of appearance and disappearance of the meniscus in the tubes under the illumination provided seemed to afford the best period for reading the crit. temp.

H. F. ZOLLER

Index of refraction and specific gravity of liquid sulfur and of viscous sulfur. P. M. MONVAL AND PAUL SCHNEIDER. *Compt. rend.* **186**, 1356-7 (1928).—The variation of n of liquid S as a function of the temp. has been detd. With increase in temp. n decreases up to 160° , then rises. Density decreases up to about 160° , remains const. for a few degrees and then decreases steadily. Sp. refraction is calcd.

L. D. R.

Surface tension of some organic substances in the molten state and Sugden's parachor. S. S. BHATNAGAR AND BALWANT SINGH. *J. chim. phys.* **25**, 21-7 (1928).—The surface tension (dynes/cm) was detd. for the following, in the molten state, by the drop method: naphthalene, 32.26 at 80.1° , α -nitronaphthalene, 43.31 at 61.5° ; phenanthrene, 37.24 at 100.5° , phenol, 37.92 at 41.0° , *o*-nitrophenol, 41.91 at 45.2° ; *p*-nitrophenol, 44.71 at 114.0° and *p*-nitrotoluene 37.15 at 54.0° . The mol. parachor is calcd. for the above and also for OH and the nuclei of naphthalene and phenanthrene.

E. G. VANDENBOSCH

Variations in the surface tensions of solutions. S. LAWRENCE BIGELOW AND E. ROGER WASHBURN. Univ. of Mich. *J. Phys. Chem.* **32**, 321-53 (1928).—This research was undertaken to discover and show how to guard against the difficulties of detg. surface tension by the capillary method. This paper deals with variations of surface tension with time. The app. used was that of Richards (cf. *C. A.* **18**, 1932). If a capillary tube is clean, the meniscus will reach the same equil. point by even, regular motion whether it is displaced by raising or lowering it. The surface tension of a sodium oleate soln. decreased from 71.0 dynes at 0 min to 42 dynes in 570 min. The surface tension of a glycerol soln. remained const. at 70.7 dynes for 34 min. and then decreased to 56.0 dynes at 528 min. Solns. of *ovalic*, *propionic* and *succinic acids*, *phenol* and *resorcinol* also showed a decrease of surface tension with time. After a fall of the meniscus a vigorous agitation causes a rise followed by a second lowering. When the meniscus is drawn down from its min. value, it snaps quickly back to the min. value. If the meniscus is forced up a few mm. before being lowered, it snaps up to the top of the forced rise. This is due to adsorption of solute on the walls of the capillary. The forced rise washes the walls as far as the liquid rises. The surface tension of a soln. of AmOAc increased from 62.6 dynes to 69.6 dynes in 30 min. Solns. of EtOAc , Pr butyrate , BuOAc , EtOH , PrOH , iso PrOH , $(\text{CHCl}_2)_2$, Me_2CO , Pr formate and MeOAc showed similar increases in surface tension with time of standing. Solns. of PrOAc were investigated at 20° , 30° and 40° . The initial surface tensions were higher at the lower temps., but the increase in tension was so much more rapid at the higher temps. that the soln. at 40° had the highest surface tension within 10 min. The ultimate surface tensions should be in the inverse order of their temps. A quant. study was made with EtOAc as the solute. In an open capillary the surface tension increased. In a closed capillary the surface tension decreased. In a capillary connected to a more concd. soln. of EtOAc , the surface tension decreased. The increase of surface tension is due to the evapn. of solute from the meniscus. When the capillary was closed with rubber the surface tension increased because rubber dissolves much of such esters. Rubber dissolved from vapor above 0.5 M EtOAc about 0.1 of its wt. in 9 hrs. In a 0.5 M soln. of PrOAc a collar of liquid formed by drainage from the walls following lowering meniscus. When the meniscus met this drop a rise occurred because the ester had evapd. from the liquid of the collar and the liquid of the collar formed a meniscus of almost pure water with a surface tension higher than that of the soln. Throbbing or successive temporary falls of the meniscus during a general rise is probably due to the soln. of impurities from the walls of capillary producing a lower surface tension. When the impurities are diffused out of the meniscus a rapid rise occurs in the part of the tube just rinsed out. When a new section of the tube is reached a second contamination may occur, and a second fall may result. There were a few cases of throbbing with a falling meniscus. The fact that change of meniscus takes place more rapidly in a small capillary than in a large one is hard to explain by diffusion and no satisfactory explanation is available. *Concn. in a surface* may be detd. by finding the surface tension when surface and body of liquid are of the same concn. Any surface contg. only the same solvent and solute which shows this same surface tension has the same concn. in the surface. Extent of adsorption may be measured

by applying this principle. If hydrolysis occurs, the products of hydrolysis will affect surface tension. Rates of hydrolysis may be measured by changes in surface tension. Rates of diffusion in liquids and in gases may be measured by detecting the arrival of the minute amt. of material necessary to affect a surface tension. Air drawn through rubber and into a capillary may contaminate the capillary and cause erratic values for surface tension.

F. E. BROWN

Coagulation of solutions of colloidal sulfur. GUISEPPE ROSSI. Univ. of Bologna. *Rev. gen. colloides* 5, 624-9(1927); cf. *C. A.* 22, 191.—A colloidal soln. was prepd. It contained in each 100 cc. S, 3.3380 g.; H_2SO_4 , 1.0991 g.; Na_2SO_4 , 1.5455 g. When 5 cc. of this sol. was dild. to 100 cc. the cond. of the dild. sol. was found to increase rather regularly with rise in temp. from 0.0034047 at 17° to 0.0053219 at 64° , except for a sharp rise in cond. at about 52° . When the cond. of a soln. contg. the same concns. of H_2SO_4 and Na_2SO_4 but no S was measured a similar increase in cond. from 0.0041939 to 0.0058380 was found. There was a break at about 52° also. The presence of the S had decreased the cond. at all temps. In another sample the increase in cond. due to the removal of the S sol varied from 32.19×10^{-6} at 19° to 8.73×10^{-6} at 54.1° . Again there was a break in the curve at about 52° . No explanation is known for the behavior at 52° . In general stability of S sols depends on adsorption of electrolytes. Coagulation due to rise of temp. is caused by less adsorption of electrolytes. F. E. B.

Colloidal phenomena in dye solutions. WALTER C. HOLMES. *Bur. Chem., J. Am. Chem. Soc.* 49, 790-1(1927).—If rosaniline base is fused with phenol, rosaniline phenolate, $C_{20}H_{20}N_3.C_6H_5O$, is obtained. Its aq. solns. are very colloidal and when dild. their depth of color increases instead of decreases. This is due to dissociation. The respective extinction coeffs. of (a) the original soln., (b) the soln. dild. with an equal vol. of H_2O , and (c) the soln. dild. with an equal vol. of EtOH are: immediately, $a = 0.54$, $b = 0.69$, $c = 0.88$; after 1 day, $a = 0.34$, $b = 0.63$, $c = 0.875$; after 6 days, $a = 0.16$, $b = 0.41$, $c = 0.85$. F. E. BROWN

The number of phases in colloidal systems. PAUL BARY. *Rev. gen. colloides* 5, 617-23(1927).—When a phase is defined as a mechanically separable part of a system the definition is ambiguous. Sepn. by filtration or osmosis depends on size of particle and pore of filter. Sedimentation, including centrifuging, seps. more or less, depending on the app. available. Centrifuging can remove a true solute. A better definition is, "The different phases which compose a system are sepd. from each other by surfaces whose surface tension is zero or positive." Undissolved solute in a satd. soln. would have an interfacial tension equal to zero. Colloids in a liquid present two cases. In the first case, the colloid is able to absorb only a definite amt. of liquid and swell to a definite size and be at equil. with unabsorbed liquid. This condition is exactly like that of a satd. soln. in contact with undissolved solute. The second case is that of a colloid which can swell indefinitely, perhaps even until its sepd. parts are mol. in size. It is difficult to see in what way this colloid differs from a soln. A protected Au-sol in a solvent is a two-phase system. The particles of protected gold constitute one phase and the soln. of protective colloid the second phase. Temp., pressure, elec. charge, p_H , and other factors will affect the swelling of gels and det. whether one or more than one phase is present. Soap mols., one end of which is sol. in water and the other insol. might be called a *hemiphase*. Soap in alc. is sol. and the system is only one phase. Soap in the presence of Ca ions becomes insol. and 2 phases are present.

F. E. BROWN

The immunity of the granule in colloidal solutions. A. BOUTARIC AND F. BANES. *Compt. rend.* 186, 1003-5(1928).—Sols of mastic resin, Au, casein and albumin were treated with a soln. of eosin and then sepd. by ultrafiltration. None of the eosin was found in the sepd. granules. When the mixt. was flocculated with $AlCl_3$ or by heating and then sepd. the greater part of the eosin was found to have been absorbed by the flocculated colloid.

E. G. VANDEN BOSCH

Barophoresis in gels. HARRY SOBOTKA AND ALBERT B. SABIN. *J. Am. Chem. Soc.* 50, 1561-72(1928).—Expts. on the rate of diffusion of colored solns. into agar gels show differences between the rate in upward and downward directions up to a crit. concn. of the diffusing soln. At higher concn. the direction of the max. rate is reversed. The term "barophoresis" is suggested for the phenomenon. J. G. McNALLY

The Brownian movement. KULESH CH. KAR AND MOHINIMOHAN GHOSH. *Physik. Z.* 29, 143-4(1928).—Einstein's formula for Brownian movement is derived from Kar's (*Physik. Z.* 24, 63(1923)) theory of the movement of particles under periodic impulses.

F. R. B.

The reversibility of various adsorbed compounds and their velocity of reversion. I. Inorganic electrolytes. NARANOSUKE KODA. *Acta Schol. Med. Univ. Imp. Kyoto* 10,

1-16(1928).—The expts. were performed at room temp. with bolus alba and blood-charcoal as adsorbents and KI as the substance to be adsorbed. Distd. water was employed as the medium in which the process of reversion occurred; the liberated KI was detd. and this value used for the basis of calcs. K. concludes from his data that adsorption and reversion are similar processes, the velocity of reversion, however, being greater than that of adsorption. The time of reversion increases with the amt. of KI adsorbed per unit of adsorbent. The equil. is produced more quickly at higher than at lower temps. Previous washing of the system charcoal-KI or bolus-KI has no influence on the velocity of reversion. Increasing the water vol. causes the amt. of KI reversed to rise, but has no particular influence on the velocity of reversion. Bolus and charcoal acted nearly equally in the expts. For each expt. the fraction $\log \text{mg./cc. of I liberated} \div \log \text{no. of sec.}$ was const. (C); the value of C ranged between 0.02 and 0.2. II. **Organic non-electrolytes.** *Ibid* 17-23.—The adsorbents were charcoal and bolus alba; the adsorbed material was glucose. The temp. ranged between 17° and 21° . With charcoal and glucose the results resembled those obtained with charcoal and KI; previous washing had no effect on the shape of the velocity curve and the velocity of reversion is favored by higher temps. The equil., however, sets in in less time than in the charcoal-KI system. The adsorption of glucose on bolus being almost zero, it was impossible to det. the reversion of this system with accuracy. III. **Organic dyes and emulsion colloids.** *Ibid* 33-42.—The reversibility of some org. dyes and an emulsion colloid was studied. The expts. were done on such dyes as give a true soln. (eosin, methylene blue, picric acid) or a mixt. of a colloidal and a true soln. (acid fuchsin, methyl violet, Nile blue, neutral red) or a colloidal soln. (Congo red, aniline blue, induline, scarlet red). Tributyrin emulsion was chosen for the emulsion colloid. Reversion was observed in only 2 cases, namely, in the system charcoal-picric acid and bolus-neutral red, where the curves obtained represented the same type as described above. Equil. is produced very rapidly. In all other cases, the adsorption was either irreversible or did not take place at all. IV. **Enzymes.** *Ibid* 43-55.—Pancreatin containing diastase, trypsin and lipase was used as adsorbed substance and blood charcoal and bolus alba as adsorbents. The adsorption of trypsin and lipase on charcoal is complete and irreversible. Diastase is fairly well adsorbed by charcoal, the process of reversion is rather slow. The adsorption of trypsin on bolus is nearly complete. The process is reversible and equil. occurs immediately. Bolus adsorbs a large amt. of lipase, but almost no reversion was seen. In the system bolus-diastase, the results obtained are similar to those obtained with charcoal-diastase.

G. SCHWACH

Nephelometric studies on starch hydrosols. A contribution to the question of the nephelometric dilution law. F. H. RITTER. *Biochem. Z.* 192, 337-50(1928).—A discussion of the deviations from Kleinmann's rule, observed with a highly dispersed starch soln. These follow a strictly formulated mathematical law. S. M.

Preparation of electrolyte-free gelatin. J. H. NORTHROP AND M. KUNITZ. *J. Gen. Physiol.* 11, 477-9(1928).—Powd. gelatin is soaked in $M/128$ AcOH for 1 hr. at $5-10^\circ$, washed 3 times with distd. water and filtered. It is then placed in approx. $0.02 M$ NaOH soln. for 1 hr., after which the supernatant liquid is removed and the gelatin is again washed 3 times with cold water. The amt. of NaOH removed is accounted for by measuring the vol. of wash water and by titrating samples of it. The quantity of NaOH left in the gelatin is calcd. and AcOH of known concn. is added to the gelatin in amt. double that present after washing. This brings the p_H to 4.7. Then follow 4-5 washings with cold water after which the gelatin is stirred into 95% alc., filtered, perfused several times with fresh alc. and then with Et_2O . Finally it is air-dried. 2.3 g. of this gelatin in distd. water had a p_H of 4.84 and a specific cond. of 1.5×10^{-5} , the cond. of the water used being 3.4×10^{-6} . Further washing does not materially change the cond. of the gelatin. If it is desired to keep the p_H at the isoelec. point, the gelatin should be dild. with water of p_H 4.7. C. H. RICHARDSON

Temperature of coagulation of pure copper colloidal solution. B. M. REID AND E. F. BURTON. *J. Phys. Chem.* 32, 425-32(1928).—The intention was to find the relation between temp. and coagulation in Bredig Cu-sols to which electrolytes had been added. It was discovered that coagulation takes place whether electrolyte is or is not added. The sols were heated in open Cu tubes sealed in Pyrex. No ebullition was permitted. Tables of data and graphs show that all colloids are coagulated by heat alone but more rapidly or at lower temps. if electrolytes are added. The longer the colloid stands after the addition of an electrolyte the lower the temp. required for coagulation. There are two cases. (1) The purest simplest colloids can be coagulated by heat alone. (2) Slow coagulation induced by traces of electrolytes may be

made rapid by rise in temp. There are three distinct changes by which rise in temp. may affect the rate of coagulation. (1) mol. motion, (2) dielectric const; (3) ionization of the solvent, water. The second should retard coagulation as temp. increased and the third is most likely to be the effective agency in hastening coagulation.

F. E. BROWN

The adsorption of iodine by charcoal in mixtures of organic solvents. J. TRIVINIC. *Compt. rend.* **186**, 1358-60(1928); cf. *C. A.* **22**, 2092.—Mixts. of H_2O -EtOH, PhH-PhMe, $CHCl_3$ - CCl_4 and EtOH-PhMe were used. The conclusions are: (1) The adsorption of I by charcoal in binary mixts. of org. solvents is expressed by the Freundlich adsorption equation. (2) If the values for the adsorption of I by charcoal are known for the pure solvents, the adsorption in any mixt. of the 2 solvents is indicated by a straight line joining these values where compn. of the solvent is plotted against adsorption.

L. B. MILLER

Contribution to the knowledge of electrolytic solution forces and of the electrolytic ionic state. III. Solubilities and solution forces, solubility and ionizing power. KARL FREDENHAGEN. *Z. physik. Chem.* **134**, 33-56(1928); cf. *C. A.* **21**, 3523.—Since every substance has a vapor pressure, solubilities can be expressed in terms of the distribution between gas and liquid phases. The distribution coeff may serve as a measure of the soln. forces between solvent and solute. Independence of the soln. forces and concn. is possible only in dil. soln. In a binary compd. the 3 distribution coeffs. of the undissocd. compd. and its 2 components must be considered. If electrolytic dissocn. occurs in the liquid phase electrolytic distribution coeffs. are required. These show how much greater the concn. of ions in the soln. must be than the concn. of corresponding neutral atoms in the gas phase in order that distribution equil and zero potential difference may prevail between the liquid and gas phases. A factor which depends on the choice of the reference zero enters into the electrolytic distribution coeff. P . However, a single such coeff. never occurs but instead the product of 2 coeffs. and the const. factor cancels. The ion product of a compd. in a solvent is given as the product of its dissocd. components in the gas phase and the P coeffs. Thus $C_{B^+} C_{S^-} = C_B C_S P_B P_S$. Values of P were detd. for a no. of elements in aq and NH_3 solns. and their order of magnitude estd. for other solvents (alc., HCN, HF). The sequence of P values in no way corresponds to the normal potentials and changes in different solvents. The ion product for a no. of substances in different solvents was computed from their known vapor pressures and calcd. dissociation consts. in the gas phase. The results agreed with the values found within the exptl. error. The agreement was considered as evidence that the p values det. the energy content of the ions as compared with the neutral atoms.

E. R. SMITH

A new form of the laws of Raoult. J. N. LANGINESCU. *J. chim. phys.* **25**, 70-82 (1928).—The formulas of Raoult for lowering of f. p. and raising of b. p. can be written $(T_{F0} - T_{F1})/T_{F0} = (RT_{F0}/L_F)x$ and $(T_{V1} - T_{V0})/T_{V0} = (RT_{V0}/L_V)x$, where L_F and L_V are the latent heats and x is the mol. fraction of the solute, the values RT_{F0}/L_F and RT_{V0}/L_V are const. for similar compds. Thus the depression or elevation, for analogous solvents, is dependent on x and independent of the nature of the components.

E. G. VANDENBOSCH

The neutral salt effect in ionic reactions. The temperature coefficient of the neutral salt effect. A. V. KISS AND I. BOSSANYI. *Rec. trav. chim.* **47**, -619 26(1928); cf. *C. A.* **21**, 3522.—The velocity of the reaction between $S_2O_8^{--}$ and I^- was measured at temps. between 0° and 75° and the temp. coeff. of the reaction was calcd. The results satisfied a 2-const. formula of the type $\log k = -(A/T) + B$. The temp. coeff. was found to have a normal value in every case and to decrease with increasing temp. The addn. of neutral salts did not change the temp. coeff.

E. R. SMITH

The neutral salt effect in ionic reactions. II. The neutral salt effect in concentrated salt solutions. A. V. KISS. *Z. physik. Chem.* **134**, 26-32(1928); cf. *C. A.* **21**, 3522.—The reaction between $S_2O_8^{--}$ and I^- was studied in concd. salt solns. to test the conclusion that the neutral salt effect follows different courses in dil. and concd. solns. This conclusion is based on the equation $v = k_R h_M C_A C_B f_A f_B / f_X$, where v is the velocity of a bimol. reaction, h_M is a const. depending on the reaction but not on the medium, h_M is a const. depending on the medium but not on the reaction, C_A, C_B, f_A, f_B are the concns and activity coeffs. of the reactants and f_X is the activity coeff. of the complex. It was found that the concn. effect of the reactants vanishes almost completely in concd. salt solns. and that the neutral salt effect follows the law of Grube and Schmid (*C. A.* **20**, 1548); i. e., the value of the velocity const. changes linearly with the salt concn.

E. R. SMITH

The activity coefficient of small ions. HANS MÜLLER. *Mass. Inst. Techn.*

Physik. Z. **29**, 78-82(1928).—M. improves his earlier paper (*C. A.* **21**, 3017) by using Gronwall and La Mer's better expansion of the Debye function. F. R. B.

Activity of hydrogen ions in aqueous solutions of beryllium sulfate. MILDA PRYTZ. *Trans. Faraday Soc.* **24**, 281-8(1928).—The H-ion activities in BeSO_4 solns. are studied by means of the H electrode, with the assumption that the H-ion activity of the reference electrode is unity and the use of Nernst's logarithmic formula. In the tabulated results, values are given for p_H and a for various concns. of BeSO_4 at 25°, 40° and 38°, in which a is the percentage hydrolysis of the salt. These values are calcd. on the assumption that for 100% hydrolysis each mol. of BeSO_4 yields 1 mol. of H_2SO_4 , and that the H_2SO_4 produced by hydrolysis is completely ionized. For dil. solns. a at 40° is always greater than a at 25°, while for more concd. solns. the reverse is true. Thus with 0.86 M BeSO_4 , p_H is 1.895 and a is 0.736 at 25° and p_H is 1.934 and a is 0.678 at 40°, while with 0.08 M BeSO_4 , p_H and a at 25° are 2.888 and 0.750 and at 40° are 2.854 and 0.816. Corresponding detns. are made in mixed solns. contg. BeSO_4 and added H_2SO_4 . For lower concns. of H_2SO_4 the effect of BeSO_4 is to decrease p_H and therefore a_H , while for higher concns. of H_2SO_4 the reverse is true. The results show that the unhydrolyzed part of the BeSO_4 makes it impossible to obtain an approx. estimate of the percentage hydrolysis of the salt by means of the H electrode except in the more dil. solns. An attempt to do this by comparing BeSO_4 solns. with equimol. solns. of MgSO_4 contg. sufficient added H_2SO_4 to give the same values of p_H was unsuccessful. H. STOERTZ

Activity coefficients of aqueous solutions of lead chloride at 25°. A. J. ALLMAND AND E. HUNTER. *Trans. Faraday Soc.* **24**, 300-6(1928).—Measurements of e. m. f. are carried out at 25° on the element Pb (amalgamated) aq. PbCl_2 -AgCl(solid)-Ag, and from the results the mean activity coeffs (γ) of the dissolved PbCl_2 are calcd. between the concn limits of satn. and 0.0003 M . For 0.0003 M , γ is 0.886, at 0.003 M , γ is 0.707, at 0.03 M , γ is 0.431 and at satn. (0.03908 M) γ is 0.388. The expts. are conducted in an atm. of N_2 , carefully purified from O_2 . H. STOERTZ

Monobasic, polybasic and polymonobasic acids and their differences. ERNST WEITZ AND HELLMUTH STAMM. *Ber.* **61B**, 1144-55(1928).—A discussion of the theoretical aspects involved in the difference of behavior of monobasic, polybasic and polymonobasic acids and salts, respecting ammoniate formation, hydrate formation and colloid coagulation. Regarding ammoniate formation the order is PO_4^{---} , IO_3^{---} , SO_4^{--} , F^- , $\text{S}_2\text{O}_8^{--}$, Cl^- , NO_3^- , Br^- , ClO_3^- , $\text{S}_2\text{O}_8^{--}$, I^- , CNS^- , ClO_4^- . There is a regular transition from polybasic to monobasic acids, with the apparent exception of $\text{S}_2\text{O}_6^{--}$ and $\text{S}_2\text{O}_8^{--}$. These are regarded, however, as constituted of 2 equiv. parts ($-\text{SO}_3\text{H}$) and ($-\text{SO}_3\text{H}$), each of which is a monobasic acid group, the acid therefore belonging to the poly-monobasic type. From the standpoint of relative coagulating ability, the polymonobasic acids occupy an intermediate position between polybasic and monobasic acids. Thus in coagulating a $\text{Fe}(\text{OH})_3$ sol, if the concn. of $(\text{NH}_4)_2\text{SO}_4$ required is 1, that of NH_4Cl is 100 and that of $(\text{NH}_4)_2\text{S}_2\text{O}_8$ is 7.5. H. STOERTZ

The strength of acetamide as an acid. G. I. K. BRANCH AND J. O. CLAYTON. *J. Am. Chem. Soc.* **50**, 1680-6(1928).—The conductivities of mixts. of (1) 0.02-0.08 N $\text{Ba}(\text{OH})_2$ and 0.0-10.0 N CH_3CONH_2 and (2) 0.02-0.08 N NaCl and 0.0-10.0 N CH_3CONH_2 , in aq. soln. at 25° were measured in the usual way. The slope, L , of the curves, cond. against concn. of base for const. concn. of acetamide, was the partial differential of the cond. with respect to the total concn. of base. The values of L were cor. for the influence of acetamide on the mobilities of the ions by the equation, $L_0 = L/(1 - E[A])$, in which $[A]$ was the normality of acetamide and E was a property of acetamide related to the solvent, and substituted in the equation, $(L_0 - L_{0B})/(L_{0B} - L_0) = K/[A]$, where L_{0B} and L_{0H} were the partial differential values for the pure barium acetamide and the base, resp. The equation was solved for K , the hydrolysis const. of acetamide. It was found to be 12, and corresponded to an acid dissocn. const. for acetamide equal to 8×10^{-10} . The dissocn. const. for benzamide was between 10^{-14} and 10^{-18} as detd. by similar measurements. A former value of 1.2×10^{-7} for benzamide was concluded to be erroneous. H. W. WALKER

p_H of buffered salt solutions. J. B. O'SULLIVAN. *Trans. Faraday Soc.* **24**, 298-300(1928).—A NiSO_4 soln. with a p_H of 5.0 is buffered with acetate, phosphate and borate buffers, the resulting solns. showing a lowered p_H . With an acetate buffer of p_H 5.0, the soln. showed a p_H of 4.4; with a phosphate buffer of p_H 6.4, the soln. showed a p_H of 4.5; and with a borate buffer of p_H 7.1, the p_H of the soln. was 5.9. The measurements are made with a quinhydrone electrode against a satd. calomel electrode, with satd. KCl as an intermediate. With a BaCl_2 soln. showing a p_H of 4.5, an acetate buffer of p_H 5.0 gave a p_H of 4.8; with CdCl_2 of p_H 5.7 the buffer gave a p_H of 4.3;

with CuSO_4 of p_H 3.7 the buffer gave a p_H of 4.0; with MnSO_4 of p_H 3.9 the p_H buffered was 4.7; with $\text{Al}(\text{NO}_3)_3$ of p_H 3.5 the p_H buffered was 3.1. On examn. of the effect of the buffer soln. upon CdCl_2 , NiSO_4 and $\text{Al}(\text{NO}_3)_3$, over a wide range of concns., an appreciable lowering of p_H is found even when the concn. of the added salt is below that of the buffer mixt

H. STORZT

The determination and significance of hydrogen-ion concentration. H. W. VAN URK. *Pharm. Weekblad* **65**, 515-27(1928).—A lucid discussion of the fundamental principles and practical application of p_H detn.

A. W. DOX

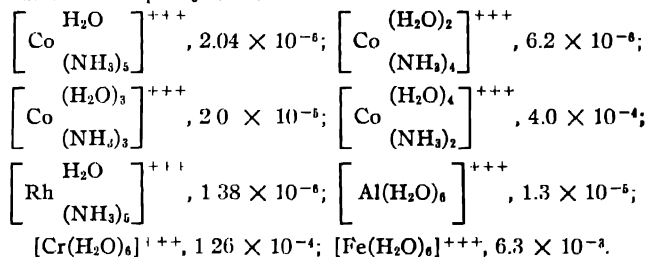
The use of quinaldine red for hydrogen-ion concentration determinations in acid medium. I. M. KOLTHOFF. *Biochem. Z.* **194**, 78-82(1928).—Quinaldine red changes color between p_H 1.4 and 3.2 from colorless to red. The indicator const. $pK_i = 2.73-0.007(t - 20^\circ)$. It has a fairly large salt error. In 0.1 N KCl a correction of +0.17 in p_H is necessary, and in 0.5 N KCl + 0.38. The protein error was not detd. 2,4,2',4',2''-Pentamethoxytriphenylcarbinol is a better indicator than quinaldine red.

S. MORGULIS

The acid dissociation of aquo ions. II. J. N. BRÖNSTED AND KIRSTEN VOLQVARTZ. *Z. physik. Chem.* **134**, 97-134(1928); cf. *C. A.* **22**, 526.—The acid character of the aquo

ions is detd. by the typical equil.
$$\left[\begin{array}{c} \text{H}_2\text{O} \\ \text{Co} \\ (\text{NH}_3)_5 \end{array} \right]^{+++} \rightleftharpoons \left[\begin{array}{c} \text{OH} \\ \text{Co} \\ (\text{NH}_3)_5 \end{array} \right]^{++} + \text{H}^+$$

and $\text{H}^+ + \text{H}_2\text{O} = \text{H}_3\text{O}^+$. The factors governing the acid strength are: (1) The elec. charge of the acid, and (2) the no. of dissociable protons. The methods generally applicable for the detn of the disson const. of these ions are: (1) Detn. of H-ion concn. by the catalytic diazoacetic ester decompn. method, (2) detn. of the soly. of salts of the cations in question in solns. of different acidity, and (3) detn. of H-ion concn. from the decompn. velocity of nitrate-aquo-tetrammine-cobaltic salts. The disson const. of a series of trivalent aquo ions were detd by these 3 methods. With increasing concn. positive deviations from the ideal behavior were observed. These deviations were found to be proportional to the ionic strength and were represented by the formula $\log K = \log K_0 - 2\sqrt{\mu} + \mu$, where μ is the ionic strength. The ions investigated and their resp. K_0 values at 15° were:



E. R. SMITH

Color variations of cyanidin chloride and 3,5,7,3',4'-pentahydroxyflavylium chloride as related to acidity and alkalinity. C. M. FEAR AND MAXIMILIAN NIERENSTEIN. *Biochem. J.* **22**, 615-6(1928).—The color changes of anthocyanidins and probably anthocyanins, in presence of acids and especially alkalies, must be standardized before any real value can be attached to them. p_H values, temp. and time of contact with reagent have to be considered.

BENJAMIN HARROW

The oxidation-catalytic action of iron. HANS HANDOVSKY. *Z. physiol. Chem.* **176**, 79-88(1928).—The oxidation of leucine to $\text{Me}_2\text{CHCH}_2\text{CHO}$, NH_3 and CO_2 by O_2 in the presence of various forms of Fe was tested by shaking the mixt. in a thermostat at 37° . No oxidation occurred when the Fe was in the form of FeSO_4 , Fe_2O_3 aq., $\text{Fe}(\text{OH})_3$ sol, $\text{FeSO}_4 + \text{Al}(\text{OH})_3$ or metallic Fe obtained by ignition of FeC_2O_4 . Metallic Fe prep'd. by heating pptd. $\text{Fe}(\text{OH})_3$ in an atm. of H oxidized leucine in an O atm. to $\text{Me}_2\text{CHCH}_2\text{CHO}$, NH_3 and CO_2 . All of these products were identified. The oxidation in 5-6 hrs. amounted to 19% of the leucine. This Fe prepn. catalyzed the oxidation also of glycine, alanine, valine, tyrosine, histidine, formylleucine and glycyllleucine, as shown by the fuchsin- SO_2 test for aldehyde. Oxidation by the Fe powder is inhibited by HCN. If, however, the reduced Fe is cooled in an atm. of N it loses its power of catalytic oxidation, but the activity may be restored by heating again in H. The activity is due to dissolved H, which is present in an activated form on the surface of the Fe crystals. This H combines with the free O to form H_2O_2 .

which then oxidizes the amino acid. If O is passed into a suspension of the active Fe in $\text{Ti}(\text{SO}_4)_2$ soln., an intense blue color develops which changes to colorless and finally yellow with further absorption of O. This effect is not obtained with the reduced Fe cooled in N. Animal charcoal, because of the presence therein of Fe, oxidizes leucine in the same way as reduced Fe. This power is lost when the charcoal is heated in a N atm. but restored by heating in H. There is no evidence that Fe in any form is capable of direct catalytic oxidation of amino acids.

A. W. DOX

Relation between the rate of stirring and reaction velocity in heterogeneous systems. ANIELA KLEIN. *Roczniki Chem.* 6, 867(1926); cf. C. A. 18, 3132; 20, 1936; 22, 1084.—In their paper on the soln. of Cu in $\text{Fe}(\text{NH}_4)(\text{SO}_4)_2$ Bekier and Rodziewicz adopt K.'s formula: $(K - a)/n = \text{const.}$ with the assumption, however, that a varies with the shape and position of the stirrer. K. shows that B. and R.'s figures, if properly calcd., prove the constancy of a within the limits of exptl. error.

MARY JACOBSEN

The relation between the hydrolysis equilibrium constant of esters and the strengths of the corresponding acids. R. J. WILLIAMS, ALTON GABRIEL AND R. C. ANDREWS. Univ. of Oregon. *J. Am. Chem. Soc.* 50, 1267-71(1928).—The Et esters of HCO_2H , AcOH , $\text{C}_2\text{H}_5\text{CO}_2\text{H}$, glycolic, lactic and of halogen acids were hydrolyzed directly until equil. was reached. In general, when the esters of similar acids are compared those formed from the stronger acids are more nearly completely hydrolyzed. When esters formed from acids of different types are compared, some other factor or factors produce great changes in extent of hydrolysis.

F. E. BROWN

The effect of neutral salts on the velocity of saponification of ethyl acetate by sodium hydroxide. I. S. D. WILSON AND ETHEL M. TERRY. Univ. of Chicago. *J. Am. Chem. Soc.* 50, 1250-4(1928); cf. C. A. 21, 3526; 22, 2307.—The salts used were NaCl, NaOAc and NaNO_3 . The initial molalities of ester and alkali were 0.008 and 0.01, resp. The molality of the salt solns. varied from 0.02 to 0.5. Data for the activity coeffs. of NaOAc and NaNO_3 were lacking. From the data available for the activities of NaOH and HCl and the equation $dx/dt = K_4(\gamma_{\text{NaOH}}/\gamma_{\text{HCl}})(B - X)$ ($E - X$), where dx/dt and K_4 have the usual significance, γ_{NaOH} and γ_{HCl} are the activities of NaOH and HCl, resp., and B and E are the initial molalities of the base and of the ester, resp., K_4 is found to be const.

F. E. BROWN

Heat of formation of molecular hydrogen. F. RUSSELL BICHOWSKY AND L. COVELL COPELAND. *J. Am. Chem. Soc.* 50, 1315-22(1928).—A mixt. of H_2 and H from a Wood's tube was passed through a small hole into a Pt calorimeter. The heat of combination of H to give H_2 was measured, and the amt. of H in the gas detd. from the law of flow of gases through small holes. The heat, thus detd. of the reaction $2\text{H} = \text{H}_2$, is $105,000 \pm 3300$ cal. per mol.

F. R. BICHOWSKY

The thermal investigation of metallurgically important reactions in a calorimeter operating at elevated temperatures. W. A. TOTH AND P. CHALL. *Z. Elektrochem.* 34, 185-99(1928).—A calorimeter which operates at elevated temps. with an accuracy of 1% is described. The calorimeter operates on the principle that when materials sol. in acids with the evolution of gases are used, the gases thus evolved carry the heat to the calorimeter liquid. Specific-heat data are given for HCl and HF solns., glass, platinum, marble, ppld. SiO_2 and quartz. The heat of vaporization of water is given as well as the heats of soln. in dil. HCl of CaO, $\text{Ca}(\text{OH})_2$, CaSiO_3 , marble, calcite, argonite, MgO, $\text{Mg}(\text{OH})_2$, Zn, $\text{Zn}(\text{OH})_2$, and smithsonite, and heats of soln. in dil. HF of quartz, sand, pptd. SiO_2 and SiO_2 contg. 33% H_2O . Data are also given on the heats of formation at 50° of CaSiO_3 from CaO and SiO_2 , of calcite and argonite from CaO and CO_2 , of $\text{Ca}(\text{OH})_2$ from CaO and H_2O , of $\text{Mg}(\text{OH})_2$ from MgO and H_2O , of $\text{Zn}(\text{OH})_2$ from ZnO and H_2O , of smithsonite from ZnO, and CO_2 , of ZnO from Zn and O; and heats of transformation of calcite into argonite and of amorphous to cryst. SiO_2 .

A. W. C.

The question of the determination of the thermal equivalent of a calorimetric bomb. W. SWIENTOSLAWSKI. *J. Russ. Phys.-Chem. Soc.*, Chem Part, 59, 563-6(1927); cf. following abstract.—Calibration against the heat of combustion of some standard substance (BzOH) will make the results of various investigators comparable. The transport method advocated by Shchukarev (*Bull. of Thermotechn. Inst.*, 1926, Russian), while precise *per se*, will lead to further confusion.

BASIL C. SOYENKOFF

Swientoslawski's article on the question of the methods of determining the thermal equivalent of a calorimetric bomb. A. N. SHCHUKAREV. *J. Russ. Phys.-Chem. Soc.*, Chem. Part, 59, 567-72(1927); cf. preceding abstract.—S. upholds an abs. method of calibration as contrasted with the relative one against the heat of combustion of a standard substance. The following refinements were introduced into the transport method. The bomb was placed in a close-fitting leaden jacket, the 2 screws being replaced by corks, and left overnight in a reservoir of water at room temp. A ther-

mometer was immersed in the water, and another one dipped into Hg on top of the cover of the bomb. After the final measurements were made of the temp. of the calorimeter, some of the water was replaced by warm water until the temp. reached that at the beginning of the expt. V was read off with the water at the same level as before the immersion of the bomb. The av. deviation was 0.5 cal. with the limit of precision of the thermometer at 0.43 cal. BASIL C. SOYENKOFF

The condensation of certain substances below their melting points. N. V. TANTZOV AND T. N. KHODALEVICH. *J. Russ. Phys.-Chem. Soc.*, Chem. Part, 59, 631-8 (1927).—Tammann and others observed that camphor, borneol and isoborneol crystd directly from their vapor. Since their results contradict the principle of min. entropy change, a study was made of the supercooled vapors of the above substances in the absence of solid nuclei of crystn. A test tube was ground at the middle to fit into the constricted top of a cylindrical vessel contg. the substance. After heating to 15-30° above the m. p., the bath was allowed to cool and a current of air washed with Et₂O sucked through the bottom of the test tube. With the bath 10° above the m. p. and the end of the test tube 50° below, a transparent viscous film deposited on the latter which could be slowly cooled to room temp. without crystn. A similar optically isotropic film results when camphor is condensed after the beginning of crystn., while in the case of borneol it grows rapidly opaque. Isoborneol in each case gave a transparent film which crystd readily on further cooling. S and I are condensed in liquid drops which can be supercooled to room temp. BASIL C. SOYENKOFF

An extension of the idea of entropy. V. NJEGOVAN. *J. chim. phys.* 25, 65-9 (1928).—A concrete notion of entropy can only be obtained by considering its abs. value. The entropy const. must be considered as being variable, for then it will not disappear on differentiation but will stay in the final equation of energy. An attempt is made to combine laws of C_p and C_v with the entropy const. E. G. V. B.

Thermodynamical principles of chemistry. I. General and synthetic method of deriving and comparing in a simple and rigorous manner the fundamental formulas of physical chemistry. E. DENINA. *Ingegneria Rivista Tecnica Mensile* 1926, No. 8, 16 pp.—The initial and final states of isothermal processes are assumed to be determined by 2 curves AA' and BB' . By applying the second law of thermodynamics to a cycle of two isotherms, there is obtained the general equation, $A = T(\partial A/\partial T) + \Delta U + T[\partial(L - L')/\partial T]$. L and L' are the work done by the system along AA' and BB' , resp., starting at any arbitrary point A', B' . A is the max. work and U the decrease in internal energy. From this equation all the special formulas of phys. chemistry can be derived by assigning the proper forms to the curves AA' and BB' , which det. how the initial and final states vary with the temp. Particular consideration is given the case of thermodynamic potential at const. pressure, and the above equation is shown to be applicable generally, even when the initial and the final states vary according to different laws. II. The laws of equilibrium in perfect gases and ideal solutions. *Ibid* No. 10, 16 pp.—D. has derived synthetically the various equations expressing the affinity of a reaction, and the equil. conditions for systems of perfect gases and of ideal soln., emphasizing the exact significance of each symbol, and the conditions of validity of each formula. Particular emphasis is placed on the necessity of defining precisely the method of detg. the concn. Relations between the various equations, often of a simple algebraic nature, are shown. R. H. LOMBARD

Observation on my work on color and magnetism of ions. GEORG JOOS. *Phys. Inst., Jena. Ann. Physik* 85, 641-2(1928).—The colors of certain Ti compds. verify J's theory (cf. *C. A.* 21, 1053). A. L. HENNE

Note on the relation between color and magnetism of ions. BORIS MALYSCHIEFF. *Ann. Physik* 85, 794(1928).—Ni carbonyl is octavalent and colorless, in contrast to other Ni compds., while $\text{Fe}(\text{CO})_5$ is yellow and also is photosensitive. M., therefore, suggests that the measurement of the magnetic susceptibilities of the carbonyls of the paramagnetic metals in the gaseous, liquid and solid forms should be of great value in indicating their structure. W. W. STIFLER

Magnetization of single crystals of iron at high temperatures. KOTARO HONDA, HAKAR MASUMOTO AND SEIJI KAYA. *Sci. Repts. Tohoku Imp. Univ.* 17, 111-30(1928).—The intensity of magnetization of a small rectangular bar consisting of a single crystal of Fe was measured by the ballistic method at various temps. from liquid air up to 770°. At ordinary temps. the magnetization curve is almost straight up to $I = 1000$, then breaks sharply and again is almost rectilinear until the satn. value at $I = 1700$ approx. is reached, when there is another sharp break and the curve becomes horizontal. As the temp. is raised these breaks are gradually displaced toward lower fields and the satn. value decreases until it vanishes at the crit. temp., 790°. By

extrapolation the satn. value at zero abs. is estd. to be $I = 1752$. The relations between the magnetization and the temp. for the directions of the principal axes, as found from measurements on an ellipsoid, are all similar to each other and also to those for the rectangular bar. Honda and Okubo's theory of the magnetization of ferromagnetic crystals (*C. A.* 12, 2480) is explained briefly and the present results are shown to be in accord with it. W. W. STIFLER

Electrode potential crystals of iron. KEIZO IWASÉ AND KOZO MIYAZAKI. *Sci. Repts. Tohoku Imp. Univ.* [1], 17, 163-7 (1928).—The electrode potential of an Fe single cryst., having the surface (110), was compared with that of polycryst. Fe against a Hg electrode in a cell with $(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2$, KCl and Hg_2Cl_2 . The single crystal gave a higher potential than the polycryst. Fe. For the single crystal the time-e. m. f. curve rises rapidly to a const. value while the curve for the polycryst. Fe rises to a max. and then gradually falls to a const. value after a comparatively long time. W. W. S.

Electrically charged boundary surface. RUDOLF AUERBACH. Univ. of Leipzig. *Kolloid-Z.* 43, 114-31 (1927).—The equations for expressing surface energy on uncharged liquid spheres, for the effect of introducing elec. charges, for the criterion for positive, zero and negative surface tensions and for pressure in a small drop, are derived. They are, resp.: $\Omega = \sigma_0 4\pi r^2$ (1); $N = V^2/8\pi r^2$ (2); $\sigma_n = \sigma_0 - (V^2/16\pi r)$ (3); $D = 2\sigma/r$ (4). In these equations Ω = surface energy, σ_0 = surface tension of an uncharged surface, N = the expansive pressure of charges on the surface of a drop, V is the potential function, σ_n is the actual surface tension, D is the pressure in a drop. The third equation shows that the measured surface tension is the difference between the surface tension of an uncharged drop and the expansive pressure due to the charge on the surface. This value may be pos., neg. or zero. Surface tensions, σ_n , were measured by the swinging stream. The streams were photographed. Eight photographs are reproduced in the paper to show the forms of streams of acetone charged at 5000-v. intervals from 0 to 30000 v. The p. d. was detd. by measuring the attraction between a plate charged with the same voltage as the stream, and a grounded plate. The force between the plates varied from 4.21 g. at 5000 v. to 421 g. at 50,000 v. For H_2O the following values for surface tension in dynes per cm. were obtained: $\sigma_{0v} = 73$; $\sigma_{5000v} = 63.7$; $\sigma_{10000v} = 49.8$; $\sigma_{15000v} = 43.0$; $\sigma_{20000v} = 35.1$; $\sigma_{25000v} = 29.2$. "v" indicates p. d. in volts. For Hg, the values were $\sigma_{0v} = 450$; $\sigma_{5000v} = 441$; $\sigma_{10000v} = 432$; $\sigma_{15000v} = 416$; $\sigma_{20000v} = 405$; $\sigma_{25000v} = 394$. For acetone, the values are $\sigma_{0v} = 23.3$; $\sigma_{5000v} = 22.2$; $\sigma_{10000v} = 18.3$; $\sigma_{15000v} = 11.9$; $\sigma_{20000v} = 10.4$; $\sigma_{25000v} = 8.1$; $\sigma_{30000v} = 4.4$; $\sigma_{17500v} = 3.7$; $\sigma_{20000v} = 0$; $\sigma_{22500v} = -5$; $\sigma_{25000v} = -10$; $\sigma_{27500v} = -12$; $\sigma_{30000v} = -18$. When the surface tension is zero or negative the stream is soon dissipated as spray. If surface tension is due to an elec. double layer, and r and $r + S$ are the radii of the 2 concentric spheres, then as S increases the charge necessary to produce a given surface tension increases. The breaking of a stream into fine particles increases the electrostatic capacity of a given vol. of liquid more rapidly even than the surface increases. $\Sigma O_n = O_0 n^{1/3}$ and $\Sigma C_n = C_0 n^{2/3}$ represent these relations when ΣO_n represents the total surface of n particles and ΣC_n represents the electrostatic capacity of the same n particles. The capacity of 1 cc. of matter in colloidal particles ($r = 1\mu$) is greater than that of a single sphere whose radius is equal to the distance from the sun to the earth. It seems probable that any liquid may be sufficiently highly charged to break it up into fine droplets or even almost to vapor. But as yet no noticeable increases of vapor pressure have been produced exptly. by this means. Highly dispersed systems may be highly charged with their great capacity, be transported or transferred to other vessels and the electricity be recovered. F. E. BROWN

The dispersion of conductivity and dielectric constant of strong electrolytes. P. DEBYE AND H. FALKENHAGEN. *Phys. Z.* 29, 121-32 (1928); cf. *C. A.* 21, 3194.—When the force acting on an ion of a strong electrolyte is suddenly changed it takes a finite time of the order of 10^{-7} sec. for equil. to be reestablished. This time can be calcd. for certain cases if the theory of Debye for strong electrolytes is assumed. The calcn. is carried through to give the time of approach to equil., the phase difference between motion of an ion and the imposed force, and the dependency of cond. and dielec. const. on the frequency. These last quantities can be easily measured. F. R. B.

Birefringence and dichroism of thin layers of iron obtained by distillation. MARCEL CAU. *Compt. rend.* 186, 1293-5 (1928).—A method is described for heating iron wire in a vacuum and distg. it to obtain iron foils of varying thickness. These were studied with a Glazebrook polarizer and a Chaumont analyzer, carefully regulated on a pencil of monochromatic light coming from a Hg-vapor lamp, followed by a separator. The results showed: (1) The variations of the azimuth, the rotation to the right and the ellipticity can be represented by sinusoids; (2) the period of the sinusoids corresponds

to a half-turn of the foil in its plane; (3) the variations in rotation and ellipticity are concordant; (4) if the direction parallel to the generating wire be called the axis, the rotation and ellipticity are zero if the axis is parallel or perpendicular to the incident vibration. The results are explained by birefringence and dichroism, since birefringence alone would give a negligible rotation, and dichroism alone would not give the ellipticity. The effect is localized in the metallic deposit and is caused by the magnetic field of the current used to produce the distn. The effect is not modified by an intense magnetic field parallel to the foil.

AMY LEVESCONTE

Decimal classification of colors. A. RUTHARDT. *Farbe u. Lack* 1928, 116.—The ten colors, including black and white, are designated by the numbers 0 to 9. The amt. of color is indicated by nos. following the first one and is expressed as parts of color per 10 or 100 parts of inert. Thus, 25 means 5 parts of color 2 plus 10 parts inert. Mixts. are sepd by commas. Thus, 255,615 means 55 parts color 2 plus 100 inert, mixed with 15 parts color 6 plus 100 inert. The predominating color is written first. G. G. SWARD

Some remarks on the theory of the rocking extraction. UNO BOXLUND. *Skand. Arch. Physiol.* 53, 176-84(1928).—Original must be consulted for details of computation.

S. MORGULIS

The reaction of starch with iodine. STAIGER. *Z. Spiritusind.* 50, 300(1927).—Methods for prepg. the reagents are given. Pure I does not give the blue color with starch, but the color is produced if a trace of HI is added. The lower the temp. of the starch soln., the more intense the blue color. An excess of I is necessary to retain the blue color when added to incompletely saccharified starch solns. Heating to near the b. p. causes the blue color to disappear, but if not overheated it will return when cooled. Substances, such as alk. earths, H_2S , Cl , $KMnO_4$, and tannic acid, tending to remove KI or HI, prevent the reaction. Alc. causes decolorization by the formation of I_2I . Salts of metals affect the color, Ag causing violet tints to appear. Reducing substances tend to decolorize the starch-iodine complex. Addns. of HCl to starch-iodine may depress the dissociation of HI and permit the blue color to be retained even at the b. p.

C. N. FREY

Demonstration of a method of measuring particle sizes in ground powders. J. V. RAMSDEN. *J. Oil Colour Chem. Assoc.* 11, 16-7(1928).—A small quantity of the sample is mixed with water till a slight turbidity is obtained, and then poured into a transparent-bottomed dish made of xylonite. This dish is placed on the stage of an inverted microscope, specially designed for this work. By means of a $1/4$ -in. microscope objective, the image of the particles is projected on a ground-glass screen on which are ruled lines. These lines are set apart at a distance corresponding to a satisfactory mesh size for the particles. Should a particle be larger than the distance between 2 lines, the material is condemned. The instrument is in daily use for control testing of barytes.

R. J. MOORE

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

The waves in the ether. Their properties and applications. I. PLOTNIKOV. *Archiv. hem. farm.* 1, 111–26(1927).—A popular outline of the waves of the whole spectrum.

The dispersion and absorption of short electric waves and their production by means of cathode tubes. V. I. ROMANOV. *Physik. Z.* 28, 770–9(1927).—A rather thorough review is given of the literature. It is shown that the oscillations of associated mols. may correspond numerically to those of the elec. spectrum. A generator consisting of two tubes is described giving short undamped elec. waves. So far, waves of 18 and 3.6 cm, resp., have been obtained.

Ionization in the upper atmosphere of the earth. E. O. HULBERT. Naval Research Lab., Wash. *Phys. Rev.* 31, 1018–37(1928).—A theory of the ionization of the upper atm. of the earth by the ultra-violet light of the sun is developed, based on known laws of pressures and constitution of the high atm., ionic recombination, attachment of free electrons to neutral mols. and diffusion of ions. It is concluded that the solar ultra-violet light is a necessary and sufficient cause of the Kennelly-Heaviside layer, and that hypotheses of other agencies of ionization, such as charged particles from the sun, penetrating radiation, etc., are uncalled for except perhaps in unusual cases. The calcd. ionization using wave lengths below λ 1300 is shown to explain quant. many facts of wireless telegraphy, i. e., skip distances, overhead absorption coeffs. limiting waves, ranges and the apparent heights reached by the waves. Calcd. seasonal and diurnal changes in ionization are shown to be in agreement with the corresponding variations in wireless wave propagation phenomena. The potential energy of the day-time ionization in a one-cm.² column of the atm. is found to be at least 1 erg and the assumption that less than 1% of this is liberated as light will account for the light of the night sky or the non-polar aurora. As a result of diffusion of the ions along the lines of magnetic force the upper spray of the ionized layer diffuses to the magnetic poles, concentrates there and causes the aurora. Calcn. indicates that O₂ of the atm. is perhaps not directly connected with the foregoing ionization, but is formed by long wave lengths of ultra-violet light from λ 1300 to λ 1800.

The origin of the aurora borealis. E. O. HULBERT. Naval Research Lab., Wash. *Phys. Rev.* 31, 1038–9(1928).—It has been assumed by several that the aurora is caused by charged particles from the sun which are diverted to the polar regions by the magnetic field of the earth. There are possible objections to this and it is suggested that the aurora is due to the ultra-violet light of the sun, which produces ions and electrons in the high atm. of the earth above 200 km. or so. These diffuse along the magnetic lines of force, concentrate at the magnetic poles of the earth, recombine and in some way yield up their energy to form the aurora. The total aurora energy during a strong display is estd. to be 10¹⁶ erg sec.⁻¹, which is in rough agreement with the energy of the upper spray of photoelec. ionization in the high atm. indicated by wireless telegraphy.

The green auroral line. G. CARIO. Princeton. *J. Franklin Inst.* 205, 515–8 (1928).—C. proposes a somewhat different explanation of the green auroral line than McLennan *C. A.* 22, 2108. In consequence of absorption of solar radiation O atoms are formed in the lower singlet state. The absorption takes place at a max. in a postulated band 1.5 to 1.8 v. distant from the convergence limit at λ 1750. The emission of the green line is due to a transition from the singlet state.

A new optical phenomenon; pulsations produced when anisotropic molecules in rotation and vibration diffuse visible and ultra-violet light. J. CABANNES. *Compt. rend.* 186, 1201–2(1928); cf. *C. A.* 18, 3529; 19, 212.—The phenomenal spectrum obtained by diffusion through liquids, discovered by Raman (*C. A.* 22, 1079) may be explained on the basis of "optical pulsations."

A new radiation. C. V. RAMAN. *Indian J. Physics* 2, 387–98(1928).—R. made the discovery that the visible radiation which is excited in pure dry glycerol by ultra-violet radiation is strongly polarized. The same phenomenon was obtained with 80 liquids, compressed gases and transparent solids. Consequently, the phenomenon is considered as universal. The "complementary filter" test shows that the phenomenon is of the fluorescence type, but it differs from the latter by the fact that the scattered light is

polarized, and by the order of magnitude. When the incident light wave length is smaller than 4,358 Å., the scattered light exhibits 2 or more sharp bright lines in the blue and green regions of the spectrum. The position of the lines is practically the same for chemically similar liquids (hexane, octane). A slight shift was evident for C_6H_6 and H_2O . Hypotheses are presented regarding the nature of the new radiation, its relation with thermodynamics and its analogies with x-rays. A. L. HENNE

New precision in cosmic-ray measurements, yielding extension of spectrum and indication of bands. R. A. MILLIKAN AND G. H. CAMERON. Cal. Inst. of Tech. *Phys. Rev.* **31**, 921-30(1928).—A method is described which leads to *greatly increased precision in the measurement of capacities of the order of one electrostatic unit. More penetrating cosmic rays than have previously been found are indicated by a new absorption curve obtained with much greater precision than hitherto possible. The new curve affords definite evidence for the existence of bands in the spectrum of cosmic rays. The measurements indicate that the cosmic rays consist chiefly of two bands about 3 octaves apart of mean absorption coeffs 0.35 and 0.04 to 0.05 per m. of water. The total energy of cosmic rays at the top of the atm. is found to be very nearly $1/10$ that due to star light and heat as computed from Seares' data (Astrophys. J. **62**, 373(1925)).* B. L.

New effects in the optical excitation of vapors. R. W. WOOD. Johns Hopkins. *J. Franklin Inst.* **205**, 481-95(1928).—W. describes expts with optically excited Hg vapor and verifies the prediction that lines resulting from a two-stage absorption increased with the square of the intensity of the exciting light, while those which resulted from a three-stage absorption increased with the cube. Effects of other introduced vapors or gases on the light emission were studied. H_2O , N_2 and air were introduced. The result dealing with the appearance of the "forbidden line" is interesting. Both H_2O vapor and N_2 must be present, the N_2 bringing electrons to $2p_3$ on a very large no. of atoms. Their return from this level to 1S is greatly facilitated by the presence of H_2O vapor although the reason for this is obscure. Expts. are described dealing with the green fluorescence of Hg vapor which seem to clear up certain apparent discrepancies in the observations of others. Expts. dealing with the optical excitation of I_2 vapor in He at a pressure of about $1/2$ mm. show that in the bands brought out by the He only half as many lines were present as would be found in the corresponding band of the absorption spectrum. *The alternate lines were missing. It was found that the rotational quantum no. changes by 2, 4, 6, 8, etc. instead of by ± 1 as in absorption or emission processes. This is of interest in connection with recent developments in the theory of mol. mechanics dealing with nuclear rotations.* BERNARD LEWIS

The inner structure of the atom. JAMES PATRICK. *Pharm. J.* **120**, 105 8, *Chemist and Druggist* **108**, 179-82(1928).—Abstr. of an address. S. WALDBOTT

Kinetics of the dissociation of diatomic molecules. J. FRENKEL AND N. SEMENOFF. *Physik.-Techn. Rontgen institut, Leningrad. Z. Physik* **48** 216-30(1928).—The "activation" considered in the theories of reaction velocity is identified with the "excitation" of the quantum theory, and the principle of detailed balancing is applied to find the relative importance of radiation and collisions in activation. If q_r is the Einstein coeff. for absorption by the normal mol., q_m the no. of activating collisions suffered by the normal mol. per sec., p_r the Einstein coeff. for emission by the excited mol. (independently of temp. and pressure) and p_m the no. of deactivating collisions suffered by the excited mol. per sec. (proportional to pressure) it is shown that at temps at which kT is small compared with the energy of activation, $q_r/q_m = p_r/p_m$. Since q_r/q_m det. the relative probability of activation by radiation and collision, radiation becomes the more important factor at pressures below a few mm. and collisions at higher pressures. Application of the principle is made to the calcn. of the rates of the following typical dissoocs of diatomic mols. (1) A gaseous dissocn. with activation into a normal and an excited atom, for which the initial rate is proportional to $e^{-E_2/kT} b$ (E_2 = energy of dissocn to normal atoms + energy of excitation of the excited atom); (b = concn. of normal molecules); (2) a gaseous dissociation without activation into normal atoms, by collisions of the first kind, for which the initial rate is proportional to $e^{-Q/kT} b^2$; (3) a dissocn. by contact catalysis, for which the initial rate is proportional to $e^{-(Q-D)/kT} b$ where D = heat evolved when an atom resulting from the dissocn. is absorbed on the wall. For I_2 at atm. pressure, the calcd. rates for the 3 processes at 500° abs. are, resp., 10^{-13} , 6×10^{-7} , 10^{-4} and at 1000°, 10^6 , 10^4 , 3×10^2 . Similar data are given for bromine. W. WEST

The radioactive elements. L. R. KOLLER. *Sci. Monthly* **27**, 54-6(1928). E. J. C.

The exact determination of radium emanation. J. v. WESZELSZKY. Univ. Budapest. *Physik. Z.* **28**, 757-61(1927).—A new app. is described. The novel feature depends upon its calibration by means of the γ -radiation of a Ra sample to be attached

to the outside wall of the app. instead of by comparison with a standard soln. according to Curie.

EMIL KLARMANN

The electrodeless discharge through gases. J. J. THOMSON. *Proc. Phys. Soc. London* **40**, 79-89 (1928); cf. *C. A.* **22**, 725.—After a description of the method of producing the electrodeless discharge and a statement of the theory, expts. are described which show that the passage of ultra-violet light through the gas enhances the discharge. This is explained as follows: The energy absorbed by the gas from the transmitted light excites the mols. to a state in which they are more easily ionized than when they are normal. The external elec. field is, therefore, not called upon to supply as much energy to the free electrons to make them ionize the excited mols. as would be required to make them ionize normal mols., thereby enabling the ring discharge to pass more easily. The effect of foreign substances in the gas, such as deposits on glass rods of S, P, Cd, etc., is to diminish the intensity of the discharge. The effect does not depend upon the nature of the gas, but, if the impurity is electroneg., is attributed to its ability to capture the free electrons in the gas, thereby making it more difficult to start the discharge, and to maintain it. Another effect of the discharge is to cause the gas through which it passes to enter into chem. combination or produce compds. of which some are unexpected. The discharge puts some of the atoms and mols. of the gas into an excited state which enhances their chem. activity. Thus, MgO which phosphoresces brilliantly in O through which a discharge is passing, combines with the O to form a higher oxide. This is indicated by the loss of the characteristic phosphorescence of MgO and the very great reduction in pressure of the O in the tube. Similar results were obtained with CaO and ZnO.

C. C. KIESS

The electrodeless ring discharge. G. MIERDEL. Greifswald Univ. *Ann. Physik* **85**, 612-40 (1928).—The motion of ions in elec. fields of high frequency is discussed; it is concluded that in the electrodeless ring discharge, only the electrons act as an ionizing factor, consequences of this assumption are exptly. verified. Measurement of the initial tension shows that the dependence on the pressure is qual. the same as in the case of internal electrodes. The initial tension is always higher than in the latter case. The "clean up" phenomenon has been investigated in H, N, O and air. In each case the cause of the disappearance of the gas is the formation of active modifications (or even chem. compds.) which are adsorbed on the glass surfaces; the cooler the surface, the larger the adsorption. As it was expected, no pressure decrease was detected in A. Spectroscopic investigations of A and N show the radial intensity distribution of the simple frequencies as expected from the theory. In H the Balmer series appears very sharply, because of the high degree of disson. The continuous spectrum of H appears with a good intensity, and exhibits an intensity max. located in the far ultra-violet.

A. L. HENNE

A theory of the electric discharge through gases. PHILIP M. MORSE. Princeton. *Phys. Rev.* **31**, 1003-17 (1928).—Three general differential equations are set up which det. the av. behavior of a discharge of electricity through a gas. Approx. solns. giving the elec. field E and the concn. of electrons and positive ions, n_1 and n_2 , at any distance x from the cathode, are found for several ranges of value of E . When E is large, the soln. corresponds to the conditions in the cathode and anode fall spaces in a glow discharge. Equations are obtained for the potential drop V across the fall space, for the c. d. at the electrode divided by the square of the gas pressure, j/p^2 , and for the thickness of the fall space times the pressure, pd . The equations indicate that for the cathode fall space there is a certain min. value V called V_n ; and for j/p^2 , called j_n/p^2 and a corresponding max. value of pd , pd_n , beyond which values the discharge ceases. These values are const. dependent only on the nature of the gas used and of the cathode material and correspond to the normal cathode fall space. The equation detg. V_n is shown to be of the right form by comparison with the exptly. detd. values. From these values of V_n , values of j_n/p^2 and of pd_n are calcd. for 4 gases and 4 cathode materials and the calcd. values check with the exptl. data. The corresponding equations for the anode fall space show why there is no corresponding normal anode fall. A consideration of the discharge when E is large indicates another stationary value of the cathode fall space when the c. d. at the cathode reaches its max. possible value. The V in this case is much smaller than V_n for the glow discharge and the form of the equations indicates that they describe conditions in an *elec. arc*. Another approx. equation is obtained when E is const., which is the case in the positive column of a glow discharge. This soln. indicates that small sinusoidal variations about the av. value E_p are possible in E . They correspond to the striations sometimes observed in the positive column. A general discussion is given of the *Faraday dark space* and reasons are given why it should be near the cathode rather than the anode.

BERNARD LEWIS

The action of the Geiger counter. L. F. CURTISS. Bur. Standards. *Phys. Rev.* **31**, 1060-71 (1928).—Expts. performed with a Geiger point counter show that when the point is negative the sensitive surface is on the point, and not on the inner wall of the chamber as suggested by Kutzner (cf. *C. A.* **18**, 2103). It is further shown that this sensitive surface can only be obtained when the point has been treated in a way which makes it catalytic. Such catalysts as FeO, CuO and Pt black work very well. Their activity is destroyed by catalytic "poisons" such as Hg, SO₂ and H₂S. The expts. indicate that the gas layer usually adsorbed by such catalytic surfaces plays an important role in the action of the counter. The gas layer is demonstrated positively by observing the point during operation through a microscope in a dark room. With a vacuum-tube amplifier connected to the counter to actuate a relay at each count, a faint flash on the surface of the point is readily seen for each click of the relay. When the point is positive no special treatment is needed to make it work. This is shown to be consistent with the explanation offered for the action of the chamber when the point is negative.

BERNARD LEWIS

The spark potential of nitrogen. BERNHARD FREY. *Ann. Physik* **85**, 381-424 (1928).—The spark potential of pure, well-dried N₂ is studied. With an elec. discharge in a secondary spark gap, there is a gas fluctuation which can be explained as a dissonance of the H₂O vapor given off. The influence of the discharge on the spark potential can be made null by heating a W wire. With Ag and Mg electrodes at moderate dryness, the potential with the Mg electrodes is one v. lower than with Ag. With very dry gas the Mg electrodes have a considerably higher spark potential than the Ag electrodes. This behavior is explained by the assumption of a Mg₃N₂ layer being formed on the electrodes by the discharge. If moisture is present Mg₃N₂ is not stable. M. F.

Theory of the scattering of slow electrons. J. HOLTSMARK. *Tech. Hochsch., Trondhjem. Z. Physik* **48**, 231-43 (1928).—The scattering of electrons by A is calcd. by introducing the plane wave representing the electron stream into the central symmetrical field of force emanating from the A atom, and investigating the radiation scattered by this field. The curve giving the sphere of action of the scattering atom as a function of the electron velocity is in good qual. agreement with expt., showing the characteristic min. of the Ramsauer effect at low electron velocities. Almost complete quant. agreement would be obtained if the atomic field were slightly smaller than that calcd. The agreement for Ne is not so close and requires a greater polarization of the Ne atom than that used (He optical polarization) in the calcn. W. WEST

Application of the Fermi statistics to the distribution of electrons under fields in metals and the theory of electrocapillarity. OSCAR K. RICE. *Cal. Inst. of Tech. Phys. Rev.* **31**, 1051-9 (1928).—It is assumed that each atom in Hg is ionized into a positive ion and an electron. Because of the crowded state of the positive ions it is supposed that they cannot move in an elec. field, while, following Sommerfeld (*Naturwissenschaften* **15**, 826 (1927)) and Pauli (*C. A.* **21**, 1925)) the electrons are assumed to act like a completely degenerate gas following the Fermi (cf. *C. A.* **20**, 2265) statistics. The distribution of electrons under an elec. field due to a charge on the surface of the metal, is discussed, and a relation derived which gives the charge on the surface in terms of the p. d. between surface and interior. To a first approximation the charge and the p. d. are proportional to each other, as if there were a condenser of const. capacity at the surface. In order to find the capacity, an estimate must be made of the dielec. const. of the mercurous ions of the Hg. This is done with the aid of measurements of refractive index of mercurous ions. The magnitude of the equiv. capacity is such that, when considered in conjunction with the diffuse layer of ions in the soln., electrocapillary curves can be explained.

BERNARD LEWIS

The motion of conductivity electrons in metals. WERNER BRAUNBEK. *Physik. Z.* **28**, 803-5 (1927).—The electronic cond. of metals is usually dealt with on the basis of the Drude-Lorentz theory, which depends upon the assumption in metals of free electrons of a definite d., free path and thermal energy. A number of phenomena such as supraconductance cannot be explained on the basis of this theory. Haber has shown that certain properties of the alkali metals, e. g., their heat of sublimation can be calcd. in good agreement with exptl. findings on the basis of a lattice theory according to which the elementary lattice of the alkali metals consists of pos. alkali ions and electrons. B. shows that calcn. made on the basis of this electronic lattice theory (in contradistinction to the electronic gas theory) agree in their order of magnitude with the exptl. findings.

EMIL KLARMANN

Quantum theory of the electron. II. P. A. M. DIRAC. *Cambridge. Proc. Roy. Soc. (London)* **A118**, 351-61 (1928).—The theory of *C. A.* **22**, 1535, is further developed. Selection rules are derived which are equiv. to those of the older theory

and, therefore, in agreement with expt. The relative intensities of multiplet lines and the Zeeman and Paschen-Back effects are given by the new theory, in agreement with the deductions from the spinning-electron theory. W. WEST

General considerations on the photoelectric effect. P. W. BRIDGMAN. Harvard Univ. *Phys. Rev.* 31, 90-100(1928); cf. following abstract.—The equality of the stopping potentials, which is expressed in the equation $V_{AB} = (h/e)(V_{0B} - V_{0A})$, is a consequence of the principle of detailed balancing without any assumption about the mechanism of photoelec. emission. If the relation is not satisfied the system cannot be in equil. and there must be slow transformations taking place with evolution of energy. Differentiation of the above equation gives a hold on the numerical magnitude of the temp. coeff. of the Volta difference and also on the magnitude of the surface heat. In K the latter must be much larger than the ordinary Peltier heat. In a cavity in any body the equil. electron d. is the same whether the photoelec. effect and the thermionic mechanism act sep. or conjointly. This gives certain connections between the photoelec. threshold and thermionic emission. The difference between the photoelec. and the thermionic work function must be a universal const. for all metals as must also the difference between the sp. heat of the metal and the surface charge and the difference between the entropy of the metal and a surface charge at 0° abs. Expt. makes it probable that each of these 3 universal const. is zero. From application of this result to thermionic emission, it is probable that the abnormal emission from coated substances involves non-equil. conditions. Finally, B. suggests that the considerations of this paper enable another significance to be attached to the argument of Lawrence (C. A. 20, 2943) that photoelectricity and thermionic emission are identical. B. L.

The photoelectric effect and thermionic emission: a correction and an extension. P. W. BRIDGMAN. *Phys. Rev.* 31, 862-6(1928).—In connecting the photoelec. effect with thermionic emission B. eliminates the assumption made previously (preceding abstract) that the photoelec. characteristic frequency is independent of temp. The thermionic work function and the photoelec. work functions differ by a universal const. which must be zero in the light of the work of Warner (cf. C. A. 21, 2424) and DuBridge (C. A. 22, 1274). The temp. deriv. at 0° K. of the photoelec. threshold differs by a universal const., which is also probably zero, from $(S_p - S_m)_0$, the difference of entropy at 0° K. of surface ions and neutral atoms. The quantity $(S_p - S_m)_0$ enters the const. of the thermionic-emission formula, so that there is a connection between this const. and the temp. deriv. of the photoelec. threshold. In spite of the known small values of this latter, expt. allows a sufficient range of numerical values to account for the extreme variations of the thermionic-emission const. from the universal value. The connection found by DuBridge between the thermionic-emission const. and the work function is shown to be reasonable from the point of view of this analysis. B. L.

The velocity distribution of photoelectric electrons. FRITZ HEROLD. Heidelberg Univ. *Ann. Physik* 85, 587-611(1928).—The method of the homogeneous field, and the measuring procedure of the central field have been united in order to obtain accurate values of the velocities. The electrons were liberated by $\lambda = 254\mu\mu$ light. After consideration of the sources of error, the velocity distributions have been detd. for Cu, Pt, Al and soot. The observations show that the curves do not completely cover each other (even if secondary details are disregarded). It is thus obvious that the nature of the material has its influence on the shape of the curve. In Pt the velocity distribution is related to the gas content. If progressively evacuated the repartition curves shift first toward the large velocities, then back toward the smaller ones. The principal cause is the modification of the limit wave. Contact potentials also modify the position of the repartition curve. A modification of the shape of the curve has been observed, principally in the domain of the mean velocities; it is indicative of the influence of the nature of the excited material. The velocity repartition measured on a Pt surface depends on the Pt thickness only in the case of a very thin deposit. The orientation of a W deposit in the light beam has no influence on the repartition curves. A. L. HENNE

The photoelectric sensitiveness limit of ammonium amalgam toward the long wave lengths. SANDER AND NITSCH. *Z. Elektrochem.* 34, 244-6(1928).—Measurements of the limit of the photoelec. sensitiveness of NH_4 amalgam have been made with respect to K and Na amalgam. Results derived from a very large no. of expts. show the existence of the series NH_4 , Na, K, which is the same as the electrochem. tension series. A. L. HENNE

The Becquerel effect. I. G. ATHANASIU. *Z. physik. Chem.* 133, 39-42(1928).—An answer to Lifschitz and Hooghoudt (C. A. 20, 3860), who criticized Athanasiu (C. A. 20, 1005). MARIE FARNSWORTH

A reply to G. Athanasiu. J. LIFSCHITZ AND S. B. HOOGHOUDT. *Z. physik. Chem.* **133**, 43-4(1928), cf. preceding abstract.

MARIE FARNSWORTH

The polarization of spectrally resolved Röntgen rays. ERNST WAGNER AND PAUL OTT. *Ann. Physik* **85**, 425-69(1928).—The degree of polarization of a ray reflected at a glancing angle of 45° from the cubic face of NaCl is detd. This is defined as the ratio of the intensity of reflection perpendicular to the cathode stream to the reflection intensity parallel to the cathode stream. It rises with decreasing tube potential with a max. of about 2.7. A clear dependence of the value on the anticathode material of the x-ray tube (Pt, Ag, Cu, Fe) could not be established. It was the same for all at a tube potential of 10.88 kv. (1.4 ± 0.2). There was no change in the degree of polarization with the appearance of the characteristic rays of the anticathode materials. M. F.

The scattering of x-rays and electron distribution in the atoms of crystals. R. J. HAVIGHURST. Harvard Univ. *Phys. Rev.* **31**, 16-26(1928); cf. following abstract.—*A crit. examn. of the method of obtaining the at. structure-factor and of the Fourier analysis method of detg. electron distributions in crystals.* The application of the Fourier analysis to the model A atom indicates that the accuracy of the analysis depends predominantly upon the accuracy of measurement of the intensities of reflection within angular limits which are easily subject to exptl. investigation. Electron distributions obtained from Fourier analysis of the exptl. detd. at. structure-factor curves for several different atoms or ions contain almost exactly the amounts of electricity which are believed to exist in the crystals within radii in good agreement with those calcd. from interat. distances detd. by ordinary crystal analysis. Modification of the calcd. F values of model atoms to take into account the Compton effect results in F curves which give, upon Fourier analysis unreasonable distributions of diffracting power. The Fourier analysis can give reasonable distributions of electron density only if the F curves are approx. correct. Since the exptl. F curves do give reasonable distributions, it is concluded that any modification which is caused by the Compton effect in the intensity of regular reflection of x-rays is negligible.

BERNARD LEWIS

The intensity of reflected x-rays and the distribution of electrons in crystals. G. E. M. JAUNCEY AND W. D. CLAUS. *Phys. Rev.* **31**, 717-27(1928).—A reply to the criticisms of Havighurst (preceding abstract). By trial a reasonable Bohr model of the Cl ion has been found which gives modified F values at all angles in good agreement with exptl. The theoretical modified F curve and the exptl. F curves have a kink at the same angle. This occurs at $\sin \theta = 0.45$ (for $M\alpha$ K α x-rays) and is connected with the result on Jauncey's theory (*Phys. Rev.* **29**, 757(1927)) that at this angle the M electrons cease to act as diffracting centers. From the theoretical modified F values a U curve is plotted for a grating space of $D = 3.06$ Å. This U curve is similar to Havighurst's exptl. U curve for the Cl ion and has an area of 16.64 electrons in good agreement with 16.74 electrons for the exptl. curve. However, the theoretical U curve carries no particular information concerning the model from which it is derived. According to J. and C. this is because the method of Fourier analysis is invalid. The accuracy of exptl. F values and U curves is discussed. The exptl. F values for Cl seem to be subject to an abs. error of 0.3 electron and the area under the U curve to an error of 0.5 electron. Objection is raised to the practice of obtaining U curves for fictitious grating spaces. It is shown that the area under the U curve is a function of D and has no precise meaning even if crystal reflection is unaffected by modified scattering.

BERNARD LEWIS

The excitation of soft x-rays. II. O. W. RICHARDSON AND F. C. CHALKIN. *Proc. Roy. Soc. (London)* **A119**, 60-83(1928); cf. *C. A.* **20**, 1354.—The x-ray spectrum of Fe in the ranges 130 to 200 v. and 600 to 720 v. has been examd. A discussion of possible series relationships among the crit. voltages is presented; no definite conclusions can be made. Some expts. with deposited metal targets were made. A compensating method of measuring the photoelectric current is described. R. L. HERSHEY

The input limit of an x-ray tube with circular focus. ALEX. MÜLLER. *Proc. Roy. Soc. (London)* **A117**, 30-42(1927).—The condition which limits the energy input into an x-ray tube is chiefly the dissipation of the heat produced in the anticathode. This paper, therefore, is primarily a mathematical study of heat flow in a cylinder with different assumptions as to the boundary conditions. In particular, two cases are studied: (1) where the curved surface of the cylinder and the flat end remote from the target are kept at a const. temp., and (2) where there is no flow of heat through the curved face of the cylinder. The following formula is obtained for the first case, when the focal spot is small compared with the anticathode: $W = 15.8 (T_m - T_0) \cdot \delta \cdot \kappa / \theta$. $\theta = \int_0^\infty e^{-x^2} \tan h(\beta x) dx$. W is the max. input in watts. T_m is the m. p. of the target and T_0 the const. temp. of the boundaries. δ is the radius of the focal spot in cm. κ

is the heat cond. of the target in g. cal. per sec. per cm. per degree. Several numerical examples of the application of this formula are given, showing that the results are in accord with experience. In one example, the temp. of the cathode of a gas-filled x-ray tube is calcd. and found to be considerably below the m. p. of Al, indicating that the observed pitting is not due to melting.

A. W. KENNEY

Quality and quantity of the scattered radiation of water produced by x-rays. F. VIERHELLER. *Physik. Z.* **28**, 745-57 (1927).—A method is described permitting the detn. of the scattered radiation sepd. from the primary radiation which is characterized by its mean wave length. A max. of energy is established in a depth of about 1 cm., which is produced by both the primary and the scattered radiation; the max. of the latter alone lies in a depth of 3 cm. The logarithms of ionization currents which are produced by the scattered radiation are inversely proportional to the vols. traversed by the radiation. The detn. of quality according to the method of Duane indicates the occurrence of minima in all places where there is a max. of quantity. The mean wave length of the scattered radiation within the central pencil is considerably smaller than that of the primary radiation. The quality of total radiation remains const. in a depth of from 4 cm. on, but is about 10% less than the primary radiation.

E. K.

Diffraction of x-rays by means of ruled gratings. Spectroscopy of the intermediate region. JEAN THIBAUD. *Physik. Z.* **29**, 241-61 (1928).—The use of the ruled grating at grazing incidence is described for measurement of wave lengths of x-rays longer than those observable by ordinary crystal methods. First is given a description of a vacuum spectrograph for use in the extreme ultra-violet and its modification for observing long x-rays which overlap the shortest optical wave lengths. Second, the collected results obtained by the new methods are presented, including (1) wave lengths in the K-series of O, N, C and B, the L-series of Fe, the M-series of Mo and the N-series of Ta, W, Pt and Au (cf. Thibaud and Soltan, *C. A.* **22**, 26, 1539); (2) description of continuous x-ray spectra of elements of high at. wt. and measurement of the K absorption limits of C, N and O (*C. A.* **22**, 1277); (3) comparison of results obtained with gratings and fatty acid crystals and detn. of refractive indices of crystals for x-rays; (4) proposed application of the grating method to measurement of γ -rays, and de Broglie waves.

C. C. KIESS

Fine structure in the k-series of copper and nickel and the width of spectral lines. HARRIS PURKS. Columbia Univ. *Phys. Rev.* **31**, 931-9 (1928).—High resolving power was obtained by means of the double x-ray spectrometer. The min. width of slits was 1.75 mm. Wide slits made possible the study of the lines after second-order reflection from two calcite crystals. Ionization currents were measured with a Compton-type electrometer. At 40 kv. and in the first order the widths at half-max. of the lines (in X. U.) were found to be: Ni $K_{\alpha_{1,2}}$, 0.66; Cu $K_{\alpha_{1,2}}$, 0.63; Mo $K_{\alpha_{1,2}}$, 0.47; Ag $K_{\alpha_{1,2}}$, 0.43; Mo $K_{\beta_{1,2}}$, 0.43; Ag $K_{\beta_{1,2}}$, 0.40. In the second order the estd. width of the components of Ni $K_{\alpha_{1,2}}$ and Cu $K_{\alpha_{1,2}}$ was 0.4 X. U., which was also the estd. width of Ni $K_{\beta_{1,2}}$ and of Cu $K_{\beta_{1,2}}$. Structure of the lines of Ni and Cu was clearly indicated by the shapes of the curves. The first-order curves of the K_{α} lines of Ni and Cu showed an asymmetry on the long-wave-length side which was checked as regards position and intensity by the second-order curves. The lack of symmetry could be explained by the presence of weak lines at displacements 0.42 and 0.35 X. U. from Cu K_{α_1} and Cu K_{α_2} , resp., and 0.45 and 0.38 X. U. from Ni K_{α_1} and Ni K_{α_2} , resp. The K_{β} doublets of Mo and Ag were clearly resolved after first-order reflection from two crystals. Their sepns. were for Ag $K_{\beta_1} - K_{\beta_2}$, 0.63 X. U. and for Mo $K_{\beta_1} - K_{\beta_2}$, 0.58 X. U. The doublets for Ni and Cu were not resolved after second-order reflection. However, the shapes of the curves permitted a soln. of the problem of intensities and displacements. Their sepns. were 0.32 X. U. and 0.29 X. U. for Cu $K_{\beta_1} - K_{\beta_2}$ and Ni $K_{\beta_1} - K_{\beta_2}$, resp. The slopes of the K_{β} curves of Ni and Cu showed evidence of the spark line $K_{\beta'}$ and the curve of Cu showed evidence of a line corresponding to the $K_{\beta'}$ line for Ca, K, Cl found by Hjalmer (*C. A.* **16**, 2259). Curves showing a variation of width of the K_{α} lines with voltage were obtained. The widths increased with increasing voltage but seemed to approach a limiting value at 40 kv. The width at the excitation potential was about $\frac{1}{2}$ the width at 40 kv. The variation is explained as due to the successive appearance of spark lines.

BERNARD LEWIS

An attempt to add an electron to the nucleus of an atom. WILLIAM D. HARKINS AND WEBSTER B. KAY. Univ. of Chicago. *Phys. Rev.* **31**, 940-5 (1928).—Electrons with a velocity corresponding to 138,000 to 145,000 v. were caused to strike the surface of liquid Hg. The Hg served as an anticathode in an x-ray tube. (This work was done before the Coolidge electron tube was available.) It was not expected by H. and K. that positive results would be obtained, since either the voltage may be too small

or the no. of electrons shot into the surface (4×10^{21}) too small. The addn. of an electron to the nucleus of an atom of Hg should give an atom of Au. Since no Au was found in the exceedingly sensitive tests used, it is shown that either less than one in a million of the electrons attached itself to an atom nucleus or else all or a part of the nuclei produced were not sufficiently stable to endure for the period (24–28 hrs.) of the tests.

BERNARD LEWIS

Multiplet separations for equivalent electrons and the Röntgen doublet law. S. GOUDSMIT. Univ. of Mich. *Phys. Rev.* **31**, 946–59(1928).—Expressions are derived for the sepn. of multiplets arising from configurations of equiv. electrons. It is explained why the Röntgen doublets obey the Sommerfeld formula, although the latter was formerly for a single electron only. The sepn. of more complicated multiplets are proved to be connected also with the Sommerfeld formula. The multiplet sepn. can be characterized by factors, designated by Γ , which give the displacement of each level from the center of gravity of the whole multiplet level. The properties of these Γ factors are studied in this paper. They are analogous to the properties of the magnetic sepn. factors g , introduced by Landé (*C. A.* **18**, 938) for the explanation of the Zeeman effect. There is a sum rule corresponding to the g sum rule, stating that for given quantum nos. of the electrons the sum of the Γ values belonging to a certain total moment j is a const., independent of the type of coupling of the electrons. This rule makes it possible to obtain expression for the multiplet sepn. in general cases. B. L.

Multiplet separations. S. GOUDSMIT AND C. J. HUMPHREYS. Univ. of Mich. *Phys. Rev.* **31**, 960–6(1928).—Formulas for the sepn. of normal multiplets arising from general configurations, are derived by reasoning from the fundamental assumption that they are due to the interaction energy between spin and orbital magnetism of the electrons. The sepn. are known for multiplets, arising from groups of equiv. electrons, from considerations given in the preceding abstract. It is shown in this investigation, by a simple treatment of the vector model, that the interaction for other configurations may be found in terms of the equiv. group and the interaction energy of the electron or group of electrons added, provided the quantum vectors of the original configuration remain unchanged. This treatment applies only to agreement with the interval rule. Examples are illustrated from the data on Fe and O^+ . Calcd. results indicate the validity of G. and H.'s formulas to the extent permitted by agreement of data with the interval rule.

BERNARD LEWIS

Series spectrum of sodium NaII. I. S. BOWEN. Cal. Inst. Tech. *Phys. Rev.* **31**, 967–8(1928).—Seventy-four lines in the Na spark spectrum are classified as combinations between 23 terms of NaII. The ionization potential of NaII is fixed at 47.0 ± 0.5 v.

BERNARD LEWIS

The spectrum of gold chloride. W. F. C. FERGUSON. N. Y. Univ. *Phys. Rev.* **31**, 969–72(1928).—The spectrum of AuCl vapor excited by streaming active N was photographed. It consists of 43 bands, comprising, for each isotope of AuCl, two intermingled systems in the green region. All the bands are shaded toward the red. No other bands were found between $\lambda 7000$ and 2000 . The band heads of each system were measured and equations are given representing their positions. Agreement with theory was found for the isotopic displacement of the band heads due to the Cl isotopes. The vibrational intensity distribution agrees with that theoretically expected from the observed relative values of the initial and final vibrational frequencies. Attempts to excite the spectra of AuBr and AuI in a similar manner were without success. B. L.

Stark effect and series limits. H. P. ROBERTSON AND JANE M. DEWEY. Princeton. *Phys. Rev.* **31**, 973–82(1928).—The energy of a conditionally periodic orbit in a hydrogen-like atom under the influence of a homogeneous external field F must be less than $-(3/2) [eFp_0/m^{1/2}]^{2/3}$. Aperiodic orbits of less, as well as of greater energy than this value can exist, and in one class of these the electron may approach the nucleus within distances comparable with the dimensions of periodic orbits. The lower limit of the energy of these orbits is approx. $-2c (eF)^{1/2}$. Since the energy of an aperiodic orbit can assume any one of a continuum of values, it is concluded that the line spectrum of such an atom must end at a point on the long-wave length side of the N series limit, and that the continuous spectrum, arising from transitions involving an aperiodic orbit, may extend even further within the N series limit. Application to the mean field in actual gases gives the position of the max. of the continuous spectrum in good agreement with the observed values. Further expts. for checking the theory are described.

BERNARD LEWIS

The Zeeman pattern of the hyperfine structure lines of the resonance line of mercury. WALTER A. MACNAIR. Bur. Standards. *Phys. Rev.* **31**, 986–96(1928);

cf. C. A. 21, 2844.—The Zeeman pattern of each of the 5 hyperfine structure lines of 2537 ($1'S_0 - 2^3P_1$), the resonance line of Hg, has been obtained in fields from 0 to 7 kilogausses. With certain very significant exceptions each one forms a $3/2$ normal Zeeman triplet, and is independent of its neighbors; that is, no Paschen-Back effect appears. The parallel branch of one of the 5 lines actually shifts its position with changes in the field strength. Each one of the 5 lines has two $3/2$ normal perpendicular branches. In addn. 3 of them have 1 or 2 extra perpendicular components. Attention is called to the relation between these results and expts. on the *polarization of Hg resonance radiation*. McN. warns against a theoretical explanation of the latter phenomenon until more is known of the hyperfine structure of the energy levels of Hg. A quartz Limmer-Gehrcke plate was used for the analysis. A rather unusual method of employing it is described.

BERNARD LEWIS

The resonance line of the iodine atom and the optical dissociation of iodine molecules. L. A. TURNER. Princeton Univ. *Phys. Rev.* 31, 983-5(1928).—The resonance line of the I atom is most probably that of wave length 1830.4 Å., corresponding to a resonance potential of 6.75 v. Light of that wave length is absorbed by a cell contg. I vapor more strongly when it is illuminated by concd. light from a C arc than when it is not so illuminated. The increased absorption is attributed to I atoms produced by the illuminations in accord with Franck's theory (C. A. 20, 548) of optical disson.

BERNARD LEWIS

Theory of the excitation of spectra by atomic hydrogen. JOSEPH KAPLAN. Princeton Univ. *Phys. Rev.* 31, 997-1002(1928).—An explanation is proposed for the results of Bonhoeffer (C. A. 19, 2915) and of Mohler (C. A. 22, 1279) on the excitation of spectra by at. H. The theories advanced by these authors do not completely explain the exptl. results. The theory presented here is based on the hypothesis that in a 3-body collision 2 H atoms can form a mol. in any one of the vibration states of its N electronic level. The principle is used, that the probability of excitation increases as the energy of the exciting body and the energy necessary for excitation approach each other. This is done by postulating that the probability of the excitation of the third body is greater, the nearer the energy required is to be the difference between the energy of recombination and the energy retained by the H_2 mol. in one of its vibration states. The theory is applied successfully to the excitation of Na, K, Cd, Zn, Cs and Mg by at. H. The excitation of the 2537 Hg line, which requires more energy than that available from recombination, is explained on the basis of Bonhoeffer's observations.

B. L.

Absorption of linearly polarized infra-red radiation by calcite ($2\mu-16\mu$). FRANK MATOSSI. *Z. Physik* 48, 616-23(1928).—The transmission of calcite for linearly polarized light was measured in the infra-red between wave lengths 2μ and 16μ . The source was a Nernst glower and the intensity of the radiation was measured with a microradiometer. Four crystals, of thicknesses 0.09 mm., 0.34 mm., 0.9 mm. and 4 mm., and arranged with optical axes parallel to the elec. vector, were examd. A strong absorption band, corresponding to the fundamental frequency of the CO_2 ion, was measured at 11.55μ . In the neighborhood of this band the reflecting power of the crystal was also measured. The bands due to the characteristic vibration frequencies of the crystal for the ordinary ray were measured at 7.14μ and 7.40μ . The other bands which were measured are tabulated and illustrated graphically, and are shown to be harmonics of, or combinations between, the frequencies $\nu_1 = 7.40$ and 7.14μ , $\nu_2 = 14.0\mu$, $\nu_3 = 9.10\mu$ and $\nu_4 = 11.55\mu$. Formulas are given for calcg. the characteristic frequency from the optical consts. found from the absorption measurements.

C. C. KIESS

Broadening of the Debye-Scherrer lines of cold-worked tungsten wire and ribbon as a function of the glow temperature and the duration of the glow. A. E. VAN ARKEL and W. G. BURGERS. *Z. Physik* 48, 690-702(1928).—The broadening effect on the K_α line of Cu was studied for (a) cold-drawn W wire contg. less than 1% total impurities; (b) cold-drawn W wire contg. 1.5% ThO_2 ; (c) cold-rolled W ribbon contg. about 1% ThO_2 . These materials were examd. by either the Debye-Scherrer or the de Jong method at glow temps. of 600, 900, 1200, 1500 and $1900^\circ K.$, the duration of the glow period extending from 2 to 240 min. Accurate measurement of the photographs with a microphotometer showed that for both wire and ribbon of the same material the sharpness of the doublet increased rapidly with temp. At temps. for which recrystn. does not occur the sharpness reached and maintained a steady state.

C. C. KIESS

Notes on the relativistic interpretation of the theory of the fine structure of the spectral lines of the hydrogen atom. S. MOHOROVIĆIĆ. *Archiv. hem. farm.* 2, 6-14 (1928).—The introduction of a special relativity theory and the general theory cannot define precisely the orbit of the electron around the proton (cf. M., *Optik bewegter Körper*, Leipzig, 1928). The close connection between the Lorentz and the Galileo

transformation equation (cf. *Ann. Physik* **67**, 320-4(1922)) is shown to be correct.

JAROSLAV KUČERA

Some methods of estimating the intensities of spectral lines. W. H. J. CHILDS. *Proc. Phys. Soc. London* **40**, 132-48(1928).—The application of several methods of photometry to the problem of detn. intensities of spectrum lines is described. The limitations of the various wedge methods are pointed out and it is shown that for a spectrum contg faint lines, like that of He, a densitometer method of obtaining intensities from a calibrated spectrogram, is to be preferred. Four densitometer methods are described. An extensive bibliography covering densitometers, microphotometers and spectral photometry is given.

C. C. KIESS

Extension of the irregular doublet law to complex spectra. MEGHNAD SAIHA AND PROTAP K. KICHLU. *Indian J. Physics* **2**, 319-42(1928).—The extension of the irregular law to complex spectra previously announced (*C. A.* **22**, 1729) is here illustrated in detail with all the available spectroscopic data, and predictions are made regarding the spectra of certain elements which are yet unknown.

C. C. KIESS

A note on the regularities in the spectra of six-valence electrons. DATTATRAYA S. JOG. *Indian J. Physics* **2**, 343-4(1928).—The extended irregular doublet law (cf. preceding abstract) has been used to identify the lines $^5S - ^6P$ and $^3S - ^3P$ of F and Ne^+ analogous to those of O.

C. C. KIESS

The spectrum of ionized sodium. KANAKENDU MAJUMDAR. *Indian J. Physics* **2**, 345-54(1928); cf. *C. A.* **22**, 1908. From the known lines of F and Ne^+ which are 7-valence electron systems, and of Na, Mg^+ and Al^{++} which are 1-valence electron systems, the lines arising from the corresponding electron transitions of the intervening systems Ne, Na^+ and Mg^{++} . . . can be interpolated as shown by the extension of the irregular-doublet law to complex spectra. The fundamental lines of Na⁺ are $^1S_0 - ^1P_1$ at 372.3 A. U. and $^1S_0 - ^3P_1$ at 376.6 A. U. The value of 1S_0 is detd. approx as 380,300, which is equiv. to an ionization potential of 47 v. A table contains the lines from 3711 A. U. to 372 A. U. which have been classified.

C. C. KIESS

Intensity measurements in the secondary spectrum of hydrogen. L. S. ORNSTEIN, W. KAPUSCINSKI AND MISS J. G. EYMERS. *Proc. Roy. Soc. (London)* **A119**, 83-91(1928).—The intensities of lines in the secondary spectrum of H between 4891 A. U. and 4487 A. U. have been measured by means of the method of photometry developed at Utrecht. Many of the lines have been found to be double and their wave lengths have been detd. Comparison of the new results with those obtained by McLennan (*C. A.* **22**, 37) shows that the real values of the intensities are not the photographic densities given by him.

C. C. KIESS

Precision measurements in the K-series of the element tin. JOHN STENMAN. *Z. Physik* **48**, 349-57(1928).—The new tube spectrometer of Siegbahn at Upsala was used in photographing the K-series of Sn. The following wave lengths were measured $\alpha_2 = 494.016$, $\alpha_1 = 489.572$, $\beta_3 = 434.947$, $\beta_1 = 434.297$ and $\beta_2 = 424.992$, all expressed in X units. The wave length of the K absorption limit of Br was also found to be 918.091 X. U.

C. C. KIESS

Precision measurements in the K-series of the elements chromium to nickel. SIGURD ERIKSSON. *Z. Physik* **48**, 360-9(1928).—New wave-length measurements of the lines α_2 , α_1 , β_1 , β_2 in the K-series of Cr, Mn, Fe, Co and Ni are presented. They were obtained with the improved tube spectrometer of Siegbahn. In order to sep. fully the lines α_1 and α_2 the second-order spectrum was used.

C. C. KIESS

Investigation on the structure of some spectra in relation to recent theoretical considerations. T. L. DE BRUIN. *Arch. néerland. sci.* **11**, 70-153(1928). (In French).—New wave-length measurements have been made of lines in the arc and spark spectra of K and F. The source employed was the electrodeless discharge, which permits the isolation of the spectra corresponding to various stages of ionization of the atom. Analysis of the spectrum K II shows that its structure is similar to that of Ne I. The fundamental term 1S_0 arising from the electron group s^2p^6 has not yet been established. The higher terms which arise from the configurations s^2p^5d , s^2p^5s and s^2p^5p , which correspond to excited states of K^+ , have been established and are tabulated in order of relative value; whence it is shown that the configuration s^2p^5d is more stable than s^2p^5p . Similar analyses have been made for F I and F II. The lowest term of F I is 2P with approx. value 135,000, which corresponds to an ionization potential of 16.7 v. Triplets with the same frequency differences have been found in F II, which indicates a structure for the spectrum similar to that of O and S. A classification of the lines belonging to Ne II is given and the structure is shown to be similar to that of F I. Finally certain lines of Ne III are shown to be similar to those found in F II.

C. C. KIESS

The band spectrum of mercury excited by a high-frequency discharge. J. G.

WINANS. *Nature* 121, 863-4(1928).—The Hg bands with max. at 4850, 3300, 2540, and 2345 Å. U. were observed, together with the arc spectrum, in a quartz tube contg. distg. Hg vapor excited by a high-frequency discharge; but when the vapor was stagnant the discharge excited only the arc lines. Heating the middle of the tube caused the disappearance of the 4850 band, and weakened that at 2345 Å. U. It is concluded from the expts. that each of the bands is emitted from sep. initial states, but that the final states for the 2345 and 2540 bands must be the same. C. C. KIESS

The molecular spectra of sulfur. B. ROSEN. *Z. Physik* 48, 545-55(1928).—The absorption spectrum of S was photographed under various temp. conditions. In the blue-violet region 104 band heads were measured, many of which are approx. represented by the formula given in an earlier paper (*C. A.* 21, 2846). In the ultra-violet 27 band heads were measured, all of which are satisfied by the formula. When the absorption bands are compared with those emitted by a discharge tube or in fluorescence certain striking intensity differences are noted which cannot very well be explained as temp. perturbations. Some unknown factor is supposed to operate which makes the probability of transition from the initial energy state to a higher state, in absorption, greater than the probability of the return to the initial state, in emission. C. C. KIESS

Structure of the second-order spectrum of sulfur. J. GIVÈS. *Compt. rend.* 186, 1354-5(1928).—Additional multiplets of the quartet system of S II are presented. They involve transitions between the S, P, P' and D terms previously announced (*C. A.* 22, 2325). C. C. KIESS

The Swan band spectrum of carbon. W. E. PRETTY. *Proc. Phys. Soc. London* 40, 71-8(1928).—Two methods of producing the Swan spectrum were (1) discharge through CO at low pressure, (2) spark between C electrodes in various gases at atm. pressure. The utmost care was taken to remove all traces of H from the sources. From the expts. with C electrodes in gases free from O the only conclusion consistent with the exptl. results is that the emitter of the bands is purely C. Theoretical considerations based on analysis of the Swan bands indicate that the emitter is a symmetrical diatomic mol. such as C₂ which has a moment of inertia of the same order as that derived from analysis of the bands. C. C. KIESS

Stability of isomers compared with their absorption spectra. MME. RAMART-LUCAS. *Compt. rend.* 186, 1301-3(1928).—A study was made of the absorption spectra of compds. susceptible to change under the influence of heat, radiations or catalysts, including 500 tests on 100 different substances, made by the author. Two rules are formulated: (1) When the two substances can be transformed into one another, the rate of change to the isomer of lower frequency is proportional to the frequency if the coeff. of absorption is the same. (2) If the change is accompanied by a loss of water, acid or salt, and if both isomers are made from the same unstable intermediate compd., it is usually possible to obtain either isomer voluntarily, if the form of the absorption curve is known. This has been done by expt. AMY LEVESCONTE

Photochemical iron chloride studies. MAX SCHNEIDER. *Z. physik. chem. Unterrichts* 39, 271-8(1927).—A method is given for measuring the oxidative action of FeCl₃ potentiometrically. Studies are made of the conditions for the formation of Turnbull's blue from FeCl₂ and K₃Fe(CN)₆. The self-reduction of FeCl₃ under the influence of white, blue and yellowish red light is studied. Its cause is discussed. Studies on blue-printing are made and the essential conditions for good prints are given. B. L.

The photolysis of benzaldehyde. MARC DE HEMPTINNE. *Compt. rend.* 186, 1295-7(1928).—The absorption spectrum of BzH shows 3 regions. Two of these can be explained by an increase of the at. vibrations and mol. rotation. The third, a fluted band, between 2200 Å. U. and 2500 Å. U. can only be due to a dissociation, of the mol. This was detd. by expt. Light from a Hg-vapor lamp through quartz caused decompn. into benzene and CO. When rays below 2700 Å. U. were intercepted there was no decompn., but light contg. only rays between 2600 and 2405 Å. U. had an effect. Increase in temp. to 208° and decrease in pressure changed the spectrum, giving fluted bands with rays between 2966 and 2610 Å. U. Rays of this length caused decompn. under these conditions. Increase in temp. alone had no effect. AMY LEVESCONTE

Photochemical studies. VI. The photochemical reaction between oxygen and mercury vapor at relatively low pressures. W. ALBERT NOYES, JR. *J. Am. Chem. Soc.* 49, 3100-6(1928).—The photochem. reaction between O and Hg vapor is largely due to the reaction between Hg vapor and O₂. It is not possible to assume that O₂ is formed by both the sensitized and unsensitized reactions and that the effects are additive. It is suggested that a complex (relatively unstable) may be formed between excited Hg and O and that this complex may give O₂ through collision with O₂ mols, or perhaps a larger amt. of O₂ through collision with activated O₂ or O₃ mols. A. L. H.

Photooxidation of certain organic substances in the presence of fluorescent dyes. C. W. CARTER. Univ. Oxford. *Biochem. J.* **22**, 575-82(1928).—Aliphatic compds. are inactive. The introduction of OH or an NH_2 group into a benzene deriv. renders the compd. susceptible to photooxidation. Side chains in which the groups $-\text{NH}_2$ and $-\text{CH}=\text{CH}-$ occur were oxidized. Other ring compds., as α -naphthol, tryptophan, thiophene and purine derivs. were oxidized. Iron salts do not accelerate the reaction and KCN does not inhibit it. H_2O_2 is not formed in the reaction. BENJAMIN HARROW

The influence of radiation on thermal unimolecular reactions. JOSEPH F. MAYER. *J. Am. Chem. Soc.* **49**, 3033-46(1928).—The absorption coeff. for black-body radiation of low temp. has been measured for N_2O_4 . The rate of activation of N_2O_4 by radiation alone is of insufficient rapidity to account for the observed decompn. rate. Radiation alone does not produce racemization in a monomol. stream of pinene. A theory involving both mol. collisions and radiation as necessary for the observed rates of activation is conceivable and not incompatible with the exptl. results, although radiation alone could not be important in either of the 2 reactions studied. A. L. HENNE

The theory of chemical action in electrical discharge. S. C. LIND. *Science* **67**, 565-9(1928).—The present status of knowledge of chem. effects in elec. discharge is discussed. The 3 theories proposed to date to account for chem. action due to gaseous discharges are: (1) The photochem. theory, wherein it is assumed that the radiations produced during discharge are responsible for the chem. action produced, (2) the static-ion theory, wherein it is assumed that the ions serve as clustering centers and that chem. effects are produced on neutralization of the clusters using part or all energy of ionization as activation energy, and (3) the kinetic-ion theory, wherein it is assumed that the ions impart kinetically a crit. activation energy to the mols. which react. Reasons are advanced in support of this static-ion or clustering theory. GEO. GLOCKLER

Spectrographic studies of complex cyanides of iron (CAMBI, SZEGÓ) 6.

REYNOLDS, WILLIAM COLEBROOK: **Atomic Structure. As Modified by Oxidation and Reduction.** New York. Longmans, Green & Co. About \$2.75.

WEBER, G.: **Das Wesen der Materie und der Aufbau der Atome.** Ein einheitliches physikal. Weltbild. Leipzig: O. Hillmann. 148 pp. M. 8.

Electron-emission material. J. W. MARDEN. Can. 277,855, Feb. 14, 1928. An electron-emission material comprises a mixt. of the oxides of Ba and Sr uniformly distributed through Ta.

Electron-emission material. H. C. RENTSCHLER and C. T. ULKEY. Can. 280,167, May 15, 1928. An electron-emission material is formed of substantially pure U.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electric steel manufacture. F. T. SISCO. *Fuels and Furnaces* **6**, 589-600(1928).—A discussion of induction and arc furnaces for melting steel together with a review of the acid and basic practice, their application and chem. reactions during melting and refining. A. D. S.

Simple high-frequency vacuum furnace for laboratory purposes. E. W. FELL. *Arch. Eisenhüttenwesen* **1**, 659-61(1927); *Stahl u. Eisen* **48**, 661-2(1928).—A high-frequency lab. vacuum furnace—3.6 kw. at 8000 cycle—with a capacity of 1 kg., allowing the addn. of solids or gases during the melting and affording an easy reading of the temp. by means of an optical pyrometer, is described. J. A. SZILARD

The electrochemical and electrometallurgical industry of Norway. F. HANAMAN. *Archiv. hem. farm.* **2**, 86-95(1928).—An outline of the Norwegian industry and its development. JAROSLAV KUČERA

The fundamental chemical reaction and the electromotive force of the lead accumulators. NAOTO KAMEYAMA. *J. Soc. Chem. Ind. (Japan)* **31**, 337(1928); *Suppl. binding* 81B(1928). (In English.)—K. discusses the double-sulfate theory and Fery's theory from the activity standpoint. According to the former, the e. m. f. E at 25° should be $E = E_0 + 0.05915 \log a_{\text{H}_2\text{SO}_4}/a_{\text{H}_2\text{O}}$, while according to the latter $E = E'_0 + 0.05915/2 \log a_{\text{H}_2\text{SO}_4}/a_{\text{H}_2\text{O}}$, A being activity and E_0 and E'_0 consts. The exptl. E values of Thibaut were plotted against $\log A_{\text{H}_2\text{SO}_4}/a_{\text{H}_2\text{O}}$, which were calcd. from known data. The re-

sult was distinctly for the double-sulfate theory and against Fery's theory. E_0 was found to be 2.0183 v. as the mean of 15 values. SHUMPEI OKA

Electrolytic refining of copper: using solutions of complex salts of cuprous chloride. I. NAOITO KAMEYAMA AND TOKICHI NODA. *J. Soc. Chem. Ind. (Japan)* 30, 773 (1927); *Suppl. binding* 198B. (In English.)—The electrolyte was an aq. soln. of KCl nearly satd. with Cu_2Cl_2 . It was found advantageous to work at 50–75°, with a soln. contg. about 4% of Cu, a little gelatin and about 2% of HCl being added. N_2 was bubbled through the soln. for the purpose of stirring and exclusion of air. About 3 amp. per sq. dm. was possible with high current efficiency and without getting poor cathodic deposits. Most of the expts. were with anodes of pure Cu. In one of the expts. crude Cu (purity 98.8%) was tried as anode and a cathode Cu of purity 99.92% was obtained. II. *Ibid* 31, 343 (1928); *Suppl. binding* 82B. (In English.)—Aq. solns. of NaCl and CaCl_2 were used for the soln. of Cu_2Cl_2 and the solns. obtained were used as electrolyte for the refining of Cu. These electrolytes were as good as KCl (see above). When high concns. of Cu are desired NaCl and CaCl_2 are better than KCl. SHUMPEI OKA

Electrolytic method for a stationary nickel catalyst for a continuous hydrogenation process. A. SVIZUIN. *Masloboino-Zhirovoye Delo* 1928, No. 3, 25–7.—S. suggests using Fe wire which has been properly prepd. for a galvanic Ni bath. The Ni is pptd. on the wire, current of a very low d. being used to obtain a very uniform and smooth cover. After this cover is obtained the c. d. is increased gradually and tree-like configurations are obtained, the Ni surface being increased. The Ni is further oxidized in a caustic bath, very thoroughly washed after this operation and the catalyst so obtained is ready for use. S. uses screen from this wire which is placed in the autoclaves in the shape of spirals. A. A. BOEHLINGK

Distribution of current density in lead accumulators. JOHN TEARE CRENNELL AND FREDERICK MEASHAM LEA. *J. (Brit.) Inst. Elec. Eng.* 66, 529–36 (1928).—The cells studied contain 37 plates, 77.5 cm. high by 28.9 cm. wide, the positive 0.63 cm. thick and the negative 0.475 cm. thick. The space between plates is 0.5 cm., with no free electrolyte at the sides of the plates and a 9-cm. space below. The capacity is 4000 amp. hr. at 500 amp. discharge rate. Such a cell is designated type X. The factors detg. the value of c. d. at any part of a plate are plate resistance, electrolyte resistance and plate polarization, and these are studied. Assuming lines of current flow in the electrolyte to be normal to the plate, the path of current in the plates to be vertical, edge corrections to be negligible and initial concn. of acid to be uniform over the length of the plate, the authors derive the equation $P + P' = (r + K) \delta I$ (1), in which P and P' are differences in potential in the body of the plate due to plate resistance, r is the electrolyte resistance between plates in ohms/sq. cm. of the electrode area, K is a const. and δI is the c. d. over the surface of the plate at a particular level. By use of a HgSO_4 electrode, plate potentials vary with acid concn. as follows: with acid of sp. gr. 1.154, positive e. m. f. is 1.0580 v., —negative 0.9430 v.; with acid of sp. gr. 1.222 — positive 1.0945 v., negative —0.9640 v., sp. gr. 1.308 — positive 1.1485 v., negative —0.9900 v. Smaller plates being used to check calcs. it is found that with the positives, the resistance of the plate may be assumed to be that of the grid alone, while with the negative there is the addnl. conductance of the paste, which will be affected considerably by its d. Plate polarization is studied on small plates with a paste area of 1.2×1.3 cm. and 0.6 cm. thick, available paste area being 3.12 sq. cm., the polarization cells being charged and discharged at 19.5, 39.0 and 78.0 ma. at 18° and 25°. The value of K as detd. from the polarization curves is given in v. per amp. per sq. cm. at different intervals after the start of discharge as follows: $\frac{1}{4}$ hr. — 1.40, 1.0 hr. — 1.60, 2 hr. — 3.30, 3 hr. — 5.54, 4 hr. — 8.80. Taking the above factors into consideration the authors derive the following expression for c. d. I at any point on a plate in a cell of type X discharging at 500 amp.: $I = aB / (e^{ax} - e^{-ax}) (e^{ax} + e^{-ax})$ in which $a = \sqrt{2(\rho + \rho') / (k + r)}$. In these equations ρ and ρ' are the resistance of the positive and negative plates per unit length, l is the length of the plates, x is the distance from the bottom of the plate of the point in question, and B is 0.467 amps. Values of I at intervals of 10 cm. over the length of the plate are given for various times of discharge, and curves are plotted. Thus after $\frac{1}{4}$ hr., I in amp. $\times 10^{-3}$ at the bottom of the plate is 3.94 and at the top 10.70; after 1 hr. it is 4.08 at the bottom and 10.45 at the top; after 4 hr. 5.36 at the bottom and 7.39 at the top, and the data show that the values at all points gradually approach 6.03×10^{-3} amp. per sq. cm. which is the mean c. d. over the whole plate. Approx. values of the amp. hr. capacity at each level during the entire discharge (8 hr.) are obtained by extrapolation and give at the bottom of the plate 40.79×10^{-3} amp. hr. per sq. cm., and at the top 63.86×10^{-3} amp. hr. per sq. cm. H. SROGER

The reversibility of a reaction caused by a current or an electric spark. PIERRE JOLIBOIS, HENRI LEFEBVRE AND PIERRE MONTAGNE. *Compt. rend.* **186**, 948-50 (1928).—When sparks from a condenser of 0.1 mf. capacity were passed through CO_2 at 17 mm. 74% decompn. was obtained. Passing the sparks through a mixt. of $2\text{CO} + \text{O}_2$ at 25 mm. resulted in 26% combination. By using a continuous current of 350 microamps. and CO_2 at 9 mm. or $2\text{CO} + \text{O}_2$ at 15 mm. equil. is reached when CO_2 is 33% decompd., or when combination is 67%. The spark and current act both as a catalyst and as a source of energy. E. G. VANDENBOSCHE

Electrodeposition of rubber (Brit. pat. 279,474) **30**. Apparatus for dehydrating petroleum emulsions or similar emulsions by electric treatment (U. S. pat. 1,674,242) **22**. Purifying Zn solutions (Brit. pat. 278,851) **18**. Purifying alumina (Can. pat. 277,526) **18**.

Primary electric battery. M. L. MARTUS and E. H. BECKER. U. S. 1,674,198, June 12. A self-depolarizing primary cell has an electrolyte of caustic alkali and a negative element of activated C extending above the normal electrolyte level. Various other structural details are described.

Electric battery. T. A. HODGKISS and W. E. SMITH. Brit. 278,903, Nov. 13, 1926. Structural features.

Electric batteries. W. E. STICHLING. Brit. 279,228, Sept. 27 1926. Structural features.

Electric dry cell batteries. H. M. R. DAM (to Joseph Block). U. S. 1,673,400-1, June 12. Structural features.

Electric dry cell batteries. HENRY M. R. DAM (to Premo Electrical Corporation). U. S. 1,673,402-3, June 12. Structural features.

Storage battery. W. E. HOLLAND (to Philadelphia Storage Battery Co.). U. S. 1,673,677, June 12. Structural features.

Storage battery. E. J. PETRIE and G. R. HANNAN. U. S. 1,673,421, June 12. The electrolyte is absorbed in diatomaceous earth or similar material which is preliminarily purified by heating to a temp. (suitably about 1100°) at which org. matter is destroyed and volatile substances are expelled but which is not sufficient to destroy the cells of the material or to fuse them together.

Separator for storage batteries. H. B. LINDLEY (one-half to Adrian K. McInnis). U. S. 1,673,835, June 19.

Storage battery separator plates. W. L. GILL, J. O. MIDGETT and A. B. BENNETT. U. S. 1,674,284, June 19.

Storage battery separator or wood and glass-felt. H. J. HAMPTON (to Electric Storage Battery Co.). U. S. 1,674,594, June 19. Structural features.

Forming wood storage battery separators. E. P. FAY. U. S. 1,673,669, June 12. Mech. features.

Electrolytic cell. E. ROMANELI. Can. 277,857, Feb. 14, 1928. Zr is specified as a film-forming conductor for electrolytic cells. Cf. C. A. **22**, 259.

Electrolytic cell (surge absorber for use with direct current). H. G. BRINTON (to General Electric Co.). U. S. 1,674,497, June 19. Structural features.

Electrolytic condenser. H. N. MILLER (to Fansteel Products Co.). U. S. 1,672,809, June 12. Filmed Al plates are used in an electrolyte including a gelatin-glycerol compn. contg. NaHCO_3 . Cf. C. A. **22**, 2517.

Electrolytic condenser. E. F. ANDREWS (to Andrews-Hammond Corporation). U. S. 1,673,434, June 12. A condenser adapted for use with a. c. comprises a positive electrode of an alloy of Ni and Fe, which may be used with a negative electrode of similar metal and an electrolyte of alkali metal hydroxide. Cf. C. A. **22**, 1285.

Separating cobalt from nickel. W. J. HARSHAW. Can. 279,454, Apr. 17, 1928. A soln. of Ni and CO salts is electrolyzed with metallic Pb anodes. The anodes are thereby oxidized to Pb oxide, and this reacts upon the Co to form $\text{Co}(\text{OH})_2$.

Printing-surfaces of steel electroplated with chromium. K. W. SCHWARTZ (to United Chromium, Inc.). U. S. 1,673,779, June 12.

Colloidal carbon. ASAHI GLASS CO., LTD. Jap. 69,055, Aug. 7, 1928. A C electrode is electrolyzed in a soln. of HClO_4 , perchlorate or a mixt. of these.

Rectifier for electric current. LER. P. BENSING. Brit. 279,259, Nov. 12, 1928. Electrodes for rectifying a. c. of low voltages and low frequencies are formed of Si or an alloy of Si with Fe, Cu or Ni or are coated with Si. If the rectifier is of the electrolytic type, the electrolyte may be a soln. of a fixed alkali hydroxide, a boride, fluoride, phosphate or carbonate or an acid such as H_2SO_4 , HNO_3 , HCl or HOAc . A depolarizer

such as FeSO_4 may be used with H_2SO_4 . In a rectifier of the dry type the second electrode may consist of an oxide or sulfide, and, in an electrolytic rectifier, of an inert element of the fourth group, e. g., C or Pb.

Rectifiers and similar electric discharge devices. SIEMENS & HALSKÉ A.-G. Brit. 279,497, Oct. 23, 1926. An incandescing cathode of material of high m. p. such as W or Mo, mounted on supports of lower m. p., has end portions of larger cross-section than the middle portion so as to prevent movement of the arc.

Rectifier for alternating currents. L. LEVY. Brit. 279,461, Oct. 20, 1926. Structural features are described of rectifiers of the general type specified in Brit. 265,652 comprising Al and cuprous sulfide electrodes in a sulfuretted atm.

Rectifier for alternating current. S. RUBEN. Brit. 278,776, June 9, 1926. The electropositive elements preferably consist of Al amalgam formed by immersing Al plates in a satd. HgCl_2 soln. The electronegative elements are preferably of CuS formed by heating Cu disks of about 5 mm. thickness in S vapor at 150–500°. Cf. C. A. 22, 2518

Electric resistance furnace. R. WIRZ (to Aktiengesellschaft, Brown, Boveri & Cie., of Switzerland). U. S. 1,673,543, June 12

Rotary electric resistance-heated furnace suitable for treating lead and zinc ores, etc. L. TOCCO and M. LANDI. Brit. 278,774, June 8, 1926

Electric control system for heat-treating furnaces. J. C. WOODSON (to Westinghouse Electric & Mfg. Co.). U. S. 1,673,544, June 12.

Heating system for electric ovens controlled by a pyrometer. H. H. F. DANGER and O. DANGER (trading as the firm of H. Danger). Brit. 279,416, Oct. 22, 1926.

Electric heater adapted for laboratory use in distillations. F. H. BUNGE. U. S. 1,673,225, June 12.

Apparatus for tempering metal articles in electrically heated baths. L. P. HYNES (to Hynes & Cox Electric Corporation). U. S. 1,673,567, June 12.

Lead peroxide accumulator. A. MIOLATI. Can. 278,224, Feb. 28, 1928. An accumulator comprises an electrolyte contg. H_2SO_4 and ZnSO_4 , a positive plate composed of chemically pure Pb and PbO_2 and a negative plate formed of a metal other than Zn, the electrolyte being free of any traces of impurities electronegative relative to Zn.

Electric arc apparatus for nitrogen oxidation or for producing other gas reactions. J. M. WHEE (to General Electric Co.) U. S. 1,673,654, June 12. Gases under pressure are supplied to a space external to a wall of Al_2O_3 , S.C or other porous refractory material surrounding the arc chamber so that the gases pass through the porous wall and reaction products are led away from the chamber.

System for coating electric conductors or other cores with paper while moistening and felting the fibers. H. F. ALBRIGHT (to Western Electric Co.). U. S. 1,672,973, June 12. An app is described.

Loaded electric conductor. W. FONDILLER (to Western Electric Co.). U. S. 1,672,979, June 12. A core of elec. cond. material is coated with Fe or Fe-Ni alloy or other suitable magnetic loading material in finely divided condition and with a second coating of insulating material.

Mercury vapor lamp. D. M. LUMSDEN. Brit. 278,795, July 10, 1926. Structural features.

Mount wires for incandescent electric lamps. R. A. PRICE (to Western Electric Co.). U. S. 1,673,267, June 12. An alloy of Au and Ag is used; preferably, Au 70 and Ag 30%.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Experiments on the complex chemical behavior of beryllium. VI. R. FRICKE AND F. RÖBKE. *Z. anorg. allgem. chem.* 170, 25–34 (1928); cf. C. A. 21, 3846.—*N*-Butylamine forms 2 compds. with BeCl_2 in the mol. ratio 1:2 and 1:4 Be salt to amine. The latter has a tendency to decomp. on washing with ether. $\text{BeCl}_2 \cdot 2$ diethylamine is the only complex obtained with this amine. The triethylamine complex is an oily liquid which does not crystallize and was studied no further. The compd. $\text{BeCl}_2 \cdot 2(p)$ -toluidine is easily sol. in H_2O , alc., acetone and *p*-toluidine but weakly so in benzene, benzine, gasoline and ether. $\text{BeCl}_2 \cdot 2$ -lepidine is very hygroscopic, decomps. rapidly in moist HCl vapor. It also decomps. in H_2O . Alc. dissolves it readily while it is slightly sol. in ether, benzene, benzine and gasoline. $\text{BeCl}_2 \cdot 2$ -benzophenone is sol. in ether and warm benzophenone but only slightly so in benzene and gasoline.

It decomps. in water. BeCl_2 -2-cinnamaldehyde evaps. in air, dissolves readily in benzene and cinnamaldehyde but weakly in ether, benzene and gasoline. It decompd. in water. The complex with anisole is not definitely BeCl_2 -2-anisole. The crystals are very hygroscopic and dissolve in water, benzene and ether. It is slightly sol. in benzene and gasoline. The m. p. of BeCl_2 -pyridine was found to be 152° . A eutectic of the system BeCl_2 -2-benzylcyanide-benzylcyanide is obtained at 97.9% of the latter. The Be salt was added to aminoacetic acid soln. but no inner complexes were detected. Be behaves here as it does in the presence of oxyacids and polyphenols. R. H. L.

Spectrographic studies of complex cyanides of iron. I. L. CAMBI AND L. SZEGÖ. *Gazz. chim. ital.* 58, 64-7(1928).—Sec C. A. 21, 3021. II. The reaction between nitroprussiate and alkalis. *Ibid* 71-6.—Sec C. A. 21, 3323. C. C. DAVIS

The composition of crystals obtained from solutions containing sodium sulfate and iodides. II. EMMA FABRIS. Univ. Pisa. *Ann. chim. applicata* 18, 115-22(1928); cf. C. A. 21, 3326.—Solns. contg. (1) Na_2SO_4 and KI at $16-25.5^\circ$, (2) Na_2SO_4 and NaI at $16-17.5^\circ$ and (3) Na_2SO_4 and NH_4I at $16-25^\circ$ were crystd. and the crystals and the mother liquors analyzed in the same way as before. The data, recorded in tabular and graphical form, show that with increase in the concn. of the iodide, the I content of the $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ crystals increases progressively. For a given concn. of NaI, KI or NH_4I accompanying the Na_2SO_4 , the highest I content in the crystd. $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ is found with NH_4I and the lowest I content with NaI, the differences being notable. The data include from 15 to 30% NaI, KI and NH_4I based on the Na_2SO_4 , and are thus an amplification of the earlier expts. From the results can be calcd. the concns. necessary to obtain $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ crystals with a definite I content from 0 to 0.3893% by the use of NaI, 0 to 0.5029% by the use of KI and 0 to 0.6358% by the use of NH_4I . C. C. DAVIS

Formation of crystallized gold. G. I. COSTEANU. *Bul. chim. soc. română stințe* 30, 35-7(1928).— SnBr_4 is added to an aq. soln. of AuBr_3 ; the mixt. is kept in a vacuum desiccator. After 4-5 days microscopical Au flakes come floating on the surface; they are hexagonal leaflets. If HBr is added to a soln. of SnBr_4 and AuBr_3 , and the mixt. is slowly evapd., $\text{AuBr}_4 \cdot \text{H}_4\text{H}_2\text{O}$ crystals ppt. first, then redissolve. Finally Au leaflets sep. A. L. HENNE

Formation of sulfur trioxide under the action of α -particles. J. E. MAISON. *Ann. soc. sci. Bruxelles* 47B, i, 172-7(1927).—The oxidation of SO_2 by O in presence of Rn has been followed manometrically. No evidence for the existence of persulfuric anhydride was obtained, SO_3 being apparently the principal reaction product. The ratio of the no. of mols. disappearing from the gaseous phase to the no. of pairs of ions produced is about 1.5. Assuming the simple reaction $2\text{SO}_2 + \text{O}_2 = 2\text{SO}_3$, this result indicates that each pair of ions produces one mol. of SO_3 . B. C. A.

New binary azeotropes. IX. MAURICE LECAT. *Ann. soc. sci. Bruxelles* 47B, i, 149-58(1927); cf. C. A. 22, 1265.—A further list of binary azeotropic mixts. and non-azeotropic systems is given. B. C. A.

Appearance of visible impurities in chemical preparations with lapse of time. G. KASSNER. *Festschr. A. Tschirch* 1926, 80-4.—The cause of a white prepn. of Bi(NO_3), becoming gray after 1 year proved to be the sepn. of Te effected by decompn. products of the cellulose of the filter paper employed. B. C. A.

Gmelins Handbuch der anorganischen Chemie. System No. 19. Wismut und radioaktive Isotope. 8th ed., revised. Published by the Deutschen Chemischen Gesellschaft. Edited by R. J. Meyer. Berlin: Verlag Chemie. 229 pp. M. 33; subscription price, M. 25.

SUTHERLAND, M. J.: Text-Book of Inorganic Chemistry. X. The Metal-Amines. Edited by J. Newton Friend. London: Charles Griffin & Co., Ltd. 260 pp. 18s. net. Reviewed in *Chem. News* 136, 318; *Chem. Trade J.* 82, 559(1928). Cf. C. A. 21, 2856.

7—ANALYTICAL CHEMISTRY

W. T. HALL

Sensibility of the thermobalance and analysis of hydrated lime by the balance. T. SOMIYA. *J. Soc. Chem. Ind. (Japan)* 31, 217-23; *Suppl. binding* 59-60B(1928). (In English).—Various improvements in the thermobalance invented by Honda are suggested whereby its accuracy becomes equal to that of the analytical balance even at temps. above 1000° . Hydrated lime was analyzed by this thermobalance. The sample suspended

from one end of the beam in an electric furnace was weighed continuously and the temp. was plotted against loss in wt. The $\text{Ca}(\text{OH})_2$ content was calcd. from the amt. of H_2O given off at 400–500° and that of CaCO_3 from the amt. of CO_2 evolved at 500–950°. The $\text{Ca}(\text{OH})_2$ detd. by this method was about 2.1% too low, but the CaCO_3 was correct.

Y. TOMODA

The determination of bismuth in lead ores. HESSLING. *Metall u. Erz* 25, 132–3 (1928).—The method given by the *Gesellschaft deut. Metallhütten- und Bergleute* ("Mitteilung," vol. 1, p. 37) for the detn. of Bi does not hold for ores which contain Sn, Sb, As or Cu. Satisfactory results are obtained by first decomp. the ore, irrespective of its nature, with Na_2O_2 , this treatment allowing the metals of the H_2S group to be detd. at the same time.

J. BALOZIAN

Microchemical sodium determination. LEIF T. POULSSON. *Biochem. Z.* 193, 423–5 (1928).—Barrenschen-Nessiner's method is improved by substituting filtration for the centrifuging.

S. MORGULIS

A note on v. Fellenberg's iodine determination. ERICH JOCHMANN. *Biochem. Z.* 194, 454–60 (1928).—Errors of the detn. are avoided by a few modifications of the original procedure. The alc. ext. is collected in Ni crucibles instead of Pt dishes, to this are added 10 drops of 5% NaNO_3 , and after evapn. of alc. the crucible is heated at 600° in an elec. oven.

S. MORGULIS

A study of the adsorption method of titration. R. KH. BURSTEIN. *J. Russ. Phys.-Chem. Soc., Chem. Part* 59, 521–36 (1927).—The titration of halides with AgNO_3 according to Fajans is reviewed. The author concludes that a sharp color change takes place only when the Ag halide is less sol. than the Ag salt of the indicator. Gelatin in concns. 0.001–0.01% does not prevent the pptn. of the Ag sol before the turning point, while 0.05% leads to abnormally large results. Albumin behaves similarly. $\text{K}_3\text{Fe}(\text{CN})_6$ cannot be titrated with AgNO_3 because the sol of $\text{Ag}_3\text{Fe}(\text{CN})_6$ coagulates before the equiv. point. In the case of C_2O_4 ions the color change takes place immediately upon the addn. of AgNO_3 , probably because Ag fluorescein is less sol. than $\text{Ag}_2\text{C}_2\text{O}_4$. $\text{K}_3\text{Fe}(\text{CN})_6$ can be accurately titrated with $\text{Pb}(\text{NO}_3)_2$, Na alizarinsulfonate being used as the indicator, the best results being obtained with 0.03–0.05 *N* solns. This indicator was successfully used in the titration of $\text{Na}_2\text{C}_2\text{O}_4$ with $\text{Pb}(\text{NO}_3)_2$.

BASIL C. SOYENKOFF

The colorimetric determination of perchlorate in chlorate. O. S. FEDOROVA. *J. Russ. Phys.-Chem. Soc., Chem. Part*, 59, 509–20 (1927).—Hahn's (cf. *C. A.* 20, 1967) method is modified as follows. To a mixt. of 0.1–0.2 cc. of the unknown and 0.1 cc. of 40% KNO_3 made up to 0.3 cc. with H_2O is added 5 cc. of Hahn's strong reagent. If the concn. of chlorate does not exceed 0.9%, 0.0012% of the perchlorate will change the color to lilac in 2–3 min. and 0.0025% to an instant purple. When the ultrareagent is used and the total vol. made up to 6 cc., 0.001 to 0.002% of the perchlorate can be detected in the presence of 1% chlorate although the color differences are less sharp. The detn. of perchlorate in electroplating baths is preceded by the pptn. of chromate; a slight excess of $\text{Pb}(\text{OAc})_2$ does not affect the results. When the concn. of chloride is not over 0.5 that of the chlorate, 0.1% of perchlorate in the latter can be detd. With concn. of chloride twice that of the chlorate, the limit of precision is 0.4%.

BASIL C. SOYENKOFF

Volumetric method of determining sulfate ion. FREDERICK G. GERMUTH. *J. Am. Water Works Assocn.* 19, 607–9 (1928).—The method of Wildenstein using 0.02 *N* BaCl_2 and 0.02 *N* K_2CrO_4 is described and recommended as accurate and rapid.

D. K. FRENCH

Qualitative analysis for cations without the use of hydrogen sulfide. D. STROHAL. *Archiv. hem. farm.* 2, 77–85 (1928).—The procedure recommended involves, for the most part, the same chemical reactions that are used in most schemes of analysis but the order in which the tests are applied is quite different. After the removal of the AgCl group, the oxidized filtrate is treated with NH_4Cl and NH_4OH instead of with H_2S . The tests are good and the procedure ought to give satisfactory results when only a rough qualitative analysis is desired. The original paper should be consulted for details.

JUROSLAV KUČERA

Determination of oxide inclusions in pig iron and steel. P. OBERHOFFER AND E. AMMANN. *Stahl. u. Eisen* 47, 1536–40 (1927).—The detn. of MnO and FeO in pig iron and steel by the Br method is not reliable, because the soln. of the oxides depends on the concn. and temp. of the Br soln. Good results for the detn. of the total SiO_2 were obtained by the following method: Dissolve 100 g. of KBr and 160 g. Br_2 in 1 liter of H_2O and filter. In this soln. dissolve 20 g. of the steel borings by shaking mechanically for 0.5 hr. Dil. to 2 l. and filter through a *Cella alkali-resistant* membrane, filter and wash first with cold and then with hot H_2O , next with 600 cc. of a hot 3% Na_2CO_3 .

then again with hot and cold H_2O , 50 cc. cold 5% HCl and finally with cold H_2O . Ignite the residue and det. Si by the HF method. The Al in the residue can be detd. by fusion with pyrosulfate.

J. A. SZILARD

Determination of oxides in steel. FRANZ WILLEMS. *Arch. Eisenhüttenwesen* 1, 605-8(1927); *Stahl u. Eisen* 48, 603-4(1928).—The oxide detns. in steel give only the O present as SiO_2 and Al_2O_3 . FeO and MnO are dissolved by a $Br-BrK$ soln., the solvent used by Oberhoffer and Ammann (cf. preceding abstract). The detn. of MnO is of importance in the elucidation of the deoxidation phenomena. A cold satd. soln. of twice-sublimed I in abs. alc., filtered through a Cella membrane, is used to dissolve the borings in a closed flask in a N atm., to prevent the formation of basic salts. To facilitate soln. the flask is shaken on the shaking app. of Wagner for 30-40 min., then filtered through a Cella membrane, which is not attacked by org. solvents. The MnO and other oxides are detd. from the residue by the usual manner and compared with results obtained by other methods.

J. A. SZILARD

The use of microanalysis in metallurgical and smelting laboratories. A. BENTDETTI-PICHLER. *Metall u. Erz* 25, 206-8(1928).—In detg. Ni, microanalytically, either the "filtering tubelet" of Emichschen (*Mikrochemisches Praktikum*, Munchen 1924, p. 63) or the "filtering cup" of Schwarz-Bergkampff (*C. A.* 21, 514) may be used, with dimethylglyoxime as the precipitant. With E.'s device, the pptn. is carried out in a microflask (cut from a small test tube) and the filtration in the tubelet under suction. In the "filtering cup," the microflask and the tubelet are attached, forming one closed piece, and so constructed that liquids may be introduced and the ppt filtered after turning slightly. Brunck's method of dissolving and pptg. is used, other analytical details being as usual. The av. of 5 detns. of Ni in $NiSO_4 \cdot (NH_4)_2SO_4$ gives 14.81% (theoretical 14.86%), the time required for a detn. being about an hr. Small amts. of various metals may be detd. by electrolytic deposition, the app. of Pregl being used. In a detn., 4-5 cc. of soln. are used, 10-25 min. being required for complete deposition of Cu. As no particular skill is necessary for carrying out microanalyses, its methods are applied in various other detns.

J. BALOZIAN

Volumetric estimation of carbon dioxide. L. LESCOEUR AND (Mlle.) S. MANJEAN. *Bull. soc. chim. biol.* 10, 523-36(1928).—The process is carried out in a closed system consisting of a wash-bottle A holding the air or substance yielding CO_2 , an Erlenmeyer flask B contg. approx. 0.02 N $Ba(OH)_2$ to which $BaCl_2$ has been added at the rate of 50 g. per l., and a circulating app. C connected to both A and B, which insures a continuous circulation of gas in the system from A to B by means of a falling jet or drops of Hg. The $BaCO_3$ formed by absorption of CO_2 is titrated with 0.02 N HCl , phenolphthalein being used as indicator. The special point of this process is the absence of error by contact with air.

L. W. RIGGS

A new method for the simultaneous determination of minute amounts of carbon dioxide and oxygen. W. O. FENN. *Am. J. Physiol.* 84, 110-8(1928); cf. *C. A.* 22, 99.—The detn. of CO_2 depends on the change in cond. of $Ba(OH)_2$ soln. due to the absorption of CO_2 (cf. Cain-Maxwell, *C. A.* 12, 1687). The app. is essentially a differential volumeter. Absorption of O_2 is indicated by movement of an index drop in a capillary tube which connects the 2 flasks of the app.

J. F. LYMAN

Method for the quantitative analysis of lead in organic compounds. HENRY GILMAN AND JACK ROBINSON. *J. Am. Chem. Soc.* 50, 1714-6(1928).—Directions are given for decomposing org. substances with concd. HNO_3 and H_2SO_4 and detg. the Pb as $PbSO_4$.

C. J. WEST

Determination of acetaldehyde according to different methods. JOACHIM WAGNER. *Biochem. Z.* 194, 441-52(1928).— AcH (a) in bisulfite combination ($CH_3CHOH.SO_3Na$), H_2O , (b) from Zn *dl*-lactate by oxidation with $KMnO_4$, (c) from purest acetaldehyde-thiosemicarbazone or exactly measured from freshly distd. purest aldehyde was analyzed by the titration method of Ripper, by the Hg method of Langedijk or by Newberg's hydroxylaminesulfate. The former (sulfite titration) method gave sufficiently accurate results even with small concns. of aldehyde.

S. MORGULIS

The determination of soluble carbohydrates. C. O. APPLEMAN, W. E. LOOMIS, T. G. PHILLIPS, W. E. TOTTINGHAM AND J. J. WILLAMAN. *Plant Physiology* 2, 195-204(1927).—Section 3 of the report of the comm. on methods of chemical analysis of the Am. Soc. of Plant Physiologists (*C. A.* 21, 3931; 22, 1933). Methods of extrn. clearing and extrn. of sol. carbohydrates in plant material are described and discussed. An extensive bibliography is given. II. **The determination of nitrogen in relatively simple compounds.** *Ibid* 205-11.—Section 4 of the report. Methods for the detn. of total N, amino N, ammonia N, amide N, nitrate N, humin N, basic N and proteose N are described. A bibliography is given.

WALTER THOMAS

Determination of sugar with Fehling's solution and centrifuging. W. S. ILJIN. *Biochem. Z.* 193, 322-5(1928).—The detns. of glucose and maltose are carried out by Bertrand's method substituting centrifuging for the filtration. Tables are given for quantities of glucose 1-25 mg. and for maltose 1-45 mg. S. MORGULIS

Determination of two sugars in one solution. W. S. ILJIN. *Biochem. Z.* 193, 326-33(1928).—In a mixt. of 2 sugars (e. g., *d*-glucose and maltose) the quantity of each can be detd. in the following manner. The entire sugar content is detd. by Bertrand's method, and the amt. of Cu corresponding to this is marked *M*. From the tables the mg. glucose and maltose corresponding to *M* are found (p_1 and p_2), so that M/p_1 and M/p_2 is the amt. of Cu per mg. glucose and maltose, resp. Assuming their concns. in the soln. to be C_1 and C_2 , $M = M/p_1 \cdot C_1 + M/p_2 \cdot C_2$ or $C_1/p_1 + C_2/p_2 = 1$. C_1 being known, and *M* detd. analytically, C_2 is easily calcd. When the concn. of both sugars is unknown it is also necessary to make a polarimetric detn., and from the data of both detns. the amt. of each sugar can be calcd. The original should be consulted for details. S. MORGULIS

The estimation of hexamine. J. RAE. *Pharm. J.* 120, 71(1928); cf. *C. A.* 12, 1907, 22, 1302.—To 10 cc. of a soln. of 1 g. hexamine in sufficient H_2O to make 100 cc., add 25 cc. $N K_2Cr_2O_7$ and 10 cc. concd. H_2SO_4 , heat on a water bath for 1 hr., shaking occasionally, allow to cool and dil. with H_2O to 250 cc. To 25 cc. of this soln. add 1 g. KI and titrate the liberated I with 0.1 *N* $Na_2S_2O_3$. Deduct the no. of cc. consumed from 25; the result multiplied by 5.833 gives the % of hexamine in the sample, based on complete oxidation of CH_3O to CO_2 and H_2O . S. WALDBOTT

Determination of hydroxylamine. JAKOB BLOM. *Biochem. Z.* 194, 385-91 (1928).— NH_2OH can be detected by a variety of methods with the following degree of sensitivity: (1) Na nitroprusside, 0.1 NH_2OH per l.; (2) $C_6H_5COCl + FeCl_3$, 0.005 g. per l.; (3) diacetyl monoxime + Ni, 0.002 g. per l.; (4) $(NH_4)_2S + NH_4OH + alc.$, 0.002 g. per l.; (5) $(NH_4)_2S + NH_4OH + MnS$, 0.00047 g. per l.; (6) *p*- $BrC_6H_4NO + \alpha$ -naphthol, 0.0001 g. per l.; and (7) with Griess, reagent, 0.000003 g. per l. Of these various reactions the 5th was chosen for a quant. method. The solns. required are: a $M/500$ *p*- BrC_6H_4NO contg. 0.37 g. of the substance in 1000 cc. 96% alc.; a $M/500$ α -naphthol-soln. contg. 0.29 g. of the substance in 1000 cc. H_2O acidified with 5 drops HCl; a 0.5 *N* NaOH soln.; and a dil. soln. of a Mg salt. The NH_2OH -contg. soln. (20 cc.) is neutralized and mixed with 2 cc. 0.5 *N* NaOH. To this is added a fresh mixt. of 3 vols. of *p*- BrC_6H_4NO and 2 vols. of the α -naphthol soln. when an orange-yellow color appears even in the presence of minute traces of NH_2OH . The reaction becomes more distinct and sensitive when 1-2 drops of a Mg salt soln. is also added, the color changing more to a red. The red coloring matter is adsorbed by the $Mg(OH)_2$ and forms a red ppt. sharply demarcated from the yellow supernatant fluid. In the absence of NH_2OH the $Mg(OH)_2$ ppt. is yellowish. S. MORGULIS

Improved method for phenol determinations. JOHN R. BAYLIS. *J. Am. Water Works Assoc.* 19, 597-604(1928).—Describes a method suggested by Gibbs using 2,6-dibromoquinonechloroimide. This reagent is sensitive to 5 parts per billion. Full details of prepn. of the reagent are given as well as a method for concg. the phenols for the detn. of very small quantities. There are few interfering compds. D. K. F.

Determination of the active sulfur in commercial benzene and of the hydrogen sulfide in raw benzene. R. KATTWINKEL. *Teer. u. Bitumen* 26, 265-7(1928); cf. *C. A.* 22, 677.—The following combination and modification of known methods is recommended. The H_2S is extd. from 100 cc. benzene by shaking with 50 cc. *N* NaOH followed by 25 cc. water, which leaves the free S in the benzene, and detd. in K.'s app. This consists of an Erlenmeyer flask with a special ground-glass stopper contg. a trap, for washing the liberated H_2S through hot water, a dropping funnel, which also serves as a gas inlet tube, and a delivery tube which conducts the gas into a single ordinary wash-bottle, which was found sufficient for complete absorption. Fifty cc. concd. HCl is run into the sulfide soln. in the flask, after the app. is flushed with H_2 . The H_2S is driven out by boiling, and passing H_2 until cold, into the wash-bottle contg. a 2.5% cadmium acetate soln. in 20% acetic acid. The CdS may be titrated directly in the absorbing soln., with 0.1 *N* I_2 or converted into CuS by adding $CuSO_4$ soln. to permanent blue. The CuS is ignited in air, finally covered and heated strongly to decompose $CuSO_4$ and weighed as CuO . The free S in the benzene, by shaking with Hg, is converted into HgS , which is filtered off and decomposed with concd. HCl in the above app. H_2S detns. on various specimens indicated contamination from the wash oil. F. S. GRANGER

The reaction of starch with iodine (STAIGER) 2.

LAMBOURNE, H., AND MITCHELL, J. A.: **Qualitative and Volumetric Analysis for Medical Students.** London: Humphrey Milford, Oxford Univ. Press. 64 pp. 5s.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Separation of fossils and other light materials by means of heavy liquids. MARCUS A. HANNA. *Econ. Geol.* **22**, 13-7(1927).—Bromoform and benzene mixts. are applied in obtaining concentrates of fossils from sands. E. J. ROBERTS

Intergrowths of chalcopyrite and cubanite. G. M. SCHWARTZ. *Econ. Geol.* **22**, 44-61(1927).—Microscopic and x-ray analyses show that cubanite (CuFe_2S_3), which is chemically intermediate between chalcopyrite and pyrrhotite, generally occurs intergrown with chalcopyrite, and that above 400-450° a homogeneous solid soln. of the 2 exists which unmixes to an intergrowth on slow cooling. Thus any intergrowth of the 2 indicates an initial temp. > 400-450°. E. J. ROBERTS

Changes in the oxidation of iron in magnetite. LILLIAN H. TWENHOFEL. *Econ. Geol.* **22**, 180-8(1927).—The oxidation of magnetite and the inversion of this oxidized magnetite to hematite are not dependent on temp. alone, but are also functions of time and source of material. The O atoms which are added when oxidized magnetite is formed are irregularly spaced within the magnetite crystal structure and their actual positions cannot be definitely detd. E. J. ROBERTS

The hydrothermal alteration of certain silicate minerals. R. J. LEONARD. *Econ. Geol.* **22**, 18-43(1927).—A study of the effect of water with various chemicals at different temps. and pressures on certain feldspars and spodumene is presented. Alunite was produced at 20°, 65° and 100° at 1 atm. and at 200° at 15 atm., but not at 350° at 1 atm., by the action of H_2O plus $\text{Al}_2(\text{SO}_4)_3$, + either H_2SO_4 , K_2SO_4 or Na_2SO_4 on microcline, albite and bytownite. Zeolites were formed by the action of H_2O + K_2CO_3 or Na_2CO_3 at 200° and 15 atm. on the feldspars, and probably by action of H_2O + K_2F_2 and Al_2F_6 at 350° and 1 atm. Cryolite was formed by action of H_2O + Al_2F_6 + Na_2SiF_6 at 350° and 1 atm. and at 400° and 575° at 8 and 10 atm., resp. Leverrierite (probably) was formed from feldspars by the action of H_2O + AlCl_3 or by H_2O + AlCl_3 + NaCl or KCl at 350° and 1 atm. or by H_2O + K_2CO_3 or H_2O + K_2F_2 + Na_2SiF_6 at 575° and 10 atm. Kaolin and sericite were looked for in all expts. but no definite evidences of their formation were obtained. Dil. HCl and H_2SO_4 at high temps. merely result in decompn. of mineral, generally with the production of SiO_2 . E. J. R.

Crystalline forms of curite and ianthinite. ALFRED SCHOEP. Univ. Gent. *Natuurwetenschap. Tijds.* **9**, 1-3(1928); cf. *C. A.* **21**, 2242.—For ianthinite, the values of φ and ρ have been measured for (110), (310) and (100). They are, resp., 21°05' and 90°, 49°11½' and 90°, 90° and 90°. The ratio $a:b = 2.59381$. The values for curite correct those previously given. The value 104° given for the angle (011)(011) is to be referred to an angle (111)(111) and has a value 107°59'42". The various values for φ and ρ have been detd.: $a:b:c = 0.9553:1:0.6535$. The plane of cleavage is undetd. A. L. H.

Some relations between oxygen minerals and sulfur minerals in ore deposits. B. S. BUTLER. *Econ. Geol.* **22**, 233-45(1927).—A table showing the relative temp. of deposition in both hypogene and supergene deposits of the O and S minerals of Fe, Mn, Zn, Pb, Cu, W and Sn is given and discussed. E. J. ROBERTS

Coincident variations of types of mineralization and of Coast Range intrusives. A. F. BUDDINGTON. *Econ. Geol.* **22**, 159-79(1927).—Certain pyrrhotites show 0.1 to 0.2% Ni and a trace of Co. E. J. ROBERTS

Zonal distribution of ore deposits in Central Europe. GEORG BERG. *Econ. Geol.* **22**, 113-32(1927).—It is not possible to introduce the pyritic, arsenopyritic, quartz-Au veins at any point into the customary order of deposits: Sn, Bi, Cu, Zn-Pb, Ag-Sb, Hg. The rich Au-Ag deposits, the enargitic Cu deposits, and others of the volcanic type were derived from magma that filled volcanic necks. E. J. ROBERTS

Tin ores of Chocaya, Bolivia. M. J. BUERGER AND JESSE L. MAURY. *Econ. Geol.* **22**, 1-13(1927).—The type of mineralization contrasts strongly with that of the hypothermal replacement tourmaline deposits of Caracales, described by Lindgren (*C. A.* **21**, 1949). E. J. ROBERTS

Minerals in relation to possible development in the Far East. H. FOSTER BAIN. *Econ. Geol.* **22**, 213-29(1927).—With the exception of W, Sb and Sn deposits, the Far East is deficient in those minerals necessary for a development of a type of civilization similar to ours. E. J. ROBERTS

Magnesite deposits of Manchuria. K. NIINOMY. *Econ. Geol.* **22**, 195-9(1927); cf. C. A. 21, 1427.—A no. of analyses of magnesites and dolomites are given showing the gradation from one to the other indicating replacement. E. J. ROBERTS

Origin of the Vermont talc deposits. JOSEPH L. GILLSON. *Econ. Geol.* **22**, 246-87 (1927).—These talc deposits were formed by the action of hot, alk. solns. low in SiO_2 and toward the last rich in MgO and CO_2 , on serpentinite rocks and certain schists and gneisses. The serpentinite was replaced by the talc either directly or with an intermediate stage of chlorite formation. The latter always took place when the parent rock was a gneiss or schist. A review of other talc deposits leads G. to believe that talc deposits in general are replacement deposits in limestone, schists, gneisses and in altered basic intrusions, the reagent solns. being of the type described above. E. J. R.

Origin and organization of coal. E. C. JEFFREY. *Mem. Am. Acad. Arts Sci.* **15**, 1-52(1924).—The effect of coal resources on the rise and decline of nations, as measured by the certain gage of increasing or decreasing populations, and some previous chem., macroscopic and microscopic studies of coals are briefly discussed. Various expts., chemicals, app. and procedures which were tried out in an extended investigation to ascertain the best method for softening, embedding and cutting sections of coal for microscopic examn. are described in detail. The problem as to the origin of coal, difficulties encountered, factors involved and conflicting theories, are outlined. Better methods for making micro-sections of coals have added much to the knowledge of the structure, compn. and origin of coal. This is evidenced by 10 photographs, 62 photomicrographs (14 of them beautifully colored) and descriptions of samples of different kinds of coals collected from all parts of the world. Types of coals studied were: sporcoals, oil-shales and cannel; bituminous coals, coking and non-coking; and anthracites. From this exhaustive investigation J. draws these conclusions: the structure of all ranks of coal and of every geological age have now been revealed and show that coals are the result of allocthonous sedimentation in open water and not from autocthonous or *in situ* deposition: the so-called sapropelic coals are not the consequence of extreme disintegration of vegetable materials under water, but are derived from fine materials deposited under tranquil conditions of sedimentation in open water; hence the sapropelic hypothesis of the origin of coal has to be rejected: algae are not an important constituent either of existing open water deposits or of the so-called sapropelic coals, such as oil-shales and cannel; objects previously interpreted as being algae in these latter coals are undoubtedly spores of vascular cryptogams, etc.: bituminous coals are the result of aquatic transport and deposition, shown by their usually large content of spores and the frequent occurrence in their substance of scattered fragments of fusain: anthracites represent only a further stage of devolatilization in bituminous coals and were formed under similar conditions: fungal organisms have played little or no part in the elaboration of the raw materials of coals: in the present state of our knowledge, hydrolysis, pressure, and temp. exercised in varying lengths of time and in varying degree account for the origin of the different ranks of coal, namely, brown, bituminous and anthracite; coking coals are predominately of woody origin and their quality depends in large measure on the proportion of wood present. A large no. of references to the literature on compn. and constitution of coal and acknowledgments for cooperation in this research are given. W. W. HODGE

New observations on the origin of fusite (mineral charcoal). H. BODE. *Braunkohle* **27**, 443-5(1928).—A review and discussion of the conclusions of various investigators. F. S. GRANGER

Fractionation and decomposition of petroleum during capillary migration. CHAS. W. COOK. *Econ. Geol.* **22**, 230-2(1927).—Alteration of petroleum may occur during capillary migration, either by fractionation or decompn., which actions may occur at relatively low temps. and pressures. E. J. ROBERTS

Preliminary report on the origin of California petroleum. JUN-ICHI R. TAKAHASHI. *Econ. Geol.* **22**, 133-57(1927).—Diatoms were not the principal source of the oil. Analyses of muds from Shioyama Bay for water-sol., HCl -sol., Na_2CO_3 -sol., chloroform-sol., benzene-sol. and distillable components are given. E. J. ROBERTS

The geologic relationship of the occurrence of oil in the Emba-Ural region to that in the Caucasus. A. F. V. STAHL. *Petroleum Z.* **24**, 135-7(1928). M. B. HART

Petroleum deposits in Altmark. HERMANN SCHROEDER. *Petroleum Z.* **24**, 193-4 (1928). M. B. HART

Mud volcanoes of the Baku region. A. F. V. STAHL. *Petroleum Z.* **24**, 195-6 (1928).—The significance of the island occurrences which are due to mud volcanoes and their relation to petroleum occurrence are discussed. M. B. HART

Handbuch der Mineralchemie. Band IV. Edited by Cornelius Doelter and Hans Leitmeier. Dresden: Th. Steinkopff. pp. 641-800. M. 8.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, R. H. ABORN

The beginning of the Wilfley concentrating table. HENRY E. WOOD. *Eng. Mining J.* 125, 975-7(1928). E. H.

The insulation of open-hearth furnace regenerators. L. B. MCMILLAN. *Iron Steel Eng.* 5, 257-62(1928).—A series of charts shows the heat losses through various thicknesses of brick walls and roofs and for various thicknesses of insulation. The benefits derived from insulation of open-hearth checker chambers are discussed. D. G.

The behavior of titanium in the titanium-bearing slags (with special reference to titanium monoxide). C. W. CARSTENS. *Z. Krist.* 67, 260-78(1928).—Ti occurs in some slags as crystd. Ti-augite. In intermediate to more basic slags, at moderate temps., as in blast-furnace operations, the Ti occurs as "deoxidized" rutile. The degree of deoxidation is a function of the temp. In such cases the pig iron is almost completely Ti free. In ultra-basic slags, with higher temp. and greater reducing conditions (as in the elec. furnace) the Ti occurs as dendritic crystals of the Ti monoxide, fulvite. Several analyses are given. L. S. RAMSDELL

Blast-furnace slag as ballast. H. BURCHARTZ and G. SAENGER. *Stahl u. Eisen* 47, 1663-4(1927).—The compn. of slag from Fe blast furnaces in Germany varies within the following percentage limits: SiO₂ 30.8-35.6, Al₂O₃ 9.1-12.0, FeO 0.3-0.8, MnO 1.3-3.5, CaO 35.9-43.4, MgO 3.7-10.2, SO₃ 0.1-0.3, S 1.1-1.8 and P 0.0-34%. It has d. 3.0, apparent sp. gr. 1.14-2.95 and absorbs 1.1-2.8% of its wt. of water. Its resistance to frost and to shattering during use as railway ballast is equal to that of granite, but slightly poorer than that of basalt. During the first year on the track it tends to accelerate the rusting of Fe, but subsequently becomes inert. B. C. A.

Apold-Fleissner process of roasting (iron ores in shaft furnaces). R. BRANHOFFER. *Stahl u. Eisen* 47, 2061-6(1927).—In the Apold-Fleissner method of roasting spathic Fe ore, the ore is passed downwards in a continuous stream through a shaft furnace, through which is passed a current of hot air or flue gas with a low content of CO₂, while a current of cold air passes upward through the lower part of the shaft below the hot-air tuyères, this part acting as a cooling chamber for the ore and a preheating flue for the air which rapidly and completely oxidizes the FeO formed in the upper zones of the furnace. The quantity and temp. of the hot gases and cold air used are carefully regulated so as to keep the CO₂ content of the flue gas at a min. and thereby ensure a thorough roasting of the ore at the lowest possible temp. Diagrams of the furnace used and calcs. of the heat balance are given. It is claimed that a furnace roasting 200-450 tons/day requires about 160,000-200,000 kg.-cal./ton with a heat efficiency of 73%. B. C. A.

Temperature and velocity of casting. FRITZ BEITTE. *Stahl u. Eisen* 48, 577-83(1928).—A lecture, followed by discussion. J. A. S.

Modern galvanizing ovens. A. BRESSER. *Korrosion u. Metallschutz* 4, 33-4(1928).—Sketches and descriptions are given of 3 types of modern galvanizing ovens. J. K. ROBERTS

Galvanizing with electric heat at Gary. EUGENE A. LONGGOOD. *Elec. World* 91, 1021(1928); 1 illus. C. G. F.

White metal for bearings, its treatment and microstructure; treatment in melting, casting temperature, construction of foundations and oiling of fixed bearings. STYRIE. *Apparatebau* 40, 109-11(1928), 6 photomicrographs. J. H. MOORE

Hardness of alloys. A. MALLOCK. *Nature* 121, 827(1928); cf. C. A. 21, 2654.—Curves showing the relative hardness of Pb alloys with Sb, Sn and Bi, resp., are given. The hardness was tested by measuring the flattening of an alloy cone by a given pressure. The Sn-Pb curve was straight; the hardening effect of Bi was slight below 70%, but greater above; the Sb-Pb curve showed a max. at about 60% Sb. G. F. C.

Acid-resisting metals and alloys. W. ROHN. *Korrosion u. Metallschutz* 4, 49-53(1928); cf. C. A. 22, 211.—A qual. presentation of the acid-resisting properties of the elements in the periodic table in which the resistance to mineral acids and foodstuff acids is indicated. The acid-resisting properties of Fe, Cr, Ni and Mo alloys to 10% solns. of HNO₃, H₂SO₄ and HCl are also discussed. J. K. ROBERTS

Equilibrium diagram of the copper-rich side of the copper-tin system. TSUTOMU

MATSUDA. *Sci. Repts. Tôhoku Imp. Univ.* 17, [1], 141-61(1928).—By thermal analysis and elec. resistance measurements it is established that a transformation takes place at 590° in alloys contg. 15-25% Sn. The transformation is considered a eutectoid change, the eutectoid contg. 26% Sn. No change was observed in the α -solid soln. The transformation at 520° was confirmed. The results, together with those of previous investigators, are used to construct a new temp.-equil. diagram up to 45% Sn. The effects of the transformations upon the forgeability and hardness have been detd. Photomicrographs of several alloys are included.

WILLIAM F. EHRET

The influence of nickel on iron-carbon-silicon alloys containing phosphorus. ARTHUR B. EVEREST AND D. HANSON. *Iron Steel Inst.* (advance copy), May, 1928, 23 pp. —Washed metal contg. 3.5% C was mixed with 97% Si and 20% ferrophosphorus to give alloys contg. 1.2 or 2.5% Si, and 0.2, 0.5 or 1.2% P. From each melt, castings contg. 0-3% Ni were poured, Ni addns. being made between each pouring. A step-casting varying from $\frac{1}{8}$ in. to 1 in. in thickness was poured to det. the chill. P increased the chill of the low-Si alloys, but Ni counteracted that effect, and it was not strongly marked with higher Si. P impaired the machinability, which was slightly improved by Ni. With low P increasing Ni hardened the alloys; it hardened the matrix in all cases, but also tended to reduce the chill. Ni tended to graphitize the alloys, and to make the graphite finer in most cases. The phosphide network in high P alloys was refined by Ni, which also made the pearlite more sorbitic. With high P, Ni made both cementite and pearlite finer-grained. Ni up to 3% was also added to a com. Fe contg. 3.05% C, 1.87% Si, 0.75% Mn, 0.09% S and 0.24% P, and to the same alloy with higher P. Results of tests on these alloys confirm those noted above. P had a smaller effect on Brinell hardness than on machinability. The max. refinement of the graphite was obtained with 2% Ni. P reduced the influence of Ni so that with high P, more Ni was required for a desired effect.

GEO. F. COMSTOCK

Chromium steel rails. THOMAS SWINDEN AND P. H. JOHNSON. *Iron Steel Inst.* (advance copy), May, 1928, 14 pp.; *Iron Steel Can.* 11, 174-6.—The practice of securing harder rails by increasing the C only is questioned, and Mn up to 1% is suggested as a possible improvement over the present specification of 0.8% max. Acid Bessemer steel contg. about 0.5% C and 1% Cr was made for crossings and switches, and gave good results in the drop tests. Reheating and air-cooling, as in hot-bending, gave improved ductility. Increased C content in acid open-hearth steel rails gave less ductility. Rapid air-cooling of the head from 950° increased the hardness. The sorbitic microstructure of the Cr steel is illustrated. Test results of British rail steel are tabulated. Track crossings of the Cr steel showed better wear resistance and toughness in service. The use of Cr steel fish plates gave stronger and stiffer joints.

G. F. C.

The rate of solution of graphite in molten iron carbon alloys. F. SAUERWALD AND A. KORENY. *Stahl u. Eisen* 48, 537-40(1928).—The rate of soln. of graphite in Fe-C alloys was detd. at 1250° and 1350°. A melt was prep. which solidified white and had the following compn.: C 3.62, Si 0.16, Mn 0.78, P 0.61 and S 0.05%, the rest being Fe. Small samples—10 to 12 g.—of this Fe were shaken with known quantities of graphite in an evacuated quartz flask and then heated for various lengths of time at 1250° in a salt bath placed in a Tamman furnace. The expts. at 1350° were carried out without a salt bath in the Tamman furnace. The flask was evacuated by a high vacuum pump and kept in motion during the test. The amt. of graphite dissolved increases with increasing temp. and also with increasing time. The results obtained by the expts. were calcd. with a fair degree of accuracy, assuming with A. A. Noyes, W. R. Whitney and W. Nernst that the rate of soln. is proportional to the surface and the degree of satn. of the liquid melt. It is emphasized that the data given for the soly. of graphite in tech. Fe are of value only if the form and vol. of graphite, the various C contents of the melt, the time, temp. and the grade of agitation of the melt are given. The order of velocity of soln. is such, that the complete soln. of graphite in cast Fe, especially at lower temps., takes a very long time.

J. A. SZILARD

Graphite in gray cast iron and its effect on the tenacity. PETER BARDENHEUER AND KARL L. ZEYER. *Stahl u. Eisen* 48, 515-9(1928); cf. C. A. 22, 373.—The soln. of graphite in gray cast Fe was investigated as a function of the temp. of overheating and the chem. compn. of the metal. In general the higher the C content, the higher the temp. required to obtain a complete resolu. of the graphite. With 3.69% C, there is considerable graphite present in sample heated to 1200° and 1300°. The sample was free from graphite only after a heat treatment at 1700°. With 2.95% C, the sample is free from graphite at about 1300-1400°. All test pieces showed with increasing temp. of overheating a displacement of the coarse graphite lamellae by the fine eutectic. This refining of graphite is more noticeable and occurs at lower temp. of overheating if the

melting is carried out in vacuum. The tendency of graphite formation decreases with increasing temp. Above 1500° white carbide particles appear. Even if melted in vacuum, cast Fe forms a gray structure, through the nuclei action of the crucible walls. At higher temp. this effect of the crucible material increases and this explains the increased graphite formation at 1500°, the so-called inversion point of Piwowarsky. The tensile strength of test pieces from annealed chill mold castings is higher than that of the corresponding test pieces from sand-castings, with pearlitic structure. The influence of the casting temp. on the strength and graphite formation was also investigated. The highest tensile strength was obtained at a casting temp. of 1300°. J. A. S.

Boiler plates. ANTON POMP. *Stahl u. Eisen* 48, 681-9(1928).—The harder plates especially the Ni-steel plates are better than the low C-plates, at higher temp. in their mech. characteristics, resistance to fatigue and tendency to recrystallize.

J. A. S.

Nitrogen-treated special steels. LEON GUILLET. *Compt. rend.* 186, 1177-80 (1928); cf. *C. A.* 22, 750. —An outline is given of the process whereby special steels are given an extremely hard surface. N treatment (nitride formation) gives a steel especially suited for motor cylinders and crankshafts. Expts. with cylinders made of N-treated steel show that its use reduces both wear on the metal and the consumption of oil. Al- and Mg-base pistons may be used. Crankshafts made of N-treated steel take such a high polish that they may be used directly with Al cranks without the use of bronze or anti-friction bearings. The resulting reduction in frictional loss adds materially to the power and speed of the motor.

WILLIAM F. EHRET

Basic Siemens-Martin ingot steel plates. ERNST POHL. *Stahl u. Eisen* 48, 649-56(1928). The limit of elasticity, breaking strength, elongation, reduction in area and impact strength of a basic Siemens-Martin ingot steel plate with a tensile strength of 46.8 kg. sq. mm. were detd. between 20° and 500°; also the effect of stretching between the same temps on the mech. characteristics at corresponding temps and at room temp. A stretching of the plates below their limit of elasticity has no effect on the mech. characteristics, but above the limit of elasticity a hardening occurs, with a corresponding decrease in the tenacity. Between 200° and 300° the capability of deformation of ingot steel plates decreases, as compared with higher or lower temps. The impact strength of ingot steel plates, stretched or overloaded between 20° and 500°, is at boiler temp. the same as that of normal plates, but considerably lower at room temp. The suggestion is advanced to construct the boilers in such a manner that the temps. to which the plates are subjected should range from 350° to 400°, rather than from 200° to 300°.

J. A. SZILARD

Manufacture of some foreign rails. C. W. GENNET, JR. *Am. Inst. Mining Met. Eng., Tech. Publ. No. 47*, 16 pp.; *Blast Furnace & Steel Plant* 16, 361-7(1928). —Inspectors were sent over to the Rheinhausen Works of Messrs. Fried. Krupp to inspect a shipment of 15,000 tons of basic open-hearth steel rails being shipped to the Boston & Maine R. R. Co. The paper describes the method of mfg. the ingots from which the rails were rolled and the results of tests made upon the finished rails. No x-rails were found. The rails were bottom cast and straightened in a roller straightening machine. The temp. of straightening varied from cold to warm and the time occupied about 15 sec per rail. From 10 to 20% required gag press treatment to remove kinks near the end of the rail. Tables giving the chemical compn. of the rails, rolling and test results, no. of heats with C content, sulfur prints, graphs of deflection and ball indentation tests accompany the paper.

J. W. SHIPLEY

Two kinds of martensite. KOTARO HONDA AND SINKITI SEKITO. *Nature* 121, 744(1928).—Resistance-temp. curves, magnetization-temp. curves and x-ray analysis are shown to lead to the conclusion that α - and β -martensite exist. β -Martensite is the more stable and is found in the interior of martensitic steels. It is body-centered cubic. α -Martensite is body-centered tetragonal with axial ratio $c/a = 1.06$ and is found in the surface layer. The probable mechanism of formation of these martensites from austenite is given. The transformation noted at 170° in martensitic steels is said to be due to $\alpha \rightarrow \beta$ -martensite.

WILLIAM F. EHRET

Twin-like crystals in annealed α -iron. HUGH O'NEILL. *Iron Steel Inst. (advance copy)*, May, 1928, 9 pp.—In examg. with the microscope a coarse-grained high-purity decarburized steel plate, strained and annealed, a grain that looked like a twin was found near a sclerometer scratch on a ferrite crystal about $\frac{3}{8}$ in. square and $\frac{1}{8}$ in. thick. Pressure figures and etch pits were made on both large crystals, and small embedded grains in this sample. Cu NH_4 chloride was preferred to HNO_3 for this kind of etching. Measurements of the angles so obtained showed that the straight grain boundaries were parallel to traces of (112) planes. The structure is shown to be consistent with the fluorite

type of twinning. The twins were probably true annealing twins, rather than unabsorbed grains, or remnants of twinned γ -Fe. Other work on this subject is reviewed and discussed. Single crystals of Fe produced by straining and annealing may contain internal twins, which may affect their tensile values. GEO. F. COMSTOCK

Orientation of crystallites in stretched or compressed metals and the crystallographic explanation of slip phenomena in stretched, compressed or rolled metals. G. TAMMANN AND A. HEINZEL. *Stahl u. Eisen* 48, 693-4(1928); *Arch. Eisenhüttenwesen* 1, 663-7(1927).—The orientation of crystallites in cast, worked or recrystd. metals can be detd. either by means of x-rays or by detg. the angle of max. brightness of the crystallites on a polished and etched surface (cf. *C. A.* 20, 2640; 21, 1615). During cold working the originally irregular orientation changes, and this change can be detd. if the grain size is not below 0.008-0.004 cu. mm. During stretching of a metal slip will occur on that slip plane, which receives the greatest shoving component. The increasing friction during slip causes a turning of the slip plane in such a way that, 2, 3 or 4 planes are in a sym. orientation around the force causing the slip. It can be shown that pulling forces (tension) effect such a sym. orientation of the slip planes, that the max. shoving components are in the direction of the slip planes; whereas pressure effects an orientation, where the max. pressure components are in the direction of the slip planes. During the rolling of metals 2 phases can be distinguished in the change of the orientation of crystallites, there is only 1 phase in case of stretching or compressing. In the first phase of rolling the changes in orientation are similar to the changes during stretching; the rotating and stretching forces of the rolls are predominant. In the second phase the changes are more such as observed during compressing, because the weight of the rolls has the greatest influence at that stage, in changing the orientation of crystallites. J. A. SZILARD

An example of the examination of metallic material by means of a metallographic method. F. HANAMAN. *Archiv. hem. farm.* 1, 236-42(1927).—The cause of the explosion of a water-tube boiler was explained by a metallographic investigation where chem. analysis and mech. examn. failed to show any error in the quality of the material. On metallographical examn. it was shown that the edges of the fissure which in the normal state had the structure of the homogeneous hypoeutectoid steel were transformed into martensite at a temp. not less than 850° and then probably soaked by water vapor. On reheating at 750° the iron regained its previous structure. The unaltered material soaked at 850° and 900° with water vapor took a structure analogous to that of the edges of the fissure, confirming the conclusions. JAROSLAV KUČERA

Cadmium deposits as rust preventatives. W. PFANHAUSER. *Korrosion u. Metallschutz* 4, 58-9(1928); cf. *C. A.* 22, 1566.—A discussion of the merits of the cyanide process for Cd plating as compared to the insol. anode process, and of the method of removal of adsorbed H, when Ni or Cr is placed over a Cd deposit, by exposure in vacuum of the newly plated metal to the electrode-pulverizing action of a high-tension a. c. J. K. ROBERTS

Cadmium deposits as corrosion preventatives. UDYLITE, G. M. B. H. *Chem.-Ztg.* 52, 292-3(1928).—It is claimed that the Udylite process gives a cathode efficiency of 85-95% with min. H₂ liberation and hence non-porous deposit. The anode efficiency is close to 100%. The simultaneous use of sol. and insol. anodes prevents enrichment of the metal content of the bath. The process yields a small-grained non-porous, silvery deposit while cyanide processes give grayish ones not as good for rust prevention. The process is very good for plating irregular surfaces due to the high distributing power. No increase in temp. of the bath is necessary. J. K. ROBERTS

Cadmium as corrosion protection for light metals. J. DORNAUF. *Korrosion u. Metallschutz* 4, 97-102(1928).—Al plated with Zn and Cd were immersed in a 3% NaCl soln. for 50 days. The Zn-coated material was much more rapidly attacked. Cd showed itself superior to Ag, Sn, Cu and Pb as a protective coating in salt solns. Cd was found effective in protecting Duralumin, Silumin and Mg-Al alloy. Cd afforded considerable protection to Al in Hg salt solns. Methods of coating the Al with Cd are mentioned. Cd is sol. in Al to the extent of about 2-3%. J. K. ROBERTS

The value of lead paints for purposes of protection of iron. A. EIBNER AND W. LAUFENBERG. *Korrosion u. Metallschutz* 4, 107-10(1928).—Imperviousness of linseed oil films to water increases with increasing linseed oil-Pb compd. content. The compds. formed are Pb soaps and Pb glycerol combinations. Linseed oil films are not completely sol. in ether, petroleum ether, CHCl₃, C₆H₆, H₂O but on subjecting to boiling in benzene under pressure the films are found to be completely sol. This was not true of Pb compd.-linseed oil films. Pb paint films 16 months old were boiled in an autoclave and agitated and the quantity of linseed oil film dissolved was measured. The

residue was treated with mineral acids and ether to det. the quantities of Pb soaps present. The Pb compds. stable in the film were detd. by difference, the compn. of the original film being known. Conclusion: The phys. state as well as the chem. nature of the pigment can influence the stability of the protective film. J. K. ROBERTS

Report of Committee A-5 on corrosion of iron and steel. J. H. GIBBONEY, et al. *Proc. Am. Soc. Testing Materials Reprint No. 13*, 1-4, June, 1928.—The rept. covers: Cu and non-Cu bearing sheet steel and Fe atm. tests at Ft. Sheridan and Annapolis; total immersion tests at Washington and Annapolis, which are near completion, and the Key West and Portsmouth tests which have shown few failures; ship plates and rivet tests at Key West, Portsmouth and Port Arthur. Immersion tests indicate that the Cu content of steel or Fe has little or no effect on this type of corrosion. Tentative specifications for zinc-coated wire are given. Activities of sub-committees on testing coatings and corrosion and on field tests for metallic coatings include brief reports. J. K. ROBERTS

The problem of metal corrosion. J. HAUSEN. *Korrosion* 3, 17-8(1928).—H discusses the papers of Grünfeld (C. A. 21, 3197), Maass and Liebreich (C. A. 18, 1971; 19, 1397), Vernon (C. A. 18, 964; 21, 48, 1623; 22, 375) and Masing and Koch (C. A. 20, 2973) on the corrosion of brass and concludes that the results of lab. expts. are not very reliable and that decisions must be based on practical trials. J. H. MOORE

Coating formed on iron electrodes in corrosion tests. W. VAN WULLEN SCHOLTEN. *Korrosion Metallschutz* 4, 73-4(1928).—S. titrates an $\text{Fe}(\text{OH})_2$ soln. with an alk. hypochlorite soln., and a FeSO_4 soln. in an acid hypochlorite soln. and concludes that $\text{Fe}(\text{OH})_2$ exists as a solid soln. in $\text{Fe}(\text{OH})_3$. J. K. ROBERTS

Action of salts upon metals at high temperatures. BERNWARD GARRE. *Korrosion Metallschutz* 4, 53-5(1928); cf. C. A. 22, 372. —Reactions can take place between salts and metals if there is a free energy decrease. A layer of reaction products builds up between the reacting substances, decreasing the reaction rate unless some of the products are broken off the surface. The grain boundaries of metals are usually attacked first because the m. p. of the impurities there is lowest. J. K. ROBERTS

Resistance of over-stressed wrought irons and carbon steels to salt water corrosion. J. NEWTON FRIEND. *Iron Steel Inst.* (advance copy), May, 1928, 12 pp.—Test bars of steel and wrought irons of various C content strained, compressed or annealed, were exposed to salt water corrosion (in tank, approx. 3% soln.) for 1-3 yrs. Losses of weight were taken as a measure of corrosion. Conclusion: For wrought iron and steels contg. up to 0.11% C, stretching to rupture, 45° torsion or compression do not enhance corrosion. For 0.20% C steel, compression and torsion increase corrosion slightly. These results are for Fe and steel at rest, not under load. J. K. ROBERTS

Metallic coatings. MAX SCHLÖTTER. *Korrosion Metallschutz* 4, 74-82(1928); cf. C. A. 22, 211.—A comprehensive discussion of coating of metals with respect to (a) prepn. of the metal by pickling and sandblasting, giving advantages and disadvantages of HCl and H_2SO_4 , embrittlement due to pickling, the causes thereof, and the use of inhibitors; (b) mech. methods of coating, dipping, tinning, sherardizing, schooping; (c) electroplating methods with special reference to the influence of the effect of the cryst. nature of the metallic salt used upon the nature of the crystals formed and their protective influence, also the effect of soly. of H in the metal on the adhesive properties of the deposit formed. J. K. ROBERTS

Pickling of metals when using inhibitors. W. H. CREUTZFELDT. *Korrosion Metallschutz* 4, 102-7(1928).—Weight loss measurements were made on annealed and oil-quenched steels varying in C (0.10 to 0.67%) in 5.3 N H_2SO_4 and in HCl. The attack increased qualitatively with the C content. Annealed, air-quenched and oil-quenched steels were exposed to 5.3 N H_2SO_4 , the steels contg. 0.10 C being attacked to the same extent, but at higher C concns. the attack increased in the order of treating mentioned. Addns. of salts of noble metals to the acid and of certain org. materials decreased the attack. Colloidal C effects no decrease and in some cases increases the attack. The inhibitors tested were useless with HNO_3 . The effects on other metals were studied with the conclusions that: (1) The greatest decrease in attack occurred with Fe. (2) Ni, Al and Sn were quite well protected. (3) No definite action could be established for Zn. Substances with free valences best lent themselves to use as inhibitors. The marked increase in activity of HCl on increasing temp. as compared to H_2SO_4 led to the conclusion that pickling should be done hot in H_2SO_4 and cold in HCl. The inhibiting phenomenon is explained by formation of an insulating film on the metal surface. J. K. ROBERTS

Influence of corrosion accelerators and inhibitors on fatigue of ferrous metals. F. N. SPELLER, I. G. MCCORKLE AND P. F. MUMMA. *Proc. Am. Soc. Testing Materials*,

Reprint No. 42, 9 pp., June, 1928.—A corrosion fatigue study on steel showed that sufficient $\text{Na}_2\text{Cr}_2\text{O}_7$ to stop corrosion will prevent the reduction of air fatigue limit by corrosion simultaneously with cyclic stress. Tests made with painted bands and with washers on the test pieces indicate that such external factors tend to localize corrosion and det. the point of failure in corrosion fatigue. J. K. ROBERTS

A rotating tube drying furnace (ORTLEPP) 1. The thermal investigation of metallurgically important reactions (TOTH, CHALL) 2. Washing coal, separating ore constituents by upward currents of water (Brit. pat. 279,447) 21.

Cémentation par le cyanure de sodium. Paris: Société d'électrochimie, d'électrometallurgie et des aciéries électriques d'Ugine. 48 pp.

GRENET, L.: Trempe. Recuit. Cémentation et conditions d'emploi des aciers. 3rd ed., revised and enlarged. Paris and Liège: Ch. Beranger.

Ore flotation. C. P. LEWIS. Can. 280,568, May 29, 1928. A Zn ore contg. also another value is concd. by agitating a pulp of the ore with xanthate and with a mineral frothing agent to produce a mineral-bearing froth relatively rich in the other value. The froth is then sepd., and sufficient lime is added to render the pulp alk., after which a Cu salt and further xanthate are added. The pulp is then again agitated to produce a mineral-bearing froth relatively rich in Zn, and the froth is sepd. Cf. C. A. 22, 2136.

Concentrating minerals by flotation. W. A. DOUGLASS (to E. I. duPont de Nemours & Co.). U. S. 1,674,166, June 19. Alkyl ester xanthogenamides or similar substances are used to facilitate flotation with pine oil or other frothing agents. Cf. C. A. 22, 1319.

Apparatus for separating ore constituents by flotation. W. C. EGGERT. U. S. 1,673,188, June 12.

Preparing ore fines for sintering. H. J. STEHLI. U. S. 1,673,891, June 19. A mass of wet fines is divided into lumps and the lumps are coated with powd. material, e. g., dry ore or flux dust or lime, to prevent them from adhering to one another and provide air passages between the lumps when in a mass. An app. is described.

Cyaniding apparatus for treating gold ores. R. KANDA. U. S. 1,673,982, June 19.

Treating sulfide ores. H. E. WETHERBEE. U. S. 1,674,491, June 19. Sulfide ore such as that of Fe and Cu is heated, while controlling exothermic action, to about 385° to drive off loosely combined S, and the sulfides are then heated to about 540° to produce max. sulfation and then further heated to about 650° to decomp. the remaining Fe sulfates; the changes in temp. between the stages of heating are relatively abrupt.

Zinc from sulfide ore. J. ALLINGHAM. U. S. 1,674,030, June 19. Zn is dissolved as ZnSO_4 by treating a pulp of roasted ZnS ore with SO_2 gas, the ZnSO_4 is reduced to Zn and a compd. of S such as CaS or FeS and the S compd. thus formed is used to produce SO_2 for further use in the process. An app. is described.

Treating zinc ores. H. WITTEK. Brit. 279,370, Oct. 23, 1926. Reduction of Zn ores is effected by cathodes in the presence of an inert gas such as N. With sulfide ores, Ca or Ba sulfides may be obtained as by-products and these may be used with C for making carbides.

Treating titaniferous slag. C. A. KLEIN and R. S. BROWN. Brit. 279,219, Sept. 17, 1926. Titaniferous slag obtained in the reduction of Fe in ores contg. Ti is subdivided while heated to facilitate elimination of metallic Fe from the slag. A jet of steam under high pressure may be used for this purpose and the dry subdivided slag may be subjected to magnetic sepn.

Ingot-mold set-up. W. H. RAMAGE (to Valley Mould & Iron Corporation). U. S. 1,673,778, June 12.

Apparatus for casting closed-bottom ingot molds. J. E. PERRY (to Valley Mould & Iron Corporation). U. S. 1,673,586, June 12.

Producing and working ingots. P. EVERMANN (to I. McCreight and R. Peale, Jr.). U. S. 1,672,999, June 12. Mech. features.

Die-casting apparatus. N. LESTER. U. S. 1,673,832-3, June 19.

Metal-casting apparatus. P. ROSENBERGER. U. S. 1,673,054, June 12.

Apparatus for casting metals under pressure. E. JORGEN-JENSEN. Brit. 279,345, March 22, 1927.

Casting aluminum. J. ZUBLIN. Brit. 279,061, Oct. 13, 1926. Mech. features.

Hardening faces of iron, steel or other castings. W. T. HULSIZER. U. S. 1,673,-

873, June 19. A corrugated Al sheet is attached to the face of a mold cavity and a flat Al sheet is attached to another face of the cavity; molten metal such as Fe, steel or alloy is poured into the cavity and the Al sheets fuse onto the metal casting produced. The corrugated Al sheet used is thicker than the flat sheet.

Composition for permanent molds for casting metals. H. TODD. U. S. 1,674,232, June 19. Molds are formed of a mixt. of sillimanite 45, monazite sand 25, coke dust 10, cow hair 2, plaster of Paris 5, china clay 3 and ganister 10 parts or from similar mixts. Cf. C. A. 21, 561.

Core binder. HENRY B. HANLEY (to Whitehead Bros. Co.). U. S. 1,673,356, June 12. A binder for use in *metal founding* comprises a concd. waste sulfite liquor prepn., oil and bentonite or similar materials. U. S. 1,673,357 specifies the use of dextrin, oil, water and bentonite or glue.

Pickling metals. J. H. GRAVELL. Can. 280,271, May 22, 1928. A pickle regulator for selectively controlling the action of metal-pickling baths comprises the portion of the distillate from proteins which is insol. in H_2O and is sol. in HCl and in equal vols. of H_2O and H_2SO_4 .

Metal precipitation. C. MULLER, L. SCHLECHT and W. SCHUBART. Can. 279,989, May 8, 1928. Metals are pptd. (e. g., Cu from ammoniacal solns. of Cu compds.) by treating the soln. with a reducing gas under elevated pressure and temp. so as to effect a substantially complete sepn. of the heavy metals.

Extracting non-amalgamable metals of the platinum group. A. R. POWELL, E. C. DEERING and JOHNSON, MATTHEY & Co., LTD. Brit. 279,156, July 19, 1926. Material such as ores contg. a high proportion of basic substances with non-amalgamable metal such as Cu, Sn or Ag, from an alk. soln. contg. also a substance which prevents pptn. of the hydrate of the coating metal such as NH_3 , cyanides, tartrates, citrates and sugars, and the treated material is then subjected to treatment with Hg (supplied as such or from an amalgam or Hg salt) to recover the metal. The metal coating may be deposited from the alk. soln. electrolytically or by the action of a reducing agent.

Apparatus and method for hydraulic separation of minerals to recover metals and precious stones from associated materials. G. C. F. F. HANCIAU. U. S. 1,673,675, June 12.

Metal-heating furnace and associated gas-producer construction. BRITISH FURNACES, LTD., AND E. W. SMITH. Brit. 279,317, March 22, 1927.

Open-hearth furnace. A. G. EGLER. U. S. 1,674,167, June 19. Structural features.

Wire-annealing furnace. F. W. MANKER (to Surface Combustion Co.) U. S. 1,674,407, June 19.

Recuperator for furnaces. C. P. MILLS (to Duraloy Co.). U. S. 1,673,122, June 12. Structural features.

Tuyère for blast furnaces. S. OHRA. U. S. 1,673,053, June 12.

Rotary kiln for burning, roasting and sintering mineral materials. F. LUTHER (to Firm of G. Polysius). U. S. 1,673,051, June 12. A cooling drum is arranged to receive material from the kiln and is provided at its delivery end with a hood and with means for introducing air.

Crucible for brass melting, etc. E. L. HAUMAN. U. S. 1,673,115, June 12. Structural features.

Alloy for sealing hard glass. W. B. GERO. Can. 279,434, Apr. 17, 1928. A seal for hard glass consists of an alloy contg. approx. 80% W and approx. 20% Mo.

Hard alloys. F. KRUPP A.-G. Brit. 279,376, Oct. 25, 1926. W may be ground in a ball-mill to less than 10^{-1} mm. and converted into carbide by heating in an oxidizing atm. in a gas-heated furnace with a slight excess of C and the resulting carbide then ground to a similar size and mixed with 5% of Co or with another metal such as Fe or Ni, similarly ground, the mixt. still further ground, pressed, sintered at $700-1100^\circ$, worked and further sintered at $1300-1600^\circ$.

Hard alloys for tools, etc. F. KRUPP A.-G. Brit. 278,955, Oct. 25, 1926. W carbide free from graphite is used together with other metals such as Fe, Ni or Co.

Low-carbon alloys of iron with tungsten and molybdenum. W. P. SYKES (to British-Thomson-Houston Co., Ltd.). Brit. 279,490, Oct. 22, 1926. In making various alloys of Fe, W and Mo with each other, a body of the metals, which may be prepd. by pressing together the powd. metals or by melting and casting, is heated to a temp. which will effect solid soln. of one metal in another, then rapidly cooled and afterward heated to an intermediate temp. An alloy of Fe 78 and Mo 22 parts contg. less than 0.02% C may be prepd. by reducing the mixed oxides with H, pressing the metal powders into a bar and heating the latter to about 1410° in H for 1 hr., quenching in

water and heating for 60 hrs. at about 600°. Alloys are also referred to which contain Fe 70-90 and Mo 10-30%; Fe 60-90 and W 10-40%; and Fe 70-75, Mo 5-25 and W 5-20%.

Copper-nickel-beryllium alloys. M. G. CORSON. Brit. 279,425, Oct. 20, 1926. Alloys contg. Cu together with Ni and Be (*e. g.*, Be 0.1-2.0 and Ni up to 40%, or Be 0.3 and Ni about 4%) are heated to above 900° and then hardened either by quenching and then reheating to 350-700° or by allowing them to cool slowly or by cooling in the air or in the furnace.

Ferrous alloy. J. T. HAY. Can. 279,814, May 1, 1928. A corrosion-resistant ferrous alloy contains 0.20-0.50% Cu, up to 0.10% Mo and less than 0.05% C.

Iron alloys for chill castings. P. D. MERICA, J. S. VANICK and T. H. WICKENDEN (to International Nickel Co.). Brit. 279,414, Oct. 21, 1926. Alloys are formed contg. C 2-4, Si 0.25-2.0, Mn 0.25-2.0, Ni 2-10 and up to 4% of Cr, with or without other metals such as Mo, W, Ti or Cu. The Ni content is greater than the Cr content (suitably about 2.5 times the quantity of Cr). P and S may be present in the usual proportions as found in cast Fe. Brit. 279,415 specifies a "wear-resisting" gray iron of generally similar compn. but contg. Ni 1-12% and a max. of 3% of Cr. Cf. C. A. 21, 1961.

Nickel alloys. N. V. HYBINETTE. U. S. 1,674,438, June 19. A Ni-contg. bath after subjection to an oxidizing treatment such as in a reverberatory furnace is deoxidized with a material such as Al which forms a non-gaseous oxide and alloying metals such as ferro-Cr are then added to the deoxidized bath.

Thorium alloys. KEMET LABORATORIES CO., INC. Brit. 279,274, Dec. 17, 1926. Alloys of Th with W or Mo or both, suitable for use in electron-emitting devices, are made by heating in H a compacted mixt. of Th hydride and the alloying metal, to decomp. the hydride, and then further heating in H to effect sintering and completion of the alloy. Numerous details are given.

Case-hardened alloy steel rolls for rolling metals, etc. F. D. CORBIN, LANELLY FOUNDRY & ENGINEERING CO., LTD., AND R. NEVILL & CO., LTD. Brit. 279,149, July 7, 1926. Rolls are made of alloy steel with their case-hardened portion of a martensitic, troostitic, cementitic or similar structure and the remaining portion of a soft pearlitic or like structure. The proportion of C in the carburized zone is regulated so that the relative proportions of C and the alloying elements are such that the carburized zone shall remain in the martensitic or similar state even after slow cooling and that this zone shall not assume the austenitic state when Ni or Mn is present. A suitable steel may contain Ni 5 and C 0.9-1.25%; Cr 7 and C 1.4%; W 4 and C 1.25%; Mo 1.25 and C 1%; V 0.75 and C 1%; Mn 3.5 and C 0.9-1.1%; or Ni 5, Cr 0.8 and C 0.2%. Details of heat-treating and case-hardening are given.

Refining nickel-copper mat. F. E. LATHE. Can. 279,756, May 1, 1928. Ni-Cu mat is refined by retaining in the mat a substantial amt. of FeS and rapidly cooling the mat to increase the rate and completeness of soln. in acid of the Ni sulfide constituent thereof, and leaching the mat with acid to dissolve the Ni sulfide.

Hardening chrome iron. W. E. GRIFFITHS. Can. 279,295, Apr. 10, 1928. Chrome iron contg. upward of 10% Cr is hardened by heating the metal in contact with a hydrocarbon gas to a temp. not below 950° until the C content at the surface of the metal is materially increased.

Ferro-boron and boron steel. T. MIYAGUCHI. U. S. 1,674,119, June 19. Molten Fe or steel is subjected to the action of gases evolved by heating a mixt. of NaCl and a B compd. such as B₂O₃. An app. is described.

Drying and removing gases from metallic powders. E. SEYFFERTH (to Fulmit G. m. b. h.). U. S. 1,674,230, June 19. Finely pulverized material is pressed into a block, alc. is allowed to percolate through the block to remove water present and the retained alc. is allowed to volatilize.

Composition for preventing and removing rust. H. J. ROGERS (to Westernfield Pharmacal Co.). U. S. 1,673,951, June 19. A compn. suitable for use on metals before painting is formed from EtOAc 69, H₃PO₄ 24, AmOAc 3, acetone 3 and "soluble cotton" 1 part.

Heat treatment of magnetic material. A. F. BANDUR (to Western Electric Co.). U. S. 1,673,790, June 19. An Fe Ni alloy or similar magnetic material is given a relatively high initial permeability and relatively const. permeability over a selected range of magnetizing forces, by heating the material at a temp. lower and for a shorter period of time than is required completely to anneal the material.

Treating treads of railway rails. EISENWERK-GES. MAXIMILIANSHÜTTE. Brit. 279,387, Oct. 21, 1926. The hot rail after rolling is plunged with its head into water for a sufficient time that on removal the temp. of the head does not exceed 450° and the

time of immersion of the head decreases with increase of the C content of the rail; a rail contg. 0.40-0.45% C may be immersed for about 45-75 sec.

Coating metallic and other articles with aluminum. W. SMITH. Brit. 279,273, Dec. 14, 1926. In coating ferrous metal articles, firebricks or other materials with Al, the material is first coated with Cd (suitably electrolytically) and then coated with Al or an Al alloy by immersion in the molten coating metal or by exposure to vapors of the coating metal. Suitable alloys are: Al 94, Cd 1.5, Zn 2, Fe 1.5 and Cu 1%; Al 97, Ni 1 and Cu 2%; and Al 98, Cu 1.5 and Mn 0.5%.

Coating wire with aluminum, etc. G. H. HOWE (to General Electric Co.). U. S. 1,673,624, June 12. An app. is described in which a wire may be passed downward into a bath of molten Al and thence out of the bath upwardly; a baffle is provided to set up a circulation of the molten Al and the surface of the bath is heated by a H burner adjacent the point where the wire emerges, to prevent deposits of dross.

Coating small articles with tin or other metal by dipping. C. E. JONES (to British Thomson-Houston Co., Ltd.). Brit. 279,092, Oct. 13, 1926. The articles while still hot are subjected to an air blast to prevent them from sticking together. An app. is described.

Coating with zinc. H. C. BAKER and J. G. FITZGERALD. Can. 278,547, Mar. 13, 1928. Ferrous metal is zinc-coated in a molten spelter bath. The cooling of the coated metal is controlled by predetd. graduations of temp. uniformly throughout its surface.

Annealing metal articles. C. R. G. STEWART (to Western Electric Co.). U. S. 1,673,271, June 12. In annealing "electrolytic iron dust and other assembled materials of different character, the assembled materials are subjected to a sufficiently high temp. to anneal both materials simultaneously and to cause one of the materials to evolve a gas which interacts with the other material

Container for cooling metal articles after annealing. F. GIESECKE. U. S. 1,674,431, June 19. A protective gas is supplied to the container by a device controlled by the vacuum in the container.

Electrodes for electric welding. R. E. POWELL (to Western Electric Co.). U. S. 1,673,020, June 12. An insulating jacket contg. Fe phosphate is used with an electrode holder also having an insulating jacket contg. Fe phosphate.

Electrode for use in welding. A. P. STROHMENGER (to The Quasi-Arc Co., Ltd.). U. S. 1,674,576, June 19. See Brit. 259,365 (C. A. 21, 3344).

Welding electrode. G. A. WHITING and R. A. HOLLAND. Can. 277,870, Feb. 14, 1928. An elec. arc welding electrode has a metallic core and a coating or covering which is decompd. in the heat of the arc to liberate H₂.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Two constitution rules. F. WRATSCHKO. *Pharm. Presse* 33, 11-4(1928).—Two rules are enunciated for detg. the skeletal structure of org. compds. in the event that the empirical formula is known. (1). *Bond rule*.—The sum of all ring closures and double bonds is equiv. to 0.5 the refractive index augmented by 2. $\sigma = (r + 2)/2$, in which r = refractive index, σ = Σ double-bonds + ring closures. (2). *Nucleus rule*.—If the structure formula of the compd. in question be erected on a basal line in such a way that each independent ring-system has 2 points common with that line, then the no. (q) of nuclear elements outside the line is obtained from the expression: $q = [73 - (R) + 5r]/7.5$, in which R is calcd. from the vol.-chem. basic formula. Numerous examples are given illustrative of the rules. W. O. E.

Volume chemistry. III. Oxygen compounds. F. WRATSCHKO. *Pharm. Presse* 33, 36-9, 61-3, 73-6, 92-4, 109, 124-6, 138-9, 160(1928); cf. C. A. 22, 1514.—Recourse should be had to the original for a proper consideration of the numerous calcns. involving compds. of the general types $C_mH_{2m-2}O_2$, $C_mH_{2m-4}O_2$, $C_mH_{2m-10}O_2$, $C_mH_{2m-4}O_1$, acyclic ethers of the type $C_mH_{2m+2}O$, $C_mH_{2m}O$, $C_mH_{2m-2}O$, $C_mH_{2m+2}O_2$, $C_mH_{2m-2}O_2$, $C_mH_{2m-4}O_2$, $C_mH_{2m-2}O_2$, $C_mH_{2m+2}O_4$ and cyclic ethers. IV. **Mixed oxygen compds.**—The values for $\Sigma E_{(CO_2H)}$ in the mono-CO₂H series have been calcd. and compared in tabulated arrangement. Similar calcns. also were made of cyclic, tri-, tetra- and penta-CO₂H esters. W. O. E.

Thermochemical magnitude as a basis for the construction of structural formulas. A. ZNAMENSKII. *J. Russ. Phys.-Chem. Soc.* 58, 909-45(1926); *Chem. Zentr.* 1927,

PhMe and AcOH, also in concd. H_2SO_4 with evolution of heat; in gaseous form it is eagerly absorbed by alc. and Et_2O , also quite well by cold H_2O ; its mol. wt. (Victor Meyer method) is 68. $SnCl_2$ reduces it to MeOH. The weakness of its oxidizing properties is remarkable; it only slowly liberates I from acidified KI solns., does not oxidize $p\text{-}C_6H_4(OH)_2$ or $(PhNH)_2$, reacts vigorously with $TiCl_4$ with evolution of heat (only incompletely (80%) in gas form mixed with CO_2 but almost quant. (97%) when a weighed quantity of the liquid form, mixed with Et_2O , is shaken with standard $TiCl_4$ soln.). Unlike Et_2O , I is exceedingly explosive. Often, especially in gaseous form, it decomps. suddenly with violent detonation. It is much more sensitive to shock than to heat. Light does not seem to influence the spontaneous decompn. particularly. Its vapors can be made to explode by merely shaking with an indifferent gas. In the absence of an indifferent gas, a yellow flame always accompanies the explosion. Considerable quantities of HCHO are formed in the explosion. C. A. R.

Hydroxycitronellal and its derivatives. R. SORNET. *Rev. chim. ind.* 37, 74-8, 110-3(1928).—A brief review, followed by an account of S.'s work on the prepn. of *hydroxycitronellal acetal* (new) and of *dihydroxycitronellal*. A 70% yield of the Me acetal was obtained as follows: to 500 g. 99% MeOH contg. 5 g. anhyd. HCl gradually add 250 g. hydroxycitronellal, keeping the temp. at $5-10^\circ$, let stand 24 hrs., make distinctly alk. to phenolphthalein with NaOH, evap. the MeOH on the water bath, dil. with an equal vol. of a suitable solvent (nature not specified), wash with water, thrice with $NaHSO_3$ (contg. no free SO_2) at not over $25-30^\circ$, with H_2O , with Na_2CO_3 and finally with H_2O , dry over Na_2SO_4 , evap. the solvent and rectify in a vacuum over a little $CaCO_3$, giving the Me acetal, $b_{12} 131-3^\circ$, $d_{20}^{20} 0.931$, $\alpha_D^{20} 3.29^\circ$ (10-cm. tube), $n_D^{20} 1.4419$, unaffected by hot alc. alkalies, sapond. with almost complete decompn. by strong acids, quant. sapond. to hydroxycitronellal by refluxing with very dil. AcOH (10-20 drops per 100 cc. H_2O). The Et acetal, similarly prepd., $b_8 136.9^\circ$ and has $d_{20}^{20} 0.915$. Though tertiary alcs. are generally considered to be dehydrated at 218° , hydroxycitronellal Me acetal $b_{760} 265-70^\circ$ unchanged. Oxidation with alk. $KMnO_4$ is too rapid and too complete to give a semi-acetal. Passing at $300-10^\circ$ over Cu previously reduced at $270-80^\circ$ gives decompn. products contg. an amylene hydrocarbon, proving the presence of a tertiary alc. function. On distn. of hydroxycitronellal, most of it passes over within a 5° range; the temp. then rises about 10° with increase in the d. and viscosity of the distillate, after which there is a more marked rise in temp. S. therefore suggests that in the hydration of citronellal the H is mostly fixed on the least hydrogenated C atom of the ethylene group, but to some extent also on the more hydrogenated C atom. Oxidation of citronellal Me acetal (cf. Harries and Schauwecker, *Ber.* 34, 2981) by alk. $KMnO_4$ gives the glycol acetal, or *dihydroxycitronellal Me acetal*, $b_8 145-50^\circ$, $b_9 151-3^\circ$, d. 0.950, sapond. by dil. AcOH and treated with $NaHSO_3$ gives an aldehyde having an entirely different odor from that of hydroxycitronellal, which S. considers to be dihydroxycitronellal.

A. PAPINEAU-COUTURE

Innovations and improvements in the manufacture of acetic acid and its derivatives. I-IV. EGDIVUS TERLINCK. *Chem.-Ztg.* 52, 249-50, 270-2, 307-9, 326-8 (1928).—*Barium acetate*.—A study of $Ba(OAc)_2$ has been carried out to det. the possibility of using it, particularly in the wood-carbonization industries, in the manuf. of HOAc derivs. The efflorescent monohydrate loses its water of crystn. at 41° , giving an anhyd. salt which does not readily take up water from the air. Concn. of $Ba(OAc)_2$ soln. yields fine crystals of the acetate which sink to the bottom of the container, hence care must be taken that it is not excessively superheated, though it is stable at 250° without loss of wt. or change of color. A special app. is designed to allow the supernatant liquid to be heated to a temp. (160°) higher than the temp. of the crystals (100°), to avoid decompn. by superheating during concn. Pure $Ba(OAc)_2$ is prepd. from crude $Ca(OAc)_2$ by pptn. of Ca as $CaSO_4$ with H_2SO_4 , pptn. of the excess H_2SO_4 with $Ba(OAc)_2$, filtration, neutralization with $BaCO_3$ and partial concn. to ppt. insol. resins. The clear soln. so obtained is then concd. to yield the pure salt. The prepn. of $Ba(OAc)_2$ direct from various grades of pyroligneous acid and com. HOAc is discussed. A small lab. app. is illustrated in which HOAc is continuously distd. from pyroligneous acid into a hot suspension of $BaCO_3$ from which uncombined HOAc dists. into a hot alk. trap which also hydrolyzes esters and resinifies the aldehydes. By this method, with small fuel consumption a highly satd. soln. of pure $Ba(OAc)_2$ results, representing 90% of the crude. *Na acetate*.—Economy of time and product is achieved by prep. NaOAc from $Ba(OAc)_2$ by pptn. in soln. with Na_2CO_3 , instead of the usual direct method. The product so obtained is pure without recrystn. *Ca acetate*.— $Ca(OAc)_2$ is prepd. by passing CO_2 into an ammoniacal soln. of $Ba(OAc)_2$, filtering and

regenerating NH_3 with CaO , thus producing a pure soln. of $\text{Ca}(\text{OAc})_2$. In the same manner NH_4OAc , $\text{Mg}(\text{OAc})_2$ and $\text{Zn}(\text{OAc})_2$ may be obtained. *Acetic acid*.—Pure, anhyd. acid is prepd. from the Ba salt by treating the finely divided solid with HCl gas, the heat of reaction being sufficient to distil much of the HOAc from the reaction mass. The Ba salt may also be dissolved in dry HOAc for treatment with HCl to advantage. *Acetic anhydride*.— Ac_2O is prepd. by the action of COCl_2 on $\text{Ba}(\text{OAc})_2$ either dry or in inert solvents. $\text{Ba}(\text{OAc})_2$ may be dissolved in Ac_2O and treated with COCl_2 , gaseous or in soln. in Ac_2O or other solvent. Complete fractionation of the resulting mixt. of COCl_2 , AcCl and Ac_2O is readily accomplished. A review of the methods of prepn. and recovery of the reagents used in these several processes is included in the paper.

A. S. CARTER

The constitution of eleostearic acid. JOHANNES SCHEIDER. *Farbe Lack* 1927, 646-7.—A brief review of the literature on the structure of eleostearic acid. S. agrees with Böseken and Ravenswaay that there are 3 double bonds located in the 5,6-, 7,8- and 9,10-positions. Twenty-one references are given.

G. G. SWARD

Walden inversion. XII. The oxidation of β -mercaptovaleric and of γ -mercaptovaleric acids and its significance in connection with the Walden inversion. P. A. LEVENE AND T. MORI. Rockefeller Institute. *J. Biol. Chem.* 78, 1-22 (1928); cf. C. A. 22, 1953.— l - β -Mercaptovaleric acid on passing from the undissociated acid to the univalent ion $\text{R}(\text{SH})\text{CO}_2^-$, shows a change of rotation to the right, and the latter on passing to the bivalent ion $\text{R}(\text{S}^-)\text{CO}_2^-$ shows a change of rotation to the left. The corresponding sulfo acid is l -rotatory and changes its rotation to the left on passing to the ion $\text{R}(\text{SO}_3^-)\text{CO}_2\text{H}$ and to the right on further ionization to $\text{R}(\text{SO}_3^-)\text{CO}_2^-$. Analogous changes occurred with l - γ -mercaptovaleric acid. The halogenation of HO acids or the substitution of the halogen by a mercapto group is thus accompanied by a Walden inversion. The behavior of β -mercapto- and β -sulfobutyric acids remains the only exception. The following compds. were prepd. and their properties described: l - β -hydroxyvaleric acid, l - β -chlorovaleronitrile, Et l - β -hydroxyvalerate, Et d - β -chlorovalerate, Et d - β -bromovalerate, d -free acid, Et l - β -thiolvalerate, free acid, l - β -sulfovaleric acid, Et l - γ -chlorovalerate, free acid, Et d - γ -thiolvalerate, free acid, lactone and l - γ -sulfovaleric acid.

ARTHUR GROLLMAN

Action of chlorinated aldehyde upon the mixed dimagnesium derivatives of acetylene. Acetylenic glycol and erythritol. R. LESPIEAU. *Bull. soc. chim.* 43, 199-210 (1928); cf. C. A. 22, 222.—A stream of C_2H_2 was passed through EtMgBr in Et_2O and CH_2ClCHO added to this soln. gave the *chlorohydrin* (I), $\text{CH}_2\text{ClCH}(\text{OH})\text{C}\cdot\text{CH}$, b_{760} 157°, b_{14} 62.3°, d_{21} 1.171. Dry KOH added to I in Et_2O gave the *ethylene oxide* (II), $\text{O}\cdot\text{CH}_2\text{CHC}\cdot\text{CH}$, $b.$ 86.7°, $d.$ 0.945. Heating II in a closed tube with H_2O gave the

glycol, $\text{CH}_2(\text{OH})\text{CH}(\text{OH})\text{C}\cdot\text{CH}$, $m.$ 39.5-40.5°, which was identified by its *dibromide*, $m.$ 47-8°. The action of CH_2ClCHO upon the di-Mg deriv. obtained as above gave another *chlorohydrin*, $[\text{CH}_2\text{ClCH}(\text{OH})\text{C}]_2$, b_s 165°, d_{23} 1.4096, identified by its *dibromide*, $m.$ 141.2.5°. Using $\text{CH}_2\text{ClCHClOEt}$, with the Mg deriv. of C_2H_2 gave a mixt. of 2 stereoisomeric *chloroethylins*, $[\text{CH}_2\text{ClCH}(\text{OEt})\text{C}]_2$ (III), b_{12} 136-7°. With Br 2 *dibromides* were obtained, 1 $m.$ 107-8°, the other $m.$ 71-2°. Removing the Br with Zn and alc. from these *dibromides*, the 1st gave the *chloroethylin* b_{11-12} 136.7°, d_{21} 1.110, and the 2nd the *chloroethylin* b_{13} 138.9°, d_{21} 1.112. *Distn. in vacuo* of the original reaction mixt. isolated a *dioxide*, $(\text{O}\cdot\text{CH}_2\text{CHC}\cdot)_2$, b_{10} 87.5-8.5°, d_{23} 1.1189, which

gave *dibromides* as *cis-trans* isomers when brominated, 1 $m.$ 57-8°, the other $m.$ 101-2.5°. Attempts to remove the Br from these isomers in order to identify them were unsuccessful. Treating III with AcOH and Ac_2O gave a *di-Et ether*, $[\text{CH}_2(\text{OH})\text{CH}(\text{OEt})\text{C}]_2$, $b_{3.5}$ 125-8°, d_{18} 1.026, on sapon. of the Ac deriv. with NaOEt . The action of MeOH in the presence of H_2SO_4 on acetylene dioxide deriv. gave the *dimethylin* (IV), $[\text{MeOCH}_2\text{CH}(\text{OH})\text{C}]_2$, $b_{3.5}$ 143-3.5°, d_{23} 1.122. Bromination of IV gave the *dibromide*, $[\text{MeOCH}_2\text{CH}(\text{OH})\text{CBr}]_2$, $m.$ 150-1.5°. Erythrol, $[\text{CH}_2(\text{OH})\text{CH}(\text{OH})\text{C}]_2$, $m.$ 113-4.5°, was obtained by heating the dioxide of acetylenic ethylene with H_2O in a sealed tube. It was identified by its *dibromide*, $m.$ 184-5°. R. C. ROBERTS

Occurrence of pinitol in redwood. E. C. SHERRARD AND F. F. KURTH. *Ind. Eng. Chem.* 20, 722-3 (1928).—By extn. of air-dried redwood sawdust with water and subsequent purification of the ext. with EtOH , were obtained white rhombic hemihedral crystals, $m.$ 185°, about as sweet as cane sugar, non-reducing with Fehling soln. and having the compn. MeO 15.67, C 43.22 and H 7.40%, corresponding to pinitol, $\text{C}_6\text{H}_4(\text{OMe})(\text{OH})_3$. A new cyclose, very sweet, $m.$ 234°, subliming with little or no decompn.,

and of the tentative formula $C_6H_5(OH)_2CH_2OMe$, was also obtained from the cold-water ext. of redwood heartwood.

W. C. EBAUGH

Epirhamnitol reduction product of epirhamnose. EMIL VOTOČEK AND JOSIP MIKSIC. Czech Polytechnic School, Prague and Zagreb Univ. *Bull. soc. chim.* **43**, 220-4(1928).—Epirhamnose was prepd. by heating *l*-rhamnonic acid with H_2O and C_6H_5N in an autoclave and reducing the epirhamnonic lactone. Reduction of epirhamnose with Na-Hg in dil. H_2SO_4 gave *epirhamnitol* (I) $[\alpha]_D^{20}$ 9.18°, a thick, colorless liquid, which could not be crystd. I and BzOH in 50% H_2SO_4 gave *dibenzylidene derivs.*, (II), m. 193-4°, $[\alpha]_D^{20}$ 32.33° and (III), m. 196°, $[\alpha]_D^{20}$ -36.7°. II and III were identified as dibenzylidene derivs. by forming their hydrazones quant.

R. C. ROBERTS

Isorhodeitol, reduction product of isorhodeose. E. VOTOČEK AND F. VALENTIN. Czech Polytechnic School, Prague. *Bull. soc. chim.* **43**, 216-20(1928).—Of the 16 possible stereoisomeric methylpentitols, only *l*-rhamnitol, rhodeitol and fucitol are known at present. *Isorhodeitol*, a 4th stereoisomer, was obtained by reducing isorhodeose with Na-Hg. Isorhodeose was obtained from the heteroglucoside, convolvulin or rhodeoretin, by hydrolysis with H_2SO_4 . Isorhodeitol is very sol. in H_2O and EtOH, hard to crystallize and in H_2O is feebly *l*-rotatory. The addn. of borax diminishes this rotatory power. It will distil without decompn. in a vacuum. BzH and isorhodeitol, which was not distilled, gave a *monobenzylidene deriv.*, m. 158°. Distd. isorhodeitol and BzH gave a *dibenzylidene deriv.*, m. 196-7°.

R. C. ROBERTS

The ketonic action of α -glucoheptulose. GABRIEL BERTRAND AND GEORGES NITZBERG. *Compt. rend.* **186**, 1172-5(1928); cf. *C. A.* **22**, 2178.— α -Glucoheptulose (I) gave the furfural color reactions when warmed with dil. HCl suggesting it to be ketonic, for aldehydic sugars generally require concd. HCl (*C. A.* **19**, 2350). I was found to be unaffected by aq. Br; hence it probably is a ketone. Reduced with Na-Hg in a slightly acid soln., I gave two alcs. which were fractionally crystd. from EtOH and found to m. 144° and 129-30°, the one being a new alc. called *glucoheptulitol* and the other identical with α -glucoheptitol. The formation of 2 isomeric alcs. also is characteristic of a ketose.

A. S. CARTER

Cleavage of polypeptides containing amino acids whose occurrence in nature is thus far unknown. VIII. Experiments with polypeptides containing α,α' -diaminosuberlic acid. EMIL ABDERHALDEN AND WALTER ZEISSET. *Fermentforschung* **9**, 336-61 (1928).—Attempts to sep. *dl*- α,α' -diaminosuberlic acid (I) into its optical components by fractional crystn. of the brucine salt of the *di*formyl deriv. (m. 209-10°) were unsuccessful. The difficulty may be due to the presence of a considerable quantity of the *meso*- in addn. to the *dl*-acid. By means of the Fischer polypeptide synthesis 3 tri- and 3 pentapeptides were prepd. Treatment of I with $ClCH_2COCl$ and *N* NaOH gave 85% of *di*[*chloroacetyl*]- α,α' -diaminosuberlic acid, m. 215-7° (decompn.), which by the action of NH_4OH and solid $(NH_4)_2CO_3$ was converted into 80% *diglycyl*- α,α' -diaminosuberlic acid (II). The tripeptide crystals with 2 mols. of H_2O and melts above 290° (decompn.). In the same manner I and *dl*- $MeCHBrCOBr$ yielded 60% *di*-[*dl*- α -bromopropionyl]- α,α' -diaminosuberlic acid, m. 207° (decompn.), from which 60% *di*-[*dl*-*alanyl*]- α,α' -diaminosuberlic acid (III) was obtained. This tripeptide crystals with 1 H_2O and melted above 290° (decompn.). Likewise, *di*-[*dl*- α -bromoisocaprolyl]- α,α' -diaminosuberlic acid, m. 208-9° (decompn.), was obtained in 55% yield from I and $Me_2CHCH_2CHBrCOBr$, and converted into 60% *di*-[*dl*-*leucyl*]- α,α' -diaminosuberlic acid (IV), which m. above 290° (decompn.) and crystals with 3 H_2O . The pentapeptides were obtained from the above tripeptides by similar reactions. II + $Me_2CHCH_2CHBrCOBr \rightarrow$ 60% *di*-[*dl*- α -bromoisocaprolylglycyl]- α,α' -diaminosuberlic acid, m. 194-5° (decompn.) \rightarrow 45% *di*-[*leucylglycyl*]- α,α' -diaminosuberlic acid, m. 168-71° with foaming. III + $ClCH_2COCl \rightarrow$ 30% *di*-[*chloroacetyl*-*dl*-*alanyl*]- α,α' -diaminosuberlic acid, m. 202-3°, decompn. 216-8°, \rightarrow 30% *di*[*glycyl*-*dl*-*alanyl*]- α,α' -diaminosuberlic acid, m. 136-8°, decompn. 210°. IV + $ClCH_2COCl \rightarrow$ 70% *di*[*chloroacetyl*-*dl*-*leucyl*]- α,α' -diaminosuberlic acid, m. 170-5°, decompn. 188-90°, \rightarrow *di*[*glycyl*-*dl*-*leucyl*]- α,α' -diaminosuberlic acid, m. 190-5° (decompn.). None of the 3 pentapeptides could be hydrolyzed by yeast maceration. When heated with H_2O under pressure at 160-5° they yielded anhydrides (diketopiperazines) of their simple constituent dipeptides, but the diaminosuberlic acid could not be recovered.

A. W. DOX

Certain derivatives of benzoyl- δ -aminovaleric acid. The synthesis of putrescine. S. I. KANEVSKAYA. *J. Russ. Phys.-Chem. Soc., Chem. Part*, **59**, 639-48(1927).— $Bz-NH(CH_2)_3COCl$ (I) was prepd. by warming the acid with 4 mols. $SOCl_2$, the excess of

the latter being distd. off *in vacuo*; it is a viscous oil, sol. in xylene, decomp. on distn. *in vacuo*. In order to prep. the aldehyde, I from 2.21 g. of the acid was treated with H_2 in boiling xylene in the presence of Pd, according to Rosemund. There resulted, instead, a cryst. product, m. 112° , and giving no depression with benzoylpiperidone; yield 0.95 g. A 60–70% yield of the piperidone was obtained on boiling I in Et_2O . I in xylene yields 85% of the anilide, m. $170-1^\circ$, with an excess of $PhNH_2$. The amide (m. $180-1^\circ$, yield 82%) is similarly prepd. Benzoylputrescine obtained from the amide by the Hoffmann reaction is extracted with $CHCl_3$ and is a viscous non-crystallizable oil which decomp. before distg. *in vacuo*. It dissolves in 2–3% alc. HCl; on the addn. of Et_2O there sep. needles of the HCl salt, m. $169-70^\circ$; yield 85%. The HCl salt heated with 37% HCl for 3–5 hrs. yields the theoretical quantity of putrescine-HCl. A quant. yield of $BzNH(CH_2)_4NHBz$, m. $175-6^\circ$, is obtained from the mono deriv. and $BzCl$ in H_2O .

BASIL C. SOYENKOFF

Polymerization and condensation. III. Autocondensation of dihydroxyacetone. P. A. LEVERNE AND A. WALT. Rockefeller Institute. *J. Biol. Chem.* 78, 23–33(1928).—A quantity of oxanthase which had polymerized was resolved into fractions and a cryst. substance (m. 164°), which had the structure $O \cdot CH_2 \cdot C(CH_2OH)OCH_2C(OH)CH_2 \cdot O$

was isolated. **Conclusion.**— $CO(CH_2OH)_2$ spontaneously condenses through loss of H_2O into substances of higher mol. wt.

ARTHUR GROLLMAN

The reducing power of chemically pure glucuronic acid. GEORG SCHEFF. *Biochem. Z.* 194, 96–104(1928).—The quantity of reduced Cu corresponding to various quantities of glucose, arabinose and glucuronic acid is tabulated.

S. MORGULIS

Reaction of isonitriles and hydrocyanic acid with phenylmagnesium bromide. HENRY GILMAN AND L. C. HECKERT. Ames, Iowa. *Bull. soc. chim.* 43, 224–30(1928).— $PhMgBr$ was treated with HCN , $MeNC$, $EtNC$, tertiary $BuNC$ and $p-MeC_6H_4NC$ separately and the products obtained were hydrolyzed to see if any BzH was obtained. $MeNC$ was the only one to give BzH and in very small quantity. G. and H. do not consider this result a conclusive proof of a bivalent C atom in HCN and the isonitriles.

R. C. ROBERTS

Esters of bromoformic acid. K. W. ROSENMUND AND HERMAN DÖRING. *Arch. Pharm.* 266, 277–80(1928).—Esters of this acid are prepd. by treating $COBr_2$ in dry Et_2O or petr. ether with the resp. alc., and subsequent distn. of the Et_2O layer *in vacuo*. The esters prepd. (Et, Pr, iso-Am and benzyl) are transparent, weakly fuming liquids and in contact with the eyes produce tears. They are only moderately stable under glass seal. *Et bromoformate*, b. 116° ; *Pr*, b. $108-79-80^\circ$; *iso-Am*, b. 58° ; *benzyl*, b. 96° . With 8-hydroxyquinoline $COBr_2$ yields the 2 products 5-bromo-8-hydroxyquinoline, m. $123-4^\circ$, and 5,7-dibromo-8-hydroxyquinoline, m. 190° .

W. O. E.

Dibenzoylarginine. K. FELIX AND K. DIRR. *Z. physiol. Chem.* 176, 29–42(1928).—*Dibenzoyl-d-arginine* (I), decomp. 235° , was prepd. in 70–5% yield from *d-arginine*, $BzCl$ and $N NaOH$ with ice cooling. It forms a *HCl salt*, m. 218° , and an *Et ester HCl salt*, m. 148° . *Dibenzoyl-dl-arginine* H_2O , m. 176° , m. anhyd. 230° , may be prepd. in the same way from *dl-arginine* but the yield is poor. It is best obtained by racemizing the *d*-form by melting its *HCl salt*. Treatment of I with fuming HNO_3 and H_2SO_4 nitrated both Bz groups in the *m*-position and at the same time caused partial racemization. Ac_2O converted I into a hygroscopic *dibenzoylacetylankhydro-arginine*, which was hydrolyzed into β -benzoylamino- α -piperidone, m. $186-7^\circ$, and benzoylacetylurea, decomp. 196° . The 2nd Bz of I must therefore be on the terminal NH_2 of the guanidine group. The prepn. of arginine from proteins by the flavianic acid method of Kossel and Gross is described in detail with certain modifications which bring the yield up to 85% of the quantity present. Salts of arginine for which more accurate detns. are reported are *d-arginine-HCl*, $[\alpha]_D^{20}$ 12.12° , contains no H_2O and is not hygroscopic, sinters 218° , solidifies 225° , m. 235° (decomp.); *monopicrate* $2H_2O$, decomp. 217° when dry; *dipicrate*, sinters 160° , decomp. 190° ; *HCl picrate*, sinters 160° , decomp. 190° ; *dl-arginine-HCl salt + H_2O* is hygroscopic, anhyd. it sinters 200° , decomp. 230° ; *monopicrate*, decomp. 223° ; *dipicrate*, decomp. 196° ; *HCl picrate*, decomp. 196° . The mono-acid salts are in general more sol. than the di-acid salts, and the *d-arginine* salts more sol. than the *dl-arginine* salts. A. W. D.

The influence of the alcohol group in amino acid esters on the velocity of 2,5-diketopiperazine formation and the formation of guanidino compounds by the action of guanidine on various amino acid esters. EMIL ABDERHALDEN AND SHIGEO SUZUKI. *Z. physiol. Chem.* 176, 101–8(1928).—A series of glycine esters was prepd. in order to det. their relative rates of ring closure to glycine anhydride and their relative reactivity

toward guanidine. The ester-HCl salts were prepd. from glycine, excess of alc. and dry HCl, and the free esters by treatment of the salts with NaOH and extn. with Et₂O.

	B. p.	Free ester	Yield	M. p.	HCl salt	Yield
Pr	50-3° at	16-8 mm.	72.7	73-5°		67.3
iso-Pr	52-5°	12-5	64.1	84-6°		70.6
Bu	55-8°	8-11	67.6	64-6°		70.3
iso-Bu	60-3°	8-11	71.4	70-2°		66.7
Am	73-6°	8-11	71.0	118-20°		68.2
iso-Am	78-80°	8-10	....	....		....
benzyl	93-5°	8-11	69.8	126-8°		31.7

Anhydride formation occurs most rapidly with the Me ester, the reaction being practically complete in 2 hrs. at 37°, and least rapidly with the benzyl ester. The Pr reacts more rapidly than the iso-Pr and the Am more rapidly than the iso-Am ester; the Bu and iso-Bu esters show little difference. The formation of glycoeyamidine and NH₃, as measured by NH₃ detn., is most rapid with the Me, then the Et ester. The iso-Pr is more reactive than Pr and the iso-Bu than the Bu ester. A. W. DOX

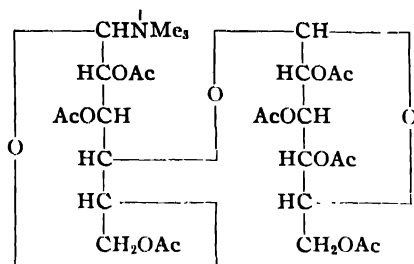
Interpretation of the Rathke guanidine synthesis and the hydrolysis of guanidines (comments on the paper by H. Schotte, R. Prieue and H. Roescheisen). HANS LÖCHER. *Z. physiol. Chem.* **176**, 43-5(1928).—The mechanism of the Rathke synthesis of guanidine from isothioureia and amine as interpreted by Schotte *et al.* (*C. A.* **22**, 1759) is inadequate since it cannot be applied to the synthesis of peralkylated guanidines from peralkylated isothiureas and dialkylamines. The Schenck interpretation, according to which an intermediate addn. product of isothioureia and amine is formed and then mercaptan split out, is applicable to all cases. Schotte's interpretation of the mechanism of guanidine hydrolysis to urea and amine is likewise open to objection, since it cannot be applied to the hydrolysis of peralkylated guanidines to tetraalkylurea and dialkylamine. A. W. DOX

Structure of carbohydrates. WALTER N. HAWORTH. *Helv. Chim. Acta* **11**, 534-48 (1928). (In English).—Lecture at Univ. Neuchâtel on Feb. 25, 1928. Brief review of the work of the Birmingham school during the past few yrs. on the structure of the lactones obtained by Br oxidation of the sugars to the hexonic acids and subsequent ring closure, and on the application of the results so obtained to the determination of the structure of monoses and bioses. C. A. R.

The oxidation of glucose in alkaline solution by oxygen or air: the formation of carbon monoxide. MAURICE NICLOUX. *Compt. rend.* **186**, 1218-20(1928).—The oxidation of glucose in alk. soln. by air or O₂ was found to yield CO. Max. CO production is at 84° in 0.2-0.08 *N* alkali, giving 1.6-1.7 cc. of CO from 0.25 g. of glucose. The ratios of O₂ absorbed to CO and CO₂ formed have been detd.; at 84° the ratio of CO to CO₂ is 1:3.16. A. S. CARTER

Action of trimethylamine on acetobromocellobiose and acetobromomaltose. GÉZA ZEMPLÉN, ZOLTÁN CSÜRÖS AND ZOLTÁN BRUCKNER. *Ber.* **61B**, 927-37(1928).—Karrer, Widmer and Staub obtained from acetobromocellobiose (I) and NMe₃ a halogen- and N-free substance (II) which was presumably a hexaacetylcellobiose anhydride and which, on account of its reducing power, was designated as cellal acetate (*C. A.* **18**, 2132). With the purpose of subjecting II to a more thorough study, it was first attempted to increase the yield by varying the conditions; a whole series of expts. showed that at 70° the yields are smaller and the products of poorer quality and at 85-965° no better yields than Karrer's could be obtained. No intermediate or other cryst. products could be isolated from the reaction mixt. In all cases was obtained a product (III) entirely similar to II in m. p. and rotatory power, in its ability to take up Br in CHCl₃, etc., but which was not II. Sapon. in CHCl₃ with NaOMe gave no insol. NaOMe addn. product, as is always the case with normal acetylated sugars, but, after concn. *in vacuo*, about 50% of pure cellobiose. In CHCl₃ 1 mol. III absorbs only 1 atom Br and in AcOH no HBr is taken up. The cryst. *Br deriv.* (IV) with Ag₂CO₃ in abs. MeOH gave a substance again similar in all its properties to II and contg. no MeO; this was also obtained from IV with AgOAc in anhyd. C₂H₆ or with Ag₂CO₃ in aq. Me₂CO and from IV in CHCl₃ washed with aq. H₂SO₄ and then thoroughly with H₂O. Numerous analyses gave values for C and H about 1 and 0.7%, resp., higher than those calcd. for cellal acetate, while the Ac values agreed, within the exptl. error, with the calcd. value. This led to the suspicion that III still contained the NMe₃ residue and as matter of fact N analyses showed the presence of 2.15-2.28% of N. The formula provisionally

given as best representing all the properties of **III** is that of *heptaacetylcellobiosidotrimethylamine*,



This formula, although it shows an unsatisfied N valance, is the only one which agrees with the analytical results; it also explains the addn. and splitting off again of a labile Br atom and the non-addn. of HBr. Acetobromomaltose with NMe₃ at 70° gives *heptaacetylmaltosidotrimethylamine* (**V**) entirely similar in compn. and properties to **III**; at 90–5° with dil. solns. of NMe₃ is obtained Me₃NHBr and heptaacetylmaltose. **III** (3.5 g. from 17.5 g **I** heated 1.5 hrs at 85–95° with 50 g. of 33% NMe₃ in abs. alc.), m. 205–6° (decompn.), $[\alpha]_D^{10.5} -11.07^\circ$ (CHCl₃). **IV** (8 g. from 10 g. **III**), m. 148–9°, $[\alpha]_D^{18} -7.53^\circ$ (CHCl₃). **V**, m. 165°, decomp. 205°, $[\alpha]_D^{21} 65.59^\circ$ (CHCl₃); the Br deriv. could not be obtained in cryst. form.

C. A. R.

Synthesis of sucrose. AMÉ PICTET AND HANS VOGEL. *Compt. rend.* 186, 724–7 (1928); *Helv. Chim. Acta* 11, 436–42 (1928).—Since Haworth has shown that fructose (**I**) is present in sucrose (**II**) not in the normal or pyran form but in the γ - or furan form it follows that sucrose cannot be synthesized by starting from normal **I**. γ -**I** is not as yet and perhaps never will be known and its Me derivs. cannot be considered for a possible synthesis of **II**, for the Me groups are too firmly held to leave any hope of the possibility of splitting them off after condensation with glucose has been effected. It occurred to P. and V. that this difficulty might be obviated by using the acyl instead of the alkyl derivs. of γ -**I** and they accordingly undertook the prepn. of the 1,3,4,6-tetraacetate (**III**). By hydrolysis of the octaacetate of **II** with concd. HCl and subsequent treatment with Ag₂CO₃ they obtained a mixt. of the tetraacetates of the 2 monoses, but recombination with P₂O₅ and sapon. of the product yielded, not **II**, but an *isomer*, m. 127°, which will be studied further. Ohle (*C. A.* 21, 2463) has recently found that in solns. of **I** an equil. is established between the β - and γ -forms and it seemed possible that the small quantity of γ -**I** present in such solns. might be converted into a stable deriv. (tetraacetate). Normal **I** was therefore treated by the method of Hudson and Brauns with Ac₂O and ZnCl₂ around 0°, poured into H₂O after 1 hr., neutralized with NaHCO₃ and extd. with CHCl₃. On concn. of the CHCl₃ soln. most of the normal acetate crystd. out and was sepd. mechanically from the accompanying thick sirup. This sirup was then repeatedly triturated with absolutely dry Et₂O as long as the Et₂O still dissolved out traces of the normal acetate. There was thus finally obtained a substance, practically insol. in Et₂O, which, although it remained amorphous and glassy even after several weeks *in vacuo* over CaCl₂, was shown by analysis, mol. wt. detns. and its power to reduce Fehling soln. at 40° to be an *isomer* of the normal acetate: C 48.24%, H 5.68%, mol. wt. in freezing C₆H₆ 344, $[\alpha]_D^{20} -2.30^\circ$ (c 6.0784 in CHCl₃), -3.27° (c 3.3664 in EtOH) (for the normal acetate, -83.93° (c 2.9308 in CHCl₃), -82.04° (c 3.6568 in EtOH)). The new tetraacetate is very little sol. in cold, easily in hot H₂O, very difficultly in Et₂O, more in alc. and CHCl₃, insol. in petroleum ether, decolorizes KMnO₄ on gentle warming and is very bitter, these properties indicating that it is truly a deriv. (**III**) of the γ -series. From 100 parts **I** were obtained (av. of several expts.) 6.5 of **III**, indicating that in Ac₂O solns. of **I** an equil. is established between about 97 parts of normal and 3 parts of γ -**I**. On shaking 4 g. each of **III** and glucose tetraacetate in 100 cc. absolutely dry CHCl₃ with a little ZnCl₂ in the cold, then 15 hrs. with 4 g. P₂O₅, decanting, evapg. to dryness *in vacuo*, dissolving the resulting sirup in boiling alc. and allowing to cool there sepd. after several days well formed crystals showing, after recrystn. from alc., all the principal characteristics of **II** octaacetate: mol. wt. in freezing C₆H₆ 686, m. 70° (unchanged by mixing with **II** octaacetate), $[\alpha]_D^{21} 59.4^\circ$ (c 1.516, CHCl₃). The same product was obtained from **I** prepd. either by inversion of **II** or from inulin. Sapon. with NaOMe at a low temp.

according to Zemlén yielded a white powder which, pptd. from a little H_2O with $EtOH-Et_2O$ (5:1) and crystd. from 80% alc., gave crystals with C 42.18%, H 6.61%, mol. wt. in freezing H_2O 344, $[\alpha]_D^{20}$ 66.37° (c 5.07, H_2O), $[\alpha]_D^{20}$ after inversion with 5% HCl —20.6° (c 0.5704). Crystallographic data (by R. GALAPIN): forms observed, 100(a) greatly developed, 110(p) well developed, 110(p') irregularly developed, 011(q) and 011(q') irregularly developed, 101 rare; angles, 110:110 78°42', 100:001 76°28', 001.011 40°52', β 103°32', $a:b:c$ 1.2543:1:0.8782. Both the natural and the synthetic II were found to exist in 2 forms, m. 184–5°, when recrystd. from H_2O or $EtOH$ and 170–1° when crystd. from $MeOH$. In all its other properties (taste, soly., behavior towards Ba, Ca and Sr hydroxides, absence of reducing power) the synthetic product was absolutely identical with natural II. C A R.

Genuine lignin. I. Acetylation of pine wood. WALTER FUCHS. *Ber.* 61B, 948–51 (1928).—The methods of prep. lignin hitherto employed yield products markedly different from the ("genuine" lignin) originally present in the cell wall. It therefore became necessary to study lignin directly in its natural form, especially with respect to those properties which in its isolation undergo changes or lead to alteration (free HO groups, reactive double bonds and labile complexes). The free HO groups can be protected by acetylation. Wood with Ac_2O and H_2SO_4 gives about 1.5 times its wt. of an acetate (I), insol. in the acetylating mixt. and hardly distinguishable in outward appearance from the original pine wood. A wood contg. originally 2.7% Ac gives on 1 acetylation a product with 41% Ac, a value which can be only very slightly increased by repeated re-acetylation. The lignin content of the original wood was 26.6%, that of the I 16.0%, i. e., about 90% of the original lignin was present in the I. The cellulose (60.5%) originally present in the wood remains almost completely in the wood on acetylation, while those substances which by the usual methods are not detd. as cellulose or lignin but as pentosans, hexosans, etc., are for the most part removed, for about 97% of the I consists of cellulose, lignin and $AcOH$. Pine wood contains 4.70% I, 2.95% MeO ; if the total MeO is assigned to the lignin present, the lignin in the original wood contains 17.7%, that in the I 17.2% MeO . Since the well-defined highest acetylation product of cellulose is the triacetate (II) (44.5% Ac) and the most highly acetylated pine wood lignin described in the literature contains 25.5% Ac, then I can consist almost only of II and an acetolignin with about 33% Ac. Although no appreciable quantities of II could be extd. from I with solvents which dissolve II, its presence in the I could nevertheless be proved. When the I was treated by the Cross and Bevan method alternately with Cl and $NaHSO_3$, there remained, not cellulose but an acetylcellulose whose Ac content varied somewhat in different expts., to be sure, but was always very close to that of II. It was only difficultly and incompletely sol. in $CHCl_3$, not at all sol. in Me_2CO and on hydrolysis with cold alc. KOH gave pure, lignin-free cellulose. Moreover, under the conditions under which II dissolves as Me glucoside (heating under pressure with $MeOH$ contg. 0.75% HCl), I dissolves to the extent of 92%, 0.5 of the lignin remaining undissolved and most of the rest being repptd. by H_2O . Before attempting to split the II into its 2 almost exclusive constituents, II and acetolignin, it would seem best, however, to characterize the double bonds in the genuine lignin and prevent undesirable attacks upon them during its isolation. This will be dealt with in a subsequent paper. C A R.

Acetic ester of cellulose xanthate. T. NAKASHIMA. *J. Soc. Chem. Ind. (Japan)* 31, 94–100; *Suppl.* 1928, 31–2B. (In English).—The acetic ester of cellulose xanthate was produced by the treatment of viscose with $ClCH_2CO_2H$, and its properties and method of analysis are given. Y. TOMODA

Action of fuming sulfuric acid on cyclohexane. V. MENSHUTKIN AND M. WOLF. *Neftyanoe Khozyaistvo* 13, 340–2 (1927).—One part by wt. of cyclohexane is completely dissolved when shaken with 27 parts of H_2SO_4 (25% SO_3) at 20–25°. Much heat and SO_2 gas are generated. Benzenesulfonic acids are formed (up to 70%), which proves the dehydrogenation of cyclohexane. Some black pitch is obtained. The benzenesulfonic acids contain 0.9% of $PhSO_3H$ and 0.1% of $C_6H_4(SO_3H)_2$. The action of anhyd. H_2SO_4 is quite similar. A. A. BOEHTLINGK

Aromatic compounds containing the tertiary butyl group. A. E. CHICHIBABIN, S. ELGAZINE AND V. A. LENGOLD. *J. Russ. Phys.-Chem. Soc.* 60, 347–54; *Bull. soc. chim.* 43, 238–42 (1928).—Bromination of $PhCMe_3$ gave the *p*-bromide (I), b. 104–6°. The Mg deriv. of I reacts with $HC(OEt)_3$, giving on acidifying *p*-tert-butylbenzaldehyde (II), m. 245–6°, d_4^{20} 0.9733. Oxidation of II gave the acid, m. 164°, previously prepd. and its constitution proved by its oxidation to *p*- $C_6H_4(CO_2H)_2$. Di-tert-butylidiphenyl, m. 128–9°, b. 190–2°, is obtained as a by-product in the prepn.

of the Mg deriv. of I. Condensation of II with Me_2CO gave a *compd.*, m. 49–50°. $\text{ClCH}_2\text{CH}_2\text{OMgBr}$ was prepd. by treating the $\text{ClCH}_2\text{CH}_2\text{OH}$ with EtMgBr and this combines with the Mg deriv. of I to give on hydrolysis *tert-butylphenylethyl alc.*, $\text{C}_6\text{H}_5\text{C}_6\text{H}_4\text{CH}_2\text{CH}_2\text{OH}$, b_{11} 141–3°, d_4^{20} 0.9782, d_{20}^{20} 0.9749, n_D^{20} 1.5209. R. C. ROBERTS

Phenylpropine. BOURGUEL. *Compt. rend.* 186, 1211–3 (1928).—B. prepd. $\text{PhCH}_2\text{C}:\text{CH}$ (I) and found its d_{20} 0.888 and d_{13} 0.892, checking all other workers on this *compd.* Because of the irregularity of the d of I as compared with $\text{PhC}:\text{CH}$ (II), d_{20} 0.930, and $\text{Ph}(\text{CH}_2)_2\text{C}:\text{CH}$ (III), d_0 0.9375, a study of the products resulting from different methods of prepn. was undertaken. By all of the recorded methods of prepn. including his own, the resulting product (IV) always had d_{20} 0.932 and n_D^{16} 1.563. The chem. and phys. properties of IV were identical with those of I except d . and n and these 2 properties fit with the homologous series including II and III. All means have failed to produce a sample of I with the original d_{20} 0.888 obtained the 1st time. A. S. CARTER

Catalytic hydrogenation of oximes and their transformation into β -hydroxylamines. G. VAVON AND KRAJCINOVIC. Nancy. *Bull. soc. chim.* 43, 231–7 (1928).—Hydrogenation of $\text{Pr}_2\text{C}:\text{NOH}$ with Pt black in alc. HCl gave Pr_2CHNOH , identified by its *oxalate*, m. 115°, and *heptyl-4-benzal nitron*, $\text{Pr}_2\text{CHNOCHPh}$, m. 53–4°, prepd. by adding BzH to the *oxalate*. $\text{Me}_2\text{CHCH}_2\text{CMe}:\text{NOH}$, m. 63°, was prepd. from the ketone or by hydrogenating mesityl oxide. Hydrogenation of this oxime gave the *hydroxylamine* identified by its *oxalate*, m. 132–3°. Hydrogenation of $\text{MePhC}:\text{NOH}$ gave chiefly $\text{PhCH}(\text{NH}_2)\text{Me}$, identified as its *oxalate*, m. 238°. Hydrogenation of $\text{Ph}_2\text{C}:\text{NOH}$ does not take place but benzohydrylamine, Ph_2CHNH_2 , m. 270°, is formed. Hydrogenation of enanthal oxime gave NH_3 and *dihexylhydroxylamine*, m. 74°, its *oxalate*, m. 137°. *Iso-BuCH}:\text{NOH} gave the *secondary β -hydroxylamine* (Me_2CHCH_2) $_2\text{NOH}$; its *oxalate*, m. 167–8°. Hydrogenation of $\text{PhCH}:\text{NOH}$ gave (PhCH_2) $_2\text{NOH}$, m. 123°, and some (PhCH_2) $_2\text{NH}$. Piperonal oxime gave *dipiperonyl- β -hydroxylamine*, m. 123–4°, on hydrogenation and this gives a solid HCl salt. R. C. ROBERTS*

The mechanism of the rearrangement of diazoaminobenzene into aminoazobenzene. II. NAOMICHI YOKOJIMA. *J. Soc. Chem. Ind. (Japan)* 31, 100–8; 32B (1928).—Several methods were tried to effect the rearrangement of $\text{PhN}:\text{NNHPh}$ (I) into $\text{PhN}:\text{NC}_6\text{H}_5\text{NH}_2$ (II) in the absence of PhNH_2 , *viz.*, by heating alone, by heating with paraffin wax, by heating I.HCl either in an open tube or in a sealed tube or by mixing I and HCl in alc. But no II was obtained. By the addn. of PhNH_2 and HCl, a part of I in alc. changed into II. The yield of II increased as the quantity of PhNH_2 increased. Y. concluded that no II could be obtained from I without PhNH_2 . III. *Ibid* 109–16, 33–4B.—From the consideration of the results of expts., either of his own or of other investigators, Y. explains the mechanism of the rearrangement of I into II as follows: In the PhNH_2 soln., HCl combines with I, forming a yellow salt of a form $\text{PhN}:\text{NNH}(\text{HCl})\text{Ph}$. The HCl serves to intensify the basic property of the amino group and accelerates the sepn. of the diazo group from it. The sepd. diazo group replaces H of the amino group of the PhNH_2 or a p -H atom. These 2 replacements occur simultaneously and give II. SHUMPEI OKA

Rearrangement of toluenediazoaminobenzene in aniline solution. M. FUKAMI AND N. YOKOJIMA. *J. Soc. Chem. Ind. (Japan)* 31, 116–7; *Ibid Suppl.* 34B (1928). (In English).—It has been found by analysis that the rearrangement of $\text{MeC}_6\text{H}_4\text{N}:\text{NNHPh}$ in PhNH_2 in the presence of PhNH_2HCl results in the formation of 70% of $\text{MeC}_6\text{H}_4\text{N}:\text{NC}_6\text{H}_5\text{NH}_2$ and 30% of $\text{PhN}:\text{NC}_6\text{H}_5\text{NH}_2$. Y. TOMODA

Dinitrophenol from dinitrochlorobenzene. A. A. KUROCHKIN. *J. Chem. Industry (Moscow)* 4, 994 (1927).—Six g. $(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{Cl}$, 10 g. NaNO_2 and 100 cc. were boiled for 3 hrs. in a round-bottomed flask with condenser. The oil gradually entered into soln. and the latter became orange-colored: $2,4-(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{Cl} + \text{NaNO}_2 \rightarrow 2,4-(\text{O}_2\text{N})_2\text{C}_6\text{H}_3\text{ONa}$. On cooling the contents of the flask 4 g. of dinitrophenolate pptd. in form of yellow crystals. The mother liquors, on being acidified, gave a white cryst. ppt. of dinitrophenol, m. 113°. NaNO_2 acts in the same way as NaNO_3 , but to a lesser extent. BERNARD NELSON

A synthesis of quinone (correction). J. F. DURAND. *Compt. rend.* 186, 1221 (1928); *cf. C. A.* 21, 2487.—Quinone is *not* formed from C_6H_6 and CO in a $\text{C}_2\text{H}_5\text{N}$ soln. of Cu_2Cl_2 , contrary to a previous statement by D. and BANOS. A. S. CARTER

Synthesis of 3,4-dihydroxyphenylalanine. C. R. HARRINGTON. *Biochem. J.* 22, 407 (1928).—A modification of a method already described (*cf. C. A.* 22, 576). To 10 g. azlactone (obtained by condensation of vanillin with hippuric acid) in 100 cc. alc.

was added 10 cc. concd H_2SO_4 ; the soln. was boiled under reflux for 20 min. About 75% of the alc. was distd. off under diminished pressure. The residue was rubbed in a dish with cold water contg. enough $NaHCO_3$ to leave the soln. slightly alk. The ester was sepd with $EtOAc$, the aq. soln. was again extd. with this solvent and the combined $AcOEt$ exts. were dried and evapd. The residue was dissolved in warm alc. and the ester pptd. by the addn. of alc. The ester sepd. first as an oil, which crystd. on rubbing. After standing in the ice-chest for some hrs., the ppt. was filtered and recrystd. from 60-65% alc. This gave 55-60% of the theoretical yield of the pure ester, m. 129° .

BENJAMIN HARROW

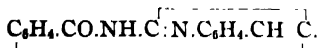
Some derivatives of diketopiperazine. Synthesis of *o*- and *m*-tyrosine. HIDENOSUKE UEDA. *J. Biochem. (Japan)* **8**, 397-407(1928).—3,6-Bis-[*o*-acetoxybenzal]-2,5-diketopiperazine was made by condensation of glycine anhydride with *o*- HOC_6H_4CHO . This product was converted to 3,6-bis-[*o*-hydroxybenzal]-2,5-diketopiperazine, and by reduction to *o*-tyrosine anhydride. By preliminary reduction it was converted to diacetyl-*o*-tyrosine anhydride, which was then split into *o*-hydroxyphenyl- α -alanine. Through condensation of glycine anhydride with *o*- $MeOC_6H_4CHO$ 3,6-bis-[*o*-methoxybenzal]-2,5-diketopiperazine was obtained, and with *m*- HOC_6H_4CHO 3,6-bis-[*m*-acetoxybenzal]-2,5-diketopiperazine. The latter by removal of the Ac groups and reduction has been converted to *m*-tyrosine anhydride, or by straight reduction, to diacetyl-*m*-tyrosine anhydride, which on cleavage yielded *dl*-*m*-tyrosine. S. M.

Catalytic reduction of mandelic acid. K. W. ROSENMUND AND H. SCHINDLER. *Arch. Pharm.* **266**, 281-3(1928).—It is shown that acylated mandelic acid and certain of its derivs. yield as the chief product on hydrogenation ($Pd-BaSO_4 + H_2$) $PhCH(CO_2H)CH_2OH$ or derivs. thereof, while the non-acylated mandelic acids suffer no change. The compds subjected to this study were mandelic acid and its *p*- MeO , *o*- HO and *o*- Cl derivs. W. O. E.

Lichen substances. V. A new synthesis of orsellinic acid. ADOLF SONN. *Ber.* **61B**, 926-7(1928).—When dihydroorsellinic esters, readily obtained by the condensation of crotonic esters with $AcCH_2CO_2Et$ under the influence of $NaOEt$, are dehydrogenated with Br, two H atoms are at the same time replaced by Br and the resulting 2,3,5,4,6- $MeBr_2(HO)_2C_6CO_2R$ with H_2 , Pd and $CaCO_3$ readily forms the corresponding orsellinic ester. *Et dibromoorcellinate*, m. $143-4^\circ$, 1.5 g. in 25 cc. 2 *N* $NaOH$ with H_2 and 2 g. of the Busch and Stove catalyst (*C. A.* **10**, 2727) yields 0.8 g. *Et orsellinate*, m. 132° , sapon to the acid after some weeks in excess of 10% $NaOH$ at room temp. C. A. R.

The products of the condensation of homophthalimide with aromatic aldehydes. ANDRÉ MEYER. *Compt. rend.* **186**, 1214-6(1928).—To study the relations of color to constitution in the derivs of homophthalimide (I), M. has prepd. a series of compds. of the general formula $C_6H_4CO.NH.CO.C.CHAr$ by condensing I with $ArCHO$ in

the presence of HCl or Et_3NH . On varying the substituents in Ar , the colors vary from yellow to red. *Homophthalimides*: *p*-methylbenzal (*p*-toluylene), $C_{17}H_{15}O_2N$, dark yellow, m. 199° , red soln. with H_2SO_4 , yellow ppt. with $SnCl_4$; *cinnamylidene*, orange-yellow, m. 223° , violet soln. with H_2SO_4 , orange ppt. with $SnCl_4$; *o*-nitrobenzal, yellow, m. 236° ; *m*-isomer, yellow, m. 273° ; *p*-compd., dark yellow, m. 263° ; *fural*, maroon; green by reflection, m. 210° , red soln. with H_2SO_4 ; *isophthalylidene*, $OHCC_6H_4CH.C_6H_5O_2N$, clear yellow, m. 292° , orange soln. with H_2SO_4 ; *salicylidene*, clear yellow, m. 215° ; *o*-methoxyben, yellow, m. 176° ; *m*-isomer, clear yellow, m. 176° ; *p*-hydroxybenzal, dark orange, m. 238° ; *anisylidene*, orange-yellow, m. 195° ; *o*-vanillylidene, 2 forms, one orange, m. $178-80^\circ$, the other yellow, m. about 165° and passing to the orange with heat; *p*-peromylidene, deep yellow, m. $218-9^\circ$; *p*-dimethylaminobenal, red, m. 195° . With *o*- $H_2NC_6H_4CHO$ the product is a *naphthylridine* of the structure:

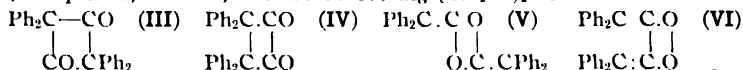


A. S. CARTER

The chemistry of camphor. ENDRE BERNER. *Tids. Kemi Bergvesen* **6**, 135-43 (1926).—A review. C. A. ROBAK

A deeply colored dimeric ketene. WOLFGANG LANGENHECK AND HILDE LANGENHECK. *Ber.* **61B**, 938-42(1928).—Very short but very energetic heating of crude $Pb_2C(OH)CO_2H$ (I) gives beautiful violet-black crystals (II); pure I gives a deep red color but no crystals of II. The reason for this is that the crude I always contains traces of the K salt and these traces of alkali catalyze the formation of II; the same effect is obtained by mixing a little Na_2CO_3 with pure I. The purification of the II is rendered difficult by the presence of benzilide, which has the same soly. as II in most

solvents; in CCl_4 , however, benzilide is almost insol. and **II** is relatively easily sol. Analyses and mol. wt. detns. indicate that **II** has the compn. $\text{C}_{24}\text{H}_{20}\text{O}_2$ of a dimeric $\text{Ph}_2\text{C}:\text{CO}$. Detn. of its structure is difficult because it yields resinous products of apparently high mol. wt. with the most varied reagents when it reacts at all (with alc. KOH , alc. KCN , PCl_5 , SOCl_2 , alc. Br , Zn dust and AcOH , EtMgBr , PhNHNH_2); no cryst. deriv. could be obtained. Only oxidation with CrO_3 gave some indication of its structure; this gave 43% of the calcd. quantity (2 mols.) of Ph_2CO . Of the 4 possible formulas (**III**–**VI**) for a dimeric $\text{Ph}_2\text{C}:\text{CO}$, **V** does not explain the deep color, **VI** should represent a very unstable substance (**II** in small quantities can be distd. without decomn. even under atm. pressure) and the compd. **III** is known (Staudinger, *C. A.* 5, 1767); this leaves only the structure **IV** of a 3,3,4,4-tetraphenyl-1,2-cyclobutanedione for **II**. **II** forms no phenylhydrazone and no quinoxaline. The intensity of its color is remarkable. While compds. like Ac_2 , Bz_2 and phenanthrenequinone are only yellow to orange in even concd. solns., **II** is still deep brown-red in much more dil. solns., orange in 10^{-6} *M* and still colored in 10^{-8} *M* solns. Qual. measurements (by LEV and VOLBERT) of the spectrum of a 3×10^{-8} *M* soln. in abs. MeOH in the light of an Auer burner showed absorption only in the blue and violet, apparently extending far into the ultra-violet where the absorption max lies. **II** (0.5 g. from 5 g. $\text{Ph}_2\text{C}(\text{OH})\text{CO}_2\text{H}$ and 0.1 g. anhyd. Na_2CO_3 in a small round-bottom flask with an air condenser 1 cm. in diam. and 20 cm. long heated with a large Teclu burner until the mixt. boils vigorously and brown vapors are evolved—the burner must now be immediately removed and the reaction allowed to proceed of itself to completion, the whole process requiring more than 0.5–1.0 min.), KMnO_4 -like prisms, *m.* 168° , mol. wt. in freezing $(\text{CH}_2\text{Br})_2$ 347–73.



C. A. R.

Arylamine salts of the naphthalenesulfonic acids. V. Acetylation of peri, Laurent and Brønner acids and the arylamine salts of their acetyl derivatives. R. B. FORSTER, T. H. HANSON AND R. WATSON. *J. Soc. Chem. Ind.* 47, 155–7 (1928); cf. *C. A.* 21, 3361.—Peri acid, Laurent acid and Brønner acid (1,8-, 1,5- and 2,6-naphthylaminesulfonic acids, resp.) do not form arylamine salts, because of the inhibiting action of the amino group on the salt-forming properties of the SO_3H group. These acids must therefore be represented by a dipolar formula. Their Ac derivs. readily yield arylamine salts. In the following table, the amine whose salt is formed is given first, the *m. p.* of the salt next and the soly. of the salt in 1% AcOH last. Salts of acetyl-peri acid: PhNH_2 , 273° , 5.26 at 18° ; *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 198° , 2.71 at 18° ; *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 207° , 1.35 at 18° ; ψ -cumidine, 257° , 0.065 at 19° ; α -naphthylamine, 242° , 0.25 at 19° ; benzidine, decomps. 287° , 0.063 at 19° ; tolidine, decomps. 267° , 0.22 at 19° ; dianisidine, no. *m. p.*, 0.13 at 20° ; *p*- $\text{ClC}_6\text{H}_4\text{NH}_2$, no. *m. p.*, 0.014 at 19° ; *p*-nitro-*o*-toluidine, decomps. 277° , 0.025 at 20° . Salts of acetyl-Laurent acid: PhNH_2 , decomps. 344° , 0.80 at 18° ; *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 259° , 0.80 at 18° ; *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 255° , 0.53 at 19° ; α -naphthylamine, indefinite, 0.05 at 18° ; β -naphthylamine, 280° , 0.34 at 18° ; benzidine, decomps. 322° , 0.13 at 18° ; tolidine, decomps. 307° , 0.273 at 20° ; dianisidine, decomps. 328° , 0.014 at 20° ; ψ -cumidine, no. *m. p.*, 0.52 at 19° ; *p*- $\text{ClC}_6\text{H}_4\text{NH}_2$, no. *m. p.*, 0.11 at 19° ; *p*-nitro-*o*-toluidine, no. *m. p.*, 0.51 at 19° . Salts of acetyl-Brønner acid: PhNH_2 , 256° , 0.78 at 15° ; *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 262° , 0.2334 at 15° ; *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 243° , 1.48 at 20° ; ψ -cumidine, 277° , 0.10 at 22° ; α -naphthylamine, 258° , 0.35 at 15° ; β -naphthylamine, 262° , 0.18 at 20° ; benzidine, 246° , 0.23 at 16° ; tolidine, decomps. 315° , 0.082 at 19° ; *p*- $\text{ClC}_6\text{H}_4\text{NH}_2$, 275° , 0.21 at 16° ; *p*-nitro-*o*-toluidine, decomps. 287° , 0.09 at 20° ; *o*- $\text{MeOC}_6\text{H}_4\text{NH}_2$, 230° , 0.98 at 22° ; *p*- $\text{EtOC}_6\text{H}_4\text{NH}_2$, 225° , 0.63 at 20° ; *m*- $\text{BrC}_6\text{H}_4\text{NH}_2$, 249° , 2.18 at 20° ; *p*- $\text{BrC}_6\text{H}_4\text{NH}_2$, decomps. 267° , 0.21 at 19° . VI. Salts of Koch acid, H acid and chromotropic acid. R. B. FORSTER AND D. H. MOSBY. *Ibid* 157–9.—Analyses of the di-Na salts of Koch acid (**I**) chromotropic acid (**II**) and H acid (**III**) showed that in all cases it was the internal arylamine di-Na salt that was stable in dil. acid soln., and there was no tendency to form sultam. Arylamine salts of **I** always consisted of 1 mol. of **I** and 2 mols. of a monoamine or 1 mol. of a diamine. Salts of **III** consisted of 1 mol. of acid and 1 mol. of monoamine, or 2 mols. of acid and 1 mol. of diamine. Salts of **II** consisted of 1 mol. of acid and 2 mols. of monoamine or 1 mol. of diamine. In the following table, the amine whose salt is formed is given first and the decompn. point of the salt next. Salts of **I**: PhNH_2 , 312° ; *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 304° ; *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 202° ; *m*- $\text{MeC}_6\text{H}_4\text{NH}_2$, 284° ; *o*- $\text{MeOC}_6\text{H}_4\text{NH}_2$, 290° ; *p*- $\text{MeOC}_6\text{H}_4\text{NH}_2$, 287° ; α -naphthylamine, 312° ; β -naphthylamine, 322° ; benzidine, 348° ; tolidine, 345° ; dianisidine, 339° . Salts of **II**: PhNH_2 , 300° ; *o*- $\text{MeC}_6\text{H}_4\text{NH}_2$,

290°; *p*-MeC₆H₄NH₂, 308°; *m*-Me₂C₆H₃NH₂, 307°; α -naphthylamine, 311°; β -naphthylamine, 293°; benzidine, 312°. Salts of III: PhNH₂, 340°; *o*-MeC₆H₄NH₂, 320°; *p*-MeC₆H₄NH₂, 335°; *p*-nitro-*o*-toluidine, 286°; *m*-Me₂C₆H₃NH₂, 327°; α -naphthylamine, 324°; β -naphthylamine, 345°; benzidine, 325°; toluidine, 340°; dianisidine, 345°.

T. S. CARSWELL

Racemization. VII. The action of alkali on casein. P. A. LEVENE AND L. W. BASS. Rockefeller Institute. *J. Biol. Chem.* **78**, 145-57(1928); cf. *C. A.* **22**, 1956.—The rotations and amino-N ratios were detd. for the mixt. of amino acids obtained by hydrolyzing casein with HCl at 125°. Complete hydrolysis was obtained in 4 hrs. when 5.0 *N* acid was used. Similar detns. were made on casein previously subjected to the action of 0.5, 1.0 or 5.0 *N* NaOH at 25° for varying lengths of time. The rates of hydrolysis at 25° of casein and gelatin by 0.5, 1.0 and 5.0 *N* NaOH were compared. The results indicate that casein is not composed of ketopiperazines of the type heretofore studied. When casein is heated with 1.0 *N* NaOH at 125°, complete racemization occurs and under these conditions it is, therefore, impossible to increase the rate of hydrolysis of the ketopiperazines sufficiently to avoid racemization. An investigation of the sol. and insol. fractions of racemized casein showed that racemization preceded hydrolysis.

ARTHUR GROLLMAN

Alizarinsulfonic acid ester—a water-soluble alizarin preparation. E. GEBAUER FÜLNEGG AND ILONA EISNER. *Ind. Eng. Chem.* **20**, 637-8(1928).—Treatment of a mixt. of alizarin and pyridine with ClSO₃H yielded the pyridine salt of alizarinsulfonic acid ester. Clear shades of alizarin red were obtained by padding cotton, impregnated with Ca and Al salts, with a mixt. of the alkali salt of the ester and (CO₂H)₂, followed by drying and steaming in a Mather-Platt.

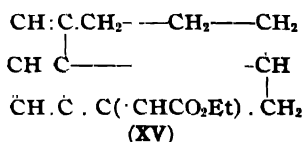
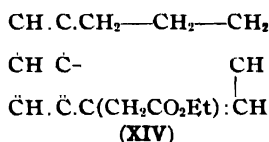
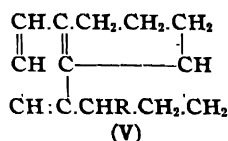
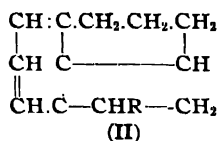
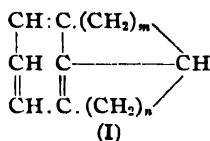
T. S. CARSWELL

Rubrene. VII. Dissociation pressure of rubrene peroxide at ordinary temperature. CHARLES MOUREU, CHARLES DUFRAISSE AND LOUIS GIRARD. *Compt. rend.* **186**, 1166-8(1928); cf. *C. A.* **22**, 961, 2354.—A C₆H₆ soln. of rubrene peroxide (I), when exposed to sunlight or an incandescent lamp in the absence of O, shows the fluorescence of rubrene (II). In the dark or in the air, the decompn. into II is not apparent and upon entrance of air into the exposed O-free tube of I, the fluorescence disappears; hence the formation of I from II is reversible. The critical O dissocn. pressure seems to be about 5 mm. of Hg.

A. S. CARTER

Benzopolymethylene compounds. XIV. Synthesis of tetracyclic compounds and of pyrene. JULIUS V. BRAUN AND ERICH RATH. *Ber.* **61B**, 956-63(1928); cf. *C. A.* **21**, 2683.—In earlier papers it was shown that in accordance with the Sachse-Mohr conception of multiplanar structure of C rings, a 5- and a 6-, a 6- and a 6-, a 5- and a 7- and a 6- and a 7-membered ring adjacent to each other can be added to a C₆H₆ ring to form tricyclic compds. of the general structure I, whereas two 5-membered rings (*m* = *n* = 2) cannot be so added. Further exptl. confirmation of the correctness of the S.-M. view is furnished in the present paper. If in a compd. of type I *n* = 3, it should be possible to add to it a 5-, 6- or 7-membered ring with formation of a tetracyclic compd., whereas if *n* = 2 only a 6- or 7-membered ring can be added according to the theory. To test this point the acids III (II, R = CH₂CO₂H), IV (II, R = CH₂CH₂CO₂H), VI (V, R = CH₂CO₂H) and VII (V, R = CH₂CH₂CO₂H) were prepd. and it was found that, whereas the chloride of III undergoes no intramol. Friedel-Crafts reaction, in the chlorides of IV, VI and VII AlCl₃ closes the ring with the same and, indeed, in part with even greater ease than it does in the analogous reactions in the tricyclic series; the resulting ketones (VIII, IX and X) can then be smoothly reduced to the hydrocarbons 1,2,3,4,5,6,7,8-octahydro-4,5-methylenepheneanthrene (XI), 1,2,3,4,5,6-hexahydro-peribenzoacenaphthene (XII) and decahydropyrene (XIII). All attempts to dehydrogenate XI and XII to the parent hydrocarbons have hitherto failed, but XIII is readily converted into pyrene, this reaction thus adding a 4th to the 3 previously known methods of synthesizing pyrene. Although the steps involved in this synthesis, starting from α -naphthol, are numerous, all the operations proceed so smoothly, under the proper conditions, that the synthesis as a whole is very easy. Tetraphthene ketone reacts with Zn and BrCH₂CO₂Et in C₆H₆ as readily as with α -hydrindone, giving almost 90% of a faintly colored, almost odorless oil, b₁₄ 214-5°, probably a mixt. of the isomeric esters XIV and XV, which with H₂ and Ni in 50% decalin soln. at about 200° yields about 90% of the *Et* ester, thickish, strongly refractive, almost odorless liquid, b₁₄ 196°, of tetraphthylacetic acid (III), m. 108°. Tetraphthylethyl alc. (II, R = CH₂CH₂OH), obtained in 40% yield, together with 55% of free III from the ester of III with Na and alc., rather thick oil, b₁₅ 188°, solidifying completely on long cooling and then m. 53°, converted by heating several hrs. at 130° with fuming HBr into the bromide (yield, about 90%), faintly yellow, b₁₅ 182-5°, gives with KCN 85% of the nitrile, liquid of

faint odor, b_{16} 205°, m. 38°, of the *propionic acid* (IV), m. 97°, whose *chloride*, b_{14} 215–20° (slight decompn. towards the end of the distn.); this with $AlCl_3$ in CS_2 gives the α -*keto deriv.* (VIII) of XI (yield, about 65% when small quantities of the chloride (10 g.) are used, 40% with larger quantities), $b_{6.5}$ 168–70°, m. 104°; *oxime*, m. 213°; *semicarbazone*, m. 266°. XI (70% from VIII by the Clemmensen method), easily volatile with steam, b_{15} 130–2°, b. 238°, m. 47°. α -Keto-hexahydrobenzonaphthene with Zn and $BrCH_2CO_2Et$ gives 80% of a thick, faintly yellow oily *ester* $C_{17}H_{20}O_2$, b_{14} 218–9°, reduced with H_2 and Ni almost quant. to the *Et ester*, thick, almost colorless oil, b_{14} 196°, of *hexahydrobenzonaphthylacetic acid* (VI), b_{13} 220–2°, m. 93°. Its chloride with $AlCl_3$ gives 60% of the *ketone IX*, $b_{6.5}$ 170–2°, m. 98° (*oxime*, m. 199°; *semicarbazone*, m. 256°), reduced with amalgamated Zn to XII, b_{12} 130–2°, m. 29°, easily volatile with steam. Ladenburg reduction of the ester of VI gave, together with 45% of the free acid, 45% of the *alc.* (V, R = CH_2CH_2OH), rather thick oil with a faint odor, b_{12} 192–4°, m. 23–4°, whose *bromide*, having the same b. p. and only about 3% sol. in hot $EtOH$, gives with KCN about 90% of the *nitrile*, b_{12} 212–4°, of the *propionic acid* (VII), m. 118°, b_{12} 238–40°, whose chloride with $AlCl_3$ gives α -*ketodecahydropyrene* (X), $b_{6.4}$ 182–3°, b_{12} 226°, m. 63° (yield, 75%); *oxime*, m. 158°; *semicarbazone*, m. 242°. XIII, b_{12} 151–2°, m. 34°, d_4^{20} 1.0612 (undercooled), n_D^{20} 1.5806; passed in a current of CO_2 over a layer of PbO-pumice at bright red heat it gives 70% of pyrene, m. 150° after 1 crystn. from alc.



C. A. R.

Organic catalysts. II. Strengthening the catalytic effectiveness of isatin by nucleus substitution. WOLFGANG LANGENBECK. *Ber.* 61B, 942–7(1928); cf. *C. A.* 21, 1216.—It was shown in the 1st paper that in the dehydrogenation of NH_2 acids by O or methylene blue isatin and some of its derivs. act as catalysts. In the present paper are reported the results of quant. expts. on the influence of substitution on the catalytic activity of isatin, use being made of the velocity of decolorization of methylene blue under comparable conditions. Substitution of the imide H atom has only a slight influence. *Isatin-1-acetic acid* (I) is a weaker catalyst than isatin itself. On the other hand, introduction of halogen or the SO_3H group into the C_6H_4 nucleus of the isatin increases its activity, when equimol. solns. are compared. Below are, resp., the wt. of isatin deriv. used, the vol. (cc.) of solvent, the temp. and time (min.) required to decolorize 5 cc. 0.01 *N* methylene blue soln. and 5 g. alanine. isatin, 0.15, 5, 40°, 270; I, 0.20, 5, 40°, 360; isatin, 0.07, 10, 70°, 14 5; 5-bromoisatin, 0.11, 10, 70°, 6; 5,7-dibromoisatin, 0.15, 10, 70°, 5; isatin, 0.073, 10, 70°, 13.5; 5-chloroisatin, 0.090, 10, 70°, 5.5; isatin, 0.073, 10, 70°, 17; K isatinsulfonate, 0.141, 10, 70°, 7.5. Some expts. were also made in connection with the mechanism of the Strecker reaction. $Me_2C(NH_2)CO_2H$ with quinone (but not with alloxan or isatin) can be dehydrogenated to Me_2CO , CO_2 and NH_3 . This dehydrogenation cannot take place through an α -imino acid, so in addn. to this latter mechanism, which has hitherto been assumed, there must be another, probably through a radical, $>NCMe_2CO_2H$, with univalent N. I (10 g., together with 5 g. unchanged isatin, from 15 g. isatin in 45 cc. 10% NaOH refluxed 4 hrs. with 17 g. anhyd. Na_2CO_3 in 50 cc. H_2O and 15 g. $ClCH_2CO_2H$), yellow-red, m. 206–7°. 5-Nitro deriv., from I with KNO_3 and H_2SO_4 , golden yellow, m. 207°. *Chloride* of I, from I and $SOCl_2$, radiating crystals. *Amide*, Cu-colored, m. about 260° (decompn.). *l-Menthyl ester*, yellow, m. 122°. C. A. R.

Dioximes. XLVII. L. AVOGADRO. *Gazz. chim. ital.* 58, 191–6(1928); cf. Ponzo and Cerrina, *C. A.* 22, 1971.—To det. whether the reaction of $BzCl$ and $PhC(:NOH)CNO$ and treatment of the $Cl(C_2N_2O)Ph$ with $MeOK$ (cf. *C. A.* 21, 1976) is applicable to other nitrile oxides of the $ArC(:NOH)CNO$ type, the action of $BzCl$

on *p*-MeC₆H₄C(:NOH)CNO (I) (cf. C. A. 18, 1491) was studied. I (10 g.) heated some hrs. on the boiling water bath with BzCl (30 g.), cooled, greatly dild. with water, made alk. with NaOH, steam-distd. and the distillate recrystd. from EtOH, yields 3-chloro-5-*p*-tolylazoxime Cl(C₂N₂O)C₆H₄Me (II), of a characteristic odor, m. 42-3°, very resistant to acids, reacts very slowly with boiling concd. aq. alk. hydroxides, forming IV (see later), reacts instantly with boiling alc. alk. ethylates and methylates, forming VII and VI, resp. (see later). In the same way but with a more energetic reaction, BzBr and I form 3-bromo-5-*p*-tolylazoxime (III), has a characteristic odor, m. 27-8°; its chem. properties are similar to those of II. II or III refluxed some days with 10% KOH in MeOH, evapd., water added, acidified with H₂SO₄, and the ppt. recrystd. from water, yields 3-hydroxy-5-*p*-tolylazoxime (IV), m. 199-200° (decompn.), easily decompd. by HNO₃ (d. 1.4) to *p*-MeC₆H₄CN and CO₂. IV boiled with 1,3,4-xylidene, dil. HCl added and the ppt. recrystd. from EtOH, yields (2,4-Me₂C₆H₃NH₂)₂CO (cf. Ber. 3, 226(1870)). IV heated in abs. EtOH with anhyd. Na₂CO₃, filtered and evapd. yields the Na salt of IV, NaO(C₂N₂O)C₆H₄Me-*p* (V), explodes violently at 205°. Aq. V and aq. AgNO₃ ppt. the Ag salt of IV, AgO(C₂N₂O)C₆H₄Me-*p*. HIO(C₂N₂O)C₆H₄Me-*p*, m. 258° (exploding), slowly decomp. when exposed to light. Aq. V and aq. CuSO₄ ppt. the neutral Cu salt of IV, Cu[O(C₂N₂O)C₆H₄Me-*p*]₂, green, unstable, being transformed into IV and the basic salt *p*-MeC₆H₄(C₂N₂O)OCuOH, light blue, the latter then slowly decomp. to a residue contg. black hydrated Cu oxides. With Cu(OAc)₂ instead of CuSO₄ the blue basic salt is formed initially. Me₂SO₄ and IV in 20% NaOH form 3-methoxy-5-*p*-tolylazoxime (VI), which purified by steam-distn. and crystn. from EtOH, m. 47-8° and has a characteristic odor. It is also formed from II or III and MeONa or MeOK. It is resistant to boiling aq. alk. hydroxides, but is slowly hydrolyzed by MeOK in MeOH. Similarly Et₂SO₄ and 20% NaOH or II (or III) and EtOK (or EtONa) form 3-ethoxy-5-*p*-tolylazoxime (VII), characteristic odor, m. 45°, is not hydrolyzed by aq. alk. hydroxides, but is slowly hydrolyzed by boiling alkali ethylates. I (5 g.) agitated with cold 5% aq. NaOH (50 cc.) until the liquid is turbid yellow, let stand, satd. with CO₂, washed with Et₂O, dild. and acidified with H₂SO₄, the ppt. dissolved in boiling water and Cu(OAc)₂ added, ppts. the Cu salt of IV, while evapn. of the filtrate yields 3-*p*-tolyl-5-hydroxyazoxime (VIII) (cf. C. A. 18, 1490). The H₂SO₄ filtrate made alk. with NH₄OH, Ni(OAc)₂ added, the green Ni salt treated with dil. H₂SO₄, extd. with Et₂O and crystd. from water, or Et₂O or AcMe-CHCl₃, yields *p*-tolylmetazonic acid, *p*-MeC₆H₄C(:NOOH)H, m. 176-7° (decomp. to VIII and *p*-MeC₆H₄CN), its aq. soln. gives an intense cherry-red color with FeCl₃, with Cu(OAc)₂ ppts. a Cu salt, dark green, insol. in dil. AcOH, and with Ni(OAc)₂ in the presence of NH₄OH ppts. a Ni salt, green-yellow. XLVIII. I. DE PAOLINI AND A. IMBERTI *Ibid* 196-202.—In the same way that hydroxyglyoximes RC(:NOH)C(:NOH)OH were prepd. from NH₂OH and α-hydroxyimino acid esters RC(:NOH)CO₂R', expts. were carried out to det. whether the reaction was applicable to the prepn. of hydroxytrioximes, RC(:NOH)C(:NOH)C(:NOH)OH, by the action of NH₂OH on esters of α,β-dihydroxyimino acids, RC(:NOH)C(:NOH)CO₂R'. Twenty % HCl (20 cc.) added dropwise to ice-cold NCC₂H₅COEt (15 g.) and satd. aq. NaNO₂ (8 g.), let stand and recrystd. from C₆H₆ yields pure NCC(:NOH)CO₂Et (I). This is a better method of prepn. than that of Müller (*Ann. chim. phys.* [7], 1, 507(1894), cf. also *Ann.* 280, 331(1894); Conrad and Schulze, C. A. 3, 1176). Alc. I and NH₂OH (3 mols.) in MeOH let stand some days, concd. alc. NH₃ added, filtered rapidly, washed with EtOH and dried *in vacuo* over a drying agent, yields the NH₄ salt of amino-hydroxytrioxime, H₂NC(:NOH)C(:NOH)ONH₄ (II). Additional II (making an almost 100% yield) is recovered by adding BaCl₂ to the mother liquor, which ppts. the Ba salt (III). II (1 g.) added to ice-cold concd. HCl (5 cc.), filtered, the filtrate let stand until crystn. is complete, filtered and washed with glacial AcOH, yields the HCl salt H₂NC(:NOH)C(:NOH)C(:NOH)OH.HCl, m. 156° (decompn.) (cf. 148-52° of Wieland and Hess, C. A. 3, 2166); its aq. soln. gives a cherry-red color with FeCl₃ and an orange color when heated (with sepn. on cooling of IV, see later). III and excess Ac₂O kept at first ice-cold, then warmed gently, water added, and crystd. from EtOH, yields H₂NC(:NOAc)C(:NOAc)C(:NOAc)OAc, m. 179° (cf. 177° of W. and H., *loc. cit.*). II in a min. of water acidified with 20% H₂SO₄, boiled a few min., cooled and recrystd. from water, yields H₂NC-N.O.CO.C(:NOH) (IV), m. 171° (cf.

W. and H., *loc. cit.*, W. and Gmelin, C. A. 3, 2936; W. and Baumann, C. A. 7, 598), gives orange-red solns. in alkali hydroxides which become colorless with excess hydroxide because of formation of salts of H₂NC(:NOH)C(:NOH)CO₂H (V) (see later). Benzoylated by the method of Jacobs and Heidelberger (C. A. 11, 2329), IV forms a *mono*-Bs

deriv. (VI), m. 193° (decompn.), hydrolyzed to IV and BzOH by treating with concd. H_2SO_4 and then dilg. with water. Since IV and VI are orange-yellow and MeC:N.O.CO.C:NOH and its acyl derivs. are colorless, a study is to be undertaken

to see whether the accepted formulas of these compds. are true. Alc. $\text{NCC}(\text{:NOH})\text{-CO}_2\text{H}$ (cf. *Ann. chim. phys.* [7] 1, 521(1894)) let stand several days with NH_2OH (2 mols.) in MeOH, excess alc. NH_3 added, filtered, the residue dissolved in a min. of water, strongly acidified with 20% HCl and recrystd. from water, yields V, m. 170° (decompn.) (cf. W. and H., *loc. cit.*); its aq. solns. are acid, gives a red color with aq. FeCl_3 and an amorphous cherry-red ppt. with aq. $\text{Ni}(\text{OAc})_2$, transformed by warming with Ac_2O into $\text{H}_2\text{NC}(\text{:NOAc})\text{CN}$, m. 137° (decompn.) (cf. W. and Gmelin, *loc. cit.*). Alc. NH_3 added to alc. V, and the ppt. recrystd. from EtOH, yields the *NH*₄ salt of V, $\text{H}_2\text{NC}(\text{NOH})\text{C}(\text{NOH})\text{CO}_2\text{NH}_4\cdot\text{H}_2\text{O}$ (VI), softens around 100°, m. 114–5° (decompn.), loses its H_2O of crystn. when dried *in vacuo*. Dil. aq. AgNO_3 added to aq. V ppts. the Ag salt of V, $\text{C}_3\text{H}_4\text{O}_4\text{N}_3\text{Ag}$. Aq. VI and aq. AgNO_3 give a yellow amorphous ppt. which redissolves in excess NH_4OH , giving a soln. which blackens slowly with sepn. of Ag, a decompn. which is accelerated by warming. C. C. DAVIS

Thio-oxytriazines. J. BOUGAULT AND L. DANIEL. *Compt. rend.* 186, 1216–8 (1928), cf. *C. A.* 22, 1360.—The tautomeric form $\text{RC:N:N:C}(\text{SH})\text{NH.CO}$ is preferred

for the thio-oxytriazines (I) to the original formula RC:N NH.CS.NH.CO to explain

the definite acidity and chem. properties. 6-Methylthio-oxytriazine (II), m. 220°, was prepd. from AcCO_2H . Dihydroxytriazines (III) liberate N_2 with NaOBr ; thus benzylidihydroxytriazine gives N_2 and β -phenyl- α,α -dibromopropionamide, whereas I liberates no N_2 but upon destroying the excess NaOBr with NaHSO_3 , III is obtained. By this method 6-methylidihydroxytriazine has been prepd. from II. A. S. CARTER

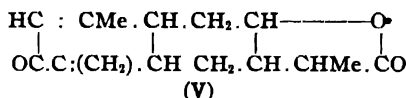
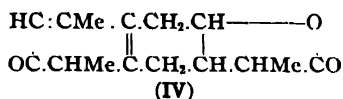
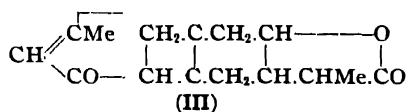
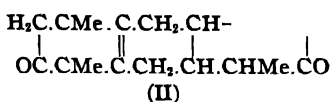
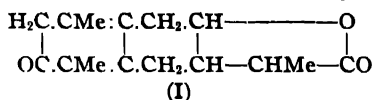
Sparteine I. K. WINTERFELD. *Arch. Pharm.* 266, 299–325(1928).—In order to render the sparteine mol. more susceptible to degradation, expts. were undertaken to introduce 1 or more double bonds through oxidation of 2 or more H atoms, thus changing the satd. mol. to an unsatd. condition. This course was pursued in the hope of obtaining oxidation products which should clearly indicate 1st, whether both N atoms are distributed among 2 different ring systems and 2nd, whether they are of tertiary character. For purposes of dehydrogenation the action of $\text{Hg}(\text{OAc})_2$ on sparteine in dil. AcOH soln. was studied. In the cold a quantity of this reagent was expended on oxidation corresponding to 2 H atoms while a further portion (3 mols. to 1 of sparteine) was utilized in the way of substitution. The dehydrosparteine, $\text{C}_{15}\text{H}_{22}\text{N}_2$, formed is an oily liquid quickly becoming light brown in the air and eventually resinifying. On pouring the free base in alc. into H_2O , it dissolves smoothly therein in contrast to the spartyrine of Willstätter, with which it is isomeric. Both however decolorize KMnO_4 in H_2SO_4 . The dehydro deriv. yields a series of well-defined salts, is optically active, $[\alpha]_D -142.10^\circ$ in CHCl_3 (sparteine, $[\alpha]_D -16.42^\circ$), thus indicating that either a double bond exists in the vicinity of an asym. C atom or that a *d*-rotatory asym. C atom has disappeared. On removal of the dehydrosparteine quant. from the CHCl_3 soln. (used in the optical rotation) by extn. with HCl, followed by reduction with Zn, the base freed by alkali from the HCl soln. had $[\alpha]_D -18.35^\circ$, and yielded in the cold an amorphous Au salt decomp. 166–7° (sparteine chloraurate, m. 193–4°). Accordingly, reduction of the dehydro compd. yields a base isomeric with the mother substance. The conception of dehydrosparteine as a quaternary base, as contrasted with sparteine, finds further justification in that it gives no ppt. with NH_3 , but is extractable with Et_2O in the presence of NaOH. If $\text{Hg}(\text{OAc})_2$ is allowed to react with sparteine in the heat, 4 H atoms are split off with the formation of didehydrosparteine, $\text{C}_{15}\text{H}_{20}\text{N}_2$, which is extd. by $\text{CHCl}_3\text{-Et}_2\text{O}$ only from strongly alk. soln. Neither concd. NH_3 nor dil. caustic soln. effects a pptn. Thus, this compd. must likewise be regarded as a carbinol base. The passage of sparteine to a dehydro- and later to a didehydro-base is indicated by the color changes incident to the operations, the soln. of sparteine being absolutely colorless, while that of the dehydro-base is bright yellow and that of the didehydro-base deep golden yellow. In contrast to dehydrosparteine, the Au and Pt salts of the didehydro-product are amorphous. The HgCl_2 compd. has the compn. $\text{C}_{15}\text{H}_{20}\text{N}_2\cdot 4\text{HgCl}_2\cdot 2\text{HCl}$ and forms a finely cryst. powder. The perchlorate is particularly characteristic. Careful oxidation of the dehydro-base in cold AcMe with KMnO_4 yielded a yellowish sirupy product of acid character. The Me ester therefrom prepd. *via* E. Fischer gave a cryst. Pt salt indicating the base to have the formula $\text{C}_{15}\text{H}_{20}\text{O}_2\text{N}_2$. This compn. was also indicated from the behavior of the base toward acetylation and

the formation of the NO compd. The oxidative scission of a side chain was thus shown, in that one of the N atoms had acquired secondary properties. Of importance in a soln. of the constitution problem was the question whether in the 2nd dehydrogenation the same ring system was involved as in the 1st, or rather was the other ring system affected? The formula of Moureu and Valeur presents a sym. arrangement of the atoms in the 2 N-contg. rings and should apparently favor dehydrogenation simultaneously in both ring systems, whether in the cold or heat. The fact, however, that dehydrogenation takes place on the 1 hand in the cold, and then in the heat, makes the M. and V. formulation of little probability. Rather do the results obtained in degradation with $\text{Hg}(\text{OAc})_2$ lead to the conclusion that both of the N-contg. ring systems are either unsym. with respect to each other, or the more plausible view that they are differently constituted. The oxidation of the didehydro-product with KMnO_4 yielded a di- CO_2H acid, susceptible of esterification like the dehydro-base; its behavior also toward Ac_2O showed the entry of 2 Ac groups. Proof that the 2 N atoms were secondary in character was seen in its NO deriv. Attempts to reduce the CO_2H group to that of a primary alc. were only partially successful. Expts. also (carried out by W. IPSEN) looking to the development of a more basic ring system, by exhaustive methylation, yielded negative results. Among the compds. prepd. and further characterized in the present investigation were: *dehydrosparteine salts*; *chloroplatinate*, $(\text{C}_{15}\text{H}_{24}\text{N}_2)_2 \cdot \text{H}_2\text{PtCl}_6 \cdot 5.5\text{H}_2\text{O}$, m. 255° (decompn.); *chloroaurate*, $\text{C}_{15}\text{H}_{24}\text{N}_2 \cdot 2\text{HAuCl}_4 \cdot 2\text{H}_2\text{O}$, m. $157-8^\circ$; *HgCl}_2* salt, $\text{C}_{15}\text{H}_{24}\text{N}_2 \cdot \text{HgCl}_2 \cdot 2\text{HCl} \cdot \frac{1}{2}\text{H}_2\text{O}$, m. $256-7^\circ$ (decompn.). *Didehydrosparteine salts*: *chloroaurate*, $\text{C}_{15}\text{H}_{22}\text{N}_2 \cdot 2\text{HAuCl}_4$, 147° (decompn.). *HgCl}_2* salt, $\text{C}_{15}\text{H}_{22}\text{N}_2 \cdot 4\text{HgCl}_2 \cdot 2\text{HCl}$, m. 222° ; *chloroplatinate*, $\text{C}_{15}\text{H}_{22}\text{N}_2 \cdot \text{H}_2\text{PtCl}_6$, m. 273° (decompn.); *perchlorate*, $\text{C}_{15}\text{H}_{24}\text{N}_2(\text{ClO}_4)_2$, m. 256° (decompn.), $[\alpha]_D^{25} 44.87^\circ$ (free base optically inactive); *picrate*, $\text{C}_{15}\text{H}_{22}\text{N}_2(\text{C}_6\text{H}_2(\text{NO}_2)_3(\text{OH}))$, m. 178° (decompn.); *chloroplatinate of acid* (by oxidation of dehydrosparteine with KMnO_4), $\text{C}_{15}\text{H}_{20}\text{O}_2\text{N}_2 \cdot \text{H}_2\text{PtCl}_6$; *benzylidene deriv. of hydrazide of acid*, $\text{C}_{27}\text{H}_{30}\text{O}_4\text{N}_4$, m. 207° ; *amine picrate* (from the nitrosourethan of the azide), $\text{C}_{12}\text{H}_{22}\text{N}_3 \cdot 2\text{C}_6\text{H}_2(\text{NO}_2)_3\text{OH}$, m. 187° (decompn.); *Me ester* (of acid arising from the oxidation of didehydrosparteine with KMnO_4), $\text{C}_{16}\text{H}_{26}\text{O}_4\text{N}_2$, sirupy liquid; *Et ester*, $\text{C}_{17}\text{H}_{30}\text{O}_4\text{N}_2$, sirup; *acetylated ester*, $\text{C}_{19}\text{H}_{30}\text{O}_6\text{N}_2$, yellowish brown oil; *benzylidene deriv. of hydrazide (chloroaurate)* (from the di- CO_2H acid via Curtius), $\text{C}_{27}\text{H}_{34}\text{O}_2\text{N}_6$, m. 175° (decompn.); *chloroaurate of benzoylated diamine* (from the dinitrosodiazide of the acid), $\text{C}_{30}\text{H}_{38}\text{O}_4\text{N}_4 \cdot \text{HAuCl}_4 \cdot \text{HCl}$, m. 98° (decompn.).

W. O. E.

The refractive power and dispersive power of santonin and some of its isomers and derivatives. I. Santonin, *p*-santonide and α - and β -*m*-santonin. G. BANCHI. *Gazz. chim. ital.* 58, 77-95(1928).—Measurements of the n values were made for the α , β and γ lines of H and the D line of Na. The following data give the exptl. value of $(n_{H\alpha} - 1)/d$, its calcd. value, the difference between this and the calcd. value, the exptl. value of $P(n_{H\alpha}^2 + 2)d/(n_{H\alpha}^2 - 1)$, its calcd. value, the difference between this and the calcd. value, $H_\beta - H_\alpha$ and $\% [(H_\beta - H_\alpha) - (H'_\beta - H'_\alpha)]/(H'_\beta - H'_\alpha)$, resp., where n is the index of refraction, d is the density and P is the mol. wt.: santonin (2 double bonds) 117.09, 113.4, 3.69, 67.675, 65.240, 2.345, 1.809, 34.60; santonin (1 double bond) 117.09, 111.0, 6.09, 67.675, 63.554, 4.121, 1.809, 48.43; *p*-santonide 116.637, 113.4, 3.237, 67.706, 65.240, 2.466, 1.252, -6.85; α -*m*-santonin 111.61, 111.0, 0.61, 64.864, 63.554, 1.310, 1.469, 14.50; β -*m*-santonin 108.13, 111.0, -2.87, 63.014, 63.554, -0.540, 1.292, 2. The chief source of error in the measurements was evapn. of the CHCl_3 used as solvent, which tended to give high values of the refractive powers. *Santonin*.—An exaltation of 2.435 is not great for a compd. of high mol. wt. in CHCl_3 . In the Francesconi formula (I) the exaltation would depend chiefly upon 3 factors, (1) conjugation of the semicyclic CO_2H double bond with a double bond of the same nucleus, (2) the aromatic character of this nucleus in the hydronaphthalic nucleus and (3) the union of the heterocyclic satd. lactonic nucleus with the hydronaphthalic nucleus. Since this last factor alone gives phenolphthalein an exaltation of 4.56, a value of 2.435 makes this formula of santonin improbable. In formula II only the double bond uniting the 2 ring nuclei is effective in causing a notable exaltation, and with this structure the observed exaltation is within limits which would be predicted. Based on the same kind of reasoning the Angeli and Marino formula (III) is also compatible with the observed exaltation. The observed exaltation is too low to be explained by the Bargellini formula (IV) and the Francesconi and Cusmano formula (V) and these are improbable. Formulas II and III conform best to the observed exaltation, and since II also conforms to the chem. properties of santonin, it is the most probable. *m*-Santonin.—The refractive power of the α -compd. is smaller than that of santonin on account of the difference of position of the double bond, the absence of the naphthalic nuclei, a single Gladstone

atom instead of 2 such atoms and the unsatn. of the heterocyclic nucleus united to the hydronaphthalic nucleus. α -*m*-Santonin has therefore a refractive power conforming to calcns. based on its accepted structure. The refractive power of the β -compd. is not readily explainable. *p*-*Santonide*.—It is possible to explain the high refractive power of this compd. by the presence of a different no. of double bonds from those in its isomers, but further chem. research is necessary before its constitution is established.



C. C. DAVIS

Gossypol. IV. Apogossypol. E. P. CLARK. Bur. Chem., Washington. *J. Biol. Chem.* 78, 159-66(1928); cf. *C. A.* 22, 2141.—Gossypol treated with 40% NaOH for 0.5 hr. on a steam bath is converted to HCO₂H and *apogossypol*, a new substance, in the proportion of 2:1. Apogossypol has the compn. C₂₈H₃₀O₆. It contains 6 OH groups and forms a hexa-Ac deriv. (m. 291°) and a hexa-Me ether (m. 230-40°). Apogossypol is much less toxic than gossypol and differs from the latter in causing acute toxic effects only.

ARTHUR GROLLMAN

The strength of acetamide as an acid (BRANCH, CLAYTON) 2. The relation between the hydrolysis equilibrium constant of esters and the strengths of the corresponding acids (WILLIAMS, *et al.*) 2. The oxidation-catalytic action of Fe (HANDOVSKY) 2. The relation between chemical constitution and x-ray diffraction in liquids (KRISHNAMURTI) 2. Detection and determination of benzene, benzene, alcohol, ether and tetralin in motor fuels (FORMANEK) 21. Iron oxide [reduction of nitro compounds] (Can. pat. 278,167-8-9) 18.

Alcohols. E. E. AYERS, JR. Can. 278,537, Mar. 13, 1928. Monohydric alcs. contg. 4 to 5 C atoms are produced by sepg., from gasoline derived from natural gas, normal butane and the pentanes by rectification under pressure with successive re-fluxing of isobutane, normal butane and normal pentane. The normal butane and pentanes are chlorinated and the alkyl chlorides are hydrolyzed. The alcs. so produced are purified by extn. with H₂O.

Alcohols. I. G. FARBENIND. A.-G. Brit. 278,777, June 10, 1926. The O-contg. org. compds. obtained by the catalytic hydrogenation of C oxides by processes as described in Brit. 227,147 (*C. A.* 19, 2673), Brit. 229,714 (*C. A.* 19, 3093), Brit. 237,030 (*C. A.* 20, 1414) and Brit. 238,319 (*C. A.* 20, 1995) are converted into colorless oils consisting of higher alcs. by catalytic treatment in the vapor phase with H in the presence of a hydrogenation catalyst. The material may be preliminarily purified by treatment with granular SiO₂ and then with NaOH. Ni, Co, Cu or Pt may be used as catalyst and Al(OH)₃, Al phosphate or oxides of Th or W may also be present.

Anhydrous alcohol. J. FLXER. Can. 279,731, May 1, 1928. Commercially anhyd. glycerol is heated to approx. 200°, the water being expelled therefrom, and a considerably less quantity of alc., approx. 65% overproof, is mixed therewith. The mixt. is heated much above the b. p. of the alc., which is vaporized and condensed. The glycerol contg. the withdrawn water is reheated at a much higher temp. for reclaiming any alc. remaining.

Device and reagent kit for testing alcohol to detect denaturants. H. F. TAYLOR (to The Detectol Mfg. Co.). U. S. 1,674,416, June 19. A small portable outfit is described in which a very small sample is at least partially distd. and the condensate then successively treated with (a) a reagent formed from KMnO₄, H₃PO₄ and water; (b) an aq. soln. of H₂SO₄ and FeSO₄; and (c) an aq. soln. of basic fuchsin and Na₂SO₄. A bluish color indicates the presence of denaturant and a whitish color its absence.

Purifying *N*-alkylcarbazoles. F. S. MORTIMER and R. W. HESS (to National Aniline & Chemical Co.). U. S. 1,674,216, June 19. Impure *N*-ethylcarbazole or other similar *N*-alkylcarbazole is extd. with H_2SO_4 of 77–87% strength at a temp. not above about 25°, and the *N*-alkylcarbazole is recovered from the filtrate by diln. with ice water to effect pptn. The crude material may be preliminarily fused with $\text{C}_{10}\text{H}_{18}$.

Alkylcoumaran. H. JORDAN. Can. 278,727, Mar. 20, 1928. The products of condensation of alkylphenols and a ketone are heated to about 300–310° to effect decompn., and the decompn. products are subjected to fractional distn., the alkylcoumarans being collected.

Alkylisopropylenephenol. H. JORDAN. Can. 278,726, Mar. 20, 1928. Alkylisopropylenephenols are produced by heating the condensation product of crude cresol and acetone to about 300–310° to effect distn., and subjecting the distillate to fractional distn. The fraction contg. the methylisopropylenephenols is collected.

Alkyl substitution. A. VERLEY. Can. 279,590, Apr. 24, 1928. An aromatic compd. is made to react with an alkylsulfuric acid, *e. g.*, *p*-cymene is prepd. from toluene by agitating a mixt. of 100 kg. H_2SO_4 contg. 25% $\text{Na}_2\text{S}_2\text{O}_7$ with 5 kg. of iso-PrOH and 25 kg. of toluene, and maintaining the temp. of the mixt. at about 60° for 1 hr. The material is then treated with H_2O and the supernatant layer drawn off. This layer is washed and sepd. into toluene and pure *p*-cymene by fractionation.

Aromatic amino compounds. I. G. FARBERIND. A.-G. Brit. 279,283, April 21, 1926. Reduction of PhNO_2 to PhNH_2 or other similar reductions are effected with Fe and HCl of over 6% concn.; or, if an acid soln. of a salt of the aromatic amine is used instead of HCl this soln. is of a corresponding concn. A finely divided Fe oxide is obtained suitable for use as a pigment. Cf. C. A. 22, 2171.

Purifying aromatic hydrocarbons. A. O. JAEGER (to The Selden Co.). U. S. 1,674,472, June 19. Aromatic hydrocarbons such as crude benzene or solvent naphtha contg. acyclic, alicyclic and heterocyclic impurities are subjected to the combined action of Cl or other halogenating agent and strong H_2SO_4 , using less of the H_2SO_4 than would produce a product of usual desired purity and the amt of active halogen being insufficient to effect substantial nuclear halogenation but sufficient to react with impurities.

Aromatic mercaptans. I. G. FARBERIND. A.-G. Brit. 279,136, Oct. 18, 1926. Mercaptans of the general formula, R.SH , in which "R" stands for a substituted or unsubstituted benzene or naphthalene residue are made by reaction of diazo-aryl compds., contg. no groups which would make them sol., upon a "more highly sulfurized metal than a metal disulfide" and reducing the product of this reaction. An alk. substance such as an alkali carbonate or bicarbonate or silicate, or a metal or salt such as Cu or a Cu salt, acting as a catalyst, may be added. 5-Chloro-2-amino-1-methylbenzene may be diazotized, neutralized and run into a heated Na polysulfide soln. to which Na_2CO_3 and CuSO_4 may be added. Ca polysulfide also may be used.

Esters. F. W. SKIRROW. Can. 279,973, May 8, 1928. Mixed esters are made by treating a mixt. of AcH and butyraldehyde with aluminum ethoxide.

Glycol esters. G. STEIMMIG and H. ULRICH. Can. 278,557, Mar. 13, 1928. Esters of glycols are produced by acting on an org. acid anhydride with an alkylene oxide at an elevated temp. and in the presence of a catalyst.

Extraction of fatty acids. E. RICARD and H. M. E. GUINOT. Can. 279,167, Apr. 3, 1928. Fatty acids contained in dil. aq. solns. are removed in the anhydrous state by treating such solns. by a systematic exhaustion by means of a mixt. of acetic esters.

Halohydrins. H. ESSEX and A. L. WARD. Can. 277,851, Feb. 14, 1928. Dichlorohydrin is pptd. by passing Cl_2 into a mixt. of allyl chloride and a satd. aq. soln. of dichlorohydrin; the dichlorohydrins are collected separately from the mixt.

Halogen-substituted olefin. C. O. YOUNG. Can. 278,157, Feb. 28, 1928. A halogen-substituted olefin is produced by treating an olefin dihalide with an aq. soln. of a caustic alkali at a relatively high temp.

Dihydroxy carbon compound. H. ESSEX and A. L. WARD. Can. 277,852, Feb. 14, 1928. Phenylglycol is produced by passing CO_2 into a mixt. of styrene and an aq. soln. of NaOCl , while the mixt. is kept cool, until all the hypochlorite has been decompd. The resulting mixt. is boiled until the chlorohydrin contained therein is hydrolyzed to phenylglycol.

Catalytic production of hydrocarbons. I. G. FARBERIND. A.-G. Brit. 279,347, May 30, 1927. In producing CH_4 and other hydrocarbons from C oxides and H or gases which split off H, the temp. is prevented from rising too high and the heat of reaction is utilized, by connecting the contact chamber with a generator of high-pressure steam so that

heat exchange is effected. Various structural features are described. Cf. *C. A.* 22, 1594.

Synthetic production of hydrocarbons. M. G. CORSON. *Brit.* 279,095, Oct. 14, 1926. CaC_2 is caused to react with an alc., phenol or Cl deriv. of a hydrocarbon in the absence of carboxyl groups, at 150–300° and under about 12–40 atm. pressure. When EtOH is used, the water present is first decompd. with production of C_2H_2 , which is withdrawn through a reflux condenser. The condenser is then removed and the vessel closed, after which diethylacetylene is formed, which may be further treated with H and a catalyst to produce hexane. When PhCl is used, diphenylacetylene, is formed, which on catalytic hydrogenation yields stilbene or dibenzyl. The dibenzyl may be treated with a reducing metal such as Zn, Mg, Na or Al and HCl to produce toluene. MeOH, PrOH, PhOH, cresol and similar compds. may also be used as starting materials in the process.

Ozonization of hydrocarbons. A. S. RAMAGE. *Can.* 279,396, Apr. 17, 1928. Ozonized air is introduced into a body of liquid hydrocarbons comprising at least about 60% of unsatd. hydrocarbons, and having an initial b. p. of 125° and an end b. p. of not above 250°, until such body attains a density of about 20° Bé.

Unsaturated hydrocarbons. W. O. HERRMANN and E. BAUM. *Can.* 279,622, Apr. 24, 1928. Unsatd. hydrocarbons are prepd. by passing more highly satd. aliphatic hydrocarbons in contact with heated C.

Carbocyclic ketones with more than nine ring members. I. RUZICKA (to Firm of M. Naef & Co.). U. S. 1,673,093, June 12. Ketones such as cyclopentadecanone are formed by heating C and Th salts of tetradecane-1,14-dicarboxylic acid or other normal straight-chain aliphatic dicarboxylic acid salts of the fourth group of the periodic system having a C chain contg. more than 10 C atoms with the COOH groups attached at the ends.

Organic arsenic compounds. ÉTABLISSEMENTS POULENC FRÈRES AND E. FOURNEAU. *Brit.* 279,379, Oct. 21, 1926. *o*-Chloro-*p*-aminoglycinamide-phenylarsonic acid is prepd. by treating diazotized *o*-chloro-*p*-nitroaniline with Na arsenite, reducing the resulting *o*-chloro-*p*-nitrophenylarsonic acid, and treating the product with chloroacetamide. *o*-Chloro-*p*-nitroaniline is made by chlorinating *p*-nitroaniline.

Formaldehyde solution. E. KUSS and G. HAHNEL. *Can.* 279,991, May 8, 1928. Solid condensation products of CH_2O are converted into aq. CH_2O solns. by heating such products together with H_2O to temps. above 100° under a pressure sufficient to keep the water substantially in the liquid state.

Paraformaldehyde. E. KUSS and R. HELLER. *Can.* 278,947, Mar. 27, 1928. $\text{C}_3\text{H}_6\text{O}_3$ is produced by catalytically oxidizing methanol which is substantially free from H_2O , and washing with strong solns. of CH_2O the reaction gases contg. CH_2O and H_2O vapor with an addition of inert gases. Cf. *C. A.* 22, 1982.

Acetic acid. H. SUIDA. *Can.* 279,952, May 8, 1928. Concd. AcOH is recovered from a vapor mixt. of AcOH and H_2O by subjecting such a mixt. to a mixt. of a phenolic compd. having a high b. p. and an org. chlorine compd. having a low b. p.

Acetic anhydride. R. MEINGAST and M. MUGDAN. *Can.* 278,936, March 27, 1928. Ac_2O is prepd. by heating AcOH vapor in the presence of dehydrating catalysts to 400–800° on heat-conducting surfaces composed of alloys contg. Cr which are not attacked by liquid AcOH.

Acetic anhydride. CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE GES. *Brit.* 279,070, Oct. 18, 1926. HOAc vapor is treated with a small quantity of a gaseous catalyst (preferably an acid such as H_3PO_4 , HCl or H_3BO_3 or substances such as P and its volatile compds. which yield acid compds. under the reaction conditions), as by heating in a C tube at 650°. The process may be combined with that of *Brit.* 272,951 (*C. A.* 22, 1783), the HOAc vapor being first heated to the reaction temp. and the catalyst being then added. The app. used may be made of Cr steel, Cu, Si, SiC or quartz and elec. heating may be employed. The process can also be used in combination with those described in *Brit.* 194,719 (*C. A.* 17, 3509), and *Brit.* 230,063 (*C. A.* 19, 3271), the HOAc vapor superheated to 600° being passed through a C tube into a molten mass of equimol. proportions of Na and Li phosphates in a graphite crucible at 700°. At the same time, a soln. of H_3PO_4 in HOAc is sprayed into the C tube.

Purifying acetylene. S. TAMARU and S. KANO. *Can.* 280,609, May 29, 1928. C_2H_2 is purified by passing raw gas over a porous substance acting as a catalyzer in the presence of small but sufficient quantity of O_2 in order to oxidize the impurities contained in the C_2H_2 .

Benzoic acid ester. H. W. MATHESON. *Can.* 280,625, May 29, 1928. BzH is made to react with Al alkoxide.

Butyl butyrate. F. W. SKIRROW. Can. 279,974, May 8, 1928. PrCO_2Bu is manufd. by treating PrCHO with Al(Obu)_3 dissolved in an ester.

Calcium formaldehyde sulfoxylate. M. BAZLEN and E. RIEGER. Can. 280,550, May 29, 1928. Difficultly sol. Ca formaldehyde sulfoxylate is produced by acting on a soln. of an alkali metal formaldehyde sulfoxylate with a sol. Ca salt together with a substance selected from the class consisting of Ca(OH)_2 , NaOH soln. and the corresponding carbonates.

Chlorinating naphthalene. S. BROWN (to Halowax Corporation). U. S. 1,672,878, June 12. Cl_2 is drawn under suction through a chamber contg. molten C_{10}H_8 , so that the chlorinating chamber is maintained under partial vacuum, without causing boiling of the C_{10}H_8 . An app. is described.

Chlorine derivatives of aminodimethylbenzene. I. G. FARBENIND. A.-G. Brit. 278,761, Oct. 11, 1926. 3-Chloro- and 5-chloro- and also 3,5-dichloro-1-amino-2,4-dimethylbenzene are obtained by chlorinating 1-nitro-2,4-dimethylbenzene and reducing the products. Details are given.

Cresol-ketone condensation product. H. H. JORDAN. Can. 278,725, Mar. 20, 1928. A new product is produced by causing condensation of crude cresol and a ketone at a temp. slightly exceeding room temp. and in the presence of a condensation agent.

d-Glucose. C. EBERT, W. B. NEWKIRK and M. MOSKOWITZ (to International Patents Development Co.). U. S. 1,673,187, June 12. "Hydrol" is treated to increase its crystallizable d-glucose content by neutralizing the "hydrol" until coagulation and pptn. of impurities takes place, filtering and then subjecting the filtered liquid to a hydrolyzing operation. Cf. C. A. 22, 2288.

Substituted guanidine. J. P. SCHMITTNÄGEL. Can. 277,565, Jan. 31, 1928. NaCN is treated with Cl_2 in the presence of an inert org. solvent, b. 70 – 100° , and the CNCl soln. thus obtained is treated with a primary amine at a temp. below the b. p. of CNCl . The mixt. is then boiled, whereby a disubstituted guanidine hydrochloride is formed.

Menthol. W. SCHOELLER and H. JORDAN. Can. 278,729, Mar. 20, 1928. Menthol is produced by hydrogenating 3-methyl-6-isopropylphenol at elevated temp. in the presence of a catalyst.

Methanol synthesis. J. C. WOODRUFF and G. BLOOMFIELD (to Commercial Solvents Corporation). Brit. 279,378, Oct. 25, 1926. In prep. catalysts for MeOH synthesis such as those of the general type described in Brit. 271,840 (C. A. 22, 1596), ZnO may be stirred into an aq. soln. contg. Cr nitrate, $\text{Fe(NO}_3)_3$ and ZnCl_2 and the mass evapd. and heated to decomp. the nitrates, the product then crushed and treated with an aq. soln. of ZnCl_2 and allowed to harden spontaneously. Other similar examples also are given and reference is made to the use of oxides of Zn, Mg, Cd, Cr, V, W, U, Zr, Ti, Al, Mn, Mo, Th and Ce (as difficultly reducible oxides) which may be used with more easily reducible oxides such as those of Cu, Ag, Fe, Ni and Co. Cf. C. A. 22, 1783.

Methanol synthesis. J. C. WOODRUFF (to Commercial Solvent Corporation). Brit. 279,377, Oct. 25, 1926. Catalysts are prep. by treating a reducible Ni compd. such as the hydroxide, oxide, nitrate, oxalate or tartrate with H at 300 – 450° (preferably 500 – 600°), suitable after forming into tablets with a binder such as dextrin. MeOH may be produced from C oxides and H by use of the catalysts at 250 – 450° under a pressure of 50 atm. or higher.

Purifying p-nitroaniline. A. MILLER (to Tower Mfg. Co.). U. S. 1,673,154, June 12. In the manuf. of nitroaniline from nitrochlorobenzene with NH_3 , in connection with which by-products are formed which cause a flocculent ppt. upon diazotization, the by-products are reduced by a mild reducing agent such as SnCl_2 .

Thymol. W. SCHOELLER and H. JORDAN. Can. 278,728, Mar. 20, 1928. 3-Methyl-6-isopropylphenol is produced by hydrogenating 3-methyl-6-isopropylphenol at elevated temp. in the presence of a catalyst.

Catalytic oxidation of toluene or other volatile organic substances. W. A. CASPARI. U. S. 1,674,589, June 19. In the production of benzaldehyde from toluene or phthalic anhydride from C_{10}H_8 or in similar reactions, the catalyst, e. g., V oxide, is suspended in finely divided condition in the reacting vapors.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

The antirachitic effect of December sunlight: seasonal variation. F. F. TISDALL AND A. BROWN. *Proc. Soc. Exptl. Biol. Med.* 24, 446-9(1927).—The sun rays in December in the latitude of the City of Toronto produce a definite antirachitic effect on rats fed on a rickets-producing diet. C. V. B.

The antirachitic effect of December skylight and of December sunlight through vitaglass. F. F. TISDALL AND A. BROWN. *Proc. Soc. Exptl. Biol. Med.* 24, 449-51 (1927).—December skylight in the latitude of the City of Toronto produces a definite antirachitic effect on rats fed on a rickets-producing diet. Vitaglass transmitted approx. $\frac{1}{4}$ of the antirachitic rays of December sunlight. Ordinary glass was impervious to these rays. C. V. B.

The antirachitic activity of monochromatic and regional ultra-violet radiations. A. F. HESS AND M. WEINSTOCK. *Proc. Soc. Exptl. Biol. Med.* 24, 759-60(1927).—Two bands of radiations given off by the Hg vapor quartz lamp—those less than 290μ in length and those between 290μ and 313μ —were isolated and their antirachitic properties tested directly by irradiating rachitic rats. Radiations below 290μ , which are shorter than those produced by the sun, were the more potent. C. V. B.

Supposed photoactivity of irradiated substances. O. BECK. *Monatsschr. Kinderheilk.* 33, 320-9(1926).—The observed darkening of the photographic plate is due to ultra-violet rays of relatively long wave lengths. Irradiation of cod-liver oil and milk produces an extension of the absorption spectrum towards the ultra-violet, and that of paraffin oil a contraction. The I value of cod-liver oil, but not of paraffin, suffers a temporary reduction. B. C. A.

Reversibility of the oxidative decomposition of amino acids and its physiological significance. F. KNOOP. *XII Int. Cong. Physiol.* 1926, 90.— α -Ketonic acids and NH_3 , in the presence of mol. H and Pd, yield 70% of the theoretical quantity of amino acids. Ferrous salts and cysteine effect the reduction in the absence of free H and catalysts. B. C. A.

The individuality of casein. Preliminary paper. K. LINDERSTRØM-LANG. *Z. physiol. Chem.* 176, 76-8(1928).—By fractional extn. of purified casein with 20 parts of 60% EtOH contg. 0.002-0.001 N HCl and pptn. of the exts. with NaOH, a no. of fractions were obtained which varied between 0.15 and 1.0% in P content, between 1.4 and 2.3% in tryptophan content and between 3.8 and 6.1% in tyrosine content. Smaller but unmistakable variations were noted in the arginine, amino-dicarboxylic acid and lysine content. The reversibility of the fractionation was shown by exhaustive extn. of the casein, pptn. of the ext. with NaOH and addn. of this ppt. to the residue. The final material was identical in every respect with the original substance. Casein is not an individual substance. A. W. DOX

Glucolysis in the blood of birds following Röntgen irradiation. A. BORNSTEIN AND O. ASCHER. *Z. ges. exptl. Med.* 52, 615-8(1926).—Glucolysis is observed following irradiation. It is more rapid at 37° than at 0° . F. L. DUNN

Experimental studies on the formation of acetone bodies from amino acids. S. WEISS. *Z. ges. exptl. Med.* 52, 707-14(1926).—The amounts of acetone and dextrose derived from seven amino acids are given. F. L. DUNN

Reflections on the chemical senses. E. G. THOMSSON. *Am. Perfumer* 23, 71-3, 161-2(1928).—A discussion of the mechanics and chemistry of taste and smell. Thus, the author considers the importance of the senses in industry, and our limited knowledge of the chem. senses. A survey is made of recent work on taste and smell; the nature and mechanism of the stimuli; classified odor and taste; the conditions upon which quality and intensity of these senses depend; the relation of chem. compn. to odor; the association of odor with memory and pleasure; the practical applications of odor and taste in industry; suggestions for some further means of soln. of the problems raised. W. O. E.

Glycogenase in the fish muscle. I. TAKEO OYA AND KIYOSHI SHIMADA. *J. Imp. Fish. Inst. (Tokyo)* 22, 24-8(1926); (In Japanese; English résumé p. 17) *Biol. Abstracts* 1, 247.—It was found that a pH of about 7 is most favorable for the action of the enzyme in fish muscle of *Scomber japonicus*, *Paralichthys olivaceus* and *Pagrosomus*

mayor. This agrees with the findings of Euler, Myrback and Karlsson for rabbit muscle. H. G.

Amylase in pyloric ceca of *Sariola quinqueradiata*. TAKEO OYA AND KIYOSHI HARADA. *J. Imp. Fish. Inst. (Tokyo)* 22 [1], 28-33(1926); (In Japanese; English résumé, p. 17-8) *Biol. Abstracts* 1, 247.—Fat-free ceca were ground with sand, extd. with H_2O and pptd. with alc., the ppt. being dried over concd. H_2SO_4 . The resultant powder was yellow and insol. in H_2O . A pH of about 7 was most favorable for the action of the amylase, as is the case with pancreatic amylase of rabbit and ox. The optimum temp. was about 43° . NaCl accelerated the amylase action at 0.0125 mols.; above 0.05 mols. it had a retarding effect. KCl had no such effect even at 0.0125 mols. H. G.

Action of heat on serum lipases. G. DI MACCO. *Riv. patol. sper.* 1, 448-54(1926); *Biol. Abstracts* 1, 814.—The activity of lipases in blood serum of dogs is destroyed in a few minutes at 70° . The 2 lipolytic fractions as detd. by quinine are more sensitive to heat. The quinine-resistant fraction loses its activity at a slightly elevated temp., while the quinine-labile fraction, which is relatively thermostable, diminishes greatly in activity at 55° within 5 min. H. G.

The influence of hormones on the chemistry of the cell. J. WOHLGEMUTH Rudolf-Virchow Hospital, Berlin. *Deut. med. Wochschr.* 54, 816-7(1928).—A review of the previous work of W. and his coworkers. ARTHUR GROLLMAN

The relation between protein and urease. HAJIME ISHIBASHI. *Bul. Sci. Fakultato Terakulturu, Kjusu Imp. Univ.* 2, 287-91(1928).—Sumner (C. A. 20, 3301) has obtained urease from jack beans in crystal forms which have the nature of globulin. When repeating S.'s expts., I. never obtained a crystal. His urease was also less active. In order to det. whether the urease is a protein, the action of proteolytic enzymes on a urease-soln. has been studied. Pepsin and trypsin produce some amino acid and decrease the activity of the urease, but the production of amino acid and the diminution of activity are not proportional. There is a close relation between urease and proteins. A. L. HENNE

Studies of metal proteins. G. B. BONNINO AND GARELLO. *Arch. biol.* 1927, 51-5; *Ber. ges. Physiol. exptl. Pharmacol.* 44, 501.—To a 1% gelatin soln. of pH 5.5-5.5 Co powder was added until pH 6.5 was reached. Another gelatin soln. of pH 6.0-6.5 was dialyzed against 0.01 N $CoCl_2$, then against dialyzed water until the cond. reached the value of the 1st soln.: 2.22×10^{-4} . The solns. are identical with regard to viscosity, Co content and the velocity of salt diffusion. MARY JACOBSEN

A study of protein coagulation by the drop method. JAN BEČKA. *Časopis lékařů českých* 66, 1770-9(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 500 M. J.

The cell stimulation problem as applied to medicine and agriculture. METHODI POPOFF. *Fortschr. Naturwiss.* [new series], No. 3, 1-31(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 356. MARY JACOBSEN

Studies in the combination of protein and salts by means of conductometric methods. II. The combination of egg albumin and salt. KINSHIRO ITO. *Kyoto Ikadaigaku Zasshi* 1, 1061-5(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 483.—The decrease of cond. of KCl , $ZnCl_2$ or $CaCl_2$ solns. on the addn. of ovalbumin is attributed to adsorption of the salt. MARY JACOBSEN

Myelins of oleates, soaps and lipoids. A further contribution to the properties of liquid lipid crystals. VINCENZO DIAMARE. *Rend. accad. sci. (Napoli)* 33, 132-49(1927).— H_2O , H_2O_2 , chromates and crystalloids generally are excellent media for the differentiation between oleate and soap myelins on the one hand and lipid myelins on the other, since they dissolve the former and favor the formation and development of the latter, without causing any chem. or morphological change. Pure water is the least favorable "culture" medium. The gray matter of the brain contains a large proportion of a typical lipoidal myelin which may be easily identified in the form of liquid crystals enclosed in the neurokeratogenic colloid. Traces of this myelin may be demonstrated in the telencephalon in the earliest embryonal stage. The embryo contains considerable quantities of a typical lipid myelin already at an age at which its alleged sources (adrenals, etc.) are still at the blastemic stage. It is therefore necessary to assume that it has its origin in the placenta, in the maternal blood or in the yolk. The method also permits the differentiation between various lipoids. Pure com. lecithin and egg yolk myelin differ from nerve myelin. The myelin derived from caseous necrotic foci differs from that of furuncle pus. MARY JACOBSEN

Chemical, colloidal and biological effects of Röntgen rays of different wave length and their relation to air ionization. II. Ferrous sulfate in aqueous solution. HUGO FRICKER AND MOSE STERN. *Strahlentherapie* 26, 749-56(1927); *Ber. ges. Physiol. exptl.*

Pharmakol. **44**, 336; cf. *C. A.* **21**, 3682-3.—A 10^{-3} mol. soln. of FeSO_4 in 0.8 N H_2SO_4 was irradiated with equal doses of Röntgen rays of 0.204, 0.519 and 0.765 A. U. The extent of oxidation to $\text{Fe}_2(\text{SO}_4)_3$ was independent of λ . MARY JACOBSEN

Permeability of human and animal skin for the visible part of the spectrum. W. E. PAULI AND E. DENNIG. *Strahlentherapie* **26**, 761-6(1927); *Ber. ges. Physiol. expil. Pharmakol.* **44**, 336.—The light absorption between 450 and 1000μ which is graphically presented decreases inversely with λ . MARY JACOBSEN

The hydrolysis of octopus muscles. KIYOSHI MORIZAWA. Kyoto Univ. *Acta Schol. Med. Univ. Imp. Kioto* **9**, 299-302(1927).—When 500 g. of dried extd. octopus muscles was hydrolyzed by boiling for 6 hrs. with 1500 g. concd. HCl, the following substances were isolated from the soln.: tyrosine, glycine, *d*-alanine, *d*-valine, *l*-leucine, *l*-proline, glutaminic acid and phenylalanine. Tryptophan could not be isolated but a qual. test was obtained from a CHCl_3 ext. of 300 g. of dried material. N. A. LANGE

Polarized light and starch hydrolysis. JOHN W. M. BUNKER and EDMUND C. H. ANDERSON. Mass. Inst. Tech. *J. Biol. Chem.* **77**, 473-88(1928).—The expts. conducted under very carefully controlled conditions indicate that polarized light has no proved effect upon starch conversion by diastase. "These results are in disagreement with the original reports upon the subject (Semmens, *C. A.* **18**, 87 and Baly and Semmens, *C. A.* **19**, 781) and with 2 reported confirmations of the original reports, although agreeing with one reported failure to confirm them. Being unable to gain access to sufficiently exact data on any previous work, and being entirely unaware of the precision of measurements upon which earlier conclusions were based, we do not know whether conditions in our expts. were comparable to those in earlier work. In order that those interested may repeat the work complete essential data on all expts. are given. In the absence of such data in other reports and in light of the subtle nature of the errors which creep into measurements of enzyme activity, it is felt that the burden of proof lies with those who believe that polarized light, rather than some unchecked error of manipulation or observation, is responsible for the accelerated hydrolysis reported by them." A. P. LOTHROP

The presence of methylglyoxal as intermediate product in glucolysis. CARL NEUBERG AND MARIA KOBEL. *Biochem. Z.* **193**, 464-7(1928).—In glucolysis expts. with dog and horse blood in the presence of glucose and semicarbazide, no methylglyoxal deriv. was found, but only a decompn. product of the reagent, hydrazodicarbamide. S. MORGULIS

The peroxidase properties of leucocyte. K. NIKOLAEV. *Biochem. Z.* **194**, 244-50 (1928).—Leucocyte ext. gives peroxidase reactions, which disappear when the ext. is boiled. The intensity of the oxidation process has no relation to the Fe content. S. MORGULIS

Blood enzymes following extirpation of the adrenals. N. V. PUCHKOV. *Biochem. Z.* **194**, 251-3(1928).—The blood catalase content increases very quickly following the removal of the adrenals. At the time of death of the animal the catalase concn. reaches a max., the catalase index being practically doubled. There was no change in the blood oxidase or esterase. S. MORGULIS

Contribution to the glucolysis problem. W. RAAB. *Biochem. Z.* **194**, 473-6(1928).—Glycogen added to blood *in vitro* causes an increase in the blood sugar, this increase being unaffected by insulin. Glycogen injected intravenously likewise gives rise to increasing blood sugar values. S. MORGULIS

The influence of intravenous injections of hepatocatalase on the catalase and anticatalase content of the rabbit tissues. I. Catalase and anticatalase content of tissues from normal rabbits. I. G. BELKINA, L. L. KREMLEV AND R. V. FALK. *Zhur-nal expil. biol. Med.* **8**, 322-8(1928); cf. *C. A.* **21**, 3973.—The catalase content of the blood and tissues of the rabbit is subject to very great variations, exceeding 400% in some instances. In the order of the catalase content the tissues may be arranged as follows: blood, kidney, liver, spleen, lungs, heart, brain and muscles. The catalase of the blood does not furnish a criterion of the catalase content in the organism generally. The distribution of the anticatalase follows approx. the same order as that of the catalase. II. Changes in the catalase and anticatalase content in blood and tissues following the injection of massive doses of catalase into the blood. I. G. BELKINA AND L. L. KREMLEV. *Ibid* 329-41.—Injected catalase disappears gradually from the blood stream, complete disappearance occurring after 3 hrs. and this is also true for the tissues. The greatest accumulation of the catalase is observed in the kidneys and muscles where the max. is reached in an hr. The changes in the anticatalase content do not follow in any regular manner the changes in catalase, except that in the liver there is always

a diminution. The inactivation by means of the anticatalase apparently occurs in all tissues but most prominently in the liver. S. MORGULIS

The effect of x-rays and of radium on the blood formation during incubation of the chick egg. M. M. FOMENKO. *Zhurnal expil. biol. Med.* 8, 354-9(1928).—X-rays and Ra inhibit the development of the chick egg. Their effect is especially manifest in the morphological changes of the young erythrocytes. The younger the cell the more sensitive it seems to be. S. MORGULIS

The ability to produce work in human muscles at high temperatures. V. A. VOLGINSKII AND A. YAKOVENKO. *Zhurnal expil. biol. Med.* 8, 209-21(1928).—At high temp. mech. work is performed with a greater loss of energy than at moderate temp. S. MORGULIS

The erythrocyte as a colloidal system. III. The permeability of erythrocytes to electrolytes. A. P. KONIKOV. *Zhurnal expil. biol. Med.* 8, 480-7(1928); cf. C. A. 22, 982.—Erythrocytes are permeable to both anions and cations of neutral salts. Apart from the diffusion, however, the ions combine with the cell proteins, especially with the hemoglobin. At $p_H < 6.8$ the anions and at $p_H > 6.8$ the cations of the neutral salt react with the hemoglobin. In studies of the exchange of H and OH ions between erythrocytes and a sucrose soln. of varying p_H it is possible to det. the reaction of the isoelec. point of the erythrocyte. This has been found to be p_H 6.8, which is also the isoelec. point of hemoglobin. The amphoteric nature of the hemoglobin can explain many physico-chemical properties of erythrocytes as, for instance, the predominance of anions in their ash, increased permeability to anions under the influence of CO_2 , etc. IV. Mechanism of hemolysis in hypotonic solutions. *Ibid* 488-501.—The osmotic resistance of erythrocytes varies according to the salt used depending upon the valence. The essential factor in hemolysis is the osmotic condition of the hemoglobin. This conclusion is reached from the observation that either the anion or cation is the effective agent in the hemolysis depending on whether the medium is in the acid or alk. side of the isoelec. point of hemoglobin (p_H 6.8). The osmotic resistance increases with alky., reaching a max. at p_H 9.0. Measured in sucrose solns. the osmotic resistance of the red cell depends upon the previous salt treatment. This indicates that the resistance does not entirely depend upon the medium but the inner state of the erythrocyte. The erythrocyte is regarded as a two-gel system consisting of stroma and hemoglobin. The osmotic pressure of the hemoglobin is detd. by the degree of ionization and follows Donnan's law. Hemolysis occurs as soon as hemoglobin passes from the gel into the sol. condition when it diffuses into the surrounding medium through the stroma gel. The permeability of the latter is likewise affected by the ionization of its proteins but in the opposite direction, the curve of the osmotic resistance of the cells in relation to the p_H of the surrounding medium being the component of these 2 distinct effects. S. MORGULIS

Influence of ultra-violet rays on some physicochemical and biological properties of tuberculin. S. M. MIKHAILOVSKII. *Zhurnal expil. biol. Med.* 9, 12-22(1928).—Ultra-violet radiation causes a shift of the p_H of tuberculin solns. to the acid side, and at the same time the surface tension increases because of the formation of larger ultra-microscopic aggregates. However no definite relationship was found between these 2 phenomena. S. MORGULIS

Role of calcium in biology and therapeutics. GEORGES BOINOT. *Bull. sci. pharmacol.* 35, 239-46(1928).—A review. L. W. RIGGS

Stabilization of albumins by globulins. VL. BERGAUER. *Bull. soc. chim. biol.* 10, 576-80(1928).—The results of this study tend to support the theory of Zsigmondy with reference to the stabilizing action of lecithin upon albumins. L. W. RIGGS

Influence of the p_H on cellular division. R. REDING AND A. SLOSSE. *Compt. rend. soc. biol.* 98, 878-9(1928).—The variations in the p_H of the blood in the course of peptonic shock form the basis of this study. It is concluded that under certain conditions the p_H value regulates the cellular division. L. W. RIGGS

Statistics and calculation of probabilities in biology and medicine. MARCEL DUPOUR. *Compt. rend. soc. biol.* 98, 1139-40(1928). L. W. RIGGS

A perfusion liquid for elasmobranchs. ELEANOR M. KAPP. *Science* 67, 513-4(1928).—Dild. sea water as a perfusion liquid for vertebrate tissues has given only partial success because of its large Mg content. It is possible to ppt. most of the Mg and relatively little of the Ca by the addn. of 12 cc. of 10 N NaOH to each l. of sea water. After standing overnight the liquid is decanted through a filter and the filtrate is adjusted to p_H 8 by the addn. of HCl. This serves as a stock soln. Before use this modified sea water is prepd. by the addn. to each 30 cc. of 10 cc. of a 20% soln. of urea and 60 cc. of distd. water and the acidity is adjusted to p_H 7.4. The removal of more Mg than pro-

vided above is attended with a loss of Ca and an increase in Na which destroys the salt-balance.

L. W. RIGGS

Buffer action as a biological principle. V. BERMAN. *Wochschr. Brau.* **45**, 21-4(1928).—The injurious effects of acids on alkalies produced by biol. processes are checked by buffer action. The cause of poor yeast made from some beet molasses has been traced to a deficiency of org. buffer substances. In the brewing industry buffers are produced during the processes of malting, mashing and fermentation. Buffer substances also affect the flavor of the beer.

A. SCHULTZ

Malt enzyme (cytase) which decomposes hemicelluloses. H. LÜERS AND W. VOLKAMER. *Wochschr. Brau.* **45**, 83-7, 95-9(1928).—A quant. study of the action of cytase was made. The optimum p_H is 5.0 and the enzyme is completely inactivated at p_H 9. Optimum temp. is 113° F. while destruction occurs within 15 min. at 140° F. Xylose, the product of hydrolysis, retards the hydrolytic action of the enzyme. It is purified by adsorption on Al hydroxide at p_H 5 followed by elution with a phosphate of p_H 8.3.

A. SCHULTZ

The oxidation-catalytic action of Fe (HANDOVSKY) 2. The reversibility of various adsorbed compounds and their velocity of reversion (KÖDA) 2.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The colorimetric amino acid determination in urine according to Folin. ERNST SCHMITZ AND HANS SCHOLTYSSEK. *Z. physiol. Chem.* **176**, 89-94(1928).—For removal of NH_3 in the Folin method of detg. amino acids in urine, commercial permuteite may be used in place of the much more costly special permuteite. The error due to the higher alk. of the filtrate is then eliminated by substituting at this point the phenolphthalein procedure recommended by Folin for detg. amino acids in blood. NH_3 may be removed also by distn. *in vacuo* with MgO , the amino acids being detd. in the residue by this procedure, and the NH_3 collected in 0.1 *N* acid for sep. detn. Analyses in which Folin permuteite, commercial permuteite and MgO were used show excellent agreement.

A. W. DOX

The intracellular hydrogen-ion concentration. I. Methods. M. SCHMIDTMANN. *Z. ges. expit. Med.* **57**, 123-6(1927).—S. concludes that it is not possible to get more than relative values for the hydrogen-ion concentration of the inside of cells because of the trauma incident to introducing the indicator into the cells. **II. The reaction and permeability of inflammatory and tumor cells.** *Ibid* 127-44.—The reactions were studied by pricking the cells with various indicators and noting quickly the color change. The results are too extensive for abstracting.

F. L. DUNN

A method of obtaining unmixed hepatic blood in animals by a transthoracic puncture of the hepatic vein. GEORGE FRENCKELL. *Z. ges. expit. Med.* **57**, 565-73(1927).—A detailed illustrated description of a method which F. has worked out in cats, and which he considers superior to the methods of London (C. A. **18**, 1323 and of Fischler (*Physiologie und Pathologie der Leber*, Berlin, Julius Springer, 1925).

F. L. DUNN

The colorimetric estimation of the hydrogen-ion concentration of urine. V. C. MYERS AND E. MUNTWYLER. Univ. of Iowa. *J. Biol. Chem.* **78**, 225-42(1928).—A colorimetric method for estg. the p_H of urine is described by using the bicolorimeter and the phthalein dyes. The effect of diln. is stabilized and the loss of CO_2 is minimized by dilg. the urine 1:5 with a saline diluent of definite p_H and making the detn. under oil. The detns. are made at 25° and the following correction factors used to convert the results to 38°: 0.24 for phenol red; 0.20 for bromothymol blue and bromocresol purple; and 0.22 p_H for bromocresol green. With salt concns. above *M*/15, the colorimetric value is greater than the electrometric while with smaller concns. the reverse is true.

ARTHUR GROLLMAN

Colorimetric estimation of the hydrogen-ion concentration of blood. V. C. MYERS AND E. MUNTWYLER. Univ. of Iowa. *J. Biol. Chem.* **78**, 243-55(1928).—Electrometric and colorimetric detns. of the p_H of 103 samples of human blood were made, the former at 38°, the latter at room temp. When a correction of 0.22 p_H was made 85% of the readings by the colorimetric method were within ± 0.04 p_H of the correct value. The av. correction for 10 samples of dog plasma was 0.30 p_H . The major part of the correction for the colorimetric readings is due to the temp. change.

ARTHUR GROLLMAN

Determination of chloride in biological fluids. R. K. CHRISTY AND WILLIAM ROBSON. King's College, London. *Biochem. J.* **22**, 571-4(1928).—After removal of protein and pptn. of chloride with $AgNO_3$, an aliquot portion of the filtrate is mixed

with potassium bi-iodate and sol. starch, and the standard KI is run in from a buret. The reaction is $\text{KIO}_3 \cdot \text{HIO}_3 + 10\text{KI} + 11\text{HNO}_3 \rightarrow 11\text{KNO}_3 + 12\text{I} + 6\text{H}_2\text{O}$.

BENJAMIN HARROW

An application of Pregl's microanalysis to the determination of free phosphates in the blood. ERIK JORPES AND HENNING MAGNUSSON. *Acta paediatr.* 7, 1-14(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 406.

MARY JACOBSEN

Determination of pancreatic trypsin in duodenal juice. FILIPPO PIGNATARI. *Folia clin. micr.* 2, 447-53(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 575; *Boll. soc. ital. biol. sper.* 2, 931-5(1927).—Detn. of the time required to liquefy a certain quantity of gelatin of p_H 7.8-8.4 at room temp.

MARY JACOBSEN

The colorimetric determination of lipid phosphorus in blood. ALVIN R. HARNES. Rockefeller Inst. *J. Biol. Chem.* 77, 405-7(1928).—The lipid P in blood (1 cc.) may be detd. by Brigg's colorimetric method (*C. A.* 16, 3493) without oxidation of the org. substances present. After CHCl_3 extn. it is hydrolyzed by the H_2SO_4 present in Brigg's molybdate soln. into H_3PO_4 and at the same time the blue color of reduced molybdate is developed. The small quantity of lipid material remaining does not interfere with the colorimeter reading. The results obtained are as accurate as those by other methods now in use and there is a great saving of time and material.

A. P. LOTHROP

Colorimetric determination of iron and hemoglobin in blood. II. SAN YIN WONG. Univ. Hongkong *J. Biol. Chem.* 77, 409-12(1928); cf. *C. A.* 17, 2295.—The simple and rapid method described dispenses with heating altogether. The Fe is split off from the hemoglobin by cond. H_2SO_4 and $\text{K}_2\text{S}_2\text{O}_8$. The proteins are pptd. with H_2WO_4 and the Fe in the filtrate is detd. colorimetrically as $\text{Fe}(\text{SCN})_3$. The % of hemoglobin is obtained by dividing the amt. of Fe per 100 cc. by 3.35 since hemoglobin contains 0.0335% of Fe.

A. P. LOTHROP

A simple respiration apparatus for determination of oxygen and carbon dioxide in indirect calorimetry. J. F. McCLENDON, HILDING C. ANDERSON, F. R. STEGGERDA, CLAIRE CONKLIN AND MILDRED WHITAKER. Univ. Minn. *J. Biol. Chem.* 77, 413-20(1928).—The app. is adapted for general student use and has been used to det. basal metabolism in men and women with normal results. The whole app. is immersed in a water bath of such a size that the heat transmitted to the air in the lungs and the heat generated in absorption of CO_2 do not change the temp. of the bath significantly; the spirometer domes when projecting from the H_2O are inclosed in a box so insulated as not to vary the temp. of the H_2O . The app. is kept in a room with ordinary temp. regulation and without large window or outside wall area.

A. P. LOTHROP

A new blood sugar method. OTTO FOLIN. Harvard Med. School. *J. Biol. Chem.* 77, 421-30(1928).—The analysis requires but 0.1 cc. of blood which is obtained by puncturing the skin with an automatic spring lancet. The blood is measured in a special 0.1 cc. capillary pipet which fills automatically in the same manner as the ordinary 0.01 cc. blood count pipets are filled. The protein is pptd. with H_2WO_4 . The sugar in the filtrate is oxidized with alk. $\text{K}_3\text{Fe}(\text{CN})_6$ and the ferrocyanide produced is measured colorimetrically as Prussian blue. The color obtained from 0.04 mg. of glucose in a 25 cc. tube is as deep as that from 0.2 mg. in the Folin-Wu method. The new method gives unmistakably lower values than the Folin-Wu method. Somewhat lower figures are obtained on finger capillary blood by the new method than on venous blood by the Folin-Wu procedure.

A. P. LOTHROP

Titrimetric quinhydrone electrodes. A comparison with the hydrogen electrode for hydron concentration determinations in plasma, whole blood, and other biological fluids. GEORGE H. MEEKER AND JOHN G. REINHOLD. Phila. Gen. Hosp. and Univ. Pa. Med. School. *J. Biol. Chem.* 77, 505-18(1928); cf. *C. A.* 20, 1826.—The balanced titrimetric quinhydrone electrode is a simple and inexpensive app. for H-ion concn. measurements and requires much less equipment than other quinhydrone methods. It is more accurate than indicator methods and is sufficiently trustworthy to permit its substitution for the H_2 electrode with cerebrospinal fluid, edema fluid, urine, milk, gastric contents of infants, and culture media. Agreement in the 2 methods extends an appreciable distance above p_H 8.0 in all the materials examd. It cannot be used with whole blood because of the reaction between hemoglobin and quinhydrone but gives satisfactory results with human serum and plasma and with horse serum. It cannot be successfully used with dog serum.

A. P. LOTHROP

Studies in the metabolism of bile. I. A quantitative Pettenkofer test applicable to the determination of bile acids in the blood. MARTHA ALDRICH AND MARY S. BLANDSON. Mayo Clinic. *J. Biol. Chem.* 77, 519-37(1928).—The Pettenkofer reaction can be used to det. pure bile acids quant. in amts. of 0.1-0.5 mg. with an accuracy of $\pm 5\%$ and the results agree within the limits of error with those obtained by the gasomet-

ric detn. of the amino N liberated by alk. hydrolysis. The method is rapid and easy and can be applied to small quantities of materials. Normal blood yields a Pettenkofer value equiv. to 3–6 mg. of glycocholic acid per 100 cc. and bile acids added to blood are recovered with an accuracy of 90% or more. Alc. is used to ppt. the proteins and ext. the bile acids in 5 cc. of blood and recrystd. glycocholic acid is used as a standard.

A. P. LOTHROP

Lipochromes. III. The quantitative estimation of carotin in blood and tissues. CHARLES L. CONNOR. Harvard Med. School. *J. Biol. Chem.* 77, 619–26(1928).

—The method is essentially a modification of that used by van den Bergh, Muller and Brockmeyer (*C. A.* 15, 255). The pigment is extd. with petroleum ether from the ppt. obtained by mixing 3 cc. of 95% alc. with 3 cc. of blood plasma and compared. in color with 0.04 or 0.02% $K_2Cr_2O_7$ soln. With tissues and organs a more elaborate procedure is necessary and xanthophyll is also detd. Carotin is frequently but not constantly present in normal blood; the amt. is slightly increased after ingestion of carotin in olive oil and is slightly higher in diabetic blood. "Lipochromes are constantly present in the adrenals of adults but are not present in these or other organs of infants, they are present also in the corpus luteum, liver and fat, but were not found in recognizable quantities in other organs except the spleen, where the amt. could be accounted for by that present in the contained blood. The seminal vesicles and heart, in all cases well colored, did not contain pigments demonstrable by the methods used. The adrenal glands of rabbits and guinea pigs contain the greatest amt. of lipochrome in these animals; next to these organs the liver contains the most. There is no carotin present in the blood of these animals even after feeding or injection of comparatively large amts." These pigments are, therefore, not as widely distributed as is generally asserted in textbooks of pathology.

A. P. LOTHROP

The Kramer-Tisdall potassium method. SERGIUS MORGULIS AND ANNE PERLEY. Univ. Neb. Med. Coll. *J. Biol. Chem.* 77, 647–9(1928).—The factor 0.071 used by Kramer and Tisdall (*C. A.* 15, 1912) for converting cc. of 0.01 N $KMnO_4$ to corresponding quantities of K is not const. for different reagents; there is no fixed factor as it varies with the amt. of K analyzed. Each new reagent should be standardized with varying amts. of a known K soln. and curves prepd. for use in analyzing unknown solns. If detns. are confined entirely to the range of 0.2 to 0.3 mg. of K as is usually the case in blood plasma analyses, the factor 0.071 is accurate. P at least in equiv. concn. does not interfere with the K detn. as identical curves were obtained with KCl and KH_2PO_4 solns.

A. P. LOTHROP

The estimation of urea and amino acid nitrogen in animal tissues. VEON C. KIECH AND JAMES M. LUCK. Stanford Univ. *J. Biol. Chem.* 77, 723–31(1928).—The method was developed for use in the analysis of the whole carcass but is probably directly applicable to single tissues and has been used with liver, muscle and fetus. Autolysis is prevented by keeping the material frozen with liquid air. H_2WO_4 is used as the protein precipitant. The urea is detd. gravimetrically as dioxanthidryl urea and the amino acid N in the Van Slyke amino N app. When samples of frozen carcass of the rat were allowed to stand at room temp. proteolysis proceeded with great rapidity as shown by the increased amino N values but the urea values remained const., thus confirming the findings of Hoagland and Mansfield and not supporting Gad-Andresen's theory of rapid ureolysis.

A. P. LOTHROP

Ferricyanometric micromethods in blood analysis. L. FLATOW. *Biochem. Z.* 194, 132–9(1928).— $K_3Fe(CN)_6$ is used in concns. of 0.0025–0.001 N with a five times more dil. soln. of indigo sulfonic acid. The titrated liquid is mixed with $1\frac{1}{2}$ its vol. of 25% KOH and the titration is carried out in diffuse light until the color changes sharply from yellow to blue. Various micro blood analyses can be made by this titration. Uric acid is detd. in the deproteinized filtrate of blood serum by using a 0.001 N $K_3Fe(CN)_6$ soln., 1 cc. of which corresponds to 0.1 mg. uric acid. The method is even applicable to clear serum directly, but in whole blood a preliminary pptn. with Ag is necessary, which causes a loss of 10%. Thiasine and glutathione can be detd. as follows: Pour 10 cc. of blood into 90 cc. 0.005 N AcOH and heat on the water bath until pptn. of protein is complete. About 75 cc. filtrate is obtained. To this add 3.7 cc. of 1.65% U acetate to complete the removal of protein. On refiltering 76 cc. is obtained corresponding to 72 cc. of the original 1:10 diln. To 2.1 cc. filtrate (= 0.2 cc. blood) add 0.4 cc. of 0.3194% $K_3Fe(CN)_6$ and 2 cc. KOH, and titrate; results are usually given which correspond to an apparent 16 mg. % uric acid. Of the remaining filtrate, boil 74 cc. (= 7-cc. blood) with 0.5 cc. 0.1 N HCl over an open flame until the vol. is 4 cc., transfer to a centrifuge tube, add 0.5 cc. 0.1 N NaOH and ppt. with 3 cc. 10% Ag lactate (contg. 5 cc. 85% lactic acid and 5 cc. 10% NaOH per 100 cc.). This throws

down the Ag salts of Cl, uric acid, thiasine and glutathione. Centrifuge the ppt., and ext. with 10% NaCl-0.1 N HCl mixt. which dissolves the uric acid, and wash with H₂O. Decomp. the remaining residue with 1 drop concd. HCl, heating 3 min. in the water bath; shake with 5 cc. H₂O and pour off the supernatant liquid (after centrifuging); make up to 7 cc. In 5 cc. det. the NH₂N by Folin's method and from this calc. the amt. of glutathione. In 0.5 cc. after adding 1.0 cc. K₃Fe(CN)₆ and 1.5 cc. KOH det. the "uric acid equiv." by titration. The reducing action of 1 mg. uric acid is equal to that of 2.73 mg. thiasine or 2.98 mg. glutathione. This allows calcn. of the uric acid equiv. of the glutathione, the difference being due to the thiasine. *Blood sugar* is detd. directly from the amt. of K₃Fe(CN)₆ consumed. Transfer 0.1 cc. blood to a mixt. of 1 cc. 0.1 N NaOH and 2.5% ZnSO₄, and heat to facilitate pptn. Then add 10 drops of 10% Na tungstate, dil. to 10 cc. with H₂O and filter after shaking. To 5 cc. filtrate (= 0.05 cc. blood) add 2 cc. of the 0.0025 N K₃Fe(CN)₆ and 0.1 cc. of a cold satd. Na₂CO₃ soln. Run a blank simultaneously, using 5 cc. H₂O in place of the blood filtrate. Heat the 2 for 15 min. in the water bath, cool and titrate. Calc. the sugar from the formula $V = 2(A - B)/A$, where A = cc. indigo required to titrate 2.0 cc. K₃Fe(CN)₆ (unheated); B = cc. required in the detn. A table is given in which the sugar concn. corresponding to V is recorded. *Copper*.—Cu occurs in blood serum, about 1-3 mg. per l. The detn. of the Cu depends upon the disappearance of cysteine from a standard soln. The procedure is an adaptation of Warburg's gasometric method. The only requirements are 3 test tubes and Cu-free distd. H₂O. Test tube A contains 2.0 cc. Warburg's pyrophosphate mixt. and 0.2 cc. 0.01 N HCl; B contains 2.0 cc. pyrophosphate, 0.1 cc. of a mixt. of equal parts of serum and 0.2 N HCl, and 0.1 cc. 0.01 N HCl; tube C contains in addn. also 0.1 cc. of a 1×10^{-4} mol. Cu soln. in 0.01 N HCl. Add an equal amt. (0.8 cc.) of a cysteine soln. to each tube, remove an aliquot (0.3 cc.) every 10 min., transfer to flasks contg. K₃Fe(CN)₆ and Na₂CO₃, and titrate the excess with the indigo soln. The loss of K₃Fe(CN)₆ is directly proportional to the Cu concn. which can be calcd. from the formula $X = [(B - A)/(C - B)] \times 10^{-4}$, where A , B and C are the amts. of indigo used in all 3 tubes at the same time. The method is now being developed to det. also Fe in blood. S. MORGULIS

A micro-method for the determination of enzyme activity. B. N. SASTRI AND M. SREENIVASAYA. *J. Indian Inst. Sci.* 11A, 31-9(1928).—In a capillary tube of uniform diam. is placed a series of drops of active soln. (substrate and enzyme) alternated with inactivated controls (substrate + boiled enzyme); the tubes are sealed and attached to a microscope slide and then immersed in a small water bath. As digestion proceeds in the active solns., the drops increase in size at the expense of the controls because of difference in vapor pressure. This difference represents a change in the no. of mols. and hence is a measure of enzyme action. The results are comparable with those obtained by standard methods for detg. enzyme activity. The method is useful where only a small amount of enzyme material is available, but is not applicable to any reaction in which gases or volatile liquids are formed. N. M. NAYLOR

The determination of sugar, uric acid, urea and creatinine in one cubic centimeter of blood. EDWARD S. ROSE. *J. Am. Pharm. Assocn.* 17, 41-2(1928).—The Folin and Wu method is used with slight variations. The suction pump is used to obtain as much filtrate as possible after the protein has been pptd. in the usual manner. *Sugar*. Use 1 cc. of filtrate and proceed as directed by F. and W. using 0.1 and 0.2 mg. dextrose for comparison. Dil. all tubes to 25 cc. *Uric acid*.—Use 2 cc. of filtrate. In order to match the colors better 1 cc. of dild. uric acid standard soln. is added to the sample and the proper correction made. For comparison use 2 tubes contg. 2 and 4 cc. of dil. uric acid standard soln. representing 0.008 and 0.016 mg. uric acid, resp. All tubes are brought to the same vol. before adding reagents and finally to 25 cc. when compared. *Urea*.—Use 2 cc. of filtrate. Use NH₃-free H₂O and reagents to avoid errors. To prevent the carrying over of interfering substances a short-neck 200 cc. Pyrex distg. flask is substituted for the large test tube. The suggested, aerated distn. of Butka and Meisner is followed. *Creatinine*.—Place 2 cc. of filtrate in a test tube and in 3 others place 1, 2 and 3 cc. of dil. creatinine soln. (contg. 1 mg. in 250 cc.) representing 0.004, 0.008 and 0.012 mv. creatinine. Add H₂O to make the vols. the same, add 1 cc. satd. picric acid soln. and 1 cc. of 5% NaOH. Mix, allow to stand 10 min., dil. to 25 cc. and compare within 5 min. L. E. WARREN

Preparation of electrolyte-free gelatin (NORTHROP, KUNITZ) 2. Determination of sugar with Fehling's solution and centrifuging (ILJIN) 7. Determination of two sugars in one solution (ILJIN) 7. Simultaneous determination of minute amounts of CO₂ and O (FRNN) 7.

PINCUSSEN, LUDWIG: **Mikromethodik. Quantitative Bestimmung. d. Harn-, Blut- u. Organbestandteile in kleinen Mengen f. klin. u. experimentelle Zwecke.** 4th revised and enlarged ed. Leipzig: G. Thieme. 200 pp. M. 6.

C—BACTERIOLOGY

A. K. BALLS

Relation of the action of microorganisms to the chemical constitution of *p*-hydroxy-*p*-hydrobenzoic acid. TH. SABALITSCHKA. *Apoth. Ztg.* **43**, 670-2(1928).—An address. W. O. E.

Comparative acid production of *B. delbrücki* and the low-temperature lactic acid bacteria, *B. lactis acidii* and *B. cucumeris fermentati*, Henneberg. STAIGER AND GLAUB-ITZ. *Z. Spiritusind.* **51**, 109-10(1928).—Cultures on sucrose, dextrose, maltose and molasses showed that *B. lactis acidii* and *B. cucumeris* produced more acid than *B. delbrücki*. Molasses plus yeast ext. gave the best results. C. N. FREY

Chromolytic study of yeasts. I. The chemical composition of yeasts. K. WATANABE. *Japan. J. Dermatol. Urol.* **27**, 373-85(1927); *Ber. ges. Physiol. expil. Pharmakol.* **44**, 133.—The tabulated results were obtained by the Unna-Schumacher method. The cells of *Blastomyces*, *Debaryomyces* and *Monilia* consist of basic protein, lipoproteins, nucleoproteins, lecithins and free nucleic acid. The Gram stain apparently depends on the lecithins and not on the nucleoproteins since it is abolished by 4 hrs. hydrolysis with HCl, which leaves the cell stainable with methylene blue. M. J.

D—BOTANY

THOMAS G. PHILLIPS

The relation of oxygen to the germination of the chlamydospores of *Ustilago zeae* (Beck) Unger. G. A. PLATZ. Dept. of Botany, Iowa State College. *Iowa State Coll. J. Sci.* **2**, 137-43(1928).—Expts. in O-poor air (down to 1% O) show that the decrease of O below the proportion found in the air causes a decrease in the proportion of these spores which germinate. These spores do not germinate in water and in dil. nutrient solns. contg. gelatin or tomato juice as well as in more concd. nutrient solns. contg. the same solutes. This is not due to lack of nutrient but to sinking deeper in the soln. and presenting less surface for absorbing O₂. F. E. BROWN

Variations of water and dry matter in the leaves of Pima and Acala cotton. R. S. HAWKINS. *Ariz. Agr. Expt. Sta., Tech. Bull.* **17**, 419-44(1927).—The amt. of water in Acala cotton leaves was always greater than that in Pima cotton leaves, the inference being that the water requirement of Acala variety is greater than Pima. Acala cotton suffered more from water stress as evidenced by heavier shedding of bolls than Pima. The leaves of Acala contained more dry matter by wt. than Pima leaves although the actual % of dry matter was less. The amt. of dry matter increased during the day more rapidly in the Pima cotton leaves than in the Acala cotton leaves, when an abundance of soil moisture was available, but the reverse was true during drought. C. R. F.

The asparagus industry in California. H. A. JONES AND W. W. ROBBINS. *Calif. Agr. Expt. Sta., Bull.* **446**, 1-105(1928).—The roots lost much sugar during spear production but the % of other constituents remained nearly const. The shoots had a mean H₂O content of 92%, fat 0.25% and N 2%. Fertilization expts. with N, P and K showed inconclusive results. Asparagus spears stored with their butts in H₂O on wet moss increased in wt. After harvesting there is a loss in reducing substances and in total sugars at all temps. These losses were especially pronounced at the higher temps., the max. rate of loss being during the first 24 hrs. Besides sugars other substances which det. flavor are esters, glucosides, amino acids and proteins. Respiration caused the loss of sugar in shoots during storage. The sugar was transformed to cell-wall material, chiefly lignin. The greatest increase in crude fiber occurred after the asparagus had been cut for 24 hrs. It was least at low temps. The amt. of crude fiber present served to indicate the toughness of the spears. The quality of com. canned asparagus is good because the canneries are located near the fields and the shoots are canned while strictly fresh. C. R. FELLERS

The enzyme content of germinating wheat. N. PROKOPENKO. *Nauchno Agronomicheskii Zhurnal* **4**, 346-54(1927); *Deut. landw. Rundschau* **1**, 824(1928).—The catalase, peroxidase and amylase are studied in early and late ripening varieties of summer and winter wheat, being expressed in terms of N KMnO₄ after the method of Bach and Operin. The catalase and peroxidase are much greater in the early ripening varieties when germinated at 7°. The amylase content is not dependent on the temperature of

germination. The late ripening summer wheat has more catalase and peroxidase than the winter variety and the early ripening summer wheat. GEORGE R. GREENBANK

Seed fats of the Umbelliferae. I. *Heracleum sphondylium* and *Angelica sylvestris*. T. P. HILDRICH AND E. E. JONES. *Biochem. J.* 22, 326-30(1928).—The fatty acids identified in both varieties were palmitic, stearic (?), petroselinic (Δ^6 -octadecenoic), oleic (Δ^9 -octadecenoic) and linoleic. Cf. *C. A.* 21, 2661. BENJAMIN HARROW

Aldehyde oxidase of the potato. FREDERICK BERNHEIM. *Biochem. J.* 22, 344-52 (1928).—To prep. the enzyme, 2 lb of potatoes were minced, the juice was pressed through linen, the liquid satd. with $(\text{NH}_4)_2\text{SO}_4$ and the ppt. filtered. The ppt. contains all the enzyme. The ppt. was washed with $(\text{NH}_4)_2\text{SO}_4$, dissolved in 150 cc. water, the cloudy suspension filtered off, and the enzyme further purified by treating the soln. 4 times with 3 g. charcoal (Merck's medicinal). The resulting soln. contains all the enzyme and 90% of the protein. It is now made slightly acid and 5 g. kaolin is added. All the enzyme is absorbed and eluted by 5% Na_2CO_3 soln. It is neutralized with dil. AcOH and dialyzed for 4 hrs. The soln. has about 5% of its original protein and about $\frac{1}{3}$ of its activity. The soln. was satd. with $(\text{NH}_4)_2\text{SO}_4$, the ppt. centrifuged off and dried in a vacuum desiccator. A gray powder was obtained which was readily sol. in water. Besides nitrate, methylene blue, Clark's dyes and quinone are reduced by the enzyme-aldehyde system. Traces of iron do not affect the activity of the enzyme BENJAMIN HARROW

Biochemistry of plant diseases. X. Fermentation of pentoses by *Fusarium lini*. M. G. WHITE AND J. J. WILLAMAN. Univ. Minnesota. *Biochem. J.* 22, 583-91(1928); cf. *Phytopathology* 16, 941(1926).—When *Fusarium lini* is grown on xylose, arabinose, or rhamnose, the main products are mycelium, CO_2 , $\text{C}_2\text{H}_5\text{OH}$ and a small amt. of organic substance precipitated by lead. Xylose is utilized the most efficiently for alcohol production and arabinose for growth. **XI. *Fusarium lini* and the pyruvic acid theory of alcoholic fermentation.** *Ibid* 592-5.—Each intermediate compd. in the pyruvic acid theory of alc. fermentation is utilized by *F. lini*, the methylglyoxal being represented by its hydroxy deriv. BENJAMIN HARROW

Studies on pectin. II. The estimation of the individual pectic substances in nature. D. R. NANJI AND A. G. NORMAN. Univ. Birmingham. *Biochem. J.* 22, 596-604(1928); cf. *C. A.* 21, 2743.—The principle involved in the estimation is based upon the work of Carré and Haynes (*C. A.* 16, 1994). It consists in pptg. the pectin as Ca pectate, after hydrolysis by alkali, and weighing as such. Results for leaves, cereal grains and fruits are recorded. BENJAMIN HARROW

Chlorination method for macerating woody tissues. W. M. HARLOW. *Bot. Gaz.* 85, 223-7(1928).—Split out material match-stick size; boil to expel air; immerse in strong Cl-water for 2 hrs.; wash; immerse in hot 3% Na_2SO_3 soln. for 15 min.; wash and repeat the treatment with Cl-water until upon mild shaking, sufficient material seeps BENJAMIN HARROW

Experimental researches on vegetable assimilation and respiration. XVII. The diurnal rhythm of assimilation in leaves of cherry laurel at "limiting" concentrations of carbon dioxide. E. J. MARSHALL. *Proc. Roy. Soc. (London)* 102B, 467-87(1928).—In the cherry laurel (*Prunus laurocerasus rotundifolia*), the nocturnal depression in assimilation represents an increased resistance to the diffusion of CO_2 toward the chloroplasts, and is due chiefly to changes in the degree of stomatal opening. **XVIII. The relation between stomatal opening and assimilation—a critical study of assimilation rates and porometer rates in leaves of cherry laurel.** *Ibid* 488-533.—The diurnal and seasonal rhythms of stomatal opening run parallel with those of assimilation rate. The relation between porometer rate and assimilation rate suggests that the rate of apparent assimilation may be regarded as detd. by a potential (the external CO_2 concn.) and a series of resistances (stomatal resistance to diffusion, resistances in the intercellular space system and in the liquid diffusion path up to the chloroplast surface, and in the photochem. and chem. phases of photosynthesis.) **XIX. The effect of variations of carbon dioxide supply upon the rate of assimilation of submerged water plants.** W. O. JAMES. *Ibid* 103B, 1-42(1928).—Comparative studies were made of aq. solns. contg. (1) NaHCO_3 and (2) CO_2 , by using each soln. at several rates of flow. The rate of assimilation was greater with NaHCO_3 at a flow of 400 cc. per hr. in the app. and at a flow of 600 cc. per hr. with high light intensity; this rate was the same with the 2 solns. at a flow of 600 cc. per hr. with low light intensity. The rate of assimilation was not influenced by the rate of flow of NaHCO_3 soln. In solns. of this salt, apparently only the free CO_2 is available for assimilation; such solns. are satisfactory for the detn. of assimilation rate when they are dil. and not too alk. JOSEPH S. HEPBURN

The spike-disease of Sandal (*Santalum album*, Linn). I. Diastatic activity of

the leaves. M. SREENIVASAYA AND B. N. SASTRI. *J. Indian Inst. Sci.* 11A, Part III, 23-9.—The diastatic activity of expressed sap from diseased leaves and stems is higher than that of healthy leaves and stems. No gradient in diastatic activity was found in the diseased leaves while in the healthy plants there was a steady fall in diastatic activity from the growing tip downwards.

H. R. KRAYBILL

Carbohydrate metabolism and its relation to growth in the edible canna. J. C. RIPPERTON. *Hawaii Agr. Expt. Sta. Bull.* 56, 1-35(1927).—A number of tables of analyses of various parts of canna plants are given. Sucrose is the chief sugar of the leaves. The hexose:sucrose ratio is very low in both mature and in rapidly growing leaves. The percentage of hexose is higher in the midribs and sheaths. In the stem proper, hexoses are greatly in excess of sucrose. The sucrose increases and the hexoses decrease toward the apex of the root-stock. Both sugars decrease in the base. The hexoses are thought to be sugars of translocation and the starch in the rootstocks seems to be formed from sucrose. The quantity of hexose in immature stems and of sucrose in immature rootstocks is low, indicating a diversion of food to new leaf growth in the immature plant. Vigorously growing rootstocks are high and mature ones low in hexoses. The sucrose content of the rootstock is lowered when normal growth is halted and if for long it does not again go up and the rootstocks are low in starch. After a prolonged dry spell copious irrigation may increase the sucrose but this increase seems to be due to hydrolysis of starch already formed. Sucrose and starch contents of rootstocks vary directly with each other. Very young rootstocks are low in starch content which increases up to the dormant stage of growth. The increase is accompanied by an increase in sp. gr. A table is given by which the approx. % of starch in the rootstocks may be read off from the sp. gr. Detns. of osmotic pressures are said to confirm the conclusions given regarding carbohydrate metabolism. Sixteen references are appended.

A. L. MEHRING

Lignin and humins in wood decomposition by fungi. C. WEHMER. *Techn. Hochschule, Hanover. Ber. deut. botan. Ges.* 45, 536-9(1927).—A critical discussion.

LAWRENCE P. MILLER

The physiology of the corolla. SERGIUS IVANOV. Mendelyev Inst., Moscow. *Ber. deut. botan. Ges.* 45, 582-7(1927).—The petals from the flowers of eight species of plants were found to have a dry weight between 15 and 20%, of which 3.46 to 20.5% was ash, 10.0 to 46.6% sugar, chiefly monosaccharide and 0.56 to 3.68% nitro-gen. Starch was absent. When the petals drop they still contain considerable moisture and sugar, but in some cases, part of the nitrogen is removed previously.

LAWRENCE P. MILLER

Seasonal course of the carbohydrate content of the fir and pine trunk. ERNST GAUMANN. Eidg. Techn. Hochschule, Zürich. *Ber. deut. botan. Ges.* 45, 591-7(1927).—Each month for 12 consecutive months, detns. of hexosans and water-sol. material in the heartwood and sapwood of the trunk of *Picea excelsa* and *Abies pectinata* were made. The hexosans in the heartwood of the fir varied between a max. of 11% in Sept. and Oct. and a min. of 8.4% in Mar., while in the pine the content varied between 7 and 9%. In the sapwood of both species the hexosans reached a max. in fall, which decreased during the winter, rose rapidly after assimilation began in spring, and decreased again before rising to the fall max. The water-sol. material increased with the spring max. but not with the fall max., indicating a difference in the type of carbohydrates at these periods.

LAWRENCE P. MILLER

Physiological investigation of *Cuscuta monogyna* Wahl. MARIE LILIENSTERN. *Ber. deut. botan. Ges.* 46, 18-26(1928).—The p_H of the plant juice is a factor in detg. its availability as host for *C.* When grown under unfavorable nutritional conditions *C.* shows increased chlorophyll content, increased peroxidase activity, and in some cases, increased diastatic power.

LAWRENCE P. MILLER

Contributions to plant microchemistry. XVII. A red-color-yielding chromogen occurring in cacti species. HANS MOLISCH. Wiener Univ. *Ber. deut. botan. Ges.* 46, 205-11(1928).—Of 29 species of *Cactus* investigated all but one produced a red color when a cut surface was kept moist and exposed to air for 2-5 days. Upon comparison of this colored material with cochineal, obtained from *Coccus cacti*, which feeds on cactus sap, it was found that their properties were quite different, although this does not preclude the possibility of close relationship. M. was unable to crystallize this coloring matter.

LAWRENCE P. MILLER

The excretion of ammonia by plant roots in cases of acid poisoning. D. N. PRYANISHNIKOV. *Biochem. Z.* 193, 211-5(1928).—Peas, beans and oats were studied from the point of view of the NH_3 excretion when the rootlets of the germinating plants were kept in acids of various strengths. The results show that the plant responds to the acid intoxication the same as the animal organism does, by increased NH_3 pro-

duction the latter being directly related to the protein content of the plant (beans produce most, oats least NH_3). This alteration of the metabolism with the production of NH_3 has been observed not only in poisoning with acid, but also with physiological acid salts (NH_4Cl , $(\text{NH}_4)_2\text{SO}_4$), or under the influence of anesthetics, fasting or unbalanced nutrition (excess N).

S. MORGULIS

The energy content and the energy accumulation in plants with regard to their carbon and nitrogen content. A. ZBOROVSKY. *Biochem. Z.* 193, 122-38(1923).—The C/N ratio in legumes of different seasons varies from 9 to 15, and there is a parallelism in the variations of the caloric value and of the C content. Slow drying plants show a relatively greater loss in calories, C or N than those which have been dried quickly at 100° .

S. MORGULIS

A contribution to the zinc problem in plant biochemistry. MIHOVIL GRAČANIN. *Biochem. Z.* 194, 215-30(1928).—Zn plays a different physiol. role in heterotrophic and autotrophic (green) plants, being a typical stimulant for the living processes of many of the former, while having invariably an injurious action on the latter. In certain concns. ZnSO_4 stimulates somewhat the germination of seeds of certain cultivated plants, but this effect is limited only to the early stages until the first leaves break through and the plant obtains the possibility of synthesizing matter through the aid of chlorophyll. By suppressing the activity of the chloroplasts through lack of light, the stimulating action of ZnSO_4 is restored. The stimulating effect on growth of ZnSO_4 increases as the temp. is raised and the light intensity diminished, so that the toxic concn. can be defined only in relation to a definite temp. light combination. Concns. greater than 0.001 M have invariably produced acute injury in *Lanum alba* or in *Glechoma hederecea*, causing rapid death either through wilting or through obvious destruction of the chlorophyll. In lower concns. a chronic type of injury manifested itself in the diminished chlorophyll content with resulting loss of green color. This naturally led to a diminished photosynthetic activity and impaired nutrition of the plant. In *Unium undulatum* and in *Elodea canadensis* the chlorophyll was lost even in very small concns. of ZnSO_4 , and this loss was detd. by the concn., temp. and light intensity, the latter playing the most important role. Thus, *Unium*, which in diffuse light at 10° after 10 days still contained an appreciable amt. of chlorophyll, showed under similar conditions of temp. and ZnSO_4 concn. but in bright sunlight almost complete disappearance of the chlorophyll. In leaves of *Lanum* which have turned yellow it was found that regeneration of the chlorophyll is possible when the leaves are placed on a 0.125 N sucrose soln. Even in some white leaves of *Unium* the reversibility of the chlorophyll could be shown. The fact that Zn, contrary to the effect of Fe, produces chlorosis leads to the conclusion that it is a neg. photocatalyzer for green plant cells, which explains why it does act as a stimulant for vegetative growth of lower plants or for germination of seeds. Soil fertilization with ZnSO_4 does in some instances result in greater yield of plant growth, but when this occurs it is thought to be due not to a direct action upon the plant but through its effect upon the microbiological condition of the soil.

S. MORGULIS

The growth of grapes. IV. Initial changes in acidity. P. R. v. D. R. COPEMAN. *Trans. Roy. Soc. S. Africa* 16, Pt. 2, 103-6(1928); cf. C. A. 22, 1791.—During the development of the grape, 3 definite stages of acidity occur: the production of acid in the sap which is transferred to the berries as formed; the increase in acidity during growth to a max. value; the final decrease in acidity to a min. value at maturity. The 3 varieties of grapes tested show similar acid changes during early stages of growth but differ in actual amount of acid produced. **V. Relationship between sugar and soluble solids in the juice.** *Ibid* 107-13.—After settling, the sp. gr. of grape juice is determined by means of a Balling hydrometer. It is shown that sugar content, to which sol. solids and acidity are closely related, may be calcd. from sp. gr. of juice. The detn. may be used to judge the quality and maturity of the fruit. **VI. The acid : sugar ratio.** *Ibid* 115-20.—This ratio decreases as fruit ripens until at maturity a certain value is reached dependent upon the acidity of the fruit. The values of the ratio at full maturity of grapes examined vary from 0.02 to 0.038, representing a sugar content of 14.2 to 15.6%. The Balling sp. gr. detns. check these calcs.

N. M. NAYLOR

Report on (the determination of) total chlorine in plants. DORIS H. TILDEN. *J. Assoc. Official Agr. Chem.* 11, 209-18(1928).—Methods for the detn. of Cl in plant material that involve direct incineration were found to be as inaccurate and unreliable as other authors have maintained. In direct ashing methods, C compds., as well as S and P, cause loss of Cl by volatilization. The possibilities of a direct method of detg. Cl without incineration in highly colored or possibly colloidal plant materials are not promising. Ashing in presence of a Cl fixative seems to be the only practical method

available. Na_2CO_3 is a feasible and satisfactory Cl fixative, provided the $\text{Na}_2\text{CO}_3:\text{Cl}$ ratio is not less than 5. The present official gravimetric method for detg. Cl does not always give consistent results, possibly because of occlusion and soly. factors; satisfactory results were obtained by a modification based on the use of dil. AgNO_3 (preferably 0.05*N*), pptg. the Cl in the cold, and violently agitating to produce an insol. granular ppt. that can be thoroughly cleaned by washing with a large quantity of cold water. The modified gravimetric, Gay-Lussac and Volhard methods were found equally reliable and accurate for detg. Cl in ashed plant material in quantities ranging from 3 to 100 mg.

A. PAPINEAU-COUTURE

Effects of external factors on wheat rust. R. CASPAR. *Kühn-Archiv*, No. 12, 205-56(1926); *Chimie et industrie* 19, 711(1928).—After a review of the literature, C. studies the method of development of wheat rust, the effects of various factors (aeration, moisture, fertilizers) and the best methods of protection against it. Fertilizers have but little action on the development of wheat rust: kainite favors it, but other K fertilizers have no appreciable effect; of the P fertilizers, superphosphate and basic slag afford some protection; Ca cyanamide is a good protective agent, NH_4NO_3 to a less extent, and NaNO_3 and $(\text{NH}_4)_2\text{SO}_4$ have no effect. Rust develops more readily in soil of av. moisture content than in very dry or very moist soil; well-aerated soil is unfavorable to its development; the tests did not show any effect due to the nature of the soil. Development of wheat rust is hindered by a high germination temp.; but as the max. temp. of germination is 25° and the optimum $16-8^\circ$ the range is small. Rust develops better in the shade than in the sun, when the seed has been buried deep or when it has been sown close. Old seed gives a crop that is less readily attacked, but this effect is not noticeable in seed less than 1 yr. old.

A. P.-C.

The hydron concentration of plant tissues. VII. The buffers of sunflower stem and root. S. H. MARTIN. Queen's Univ., Belfast. *Protoplasma* 3, 273-81 (1928); cf. C. A. 22, 613.—Stems of mature sunflowers (*Helianthus annuus*) were cut off slightly above soil level and the juice of the stem was expressed by pressure. The roots were carefully cleaned and the sap was obtained by pressure. Colorimetric methods were used to det. p_H , which was about 5.8. Inorg. PO_4 detn. were made and expressed as buffer values in terms of $M \text{H}_2\text{PO}_4$. Conclusions: The normal reactions of the sap of mature sunflower stems and roots are buffered as in the hypocotyl of the seedling, by a dil. concn. of inorg. PO_4 present in soln. in the cell sap. **VIII. The buffers of bean stem and root.** *Ibid* 282-301.—The inorg. PO_4 content of the expressed sap of broad bean stem and root were detd. by Embden's method. The buffer value of the expressed sap was detd. by titration with standard alkali and the results so obtained were calcd. in terms of $M \text{H}_2\text{PO}_4$. Stem and root sap exhibited similar phenomena: (1) varying amts. of inorg. PO_4 were present; (2) the amts. of buffer action varied; (3) at all the reaction points the sap of the stem or of the root exhibited a higher buffer capacity than that due to the contained inorg. PO_4 ; (4) in all cases the buffer value of the sap increased as titration towards an arbitrary end point, which was p_H 6.8 in most cases; (5) the differences between H_3PO_4 content and buffer values, at the various reaction points detd., apparently bore no definite relation to the actual amts. of inorg. PO_4 in soln. in the cell sap. About 1.99 g. oxalic and 1.553 g. malic acids were present per l. of sap. The oxalates act as buffers within the reaction range p_H 3.0 to p_H 5.3. Malates buffer between p_H 3.7 and p_H 6.0. The CO_2 content varies from 3 cc. to 7.5 cc. per 100 cc. of sap. In contact with CO_2 of concns. ranging from 5 to 50% the reaction of the expressed sap of the bean was shifted by increasing amts.: 50% CO_2 brought the reaction from p_H 5.8 to p_H 4.8.

M. H. SOULE

An apparatus for controlling the flow of nutrient solutions in plant cultures. E. S. JOHNSTON. Univ. of Maryland. *Plant Physiology* 2, 213-5(1927).—Description, with diagram, of an app. devised for the continuous renewal of culture solns. in studies of plant nutrition. The unique feature is the introduction of an outlet siphon that fits into one of the cork stoppers of the cover of the earthenware culture jar. By raising or lowering this siphon the rate at which soln. flows from the culture jar can be controlled. Since this rate, together with the rate of transpiration, det. the rate of flow into the culture jar from the other units of the app., viz., a large reservoir, a const.-level jar and a sub-reservoir, the amt. of soln. flowing per unit of time from the culture jar is always in excess of the transpiration by an amt. depending on the adjustment of the outlet siphon.

WALTER THOMAS

The behavior of the cyanogenetic glucosides of cherry laurel during starvation. H. GODWIN AND L. R. BISHOP. *New Phytologist* 24, 295(1927); *Pharm. J.* 120, 55 (1928).—The cyanogenetic glucosides represent a fairly large fraction of the stored carbohydrate of the leaves. The glucoside (A) is formed as a necessary result of the

up-grade metabolism of the cherry laurel plant, and is not an intended protective compd. or a definite food reserve. When split by enzyme action, the liberated sugar is used in respiration. The study of the problem of starvation, respiration and yellowing in cherry laurel leaves showed the following main points: (1) During starvation, *A* disappears. (2) The loss begins in early stages and probably before any yellowing can be seen. (3) The end of yellowing shows leaves entirely depleted of *A*. (4) The rate of loss of *A* increases after a time to a max., then decreases. (5) The period of max. loss of HCN appears to coincide fairly closely in time with similar maxima in the rates of CO₂ output and of yellowing. Rosenthaler (cf. *C. A.* 15, 2293) and Treub have shown that in very young leaves at the time of opening of the bud, the % of HCN is very high; this falls later with the period of max. growth to a low value, and disappears at the time of the fall of the leaf. The following explanation is suggested: When the cells are quite young, the protoplasm is in the gel state, hence the available H₂O at enzyme centers may be presumed to be so small that accumulation of *A* results. In the mature stage the protoplasm is balanced between the states of sol and gel. In the senescent state passage to sol condition liberates the hitherto bound conditions of the H₂O and enzymes, so that a rapid attack on the elaborated products ensues, and among others, the glucosides are then rapidly broken down.

S. WALDBOTT

Assimilation of carbon dioxide. K. SCHAEFFER. *Schweiz. Apoth. Ztg.* 65, 537-42 (1927).—A review of the work of Klein (*C. A.* 20, 2519-20, 3447; 21, 2917) based chiefly on that of Wislicenus (*C. A.* 13, 1483) and Neuberg (*C. A.* 14, 3257). By means of *dimedon*, K. had recognized the formation of HCHO as an intermediary product in the plant synthesis of hexose from CO₂ and H₂O.

S. WALDBOTT

The determination of soluble carbohydrates (APPLEMAN, *et al.*) 7.

E—NUTRITION

PHILIP B. HAWK

Effect of high-voltage cathode rays on rickets and on the activation of cholesterol. A. KNUDSON AND W. D. COOLIDGE. *Proc. Soc. Exptl. Biol. Med.* 24, 366-9(1927).—With voltages of 100, 200 and 350 thousand, rickets in rats cannot be cured by direct treatment with cathode rays. Cholesterol outside of the body was activated by these rays. Because of the damage done to the animals, it is not possible to give the dose necessary to activate enough of the cholesterol of the skin to bring about cure.

C. V. B.

Contaminating substances as a factor in the activation of cholesterol by irradiation. A. F. HESS AND A. WINDAUS. *Proc. Soc. Exptl. Biol. Med.* 24, 369-70(1927).—Cholesterol purified by being twice sepd. as the dibromide and then recrystd. failed to be activated by ultra-violet rays. Similarly treated phytosterol also failed to be activated. Possibly it is some contaminating substance which acquires this specific property.

C. V. B.

The development of marked activity in ergosterol following ultra-violet irradiation. A. F. HESS AND A. WINDAUS. *Proc. Soc. Exptl. Biol. Med.* 24, 461-2(1927).—Ergosterol, prepd. from yeast, was irradiated with the Hg vapor quartz lamp for 1½ hr. at a distance of 1 foot; it was then suspended in linseed oil and fed to rachitic rats in varying amts. Healing resulted when as little as 0.003 mg *per capita* daily was given. To obtain similar results with irradiated cholesterol approx. 1 mg. daily was required.

C. V. B.

Feeding experiments with plants at different stages of development. III. Synthesis of vitamin in plants. M. KARSHAN, F. KRASNOW AND B. HARROW. *Proc. Soc. Exptl. Biol. Med.* 24, 765-6(1927).—Fifteen rats were kept on a synthetic diet deficient in vitamin A until they became stationary in wt. Groups were then given in addn. to the diet 6 seeds of ungerminated corn, 6 seeds of germinated corn and 6 green seedlings per rat per day, resp., for 81 days. The first 2 groups contracted xerophthalmia and died; the last group gained wt. and were in good health. Vitamin A is synthesized during the course of greenin^g.

C. V. B.

Vitamins A and B in the Chinese litchi nut. A. H. SMITH AND P. P. T. SAH. *Proc. Soc. Exptl. Biol. Med.* 25, 63-4(1927).—The dried litchi nut constitutes an exception among edible fruits in its lack of the 2 food factors, vitamins A and B, which were found present, if at all, in only very small and ineffective amts. The nut is not toxic.

C. V. B.

Further evidence of destruction of vitamin B in evaporated milk. A. L. DANIELS AND L. BROOKS. *Proc. Soc. Exptl. Biol. Med.* 25, 161-3(1927).—Expts. on nursing

rats and on pigeons indicate that the antineuritic vitamin is destroyed in part in evapd. milk. C. V. B.

Vitamin content of barley germ (malt germ). A. SCHNITTENHELM AND B. EISLER. *Z. ges. expl. Med.* 58, 645-61(1928).—Vitamins A, B, D and E were found. Vitamin C was lacking. F. L. DUNN

A study of the effect of feeding creatine on growth and its distribution in the liver and muscle of normal mice. A. CHANUTIN AND H. H. BRARD. Western Reserve Univ. *J. Biol. Chem.* 78, 167-80(1928).—Creatine added to the diet of mice did not influence their growth curve. The feeding of arginine-rich protein did not increase the creatine concn. of the liver or muscle which were 0.035 and 0.367%, resp. Administration of creatine to mice induced its accumulation in the liver and muscle. On its withdrawal from the diet, the concn. in the liver diminished while that in the muscle remained const. ARTHUR GROLLMAN

Vitamin B content of malt extract. A. I. BACHARACH AND EDITH ALLCHOVNE. *Biochem. J.* 22, 313-6(1928).—Several varieties of commercial malt ext. (British manuf.) are rich in vitamin B ("that vitamin which will restore to normal growth rats on a diet devoid of water-sol. growth-promoting factors"). The vitamin is derived from the unmalted flour. BENJAMIN HARROW

Metabolism in scurvy. I. The lactic acid excretion of scorbutic guinea pigs. H. L. SHIPP AND S. S. ZILVA. *Biochem. J.* 22, 408-15(1928).—Studying the lactic acid in the urines of normal and scorbutic guinea pigs, as well as of guinea pigs suffering from general nutrition, the authors were unable to observe any significant change in the percentage of lactic acid (cf. Rosenwald, *C. A.* 20, 2355). BENJAMIN HARROW

Antineuritic yeast concentrates. IV. The further purification of yeast vitamin B (curative). H. W. KINNERSLEY AND R. A. PETERS. *Biochem. J.* 22, 419-33(1928); cf. *C. A.* 22, 2399.—"Yeast vitamin B" is here used in place of "torulin." The material has now been concd. to such a point as to show an activity of 0.027 mg. per day (pigeon dose). Both phosphotungstic and chloroplatinic acids have been used for concg. the yeast vitamin B (which is insol. in CCl_4 , ether, acetone and ethyl acetate). The vitamin is destroyed by 1 hr.'s heating with 0.5 N NaOH; toward oxidizing and reducing agents it is relatively stable. BENJAMIN HARROW

Relation of vitamin B to the growth-promoting factor for a Streptothrix. R. A. PETERS, H. W. KINNERSLEY, JEAN ORR-EWING AND VERA READER. *Biochem. J.* 22, 445-50(1928).—Vitamin B, and the bacterial growth-promoting factor are not identical because sufficient alkali treatment always inactivates the curative properties, but the purer exts. after such treatment still retain growth-promoting activity. BENJAMIN HARROW

Critical examination of methods of evaluating vitamin A by means of the growth of rats. E. M. HUME AND H. H. SMITH. *Biochem. J.* 22, 504-21(1928).—To est. vitamin A it is best to give the test dose from the start of the expt., a dose being sought which produces a given amt. of growth in a given time, taking growth to 300 g. for males and 200 g. for females at 6 months of age as that which an optimum dose ought to give; or to seek such doses as will, after a depletion period, give subnormal growth, graded to the dose, for the first few weeks. BENJAMIN HARROW

Sources of supply of vitamins A and D. O. ROSENHEIM AND T. A. WEBSTER. *Nature* 120, 440(1927).—Liver fat of sheep, calf and ox contain on an av. as much as ten times the amt. of vitamin A found in a good Newfoundland cod-liver oil. The vitamin D can be obtained by irradiating ergosterol which, in turn, can be obtained from yeast. Margarine can take the place of butter if to the former are added appropriate exts. from the liver fat of herbivorous animals and the calcd. quantity of irradiated ergosterol. BENJAMIN HARROW

Feeding of dairy cows and their need for vitamins. E. S. SAVAGE. *Certified Milk Conferences* 1927, 126-31.—A study (with bibliography) of the ration with especial reference to vitamins A, B, C and D. JOSEPH S. HEPBURN

Comparative study of certified and pasteurized milk in infant feeding. M. S. LEWIS. *Certified Milk Conferences* 1927, 203-15.—Each type of milk was used in the diet of over 100 infants. Certified milk produced greater av. gains in wt. and growth and more freedom from rickets. JOSEPH S. HEPBURN

The effect of variations in vitamins, protein, fat and mineral matter in the diet upon the growth and mortality of eastern brook trout. C. M. MCCAY, F. C. BING AND W. E. DILLEY. *Trans. Am. Fish. Soc.* 57, 240-50(1927).—Feeding studies upon 10 groups of 50 fingerlings each are recorded. Rations of purified constituents were fed and the growth curves and mortality rates recorded. The rations contained variable proportions of casein, cooked starch, lard, salt mixt., yeast and cod-liver oil. A ration

of dried skim milk with yeast and cod-liver oil served as a control. No growth was obtained upon a 10% casein ration, demonstrating that this is the protein minimum. After 5 months of stunting upon this low protein a normal growth rate could be resumed if raw liver was fed. If the protein exceeded 10% the fingerlings displayed an initial growth followed by death in 10-12 weeks. Stunted fingerlings lived nearly twice as long as those that grew upon synthetic diets. Some other factor is concerned with the growth of trout which is different from any known vitamin. Dried skim milk plus yeast and cod-liver oil produces a growth rate equiv. to that of raw meat for a period of 3 months, but is followed by sudden death of all fingerlings. High-fat diets are not specifically injurious for limited periods of feeding.

C. M. McCAY

Factor H in the nutrition of trout. C. M. McCAY AND W. E. DILLEY. *Trans. Am. Fish. Soc.* 57, 250-60(1927); cf. *C. A.* 22, 1630.—Nutrition studies upon 20 groups of trout fingerlings are reported. Trout are equally stunted by a low protein level whether the diet contains 3 or 6% mineral matter. Fresh meat contains much thermolabile dietary factor, termed "H," which is essential for life and growth. This is not identical with vitamins A, B, C, D and E. A quantity of raw liver as small as 5% exerts a marked increase in the growth obtained upon dried skim milk. The use of lactose to replace starch in making up synthetic trout rations is of no value. Agar-agar affords no improvement. Artificial dry skim milk lacks factor H. The factor in liver responsible for growth is different from that concerned in blood regeneration. Raw meat combined with dry skim milk is an excellent ration for the practical rearing of trout and produces a better growth rate than raw meat, with very low mortality.

C. M. McCAY

Calcium in the urine and blood during the administration of lemon juice. A. LEVI. *Bull. soc. ital. biol. sper.* 3, 67-9(1928).—The Ca content was detd. in the urine and blood of animals receiving lemon juice for a long time and kept on a const. diet. The Ca in the urine of one rabbit increased from a normal av. of 0.1 g. to 0.28 g. per 24 hrs. in 3 weeks. The Ca in the blood of another rabbit decreased from 100 mg. to 81 mg. per 1000 in 4 weeks and the Ca in the blood of a dog decreased from 90 to 76 mg. per 1000 in 3 weeks.

PETER MASUCCI

Some experiences of endemic, manifest and latent scurvy in Sweden with special reference to new methods of diagnosing latent scurvy. HAROLD ÖHNELL. *Acta Med. Scand.* 68, 176-88(1928).

S. MORGULIS

Specific dynamic action in avitaminosis. IX. Internal secretion and avitaminosis. A. V. ARVAY. *Biochem. Z.* 192, 369-82(1928).—Lack of vitamin A and B causes a diminution in specific dynamic action, whereby the same effect is observed when only B is missing but not when A alone is lacking. It is supposed that the lack of vitamin B diminishes the activity of the thyroid gland and that this induces the disappearance of the specific dynamic effect.

S. MORGULIS

The nutritive value of fat. III. JUNICHI OZAKI. *Biochem. Z.* 192, 428-30(1928); cf. *C. A.* 21, 3939; 22, 802.—The nutritive value of natural fats depends on their chem. constitution. Butter has the highest value among the natural fats. Cod-liver oil is not different in nutritive value from other oils. Oils are better utilized than solid fats, and fish oils are generally poorer than vegetable or animal oils. The fatty acids of cod-liver oil have no special value, so that it is the vitamin content of the oil alone which imparts to it its properties.

S. MORGULIS

Phosphatide metabolism of pigeons in B avitaminosis. ERNST SCHMITZ AND TATSUJI HIRAOKA. *Biochem. Z.* 193, 1-17(1928).—Injection of lecithin does not prevent the rise in blood cholesterol. An increase in the adrenals occurs only exceptionally. In rice-fed pigeons the increase in the adrenal cortex as an avitaminosis symptom develops very slowly. On the contrary, lecithin fed by mouth in the same amts. failed to produce this effect. The most striking influence of the lecithin injections, however, appears in the less pronounced diminution in the number of red cells.

S. MORGULIS

Demonstration of the antirachitic factor in grass grown in the dark on artificial nutritive media. II. W. VÖLTZ AND W. KIRSCH. *Biochem. Z.* 193, 281-4(1928); cf. *C. A.* 21, 3655.—Grass grown to a height of 10-12 cm. in total darkness and on nutritive solns. of a known salt compn. exerts an antirachitic effect. The substance responsible for this action is not taken up by the rootlets but is elaborated by the plant in its cellular metabolism.

S. MORGULIS

A method for the prevention of starvation of pigeons suffering from avitaminosis. R. O. FETTELBERG. *Zhurnal eksptl. biol. Med.* 8, 343-52(1928).—Starvation of exptl. pigeons can be prevented by alternate feeding with polished rice and inactivated barley. The opisthotonos, convulsions and paralysis occur without, however, the animals

undergoing starvation. Pigeons thus fed develop the disease later and lose less wt. than pigeons receiving a monotonous vitamin-free diet. S. MORGULIS

The Imperial (Japanese) Government Institute for Nutrition. GERMAINE SILVESTRE DE SACY. *Bull. soc. hyg. aliment.* 15, 481-504, 524-51 (1927).—A description of the organization of the Institute and of the nature of the work carried out, with summaries of the results so far obtained. **Calorific requirements of Japanese.** TAKAHIRA, KITAGAWA, ISHIBASHI AND KAYANO.—Detns. were carried out with Benedict's app. on 11 primary-school teachers, 10 policemen and 10 chauffeurs, the av. values found for the resp. classes being 22.75, 26.07, 25.54 cal. per kg. per 24 hrs.; and 36.17, 53.58, 37.08 cal. per hr. per sq. m. of body surface. **Basal calorific requirements of Japanese.** TAKAHIRA, KITAGAWA, ISHIBASHI AND KAYANO.—The av. requirements of 73 male and 43 female normal healthy adults were 37.30 and 33.88 cal. per hr. per sq. m. of body surface, resp. **Standard basal calorific requirements of Japanese.** TAKAHIRA.—The following formula is proposed for detg. body area: $S = 127P \times 718/H \times 74.49$, where S = surface, P = wt. and H = height. The basal calorific requirements can be calcd. from height, wt. and age. **Variations in metabolism during fast and on resumption of feeding.** HIRAO TAKAHIRA.—Six men fasted 12-30 days. The rate of loss in wt. was high during the first few days (approx. hyperbolic curve), but after a week became small and practically const. On resumption of feeding there was a tendency to fix a large amt. of N, the metabolism reached a value higher than normal, and the normal wt. was regained in 80-100 days. **Basal metabolism in laborers.** TAKAHIRA, KITAGAWA, ISHIBASHI AND KAYANO.—Expts. with 30 men and 20 women showed the min. value of the basal metabolism of the men was 40.23 cal. per m.² body surface per hr. (7.21% higher than the standard of 37.33) and the av. of the women 36.43 (7.2% higher than the standard of 33.84), the reason for the increase being due to the fact that phys. work increases the metabolism and its effect continues to be felt at the time the measurements are made. **Improvement of the physical condition of badly fed children.** T. KAWAKAMI AND C. TAKANABE.—Observations on 503 underfed children (285 boys and 218 girls) 8-15 yrs. old showed that: increase in body wt. is proportional to the amt. of food taken; the total amt. of food taken increases with age; the total quantity of food taken is proportional to the body wt. but the quantity of food per kg. body wt. taken per day decreases with increase in wt. Standard diets are suggested for underfed Japanese children of different sexes and at different ages. **Parallelism between creatinine excretion and basal metabolism.** TAKAHIRA.—Comparative detns. of basal metabolism and of creatinine in the urine of 31 men and 21 women showed that the so-called creatinine coeff. (ratio of creatinine excreted to body wt.) is related to body surface and to basal metabolism. **Effect of the degree of polishing of rice on its absorption.** SUGIMOTO, HIGUCHI, MOMOYEDA AND TANAKA.—Numerous expts. showed that the degree of absorption increases with the degree of polishing. Investigation of the variation in the compn. of rice with polishing showed that: (1) N decreases slightly while fat, ash and fiber decrease considerably during polishing; (2) none of the constituents of rice is completely eliminated by polishing; (3) the compn. of different varieties of rice which have been polished to the same extent varies considerably; (4) the P content of rice varies considerably in different varieties; (5) use of rice which has been 70% polished is recommended on both economic and physiol. grounds. The difference in p_H values of the isoelec. points of *oryzanin* from common and from glutinous rice is 0.07-0.52, the glutinous rice proteins having the higher acidity. The oryzanin of common rice is more difficultly sol. in alkalies, has a slightly higher n and α , contains about 1% more N (with predominance of NH_2 , lysine and arginine, as compared with predominance of monamino-N, histidine and cystine in glutinous rice) and has a higher free amino-N content than that of glutinous rice. The ratio of lysine in the oryzanin of common and of glutinous rice is 100:57. **Influence of methods of cooking on the absorption of rice.** SUGIMOTO, FUJIMAKI, MOMOYEDA, TANAKA AND YASUDA.—The expts. show that: (1) polished rice is absorbed better in the form of pudding (the rice is washed with water, sun-dried, ground to a flour, 1200 g. are made into a dough with 650 cc. H_2O and a certain quantity boiled with 400 cc. H_2O in an enameled mold) than merely boiled; (2) the degree of absorption of unpolished rice pudding is intermediate between that of boiled polished rice pudding and boiled unpolished rice, but the fat of unpolished rice pudding is as easily absorbed as that of boiled polished rice; (3) ingestion of polished rice in the form of "gruel" (prepd. by boiling 8 g. salt, 3 l. H_2O and 3 "measures" (8 "measures" = 1200-1300 g.) of rice) decreases the degree of absorption of total N, carbohydrates and fat, and increases that of inorg. constituents; (4) with "Ojiya" polished rice (wash 5 "measures" of rice with 4 l. H_2O , boil, add 80 g. of bean meal and boil again) the absorption of total N and carbohydrates decreases and that of fat and inorg. constituents increases; (5)

ingestion of "Suchi" polished rice (boiled rice flavored with vinegar) slightly increases absorption of all the constituents; (6) the absorption of all the constituents (except carbohydrates) of polished rice boiled with red bean juice (prepd. by boiling 1470 g. red beans with 10 l. H_2O and filtering through gauze) was considerably higher than that of polished rice boiled merely with H_2O ; (7) the absorption of "Okawa" (a mixt. of 7 "measures" polished glutinous rice and 3 "measures" ordinary polished rice is washed, soaked overnight in H_2O , drained and boiled 45 min. in 350 cc. H_2O) gives lower total N, fat and ash absorption than boiled polished rice, but higher carbohydrate absorption; (8) absorption of all the constituents of rice are higher in the case of "Mochi" (wash 18 l. of rice, soak overnight in an equal vol. H_2O , drain and cook as for "Okawa") prepd. from glutinous rice than in the case of "Okawa". **Chemical investigation of rice: oxidase.** HIGUCHI.—Qual. tests on 160 samples unpolished and 60 samples polished rice harvested in 1919–23 showed that the reactions for catalase and peroxidase are parallel to that of oxidase. The following *quant. method for catalase* was devised: suspend 100 grains of ground unpolished rice in 100 cc. H_2O and filter; to 25 cc of filtrate add 10 cc. of neutral 0.05% H_2O_2 , let stand 1 hr. at 25°, add 50 cc. H_2SO_4 (concn. not given) and titrate the excess H_2O_2 with 0.1 N $KMnO_4$. Application of the method showed that (1) different qualities of rice vary considerably; (2) the activity of a given quality of rice is approx. the same for samples for neighboring localities, but differs when they come from distant localities; (3) rice from cooler climates is generally more active; (4) with different samples of the same quality and from the same locality, the activity decreases with the time elapsed since harvesting; (5) there is no relation between these phenomena and the sp. gravity of the rice; (6) decrease in activity is retarded when the rice is stored in a dry place; (7) polished rice is less active than unpolished rice. **Biological value of the chief vegetable Japanese foods.** KAICH FURUMI.—The biol. value of the proteins of a few Japanese foods was found to be as follows: polished rice 81.68, semi-polished rice 93.25, unpolished rice 66.08, barley 66.21, sweet potatoes 81.41, koryo 41.08, millet 56.86. **Vitamin contents of Japanese foodstuffs.** SHIMODA, FUJIMAKI AND SARETASHI SAIKI.—*Summer oranges* contain vitamin A. *Canned plums* contain no vitamin B but an appreciable amt. of vitamin C. *Lard*, as marketed, contains very little vitamin A, and even in the porportion of 15% cannot complete a ration otherwise deficient in vitamin A. *Radish juice* has an even higher vitamin C content than orange or lemon juice. *Alc. ext. of *Tapes Philippinarum** (a fresh-water shell) is deficient in vitamin B. *Radish leaves* have a high vitamin A content. The highest vitamin C content of radishes is to be found in the peelings. When radishes are kept in "nukamiso" (paste made from rice polishings) the vitamin C content decreases considerably, and when they are kept in salt it almost completely disappears. The decrease in vitamin C content in *fermented rice* is due to a difference in osmotic pressure, the vitamin disappearing through osmosis and the destructive action of certain org. acids. *Cucumber and egg-plant* preserved in "nukamiso" contain a small amt. of vitamin C, while *cabbage* similarly kept contains only traces of vitamin C. *Buckwheat flour* has a high vitamin B content, but no vitamin A. *Oysters* have a high vitamin A content. The vitamin B content of *red kidney beans* is comparable to that of buckwheat flour; *Japanese eels* (*Eutosphernis japonicus*) has a very high vitamin A content, 0.1 g. added to the ration of young rats being sufficient to ensure normal growth. **Effect of some foodstuffs on growth.** KWAKAMI, UCHIDA AND NAKAMURA.—Curves are given showing the rates of growth of mice fed on animal protein (*dried fish* and "*katsuobushi*") and on vegetable protein (*kidney bean meal*), carbohydrates being supplied in the form of ground rice and vitamins in cabbage, the protein, fat and carbohydrate contents of the diets being 18.4, 4.0 and 75, resp. The animal proteins caused much more rapid growth than the vegetable proteins, and dried fish was superior to "*katsuobushi*," probably owing to the presence of non-protein substances in the former. **Avitaminosis A in guinea pigs.** ANON.—On 2 different occasions avitaminosis A was produced exptly. on lots of 15 guinea pigs in about 2–3 weeks. **Deficiency of vitamin A in unpolished rice.** FUJIMAKI AND SHIMODA.—Expts. (on rats and on pigeons) which have not yet been concluded clearly indicated that unpolished rice can produce the symptoms of avitaminosis A. **Excretion of vitamin B in urine.** SUGIMOTO.—The urine of normal healthy men contains a substance which, like vitamin B, is capable of stimulating the growth of yeast; but the presence of vitamin B in urine is doubtful. **Properties of vitamin D.** SAIKI AND FUJIMAKI.—Vitamin D is not destroyed by heating 1.5 hrs. at 100° or at 115°, is hardly affected in 1.5 hrs. at 130°, slightly destroyed in 1.5 hrs. at 140–5°, about 40–50% destroyed in 45 min. at 150–5° and almost completely destroyed in 1.5 hrs. at 165–70°. It is not destroyed in 1 hr. at temps. down to –60°. It is largely destroyed by heating 1 hr. at 100° in 0.1

N acid or alkali. The proteins of buckwheat flour. M. HARA.—Analysis of the N compds. *via* Van Slyke gave: amino N 0.0525 (8.19% of the total N), humine 0.0487 (7.60), cystine 0.0117 (1.82), arginine 0.1527 (23.82), histidine 0.0158 (2.43), lysine 0.0204 (3.19), monoamino N 0.2599 (40.53), non-amino N 0.0874 (13.63), total N 0.6590 g. H₂O-sol. protein N was 0.80, N sol. in 10% NaCl 1.25, N sol. in 0.20% alkali 0.55%, N sol. in 70% alc. none. The 10% NaCl and 0.20% alkali exts. were colloidal, owing to the presence of mucin. **The protein content of Italian millet.** KONDO.—The compn. was found to be: H₂O 13.57, crude protein 11.12, albuminoids 10.36, crude fat 5.32, N-free ext. 63.68, crude fiber 1.71, ash 0.87%. Total N in 15 g. of millet was 0.2567, sol. in H₂O 0.0561 (21.85% of total N), sol. in 10% NaCl 0.0644 (25.48), sol. in NaOH 0.0774 (30.15), sol. in alc. 0.1443 g. (56.21). Analysis of the protein of polished Italian millet *via* Van Slyke gave: total N 0.6009 g. in 30 g., humine 0.0155 (2.54% of total N), amide 0.0734 (12.03), arginine 0.0592 (9.71), cystine 0.0135 (2.21), histidine 0.0720 (11.81), lysine 0.0369 (6.05), monoamino N 0.3015 (49.43), non-amino N 0.0290 (4.76). **Effects of alkaloids on animals fed on diets deficient in vitamins.** SANETOSHI SAIKI.—Rats fed on a diet deficient in vitamin A can stand higher doses of *strychnine* than those fed on a normal diet. Rats fed on a diet deficient in vitamin B can stand higher doses of *strychnine* than those fed on a normal diet, but not as high as those fed on a diet deficient in vitamin A. Guinea pigs fed on a diet deficient in vitamin A cannot stand higher doses of *strychnine* than those fed on a normal diet. **Comparative nutritive value of the different proteins of Japanese foodstuffs.** OMETARO SUZUKI, YOSHIKOTO MATSUYAMA AND NEKETARO HASHIMOTO.—The nutritive value of *fish proteins* is as high as that of casein, horse meat or beef, and is apparently related to their amino-acid content and particularly to the lysine content. Dried fish, even after prolonged storage, has the same nutritive value as fresh fish as far as the proteins are concerned. The nutritive value of 10% *rice proteins* in the diet is approx. equal (or slightly inferior) to that of 7% fish proteins. When 2% brewers' yeast is added to the diet, 8.5% of rice protein are required for normal growth; while with 2% fish or horse proteins 6.5% rice proteins are sufficient. Addn. of small proportions of milk, meat, egg or fish proteins gives better growth than addn. of larger proportions of rice proteins. The min. proportion of meat, milk or fish proteins required by adult rats is 5–6%, and of rice proteins 7%. Normal growth of rats cannot be obtained when wheat is the sole source of proteins. Sufficient growth can be obtained with 6% wheat proteins and 2% meat proteins, and better growth when approx. 33% of the total protein consists of egg or milk albumin, a diet contg. 10% of the mixed proteins giving much better results than one contg. 15% of wheat proteins alone. Growth is not satisfactory when *Kaoliang* (*Andropogon sorghum*) is the only source of proteins, because of their very low arginine, histidine, lysine and cystine contents. The nutritive value of these proteins is intermediate between those of rice and wheat. Growth was normal with diets contg. 10 and 8%, resp., of *oat proteins*, but was very slow with only 5%. The nutritive value of oats is approx. equal to that of barley; it contains sufficient vitamin B, but is low in Ca, and better results are obtained on adding a little of the latter. Rats fed on rations contg. 10% of *rye proteins* seldom reached a wt. of 200 g. and most of them died in 4–5 months; with 8% a few reached 200 g., but most of the animals died; the results with 5% rye proteins were about the same as with oats and barley, but the death rate was higher. These results may be due to deficiency of Ca or of H₂O-sol. vitamins. Normal growth was obtained with a ration contg. 14% of *pea proteins*, provided sufficient vitamins A and B are supplied; and it can be obtained with smaller proportions of proteins. From the results of their expts. S., M. and H. tried to find a relationship between the nutritive value of the various proteins and their amino-acid contents: the problem apparently cannot be satisfactorily solved at the present time because it is extremely difficult to det. all the amino acids quant. The nutritive value seems more closely related to the lysine content than to the total diamino acid content; but many other amino acids (cystine, proline, etc.) are generally essential, and many recently discovered amino acids certainly are factors in nutrition. **Relation between the salt content of a diet and its deficiency in vitamin A.** FUCHI-NAKAMURA.—Three groups of young white rats were fed on a diet deficient in vitamin A and contg., resp., 0.5, 2 and 5% of mixts. of salts. The results showed that there is an optimum in the salt content of the ration to prolong the life of rats fed on a diet deficient in vitamin A. **Study of foodstuffs used in times of famine: amaryllis.** NARRITA.—Plants harvested in May, dried in the shade and ground to a flour had the following compn.: H₂O 80.53, crude proteins 1.19, crude fat 0.23, crude fiber 0.72, carbohydrates (as glucose) 17.32, ash 0.01%. It contained 0.05% "*sekisamine*" (C₂₄H₄₄N₂O₄), m. 200°, and 0.13% "*lycorine*" (C₂₇H₃₄N₂O₂), m. 248°, difficultly sol.

in Et_2O and EtOH , causing nausea (cf. Kondo and Tomimura, *C. A.* 21, 3622). **Storing of foodstuffs: drying of sea foods.** HARA AND KONO.—A preliminary comparison of the effects of sun-drying and vacuum drying of fish showed that: (1) dehydration is more complete in vacuum drying, resulting in a flatter and more transparent product and more tender flesh; (2) chem. changes in the compn. of the proteins are unimportant in vacuum drying, provided the temp. is not too high; (3) vacuum drying gives preserved fish in a state closer to fresh fish, from both the chem. and physio-chem. standpoints, than any other process; (4) the time required for drying depends on the size and shape of the fish, but is approx. twice as long for sun drying as for vacuum drying.

A. PAPINEAU-COUTURE

The availability of the calcium in calcium lactate in the human. F. W. HEYL AND M. C. HART. *J. Am. Pharm. Assoc.* 17, 225-32(1928).—A short review of previous work is given. For these expts. 5 men lived for 15 days on a fairly uniform diet. During a fore-period of 5 days, the basal diet, adequate in respect to protein and energy requirements, supplied about 0.2 g. Ca per day and established a strictly negative balance. During the following 10 days, in each of 2 series of expts. there was superimposed upon this acidotic diet (1) milk, (2) Ca lactate in soln. The balance for Ca, Mg and P were detd. in 5-day periods, but all calcs. on maintenance requirements are based on the entire 10-day period. Ca and P were detd. in food, urine and feces. When Ca lactate is superimposed for 10 days upon an acidotic Ca-deficient but vitamin-contg. diet, a quantity amounting to approx. 9.5 g. is required to establish Ca equil. This represents 2.5 or more times as much as is necessary to establish Ca-equil. with milk. The urinary Ca excretion was markedly increased, about 10% of the Ca increment taking this route of excretion. The same tendency is noted in using milk. The urinary P excretion was decreased and P retention secured by the ingestion of Ca lactate. In this diet the original Ca: P ratio was 2:9, and the favorable influence upon P metabolism may be due to the establishment of a more favorable balance of 14:9. However, in the milk expts., a ratio of 5:9 yielded a more decided P retention; concerning the effect of Ca lactate upon Mg metabolism, slightly increased losses were noted in 3 of the 5 subjects.

L. E. WARREN

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ROBERTS, L. J.: **Nutrition Work with Children.** Chicago: Univ. Chicago Press. 394 pp. Reviewed in *Expt. Sta. Record* 58, 86(1928).

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F—PHYSIOLOGY

E. K. MARSHALL, JR.

Basal metabolism: the modern measure of vital activity. F. G. BENEDICT. *Sci. Monthly* 27, 5-27(1928). E. J. C.

The effect of artificial hyperthermia on the lipid content of horse blood. HUGO THEARELL. *Acta Med. Skand.* 68, 248-52(1928).—A horse was kept in a warm, dry chamber, and its body temp. rose from 38.1° to 40.7° after 22 hrs. Three blood samples were obtained during the expt. (the first sample being the control). The dry residues of these samples were: 20.34, 20.30 and 21.77%, resp. The blood mixed with dry Na_2SO_4 set to a dry mass which was finely powdered and subjected to successive extrn. with ether, ether-alc. mixt. (2 parts ether + 5 parts 96% alc.) and finally abs. alc. Only in the case of cholesterol was there a definite rise of about 11% in the last blood sample.

S. MORGULIS

Biochemical changes in the organism during fatigue. I. Experiments on hammer-smiths and on students. JULIE HEFTER AND RAHEL JUDELOWITSCH. *Biochem. Z.* 193, 62-9(1928).—During very exhausting phys. work there develops a lasting condition of acidosis, depending upon an increased concn. of H_3PO_4 and acetone bodies in the blood. The lactic acid which during work accumulates in the blood disappears very quickly, but the acidotic condition persists even over a night's rest, and the rest period must be considerably prolonged to avoid the accumulative effect from one day to the next. In students after prolonged and intense mental activity there is evidence of acidosis (lowered alkali reserve) but the normal condition is reestablished after a night's rest, while the blood lactic acid content remains within normal limits during the mental exertion.

S. MORGULIS

Methylglyoxal as an intermediate cleavage product in the glycolysis of blood. H. K. BARRENSCHEEN. *Biochem. Z.* 193, 105-8(1928).—Methylglyoxal has been definitely demonstrated by means of forming a compd. with semicarbazide as an intermediate product in blood glycolysis. S. MORGULIS

Is there a proportionality between muscle exertion and the lactic acid, phosphate and sugar content of the blood? N. P. RIABOURSCHINSKY. *Biochem. Z.* 193, 161-75 (1928).—Increased muscle work calls forth an increased passage of lactic acid from the muscles into the blood. The lactic acid during the period immediately following work or during the rest is not uniformly distributed. After static work the lactic acid of the blood increases in the arm exercised due largely to stasis and poor oxygenation; the lactic acid in the unused arm remains unchanged which indicates a rapid disappearance of the acid in the circulation. Immediately after the work there is a slight rise in blood P which is not proportional to the amt. of work. During the resting period the P falls below the initial level, the more so the harder was the work. The changes in blood sugar are slight and not significant. S. MORGULIS

Insulin and fat metabolism. J. HEPNER AND O. WAGNER. *Biochem. Z.* 193, 187-91(1928); cf. *C. A.* 22, 818.—The autolyzing liver of starved rabbits treated with large doses of insulin shows unmistakable evidence of fat synthesis, which is exactly opposite to that observed in pancreatectomized animals. The authors conclude that insulin really contains 2 hormones, concerned with carbohydrate and fat metabolism, resp. Pancreas dialyzate given by mouth has no effect on hyperglucemia but does cause lipodiarresis; furthermore, small insulin doses produce an accumulation of glycogen and a loss of fat in the liver while massive doses have the reverse effect and these facts indicate that the 2 components of insulin are antagonists. S. MORGULIS

The digestion of crude fiber by chickens and the significance in this respect of the appendix. T. RADEFF. *Biochem. Z.* 193, 192-6(1928).—Chickens cannot digest crude fiber from dry barley, but the crude fiber of wheat is 5% digested, that of oats 7% and of dry corn 17%. This digestion takes place practically entirely in the appendix. S. MORGULIS

Studies on the respiration of the frog heart. I. Oxygen consumption of the surviving frog heart in Ringer, Tyrode and Locke's solution. TATSUJI HIRAOKA. *Biochem. Z.* 193, 197-202(1928).—For details of the results obtained with different salt solns. with or without the addn. of glucose the original must be consulted. S. M.

Studies on the respiration of the frog heart. II. Effect of acid and alkali on the oxygen consumption of the surviving frog heart. W. ARNOLDI AND T. HIRAOKA. *Biochem. Z.* 193, 203-6(1928).—Addn. of 0.5-11 cc. 0.001 N HCl or NaOH to 120 cc. Tyrode soln. with glucose causes a marked diminution in the O_2 -consumption of the spontaneously beating heart. The alkali produces a change manifesting itself as a lasting diastolic state, while the acid produces a lasting systole. S. MORGULIS

Studies on fat metabolism. II. A. LÖW AND R. PFELER. *Biochem. Z.* 193, 276-7(1928); cf. *C. A.* 21, 3665.—Subcutaneous injection of adrenaline causes a rise in the blood cholesterol. III. *Ibid* 277-80.—Adrenaline causes fat mobilization from the periphery to the liver; the glycogen store of the liver is greatly diminished. Occasionally, the glycogen supply of the liver following a single injection is increased even when, as in starvation, the glycogen content is greatly reduced. S. MORGULIS

Metabolism of embryonic tissues in serum. SUSUMU KUMANOMIDO. *Biochem. Z.* 193, 315-21(1928).—The anaerobic glycolysis of embryonic tissue (chick, rat) is greater in Ringer soln. than in serum. S. MORGULIS

Studies on the potassium and calcium content of peripheral nerves. A. SIMON AND AND J. SZELŐCZENY. *Biochem. Z.* 193, 393-9(1928).—The K and Ca content of the rabbit, *N. ischiadicus*, shows great variability. The Ca content of the right and left nerve is fairly const., which is not the case with K. The nerve does not contain a const. indiffusible fraction of Ca and K, and both diffuse from the macerated nerve continuously during 24 hrs. Under the influence of cocaine the Ca content of the nerve changes but without any regularity. More Ca diffuses out in 2 hrs. from a nerve in physiol. soln. contg. cocaine than in one without the cocaine. S. MORGULIS

The calcium content of the heart muscle. R. KAPPELLER AND H. KUTSCHERA-AICHBERGEN. *Biochem. Z.* 193, 400-8(1928).—In 4 beef and human hearts (normal) there has been found the same Ca content, 25-25.7 mg. %. There was no difference between the right and left side of the heart. Normal Ca values were found in a case of chronic sepsis and of aortitis luetica. In a case of left insufficiency of the heart, the left half showed a lowered Ca while on the right side there was a slight compensatory increase. In 2 cases of extreme valve failure the Ca content of both sides of the heart was considerably lowered. The Ca content is independent of the lipid content of the

heart. Part of the Ca is bound to lipoid as it is extd. from the dry powder by anhyd. ether. The Ca of the myocardium in heart insufficiency is lowered, the decrease being frequently most pronounced on the side bearing the greatest fractional load. S. M.

Physiology of plasmalogen. II. Behavior of plasmalogen in the serum of the new born. K. IMHAUSER. *Biochem. Z.* 193, 416-22(1928); cf. *C. A.* 21, 3665.—The serum of new born calves contains only traces of plasmalogen, about $\frac{1}{20}$ that found in the serum of adult animals or of the mother. From the day of birth this increases and reaches the normal level at the age of about 1-2 months. S. MORGULIS

Blood composition and blood coagulation. ALFRED GIGON AND RENÉ BOULENAZ. *Biochem. Z.* 194, 83-90(1928).—Serum from clotted blood contains more C than from defibrinated blood, while the latter contains more plasma than from NaF blood (0.3-1%). The differences in the N values are not parallel to those in the C values. Serum from clotted and defibrinated blood shows consistent differences in compn. The addn. of NaF to blood to a concn. of 10% alters very markedly the compn. of the blood, plasma or serum. Stirring vigorously NaF blood yields a plasma richer in C than blood not so treated. S. MORGULIS

The ammonia content and formation in blood. I. ERIK GOTTLIEB. *Biochem. Z.* 196, 151-62(1928).—The NH_3 N of the arterial and venous blood from fasting dogs is 0.03 mg. per 100 cc. Most of this NH_3 is not preformed, but is being produced from the moment the blood is drawn at a uniformly diminishing rate, depending upon the temp. and partly also the H-ion concn. In strongly alk. media, however, (p_{H} 12) there is a greater NH_3 formation. S. MORGULIS

Ammonia formation in the kidney. II. ERIK GOTTLIEB. *Biochem. Z.* 194, 163-76(1928).—Exptl. results are given which corroborate Nash-Benedict's theory of the formation of NH_3 in the kidneys S. MORGULIS

Synthesis and resorption of cholesterol as manifested in experiments on chicken eggs. H. DAM. *Biochem. Z.* 194, 188-96(1928).—Analyses of total cholesterol in fully developed chick embryos and in freshly laid eggs reveal an increase of about 10%, which, however, is not a large enough difference to exclude the possibility that it is due to variation rather than actual synthesis. Cholesterol compounds, which can be extracted only with ether after heating with acetic acid, could not be demonstrated either in the eggs or in the chick embryos. After a feeding of free cholesterol or of cholesterol palmitate the cholesterol content of the eggs increased 20%. S. MORGULIS

Studies on blood coagulation. XIX. Inhibition of coagulation by Germanin ("Bayer 205"). BERNHARD STUBER AND KONRAD LANG. *Biochem. Z.* 194, 204-12(1928); cf. *C. A.* 22, 1798.—A parallelism is observed between the inhibition of coagulation and the velocity of glycolysis of the blood. Renewal of blood glycolysis through CO_2 -breathing removes the inhibiting effect of Germanin on the clotting and *vice versa*. Under the influence of Germanin there is an alteration in the plasma proteins (shift towards the lyophile side), a diminution of the H-ion concn. and of the Cl of the blood, the latter being due to a migration into the tissues. S. MORGULIS

The ammonia content and formation in muscles and their dependence upon function and state. V. The course of traumatic formation of lactic acid and ammonia and its relation to inhibiting factors. ST. CHRZASZCZEWSKI AND WŁ. MOZOLWSKI. *Biochem. Z.* 194, 233-43(1928).—When a muscle is ground with quartz in H_2O there is a formation within 2 min. of lactic acid which represents a tenfold increase over the original quantity. The course of the lactic acid formation is very similar to that of the NH_3 formation under like conditions. Both are inhibited by a borax soln. of p_{H} 9.3; a 1% NaF soln. completely inhibits the lactic acid formation but only slows up more or less the NH_3 formation. This last fact serves to differentiate the 2 processes between which there is no direct relationship. S. MORGULIS

Regulation of the liver metabolism through the nervous system. I. Preliminary experiments. P. ASTANIN, I. KRIWSKY AND W. RUBEL. *Biochem. Z.* 194, 254-61(1928).—Perfusion of liver with defibrinated blood results always in an increase of the urea concn., this increase being very great though irregular if $(\text{NH}_4)_2\text{CO}_3$ is added. The acid-base equil. is undisturbed, the sugar concn. is raised while the non-protein N is likewise increased. Not the entire amt. of used up NH_3 N appears as urea. When the perfusion is made with Ringer soln. there is no new formation of urea and the sugar concn. falls. II. The effect of the vegetative nervous system on urea and sugar formation in the liver. P. ASTANIN AND W. RUBEL. *Ibid* 262-72.—The liver of fasting dogs is isolated without disturbing its vegetative nervous system. Stimulation of the peripheral end of the vagus caused an increase in the urea formation, while stimulation of the sympathetic had no effect. Stimulation of the sympathetic causes a rise in the

sugar concn. of the perfusion fluid, and stimulation of the vagus generally has the opposite effect. S. M.

Further studies on antitrypsin of normal serum. L. UTKIN-LYUBOVITZOV. *Biochem. Z.* 194, 292-305(1928).—Serum antitrypsin cannot be identified with any of the well-known serum proteins. By adsorption with $\text{Fe}(\text{OH})_3$ and subsequent elution it is possible to prep. solns. with very little N but considerable antitryptic activity. S. MORGULIS

Studies on the normal blood sugar content of the horse and cattle. KARL SCHWARZ. *Biochem. Z.* 194, 328-34(1928).—The av. blood sugar concn. of the healthy horse is 0.093%, the values found in different animals ranging from 0.062 to 0.120%. The frequency distribution of the blood sugar variations is as follows: 0.062-0.082% sugar in 26% of the investigated animals; 0.083-0.102% in 46%; and 0.103-0.120% in 27% of the horses. In cattle the av. blood sugar is 0.082%, with the following frequency distribution of the variations: in 15% the concn of sugar is 0.044-0.075%; in 60%, 0.076-0.110%; and in the remaining 25% of the animals the sugar concn. is 0.110 to 0.177%. No obvious relationship was found between the sugar concn. and the sex of the animal. S. MORGULIS

The production of constant blood sugar values in rabbits. KARL SCHWARZ AND ADALBERT LURETZ. *Biochem. Z.* 194, 335-45(1928).—When rabbits are given food *ad libitum* they show an almost const. blood sugar concn when the sampling is made 5 hrs. after the last feeding. This is achieved either by giving dry or green food, though a change from one to the other kind of food leads to strong variations, and the abs. values are greater when green food is used. The av. sugar concn. on the 2 kinds of food was 0.117-0.130% on dry and 0.098-0.103% on green food. S. MORGULIS

Studies on the normal blood sugar content of chickens. KARL SCHWARZ AND KARL HEINRICH. *Biochem. Z.* 194, 346-50(1924). The av. blood sugar of chickens is 0.253%, with variations from 0.212 to 0.309%. In 18% of the chickens the sugar was 0.212-0.235%; in 65.9%, 0.236-0.275%; and in 15.3%, 0.276-0.309%. S. M.

Studies on the relation between the blood sugar content and the production of milk in cows. KARL SCHWARZ AND EGON MEZLER-ANDELBURG. *Biochem. Z.* 194, 362-75 (1928).—Milching cows even on an abundant diet have a lower blood sugar concn. than non-milching cows. While the latter have on the av. 0.082%, the latter have a lower av. concn. with the following frequency distribution: in 5% of the cows 0.040-0.050%; in 20%, 0.050-0.060%; in 45%, 0.060-0.070%; in 20%, 0.070-0.080%; and in 10% the concn. is above 0.080%. There was, however, no direct relationship between sugar concn. and the quantity of milk produced, except that the blood sugar concn. increased with the prolongation of lactation. Furthermore, no evidence was found for the occurrence of hypoglycemia together with a comatous condition of the cow soon after giving birth and the initiation of secretion of milk. S. MORGULIS

Daily variations in the blood sugar of cattle. ANTON RICHTER. *Biochem. Z.* 194, 376-84(1928).—Under uniform conditions the blood sugar of the milch cow shows practically no variations from day to day. There has been no rise observed in the blood sugar following feeding, because the absorption goes on continuously. In this respect the ruminant differs very sharply from the animals possessing the single stomach. S. MORGULIS

Studies on the influence of certain basic fractions of meat extract on the secretion of the stomach glands. R. KRIMBERG AND S. A. KOMAROV. *Biochem. Z.* 194, 410-21(1928); cf. C. A. 21, 2309.—The carnosine-methylguanidine fraction of meat ext. has a powerful excitatory effect on the secretion of gastric glands. The carnitine fraction is also active but is at least 10-15 times weaker than the previous fraction. Finally, the purine and the "residual" fractions of the meat ext. were practically without effect on the gastric secretion. S. MORGULIS

Influence of mental fatigue on the excretion of organic phosphorus in the urine. L. E. TARANOWITSCH. *Biochem. Z.* 194, 461-5(1928).—No definite relationship was found between the excretion of org. and total P during mental work. S. MORGULIS

The influence of bile acids on carbohydrate metabolism. II. Effect of bile acids on the mutarotation of glucose. TAKUICHI HATAKEYAMA. *J. Biochem. (Japan)* 8, 371-9(1928).—In a neutral as well as alk. medium cholic and desoxycholic acids stimulate the mutarotation of glucose. The stimulating action of cholic acid on the mutarotation of glucose increases up to a certain concn. of the acid. On the contrary, desoxycholic acid stimulates only in a concn. 0.025-0.100% but in concns. 0.2-0.3% it has an inhibiting effect. In general the stimulating action of cholic acid is greater than of desoxycholic acid. III. The condensation of glucose or alanine with bile acids. *Ibid*

381-90.—Both glucose and alanine undergo condensation with cholic and desoxycholic acids but the former reaction is much more dependent upon the alkyl. S. M.

Influence of bile acids on the nuclease action in the intestine and in the liver. TAKEJI OKAMURA. *J. Biochem. (Japan)* **8**, 391-6(1928). S. MORGULIS

Water metabolism under different conditions. D. RANCKEN. *Skand. Arch. Physiol.* **51**, 260-86(1927).—The vol. of the lower limbs, the intake of water and the output of urine were measured under various conditions (light, darkness, humidity, warmth, wind) throughout the day at different seasons. In dry and sunny weather the body loses water until about 2 p. m. but conserves its water content during the second half of the day. This is not observed on dark, rainy days, or when the expts. are carried out in a dark room. S. MORGULIS

The relationship between the formation of bile and glycogen in the liver of the rabbit. ERIK FORSGREN. *Skand. Arch. Physiol.* **53**, 137-51(1928).—By pptg. bile acids and pigments with BaCl_2 and using the usual technic for demonstrating the disposition of glycogen in the liver cells the following results were obtained in regard to the relationship between their formation in rabbits. Under normal conditions there is an antagonism between bile and glycogen formation. In liver cells contg. an abundance of specific bile constituents there is very little glycogen and *vice versa*. All liver cells of a lobule may hold simultaneously either an abundance of bile constituents or of glycogen, but more generally the bile constituents are most abundant in the cells on the periphery and glycogen in the central cells of a lobule. Bile formation usually commences in the periphery while glycogen is first deposited in the center of the lobule, and they persist in these situations the longest. Liver function is periodic, bile formation alternating with glycogen formation. In the morning there is as a rule a max. glycogen deposition and min. bile formation in all cells. During the day the situation is reversed, and at intermediate times every transition between these extremes is found. S. M.

The respiratory quotient during muscle work of short duration. J. LINDHARD. *Skand. Arch. Physiol.* **54**, 79-98(1928); *Kgl. Danske Videnskab. Selskab Biol. Medd.* **6**, No. 7, 27 pp.—The respiratory quotient after a brief muscular exertion rises rapidly and becomes greater than 1.0 during the first 5 min. It then quickly falls and in 15-20 min. returns to the resting value. The expts. do not sustain Hill's hypothesis that muscle work of short duration is done entirely at the expense of carbohydrate. S. M.

The relative activity of the thyroid gland of vertebrate animals. B. M. ZAVADOVSKII AND N. A. NOVIKOVA. *Zhurnal expl. biol. Med.* **8**, 51-8(1928).—The physiol. activity of various thyroids is detd. by implantation into axolotls. From 30 to 50 mg. of thyroid are necessary to produce metamorphosis into *Amblystoma*. Expts. with glands from dogs, cats, rabbits, guinea pigs, pigeons and chickens show that thyroids from various species have practically the same activity. S. MORGULIS

Tissue acidosis in autolysis under physiological conditions. B. M. STARK. *Zhurnal expl. biol. Med.* **8**, 162-70(1928).—Acidosis of autolyzing pieces of liver, kidney and spleen occurs sooner *in vitro* than when these pieces are in the organism. In autotransplantation expts. the acidosis reaches a p_H 6.7-5.5 and lasts 6 hrs.; in heterotransplantations the p_H is 6.7-5.1 and the acidity lasts 12 hrs. S. MORGULIS

Vasodilators. K. G. USHINSKII. *Zhurnal expl. biol. Med.* **8**, 314-7(1928).—Platysmographic and elastometric studies show that baths with H_2S -contg. waters act directly on the peripheral vessels causing dilatation. S. MORGULIS

Effect of splenectomy on the blood sugar. A. M. BLINOV. *Zhurnal expl. biol. Med.* **8**, 467-70(1928).—Splenectomy has no effect on the blood sugar curve either during fasting or during feeding. S. MORGULIS

Alteration of vasomotor properties of blood on changing *in vitro* its reaction. H. S. KOSHTOYANTZ. *Zhurnal expl. biol. Med.* **8**, 471-9(1928).—Weak acids (H_3BO_3 , NaH_2PO_4) or weak bases (NaHCO_3 , Na_2HPO_4) have an opposite effect on the vasomotor action of blood. Added to pure Ringer soln. without the blood these substances have no effect. S. MORGULIS

The relation between hormonal and enzymic phenomena in the mechanism of regulation of the carbohydrate metabolism. V. A. ENGELHARDT AND A. N. PARSHIN. *Zhurnal expl. biol. Med.* **8**, 573-80(1928).—Massive doses of insulin which cause death from hypoglycemia in the exptl. animals are practically without any significant effect on the blood amylase. The av. was a 10% rise in the amylase 20 min. after the insulin injection. S. MORGULIS

Sedimentation reaction of erythrocytes in fatigue. D. E. ROSENBLUM. *Zhurnal expl. biol. Med.* **8**, 69-73(1928).—Following a fatiguing march (covering a distance of 10-20 km. at a rate of 6.6 km. per hr. with a 25 kg. load) the rate of sedimentation of

the blood cells diminishes, this being more pronounced the less accustomed the subject is to the exertion.

S. MORGULIS

The dynamics of phosphoric acid and glycolysis in blood. V. A. ENGELHARDT AND A. E. BRAUNSTEIN. *Zhurnal expl. biol. Med.* 9, 162-77(1928).—The change in inorg. P is smaller the more intense the process of glycolysis in the blood. The factors which promote the splitting off of inorg. P inhibit glycolysis in about the same degree. In a system where there is no glycolysis taking place there is no acceleration of the P formation while on inducing glycolysis (addn. of glucose) results at once in a smaller change in inorg. P contour. The inhibition, however, is not a direct effect of glycolysis inasmuch as it was observed also in systems incapable of glycolysis (serum + boiled ext. of red cells; red cells + NaF, or in acidified blood). Conclusion: Two independent processes go on during glycolysis: "hydrolysis" of P from some org. combination and "esterification" of P in conjunction with glycolysis. The fact that in glycolysis there is usually no change in the P content is due to a fine balancing of the 2 opposed reactions. As promotes greatly the splitting of the phosphate esters, and hence under its influence glycolysis is accompanied by a large formation of inorg. P. S. MORGULIS

Changes of double refraction in different rigors of the muscles. HANS STUBBEI, AND TZE-YEH LIANG. *Chinese J. Physiol.* 2, 139-50(1928). (In German.)—A change occurs in the double refraction value of striated muscle fiber in different kinds of rigor in the isotonic and isometric preps. with the compensation measured according to Snéarmont. It appears that the decrease of double refraction is not conditioned by a disorientation of micellae or by a change in the distance of a single micella from its neighbor. The most probable cause of the decrease is either a diminution of the anisotropy of the micellae, or a change in the difference of the refractive indices of the micellae and imbibing liquid; which of these causes was not detd.

L. W. RIGGS

G—PATHOLOGY

H. GIDEON WELLS

The reaction of animals with pancreatic diabetes to various forms of carbohydrates. I. Glycogen. W. S. ILJIN. *Z. ges. expl. Med.* 52, 24-32(1926).—When glycogen is injected into pancreatectomized cats, the glycogen is excreted as glucose in the urine. Conclusion: Glycogen is a storage stage of carbohydrate metabolism and insulin is not necessary for its conversion into glucose. F. L. DUNN

The role of the reticulo-endothelial system in streptococcus infections. I. The reaction of the reticulo-endothelial system in the mouse to streptococcus infections. N. LOUROS AND H. S. SCHEVER. *Z. ges. expl. Med.* 52, 291-306(1926).—Histological studies were made following the injection of 18 strains of streptococci into 69 white mice. In general L. and S. conclude that the changes observed were not specific but a pathol. acceleration of normal processes in the reticulo-endothelial system. Bibliography. II. Trypan blue, iron blockade and the function of the reticulo-endothelial system. *Ibid* 307-20.—Both trypan blue and iron did not act on the reticulo-endothelial system by producing a blockade but rather by a chemico-toxic action. The protective action of the reticulo-endothelial system does not parallel the blockade, nor the storage of substances in the reticulo-endothelial system. Bibliography. VI. Therapeutic studies with metals and metallic salts. *Ibid* 57, 221-33(1927).—Mn chloride in 1:1000 to 1:15,000 diln. of a 0.01 M soln. will protect 40% of mice injected with a lethal dose of streptococci. CdCl₂ prolonged life over the controls. VII. Studies with buffer solutions. N. LOUROS AND A. SCHMECHEL. *Ibid* 440-9.—Using Sorenson buffers made isotonic L. and S. show that both acid and alk. buffers had a protective action on white mice injected with streptococci. The maximal protective actions were obtained at pH of 4.5 and 8.3. Life was prolonged and histological studies of the reticulo-endothelial system showed increased protection. Bibliography. F. L. DUNN

The vegetative nervous system and immunity. I. The effect of pilocarpine on immune body production. A. BELAK, F. SAGHY AND L. CSERESZNYES. *Z. ges. expl. Med.* 52, 559-67(1926).—Agglutination tests in rabbits following the injection of killed paratyphoid B bacilli show that pilocarpine increases the titer over controls receiving water and controls receiving atropine. II. The effect of calcium salts on the formation of agglutinins. A. BELAK AND L. CSERESZNYES. *Ibid* 567-71.—Ca solns. show an increased formation of agglutinins over controls in rabbits. III. The irritation theory of immune body formation. *Ibid* 572-8.—If the rabbit ear is amputated and the wound cauterized within 10 min. after the injection, the agglutinin titer following atropine does not rise above that observed for the control, while following pilocarpine the titer increases 2-3 times above the controls. B. and C. suggest that immune body

production requires only a momentary contact between the antigen and the nervous system. F. L. DUNN

Acid and alkali in diabetes. GEZA HETENYI. *Z. ges. expil. Med.* **57**, 409-32 (1927).—A group of diabetics was placed on fixed diets and after a control period, 20-30 g. NaHCO_3 daily was given, and followed with 300 cc. 0.1 N HCl daily. Alkali lowered the blood sugar, NH_3 excretion and ketosis, while acid produced increases over the normal. In rabbits with insulin the injection of NaHCO_3 brought on hypoglycemic convulsions quicker than when insulin was given alone. Conclusion: Alkali favors the action of insulin. F. L. DUNN

Amino acid secretion in liver disease compared with cholesterol and lactic acid. ERNST DERRA. *Z. ges. expil. Med.* **57**, 567-72 (1927).—Urinary excretion of amino acids in normal men did not go above 18 mg. %, or 200 mg. in 24 hrs. There is an increase in fever and the results are variable in liver disease. The highest values were obtained in acute yellow atrophy, severe cirrhosis and cholangitis. Conclusion: The amino acid excretion is not a good index of liver damage. Bibliography. F. L. D.

Physicochemical studies of the serum in scarlet fever. HENDRE TUDOS AND ALFRED EBEL. *Z. ges. expil. Med.* **57**, 709-14 (1927).—The cond. and chloride content of the serum in scarlet fever are somewhat reduced over the normal values. Except for nephritis the complications have little added effect. F. L. DUNN

Alimentary hypoglycemia as a functional test of the Islands of Langerhans. F. DEPISCH AND R. HASENÖHRL. *Z. ges. expil. Med.* **58**, 81-109 (1927).—The blood-sugar curves following the ingestion of 75-100 g. glucose in a 10% soln. were studied. In normals following the hyperglycemia there is a fall in blood sugar to 8-21 mg. % below the normal fasting level. With repeated large amts. of glucose the alimentary hypoglycemia is increased. The hypoglycemia was greater than normal in hypertension, convalescent patients, renal glucosuria, obesity and following starvation, and less in Basedow's disease and diabetes. Bibliography. F. L. DUNN

Experimental studies on insulin resistance in diabetes mellitus. F. DEPISCH AND R. HASENÖHRL. *Z. ges. expil. Med.* **58**, 110-6 (1927).—The serum from a case of diabetes with a paranephritic abscess had an insulin-inhibiting action on rabbits. This effect was not changed by the action of carbolic acid and was only slightly affected by heat up to 80° for 2 hrs. Serum from cases with diabetes but without sepsis did not show this effect, and cases with sepsis but without diabetes did not show it. F. L. D.

Anaphylaxis studies in man and animals. VII. The potassium and calcium content of the blood and tissues of dogs and rabbits and its changes during sensitization and anaphylaxis. A. SCINITTENHELM, W. ERIHARDT AND K. WARNAT. *Z. ges. expil. Med.* **58**, 662-82 (1928).—Values are given for the K and Ca content of various parts of the blood stream, liver, lung, spleen and intestine in normals animals and at the height of anaphylaxis. Following antigen injections the K and Ca contents of the blood rise, the ratio of K:Ca remaining fairly const. In acute anaphylactic shock the K content rises in all vessels studied for serum but not whole blood. F. L. DUNN

Functional tests of the liver and reticulo-endothelial system by the use of dyes; the clinical value of the tetrachlorophenolphthalein test. F. SCHELLONG AND B. EISLER. *Z. ges. expil. Med.* **58**, 738-56 (1928).—Studies of dye disappearance is normal animals, animals with india-ink blockade and with splenectomy showed that the reticulo-endothelial system plays an important part in the rate of disappearance of the dye. The tetrachlorophenolphthalein test does not test liver cells entirely. Clinical data corroborate this view. F. L. DUNN

Blood as a physicochemical system. VII. The composition and respiratory exchanges of human blood during recovery from pernicious anemia. D. B. DILL, A. V. BOCK, C. v. CAULAERT, A. FÖLLING, L. M. HURKTHAL AND L. J. HENDERSON. *Mass. General Hospital. J. Biol. Chem.* **78**, 191-214 (1928); cf. *C. A.* **22**, 113.—A study was made of the physicochem. changes occurring in the respiratory and circulatory mechanisms of a man during recovery from pernicious anemia under liver ext. therapy. The data are collected in the form of a *nomogram*. ARTHUR GROLLMAN

Influence of normal and cancerous blood-serum on pancreatic lipase action and the effect of ionic and colloidal lead. R. F. CORRAN AND W. C. M. LEWIS. *Biochem. J.* **22**, 451-63 (1928).—Cancer serum has a reduced augmentative effect on lipase as compared with normal serum; this confirms the results of Shaw-Mackenzie (*C. A.* **9**, 2769). Lead, both in the ionic and colloidal forms, increases the hypolytic augmentation of both normal and cancerous sera. BENJAMIN HARROW

Renal function test with sodium thiosulfate and sodium iodide. An experimental comparison with the phenolsulfonephthalein test. ADOLF BOLLIGER. *Arch. Internal Med.* **41**, 642-54 (1928).—Ten cc. of a soln. contg. 1 g NaI, 1 g. $\text{Na}_2\text{S}_2\text{O}_3$ and 6 mg. phenol-

sulfonephthalein was injected into normal, pregnant and nephritic dogs and dogs with extrarenal lesions and the urine examd. 2 hrs. later. The NaI test is of little value. The $\text{Na}_2\text{S}_2\text{O}_3$ test is a sp. quant. test for exptl. renal insufficiency even a little more accurate and sensitive for slight renal lesions than the phenolsulfonephthalein test. The $\text{Na}_2\text{S}_2\text{O}_3$ excretion is reduced in pregnancy.

MARY JACOBSEN

Experimental obstructive jaundice. III. Modification of the parathyroid tetany mechanism in jaundice. W. C. BUCHBINDER and RUTH KERN. *Arch. Internal Med.* 41, 754-63(1928); cf. C. A. 22, 1188.—Jaundice, especially one of longer standing, markedly reduces or entirely prevents tetany in parathyroidectomized puppies and adult dogs. The blood Ca falls in puppies much more than in adult dogs, and may reach the tetany level without there being any tetany. Acute jaundice increases the susceptibility to severe and terminal tetany. Tetany may be relieved by 2 cc. whole bile. The blood Ca level is not raised by either CaCl_2 or Collip's hormone. Conclusion: The threshold of nervous excitability is raised in obstructive jaundice in harmony with the fact that bile is a depressant of the central nervous system. M. J.

The origin of cancer. W. CASPARI. *Arch. klin. Chir.* 146, 711-36(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 45.—Review.

MARY JACOBSEN

Anaphylaxis from a biological point of view. GUIDO SERENI. *Biol. Reviews* 3, 93-122(1928).—Critical review, with 170 references. Anaphylaxis and immunity are both allergic phenomena. Their differentiation is artificial and purely teleological. The criteria of anaphylaxis are: an exciting substance, a period of incubation and response to the same substance. The shock is incidental. The presence of antibodies in the circulation is not essential; they may be fixed in organs. For the same reason the failure to produce anaphylaxis in certain organisms with our present technic is not sufficient evidence against the universality of anaphylaxis.

MARY JACOBSEN

Effect of organic antimony compounds on serum in infantile leishmaniasis. STANISLAO FABRIS. *Pediatria Rivista* 36, 5-14(1928).—In 25 cases of infantile leishmaniasis the serum gave a ppt. or, more frequently a turbid contact ring with Heyden's preps. no. 482 (antimonylstibetyl), 292 (stibacetine) and particularly with 1 and 0.5% 417 (stibosan). Most of the inactivated sera behaved in the same manner. The reaction was negative with normal sera and in a no. of various diseases among others splenic anemia.

MARY JACOBSEN

The potassium and calcium content and the potassium : calcium ratio in the serum of infants. VITTORE ZAMORANI. *Pediatria Rivista* 36, 57-71(1928).—The mean values obtained from the serum of 10 normal children were: K 24.34 mg./100 cc., Ca 10.41 mg./100 cc., K:Ca 1.91. In acute bronchopneumonia, typhoid and smallpox, Ca and K vary, while K:Ca remains const. The latter is lowered in spastic and convulsive (non-tetanoid) conditions and increased in tracheo-bronchial adenopathy. The increase is considerable in rickets and asthma, because of the lowered Ca and higher K, in tetany because of the fall of Ca. In these diseases the physiol. equil. between serum and tissue cells is upset, the latter not being able to retain and fix Ca and K in physiol. proportions.

MARY JACOBSEN

The enzyme test in the study of the condition of certain organs in infantile malaria. ANTONIO SIRCA. *Pediatria Rivista* 36, 135-42(1928).—Sivori and Rébaud's enzyme reaction decreased in intensity in the order: spleen, pancreas, liver. Except for a few cases with severe blood picture the adrenals gave an inconst. and insignificant reaction. The test was negative for kidney, thymus and thyroid. The serious damage to the pancreas in malaria has not been pointed out before.

MARY JACOBSEN

Effect of skin vascularization on the Pirquet test. GIUSEPPE CIMMINO. *Pediatria Rivista* 36, 196-205(1928).—Pirquet's reaction is intensified by vasoconstriction or passive hyperemia of the skin and attenuated by vasodilatation or active hyperemia. The reaction depends chiefly on the sp. or unsp. reaction of the skin and to a small extent on sp. circulating substances. Vasoconstriction possibly extends the contact of the circulating antibodies with the antigens fixed in the skin.

MARY JACOBSEN

The blood cholesterol of children in smallpox. GIULIO POI. *Pediatria Rivista* 36, 355-61(1928).—The blood cholesterol was lowered in smallpox and rose to its normal value or even above it during the convalescence.

MARY JACOBSEN

The physiopathological significance of cholesterol. RAFFAELE MENASI. *Rass. clin. terap. sci. affini* 26, 87-98(1927); cf. *Pensiero med.* 15, 30(1926).—Review. M. J.

Effect of mechanical injury on desiccated chicken sarcoma. WARO NAKAHARA. *Inst. Infectious Diseases. Japan Med. World* 8, 51-8(1928).—Active tissue of a Rous sarcoma No. 1 was desiccated and ground by hand in a mortar for 1.5 to 2 hrs. with care not to produce an undue amt. of heat by unnecessary friction. Pulverized material was injected into the breast muscle of the left side of normal chickens, while non-pulver-

ized material was injected into the right side of the same bird. After 3 weeks, pulverized material dried for 5 to 7 days did not produce tumors while non-pulverized material did. Tissue dried for 3 days only, produced palpable nodules following the injection of pulverized material but tumors were produced following the injection of non-pulverized material. The conclusion reads "it seems clear from the above described expts. that the sarcoma transmitting 'agent' is in all probability a formed body and microscopical findings suggest that the formed body in question may be the sarcoma cell itself. If the 'agent' were a chem. substance, its function could hardly be expected to be seriously damaged by so gross a treatment as grinding in a mortar."

N. KOPELOFF

Chemical and biological studies on primrose idiosyncrasy. BR. BLOCH AND P. KARRER. *Vierteljahrsschr. naturforsch. Ges. Zürich* **72**, Beibl., No. 13, 1-26(1927).—A substance primin, having the following properties was isolated from the Et_2O ext. of primrose: yellow cryst. substance, m. $62-63^\circ$, insol. in H_2O , sol. in Et_2O , CHCl_3 and EtOH , slightly sol. in cold petr. ether, sol. in hot H_2O . The analyses and mol. wt. indicate that primin has the formula $\text{C}_{14}\text{H}_{14}\text{O}_3$ or $\text{C}_{14}\text{H}_{12}\text{O}_3$. An O is present apparently as OH or possibly as lactone. Primin is unsatd., decolorizes KMnO_4 and reduces AgNO_3 . Biol. tests show that primin gives the typical dermatitis produced by primrose.

H. R. KRAVBILL

The existence and the chemical nature of hemolytic properties of antigens used for the Wassermann reaction. F. OKOLOV. *Biochem. Z.* **192**, 324-36(1928); *Zhurnal expl. Biol. Med.* **8**, 17-31.—Cooling as a means of removing the hemolytic properties of antigen is an indirect way of bringing about good results through limiting the necessary quantity of ext. The hemolytic property of liver antigen is about twice as great as that of heart antigen exposed to low temps. The hemolytic action of antigen from human liver or heart is due principally to fatty acids or their salts, which are more effective in this respect than lecithin or Na glycocholate.

S. MORGULIS

Chemico-immunological studies on globin and globin derivatives. F. OTTENSOOSER AND E. STRAUSS. *Biochem. Z.* **193**, 426-63(1928).—From the weakly antigenic hemoglobin a strongly antigenic globin can be prepd. under proper conditions. This is an atypical behavior for a basic protein. Nitroglobin and aminoglobins which are sol. in the body fluids and are either weakly basic or not at all basic, act as strong typical antigens. Specific globin pptn. takes place best in antigen solns. at pH 8.1-8.3. Attempts to prep. concd. globin solns. for anaphylaxis expts. were unsuccessful. The species specificity of the antiglobin sera in pptn. of globins is very marked; also the complement formation betrays a species differentiation. Globin possesses the characteristic specificity as hemoglobin.

S. MORGULIS

Preparation of diphtheria anatoxin by means of acetaldehyde. V. M. KULIKOV AND A. KOMPANEJZ. *Zhurnal expl. Biol. Med.* **8**, 79-83(1928).— AcH is more suitable than CH_3O in the prepn. of anatoxin as it can easily be removed by shaking or warming. AcH detoxicates the toxin quickly and with certainty. The anatoxin is antigenic, and this property can be increased by proper exptl. conditions (temp., concn., etc.).

S. MORGULIS

Paraffin as antigen. Z. V. YERMOLYEVA. *Zhurnal expl. Biol. Med.* **8**, 188-90(1928).—Injection of aqueous suspensions of paraffin causes the serum to acquire the specific property to produce pptn. and complement formation with these suspensions.

S. MORGULIS

The individual properties of alexin. II. Role of the individual alexin in the Wassermann reaction. V. FRIEZE AND L. SILBER. *Zhurnal expl. Biol. Med.* **8**, 318-21(1928).—The hemolytic and the adsorption capacity of the alexin are differentiated. These are mutually independent characteristics, the hemolytic titer having no effect on the adsorption capacity. With alexins of the same hemolytic dose sera with a partial pos. Wassermann (+, ++, +++) yielded different results from complete hemolysis to complete inhibition of hemolysis. Strongly pos. sera gave uniform results with all alexins but with neg. sera gave occasionally pos. results with some alexin. It is maintained that for the proper standardization of the Wassermann reaction alexin of standard adsorption capacity must be prepd.

S. MORGULIS

Studies on experimental shock with especial reference to its treatment. MAURICE I. SMITH. *J. Pharmacol.* **32**, 465-508(1928).—Evidence against the traumatic-toxemia hypothesis in shock was furnished by expts. in which direct transfusion of blood from the leg of a dog with leg tissues crushed, to another dog failed to produce shock symptoms in the recipient. Injection of blood from the crushed limb of an animal into the same animal failed to produce shock. Pituitary ext. given during the primary fall in blood pressure observed in histamine shock generally caused recovery, whereas if given

during the secondary stage the ext. was of little or no value. In cases of shock produced by manipulation of the intestines, supplemented by hemorrhage, injections of the following were of no permanent value: normal saline, normal saline and pituitary, 0.5 M glucose, gum saline, gum saline and pituitary, ephedrine, glycogen in normal saline.

C. RIEGEL

Quantitative variations of the blood iron content during asphyxia. LÉON BINET AND PAUL FLEURY. *Compt. rend. soc. biol.* 98, 825-6(1928).—Increases in the Fe content of 23 and 51% were noted in 2 chloralosed dogs which were subjected to 4-min. periods of asphyxia by closing the wind-pipe. In 2 splenectomized dogs asphyxia caused but little change in the Fe content of the blood. Contraction of the spleen forces an increased no. of erythrocytes into the circulation with a consequent rise in the Fe content.

L. W. RIGGS

Metabolism of carbohydrates in epileptics. C. J. MUNCH-PETERSEN. *Compt. rend. soc. biol.* 98, 891-3(1928); cf. Lennox, *C. A.* 22, 111.—A report is given of the sugar metabolism in 12 epileptics in connection with the administration of sugar and adrenaline.

L. W. RIGGS

Action of certain yeasts and more particularly alcoholic fermentation on toxins. ALEXANDRE COMIS. *Compt. rend. soc. biol.* 98, 1091-3(1928).—Toxins of dysentery, ricin, diphtheria and paratyphus B were fermented generally with the yeast *S. ellipsoidens* and inoculated in rabbits. In all cases the toxicity of the toxin was diminished while its antigenic power was preserved and the immunizing action was reinforced.

L. W. RIGGS

Variations in the blood density in the course of asphyxia. Study of the density of the blood from the splenic vein. LÉON BINET AND L. PERLÈS. *Compt. rend. soc. biol.* 98, 1096-7(1928).—Acute asphyxia increased the density of the blood from an av. of 1.0558 to 1.0621 in 6 cases. The density returns to normal in 15 to 45 min. after normal respiration is established. This change in density is not observed in splenectomized dogs. During asphyxia the blood of the splenic vein in 6 dogs had an av. density of 1.0977 as compared with 1.0531 in the arterial blood of the same dogs.

L. W. RIGGS

Accumulation of sulfur in the skin after extirpation of the suprarenals. M. LOEPER, J. DECOURT AND A. LESURE. *Compt. rend. soc. biol.* 98, 1098-9(1928); cf. *C. A.* 21, 2311, 3948.—In 3 dogs deprived of suprarenals the S in the skin increased from 23 to 30% in 8 days following the operation. This fact is of interest in connection with the accumulation of melanin, a highly sulfurized compd., in Addison disease.

L. W. RIGGS

Modifications of cholesterolemia in oxaleemics. G. LAROCHE AND A. GRIGAUT. *Compt. rend. soc. biol.* 98, 1104-5(1928).—In 7 cases of gout there was a hyperoxalemia ranging from 0.059 to 0.078 (normal 0.04), and the cholesterolemia ranged between 2.08 and 3.05, but the variations were not parallel to those of the oxalemia. L. W. R.

Passage of bismuth and of arsenic across the vasculo-meningic barrier in man under the influence of an aseptic meningitis. S. MUTERMILCH AND (MLLE) E. SALAMON. *Compt. rend. soc. biol.* 98, 1113-5(1928); cf. *C. A.* 21, 2332.—The intrarachnoid injection of sterile farina emulsion in general paralytics causes an aseptic meningitis. Under this condition intravenously injected As or Bi medicaments may penetrate the cerebrospinal fluid.

L. W. RIGGS

Diastatic treatment of experimental cobraic in venomation. C. PICADO. *Compt. rend. soc. biol.* 98, 1130-1(1928).—Injection of cobra venom in the rabbit was followed after 5 min. by several injections around the site of the venom injection, of a mixt. of eosin and trypsin and also an intravenous injection of sparteine sulfate. The animals survived without local or general reactions.

L. W. RIGGS

Effect of castration on the basal and summit energy metabolism. X. CHAHOVITCH AND (MLLE) M. VICHNITCH. *Compt. rend. soc. biol.* 98, 1153-5(1928).—Expts. with rats proved that castration caused a lowering of the basal metabolism which began in some of the animals in 18 days after castration. There was also a diminution in the summit metabolism which was pronounced several months after castration.

L. W. RIGGS

Diuretic power of serum of patients with diabetes insipidus. MARCEL LABBÉ AND P. L. VIOLLE. *Compt. rend. soc. biol.* 98, 1290-3(1928).—In tests with rabbits the injection of the serum of patients with diabetes insipidus caused no greater polyuria than did the injections of normal serum.

L. W. RIGGS

Endemic goiter and public health. O. P. KIMBALL. *Am. J. Pub. Health* 18, 587-601(1928).—Endemic-goiter caused by deficiency of iodine in the modern, highly refined, table salt is prevented by the use of iodized salt contg. 1 pt. KI per 5,000 NaCl;

or by taking one iodostarin tablet (10 mg. I) per week. Too much iodine may be harmful. C. M. SALLS

Mineral metabolism in celiac disease. S. V. TELFER. *Glasgow Med. J.* **38**, 306-13 (1928).—The results of a metabolic study of fat and mineral utilization are recorded. On a diet of fresh milk the retention of the bone-forming elements is much reduced and fat utilization is defective. The retention of MgO is not appreciably lessened. The retention of Fe_2O_3 is neg. The mode of excretion differs widely from that in normal subjects. The output of fecal solids is excessively great, and is associated with an undue loss of mineral matter and fatty derivs. from the intestine. The percentage of fatty derivs. in the solids is double the normal while the percentages of total mineral matter and of the individual mineral constituents are below the av. The CaO is excreted as an insol. soap and constitutes a large part of the solids. The urinary excretion of CaO, MgO and P_2O_5 is low. The mode of excretion indicates the existence of a grossly defective absorption of both mineral elements and fats. M. H. SOULE

Surface tension of serum of the sensitized guinea pig. I. Surface tension changes incident to the process of sensitization. SUSAN G. RAMSDILL. *J. Exptl. Med.* **47**, 987-91 (1928).—The change in surface tension behavior in the serum of sensitized guinea pigs is, as du Noiry has concluded for immunized rabbit serum, not referable to an antibody content, since the capacity for transfer of sensitization remains in the serum indefinitely, while the increased time-drop phenomenon is a transitory manifestation. That this phenomenon cannot be invoked by a new antigen capable of calling out its sp. antibody would seem to indicate that this expense is due to some basic stable alteration of a tissue active in the general process of sensitization. That this alteration is not called out by such a simple toxic injury as a $\text{UO}_2(\text{NO}_3)_2$ nephritis is contributory evidence that the primary toxicity of the horse serum is not the sp. factor involved.

II. Surface tension changes in the blood in anaphylactic shock. *Ibid.* 993-8.—The primary change in surface tension of serum incident to anaphylactic shock is probably due to a lowering of the surface tension of the serum by the addn of the antigen serum. But this may be followed by a further decrease or by an increase depending on the intensity and duration of certain secondary tissue changes. C. J. WEST

H—PHARMACOLOGY

A. N. RICHARDS

The influence of some gases and drugs upon the tonus and peristalsis of the isolated intestines. TSUNEYA NISHIKAWA. *Jikei-Kwai Med. Col., Tokyo Sei-i-Kuon Med. J.* **47**, No. 1, 3-4 (1928).— O_2 increases the duration of peristalsis in isolated rabbit intestines suspended in Tyrode's soln. while the effect of N is not so marked. The bubbling of H_2 through the soln. has an unfavorable effect, and CO_2 is more harmful. Under the influence of O_2 morphine or atropine in 1:10000 soln. accelerates both the tonicity and peristalsis while in stronger soln. (1:5000) they increase the tonicity and weaken the peristalsis. The action of morphine with CO_2 on the intestines is the same as that with O_2 while atropine causes in both dilns. with this gas a lowered tonicity and peristalsis. With N, morphine has no effect in the smaller dose but in the higher concn. weakens the peristalsis but does not change the tonicity. Atropine behaves the same on the intestine with N as with O_2 . With no gases morphine accelerates the natural peristalsis and tonicity, the more pronounced effect being noted with the greater concn. of the drug. Atropine on the other hand causes a marked decrease in peristalsis and tonicity, a greater effect being noted with the stronger soln. H. J. DEUEL, JR.

Blood calcium studies. IX. The influence of insulin on the blood calcium. E. KULIN. *Z. ges. exptl. Med.* **52**, 260-1 (1926).—The blood Ca was detd before insulin injection in 8 diabetics, and again 4-5 hours afterwards. A drop of 0.5 to 3.5 mg. per 100 cc. was observed. F. L. DUNN

The mechanism of alimentary hyperglucemia. I. The influence of the vegetative nervous system upon alimentary hyperglucemia. W. GRUNKE. *Z. ges. exptl. Med.* **52**, 488-98 (1926).—Blood-sugar curves were detd. following the ingestion of glucose with and without the previous administration of ergotamine. Ergotamine markedly reduces the blood-sugar elevation. Fluoroscopic studies showed that ergotamine did not disturb the function of the stomach and G. suggests that the vegetative nervous system is an important factor in alimentary hyperglucemia. F. L. DUNN

Electrolytes and vagus irritability. F. BRICKER and A. TSCHARNY. *Z. ges. exptl. Med.* **52**, 550-8 (1926).—An excess of Ca ion in the blood of rabbits increases the effect of pilocarpine on the blood pressure; and also increases the irritability of the peripheral end of the vagus nerve. K ion does not have this effect. F. L. DUNN

The action of potassium and calcium on urinary acidity. ISTVÁN HETENYI AND J. HOLLO. *Z. ges. expth. Med.* 52, 595-602(1928).—The titratable acidity and the pH of the urine were followed for 4 hrs. following the injection of solns. contg. K and Ca into patients with various diseases. Both salts were diuretic. Ca shifted the urinary reaction to the acid side and K to the alk. Controls using NaCl did not show this effect.

F. L. DUNN

The effect of oxidation inhibitors upon glucolysis in the blood of birds. A. BORNSTEIN AND O. ASCHER. *Z. ges. expth. Med.* 52, 607-14(1928).—Goose blood kept at 37° does not show any glycolysis in 2-3 hrs. normally. It is not observed then unless the O in the blood has been consumed, or unless the blood has been satd. with CO₂, or unless such poisons as cyanide, quinine or arsenious acid have been added. This is in confirmation of the Meyerhof theory of glucolysis.

F. L. DUNN

Studies on diiodotyrosine and thyroid gland preparations with a discussion of the gas metabolism method of Knipping. FR. HOFFMAN. *Z. ges. expth. Med.* 57, 68-76 (1927).—No changes were observed in basal rate, pulse or temp. in normal men following the injection of 3,5-diiodo-L-tyrosine in doses up to 4.2 g. and in 1 case with daily doses of 4 cc. of a 15% soln. It was not found possible to increase the basal rate more than 50% above normal no matter how large the dosage of thyroid gland prepn. was.

F. L. DUNN

The distribution of gold in the healthy and tuberculous organism following the injection of sanocrysin. SHUSAKU KUROSA. *Z. ges. expth. Med.* 57, 77-110(1927).—Histochem. studies in white mice and guinea pigs following the injection of sanocrysin showed an increased deposit in the diseased organs in tuberculous animals, but not in the diseased part. Bibliography.

F. L. DUNN

Studies with secretin. I. The blood-sugar lowering action of secretin in animals. LADISLAUS TAKÁCS. *Z. ges. expth. Med.* 57, 527-31(1927).—A substance can be extd. from the small intestine mucosa which reduces the blood sugar 50-60% in rabbits and dogs. II. **The blood-sugar lowering action of secretin in healthy and diabetic individuals.** *Ibid.* 532-6.—Similar results were obtained, the lowering amounting to 55% in some instances. Hypoglycemic symptoms appeared and the ext. was effective when given by mouth or rectally. T. suggests that this may have a bearing on the etiology of diabetes.

F. L. DUNN

Studies on chologogs. I. The action of sodium dehydrocholate (decholin) in man. STEPHAN RUSZNYAK. *Z. ges. expth. Med.* 57, 536-53(1927).—With a duodenal tube no therapeutic effect was observed in 19 cases when 2 g. of decholin was injected intravenously. Bibliography.

F. L. DUNN

The action of colloidal sulfur upon the respiratory exchange. G. PENNETTI. *Z. ges. expth. Med.* 57, 584-94(1927).—Colloidal S in subcutaneous doses of 30-40 mg. per kg. in deeply urethanized rabbits had no noteworthy effect on the respiratory exchange, but did lower the blood sugar 15-20%. Doses of 100 mg. per kg. body weight resulted in lowering of the respiratory quotient and a hyperglucemia, due to a S poisoning.

F. L. DUNN

Studies on the excretion of unoxidized substances in the urine. The action of adrenaline, insulin and phlorhizin on the C:N ratio and on the oxygen deficit in the urine. HANS E. BUTTNER. *Z. ges. expth. Med.* 57, 721-39(1927).—The amt. of O required in the complete combustion of urine is the O deficit. Following doses of adrenaline 0.5 mg. per kg. the O deficit increases for about 8 hrs. to double the normal, sinking to below the normal during the following 16 hrs., making the total amt. the same as in the normals for the 24-hr. period. The increased O deficit did not seem to be due to carbohydrate or org. acids. A definite change in the O deficit was not shown following the injection of insulin, 2 units per kg., into rabbits. Phlorhizin in rats increased the O deficit 150%.

F. L. DUNN

The dependence of the action of insulin on the female sex glands. E. VOGT. Univ. Tübingen Hospital. *Deut. med. Wochschr.* 54, 701-2(1928).

A. G.

The therapeutic use of phosphorus. G. ZACHARIAE. *Deut. med. Wochschr.* 54, 920(1928).—A discussion of the therapeutic use of *tonophosphan*, a com. prepn. contg. P.

ARTHUR GROLLMAN

Poisoning by somnifen. E. LICHTENSTEIN. *Deut. med. Wochschr.* 54, 921(1928).—Report of a case.

ARTHUR GROLLMAN

Morphine poisoning in a seven-week old infant. J. FLEISCHER. *Deut. med. Wochschr.* 54, 921(1928).—Report of a case.

ARTHUR GROLLMAN

Action of benzene upon simple secondary anemias in rabbits and upon normal rabbits. THOMAS HODGE MCGAVACK. Univ. Calif. *J. Am. Inst. Homeopathy* 21, 461-76(1928).—Subcutaneous administration of C₆H₆ in daily doses ranging from 0.004

to 0.1 cc. had no influence on the recovery of 10 rabbits from simple secondary anemia due to hemorrhage. The smallest dose of C_6H_6 which produced a definite physiol. action in normal rabbits was 0.1 cc. given subcutaneously for 20 to 25 consecutive days. In 20 rabbits suffering from chronic C_6H_6 poisoning, the bone marrow was stimulated with the production of immature types of cells, and either destruction of granulocytes or failure to produce them in any but the smallest quantity (2 to 4%); the red cells were reduced slightly in no.; and the megakaryocytes increased greatly in activity. The more primitive forms of cells entered the circulation, and were frequently caught in the lungs as a result of their size; thereby a tendency existed to obstruct the smaller arterioles and capillaries and produce minute necrotic areas. The spleen was rarely affected. When 4 rabbits were given a dose of 0.75 cc. per kg. of body wt. subcutaneously daily for 6 or 7 days, the thrombocyte count in the circulating blood showed an initial increase, followed, in turn, by a primary fall, a secondary rise, and a secondary fall; complete recovery to normal was attained on the 17th to 20th day of the expt. When this dose was doubled, and given to 2 rabbits until death occurred, their bone marrow and lungs showed the same changes as recorded above in chronic poisoning. Acute poisoning with recovery followed intraperitoneal injection of a single dose (1.5 cc.); among the symptoms were subnormal temp., increased respiration and pulse rate, paralysis of the adductor muscles, decreased control of the neck muscles, spasmodic twitchings of the facial and trunk muscles and rigidity of the spinal muscles; lapse of consciousness did not occur; the leucocyte count was markedly lowered; the erythrocyte and the thrombocyte counts were but little changed. Conclusion: C_6H_6 exerts its action upon the marrow of the long bones; small doses (0.1 cc. daily) over a sufficiently long period of time produce the same effects as larger doses for shorter periods; the action is essentially leucotoxic, and chiefly affects the granulocytes, mononuclear types and megakaryocytes, but not the erythrocytes. In acute poisoning, the bone marrow activity is first depressed, then increased; in chronic poisoning, the reverse occurs. The total amt. of C_6H_6 required to produce death is no greater in chronic than in acute poisoning.

JOSEPH S. HEPBURN

The effect of drugs on cardiac output. VI. The effect of ephedrine on the minute cardiac output of normal dogs. CHARLES P. WILSON, COBB PILCHER AND T. R. HARRISON. *Arch. Internal Med.* 41, 622-32(1928).—"Ephedrine increases the minute cardiac output, and the results of its use in shock indicate it is of value as a cardiac stimulant."

M. J.

A new gold preparation for the chemotherapy of tuberculosis. BERNARDO ODDO. *Boll. chim. farm.* 67, 3-4(1928); cf. *C. A.* 22, 1435.

MARY JACOBSEN

Copper in medicine and industrial pathology. II. Pathology of copper workers. 1. Workers with pure copper. 2. Workers engaged in the manufacture of copper salts and compounds and those coming into contact with them. 3. Workers engaged in the manufacture of copper alloys. VINCENZO MAZZI. *Rass. clin. terap. sci. affini* 27, 49-76; 119-61(1928). Cf. *C. A.* 22, 1804.

M. J.

The physiological action of anions. N. ONODERA. Kyushiu Imperial Univ. *Jap. Med. World* 8, 58-60(1928).—As a result of expts. on men and dogs it is concluded that "the sulfuric acid on coming into contact with the mucous membrane of the stomach forms a substance resembling peristaltic hormone and makes the mech. component of digestion, while the HCl and pepsin make the chem. components. Salt of cholic acids protect the intestinal wall, completing the absorbing function; phosphate of soda acting on the duodenal wall manifests its action by stimulating the internal secretion of the pancreas."

N. KOPELOFF

Physicochemical modifications in the blood following chloroform narcosis. G. MONTENARTINI. *Boll. soc. ital. biol. sper.* 3, 140-1(1928).—Dogs were anesthetized with 20 g. chloroform. The index of refraction of the blood increased. In man, the protein equil. was disturbed, tending towards an increase in globulins. A hypocholsterinemia was observed in dogs.

PETER MASUCCI

A comparative study of the convulsant action of the acid and neutral salts of acid fuchsin. J. E. THOMAS. St. Louis Univ. *J. Pharmacol.* 33, 1-19(1928).—Frogs were bled by excision of the ventricle, and solns. of fuchsin injected into the aorta. Acid solns. of fuchsin caused convulsions in less time, and more consistently than alk. solns. of fuchsin. In frog perfusion expts. when the concn. of acid fuchsin in the Ringer soln. was greater than that of alk. fuchsin convulsions occurred sooner than when the greater part of the fuchsin was present as the alk. form. The convulsant action of alk. solns. of fuchsin in perfused frogs was greater if the soln. was used immediately after the addition of alkali rather than later, after decolorization had occurred. C. R.

A comparison of the actions of cocaine and adrenaline upon excised smooth muscles

of different species. C. H. THIENES. Univ. of Oregon. *J. Pharmacol.* 33, 21-41 (1928).—Cocaine was added to a bath of Tyrode, Locke or Ringer soln., in which was suspended a strip of smooth muscle. With stomach muscle of the rabbit, guinea pig, rat and cat, there was increased tonus with cocaine. With strips of small intestine or colon from the rabbit, cat, dog, guinea pig, either an increase or decrease in tone was produced. Strips of the fundus of the urinary bladder usually showed increased tonus after the addition of cocaine. Low concns. of cocaine (1:50,000 to 1:25,000) caused increased tonus of uterine strips, while with high concns. (1:10,000 to 1:5000) there was either an augmentation or a depression of activity. Adrenaline in the majority of cases gave results opposite to those produced by cocaine. C. RIEGEL

Studies on hypnotics of the barbituric acid series. NATHAN B. EDDY. Cornell Univ. *J. Pharmacol.* 33, 43-68(1928).—Given orally to cats, the fatal doses of the drugs studied were found to be: barbital (diethylbarbituric acid) 280 mg.; amytal (isoamylethylbarbituric acid) 100 mg.; ipral (Ca ethylisopropylbarbiturate) 140 mg.; neonal (butylethylbarbituric acid) 84 mg.; phanodorn (cyclohexenylethylbarbituric acid) 120 mg. per kg. Thirty cats were divided into 6 groups of 5 each, and members of each group administered a certain percentage of the fatal dose of each drug. Effects on the following were observed: posture, hypnotic effect, heart rate, respiratory rate, analgesia, rectal temp., size of pupils, reaction of pupil to light, conjunctival reflex, correction of abnormal position, running, righting reflex, knee jerk, tone of hind limbs, general condition. Phanodorn was the most depressant and hypnotic, produced only a moderate depression of the respiration and was least likely to cause muscular rigidity and trembling. Amytal was very similar but had a greater effect on respiration. Ipral was the least desirable because it was the least depressant, and complete recovery was delayed more than with the others. To produce a stupor amounting to anesthesia a dose of at least 50% of the fatal dose had to be given. There were no consistent effects with any of the drugs on heart rate or size of pupil. C. RIEGEL

Pharmacological action and chemical characteristics of products produced from Witte's peptone by electrolysis. FRANK P. UNDERHILL and ERWIN G. GROSS. Yale Univ. *J. Pharmacol.* 33, 69-80(1928).—A soln. of Witte's peptone was electrolyzed. The soln. obtained from the anode chamber was acid to litmus. The material obtained on evapn. gave a bright red color with HNO_3 . It had a low ash content, was low in tryptophan and compared to Witte's peptone was low in basic N, especially arginine and lysine. The soln. obtained from the cathode chamber was alk. to litmus. The material obtained on evapn. had a high ash content, and a tryptophan content higher than that of the anode material but lower than Witte's peptone. The basic N was high, particularly arginine and histidine. The soln. from the center chamber was neutral to litmus. Both the sol. and insol. portions showed reactions similar to the original Witte's peptone. C. RIEGEL

The pharmacology of cardiazole. W. J. R. CAMP. Univ. of Illinois. *J. Pharmacol.* 33, 81-92(1928).—In the frog, ablation of the cerebrum and optic lobes did not affect the convulsions produced by cardiazole (given either subcutaneously or intravenously), but removal of the medulla prevented convulsions. In the rat and rabbit, removal of the cerebrum affected the convulsions of the entire body except the head. Cardiazole injected into the 4th ventricle after respiration had stopped stimulated respiration. Salivary secretion was increased after cardiazole. The action was inhibited by deep ether anesthesia, and ineffective after section of the 7th cranial nerve. The latter indicates central action of the drug. In a rabbit with the cervical sympathetic chain cut on one side, administration of cardiazole had no effect on the eye on the operated side, but caused dilation of the pupil and exophthalmos on the normal side. This also indicates central action. Kidney vol. was increased after cardiazole. The urinary bladder was markedly contracted. Both these effects were inhibited by deep ether anesthesia, or, in the case of the kidney, by section of the splanchnic nerve, and in the case of the bladder, by section of the dorsal cord. C. RIEGEL

The influence of atropine and adrenaline on the reaction of the perfused frog heart to acetylcholine. O. W. BARLOW. Western Reserve Univ. *J. Pharmacol.* 33, 93-113(1928).—Perfusion of a soln. of acetylcholine into a frog heart caused a depression of the amplitude and rate of the heart beat, the effect increasing with increase in concn. of the drug. Increasing the perfusion pressure increased the depressive action on the amplitude but had little or no effect on the rate. Acetylcholine lowered the threshold of stimulation of the vagus. The depressant effects of acetylcholine in concns. up to 1 in 10^6 were completely removed by the presence of one part of atropine to 10 of acetylcholine. If the concn. of acetylcholine was increased up to 1 in 10^4 or 10^5 the depression is merely delayed by atropine, and with stronger concns. of acetylcholine atropine has

little or no effect. Administration of acetylcholine in concns. of 1 in 10^4 to 1 in 10^3 to a heart being perfused with atropine causes acceleration. This is attributed to a stimulation of the sympathetic receptive mechanism. The stimulating effect is obscured in a normal heart by parasympathetic stimulation and becomes apparent only after the parasympathetic effect has been prevented by atropine. With concns. of acetylcholine 1 in 10^2 there is a depressant action on the heart muscle. Adrenaline in dilns. greater than 1 in 10^6 after acetylcholine had no effect or an action antagonistic to the depressant action of acetylcholine. Concns. of adrenaline greater than 1 in 10^6 had an additional depressant action. C. RIEGEL

Chemical constitution and pharmacological properties of the derivatives of methylimidazole. J. V. SUPNIEWSKI. *Compt. rend. soc. biol.* **98**, 1229-30(1928).—Imidazole, 4-methylimidazolyl alc. or 4-imidazolyl aldehyde administered to the cat produces an increase in the blood pressure by vaso-constriction. They also cause a contraction of the isolated uterus of the guinea pig. Intravenous injection of 0.03 g. per kg. of 4-methylimidazole in the cat causes a diminution in the blood pressure by vasodilatation of the intestinal and renal regions. This compd. increases the frequency and amplitude of the respiration. The actions of 4-methyl-5-methylimidazolyl alc., 4-chloromethylimidazole, 4-aminomethylimidazole, 2-thio-4-methylimidazole, 4-diethylaminomethylimidazole and 4-piperidylmethylimidazole are described. In general each of these substances affects the blood pressure and the respiration. L. W. RIGGS

Insulin and the external secretion of the pancreas. JEAN LABARRE AND PIERRE DESTREÉ. *Compt. rend. soc. biol.* **98**, 1237-9(1928).—The injection of insulin causes a diminution in the output of pancreatic juice, especially marked at the moment of the greatest lowering of the glucemia. The lipolytic, tryptic and amylolytic powers are diminished at the same time. L. W. RIGGS

Stimulating action of intravenous injections of dextrose on the external secretion of the pancreas. JEAN LABARRE AND PIERRE DESTREÉ. *Compt. rend. soc. biol.* **98**, 1240-2(1928).—The cross circulation method of Heymans and Heymans for perfusing the brain being used it is found that injection of hypertonic glucose soln. causes an increase in the pancreatic secretion and in the digestive powers of the secretion by action on the nerve centers (vagus). The effect does not occur from similar injections of hypertonic NaCl. L. W. RIGGS

Influence of beryllium on the irritability of the frog heart. W. DULIÈRE AND L. DEBORGGRAEF. *Compt. rend. biol. soc.* **98**, 1255-6(1928); cf. *C. A.* **22**, 1627, 2212, 2623.—The substitution of $\frac{2}{3}$ of the Ca in the perfusing liquid by Be is perfect, but the substitution of $\frac{1}{4}$ of the Ca by Be is impossible. A critical zone exists as in the substitution of Ca by Mg. Be may replace K to a slight extent. L. W. RIGGS

Influence of subcutaneous injections of oxygen on the saturation of arterial blood. P. SPEHL AND A. LEMORT. *Compt. rend. soc. biol.* **98**, 1262-3(1928).—The subcutaneous injection of 500 to 1500 cc. of O had no influence on the O satn. of arterial blood in patients with pulmonary emphysema. L. W. RIGGS

Mobilization by ephedrine of the formed elements of the blood in reserve in the spleen. LÉON BINET, A. ARNAUDET, (MLLE.) B. FOURNIER AND M. KAPLAN. *Compt. rend. soc. biol.* **98**, 1282-4(1928).—Expts. with dogs showed that the splenic contraction caused by ephedrine results in the passage into the circulation of the formed elements which are held in reserve in the spleen. L. W. RIGGS

Action of adrenaline by instillation into the conjunctival sac on the physico-chemical properties of the aqueous humor. MAURICE VINCENT. *Compt. rend. soc. biol.* **98**, 1284-6(1928).—The instillation of adrenaline into the conjunctival sac causes an increase in the p_H of the aqueous humor and a diminution in its total CO_2 content. L. W. RIGGS

Effect on intra-ocular pressure of intravenous injections of hypertonic salt solution. ROBERT K. LAMBERT AND SAMUEL SILBERT. *J. Am. Med. Assoc.* **90**, 1435-6(1928).—An av. drop of 40% occurred in the intra-ocular pressure in 25 patients with normal pressure, following the intravenous injection of 300 cc. of 5% NaCl soln. and a proportionate drop of 21% followed the injection of 150 cc. of the same soln. L. W. R.

Fate of alcohol in the human body. W. LAUFFBERGER. *Wochschr. Bruu.* **45**, 88-9(1928).—Alc. cannot be stored for long in the body and hence is either oxidized to CO_2 and water or excreted unchanged. It is probable that the amount excreted increases with habitual indulgence in alc. A. SCHULTZ

The influence of gas adsorption on the gas effect during its pharmacological action on the extirpated frog heart. I. NARANOSUKE KŌDA. *Acta Schol. Med. Univ. Imp. Kioto* **10**, 137-54(1928).—The contractions of an isolated frog heart were recorded; then the effect of a gas soln. was studied and following this, the effect of adsorbing

the gases by certain added adsorbents. The gases used were CO_2 , CO , coal gas, NO , N_2O , H_2S , SO_2 , C_2H_4 , C_2H_2 , MeCl , Cl_2 , H_2 , O_2 and tobacco smoke; they were applied dissolved in Ringer soln. Blood charcoal, bolus alba, infusorial earth, starch powder, pancreatin and mastic emulsoid were used as adsorbents. With exception of O_2 , all gases showed an inhibitory action on the heart contraction, and every adsorbent able to adsorb the gas employed accelerated recovery. Charcoal and bolus were the best adsorbents. Each adsorbent has its own order of affinities for the different gases. Inorg. gases seem to be more readily adsorbed than org. gases. Two exceptions from the rule that the amt. of gas adsorbed is increased with the b. p. of the resp. gas adsorbed were found: MeCl is weakly adsorbed despite high b. p. and NO strongly adsorbed in spite of low b. p. **II. Experiments with various charcoals.** *Ibid* 155-64.—Blood charcoal, wood charcoal, carbonin (a prepn. of wood charcoal) and straw charcoal were tested regarding their affinity towards gases acting on the extirpated frog heart. The same method as above was used, the recovery of the amplitude and the rate of the heart beat being the indicator for the intensity of the reacting power. Blood charcoal was the most effective material, while carbonin and wood charcoal came next. **III. Experiments at high and low temperatures.** *Ibid* 165-73.—The pharmacol. action of C_2H_2 , CO_2 and H_2S , on the heart contractions and their adsorption by blood charcoal or bolus alba were investigated under the influence of high and low temp. The temps. chosen ranged between 37° and 45° or 0° and 9° . The method used was the same as described in the above. K. found the pharmacol. effect of the gases greater at extreme than at moderate temps.; at extremely high or low temp., the recovery was weaker than at moderate temp. No recovery occurred over 48° or under 1° . The recovery through adsorption was better at low than at high temp. The order of the recovering action of charcoal or bolus for each gas was the same at high and low temps. as at moderate temps.

G. SCHWOCH

Action of veratrine on striped muscle. A. QUERIDO. Univ. Amsterdam. *Arch. n  rland. physiol.* 12, 28-153(1927).—A few workers have supposed that the drug acts on the motor nerve; the majority, however, believe that it poisons the muscle by altering its metabolism, by forming a toxin in it, by removing a normal inhibitor of contraction or by affecting the red fibers rather than the white or the sarcoplasm rather than the fibrillae. Q. working with frogs and rats shows that the threshold of veratrinized rat's muscle is less than normal; minimal stimuli produce simply a prolonged contraction without the initial quick phase; with increasing strengths of stimulation, the areas of the curves increase by steps; the muscle therefore still obeys the "all or none" law. The latent period is shortened but the refractory period prolonged to a duration equal to several times that of the contraction; the subnormal contraction of the relative refractory period is similar to that produced by subnormal excitations. The form of the elec. response depends on the sensitivity of the string galvanometer; a large no. of oscillations were found of frequency 80 to 120 per second, diminishing in amplitude but increasing in frequency towards the end. Silhouette records of a small part of the muscle show oscillations at 50 per second in irregular groups lasting 0.4 second. Degenerated muscles (section of motor nerve) do not give a veratrine contraction, but section of the sympathetic does not prevent its appearance. Veratrine has no definite effect on the smooth muscle of the nictitating membrane, but acts on the frog's heart as on skeletal muscle, the effect being demonstrated by mech. stimulation of a heart stopped by vagal stimulation. The muscle can be poisoned by applying veratrine to the nerve, alive or dead; indirect excitation will only produce a veratrine contraction if the nerve is uninjured; the drug prevents the action of the vagus on the heart, but not its effect on respiration. After curare and veratrine, direct stimulation produces the usual veratrine curve; indirect stimulation produces only a prolonged contraction without the preliminary twitch. The intensity and course of the poisoning are influenced by the concn. of the veratrine, but the amt. absorbed by the muscle in a given time depends on the total quantity supplied, and not on its concn.; in 1 hr. an isolated muscle of *R. esculenta* requires 5×10^{-9} to 25×10^{-9} g. to poison it. The action of the drug increases to a max. when it is present in low concn.; above this concn., after the max. effect is attained, its influence diminishes and the muscle dies. Conclusion: A veratrine contraction is due to the asynchronous rhythmical contraction of groups of the muscle fibrillae, and the drug acts directly upon the muscle, which it can reach by way of the nerve. A very complete bibliography is given.

M. H. SOUT  

Active principles of the posterior lobe of the pituitary gland. I. Demonstration of two active principles. II. The separation of the two principles and their concentration in the form of potent solid preparations. OLIVER KAMM, T. B. ALDRICH, I. W. GROTE, L. W. ROWE AND E. P. BUGGER. *J. Am. Chem. Soc.* 50, 573-601(1928).—

The oxytocic and pressor principles of the posterior lobe have been sepd. and obtained as stable, H₂O-sol. powders; the Me₂CO-desiccated gland material is extd. with 0.25% AcOH, the ext. concd. at a low temp., the proteins and the active principles are pptd. with (NH₄)₂SO₄ and the principles extd. from the ppt. with glacial AcOH, followed by fractionation with various org. solvents (Me₂CO, Et₂O and light petroleum) and subsequent purification. No decompn. occurs during the process and the combined components show activities identical with those of the original ext. The prepn. of the pressor principle (for which the term β -hypophamine is suggested) is 80 times as potent and the oxytocic (α -hypophamine) more than 150 times as potent as the International Standard Powdered Pituitary. The principles have not been obtained cryst., but both are basic. Expts. on rabbits seem to indicate that the diuretic-antidiuretic action of the posterior lobe of the pituitary is due to the pressor principle. The development of a tolerance to the pressor principle by a rapid succession of intravenous injections of relatively large amts. is identical with that obtained with impure pituitary exts. but no depressor action is observed with the pure prepn. The 2 principles are being manufactured for exptl. clinical use under the trade names *oxylocin* and *vasopressin* and a preliminary discussion of the therapeutic indications is presented.

C. J. WEST

HEYMANN, KURTIN: Chimiothérapie par voie buccale avec l'arsenic. PARIS: J. B. Baillière et fils. 134 pp. F. 20.

I—ZOOLOGY

R. A. GORTNER

Relation between the reducing power of sea water and the distribution of sea-shore organisms. F. FISCHER. *Compt. rend.* **185**, 1525-7 (1927).—Dissolved reducing substances in sea water favor the distribution of *Sabella pavonia*, Sav., and *Nassa reticulata*, L.

B. C. A.

The muscle protein. V. The nutritive value of the muscle protein. (2). The amount of lysine in the muscle protein and its effect on the growth of young rats. HIDE-SABURO SEKINE. *J. Imp. Fish. Inst.* **22**, 42-3 (1926); (In Japanese; English résumé, p. 20); *Biol. Abstracts* **1**, 260.—Two muscle proteins, from the fish *Oncorhynchus masou* and the mollusk *Meretrix meretrix* (without an adductor muscle), were used. The growth-promoting value and the lysine content of the fish-muscle protein are, resp., 69-74% and 69% of that of the mollusk protein. Conclusion. The lysine content of muscle protein is directly related to the growth of young animals whereas the other amino acids, such as tryptophan and histidine, are practically not related to this function, because the amts. of the latter are present in sufficient quantities in the muscle proteins or are substituted by others (histidine, arginine).

H. G.

The influence of altered hydrogen-ion concentration on *Stentor*, *Diaptomus* and *Daphnia*. K. MÜNSTER STROM. *Nyt. Mag. Naturvidenskub.* **64**, 109-15 (1926); *Biol. Abstracts* **1**, 853.—An attempt to study the effect of changes in p_H alone, independently of changes in concn. of other ions. For this, Sorensen's phosphate mixts. are unsuitable because of the toxic effect of K ions—more marked in *Diaptomus gracilis* and *Daphnia pulex* than in *Stentor*. S. uses very dil. mixts. of phosphates, but does not indicate how the final p_H is estd. *Stentor* is only slightly influenced by changes of p_H from 6.5 to 8.0. *Daphnia* thrives in slightly alk. medium (p_H 7.9), while *Diaptomus* prefers a slightly acid reaction.

H. G.

The adaptation of protozoa to poisons. O. HARNISCH. *Zool. Anzeiger Supplementband 2* (Verhandl. Deutsch. Zool. Ges. E. V. 1926) 99-108 (1926); *Biol. Abstracts* **1**, 636.—*Colpidium campylum* was grown in 1% dextrose soln., p_H 6.4-6.6, with *Barterium coli*. Quinine-HCl was added in increasing amts., beginning with 1:5000. Usually 1:2000 was the max. tolerated by *Colpidium* not previously adapted. Adapted by living in increasing concns., it tolerated 1:300. Reported destruction of quinine by *Paramecium* could not be verified. *P. caudatum*, grown with *Bact. proteus* for a week in lettuce water contg. sublethal concns. of arsenious acid, later lived in 2 or 3 times these concns. The toxic dose varies with environment and with the reaction of the medium.

H. G.

Effect of chloropicrin on silk worm pupae. ARNALDO PIUTTI. *Rend. accad. sci. (Napoli)* **33**, 106-11 (1927).—Killing the pupae by 1 hrs.' exposure to 0.01 g. chloropicrin per l. instead of by heat represents a saving in time and equipment and eliminates the risk of heat injury to the cocoon. The cocoon unwinds as easily as a normal cocoon. The crude thread has the same color, translucency and strength. The yield in degummed thread is 9.8% higher than by the old process. A sixfold thread winds up very well at 108 bobbin revolutions per min. The pupae are dark brown and have

a characteristic disagreeable odor. They should preferably be used for the manuf. of fatty oils instead of for fertilizer. The poisoned pupae yield on extrn. 1.5–2% more oil, which seps. *stearic acid* on standing. The latter is perhaps split off by the sudden poisoning.

MARY JACOBSEN

The respiratory proteins of the blood. III. The acid-combining capacity and the dibasic amino acid content of the hemocyanin of *Limulus polyphemus*. ALFRED C. REDFIELD AND ELEANOR D. MASON. Harvard Med. School. *J. Biol. Chem.* **77**, 451–7 (1928); cf. *C. A.* **22**, 979.—The hemocyanin of *Limulus polyphemus* binds about 160×10^{-5} mols. of acid per g. and reacts with acid as though it were a univalent base with an apparent dissoen. const. of 3.3. The max. acid-binding power agrees closely with that calcd. from the dibasic amino acids of this protein. On the basis of the presence of 2 atoms of Cu in the hemocyanin mol. the probable no. of basic amino acids in the mol. has been calcd. to be as follows: arginine 36, histidine 40, lysine 38, total 114; total acid-combining capacity 117 (dett. experimentally).

A. P. LOTHROP

Reducing substances in the blood of the dogfish, *Squalus sucklii*, and certain other fishes. F. D. WHITE. Univ. Manitoba Med. School. *J. Biol. Chem.* **77**, 655–69 (1928).—“Blood samples taken from the dogfish, *Squalus sucklii*, shortly after capture show a low sugar content but if the fish is kept for a period of not less than 4 days, even under fasting conditions the sugar content rises to an approx. const. level of 55 to 60 mg. per 100 cc. of blood. Blood filtrates subjected to fermentation according to the procedure of Folin and Svedberg demonstrate that in dogfish blood the sugar is almost completely fermentable, while in the blood of 3 species of teleosts there appear to be normally present non-fermentable reducing substances to the extent of about 10 to 12 mg. per 100 cc., as detd. by the revised Folin procedure. Dogfish subjected to conditions of gradually increasing asphyxylation have shown no evidence of hyperglucemia under the exptl. conditions employed.” The revised Folin method (*C. A.* **20**, 2340) when very rigidly carried out gives results which more closely approx. the true glucose content of blood than do the Folin-Wu or Benedict procedures.

A. P. LOTHROP

The changes in the plasmic-nuclear ratio in immature eggs of sea urchins under the influence of differences in the osmotic pressure of the medium. S. SKOWRON AND (MME.) H. SKOWRON. Zoological Sta., Naples. *Bull. intern. acad. Polonaise* **1926B**, 859–79.—The authors measured the vols. of the nucleus and protoplasm of immature eggs of *Sphaerechinus granularis* when placed in glucose solns. of varying osmotic concns. At a concn. corresponding to that of sea water ($\Delta 2.28^\circ$) the plasmic-nuclear ratio was 6.6:1. The ratios 5.4:1, 5.0:1, 5.6:1, 5.4:1 and 6.2:1 were found for the concns. corresponding to $\Delta 1.73^\circ$, $\Delta 1.70^\circ$, $\Delta 1.26^\circ$, $\Delta 1.08^\circ$ and $\Delta 2.57^\circ$. The eggs of *S.* have a membrane between the nucleus and the cytoplasm in addn. to the membrane segg. the cell from the surrounding medium. The differences in plasmic-nuclear ratio are probably due to the existence of different osmotic pressures in these 2 parts of the cell.

LAWRENCE P. MILLER

The proteolytic enzymes of serum. IX. The difference in behavior of sera at definite stages of anuran metamorphosis. M. v. FALKENHAUSEN, H. J. FUCHS AND M. SCHUBERT. *Biochem. Z.* **193**, 269–75 (1928).—The sera of cold-blooded animals in different stages of metamorphosis act upon fibrin from older stages by causing it to become hydrolyzed, whereas upon fibrin from younger stages it acts like an immune serum causing the disappearances of the non-protein N. Serum of the fully developed frogs does not display immunological reactions with the fibrins of the different developmental stages.

S. MORGULIS

Studies on fish bile. II. Bile from *Tetrodon porphyreus* Sieb. (Fugu fish.) NORITARO TERAOKA. *J. Biochem. (Japan)* **8**, 341–50 (1928).—Cholic acid and taurine were isolated and identified from the bile of the Fugu fish. The taurocholic acid is the chief component of this bile (about 9%).

S. MORGULIS

The relative thyroid gland activity in axolotl and *Amblystoma*. T. ROLITCH. *Zhur-nal ekspl. biol. Med.* **8**, 60–71 (1928).—By the method of implantation it is shown that the axolotl thyroid gland is not very active. Transplanting 36 axolotl glands subcutaneously into one axolotl induced metamorphosis in 5 months; in another instance metamorphosis was induced in 11 months following the implantation of 78 glands. On the contrary, the subcutaneous implantation of 38 *Amblystoma* glands into axolotls produced metamorphosis in 37–39 days. Smaller quantities of thyroid gland (axolotl or *Amblystoma*) produce; only after 10–11 months, weak symptoms of metamorphosis (exophthalmus).

S. MORGULIS

12—FOODS

F. C. BLANCK AND H. A. LEPPEL

Recent investigations in food chemistry. R. STROHECKER. *Arch. Pharm.* **266**, 329-46(1928).—A review. W. O. F.

A new material for food storage. W. E. WARNER. *Food Manuf.* **3**, 376(1928).—The advantages of Celotex for the construction of cold-storage space are detailed.

J. A. KENNEDY

Coloring matters in food. F. W. ANDREWS. *Food Manuf.* **2**, 257-8, 283-4, 371-2 (1928).—The general rules and finer points to be observed by the user in applying colors to foods are given and the pitfalls and dangers to be avoided are pointed out. The application to the various confectionery and meat products is dealt with in detail. There is also discussed the question of purity in relation to food colors. J. A. K.

Bacteria and the canning industry. R. F. HUNWICKE. *Food Manuf.* **1**, 19-20, 2, 179-80, 184(1928).—Microorganisms which are assocd. with the spoilage of canned meats and fish are discussed. Bacteria are more implicated than yeasts. Spoilage of the 2 kinds of *condensed milks* is due to a variety of causes; the bacteriol. problems encountered differ very much from those assocd. with other classes of canned foods.

J. A. KENNEDY

The salmon canning industry. ERNEST D. CLARK. *Food Manuf.* **3**, 345-50, 363-7(1928), cf. *C. A.* **22**, 828.—C. gives an account of the life history of the salmon and a picture of the plant and processes used at the Western Canneries. J. A. K.

The successful cider mill of today. II. HOWARD F. MACMILLAN. *Fruit Products J. and Am. Vinegar Ind.* **7**, No. 10, 13-15, 17(1928); cf. *C. A.* **22**, 2626.—Several plans by which cider may be successfully handled and marketed are considered. Among these are the principles of filtration, filtering medium, filtering outfits, bottling equipment and the possibilities of a maturing period for apple cider which is said to be distinctly beneficial.

J. A. KENNEDY

A new procedure for the determination of caffeine in tea. W. A. UGLOW AND A. M. SCHAPIRO. Leningrad Med. Inst. *Z. Untersuch. Lebensm.* **55**, 149-55(1928).—An accurate, simple, rapid method for detn. of caffeine in tea is as follows: 10 g. of the powd. sample is boiled 30 min. in 400 cc. of 4% Na_2CO_3 soln., the mixt. cooled to 60-70° and the tannins and albuminous material are pptd. by satd. CuSO_4 soln., gradually added until the reaction is slightly acid. The mixt. is diluted to 500 cc., shaken for 30 min., allowed to stand 20 min., 300 cc. of clear liquid pipetted out and extd. 4 times with 80-cc. portions of CHCl_3 . The CHCl_3 is evapd. from the combined exts. at a temp. not exceeding 60°, the residue (caffeine) dried at 80-90° and weighed. The caffeine obtained by this method being taken as 100%, the amt. by the method of Leindrich and Nottbohm (*C. A.* **3**, 1429-30) is 88% and by the method of the Russian military Pharm. (1913) is 80%. The method may be applied to *coffee*, provided fat is removed by extn. with petroleum ether.

WILLIAM J. HUSA

The composition and food value of margarine. J. S. ABBOTT. *Bull. Inst. Margarine Manufrs.* No. 10, 23 pp.(1927).—A popular account of the prepn., food value and uses of margarine.

W. C. EBAUGH

The effect of acidity on the softening of dill pickles. B. E. LESLEY AND W. V. CRUESS. *Fruit Products J. and Am. Vinegar Ind.* **7**, No. 10, 12(1928).—The authors' expts. lead them to believe that the softening of dill pickles is due to acidity.

J. A. KENNEDY

Concentrated milk. I. KRENN. *Wiener med. Wochschr.* **78**, 397(1928).—Analysis of samples of natural and condensed milk are given.

ARTHUR GROLLMAN

Elimination of iodine in milk. W. RASCHE. *Z. Kinderheilk.* **42**, 124-32(1926).—After ingestion by cows and goats of KI (0.5-1 g. 3-4 times at 48-hr. intervals), 11% of the I was recovered from the milk, irrespective of its vol. or fat content. B. C. A.

The action of the halides on milk and on the milk constituents. A. J. J. VANDEVELDE. Univ. Ghent, Belgium. *Natuurwetenschap. Tijdschr.* **10**, 66-72(1928).—Small quantities of Cl, Br or I do not sterilize milk. Larger quantities cause the pptn. of the casein. Analyses are given of the ppt. and of the serum in each case. The lactose content diminishes slightly with Cl and Br; the rotation due to lactose disappears or may even change its sign; an acid, $\text{C}_6\text{H}_{10}\text{O}_8$, m. 210° is obtained; I seems to have no effect.

A. L. HENNE

The determination of moisture in dry skim milk by the Bidwell-Sterling toluene distillation method. P. A. WRIGHT. *J. Dairy Sci.* **11**, 240-2(1928).—Detns. of moisture in dry skim milk by a vacuum oven showed slightly lower results than from the

Bidwell-Sterling toluene-distn. method (cf. *C. A.* 19, 620). As prolonged heating shows progressive decompn. of the lactose hydrate, the use of the toluene-distn. method, with a 2-hr. distn. time, is recommended. W. C. EBAUGH

The cooling and freezing of milk. HENRI CORBLIN. *Bull. soc. encour. ind. nat.* 1928, 232-42.—Chem. analyses of milk, frozen by standing for 48 hrs. at -10° , showed that the upper layer contains most of the fat, while the center and lower layer were rich in lactose and casein. When melted, the milk was changed in flavor and the cream floated in globules on the surface. This is a serious problem in transportation of milk for long distance. If thin layers of the fresh milk are cooled to -15° , with const. stirring, it can be frozen in about 8 min. This frozen milk is homogeneous, and when melted is similar to fresh milk. The milk may be transported in solid form, by freezing it between 2 cylindrical vessels 1 cm. apart in a brine. A more practicable application is to freeze the outside layer of milk in ordinary milk cans by cooling 15 min. in brine. In melting this does not affect the quality of the milk, and keeps the temp. of the inner liquid at 0° . AMY LEVESCONTE

Estimation of the milk constituents of caramels. WILHELM HARTMANN. *Pharm. Zentralh.* 69, 337-9(1928).—A discussion of the author's experience in examg. numerous samples and controls, the estn. of the fatty content being effected substantially *via* Ritthausen, in that a 20% aq. soln. of the caramel (100 + 400) was freed from nuts by sedimentation and filtration through cotton or mull, then after pptn. with 25 cc. of Fehling soln. and addn. of 25 cc. of 0.25 *N* caustic alkali the mixt. was treated with a suspension of filter paper (prepd. from 100 sq. cm. cut, fat-free filter paper shaken with H_2O) and later freed therefrom by decantation). This filter mass, washed and dried, was then exhausted of its fat by extn. with Et_2O for 6 hrs. Volatile fatty acids were thereupon detd. in not less than 1-g. samples of the recovered fat after hydrolysis with 4 g. of 5% glycerolic KOH soln., distn. being carried out in a Polenske app. in the presence of dil. H_2SO_4 until the distillate amounts to 110° . The values (R.-M. nos., etc.) obtained on some 16 samples involving butter, coconut, beef and pork fat, and mixts. thereof, have been tabulated and graphed. W. O. E.

Determination of corn-cockle in flour by hemolysis. F. S. OKOLOV. Research Inst. for Sanitation and Hygiene, Moscow. *Z. Untersuch. Lebensm.* 55, 155-62(1928).—The hemolytic action of the saponin in corn-cockle is the basis of a method for the detn. of corn-cockle in flour in amts. ranging from 0.05 to 6%. Flour is macerated with 1% NaCl soln. Part of the liquid is filtered off and tested for hemolytic action, a 1 to 18 suspension of washed erythrocytes from rabbit's blood being used. W. J. H.

Factors of flour quality. The colloid particle. C. O. SWANSON. Kans. State Agr. Coll. *Miller's Rev.* 92, No. 5, 27-9(1928).—A clear explanation of the term colloid, with especial reference to its application to flour dough. L. H. BAILEY

Flour specifications. G. L. ALEXANDER. Commercial Milling Co., Detroit. *Miller's Rev.* 92, No. 5, 21-3(1928).—Flour specifications began with the use of simple "hand tests" for color, odor, fineness of granulation, water absorption and doughing properties. In the hands of a trained operator such tests gave good comparative results, but there is not way to reduce these measurements to figures, and differences arise in the results of different operators working with the same flour. Gluten washing is another test that has been largely used. Chemical analyses are more reliable than the so-called "hand tests" when made by competent analysts. Moisture, ash and total protein have largely replaced these other tests. Of late years physical and physical-chemical methods have been applied but have not quite justified the claims of their originators. The baking test is also used extensively in judging flours. Flours differ greatly in characteristics or qualities, but no flour is a poor flour because it will not make the best bread. It may make excellent pastry, or *vice versa*. The safest way to sell flour or any other material is on sample. It is more important that a flour should be suitable for the purpose for which it is to be used than that it should meet rigidly some arbitrary specifications as, for instance, ash content. Specifications for yeast breads have been pretty well worked out. Work is being done on specifications for flours for other purposes. Pastry flours may be classified as those most suitable for (1) pies; (2) sponge or angel-food cakes; (3) pound cakes or layers and (4) cookies and fried cakes. For pies, soft wheat patents or sometimes clears, contg. 6-7% protein, are most desirable. For the sponge type of cakes a short patent from one of the stronger varieties of soft wheat is most effective. Pound cakes, chocolate layers and other cakes with a fairly heavy tendency can be made from long patent soft flours. For cookies and doughnuts, clear flours can be used to the best advantage. L. H. B.

The strength of flour. D. W. KENT-JONES. *Food Manuf.* 1, 101-2(1927).—The strength of flour may be regarded as the factor which will normally produce large, well-

piled loaves, provided that the gas production is sufficient; in practice this can often best be judged from the behavior and the properties of the fermented dough. Another useful viewpoint is the power of a flour to carry a known weak flour and still produce a good loaf. Such a method will clearly show when a flour is so strong that it becomes over strong. In such cases the over-strong flour will not make a good loaf when baked alone, but will do so when carrying a very large proportion of the weak flour. J. A. K.

The effect on their bread-making properties of extracting flours with ether. ARNOLD H. JOHNSON. Minn. Agr. Expt. Sta. *Cereal Chemistry* 5, 169-80(1928).—Bread of better color, texture and vol. was produced from ether-extd. flour than from natural flour. Low-grade flours were improved more in vol. of bread baked from them than were patent flours. Extn. of flours with ether did not affect the absorption, the wet or dry gluten or the viscosity of the water-extd. acidulated suspension. The extensibility of ether-extd. flours was slightly lower than that of the corresponding natural flours. Diastatic activity and reducing sugar content were higher in ether-extd. flours than in the corresponding natural flours. Treatment of the flours used in making this study with 70% alc. or with 96% alc. markedly lowered its quality for bread making. Such other properties as viscosity and extensibility were also reduced. Treatment with 70% alc. was the more injurious. Treatment of the flour with water did not notably affect its properties for bread making, but its extensibility and viscosity were reduced.

L. H. BAILEY

A study of "rope" in bread. E. A. FISHER AND P. HATTON. Research Assoc. of British Flour Millers, St. Albans, Eng. *Cereal Chemistry* 5, 192-208(1928).—"Rope" in bread is a disease due to the activities of various forms of *B. mesentericus*. It is similar in some of its effects to the disease of the same name observed in wine, beer and wort. Much of the earlier work on this disease is reviewed and it is shown that moisture, warmth and a low degree of acidity are necessary for its development. Many of the methods suggested for controlling "rope" depend on the addition of acids or acid substances to the dough, whereby the H-ion concn. is raised sufficiently to inhibit rope development. In this connection a study has been made of acetic acid, lactic acid, tartaric acid, acid potassium phosphate and acid calcium phosphate. Of these substances, acid calcium phosphate is the most effective as a preventive of rope and is least open to objection. The changes in pH and buffer value of bread consequent on rope development have been detd., and these changes show that slight stickiness and faint smell in bread do not mark the beginning of ropiness (as was formerly thought), but are characteristic of a late and acute stage of the disease.

L. H. BAILEY

The action of phosphatides in bread dough. E. B. WORKING. Kansas State Agr. College. *Cereal Chemistry* 5, 223-34(1928).—At least two distinct changes are brought about in dough during development by fermentation. Both of these are required to produce the proper balance between tenacity and ductility necessary for the production of the best bread. One of the changes is the reduction of the tensile strength of the gluten strands caused by acid through its effect of swelling the strands by increasing their absorption of water. The other change is the increase in ductility of the dough caused by substances such as phosphatides through a lubricating effect on the gluten strands allowing them to slip more readily upon each other. By adding acid and also egg yolk or an oxidizing agent that will cause the liberation of phosphatides, thus artificially bringing about these two changes, finished bread and buns of the best quality can be produced, two hrs. after the mixing is started. This sharp differentiation of two factors in dough development should make possible more intelligent testing of flour for quality and fermentation tolerance, and a more intelligent study of the problem of flour maturing and bleaching.

L. H. BAILEY

Some factors influencing the absorption in experimental baking. JAN MICKA AND ELIZABETH CHILD. Trent Inst. of Baking Technology, Ontario, Can. *Cereal Chemistry* 5, 208-14(1928).—The quantity of flour used in a dough does not appreciably alter its absorption. There is a difference of approx. 3% between the absorption of a dough consisting of flour and water alone and that of a dough contg. salt, sugar, lard and yeast. It is much more difficult to det. the end point of absorption in a dough of only flour and water. The absorption is increased with the use of salt in a dough because any slackness directly after mixing is more than offset by the stiffening of the dough during fermentation, salt having a toughening effect on the gluten. Sugar is largely responsible for the decreased percentage absorption of a dough contg. salt, sugar, lard and yeast as compared with a dough made of flour and water alone. Lard is to a small extent responsible for reducing the percentage absorption of a dough contg. salt, sugar, lard and yeast as compared with a dough made of flour and water. The absorption of a flour is slightly increased by yeast. High absorption is more detri-

mental to the quality of bread than low absorption. Information would be more reliable if percentage absorption were reported in figures which were practical in making bread, taking into consideration the retention power during fermentation and all other factors which influence absorption. Absorption should not be computed to a 13.5% or a 15% moisture basis.

L. H. BAILEY

Effects of heating immature wheat. C. O. SWANSON. Kans. State Agr. Coll. *Miller's Rev.* 92, No. 5, 47-52(1928).—Carefully controlled use of heat on fully matured, but new wheat will bring about an improvement in baking qualities. However, if the degree of temp. is too high or if the period of heating is too long, marked damage may result. When heating takes place under uncontrolled conditions, such as happen when wheat is cut immature, and stacked with too much moisture or when cut with the combine when not sufficiently matured, serious damage results. There is no damage in combine wheat if cut when fully mature and when it is not wetted by rain. Controlled heating will improve immature wheat when the degree of temp. is not too high nor the period of heating too long. The main purpose of this expt. was to find the limits of time and temp. at which wheat could be safely heated. The expts. will be repeated in order to det. more accurately the practical applications. This procedure will be used to det. the safe limits of heat in tempering wheat.

L. H. BAILEY

Lipoid phosphorus of wheat and its distribution. BETTY SULLIVAN AND CLEO NEAR. Russell Milling Co., Minneapolis, Minn. *Cereal Chemistry* 5, 163-8(1928).—In an analysis of the lipoids extd. from various parts of the wheat kernel, it has been found that the highest percentage of P is present in the lipid from the highest grade of flour (the patent) which contains the least total P. The phosphorus percentage of the lipoids decreases with decreasing refinement and increasing total phosphorus of the products from which they are extd. The N content of the lipid extd. from the patent was higher than that extd. from the germ. Anhydrous ether exts. a smaller quantity of the total lipoids in the sepsis. from the endosperm than from the embryo and pericarp of the grain.

L. H. BAILEY

Yeast fermentation in flour-water suspensions. T. R. JAMES AND L. X. HUBER. Sperry Flour Co., Spokane, Wash. *Cereal Chemistry* 5, 181-91(1928).—A method has been developed for the convenient measurement of rate of fermentation. The rate of fermentation is greater for clear flours than for patents. Oxidizing agents were found to be of no value to fermentation. NH_4Cl greatly stimulated the growth of yeast toward the end of the fermentation period. Alky. decreased yeast growth and added acidity increased fermentation. The effect of acidity varied greatly with the type of flour.

L. H. BAILEY

Tallowiness or rancidity in grain products. M. S. FINE AND A. G. OLSEN. *Ind. Eng. Chem.* 20, 652-4(1928).—Tallowy odors in patent flour developed most quickly in samples contg. 2.0% moisture and at temps. above 20° . A moisture content of 5% was protective, and samples contg. 10-12% moisture have shown no tallowy odor after 3 years. Suitable hydration of a dry baked product which had developed a tallowy odor exerted a curative effect. Addn. of 0.25 to 0.5% glycerol also exerted a protective action.

AMY LEVESCONTE

Fiber content and viscosity of potato flour. W. EKHARD. *Z. Spiritusint.* 50, 322-3(1927).—Addns. of 0.5, 1, 2, 3 and 5% of fiber to pastes with H_2O content approx. alike, 17.61 to 17.81%, gave no marked changes in viscosity measured according to the method of Saare. The gel properties reside in the esterified amylopectin, but the amylose ester may also form gels. It is impossible at present to explain the properties necessary for high viscosity. Nor can the change in viscosity of flours, due possibly to seasonal variation, be accounted for.

C. N. FREY

The digestibility of potatoes as influenced by methods of preparation. BESSIE BOGGESS AND A. C. IVY. Univ. Chicago. *J. Home Econ.* 19, 496-503(1927).—The starch of potatoes fried in cold fat is more easily digested than that of boiled potatoes and of those fried in hot fat. Fats in the amts. used facilitated the digestion of starch by the pancreatic juice. In dogs boiled potatoes were emptied from the stomach at a faster rate than fried. No appreciable difference was noted in the rates of emptying between pan fried (12.5% fat) and French fried (7.1% fat). In four of five human subjects potatoes boiled or fried were emptied at the same rate while with the fifth boiled potatoes were emptied faster. Excess fat (37.5%) with boiled potatoes caused a marked delay in emptying. In the av. normal individual fried potatoes, unless steeped in fat, are no more likely to cause digestive disturbances than boiled potatoes.

L. D. ELLIOTT

The application of luminescence phenomena in the study of apple preserves. F. M. LITTSCHIED. *Z. Untersuch. Lebensm.* 55, 175-8(1928).—Data are given on

the luminescence phenomena in ultra-violet light of apple preserves, showing the influence of impurities and adulterants.

WILLIAM J. HUSA

The microscopic structure of some tropical fruits and their detection in marmalade-like preparations such as "Lukutate-Mark." C. GRIEBEL. *Z. Untersuch. Lebensm.* **55**, 89-111(1928).—A description is given of the microscopic structure of the fruits of *Diospyros lotus*, *Achras sapota*, *Mangifera indica*, *Carica papaya*, of the seed coat of *Durio zibethinus* and of a bulb known as "Nillu," with emphasis on the characteristics of value for the detection of these plant parts in preps. The marmalade-like prep. known as "Lukutate-Mark" has a variable compn.

WILLIAM J. HUSA

Pectin. W. PEYER AND H. IMHOFF. *Apoth. Ztg.* **43**, 613 4(1928).—The nature of pectin is discussed in connection with methods of prep. from apple and orange peel, notably also from the sugar beet, after its freedom from sucrose. Some new uses for pectin are suggested.

W. O. E.

Acidity of juices of fruits and preserves. C. F. MUTTELET. *Compt. rend.* **186**, 1299-1301(1928).—In the detn. of acidity of fruit juices pectin must be removed. In place of the costly pptn. by concd. alc., it is proposed to hydrolyze the pectin to pectic acid, ppt. the latter with $\text{Ba}(\text{AcO})_2$ and det. the citric and malic acids in the filtrate by the usual methods.

L. W. RIGGS

Starch sugar and marmalade manufacture. W. EKHARD. *Z. Spiritusind.* **51**, 82(1928).—The addn. of glucose to marmalade has been criticized because it neither gives the desired sweetness, as some state, nor is crystn. prevented by its use. No harmful physiologic action of starch sugar was observed in the fermentable and unfermentable portion. Some investigators found glucose equal to cane sugar from a nutritional standpoint. Colloids found in glucose protect the organism against the osmotic action of sugars. Cane sugar has a strong osmotic action and its assimilation is thereby hindered. Glucose is considered a good sugar for marmalades.

C. N. FREY

Honey diastase. J. FIEBE AND W. KORDATZKI. Hygienic Inst., Landsberg. *Z. Untersuch. Lebensm.* **55**, 162 9(1928).—By the method of Koch the diastatic action of honey is detd. under the conditions of acidity and salt content existing in the honey. The method of Gothe depends on the detn. of the activity of diastase under optimum conditions and thus gives a measure of the actual diastase content. Gothe's method is as follows: Ten g. of honey is dissolved in H_2O , neutralized to litmus with 0.05 N Na_2CO_3 soln. and dild. to 100 cc. A series of tests is run with various proportions of honey soln. and starch soln., the total vol. of 16 cc. contg. 0.5 cc. of 0.02 N HAc and 0.5 cc. of 0.1 N NaCl. The tests are run for 1 hr. at 45-50° and cooled in ice water. The test which gives a purple color on addn. of 1 drop of 0.1 N I soln. is noted. A good honey requires less than 2.8 cc. of honey soln. to digest 5 cc. of 1% starch soln. under the above conditions. F. and K. have modified Gothe's method by using 0.05 N NaOH and phenolphthalein for the neutralization.

WILLIAM J. HUSA

The composition and valuation of the honey of bees fed on sugar. J. FIEBE. Hygienic Inst., Landsberg. *Z. Untersuch. Lebensm.* **55**, 169-73(1928). The honey of bees fed on sugar has the following properties. It remains fluid even on long keeping, with only a slight tendency toward crystn. It is light yellow in color, deficient in aroma and lacks flavor. A 10% soln. of the honey turns the plane of polarized light slightly to the right or slightly to the left. The sucrose content is increased, but is variable, being dependent on the amt. of sugar fed, season of feeding, etc. The sucrose is gradually inverted. The honey is low in mineral matter and in diastase. Such honey is sometimes considered to be an adulterated product.

WILLIAM J. HUSA

Jam manufacture. HERBERT MANSFIELD. *Food. Manus.* **1**, 12-4, 89 92(1927).—The factors to be taken into consideration in deciding between the direct process of converting the fruit directly into jam and the indirect process of preserving the fruit for jam-making at a subsequent date are discussed. Particulars are given for preserving fruit by chemicals, pulping by heat, parboiling and refrigeration.

J. A. KENNEDY

Maple sap and its improvement. EDWARD HART. *Ind. Eng. Chem.* **20**, 581(1928).—A comm. has been formed of the Faculty of Lafayette College to carry forward a plan wherein by careful selection of seed, it is hoped that the yield of sugar can be materially increased. This comm. consisting of 3 members, together with their successors, is pledged to carry this work to completion.

J. A. KENNEDY

The detection and identification of poison mushrooms by experimental and biological methods. Rehabilitation of allegedly poisonous and suspected mushrooms. GIOVANNI FERRI. *Boll. chim. farm.* **67**, 97-105(1928).—A tabulated classification of poison mushrooms, chem. and biol. methods and symptoms of poisoning. Mushrooms contg. hemolysins which are destroyed by cooking or digestive juices are not only harmless, but mostly edible. *Boletus luridus*, *Amanita spissa* and *A. ompha* are edible. A.

mappia, *A. citrina*, *Volvaria gloiocephala*, *V. speciosa* and *A. panternia* although harmless are not edible because of disagreeable taste or odor. *Chilocybe candicans*, allegedly harmless, contains 3-4 times as much *muscarin* as *A. muscaria*. The biol. method of detection is simpler and more rapid than the chem. Pellegrini-Gillot's method is often misleading: (1) because the guinea pig is immune to the poison of *Boletus satanus* and *Gyromitra esculenta* and highly resistant to *A. muscaria*, while it succumbs to the injection of the harmless meadow mushroom; (2) because the sporophore ext. used in this method is apparently often toxic by the subcutaneous, even if harmless by the oral, route. F. uses for the test minute doses of an ext. of the flesh portion. Besides guinea pigs, rabbits, rats, pigeons and sparrows are suitable for the expts. The sparrow is particularly useful for forensic tests, where often only traces of the poison are available. For the detection of *A. phalloides* the very rapid and sp. hemolytic test may be used.

MARY JACOBSEN

The organic acids of tomatoes. ARTHUR BORNTAEGER. *Z. Unters. Lebensm.* 55, 112-43(1928); cf. *C. A.* 20, 952.—B. has never found oxalic acid in mature tomatoes, although very unripe tomatoes may contain traces. Canned tomatoes when spoiled may contain oxalic acid formed through the action of bacteria or molds. The filtered expressed juice of mature green tomatoes contained no pectin, traces being found in the juice of ripe, but not over-ripe, tomatoes. Aq. exts. prepd. on the boiling water bath contained much pectin in the entirely unripe up to the somewhat softened tomatoes; as the softening proceeded further the amt. diminished. During softening of the ripe fruit, citric and malic acids disappeared. Over-ripe fruit contained succinic acid and sometimes arabic acid.

WILLIAM J. HUSA

By-products of the pineapple canning industry. V. R. GREENSTREET AND GUNN L. TEIK. *Malayan Agr. J.* 16, 8-13(1928).—Expts. indicate methods for more efficient disposal of pineapple waste in Malaya. The expressed juice, subjected to yeast fermentation and distn., gives a *potable alc. liquor*. The residue may be made into a nutritious *cattle food* or allowed to decomp. on the land as a *fertilizer*. N. M. N.

Chemical composition of turnips and turnip leaves. STAN. REYNAERT. Univ. Louvain, Belgium. *Natuurwetensch. Tijdschr.* 10, No. 3, 92-7(1928).—Ordinary analysis of several varieties of turnips, with a comparison between the leaves and the bulbs.

A. L. HENNE

The asparagus industry in California (JONES, ROBBINS) 11D. Report on (the determination of) total chlorine in plants (TILDEN) 11D. Preservation of orange juice with Na benzoate (ÁLVAREZ) 28. Apparatus for sterilizing or pasteurizing milk (U. S. pat. 1,673,215) 1. Apparatus for dehydrating milk (U. S. pat. 1,673,066) 1. Food products from oleaginous seeds (Brit. pat. 279,122) 27.

BRÉTIGNIÈRE, L., AND GODFERNAUX, J.: *L'ensilage des fourrages verts. Méthodes anciennes. Procédés nouveaux*. Paris: Libr. agricole de la Maison rustique. 256 pp. F. 14.

Foods (vegetable extracts with phosphates) treated with ultra-violet rays. J. PERINO. *Brit.* 279,487, Oct. 22, 1926. Nutritive exts. are obtained from vegetables by treatment with salts such as alkali phosphates and NaCl and with ultra-violet rays in the substantial absence of O. Various details are given and among the materials which may be treated are: peas meal, cabbage, spinach, green kale, lettuce and carrots. An aq. paste of Ca, Mg and Fe hydrates may be used in prepg. the ext. from peas meal and it may be mixed with exts. of the other vegetable materials.

Edible protein products from blood. F. C. ARWOOD (to American Protein Corporation). U. S. 1,673,964, June 19. All of the red corpuscular matter is sepd. from blood and the resulting soln. is subjected to heat (suitably at a temp. of about 37°) completely to ferment the blood sugar present. Yeast may be added.

Apparatus for drying alimentary pastes. G. GARBUIO. U. S. 1,674,326, June 19. Apparatus for concentrating fruit juices by freezing. W. A. HEYMAN. *Brit.* 278,799, July 13, 1926.

Preserving citrus fruit juices. W. H. BRADLEY. U. S. 1,673,493, June 12. The extd. juice is refrigerated and allowed to stand for sepn. of assoc. pulp, the clarified juice is drawn off and mixed with sugar, again allowed to stand until the sugar is absorbed by the juice and the juice is then sterilized and bottled.

Preserving egg contents. A. K. EFRSIN. *Brit.* 279,159, July 19, 1926. A treatment especially applicable to egg yolk to be frozen without impairing its emulsi-

ing properties comprises the addn. to the material of a water-sol. org. OH compd. such as glycerol, EtOH, ethylene glycol, sucrose, lactose or dextrose capable of preventing denaturing of egg protein during freezing, and an edible acid capable of increasing the water-imbibing capacity of the protein, e. g., acetic, tartaric, citric, lactic, malic or succinic acids or H_3PO_4 . A condimental essential oil may also be added if the product is subsequently to be used for making salad dressing or the like in which the oil would be a suitable ingredient.

Preserving meat or other foods by refrigeration and treatment with a "fog" of salt solution. A. R. McLEOD (to Food Chillers, Ltd.). U. S. 1,673,694, June 12. An app. is described.

Treating tea. H. NAGASAKI. U. S. 1,673,264, June 12. Tea is dehydrated by heating to a low temp. under reduced pressure, then pulverized and sprayed with an edible dehydrated oil such as olive oil or peanut oil from which all free fatty acid has been removed, so as to impregnate the tea with the oil. This treatment serves to preserve the flavor of the tea.

Food for animals. U. S. FARM FEED CORPORATION. Brit. 278,818, July 20, 1926. Hay, straw, clover, corn stalks or other farm "roughage" is subjected to an accelerated fermentation in the presence of moisture to increase the palatability and digestibility. The fermentation may be induced by ferments naturally present or yeast or malt may be added. MgO , lime, S , $NaCl$ and phosphates may be added, and BzH may be used as a flavoring and antiseptic agent.

13 —GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Chemical engineering at Iowa State. S. D. KIRKPATRICK. *Chem. Met. Eng.* 35, 338-41(1928) E. H.

Editorial impressions of economic and technical progress in German chemical industry. H. C. PARMELEE. *Chem. Met. Eng.* 35, 334-7(1928) E. H.

Industrial thallium poisoning. TELEKY. *Wiener med. Wochschr.* 78, 506-8 (1928).—The literature of Tl poisoning is reviewed with 27 references. Clinical findings in the cases of workers in factories manufg. Tl who suffered from Tl poisoning are also reported. ARTHUR GROLLMAN

Sulfur dioxide. CHARLES W. JOHNSTON. *Refrigerating Eng.* 15, 61-71(1928). Complete description of a manufg. plant. The methods of analysis, purification, effect on the human body and special properties are discussed. H. F. ZOLLER

Steam storage. A. J. T. TAYLOR. *Fuel in Science and Practice* 7, 206-26(1928).—The general principle of steam storage is discussed and the Ruths steam accumulator and its principal parts are described in detail. The Ruths accumulator is based on the old principle of storing the heat energy of steam in a large quantity of H_2O under pressure and at saturation temp. It differs from other accumulators in its large storage capacity capable of accommodating wide variations in steam consumption over periods of several hours. Installations of Ruths accumulators in (1) textile mill, (2) sugar refinery, (3) iron and steel works, (4) pulp and paper mill, (5) colliery, are described. D. A. REYNOLDS

Conditions governing the extraction of a solution by an immiscible solvent. E. I. SMITH. *J. Soc. Chem. Ind.* 47, 159-60T(1928).—It is mathematically proved that for a given vol. of extg. solvent and a given no. of extns., the max. extn. is obtained when the solvent is divided into equal portions. T. S. CARSWELL

Behavior of lead in the animal organism. I. ROBERT A. KEHOE AND FREDERICK THAMANN. *Am. J. Pub. Health* 18, 555-64(1928).—Expts. on the elimination of Pb from the animal organism indicate that a significant portion of the Pb in the body exists in the form of compds. with org. constituents of the tissues, the quantities in equil. with inorg. phosphates being constantly changed by reason of the conversion of the org. compds. into the forms in which the Pb is excreted. Since the av. daily excretion of Pb depends upon the quantity of Pb stored in the body it should be possible to make a careful study of Pb excretion over a sufficient period of time to det. the adequacy of all the preventive measures that are used to control an industrial lead hazard. C. M. SALLS

Educational and research activity in refrigeration. E. F. BURTON. *Refrigerating Eng.* 15, 93-112(1928).—A comprehensive discussion of the place of refrigeration in university and trade school curriculae, the type of research carried on in each school

and the necessity of lab. instructions. Several research projects are proposed.

H. F. ZOLLER

Dry ice in modern refrigeration. J. W. MARTIN, JR. *Refrigerating Eng.* 15, 33-5 (1928).—Solid CO_2 exposed to its own gas at atm. pressure maintains a temp. of -109.3°F . It will absorb approx. twice as much heat as will the melting of H_2O ice. Its heat of fusion is 81.54 B. t. u.; heat of vaporization 158.6 B. t. u.; heat of sublimation 246.4 B. t. u. The total heat-absorptive power at 32° in raising the temp. from -109° to $+32^\circ \text{F}$. is about 285 B. t. u. CO_2 is mainly produced from burning coke. H. F. Z.

Armored containers for storing and shipping compressed gases. F. RIEDER. *Z. kompr. fluss. Gase* 27, 6-7 (1928).—Compressed gas containers of thin corrugated metal encased in heavy wire screen armor are described. These containers will withstand the pressures used in the ordinary heavy-walled steel cylinders, and are considerably lighter in weight. The construction is protected by Swiss Patent No. 123,156.

R. L. DODGE

Gas defense conference in Brussels. RUDOLF HANSLIAN. *Z. ges. Schiess-Sprengstoffw.* 23, 140-5, 172-6 (1928).—The report of an international conference called by the Red Cross on gas defense for civilian populations in future wars. A comprehensive plan is presented for individual and group protection.

J. S. REICHERT

The tear gases. I. V. VOLJANSKI. *Arhiv. hem. farm.* 2, 14-24 (1928).—A short review.

JAROSLAV KUČERA

Filters for gas masks. ENGELHARD. *Z. ges. Schiess-Sprengstoffw.* 22, 330-3 (1927); 23, 27-9, 103-4, 176 7 (1928); cf. *C. A.* 22, 649.—E. describes the design of a tightly fitting facepiece, anti-dimming eyepieces, chemical container, chemical fillings, life of the canister against various gases, methods of testing, toxic smoke filters and the gas mask carrier.

J. S. REICHERT

Cu in medicine and industrial pathology (MAZZI) 11H.

BOLL, MARCEL, AND BAUD, PAUL: **Memento du chimiste. Tome II. Partie industrielle.** Paris: Dunod. 686 pp. Paper, F. 95; bound, F. 103.

Refrigerating apparatus of the absorption type. SIGURD M. BACKSTRÖM (to Electrolux Servel Corporation). U. S. 1,673,931, June 19.

Continuous-cycle absorption refrigerating apparatus. PLATEN-MUNTERS REFRIGERATING SYSTEM AKTIEBOLAG (to Electrolux Ltd.). Brit. 279,132, Sept. 15, 1925.

Electric refrigerating apparatus adapted to operate with ethyl chloride. H. R. VAN DEVENTER. Brit. 279,088, Oct. 12, 1926.

Coating or impregnating process. A. BIDDLE. Can. 279,849, May 1, 1928. Porous and cellular bodies and fibrous materials are impregnated with a water-resisting substance by forcing, under fluid pressure, an aq. dispersion of a colloid against the surface and into the pores, cells and interstices of such bodies and materials, the bodies so coated then being subjected to an insolubilizing agent to convert the coating into a water-resisting material.

Generating mixtures of steam and combustion products under pressure. R. TAIT and D. M. TAIT. Brit. 279,197, Aug. 18, 1926. Liquid gaseous or powd. fuel is supplied to a mixing chamber to which primary air (which may be mixed with steam) is supplied at a pressure of about 800 lbs. per sq. in. and the mixt. thus formed is admitted to an elongated combustion chamber supplied with secondary air at a pressure of about 500 lbs. per sq. in. and at a temp. of about 540° ; the mixt. is spontaneously ignited by compression ignition. Details of the app. are described.

Purifying gases. H. J. KRASE, H. C. HETTERINGTON and A. T. LARSON (to Arthur B. Lamb, Trustee). U. S. 1,673,877, June 19. CO_2 is removed from H-N mixts. or other gases by bringing the gas mixt. into contact with an aq. ammoniacal soln. of an NH_4 salt other than the carbonate, e. g., NH_4NO_3 .

Purification of gases. G. PISTOR and E. BROSBACH. Can. 279,987, May 8, 1928. Dust is sepd. from the raw gases escaping from a P furnace by passing such gases through a filter chamber filled with constituents of the charge of the furnace and kept at a temp. above the dewpoint of P.

Sterilizing water or other liquids by contact with bodies coated with metals such as copper and silver. G. A. KRAUSE. Brit. 279,085, Oct. 14, 1926.

Evaporating solvent from solution of polymerized styrene or other solutions. W. S. JOHNSTON and A. W. KEEN (to Naugatuck Chemical Co.). U. S. 1,673,685,

June 12. Steam or other gaseous drying agent under pressure is intimately mixed with the soln. and the pressure is suddenly released from the mixt. An app. is described.

Rectifying system for fractional distillation of petroleum oils or other liquid mixtures. J. P. FISHER (to Heat Treating Co.). U. S. 1,672,978, June 12. An app. is described.

Insulated electric wires and cables. H. B. BURLEY (to Boston Insulated Wire & Cable Co.). U. S. 1,674,156, June 19. A conductor is coated with a layer of rubber compn. and a layer of fibrous material, the layer is semivulcanized, a second layer of rubber compn. is applied and further vulcanization is effected under pressure between heated plates.

Heat-insulating composition. W. K. NELSON. Can. 280,010, May 8, 1928. A heat-insulating material of a cellular texture comprises the set product of a mixt. contg. H_2O , calcined gypsum as the major ingredient, an acid-reacting salt, a carbonate compd., a gas-adsorbing or emulsifying substance and a bubble-strengthening substance of colloidal particles, the last-named substance being used in such quantities as to have little retarding effect on the hydration and setting of the gypsum. Cf. C. A. 21, 3404.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Water purification. ALEXANDER HOUSTON. *Chemistry & Industry* 47, 522-5 (1928).—There are included 5 photomicrographs of microorganisms found in plankton; a sketch map of the New Walton Works and photographs of the primary and secondary filters, interior of the primary filters and the chlorinating plant at Walton. J. A. K.

Water softening with barium salts. C. J. RODMAN. *Chem. Met. Eng.* 35, 221-3 (1928).—The description of softening by means of Ba salts is given in some detail.

J. A. KENNEDY

The pollution of tidal and non-tidal waters. J. H. COSTE. *J. Soc. Chem. Ind.* 47, 133-9T (1928).—This is a review with reference to conditions as they exist in England.

J. A. KENNEDY

The new water works for Bilston. R. C. S. WALTERS. *Water Water Eng.* 30, 101-5, 153-8 (1928).—A complete and detailed description is given of this new plant.

J. A. KENNEDY

The chemistry of mineral water. J. KNETT. *Oesterr. Chem. Ztg.* 31, 77-9 (1928).—Mineral water is discussed from the standpoint of compn. and methods of reporting analyses.

RUSSELL C. FRB

Study of physical and chemical conditions in San Francisco Bay especially in relation to the tides. ROBERT C. MILLER, WILLIAM D. RAMAGE AND EDGAR L. LAZIER. *Univ. California Pub. Zool.* 31, 201-67 (1928).—A study was made of the salinity, temp., turbidity, dissolved O_2 , dissolved H_2S and H-ion concn. of the water at 5 selected localities in San Francisco Bay in relation to tidal changes, meteorological conditions and sewage contamination. In the presence of strong tidal currents, the ebb and flow of the tide influenced the results. Max. salinity, lowest temp. and lowest H_2S usually occurred near the end of flood. No regular tidal relationship was found for dissolved O_2 , pH and turbidity. However, the pH varied directly with the dissolved O_2 ; and the dissolved H_2S bore an inverse relation to these 2 factors. Surface water had a lower av. salinity, higher temp., greater concn. of dissolved O_2 and higher pH than did bottom water even at depths of only a few ft. The av. dissolved H_2S content was not influenced by the depth. The % of satn. with dissolved O_2 increased with the temp. and the number of hrs. of sunshine. The water was usually 80% or more satd. with O_2 ; at times rapid photosynthesis gave rise to satn. or supersatn. The pH values were rather high and varied within narrow limits: 7.50 to 8.16. The max. value for H_2S was 0.42 cc. per l., the av. value 0.13 cc. "So far as our investigations show, the chem. effect of the sewage at present discharged into San Francisco Bay is inconsiderable and is quickly dissipated by tides and currents. The most objectionable feature, biologically, of sewage contamination in the bay appears to be the accumulation of sludge on the bottom near the sewer outlets." A 4-page bibliography is given. J. S. H.

New cooling apparatus cracks off scale. ANON. *Oil & Gas J.* 26, No. 51, 76 (1928).—A cooler or condenser developed by the Griscom-Russell Co. consists of a series of Admiralty metal tubes set with an initial curvature into cast iron headers. Scale formed on the tubes by the evapn. of the cooling water is automatically cracked off if the flow of hot liquid through the tubes is interrupted, causing them to return to their

initial curvature. The same principle is applied to evaporators for distg. pure boiler feed water from hard, dirty or salt water. M. B. HART

Improved method for phenol determinations (BAYLIS) 7. Sterilizing water (Brit. pat. 279,085) 13. Base-exchanging substances (Brit. pat. 279,466) 18.

Portable water filter. T. C. HOLZ and E. L. PEGG. U. S. 1,674,203, June 19.

Apparatus for aerating water. C. DEROSI. Brit. 279,281, Jan. 7, 1927.

Valve to control flow of water through water-softening apparatus. J. N. D. HEENAN. Brit. 279,330, April 22, 1927.

Base-exchanging substances. A. ROSENHEIM. Brit. 279,028, Oct. 16, 1926. Natural minerals or rocks of suitable character or artificial substances such as glass are rendered base-exchanging or their capacity in this respect is increased by treatment under pressure with acid, neutral or alk. reagents or successively with reagents of different character. Pressures up to 10–15 atm. and temps. up to 170–200° may be employed. Examples are given of: treatment of trachytic tuffs, palagonite tuffs, phonolite tuffs, or glasses rich in alkali, with H_2SO_4 or a bisulfate soln.; treatment of baked or unbaked kaolin with an alkali or alk. earth hydroxide; treatment of glauconite with a soln. of NaCl, KCl, KNO_3 , $NaNO_3$, Na phosphate or NH_4Cl ; treatment of shale with a waterglass soln.; treatment of baked bricks, clinkers, baked clay or minerals such as feldspar, leucite, phonolite, basalts, slags, lava, unbaked clay, field soil or their mixts. with HCl followed by alkali silicate, or NaOH, or by alkali carbonate, phosphate or aluminate; treatment of granite with HCl and then with water-glass soln. When alk. earth compds. are used it is preferable to replace them with alkali. Oxides such as those of Fe, Al, Si, Zr or Ti may be pptd. in or on the substances. Coke may be impregnated with Al sulfate and then treated with alkali silicate and afterward, if desired, with NaCl. Pumice may be successively treated with an acid and with alkali silicate. Cf. C. A. 22, 2424.

Boiler compound. NAKASABURO KUBO. Jap. 69,069, Aug. 7, 1926. A mixt. of powdered graphite, tannin, sugar cane and $NaHCO_3$ or alkali carbonate is specified.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Fertilizing of heavy soils rich in potash. DIENST. *Ernährung der Pflanze* 1927, No. 6.—Two stiff clay soils, shown by the Neubauer method to contain ample available potash, nevertheless proved very responsive to potash fertilizers when cropped with roots and potatoes. B. C. A.

Increasing iodine content by iodine addition. K. SCHARER AND A. STROBEL. *Angew. Bot.* 9, 187–99(1927); *Biol. Abstracts* 1, 1022.—When KI was added to soil in which sugar beets, peas, oats, alfalfa, pasture grasses, etc., were growing, in all cases the I content of the crop was increased. The increase is outside the limits of analytical error. H. G.

The effect of colloidal silica on the efficiency of phosphates. SHINPEI SEKI. *Bul. Sci. Fakultato Terkultura, Kjusu Imp. Univ.* 2, 253–61(1928).—In the experimentation with rice plants by the method of sand culture, the addn. of colloidal SiO_2 increases the efficiency of $Ca_3(PO_4)_2$ markedly, and that of acid phosphate slightly. The increase of the phosphoric acid content in the plants depends on the quantity of colloidal SiO_2 supplied. The contents of crude ash and SiO_2 in the straws and in the mixts. of husks and chaff increase with the colloidal SiO_2 supply. In the unhulled rice, the H_3PO_4 content and its % of the total H_3PO_4 in the plant increase with the supply of colloidal SiO_2 ; it seems that SiO_2 facilitates the transportation of H_3PO_4 in the plant body. The SiO_2 content of the plant depends on the SiO_2 supply. No difference exists between colloidal SiO_2 and so-called pptd. SiO_2 , with respect to their beneficial action upon the efficiency of phosphates. The effect of colloidal SiO_2 on the decomn. of $Ca_3(PO_4)_2$ with or without nutrient salts is negative, at least in lab. expts. A. L. H.

Superphosphate as stimulant of [plant] growth. L. ZALESKI. *Mem. Inst. Nat. Pol. Econ. rurale Pulawy* 7, 1–27(1926).—A study of the effect of the introduction of small quantities of superphosphate immediately under the seeds. B. C. A.

Solubility of phosphates in citric acid. Z. SZWARCJA. *Przemysl Chem.* 12, 137–41(1928).—The final equil. of $Ca_3(PO_4)_2$ in citric acid according to $3Ca_3(PO_4)_2 + 4C_6H_8O_7 \rightleftharpoons 3Ca(H_2PO_4)_2 + 2Ca_3(C_4H_4O_7)_2$ depends on fineness, temp., time of action and

quantity of water, the stoichiometric ratio being 930.81 parts of $\text{Ca}_3(\text{PO}_4)_2$ to 768 parts $\text{C}_6\text{H}_5\text{O}_7$. On these considerations the soly. of Constantine and Rochow phosphates is compared. Contrary to earlier findings, it is found to be greater for the former, in which the phosphate content is much greater. In their present forms both the conventional and the Robertson methods for measuring the soly. in citric acid of H_2PO_4 in phosphates are irrational. The judgment of the suitability of such phosphates does not depend on purely chem. considerations. A. C. ZACHLIN

By-products of the pineapple canning industry [as a fertilizer] (GREENSTREET, TEIK) 12. The cell stimulation problem as applied to medicine and agriculture (POPOFF) 11A. Cellulose [for use in fertilizer making] (U. S. pat. 1,672,895) 23.

BENNETT, H. H., AND ALLISON, R. V.: *The Soils of Cuba*. Washington, D. C.: Tropical Plant Research Foundation. 409 pp \$6 25. Reviewed in *Nature* 121, 859(1928).

GOUJON, A.: *La chaux et le chaulage dans la pratique agricole*. Paris: Libr. agricole de la Maison rustique. 93 pp. F. 5

STOLLENWERK, WILHELM: *Kolloidchemie*. Guide for Agricultural chemists and for teachers and students of agriculture. Stuttgart: E. Ulmer. 146 pp. Cloth bound, M. 5 50.

Fertilizer. N. CARO and A. R. FRANK. Brit. 279,421, Oct. 23, 1926. A fertilizer of alk. reaction is made by passing NH_3 over CaCO_3 or mixed carbonates such as dolomite heated to 500–900° under either ordinary or higher pressure.

Fertilizer. SELBI SOC D'EXPLOITATION DE LICENCES DE BREVETS INDUSTRIELS Brit. 279,022, Oct. 16, 1926. A non-hygroscopic fertilizer is obtained by mixing vinasses from distilleries and sugar factories (preheated and preferably mixed with peat or sawdust or the like) with a equal wt. of superphosphate (preferably also previously heated) and heating the mixt. sufficiently to effect drying, e. g., at a temp. of 125–30°.

Superphosphates. A. GAILLARD. Brit. 279,380, Oct. 25, 1926. Superphosphate is dried at a low temp., removed to a "silo" or the like where part of the acquired heat is retained, subjected to a second drying operation and these operations are repeated until the product attains a desired degree of moisture content (suitably 3–4%). An app. is described. Cf. C. A. 22, 1429.

Insect powder. A. IMAZU. Brit. 278,816, July 20, 1926. Pyrethrum powder is mixed with C_{10}H_8 and camphor. MgCO_3 , ultramarine and camphor oil also may be used in similar mixts.

Fungicidal preparation. K. MARX and H. WESCHER. Can. 280,362, May 22, 1928. A fungicidal prepn. contains an alkali-sol. complex org. Hg compd. and an alkali-sol. Cu compd.

Fungicide for seeds. K. MARX and H. WESCHER. Can. 280,363, May 22, 1928. A fungicide for seeds contains $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$, $\text{KNaC}_4\text{H}_4\text{O}_6 \cdot 4\text{H}_2\text{O}$, NaOH and NaCl .

16—THE FERMENTATION INDUSTRIES

C. N. FREY

New aims of fermentation technology. F. HAYDUCK. *Z. Spiritusind.* 50, 297 (1927).—The industries involved and their research problems are discussed. C. N. F.

Alcohol fermentation. XIV. The nature of zymín fermentation. S. KOSTYCHEV AND V. FAERMANN. *Z. physiol. Chem.* 176, 46–54 (1928); cf. C. A. 21, 3206.—Zymín, the "Acetondauerhefe" prepd. by dehydration of yeast with MeAc and Et_2O , differs from Lebedev's dried yeast or "Trockenhefe" in that no induction period precedes the fermentation, and the power of stimulating living yeast cells is absent. This lack of stimulative power is not due to removal of active substances by the solvents employed but rather to the failure of these substances to diffuse out of the plasmolyzed cells, since the stimulative action on living cells may be restored by boiling the zymín. The usual tests, such as inoculation on beer wort gelatin, show no evidence of the presence of living cells, and the fermentation brought about by zymín has always been considered a cell-free fermentation. It is now shown that the zymín cells are not actually dead, but can be resuscitated by proper treatment. If the zymín is placed in 10% sucrose at 0° for 8 hrs. and the temp. raised to 30° for 16 hrs., yeast colonies may be obtained by inoculation on the gelatin plates. This treatment deplasmolyzes the cells and re-

stores their power of proliferation. Zymin preps. consist of yeast cells which are moribund but still living and capable of fermenting sugar. Buchner and his collaborators committed a serious oversight in examg. their preps. culturally before and not after the fermentation. The conversion of sugar into EtOH and CO_2 by zymin is not a cell-free fermentation. XV. The fermentation of yeast maceration juice. S. KOSTYCHEV AND A. CHROMITSCH. *Ibid* 55-73.—The filtrate obtained by passing yeast maceration juice through a Chamberland filter may or may not have the power of fermenting sugar. If the pores of the filter are relatively large and the filtration takes place rapidly, an active filtrate is obtained. Fermentation by such filtrates has been regarded by other investigators as evidence in support of the zymase theory. However, the first portion of a filtrate may be active and a later portion, after the pores have become clogged and the filtration less rapid, may be inert. This cannot be due to a removal of the supposed zymase by ultrafiltration, since a large amt. of protein and invertase passes through. For the same reason the induction period of active filtrates cannot be attributed to removal of hexosephosphoric acid, as claimed by Kluyver and Struyk (*C. A.* 22, 245). Inactive filtrates undergo fermentation when inoculated with minimal quantities of the unfiltered maceration, showing that secondary factors such as cozymase and hexosephosphoric acid are still present in abundance. Inoculation of inactive with active filtrates also gives rise to fermentation. Finally, as will be reported in a later paper, the living organisms have been isolated from filtered maceration juice. Fermentation by maceration juice is therefore a biological process and furnishes no grounds for the assumption of a cell-free fermentation. A. W. DOX

Isolation of methylglyoxal in alcoholic fermentation. W. WINDISCH *Wochschr. Brau.* 45, 80-1(1928).—The isolation of the disemicarbazone of methylglyoxal from the products of alc. fermentation by Kostychev and Soldatenkov was unsuccessfully attempted by Neuberg and Kobel. The latter claim that the Russian scientists had isolated hydrazodicarbamide, a decompn. product of semicarbazide. Both compounds have the same m. p. and soly in water but differ in their ultimate compns. A. S.

Production of glycerol by fermentation. V. Effects of sulfites on yeast cell and fermentation. Y. TOMODA. *J. Soc. Chem. Ind. (Japan)* 31, 9-20; *Suppl. binding* 5-6B (1928). (In English); cf. *C. A.* 22, 1822.—The effects of sulfites on yeast cell and fermentation have been studied by means of staining the cell with methylene blue and detg. the decrease of sugar in the fermenting medium. NaHSO_3 is very injurious to the yeast cell and fermentation. Even a soln. of 0.5% has a marked injurious effect. The inhibiting action of NaHSO_3 is reversible to some extent. The activity of the yeast cell, which has been injured by NaHSO_3 , can be regenerated by adding Na_2CO_3 or NaHCO_3 within 20 hrs after the addition of NaHSO_3 . The injurious effect of NaHSO_3 is due to the action of HCO_3 ion. The presence of Na_2SO_3 or of SO_3 ion nearly arrested the propagation of yeast; and the fermentive activity is greatly diminished, being dependent upon the free zymase, which is not in the combined state with the protoplasm of the yeast cell. In a synthetic medium, which contains Na_2SO_3 , the velocity const. of the fermentation is a linear function of the number of yeast cells in unit vol. But in a natural medium, such as molasses soln., the velocity const. becomes a linear function of the log of the number of yeast cells. $\text{CH}_3\text{CHO} \cdot \text{NaHSO}_3$ complex has no injurious effect upon yeast cell and fermentation, but in alk. medium the complex is slightly dissoed into its components, which produce an injurious effect. The inhibiting action of NaHSO_3 can be eliminated by adding AcH, but not by adding cozymase. Y. NAGAI

Comparing the values of raw fusel oil by various methods. B. LAMPE. *Z. Spiritusind.* 51, 30(1928).—The detn. of fusel oil and its water and amyl alc. content was attempted by various methods. Tables are given. C. N. FREY

The influence of various factors on the production of fusel oil during fermentation of molasses. SVETOZAR JANKOVIC. *Z. Spiritusind.* 51, 105-6(1928).—A molasses contg. 52.4% sugar and 1.7% N was fermented under various concns. and temps. The largest quantity of fusel oil, 1.45%, was obtained at 15 balling, at a temp. of 27° , acidity of 0.5° and with double percent of stock. The smallest quantity, 0.22%, was obtained at 25 balling, 27° , acidity 1.5° and double the amt. of stock. The greatest quantity of fusel oil was formed under those conditions most favorable to yeast activity. No nutriment except that in the molasses was added. The protein of the yeast was 31.31% in the 15 balling and 36.81 in the 25 balling. The proteins of the yeast furnish the material from which fusel oil is created. Higher yeast addn. and low concn. of molasses favor degradation of yeast amino acids. C. N. FREY

The determination of small quantities of fusel oil. E. GLIMM, H. SCHRÖDER AND F. STENTZEL. *Tech. Hochschule Danzig. Z. Untersuch. Lebensm.* 55, 173-5(1928).—

The R6se "shaking buret," using 100 cc. of liquid, has been employed in smaller sizes, using 10 cc. and 20 cc. of liquid, without sacrifice in accuracy. WILLIAM J. HUSA

Statistics of analytical results for brewing materials. F. KUTTER. *Wochschr. Brau.* 45, 24-6(1928).—A method is described of calcg. a weighted av. from a number of analytical results. A. SCHULTZ

Extension of malt analysis by a test of flavor. H. KROPPF. *Wochschr. Brau.* 45, 87-8(1928).—Differences in the quality of malts not detectable by chem. means can be found by testing the flavor of their worts. Slow germination at relatively low temps. and rapid kilning are advocated for the production of a good malt. A. SCHULTZ

Linear or logarithmic methods of calculating color values in malt analysis. F. KUTTER. *Wochschr. Brau.* 45, 238-9(1928).—Linear color calcns. of worts agree better with facts than the logarithmic. A. SCHULTZ

Linear or logarithmic methods of calculating color values in malt analysis. H. K. SCHINDLER. *Wochschr. Brau.* 45, 15-6(1928).—In calcg. the color of worts from a certain concn. to that of the standard, e. g., 10% it is usually assumed that the color is proportional to the concn. This linear method has been criticized and a logarithmic one was suggested. S shows that the latter method gives absurd results and maintains that the linear method is justified on scientific grounds. A. SCHULTZ

Barleys of the 1927 crop and their malting. C. SCHWARZE. *Wochschr. Brau.* 45, 7-9(1928).—A table shows the compn. of barleys from Saxony and Schleswig for the years 1911 to date. The present crop is inferior because of a deficiency of sunlight. The moisture content of this years' barley is 16.35% as compared with 12.96 to 17.00% for the preceding years. Protein on the dry basis averages 11.93 as compared with 9.63 to 12.73. Longer steeping is required for this barley. A. SCHULTZ

The chemical composition of barley and malt and their worts and beers of 1925. W. WINDISCH, P. KOLBACH AND W. BANHOLZER. *Wochschr. Brau.* 45, 197-201, 209-13, 219-24(1928).—Analytical data are given for a number of barleys, malts, worts, and beers. A. SCHULTZ

Oxalic acid and its adsorption compound in beer. C. GEYS. *Wochschr. Brau.* 45, 1-7(1928).—The oxalic acid in beer is derived mainly from the malt. The soly. of CaC_2O_4 is 20 mg. per l. of mature beer and thus sepn. of crystals often occurs. Conditions favorable for the coagulation of colloids also favor oxalate crystn. and so the adsorption compd. develops into a CaC_2O_4 crystal surrounded by coagulated colloid. A. SCHULTZ

Application of the copper method to the determination of sugars and dextrin in beer in three operations. MARIO TAVEIRA. *Bol. assoc. Brasil. farm.* 8, 10 4(1927).—(1) The reducing sugars are detd. with Fehling's soln. and calcd. as maltose. (2) Dextrose is pptd. with 70% alc., the filtrate inverted with HCl and titrated. (3) The total carbohydrates are inverted and titrated. MARY JACOBSEN

Filters and chips. B. SIMON. *Wochschr. Brau.* 45, 163-4(1928).—The so-called Simon chips is a better device for the maturation of beers than Hallermann's aluminum plates because of a better circulation of the beer. These chips are adapted for any tank or vat of any size. A. SCHULTZ

Filters and chips. A. HALLERMANN. *Wochschr. Brau.* 45, 107-10, 224-9(1928).—Extra settling surfaces consisting of Al plates 2×0.25 meters were provided in large tanks to hasten clarification and maturing of beers. A. SCHULTZ

Studies on sarcina. K. SILBERNAGEL. *Wochschr. Brau.* 45, 143-8, 155-60(1928).—About 20 organisms of the sarcina type were isolated mostly from beers. They were divided into a group showing vigorous growth on agar and producing yellow colonies within 10 days while the second group gave white colonies and grew much slower. Food requirements of these organisms are given. A. SCHULTZ

Characterization of coal-tar dyes added to wines. R. A. VALENTINI. *Boll. chim. farm.* 66, 161-4(1927).—Basic dyes: add pure $\text{Ba}(\text{OH})_2$, NaOH or KOH to 100 cc. wine to a slightly alk. reaction and shake cautiously with 20 cc. AmOH. A violet color indicates orsellin, pink Biebrich scarlet or roccelin, green aminoazobenzene. If the AmOH remains colorless acidulate with HCl: pink indicates fuchsin, or safranine, yellow aminoazobenzene, chrysoidine or chrysaniline, violet methylviolet or mauveine. Evap. the AmOH soln. in the presence of wool or silk fibers, and pour a few drops HCl on the fiber. The characteristic colors appear. Acid dyes: The wool dyed by the above procedure is boiled with a few cc. of very dild. NH_4 . The pink soln. is evapd. and gives with concd. H_2SO_4 the following colors: safranine green, dild. blue-violet-pink, bordeaux blue, dild. sherry red, Biebrich violet streaked green and blue, dild. ponceau red, roccelin violet, dild. red, purpurine maroon dild. red ppt., erythrosine brownish yellow, evolves I vapors on heating. Coal-tar dyes may be distinguished from the

natural wine colors by Rota's SnCl_2 reduction: Add to the aq. dye soln. a few drops concd. HCl , then 10 cc. 10% SnCl_2 and heat to the b. p. Azo dyes are completely, NO_2 derivs. partly, decolorized; auramines, aurines and alizarin are not changed. Certain dyes disappear from the wine on standing. Fuchsin is pptd. by the tannins, while azo dyes are destroyed by microorganisms in diseased wines. M. J.

Identification of "black yeast." G. K. BOVGWITZ. *Wochschr. Brau.* 45, 213 (1928).—The cultural properties of the black yeast, *Nadsoniella nigra*, are described.

A. SCHULTZ

Observations regarding the flocculation point of brewers yeast. RICHARD KOCH. *Wochschr. Brau.* 45, 187-92, 201-6(1928).—The flocculation point is a characteristic of the yeast culture and independent of the compn. of the wort.

A. SCHULTZ

Relations between time and temperature of storage of beer yeast and their joint influence on fermentation, reproduction and acid formation. F. STOCKHAUSEN AND F. WINDISCH. *Wochschr. Brau.* 45, 31-7, 49-57(1928); cf. C. A. 22, 2026.—The fermentative and reproductive powers of two bottom fermentation yeasts, U and 1103, were increased by storage under water at 32°F. and diminished by storage under water at 68°F.

A. SCHULTZ

The nutrition of yeast with organic nitrogen-containing substances and ammonium salts in the aeration process. A. WOHL. *Chem.-Ztg.* 52, 202-3(1928).—A reply and criticism on an article by Claassen (C. A. 22, 1209).

J. C. JURRJEWS

Electrocolorimeter (STOCKHAUSEN, WINDISCH) 1. Buffer action as a biological principle (BERMANN) 11A. By-products of the pineapple canning industry [as a potable alcoholic liquor] (GREENSTREET, TEIK) 12. The successful cider mill of today (MAC-MILLAN) 12.

Beverage extracts. I. WALLERSTEIN (to Wallerste'n Co.). U. S. 1,673,273, June 12. A mash is formed of materials including malt and is allowed to stand at a suitable temp. and for a time sufficient to effect conversion of the starches present into a high percentage of dextrins and a low percentage of fermentable sugars; a proteolytic enzyme is then added to increase the quantity of water-sol. protein in the mash or wort, and the mash is maintained at a proteolyzing temp. U. S. 1,673,274 specifies a similar process in which the proteolyzed wort is boiled with hops after filtration. U. S. 1,673,275 specifies adding to the mash material during the process a material such as proteolyzed proteins of soy beans, which is rich in non-coagulable proteins.

Dihydroxyacetone. W. LENZ. *Can.* 278,945, Mar. 27, 1928. Glycerol is converted into dihydroxyacetone by means of bacteria obtained from hay or similar vegetable materials which have undergone fermentation, and cultivated on such nutrient media as contain extractive substances from vegetable materials such as straw, wood, hay, bran, rice-bran, waste products left in making malt or the like, to which is added the glycerol to be converted.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Esters of lemon and orange oils. R. H. JENSEN. *Perfumery Essential Oil Record* 18, 510(1927).—The ratio of aldehydes to esters (expressed as linalyl acetate) should be about 2.5 when the latter are detd. by sapon. with 0.5 N alc. KOH, and boiling for 15 min. only. Higher ratios indicate adulteration with citral. B. C. A.

A method of preparation of a liver extract powder for the treatment of pernicious anemia. J. B. COLLIP. *Can. Med. Assoc. J.* 18, 392-3(1928).—Allow frozen liver to soften and mince finely while still semi-frozen. Drop into boiling water (approx. 4 vols.) and agitate violently, keeping the temp. below 80°. Within a few min. rapidly transfer to a large canvas bag and express juice. Transfer this to a large no. of meat trays and place them in a wind tunnel. If there is any delay at this stage add a phenol preservative or acidify adequately to prevent bacterial decompn. By means of a hot-air blast through the tunnel reduce the juice to sirupy consistency. Transfer to a large enamel container and add 2 vols. $(\text{CH}_3)_2\text{CO}$. Collect the ppt. on large filters and allow to drain. Air-dry at a temp. not exceeding 60°. Powder. The prepn. is simple and not costly, and is effective in the treatment of pernicious anemia. A. T. CAMERON

The preparation of peptone for therapeutic purposes. J. TEMMINCK GROLL. *Pharm. Weekblad* 65, 465-74(1928).—Directions are given for the prepn. of peptone

for alimentary purposes by successive digestion of casein, beefsteak or fibrin with pepsin and pancreatin. Such preps. are free from the bitter taste of Witte peptone in which the digestion is made with acid. They show a higher amino N content (formol titration) and also higher ash (NaCl) than com. Witte peptone, Nutrose and Somatose.

A. W. DOX

Microchemical reactions for hyoscyamine. M. WAGENAAR. *Pharm. Weekblad* **65**, 549-51(1928).—A discussion of various reactions of hyoscyamine, including sublimation, pptn. of the free base and the cryst. ppts. obtained with AuCl_3 , picric acid, $\text{KI} + \text{I}$ and $\text{KBr} + \text{Br}$.

A. W. DOX

Volatility of nicotine. W. R. HARLAN AND R. M. HIXON. *Ind. Eng. Chem.* **20**, 723-4(1928).—Dry air satd. with nicotine vapor was passed through 2 N H_2SO_4 and the nicotine detd. by pptn. with silicotungstic acid, ignition and weighing (A. O. A. C. method). The following quantities were found per 10 l. of air, viz., 1.8 mg. at 25°, 2.7 mg. at 30°, 4.1 mg. at 35° and 5.9 mg. at 40°. The vapor concn. of nicotine over 2.97% nicotine-hydrated lime dust at 35° varied from 2.97 to 3.42 mg. per 10 l., and that over a 2.94% nicotine-bentonite dust was too small to measure, only slight amts. of nicotine being detected in the vapor phase.

W. C. EBAUGH

Starch solution of the German Pharmacopeia. G. FRERICH. *Apoth. Ztg.* **43**, 599-600(1928).—The difficulties are pointed out in the prepn. of official starch soln. The method specified in D. A.-B. 5 is considered superior to that of the present edition.

W. O. E.

New condensation product of salicylic acid and isovaleric anhydride. JULIUS DALIETOS. *Arch. Pharm.* **266**, 325-8(1928).—A series of expts is described looking to the prepn. of isovalerylsalicylic acid (comparable to acetylsalicylic acid or aspirin). A mixt. of salicylic acid (7 g.), isovaleric anhydride (12 g.) and concd. H_2SO_4 (0.05 g.) was heated 4 hrs. on the sand bath at 150°, the fused mass then treated with CHCl_3 and toluene, alc. NaOH and finally abs. EtOH. The Na salt, $\text{C}_{12}\text{H}_{13}\text{O}_4\text{Na}$, m. 233.6°, had a sweetish taste and characteristic odor. The free acid, $\text{C}_{12}\text{H}_{14}\text{O}_4$, forms white unctuous leaflets of primarily bitter followed by sweetish taste and valerian-like odor. Its therapeutic properties are being investigated.

W. O. E.

Narcotic poisons. FRITZ REDLICH. *Apoth. Ztg.* **43**, 603-5(1928).—A brief historical treatment of poppy culture and opium prepn. as practiced from the earliest times in Egypt and Asia-minor, showing its spread eastward and notably east and south-east through India and China. The difficulties are pointed out in the various national and international attempts to control production and traffic in opium and its products, as also those of the coca leaf.

W. O. E.

Detection of arsenic. G. FRERICH. *Apoth. Ztg.* **43**, 610-3(1928).—A commentary on the official method for detecting As in the various pharmacopeial preps.

W. O. E.

Safran. C. GRIEBEL AND F. WEISS. *Apoth. Ztg.* **43**, 642-4(1928).—A study has been made of the question whether this little used drug in strictly pure condition contains NH_3 in the form of a salt. The answer is affirmative and affects somewhat the pharmacopeial requirement. Several samples of safran were examd. and the results are tabulated.

W. O. E.

Hexamethylenetetramine. L. ROSENTHALER. *Apoth. Ztg.* **43**, 653-4(1928). A morphological study of different com. samples of this drug, with illustrations.

W. O. E.

Liquor hydrogenii peroxidi. PHILIP A. BERRY. *Australasian Assoc. Advancement Sci.* 1928 (preprint), 3-11.—Because of the recognized unsatisfactory nature of the British Pharm. characters and tests for this prepn. a critical study has been made of the methods now in general use (the British gasometric method, the Ger. iodometric process, and the U. S. P. permanganate method) and later other standards, such as the limit of acidity, solid residue, etc., are also dealt with.

W. O. E.

Propagation conditions of the peppermint and its probable parents. W. HIMMELBAUR AND W. HINDES. *Heil- und Gewürz-Pflanzen* **11**, 1-24(1928).—An historical study leading among other results to the conclusion that the parents of the peppermint are found in *Mentha spicata* (varidis) and *M. aquatica*.

W. O. E.

Natural drugs of Soviet Russia. LUDWIG KROEBER. *Heil- und Gewürz-Pflanzen* **11**, 33-6(1928).—A brief report on the production and traffic in crude drugs and tannins.

W. O. E.

The apothecary Johann van Beethoven. OTTO ZEKERT. *Pharm. Monatsh.* **9**, 29-35, 62-8, 90-3, 107-10(1928).—An address.

W. O. E.

International organization for the culture and collection of drug plants. W. C. DE GRAAFF. *Pharm. Monatsh.* **9**, 85-7(1928).—An address.

W. O. E.

Simplified adjustment of normal solutions of the German Pharmacopeia. E. RUPP. *Apoth. Ztg.* **43**, 568-9(1928).—Several modifications in the official procedure are suggested and discussed for 0.1 *N* solns. of I, $\text{Na}_2\text{S}_2\text{O}_3$, NaAsO_3 , KBrO_3 , KMnO_4 and AgNO_3 . W. O. E.

Galenical preparations. F. WRATSCHKO. *Pharm. Monatsh.* **9**, 87-90, 103-6 (1928).—An address dealing with the biol. and phys. methods of evaluation. W. O. E.

Cenomasse zyma. H. ESCHENBRENNER. *Pharm. Ztg.* **73**, 701-3(1928).—A further study has been made of the adaptability of this yeast ext. product to the prepn. of pill masses of varying compn., notably those contg. creosote. The results obtained were generally favorable. W. O. E.

Adulterated anise powder. D. AYE. *Apoth. Ztg.* **43**, 675-6(1928).—A case is cited in which a sample of powdered anise was found to be adulterated with poison hemlock, the alkaloid of which is coniine. W. O. E.

Nicotine in tobacco. A. HEIDUSCHKA AND F. MUTH. *Pharm. Zentralhalle* **69**, 305-7(1928); cf. *C. A.* **21**, 3103.—A study has been made of some 10 different brands of cigarettes (full strength tobacco) and 6 different brands of cigarettes (more or less de-nicotinized), the nicotine content of the resp. tobaccos and of the smoke therefrom detd. and the results tabulated. Of the "regular" cigarettes the nicotine content ranged from 1.11 to 1.31%, while that of the so-called de-nicotinized product ranged from 0.64 to 1.22%. W. O. E.

Preparation of monobromocamphor. F. CHEMNITIUS. *Pharm. Zentralhalle* **69**, 307-9(1928).—A detailed description is given for the prepn. of this drug. W. O. E.

Chemistry of the essential oil from angelica seed. ELEMÉR KOPP. *Pharm. Zentralhalle* **69**, 353-5(1928).—From a study of several freshly distd. samples it is concluded that the limits of consts. of this oil should be modified to read: d_{40} 0.851 to 0.900; $[\alpha]_D^{15}$ 11° to 13.5° (or -1.4° to -6.2°), n_{20} 1.4846 to 1.4890; acid no. 1.7 to 6.7; ester no. 13 to 62.2, acetyl no. 46.3 to 140.2; soly. in 90% alc. not always clear; however the freshly distd. oil yields a clear soln. in 96% alc., while an old product is insol. even in 15 parts of 96% alc. W. O. E.

New reaction of lichenin. A. v. LINGELSHEIM. *Pharm. Zentralhalle* **69**, 355-7 (1928).—Lichenin yields in aq. soln. a ppt. with tannin, thus explaining the behavior of *Cetraria* decoction on the addn. of tannin (pptn.). W. O. E.

Grahe's reaction of the cinchona barks. A. v. LINGELSHEIM. *Pharm. Zentralhalle* **69**, 321-5(1928).—This test, involving dry distn. of the bark in a test tube and deposition of the evolved vapors on the cooler portions of the glass as a "reddish tar," has now been applied to a large no. of bark varieties, with the result that certain samples yield a reddish brown deposit, others no reddish drops at all, the distn. product being brownish yellow. Some 170 samples were examd., both true and false barks, and the results recorded and discussed. W. O. E.

Traffic in drugs during the year 1927. J. HERZOG. *Apoth. Ztg.* **43**, 628-9(1928).—An address dealing with the exploitation of certain specialties, as besco tablets, glukhorment, lukutate, adsorgan, synthalin, salvamin, sympathol, thyroxine and others. W. O. E.

Sensitiveness of sodium hypophosphite solution toward selenium. G. BÜMMING AND K. FERREIN. *Pharm. Ztg.* **73**, 656-7(1928).—The sensitiveness of the official soln. of Na hypophosphite (Thieles reagent) toward Se ($1/100$ mg.) under the conditions of the Ger. Pharm. has been studied and found to be greater than toward As ($1/50$ mg.). W. O. E.

Odor tests. A. ROSENTHAL. *Seifensieder-Ztg.* **55**; *Parfumer* **2**, 33-4(1928).—To test essential oils and exts. for odor R. recommends diln. with alc. or spreading 0.5-0.10 cc. upon strong filter paper. P. ESCHER

The butyrates and isobutyrate in perfumery. A. MÜLLER. *Seifensieder-Ztg.* **55**; *Parfumer* **2**, 43-4(1928).—A table of 23 butyrates and isobutyrate, giving their name, odor and specific use in perfume. P. ESCHER

The ouabain content of *Acokanthera schimperi* of Erythrea. S. BERLINGOZZI AND D. MIGLIACCI. *Boll. chim. farm.* **67**, 33-5(1928).—The ouabain content as detd. by the frog heart and dog method (no chem. sepn. of the glucosides was made) is 0.3% in the wood and 0.1% in the leaves. MARY JACOBSEN

Determination of morphine in opium. V. MACRI. *Boll. chim. farm.* **67**, 129-31 (1928); cf. Eder and Märki, *C. A.* **22**, 1652.—According to E. and M. the morphine is extd. with water, liberated with 2 *N* BaHCO_3 or NH_3 , pptd. with benzene, dissolved in 0.1 *N* HCl and the excess of the latter titrated with methyl red. M. prefers extn. with a satd. morphine soln. contg. the necessary amt. of Ca(OH)_2 , especially when the

opium has an alk. reaction. Org. solvents have the disadvantage of dissolving other alkaloids. Ether as a precipitant is preferable to benzene because of its soly. in water. Benzene does not permit the detection of a certain possible adulterant, the nature of which is being investigated. Weighing the dried extd. opium residue is preferable to detg. the wt. of the evapn. residue of the ext. MARY JACOBSEN

Fluidextract of chelidonia. ADOLFO ALBANESE AND ANTONIO PEDRONI. *Boll. chim. farm.* 67, 194-200(1927); cf. C. A. 15, 1902-3—Chelidonia exts. are mentioned in several pharmacopias but no tests are given. The fluidext. supplied by an Italian manufacturer was a brown, bitter, fairly thick liquid, leaving a brown residue when dissolved in hot or cold water or alc. It is insol. in other org. solvents, sol. in concd. acids with a reddish maroon color. It reduces Fehling's soln. The reactions of the ext. (directly and after purification with Pb acetate) with HCl and H₂SO₄ and alkaloidal reagents are given in detail. For the identification of the active constituents the ext. is preferably shaken out with CHCl₃ and the latter evapd. on a porcelain plate, leaving a residue with a pink center (I) and a yellow border (II) which gives the following color reactions: concd. H₂SO₄ I violet blue, II coffee brown, concd. HNO₃ orange-yellow; Fröhde's reagent I brownish green, gradually streaked blue, II violet, turning green. The I reactions are characteristic for β - and γ -homochelidonine and sanguinarine the II and HNO₃ reactions for chelidonine and homochelidonine. The ext. contains: 0.18% alkaloids (Schmidt's method) 28% of which are β - and γ -homochelidonine; 3.24% ash, 42% of which is K₂CO₃; water-insol. portion 11.11%; free acids = 0.410 g. NaOH per 100 g. Dextrin was absent; traces of Cu were found. MARY JACOBSEN

Synthetic musks. L. GIVAUDAN. *Aromatics* 9, 25, 46(1928)—Descriptive

WILHELM SIEGERBLOM

Natural source of citronellol. EUGENE CHIARABOT. *Aromatics* 9, No. 1, 28(1928).—See C. A. 22, 139.

WILHELM SIEGERBLOM

A botanical and pharmacognostic study of "Saiko," Radix Bupleuri. N. FUJITA AND K. KIMURA. *J. Pharm. Soc. Japan* 48, 264-76(1928). NAO UVEI

Pharmacy in Canada and the United States. HERBERT SKINNER. *Chemist and Druggist* 108, 215-23(1928)—Descriptive account of a visit, with photographs, including those of Canadian and U. S. Colleges of Pharmacy. S. WALDBOTT

The estimation of liquor bismuthi et ammonii citratis. ANON. *Pharm. J.* 120, 270(1928).—The Brit. Pharm. method (evap. 10 cc. to dryness and ignite, yield not less than 0.5 g. Bi₂O₃) entails loss through spurring and partial reduction to Bi. The following reduction method with CH₂O in alk. soln. is more rapid and gives more uniform results. Heat in a beaker on a water bath for 30 min. a mixt. of 10 cc. of the liquor with 20 cc. CH₂O soln. (Brit. Pharm.), 5 cc. of 20% NaOH and 20 cc. H₂O, transfer the ppt. formed to a previously ignited and tared Gooch crucible, wash out the alkali, then dry and det. the wt. of Bi₂O₃ after ignition in a Davies' furnace. S. W.

Volumetric estimation of liquor strychninae hydrochloridi. J. RAE. *Pharm. J.* 120, 270(1928).—The method is based on the quant. pptn. of strychnine from slightly acid solns by K₂Cr₂O₇. Evap. 10 cc. of the liquor in a beaker on a water bath to 5 cc. to expel all the EtOH, add 5 cc. H₂O, 25 cc. of 0.1 N K₂Cr₂O₇ and 2 cc. of dil. H₂SO₄ (Brit. Pharm.) set aside for 30 min. Transfer the contents of the beaker to a 100-cc. flask, make up to vol. with H₂O, shake and filter off 50 cc. To the filtrate add 1 g. KI, 3 cc. HCl and titrate with 0.1 N Na₂S₂O₃. Multiply the no. of cc. used by 2, subtract from 25 and multiply the result by 0.1356 to obtain the % of strychnine-HCl in the soln. examd. S. WALDBOTT

The volatile oil of hypericum perforatum. E. R. MILLER. *J. Am. Pharm. Assocn.* 16, 824-8(1927).—Seven specimens of plant collected in the autumn of 1915 were distd. at that time. Yields 0.106-0.125%; d₁₅ 0.8065-0.8180; n_D 1.4555-1.4612; α_D 12.4-15.9°, constituents α -pinene, (probably) an aliphatic hydrocarbon and one or more sesquiterpenes. L. E. WARREN

Studies in drug analysis. IX. Estimation of acetylsalicylic acid (aspirin), phenylcinchoninic acid (cinchophen) and caffeine in admixture. W. O. EMERY. *J. Am. Pharm. Assocn.* 17, 18-22(1928).—Warren's method (C. A. 21, 801) gave results 1-4% too high with corresponding low values for aspirin. Tablet material was exhausted by treatment with dil. Na₂CO₃ and filtering on a suction plate. Caffeine.—For each 0.3 g. aspirin add 1 g. of dry Na₂CO₃ and 10 cc. of H₂O and stir occasionally for 30 min. Filter by suction and wash the container and filter with water. Transfer the soln. to a separator and ext. the caffeine with CHCl₃. Wash the solvent, evap. it and dry the residue and weigh as caffeine. Aspirin.—Add the washings to the alk. soln. and heat to dryness. Dissolve the residue in 25 cc. of H₂O, add 1.5 g. of dry Na₂CO₃ and dil. with H₂O to 200 cc. Heat on the steam bath and add 10 cc. portions of 0.2 N I until

an excess of I is apparent after protracted heating. Add 0.5 g. of Na_2CO_3 and heat for 1 hr. Filter through a weighed Gooch crucible and wash with 200 cc. of hot H_2O . Dry the residue at 100° . The ppt. multiplied by 0.5238 = aspirin. *Cinchophen*.—Evap. the filtrate to 10 cc., transfer to a separator and acidify with 10% H_2SO_4 . Ext. with 4–50 cc. portions of $\text{CHCl}_3\text{-Et}_2\text{O}$ (40–10). Wash the solvent with a soln. of SO_2 and then with H_2O . Continue the extn. and washing until the cinchophen residue has been removed. Evap. the solvent and weigh as cinchophen. In a second method where caffeine is absent the cinchophen or mixt. of cinchophen with aspirin is dissolved in glacial acetic acid, the soln. heated and a measured excess of 0.1 *N* I added. The soln. is made to vol. and the uncombined I detd. in an aliquot portion with 0.1 *N* $\text{Na}_2\text{S}_2\text{O}_3$. The results by both methods are good.

L. E. WARREN

The standardization and stabilization of nux vomica, gelsemium and veratrum and the hydrogen-ion concentration factor. IV. E. E. SWANSON AND C. C. HARGREAVES. *J. Am. Pharm. Assocn.* 17, 23–7 (1928).—The preps. studied were (A) fluidexts. of nux vomica U. S. P. IX, (B) gelsemium U. S. P. IX and (C) veratrum U. S. P. IX. The chem. assay method and the bio-assay method give correlative results. A is stable and requires no H-ion concn. factor. B requires no definite H-ion concn. to stabilize its alkaloids. The chem. method of assay is not reliable; consequently a bio-assay is desirable. C appears to require some definite H-ion concn. to control its deterioration and stabilization. The chem. method of assay is unreliable. The drug should be assayed by biological means.

L. E. WARREN

Causes of deterioration of strophanthus seed during storage. ELIZABETH PICKERING. *J. Am. Pharm. Assocn.* 17, 121–3 (1928).—A specimen of seed of *Strophanthus Kombé* assayed 120–33% U. S. P. After grinding and storage for 1 yr. it assayed but 37.5–48.5%. The literature indicates that exposure to light, heat, moisture and mold spores tends to cause deterioration in the drug.

L. E. WARREN

p_{H} Determinations in alcoholic solutions. RALPH B. SMITH. *J. Am. Pharm. Assocn.* 17, 241–3 (1928).—Nineteen pairs of buffer solns. were made up, one in each pair contg. H_2O as solvent and the other 50% EtOH. The voltage of each was detd. at 25° against a standard calomel half-cell. EtOH buffer solns. gave stable readings. The e. m. fs. of the EtOH solns. were higher in every case than those of the H_2O solns. It is not possible to calc. the p_{H} from the results obtained because the constant of the H electrode in EtOH is not known. However comparative values were obtained by using the constants for H_2O . By this procedure the variations of the two members of the pairs are from 0.16 to 1.88 p_{H} units. The method was extended to tinctures. It is important to use a freshly plated electrode which has been presatd. with H immediately before use. The voltage will usually become stable in 5–15 min. and remain so for 15–20 min. or even longer. Poisoning then sets in and the voltage drops off. The following values were found: tinct. digitalis U. S. P. 5.12–5.77; tinct. aconite U. S. P. 5.20–5.51; tinct. of strophanthus U. S. P. 5.43, tinct. of aconite made with acid menstrua gave values between 2.32 and 4.53.

L. E. WARREN

The boycott of Spanish ergot. H. H. RUSBY. *J. Am. Pharm. Assocn.* 17, 249–52 (1928).—R. claims that there is a movement to boycott Spanish ergot in favor of Russian or other kinds. He examd. very large quantities of Spanish ergot during the past 25 years. He never saw a specimen which would not comply with the requirements of the present Pharm. He never saw a specimen of Russian ergot which was really good.

L. E. WARREN

Gelatin in medicine. GEORGE D. BEAL AND ANDREW NEFF. *J. Am. Pharm. Assocn.* 19, 261–5 (1928).—An assay in which the gelatin amino acids, gelatin as a pure protein, its use in infant feeding, hemostatic action, therapeutic uses, as a basis for capsules and suppositories and its use in adult dietaries are discussed. Recently 9 adults subsisted for 1 month on plain or gelatinated milks. With the exception of a small amt. of fruit, no other food was taken. In spite of this strenuous diet, these men all continued their work as usual, and all remained in perfect health throughout the test.

L. E. WARREN

Viburnum cassinoides, a recent substitute for *viburnum prunifolium*. HEBER W. YOUNGKEN. *J. Am. Pharm. Assocn.* 17, 330–5 (1928).—A bark labeled “black haw” was found to be *Viburnum cassinoides* L.

L. E. WARREN

Cascara. T. J. STARKER. *J. Am. Pharm. Assocn.* 17, 335–9 (1928).—Historical essay.

L. E. WARREN

Chinese botanical sources of ephedrine and pseudoephedrine. B. F. READ AND J. C. LIKE. Peking Med. Coll. *J. Am. Pharm. Assocn.* 17, 339–44 (1928).—The botanical sources of the drug Mahuang have been traced to *Ephedra equisetina* Bunge and *E. sinica* Stapf. Both plants yield ephedrine and pseudoephedrine and both

show great seasonal variation in the alkaloidal content. Autumn is the best time for collecting.

The occurrence and alkaloidal content of various *Ephedra* species. II. C. NEILSON and H. McCausland. Abbott Labs. *J. Am. Pharm. Assocn.* 17, 427-30(1928).—Continuation of (C. A. 21, 4024). *Ephedra trifurca* Torr. was collected in Arizona and was analyzed for alkaloids by standard methods but none was found. *Ephedra vulgaris* was grown in Illinois from seeds imported from Switzerland. The first year plants (without the roots) contain no alkaloids.

Ephedrine assays by titration. H. O. MORAW. Lab. Swann Myers. *J. Am. Pharm. Assocn.* 17, 431-5(1928).—In the gravimetric method at least 12 hrs. are required to dry the alkaloid over H_2SO_4 before weighing. The residue continues to lose wt. after that; a white sublimate collects on the sides of the desiccator. Heat cannot be used without losses. Assays of known alkaloid were conducted by shaking with NH_4OH , Et_2O , evapg. most of the solvent, adding a measured excess of standard acid, evapg. the remaining excess of solvent and titrating the excess acid with bromothymol blue as indicator. NH_4OH does not interfere if the vol. of Et_2O be reduced to about 10 cc. by evapn. Tablets and sirups contg. ephedrine may be assayed readily. Solns. of ephedrine in oil may be titrated directly by adding an excess of petr. benzine, a nearly equal vol. of H_2O and a measured excess of acid. The mixt. is shaken thoroughly and the excess acid titrated in the usual way.

Preliminary report on the examination of *Viburnum cassinoides*. FLORIN J. AMRIEIN. *J. Am. Pharm. Assocn.* 17, 556(1928).—The specimen was a commercial root bark labeled shonny haw. It was identified by Youngken as *Viburnum cassinoides* L. $EtOH$ reducing sugars, valeric acid and a "resinous glucoside" were found.

The behavior of the cyanogenetic glucosides of cherry laurel during starvation (GODWIN, BISHOP) 11D.

DRIVER, JOHN EDMUND, AND TREASE, GEORGE EDWARD: **The Chemistry of Crude Drugs.** An elementary Text book for Students of Pharmacognosy. New York: Longman's, Green & Co. 160 pp. \$4.

GILDERMEISTER, E., AND HOFFMANN, FR.: **Die ätherischen Öle.** Vol. I. 3rd ed., revised. Miltitz. Schimmel & Co., Leipzig. L. Staackmann. 864 pp. Reviewed in *Perfumery and Essential Oil Record* 19, 188(1928).

GROSIA, ALBERTO: **Lezioni di chimica farmaceutica e tossicologica. Parte I. Chimica dei metalloidi.** 2nd ed., revised and enlarged. Padova. La Litotipo. 346 pp. L. 40.

HUGOUNENQ, FLORENCE: **Principes de pharmacodynamie.** Paris: Masson et Cie. 392 pp. F. 40.

The Quarterly Journal of Pharmacy and Allied Sciences. (*New Journal*) Published quarterly by the Pharmaceutical Press (London), under the direction of the Council of the Pharmaceutical Society of Great Britain. This journal will replace the *Year Book of Pharmacy*. Vol. I, No. 1, contains 162 pp. 10s.

Synthetic drugs (santalol derivatives). VEREIN FÜR CHEMISCHE INDUSTRIE AKT.-GES. Brit 278,982, July 14, 1926. Double compds. of santalol esters with $(CH_2)_6N_4$ are prepd. by reaction of the components, preferably in a solvent such as $CHCl_3$, CCl_4 or C_6H_6 , with or without heating; e. g., santalol may be treated with bromoacetyl-bromide and the resulting bromoacetic acid santalyl ester allowed to stand in $CHCl_3$ soln. with $(CH_2)_6N_4$ when a cryst. powder seps. Other santalyl esters referred to are the halides, nitrate, sulfate, thiocyanate, alkyl- or aryl-sulfonates such as the benzene sulfonate, esters of halogen-fatty acids and aryl-sulfo-fatty acids. Santalyl nitrate is made by treating santalol with HNO_3 and H_2SO_4 ; santalyl sulfate is made by treating santalol with H_2SO_4 ; santalyl thiocyanate is formed when mixed solns. of santalyl chloride and $NaCNS$ in dry acetone are allowed to stand, the $NaCl$ being filtered off and the acetone distd.; santalyl benzenesulfonate is made by cooling mixed solns. of santalol, benzene sulfochloride and pyridine in ether, shaking the resulting soln. with water, drying and distg. the ether.

Complex antimony compound. H. HAHN (to Winthrop Chemical Co.). U. S. 1,674,362, June 19. A complex Sb compd. is derived from thioglycollic acid and antimonyl pyrocatechol, which probably has the formula (as a Na salt): $C_6H_4O_2-Sb-SCH_2-COONa$. It crystallizes from water as a white compd. sol. with a practically neu-

tral reaction, and may be used as a *therapeutic agent* in trypanosome infections. Cf. C. A. 21, 2170.

Thiocarbazides of the naphthalene series. G. M. DYSON, F. A. MASON and A. RENSHAW (to British Dyestuffs Corporation, Ltd.). U. S. 1,673,498, June 12. By the action of aromatic carboxylic or sulfonic halides which contain in the aromatic nucleus a nitro group, upon sulfonated amines or aminophenols of the naphthalene or acenaphthene series, or upon their derivs., which contain an —NH— group in the α -position, *N*-acidyl-substituted compds. are obtained which, after reduction of the NO_2 group and diazotization of the NH_2 group formed and reduction of the diazo compd. thus obtained, yield hydrazines which may be converted by CSCl_2 into the corresponding thiocarbazides. The latter may be used as *therapeutic agents* for destroying blood parasites or as *intermediates for making dyes*. U. S. 1,673,599 describes the similar manuf. of *carbazines* (instead of thiocarbazines) by using phosgene (instead of thiophosgene) in the process. The carbazines also may be used as *therapeutic agents* or as *dye intermediates*. Numerous starting materials are listed as suitable for use in making the thiocarbazines and carbazines and a specific detailed example is given in each patent.

2,3-Dihydro-2-keto-1-methyl-5-benzimidazolearsonic acid. W. KOLLE, K. STREITWOLF and A. FEHRLE (to I. G. Farbenind. A.-G.). U. S. 1,674,368, June 19. This compd. is formed by reaction of phosgene on $\text{C}_6\text{H}_5\text{As}(\text{OH})_2\text{O}(1).\text{NHCH}_3(4).\text{NH}_2(3)$. It is a *therapeutic agent*. The corresponding 1-propyl deriv., the 1-allyl deriv., 1-benzyl- and 3-methyl- deriv. all m. 280° .

Organic arsenic compounds and dyes. I. G. FARBENIND. A.-G. Brit. 278,789, July 7, 1926. 4-Hydroxy-3-acetamido-aryl-1-arsonic acids are prepd. by reducing an aryl-1-nitro-3-acetamido-4-hydroxy compd. and then replacing the amino group with the arsonic acid group by Bart's method as described in Brit 568 of 1911 (C. A. 6, 1819). Examples are given of the production of 4-hydroxy-3-acetamidophenyl-1-arsonic acid, 5-chloro-4-hydroxy-3-acetamidobenzene-1-arsonic acid and 5-methyl-4-hydroxy-3-acetamidobenzene-1-arsonic acid. These compds. may be used for *therapeutic purposes*. 1-Amino-3-acetamido-4-phenol may be diazotized and combined with resorcinol to a bluish red and with R-salt to a dull violet *dye*. 5-Chloro-1-amino-3-acetamido-4-phenol, diazotized and combined with resorcinol yields a reddish dye.

Pile remedy. W. F. BROCKETT. U. S. 1,674,353, June 19. Volcanic ash contg. a large proportion of SiO_2 , Al_2O_3 and Na_2O is formed into a salve by admixt. with petroleum jelly contg. PhOH 2% and KMnO_4 1%.

Surgical plaster. D. SARASON. Brit. 279,030, Oct. 16, 1926. Unvulcanized rubber contg. little or no resin is applied to fabric and the exposed surface is treated with talc to render it non-adhesive when not in use. Before use it is coated with rubber soln.

Hormones. I. G. FARBENIND. A.-G. Brit. 279,123, Oct. 15, 1926. Solns. of the active principle of the ovary are purified by use of water-sol. N-free ethers or esters of a polyhydric alc. such as diethylin, diacetin or 1, 3-glycerin-dimethyl ether. Water is added to ppt. cholesterol.

Hormones. I. G. FARBENIND. A.-G. Brit. 279,445, Oct. 20, 1926. Hormones affecting the action of the heart and which are sol in water but not sol. in strong alc. are obtained from the hearts of warm-blooded animals by extn. with water or with org. solvents such as acetone or ether, preferably under neutral or slightly alk. conditions; "balast substances" such as albumins and lipoids are removed from the exts. by known methods. Several examples are given.

Treating cigaret tobacco with menthol dissolved in oil of eucalyptus. A. VUCCINO. U. S. 1,673,216, June 12.

Hair-waving composition. L. ONGRASSIA. Can. 278,476, Mar. 13, 1928. A compn. for use in hairdressing comprises 80 parts borax, 1 part mineral oil and 4 parts $\text{Na}_2\text{S}_2\text{O}_4$.

Bactericidal and therapeutic agent. R. W. FRENCH and W. C. HOLMES. Can. 278,331, Mar. 6, 1928. A reactive form of a basic dye is made to react with a cyclic compd. contg. phenolic groups.

Fumigant. H. W. HOUGHTON. Can. 280,056, May 8, 1928. A fumigant is produced by generating CNCl and HCl by liberating nascent Cl_2 in an aq. soln. of a cyanide acidified with HCl by the addn. of a chlorate compd. protectively coated with a silicate compd.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

The fusion of carbon and the preparation of diamonds. I. PLOTNIKOV. *Arkh. hem. farm.* 1, 199–206 (1927).—Articles by Rishkevich (*C. A.* 15, 1432; 16, 368, 1523, 2444, 2804); Lummer (*C. A.* 9, 143, 2351); and others are criticized as a result of tests made in Moscow in 1916 (*C. A.* 12, 248). Other media more suitable than Fe will be tried under high temp. and pressure.

JAROSLAV KUČERA

Active charcoal. Amorphous nature, temperature stability, dependence of adsorptive power on the physical and chemical properties of the charcoal and the adsorbed molecule. OTTO RUFF AND PAUL MAUTNER. *Kolloid chem. Beihefte* 26, 312–56 (1928). Expts. on the relationship between granule size and adsorptive power of various charcoals led to the conclusion that the minimal adsorptive power is not a function of surface area but of the no. of "corner" atoms of unsatd. character in the surface. The no. of such atoms is greater in amorphous and less in graphitic charcoals. Colloidal materials are adsorbed by a charcoal in greater amts. than molecularly dispersed solutes. By means of x-ray studies the decrease in adsorptive power of charcoals caused by heating was connected with the increase in graphite space lattice of the charcoal. The continued graphitization of charcoals at 1000° caused a marked decrease in adsorptive power. X-ray data on "Supranorit" are reported. Commercial charcoals were examined and their adsorptive capacity and intensity ratings listed. Current methods of rating com. charcoals are discussed. It is not yet possible to rate a charcoal for all purposes by any single standard test. An extensive bibliography is included.

R. L. DODGE

Utilization of brass scrap in the manufacture of copper sulfate. A. V. VINOGRADOV AND V. I. VINOGRADOVA. *J. Chem. Ind. (Moscow)* 3, 1229–30 (1926).—To utilize the scrap brass accumulated in a Russian factory, the brass was oxidized by calcination in a furnace, then dissolved in HCl and the Cu and Zn were sepd. by pptg. the former as Cu_2Cl_2 either by the action of H_2 under pressure, or by addition of Zn or of brass. On strongly agitating and heating this Cu_2Cl_2 , suspended in a small amt. of H_2O , with a 10% soln. of BaCl_2 , the latter in some excess, a black ppt. of easily filterable Cu_2S was obtained, while BaS , BaCl_2 and $\text{Ba}(\text{OH})_2$ remained in soln. and were ultimately recovered in the form of BaCl_2 by acidifying with HCl. The reaction: $\text{Cu}_2\text{Cl}_2 + \text{BaS} = \text{Cu}_2\text{S} + \text{BaCl}_2$ is almost quant. Cu_2S was filtered, dried at 80–90° and ignited slightly at 200–300°. Analyses of the ignited substance have shown that it consists practically of $\text{CuSO}_4 \cdot 3\text{H}_2\text{O}$, CuO 44, BaSO_4 11 to 12, H_2O 5 to 5.5%. It is transformed into CuSO_4 by dissolving in dil. H_2SO_4 , leaving a small residue of BaSO_4 .

BERNARD NELSON

Cement [from phosphorus furnace] (Can. pat. 277,732) 20.

Recovery of nitric acid from waste nitrating acid. H. N. LENTZ. Can. 277,995, Feb. 21, 1928. A current of waste acid, free from aromatic compds. and having more HNO_3 than nitrosulfuric acid, is subjected to a current of steam at a rate of flow sufficient completely to denitrate the waste acid. The HNO_3 portion of the vapors arising from the waste acid is condensed and N_2O_4 is sepd. from the resulting condensate. The N_2O_4 is converted into dil. HNO_3 , the latter being returned to the current of waste acid.

Apparatus for ammonia synthesis. I. W. CEDERBERG (to Patents Exploitation Co. "Alpina" Ltd.). U. S. 1,673,966, June 19. The reaction chamber has permeable walls throughout its entire length and its temp. may be controlled by an elec. heater.

Oxidation of ammonia. F. G. LILJENROTH. Can. 278,867, Mar. 27, 1928. A non-explosive gas mixt. composed of NH_3 , O_2 and nitric oxide is subjected to a catalytic combustion. The resulting gas mixt. is supplied to a condensation system, wherein a part of the condensable products is condensed, the remainder being used in forming the gas mixt. to undergo combustion in continuously performing the operation.

Salts from natural brines. C. E. DOLBEAR. U. S. 1,673,969, June 19. In order to recover a K salt, borax and Na_2CO_3 from mixts. contg. also NaCl and Na_2SO_4 in the solid state, the mixed salts are leached in the presence of CaO with a hot soln. contg. K, a Na borate, NaCl and Na_2SO_4 . The resulting soln. is cooled to crystallize the K salt.

Purification of salts. A. VOHL and W. WACHTENDORF. Can. 277,919, Feb. 21, 1928. Solns. of metal salts contg. org. impurities are purified by treatment with oxi-

dizing and basic agents. Those metallic agents and reaction products thereof which are different from the bulk of the metal ions originally present in the soln. are removed and the deposits formed are sepd.

Anhydrous chlorides. M. JÄGER, W. MOSCHEL and R. SUCHY. Can. 277,353, Jan. 24, 1928. Metal chlorides which are decompd. when heated alone can be produced free from H_2O and oxides by melting with the addn. of reactive C, and running the melt downward in a heated irrigation tower counter-current to a gaseous chlorinating agent.

Alkali metal nitrates. W. WILD and C. BECK (to I. G. Farbenind. A.-G.). U. S. 1,674,077, June 19. In producing nitrate from a chloride such as KCl which is contaminated with sol. sulfates, the material is treated in aq. soln. with HNO_3 and then treated with a Ca compd. or other suitable oxides, carbonate or nitrate which will form a difficultly sol. sulfate which is removed.

Alumina. H. SPECKETER and K. ROSENBERGER. Can. 279,990, May 8, 1928. Aluminous material is dissolved in H_2SO_4 and the soln. sepd. from the residue. An alkali metal chloride is added to the soln. in a quantity equiv. to the sulfate present and the soln. is then evapd. to dryness. The product is heated to about 700° to expel the HCl, the sintered product mixed with coal, and the mixt. reduced to about 1000° to form aluminate, sulfide and alkali metal carbonate. The melt is dissolved, and CO_2 is introduced until Al_2O_3 begins to sep. The Al_2O_3 is pptd. by stirring.

Purifying alumina. B. T. HORSFIELD. Can. 277,526, Jan. 31, 1928. Fused Al_2O_3 is treated with a carbonaceous reducing agent in excess of the amt. needed for reduction of oxides of Fe, Si and Ti, whereby the alumina is left with a relatively high content of free C. A gas is injected into a stream of the molten alumina at a velocity sufficient to cause the formation of hollow globules and simultaneous oxidation of the free C and volatilization of Fe_2O_3 . Cf. C. A. 21, 3717.

Anhydrous aluminum chloride. N. C. CHRISTENSEN. U. S. 1,673,495, June 12. Al is heated in the presence of $PbCl_2$ or other suitable chloride of a metal having less affinity for Cl than Al at high temps. and the $AlCl_3$ is sepd. from the residue by volatilization and condensation.

Ammonium salt. H. BAIER. Can. 278,027, February 21, 1928. Gas mixts. contg. H_2S , NH_3 and available O_2 are maintained at a suitable elevated temp. in contact with a catalyzer comprising a metallic component for binding S and a metallic component for transferring O_2 . A metal sulfide is thus produced, the S being oxidized and the NH_3 reacting with the oxide of S to produce an NH_4 salt.

Purifying barium carbonate. J. E. MARWEDEL and J. LOOSER (to Rhenania-Kunze in Verein Chemischer Fabriken A.-G.). U. S. 1,673,985, June 19. Impure $BaCO_3$ contg. small quantities of insol. S compds. is mixed with an alkali metal hydroxide and heated to about 120° to solubilize the S compds.

Purifying bauxite. T. R. HAGLUND (to International Patent Corporation). U. S. reissue 17,001, June 19. See original pat. 1,569,483 (C. A. 20, 804).

Calcium arsenite. J. ALTWEGG and A. M. DUTEL. Can. 277,392, Jan. 24, 1928. Pulverulent $CaHASO_3$ is manufd. by forming a mixt. of CaO and H_3AsO_3 in the mol. proportions of 3 to 1, and subjecting the mixt. to the action of a current of steam.

Calcium cyanamide. G. E. COX (to American Cyanamid Co.). U. S. 1,674,466, June 19. Ground CaC_2 is placed in a container and covered with a layer of comminuted insulating material such as kieselguhr and reaction is then effected between the carbide and N. An app. is described.

Calcium nitrate. APPAREILS ET EVAPORATEURS KESTNER. Brit. 279,037, Oct. 16, 1926. HNO_3 is used to react with $CaCO_3$ and the CO_2 evolved is led by pressure or suction in the same direction as the HNO_3 . A reaction tower and assoc. app. are described.

Carbon disulfide. E. LEGELER (to I. G. Farbenind. A.-G.). U. S. 1,672,948, June 12. Raw CS_2 to be purified in liquid form is passed countercurrent to vapors of CS_2 generated in the heating chamber of a rectifying column to remove H_2S and the partially refined CS_2 contg. S and S compds. is passed into the heating chamber of a distg. column in which a soln. of S in CS_2 is kept boiling; escaping vapors of CS_2 are condensed and collected and the excess of S soln. is withdrawn from the chamber. Cf. C. A. 21, 3538.

Carbon disulfide. P. SIEDLER. Can. 277,731, Feb. 7, 1928. A column of carbonaceous material is heated by passing an elec. current longitudinally through it, and S is introduced adjacent to one end of the column, so that the vapors produced are passed longitudinally through the column and withdrawn at a point adjacent to the other end of the column. Cf. C. A. 21, 804.

Cobalt carbonyl. C. MÜLLER and E. KEUNECKE. Can. 278,950, Mar. 27, 1928.

Co carbonyl is produced by acting on metallic Co with CO under a pressure of at least 5 atms., and cooling the reaction gases prior to the release of pressure to a temp. sufficient to sep. most of the carbonyl.

Copper arsenate. J. ALTWEGG and A. M. DUTEL. Can. 279,168, Apr. 3, 1928. Copper arsenate is prepd. by heating CuHASO_3 and passing through it a heated current of a gaseous mixt. contg. O_2 .

Cyanamide. H. C. HETHERINGTON and L. A. PINCK (to Arthur Bamb. L, trustee). U. S. 1,673,820, June 19. In producing a soln. of cyanamide practically free from dicyanodiamide, a slurry is formed from crude Ca cyanamide and water, filtered and the filter-cake while still on the filter is treated with water at over 30° , the filtrate is cooled to about 20° , substantially all the Ca is pptd. out of the cooled filtrate, *e. g.*, by CO_2 under pressure and the ppt. is removed.

Cyanamides. N. CARO and A. R. FRANK. Brit. 279,419, Oct. 23, 1926. Cyanamides are prepd. by reacting on carbonates of Ca, Mg, Zn, etc., with NH_3 under pressures of 3-10 atm. and at temps. near the temps. of disson. of the carbonates under ordinary pressure. Inert gases or H may be mixed with the NH_3 and the water formed in the reaction may be removed by a condenser connected with the reaction vessel. Brit. 279,420 specifies producing cyanamides of bivalent metals such as Ca, Ba, Mg or Zn by treating dolomite or other carbonates with dry NH_3 and CO under ordinary or higher pressure at temps. near the temp. of disson. of the carbonates. Fluxes such as alkali carbonates, CaF_2 or CaO may be added. The reaction may be carried out in ceramic or quartz vessels and the presence of Fe, Ni or other metals which cause decomn. of NH_3 or formation of carbonyl compds. should be avoided.

Cyanogen chloride. J. P. SCHMITTNAGEL. Can. 277,566, Jan. 31, 1928. NaCN is treated with Cl_2 in the presence of an inert solvent, b. $60-100^\circ$, and of a small amt of an org. catalyst.

Manufacture of galena for radio use. SHIMADA SADA0. Jap. 69,092, Aug. 11, 1926. Oxide of Pb, S, AgNO_3 , ZnO, Si and B are melted in a crucible at $1120-1250^\circ$, a small amt. of Ag_2S , ZnS and trace of Si are contained in the product.

Iron oxide. J. LAUX. Can. 278,167, February 28, 1928. Aromatic nitro compds. are reduced to amines with the production of an Fe oxide which is suitable for use as a pigment, the reduction being carried out by means of Fe and an amt. of HCl insufficient for dissolving the resulting amine and Fe in the presence of a concd. soln. of a metal chloride which is not reduced by Fe.

Iron oxide. J. LAUX. Can. 278,168, Feb. 28, 1928. Aromatic nitro compds. are reduced to amines with the production of an Fe oxide which is suitable for use as a pigment. The reduction is carried out by means of Fe and a concd. aq. soln. of the HCl salt of the aromatic amine corresponding to the nitro compd.

Iron oxide. J. LAUX. Can. 278,169, February 28, 1928. Fe oxide pigments are produced as by-products in the reduction of aromatic nitro compds. to the corresponding amines, the reduction being carried out by means of Fe, Al metal and a dil. acid insufficient to dissolve the Fe.

Anhydrous magnesium chloride. W. R. COLLINGS and P. COTTRINGER. Can. 277,344, Jan. 24, 1928. Partially dehydrated MgCl_2 is intermixed with the normal hydrated salt, both in solid form, and the mixt. is directly heated through a gradually increasing temp. range of $115-350^\circ$.

Purifying phosphatides. H. BOLLMANN (to Mary F. Foster, trustee). U. S. 1,673,615, June 12. An emulsion comprising lecithin, phosphatides insol. in alc., oil, bitter substances and other impurities is dild. with a mixt. of C_6H_6 and a much larger quantity of alc., the soln. and undissolved material are heated to the b. p., boiled for some time and the soln. is removed from the "settled smear" contg. insol. phosphatides and is slowly cooled to about 20° , the residue consisting of phosphatides insol. in alc. and free from bitter substances and neutral oil is removed, the remaining soln. is evapd. *in vacuo* and the lecithin thus obtained is further purified by washing it with acetone.

Phosphorus sulfide. YOSHITARO NAKANO. Jap. 69,074, Aug. 11, 1926. Phosphate, or a substance contg. this, is mixed with carbonaceous matter and S or sulfide or sulfate, and then heated.

Phospho-tungsto-molybdenum compound. P. RAHE, B. WENK and E. HARTMANN. Can. 279,822, May 1, 1928. A new phospho-tungsto-molybdenum compd. consists of reduced $24(\text{WO}_3 + \text{MO}_3) \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$.

Sodium bicarbonate from brines. W. A. KUHNERT. U. S. 1,674,474, June 19. Complex brines contg. Na_2CO_3 are treated with CO_2 while keeping the temp. below 45° and coarsely cryst. sesquicarbonate is thus pptd. until the concn. of Na_2CO_3 in the brine is materially reduced. The brine, still mixed with the ppt. thus formed, is then further

carbonated to ppt. NaHCO_3 and convert at least part of the ppt. previously formed into NaHCO_3 and the NaHCO_3 is sepd. Cf. C. A. 21, 1168.

Sodium chromate. H. SPECKETER and G. HENSCHEL. Can. 277,733, Feb. 7, 1928. A mixt. of chrome ore and bauxite with an amt. of soda ash required for forming chromates, aluminates and ferrates is exposed in an oxidizing atm. to a temp. of 900–1000°. The mass is extd. with water and alumina, Na_2CO_3 and chromates are sepd. therefrom.

Sodium sulfate. M. A. PURDY (one-half to Pacific Distributing Corporation). U. S. 1,673,471, June 12. Purification is effected by wet crushing the anhyd. sulfate in contact with a substantially satd. soln. of Na_2SO_4 , maintaining a flow of the sulfate soln. gradually decreasing in strength and advancing the material from the crusher through the soln. to a point of discharge where the soln. will have the least strength.

Sodium sulfide. A. SCHAFER. Can. 279,988, May 8, 1928. Na_2S is produced by heating an intimate mixt. of Na_2SO_4 and coal in a plate furnace. The mass is agitated by suitable mechanical means and access of air to the mixt. is prevented.

Zinc oxide. H. REINHARD. Can. 279,299, Apr. 10, 1928. ZnO is manufd. by volatilizing crude Zn or Zn-contg. mixts. in a closed chamber provided with an outlet for fumes and feeding to the outlet a gas which retards or prevents oxidation and condensation, so that formation of metallic or oxidic accretions is prevented.

Beryllium. H. FISCHER (to Siemens & Halske A.-G.). U. S. 1,673,043, June 12. Impure metallic Be is purified by introducing it into a molten mixt. formed from CaCl_2 , CaF_2 and NaCl or other suitable alk. earth and alkali metal halides.

Active carbon. J. VAN LOON. Can. 278,517, Mar. 13, 1928. Active C is manufd. by grinding C in the presence of liquid at elevated temp.

Activated carbon. NAAMLOOZE VENNOOTSCHAP ALGEMEENE NORIT MAATSCHAPPIJ. Brit. 279,104, Oct. 16, 1926. C is activated or regenerated or improved by treatment with various reagents and then heating and subjecting to further treatment. Among the reagents which may be used are: Na and K hydroxides and carbonates, lime and other alk. earth compds., H_2SO_4 , H_3PO_4 , HNO_3 , chlorides of Zn, Mg, Ca or other chlorides, compds. evolving Cl, sulfates, bisulfates, sulfides, peroxides, perchlorates and other persalts and oxidizing agents. The activity of C may also be increased by the direct action of an elec. current so that the C is heated to 600–1000° by serving as a resistance. An app. is described and numerous details and modifications of procedure are given.

Adsorbent carbon. A. B. RAY. Can. 278,932, Mar. 27, 1928. A non-coking coal admixed with ZnCl_2 is calcined at a high temp.

Carbon black from mixtures of acetylene and other hydrocarbons. L. R. CHURCHILL (to Goodyear Tire & Rubber Co.). U. S. 1,673,496, June 12. A mixt. of air and hydrocarbon gas is introduced into an expansion chamber, a large vol. of C_2H_2 is forced into the chamber, detonation is effected before diffusion of the C_2H_2 with the other hydrocarbon material (which may be gasoline or CH_4) has occurred and the chamber is cooled; this cycle is repeated. An app. is described.

Hydrogen. BERGWERKSVERBAND ZUR VERWERTUNG VON SCHUTZRECHTEN DER KOHLENTCHNIK GES. Brit. 279,128, Oct. 16, 1926. MgO is used as a catalyst in producing H by reaction of CO with steam. An app. is described.

Hydrogen. FRANS G. LILJENROTH and MARKUS LARSSON (to Phosphorus-Hydrogen Co.). U. S. 1,673,691, June 12. Reaction is effected between PH_3 and steam in the presence of a catalyst such as Pd-asbestos at an elevated temp. (suitably about 500–600°) at which the P of the PH_3 is oxidized by the O of the H_2O and the H of both the PH_3 and H_2O is liberated.

Hydrogen. R. WILLIAMS (to Lazote, Inc.). U. S. 1,673,032, June 12. In producing H by the catalytic reaction of steam and a gaseous mixt. contg. unsatd. hydrocarbons, the unsatd. hydrocarbons are eliminated by passing the mixt. contg. them together with H over a heated hydrogenation catalyst such as reduced Ni.

Hydrogen production and destructive hydrogenations. I. G. FARBENIND. A.-G. Brit. 279,072, Oct. 14, 1926. H for use in destructive hydrogenations is made by decomp. gases contg. hydrocarbons (such as gases obtained in the destructive hydrogenation of coal or the like) with CO_2 with or without steam or other gases not rich in O. Catalysts as described in Brit. 254,713 (C. A. 21, 2793) or other catalysts may be used. Numerous details of procedure are given.

Phosphorus. H. LANG. Can. 280,361, May 22, 1928. Gases contg. P are cooled below the dew-point of the latter and rapidly moving drops of a liquid are caused to strike upon the resulting P fogs.

Sulfur. A. E. SMAILL. Can. 280,493, May 29, 1928. S is recovered from gases

by segregating the SO_2 content, followed by a decomp. reaction with carbonaceous material and sulfide.

Mining sulfur by underground fusion. W. T. LUNDY and H. S. BURNS (to Freeport Sulfur Co.). U. S. 1,673,879, June 19. Fusion is effected by injecting into the S-bearing formation a heated fluid carrying lumps of earthy materials in suspension, e. g., hot water carrying clay, gumbo, sand, gravel, etc. Cf. C. A. 21, 630.

Sulfur recovery from iron sulfides. R. F. BACON. U. S. 1,672,924, June 12. Substances such as monosulfide of Fe are treated with SO_2 to form S and Fe oxide.

Precipitation of tin. H. HARRIS. Can. 279,739, May 1, 1928. Sn is pptd. from a soln. contg. Na oxysalts of Sn and As in soln. by adding calcareous matter as the pptg. agent for the Sn to such a soln. already contg. CO_2 or a carbonate to prevent the simultaneous pptn. of As.

Titanium compound. P. FARUP. Can. 280,396, May 22, 1928. Ti compds. are produced by adding a soln. contg. Ti to another soln. contg. Ti and an acid and under partial decompn., the resultant soln. being heated to pptn. of Ti compds. in the same.

Titanium compound. W. B. LLEWELLYN and S. F. W. CRUNDALL. Can. 280,393, May 22, 1928. Hydrated basic titanic phosphate is prepd. by mixing gradually under agitation H_3PO_4 or a phosphate with a soln. of a titanic salt of a concn. of between 2.5 and 10% of TiO_2 by vol., and at a temp. of not less than 50° .

Purifying zinc solutions. R. H. STEVENS, G. C. NORRIS and W. N. WATSON (RHODESIA BROKEN HILL DEVELOPMENT Co., LTD.). Brit. 278,851, Sept. 1, 1926. Preliminary to electrolysis, Zn solns. are freed from impurities such as Cu, Cd, Co, Ni, Hg, Sb and As by pptn. with alkali xanthates, Zn xanthates or similar compds.

Alcohol composition. R. A. WEINSTEIN. Can. 280,501, May 29, 1928. A jelly-like compn. consists of a minor portion of agar-agar and a major portion of dil. alc.

Drying hydrogels. E. B. MILLER (to Silica Gel Corporation). U. S. 1,674,558, June 19. A hydrogel such as silica gel or metal oxide gel is heated at a relatively low temp. while stationary until the water content is sufficiently reduced that the hydrogel will withstand being tumbled about, and is then heated at a higher temp. while agitated.

Base-exchanging substances. A. O. JAEGER (to Selden Co.). Brit. 279,466, Oct. 19, 1926. Base-exchanging substances which may be used for water purification, as adsorbents for gases, as pigments, insecticides, seed disinfectants or cements are prepd. by reaction of at least one sol. silicate (or alk. salts of the acids of B, P, S, N, Sn, Ti, W, Cr, Cb, Ta, U, As, Sb or Mn) and a metal salt and a metallate so as to obtain a product which is alk. to litmus. Salts which may be used include those of Cu, Ag, Au, Bi, Be, Zn, Cd, Al, the rare earths, Ti, Zr, Sn, Pb, Th, Cr, U, V, Mn, Fe, Ni and Co; and by "metallates" are included any alkali compd. of a "metal acid" which can form a base-exchanging compd. with a sol. silicate either with or without changing its valency during the reaction. An extremely large number of details and illustrative examples of different reacting substances are given.

Catalyst. R. G. FRANKLIN. Can. 280,008, May 8, 1928. A catalyst for the production of oxygenated org. compds. from CO and H_2 is prepd. by causing a sol. Cr compd. to react with ZnCO_3 .

Catalysts for synthesis of ammonia. G. F. UHDE. Can. 279,790, May 1, 1928. The catalysts are complex compds. of Fe cyanide insol. in H_2O and the extra-radical Fe is substituted by another metal, such as Al.

Regeneration of catalysts. A. O. JAEGER. Can. 280,580, May 29, 1928. Contact masses, which have become deteriorated by use in the catalytic oxidation of org. compds., are regenerated by treating them with an "acid radical substance" or inorg. peroxide which is volatile below red heat and which does not leave a residue non-volatile upon treatment with O_2 -contg. gases at elevated temps.

Chemical composition. J. F. KING. Can. 277,908, Feb. 14, 1928. A compn. of matter consists of 300 lbs. NaBO_3 , 50 lbs. cornstarch, 30 lbs. Na_2PO_4 , 25 lbs. sulfate alumina powder, 75 lbs. tipsom salts and 20 lbs. denatured alcohol.

Agglomerating cork. ARMSTRONG CORK CO. Brit. 279,190, Aug. 6, 1926. After particles of cork are pressed into blocks, sheets or other form, hot gases are passed through the material to set up an oxidizing exothermic reaction. Air, steam or furnace gases may be used and the temp. may be 220 – 350° .

Condensation product of urea with formaldehyde. A. GAMS and G. WIDMER (to Soc. anon pour l'ind. chim. à Bâle). U. S. 1,674,199, June 19. Condensation is effected under superatm. pressure (suitably a pressure of about 2–3 atm.) which serves to accelerate the reaction.

Phenolic condensation product. O. A. CHERRY and F. KURATH. Can. 280,359, May 22, 1928. A phenolic condensation product is prepd. by condensing a combination

of a phenol and a methylene-contg. substance in the presence of furfuramide, while maintaining an excess of phenol over that necessary for complete combination with the methylene-contg. substance.

Phenolic condensation product. O. A. CHERRY and F. KURATH. Can. 280,543, May 29, 1928. A potentially reactive phenolic condensation product is prepd. by heating a mixt. of a phenol, a methylene-contg. substance, furfural and NH_3 .

Casein product. A. POULBOR. Can. 279,665, Apr. 24, 1928. In the production of plastic masses or elements consisting of hardened casein, the required quantity of CH_3O is mixed and pressed in the cold with casein in the presence of EtOH , being subsequently heated for the purpose specified.

Molded articles comprising pitch or other similar organic binders. F. KURATH and L. T. RICHARDSON (to Cutler-Hammer Mfg. Co.). U. S. 1,674,287, June 19, 1928. Articles of high impact resistance are formed by cold molding sep. composite particles of a mixt. comprising an org. binder such as a mixt. formed from stearin pitch, coal-tar pitch, gilsonite and fish oil or castor oil and asbestos or other fibrous material. The particles are so arranged as to insure a ragged or uneven break when the molded article is broken. Cf. C. A. 22, 2644.

Material for preparing metals for painting. J. H. GRAVELL. Can. 280,098, May 15, 1928. A material for prep. metals for painting consists of an admixt. of H_3PO_4 , alc., gelatin, NaCNS and As_2O_3 .

Finish remover. J. G. DAVIDSON. Can. 280,536, May 29, 1928. A finish remover contains a finish solvent having the type formula: $\text{HOC}_n\text{H}_{2n}\text{O}-\text{C}_x\text{H}_{2x}\text{OR}$, where R is an alkyl or aryl group, and n and x equal 2 or 3. The dash stands for either a single bond or a bivalent radical.

Finish remover. J. G. DAVIDSON. Can. 280,537, May 29, 1928. A finish remover contains a finish solvent having the type formula: $\text{ROC}_2\text{H}_4\text{O}-\text{C}_2\text{H}_4\text{OR}_1$, where R is an acyl group, R_1 is an alkyl or aryl group, and the dash is a simple bond or $\text{C}_2\text{H}_4\text{O}$.

Stencil sheets. S. HORII. Brit. 278,956, March 18, 1927. Sheets such as Yoshino paper are coated with a compn. contg. a soln. of an ester of polysaccharides such as mannan acetate, cellulose acetate or cellulose nitrate and the fatty acid of tsbaki oil. The fatty acids of sasanqua oil and other ingredients such as EtOAc , AmOAc , AmOH and gasoline may be used in the compn.

Stencil sheet. H. L. SHALLCROSS (to Shallcross Co.). U. S. 1,674,611, June 19, 1928. A suitable paper of porous open texture is coated with an alc. soln. of lac admixed with dissolved nitrocellulose, camphor and oils.

"Anti-slipping" composition. J. TALBOT. Brit. 278,785, July 6, 1926. A compn. for use on mats, rugs or other articles to prevent them from slipping on polished surfaces comprises water, a size such as glue, gluten or gelatin, a hygroscopic compd. such as glycerol or KCl , latex and CH_2O .

Laminated material for gears, clutch facings, etc. F. GROFF (to Bakelite Corporation). U. S. 1,673,239, June 12, 1928. A fibrous base such as paper, cloth or asbestos is impregnated with a resin of the glycerol-phthalic anhydride type, the material is dried to expel solvent and set the resin, a plurality of sheets are superposed with intervening reactive phenolic resin, and the sheets are united by heat and pressure.

Impregnating woven fabrics for brake bands, etc. W. OTTMANN. Brit. 279,496, Oct. 21, 1926. Fabrics such as bands of asbestos fabric with a cotton weft may be treated with waterglass, dried and then subjected to the action of HCl , H_2SO_4 or $(\text{NH}_4)_2\text{SO}_4$ to form a ppt. in the fabric; part of the waterglass may be left undecompd. to render the fabric more adhesive if desired, or the fabric may be further treated with waterglass after the decompn. SiCl_4 or SiF_4 also may be used for the impregnation and then decompd. by water, alkali or waterglass soln.

Steel driving belts. R. J. REANEV. Brit. 279,288, Jan. 24, 1927. The core of a driving belt is formed of a strip of metal such as Swedish steel treated with weak HCl or H_2SO_4 or similar solvent and then washed with alkali or treated with a grease solvent or buffed to render it suitable to receive a thin layer of liquid rubber which is burnt by a blow torch "to sweat it into the surface of the metal." A further coating of rubber also may be applied and a layer of fabric is then subjected to friction on both sides and subjected to further treatments which may include the application of a shellac coating.

Waterproof plastic. W. A. COLLINGS. Can. 280,263, May 22, 1928. Calcareous plastics are waterproofed by incorporating dry bentonite into the same.

Pencil "leads" formed of an alloy of zinc and bismuth. E. ROSENBAUM and J. W. GUNDLICH (to Guroschreibstift Ges.). Brit. 279,090, Oct. 12, 1926.

Ink ribbons, carbon paper and like articles. R. JARMAI and E. LORAND. Brit. 279,403, Oct. 19, 1926. Ultramarine is added to various mixts. contg. other coloring

substances and which may also contain waxy or oleaginous vehicles, to lessen the liability of the compn. to smearing. Formulas are given.

Metal-cleaning preparation. J. D. KLINGER and C. L. BOYLE. Can. 279,500, Apr. 24, 1928. A prepn. for cleaning metal for painting consists of an admixt. of H_3PO_4 , a sol Cr compd., and ethyl methyl ketone. Cf. C. A. 22, 1833.

Anti-freeze composition. J. G. COLLINS. Can. 279,520, Apr. 24, 1928. An anti-freeze compn. consists of 1 gal. H_2O , 2 lbs. NaCl (97% test), and glucose (43% gravity) mixed with the soln. of NaCl in the proportions of 1 qt. of glucose to $1\frac{1}{2}$ gals. of the soln. Glycerol may also be added to the soln. to lower its freezing point.

Non-oxidizing jelutong product. M. L. HAMLIN (to Beech-Nut Packing Co.). U. S. 1,674,435, June 19. A product suitable for use in making chewing gum is prep'd by coagulating the latex of *Dyera costulata* or similar trees, removing the coagulated product and treating it while heated with an anti-oxidizing compd. such as a phosphate to distribute the compd. throughout the mass and protect it from oxidation by the air.

Protecting material from moths. W. LOMMEL, H. MUNZEL, H. STÖTTER and B. WENK. Can. 280,549, May 29, 1928. Material is protected from moths by treating it with an *o*-hydroxy-3-carboxylic acid or deriv. of the same, in which the *p*-position to the hydroxyl group is occupied by halogen or S.

Gluing wood with starch. J. FLASCHNER. Brit. 279,087, Oct. 14, 1926. Starch or starch-contg. material is applied to the surfaces to be glued and the starch is then converted *in situ* into an efficient glue by the action of heat and pressure. Substances such as polymerized CH_2O and $MgCl_2$ may be added.

Sealing composition. F. A. ADAMSKI. Can. 279,433, Apr. 17, 1928. A sealing compn. comprises a mixt. of a fibrous material and S, the S being in considerable excess of the fibrous material.

Stereotype. E. S. HOLE. Can. 279,238, April 10, 1928. In making printing surfaces, matrices, etc., a mixt. of an aldehyde, a coal tar intermediate and an alk. condensing agent is boiled, and a salt of Cr and NH_4OH are added, while the mixt. is in its H_2O -sol. state. A fibrous base is then impregnated with the mixt., and the impregnated base is dried and molded under heat and pressure.

Artificial lithographic stone. SATARO FURUYA. Jap. 69,052, Aug. 7, 1926. Powdered whetstone and clay are mixed with fused S, kneaded, pressed into a mold and cooled.

19- GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

A new method of determination of boric acid in glass. A. A. MACHIGIN AND T. F. KORZUKHINA. *J. Russ. Phys.-Chem. Soc.* 59, 573-8(1927).—A sample of glass (2.5 g.) is fused with 15 g. Na_2CO_3 and dissolved in H_2O . The soln. is transferred to a 500-cc. volumetric flask provided with a reflux condenser. HCl is added until decompn. is complete, then solns. of 65 g. $BaCl_2$ and 19 g. cryst. Na_2CO_3 in H_2O . The mixt. is boiled for 0.5 hrs. and on cooling made up to 500 cc. The $BaCO_3$ which is formed ppts. Si and Al salts while $Ba(BO_2)_2$ dissolves in the excess of $BaCl_2$. Measured portions of the filtrate are made acid to Me orange; CO_2 is boiled off and the soln. rendered alk. with $Ba(OH)_2$ before titration in the presence of mannitol and phenolphthalein. The av. error is slightly over 0.1%.

BASIL C. SOYENKOFF

Relationship between chemical composition and the resistance of glasses to the action of chemical reagents. II. Glasses containing iron oxides. VIOLET DIMBLEBY AND W. F. S. TURNER. *J. Soc. Glass Tech.* 12, 52-7(1928); cf. C. A. 21, 2364.—Glasses contg. 1-3 mols. Fe_2O_3 per 100 mols. SiO_2 show greatly increased resistance to corrosion by H_2O , HCl and Na_2CO_3 . At higher Fe_2O_3 contents the resistance increases very slowly. NaOH solns. attack glass more readily with higher Fe_2O_3 content. Tabulated below are the results of the resistance tests of Fe_2O_3 -bearing glasses compared with glasses of other metallic oxides, either through the whole series or up to the mol. content shown where equal resistances are developed to the boiling reagents:

	CaO	BaO	PbO	MgO	ZnO	Al_2O_3	ZrO_2	TiO_2
H_2O	>	>	>	>12	>10	>8	>4	>8
HCl	>6	>8	>8	>6	>6	>4	>4	>4
Na_2CO_3	>	>	>	>	>4	>4	>	<
NaOH	>4	>6	>8	>4	>6	>4	>12	<

Thus for example iron-contg. glasses are superior to CaO glasses throughout the series in resisting H_2O and Na_2CO_3 but only up to 6 mol. CaO glass in HCl soln. and 4 mol. CaO glass in NaOH soln. H. F. K.

Influence of iron oxide on the properties of glass. S. ENGLISH, H. W. HOWES, W. E. S. TURNER AND FRANCIS WINKS. *J. Soc. Glass Tech.* 12, 31–44(1928).—In the 10-member series of the general mol. formula $6SiO_2(2-x)Na_2O.Fe_2O_3$, the amts. of Fe_2O_3 varied from 44.4 lb. to 444 lb. per 1000 lb sand. Melting was carried out at 1400° in a sillimanite pot which became corroded but slightly. Up to 222 lb. Fe_2O_3 per 1000 lb. sand the melting of the batches occurred readily; above this Fe_2O_3 content the time of melting increased. Analysis of the glasses showed a conversion to FeO of about 15%. Since the color of glass is affected by the FeO/ Fe_2O_3 ratio, temp., time, atm. condition, compn. of glass and its viscosity are detg. factors. With increasing Fe_2O_3 content the glasses increased in hardness, annealing temps. and quite regularly in density but decreased in thermal expansion. H. F. K.

The estimation of ferrous oxide in heat-protective glasses. H. HEINRICHS. *Glastech. Ber.* 5, 154(1927); *J. Soc. Glass Tech.* 11, 373–4A.—A special interest attached to the estn. of the FeO content of glasses for heat-protective purposes, in which Fe oxide was intentionally added, and melting was carried out under reducing conditions. For a series of glasses of this type the FeO was detd. by dissolving the glass in HF and H_2SO_4 in an atm. of CO_2 and titrating the residue with 0.001 N $KMnO_4$. Decompn. was performed in a Pt dish placed in a specially designed Pb container, heated by an a r-bath. Results are summarized as follows:

Glass No.	Total iron as FeO %	Content of FeO in glass %	Color of glass
1	1.0	0.234	Green
2a	1.0	0.637	Intense bluish green
2b	1.0	0.675	Intense bluish green
2c	1.0	0.665	Intense bluish green
2d	1.0	0.651	Intense bluish green
3	1.12	0.388	Green with blue tinge

The ratio %FeO: % Fe_2O_3 was 0.3 for the green glass and 2.0 for the blue glasses, and in no case was complete reduction of the Fe secured. Although the blue tint increased with increasing FeO content, the results did not warrant a conclusion as to the color of a glass contg. all the Fe in the ferrous condition. The possibility that such a glass would be colorless, in conformity with the statement by G. R. McCarthy that $FeSiO_3$ in the Fe minerals possessed no color, still existed. A qual. test for FeO in glass was due to von Chugaev and Orelkin (*C. A.* 9, 1442). 0.3–0.5 g. of powd. glass in a reagent glass tube with 10 cc. of dil. HCl was heated in a beaker of boiling water and filtered. The cold filtrate was treated with 2–3 drops of a satd. alc. soln. of dimethylglyoxime and rendered ammoniacal. By this test traces of FeO were detected in perfectly colorless glasses. The red color obtained could easily be distinguished from that given by Ni when present in the glass as coloring agent or decolorizer, since the ferrous compd. was decompd. by heating while the Ni compd. when in larger amt. coagulated. H. G.

Study of the casing of colorless by cobalt blue glass. I. The thermal expansions. W. E. S. TURNER AND FRANCIS WINKS. *J. Soc. Glass Tech.* 12, 57–75(1928).—The glasses used were (a) fairly soft glass of the formula $6SiO_2.0.7CaO.1.3Na_2O$, (b) a standard crystal tableware batch consisting of sand 1000 parts, red lead 660, K_2O 330 and KNO_3 53, and some commercial colored glasses. Cobalt oxide was added in small amts. up to 0.5% in glass "a" and to 0.9% in glass "b." The thermal expansion was detd. on rods 10 cm. \times 0.5 mm. in a special furnace fully described. With soda-lime glass the thermal expansion increases with temp. even below the lower annealing temp., but is no greater than 3% for the 0.49% CoO glass except during the annealing range. With the K_2O -lead oxide glass the effect of 0.9% CoO addn. is again not over 3%. This is not enough to prevent successful welding of the members of each series. Additions of CoO displaced both the upper and lower annealing temps. as much as 25° for the 0.9% CoO addn. to the K_2O glass. II. The question of setting rate. S. ENGLISH AND W. E. S. TURNER. *Ibid* 75–82.—A soda-lime-silica glass and one of potash-lead oxide-silica showed increasingly greater setting rates with increased CoO content, although the viscosities between 1400° and 700° grew less. Colored glasses showed greater difference between inner and outer layers due to greater radiating power. H. F. KRIEGER

Ultra-violet light transmission of some colorless bottle glasses. DAVID STARKIE AND W. E. S. TURNER. *J. Soc. Glass Tech.* 12, 27–9(1928).—Glass sections were

taken from 8 varieties of food containers. These were ground to 2 mm. thickness, polished and their absorption spectra detd. by the aid of a Hilger quartz spectrograph. Results indicate a rather definite increase in absorption with rise of Fe_2O_3 content in glasses. TiO_2 also absorbs violet light though the amount present in most commercial glasses is below 0.02% and hence too small to function greatly. H. F. KRIEGE

The temperature-time curve of visible devitrification in plate glass. E. ZSCHIMMER AND A. DIETZEL. *Sprechtsaal* 60, 110, 129, 145, 165, 186, 204 (1927); *J. Soc. Glass Tech.* 11, 142A. The method and results were described previously. The glass tested had the compn SiO_2 70.15, Al_2O_3 1.09, Fe_2O_3 0.21, CaO 15.62, Na_2O 11.79, K_2O 0.16, As_2O_5 0.14, SO_3 0.84% and the danger zone lay between 950° and 1050° . At the point of max. crystn., 1005° , crystals grew to a length of 10μ in half a min., to 50μ in $2\frac{1}{2}$ min. and 100μ in 5 min. H. G.

Valency of arsenic and antimony in glass. H. HEINRICH and F. SALAQUARDA. *Glastech. Ber.* 4, 130-7 (1926).—The amt. of As_2O_5 and Sb_2O_5 is detd. by heating the powd glass with KI and HCl and detg. the excess of I. The total As and Sb, including trivalent As, is also detd. From 75 to 80% of the As is present as As_2O_5 , but only 0-6% of the Sb as Sb_2O_5 . The detn. is facilitated by the addn. of a large excess of salt-peter. B. C. A.

The influence of moisture in the manufacture of glass. W. E. S. TURNER. *Glastech. Ber.* 5, 57 (1927); *J. Soc. Glass Tech.* 11, 325A.—Large quantities of moisture in the glass batch resulted in an appreciable lowering of temp. when the batch was introduced into the furnace, and a batch contg. crystal soda and having a total moisture content of 28% reduced the temp. of the pot from 1400° to 500° . Small quantities of moisture distinctly affected the time required for melting. A soda ash-limestone-sand batch melted most rapidly when contg. 1% of water, while the optimum condition for melting a soda-lime batch contg. an appreciable proportion of saltcake, or a potash-lead oxide-sand batch, was that in which 4% moisture was present. Working properties of the glass were affected by the moisture present in the batch, and a soda-lime-silica glass became increasingly viscous as the moisture in the batch increased beyond 5%, batches with 10 to 15% of water giving highly viscous, lumpy glasses. Similar differences were found with glasses made from batches contg. sand, feldspar, limestone, magnesia, potash and soda. Again, soda-alumina-silica glasses with 4-5% of Al_2O_3 set more rapidly when hydrated Al_2O_3 was used than when calcined Al_2O_3 was employed. Borosilicate glasses of the lamp glass type, on the other hand, were const. in property whether crystal or calcined borax was used. The variations in property were strongly marked even where analysis indicated almost identical chem. compn. Little of the batch moisture apparently remained in the glass, for a soda-lime glass from a batch contg. 10% of water lost only 0.02% more in wt. when heated to 920° than one made from a batch contg. only 1% of moisture. H. G.

What is lead crystal? I. SPRINGER. *Sprechtsaal* 60, 481 (1927); *J. Soc. Glass Tech.* 11, 232A.—The older conception of a "flint" glass was that of one contg. at least 30, generally 33, and rarely more than 38% of Pb oxide, although for optical purposes as much as 80% were used. Improvements in firing enabled light flints contg. up to $22\frac{1}{2}\%$ of Pb oxide to be made in open pots. More recently still a cheaper demicrystal with less than 10% of Pb oxide, with CaO or BaO , or both, has appeared on the market. The following limitation of terms was suggested: heavy lead crystal, Pb oxide above 30%, light crystal, from 17 to 23%, and demicrystal from 7 to 13%. The question of differentiation arose for those not expert, and in this connection color and luster were perhaps the best guides, together with d., and the fact that the cutting and polishing were not so good in the lighter wares. H. G.

The color method in ceramic and mineral research. R. RIEKE AND O. WIESE. *Ber. deut. keram. Ges.* 9, 109-55 (1928).—Methods of examn. of minerals and ceramic mixts. microscopically with the aid of dyes are described. These may be examd. after firing to different temps. The results of such examn. of the following minerals and mixts. are described: $\text{Al}(\text{OH})_3$, H_2SiO_3 , CaCO_3 , CaF_2 , MgCO_3 , MgSiO_3 , dolomite, feldspar, muscovite, kaolinite and ceramic mixts. A bibliography on the examn. of clays and minerals is included. H. G. SCHURECHT

The formation of crystals in ceramic bodies and glazes. R. RIEKE. *Ber. deut. keram. Ges.* 9, 156-68 (1928).—The formation of crystals in ceramic bodies may be good or bad, depending upon the use of the material and upon the nature of the crystals. For elec. porcelain the formation of mullite is desirable because it increases the strength and resistance to sudden temp. changes, but for translucent porcelain it is undesirable since it reduces the translucency. Amorphous mullite forms at temps. as low as 1000° but does not become cryst. until fired to higher temps. Fluxes which lower the viscosity

of the molten part of the body, as CaO , MgO or ZnO , facilitate the formation of crystals in bodies. Likewise glazes with a low viscosity may develop crystals, whereas viscous glazes may hinder their growth. Many opacifiers produce opacity in the glazes through crystn. of certain ingredients during cooling. S gases in the kiln may combine with the glaze and form cryst. alk. earth silicate patches on the glaze, some of which are soluble.

H. G. SCHURECHT

The salt glaze examined in thin section. W. FISCHER. *Keram. Rundschau* 36, 165-7 (1928).—A microscopic study of thin sections cut normal to the glaze-body contact shows (1) the more densely burned the body, the sharper the boundary between glaze and body; (2) the thickness of a normal salt glaze is 0.01 to 0.05 mm.; (3) the longer the period of salting the greater the thickness of the glaze, although the increase in glaze thickness is greatest in the early periods; (4) the salt glaze is heterogeneous and tends to crystallize; (5) the thicker the glaze the greater the crystn. tendency. Imperfect (foamy or silvery) salt glazes are characterized by great glaze thickness and by octahedral crystals arranged in bands or cords and often as skeleton forms which are probably composed of Fe_2O_3 with dissolved FeO and of ilmenite. H. INSLEY

The testing and behavior of refractory material under stress at high temperatures. A. J. DALE. *Trans. Ceram. Soc. (Eng.)* 26, 138(1926-7); *J. Soc. Glass Tech.* 11, 363A(1927).—Silica bricks contg. unconverted quartz were liable to disruption under heavy load at temps. above 1250-1300° unless an especially elastic matrix was present. A silica brick contg. a large % cristobalite under a load of 4 lbs. per sq. in. withstood the highest temp. attainable in the load-test furnace without abnormal expansion at high temp. Under a load of 50 lbs. per sq. in. the brick failed at 1700-1730° but with no deformation until 1700°. Rapid expansion was developed between 200° and 350°, due to the α - β -cristobalite inversion. With a silica brick having good tridymite development the subsidence range under a load of 4 lbs. per sq. in. was 150-180°, whereas with many silica products this seldom exceeded 50-80°. This extended range suggested failure due to a viscous flow of the matrix. The temp. of ultimate collapse was above 1675° even under a stress of 75 lb. per sq. in. There was no rapid expansion at high temps., which makes the brick especially suited to high-temp. arch work, etc. Rapid expansion at low temps. (100-300°) was not particularly marked. Bricks of high tridymite content might fail under high loadings below 1600°, but if a matrix of moderate viscosity were present a distribution of internal stress was possible. A fireclay brick with high Fe_2O_3 content is not necessarily inferior as regards refractoriness at moderate temps. A brick with 3.71% Fe_2O_3 stood up to a temp. of 1400° before rapid subsidence developed. Much depends on whether the Fe content is homogeneously or heterogeneously distributed. A brick of low refractoriness may prove satisfactory at a temp. below 1250°, but the margin of safety would be small. High Al_2O_3 content and moderate porosity favor refractoriness at temps. up to and around 1400°. The temp. of complete squatting of a brick under load is not a safe guide to the behavior of the material at a lower temp. as a brick might be subsiding over a temp. interval of 150-200°.

D. E. SHARP

Comparative evaluation of the quality of enameled ware of Russian and non-Russian origin. I. I. SILVESTROVICH AND P. N. GRIGORIEV. *Keram. Rundschau* 36, 187-9(1928).—Comparative tests were made on Russian and non-Russian cast iron and sheet-metal enameled ware. Tests included detn. of color, resistance to soln. in boiling H_2O , AcOH and Na_2CO_3 , resistance to mech. shock and resistance to quenching after heating to 200°. Non-Russian enameled ware tested was of Polish, Czechoslovakian and German origin. General results of tests were: (1) Russian ware was slightly darker in color than non-Russian; (2) no other marked differences in appearance were noted; (3) Russian ware showed far greater resistance to soln. and failure in 1% AcOH ; (4) non-Russian ware showed somewhat greater resistance to quenching after heating; and (5) Russian ware was somewhat superior to non-Russian in resistance to mech. shock.

H. INSLEY

Alloy for sealing hard glass (Can. pat. 279,434) 9.

KONINGH, H. DE: **The Preparation of Precious and Other Metal Work for Enameling.** London: C. Lockwood. 88 pp. 4s. 6d., net.

Glass. W. C. TAYLOR. Can. 280,176, May 15, 1928. A colored heat-resisting glass of low coeff. of expansion has a high SiO_2 content and contains K_2CO_3 , lithia, boric oxide, Al_2O_3 and a usual coloring oxide.

Glass. W. C. TAYLOR. Can. 280,177, May 15, 1928. A heat-resisting green glass which shows high transmission of green light and generally good absorption of the other parts of the spectrum contains boric oxide, lithia, CuO and Co_2O_3 .

Plate glass manufacture. M. BICHEROUX (to Maatschappij tot Beheer en Exploitatie van Oetrooten). U. S. 1,637,098, June 12. Mech. features

Apparatus for making plate glass. M. BICHEROUX (to Maatschappij tot Beheer en Exploitatie van Oetrooten). U. S. 1,673,138, June 12

Apparatus for plate glass manufacture. M. BICHEROUX (to Maatschappij tot Beheer en Exploitatie van Oetrooten). U. S. 1,673,347, June 12.

Apparatus for making sheet glass. L. D. SOUTHER (to Libbey-Owens Sheet Glass Co.). U. S. 1,673,892, June 19.

Apparatus for producing sheet glass. E. T. FERNGREN (to Libbey-Owens Sheet Glass Co.). U. S. 1,673,907, June 19.

Apparatus for producing sheet glass. N. MAMBOURG (to Libbey-Owens Sheet Glass Co.). U. S. 1,673,916, June 19.

Apparatus for drawing glass. A. E. SPINASSE. U. S. 1,674,529 30, June 19.

Apparatus for pressing glass. R. L. ELLERY. U. S. 1,673,108, June 12.

"Unbreakable glass." F. THIEL, A. VACHA and F. J. GOLDSCHMIDT. Brit. 279,031, Oct. 12, 1926. Sheets for making lamp shades or other articles are formed of celluloid or similar material coated with transparent or translucent varnish and with small particles of glass uniformly distributed.

Blowing glassware. G. E. HOWARD (to Hartford-Empire Co.). U. S. 1,673,747, June 12. After the glass has been expanded to fill a mold, air is simultaneously passed into and out of the expanded glass, to hasten its cooling. An app. is described.

Flue and draft system for brick and pottery kilns. J. N. SILVA. U. S. 1,673,597, June 12.

Ceramic body. F. H. RIDDLE. Can. 277,673, Feb. 7, 1928. A raw batch for ceramic bodies contains a mineral of the sillimanite group and other aluminous material. Cf. C. A. 21, 3439.

Ceramic materials. F. H. RIDDLE. Can. 277,672, Feb. 7, 1928. The raw batch of a ceramic material consists of cryst. Al silicate, a synthetic flux contg. an alk. earth metal oxide, raw clay and an alk. earth metal flux.

Abrasive composition. A. BIDDLE. Can. 279,851, May 1, 1928. An abrasive compn. consists of 50 parts by wt. rubber latex, 10 parts casein, 3 parts of a casein solvent, 25 parts H_2O , and 80 parts sand.

Refractory compositions. SOUTH METROPOLITAN GAS CO. and R. H. B. LAMPREY. Brit. 278,821, July 23, 1926. A compn. suitable for making gas retorts and the like comprises tridymite and quartzitic silica and fireclay which has been purified by elutriation and treatment with acid. The proportions are such as to produce a desirable reduction of the shrinkage of the clay during drying and burning and to counteract after-shrinkage during use; a suitable mixt. is clay 40-45, calcined flint (No. 4 No. 8 mesh) 20-25, calcined flint (No. 8 No. 12 mesh) 20-15 and sand 20-15%. Alumina or SiC may replace the sand.

Refractory material. J. G. DONALDSON and H. L. COLES (to Guardian Metals Co.). U. S. 1,673,106, June 12. Walls of safes or vaults or other refractory articles are formed of over 70% Zr oxide and less than 30% Zr silicate and C-dissolved in the silicate. U. S. 1,673,107 specifies a material formed by heating together ZrO_2 over 85, SiO_2 less than 15 and C less than 10 parts, to fuse together the oxides and dissolve the C in the product.

Vitreous enamel. H. V. HUBER and T. M. FELTON (to Vitro Mfg. Co.). U. S. 1,673,679, June 12. A vitrifiable compn. suitable for use on earthenware or other material comprises a coloring sulfide such as CdS , a compd. of Pb such as Pb_2O_3 and another compd. such as CdO which has the same base as the sulfide and prevents formation of a discolored compd. H_3BO_3 and other compds. may be used.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Cement in 1926. P. W. BAGLEY. Bur. Mines, *Mineral Resources of U. S. 1926*, Part II, 303-34 (preprint No. 27, published April 4, 1928). I. C.

Hair felt [for roofing] (U. S. pat. 1,673,967) 25.

ECKEL, E. C.: **Cements, Limes and Plasters.** 3rd ed., revised. New York John Wiley & Sons. \$7. Reviewed in *Eng. Mining J.* 125, 953 (1928).

WECKE, FRIEDRICH: **Handbuch der Zementliteratur.** CHARLOTTENBURG: Zementverlag. 1447 pp. Cloth bound, M. 44.

Cement. G. PISTOR and R. SUCHV. Can. 277,732, Feb. 7, 1928. Hydraulic cement is produced by withdrawing the molten slag from a P furnace and introducing aluminous additions into the slag.

Coating with cement. L. G. COPEMAN. Can. 278,359, Mar. 6, 1928. The surface of the material to be coated is treated with a soln. of $MgCl_2$ and then a coating of oxy-chloride cement is applied.

Cement mortars and concrete, etc. C. PICKSTONE. Brit. 279,355, June 16, 1927. Fine slate flour is substituted for 5–15% of the usual aggregate and 0.25–0.50% of Na silicate of 50–55° Bé. is added to the gaging water.

Bituminous concrete. L. S. VAN WESTRUM. Can. 279,417, Apr. 17, 1928. Bituminous concrete is manufd. by mixing a mineral aggregate with true cement or a cementitious powder consisting of a true cement and stone or slag flour, with oxide of iron, and further mixing the mixt. with a bituminous soap.

Aggregates for use with concrete. J. R. GARROW. Brit. 278,788, July 7, 1926. Org. material such as wood, sawdust, shavings, coir, sizal or paper pulp, for use with cement or concrete, is expanded by the action of heat and moisture and then treated with substances which will fill the pores and maintain them in expanded condition, e. g., 2 solns. may be employed which will react to form an insol. compd. in the pores such as $PbSO_4$, Pb chromate, $BaSO_4$ or $Zn(OH)_2$. Numerous other examples also are given. A salt of high osmotic pressure such as $CaCl_2$ may be added to the soln. used for expanding the pores.

Road-making material. S. S. SADTLER (to Am'esite Asphalt Co. of America). U. S. 1,674,523, June 19. A soap contg. unneutralized acid is dissolved in a bitumen liquefier such as kerosene, stone is treated with the compn. thus formed and the material is afterward incorporated with a bitumen.

"Artificial marble." H. L. BATES. Brit. 278,983, May 13, 1927. See U. S. 1,629,854 (C. A. 21, 2369).

Felt for tread surfaces or sound-insulation in building construction. F. CARL and C. RIEDEL. Brit. 279,093, Oct. 15, 1926. Sheets or slabs of felted animal fiber are impregnated with bitumen or tar which may be used with solvents such as C_4H_{10} or a petroleum oil.

Cement waterproofing material. MITSUBISHI GOSHI Co. Jap. 69,075, Aug. 11, 1926. To a mixt. of a glyceride of a fatty acid with resin and alk. earth oxide is added silica gel. This compn. is used as waterproofing material.

Waterproofing and fireproofing timber. F. S. VIVAS. Can. 279,153, Apr. 3, 1928. Timber is immersed in a hot aq. soln. of borax and $CaCl_2$, and subsequently in an aq. soln. of iron sulfate.

Drying and seasoning wood. L. BACHRICH. Brit. 279,453, Oct. 20, 1926. Wood is first treated with air at a temp. of 40–60° in 2 stages at the end of each of which the satd. air is allowed to escape through a valve in the top of the treating chamber, and is then treated with air at 70–75°. With wood about 4–5 cm. thick, the stages may require 4–5 and 7–8 hrs., resp., and a period of "rest" may intervene between the stages. The treatment may be repeated with wood of large dimensions.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Notes on recent developments in fuel technology. R. WIGGINTON. *Fuel in Science and Practice* 7, 193–4, 241–4 (1928); cf. C. A. 22, 2254.—Brief reviews of the following subjects: carbonization at power stations, benzene (crude motor spirit), oil from coal, removal of O from feed water, water softening with Ba salts, producer gas vehicles.

D. A. REYNOLDS

Observations on the determination of the elementary oxidizable carbon in fossil solid fuels. I. BLUM. Inst. Ind. Chem., Bucarest. *Bul. chim. soc. română științe* 30, 43–9 (1928).—In the detn. of the oxidizable elementary C, one should subtract from the total CO_2 a quantity equiv. to the CO_2 absorbed in the coal, to the CO_2 evolved by the mineral matter, and to the CO_2 obtained from org. constituents. The CO_2 to be

subtracted is detd. in a single assay, when 1 g. of coal is distd. in the combustion tube in a N atm, or when a sample is distd. from the Fischer-Schrader Al retort. This correction is to be used when the calorific power is calcd. A. L. HENN:

Sardinian fuels, with special attention to fuels of the Perdasdefogu basin (Ogliastrea). II. R. BINAGHI AND A. BRUNDO. Univ. Cagliari. *Ann. chim. applicata* 18, 122-34(1928) — Earlier studies on lignites (cf. B and Romoli-Venturi, *C. A.* 20, 652) being extended, the Ogliastrea anthracites were examd., their chief interest being their potential value for use in blast furnaces utilizing limonite ore occurring nearby. Analyses of representative anthracite show the following % compn.: moisture 1.66-1.75, ash 8.51-26.14, C 49.79-73.53, H 2.39-3.95, O 12.59-19.82, N 0.58-0.76, S 0.84-1.10, with calorific power of 4430-5675. A comparison of the character of this anthracite with similar anthracites which have been used successfully in metallurgy shows that the Ogliastrea anthracite may be used in connection with the blast-furnace reduction of the local limonite ores. A review of earlier publications on the fuel resources of Sardinia is included, with numerous rare references. C. C. DAVIS

Combustible liquids from coal, a lecture delivered at the college of France. R. CHAUX. *Bull. soc. chim.* 43, 385-411(1928) — A review is given of the production of combustible liquids from coal by hydrogenation and by the utilization of the hydrocarbon constituents of coke-oven gas for the production of alcs. and use of coal tars for producing C_6H_6 , its homologs and other aromatic compds. The syntheses of MeOH, Synthol and liquid hydrocarbons from CO produced by the gasification of coal are discussed. A bibliography of 160 references is given. RAYMOND E. SCHAAD

Motor spirit, its use in internal-combustion engines. H. Y. V. JACKSON. *J. Inst. Petroleum Tech.* 13, 855-74(1927) — A general survey of the requirements for a good fuel. BRIAN MEAD

Detection and determination of benzine, benzene, alcohol, ether and tetralin in motor fuels. I. FORMÁNEK (*Chem.-Ztg.* 52, 325-6(1928)) — The dyes algol red BTK, algol red 2G, and lake red Ciba B dissolve in C_6H_6 , its homologs, and in tetralin; the first 2 produce a red color; the latter gives a rose-red with orange yellow fluorescence. These dyes are practically insol. in benzine, petroleum and gas oil, and entirely insol. in alc. and in Et_2O . Benzene in com. benzine and C_6H_6 adds to turpentine oil may be detd. colorimetrically by agitating 20 cc. of the liquid with 0.01 to 0.02 g. of any of these dyes, and comparing the tint of the fuel layer with those of a color scale prepd. from a series of synthetic fuel mixts. contg. known amts. of C_6H_6 . By means of these dyes 5% of C_6H_6 is detectable in a mixt. of C_6H_6 or other aromatic hydrocarbon with benzine, spirits, Et_2O , or with other fuels. Spirits-sol. aniline blue 2B colors alcs., aldehydes and ketones deep blue. It is insol. in H_2O , benzine, petroleum, C_6H_6 , PhMe, $C_6H_4Me_2$, higher homologs of C_6H_6 , tetralin, cyclohexane, Et_2O , CS_2 and turpentine oil. With this dye 2.5% of alc. can be detected in a benzine-spirits mixt., less than 2% in a C_6H_6 -benzine-, or benzine- C_6H_6 -spirits mixt., or even 1% in Et_2O , natural benzines can be distinguished also from such artificial fuels as Synthol, Synthin, Ketol, etc., which consist of alcs. and aldehydes. *Ibid.* 346-8. — Perchromic acid soln. (aq. $K_2Cr_2O_7$ soln. acidified with H_2SO_4 and treated with H_2O_2) gives a blue color to Et_2O , but not to benzine, petroleum, gas oil, C_6H_6 , EtOH or tetralin. The blue color which it gives to alcs., aldehydes and ketones changes after some time through bright green to yellowish green, and to brown with AmOH and BuOH while they are oxidized to aldehydes. Addns. of PhNH₂ dissolved in a fuel during heating sep. on cooling if it contains benzine only or not more than approx. 20% of C_6H_6 , tetralin, Et_2O , 99% EtOH or 35% of 96% EtOH. The original fuel is fractionated to detect Et_2O , C_6H_6 , benzine and tetralin. The distillate collected below 40° is tested for Et_2O by perchromic acid, that from 40° to 120° for C_6H_6 and benzine, and the residue boiling above 200° is tested for tetralin by algol red, lake red Ciba B or chem. means. Benzine or C_6H_6 in mixts. of benzine or C_6H_6 with EtOH is detd. volumetrically by dissolving the EtOH from 100 cc. of the mixt. by 150 cc. of H_2O colored with fuchsin. By adding 50 cc. of benzine followed by 100 cc. of colored H_2O to 100 cc. of an Et_2O -EtOH mixt., shaking and allowing to settle, the Et_2O dissolves in the benzine layer and is measured volumetrically. Thus the known Et_2O content of a synthetic mixt. is obtained within approx. 1% when the correction is applied for the soly. of Et_2O in H_2O . R. E. S.

Fusion of coal, coke and motor fuel by sodium peroxide. G. E. MABEE. *Ind. Eng. Chem.* 20, 644-5(1928). — Complete combustion of coal or coke can be obtained when fusing with Na_2O_2 , without the use of $KClO_3$ or $PhCO_2H$, if 0.5 g. substance is mixed with 15 g. Na_2O_2 and ignited by placing in a muffle furnace at 800°. When highly volatile mixts. are to be fused, the charge consisting of 1 cc. of substance and 15 g. Na_2O_2 is ignited by the addn. of 0.5 cc. MeOH. T. S. CARSWELL

The gas industry in Jugoslavia. M. HORVATÍĆ. *Archiv. hem. farm.* 1, 67-72 (1927).—A review of the present state of the gas industry in Jugoslavia. J. K.

Modern gas supply. FRANZ BÖSSNER. *Oesterr. Chem.-Ztg.* 31, 82-4(1928).—A comparative review of modern gas technic. A. S. CARTER

More common commercial gas fuels. L. H. DALMAN. *Oil & Gas J.* 26, No. 51, 116, 119, 220, 222, 224-7(1928).—The combustion theory of illumination and the chem. principles involved in prepg. illuminating gas are discussed. The manuf. of coal gas, chem. theories of carbonization, manuf. of carbureted water gas and acetylene and gas fuels are included in the discussion. M. B. HART

Climate fixes type liquid-gas fuel. W. T. ZIEGENHAIN. *Oil & Gas J.* 27, No. 1, 168-9(1928).—Compressed C_2H_6 , C_4H_{10} and iso- C_4H_{10} , alone, or in mixts., may be used as a domestic fuel. The heating values of these gases are very high, 2522 B. t. u. per cu. ft. for C_2H_6 , 3275 for iso- C_4H_{10} and 3275 for C_4H_{10} , as compared with 1000 for natural gas. A mixt. of iso- C_4H_{10} and C_2H_6 is preferable for all-season use to a mixt. of C_4H_{10} and C_2H_6 because the former mixt. has less spread between vapor-compn. and b. p. curves. In a mixt. contg. all three a max. vol. of iso- C_4H_{10} tends to give a mixt. showing a minimum change in compn. through the boiling range. Burner design for such fuel, and mixts. should be standardized. M. B. HART

Examination of products of combustion from typical gas appliances. II. Gas fires. ARTHUR SMITHELLS, et al. *Inst. Gas Eng. 17th Rept. of the Gas Investigation Comm.* 1927, 85-154; cf. *C. A.* 21, 3730.—A modern 9-radiant gas heater was installed in a room 16'3" × 13'11" × 11'11" high and tested for carbon monoxide production. With a heater adjustment consisting of an air-gas ratio of 1.5 and a 5" flame from each burner the normal gas rate was 38.3 cu. ft. per hour. The CO production (caled. to parts of CO per 10,000 parts of gas consumed) was 15 parts at 0.5 normal gas rate, 30 parts at the normal gas rate, 150 parts at 15% overload on the gas rate, and 200 parts at a 30% overload. On increasing the air-gas ratio on the same heater to 1.9 the CO production was 13 parts at 0.75 normal gas rate, 16 parts at the normal rate, 50 parts at 25% overload. A popular 10-radiant heater manufd. in 1911 was tested in the same manner, the normal gas rate being 42.6 cu. ft. per hour. With an air-gas ratio of 1.4 the CO production was 16 parts at 0.5 normal gas rate, 33 parts at 0.7 rate, 200 at 0.9 rate and 235 parts at a normal gas rate. On increasing the air-gas ratio to 1.9 the CO production decreased to 7 parts at 0.5 gas rate, 80 parts at the normal rate and 100 parts at 20% overload of the gas rate. Interchanging the radiants in the two heaters indicated that the 1911 type showed a lower CO production. The differences in design are discussed from the standpoint of this information. With the radiants removed completely, the open burners produced about 12.4 parts of CO per 10,000 of gas consumed at a 0.8 normal gas consumption rate. Additional notes on the iodine pentoxide method for CO and discussion of the report by members of the society are appended. A. S. CARTER

The so-called "odorizing" of illuminating gas. JOSEF DOLLINGER. *Oesterr. Chem.-Ztg.* 31, 87-8(1928).—D. discusses the use of highly odorous agents (e. g., mercaptans, sulfides, carbilamines, etc.) to produce a gas of violent odor and thus decrease the chance of poisoning. A. S. CARTER

Oxygen determination in illuminating gas. VIKTOR FUNK. *Gas u. Wasserfach* 71, 443-4(1928).—The usual methods for detg. O_2 in illuminating gas may be in error 0.2% or more. A convenient form of gas buret and special precautions are given which insure much greater accuracy. The pyrogallol and chromous acetate (gas volumetric) methods are described in detail. In the former method the difference between the known percentage of O_2 and that found by analysis averaged about 0.02% and in the latter method somewhat less. All solns. are satd. with gas before use and temp. is controlled within 0.1° during a detn. R. W. RYAN

Flow of gas through small orifices. E. L. RAWLINS. *Oil & Gas J.* 26, No. 51, 111-2, 125-6, 129(1928).—A study carried out at the Bureau of Mines of the flow of gas through small orifices has shown that all problems can be reduced to two formulas, one applicable when the flow is critical (ratio of downstream pressure to upstream pressure less than 0.55 to 0.62), and the other when it is non-critical (ratio of downstream to upstream pressure greater than 0.55-0.62). M. B. HART

Causes of illuminating gas accidents and precautions for their prevention. HANS GUNTNER. *Oesterr. Chem.-Ztg.* 31, 84-7(1928).—A general survey of the various types of gas accidents from the standpoint of prevention. Six types of safety devices are reviewed: (1) app. automatically acting when in an atm. of unburned gas through the change in temp. of Pt or the rate of diffusion of the gas; (2) app. to shut off gas supply if the flame is extinguished; (3) a device to prevent accidental opening of valves;

(4) a device which is put in action by tubing slipping off or preventing such slipping; (5) app. turning off wall-valves or indicating by light or sound when the valves are not closed; (6) automatic lighters to ignite escaping gas. A. S. CARTER

Carbonization. II. ARTHUR SMITHELLS, *et al.* *Inst. Gas Eng. 18th Rept. of the Gas Investigation Comm.* 1927, 207-70; cf. *C. A.* 21, 4047.—By the same app., coal and method of the previous report, carbonization measurements were made with a retort temp. of 915° instead of 980°. In the early stages of carbonization the rate of gas evolution decreased with a decrease in size of coal particle, and from mixts. of sizes the rates were less than when the constituent sizes were worked sep. In the later stages the rate of gas evolution was greater with the smaller sizes; hence in the end the vol. of gas produced is about the same in all cases. The 60° temp. decrease between this and the previous tests caused a decrease in gas vol. of 750 cu. ft. per ton of coal and a 30% increase in the yield of tar. The thermal value was decreased by 4 therms. Mixing coke with the coal gave an increased gas evolution and NH₃ yield and increased thermal value with decrease in amt of tar when calcd. to the coal content, but the disadvantages outweighed the advantages in the case of this particular, not highly caking, coal. The addn. of 2 parts CaCO₃, Fe₂O₃ or Na₂CO₃ to 98 parts of coal caused an increase in the gas evolution, but the gas was of lower calorific value. With CaCO₃ the gas increase was 11%; with Fe₂O₃, 6% and with Na₂CO₃, 24%. Thermal values increased with CaCO₃, 5%, with Fe₂O₃, 2% and with Na₂CO₃, 12%. CaO and Fe₂O₃ lowered the ignition temp. of the coke and Na₂CO₃ increased it, though the latter coke was the most active toward steam. The discussion of the report by the society is included. A. S. CARTER

Low-temperature carbonization of lignites and sub-bituminous coals. J. I. DAVIS AND A. E. GALLOWAY. *Ind. Eng. Chem.* 20, 612-7(1928). Comparative low-temp. lab.-scale carbonization tests were made on 24 sub-bituminous coals and lignites by 3 different methods: the oil-shale method of the Bureau of Mines; the Gray and King method developed in England and the Franz Fischer method as used in Germany. The latter method gave the most concordant results. T. S. CARSWELL

Removal of sulfur from commercial benzene. HUGO KIEMSTEDT. *Brennstoff-Chemie* 8, 326-7(1927).—The S in benzene is formed mainly from H₂S reaching the crude product from the gas. It is, therefore, desirable to remove the H₂S as early as possible in the process, or before it has been oxidized or has reacted with the liquids. The H₂S may be removed by washing the freshly condensed distillate with NaOH. E. G. MEYER

Chemical study of low-temperature tar. G. T. MORGAN. *J. Soc. Chem. Ind.* 47, 131-3T(1928).—An attempt to sep. low-temp. tar into its constituents by fractional distn. resulted in losses by decompn. Sepn. by low-boiling solvents resulted in the identification of the following substances: (1) *neutral oils*, valuable as fuels with anti-knock properties; (2) *waxes*, melting from 61-2° down to 10°, and contg. 3 hydrocarbons with C contents corresponding to C₂₆, C₂₇ and C₂₉; (3) *aromatic hydrocarbons*, among which are *anthracene*, *dimethylnaphthalene*, and probably *β-methylanthalene*; (4) *volatile bases*, among which are *PhNH₂*, *α-picoline*, *2,4-lutidine*, *s-collidine*, *quinoline* and *quinaldine*; (5) *amorphous bases*, called *resinamines*, with the properties of resins; (6) *acidic substances*, mainly *phenols*, among which are *PhOH*, *cresol* and *s-xyleneol*. *Bacterial study of the phenols* showed max. germicidal activity of the fraction b₁ 140-70°. T. S. CARSWELL

Effect of physical characteristics of coke on reactivity. J. D. DAVIS AND D. A. REYNOLDS. *Ind. Eng. Chem.* 20, 617-21(1928).—Results of reactivity tests of low- and high-temp. cokes in air, steam and CO₂ over temp. ranges from 800° to 1100° are given. The effects on reactivity of bulk density, volatile matter, adsorptive power, size of test particles, and varying reactivity of particles of the same sample have been detd., and the app. with which the detns. were made is described. T. S. CARSWELL

Coke tumbler tests. A. R. POWELL AND D. W. GOULD. *Ind. Eng. Chem.* 20, 725-8(1928).—A new tumbler machine is described. Comparative results are given for different cokes as to shatter test, tumbler test and plant yields. The tumbler test does not imitate closely the type of handling coke received in the plant but does indicate the ability of sized coke to withstand handling between the point of production and the point of use. DAVID GORDON

Laboratory apparatus for fractionating mixed liquids [tar oils] (HÖPNER) 1. Determination of active S in commercial benzene and of H₂S in raw benzene (KATTWINKEL) 7. The origin of fusi (BODE) 8. Origin and organization of coal (JEFFREY) 8. Destructive hydrogenation of coal (Brit. pat. 279,055) 22. Filter for liquid fuels

(Brit. pat. 279,382) 1. Thermostatically actuated valve for controlling gas supply (U. S. pat. 1,674,473) 1. Distilling solid carbonaceous material (U. S. pat. 1,674,420) 22. Metal-heating furnace and associated gas-producer construction (Brit. pat. 279,317) 9. Purifying aromatic hydrocarbons (U. S. pat. 1,674,472) 10. Electrically operated valve for controlling the flow of gas to burners (U. S. pat. 1,674,021) 1.

STACH, ERICH: **Kohlenpetrographisches Praktikum**. Berlin: Verlagsbuchhandlung Gebrüder Borntraeger. 196 pp. \$2.80. Reviewed in *Mining Met.* 9, 292 (1928).

Fuel for burning in pulverized form. L. B. GREEN (to Borden Co.). U. S. 1,673,114, June 12. Solid fuel such as coal is initially pulverized and then compressed into briquets; pulverized fuel is subsequently removed from the surfaces of the briquets and immediately delivered to a burner.

Fuel briquets. L. RUDEMAN. U. S. 1,674,179, June 19. Peat, bagasse or other aq material contg. fibrous vegetable matter and contg. not more than 65% of water is treated with waste sulfite lye and carbolineum or other suitable phenolic compn. and briquets are formed from the mixt. by preliminary pressure at about 100° and then subjected to a sustained final pressure (suitably 100–400 atm.). Pitch or other binders also may be used.

Fuel briquets. A. M. HART. Brit. 279,140, April 22, 1926. Vegetable material such as grasses, weeds, bracken, straw or leaves is mixed with Na or K silicate, briquetted and dried. The vegetable material may be preliminarily carbonized if desired and carbonized mineral matter such as coal refuse or lignite also may be added. The process of carbonizing described in Brit. 188,807 (*C. A.* 17, 1709) may be used. Cf. *C. A.* 22, 2259.

Fuel composition. H. S. REID. Can. 280,524, May 29, 1928. A fuel compn. contains 98–80 parts liquid hydrocarbon oil, 2–20 parts paraldehyde and up to 12 vols. of C_2H_2 per vol. of paraldehyde.

Composition for kindling fuels. F. J. DIEDERICH. U. S. 1,674,163, June 19. Comminted wood is mixed with a difficultly ignitable mineral oil and with $KClO_4$, BaO_2 or other suitable non-explosive compd. capable of generating O when heated.

Liquid fuel. J. LEFRANC. Can. 277,394, Jan. 24, 1928. A liquid fuel for internal-combustion engines is composed of a soln. of C_2H_2 in a mixt. of the complex ketones obtained from the dry distn. of aliphatic salts of Ca with another combustible liquid having insufficient carbureting and calorific properties.

Washing coal, separating ore constituents, etc., by upward currents of water. L. HOVOIS. Brit. 279,447, Oct. 19, 1926. An app. is described.

Apparatus for "amalgamating" and distilling coal, etc. W. B. RULON. U. S. 1,674,129, June 19.

Low-temperature carbonization of coal, lignite, etc. SOC. DE RECHERCHES ET DE PERFECTIONNEMENTS INDUSTRIELS. Brit. 279,130, Oct. 15, 1926. Coal, lignite or similar material is heated with a gas such as superheated steam by direct contact in an app. which is described and in which the material is periodically moved from one to the next of a plurality of treatment chambers.

Destructive hydrogenation. A. L. H. SPILKER, C. ZERBE and GES. FÜR TEERVERWERTUNG. Brit. 279,410, Oct. 20, 1926. The destructive hydrogenation of hydrocarbons, coals and coal products is effected by the catalytic action of halogens or halogen compds. (other than I and its compds.) in mixt. with each other or with I or I compds. Crude natural mixts. or mother liquors from the potash industry may be used. $C_{10}H_8$ may be treated with H at 470° under 100 atm. pressure in the presence of NH_4Cl to obtain 70% of liquid products. Coal-tar pitch similarly treated in the presence of KBr and Fe alum yields about 70% of liquid products mainly b. 200–360°. Coal from seams of recent formation may be hydrogenated in the presence of KI, KBr and KCl or NH_4Cl ; and products of the benzene type are obtained by hydrogenating brown-coal tar or low-temp. coal-tar in the presence of KI, NH_4Cl and $FeCl_3$ at temps. of 200–500°.

Hydrogenation of carbonaceous materials. M. PIER, K. WINKLER and K. WISELL. Can. 278,742, Mar. 20, 1928. In the destructive hydrogenation of carbonaceous materials, the gases freed from the liquid reaction products are scrubbed with a benzine-like product of the destructive hydrogenation.

Hydrocarbons. C. KRAUCH and M. MÜLLER-CUNRADI. Can. 278,741, Mar. 20, 1928. Hydrocarbons of high mol. wt. are produced by converting products of the

destructive hydrogenation of carbonaceous materials into unsatd. hydrocarbons by dehydrogenation and polymerizing the latter.

Absorption of ammonia and hydrogen sulfide. C. HANSEN. Can. 278,558, March 13, 1928. A process for the simultaneous absorption of NH_3 and H_2S from industrial gases consists in absorbing such gases in an aq. soln. of NH_4 sulfite-bisulfite.

Gas from coal. M. W. TRAVERS and F. W. CLARK (to Travers and Clark, Ltd.). U. S. 1,674,000, June 19. In the manuf. of gas which is carbureted only by the products of carbonization of the coal, air is blown during the blow period through hot coke in a chamber into which coal is fed at the top, and the blow gases thus produced are passed through a regenerator without passing through the coal; during the run steam is blown through the coke and water gas thus produced is passed through the coal and a sufficient quantity of the gas to effect complete carbonization of the coal is forced back through the regenerator and directly through the coal without passing through the main gasification zone. An app. is described.

Gas manufacture. C. S. CHRISMAN (to Humphreys & Glasgow, Ltd.) Brit 279,059, Oct. 13, 1926. A mixt. of distn gas and carbureted water gas is obtained by blasting the lower portion of a fuel bed, making an up-run through the fuel bed, carbureting and fixing other gas by heat stored during the blasting and passing the carburetted gas and water gas from the up-run through the upper part of the fuel bed to generate coal gas which is mixed with the other combustible gases. An app. is described. Brit 279,060 specifies the production of a mixt. of distn. gas and water gas from fuels contg volatile substances by the use of 2 gas producers, the lower part of each of which is blasted with air; the heat of the blast gases is stored in stoves and one producer is subjected to up-streaming to liberate coal gas and the other to down-streaming through its lower portion to produce water gas and the latter is heated and passed through the upper part of the up-streamed producer and the mixed gases are led off from the latter. Other details of operation and construction are also described.

Gas producer. I. G. FARBENIND. A.-G. Brit. 279,316, March 22, 1927. In a gas-making process as described in Brit 214,544 (C. A. 18, 2802) in which air or both air and steam are blown through powd fuel on a grate so as to agitate the material, the gasifying agent is blown from above onto the fuel bed, and may also be blown from below. Fuel dust carried away in the gas is gasified by the admission of a limited supply of air or O and fresh fuel may be supplied to the charge from below the normal fuel surface during the "run" for water gas. Liquid fuel, tar or molten asphalt may be added to increase the calorific value of the gas. An app. is described.

Gas producer for use on motor vehicles. G. IMBERT. Brit 279,475, Oct. 25, 1926. A producer is described in which wood, peat and other vegetable fuel may be used.

Heat-exchange apparatus adapted for heating air with flue gases. T. W. MUNFORD (to Mantle Engineering Co.) U. S. 1,673,418, June 12.

Apparatus for using waste heat from gas-making apparatus for heating a boiler, etc. P. PLANTINGA. U. S. 1,673,589, June 12.

Testing flue gases by comparative resistance measurements of electrically heated wires. SIEMENS & HALSKE A.-G. Brit 279,478, Oct. 25, 1926.

Safety device for preventing escape of gas on stoppage of the gas-propelling supply fan. O. GALAUP. U. S. 1,673,976, June 19.

Extracting phenols and other compounds from tarry liquors. A. WEINDEL (to P. Franke). Brit. 279,465, Oct. 21, 1926. Tarry liquors from coking and gas works are treated with a tar oil fraction, b. 230-350°, to ext. tarry matter, phenols and pyridine bases. The tar oil may be prepd. for use by treating with soda to remove any phenol and then with dil. acid to remove pyridine bases, and any C_{10}H_8 present may be removed by crystn. An app. is described in which the treatment may be carried out counter-currentwise and the oil may be repeatedly used after removal of the phenol and pyridine bases which are extd.

Semi-coke briquets. KOKS- UND HALBKOKS-BRIKETTIERUNGS-GES. Brit. 279,020, Oct. 14, 1926. Finely divided bituminous coal is briquetted with water-sol. or inorg binders such, e. g., as sulfite waste liquor and clay, and the briquets are subjected to a roasting and then to a distn. at a temp. of 350-650° (depending on the kind of coal used).

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

Petroleum in 1926. G. R. HOPKINS AND A. B. COONS. *Bur. Mines, Mineral Resources of U. S., 1926, Part II*, 335-417 (preprint No. 28, published April 26, 1928); cf. *C. A.* 22, 1032. L. C.

Treating California straight-run gasoline. E. N. KLEMGARD. *Refiner Natural Gasoline Mfr.* 7, No. 4, 80-1, 84 (1928).—A review of treating processes. M. B. H.

Good products at any cost from any crude available. P. TRUESDELL. *Natl. Petroleum News* 20, No. 17, 85-8 (1928).—The equipment and methods used by the Marland Refining Co. in combining Dubbs, Fleming and Cross cracking plants are described. M. B. HART

Simplified calculations in design of natural gasoline absorbers. W. K. LEWIS. *Chem. Met. Eng.* 35, 93-5 (1928).—Previously developed principles are extended. BRIAN MEAD

Vapor pressure of gasoline. G. G. OBERFELL, R. C. ALDEN AND H. HEPP. *Natl. Petroleum News* 20, No. 20, 57-9, 61, 63-4 (1928).—A comparison of procedure and errors involved in 7 proposed methods for the detn. of the vapor pressure of gasoline has shown that the Beistle-Prather method, in which pressure readings at const temp. are taken for 200 and 400 cc. air vol. and the true vapor pressure of the gasoline calcd. therefrom, is simple, easy to manipulate and requires only a short time. It should be possible to establish shipping limits for this method, making it possible to use it commercially. M. B. HART

Method of fractionation natural gasoline. D. B. KEYES. *Chem. Met. Eng.* 35, 92 (1928); cf. *C. A.* 21, 1701.—A simple scheme for rectification of natural gasoline is outlined. BRIAN MEAD

Theory and practice of fractionation in natural gasoline plants. L. S. GREGORY. *Natl. Petroleum News* 20, No. 21, 102-6 (1928).—Natural gasoline may be fractionated alone, or mixed with gas or mineral seal oil or both. These methods may be compared by calcg the operating conditions necessary to produce grade-A gasoline having 35% C_4H_{10} , 36.7% C_5H_{12} and 28.3% heavier. In general, fractionation of the gasoline alone is most successful on a very lean or very rich gas when a wide range of products is desired. For a narrow range of products with a rich gas, fractionation of the gasoline with gas or mineral seal oil or both gives better results. High-pressure fractionation permits of ease in controlling reflux temp. and prevents column freezing. Aviation gasoline and a volatile liquid suitable for gaseous fuel may be made directly from natural gasoline by fractionation. M. B. HART

Tube-still distillation. C. H. S. EDMONDS. *Oil Eng. Tech.* 9, 121-7 (1928).—For topping or stripping crude oil, a single flash distn. system is preferred but in cutting deeply into the crude oil for lubricating stocks the step-up or series system is better, as it lends itself to vacuum operation. Single flash, however, yields a much greater percentage of distillate than the step-up system at the same temp., and the total heat input is less. The use of heat exchangers and building the still so that the max. use of radiant heat is attained make it possible to obtain very high efficiency of operation. Tables show how the nature of products from Midcontinent crude oil can be varied by regulation of the temp. and rate of heating. M. B. HART

Double stabilizing column installed at Roxana plant in Logan county. J. C. CHATFIELD. *Natl. Petroleum News* 20, No. 16, 54, 57 (1928).—It is asserted that the use of a double stabilizer results in complete sepn. of C_3H_8 and C_4H_{10} , and gives 97% recovery of gasoline having the following boiling range: I.B.P. 68° F.; 10% over at 82° F.; 20% at 92°; 30% at 102°; 40% at 112°; 50% at 126°; 60% at 138°; 70% at 168°; 80% at 180°; 90% at 212°; E. P. 282° F. The gasoline exerts a vapor pressure of only 7.5 lbs. at 100° F. M. B. HART

Designing equipment for chemical treatment of oil distillates. J. C. MORRELL AND D. J. BERGMAN. *Chem. Met. Eng.* 35, 291-5 (1928); cf. *C. A.* 22, 2262.—Calcs. are given to aid the designing of blow-case orifices for handling both 66° Bé. H_2SO_4 and 30° Bé. NaOH soln. Reagent and recirculating pumps with capacities of 10 and 20 bbls. per hr., resp., are recommended. The sludge and the reagent remaining unused after treating are allowed to settle out from the oil in settling tanks in which water-washes may be made also. For removing small quantities of H_2S from cracked distillates a water spray is used in the settling tank. For larger amts. of H_2S the orifice column and baffled coil may be used followed by a NaOH wash together with recircula-

tion of the NaOH and oil through the orifice column to remove the last trace of H_2S . A Pb-lined 1000-bbl. cylindrical batch agitator with a recirculating pump having a capacity of at least 1000 gallons/min. is discussed and illustrated in detail. Flow diagrams are given for arranging and assembling the finished treating plant.

RAYMOND E. SCHAAD

Cracking process actually used in Mexico for the treatment of heavy oils. RAMON CEBALLOS. *Bol. petroleo* **24**, 407-10(1927).—The feature of this cracking process is the obtaining of a residue of low viscosity which can be utilized in making fuel oils. Its characteristics are as follows: The crude petroleum is not subjected to a preliminary distn. before cracking, for removing the lighter constituents, and there is no withdrawal of the lighter fractions, except of water vapor and gases, until the cracking is completed and the cracked oil is in the still. The temp. of the crude oil is raised by steps by passing it through 2 heat interchangers at 115° and 315° , after which it enters a heater where it is cracked at about 430° . The hot, cracked oil serves to heat the 315° heat interchanger and is thereby cooled to 315° , after which it is distributed to the stills where it arrives at a temp. of about 200° . The paper is illustrated by a flow sheet of the process; by drawings of the heaters for cracking and of the tubular heat interchangers, and by photographs, at the Port of Tampico, of plants of the Huasteca Petroleum Co., and of the Transcontinental Petroleum Co. of S. A., both of which use this process

R. H. LOMBARD

Composition of cracked distillates. J. S. S. BRAMB AND T. G. HUNTER. *J. Inst. Petroleum Tech.* **13**, 794-816; Discussion 816-24.—**Part I. Separation of the component classes of hydrocarbons.**—The use of selective solvents was investigated: MeOH, satd. soln. of SO_2 in Me_2CO , $C_6H_5NO_2$, $C_6H_5NMe_2$, $C_6H_5NH_2$. No satisfactory sepn. occurred. Aniline points were used largely as a measure of fractionation. The following results give aniline points of a few pure hydrocarbons: pentane, 70.0° ; hexane, 70.0° ; heptane, 70.0° ; octane, 70.5° ; isopentane, 77.0° ; isodecane (diisomyl), 78.0° ; benzene, -20.0° ; xylene, -20.0° ; cumene, below -15.0° ; amylene, 0.7° ; β -isomylene (trimethylethylene) 11.0° ; *l*-limonene below -15.0° ; hexylene, 16.4° . Sepn. by mercuric acetate also proved unsatisfactory. The final method adopted was bromination followed by reduction with Zn-Cu couple in neutral alc. For the sepn. of paraffins and naphthenes a third liquid was added. This could be aniline, MeOH or Am. alc. **Part II. Composition of cracked spirit.**—Raw material was cracked spirit obtained by cracking Russian kerosene in a Cross unit. By use of the methods described in part I, with modifications, the following compn. data were obtained. Both normal and iso-paraffins were present. Naphthenes occurred in as great proportion as the paraffins. Olefins predominate in the lower-boiling fractions. Di-olefins were definitely in the first cuts. Cyclic olefins predominate among the unsatd. compds. in higher-boiling naphthas. Small quantities of aromatics were present, benzene and toluene.

BRIAN MEAD

The how and why of gasoline performance. J. BENNETT HILL. *Proc. Am. Soc. for Testing Materials* (preprint), **86**, 11 pp.(1928); cf. Davin, C. A. **22**, 2261.—The volatility as indicated by the A. S. T. M. distn. curve and detonation tests made in an engine under carefully controlled conditions cover suitably the required properties of a motor fuel which are primarily ease of starting in a cold engine, normal functioning without choke, uniform feed from the carburetor, and combustion under high cylinder pressures with min. detonation. Lab. tests now used to det. gasoline quality cover the other characteristics such as: odor, corrosive qualities of the fuel or of the exhaust gases, crank case dila., deposition of solid C, evapn. loss during handling, transportation and storage, chem. or phys. changes on long standing and harmful physiol. effects from contact with the gasoline. Also in *Oil and Gas J.* **27**, No. 8, 116, 119, 120(1928).

RAYMOND E. SCHAAD

Effect of antiknock compounds in the vapor phase. M. AUBERT, DUMANOIS AND A. PIGNOT. *Compt. rend* **186**, 1298-9(1928); cf. C. A. **22**, 863.—Photographically recorded time-pressure curves were obtained for the adiabatic ignition of hexane-air mixts. with a 1.1752 by wt fuel-air ratio. The addn. to the hexane-air mixts. of 5% of different antiknock compds in the vapor phase increases the duration of the combustion period, as measured by the duration of rise of pressure, from 0.004 sec. for the hexane-air mixt. alone to the values with the dopes of: $PbEt_4$ 0.011, toluidine 0.01, MeOH 0.006 and Et_2S 0.005 sec.

RAYMOND E. SCHAAD

Composition of petroleum and its products. G. A. BURRELL. *Ind. Eng. Chem.* **20**, 602-8(1928).—Chem. research accomplished and remaining to be done is discussed with respect to the compn. of straight-run gasoline, kerosene and natural gas; olefins, naphthenes, acetylene, aromatics; etc.; in petroleum; color in petroleum; gums; cracked

products; coke formation; oxidized products; petroleum acids; N compds.; O and S in petroleum; the sweetening reaction; the action of H_2SO_4 ; identification of hydrocarbon groups; detn. of unsatd. compds.; by-products from petroleum such as alc., glycol and amyl acetate.

D. F. BROWN

Solid-solution formation in mixtures of paraffin waxes. L. D. MYERS AND G. STEGEMAN. *Ind. Eng. Chem.* 20, 638-41 (1928).—Paraffin wax was fractionated by distn. under an abs. pressure of 0.1 mm. and at a rate of 12 drops of distillate per min. Extn. of the purified wax indicates that waxes from diff. sources have very similar compns. and that differences in m. ps. of com. paraffin waxes are due to differences in their oil content. Investigation of the wax mixt. shows that paraffin waxes form solid solns., the m. ps. of which lie between the m. ps. of the components and the existence of these solid solns. accounts for the absence of a sharp m. p. for paraffin wax. Investigation of the oil-wax mixt. shows that the soly. of paraffin wax in oil increases markedly at about 10° below the m. p. of the wax; low-melting waxes are more sol. in oil than high-melting waxes; mixts. of low-melting and high-melting waxes have intermediate solubilities; increase of soly. of mixts. in oil at about 10° below the m. p. is as marked as in pure waxes; this increase in soly. explains the loss of wax in the later stages of sweating; the wax appears to retain oil as a solid soln. of oil in wax (about 2% at room temp.). The amt. of oil retained in the last stages of sweating is too small to be detected but appears to explain some of the difficulties encountered in the sepn. of oil from wax.

D. F. BROWN

Treatment of Baku lubricating oil distillates by German plants. K. KOSTRIN. *Azerbajdzh. Neft. Khoz.* 1928, No. 5, 55-7.—Agitators used for oil treatment with acid and caustic are similar to those used in Baku. Each unit has a filter press. Solar oil of d. 0.890 is used. Transformer and white oils are manufd. For transformer oils the solar oil is treated hot with two 3% portions of 98% H_2SO_4 and the sludge is discharged after each treatment. Neutralization is carried out with a 15° Bé. soln. of NaOH with the addn. of 2% of a 30% alc. NaOH soln., the alc. being later recovered by distn. During the neutralization the temp. is kept at $75-80^\circ$. The oil is tested with phenolphthalein. The oil is washed with H_2O 6-7 times and dried with air at 90° , 1.5% of fuller's earth is added and the oil is filtered through a filter press. After addition of another 1.5% of fuller's earth the oil is filtered again and is then ready for use as transformer oil. The total loss through treatment amounts to 11-12%. To obtain medicinal white oil 45-50% of H_2SO_4 is used and the neutralization carried out with a 25° Bé. soln. of NaOH. Following are the losses at treatments with various proportions of H_2SO_4 : 10% acid, loss 15%; 20%, loss 24%; 30%, loss 30%; 40%, loss 35%. Sometimes the oils are treated with aniline dyes to destroy the fluorescence. Oils of American origin have a higher loss when treated. For turbine oils a distillate is used of viscosity $E = 4$ or 6. For heavy transformer (turbine ?) oils 6% of 98% acid is used, for light transformer (turbine ?) oils 4.5% only. Neutralization is carried out the same way as for transformer oils; also the fuller's earth and filtration process. Ordinary machine oil of E_{40} 6.5-7.0 viscosity is treated in the same way. The losses are: acid about 2.7%, caustic (solid) 0.4%, alc. 1.0%, fuller's earth 1.5%. Cylinder and spindle oils are treated the same way. For cylinder oils the filter press must be heated and losses in filtration amount to 2.0-2.5% each time. Turbine oil treated without the addn. of alc. gave a product which did not stand the emulsification test, and showed a loss of 7-8% as compared with the loss of 6.5% when alc. was used. Instead of fuller's earth the following acid-treated clays were used: Terrana and Frankonit. The NaOH sludge is used for prepg. emulsion cutting oils. The use of clay is important, as more stable oils are obtained and traces of sulfonic acids removed.

A. A. BOERTLINGK

The determination of acid and saponification numbers of insulating and steam-turbine oils. BAADER. Goldenberg-Werk, Knapsack b. Köln. *Erdöl u. Teer* 4, 234-5, 252-3 (1928).—For com. analysis, the sample (5-8 g.) is weighed and dissolved in 75 cc. of a so-called "blue soln." (1.2 g. alkali blue 6B to 1000 cc. pure benzene and 1500 cc. 96% alc.) in a 250-cc. Erlenmeyer flask with a side tube, for observing the color through a thin layer of liquid, and titrated quickly with 0.1 N alc. KOH, from a 25-cc. buret, to obtain the acid no. For the sapon. no., the remainder of the 25 cc. of KOH is run in and boiled $\frac{1}{2}$ hr. under a reflux and titrated back with 0.1 N HCl. In each case the titration of a blank detn. is subtracted and the difference $\times 5.6/\text{sample}$ = the desired value. For more accurate work, the acid no. is detd. on a sep. sample in a 100-cc. flask with 40 cc. of blue soln. Because of the small relative magnitude of the values in question, especial exactitude is required in the volumetric measurements and regulation of conditions. A uniform titration temp., which should not exceed 20° .

is important. Because of the sensitiveness of the blue soln. to CO_2 and other air contamination, titrations should be carried out as quickly and with as little shaking as possible; any change after the first end-point is ignored. The reflux condenser used is of the so-called mushroom type, which sits in the neck of the flask without a cork. Cork introduces appreciable errors. With proper precautions the results are highly reproducible. From examn. of numerous specimens, the sapon. no. is regarded as a criterion of refining in new oils, in which it should not exceed 0.15, and of deterioration in used oils, which are no longer serviceable if it exceeds 4, for insulating oils, or 6 for steam-turbine oils. The acid no. is superfluous if the sapon. no. is less than 1.0

F. S. GRANGER

The significance of various tests applied to motor oils. ROBERT E. WILSON AND D. P. BARNARD, 4TH. *Proc. Am. Soc. for Testing Materials* (preprint), **87**, 1200(1928).—The relatively large no. of methods which have been developed for or sometimes used for testing motor oils are evaluated in the light of all available information in terms of the bearing which the results of the tests have upon the performance of the oil in service. The tests for properties important in service are: viscosity including temp. coeff. of viscosity, pour test and C residue. Tests having little relation to performance but which may indicate contamination or inadequate refining include color, H_2O and sediment, neutralization no. and corrosion test. Gravity, flash and fire tests have little or no bearing on performance but may indicate the probable source of the oil. Tests designed for other products but sometimes rashly applied to motor oils include those for S content, unsatn., emulsification, pptn., evapn. and analytical data. Satisfactory tests are not available for 2 other properties of possible importance, oiliness and resistance to oxidation

RAYMOND E. SCHAAD

The viscosity-gravity constant of petroleum lubricating oils. J. B. HILL AND H. B. COATS. *Ind. Eng. Chem.* **20**, 641-4(1928).—A math. relation between viscosity and sp. gr. is derived from published data on the physical properties of petroleum fractions. This relation is expressed by the formula $G = a + [(1.0752 - a)/10] \log(V - 38)$, where G = sp. gr. at 60°F . (15.6°C .), a = a const. which is different for each crude and is characteristic of it, V = the Saybolt viscosity at 100°F . (37.8°C .). The const. a is low for the paraffinic crudes and high for the naphthenic crudes and its value for any oil is a direct index of the degree of the paraffinic or naphthenic character of the oil.

D. F. BROWN

Solubility of lubricating oil in liquid carbon dioxide. ELTON L. QUINN. *Ind. Eng. Chem.* **20**, 735-7(1928).—When CO_2 is used in the refrigeration industry any oil carried to the expansion coils will solidify and prevent efficient heat transfer. Q. detd. soly. and d. of lubricating oil in liquid CO_2 at various temps. Max soly., 0.9% by wt. of oil, occurred at 10° . The oil did not appreciably change the d. of liquid CO_2 at ordinary room temp. The soly. of glycerol in liquid CO_2 was less than 0.005%. D. G.

Corrosion by oil. HORACE J. YOUNG. *J. Inst. Petroleum Tech* **13**, 760-72 (1927); discussion 772-92. See *C. A.* **22**, 602.

BRIAN MEAD

Liquefaction of naphtha asphalt by the Bergius method. K. SMOLENSKI AND W. BADZYNSKI. *Przemysl Chem.* **12**, 117-36(1928). Asphaltic still residues from Polish paraffin oils are susceptible to treatment by the Bergius process. The total yield of liquid fuel runs about 60% of asphalt used, in which figure are included 20% benzine, and about 20% naphtha. The properties of these are related to those of light Polish crude oils. Of the remainder 25-30% is in the form of coke, from which further hydrogenation does not yield further quantities of liquid products. This coke contains about 87% C and 4% H and has a heat value of about 8000 cal. It can be briquetted for use as fuel. On liquefaction by means of H a gas contg. CH_4 and H_2 is produced to the extent of about 15% by wt. of asphalt. A series of products is obtained from asphalt, the value of which exceeds that of the original material. The cost of producing H_2 is the controlling factor. In addn. to the known technical methods of producing H_2 which are used for NH_3 synthesis there is the possibility of using CO or water gas with steam. The use of natural gas should also be considered.

A. C. ZACHLIN

Fractionation and decomposition of petroleum during capillary migration (Cook) **8**. Mud volcanoes of the Baku region (STAHL) **8**. Petroleum deposits in Altmark (SCHROEDER) **8**. The geologic relationship of the occurrence of oil in the Emba-Ural region to that in the Caucasus (STAHL) **8**. Apparatus for distilling hydrocarbons (Brit. pat. 278,768) **1**. Rectifying system for fractional distillation of petroleum oils (U. S. pat. 1,672,978) **13**. Unsaturated hydrocarbons (Can. pat. 270-622) **10**.

Cracking crude petroleum oils. H. BLUMENBERG, JR. (to A. M. Buley). U. S. 1,673,491, June 12. Al chlorosulfate is used to assist cracking.

Cracking hydrocarbon oils. L. DE FLOREZ (to Texas Co.). U. S. 1,674,390, June 19. Oil is continuously heated in a vaporizing zone and the vapors produced are heated under pressure in a cracking zone to a cracking temp. The velocity of flow of the material is progressively increased as it passes through the vaporizing and cracking zones; vapors are discharged from the cracking zone and expanded so as progressively to decrease their velocity and are condensed after expansion. An app. is described.

Destructive hydrogenation of hydrocarbons, coal, etc. A. L. H. SPILKER, C. ZERBE and GES. FÜR TEERVERWERTUNG. Brit. 279,055, Oct. 18, 1926. In processes such as described in Brit. 277,974 (C. A. 22, 2655) in which I or an I compd. is used, the I compds. employed are such as are decompd., but slightly or not at all at the reaction temp. (such as alkali or alk. earth iodides) and these are used together with a substance which will cause dissocn. of the I compds., such as Fe alum, FeCl₃ and CuSO₄. Tetrahydronaphthalene and benzene hydrocarbons may be produced from C₁₀H₈ and NH₃ and liquid hydrocarbons may be produced from coal-tar pitch.

Treating residue from petroleum cracking, etc. C. B. WATSON (to Pure Oil Co.). U. S. 1,673,854, June 19. Residue from cracking or distn. is circulated through a conduit to a sepg. receptacle and an inert gas such as steam is forced under pressure into the conduit to force the residue in atomized form into the receptacle; heated inert gas is supplied to maintain the material in the receptacle in a turbulent and heated condition, lighter fractions are withdrawn from the upper part of the receptacle and passed to condensing and collecting app. and a portion of the residual oil is fed to burners and the rest is removed from the system. An app. is described.

Decolorizing and purifying petroleum hydrocarbons. A. OBERLE (one-half to Thomas E. Scofield). U. S. 1,674,020, June 19. Oil such as gasoline obtained by cracking is treated with a soln. contg. KI, and filtered after permitting sepn. from the treating soln.

Treating petroleum hydrocarbons containing sulfur. H. G. M. FISCHER and W. J. ADDEMS. Can. 278,206, Feb. 28, 1928. Petroleum hydrocarbons contg. sour S compds. of the type of mercaptans are mixed with S in the presence of PbS and an alkali, the total amt. of lead in the mixt. being insufficient directly to convert more than a small proportion of the mercaptans into Pb mercaptides.

Desulfurizing liquid hydrocarbons. H. H. WILSON. Can. 278,381, Mar. 6, 1928. Low-boiling petroleum oils contg. S are brought into intimate contact with anhydrous KOH in finely divided condition.

Producing hydrocarbons by hydrogenation of phenols. D FLORENTIN, A. KLING and C. MATIGNON. Brit. 279,488, Oct. 23, 1926. The process described in Brit. 276,007 (C. A. 22, 2479) is applied to phenolic oils and tars such as low-temp. carbonization tars; PhOH is converted into C₆H₆ and cresols are converted into toluene by the action of a dehydrating catalyst and H under pressure. With complex material such as low-temp. tars, a second catalyst may be employed such as a halide of Mg, Zn, Fe, Cr or Al and the hydrogenation effected in 2 stages at different temps. Examples are given.

Refining hydrocarbons. R. K. STRATFORD. Can. 278,179, Feb. 28, 1928. The S content of hydrocarbon materials is reduced by treating the materials with freshly pptd. PbS.

Treatment of hydrocarbon oils. J G. DETWILER. Can. 280,586, May 29, 1928. Hydrocarbon oil is treated with a reagent with the resultant formation of sludge, after which the oil is treated with CH₂O to effect coagulation and sepn. of the sludge from the oil, the remaining oil being treated with NH₃.

Apparatus for distilling petroleum oils. H. M. GODSEY. U. S. 1,673,238, June 12. A plant is described in which furnace gases are introduced directly into oil in a still.

Device for removing deposits of coke or the like from "soaking drums" of petroleum-cracking apparatus, or for breaking out filter beds and tank residues, etc. BEACON OIL CO., B. P. CRITTENDEN, A. C. KILLINGER and H. L. BOLTON. Brit. 278,944, Feb. 28, 1927.

Demulsifying agents for refining petroleum oils. E. D. GRAY (to Standard Oil Co. of Calif.). U. S. 1,673,045, June 12. A petroleum sulfonate sludge contg. some free H₂SO₄ is treated with a lubricating oil stock, the treated oil is sepd. from the sludge, partially neutralized with alkali such as NaOH, freed from sediment and is then further neutralized and washed to obtain a demulsifying agent.

Apparatus for dehydrating petroleum emulsions or similar emulsions by electric

treatment. W. O. EDDY (to Petroleum Rectifying Co. of Calif.). U. S. 1,674,242 June 19.

Distilling oil shale or other solid carbonaceous material. M. J. TRUMBLE. U. S. 1,674,420, June 19. Steam is passed through the material to preheat it and effect distn. The residue is treated with superheated steam under pressure at a temp. which will effect destructive distn. and satd. steam is then passed through the residue to raise the temp. of the steam which is then used for the first step of the process. An app. is described. Cf. C. A. 22, 1672.

Processing shale. W. H. HAMPTON. Can. 280,272, May 22, 1928. An intimate mixt. of solid bitumeniferous matter and a base with an oil is digested at temps. within the approx. range of from 600° to 700° F. to liberate NH_3 and volatilize certain valuable hydrocarbon oil fractions.

Processing shale. W. H. HAMPTON. Can. 280,617, May 29, 1928. Bituminiferous solid material, such as shale, etc., is digested in comminuted condition with a suitable digestion liquid, such as an oil, the products vaporized in the digestion being recovered and the residual solid matter sepd. from the digestion liquid by centrifuging.

Gasoline recovery. T. DOBRESCU. Can. 280,614, May 29, 1928. Gasoline is extd. from petroleum gases by adsorptive agents such as activated C, at high temp., the rate of flow of the gases and the temp. being controlled in such a manner that the adsorption of other gases is avoided as much as possible and the adsorption agent is charged substantially only with the gasoline.

Lead tetraethyl. H. W. DOUDT. Brit. 279,106, Oct. 15, 1926. Mg Et_2 chloride is caused to react upon Pb salts, e. g., Et_4PbCl may be added to Mg turnings in the presence of ether contg. a small proportion of MeI and I , and the resulting soln. then treated with a suspension of PbCl_2 in ether for several hrs., the product poured into water, the ether distd. and the Et_4Pb recovered by steam distn.

Lubricant. H. DIMMIG. Can. 280,036, May 8, 1928. An oil compn. comprises a soln. of hydrocarbon oil and lead oleate.

Lubricant. M. C. VAN GUNDY and H. DIMMIG. Can. 280,037, May 8, 1928. A mixt. of oleic acid and lead oxide is heated to approx. 520–525° F., thereby forming normal lead oleate, which is then mixed with lubricating oil.

Use of lubricants. G. WISNER. U. S. 1,672,922, June 12. A "neutralizing substance" such as stearic acid is used for coating surfaces outside of and around clock bearings or like surfaces to be lubricated, and the surface to be lubricated is then treated with mineral oil or other lubricant of small cohesive properties, the creeping of which is prevented.

Filter for lubricating oil, etc. R. P. F. LIDDELL (to Union Tru t Co. of N. Y.). U. S. 1,673,572, June 12.

Apparatus for separating gas, oil and water by gravity. V. CHANCELLOR and S. L. CALVERT. U. S. 1,673,663, June 12.

Extraction of tar sand. C. KNIGHT. Can. 278,861, March 27, 1928. The crude petroleum and asphaltum content in bituminous or tar sands is liquefied by treating such sands while heated to a proper temp. with H_2O to which has been added sufficient distillate and a proper percentage of NaCl .

Extraction of tar sand. C. KNIGHT. Can. 278,862, Mar. 27, 1928. The crude petroleum and asphaltum content of bituminous or tar sands is liquefied by using superheated air with either hot or cold distillate along with a proper percentage of NaCl or Na_2CO_3 delivered under pressure through a pipe or air line passing through the overburden into the sands.

Bituminous composition. L. KIRSHBRAUM. Can. 279,241, Apr. 10, 1928. An emulsion comprises bitumen forming the internal phase and H_2O and bentonite forming the external phase.

Bituminous emulsions. SOC ANON LA TRINIDAD. Brit. 279,026, Oct. 15, 1926. Asphalt or other bituminous material contg. pulverulent or colloidal mineral matter is mixed with an anhyd. emulsifying agent such as a Na or K soap contg. 1–8% of added com. olein. The mixt. may be converted into an emulsion by stirring it with cold water. Tar, schist oil or residual oil of petroleum may be mixed with the bituminous material used. Cf. C. A. 22, 316.

Cellular bituminous material. J. H. YOUNG (to H. H. Robertson Co.). Brit. 279,360, Nov. 8, 1926. See U. S. 1,630,103 (C. A. 21, 2383).

Asphaltic material. W. C. WEST. Can. 279,421, Apr. 17, 1928. An asphaltic compn. includes a mineral aggregate, a semi-liquid asphalt or asphaltic flux and a hard asphalt remaining unblended while cold but adapted to blend with the asphalt or asphaltic flux upon the application of heat.

Petroleum asphalt. E. A. RUDIGIER (to Standard Oil Development Co.). U. S. 1,673,533, June 12. Petroleum still residuum at a temp. of about 215° is transferred from reducing stills to a heat-insulated container and blown with air, without applying external heat. An app. is described.

Acetic acid. W. ZEISS. Can. 278,933, March 27, 1928. AcOH is produced by acting with H₂SO₄ on Ca pyrolignite dissolved in a mixt. of CaSO₄ and AcOH.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Problems in cellulose chemistry. K. HESS. Kaiser-Wilhelm-Inst., Berlin. Z. *Furben-Ind.* 20, 57-60, 135 5(1928); cf. C. A. 18, 1384; 20, 664, 2410, 2663; 21, 173.—A review.

FREDERICK C. HAHN

Cellulose resources. III. Cost of field crops for cellulose. GEORGE M. ROMMEL. *Ind. Eng. Chem.* 20, 716 9(1928).—Approx. costs per ton are given for cellulose field crops as follows: corn stalks, \$8 00; straw, \$7.50-\$14.00. Corn stalks contain 40% "extractable" cellulose. Pulp from corn stalks averages 95.6% α -cellulose. The economic effect of diverting such field crops to the manuf. of cellulose is problematical since there is no satisfactory information on their food value and on their fertility value.

J. S. REICHERT

Influence of the preliminary alkaline treatment in the preparation of cellulose with chlorine gas. FRANCESCO GIORDANI. Reale Scuola di Ingegneria Napoli. *Ann. chim. applicata* 18, 87-90(1928).—Expts. carried out over a long period by G. and his collaborators (cf. Bakunin, *Giorn. chim. ind. applicata* 3, 517(1921); G., *Boll. soc. naturalisti Napoli* [2], 38, 260(1924); G. and Cittadini, C. A. 21, 2984; *Atti ist. inc. Napoli* [6], 80, 3(1928)) are at variance with the results recently published by Mutti and Venturi (C. A. 22, 316). According to G., the yield of cellulose from esparto increases to a max. at 3% NaOH and then decreases with further increase in the concn. of alkali. Furthermore at 3% concn. of NaOH, the consumption of NaOH increases notably and becomes greater than that of Cl, so that the general economy of the process, which is based on the utilization of excess Cl, is destroyed. The % α -cellulose varies irregularly so that no conclusions can be drawn. The α -cellulose and Cu no. show that the Cl gas method of treatment is not so inefficient as often considered. The consumption of NaOH and therefore the efficacy of the preliminary alk. treatment depends upon the ratio between the wt. of fiber and vol. of NaOH soln., which in industrial practice is approx. 1 kg. per 5 l. Data show that the relative consumption of NaOH and of Cl varies greatly with the ratio of wt. of fiber to vol. of alk. soln., the quantity of NaOH relative to Cl consumed decreasing with decrease in the vol. of soln. of a given concn. Thus with 2% NaOH, the following results were obtained with ratios of 1/10 and 1/7.5: NaOH consumed 43.5, 24.0; Cl consumed 57.0, 54.0; yield of cellulose 50.0, 55.6; % α -cellulose 78.7, 71.8; Cu no. 1.9, 1.8. This is a typical case showing that with diminution in the quantity of NaOH and of Cl consumed the yield and quality of the product improve.

C. C. DAVIS

Mercerization of sulfite cellulose. V. I. SHARKOV. *J. Chem. Ind. (Moscow)* 3, 1148-9(1926).—In the manuf. of viscose the first stage consists in mercerizing sulfite cellulose by NaOH. An investigation of this operation by D'Ans and A. Jäger (C. A. 20, 819) has shown that the max. of swelling of sulfite cellulose is with 11-13% NaOH solns. and that NaCl, Na₂CO₃, or sugar, alc., tannin and other substances decrease the swelling of cellulose during mercerization. S. undertook to study this phenomenon in greater detail, using sulfite cellulose cardboard, and came to the same general conclusions as D'Ans and Jäger. He gives 4 diagrams and 2 tables. The max. of swelling is with approx. 14% NaOH solns. or 17% KOH solns. In absorption of alkalis by cellulose the equil. of the system is reached after 30 sec. provided the soln. has a free access to each sep. fiber. Alc. or glycerol added to the NaOH soln. lowers the extent of swelling more than any other substances.

BERNARD NELSON

State of aggregation of cellulose acetate. H. PRINGSHEIM, W. KUSENACK AND K. WEINREB. *Papier-Fabr.* 25, 785-9(1927).—The viscosities in cuprammonium soln. of a sample of cellulose, of the same material after heating to 125°, after treating 4 hrs. with 50% NaOH, and after treating for 3 days with thrice its wt. of 16% NaOH were, resp., 5.41, 3.49, 2.58 and 1.62. The viscosities of the acetates prepd. from these samples (in tetrachloroethane) were, resp., 2.13, no change, 1.64 and 1.53. The viscosity of the cellulose regenerated from the acetates ran parallel with that of the

acetates. By heating the acetate of the alkali-treated cellulose to 250–5° in naphthalene, its viscosity was further reduced; cellulose obtained by hydrolysis of this acetate had a viscosity of 1.24. The lowest viscosity obtained by heat-treatment of the acetate was 1.19, but even this acetate was insol. in MeOH, and therefore the cellulose from which it was derived still possessed a higher state of aggregation than glucose anhydride.

R. H. DOUGHTY

The chemistry of wood. I. Analysis of wood rays in hardwoods. WM. M. HARLOW AND LOUIS E. WISE. *Ind. Eng. Chem.* 20, 720–2(1928).—Wood rays were isolated by mech. means from white oak and flame she-oak and subjected to chem. study. Ash, hot water-sol., alc.-benzene ext., lignin, cellulose and pentosans were detd. in the total wood and in the wood rays. The wood rays are higher in lignin and lower in cellulose than the total wood in both species. With flame she-oak the sum of the alc.-benzene sol., lignin, pentosans and pentosan-free cellulose accounts for approx. 95% of the sample, both for the wood rays and for the total wood. With white oak the sum of the water-sol., lignin, pentosans and pentosan-free cellulose accounts for approx. 97% of the dry sample, both for the wood rays and for the total wood.

J. S. REICHERT

[Caustic] soda recovery plant [for use with waste liquors from esparto grass digestion]. J. HOLMES. *Proc. Tech. Sect. Papermakers' Assoc.* 7, 27–45(1926).—The low heat efficiency of soda recovery units of the usual design is discussed, and a description is given of the Holmes closed system of recovery in which a considerable economy of heat is realized by blowing the digester charge into a closed pressure tank, which also receives the relief steam from the digester during the cook. Feed liquor to the evaporator is withdrawn from the bottom of this tank, and the steam available from the pressure reduction is used to heat the first effect of the evaporator. Heat exchangers are placed in the vapor pipes of the evaporator to effect the transfer of heat to the wash liquor and to fresh caustic liquor. The operation of the vacuum evaporator is dealt with in detail, and emphasis is laid on the reduction of efficiency caused by air leaks, gases dissolved in the liquor and scale. The prospect of utilizing the heat, which under the present system is dissipated in the roaster, is also discussed, and it is suggested that, given reasonably efficient plant, the total heat recovered should supply not only the soda recovery plant, but also the digesters.

B. C. A.

Preparation of bleaching liquors from liquid chlorine. H. WREDE. *Papier-Fabr.* 25, 817–24(1927).—Methods and app. used in American paper mills are described and discussed.

R. H. DOUGHTY

Caroá fiber as a paper-making material. M. B. SHAW AND G. W. BICKING. U. S. Bur. Standards, *Tech. Paper* No. 340, 21, 323–46(1927).—Exptl., followed by semi-com., cooks indicate that caroá fiber could be satisfactorily used for paper-making. The yield, soda consumption and the character of the pulp depend to some extent on the preliminary treatment of the raw material. Retting appears to give the most favorable results, a 55.3% yield of pulp (dry pulp on dry material after cutting and dusting) being obtained by digestion with 25% of caustic soda for 4 hrs. at 172°. When bleached with 10% of bleaching powder the product compares favorably with rag pulp and is capable of furnishing paper of high strength. The semi-com. trials were made on unretted fiber that had been beaten dry, and gave lower yields of bleaching pulp, e. g., 49.5–51.5%. Caroá fiber has a fiber length of 2.25–5.75 mm. (av. 4 mm.) and a thickness of 0.0046–0.0154 mm. (av. 0.01 mm.), and should therefore have good felting properties. When less soda is used pulps are obtained which, though technically unbleachable, provide excellent wrapping papers equal in strength to those made from kraft pulp. There is no organized caroá industry at present, but the economic availability of the fiber for paper-making appears promising. The paper-making equipment and the technic employed in paper-making research are described in detail.

B. C. A.

Gelatin. J. S. ALLAN. *Proc. Tech. Sect. Papermakers' Assoc.* 7, 69–87(1926).—The properties of gelatin, more especially in relationship to the sizing and coating of paper, are reviewed.

B. C. A.

Tanning materials from cellulose (ESOURROU) 27. Genuine lignin. I. Acetylation of pine wood (FUCHS) 10.

Cellulose. A. CLASSEN. *Brit.* 279,147, June 7, 1926. Finely divided cellulose is obtained from wood meal, paper refuse or like material by dissolving in strong HCl with or without another strong acid such as H₂SO₄ or H₃PO₄ at a temp. of about 0° or lower (preferably with introduction of gaseous HCl), sepp. any undissolved material,

and adding a pptg. agent such as an alkali salt, *e. g.*, an alkali metal chloride or Na or NH_4 sulfate. Straw is also mentioned as a raw material.

Cellulose. P. J. A. MAIGNEN. U. S. 1,672,895, June 12. Raw plant material such as straw, grasses, wood or pine needles is subjected to the progressive action of a soln. of NaOH generated in the cooker used from Na_2CO_3 and $\text{Ca}(\text{OH})_2$ in water, at atm. pressure; the cellulose produced may be used for making paper, and the soln. of non-cellulosic substances may be used as a fertilizer.

Cellulose rich in α -cellulose. BROWN CO. Brit. 278,767, April 13, 1926. Bisulfite pulp is treated with NaOH or other alkali to effect purification without mercerization and obtain a product suitable for making cellulose esters or ethers or for making high-grade paper. An app. is described.

Cellulose from wood. I. G. FARHENIND. A.-G. Brit. 279,036, Oct. 13, 1926. Material such as moist fir wood is treated (in a modification of the process described in Brit. 274,892 (C. A. 22, 2273) first with air contg. oxides of N so that HNO_3 is formed in the material and then, for several hrs., with air alone. A temp. of 40–50° is suitable.

α -Cellulose fiber. G. A. RICHTER and M. O. SCHUR. Can. 278,538, Mar. 13, 1928. An alk. digesting liquor is mixed with an aq. suspension of chem. wood pulp of a predetd. consistency, and such mixt. is thickened to a predetd. consistency, the pulp then being digested in the alk. liquor

α -Cellulose fiber. G. A. RICHTER. Can. 278,540, Mar. 13, 1928. Predigested pulp is digested in an alk. liquor contg. Na compds. recovered from the spent liquor resulting from the digestion of raw cellulosic material in the production of pulp together with the spent liquor resulting from the digestion of predigested pulp with alk. liquor.

α -Cellulose fiber. G. A. RICHTER. Can. 278,541, Mar. 13, 1928. Predigested pulp is digested in an alk. liquor, the spent liquor is mixed with waste liquor from the kraft process and Na is recovered from the mixed spent liquors.

α -Cellulose fiber. G. A. RICHTER. Can. 278,543, Mar. 13, 1928. Raw pulp is digested at a relatively low temp. in a liquor contg. an alkali and an oxidizing agent, and the pulp is then digested in an alk. liquor at elevated temp.

α -Cellulose fiber. G. A. RICHTER. Can. 278,544, Mar. 13, 1928. Pulp is treated with a NaOH soln. at a temp. considerably below 212° F., the NaOH being present in an amt. sufficient to render sol. a substantial proportion of the less resistant celluloses, ligneous and other coloring substances, but insufficient to cause a mercerization of the α -cellulose content.

Treatment of cellulose fiber. G. A. RICHTER. Can. 279,811, May 1, 1928. Cellulose fiber is treated with a NaOH soln. of mercerizing strength, the treated fiber is aged to effect a depolymerization of the same, and the fiber is then washed and digested in an alk. soln.

Process and apparatus for treating fiber. G. A. RICHTER. Can. 278,542, March 13, 1928.

Cellulose film fabric. H. DREYFUS. Can. 279,892, May 8, 1928. Artificial filaments or threads are made from cellulose esters of viscosities exceeding about 50 by spinning solns. of such cellulose esters, the solns. comprising a small proportion of a high-boiling liquid.

Digesting cellulose. R. PICTET and F. THARALDSEN. Can. 279,430, Apr. 17, 1928. Cellulose pulp is produced by treating wood, etc., under pressures above 8 atms. and under heat not exceeding 110°, with highly concd. aq. solns. of H_2SO_4 contg. more than 100 g. of SO_2 per l.

Coloring cellulose esters and ethers. M. J. THEUMANN. Can. 278,978, Mar. 27, 1928. An inorg. coloring matter is produced by chem. reaction, in a soln. of the cellulose deriv. to be colored. The colored cellulose deriv. is subsequently pptd. from the soln. by a liquid which dissolves the solvent of the ester or ether, and in which both the ester or ether and the produced coloring matter are insol.

Cellulose compounds. L. LILIENFELD. U. S. 1,674,401, June 19. Cellulose thiourethans and their substitution derivs. are formed by treating viscose or the like with monochloroacetic acid or other suitable monohalogen deriv. of a fatty acid and then treating the resulting reaction product with aniline or similar aromatic amine. The products are suitable for making films, threads, plates, etc., and are insol. or but slightly sol. in water but are sol. in alkalies and may be pptd. by neutralizing the alkali. They are also sol. in aq. pyridine and various other org. solvents. Numerous details and examples are given. U. S. 1,674,402 relates to the production of Et or other alkyl esters of cellulose thiourethans. The products dissolve in C_6H_6 -alc. mixt., MeOH-MeOAc mixt. and alc.-acetone mixt. and may be used in coating compns., as substitutes for celluloid, artificial silk, for elec. insulation, coating fabric for artificial leather for binding books or for similar purposes. Numerous details and examples are given.

U. S. 1,674,403 specifies artificial products such as may be formed with a cellulose aryl-thiourethan and a plasticizing agent.

Cellulose derivatives. I. LILIENTHAL. U. S. 1,674,404, June 19. Films, threads or other products are formed by bringing an aq. alk. soln. of a cellulose phenylthiourethan into the desired form and treating it with H_2SO_4 of 50-78% strength or other suitable acid bath which may also contain various admixts. U. S. 1,674,405 specifies treating viscose with monochloroacetic acid or similar monohalogen fatty acid and then treating the product with NH_3 to obtain compds. having properties similar to those of U. S. 1,674,401. Cf. C. A. 21, 822.

Films of cellulose derivatives. I. G. FARBER. A.-G. Brit. 279,047, Oct. 16, 1926. In app. for making films, the surface of the support consisting of a cellulose deriv. such as nitrocellulose is subjected to sapon., denitration or like treatment, *e. g.*, by use of a soln. of Na hydrosulfide or NH_4 sulfide, so that the support will not swell nor dissolve in the solvent used for making the film-dope.

Solutions and products from cellulose esters and ethers. H. J. HANDS and S. ICERS, LTD. Brit. 279,139, April 21, 1926. Chloropropanes contg. at least 4 Cl atoms are used (suitably with various other solvents, plasticizing agents and the like) with cellulose acetate or other esters or ethers of cellulose or other carbohydrates in forming coating compus., artificial threads, films, molded articles, etc.

Applying cellulose esters and ethers. G. SCHNEIDER. Can. 277,599, Jan. 31, 1928. Metallic effects obtained by rubbing crystals of metallic salts on polished surfaces of cellulose derivs. are preserved by coating the surfaces so treated with a soln. of a cellulose deriv. in a solvent which does not dissolve the cellulose deriv. forming the base. Cf. C. A. 22, 2273.

Composition of sulfur and cellulose. M. DARRIN. Can. 277,710, Feb. 7, 1928. A compn. of matter comprises approx. 20-35% cellulose and the remainder chiefly S.

Ligninsulfonic acid. J. BADDILEY and A. J. HAILWOOD. Can. 280,152, May 15, 1928. New, technically valuable, products are manufd. by the moderated oxidation of sulfite cellulose pitch with HNO_3 .

New derivatives of ligninsulfonic acid. H. ADAMS and A. SHEPHERDSON. Can. 279,809, May 1, 1928. New derivs. of ligninsulfonic acid (sulfite cellulose pitch) are manufd. by treating the acid at an elevated temp. with NaOH followed by an acidifying treatment.

Apparatus for dry-spinning of cellulose acetate filaments, etc. COURTAULDS, LTD. AND F. D. LEWIS. Brit. 278,814, July 19, 1926. Threads of the highest luster and free from glitter are obtained by employing a temp., at and near the nozzle, approaching the highest temp. compatible with continuous spinning; lowering the temp. decreases the luster and later leads to production of threads showing the effect of glitter. The max. temp. used depends on various other factors of the process.

Apparatus for dry-spinning artificial silk filaments. COURTAULDS, LTD. AND C. F. TOPHAM. Brit. 278,881, Oct. 11, 1926.

Filaments of artificial silk or other materials. J. G. JACKSON. U. S. 1,672,943, June 12. Filaments as they are extruded into a coagulating bath are subjected to a vibratory wave effect which may be induced by injecting a fluid through a nozzle adjacent the spinning nozzle. The filament formed thus assumes a permanently waved effect and its flexibility and elasticity are improved. An app. is described.

Artificial silk. H. SCHMIDT and E. HUBERT. Can. 279,296, April 10, 1928. In the manuf. of artificial silk from a cuprammonium cellulose soln., the spinning is effected in a pptg. bath contg. free CO_2 or a bicarbonate.

Rayon threads, films, etc. W. H. BRADSHAW. Can. 279,630, Apr. 24, 1928. Threads, films, sheets, etc., are prepd. from cellulosic materials by treating a prepd. cellulose contg. 98-100% α -cellulose with a cuprammonium soln. and mechanically working the mass in a closed mixer contg. a relatively small amt. of air.

Rayon. G. A. RICHTER. Can. 279,610, Apr. 24, 1928. Viscose rayon is manufd. by rapidly heating an aq. soln. of cellulose xanthate immediately prior to spinning it, spinning such soln. while so heated into filaments, and delivering the filaments into a setting bath.

Artificial textiles. T. KOCH. Can. 280,291, May 22, 1928. Artificial textile products are prepd. from viscose, substances being added to the viscose which are emulsifiable with the same but which during the subsequent process do not yield gas but evap. on drying the thread after fixation.

Artificial textiles. T. KOCH. Can. 280,292, May 22, 1928. In the prepn. of artificial textile products with reduced luster, substances are added to the spinning

soln. which are emulsifiable with the same and which practically do not evolve gas during the subsequent spinning process.

Pulping wood. F. G. RAWLING. U. S. 1,673,089, June 12. See Can. 271,900 (C. A. 21, 3743).

Wood pulp. L. BRADLEY and E. P. MCKEEFE. Can. 279,696, Apr. 24, 1928. Wood is cooked in a liquor comprising substantial amts. of NaOH, Na₂S and Na₂SO₃. Cf. C. A. 22, 868.

Wood pulp. L. BRADLEY and E. P. MCKEEFE. Can. 279,697, Apr. 24, 1928. Wood chips are digested with a cooking liquor which contains Na₂S and Na₂SO₃. The residual liquor thus produced is concd., the org. compds. are decomposed and a product is formed which contains Na₂CO₃. A soln. of the soda compds. is prep'd., and the soln. treated with a sulfite, whereby Na₂CO₃ is converted into Na₂SO₃. The liquor thus produced is employed in the cooking step.

Sulfate pulp. G. A. RICHTER. Can. 279,810, May 1, 1928. Raw cellulosic material is cooked in an alk. soln. of NaOH and Na₂S and the Na compds. of the waste cooking alk. liquor are melted in an oxidizing atm., the resulting Na compds. being recovered in soln. Such soln. is acidified with SO₂ and cellulosic material is cooked in such acid soln., the Na compds. of the waste acid cooking liquor being smelted and the resulting Na compds. being recovered in an alk. soln. Any Na₂CO₃ in such soln. is causticized with lime and the insol. carbonate removed. Raw cellulosic material may then be cooked in the resulting soln., a cyclic operation thus being completed.

Molding receptacles of waterproofed wood pulp with an exterior layer of absorbent pulp (for cooling by evaporation, etc.). J. J. H. STURMEY. Brit. 279,210, Sept. 4, 1926. Mech. features.

Apparatus and method of forming receptacles from fibrous pulp by felting and pressure. J. B. HAWLEY (to Arvey Mfg. Co.). U. S. 1,673,047, June 12.

Paper-making apparatus. W. H. MILLSPAUGH. Brit. 278,817, July 20, 1926

Suction box for paper-making or similar apparatus. G. PEEBLES (to Selbec, Inc.). Brit. 279,048, Oct. 12, 1926.

Apparatus for refining paper pulp. L. A. THOMAS. U. S. 1,674,231, June 19.

Insulating paper. R. P. ROSE and H. E. CUDE. Can. 279,628, Apr. 24, 1928. An insulating paper comprises rosin-sized hydrated cotton fiber, rubber and a protective colloid including an acetylated starch and a sol. silicate.

Carbon paper. F. PELTZER & Co. Brit. 279,375, Oct. 23, 1926. Very thin paper is used and a very thin film-like coating is applied so that the product is suitable for attachment to the original and may be used once and discarded because of its cheapness. The viscosity of the usual coating compn. may be modified by the addn. of fatty acids such as stearic acid, carnauba wax, montan wax, neutral fats, hydrocarbons or higher alcs.

Protecting cardboard containers or other articles against moisture. L. RADO and J. MODERN. Brit. 278,775, June 8, 1926. Composite sheets of Al foil and paper are used.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

The influence of different kinds of stemming on the efficiency of explosives. JOS. JØRSTEN. *Z. ges. Schiess-Sprengstoffw.* 22, 346-8(1927).—Five explosives of different types, viz., gelatin dynamite, kieselguhr dynamite (75%), an NH₄NO₃ explosive, a NaClO₄ explosive and a KClO₄ explosive, were tested by the Trauzl Pb block test to det. their efficiency with various kinds of stemming materials. The results with loam were approx. as good as with cement, and better than those with water, sand or rock dust.

C. G. STORM

Flame movement in gaseous explosive mixtures. O. C. DE C. ELLIS. *Fuel in Science and Practice* 7, 195-205(1928); cf. C. A. 21, 1356, 2065.—When an explosive mixt. is ignited at the center of a spherical vessel, the pressure is communicated along a falling gradient, and is accompanied by a surge in the gas. There is a finite period between ignition and the moment at which pressure is increased at any point from the ignition point. The pressure is generated from the expanding layer of gas adjacent to the flame-surface and within it. Pressing outwards, it displaces the flame-surface, increasing the vol. of the flame-gases and compressing the unburned gas surrounding the flame; inwards it compresses the flame gases. The first function decreases as the vol. of the flame grows. When the vol. of the flame is approx. half the vol. of the sphere,

the pressure generated is distributed equally outward and inward. After this critical moment, the second function is increasingly marked as the vol. of the unburned gas decreases. There is, therefore, a gradual arrest of the distension of the flame which reaches a critical point when the vol. of the flame is approx. half that of the explosion-vessel—within a sphere when the diam. of the flame is approx. 0.8 that of the vessel. This arrest would not occur if the gas were not enclosed, because in that case there would be no increase in pressure in the unburned gas, surrounding the flame. Numerous illustrations are included.

D. A. REYNOLDS

Theories of combustion processes. N. SEMENOV. *Z. Physik* **48**, 571-82(1928).—Explosions are shown to be of 2 types: (1) Heat explosions, in which heat is liberated by the reaction at the start faster than it is removed through the walls of the vessel; hence the resulting increase in temp. produces an infinite reaction velocity. (2) Chain reactions in which, according to Arrhenius, the excess energy of an excited mol. is given by collision to a normal mol. of the reacting substance, thus causing it to become excited and finally producing an infinite reaction velocity. Reactions of type (1) have for each temp. a crit. d. below which the explosion will not take place. The equation relating the crit. d. to temp. is derived. Reactions of type (2) have a crit. d. which is independent of the temp. and is very small. If, in type (2), the no. of mols. activated in unit time is very small some time may elapse after the mixing of the reactants before ignition takes place. The ignition may be hastened by increasing the pressure above the crit. pressure. In order to check the reaction, however, the pressure must be lowered below its crit. value. Exptl. evidence supporting these ideas is to be published.

H. F. JOHNSTONE

The denitration of spent acids under reduced pressure. ARNOLD SCHMID. *Z. ges. Schiess-Sprengstoffw.* **22**, 354-8(1927).—In the usual process for denitration of spent acids from the manuf. of *nitroglycerin*, the effect of steam is to convert a large part of the original 12% of HNO_3 to oxides of N, and the recovered HNO_3 is in a much diluted condition. Also the recovered H_2SO_4 is of only about 70% strength. S. describes a new vacuum process of denitration which yields 98-100% HNO_3 practically free from N_2O_5 , and H_2SO_4 of about 83%. About 70% of the HNO_3 is recovered by slow heating up to about 110° at reduced pressure. Further heating up to 150° without diln. removes the remainder of the HNO_3 and completely oxidizes all org. matter to CO_2 and H_2O , leaving the H_2SO_4 free from such impurities. Exptl. work leading to the development of the process is discussed and a plant layout described.

C. G. STORM

Recovery of HNO_3 from waste nitrating acid (Can. pat. 277,995) 18.

25--DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

The relation between the chemical constitution and the color of dyestuffs. S. R. TROTMAN. *Dyer, Calico Printer* **59**, 208-9(1928).—A general theoretical discussion.

RUBY K. WORNER

Studies of dibenzodithiazinequinones, a class of the vat dyestuffs. II. Reaction between nitric acid and dibenzodithiazinequinone. R. SHIBATA. *J. Soc. Chem. Ind. (Japan)* **31**, 73 5, *Suppl. binding* [in English], 23-4B(1928); cf. *C. A.* **22**, 1585.—When dibenzodithiazinequinone was treated with the mixt. of fuming HNO_3 and glacial AcOH in the cold, a powdery substance was obtained. It resembles Orange II in color, is sol. in dil. alkali, and forms cryst. compds. with NaOH , KOH and NH_4OH , which are sol. in H_2O and crystallize out from the soln. on addn. of alc. From the hyposulfite vat contg. NaOH , it gives the same shade on fibers as dibenzodithiazinequinone. By analysis, it has been found that the action of the above mixed acid upon dibenzodithiazinequinone is an oxidation, not a nitration, resulting in the formation of the corresponding disulfoxide.

Y. TOMODA

Testing the permanence of dyes in light. W. KACZKOWSKI. *Przemysl Chem.* **12**, 141-5(1928).—Factors which influence the rate of fading of dyes in light are enumerated. The effect of the fiber is stressed. Sunlight is so varied with location, season and even time of day that it is not suitable for testing. A standardized artificial light source is indispensable for quick comparisons. The quartz lamp is too rich in the ultra-violet spectrum. "Osram" and "Philips" lamps are satisfactory in respect to the character of their light.

A. C. ZACHLIN

Printing of cellulose acetate rayon mixed fabrics. ERICH HEIM. *Z. Farben-Ind.* 20, 65-6(1928).
FREDERICK C. HAHN

The present position of the dyeing of artificial silks. H. H. HODGSON. *Z. Farben-Ind.* 20, 66-8(1928).—A review.
FREDERICK C. HAHN

Unequal dyeing of rayon. H. HOZ. *Z. Farben-Ind.* 20, 68-70(1928).—Uneven dyeings which are often obtained with rayon are due to unevenness of surface and non-uniformity of internal structure of the filament. A number of dyes are mentioned, however, which minimize the effect of the foregoing unevenness.
F. C. H.

Dyeing of straw. ADOLF GEBHARDT. *Z. Farben-Ind.* 20, 71-6(1928).—A general article on the bleaching of straw, and on the dyeing of raw and bleached straw with different types of dyes.
FREDERICK C. HAHN

Uneven dyeing. J. MOFFAT. *Dyer, Calico Printer* 59, 182-3, 206-7(1928).—Among the causes of uneven dyeing are: impurities, especially Fe, in H₂O; alkali used in scouring, alkali migration; selection of dyestuffs; temp. at which addns. are made to the dye bath; machine used in dyeing; uneven temp. in the dyebath; oil used in carding; mixts. of wool. The use of leveling agents is advised in case of trouble.
R. K. W.

Production of bright colors on textile fabrics. XXXIII. RAFFAELE SANSONE. *Am. Dyestuff Rept.* 16, 623-6(1927); cf. *C. A.* 21, 3747.—Bright colors with basic dyes, the oil mordanting process and the construction and operation of the machinery required are the subjects of this paper. XXXIV. *Ibid* 671-2.—The construction and operation of a drying app. are described. XXXV. *Ibid* 17, 355-9(1928).—The equipment and operations of the Al(AcO)₃ processes are described.
L. W. RIGGS

Dyeing union materials consisting of cotton and (viscose) artificial silk. W. ALTERHOFF. *Melliand's Textilber.* 8, 795-6(1927).—In dyeing cotton-viscose silk materials, level shades may be obtained if the gray material be scoured for 1/2 hr. in a boiling bath contg. 1 g. of soda ash and 0.5 g. of Monopole soap per l., and then entered into a boiling liquor contg. 20% of Glauber's salt and 1 g. per l. of a sol. oil (e. g., Monopole Brilliant oil or Aviroil KM), the dye being added after 1/4 hr. and dyeing continued for 3/4-1 hr. at the boil and 1/2 hr. in the cooling dye bath. The dyed material is then washed and scoured in a warm bath containing acetic or formic acid, a small quantity of a suitable oil being added if a soft handle be desired.
B. C. A.

Preliminary treatment and dyeing of acetate silk. NOVOSILK. *Kunstseide* 9, 599-606(1927).—A general article.
FREDERICK C. HAHN

Studies on natural silk. I. Iodine-absorbing power of silk fibroin. T. TAKAHASHI. *J. Soc. Chem. Ind. (Japan)* 31, 152-5; *Suppl. binding* [in English], 42B(1928).—Silk-fibroin, which had been treated with various reagents and regenerated, showed various iodine-absorbing power. This shows that the chem. reactivity of fibroin depends greatly on the fibrous structure.
Y. TOMODA

Silk degumming. V. Influence of fatty acid upon silk degumming. T. TAKAHASHI. *J. Soc. Chem. Ind. (Japan)* 31, 148-51; *Suppl. binding* [in English], 41B(1928); cf. *C. A.* 22, 2468.—Fatty acid prevents the degumming of silk either in acid or in alk. medium, but the effect is not distinct when the acidity of the medium is stronger than the isoelec. point of sericine. The degumming action of soap soln. is due to its alky., by which the sericine becomes solvated; the fatty acid or acid soap liberated as the result of combination of alkali with sericine is adsorbed on the fiber and protects the fiber better from the further action of alkali.
Y. TOMODA

Soaking raw silk for crepe yarns and producing crepe effect in fabric. WARREN P. SEEM. *Textile World* 73, 3701-3(1928).—A discussion of the factors affecting shrinkage of silk fabric and the materials used for soaking raw silk for crepe.
RUBY K. WORTER

Advantages of controlling hydrogen-ion concentration in wet processes of wool manufacturing. CHAS. E. MULLIN. *Textile World* 73, 2623-7, 3094-6(1928).—Possible applications of pH control in the wool industry are discussed.
RUBY K. WORTER

Cockles in woolen goods. TEXTUS. *Textile World* 73, 3579(1928).—A brief discussion of their cause and prevention.
RUBY K. WORTER

Fiber cross-sections. A. HERZOG. *Kunstseide* 9, 558-61(1927); cf. *C. A.* 21, 2563.—A quick method for the prepn. and examn. of fiber cross-sections is described, which depends on cementing a bundle of fibers together with collodium, cutting a cross-section thereof, covering the cross-section with paraffin oil contg. some sol. dye and then examg. microscopically. Methods of illumination and photographing are described.
FREDERICK C. HAHN

Changing and sampling of colors under different conditions of light. G. RUDOLPH. *Kunstseide* 9, 561-5(1927).—A discussion of difficulties in matching colors, and methods of avoiding these difficulties by the use of different sources of light.
F. C. H.

Determination of rayon and silk in woolen goods. P. M. GREMPE. *Kunstseide* 9, 570-1 (1927).—The tests given are based on the fact that wool and silk dissolve in 3% NaOH soln. while the rayon is insol. The treatment of the alk. soln. with Na_2PbO_2 gives a brown to black color with wool, but no color with silk. FREDERICK C. HAHN

Stretching of rayon. W. ALTERHOFF. *Kunstseide* 9, 571-2 (1927).—Some suitable methods of sizing rayon are described, and tests on the sized rayon show improved stretching properties. FREDERICK C. HAHN

The scouring of rayon. FRED. GROVE-PALMER. *Am. Dyestuff Rept.* 17, 342-4 (1928).—Because of the frail quality of rayon fiber, especially when wet, it must be handled with care. Only easily saponifiable oils should be used in lubricating the fiber, and kerosene should be avoided in the degumming process on account of the sticky residue which it leaves. L. W. RIGGS

Testing of wetting-out agents. H. C. ROBERTS. *Am. Dyestuff Rept.* 17, 339-42 (1928).—The methods of Auerbach (cf. *C. A.* 20, 3575), Frieberger, Voltz and Lawrie for wetting-out textiles are compared. From the author's expts. it appears that some factor other than the fat content detcs. the superiority of one wetting-out agent over another. L. W. RIGGS

Increasing the production of cotton padders. REYNOLDS LONGFIELD. *Am. Dyestuff Rept.* 17, 349-55 (1928).—A description is given of the procedure followed in the dye-house of a cotton-finishing plant for increasing production per man-hour and per machine-hour without investment for addnl. equipment. In this instance the av. daily wages per man increased 25%, production per machine 36%. The av. unit labor cost decreased 27.5% and the annual reduction in labor cost per million yards was \$20,000. L. W. RIGGS

Effectiveness of materials used for waterproofing canvas, and their influence on the fabric. T. D. JARRELL AND H. P. HOLMAN. *Textile World* 73, 3103-5 (1928); cf. *C. A.* 21, 3132.—Samples of canvas variously treated and exposed to the weather for 6 months showed the following decreases in strength: untreated, 39%; treated with 85% yellow petrolatum and 15% beeswax, 90%; with raw sienna added to the petrolatum and beeswax treatment, 23%; with burnt umber incorporated, 19%; treated with boiled linseed oil, 65%; with burnt umber added to the linseed oil, 47%; with Al bronzing powder added to linseed oil, 18%; with lampblack added to linseed oil, 13%; and treated with paraffin, 81%. Thus the oily, greasy or waxy waterproofing materials tried, with the exception of some bituminous materials, increased the rate of deterioration in strength. The loss was always much less with pigments than without them. If dark colors and a greasy finish are unobjectionable, bituminous materials are recommended. For light finishes, a mixt. of beeswax with petrolatum or amorphous mineral wax in the ratio of 1 to 4 is satisfactory. Drying oils, such as linseed, may be used for canvas in a fixed position where air permeability is unnecessary. Paraffin is an unsatisfactory waterproofing agent chiefly because of its cryst. structure. Other objections are that it melts in warm weather; it causes rapid loss in strength on exposure to sunlight; and it increases susceptibility to mildew when conditions are favorable. Methods of applying bituminous materials and the best treatment for paulins, light-weight tent fabrics and awning materials are discussed. The water resistance of the fabrics was rated according to the amt. of H_2O passing through a filter composed of the fabric folded with absorbent paper and placed in a glass funnel. R. K. W

Soaps for silk (GROVE-PALMER) 27. Decimal classification of colors (RUTHARDT) 2. Colloidal phenomena in dye solutions (HOLMES) 2. Organic arsenic compounds and dyes (Brit. pat. 278,789) 17. Thiocarbazides and carbazides of the naphthalene series [for use as dye intermediates] (U. S. pats. 1,673,498-9) 17.

KRETSCHMER, KARL. *Die Schlichterei in ihrem ganzen Umfange*. 2nd revised ed. Wittenberg: A. Ziemsen. 272 pp. M. 10; cloth bound, M. 12.

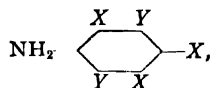
Dyes. BRITISH DYESTUFFS CORPORATION, LTD., A. SHEPHERDSON and S. THORNLEY. Brit. 279,205, Aug. 26, 1926. Benzanthrone and its unsulfonated derivs. (other than dibenzanthrones) such, e. g., as methylbenzanthrone, are condensed with hydroxylamine and the resulting compds. subjected to alkali fusion. The products dye cotton from the vat in gray to black shades. The condensation may be effected in the presence of H_2SO_4 and FeSO_4 .

Dyes. I. G. FARBENIND. A.-G. Brit. 278,771, May 12, 1926. Anthraquinone-carbazoles are made by treating the condensation products from dibromophenan-

threnequinone or other halogenphenanthrenequinones and 1-aminoanthraquinone with AlCl_3 (suitably in pyridine and followed by purification with hypochlorite). The product of the example given dyes cotton reddish brown shades from the vat.

Dyes. I. G. FARBENIND. A.-G. Brit. 279,003, May 12, 1926. Anthraquinone carbazoles are made by treating condensation products from halogenphenanthrenequinones and 1-aminobenzoylaminoanthraquinones with acid condensing agents such as AlCl_3 , chlorosulfonic acid and H_2SO_4 . The products dye cotton from the vat yellow-brown and red-brown shades. Several examples are given.

Dyes. I. G. FARBENIND. A.-G. Brit. 279,146, May 20, 1926. Azo dyes are made in substance, on the fiber or on a substratum, by coupling a 2,3-hydroxynaphthoic arylide with a diazotized amine of the general formula



in which X represents H or a univalent substituent, one Y represents an alkyl, aralkyl or aryl sulfone or ketone group or a sulfonamide or carboxamide, and the other Y represents halogen, alkyl, aryl, oxyaryl, oxyaralkyl, oxyaryl, thioalkyl, or thioaryl. (The use of alkyl-, aryl-, and aralkylamides of alkyloxy-, aralkyloxy-, and aryloxy-*m* aminobenzoic acids and their homologs and substitution products is, however, excluded.) A very large no. of suitable starting materials are listed.

Dyes. I. G. FARBENIND. A.-G. Brit. 279,401, Oct. 21, 1926. Vat dyes are formed by treating with an oxidizing agent and then with a sapon. agent 9,10-diethers of anthrahydroquinones contg. one or more β -amino or β -mono-substituted-amino groups and in which at least one *o*- α -position to an amino group is occupied by H; *e. g.*, 2-aminoanthrahydroquinone-9,10-dimethyl ether may be heated in dil. HCl suspension with FeCl_3 and the product sapond. with concd. H_2SO_4 . The product thus obtained may be purified by vatting and repptn. or by extn. with pyridine; it dyes cotton from the vat fast blue. Alk. hypochlorite may also be used as the oxidizing agent. The 2-aminoanthrahydroquinone-9,10-diethers are made by reducing 2-amino- or 2-acylamino-anthraquinones, alkylating the leuco compds. formed, and with the acylamino compds. splitting off the acyl residue. The reduction may be effected with H under pressure in the presence of Ni in alc. soln.

Dyes. I. G. FARBENIND. A.-G. Brit. 279,429, Oct. 22, 1926. Monoazo dyes are made by coupling diazo compds. of *o*-aminonaphthol or its diazotizable derivs. with 1-naphthol-8-sulfonic acid. They dye wool red shades which change to gray on chroming. Cr compds. of the dyes may be obtained by boiling, or heating to 120° under pressure, with Cr formate soln. 1-Amino-2-naphthol-4-sulfonic acid or a nitrated deriv. may be used as first component.

Dyes. I. G. FARBENIND. A.-G. Brit. 279,489, Oct. 23, 1926. Thioindigoid dyes are made by treating with a ring-closing condensing agent a 3-methylbenzene-1-thioglycolic acid substituted in the 2-position by -CN, -CONH₂, or COOH and either oxidizing the "4-methoxythionaphthene" or condensing it with a diketone or a reactive deriv. 3-Methylbenzene-1-thioglycolic-2-carboxylic acid nitrile (which may be used as a starting material) is made from 1-methyl-2-amino-3-nitrobenzene by substituting the cyano group for the amino group, reducing the NO₂ to NH₂ and exchanging the latter for the thioglycolic acid residue by way of the diazo compd. 3-Methylbenzene-1-thioglycolic acid is made from 1-methyl-2-amino-3-chlorobenzene by replacing the NH₂ group by cyano, sapong. the latter, and exchanging the Cl for the thioglycolic acid residue.

Dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLÉ. Brit. 279,479, Oct. 20, 1926. Violanthrone, isoviolanthrone and their substitution products such as dimethylviolanthrone ("diketopyrene dyes") are treated with sulfonating agents such as H_2SO_4 monohydrate, fuming sulfuric acid, or chlorosulfonic acid, to form sulfonic derivs. which dye cotton from the hyposulfite vat in bluish tints. The sulfonic acids, by alkali fusion, yield other dyes which are probably hydroxy compds. which dye cotton blue to gray not fast to Cl. These hydroxy compds. yield fast dyes by further treatment with etherifying agents such as chlorinated hydrocarbons, acid esters, aldehydes, or acetals, or with halogenating agents, or with both an etherifying and a halogenating agent (which may be used in either succession). Several examples are given.

Dyes. R. F. THOMSON, J. THOMAS and SCOTTISH DYES, LTD. Brit. 278,834, Aug. 4, 1926. The pure form of dibenzanthrone obtained as described in Brit. 251,313 (C. A. 21, 1361) and Brit. 278,112 (C. A. 22, 2668) is halogenated, *e. g.* by treatment

with sulfuryl chloride or Cl in PhNO_2 with or without addn. of I or with Cl in chlorosulfonic acid or with Br in PhNO_2 . Di-, tri, tetra- and a lower chlorinated dibenzanthrone and a dibromodibenzanthrone are produced. The products dye cotton from the vat fast blue

Dyes and intermediates. I. G. FARBENIND. A.-G. Brit. 279,436, Oct. 23, 1926. 3,5-Dichlorotoluene-2-carboxylic acid is made by transforming 3,5-dichloro-2-aminotoluene by Sandmeyer's method into 3,5-dichloro-2-cyanotoluene and saponing. The product can be converted by way of the mercaptocarboxylic acid into 4-methyl- β -chloroxythionaphthene.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 279,134, Oct. 18, 1926. Compds suitable for use as intermediates are obtained by reaction of a secondary aromatic amine with a 1-halogen-2,4- (or 2,6-) dinitro-6- (or 4-) sulfonic or carboxylic halide; or the process may be conducted so that the halide is prepd. "*in situ*" as by condensing 4-chloro-3,5-dinitrobenzoic acid and monomethylaniline by use of PCl_5 . Among the reacting materials which may be used together are: 1-chloro- (or other halogen) 2,6-dinitro-4-sulfonic chloride and methyl- or benzylaniline, 1-halogen-2,6-dinitro-4-carboxylic chloride and methylaniline, or methyl-4-hydroxy-3-carboxyphenylamine, 1-halogen-2,4-dinitro-6-sulfonic chloride and monomethylaniline. The condensation does not require an indifferent solvent but if a solvent is used the reaction may be effected in a ball-mill with an acid-binding substance such as CaCO_3 or NaOAc .

Azo dyes. P. CACCIA. U. S. 1,673,311, June 12. An amino compd. such as 2-amino-8-naphthol-6-sulfonic acid is coupled in the presence of NaCN with diazo derivs. of benzidine, toluidine, or dianisidine or the like to form dyes which can be used for dyeing the cotton and artificial silk in mixed goods without dyeing silk.

Trisazo dyes. HENRY JORDAN (to E. I. du Pont de Nemours & Co.). U. S. 1,674,114, June 19. Trisazo dyes of various grayish blue to gray shades are made by coupling aryl diazo compds such as those from *p*-toluidine or *p*-sulfanilic acid, aniline, xylidine, *o*-toluidine, *o*-anisidine or 1,6-Cleve's acid, as first component, with a 1,6- or 1,7-naphthylaminesulfonic acid, diazotizing and further coupling with a 1,6- or 1,7-naphthylaminesulfonic acid, diazotizing and coupling with a peri-aminonaphtholsulfonic acid. Several examples are given. Cf C. A. 22, 1692.

Dye powders. B. L. WEST (to National Aniline & Chemical Co.). U. S. 1,672,920, June 12. Niagara Blue 2B or other dry dye is triturated with a hydrated salt such as $\text{crystd. Na}_2\text{SO}_4$ until the mixt. becomes substantially homogeneous in color. The mixt. thus formed is suitable for dyeing in uniform shades.

Dye preparations. I. G. FARBENIND. A.-G., K. F. MAENNCHEN and F. HÜMMERICH. Brit. 278,890, Oct. 21, 1926. The alkali-starch prepn. used in making stable preps of vat dyes as described in Brit. 259,999 (C. A. 21, 3468) is replaced by a mixt. of dry caustic alkali and starch.

Solubilizing dyes with guanidine derivatives. R. F. ROSE (to E. I. du Pont de Nemours & Co.). U. S. 1,674,128, June 19. Pontamine yellow CH, eosin or similar dyes contg. a strongly acid group are rendered sol. in ordinary org. solvents by combining dixylylguanidine or other water-sol. disubstituted guanidine salt with a water-sol. salt of the dye such as the Na salt, by double decompn.

Benzanthrone derivative. K. ZAHN and W. ECKERT (to Grasselli Dyestuff Corporation). U. S. 1,674,351, June 19. Benzanthrone-Bz-1-amino-2-sulfonic acid is made by boiling nitrobenzanthrone with NaHSO_4 soln., dilg., acidifying, boiling and salting out. It is a dark red powder sol. in hot water with a red color and in concd. H_2SO_4 with a brownish yellow color showing a weak fluorescence and dyes wool from an acid bath bright red.

Dyeing with aniline black. CALICO PRINTERS' ASSOCIATION, LTD., L. A. LANTZ and R. WATSON. Brit. 279,164, July 20, 1926. After material is impregnated or printed with the usual mixt. of aniline salt, alkali chlorate and alkali ferrocyanide, it is heated to 110–180° in the absence of steam, then heated with steam (either at 100–105° or at higher temps.) and is finally washed in water or a weak alk. soln. Various features of app. are described.

Dyeing cellulose acetate "silk." G. REDDELIEN and GEORG MATZDORF (to Grasselli Dyestuff Corporation). U. S. 1,673,301, June 12. Suspensions are used formed from dyes of the general formula $\text{R-N:N-R'-N-(alkyl-OH)}_2$, in which R and R' represent aromatic radicals of the benzene series, e. g., the dye 4-nitroaniline-azo-dihydroxydiethylaniline.

Dyeing cellulose esters and ethers. E. FISCHER and C. E. MÜLLER (to Grasselli Dyestuff Corp.). U. S. 1,674,168, June 19. Yellow dyeings are produced by 4-

benzene-azo-2',6'-dinitro-4'-sulfodiphenylamine or other monosulfonated arylazodiarylamines contg. at least 1 NO₂ group in the diarylamine complex.

Dyeing cellulose esters and ethers. I. G. FARBENIND. A.-G. Brit. 279,133, Oct. 18, 1926. Water-sol. dinitroarylamino-diarylamines which dye animal fibers yellow to reddish brown and generally yield fast tints on acetylcellulose and other cellulose esters and ethers are made by condensing *p*-aminodiphenylamine or one of its substitution products with an aromatic dinitrohalogen compd. such as 3,5-dinitro-4-chlorobenzoic acid or one of its salts, 2-chloro-3,5-dinitrobenzoic acid or similar compds. The condensation may be effected in water, alc., pyridine or PhNO₂ with or without addition of acid-binding substances such as CaCO₃ or NaOAc. Brit. 279,135 specifies producing brown dyeings upon cellulose esters or ethers with dyes of the type just described free from sulfonic groups and contg. at least 2 nitro groups and one carboxylic group. Several examples are given.

Apparatus for dyeing hanks. W. GERBER. Brit. 279,236, Oct. 8, 1926.

Filter-press for use in dye manufacture, etc. A. M. CAPRA. Brit. 278,940, Feb. 14, 1927.

Preparing cotton fibers for dyeing with direct dyes. P. KARRER (to Chemische Fabrik vorm Sandoz). U. S. 1,673,627, June 12. Cotton fibers after partial esterification with an org. sulfonic group as by treatment with a toluenesulfonic compd. are further treated with a heterocyclic N compd. such as pyridine or quinoline which improves the affinity of the material for acid dyes. Cf. C. A. 22, 690.

Apparatus and method of printing flat and bas-relief ornamentations on textile fabrics. E. CADGÈNE and G. DUPONT. U. S. 1,673,933-4, June 19.

Producing decorative pattern effects on various surfaces with condensation products of urea and formaldehyde. BRITISH READ PRINTERS, LTD., and F. A. H. HEYNERT. Brit. 278,801, July 13, 1926.

Treating threads, yarns and fabrics of cellulosic fibers. R. VAN BUGGENHOUDT and R. HOMÉYER. Brit. 279,137, Oct. 18, 1926. Effects involving swelling and weighting are produced by dipping the material for a few min. in an alk. soln. which may be formed from a mixt. of KOH 85, tannic acid 6.5, HOAc 5, and ether 3.5%, then passing through air, and finally neutralizing and washing.

Apparatus for testing cotton strands, etc. W. A. STRAW (to Western Electric Co.). U. S. 1,672,963, June 12.

Weighting silk. F. ELÖD (to Rudolph Koepp & Co.). U. S. 1,674,356, June 19. Silk fiber is treated with a double salt of alkali metal formate and a Sn salt such as SnCl₄ and the treated material is washed to hydrolyze the Sn salt.

Viscose silk. I. G. FARBENIND. A.-G. Brit. 279,437, Oct. 23, 1926. "Viscose silk" is desulfurized by a soln. of caustic alkali or a soln. contg. an alkali salt which in hot or cold water is hydrolytically dissoed. such as salts of the higher fatty acids and other acids such as sulforicinoic acid, soaps and carbonates. Waste lyes from mercerizing, brought to a content of 1-2% NaOH, may be used. When a soap soln. is employed, the "silk" has a crackling feel.

Artificial silk. YONEKICHI TODA. Jap. 69,042, Aug. 2, 1926. After it leaves the coagulating bath the artificial silk is washed with water and treated with a sol. size in the untwisted condition. After bleaching, the woven fabric has a high luster.

Imitation linen. TSUNEICHI SAWANISHI. Jap. 69,503, Aug. 7, 1926. A union fabric is made from untreated cotton yarn and yarn treated with H₂SO₄. This fabric is treated with concd. H₂SO₄ to give it a crimped effect and the feel of linen.

Artificial wool. H. C. IZIGUX. Can. 277,412, Jan. 24, 1928. A cellulosic artificial textile resembling wool is obtained by immersing the textile to be treated in a bath contg. per l the following: 25-75 g. NaOH, 80-150 g. Na₂S and 120-200 g. Na₂S₂O₃. After immersing for 15 min., the textile is drained and passed through a tepid bath contg. 100-200 g. H₂SO₄.H₂O per l., whereby colloidal S is pptd. into the textile, which is then washed with hot water and centrifugally dried.

Preparation of effect threads. A. RHEINER. Can. 278,731, Mar. 20, 1928. Effect threads are prepd. by acetylation of vegetable fibers with a mixt. of Ac₂O, AcOH and one of the catalyzers which hitherto have been employed for the prepn. of cellulose triacetate, the acetylation being allowed to advance only to the formation of cellulose mono- and diacetate.

Wetting and cleansing textile materials. I. G. FARBENIND. A.-G. Brit. 278,752, May 22, 1925. Wetting and cleansing by aq. liquids is improved by use of sulfonic acids or their salts such as: *N*-diamyl- α -naphthylaminesulfonic acid, isopropylchloro-naphthalenesulfonic acid and isopropyl-naphtholsulfonic acid.

Degumming flax straw. L. N. GILLIS. Brit. 279,302, Feb. 15, 1927. In produc-

ing linen fiber, the straw is crushed and the shives are eliminated as far as possible and the strips are then laid in parallelism and treated for 10-20 min. with a soln. formed of NaOH 1.75 lbs., $K_2Cr_2O_7$ 3.5 oz. and water 12 gals., at boiling temp., washed with warm water and then with neutral soap soln. and then with cold water and with a bath acidulated with H_2SO_4 , and the material is dried and hackled.

Hair felt. A. L. CLAPP (to Beckwith Mfg. Co.). U. S. 1,673,967, June 19. Felt suitable for roofing or other purposes is formed on a paper machine from hair of original length, short hair and cellulosic material such as rag fiber.

Forming felted sheet material with plies of different character. I. J. NOVAK (to Raybestos Co.). U. S. 1,672,988, June 12. Mech. features.

26—PAINTS, VARNISHES AND RESINS

A. II. SABIN

British standard specifications for pigments. C. A. KLEIN. *J. Oil and Color Chem. Assoc.* 10, 355-72(1927).—A general account of the inception of the Brit. Eng. Standards Assoc. Sub-Comm. on paint materials, with special reference to the work of the Pigment Panel. The nature of the specifications evolved for dry pigments and oil-pastes is indicated, the various clauses being briefly discussed. B. C. A.

Accelerated tests for the settling of pigments in paints. SIDNEY WERTHAN and R. H. WIEN. *Ind. Eng. Chem.* 20, 729-32(1928).—An accelerated settling test is described in which the sample is kept at 65-70° for 18 hr., then centrifuged for 20 min. at 1000 r. p. m., returned to the oven for 5 hr., centrifuged again for 20 min. and this cycle repeated for 4 or 5 days, reproducing conditions typical of 2 yrs. normal storage. A special penetrometer for testing the settled pigment is described. H. STOERTZ

Some theories of pigment settling. P. R. CROLL. *Ind. Eng. Chem.* 20, 734-5 (1928).—A discussion of settling with particular reference to the effect of particle size, mech. dispersion, degree of wetting, shape of pigment particle and viscosity. H. S.

Settling of pigments in house paints. H. L. BEAKES. *Ind. Eng. Chem.* 20, 732-4 (1928).—Single pigment paints are made up with ZnO (5% leaded), sulfate white lead, Titanox, Pb_3O_4 (96-97%), asbestine, SiO_2 , barytes and china clay, and 2 double pigment paints (1) 50% Pb and 50% Zn, (2) 60% Pb_3O_4 and 40% asbestine. Settling tests are made in 10 gal. drums, % pigment at various levels being detd. from day to day by drawing samples through 5 openings. ZnO, sulfate white lead and Titanox showed marked settling in 1 month, asbestine in 18 days, SiO_2 in 11 days, Pb_3O_4 in 9 days and barytes in 2 days. The 50-50 Pb-Zn showed marked settling in 6 days, but the 60-40 Pb_3O_4 -asbestine showed practically no settling in 1 month. H. S.

Effect of weathering on the heat-reflecting efficiencies of paints on metal tanks. H. A. NELSON and R. W. JAMIESON. *Ind. Eng. Chem.* 20, 702-5(1928).—Five different paints are tested: (1) 2 coats of a flat paint followed by 2 coats of 100% ZnO oil enamel, (2) 3 coats of a white Zn pigment paint that chalks away on exposure, (3) 3 coats of medium gray industrial metallic Zn pigment, (4) 2 coats of Al paint, (5) 1 coat of a black oil enamel. The loss in efficiency as detd. by heat reflection based on the black surface as a standard is in 11 months exposure to weather for the metallic Zn paint—50%, for the Al paint—50%, for the white enamel—60% and for the white paint—10%. H. STOERTZ

Coal-tar paints as metal preservatives. A. V. SIVOLOBOV and A. I. IUZHILIN. *J. Chem. Ind. (Moscow)* 3, 1308-10(1926).—Coal-tar paints, which usually contain fillers such as portland cement, lime, etc., and a thinner such as kerosene or light fractions of coal-tar distillates, are not harmful to iron and preserve it from rusting as long as the coat of paint remains intact. For painting iron roofs, however, these paints can replace oil paints only on condition of renewing the coat of paint every year, since they are very apt to soften in summertime and weather-off. An account is given of various expts. concerning the speed of drying of these paints and their anti-corrosion effect. BERNARD NELSON

Vanadium compounds as driers. F. HEBLER. *Farben-Ztg.* 32, 2077-8(1927).—Polemical with Swehten (C. A. 21, 1716) and with Rhodes and Chen (C. A. 16, 1325). V driers accelerate the rate of O-absorption of linseed oil films, but retard their actual drying. Boiled oil films contg. 0.1% and 0.2% of V remained tacky for more than 1 week, while the original raw linseed oil dried in 5 days. The wrinkling of films reported by Swehten is also not confirmed, and his exptl. conditions are queries. The field of application of V as a com. drier is considered to be problematical. B. C. A.

Oil absorption of lithopone. E. KLUMPP. *Farben-Ztg.* 32, 1491-2(1927).—A general discussion on lithopones of high and low oil absorption and their suitability for various purposes. The opacity of paints based on lithopone of low oil absorption is gained at the expense of durability, whereas lithopone paints of high oil absorption are durable, but have relatively poor hiding power. B. C. A.

Formulation of nitrocellulose lacquers. H. E. HOFMANN AND E. W. REID. *Ind. Eng. Chem.* 20, 687-93(1928).—By means of triangular coordinate charts, the properties of lacquers as influenced by the nature and proportion of volatile and non-volatile constituents are studied. The effect of possible variation in nitrocellulose, resin, plasticizer, solvent and thinner upon such properties as gloss, adhesion, flexibility, hardness, durability, blushing, lifting and brushing properties is discussed from the standpoint of the formulation of new lacquers. Data obtained from tests are used to formulate a com. lacquer, having the compn. before thinning: nitrocellulose 10, ester gum 10, dibutyl phthalate 5, Titanox pigment 10 and solvent mixt. 65% (toluene 70, denatured alc. 10, Et acetate 10, cellosolve 10%). This gives a satisfactory clear, smooth film. H. STOERTZ

Characteristics and treatment of insulating varnishes. P. B. COCHRAN AND H. J. GRAHAM. *Ind. Eng. Chem.* 20, 698-701(1928).—Oil varnishes of the type contg. gum rosin ester, asphalt or copal, and used in the insulation of coils and impregnation of tape or cloth, are treated with ozonized air in the baking process with a resultant saving in time of 40-50%. A prebake of the unvarnished piece in ozonized air also shortens the drying time, an asphalt varnish drying in 60 min. at 110° dried in 18 min. at 140°. The effect of ozone on cotton insulation was tested, an increase in tensile strength of 20 to 30% being obtained. H. STOERTZ

Manufacture and use of amberol-type resin varnish. A. E. STAUDERMAN AND H. L. BEAKES. *Ind. Eng. Chem.* 20, 674-6(1928).—A synthetic resin varnish for general interior and exterior use is formulated as follows: 100 lb. Amberol, 30 gals. China wood oil and 51 gals. thinner. Mineral spirits is the best thinner, followed by benzine as 2nd choice, solvent naphtha and turpentine giving soft cheesy films. A study of driers shows that liquids contg. single metals while slow in drying have no tendency to skin over. The drying time of this varnish is 4 to 5 hr., permitting 2 coats to be applied in 1 day. It is gas proof, draft proof, and stands up well in H₂O and NaCl solns. It also seems to have desirable properties as a primer under lacquers or enamels. H. STOERTZ

Demonstration of a method of measuring particle sizes in ground powders (RAMSDEN) 2. Decimal classification of colors (RUTHARDT) 2. The value of Pb paint for purposes of protection of iron (EIBNER, LAUFENBERG) 9. Aromatic amino compounds [for use as pigments] (Brit. pat. 279,283) 10. Iron oxide [pigment] (Can. pat. 278,167-8-9) 18.

INTERNATIONAL LABOUR OFFICE: **White Lead**—data in regard to the use of white lead in the painting industry. London: P. S. King. 414 pp. 9s., net.

Color bases for paints. J. S. WILSON, J. THOMAS and SCOTTISH DYES, LTD. Brit. 278,765, April 12, 1926. An aq. paste of a vat dye such as Caledon Blue, Caledon Jade Green or Caledon Red are mixed with liquids such as castor or linseed oils or turpentine and the water is distd. (preferably *in vacuo*) to obtain a color for use in varnishes or paints.

Titanium pigments. C. A. KLEIN and R. S. BROWN. Brit. 278,791, July 8, 1926. In a process such as described in Brit. 243,081 (C. A. 20, 3826), BaCO₃ is added to the water into which the paste of Ba and Ti sulfates is run and is converted into BaSO₄ by the H₂SO₄ liberated by the hydrolysis which occurs. Small quantities of HCl or BaCl₂ or NaCl also may be added.

Paint emulsion. C. L. YOUNG and C. A. PROSSER. Can. 279,341, Apr. 10, 1928. A plastic and paint consists of a mixt. of the following approx. proportionate quantities: 40 lbs. whiting, 2 gals. water, 1.5 lbs. hide glue, 1 gal. linseed oil, 8 lbs. resin, 1 gal. benzine, 0.25 lb. salicylic acid and 1 oz. cobalt blue.

Printing ink. J. J. JAKOSKY. U. S. 1,673,245, June 12. A C-bearing oil such as a hydrocarbon oil suitable for use as a vehicle in printing ink is locally heated (in an app. which is described and which may include an elec. resistance heater) to dissoc. a portion of the material into C black and gaseous products and the C thus formed is distributed through the undissocd. portion of the body of oil under treatment; this

treatment is continued until sufficient C is formed and distributed in the oil to form a printing ink.

Printing ink. IWAQ KAWABATA. Jap. 69,035, Aug. 2, 1926. Lake pigments are kneaded with rosin-oil and mixed with gum soln. in volatile oil. $MgCO_3$, $CaCO_3$, $Al(OH)_3$, ZnO , etc., may be added. The product is used as a gravure printing ink for mono- or multicolor printing.

Nitrocellulose lacquer. C. L. GABRIEL and C. BOGIN (to Commercial Solvents Corporation). U. S. 1,673,111, June 12. Nitrocellulose 1 lb. is dissolved in 1 gal. of a solvent mixt. contg. normal $BuOAc$ 10, $EtOAc$ 30, benzene 25, toluene 20 and xylene 15%.

Lacquer composition. J. G. DAVIDSON. Can. 278,931, Mar. 27, 1928. A lacquer compn. contains a polymerized vinyl ester of an $AcOH$ compd., a solvent therefor and a cellulose ester.

Resins from gutta-percha or balata. A. B. CRAVEN and YORKSHIRE DYEWARE & CHEMICAL CO., LTD. Brit. 278,922, Jan. 1, 1927. The semi-fluid resin extd. from crude gutta-percha or balata may be treated with a small quantity of lime to neutralize free acids and may be treated with a small proportion of a siccativ such as Mn resinate and then blown with air while heated to about $80-100^\circ$ for 10 hrs. to obtain a solid resin.

Molded articles of fabric and phenolic resin. S. BROWN (to Bakelite Corporation). U. S. 1,673,797, June 19. In making articles such as sheets, gears or gaskets, threads of fibrous material are impregnated with a phenol resin in colloidal suspension, and after drying and weaving, the resulting fabric is molded.

Resinous composition. E. A. DANIELS and H. S. SNELL (to Western Electric Co.). U. S. 1,673,803, June 19. A compn. suitable for use as a binder in mixts. for molding is formed by condensation of a guanidine such as triphenylguanidine with shellac or other suitable resinous exudation. U. S. 1,673,804 specifies aldehyde ammonia instead of the guanidine. U. S. 1,673,805 specifies an aminonaphthalene. U. S. 1,673,806, specifies diphenylamine or other secondary amine of the aromatic series. U. S. 1,673,807 specifies an addn. product of piperidine and CS_2 . U. S. 1,673,808 specifies $Na \beta$ -naphtholate.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Trend of chemical research in the oil industry. DAVID WESSON. *Oil and Fat Ind.* 5, 165-6(1928). L. C.

Composition of the fatty acids of palm oil. ARCHIBALD RAYNER and SIDNEY G. CAMPBELL. *J. Soc. Chem. Ind.* 47, 149-50T(1928); cf. *C. A.* 21, 2195--. The titer and I no. and solid acid content of palm oils may vary considerably according to the source of the oil. The difference in these characteristics is due to variations in the amt. of solid acids present, and not to any great variation in the compn. of the latter. The proportion of stearic acid in the solids is considerable and varies from 12.5 to 18.5%. The liquid acids calcd. from the I no. contain, on an av., 20% linoleic and 80% oleic acid.

E. SCHERUBEL

The Halphen reaction for cottonseed oil as a general reaction for oils of the Malvaceae, Tiliaceae and Bombacaceae. SERGIUS IVANOV. Mendeleejew Institute, Moscow. *Ber. deut. botan. Ges.* 45, 588-91(1927).—The Halphen reaction (cf. *C. A.* 7, 3245) was positive with the oils of the families mentioned. Oils from the Sterculiaceae gave a negative reaction.

LAWRENCE P. MILLER

A micro-analytical method for rapid determination of the saponification number. EWALD MATTHIES and HERMANN ZIEGENSPECK. *Bot. Archiv.* 15, 187-8(1926); *Biol. Abstracts* 1, 240. —By use of a concd. KOH soln. (6:10 in water), sapon. of fats and oils takes place smoothly and rapidly. From this M. and Z. developed a micro-method which enabled them to det. accurately the sapon. no. of 3 drops or even of 1 drop of fat. Into a dry reagent glass put 3-4 drops of fat; weigh, by difference of container before and after, on a Pregel micro-balance; add 0.15 cc. KOH (6:10 in water) and the same quantity in a 2nd reagent glass as blank. To the 1st glass add 6 drops alc. and saponify on a flame until bubbles arise. After cooling, dissolve the soap in 2 cc. acid-free alc. to which phenolphthalein has been added (3 drops to 20 cc.). Titrate from microburet with 0.25-0.1 N acid. Titrate the blank, and from the difference, calculate the sapon. no. in the usual way.

H. G.

The colloid principle as applied to creams, soaps and pastes. W. VAN ALAN CLARK. California Perfume Co. *Aromatics* 9, No. 1, 19, 46(1928).—The "rotor" type of colloid mill is more simple and effective for general cosmetic uses than is the high-pressure type. The clearance space of 0.005 in. between the grinding faces of such a mill reduces the material to particles of about 3 to 5 microns. This not only insures perfect distribution of the ingredients, but sometimes greatly affects the chem. reactions involved, thus necessitating a new technic in premixing the ingredients. For instance, a shaving cream made by introducing stearic acid and coconut oil simultaneously produces lumps of stearic acid soap floating in a mixt. of alkali soln., free coconut oil and some coconut oil soap, whereas cooking coconut oil and alkali with steam for 1 hr., adding melted stearic acid to alkali for a few min., mixing the two soaps and transferring immediately to the colloid mill produces a neutral shaving soap of extra fine quality and does away with aging. The varying speed with which different soaps are saponified sets the procedure to be used.

WILHELM SEGERBLOM

Soaps for silk. FRED GROVE-PALMER. *Dyer, Calico Printer* 59, 210-1(1928).—In the silk mill, a curd soap of high quality is satisfactory for the soaking, but not for the degumming process. Typical analyses of three types of soap found satisfactory for the latter process are given. The soaps include one made from a sol. sulfonated linseed or castor oil, a pure oil soap and a green olive oil soap.

RUBY K. WORTNER

"Physiol." K. RIETZ. *Seifensieder Ztg.* 55, 157-9(1928); cf. *C. A.* 22, 1867.—R rejects "Physiol" as a soap accessory, since it is expensive and practically useless.

P. ESCHER

Seed fats of the Umbelliferae (HILDITCH, JONES) 11D. Electrolytic method for a stationary Ni catalyst for a continuous hydrogenation process (SVIZUIN) 4.

Fat or oil emulsion. O. RÖHM. *Can.* 280,578, May 29, 1928. An emulsion comprises a mixt. of fat or oil, freshly pptd. $Al(OH)_3$ and urea.

Refining fats and oil. HONEN OIL CO., LTD. *Jap.* 69,084, Aug. 11, 1926. Fats and oils are decolorized and deodorized by heating in two stages, first at a lower temp. and then at a higher temp. under reduced pressure by superheated steam at 200°. They are cooled out of contact with air.

Oil and food products from oleaginous seeds. E. A. ANDRE. *Brit.* 279,122, Oct. 15, 1926. Seeds such as linseed, sunflower and sesamum seeds or their cakes are defatted with solvents and then milled; e. g., linseed meal, after treatment with a neutral solvent, is divided by sifting into episperm and kernel and the latter may be treated with proteolytic enzymes.

Apparatus for distillation and recovery or solvents used in oil extraction. L. J. SIMON and SIMON BROS. (ENGINEERS), LTD. *Brit.* 278,815, July 19, 1926.

Apparatus and system for extracting oils with solvents. J. SAVAGE. *Brit.* 278,891, Oct. 22, 1926. Moist oleaginous materials are subjected to extrn. by circulating through them the vapors of a volatile solvent; the extd. water and solvent are condensed and sepd. and the solvent is returned to the extrn. chamber at a temp. just below its b. p. at the pressure existing in the app. Various details of the app. are described.

Cleansing composition for removing grease paints and other "make-up." H. BÖHM (to Chesavon-Fabrik Chem. Techn. Pharm. Präparate Ges.). *Brit.* 279,454, Oct. 19, 1926. Compns. are formed mainly of soap and $NaHCO_3$. The $NaHCO_3$ may be in much larger proportion and the compn. may also contain Na_2CO_3 , water, glycerol or other suitable substances.

Montan wax. W. PUNGS and M. JAHRSTORFER. *Can.* 279,448, Apr. 17, 1928. The properties of montan wax are improved by treatment with CrO_3 in the presence of glacial $AcOH$ and small quantities of H_2SO_4 .

Montan wax. W. PUNGS and M. JAHRSTORFER. *Can.* 279,449, Apr. 17, 1928. The wax esters are sepd. by treatment with concd. $AcOH$.

28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

Electricity in sugar refining. LOUIS LEUREY. *Elec. World* 91, 1003-9(1928).—Thirteen illus.

C. G. F.

The importance of decolorizing carbon in the production of glucose from starch. F. EDEL. *Z. Spiritusind.* 50, 351-2(1927).—An activated carbon, Carboraffin, its

action and regeneration are discussed. By means of this carbon a process requiring 3 days with boneblack can be completed in 1 day.

C. N. FREY

Centrifugal treatment of cane juices. P. HONIG AND W. F. ALEWYN. *Arch. Suikerind.* 36, III, 333-70(1928).—During the last crop several expts. were made with a centrifugal to treat juices and molasses for the purpose of finding out at which station of the factory the use of a separator would be most profitable. Most of the expts. were run with a small De Laval centrifugal, type 300, 16.5 cm. diam.; a few were made with a larger type. The results are given in tables, recalcd. for a com. machine. It is not considered practical to centrifuge raw juice, defecated juice or muds contg. too much suspended matter, because the cleaning causes too much loss in capacity. Centrifuging thin juice is not advisable because during evapn. a new ppt. is formed. But treatment of sirups and run-offs will give the best results. The quantity of suspended matter was in 2 expts. as high as 15 g. per l. in sulfitated sirup. Special attention was paid to the sepn. of the wash of white sugar centrifugals which have always given much trouble. Though the quantity of sepd. matter was not as great as in the case of sirup, its nature was entirely different. To study the effect of centrifugal sepn. on the boiling process, several tests were made in a small vacuum pan, of 75 l. capacity. In 2 of these tests the boiling time for centrifuged sirup was less than the time for the untreated sirup; the sugar from the centrifuged sirup was of a brilliant white color, while that from the original sirup was a gray, dull product. The difference in boiling time and in the appearance of the product in the tests with wash of white sugar centrifugals was even greater. The boiling of the centrifuged wash resulted in a massequite of even grain, very easy purging, while the strike from the untreated wash took much more time, purged badly and gave a very uneven grain. Boiling tests with molasses showed a favorable effect of centrifuging on the crystn. and on the quality of the product. The sucrose content of the sediment from sirup and wash may be too high to let it go to waste; but mixing with a small amt. of H₂O, liming to p_H 8.5 and filter pressing gave satisfactory results. Analytical methods used. M. v. D. KREKE. *Ibid* 370-5.

P. R. PEKELHARING

Unifying cane-sugar fabrication and refining. W. D. HORNE. *Ind. Eng. Chem.* 20, 680-2(1928).—One concern in Cuba makes raw sugars of 99 purity and over by super-defecation (*C. A.* 18, 1402, 2615) in several plants. The sugar is dried in single granulators, stored and transported in bulk and washed from gondola cars directly into the melter of the refinery, without further affination. The melt is very easy to filter, and the bone char lasts much longer than when used on ordinary raws. The yield is better, and remelts are greatly reduced. Overhead expenses are also lessened by combining the 2 operations. "This movement may bring about a radical redistribution of the cane-sugar refining industry of the world."

F. W. ZERBAN

Experiments with imported sugar canes. G. L. FAWCETT. *Rev. ind. agr. Tucumán* 17, 235-64(1927); cf. *Rev. ind. agr. Tucumán* 14, 89-108(1924).—A tabulated report of expts. extending over the years 1923-6.

MARY JACOBSEN

Preservation of cane and orange juice with sodium benzoate. ALEJANDRO S. ÁLVAREZ. *Rev. ind. agr. Tucumán* 18, 35-7(1927).—Fermentation of cane juice was prevented for 24 hrs. by 0.01%, for 48 hrs. by 0.05% BzONa. With increasing BzONa concn. the tendency to fermentation decreased. It was delayed 1 month by 0.11% and even longer by 0.12-0.14%, but the juices were bitter, the glucose content increased from 0.88 to 2.579% and the purity decreased from 81.17 to 58.62%. Orange juice was preserved 11-14 days by 0.01-0.05% BzONa. After 3 weeks decompn. was indicated by cloudiness and slightly altered taste. Juices contg. 0.1% BzONa presented after 1 month a normal appearance but an altered taste. The content in reducing sugars rose from 3.97 to 4.63%; the polarization fell from 3.61 to 2.73%. M. J.

Influence of hyposulfites on [beet] sirups. J. ZAMARON. *Bull. assoc. chim. suc.* 44, 426-8(1927).—In lab. tests on beet sirups of about 65° Brix, treated with hyposulfite and then heated to 95° before filtration, no improvement in color was perceptible with less than 1 g. of hyposulfite per l., and the purity of the sirups was practically unchanged. Sulfited factory sirups treated with 40 g. of hyposulfite per hectoliter at 70° and then heated to 95° before filtration underwent a slight amt. of inversion although alk.

B. C. A.

Influence of the hydrogen-ion concentration and of lead salts on saccharase and the preservation of beet pulp for analysis. E. PARISI. *Ist. Superiore Agrario Bologna. Ann. chim. applicata* 18, 99-103(1928).—Attempts to preserve pulp and juice by org. antiseptics (thymol, HCHO, Et₂O and salicylic acid) and by HgCl₂ have given unsatisfactory results, for the polarization decreases rather rapidly in their presence. A survey of earlier expts. by other investigators suggested that the destruction of sucrose

might be prevented by metallic ions, provided that the p_H value was high enough (cf. Euler and Myrbäck, *C. A.* 17, 113). Very active saccharase solns. prepd. by the method of Willstätter and Racke (*C. A.* 16, 938, 3320) were first tested. Thus a fraction of a cc. of the soln. added to 100 cc. of 10% aq. sucrose inverted all the sucrose rapidly at room temp. When the same sucrose soln. was made alk. with 4 cc. of Pb acetate (p_H 7.1) before addn. of the enzyme, its optical rotation remained unaltered after 48 hrs. at 40°, but if then acidified with AcOH, the polarization began to diminish at once. The same preservative action of Pb(OAc)₂ in alk. medium was found with beet pulp and juice. Expts. indicate that excellent results are obtained by using 177 cc. of 4% aq. basic Pb acetate per 26 g. of pulp or juice, the polarization remaining unchanged at the end of 1 month (the longest time tested). Samples may thus be preserved sufficiently long for all exigencies arising in analytical practice. Pulp prepd. by grating, treated with toluene and sealed immediately from air showed a diminishing sucrose content, as judged by polarization measurements. Since under these conditions microorganisms cannot develop and form invertase, it is possible that an invertase is originally present in the roots. This problem is under investigation. C. C. DAVIS

Desaccharification of molasses by the acetic acid method. G. MEZZADROLI, I. MUTTI AND A. PIOMBO. *Zymologica* 2, 121-36(1927).—The exptl. results obtained confirm the possibility of desaccharifying molasses by the acetic acid process (cf. Rajtóra, *C. A.* 19, 743). The industrial feasibility of the process depends on the prices of sugar, molasses and acetic acid, the extent of the loss of acetic acid and the cost of redistilling and cong. the recoverable acid. B. C. A.

Modified scale for Pfund color grader for use on dark sirups. J. J. WILLAMAN. *Ind. Eng. Chem.* 20, 701(1928).—Dark sorghum sirups cannot be read on this instrument. But when the thickness of the wedge was increased by inserting plates made of the same glass, the logs of the color values plotted against the no. of the glass plates inserted gave straight lines. On the basis of this observation the scale of the app. has been extended, showing color values with 1, 2 and 3 glasses inserted. The plot and the new scale are illustrated. F. W. ZERBAN

Action of formaldehyde on sodium hydroxide. P. MALVEZIN. *Bull. assoc. chim. ser.* 44, 441-2(1927).—The reactions described by Mestre (*C. A.* 22, 1870) were studied previously by M. B. C. A.

Identification of mill starches by the use of the microscope and camera. A. H. GRIMSHAW. *Textile World* 73, 3692-5(1928).—A description of app. and method. Illustrated. RUBY K. WORNER

The determination of soluble carbohydrates (APPLEMAN, *et al.*) 7.

29—LEATHER AND GLUE

ALLEN ROGERS

Fixation of aluminum by hide substance. ARTHUR W. THOMAS AND MARGARET W. KELLY. Columbia Univ. *Ind. Eng. Chem.* 20, 628-32(1928).—When hide substance is treated with the normal chloride or sulfate of Al and then washed with H₂O, practically all the adhering Al salt is removed. Upon raising the p_H value of the soln., increasing amts. of Al are irreversibly fixed. Up to p_H 3.65 the chloride excels the sulfate as a tanning agent, but above this p_H value the sulfate excels, since the chloride is pptd. by further additions of alkali. The max. fixation obtained was 3.5 g. Al₂O₃ per 100 g. hide substance. Optimum concn. of Al salt is about 0.2 N. Complete tannage is obtained in a few hrs. NaCl decreases slightly and Na₂SO₄ decreases markedly the fixation of Al. H. B. MERRILL

Fixation of iron by hide substance. ARTHUR W. THOMAS AND MARGARET W. KELLY. Columbia Univ. *Ind. Eng. Chem.* 20, 632-4(1928); cf. preceding abstract.—In contrast to Al, Fe is irreversibly fixed by hide substance from solns. of the normal salts. Fixation increases with the basicity of the salt. Fixation is exceedingly rapid. NaCl diminishes the fixation, but Na₂SO₄ shows either a slight inhibiting or a slight accelerating effect upon the fixation of Fe, depending upon the basicity of the Fe salt. This behavior of sulfate is different from its behavior in solns. of Al or Cr salts. H. B. MERRILL

The soaking of dried hides. VITTORIO CASABURI. *Cuir tech.* 17, 178-83(1928); cf. *C. A.* 22, 2487.—Forty g. portions of Bahia dried skin were immersed in 300 cc. of solns. of various salts. At intervals of 24 hrs. they were allowed to drain for 1 hr. and

weighed: soaking was considered complete when the wt. did not increase during 24 hrs. The vol. of the remaining liquid was then measured and its p_H , solid matter and N were detd. Expts were conducted at 15° and 24°, with distd. H_2O , with 0.02 *N* NaOH, NaSH, KCNS, NaCl, Na_3AsO_3 , and Na citrate, and with 0.6 g. $CaCl_2$ per l. The best results were obtained with KCNS, Na_3AsO_3 and Na citrate. J. G. N.

Tanning materials from cellulose. RENÉ ESCOURROU. *Cuir tech.* 17, 155-66 (1928) — Exts obtained as by-products in the sulfite process of paper manuf. are of value only when used in conjunction with other tannins. Liquid exts. are preferable; the acidity, p_H , tannin and non-tannin content ought to be such that when blended with other tanning materials the resulting liquors will have desirable properties. Analytical figures are given. J. G. NIEDERCORN

The microscopic examination of vegetable tannins by means of polarized light. B. AVENATI-BASSI AND G. A. BRAVO. *Boll. ufficiale staz. sper. ind. pell. mat. concianti* 6, 108-16 (1928).—Woods from chestnut, oak-tree, quebracho and bark from larch, silver fir, red fir, mangrove and mimosa were examd. under the microscope and polarization microscope. G. SCHWOCH

Vegetable tanning. III. The mechanism of the dehydration of lyophilic colloid by tanning agents. H. G. BUNGENBERG DE JONG. *Rec. trav. chim.* 46, 727-38 (1927); cf. *C. A.* 17, 3622; 18, 599, 2263.—Data are reported for 0.08% agar solns. treated at 40° and at 50° with tannin in concns. from 0 to 39.58% Tannin dehydrated this hydrophilic colloid and produced opalescence in concns below 1%. At concns. of about 22% flocculation occurred. At concns. above 35% the sols were again clear. Viscosity measurements show that the viscosity due to addn. of tannin decreases as opalescence and flocculation appear and increases again as the sol becomes clear. At 50° the changes occur at lower concns. of tannin than at 40°. Some electrolytes were present in the tannin. When aq. solns. of tannin are cooled, they sep into 2 liquid phases. The heterogeneous region lies toward the water side of the system. Other "amorphous" and cryst. tanning agents show similar phenomena of heterogeneity. All factors which influence heterogeneity of aq. tannin solns. (such as temp., p_H , or presence of glycol or glycerol) also affect in a similar way the dehydration of hydrophilic colloids induced by tannin. This is readily explained if one assumes that tannin seps. in the tannin-rich layer on the particles dehydrated. The active part of the mol. would be toward the article dehydrated and the phenolic group would not take up water readily. The tannin might be one or more than 1 mol. layer in thickness. If the tannin is so concd. that there is but one phase present the lyophilic condition is re-established. Max. dehydration should increase with decreasing temp. Expts. verify this assumption. F. E. BROWN

Effect of egg yolk on the distribution of oil in chrome calf leather. HENRY B. MERRILL. *Ind. Eng. Chem.* 20, 654-6 (1928).—By means of the technic previously described (*C. A.* 22, 1248) it is shown that when egg yolk, white or whole egg is added to a sulfonated neatsfoot oil fat liquor a larger fraction of the total oil absorbed by the leather is taken up by the flesh side as compared to the grain side. A tentative explanation, based on the effect of egg in coarsening the texture of the emulsion, is offered. H. B. MERRILL

Bactericidal action [in tanning processes] of chromium salts and its general origin. S. HILPERT, L. PANETH AND E. SCHLUMBERGER. *Z. angew. Chem.* 40, 1080-9 (1927).—Two factors must be considered separately, viz., the direct action of acidity on bacteria, and the influence of acidity on the action of Cr salts on protein. With *Staphylococci* the action of acidity persists up to p_H 3, and with *B. coli* up to p_H 2; beyond this the action of the Cr salt supervenes. With *Staphylococci* and a 0.01% soln. of chrome alum there is a feeble bactericidal action up to p_H 4, due to acidity. At p_H 4.29 the reaction between the Cr salt and protein begins, and reaches a pronounced max. at p_H 4.46. As neutrality is more nearly approached this action disappears again. *B. coli* gives a max. at the same p_H value, but is more resistant to acidity. Com. green $Cr_2(SO_4)_3$, which is a stronger tanning agent than chrome alum, exerts a more powerful bactericidal action at the optimum p_H value than the latter. B. C. A.

The manufacture of glace kid. G. HUGONIN. *Cuir tech.* 17, 150-5, et seq. (1928).—A description. J. G. NIEDERCORN

Progress in the glue industry, in 1927. R. KISSLING. *Chem. Umschau* 35, 109-11 (1928).—A brief review of the literature of 1927, with a list of 67 references. P. E.

Tanning. F. S. Low. *Can.* 278,390, Mar. 6, 1928. In the tanning of leather, the hide is exposed to the action of a soln. contg. chromous chloride under conditions per-

mitting oxidation of the chromous chloride to basic chromic chloride. Cf. C. A. 21, 3140.

Tanning shark skins and similar fish skins. A. EHRENREICH. Brit. 278,885, Oct. 14, 1926. The skins are tanned previous to removal of the dermal armor, the latter is then removed, and the skins are then subjected to a supplementary tanning, e. g., by sumac, sulfite cellulose ext., chrome alum or other tanning substances.

Composition for treating hides and skins. H. DODGE. Can. 279,525, Apr. 24, 1928. A compn. of matter for the treatment of hides and skins consists of Na_2CO_3 , Na_2SO_4 , niter and CH_2O . Cf. C. A. 22, 1494, 1701.

Transparent gelatin sheet. E. M. KRATZ. Can. 277,373, Jan. 24, 1928. A gelatin sheet comprises 40–94% gelatin, 5–60% of 4–10% sulfonated castor oil, 1% or less of orthophosphoric acid and a dyestuff.

Gelatin solutions. I. G. FARBERIND. A.-G. Brit. 279,443, Oct. 20, 1926. Gelatin is peptized in the presence of water by an alkali or alk. earth hydroxide and an org. solvent or diluent is added. By mixing the soln. thus prepd. with an org. acid such as HIOAc the p_{H} of the product may be varied. MeOH , EtOH , C_6H_6 and Ba(OH)_2 may be used in prepg. different solns.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The use of the analytical quartz lamp in the rubber laboratory. F. KIRCHHOFF. *India Rubber J.* 75, 791–3(1928).—See C. A. 22, 2291. C. C. DAVIS

The distribution of compounding ingredients in rubber mixings. ST. REINER. *India Rubber J.* 75, 795–6(1928).—See C. A. 22, 2290. C. C. DAVIS

New rubber compression testing machine. C. L. HIPPENSTEEL. *Bell Labs. Record* 5, 153–5(1928).—A new type of machine of improved mech. construction has been developed for use in the compression test already described (C. A. 20, 1921).

The resistance to extension of vulcanized rubber. II. R. ARIANO. *India Rubber J.* 75, 759–61(1928); cf. C. A. 20, 3362.—An English version of C. A. 22, 2081. C. C. DAVIS

C black from mixtures of C_2H_2 and other hydrocarbons (U. S. pat. 1,673,496) 18. Non-oxidizing jelutong product (U. S. pat. 1,674,435) 18. Surgical plaster (Brit. pat. 279,030) 17. Insulated electric wires and cables (U. S. pat. 1,674,156) 13.

MORELLET, F.: Étude sur la dévulcanisation du caoutchouc. Paris. G Doin et Cie. 16 pp. F. 2.

VISSER, W. DE. The Calendar Effect and the Shrinking Effect of Unvulcanized Rubber. Translated from the original Dutch. London: Crosby Lockwood & Son. 152 pp. 15s. Reviewed in *J. Franklin Inst.* 205, 901(1928).

Treating latex. M. R. DAY (to Rubber Latex Research Corporation). Brit. 279,336, Jan. 3, 1927. Stabilization of latex is effected by adding a small proportion of blood or its constituents such as defibrinated blood, serum or "red end" (hemoglobin). The product may be coagulated by acids when desired but does not coagulate by agitation or addn. of fillers.

Treating latex. W. A. GIBBONS and J. MCGAVACK (to U. S. Rubber Plantations). U. S. 1,673,672, June 12. Latex is treated with a material such as a salt of sulfonated undecylinic acid which prevents coagulation but permits bacterial action and is allowed to stand until the protein constituents of the latex are substantially decompd. and is then dried to form a film which has a pitted surface and is substantially transparent

Rubber latex packing or gaskets. F. CARL. Brit. 279,342, May 24, 1927. In making packings, gaskets, bottle closures and the like as described in Brit. 259,987 (C. A. 21, 3490), the fillers are omitted and thickened or concd. vulcanized latex is used with or without addn. of unvulcanized latex. S, ZnO, etc., may be used for vulcanizing.

Uniting fabric seams with latex. C. C. LOOMIS and G. E. PERRY (to U. S. Rubber Co.). U. S. 1,673,573, June 12. A partially coagulated latex in paste form and contg. vulcanizing ingredients is applied between superposed fabric edges such as those of cotton or jute and the material is pressed and vulcanized.

Electrodeposition of rubber, etc. ANODE RUBBER CO., LTD. Brit. 279,474, April 15, 1926. In electrodeposition of rubber or the like from dispersions, substances are incorporated with porous molds which increase the cohesion of the rubber particles, *e. g.*, compds of Ca, Mg, Ba, Zn, Fe or Al, or highly absorptive org. bases, esters or urethans. The addn. of NH_3 or NH_4 salts assists soln. and renders the soln. alk. Carbonates produced in molds are removed by an acid to prep. the molds for further use.

Retarding oxidation of rubber. S. M. CADWELL (to Naugatuck Chemical Co.). U. S. 1,673,549, June 12. Before vulcanization there is incorporated with rubber an accelerating aldehyde-aliphatic amine condensation product in excess of that required to secure proper vulcanization. Cf. C. A. 21, 2200.

Sponge rubber. T. W. MILLER (to Faultless Rubber Co.). U. S. 1,674,053, June 19. A quantity of vulcanized sponge rubber particles is incorporated into unvulcanized sponge rubber stock together with addnl. "blowing agent" and the mixt. is formed and vulcanized.

Rubber articles from aqueous rubber dispersions. M. C. TEAGUE (to American Rubber Co.). U. S. 1,673,649, June 12. In forming coatings or other articles a body of dispersion such as latex is disposed in a relatively thick layer in the presence of a hydrophilic agent such as glycerol or an NH_4 soap and is exposed to drying conditions so that moisture is substantially uniformly withdrawn from all parts of the body without formation of a dried surface film.

Tanks lined with guayule or its mixtures with rubber, etc. SOC. ELECTROMECANIQUE D'APPAREILLAGE POUR L'ESSENCE. Brit. 279,291, Dec. 31, 1926

Vulcanization. D. H. POWERS. Can. 278,942, Mar. 27, 1928. Rubber is combined with a vulcanizing agent and a compd. obtainable by the chem. combination of not less than 2 mols. of an aldehyde and 2 mols. of a primary amine with a whole number of mols. less than 3 of CS_2 .

Vulcanizing rubber. D. H. POWERS (to E. I. du Pont de Nemours & Co.) U. S. 1,674,122, June 19. Oxyethyl- (or butyl-) thiocarbonic monosulfide or similar compd. is used as an accelerator. Conjoint use of an amine such as aniline further expedites the vulcanization.

Vulcanizing rubber. A. C. BURRAGE Brit. 279,280, Jan. 4, 1927. As an accelerator there is used an aryl substituted guanidine having an alkyl substituent in the *o*-position, *e. g.*, di-*o*-tolylguanidine (which may be made by heating di-*o*-tolylthiourea, produced by the reaction of CS_2 on *o*-toluidine, with PbO in the presence of NH_4NO_3 and alc. and neutralizing the filtrate with NaOH) Cf. C. A. 21, 1724.

Vulcanizing rubber. S. M. CADWELL (to Naugatuck Chemical Co.). U. S. 1,673,550, June 12. Dimethylthiocarbamyl-*p*-toluenethiolsulfonate or other compds. contg. the group S.SO_2 are used as accelerators.

Accelerator for vulcanizing rubber. H. O. CHUTE. U. S. 1,673,801, June 19. In prepg. an accelerator, magnesia and an aromatic amine such as aniline are mixed without heating and CS_2 is gradually added while keeping the mixt. cold and without evolution of substantial quantities of H_2S and the material is then heated to a temp. not exceeding 140° until evolution of gas has substantially ceased.

Vulcanization accelerator. W. SCOTT. Can. 278,941, Mar. 27, 1928. A rubber vulcanization accelerator is made by treating with CH_2O the condensation product of aniline and a straight-chain aldehyde contg. a plurality of C atoms.

Apparatus and method for vulcanizing rubber tire tubes, etc. W. L. FAIRCHILD. U. S. 1,673,352-3, June 12. Steam is injected into the tube for vulcanization and the tube is subjected to a swinging movement to dislodge any deposits of water which may condense within the tube.

Rubber compound. A. M. KINNEY. Can. 280,213, May 15, 1928. A rubber compd. contains rubber, vulcanizing constituents and naphthenic compds.

Adhesive rubber composition. M. C. TEAGUE. Can. 280,523, May 29, 1928. An adhesive compn. comprises an aq. suspension of rubber and an emulsified resinous polymerization product of a higher fraction of coal tar distillate.

Rubber-like synthetic product. J. BARR. Brit. 279,406, Oct. 20, 1926. An elastic rubber-like product is obtained by the polymerizing action of S or S-yielding compds. such as alkali sulfides upon satd. halogenized hydrocarbons of the $\text{C}_n\text{H}_{2n+2}$ group, *e. g.*, methylene or ethylene dichloride, dibromide or iodide. Several examples are given.

Gum composition. MEIJI GUM CO., LTD. Jap. 69,058, Aug. 7, 1926. Plant fiber and wood are dried and powdered. Gum, distd. matter or latex is absorbed by the powder, wax, asphalt, etc. are added, the mixt. is heated and pressed, then rubber and vulcanizer are added and the mixt. is vulcanized by heating. Soft or hard gum compn. is obtained.

CHEMICAL ABSTRACTS

Vol. 22.

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No. 16

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Sodium peroxide bomb calorimeter. ANON. *Engineering* 125, 623(1928).—Parr's calorimeter as modified by Griffin & Sons and by Baird & Tatlock is described.

J. H. MOORE

The Wulff indicator-foil calorimeter for the determination of hydrogen-ion concentration. ALBERT DIEM. Johs. Eckart Konservenfabrik München. *Konserven-Ind* 14, 93-4; *Chem Zentr.* 1927, I, 2111.—The Wulff indicator-foil consists of a colloidal membrane with the adsorbed indicator. The colloidal structure is so chosen that an aq. soln. can readily diffuse into the membrane and yet the indicator can diffuse out only very slowly. Therefore it is suitable for colloidal, viscous, highly turbid solns colored with colloidal dyes and in the presence of oxidizing or reducing agents. The readings are obtained by means of a comparative scale over the range $\pm 0.2 p_H$, with further extn. to $\pm 0.1 p_H$ and with the aid of buffer solns. to $\pm 0.05 p_H$. Foil and app. are obtainable from F. & M. Lautenschlager, G.m.b.H., München.

C. C. DAVIS

A new equilibrator: a device for the determination of the distribution ratio of a volatile solute between two miscible solvents. GRINNELL JONES AND B. B. KAPLAN. Harvard Univ. *J. Am. Chem. Soc.* 50, 1600-3 (1928).—By rotating (16 r. p. m.) the device described, a gas or vapor may be made to circulate continuously through 2 sepd. liquids. It may also be rocked to and fro to produce the same results. The app. may also be used, besides its use for detns. of the distribution ratio of I_2 between H_2O and aq. KI solns., for Br_2 between aq. KBr solns. and H_2O , for CO_2 between H_2O and any aq. salt soln. of H_2CO_3 , and for SO_2 between H_2O and any aq. solns. of its salts.

J. BALOZIAN.

An electrolytic stand for use with rotating electrodes. A. GUNDER. *Z. anal. Chem.* 73, 444-5(1928).—The app. described is similar in principle to that of Böttger but is more sturdy in construction.

W. T. H.

One-meter vacuum spectrograph. R. A. SAWYER. *J. Optical Soc. Am.* 15, 305-8 (1927).—A convenient type of vacuum spectrograph designed to use the standard Natl. Phys. Lab. one-meter grating and to operate from 3000 to 1700 Å. U. is described.

B. C. A.

Hand spectroscope with new reagent-tube condenser. F. LÖWE. *Chem. Fabr.* 1928, 3-4.—Two tubes for the soln. to be examd. are mounted in the prism, which is fixed relatively to the lamp and condenser. The spectra corresponding with the 2 tubes appear in the eye-piece as vertical bands side by side and having a common boundary; a wave-length scale is projected so as to appear at one side of the double band.

B. C. A.

Report of committee D-15 on thermometers. W. H. FULWEILER, et al. *Proc. Am. Soc. Testing Materials, Preprint* 80, 1-5(1928).—Specifications are proposed for thermometers to be used for (a) heat test of raw tung oil, (b) sp. gr. of petroleum products and (c) Ringler viscometer (4 ranges).

W. C. EBAUGH

Some further uses for the neon grid-glow tube. T. R. WILKINS AND F. B. FRIEND. *J. Optical Soc. Am.* 16, 370-3(1928).—A three-electrode Ne tube can be used for the registration of α -rays and as a sensitive voltmeter.

D. G.

Tube apparatus for crystallization and evaporation. O. ZAHN. *Chem. Fabr.* 1928, 4-6.—The plant consists essentially of a slowly rotating iron tube, very slightly inclined to the horizontal, and provided with annular end pieces, by adjustment of which the height of the liquid passing through the tube is controlled. A current of air is drawn through in the direction opposite to that in which the liquid flows. The hot satd. soln. is fed in at one end; the crystals formed are carried through with the mother-liquor and discharged continuously on to a filter or centrifugal. Brick or ebontite lining is specified for corrosive materials. When used as an evaporator, the tube is

enclosed in suitable flues for heating. By connecting a heated tube with one through which cold air is drawn, evapn. and crystn. can be effected continuously and automatically. B. C. A.

Continuous vacuum-distillation apparatus. R. KUMMER. *Chem. Fabr.* 1927, 7.—The app. is entirely of glass, with ground joints, all parts being standardized. Two receivers are provided, so arranged that the distillate can be passed from the first to the second, and thence withdrawn, without interrupting the distn. By means of a dropping funnel with joint ground into the distg. flask, continuous addn. of fresh liquid to the latter can be made. B. C. A.

Filtration apparatus for washing nickel catalyst. Y. SOSENSKII. *Leningrad Oil and Fat Ind.* (Russia) 1926, No. 7-8, 68-70.—The Ni catalyst is usually prepd. from Na_2CO_3 and NiSO_4 with the addn. of pumice stone. The product always contains chlorides and sulfates. A filter press eliminates these impurities. Three containers are used: container A is open on top and has a discharge pipe and valve leading in to the second container B. Close to the bottom of A are fixed 2 perforated plates with a filtering cloth between; a stirrer agitates the catalyst and soln. above these plates. The drum-shaped container is connected to a vacuum pump. The liquid is sepd. quickly by the vacuum from the ppt., which can be washed repeatedly. This drum has a gage tube to indicate the level of liquid. As soon as the drum is filled, the vacuum pump is stopped and air led in. Container C receives the liquid from B. This invention is covered by the Russian (Soviet) patent No. 2364, May 11, 1925.

A. A. BOEHTLINGER
Comparison of attack and utility of modern filtering apparatus. A. SIMON AND W. NETH. *Chem. Fabr.* 1928, 41-9.—The resistance of Jena, Berlin, Haldenwanger and quartz filtering crucibles to attack by various reagents has been compared by observing losses in wt. suffered under comparable conditions. A study has also been made of the rapidity and efficiency with which the various types of filter can deal with the different kinds of ppt. commonly obtained in analysis, e. g., $\text{Al}(\text{OH})_3$, BaSO_4 , AgCl , etc. There is little difference between the types of crucible examd. as regards resistance to attack by reagents other than hot alkali. For hot alkalies quartz and Jena glass are considered best. The authors do not recommend the use of Jena blue frit crucibles. B. C. A.

New indicating equipment for industrial p_{H} measurements. HENRY C. PARKER. *Ind. Eng. Chem.* 20, 676-80(1928).—A new "Portable Acidity Meter" which when used with a H_2 electrode is direct-reading in p_{H} (but is provided with a voltage scale for use with other electrodes), a new " p_{H} indicator" with a quinhydrone electrode for routine work and a "H-ion field kit" completely equipped for making field measurements with H_2 or quinhydrone electrodes are described. The manipulations required for industrial measurement of p_{H} with a field kit are described. J. BALOZIAN

Table column molding machine with air pressure. MAX BERGER. *Apparatebau* 40, 127-8(1928).—An app. for working celluloid and casein products, or insulating materials that are plastic while hot. J. H. MOORE

Overhead process piping in chemical laboratories. F. C. VILBRANDT. *J. Chem. Education* 5, 738-40(1928).—One hundred per cent visible process piping in a college lab. is described and illustrated. Lines for water, steam, gas, air, H_2S and electricity start from a central location, rise to a 17-ft. level in the saw-tooth type building, are supported on cross members of the bays, branch off in different parts of the building, and then in each room come down to the level of the specific piping for the desks (above the desk tops) and then branch off at the wall end of each set of desks. W. C. H.

Removing "frozen" glass stoppers. JAMES C. RICE. *J. Chem. Education* 5, 756(1928).—Invert the bottles and permit the contd. soln. to exert its solvent action for about a week. The method succeeds in about two-thirds of the cases tried, and the remaining third will scarcely respond to any treatment. W. C. EBAUGH

Apparatus for classifying powdered materials contained in dilute pulps (Brit. pat. 280,121-2-3) 13. **Apparatus for hydraulic and mechanical classification of finely divided solids in pulp form** (Brit. pat. 279,932) 13.

Autoclave and digester cover construction. R. K. G. ACHENBACH (trading as Achenbach & Schulte). Brit. 279,706, March 31, 1927.

Calorimeter and centrifugal apparatus for supplying it with gas and air for combustion together. GAS RESEARCH CO. Brit. 280,010, May 4, 1926.

- Air filter.** GEORGE S. DAUPHINEE (to The Cooling Tower Co.). U. S. 1,674,764, June 26.
- Rotary filter for separating solids from liquids.** A. WRIGHT and F. W. YOUNG. Brit. 280,389, Dec. 14, 1926.
- Liquid-meter.** NAAMLLOOZE VENNOOTSCHAP MAATSCHAPPIJ VOOR UITVINDINGEN. VAN DIKKERS EN BARGEBOER and A. BARGEBOER. Brit. 280,100, April 14, 1927.
- Manometer.** J. H. SHAW. Brit. 279,773, Nov. 1, 1926.
- Radiation pyrometer.** A. SCHWARTZ. Brit. 280,454, May 27, 1927.
- Contact thermometer and associated temperature alarm device.** C. PÖHLMANN. Brit. 279,853, Oct. 27, 1926.
- Drying apparatus.** FABRIKANTERNE AV TÖRRINGSMASKINER NIRO A. S. Danish 36,540, Sept. 20, 1926. The app. is designed for the drying of substances not to be used as nutrients. The substances are atomized in such a way that only the particles smaller than a certain size are allowed to pass through the process, the larger particles being caught by a moist catching body placed at suitable distance from the atomizer while the smaller particles are carried away with a current of air flowing at an angle to the direction of the particles.
- Apparatus for spray evaporation of solutions.** J. A. REAVELL. Brit. 279,544, July 27, 1926.
- Drum apparatus for cooling or drying liquid or plastic materials.** STUART P. MILLER (to The Barrett Co.). U. S. 1,675,274, June 26.
- Apparatus for aerating liquids.** M. GUGGENBUHL. Brit. 280,141, July 14, 1927.
- Devices for regulating the level of liquids in evaporating apparatus.** A. M. DIKKERS and A. BARGEBOER (to Naamllooze Vennootschap Maatschappij voor Uitvindingen. van Dijkers en Bargeboer). Brit. 280,155, Nov. 6, 1926.
- Apparatus for sterilizing milk (or other liquid treatments) by radiation.** F. HOFFMANN. Brit. 279,902, Oct. 30, 1926.
- Pasteurization apparatus.** BUAAS MEJERIMASKINFABRIKKER. Danish 37,280, March 28, 1927.
- Drum drier for fluid egg material or other liquids.** J. HUNTER and J. MC GOUGAN. Brit. 279,722, May 4, 1927. Heated air is blown through a drum on the inner surface of which the liquid material to be dried is first carried up as a film and then allowed to fall in a shower through the heated air.
- Emulsifying apparatus.** PEDER K. NIELSEN. Danish 37,883, Aug. 29, 1927.
- Emulsifying machine.** INGEMAN LARSEN. Danish 37,702, July 11, 1927.
- Emulsifying apparatus.** PETER MOGENSEN. Danish 37,997, Sept. 9, 1927.
- Emulsifying machine.** JENS B. JENSEN. Danish 37,741, July 25, 1927.
- Apparatus for carbonating water or other liquids.** OTIS C. RILEY, PAUL W. JOEL and CHARLES B. POAR. U. S. 1,674,993, June 26.
- Control device for air-humidifying systems.** JULIUS ROEMER. U. S. 1,675,302, June 26.
- Indentation apparatus for testing hardness of materials.** J. C. B. FIRTH and F. G. DICKINSON. Brit. 280,292, Aug. 12, 1926.
- Impact and rebound device for testing hardness of materials.** ÉTABLISSEMENTS VALLAROCHE. Brit. 280,182, Nov. 2, 1926.
- Apparatus with rotary cylinders for separating solid materials.** KALKER TRIEUR-FABRIK UND FABRIK GELOCHTER BLECHE MAYER ET CIE., A.-G. Brit. 280,092, Nov. 19, 1926.
- Extrusion or extraction press (with radially adjustable jaws to choke the outlet).** V. D. ANDERSON CO. Brit. 280,422, March 19, 1927.
- Apparatus for mixing fire-extinguishing chemicals or other powdered substances with liquid flowing through pipes.** FOAMITE FIREFOAM, LTD. Brit. 280,407-8, Sept. 1, 1926.
- Apparatus for mixing powdered fire-extinguishing chemicals or other materials with streams of liquid.** FOAMITE FIREFOAM, LTD. Brit. 280,313, Sept. 1, 1926.
- Apparatus for catalytic gas reactions and associated heat-exchange system.** A. O. JARGER (to Selden Co.). Brit. 279,819, Oct. 27, 1926.
- Tubular heat exchange apparatus for flue gases, air, water, etc.** A. E. LEEK. Brit. 279,663, Dec. 8, 1926.
- Dehydrating or separating constituents of gases by spraying with adsorbent material.** J. A. REAVELL. Brit. 280,268, Aug. 6, 1926. An app. is described.
- Pressure-reducing device for use on receptacles containing carbon dioxide or other liquefied or compressed gases.** R. M. L. LEMOINE (née TROUILLET). Brit. 279,906, Oct. 29, 1926.

Electrodeposition of rubber, etc. ANODE RUBBER CO., LTD. Brit. 279,474, April 15, 1926. In electrodeposition of rubber or the like from dispersions, substances are incorporated with porous molds which increase the cohesion of the rubber particles, *e. g.*, compds. of Ca, Mg, Ba, Zn, Fe or Al, or highly absorptive org. bases, esters or urethans. The addn. of NH_3 or NH_4 salts assists soln. and renders the soln. alk. Carbonates produced in molds are removed by an acid to prep. the molds for further use.

Retarding oxidation of rubber. S. M. CADWELL (to Naugatuck Chemical Co.). U. S. 1,673,549, June 12. Before vulcanization there is incorporated with rubber an accelerating aldehyde-aliphatic amine condensation product in excess of that required to secure proper vulcanization. Cf. C. A. 21, 2200.

Sponge rubber. T. W. MILLER (to Faultless Rubber Co.). U. S. 1,674,053, June 19. A quantity of vulcanized sponge rubber particles is incorporated into unvulcanized sponge rubber stock together with addnl. "blowing agent" and the mixt. is formed and vulcanized.

Rubber articles from aqueous rubber dispersions. M. C. TEAGUE (to American Rubber Co.). U. S. 1,673,649, June 12. In forming coatings or other articles a body of dispersion such as latex is disposed in a relatively thick layer in the presence of a hydrophilic agent such as glycerol or an NH_4 soap and is exposed to drying conditions so that moisture is substantially uniformly withdrawn from all parts of the body without formation of a dried surface film.

Tanks lined with guayule or its mixtures with rubber, etc. SOC. ELECTROMECANIQUE D'APPAREILLAGE POUR L'ESSENCE. Brit. 279,291, Dec. 31, 1926.

Vulcanization. D. H. POWERS. Can. 278,942, Mar. 27, 1928. Rubber is combined with a vulcanizing agent and a compd. obtainable by the chem. combination of not less than 2 mols. of an aldehyde and 2 mols. of a primary amine with a whole number of mols. less than 3 of CS_2 .

Vulcanizing rubber. D. H. POWERS (to E. I. du Pont de Nemours & Co.). U. S. 1,674,122, June 19. Oxyethyl- (or butyl-) thiocarbonic monosulfide or similar compd. is used as an accelerator. Conjoint use of an amine such as aniline further expedites the vulcanization.

Vulcanizing rubber. A. C. BURRAGE. Brit. 279,280, Jan. 4, 1927. As an accelerator there is used an aryl substituted guanidine having an alkyl substituent in the *o*-position, *e. g.*, di-*o*-tolylguanidine (which may be made by heating di-*o*-tolylthiourea, produced by the reaction of CS_2 on *o*-toluidine, with PbO in the presence of NH_4NO_3 and alc. and neutralizing the filtrate with NaOH). Cf. C. A. 21, 1724.

Vulcanizing rubber. S. M. CADWELL (to Naugatuck Chemical Co.). U. S. 1,673,550, June 12. Dimethylthiocarbamyl-*p*-toluenethiolsulfonate or other compds. contg. the group $\text{S}\cdot\text{SO}_2$ are used as accelerators.

Accelerator for vulcanizing rubber. H. O. CHUTE. U. S. 1,673,801, June 19. In prepg. an accelerator, magnesia and an aromatic amine such as aniline are mixed without heating and CS_2 is gradually added while keeping the mixt. cold and without evolution of substantial quantities of H_2S and the material is then heated to a temp. not exceeding 140° until evolution of gas has substantially ceased.

Vulcanization accelerator. W. SCOTT. Can. 278,941, Mar. 27, 1928. A rubber vulcanization accelerator is made by treating with CH_3O the condensation product of aniline and a straight-chain aldehyde contg. a plurality of C atoms.

Apparatus and method for vulcanizing rubber tire tubes, etc. W. L. FAIRCHILD. U. S. 1,673,352-3, June 12. Steam is injected into the tube for vulcanization and the tube is subjected to a swinging movement to dislodge any deposits of water which may condense within the tube.

Rubber compound. A. M. KINNEY. Can. 280,213, May 15, 1928. A rubber compd. contains rubber, vulcanizing constituents and naphthenic compds.

Adhesive rubber composition. M. C. TEAGUE. Can. 280,523, May 29, 1928. An adhesive compn. comprises an aq. suspension of rubber and an emulsified resinous polymerization product of a higher fraction of coal tar distillate.

Rubber-like synthetic product. J. BAER. Brit. 279,406, Oct. 20, 1926. An elastic rubber-like product is obtained by the polymerizing action of S or S-yielding compds. such as alkali sulfides upon satd. halogenized hydrocarbons of the $\text{C}_n\text{H}_{2n+2}$ group, *e. g.*, methylene or ethylene dichloride, dibromide or iodide. Several examples are given.

Gum composition. MEIJI GUM CO., LTD. Jap. 69,058, Aug. 7, 1926. Plant fiber and wood are dried and powdered. Gum, distd. matter or latex is absorbed by the powder, wax, asphalt, etc. are added, the mixt. is heated and pressed, then rubber and vulcanizer are added and the mixt. is vulcanized by heating. Soft or hard gum compn. is obtained.

CHEMICAL ABSTRACTS

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1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Sodium peroxide bomb calorimeter. ANON. *Engineering* 125, 623(1928).—Parr's calorimeter as modified by Griffin & Sons and by Baird & Tatlock is described.

J. H. MOORE

The Wulff indicator-foil calorimeter for the determination of hydrogen-ion concentration. ALBERT DIEM. Johs. Eckart Konservenfabrik München. *Konserven-Ind.* 14, 93 4, *Chem. Zentr.* 1927, I, 2111.—The Wulff indicator-foil consists of a colloidal membrane with the adsorbed indicator. The colloidal structure is so chosen that an aq. soln. can readily diffuse into the membrane and yet the indicator can diffuse out only very slowly. Therefore it is suitable for colloidal, viscous, highly turbid solns. colored with colloidal dyes and in the presence of oxidizing or reducing agents. The readings are obtained by means of a comparative scale over the range $\pm 0.2 p_H$, with further estn. to $\pm 0.1 p_H$ and with the aid of buffer solns. to $\pm 0.05 p_H$. Foil and app. are obtainable from F. & M. Lautenschläger, G.m.b.H., München.

C. C. DAVIS

A new equilibrator: a device for the determination of the distribution ratio of a volatile solute between two miscible solvents. GRINNELL JONES AND B. B. KAPLAN. Harvard Univ. *J. Am. Chem. Soc.* 50, 1600-3 (1928).—By rotating (16 r. p. m.) the device described, a gas or vapor may be made to circulate continuously through 2 sepd liquids. It may also be rocked to and fro to produce the same results. The app. may also be used, besides its use for detns. of the distribution ratio of I_2 between H_2O and aq. KI solns., for Br_2 between aq. KBr solns and H_2O , for CO_2 between H_2O and any aq. salt soln. of H_2CO_3 , and for SO_2 between H_2O and any aq. solns. of its salts.

J. BALOZIAN,

An electrolytic stand for use with rotating electrodes. A. GUNDER. *Z. anal. Chem.* 73, 444-5(1928).—The app. described is similar in principle to that of Böttger but is more sturdy in construction.

W. T. H.

One-meter vacuum spectrograph. R. A. SAWYER. *J. Optical Soc. Am.* 15, 305-8 (1927).—A convenient type of vacuum spectrograph designed to use the standard Natl Phys Lab. one-meter grating and to operate from 3000 to 1700 Å. U. is described.

B. C. A.

Hand spectroscope with new reagent-tube condenser. F. LÖWE. *Chem. Fabr.* 1928, 3 4.—Two tubes for the soln. to be examd. are mounted in the prism, which is fixed relatively to the lamp and condenser. The spectra corresponding with the 2 tubes appear in the eye-piece as vertical bands side by side and having a common boundary; a wave-length scale is projected so as to appear at one side of the double band.

B. C. A.

Report of committee D-15 on thermometers. W. H. FULWEILER, et al. *Proc. Am. Soc. Testing Materials, Preprint* 80, 1-5(1928).—Specifications are proposed for thermometers to be used for (a) heat test of raw tung oil, (b) sp. gr. of petroleum products and (c) Engler viscometer (4 ranges).

W. C. EBAUGH

Some further uses for the neon grid-glow tube. T. R. WILKINS AND F. B. FRIEND. *J. Optical Soc. Am.* 16, 370-3(1928).—A three-electrode Ne tube can be used for the registration of α -rays and as a sensitive voltmeter.

D. G.

Tube apparatus for crystallization and evaporation. O. ZAHN. *Chem. Fabr.* 1928, 4-6.—The plant consists essentially of a slowly rotating iron tube, very slightly inclined to the horizontal, and provided with annular end pieces, by adjustment of which the height of the liquid passing through the tube is controlled. A current of air is drawn through in the direction opposite to that in which the liquid flows. The hot satd. soln. is fed in at one end; the crystals formed are carried through with the mother-liquor and discharged continuously on to a filter or centrifugal. Brick or ebonite lining is specified for corrosive materials. When used as an evaporator, the tube is

enclosed in suitable flues for heating. By connecting a heated tube with one through which cold air is drawn, evapn. and crystn. can be effected continuously and automatically. B. C. A.

Continuous vacuum-distillation apparatus. R. KUMMER. *Chem. Fabr.* 1927, 7.—The app. is entirely of glass, with ground joints, all parts being standardized. Two receivers are provided, so arranged that the distillate can be passed from the first to the second, and thence withdrawn, without interrupting the distn. By means of a dropping funnel with joint ground into the distg. flask, continuous addn. of fresh liquid to the latter can be made. B. C. A.

Filtration apparatus for washing nickel catalyst. Y. SOSENSKII. *Leningrad Oil and Fat Ind.* (Russia) 1926, No. 7-8, 68-70.—The Ni catalyst is usually prepd. from Na_2CO_3 and NiSO_4 with the addn. of pumice stone. The product always contains chlorides and sulfates. A filter press eliminates these impurities. Three containers are used: container A is open on top and has a discharge pipe and valve leading in to the second container B. Close to the bottom of A are fixed 2 perforated plates with a filtering cloth between; a stirrer agitates the catalyst and soln. above these plates. The drum-shaped container is connected to a vacuum pump. The liquid is sepd. quickly by the "vacuum from the ppt., which can be washed repeatedly. This drum has a gage tube to indicate the level of liquid. As soon as the drum is filled, the vacuum pump is stopped and air led in. Container C receives the liquid from B. This invention is covered by the Russian (Soviet) patent No 2364, May 11, 1925.

A. A. BOEHTLINGK

Comparison of attack and utility of modern filtering apparatus. A. SIMON AND W. NETH. *Chem. Fabr.* 1928, 41-9.—The resistance of Jena, Berlin, Haldenwanger and quartz filtering crucibles to attack by various reagents has been compared by observing losses in wt. suffered under comparable conditions. A study has also been made of the rapidity and efficiency with which the various types of filter can deal with the different kinds of ppt. commonly obtained in analysis, *e. g.*, $\text{Al}(\text{OH})_3$, BaSO_4 , AgCl , etc. There is little difference between the types of crucible examd. as regards resistance to attack by reagents other than hot alkali. For hot alkalies quartz and Jena glass are considered best. The authors do not recommend the use of Jena blue frit crucibles. B. C. A.

New indicating equipment for industrial p_{H} measurements. HENRY C. PARKER. *Ind. Eng. Chem.* 20, 676-80(1928)—A new "Portable Acidity Meter" which when used with a H_2 electrode is direct-reading in p_{H} (but is provided with a voltage scale for use with other electrodes), a new " p_{H} indicator" with a quinhydrone electrode for routine work and a "H-ion field kit" completely equipped for making field measurements with H_2 or quinhydrone electrodes are described. The manipulations required for industrial measurement of p_{H} with a field kit are described. J. BALOZIAN

Table column molding machine with air pressure. MAX BERGER. *Apparatebau* 40, 127-8(1928).—An app. for working celluloid and casein products, or insulating materials that are plastic while hot. J. H. MOORE

Overhead process piping in chemical laboratories. F. C. VILBRANDT. *J. Chem. Education* 5, 738-40(1928).—One hundred per cent visible process piping in a college lab. is described and illustrated. Lines for water, steam, gas, air, H_2S and electricity start from a central location, rise to a 17-ft. level in the saw-tooth type building, are supported on cross members of the bays, branch off in different parts of the building, and then in each room come down to the level of the specific piping for the desks (above the desk tops) and then branch off at the wall end of each set of desks. W. C. E.

Removing "frozen" glass stoppers. JAMES C. RICE. *J. Chem. Education* 5, 756(1928).—Invert the bottles and permit the contd. soln. to exert its solvent action for about a week. The method succeeds in about two-thirds of the cases tried, and the remaining third will scarcely respond to any treatment. W. C. EBAUGH

Apparatus for classifying powdered materials contained in dilute pulps (Brit. pat. 280,121-2-3) 13. Apparatus for hydraulic and mechanical classification of finely divided solids in pulp form (Brit. pat. 279,932) 13.

Autoclave and digester cover construction. R. K. G. ACHENBACH (trading as Achenbach & Schulte). Brit. 279,706, March 31, 1927.

Calorimeter and centrifugal apparatus for supplying it with gas and air for combustion together. GAS RESEARCH CO. Brit. 280,010, May 4, 1926.

- Air filter.** GEORGE S. DAUPHINEE (to The Cooling Tower Co.). U. S. 1,674,764, June 26.
- Rotary filter for separating solids from liquids.** A. WRIGHT and F. W. YOUNG. Brit. 280,389, Dec. 14, 1926.
- Liquid-meter.** NAAMLIOOZE VENNOOTSCHAP MAATSCHAPPIJ VOOR UITVINDINGEN. VAN DIKKERS EN BARGEBOER and A. BARGEBOER. Brit. 280,100, April 14, 1927.
- Manometer.** J. H. SHAW. Brit. 279,773, Nov. 1, 1926.
- Radiation pyrometer.** A. SCHWARTZ. Brit. 280,454, May 27, 1927.
- Contact thermometer and associated temperature alarm device.** C. PÖHLMANN. Brit. 279,853, Oct. 27, 1926.
- Drying apparatus.** FABRIKANTERNE AV TÖRRINGSMASKINER NIRO A. S. Danish 36,540, Sept. 20, 1926. The app. is designed for the drying of substances not to be used as nutrients. The substances are atomized in such a way that only the particles smaller than a certain size are allowed to pass through the process, the larger particles being caught by a moist catching body placed at suitable distance from the atomizer while the smaller particles are carried away with a current of air flowing at an angle to the direction of the particles.
- Apparatus for spray evaporation of solutions.** J. A. RÆAVELL. Brit. 279,544, July 27, 1926.
- Drum apparatus for cooling or drying liquid or plastic materials.** STUART P. MILLER (to The Barrett Co.). U. S. 1,675,274, June 26.
- Apparatus for aerating liquids.** M. GUGGENBUHL. Brit. 280,141, July 14, 1927.
- Devices for regulating the level of liquids in evaporating apparatus.** A. M. DIKKERS and A. BARGEBOER (to Naamllooze Vennootschap Maatschappij voor Uitvindingen. van Dikkers en Bargeboer). Brit. 280,155, Nov. 6, 1926.
- Apparatus for sterilizing milk (or other liquid treatments) by radiation.** F. HOFFMANN. Brit. 279,902, Oct. 30, 1926.
- Pasteurization apparatus.** BUAAS MEJERIMASKINFABRIKKER. Danish 37,280, March 28, 1927.
- Drum drier for fluid egg material or other liquids.** J. HUNTER and J. Mc GOUGAN. Brit. 279,722, May 4, 1927. Heated air is blown through a drum on the inner surface of which the liquid material to be dried is first carried up as a film and then allowed to fall in a shower through the heated air.
- Emulsifying apparatus.** PEDER K. NIELSEN. Danish 37,883, Aug. 29, 1927.
- Emulsifying machine.** INGEMAN LARSEN. Danish 37,702, July 11, 1927.
- Emulsifying apparatus.** PETER MOGENSEN. Danish 37,997, Sept. 9, 1927.
- Emulsifying machine.** JENS B. JENSEN. Danish 37,741, July 25, 1927.
- Apparatus for carbonating water or other liquids.** OTIS C. RILEY, PAUL W. JOEL and CHARLES B. POAR. U. S. 1,674,993, June 26.
- Control device for air-humidifying systems.** JULIUS ROEMER. U. S. 1,675,302, June 26.
- Indentation apparatus for testing hardness of materials.** J. C. B. FIRTH and F. G. DICKINSON. Brit. 280,292, Aug. 12, 1926.
- Impact and rebound device for testing hardness of materials.** ÉTABLISSEMENTS VALLAROCHE. Brit. 280,182, Nov. 2, 1926.
- Apparatus with rotary cylinders for separating solid materials.** KALKER TRIEUR-FABRIK UND FABRIK GELOCHTER BLECHE MAYER ET CIE., A.-G. Brit. 280,092, Nov. 19, 1926.
- Extrusion or extraction press (with radially adjustable jaws to choke the outlet).** V. D. ANDERSON CO. Brit. 280,422, March 19, 1927.
- Apparatus for mixing fire-extinguishing chemicals or other powdered substances with liquid flowing through pipes.** FOAMITE FIREFOAM, LTD. Brit. 280,407-8, Sept. 1, 1926.
- Apparatus for mixing powdered fire-extinguishing chemicals or other materials with streams of liquid.** FOAMITE FIREFOAM, LTD. Brit. 280,313, Sept. 1, 1926.
- Apparatus for catalytic gas reactions and associated heat-exchange system.** A. O. JARGER (to Selden Co.). Brit. 279,819, Oct. 27, 1926.
- Tubular heat exchange apparatus for flue gases, air, water, etc.** A. E. LEEK. Brit. 279,663, Dec. 8, 1926.
- Dehydrating or separating constituents of gases by spraying with adsorbent material.** J. A. RÆAVELL. Brit. 280,268, Aug. 6, 1926. An app. is described.
- Pressure-reducing device for use on receptacles containing carbon dioxide or other liquefied or compressed gases.** R. M. L. LEMOINE (née TROUILLET). Brit. 279,906, Oct. 29, 1926.

Filler for storing acetylene or like gases in tanks. PERCY C. AVERY (to Pressed Steel Tank Co.). U. S. 1,675,083, June 26. A tank with an orifice at one end is packed with resilient fibrous material such as flax fiber and gypsum or fuller's earth and a screen at the orifice-end of the tank distributes the flow of fluid between the filler and the orifice.

Apparatus for mixing, compacting, degassing or grinding viscid material. A. SONSTHAGEN and G. PÖVERUD. Brit. 279,707, April 6, 1927.

Safety cut-out for Röntgen-ray apparatus. W. OTTO. Brit. 279,838, Oct. 26, 1926.

Heat-exchange apparatus for heating water, etc. W. ST. JOHN'S-FINDLAY. Brit. 280,266, Aug. 5, 1926.

Apparatus for heat-treatment of springs, bolts or other small articles. CARL L. IPSEN (to General Electric Co.). U. S. 1,675,271, June 26.

Apparatus for drying veneer or other sheet materials. ARTHUR J. VANCE (to The Coc Mfg. Co.). U. S. 1,675,284-5, June 26.

Apparatus (with tank and rotatable drum) for acidulating wool or other materials. ÉMILE MOLINGHEN and JULES GAYE. U. S. 1,674,786, June 26.

Tungsten filaments coated with thorium. JOHN W. MARDEN, THOMAS P. THOMAS and JOHN E. CONLEY (to Westinghouse Lamp Co.). U. S. 1,675,120, June 26. Filaments for electron emission are formed of W free from Th compds. which is thermally plated with metallic Th, *e. g.*, by deposition from Th acetylacetonate vapor. An app. is described.

Use of metallic magnesium to produce a high vacuum in vacuum tubes. S. LOEWE. Brit. 279,844, Oct. 26, 1926. Mech. features.

Annular tunnel kiln construction. WOODALL-DUCKHAM (1920), LTD. and A. M. DUCKHAM. Brit. 280,044, Dec. 3, 1926.

Apparatus for making marbles or other spherical bodies from glass or other plastic material. W. J. MILLER, INC. Brit. 279,920, July 1, 1926.

Electric discharge device. E. F. LOWRY (to Westinghouse Electric & Mfg. Co.). Brit. 279,890, Oct. 28, 1926. A thermionic cathode comprises an alk. earth oxide coating on a core of Co, Ni and Co, or an alloy of these metals with Si or another metal such as a metal of the Fe group, Ti or V in sufficient quantity to render the alloy malleable. Details are given of the prepn. of various alloys.

Electric discharge device. SIEMENS & HALSKE A.-G. Brit. 279,501, Oct. 23, 1926. In gas discharge devices such as rectifiers, the anode is made at least partly of refractory conducting material such as Ta or Mo which absorbs impurities, *e. g.*, water vapor, N or CO₂, at high temps., and of such dimensions that it attains this temp. The cathode operates at incandescence and rare gases are used as filling.

Electric discharge vacuum tube. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 280,236, Nov. 6, 1926. An incandescent cathode contains alk. earth metals and also compds of such metals such as the oxides; these may be carried on a core of Pt or W.

Multiple-hearth rabble furnace for calcining. ROBERT D. PIKE. U. S. 1,674,919, June 26.

Reversible regenerator for furnaces. H. SMITH. Brit. 279,505, Oct. 23, 1926.

Actuating mechanism for selective control thermostat systems. CHARLES L. FORTIER (to Johnson Service Co.). U. S. 1,675,213, June 26. An app. is described suitable for controlling various heating systems.

Thermostatic control for gas burners. JAMES ROSS. U. S. 1,674,800, June 26.

Thermostatic valve for proportioning hot and cold water. A. S. D. HANTON and J. DICK. Brit. 279,804, Oct. 28, 1926.

Thermostatic electric switch. I. McCABE. Brit. 280,179, Nov. 8, 1926.

Thermostatic electric switch. G. S. LANE. Brit. 280,338, Oct. 8, 1926.

Thermostatic electric switch. BRITISH THOMSON-HOUSTON Co., LTD. Brit. 280,323, Sept. 15, 1926.

Thermostatic electric switch. HERBERT J. SAUVAGE (to Electro Thermostatic Control Co.). U. S. 1,675,137-8, June 26.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

Edgar Fahs Smith. WALTER T. TAGGART. *Science* 68, 6-8(1928).—Obituary.

The life and the works of Otto Billeter. H. RIVIER. *Helv. Chim. Acta* 11, 700-10 (1928).—A portrait and a bibliography are included.

E. H.
E. H.

Johannes Gadamer. W. SCHLENK. *Ber.* 61A, 80-2(1928).—Obituary. E. H. Gustav Schultz. H. BUCHERER. *Ber.* 61A, 82-3(1928).—Obituary. E. H. The Cambridge University chemical laboratory. F. G. MANN. *Chemistry & Industry* 47, 690-6(1928). E. H.

The behavior of Debye electrolytes at high field strengths. G. JOOS AND M. BLUMENTRITT. *Physik. Z.* 28, 836-8(1927).—The cause of the deviation of electrolytes from Ohm's law in strong elec. fields, as observed by Wien (cf. *C. A.* 22, 906) was investigated mathematically in the light of the Debye-Hückel theory. The deviation increases with the valencies of the ions and is approx. proportional to $1/\sqrt{D}$, where D is the dielec. const. Numerical calcns. were in good agreement with the exptl. results of Wien. E. R. SMITH

Isotherms of diatomic gases and their binary mixtures. XXXIV. Isotherm of hydrogen at temperatures from 0° to 100°. G. P. NIJHOFF AND W. H. KEESOM. *Verlag Akad. Wetenschappen Amsterdam* 36, 1278-80(1927).— B_A and C_A values are given for the isotherms of H_2 and compared with previously obtained data. B. J. C. v. D. H.

Thermophile bacteria and the radiation pressure of the sun. SVANTE ARRHENIUS. *Z. physik. Chem.* 130, 516-9(1927).—The pressure of the sun's rays might have driven thermophile bacteria from Venus to the earth when Venus was between the sun and the earth. F. E. BROWN

The atomic volume of zirconium and of hafnium. A. E. VAN ARKEL. *Z. physik. Chem.* 130, 100-4(1927).—The at. vol. of Zr was detd. from photographs made with the aid of x-rays ($\lambda = 1.537$ A. U.) and a precision camera. Two samples of Zr were used. One (I) was a drawn wire, the second (II) was a thin rolled sheet. The data for the 2 are: I, $a = 3.223$, $c = 5.123$, $V = 13.97$, $\rho = 6.53$; II, $a = 3.224$, $c = 5.128$, $V = 14.00$, $\rho = 6.515$. For Hf, the corresponding data are: I, $a = 3.201$, $c = 5.077$, $V = 13.66$, $\rho = 13.08$; II, $a = 3.200$, $c = 5.061$, $V = 13.61$, $\rho = 13.12$. ρ indicates density, and V at. vol. With powder the values are: Zr $a = 3.223$, $c = 5.150$; Hf $a = 3.186$, $c = 5.037$. The final values are Zr $a = 3.223 \pm 0.002$, $c = 5.123 \pm 0.003$, $V = 13.97 \pm 0.02$, $\rho = 6.53 \pm 0.01$; Hf $a = 3.200 \pm 0.002$, $c = 5.007 \pm 0.005$, $V = 13.66 \pm 0.06$, $\rho = 13.08 \pm 0.05$. The accuracy may not be very high but the at. vol. of Hf is definitely smaller than that of Zr. F. E. BROWN

The structure of zirconium silicide. HELMUT SEYFARTH. Univ. München. *Z. Krist.* 67, 295-328(1928).— $ZrSi_2$ is orthorhombic bipyramidal. The unit cell contains 4 mols. and has the dimensions $a = 3.72$, $b = 14.61$ and $c = 3.67$ A. U. The Zr atoms occur with pairs of Si atoms, forming definite $ZrSi_2$ mols., in which the distance Zr-Si is apparently 0.56 A. U. This extremely small distance is explained by the homopolar binding, which makes the center of gravity of the electron distribution of the Si atoms much closer to the Zr atom than the actual center of gravity of the Si atoms. The x-ray data locate the electrons rather than the nucleus. L. S. R.

The crystal structure of ethylammonium bromide and iodide. STERLING B. HENDRICKS. Rockefeller Inst. Med. Research. *Z. Krist.* 67, 119-30(1928).— $NH_4C_2H_5Br$ and $NH_4C_2H_5I$ are monoclinic, with 2 mols. in the unit cell. The dimensions are $X = 4.63$, $Y = 8.32$, $Z = 6.24$ A. U., $\gamma = 86^\circ 59'$ and $X = 4.81$, $Y = 8.68$, $Z = 6.63$ A. U., $\gamma = 87^\circ 54'$, resp. The general positions of the halogen, N and C atoms are vyz and $\bar{x}\bar{y}, z + \frac{1}{2}$, with $x_{Br} = 0.11$, $y_{Br} = 0.15$ and $x_I = 0.12$ and $y_I = 0.16$. The structure is unlike that of other substituted NH_4 halides. The corresponding chloride is isomorphous, but gave indeterminate results. L. S. RAMSDALL

The crystal structure of tetramethylammonium halides. R. W. G. WYCKOFF. Rockefeller Inst. for Medical Research. *Z. Krist.* 67, 91-105(1928).— $N(CH_3)_4I$, $N(CH_3)_4Br$ and $N(CH_3)_4Cl$ are tetragonal, with the dimensions $a = 7.96$, 7.76 , 7.78 A. U. and $c = 5.75$, 5.53 and 5.53 A. U., resp. The space group is 4 Di-7, and if 4 C atoms are assoc. with each N atom, the at. positions are as follows: halogen atoms at $\frac{1}{2}0u$ and $0\frac{1}{2}u$, with $u_I = ca. 0.39$, $u_{Br} = 0.37$ and $u_{Cl} = 0.35$; N atoms at 000 , $\frac{1}{2}\frac{1}{2}0$; C atoms at $u0v$; $0u\bar{v}$; $u + \frac{1}{4}, \frac{1}{4}, \bar{v}$; $\frac{1}{2}, u + \frac{1}{4}, v$; $u0v$; $0u\bar{v}$; $\frac{1}{2} - u, \frac{1}{2}, v$; $\frac{1}{2}, \frac{1}{2} - u, v$, with u about 0.15 and v between 0.10 and 0.17. The CH_3 groups form an irregular tetrahedron about the N atoms. This arrangement is like the NH_4Cl grouping, elongated in a vertical direction to accommodate the large $N(CH_3)_4$ radicals. L. S. RAMSDALL

The crystal structures of the methylammonium halides. STERLING B. HENDRICKS. Rockefeller Inst. Med. Research. *Z. Krist.* 67, 106-18(1928).— $MeNH_2Cl$, $MeNH_2Br$ and $MeNH_2I$ have tetragonal unit cells contg. 1 mol. The dimensions are $a = 4.28$, 5.09 , 5.11 A. U. and $c = 5.13$, 8.76 , 8.97 A. U., resp. In the chloride the positions are: Cl at 000 , N at $\frac{1}{2}, \frac{1}{2}, u$ ($u = ca. 0.24$), C at $\frac{1}{2}, \frac{1}{2}, v$ ($v = ca. 0.50$). For the other

two: Br and I at $0\frac{1}{2}u$, $\frac{1}{2}0u$ ($u_B = ca\ 0.18$, $u_I = 0.19$), N and C at $0\frac{1}{2}w$, $\frac{1}{2}0\bar{w}$. The former is a distorted "low" NH_4Cl structure; the latter 2 correspond to the "high" form. L. S. RAMSDELL

The crystallography of double nitrates of neodymium and praseodymium. R. B. ELLESTAD AND F. A. GRAY. *Z. Krist.* **65**, 140-1 (1927).—Crystals of double nitrates of Nd and Pr are trigonal trapezohedral, with axial ratios as follows: Nd-Zn 1.569, Nd-Ni 1.579, Nd-Mg 1.576, Nd-Mn 1.580, Nd-Co 1.584, Pr-Zn 1.584, Pr-Ni 1.576, Pr-Co 1.567, Pr-Mn 1.565, Pr-Mg 1.562. L. S. RAMSDELL

X-ray investigation of *o*- and *m*-nitroaniline. K. HERRMANN AND M. BURAK. Berlin, Inst. phys. chem. and electrochem. of tech. Hochschule. *Z. Krist.* **67**, 189-225 (1928).—*o*-Nitroaniline is holohedral orthorhombic—space group V_h^{17} . There are 16 mol. wts. in the unit cell, with $a = 10.09$, $b = 29.44$ and $c = 8.52$ A. U. The compd. is polymerized. *m*-Nitroaniline is hemimorphic orthorhombic, space group C_{2v}^5 . There are 4 single mols. in the cell, which has $a = 19.23$, $b = 6.48$ and $c = 5.06$ A. U. L. S. RAMSDELL

The crystal structure of the water-soluble modification of germanium dioxide. WM. ZACHARIASEN. Mineral. Inst. Univ. of Oslo. *Z. Krist.* **67**, 226-34 (1928).—The ordinary form of GeO_2 (sol. in H_2O) is hexagonal (trigonal trapezohedral) and isomorphous with quartz. There are 3 mols. in the unit cell, which has the dimensions $a = 4.972$ and $c = 5.648$ A. U., $c/a = 1.136$. The space group is D_3^4 or D_3^6 , and the Ge atoms are at $u00$, $\bar{u}\bar{u}\frac{1}{3}$, $0u\frac{2}{3}$, with $u = 0.43 \pm 0.01$. L. S. RAMSDELL

Simple methods for the qualitative detection of piezoelectricity in crystals. P. TERPSTRA. University Groningen, Netherlands. *Natuurwetensch. Tijdschr.* **10**, 89-92 (1928).—The crystal to be examd. is placed between the plates of a piezo-condenser, in the circuit of an emitting radio set, advantage being taken of length modifications of the crystal. A. L. HENNE

Uncommon common salt. A. F. DUFTON AND C. G. WEBB. *Nature* **121**, 942 (1928).—The crystals are cubes with hollow faces and beveled edges, the form being {110}. L. C.

The evaporation and solution phenomena of zinc. G. AMINOFF. *Z. Krist.* **65**, 23-7 (1926).—On evapn. of Zn the following faces are sufficiently developed to give reflections: 0001, 1011, 1120 and 1010. The rate of soln. in H_2SO_4 is least in the direction of the c axis. L. S. RAMSDELL

Monocrystalline metals: their preparation and their properties. MARC PRIVAULT. *Rev. g n. sci.* **39**, 363-9 (1928).—A review F. H.

Solid solutions between compounds of elements of different valence. G. BRUNI AND A. FERRARI. R. Politecnico, di Milano. *Z. physik. Chem.* **130**, 488-94 (1927). (Italian).—When compds. of elements of different valences form solid solns. with one another the equiv. vols. of the pure compds. are very nearly equal. This is shown to be true in the molybdates of Pb and the rare earths: LiF and $MgCl_2$; and $LiCl$ and $MgCl_2$. The case of complete solid soln. between $LiCl$ and $MgCl_2$ is considered in detail with reference to the manner in which substitution occurs in the lattice between different nos. of atoms, and between atoms of different valences. $LiCl$ is isometric, of the NaCl structure. $MgCl_2$ is birefringent, shows basal cleavage, and seems to be rhombohedral, hexagonal, having a characteristic angle of nearly 90° , and therefore pseudo-cubic. Because of this, its lattice structure may be very similar to that of $LiCl$. In explanation of the complete solid soln. between $LiCl$ and $MgCl_2$ it is suggested that the lattice in each case is essentially made up of an equal distribution of neg. ions in contact with each other, and that in the voids between these ions are disposed the relatively much smaller metallic ions. The distribution of different nos. of the latter leads to the different symmetry of the 2 lattices. R. H. LOMBARD

An investigation of mixed crystals and alloys. I. VEGARD AND HJALMAR DALE. *Z. Krist.* **67**, 148-61 (1928).— $Pb(N_2O_2)$ and $Ba(NO_3)_2$ form a complete series of mixed crystals, which follow the additive law exactly in regard to dimensions of the unit cells. With $NaBr$ and NH_4Br there is no demonstrable formation of mixed crystals. Cu and Ni form a complete series and follow the additive law. Although Co has similar radius to Ni, there is only a limited miscibility with Cu-Co. The Cu lattice will take up 13% Co, and the Co 8% of Cu. The cubic form of Co seems to be stabilized by a trace of Cu, and none of the hexagonal type was formed. The cubic form is probably due to slight impurities. Careful measurements on quickly cooled Cu-Au alloys showed a complete series approx. following the additive law. The great discrepancies of Bain (cf. C. A. **17**, 1940) are explained by intermetallic compds. L. S. RAMSDELL

The diffusion problem for a solid in contact with a stirred liquid. H. W. MARCH AND WARREN WEAVER. Univ. of Wis. *Phys. Rev.* 31, 1072-82(1928).—A cylindrical solid of length a in a direction x and arbitrary cross section normal to x is in contact on its plane face $x = a$ with a well-stirred liquid. The face $x = 0$ of the solid and the lateral face are impervious to heat. The liquid extends from $x = a$ to $x = a + b$, there being no loss of heat across the face $x = a + b$. The initial temp. of the solid and liquid being given, a Volterra integral equation of the second kind with discontinuous kernel is obtained for the temp. of the liquid as a function of the time. The soln. of this integral equation is obtained. The connection of this problem with a case of material diffusion is shown, and a numerical illustration is given. The theory suggests a new method of detg. directly and accurately the thermal cond. of solids. BERNARD LEWIS

The effect of temperature on the dielectric constants of some gases at different pressures. Remarks on the paper by Magdalene Forró. H. A. STUART. *Z. Physik* 48, 747(1928); cf. *C. A.* 22, 1897.—Mol. polarization in gases cannot be proportional to the sq. of the d . as claimed by F. but is independent thereof. This is substantiated by further exptl. results. H. F. JOHNSTONE

Ring method in changing surface tension. LECOMTE DU NOUY. *Science* 67, 607(1928).—Reply to criticisms of Bigelow and Washburn (*C. A.* 22, 2697).

L. W. RIGGS

The density of molten magnesium. KURT ARNDT AND GEORG PLOETZ. *Tech. Hochsch., Charlottenburg. Z. physik. Chem.* 130, 184-6(1927).—The d . was detd. by the sinking of an egg-shaped silvered-iron bob in melted Mg in a tall, unglazed porcelain crucible. The temps. and corresponding d s. are resp: 666°, 1.58; 678°, 1.55; 696°, 1.54; 710°, 1.53; 720°, 1.51. From the curve given, the estd. values are 650°, 1.601; 700°, 1.536; 750°, 1.470. The d . of Mg at room temp. is about 1.74. The vol. of Mg increases about 6% on melting. Mg poured at 700° shrinks about 11.5% on cooling to room temp.

F. E. BROWN

Internal friction in solids. A. L. KIMBALL AND D. E. LOVELL. Gen. Elec. Co. *Phys. Rev.* 30, 948-59(1927).—Tests on 18 different solids, including several metals, glass, celluloid, rubber and maple wood, show that the internal friction for streams below the elastic limit does not obey the liquid-viscosity law, as is usually assumed, according to which the frictional force depends upon the velocity strain, but is entirely independent of strain velocity, as far as can be observed. It was found to depend upon the amplitude of strain during the strain cycles and approx. to obey the law: Energy loss per cycle per unit vol. equals ξf_m^2 . f_m is the max. value of the stress during the stress cycle and ξ a proportionality factor called the internal-friction const. The method used was to measure the transverse deflections of the end of a rod, about 1 m. long, of the material being studied, which deflections were produced during rotation of the rod, when its end was deflected downward by suitable loads on it. The expts. differ from most previous work in that relatively large masses of material were employed, tending to reduce surface effects, which are likely to enter in the case of vibration decrement expts. on wires and on thin strips. A table of the internal-friction consts. obtained is given and also a table of similar internal friction consts. calcd. from data of previous investigators. A reasonable agreement is found. BERNARD LEWIS

The melting temperature of calomel. OTTO RUFF AND REINHARD SCHNEIDER. *Z. anorg. allgem. Chem.* 170, 42-4(1928).—M. ps. of mixts. of HgCl and HgCl₂ were detd. for various ratios of the components. Extrapolated to 100% HgCl the m. p. would appear to be about 543°, which is nearly 40° higher than previously recorded.

R. H. LAMBERT

Change of compressibility with pressure. I. H. ADAMS. *J. Washington Acad. Sci.* 17, 529-33(1927).—The compressibilities, β , of a no. of elements and minerals have been detd. directly or, when possible, from the change in length produced by pressure, P , the latter method being the more sensitive. When β is plotted against $d\beta/dP$ a curve is obtained from which the order of magnitude of the pressure coeff. of compressibility can be detd. if the mean compressibility over a given pressure range is known. Te and the alkali halides do not fall on the curve. B. C. A.

Investigations on the one-component system SiO₂. II. Catalysts for the slow transformations. C. J. VAN NIEUWENBURG AND C. N. G. DE NOOIJER. *Rec. trav. chim.* 47, 627-34(1928); cf. *C. A.* 22, 1265.—A discussion is given of Fenner's stability diagram for the 3 modifications of SiO₂. That cristobalite has a stable region above 1470° is still questioned. The results obtained by Fenner may be influenced greatly by the large excess of Na₂WO₄ used as a catalyst. Studies with other catalysts show surprising results, especially with the carbonates of Li, Na and K, the former converting

... of the SiO_2 . The oxides of Ca, Mg and B are not good catalysts. Na_2SiF_6 was found very effective even though a greater part of it volatilizes. R. H. LAMBERT

Refractometry of binary liquid systems. I. V. YA. ANOSOV. *Ann. inst. anal. physico-chim. (Leningrad)* **3**, 379-404(1926); cf. C. A. **20**, 2612.—Three types of n curves are distinguished: (1) for ideal mixts.—a straight line or a curve closely approx. thereto; (2) for systems in which dissoen. of the component occurs—a curve convex to the axis of concn.; and (3) for systems with reciprocal chem. action—a curve concave to the concn. axis. Results are given for 6 binary liquid systems. For EtOAc-SnCl_4 and piperidine-allylthiocarbimide in which the components react strongly, chem. combination is characterized by change in direction and by a max. divergence from additivity. The piperidine-allylthiocarbimide curve exhibits a singular point. II. *Ibid* 455-7.—The n of mixts. of Me_2CO and CHCl_3 at 13° gives a curve slightly concave to the axis of compn. (cf. Zawadzki, *Z. physik. Chem.* **35**, 129-203(1900)). The values for the system: $\text{Ac}_2\text{O-H}_2\text{O}$ show a min. for the compn. $\text{C}_2\text{H}_5\text{O}_2$ and a max. between 60 and 70 mol % H_2O , possibly indicating the formation of the compd. orthoacetic acid, $\text{CMe}(\text{OH})_3$. For $\text{BzH-C}_3\text{H}_5(\text{NO}_2)_3$, the n isotherm at 12.5° exhibits concavity toward the axis of compn., the $\text{C}_3\text{H}_5(\text{NO}_2)_3$ probably undergoing assocn. B. C. A.

Azeotropism in binary systems containing an amide. M. LECAT. *Ann. soc. sci. Bruxelles* **47B**, ii, 87-97(1927); cf. C. A. **22**, 1712.—The azeotropic data for binary systems contg. acetamide or propionamide are collected and discussed. Empirical formulas are given for the azeotropic lowering in systems contg. hydrocarbons, esters, halogen compds. or ethers and acetamide. B. C. A.

Sols with structure-viscosity. I. Viscometry of the ammonium oleate sol. W. O. OSTWALD, R. AUERBACH AND J. FELDMANN. *Kolloid-Z.* **43**, 155-81(1927); cf. C. A. **19**, 2288-9, 3045; **20**, 3607.—When rate of flow of NH_4 oleate sols through a capillary is plotted against driving pressure an S-shaped curve is formed. When η , the coeff. of viscosity, is plotted against driving pressure, the curve for water is a straight line, but the curve for NH_4 oleate sols is V-shaped. At very low pressures η increases very rapidly with decreasing pressure. The point of inflection at which increase of η begins with decreasing pressures depends on the concn. of the NH_4 oleate and its previous history. Mech. treatment reduces the viscosity of these sols under large or medium pressures. The anomalous effects at low pressures may be due to a kind of gelatinization which is temporarily experienced under low pressures and slow flow. The curve for NH_4 oleate sols (viscosity plotted against pressure) become similar to those for water when the NH_4 oleate sols are heated to 65° for a few minutes. Oleate sols have a less stable structure than gelatin sols and therefore show turbulence effects more readily. II. **Structure turbulence of cotton yellow sols and Hg thiosalicylic acid sols.** *Ibid* 81-7.—Sols of cotton yellow and of Hg thiosalicylate show an anomalous viscosity similar to that reported for NH_4 oleate in the preceding paper. The presence of Na_2SO_4 in the cotton yellow did not prevent the anomalous viscosity at low concns. (below 0.75%). At a concn. of 0.75% cotton yellow, such sols have only a slight abnormality and near a concn. of 1.3% cotton yellow (the concn. of max. viscosity) there is no structure turbulence. At higher concns. (1.56 and 1.69%) anomalous viscosity explained by structure turbulence reappears. All sols known to show structure turbulence also show elastic shear. These papers include 18 tables of data and 52 curves formed by plotting the data. F. E. BROWN

The dependence of the viscosity of starch suspensions on velocity. R. KÖHLER. *Kolloid-Z.* **43**, 187-90(1927); cf. preceding abstr.—The Ostwald pressure viscometer (cf. C. A. **18**, 3510; **19**, 1641) was modified by using a larger capillary. This instrument was used to det. the viscosity of a mixt. of CCl_4 and paraffin oil ($d_{20} = 1.519$) and the viscosities of suspensions of 10, 15, 20 and 25% starch in this medium. The starch was prepd by drying rice starch over P_2O_5 in a desiccator at 90° . The finely sieved starch remained stably suspended for a day. Viscosity increases with the addn. of starch. The time of flow for equal vols. of 25% starch are from 3 to 5 times that for the suspension medium. In all cases the apparent viscosity increases with decreasing pressure. The equation of Waele and Ostwald ($\eta \cdot p^{n-1} = k$) is applicable.

F. E. BROWN

The viscosity anomalies of sols in the Couette apparatus. WOLFGANG OSTWALD. *Kolloid-Z.* **43**, 210-4(1927); cf. preceding abstrs.—Hatschek found a viscosity hysteresis when he measured the viscosity of sols by Couette's app. (cf. C. A. **8**, 281). That is, when the rate of rotation of the cylinder was changed from the original rate and later returned again to it, an increase in viscosity was indicated. This is due to the adsorption of colloidal particles on the walls of the cylinders and the consequent decrease of the effective distance between them. The second anomaly is, starting

with a slow rotation of the cylinders and gradually increasing the rate, there is first a decrease in apparent viscosity, then an increase in apparent viscosity. This is due to a high viscosity produced by the structure of the colloid. At low rates of rotation this structure is not destroyed. A more rapid rate of rotation destroys the structure and decreases the viscosity of the colloid. Rates of rotation still more rapid set up turbulent flow, which increases the apparent viscosity. All of these causes should operate in capillaries as well as between cylinders. Ostwald and his coworkers have been able to reproduce these phenomena in their capillary app. F. E. BROWN

The gelatinization of lyophilic sols and the structure of lyophilic gels. H. G. BUNGENBERG DE JONG. Leyden. *Z. physik. Chem.* 130, 205-16(1927).—The gelatinization of an agar sol seems to be of the nature of a deflocculation, even though in the first stages of the process both stability factors (the elec. charge and the hydration) persist in nearly their original magnitude. In explanation of deflocculation under such conditions it is suggested that at the moment of gelatinization the charge and the hydration become localized on certain areas of the particles, and that deflocculation results by virtue of contact between the remaining unprotected areas. The charged and hydrated areas would form the walls of the voids between the particles. Such a structure for a gel demands the pressing out of water when the gel undergoes permanent deformation, and this was observed with viscose gels. Also, a gel which swells isotropically should, after undergoing permanent deformation, exhibit anisotropic swelling. In confirmation of this, it was found that if threads of viscose gel were stretched permanently and subjected either to phys. swelling by H_2O or to chem. shrinking caused by destroying the hydration centers by H_2SO_4 , then the swelling or shrinking was less in the direction of the permanent stretching than in the cross-section of the thread. Threads of viscose gel which had been stretched very severely swelled abnormally in that their length decreased and their diam. increased. This phenomenon seemed to be accompanied by a simultaneous alteration of the state of deformation of the gel which occurred only once. After its occurrence the reversible swelling had the same sign in both directions, and was much smaller along the length than across the diam., as would be expected. The significance of the forces of adhesion present at the contact surfaces of the particles, and of the hydration and charge of the free surfaces, is discussed with reference to swelling equilibrium and gelatinization in general. R. H. LOMBARD

Soaps as colloidal electrolytes. JAMES W. MCBAIN. *J. Am. Chem. Soc.* 50, 1636-40(1928).—The contention of Linderstrom-Lang (cf. *C. A.* 21, 8) that soap solns. consist only of the dissociated salts of fatty acids rather than colloidal micelles is held to be untenable. J. G. McNALLY

The liquid-liquid separation of gelatin by thiosalicylic acid and the relation of these systems to the phase rule. WOLFGANG OSTWALD AND RUDOLF KÖHLER. *Kolloid-Z.* 43, 131-50(1927).—The purpose of this study was to det. whether gelatin is or is not molecularly dispersed in the 2 liquid phases which exist when thiosalicylic acid is added to a suspension of gelatin in water. If a seemingly homogeneous system has the same no. of degrees of freedom after a sepn. into layers as it had before sepn., both phases must have existed before the sepn., though one of them may have consisted of microscopic particles. When thiosalicylic acid is used to sep. the gelatin-poor, from the gelatin-rich soln., both layers are liquid at room temps. This makes sepn. and analysis easy. Solns. or suspensions were made to contain 15, 14, 13, 10, 5 and 2% gelatin. Each of the gelatin solns. was also made 0.3, 0.4 and 0.6 *N* with thiosalicylic acid, and the concns. of acid were extended to more dil. and more concd. solns. if a sepn. occurred. The 15% gelatin remained in 1 layer. The 14% gelatin formed 2 layers when the acid was 0.4 *N*. The 13% gelatin formed 2 layers when the acid was 0.3, 0.4 and 0.5 *N*. The 10% gelatin and the 5% gelatin formed 2 layers when the acid was 0.3, 0.4, 0.5, 0.6 and 0.7 *N*. The 2% gelatin formed 2 layers when the acid was 0.2, 0.3, 0.4, 0.5 and 0.6 *N*. The concn. of gelatin approached 20% in all of the lower more concd. layers. The variations are, for max. concns., 22.6% in the 5% soln. of gelatin to 17.5% in the 14% soln. The min. concns. in the lower layer were between 10.4% in the 10% soln. and 19.3% in the 13% soln. A moderate concn. of thiosalicylic acid (0.3-0.4 *N*) produces a greater difference in concn. between the layers than a more or less concd. acid soln. A rise in temp. decreases the difference in compn. of the layers. There are fundamental differences between the diagram of the system K_2CO_3 - $EtOH$ - H_2O and the diagram of the system gelatin-thiosalicylic acid- H_2O . The compn. of the mixt. det. the compns. of the layers in the last-named system. Also, the system gelatin-thiosalicylic acid- H_2O has more degrees of freedom than it could have if it were a 2-phase system, and it cannot, therefore, be a molecularly dispersed soln. F. E. BROWN

The influence of neutral salts on the separation of gelatin by thiosalicylic acid. WOLFGANG OSTWALD and RUDOLF KÖHLER. *Kolloid-Z.* **43**, 151-5 (1927); cf. preceding abstr.—Solns. were prepd from 20% gelatin soln., 2 *N* thiosalicylic acid, and about 4 *M* solns of appropriate salt solns. The final concns. were gelatin 10%, thiosalicylic acid 0.2-0.7 *N* by intervals of 0.1 *N*, salt solns. 0.04 to 1.4 *M*. The salts used were K citrate, $(\text{NH}_4)_2\text{SO}_4$, KCl, KBr and KSCN. At low concns. each salt either produced no change or aided in the sepn. into 2 phases. With increasing concn., each salt first hindered sepn. and then at still higher concns. again promoted sepn. into layers. The bromide was an exception. No sepn. into layers occurred at any concn of bromide investigated, but no concns. of less than 0.2 *M* are reported. Anions near SCN in the Hofmeister series are more effective in promoting the sepn. into layers by thiosalicylic acid than citrate-ion and those near it. The ions near SCN in acid solns. produce a sepn. of gelatin suspensions into layers in the absence of thiosalicylic acid. F. E. BROWN

The permeability of gelatin membranes. RUNAR COLLANDER. Univ. of Hel-singfors. *Protoplasma* **3**, 213-22 (1927).—The membranes were prepd. by soaking extrn. thimbles (S & S, 94 \times 33 mm) in 30% gelatin soln. The treated thimbles were then air-dried and hardened by immersion in a 1:5 mixt. of formalin and EtOH. This gave membranes 0.8-1 mm. thick. Org. substances of high mol. wt. were used in the expts. A surface-active and an inactive substance, such as fructose and trimethyl citrate, were allowed to diffuse simultaneously through the same membrane. Measurements were made with aq. and MeOH solns. The data show that mol. size, as measured by mol. refraction, was the main factor governing the rate of diffusion. The capillary-active or inactive nature of the substance was relatively unimportant. The differences between the present results and those obtained with living protoplasm are briefly discussed and the present data interpreted as supporting the lipid theory.

M. H. SOULE

The theory of viscometry of colloidal systems. WOLFGANG OSTWALD. *Kolloid-Z.* **43**, 190-209 (1927).—A review of viscosity detns., and especially viscosity detns. of colloids, reveals abnormalities in results by all methods. Some of these have been supposed to be due to the app. (cf. *C A* **2**, 1086; **7**, 3873) used and consequently incapable of investigation by other types of app. Anomalies such as structure turbulence have been reproduced in capillary viscometers and hence are properties of colloidal substances and not due to kinds of app. Any information about viscosity which can be obtained by Couette's app. can be obtained just as validly by a capillary viscometer. Both the capillary and Couette's app. depend for the validity of their results on one layer of liquid slipping on another—laminar streaming. Both are subject to turbulent streaming when the velocity is too great. The stream profile in the Couette app. is distorted by turbulent streaming in much the same way as the stream profile in a capillary tube is distorted by the same phenomenon. In a capillary the entire central part of the cylinder of flowing liquid seems to be pushed through the outer layers which cling to the walls of the tube. The stream lines are blunt instead of parabolic over the front of the cylinder of flowing liquid. In the Couette app. the liquid seems to cling to the outer cylinder and slip on the inner cylinder. The face is almost perpendicular to the surfaces of the cylinders. These departures from the conception of Poiseuille, that each mol. layer slips on both its neighboring layers in the same way, are never entirely true in colloids. When the irregular structures of colloidal substance, including feather-like bodies, are distorted, such simple slipping is impossible and turbulent streaming is the rule, not the exception. F. E. BROWN

Ionization and adsorption isoelectric points. R. B. HARVEY. Univ. of Minn. *Plant Physiology* **2**, 220 (1927).—For clearness H. proposes that the isoelec. points of membranes produced (1) by the ionization of ampholytes and (2) by differential adsorption, which takes place without appreciable soln. of the membrane, be designated as *ionization isoelec. points* and *adsorption isoelec. points*, resp. WALTER THOMAS

The theory of adsorption. TH. SEXL. *Z. Physik* **48**, 607-10 (1928).—On the basis of statistical considerations, which are analogous to those used by Stern in deriving his vapor-pressure formula (*C. A.* **13**, 2623), the equation for the adsorption of gases by solid bodies is derived. The result is in agreement with the Langmuir equation. The const. of the L. equation assume a mol. kinetic significance. H. F. J.

Surface boundary action in anisotropic liquids. W. KAST. *Physik. Z.* **29**, 293-5 (1928).

M. R. FENSKE

Pseudo-electrolytes. Condition of ammonia in aqueous solution. E. BAARS. *Sam. chem. u. Chem.-tech. Vorträge* **29**, 53 pp. (1927).—The equil. between NH_3 and water in an indifferent medium (nitrobenzene) was investigated; the solubilities of NH_3

in dry and aq. nitrobenzene and of water in benzene were detd. Values of $K = [\text{NH}_4\text{OH}]/[\text{NH}_3][\text{H}_2\text{O}]$ increase with the NH_3 concn. Values of K' for the reaction $2\text{NH}_3 + \text{H}_2\text{O} = 2\text{NH}_4\text{H}_2\text{O}$ change to a similar extent, but in the opposite sense. Hence both hydrates are considered to be present. The partial pressures of water and NH_3 over solns. of NH_3 , and the contraction on admixture of NH_3 and water vapor at the ordinary temp. were also investigated. B. C. A.

The solubility of the barium salts of α -sulfocarboxylic acids. H. J. BACKER. Reichs-Univ., Groningen. *Z. physik. Chem.* 130, 177-83(1927).—All solubilities were detd. at $25^\circ \pm 0.02^\circ$, by evapg. a portion of a soln. formed by shaking with excess solute for about a week in a thermostat. The data are as follows:

Formula	Gs. salt in 100 gms. of H_2O		Molar soly. of dry salt
	Water free	Crystallized	
$\text{C}_2\text{H}_2\text{O}_5\text{SBa} \cdot \text{H}_2\text{O}$	0.296	0.315	1.07×10^{-3}
$\text{C}_3\text{H}_4\text{O}_5\text{SBa} \cdot \frac{3}{2}\text{H}_2\text{O}$	7.28	8.02	25.2×10^{-3}
$\text{C}_4\text{H}_6\text{O}_5\text{SBa} \cdot 2\text{H}_2\text{O}$	6.04	6.81	19.9×10^{-3}
$\text{C}_5\text{H}_8\text{O}_5\text{SBa}$	5.70	5.70	17.9×10^{-3}
$\text{C}_2\text{H}_3\text{O}_5\text{ClSBa} \cdot \text{H}_2\text{O}$	1.51	1.61	4.88×10^{-3}
$\text{C}_3\text{H}_5\text{O}_5\text{BrSBa} \cdot \frac{3}{2}\text{H}_2\text{O}$	3.14	3.38	8.85×10^{-3}
$\text{C}_3\text{H}_5\text{O}_5\text{ClSBa} \cdot 3\text{H}_2\text{O}$	2.88	3.38	8.89×10^{-3}
$\text{C}_3\text{H}_5\text{O}_5\text{BrSBa} \cdot 3\text{H}_2\text{O}$	4.36	5.03	11.84×10^{-3}

The corresponding carboxylic acids are from about 3 to 300 times as sol. as these sulfocarboxylic acids. The substitution of a halogen (Cl or Br) increases the soly. of the sulfacetate but decreases the soly. of the sulfopropionate. In both cases the soly. of the salt of the Br-substituted acid is greater than that of the Cl-substituted acid.

F. E. BROWN

Simplified method of study of salt equilibria in solutions. I. YA. BASHILOV. *J. Chem. Ind. (Moscow)* 3, 1212-5(1926).—B. recommends a rapid method for studying equil. of various systems of salt solns. and drawing their isothermic curves. Instead of having to make a complete analysis at each change of components of the system, B. uses titration. Thus, in order to obtain an isothermic curve of the system $\text{BaCl}_2 + \text{HCl} + \text{H}_2\text{O}$ at 10° , B. takes an accurately measured amt. of a soln. of 295 g. BaCl_2 per liter, and drops in from a buret a soln. of 379 g. HCl per l. until a trace of a cryst. ppt is formed. The amt. of the HCl soln. employed is noted, a measured amt. of water is added which exceeds the quantity necessary to redissolve the cryst. ppt. The HCl soln. is again added until a ppt. is formed. These alternate operations of pptn. by HCl and resoln. by measured quantities of water are continued until sufficient data are obtained to draw an isothermic curve. B. operates in the same manner to study the equil. of the system $\text{BaCl}_2 + \text{Al}_2\text{Cl}_6 + \text{H}_2\text{O}$ and gives 3 diagrams of curves and 2 tables of figures. The results obtained by this simplified method compare favorably with those obtained by the old method, which involves lengthy analytical detns. The new method, however, cannot be applied to systems in which there is no sepn. of the solid phase, as $\text{BaCl}_2 + \text{ZnCl}_2 + \text{H}_2\text{O}$, or $\text{BaCl}_2 + \text{NH}_4\text{Cl} + \text{H}_2\text{O}$. B. N.

The saturation of sugar-lime solutions. II. A. H. W. ATEN, P. J. H. VAN GINNEKEN AND E. VERWEY. *Z. physik. Chem.* 130, 365-77(1927); cf. C. A. 21, 666.—Sugar is a weak acid whose dissocn. const. is 14.6×10^{-4} . The activities of the metal ions of LiOH , KOH and Ba(OH)_2 are not materially changed by the addn. of sugar. These metals probably form dissocd. saccharate mols. The compns. of some mols. might be S-Ca-O-Ca-OH or $\text{S(CaO)}_n\text{CaOH} \cdot m\text{H}_2\text{O}$, where S represents the univalent saccharate ion. All of the Ca saccharates are more sol. than CaO ; so the addn. of sugar increases the amt. of Ca in soln. The S-Ca soln. was put into a closed flask, treated for a few min. with a measured vol. of CO_2 , and weighed to det. the amt. of CO_2 absorbed. Let R represent the ratio of the normality of the absorbed CO_2 to the normality of the original soln. and N represent the ratio of the titration value of the filtrate after treatment with CO_2 to the titration value before treatment. When a soln. contg. 3.5 mols. of sugar and 0.1 N with CaO was treated with CO_2 in different cases so that R varies from 0.15 to 0.95 at room temp., at 80° and at 95° , N did not vary inversely as R, but remained unchanged until R was 0.2 to 0.4. After R reached 0.6, N was less than the inverse proportion would indicate. If the soln. and ppt. were vigorously shaken together, the values of N were above the theoretical for all values of R above 0. When a soln. contg. 0.7 mols. of sugar and 1.7 N with CaO is treated with CO_2 until $R = 0.2-0.4$, a ppt. forms. At higher and lower values of R, no ppt. forms until $R = 0.7$. If the ppt. formed when $R = 0.2-0.4$ is left in contact with the soln. while more CO_2 is added it is redissolved. The ppt. formed at $R = 0.7$ is jelly-like, difficultly sol. and is

not dissolved by warming. If the soln. is more concd., as for instance one contg. 1 mol. of sugar and 2.3 N CaO, the second ppt. does not form until R is very nearly 1, but when $R = 0.77$ the soln. gelatinizes. A ppt. forms when R is 0.2-0.4 as in the other concd. soln. The compn. of the ppt. formed when $R = 0.2-0.4$ varied from $6\text{CaO} \cdot 3\text{S} \cdot 1\text{CO}_2$ to $6\text{CaO} \cdot 3\text{S} \cdot 2\text{CO}_2$. The ppt. forming at $R = 0.7$ can be represented by the formula $3\text{CaO} \cdot 2.5\text{XCaCO}_3$, where X increases with increasing R and 8 is the lowest value of X found at room temp. The final ppt. after treatment is $\text{CaCO}_3 \cdot 6\text{H}_2\text{O}$. Complexes from $2\text{CaCO}_3 \cdot \text{Ca}(\text{OH})_2$ to $\text{CaCO}_3 \cdot 2\text{Ca}(\text{OH})_2$ exist in the sugar soln., and sugar adds to the complexity of the mols. $\text{Ca}(\text{OH})_2$ and Ca saccharate also form complexes. Some of complexes suggested are $6\text{CaCO}_3 \cdot 3\text{Ca}(\text{OH})_2 \cdot 2\text{S}$; $3\text{CaCO}_3 \cdot 6\text{Ca}(\text{OH})_2 \cdot 4\text{S}$; $\text{Ca}(\text{OH})_2 \cdot \text{S}$; $3\text{Ca}(\text{OH})_2 \cdot 2\text{S}$. The existence of such complexes would explain the proportions of sugar and CaO without assuming the existence of disaccharates and trisaccharates.

F. E. BROWN

The osmotic pressure of salt-containing protein solutions. J. A. CHRISTIANSEN. *Compt. rend. lab. Carlsberg* 17, No. 6, 17 pp. (1928); cf. Polanyi, *C. A.* 9, 389; 19, 1800; Bjerrum, *C. A.* 18, 3131. - It is shown by mathematical analysis using the method of Gibbs (Scientific Papers I, 1st ed., 1906) that the osmotic pressure of proteins as measured by Sorenson (*C. A.* 12, 2575) is practically independent of barometric pressure; and that the compn. of protein hydrate varies with the protein concn. at const. salt concn. in the outer liquid.

DAVID DAVIDSON

The thickness of the passive surface layer and the velocity of solution of aluminum. MIECZYSLAW TZENTNERSHVER. *Roczniki Chem.* 6, 383-95 (1926); cf. *C. A.* 8, 2834. - An Al disk 1.1 cm diam and 0.3 cm thick contg. 0.24% Si and 0.45% Fe was cemented on a stirrer and agitated in acids of varying concns. The velocity const. of the reaction was calcd. according to Boguski's equation $K = [11,026 V/F(t - t_0)] \log [11,206 C(V - v_0)/(11,206 C(V - v) + 11,206 C(V - v_0))]$, C being the initial acid concn., F the free surface of the disk, V total vol. of the fluid, v_0 the H_2 evolved in the induction period, v the total H_2 evolved. There is a typical induction period before the velocity becomes const. The thickness of the passive layer $d = (26.97 v_0/3) \times 11,206 \times 2.58 \times F$. ($2.58 = \text{sp. gr. of Al}$) was found to be 30.84μ . The smoothest surface obtained by polishing with a knife, with Al_2O_3 or a grease corresponds with the thickest passive layer. $58-84\mu$. The duration of contact with air, immersion in benzene or concd. HNO_3 , has no effect on either d or the length of the induction period. The latter fact makes the hypothesis of a protective Al_2O_3 layer appear doubtful. d is considerably reduced by polishing the surface with emery or by treating it with Al solvents such as I-KI or HCl. The induction period in 2 N HCl is 28 min., in N HCl 1300 min. d is independent of the acid concn. K increases rapidly with the initial acid concn. in accordance with Hantzsch's theory that the reaction does not take place between Al and H^+ , but between metal and undissoc. acid. K is not influenced by the rate of stirring, but it increases rapidly with the temp., the temp. coeff. being 1.7-2.4 for each 10° . The reaction is, therefore, not detd. by diffusion but is a true homogeneous chem. reaction. It does not depend on the dissocn. of the acid, since the ratios of K for 2 N HCl, HBr and HI are 1300:6:0; for 2 N H_2SO_4 $K = 2$. In a soln. contg. 2 equivs. HCl and 1 equiv H_2SO_4 per l., K is the same as in 2 N HCl, another evidence against the theory of protective layers. When the dissocn. of HCl is reduced by the addn. of chlorides K increases; the addn. of $1/3$ mol. AlCl_3 to 1 l. of N HCl increases K from 41 to 514. The addn. of sulfates or nitrates reduces K by lowering the HCl concn.

MARY JACOBSEN

Equilibrium relations in the water-gas reaction in the temperature range from 300° to 1000° . BERNHARD NEUMANN AND GOTTHARD KÖHLER. *Z. Elektrochem.* 34, 218-37 (1928). - Equil. values for the reaction, $\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2$, were accurately detd. at temps. from 300° to 1000° by a dynamic method. The catalyst used was Co oxide, this was replaced at the lower temps. by iron oxide in order to avoid the formation of CH_4 . Small amts. of Al_2O_3 and KOH were present in the catalyst to increase its hardness and to act as a promoter. The values obtained for the equil. const., $K = [\text{CO}][\text{H}_2\text{O}]/[\text{CO}_2][\text{H}_2]$, were reproducible and they were practically the same at each temp. regardless of the direction in which the equil. was approached. From the value $K_{986^\circ} = 1.61$, a value slightly higher than that obtained by Hahn, the integration const. of the reaction isochore was found to be 0.84 and $\Delta H_0 = 9500$ cal. The curve obtained from the isochore with these values agrees with the exptl. data. The value of the integration const. also agrees with that obtained from vapor pressure data according to the Nernst heat theorem. The consts. calcd. by combination of the equilibria Fe-O-H and Fe-O-C, from the results of Eastman and of Hofmann (*C. A.* 16, 1901; 19, 2293), agree only partially with the observed values. H. F. J.

The determination of temporarily inaccessible kinetics of reaction by the division of the reactions. E. ABEL AND R. SIERRENSCHNEIN. *Techn. Hochschule, Wien Z. physik. Chem.* 130, 631-57(1927).—A reaction of unknown mechanism is studied by sepg, the reaction into parts. The reaction, $\text{IO}_4^- + 7\text{I}^- + 8\text{H}^+ \rightarrow 4\text{I}_2 + 4\text{H}_2\text{O}$ was studied by a comparison with the reaction, $\text{IO}_4^- + 5\text{I}^- + 6\text{H}^+ \rightarrow 3\text{I}_2 + 3\text{H}_2\text{O}$. The paper is largely mathematical but more than 3 pages of tables of data are given. HIO_4 does not react directly with I^- to form I_2 . Iodates or HIO_4 is formed as an intermediate product. In a H_2SO_4 soln. the differential equation for the first reaction is, $d[\text{IO}_4^-]/dt = [\text{IO}_4^-][\text{I}^-](1.3 \times 10^3 F_1 + 1.4 \times 10^7 F_2 [\text{H}^+]^2)$, where F_1 and F_2 are coeffs. dependent on the total ionic concn. The decompn of the iodate is slower than its formation, so iodate accumulates in the reacting soln. In strong H_2SO_4 soln. HIO_4 does not react with I^- to produce I_2 but the reaction produces only iodate ions and I_2 . In a soln. of AcOH and an acetate where the H^- ion concn is 10^{-6} to 10^{-8} the completed reaction may occur.

F. E. BROWN

The dynamics of the reduction of oxides by carbon. G. TAMMANN AND A. YA. ZVORUKIN. *Z. anorg. allgem. Chem.* 170, 62-70(1928).—The decompn. of oxides of the metals in the presence of C begins at a temp. depending on the nature of the carbon used. Only exothermic reactions proceed rapidly. The decompn. of the oxides of Cu, Mn, Fe, Co, Cd, Ni, Pb and Zn, was studied. C in the form of graphite, lamp black and sugar carbon was studied. Graphite gives the highest temp. of initial reaction. The rate of heating is of great importance in obtaining the pure metal.

R. H. LAMBERT

Organic catalysts with hydrogen-ion optimum. G. LJUNGGREN. *XII Int. Cong. Physiol.* 1926, 97-8.—Amino compds. exert a catalytic effect on the decompn. of acetoacetic acid; the optimal pH , which is near the neutral point, varies for different amines. The reaction is unimol. The effect is due chiefly to the primary amino group; the total concn. of the soln. is of importance.

B. C. A.

A study of the oxidation of some dicarboxylic acids by hydrogen peroxide in the presence of certain catalysts. JAMES H. WALTON AND DONALD P. GRAHAM. *Univ. of Wisconsin. J. Am. Chem. Soc.* 50, 1641-8(1928); cf. *C. A.* 20, 3375.—The progress of the oxidation reaction was detd. by removing and titrating at intervals with alkali and KMnO_4 samples of the acid soln. contg. catalyst and H_2O_2 . The expected rapid oxidation of *oxalic acid* by H_2O_2 in the presence of catalysts did not materialize because of the formation of a stable equimolar $\text{Fe}^{+++} \text{C}_2\text{O}_4^{--}$ complex. FeCl_3 is a better catalyst for the oxidation of *formic acid* (to CO_2 and H_2O) than Cu salts and CO_2 in soln. decreases the rate of oxidation with FeCl_3 . Succinic, malic, tartaric and lactic acids show increased oxidizability and tend to decrease the decompn. of H_2O_2 by the catalysts. Increase in acidity decreases the rate of decompn. of H_2O_2 and the rate of oxidation of the acid by the suppression of the formation of *ferric acid*. With acids contg. $-\text{CH}_2\text{CH}(\text{OH})\text{COOH}$ (lactic and malic) the concn. of the catalyst has little effect on either the oxidation or the rate of decompn. of H_2O_2 . In oxidation of glycerol and ethylene glycol the acidity due to the intermediate HCOOH (or HOAc) rose to a max., showing the protecting action of the primary carbinol group.

ALBERT THOMAS FELLOWS

The rate of oxidation of hydrogen peroxide by bromine and its relation to the catalytic decomposition of hydrogen peroxide in a bromine-bromide solution. WM. C. BRAY AND ROBERT S. LIVINGSTON. *Univ. of Calif. J. Am. Chem. Soc.* 50, 1654-65(1928); cf. *C. A.* 17, 2220.—The rate of reduction of Br_2 by H_2O_2 as measured by a new convenient flow method applicable to reactions having half times of the order of magnitude of ones ec., conforms to the equation: $-d[\text{H}_2\text{O}_2]/dt = \chi_1[\text{H}_2\text{O}_2][\text{Br}_2]/[\text{H}^+][\text{Br}^-]^2$, even where the concns. of acid and bromide are small. The values of χ_1 are 0.018 and 0.043 at 25° and 35° , resp. The equation and the values of χ_1 at 25° are concordant with and were predicted from exptl. work on the catalytic decompn. of H_2O_2 . Balint's results (Thesis, Budapest, 1910) have been reviewed and χ_2 at 0° recalcd. to give 0.00062 and Christiansen's (*C. A.* 20, 324; 22, 12) hypobromite-ion mechanism is rejected as unsatisfactory. An *iodometric* analytical method for H_2O_2 is described.

ALBERT THOMAS FELLOWS

Anomalies of palladium in its electromotive behavior in hydrochloric acid solution. FRIEDRICH MÜLLER. *Z. Elektrochem.* 34, 237-40(1928); cf. *C. A.* 13, 2319; 17, 37; 19, 795.—The abnormally low electrode potential of Pd at the equiv. point when used in oxidimetric titrations is connected with the presence of Cl^- in the soln. and cannot be attributed to a time effect. The low values are not observed in H_2SO_4 solns. Exptl. results suggest that the effect is due to the formation of a difficultly sol. subchloride of Pd. Equations are derived to show the dependence of the potential on the soly. product

of this compd. The same abnormality is noted with Pd electrodes in HBr solns. contg. free Br and with Ag electrodes in HCl. Attempts to find the new Pd compd. by reduction of PdCl_2 were unsuccessful.

H. F. JOHNSTONE

The relation between reactive power and electrical conductivity in the solid state.

J. ARVID HEDVALL. *Z. anorg. allgem. Chem.* 170, 71-9(1928).—The double decompn. of cuprous halides and BaO was examd. at many temps. A sharp increase in the reaction occurs at 270°, 312° and 340° for chloride, bromide and iodide, resp. These temps. correspond to the temp. at which a sharp increase in elec. cond. is found. This would imply that conduction is not only electronic but also by the at. and mol. lattice, since pure electronic conduction occurs at much lower temps. A discussion is given of the sulfates in which the SO_4 is greatly deformed. The temp. of reaction with BaO for such sulfates was found to be higher than that for the cuprous halides. Since, however, the lattice structure of Ca^{++} , Sr^{++} and Mg^{++} is that of the rare-gas types, these ions are very little deformed and therefore are not readily opened. Of this type Li^+ and Be^{++} are most deformed and should react with BaO at much lower temps. in the sulfate compds. This has not yet been confirmed.

R. H. LAMBERT

Dispersion of metals in solid salts under the action of an electric current. T. PECZALSKI. *Compt. rend.* 185, 1588-91(1927).—An Fe tube filled with a salt (KCl , BaCl_2 or SrCl_2) and contg. a Cu rod placed axially, was heated to a temp. below the m. p. of the salt, and the Fe and Cu portions were then connected to a source of current. Above 300° the cond. increased rapidly after 1 hr. when the Cu was made pos., and Cu was detectable in the salt. When the Cu was neg. the increase was slower and Fe was detectable in the salt. The use of Al and Al_2O_3 in place of the Cu and the salt, resp., gave neg. results except for an increase in cond. in the former case when the Fe was pos. The results are explainable by emission of ions of the metal, while there is also evidence of electrolysis of the salt vapors, with the formation of unstable compds. between the metal and the cations and subsequent deposition of the former in the salt.

B. C. A.

Electrolytic reduction potentials of organic compounds. I. Polarographic method. M. SHIKATA. *Mem. Coll. Agr. Kyoto* 4, 1-8(1927).—A description is given of the use of polarograms, produced by the automatic registration of current-voltage curves on a rotating drum, for the detn. of the reduction potentials of org. compds. at the dropping Hg cathode. II. Isovaleraldehyde. M. SHIKATA AND I. TACHI. *Ibid* 9-8; see C. A. 21, 1917. III. Pyridine. *Ibid* 19-33; see C. A. 22, 720. IV. Nicotinic acid. *Ibid* 35-48; see C. A. 22, 1894.

B. C. A.

Reduction potential of selenious acid and the free energy of aqueous selenic acid. M. S. SHERRILL AND E. F. IZARD. *Mass. Inst. Tech. J. Am. Chem. Soc.* 50, 1665-75(1928).—Equil. studies of the reaction $\text{X}_2 + \text{H}_2\text{SeO}_3 + \text{H}_2\text{O} = 3\text{H}^+ + \text{HSeO}_4^- + 2\text{X}^-$ lead to values of 1.42×10^9 and 0.88, resp., for the equil. const. where Cl_2 and Br_2 are used. The reduction potential of the reaction $\text{H}_2\text{SeO}_3 + \text{H}_2\text{O} = 3\text{H}^+ + \text{HSeO}_4^- + 2\text{E}^-$ was calcd. to be -1.088 v., which in turn leads to a free-energy value ($\Delta F_{298.0}^\circ$) of -107,710 cal. for HSeO_4^- (or one mole of aq. H_2SeO_4). Redetns. of the soly. of Cl_2 in aq. HCl and the concn. of Cl_3^- present were made, and the activity and distribution consts. of Br_2 between CCl_4 and aq. KBr and HBr measured.

A. T. FELLOWS

Observations on the hydrogen electrode. SHIGEHARN SEKINE. *Z. Elektrochem.* 34, 250-3(1928).—Measurements of the current obtained through different external resistances from the cell, $\text{H}_2(\text{Pt})/\text{H}_2\text{SO}_4/\text{PbO}_2$ show that the voltage of the cell is not const. A small decrease in resistance causes first a normal increase in amperage and then a quick decrease. A further decrease in resistance produces fluctuations in the current strength between certain max. and min. values. The periods of fluctuation were of several min. duration and were easily reproducible. The abnormality is interpreted as a relation between the rate of adsorption of H by Pt and the ionization of the adsorbed gas. These results were not noticed when a Pd sheet was substituted for the Pt.

H. F. JOHNSTONE

Investigations on paramagnetism—the magnetic moments of the ions of the elements of the transition groups. D. M. BOSE AND H. G. BHAR. *Z. Physik* 48, 716-21 (1928).—The magnetic susceptibilities of various salts of the elements of the transition groups were measured with a Curie balance, and the no. of Weiss magnetons assocd. with each metallic ion was computed. Pd^{II} , Ta^{V} , Os^{III} , Pt^{IV} , Pt^{IV} , Th^{IV} and U^{VI} were diamagnetic. The moments of the others were: V^{III} , 12.6; Mo^{++} , 18.1 and 18.4; Rh^{III} , approx. 1.5; Ru^{III} , approx. 1.5; W^{III} , approx. 2; W^{IV} , 8.9; Ir^{IV} , 9.5; Ir^{III} , approx. 2.4; U^{IV} 12.1. The interpretation of these results in terms of Hund's theory and of B.'s modification of Hund's theory is discussed, and tables are given in which exptl. and computed values are compared.

W. W. STILES

The determination of specific heats and heat tone from temperature-time curves. W. M. COHN. *Z. angew. Chem.* 40, 1557-9(1927); cf. *C. A.* 21, 2773.—The substance under examn. is placed in a small crucible contg. also a thermoelement within an elec. furnace. The method is intended principally for silicates and ceramic masses for which variations in the thermal cond. may be neglected. Then the rate of transmission of heat to the substance $dQ/dt = f(t, G)$, where t is the temp. of furnace and G the temp. difference between the furnace walls and the crucible. This function is a const. for a given furnace. A substance is chosen, the sp. heat of which has been ascertained. For the same substance the temp.-time curve is measured and thus dQ/dt is obtained. A series of curves is produced for varying values of G , and the temp.-time relations for various substances are transformed into temp.-heat quantity relations. Sp. heats are detd. by tangents and the thermal effect of any chem. reactions which occur can be measured.

Thermal conductivities of certain liquids. G. W. C. KAYE AND W. F. HIGGINS. *Proc. Roy. Soc. (London)* A117, 459-70(1928).—The thermal conductivities of a no. of common liquids have been detd. by a plate method, over a range of temps. up to 200° (where feasible). The app. consisted of 2 Al blocks, the upper "hot block" contg. an elec. heating coil and the lower "cold block" being provided with radiating fins. The test liquid was contained in a small trough running round the upper end of the cold block, and formed a layer about 20 sq. cm. in area and up to 0.5 mm. thick, between the 2 blocks. An Al guard plate contg. a subsidiary heating coil was mounted above the hot block and sepd from it by a thin film of air, and by adjusting the current through the subsidiary coil it was arranged that the energy supplied to the main heating coil should be almost all transmitted downwards through the test liquid. Corrections were applied for lateral heat loss from the hot block, heat transferred through the liquid in the trough, and heat lost by evapn. from the liquid in the trough. The following results were obtained for the cond. at 20° and the temp. coeff. α in the expression $K_t = K_0(1 + \alpha t)$, resp.: water, 0.0014, +0.001; glycerol, 0.00068, +0.0005; castor oil, 0.00043, -0.0005; aniline, 0.00041, 0.0000; olive oil, 0.00040, -0.0003; cylinder oil, 0.00036, 0.0004; transformer oil, 0.00032, -0.0006; "B.P." paraffin, 0.00030, -0.0001; paraffin oil, 0.00029, -0.0005.

The determination of the reaction temperature by heating curves in powder mixtures. J. ARVID HEDVALL AND E. GUSTAFSSON. *Z. anorg. allgem. Chem.* 170, 80-4 (1928).—The temp. at which the reaction of a powd. mixt. takes place can be obtained either in the center of the mass or near the surface, although the time to reach that temp. is different in the 2 cases. When BaO reacts with the halides of Cu, a measure of the amt. of reaction may be obtained by noting the red Cu_2O formed. The temp. for the reaction of BaO with $CuSO_4$ was found to be 346°.

Flame and combustion. G. I. FINCH. *Nature* 120, 694(1928).—The combustion of CO to CO_2 , both moist and dry, was studied in a steady high-tension d. c. discharge. Both cathodic and pos.-column combustion were examd. The former depends on the current and is independent of gas pressure or moisture. Moisture accelerates combustion in the pos.-column region.

An investigation as to the accuracy of Stohmann's thermodynamical data. P. E. VERKADE AND J. COOPS, JR. *Rec. trav. chim.* 47, 606-18(1928).—The heats of combustion of a long series of materials have been studied in regard to at hermochem. specification as agreed to by international stipulations. These are compared with the data of Stohmann, which are incorrect. The ratio of the 2 values ranges from 1.0031 to 0.9892. Homogeneity in S.'s data is quite evident but no single correction coeff. is sufficient as proposed by Sweitoslawski. The heat of combustion of diphenylamine as given by Stohmann is also shown to be incorrect. By using a large no. of comparison substances V. and C. conclude that no method is available for a systematic correction of the investigations of one source in order to have the data conform to international standards.

Thermodynamics, wave-theory and Compton effect. C. V. RAMAN. *Nature* 120, 950-1(1927).—Objections to Compton's explanation of the nature of the Compton effect are summarized and R.'s views which are being presented and developed elsewhere, are indicated.

Absorption of ultrasonic waves by various gases. T. P. ABELLO. Univ. of Chicago. *Phys. Rev.* 31, 1083-91(1928); cf. *C. A.* 22, 1901.—A beam of ultrasonic waves with a frequency of 612 kilocycles from an oscillating quartz crystal was passed through a mixt. of gas and air contained in a brass absorption tube with ends covered by thin celluloid films. The design of the tube greatly reduced the effect of resonance and allowed the use of 2 different lengths of absorbing gas leaving the geometrical arrange-

ment of openings and absorbing screens the same. The emergent beam was allowed to fall upon another quartz crystal which had a natural frequency very nearly equal to the frequency of the waves and which was connected to the grid of a triode. The intensity of the receiving signal was measured by a previously calibrated vacuum-tube voltmeter. A logarithmic decrease in the transmitted energy with increase in the percentage of the gas in the mixt. was found with CO_2 , N_2O , H_2 and He. The increase in the absorption coeff. (cm^{-1}) at 612 kilocycles when air was replaced in a mixt. contg. 1% by vol. of the gas was found for CO_2 to be 0.029; for N_2O , 0.034; for H_2 , 0.014; for He, 0.0025. For argon mixts. no absorption was observed. *Reflection of ultrasonic wave by a thin celluloid film.* The fractional part of the beam which was transmitted by the films at the ends of the absorption tube increased with increase in percentage of CO_2 and N_2O but decrease with increase in percentage of H_2 and He, agreeing qual. with Rayleigh's theory.

BERNARD LEWIS

Pumice impregnated with anhydrous magnesium perchlorate as a drying agent. JOHN H. YOE, RANDOLPH W. MCGAHEY AND WM. T. SMITH. *Ind. Eng. Chem.* **20**, 656-7(1928). -Pumice granules impregnated with anhyd. $\text{Mg}(\text{ClO}_4)_2$ absorbed water perfectly up to about 25% the weight of the $\text{Mg}(\text{ClO}_4)_2$ present. T. S. CARSWELL

Alcohol tables. F. WRATSCHKO. *Pharm. Presse* **33**, 175-6(1928).—Four tables are given showing, resp., the wt. % and d_{15}^{15} , and d_4^{25} of aq. alc. mixts., interpolation values with formula for their use, and finally the d. of H_2O from 10° to 25°. W. O. E

Molybdenum blue, its properties and composition. LLOYD A. MUNRO. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* **16**, 9-24(1928).—Mo blue is more readily prepd. with SnCl_2 and H_2S . Green and brown colors are due to a further reduction compd.; the action is reversible. Mo blue is obtained only in acid soln.; it is a negative colloid; it also exists as a crystalloid; it forms cubic crystals from alc., and transparent cubes bearing octahedral faces from the blue filtrate obtained after pptn. of the gel with NH_4OH . Mo blue is insol. in Me_2CO , CHCl_3 , C_6H_6 , CS_2 or Me_2CO , sol. in H_2O , abs. EtOH and MeOH. The hydrogel has the formula $\text{Mo}_3\text{O}_8\cdot\text{H}_2\text{O}$; the blue = Mo_3O_8 . The sensitivity of the Sn test is 1 part in 1,423,000. A. L. HENNE

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

Significance of minimum ionizing potentials of gases in relation to their molecular volumes. S. C. BISWAS. *Quart. J. Ind. Chem. Soc.* **4**, 441-7(1927).—From a consideration of the relationship between the dielec. const. K and the mol. const. v of gases it

appears that $v \propto \sqrt{K-1}$ in contrast to Landolt's equation $\sqrt{(K-1)/d} = \text{a const.}$ or the Lorentz-Mosotti equation $(K-1)/(K+2)d = \text{a const.}$ V_r (the min. ionization potential) $\div d$ is const.; this means that the sp. work required to displace an electron measured by the sp. min. ionizing potentials for different gases, can be calcd.

H. B. W.

An apparent failure of the Hund theory. A. G. SHENSTONE. Princeton Univ. *Nature* 121, 619(1928).—The predictions of Hund's theory in regard to the designations of the levels of an ion to which the term sequences of an atom converge are not fulfilled by the 1P and 3P terms of Ne I, nor by the 1D and 3D terms of atoms and ions having 9 d -electrons, such as Ni I, Cu II, Pd I, Ag II. By assuming Paschen's 1s series for Ne I, it is found that 3P_2 and 3P_1 converge to one limit, and 3P_0 and 1P_1 to a higher limit. The two limits are the 2P term of Ne II. According to the theory, the limits of 3P_1 and 1P_1 should be interchanged. An explanation given by Hund is shown to be incompatible with intensity relations in the far ultra-violet series $^1S_0 - n s$. In Cu II, Ni I and Ag II, only 2 members of the 3D and 1D terms are known, but the calculated limits agree in pairs $^3D_3, ^3D_2; ^3D_1, ^1D_2$. The theoretical pairs are $^3D_3, ^1D_2; ^3D_2, ^3D_1$. For Pd I, an identification of more terms has been made, with results for the middle set of terms in agreement with those of Bechert and Catalan, but not with those of McLennan and Smith. The D term-sequences converge as above, the difference between the calcd. limits of 3D_3 and 3D_2 being 80 cm. $^{-1}$ and between 3D_1 and 1D_2 20 cm. $^{-1}$, whereas the difference between the terms 3D_3 and 3D_2 of Pd II is more than 3500 cm. $^{-1}$. No explanation is attempted for these failures of the theory in the case of atoms having nearly completed electron groups.

F. A. JENKINS

The fundamental state of the helium atom. E. GIL A. HYLLEAAS. *Z. Physik* 48, 469-94(1928).—A process for the accurate calcn. of the ionization potential of the He atom is outlined. It involves a soln. of the Schrodinger wave equation for bi-electron systems which corresponds to the Ritz process for the soln. of variation problems. The calcs. are carried out by 11 successive approximations which lead nearly to convergence. The ionization potential is calcd. to be 24.35 v., while that observed by Lyman was 24.46 v. The agreement is better than for the values calcd. by Slater (*C. A.* 22, 1721) and by Kellner (*C. A.* 21, 3823).

H. F. JOHNSTONE

Secular changes in electronic orbits in a magnetic field. W. M. HICKS. *Phil. Mag.* [7], 5, 801-23(1928).—The use which has been made of Larmor's theorem to explain the Zeeman effect on the quantum basis is well known. On the supposition that the effect of H^2 (H = magnetic field) on the motion may be neglected, the motion of a single electron round a nucleus is compounded of an elliptic orbit in some plane inclined to H which at the same time regresses with angular velocity $w = HE/2 mc$. Now, such an electron in orbits of at. dimensions makes about a billion circuits in $1/1000$ sec. Thus during the life even of an excited orbit there is time for secular effects to produce very large changes in the orbital consts. It is the purpose of the present investigation to det. these changes, and at the same time to find the conditions that H^3 and higher powers may be neglected. The principal results may be summarized as follows: If the initial orbits are parallel or perpendicular to H their planes remain fixed, but the line of apsides regresses. If the initial orbit be a circle, it will remain a circle, with the inclination of its plane unaltered, but the nodal line progresses at a const. rate of the second order of magnitude. In other cases the nodes, apsides, eccentricity and inclination of plane all change. There are two categories of cases: where the apsides continually regrede, or where they oscillate on either side of the line perpendicular to the node.

GEORGE GLOCKLER

Experimental test of Maxwell's distribution law. JOHN A. ELDRIDGE. Univ. of Iowa. *Phys. Rev.* 30, 931-5(1927).—A method is described for obtaining a velocity spectrum of a metallic vapor. The app. consists of a no. of coaxial disks with radial slots which rotate at high speed and serve as a velocity filter for the mols. The velocity can be measured directly. The app. has been used to measure the distribution law of mol. velocities in Cd vapor and it is found to agree with that of Maxwell within exptl. error.

BERNARD LEWIS

The composition, pressure, temperature and electric conductance of the higher atmosphere in relation to the nature of the propagation of radio waves. P. O. PEDERSEN. *Kgl. Danske Videnskab. Selskab Math.-fysiske Medd.* 8, No. 4(1927).—Short waves (15 to 20 m.) will travel around the earth and still possess appreciable intensity when received. Radio waves are transmitted through and by means of the atm. the upper strata of which may serve as a "shell," preventing complete radiation into space and reflecting the waves back to the earth. The waves may be reflected back and forth a few times between the surface of the earth and the "shell," but on account of the great

loss of energy in a single reflection (75 to 90%) long distances must be covered in one or, at the most, a very few reflections or "steps," and the path would consequently be located mainly in the higher atm. along the shell, practically parallel to the earth's surface. Reference is made to the possible relationship between certain values such as the damping const. of the waves, the av. electron velocity, the av. length of the free electron path, the av. no. of electron collisions per second, and a const. depending on the wave length and the concn. of electrons in the atm. The partial pressure of each of the constituents of the upper atm. (H, O, N, He) may be calcd. for different elevations based on certain assumptions regarding the temp. and nature of the constituents. The elec. cond. of the atm. in the direction of the earth's magnetic field at elevations of 120, 140 and 160 km. is, resp., 300, 4000, 9000 times as great as the corresponding cond. at right angles to the field. P. believes that radio wave transmission studies will bring about the solution of such problems as the detn. of the extent of ionization caused by the very penetrative cosmic rays and by the ultra-violet astral rays. The former kind of ionization is involved in the damping effect on very long waves; the latter causes the greater damping of long waves on winter days than on summer days.

E. O. ELLINGSON

The homopolarity of the hydrogen halides. V. KONDRAT'EV. *Z. Physik* **48**, 583-5(1928); cf. Lewis, *C. A.* **22**, 2112.—The energy of dissocn. of the H halide mol can be calcd. from its infra-red vibration spectrum. Based on the results of Randall and Imes (*C. A.* **14**, 2296) the calcd. values are found for HF, HCl and HBr to be, resp., 185, 111 and 80.5 cal. per mole. These results agree with those found in thermochem. data. The H halides, therefore, are homopolar compds. H. F. JOHNSTONE

A new optical method of investigating powders or substances with a fibrous structure. G. P. VORONKOV AND G. I. POKROVSKII. *Kolloid-Z.* **45**, 1-7(1928).—The intensity of the reflected component of a light ray incident on coarse suspensions of chalk, mica, glass, filter paper, talc and silk was measured. From these data the consts. of several given equations were evaluated. Preliminary results indicate that these consts. may be related to the shape of the particles in the suspensoid. J. G. McNALLY

Investigation of a mercury-thallium molecule. R. K. WARING. Johns Hopkins Univ. *Nature* **121**, 675(1928).—Two kinds of evidence are obtained for the existence of a Hg-Tl mol. When a mixt. of Hg and Tl vapors is condensed in an empty bulb, there being an excess of solid Tl in the system, more Tl is found than when pure Tl is condensed, starting at the same temp. Also the absorption spectra of mixts. of Hg and Tl vapors at 300-1100° contain new bands shaded to the red, of which several lie in the ultra-violet and one in the green. They are not found with the pure vapor of either substance. With rising temp. and vapor density, the bands broaden, principally towards the red.

F. A. JENKINS

Magnetism and the structure of some simple and complex molecules. D. M. ROSE. *Phil. Mag.* [7], **5**, 1048-67(1928).—In this paper the recent theories of the structure of diatomic mols. proposed by Birge and Mulliken (*Molecular Spectra in Gases*, *Bull. Nat. Res. Council* **11**, Part 3, (1926)) and of the nature of coordination links in Werner's coordination compds. proposed by Sidgwick (*Electron Theory of Valence*, Univ. of Oxford Press 1927), have been tested by the investigation of the magnetic properties of the coordination compds. of the elements belonging to the first transition group. Sidgwick has proposed to account for the linkage of the 6 at. groups to the central atom in a sixfold compd. by supposing that in general each of the at. groups contributes two electron orbits to the latter; all of them taken together form a valency group of 12 electrons round the core of the central atom, which has been stripped of its own valency electrons. From magnetic evidences it is concluded that if there are vacancies in the M_3 shell of the central atom for four electrons, then 4 of the 12 shared electrons occupy the M_3 shell, while the remaining 8 form an octet shell round the core. When the M_3 shell of the core cannot accommodate all of the 4 electrons, they move in orbits outside the latter. In the case of fourfold compds. the valency shell of 8 electrons contributed by the 4 at. groups forms an octet shell outside the core of the central atom. The at. groups which are usually found in coordination compds. include, among others, the following: OH, OH₂, NH₃, CN, CO, NO, O₂ and N₂H₄. Birge and Mulliken have, from band spectra evidence, given a new theory of the structure of diatomic non-polar mols. like those included in the above group. It is shown that the no. of coordination bonds contributed by these groups can be satisfactorily accounted for on their structures proposed by the new theory. GEORGE GLOCKLER

Electronic theory of valency. T. M. LOWRY. *Phil. Mag.* [7], **5**, 1072-80(1928); cf. *C. A.* **22**, 724.—Compds. in which neutralization of the ionic charges is prevented by the laws of valency generally behave as "strong electrolytes" in soln. Badly con-

ducting solns. can, however, be obtained by dissolving a salt in a medium with a low dielec. const., when abnormal variations of cond. with dila. are generally observed. Many fused salts are good conductors, giving values for the "coeff. of ionization" which may be above 100%, perhaps as a result of the formation of multiple-charged ionic aggregates. Other fused salts, however, are poor conductors, probably because the crystal lattice breaks down into neutral ionic doublets on fusion. The term "hydrolysis" has no significance, from the point of view of the theory of complete ionization, unless the H^+ or OH^- ion of water can be fixed by one of the ions of the salt, with formation of a covalent compd.

GEORGE GLOCKLER

Note on the work of V. A. Sokolov: "The laws of radioactive decompositions." II TH. WOLFF. *Z. Physik* 48, 745-6(1928); cf. *C. A.* 22, 1902.—The relation between the decompn. consts. of α -radiators and their position in the decompn. series given by S. follows from a previously published equation of the author (*C. A.* 14, 3356) together with the Geiger-Nuttall formula.

H. F. JOHNSTONE

The disintegration of radium E from the point of view of wave mechanics. G. P. THOMSON. Univ. of Aberdeen. *Nature* 121, 615-6(1928).—Ellis and Wooster (*C. A.* 22, 537) found that the initial energy of a β -particle from Ra E may vary from 4×10^4 to 1.05×10^6 v. This result may be interpreted by the wave mechanics, according to which such an electron corresponds to a wave group of the nature of a single pulse, the damping factor being of the order of the wave length. Such a wave group is far from monochromatic and would spread rapidly in the direction of propagation, implying a considerable range of possible velocities for the electron. If the waves traverse a magnetic field (dispersive medium), the group would be split up into monochromatic waves. The observed continuous spectrum of velocities can thus be understood on this point of view. By using Heisenberg's uncertainty relation, and assuming the no. of β -particles with momentum g to be proportional to $\exp. - [(g - 1.25m_0c)/0.65m_0c]^2$, the uncertainty of momentum of the β -particles is found to be $0.65m_0c$, and the corresponding uncertainty of position $\sigma = h/2\pi \times 0.65m_0c$. The mean de Broglie wave length is 2×10^{-10} , and hence $\lambda = 3.3\sigma$. The group is, therefore heavily damped, the amplitude of the first min. being only 7% of that in the middle of the group. Since σ is much larger than the nuclear diam., the latter does not determine the uncertainty of position.

F. A. JENKINS

Purification of radon. L. WERTENSTEIN. *Phil. Mag.* [7], 5, 1017-27(1928).— H_2 is removed quickly by CuO and P_2O_5 . CO_2 is not readily removed by KOH in a boat at room temp. It may take 24 hrs. or more to remove the CO_2 by these means. Hydrocarbons are oxidized by CuO but the resultant CO_2 is slow to remove. G. G.

The present state of the chemistry of polonium. MARIE CURIE. *Roczniki chem.* 6, 357-61(1926).—Po is suitably prepd. from dead radon tubes. Ra D with a half time value of 16 years can be easily kept in labs. as a source of supply of Po. The ampoules are ground and extd. with warm, dild. acid. The soln. contg. besides Ra D and Po a little Pb from the glass and Hg from the app. in which the radon was purified is pptd. with H_2S in small quartz crucibles in the presence of a few mg. Pb, washed with $K_2S \cdot (NH_4)_2S$ and sepd. from Cu with NH_3 . Po is sepd. from Pb with concd. HNO_3 in which it is sol. It is recovered either by electrolysis from HNO_3 with a Au electrode or—in considerably higher yield—by deposition on a rotating Ag disk from a HCl soln., in which Pb remains dissolved. After dissolving in HNO_3 the Ag is pptd. with HCl, retaining only a little Po, provided the soln. is sufficiently acid. Ni or Cu may also be used, but the sepn. from Ag is easier. A disk carrying a large quantity of Po imparts to the air a strong O_3 odor and causes lively fluorescence of a ZnS screen. A current of several million amp. is produced by 0.001 mg. The HCl soln. of Po thus obtained is pure and may serve for the study of its chem. properties. The pptn. of Po in the presence of another metal is detd. by both chem. analogy and adsorption. It is difficult to sep. the phenomena, but it may be safely assumed, that the pptn. by H_2S in acid soln. is characteristic for Po, since it is practically quant. for minute quantities of Po and in the presence of minute quantities of metals which act as adsorbents under these conditions. Further the % relation of pptd. Po sulfide (I) and PbS (II) or Bi_2S_3 (III) is const., which points to isomorphism, and almost = 1 (it would be 1 with isotopes). I cannot be sepd. from II or III by an excess of the solvent from which it was pptd. It is on the inside of the ppt. rather than on its surface, while with Au_2S_3 and TeS adsorption alone takes place. On the other hand the pptn. of Po hydroxide (IV) on $Bi(OH)_3$ or $Fe(OH)_3$ decreases with the concn. of the NaOH. C as an adsorbent behaves similarly. IV may be partly redissolved by fresh N NaOH and from such a soln. Po is deposited at the anode (complex anion?). It may be concluded that the analogy with Bi is borne out by I, that with Te by IV, but that Po is not an analog

of Te, since its sulfide is insol. in $(\text{NH}_4)_2\text{S}$. Its salts are acid-sol.; it is a noble metal. Its individual characteristics do not permit identification with any neighboring element. The method described will prove useful in the study of adsorption generally.

Ranges of α -particles of uranium I and II. G. C. LAURENCE. *Phil. Mag.* [7], 5, 1027-38(1928); cf. *C. A.* 22, 537.—The ranges of the α -particles of U, I and II were detd. by the Wilson cloud chamber method, with modifications made necessary by the small activity of the radioactive material. The method was satisfactorily checked by its application to the range of Po. The ranges at 15° and 760 mm. of Hg were found to be: U I 2.73, U II 3.28, with a probable error of less than 1%. From the range of U II its decay const. was calcd. to be 1.7×10^{-12} sec. $^{-1}$, or a half-life of 13,000 yrs.

MARY JACOBSEN
GEORGE GLOCKLER

The radium content of Stone Mountain granite. CHARLES S. PIGGOT. *J. Wash. Acad. Sci.* 18, 313-6(1928).—This material contains 4.826×10^{-12} g. of Ra per g. of granite. The Lind interchangeable electroscope was used. The detn. was made on a gray biotite-muscovite granite from Stone Mountain, Ga. L. D. ROBERTS

Spectrography of γ -rays by crystalline diffraction. FRILEY. *Compt. rend.* 186, 137-9(1928).—An app. is described for applying the rotating-crystal method to the diffraction of γ -rays. An optical bench 1.5 m. long is used to support 3 sliding mounts, one carrying the source of radiation and the slit system, the other the crystal and mechanism for rotation, and the third the camera. The radiation is obtained from small ampoules of Rn placed in a Pb block. Between the slits a p. d. of several hundred v. is established to remove the β -rays. The crystal rock salt, is rotated at the rate of one turn in 24 hrs., the angle being variable. Provision is made for micrometer adjustments, and cross wires are substituted for the crystal in lining up the app. The distances from source to plate were 65 to 110 cm., and the exposures lasted 2 to 5 days. By this technic, wave lengths between 35 and 284 X. U. have been measured. *Ibid* 425-7.—Bv using the app. described above, a spectrographic study has been made of the γ -rays emitted by Ra. Twenty-one different wave lengths are listed varying from 20 to 284 X. U., corresponding to quantum voltages from 617 to 43.5 kv. The more intense lines have the following wave lengths in X. U.: 20, 35, 42, 51.5, 140, 144, 155, 161, 166, 232. The origin of the different lines is indicated. The results are in good agreement with data on corpuscular spectra obtained in the same region, except for the 2 triplets (nuclear Ra B and triplet of fluorescence) where the analysis by corpuscular spectra is still uncertain. Both these groups of lines are very intense in this new method. A. W. KENNEY

A method for the direct experimental determination of the magnetic moment of a single electron. TH. SEHL. *Z. Physik* 48, 729-30(1928).—A possible exptl. arrangement of condenser and electromagnet is described by which it might be possible to measure the magnetic moment of a single electronic charge. This would make it possible to check directly the hypothesis put forward by Uhlenbeck and Goudsmit to explain the anomalous Zeeman effect. W. W. STIFLER

Theory of the magnetic electrons. I. D. IVANENKO AND L. LANDAU. *Z. Physik* 48, 340-48(1928).—Mathematical. A. L. HENNE

Dirac's theory of spinning electrons. A. LANDÉ. *Z. Physik* 48, 601 6(1928); cf. *C. A.* 22, 1535.—Mathematical. A more general form of the coupling matrix is set forth. Analogs in classical mechanics are shown. H. F. JOHNSTONE

The refraction quotients of the de Broglie waves of the electron. A. JOFFÉ. *Z. Physik* 48, 737-8(1928); cf. Klemperer, *C. A.* 22, 1903.—J. shows that the refraction exponent calcd. by K. on the basis of the wave theory follows as well from pure electrostatic considerations. The reflection of electrons therefore cannot be considered a proof for the wave theory. H. F. JOHNSTONE

A note on A. Sommerfeld's paper: "The electron theory of metals on the basis of the Fermi statistics." ERICH KRETSCHMANN. *Z. Physik* 48, 739-44(1928); cf. *C. A.* 22, 1538.—The validity of the formula derived by S. for elec. and heat conductance is not dependent on the assumption that the mean free path of the electrons is, in the first approximation, independent of the temp. H. F. JOHNSTONE

A note on the distribution of electrons among atomic levels. E. C. STONER. Univ. of Leeds. *Proc. Leeds Phil. Lit. Soc., Sci. Sect. 1*, Pt. 6, 226-31(1928).—A new distribution is not proposed. It is pointed out that some unjustifiable applications of a scheme previously given (*C. A.* 19, 209) have been made. Recent work has cleared up many points, but electrons cannot be subdivided into groups specified by n , k and j values appropriate for x-ray levels. W. ALBERT NOYES, JR.

Predicted ionization potential of niton. S. C. BISWAS. *Phil. Mag.* [7], 5, 1094-

98—B. calcs. the ionization potential for Rn to be 14 v. He takes into account the fact that in other groups of the periodic system there are found cases where the ionization potential of an element near the bottom of the table increases. Glocker (C. A. 20, 145) and Struwe (C. A. 20, 2450) have previously calcd. the ionization potential of Rn to be about 10 v. by extrapolation *within* the rare-gas group only. G. G.

Mobility of positive ions formed by α -rays in air, hydrogen and helium. J. S. ROGERS. *Phil. Mag.* [7], 5, 881-903(1928).—The method used has the following advantages: The mobility values are found from straight-line intercepts on the potential axis and not from discontinuities in the curves. The ions investigated are not produced in a subsidiary chamber, but directly in the chamber in which they are at once measured. The ions are not entering the measuring-chamber continuously but only for limited times (on account of the sectored wheel). Adequate precautions are taken to remove those positive ions which are approaching the top plate but which fail to reach it. In general the values obtained for the mobilities are the same as obtained by others (C. A. 16, 3256, 3806; 19, 930, 1986, 2778). The mobility of the positive ion depends on its life but this dependence is not a continuous function of the life but for certain ranges of lives the mobility remains const. In each of the gases investigated 3 different mobilities have been found and the change from one to the next occurs at very nearly the same lives. There is still no theoretical equation which will give satisfactorily the mobility of ions but the present expts. indicate that, whatever the ion is initially, *after a very short time it has developed into some kind of cluster.* GEORGE GLOCKLER

Space-charge effects. H. W. B. GILL. *Phil. Mag.* [7], 5, 859-65(1928).—The effect of space charge on the potential distribution between grid and plate in a triode was studied (cf. C. A. 19, 2447). GEORGE GLOCKLER

Primary dark space of a Geissler discharge. K. G. EMELEUS, AND N. M. CAR-MICHAEL. *Phil. Mag.* [7], 5, 1039-48(1928).—The primary dark space on the cold cathode of a Geissler discharge is similar in appearance to the positive-ion sheaths present on negative exploring electrodes. A number of its properties can be accounted for by application of the equations developed by Langmuir for the latter, but there are discrepancies between the observed and calcd. current densities which indicate that the cathode is receiving fast electrons from adjacent parts of the discharge, which, in turn, could produce a secondary emission of electrons from the metal. The primary dark space may be the analog in a glow discharge of the cathode sheath in an arc (cf. C. A. 19, 1531). GEORGE GLOCKLER

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of Te, since its sulfide is insol. in $(\text{NH}_4)_2\text{S}$. Its salts are acid-sol.; it is a noble metal. Its individual characteristics do not permit identification with any neighboring element. The method described will prove useful in the study of adsorption generally.

MARY JACOBSEN

Ranges of α -particles of uranium I and II. G. C. LAURENCE. *Phil. Mag.* [7], 5, 1027-38(1928); cf. *C. A.* 22, 537.—The ranges of the α -particles of U, I and II were detd. by the Wilson cloud chamber method, with modifications made necessary by the small activity of the radioactive material. The method was satisfactorily checked by its application to the range of Po. The ranges at 15° and 760 mm. of Hg were found to be: U I 2.73, U II 3.28, with a probable error of less than 1%. From the range of U II its decay const. was calcd. to be 1.7×10^{-12} sec.⁻¹, or a half-life of 13,000 yrs.

GEORGE GLOCKLER

The radium content of Stone Mountain granite. CHARLES S. PIGGOT. *J. Wash. Acad. Sci.* 18, 313-6(1928).—This material contains 4.826×10^{-12} g. of Ra per g. of granite. The Lind interchangeable electroscope was used. The detn. was made on a gray biotite-muscovite granite from Stone Mountain, Ga.

L. D. ROBERTS

Spectrography of γ -rays by crystalline diffraction. FRILEY. *Compt. rend* 186, 137-9(1928).—An app. is described for applying the rotating-crystal method to the diffraction of γ -rays. An optical bench 1.5 m. long is used to support 3 sliding mounts, one carrying the source of radiation and the slit system, the other the crystal and mechanism for rotation, and the third the camera. The radiation is obtained from small ampoules of Rn placed in a Pb block. Between the slits a p. d. of several hundred v. is established to remove the β -rays. The crystal rock salt, is rotated at the rate of one turn in 24 hrs., the angle being variable. Provision is made for micrometer adjustments, and cross wires are substituted for the crystal in lining up the app. The distances from source to plate were 65 to 110 cm., and the exposures lasted 2 to 5 days. By this technic, wave lengths between 35 and 284 X. U. have been measured. *Ibid* 425-7.—By using the app. described above, a spectrographic study has been made of the γ -rays emitted by Ra. Twenty-one different wave lengths are listed varying from 20 to 284 X. U., corresponding to quantum voltages from 617 to 43.5 kv. The more intense lines have the following wave lengths in X. U.: 20, 35, 42, 51.5, 140, 144, 155, 161, 166, 232. The origin of the different lines is indicated. The results are in good agreement with data on corpuscular spectra obtained in the same region, except for the 2 triplets (nuclear Ra B and triplet of fluorescence) where the analysis by corpuscular spectra is still uncertain. Both these groups of lines are very intense in this new method.

A. W. KINNEY

A method for the direct experimental determination of the magnetic moment of a single electron. TH. SEHL. *Z. Physik* 48, 729-30(1928).—A possible exptl. arrangement of condenser and electromagnet is described by which it might be possible to measure the magnetic moment of a single electronic charge. This would make it possible to check directly the hypothesis put forward by Uhlenbeck and Goudsmit to explain the anomalous Zeeman effect.

W. W. STIFLER

Theory of the magnetic electrons. I. D. IVANENKO AND L. LANDAU. *Z. Physik* 48, 340-48(1928).—Mathematical.

A. L. HENNE

Dirac's theory of spinning electrons. A. LANDÉ. *Z. Physik* 48, 601-6(1928); cf. *C. A.* 22, 1535.—Mathematical. A more general form of the coupling matrix is set forth. Analogs in classical mechanics are shown.

H. F. JOHNSTONE

The refraction quotients of the de Broglie waves of the electron. A. JOFFÉ. *Z. Physik* 48, 737-8(1928); cf. Klemperer, *C. A.* 22, 1903.—J. shows that the refraction exponent calcd. by K. on the basis of the wave theory follows as well from pure electrostatic considerations. The reflection of electrons therefore cannot be considered a proof for the wave theory.

H. F. JOHNSTONE

A note on A. Sommerfeld's paper: "The electron theory of metals on the basis of the Fermi statistics." ERICH KRETSCHMANN. *Z. Physik* 48, 739-44(1928); cf. *C. A.* 22, 1538.—The validity of the formula derived by S. for elec. and heat conductance is not dependent on the assumption that the mean free path of the electrons is, in the first approximation, independent of the temp.

H. F. JOHNSTONE

A note on the distribution of electrons among atomic levels. E. C. STONER. Univ. of Leeds. *Proc. Leeds Phil. Lit. Soc., Sci. Sect.* 1, Pt. 6, 226-31(1928).—A new distribution is not proposed. It is pointed out that some unjustifiable applications of a scheme previously given (*C. A.* 19, 209) have been made. Recent work has cleared up many points, but electrons cannot be subdivided into groups specified by n, k and j values appropriate for x-ray levels.

W. ALBERT NOYES, JR.

Predicted ionization potential of niton. S. C. BISWAS. *Phil. Mag.* [7], 5, 1094-

98.—B. calcs. the ionization potential for Rn to be 14 v. He takes into account the fact that in other groups of the periodic system there are found cases where the ionization potential of an element near the bottom of the table increases. Glockler (*C. A.* 20, 145) and Struwe (*C. A.* 20, 2450) have previously calcd. the ionization potential of Rn to be about 10 v. by extrapolation *within* the rare-gas group only. G. G.

Mobility of positive ions formed by α -rays in air, hydrogen and helium. J. S. ROGERS. *Phil. Mag.* [7], 5, 881-903(1928).—The method used has the following advantages: The mobility values are found from straight-line intercepts on the potential axis and not from discontinuities in the curves. The ions investigated are not produced in a subsidiary chamber, but directly in the chamber in which they are at once measured. The ions are not entering the measuring-chamber continuously but only for limited times (on account of the sectored wheel). Adequate precautions are taken to remove those positive ions which are approaching the top plate but which fail to reach it. In general the values obtained for the mobilities are the same as obtained by others (*C. A.* 16, 3256, 3806; 19, 930, 1986, 2778). The mobility of the positive ion depends on its life but this dependence is not a continuous function of the life but for certain ranges of lives the mobility remains const. In each of the gases investigated 3 different mobilities have been found and the change from one to the next occurs at very nearly the same lives. There is still no theoretical equation which will give satisfactorily the mobility of ions but the present expts. indicate that, whatever the ion is initially, *after a very short time it has developed into some kind of cluster.* GEORGE GLOCKLER

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gas disappearance are measured concurrently. For H, O and N the gas disappearance is proportional to the quantity of electricity transferred through the walls. For H, every electron charge passed involves the disappearance of 1 H₂ mol. For O and N, 2 electron charges correspond to the disappearance of 1 atom of O and N, resp. For He, a current flowed, but no disappearance of gas took place. The cond. of both quartz and glass was considerable, and the mechanism largely electrolytic. Only a small quantity of the gas is recovered on heating, and the electric action is not reversible (Na is introduced on reversing the current). An attempt to collect the gas passing through the walls was unsuccessful. The non-disappearance of He shows that the action is not an accelerated diffusion through the glass pores, for in that case He should pass through 20 times as quickly as H. It is suggested that an electrolytic decompn. of the glass takes place, resulting (for H) in the formation of H₂O which penetrates the glass. With a Hg discharge, gas is usually brought out of the walls.

F. A. JENKINS

Hydrogen activated by the electrical discharge. A. DE HEMPTINNE. *Ann. soc. sci. Bruxelles* [1], 47B, 143-9(1927).—In a continuation of previous work on the reduction of metallic oxides by H in presence of an elec. discharge (cf. C. A. 17, 2815) it is shown that PbO₂ and HgO, but not CuO or PbO, are reduced when not directly exposed to the electronic or ionic bombardment. The values of N/N' are, however, smaller. These observations are interpreted as indicative of the existence of non-ionized, active H, monatomic, triatomic or excited, in the tube. Reduction at the cathode is effected by means of pos. ions and at the anode by the intervention of neg. ions or by non-ionized active H. Actual bombardment favors the reduction.

B. C. A.

The radiation emitted from the point of incidence of hydrogen-canal rays on metals. CHR. GERTSEN. University of Kiel. *Ann. Physik* 85, 881(1918).—H positive rays, produced at 20 to 60 kv., were directed at metallic targets (Be, Mg, Al) to see if the characteristic radiation of the metal was emitted from the point of incidence. A weak wave radiation originated from this spot, but no est. of wave length could be made, and it is uncertain whether it represents a characteristic emission from the metal, or an emission of the Lyman series. The effect of wave radiation was largely masked by scattered corpuscular emission. In an effort to sep. the corpuscular from the wave emission, it was found that a part of the canal rays was scattered with approx. unchanged velocity; the no. of positive particles of high velocity scattered by different metals in a direction of from 80° to 100° with the incident beam is proportional to the product of the no. of atoms per cc. in the metal and the square of its at. no., *i. e.*, the same law of scattering as for α -particles by the nucleus. W. W.

The role of positive ions in the spontaneous discharge in air. WALTHER MÜLLER. *Z. Physik* 48, 624-46(1928).—The object was to find whether positive ions are capable of producing ionization of neutral mols. by collision or whether they liberate from the cathode electrons which in turn produce ionization by collision. Current-potential curves for air were detd. for pressures ranging from 9 mm. to 4 atm. and with voltages from those at the satn. values to above the sparking potential. Two coaxial cylinders were used as electrodes. The results confirm the Townsend relation for the ionization by electrons, *viz.*, that the ionization no. is proportional to the pressure and to a function of the ratio, field strength: pressure. The effect of the positive ions, however, depends on the strength of the field surrounding the cathode, on the character of the cathode metal and on the temp. of the cathode. The results show that positive ions produce no ionization by collision but liberate electrons from the electrode. This was further confirmed by measuring the amt. of electricity carried by brief discharges above the sparking potential when the inner cylinder was positive. A formula for finding the no. of electrons liberated under different conditions was derived. H. F. J.

Presence of charges at an electrode surface. W. C. CLARKSON. *Phil. Mag.* [7], 5, 1104-10(1928).—The possibilities of a charge or field existing at an electrode surface after a discharge are investigated. It is shown that with brass in air no field greater than $\frac{1}{100}$ v. was present $\frac{1}{10}$ mm. distant after a spark, and no charge as great as $\frac{1}{100}$ v. for a capacity of some cm. was given up by a steel needle after $\frac{1}{1000}$ sec. Impurities, etc., caused no appreciable change. A résumé is given of related work, and it shows that if charges actually are involved they must be immeasurably greater than those detectable here. From this it is concluded that, with respect to elec. charges, the system responsible for polarization, whether reversible or irreversible, must be a closed one. When this conclusion is applied to the charged cathodic layers which are shown to correlate and explain contact potential, sparking potential and lag variations, it follows that reversible polarization, like them, is a manifestation of "double layers" at

the cathode surface. Such layers may be expected to attend dynamic equil. of the gas-electrode interface. "Wall" and insulator effects are discussed. GEORGE GLOCKLER

Emission of particles from hot platinum in air at atmospheric pressure. W. D. FLOWER. *Phil. Mag.* [7], 5, 1084-94(1928).—An ultra-microscopic study of air contg. large ions and nuclei emitted by a hot Pt wire has been made. After the source nuclei had been removed the no. visible increased to a max. and then diminished. This is explained if at emission the nuclei are too small to be seen but subsequently coagulate. Reliable results on the rate of coagulation of these nuclei were obtained by using them as nuclei for condensation and photographing the droplets formed. The equation of the coagulation time-curves is hyperbolic and is given by $dn/dt = -kn^2$, where n is the no. present and k is a const. equal to 0.15×10^{-8} cc./sec. This value is in reasonable agreement with the value 0.13×10^{-8} cc./sec. obtained by Kennedy for large ions and nuclei from a Bunsen flame. The application of the coagulation theory of Smoluchowski to these results is discussed. GEORGE GLOCKLER

Cause of the loss of thermionic activity of thoriated tungsten filaments under certain voltage conditions. A. C. DAVIES AND R. N. MOSS. *Phil. Mag.* [7], 5, 989-1010(1928); cf. C. A. 17, 3830.—The object of the present investigation was to inquire more closely into the cause of the deactivation of thoriated W filaments, in a high vacuum, by the application of voltage encouraging emission, at temps. well below the minimum necessary to cause any decrease of emission due to the temp. alone. To this end a thorough investigation was first made of the way in which the emission from an activated thoriated W filament varied with time during the application of various different arrangements of elec. fields, at a series of different filament temps. and concn. gradients of Th in the filament. Valves of the type V. S. 8 B. were employed for this purpose. These are triode valves with cylindrical electrodes, the filament being enclosed by an open spiral grid of about 3 mm. diam., and a cylindrical anode of about 1 cm. diam. and 2 cm. length. GEORGE GLOCKLER

Influence of various gases upon wire vibration in a corona discharge tube. J. E. SNYDER AND G. M. EVANS. *J. Sci. Instruments* 5, 166-7(1928).—When a 60-cycle corona discharge of 2.5 to 3.5 milliamp. occurred in an all-glass discharge tube of the wire-coaxial cylinder type, the wire did not vibrate when the surrounding gas was air, NH_3 , O_2 , H_2 or a mixt. of N_2 and H_2 , but when surrounded by pure N_2 the wire vibrated so violently that the tube could not be used. CO_2 and CH_4 produced results similar to N_2 . The vibration in N_2 was partially prevented by sealing in the wire while heated electrically and under tension. W. W. STIFLER

Resistance of sputtered films. R. S. BARTLETT. *Phil. Mag.* [7], 5, 848-59(1928).—The aging of sputtered films is shown to depend on the temp. to which the film is raised. The resistance decreases to a min. value and then increases as the temp. is further increased. The dependence of the temp. coeff. of resistance on degree of aging and on temp. is shown. Other exptl. evidence is brought forward in support of the theoretical considerations suggested below. It is shown that the peculiar elec. properties of thin metallic films on glass may be attributed to 3 principal causes. Occluded gas contributes toward the high sp. resistance, and particularly the decrease in resistance with aging, brought about by the outgassing of the metal. A granular or irregular structure explains the dependence of sp. resistance on thickness and the negative aging of very thin films. A state of tension in the film, produced by unequal coeffs. of expansion of film and backing, opens or closes gaps in the film as the temp. changes, giving rise to the low or negative temp. coeff. of resistance and other peculiarities. Exptl. evidence of B. and others is advanced to justify these proposals. The importance of the conditions of deposition in detg. the properties of the film is pointed out. GEORGE GLOCKLER

Shadowgraph method as applied to a study of the electric spark. H. A. ZINSZER. *Phil. Mag.* [7], 5, 1098-1104(1928).—Optimum conditions for studies of the early stage of the spark discharge and also of sound-pulses were discovered, the former by the use of an auxiliary gap, the latter by the use of a low variable inductance. Diffusion of metallic vapor into the gap-space are verified by instantaneous photography. Photographic life-histories of various spark discharges have been obtained. A new method is suggested for detg. the lag of a needle-gap, for the study of steep wave-front impulses and for the study of vortex rings and explosions. GEORGE GLOCKLER

The determination of ionization by x-rays on the basis of the absolute R-unit. HANS KÜSTNER. *Physik. Z.* 28, 797-803(1927).—An app. for the practical detn. of x-ray doses is described which was built upon request of the Deutsche Röntgen Gesellschaft. It depends upon the comparison of ionization in air produced by x-rays with that by a small Ra standard. EMIL KLARMANN

Quantitative Röntgen spectrum analysis by means of cold excitation of the spectrum. R. GLOCKER AND H. SCHREIBER. *Ann. Physik* 85, 1089-1102(1928).—A method of quant. x-ray analysis is described in which the sample to be analyzed is excited to emission of characteristic x-rays by exposure to a stream of primary x-rays from the anticathode of the tube. The advantages of this method are that the sample remains cold and undergoes no change in its compn., as might be the case if it were excited by cathode particles, with consequent increase in temp. The disadvantage lies in the prolonged exposure time required to get spectrograms of suitable d. for measurement. The method has been applied successfully to the analysis of steels contg. V, Ti and W, the proportions of each being detd. from the relative intensities of their K_{α} lines. In expts. with a mixt. of oxides of Sb and Sn in CaSO_4 , contg. the same no. of Sb and Sn atoms, the ratio of intensities of the L_{α} lines was Sb:Sn = 1.1, while with exposure made with the sample on the anticathode and excited by cathode rays the ratio was Sb:Sn = 1:6. The effect on the line intensities of the tube voltage and the presence of foreign substances was also investigated and was found to have no detrimental influence on the method of analysis. C. C. KRESS

Progress of systematics and theory of spectra of molecules. F. HUND. *Physik. Z.* 28, 779-84(1927).—A review of recent accomplishments. E. K.

Recent progress in the theory of band spectra. EDWIN C. KEMBLE. Harvard Univ. *J. Franklin Inst.* 206, 27-42(1928). E. H.

Apparent irregularities in experiments with heterogeneous x-ray beams, with special reference to the J-phenomenon. R. T. DUNBAR. *Phil. Mag.* [7], 5, 962-89(1928); cf. *C. A.* 22, 21.—Two expts. are described which aimed at discovering the J-discontinuities in the absorption of scattered x-radiation (heterogeneous). The results were negative. The results obtained by Barkla and his collaborators are discussed. It is shown that much of the irregularity they observe is only apparent, that is, possibly arises largely, if not altogether, from the assumption that a heterogeneous beam should give sufficiently nearly the same results as a homogeneous beam, the latter having an absorption-coeff. equal to the half-value absorption-coeff. of the former. The progressive absorption method, for instance, frequently used by them to test for the Compton effect, is not suitable unless the radiation is homogeneous, or nearly so; for very heterogeneous beams it is unable to distinguish between classical and Compton scattering. It is suggested that the pronounced irregularities observed by the above authors are assocd. with the varying amts. of extremely soft radiation which may succeed in reaching the electrosopes. GEORGE GLOCKLER

Positions of x-ray spectra as formed by diffraction grating. A. W. PORTER. *Phil. Mag.* [7], 5, 1067-71(1928).—In the calcn. of the positions of x-ray spectra as formed by a diffraction grating, it is customary to consider them as Fraunhofer spectra, such as are obtained with gratings in ordinary spectroscopy. In such cases the incident light is a parallel bundle, and so also is the diffracted bundle which is afterward brought to a point (or line) by a lens. But when x-rays are used, there is no means of producing this parallelism; the incident beam is always divergent, and the diffracted beam that reaches any one point is convergent. For ordinary measurements this is of small importance; but when the extreme accuracy with which x-ray spectral measurements are now being made is considered, the question arises as to what will be the consequence of the lack of parallelism. The object of the paper is to find a first approximation to the correction which the usual formula needs. GEORGE GLOCKLER

Fluorescent secondary x-radiation and the J-phenomenon. W. H. WATSON. *Phil. Mag.* [7], 5, 1145-63(1928).—The ionizations produced by 2 secondary beams from a radiator whose K-characteristic x-radiation was excited have been compared with equal amts. of absorbing material in the paths. Under the proper conditions of tube control, the ratio of the ionization did not alter continuously when the amt. of absorbing material (X) was increased, but exhibited discontinuities in its relation with X, which seem identical with the J-absorption discontinuities observed in former expts. It is shown that, except for the effects of crystal reflection in the radiator, the radiation studied is composed almost entirely of the K-characteristic radiation of the radiator. The effect of changing the orientation of the radiator with respect to the primary beam is to displace a discontinuity, so that a different amt. of absorbing material is required to produce it. The results show that the J-phenomenon may recur periodically in absorption without appreciable change in the absorption coeff. of the beam in its passage through the absorber. GEORGE GLOCKLER

Modified scattered x-radiation and superposition. The J-phenomenon. C. G. BARKLA. *Phil. Mag.* [7], 5, 1164-71(1928).—The results exhibit the change from "unmodified" to "modified" scattered radiations, not by passing through a certain

crit. av. frequency as measured by an av. absorption coeff. (illustrated previously by many examples of the J-discontinuity), but by a change in the other factor involved. In this case it was produced by the superposition of radiations of the same frequencies, and in almost exactly the same proportions. An unmodified radiation was found from air or thin paper, but the degree of modification as measured by absorption methods rapidly developed with increasing thickness of the scattering substance, and approached a limiting value. The expts. appear to link up the classical and the quantum results, though it may be only by a combination of the 2 in various proportions dependent on the relative duration of 2 processes in the time required for an expt. The modification, however, depends on some kind of coherence of the whole radiation. What this means fundamentally is not yet apparent: it may, as previously suggested, depend on a certain degree of continuity or of superposition in the whole stream of radiation (C. A. 22, 21).

GEORGE GLOCKLER

Spectra and atoms. A. FOWLER. *J. Chem. Soc.* 1928, 764-80.—Explanations of spectroscopic terms and their correlation with electronic configurations are given. An application of the theory to the field of astrophysics is shown. H. F. J.

The intensity of reflection of x-rays by crystals at low temperatures. R. W. JAMES. *Mem. Proc. Manchester Lit. Phil. Soc.* 71, 7-13(1926); cf. C. A. 22, 2691.—Theoretical deductions indicate that the intensity of x-ray diffraction spectra is proportional to e^{-M} according to Debye, or to e^{-2M} according to Waller, M in both cases being a function of the temp., the wave length and the angle θ . Exptl. evidence on the variation of intensity with the temp. was, therefore, desired; and in a new series of expts. the intensity of reflections from rock salt at liquid air temp. was obtained for the 400, 600, 800 and 1000 spectra (referring to the true unit cell). According to either Debye's or Waller's theory, the exptl. points, if plotted with the abs. temp. as abscissae and the expression $(\lambda/\sin \theta_1)^2 \log_{10}(\rho_T/\rho_1)$ as ordinates (ρ indicating intensity) should give a straight line, the slope according to Waller's theory being twice that according to Debye's. The results of these and previous expts. at higher temps. are in fair agreement with Waller's predictions up to 500° or 600° abs.; but above that temp. the decrease of intensity with temp. is more rapid than the theory predicts.

A. W. KENNEY

Additional information on the intensity relationships in the L series x-rays. AXEL JÖNSSON. *Z. Physik* 46, 383-91(1928); cf. C. A. 21, 2428.—In this work the relative radiant energies of the stronger lines in the L spectra of Mo, Rh, Pd and Ag are presented. The data were obtained with the most recent Siegbahn high-vacuum spectrograph by means of a quartz crystal and a Geiger chamber. The intensities of the satellite lines such as α_2 and α_3 were obtained by graphical methods, since the maxima are not distinctly marked in the direct exptl. data. The relative measure of line intensity was taken as the product of the max. intensity and the half value breadth corrections being made for absorption by the anticathode. Corrected intensities are recorded for 9 lines of each of the 4 metals with α_1 as the standard. These intensities were compared with intensities calcd. by means of the new quantum mechanics which have been so successful in the optical region. The doublets L , α_1 , α_2 , β_1 and l , η agree very well with these calcs.; but the calcd. doublet $\beta_2\gamma_1$ does not agree at all with the exptl. values. Apparently for this doublet it is only those metals where the $N_{1v,v}$ level is filled with electrons to which this method of calcn. is applicable.

A. W. KENNEY

Influence of form and polarity of molecules on the x-ray spectrum of liquids. II. The occurrence of two intense, amorphous rings with substances whose molecules contain several of the same groups or parts. J. R. KATZ and J. SELMAN. *Z. Physik* 46, 392-405(1928).—Does the av. distance between mol. centers constitute the only identity period in a liquid, or do the av. distances between similar parts of the mol. also constitute an identity period? The authors attempt to answer this question by studying liquids whose diffraction diagrams contain more than one ring, and, in particular, substances in the following groups: (A) those having a central atom carrying 3 or 4 identical side chains; (B) benzene or pyridine rings having 3 identical side chains; (C) closed C rings contg. many (e. g., 15) C atoms; (D) polymerized substances. In all these materials, the presence of more than one diffraction ring has been established by photographic methods using cylindrical slits 6 cm. long and 0.7 to 1.0 mm. bore. Tripropyl-, tributyl-, triisobutyl- and triisomylamines showed inner rings giving interplanar distances corresponding rather closely to mol. diams. calcd. by assuming spheres. The outer rings gave distances corresponding very closely with the length of the side chain. Tripropylamine, e. g., shows an interplanar distance of 5.2 Å. U., and ProH itself gives a distance of 5.3 Å. U. The triethyl-, triisobutyl and triisomy

orthoformic esters, tetraethyl orthocarbonate and tetramethyl and tetraethyl orthosilicic acid esters, trimethyl, triethyl and triisobutyl orthoboric acid esters, and triethyl and tricresyl orthophosphates were studied with similar results. In the case of tricresyl phosphate there were secondary rings corresponding in magnitude to toluene and to MeOH. It is noted in these cases that the heavier the central atom the more intense is the inner ring, and the heavier the side chains the more intense is the outer ring. The three isomeric trimethylbenzenes gave nearly identical results except for the 1,3,5-isomer, in which the intermol. spacing is exceptionally high. Triethylbenzene (mixt.) and trimethylpyridine (1,3,5) gave spacings indicating side chains of the expected magnitudes. Methylcyclopentadecane and several of its derivs. were investigated. The small side chains, as might be expected with such a large mol., had very little effect. There was perceptible a spacing of 5.6 A. U. corresponding to 4 C atoms, and this was more intense than the longer spacing. This suggests that the ring is made of chains of 4 C each. Several polymerized materials, such as metastyrene, paraindene, and coumarone resin were investigated. In each of these the polymerized material showed a spacing practically identical with the spacing characteristic of the unpolymerized material, and, in addn., a much larger spacing (about 12.5 A. U.). Synthetic rubber was an exception to this, giving the same spacing as isoprene. Paraldehyde and parapropionaldehyde gave spacings corresponding to the intermol. distances and to the unpolymerized substance. In general, it is true that the intermol. distances as calcd. from mol. diams. are somewhat smaller than those indicated by the x-rays. A possible reason for this is the invalidity of the assumption that the mols. are spherical. Possibly also small aggregates exist in which the mols. are regularly arranged. The triglycerides of the fatty acids gave only one spacing which was equal to the spacing characteristic of the acid itself, and the dialkylamines behaved similarly. Distances corresponding to mol. diameters do not appear in these cases. A. W. KENNEY

Using x-rays to inspect materials for internal defects. HERBERT R. ISENBURGER. *Foundry* 56, 171-3(1928).—This article is a brief description of the methods of studying materials with x-rays, (1) by radiographic methods, (2) by means of absorption spectra, (3) by means of emission spectra and (4) by means of diffraction spectra. The appropriate app. is described, and the information to be obtained by the different techniques is briefly stated. A. W. KENNEY

The law of absorption of x-rays by matter. P. VILLARD. *Compt. rend.* 185, 1415-9(1927).—The law for the variation of the fluorescent absorption coeff. of x-rays, $\tau/\rho = C\lambda^3$ where λ is the wave length and C is a const. proportional to the 4th power of the at. no. and inversely proportional to the mass of the at., has received inadequate exptl. verification. Putting this in the form $C = C_0\theta(\lambda)$, i. e., $\tau/\rho = C_0\theta(\lambda)\lambda^3$, yields a simple form for study, since it indicates directly variations in the "const." C ; and a comparison of data plotted in this way suggests a similarity to the resonance curve of the potential in a damped elec. circuit excited by waves damped to a negligible extent. The following expression is thus obtained: $C = C_0(4\lambda^2 + d^2\lambda_0^2/\pi^2) / \sqrt{(4\lambda^2 - 4\lambda_0^2 + d^2\lambda_0^2/\pi^2)^2 + 16d^2\lambda_0^4/\pi^2}$, where d is a const. (dN being the coeff. of damping) and λ_0 is the wave length appropriate to the resonator. Data obtained with Zn by Allen in 1924 and 1926 (cf. *C. A.* 18, 3317; 20, 1942) are used to test this equation, in which case $C_0 = 168$, $\lambda_0 = 0.093$ A. U. and $d^2 = 2.1\pi^2$. The agreement between exptl. results and calcn. is very good over the range $0.102 < \lambda < 0.710$. The hypothesis of an at. resonance which thus appears to be verified utilizes the theoretical exponent 3 for the law of Bragg and Peirce; and at the same time gives a phys. significance to the formula. A. W. KENNEY

X-ray investigation of passive metals. F. KRÜGER and E. NÄHRING. *Ann. Physik* 84, 939-48(1927).—Since a completely satisfactory explanation of the phenomenon of the passivity of metals has not been realized, and, in particular, the oxide-film theory has not received adequate proof, the authors proposed to exam. passive metals in powder form by means of x-rays, with the expectation that the large surface would produce enough oxide to give a characteristic x-ray spectrum, calcns. indicating that a film as thin as 10^{-7} cm. should be sufficient to give a definite indication. A special x-ray tube with a hot cathode and a Cu target was used, the casing being metal. The Debye-Scherrer and Bohlin-Seemann methods were both employed. Fe was rendered passive by treatment with strong HNO_3 , and pressed into a pellet. Its passivity was tested repeatedly, but it gave no indication of the presence of oxide. Ni was made passive by electrolytic treatment, and pictures of the powder were taken in a small rubber tube. Neither it nor Cr, which was also made passive electrolytically, showed any indication of the presence of oxide. On the other hand, a mixt. made up of Ni-NiO in the proportions 50:1 clearly indicated oxide lines. These expts. seem direct evidence

that the passivity of metals is not to be explained on the basis of a surface layer of the metal oxide. The possibility of a mol. layer of O_2 is not excluded. A. W. KENNEY

Absorption of x-rays in various elements. F. K. RICHTMYER. *Nature* 120, 915-6 (1927).—Jönsson's note (*C. A.* 22, 1098) stated that the jump of the absorption coeff. in passing the K absorption limit equals E_K/E_L . If this is true, it follows, according to the commonly accepted mechanism of absorption, that this ratio equals the ratio of the no. of $(K + L + M + \dots)$ photoelectrons to the number of $(L + M + \dots)$ photoelectrons expelled, whence it follows that the relative nos. of K and of L photoelectrons must be independent of the relative nos. of K and L electrons in the atom. This would be a very unexpected result. The difficulty of measuring with precision the true fluorescent absorption coeffs. makes exptl. data somewhat uncertain. An empirical relation may well be accepted, even though it conflicts with theory.

A. W. KENNEY

Density necessary to produce the nebular spectrum. C. T. ELVEY. *Nature* 121, 12(1928).—It is not known whether a nebular spectrum can be produced when the d. of a mixt. of O and N becomes sufficiently low; from astrophysical observations, however, and certain assumptions, it is computed that the mean d. at which the nebular spectrum appears is 1.8×10^{-17} g./cc.

B. C. A.

The density necessary to produce the nebular spectrum. DONALD H. MENZEL. Lick Observatory. *Nature* 121, 618(1928).—A calcn. of the density of the expanding gaseous shell of a nova at the moment when the nebular lines appear was given by Elvey (cf. preceding abstr.). It was necessary to assume a value of 10^{-9} g./cc. for the original density, ρ_0 , of the shell when coincident with the stellar atm. This is equiv. to the assumption that the phenomenon of the nova originates in a particular layer of the star's atm. and according to M. is not justified. The value used may be 10^4 times too small, and the resulting crit. densities for the nebular lines and life periods for the metastable atoms may be in error by a corresponding factor. The densities obtained were close to those known for planetary nebulae, a fact which indicates that the ρ_0 used by E. may be approx. correct. The photoelec. ionization of the gas by the intense stellar radiation should also be taken into account.

F. A. JENKINS

The origin of the spectrum of the solar corona. MEGHINAD SAHA. *Nature* 121, 671-2(1928).—A study of the relative intensities of the *Tl* lines $2p_1 - 3s$ and $2p_2 - 3s$ in the spectrum of the vapor heated to 2500° A. U. in a graphite furnace shows that the former line is at least 10 times stronger. The reverse order of intensities would normally be expected. Therefore it is assumed that, to maintain the necessary concn. of atoms in the $2p_1$ state, the forbidden transition $2p_2 \rightarrow 2p_1$ must occur under the influence of the field of radiation. Applying analogous reasoning to the case of Si in the sun, S. concludes that the forbidden line $\lambda 6527.05$ ($^3P_1 - ^1S_0$) should appear in the light from the solar corona, as well as in the Fraunhofer spectrum. Also the Si lines $\lambda 4102.95$, 3905.67 should be high chromospheric lines. The exptl. verification of these points is doubtful. It should be possible for metastable atoms of lighter elements (e. g., C or Si in the 1S_0 state) to be ejected into the corona by light pressure and there undergo forbidden transitions for the same reason that such transitions occur in nebulae. The corona spectrum may also contain forbidden lines of N, O, P, S, P^+ and S^+ , but the spectroscopic data are inadequate for their positive identification.

F. A. JENKINS

Tesla luminescence spectra of the halogens. S. S. BHATNAGAR, D. L. SHRIVASTAVA, K. N. MATHUR AND R. K. SHARMA. *Phil. Mag.* [7], 5, 1226-39(1928).— I_2 has been examd. spectroscopically by excitation under electrodeless Tesla discharge. The spectrum obtained has a bright continuous background from $\lambda 4800$ to 2130 with a no. of electronic emission bands superposed on it. Four different systems of bands have been located. One of these systems has been analyzed and shown to conform to the equation $\nu = 29,078 + (710 n' - 8n'') - (213.7 n'' - 0.6 n''')$, where $29,078$ is the wave number of the head of the system. The presence of the fluorescence term $(213.7 n'' - 0.6 n''')$ has been shown to indicate that this system is given in emission as the mol. returns from a higher excited state to the metastable 3p_1 state. A brief discussion is given of the bands at $\lambda 4800$ and 3400 , which have been frequently called the "electron affinity" bands. An attempt has also been made to explain the continuous background.

GEORGE GLOCKLER

Variation of intensity ratios of optically excited spectrum lines with the intensity of the exciting light. E. A. BAKER. *Nature* 120, 917-8(1927); cf. Wood, *C. A.* 22, 1726.—Expts. on photographic action give results similar to those obtained by Wood for Hg vapor, and place the photographic action among the phenomena of phosphorescence.

B. C. A.

A change of wave length in light scattering. C. V. RAMAN. Calcutta. *Nature* 121, 619(1928); cf. C. A. 22, 1907.—By a method of complementary color filters, the presence of new wave lengths in the light scattered from dense org. vapors is established. The modified scattered radiation from pentane vapor is strongly polarized, but that from naphthalene vapor is only slightly polarized, in agreement with the previous results with liquids. When a cloud is formed by expansion, both the unmodified and the modified scattered light are brighter, and hence the radiations of altered wave length from neighboring mols. are coherent with each other. With a suitable filter for the incident light, the scattered light is found to show a dark region in the spectrum between the unmodified and the modified wave lengths. The new lines observed with scattered Hg radiation (cf. following abstr.) are accompanied by a continuous spectrum. The intensity of the modified lines and of the continuous spectrum varies with the chem. nature of the scattering substance.

F. A. JENKINS

The optical analog of the Compton effect. C. V. RAMAN AND K. S. KRISHNAN. Calcutta. *Nature* 121, 711(1928); cf. C. A. 22, 1907 and preceding abstract.—Two spectrograms are shown, (1) of the light from a quartz Hg arc from which wave lengths $> 4358 \text{ \AA}$. U. have been filtered out, (2) of the same light scattered from liquid toluene. In (2) several new lines occur, some of which are farther toward the red than $\lambda 4358$. Of these, the group of longest wave length disappears when the 4358 line is cut out of the incident light. The next group (at about $\lambda 4500$) disappears when the group $\lambda 4047, 4078$ and 4109 is removed from the incident light by a quinine soln. filter, while $\lambda 4358$ can still be seen. The phenomenon is regarded as analogous to the Compton effect in x-rays, but the wave-length shifts for visible rays appear to be much larger. It is suggested that the incident quantum may be scattered by the mols. of the liquid either as a whole or in part, in the former case giving the original wave length and in the latter an increased wave length. The decrease in frequency is of the same order of magnitude as the mol. infra-red absorption frequency. It is not quite the same for different mols. Accurate measurements are in progress.

F. A. JENKINS

Relative intensity of the principal doublet (H, K) and of the diffuse doublet (X) in the spectrum of the calcium chromosphere. C. DAVIDSON. *Month. Not. Roy. Astr. Soc.* 88, 30-3(1927).—A series of photographs with varying exposures of the chromospheric spectrum in the neighborhood of these lines has been obtained by focusing an image of the sun tangential to the slit of the spectrograph. After correcting for the superimposed continuous spectrum from Planck's formula, for $T = 5000^\circ$, it was found that the intensity of the line, 8542 \AA . U. of the diffuse doublet is somewhat greater than that of K_1 at a level between 1000 and 2000 km. above the photosphere. At heights above 4000 km., X rapidly ceased to be recorded. The results, although incomplete, are therefore in agreement with Milne's prediction, derived from a consideration of the mechanics of the ionized Ca atom, that the infra-red lines (X) should be more intense than H, K at low levels, while at high levels they should be fainter.

B. C. A.

Absolute intensity measurements in a sodium flame and periods of excitation. L. S. ORNSTEIN AND E. F. M. VAN DER HELD. Univ. Utrecht. *Ann. Physik* 85, 953-60(1928).—The no. of quanta radiated per Na atom per sec. in a Na_2CO_3 flame was estd. photographically by comparing the density of the image of the Na flame with the yellow light from a relatively calibrated nitra lamp, which was in turn, simultaneously compared with the Hg green, calibrated in abs. intensities. The flame was produced with air-coal gas and a liquid atomizer; temps. were measured by a compensation pyrometric method, accurate to 20° . The curve of quantum yield per atom per sec. against concn. shows that at concns. below which further diln. causes no appreciable increase in the yield (below $10^{-4} N$) 250 quanta are emitted per atom per sec. at 197° abs . Substitution of this value in the Einstein Equation for the life period of an atom in an excited state gives a value for τ of $5 \times 10^{-8} \text{ sec}$. A composite filter for the Hg green is described.

W. WEST

Structure of the Swan bands. JOHN D. SHEA. Univ. of Cal. *Phys. Rev.* 30, 825-43(1927).—Data obtained by several other investigators have been used in a detailed quantum analysis of the Swan bands (*Trans. Roy. Soc. Edin.* 21, 411(1857)). The data by Johnson (C. A. 21, 1760) have been employed only in the multiplicity of the lines. Tables of the frequencies of the lines and their combination differences are given for the (0,0), (0,1), (1,0), (1,1) and (1,2) bands. Quantum nos. have been assigned to all lines of the R and P branches of the above bands. The Q branch is not observed in these bands. The combination principle is verified in the case of all the above bands. A new method for obtaining accurate numerical values of the consts. of the rotational energy function, $E = B_0 m^2 + D_0 m^4 + F_0 m^6 + H_0 m^8 + \dots$ has been

developed by assuming the theoretical relations between rotational and vibrational consts. recently derived by Kratzer, Kemble and Birge. The so-called method of zero sums has been reformulated for rapid use in band-spectra computations. The moment of inertia of the Swan-band carrier for infinitely small vibration is found to be 15.84×10^{-40} g. cm.² for the initial state in the emission process, and 17.03×10^{-40} g. cm.² for the final state, with a probable error of less than 0.1%. The consts. of an assumed law of force of the form $F = k_1(r - r_0) + k_2(r - r_0)^2 + k_3(r - r_0)^3 + \dots$ are evaluated. For small values of j the R branches consist of triplets, the P branches of doublets, the sepn. decreasing as j increases. Empirical formulas for the sepn. as a function of j are given. The sepn. for corresponding j values in the various bands shows interesting numerical relations. The well-known "staggering" of alternate lines has been investigated quant. for the (0,0) band, and can be explained by the assumption of a double moment of inertia, either in the initial or final state, in agreement with Mulliken's (C. A. 21, 3541) prediction of σ -type doubling for these bands. The necessary difference of the 2 values of the moment of inertia is 0.012%. The mol. C⁻ - C⁻ is suggested as the probable carrier of the Swan bands, provided such a doubly charged mol. can exist.

BERNARD LEWIS

The absorption of light by silver bromide and silver chloride layers. J. EGGERT AND RICHARD SCHMIDT. *Z. Physik* 48, 541-4(1928).—Microcrystals of AgBr and AgCl, prepd. by mixing very dil. solns. of AgNO₃ and the Na halide, were used in the detn. of the max. limit of absorption of these salts. The cryst. structure of the preps. could not be observed under a microscope, but according to the Debye-Scherrer diagrams it is invariable. The source of light was a nitra lamp. Exposure was made on panchromatic plates for 24 hrs. The max. limit of absorption for AgBr was found at $\lambda = 480\mu$, and for AgCl at $\lambda = 400\mu$. These results agree with those of Eggert and Nodack (C. A. 18, 1090). The absorption spectrum of AgBr is not affected by the color change produced in the salt by ordinary light. The amt. of Ag liberated under such conditions is $10^{-6} - 10^{-4}\%$ of that present in the AgBr. H. F. JOHNSTONE

The Zeeman effect of the symmetrical top according to wave mechanics. EDWARD U. CONDON. *Phys. Rev.* 30, 781-4(1927).—The alternation of the quantum-theoretical energy levels of a symmetrical top due to the action of a magnetic field on the charge which is fixed to the top, is investigated by means of the perturbation theory of the wave mechanics. A formula is given for the change in the energy levels. B. L.

The spark spectrum of copper. A. C. MENZIES. *Proc. Roy. Soc. (London)* A119, 249-56(1928).—A vacuum grating spectrograph was used to photograph light emitted by the fusing of 2 Cu wires. The 3 lines observed at wave lengths 1358.76, 1367.92, and 1472.38 have been identified as combinations between the hitherto unknown lowest term of Cu II, ¹S₀ and the terms ³P₁, ³D₁ and ³P₁ established by Shenstone (C. A. 22, 1542). The character of other lines observed in the fused-wire spectrum—absorbed or self-reversed—is regarded as confirming Shenstone's classification. The values of new terms found for Cu II are given together with a list of the newly classified lines.

C. C. KRESS

The existence of intermetallic compounds in the vapor state. The spectra of the alkali metals and of their alloys with each other. J. M. WALTER AND S. BARRATT. *Proc. Roy. Soc. (London)* A119, 257-75(1928).—Comprehensive tables list the wave lengths of heads of bands observed in absorption in the vapors of the alkali metals. These data show not only that Li, Na, K, Rb and Cs form binary mols. in the vapor state, but also that they combine with each other to form the mols., LiK, LiRb, LiCs, NaK, KRb, RbCs, etc. (No bands attributable to LiNa have been observed). With the exception of mols. contg. Li the observed bands lie near the principal series lines of the constituent atoms. Most of the alkali metal mols. also exhibit in absorption isolated diffuse bands without fine structure, which are regarded as analogous to the continuous absorption bands of the halogen mols. If so, they correspond to the dissocn. of the mol. into one normal and one excited atom, and supply the data from which tentative values of the heats of formation of the mols. have been calcd. During the course of the work the concn. of K₂ mols. in K vapor was detd. by the Victor Meyer method, and was found not to exceed 5% at 935°.

C. C. KRESS

Fine structure of Balmer lines. G. HANSEN. *Ann. Physik* 84, 688(1927).—Statements criticizing Hilger's Lummer-Gehrcke plates appearing in a communication of the author (C. A. 20, 1177) are withdrawn.

B. C. A.

Fine structure of the spectrum lines of thallium in the ultra-violet. W. MOHAMMAD. *Phil. Mag.* [7], 5, 1111-4(1928).—Tl is not very rich in lines. There are 21 between λ 6550.15 and 2580.25. Out of these, 11 are very weak, having an intensity less than 4 (max. intensity 500) and thus, except 2580.25, these could be not photo-

graphed. The structure of the remaining lines has been detd. for the first time (C. A. 21, 3560).

GEORGE GLOCKLER

Ultra-violet absorption spectrum of cod-liver oil. J. W. WOODROW. *Phil. Mag.* [7], 5, 944-6(1928).—It has been shown that the characteristic ergosterol absorption bands can be observed in a thin film of cod-liver oil by means of a sensitive photoelec. spectrophotometer.

GEORGE GLOCKLER

Infra-red oscillation spectrum of water molecules and its variation with state. J. W. ELLIS. *Phil. Mag.* [7], 3, 618-21(1927).—A collection of data for the infra-red spectrum of water showing that the spectra for the various states can be explained as being combinations of two primary bands, each pair being characteristic of the special state.

B. C. A.

Characteristic infra-red vibrations of certain crystals of the rock-salt type. L. G. CARPENTER AND L. G. STOODLEY. *Phil. Mag.* [7], 5, 823-32(1928).—Using the data of Lennard-Jones (C. A. 20, 3599) regarding the force fields of rare-gas-like ions (Na^+ , K^+ , Cl^- , Br^-), C. and S. calc. infra-red frequencies and compare them with the calcns. of Born and Brody (C. A. 17, 1183), who obtained these frequencies from density and compressibility data. The 2 methods check within about 10%.

G. G.

The Stark effect of the fine-structure of hydrogen. R. SCHLAPP. *Proc. Roy. Soc. (London)* A119, 313-34(1928).—A theoretical investigation of the influence of an elec. field on the fine-structure of the levels of the H atom based on the equations of Darwin and Dirac. The formula which is developed for the intensity of a line corresponding to a given transition between the levels of 2 different quantum states is applied fully to the calcn. of all the components of $\text{H}\alpha$ in weak and strong fields.

C. C. K.

Observations on the band spectra of mercury. LORD RAYLEIGH. *Proc. Roy. Soc. (London)* A119, 349-57(1928).—Hg vapor excited to fluorescence by the continuous H spectrum exhibits not only the well-known broad structureless bands in the visual and ultra-violet, but also the narrow band at 2540 A. U., the resonance line at 2537 A. U. being absent. In the region of the bands 2345, 2338, 2334 A. U., etc., all of which appear prominently in absorption, only the first appears in the fluorescence light. It is followed by a continuous spectrum which extends into the ultra-violet as far as 2150 A. U. The 2345 bands in absorption are accompanied by another set of narrow bands degraded to the red and spaced at about 1 A. U. (C. A. 22, 541). When produced in emission by exciting Hg vapor with a high-voltage discharge, there is no trace whatever of these narrow, underlying bands. The band in the region 2482 to 2476 A. U., which appeared in the high-potential discharge, and which had previously been described as continuous, was observed to have a structure consisting of alternate max. and min. The wave lengths of the max. and the wave-no. differences between them are given in a table.

C. C. KIESS

Stark effect and series limits. JANE M. DEWEY AND H. P. ROBERTSON. Princeton Univ. *Nature* 121, 709-10(1928).—The Stark effect for highly excited states is investigated with particular reference to the existence of conditionally periodic orbits. A negative upper limit is found for the energy of quantized orbits in a H-like atom. Various types of non-quantized orbits with negative energies can also exist. The lower limit of the energy of a certain class of these periodic orbits is given by $-2e\sqrt{eF}$, where F is the applied field. This limit may be less than the upper limit for the periodic orbits. As a result, the line spectrum will not be continued to the normal series limit, but will end on the long-wave side at a point depending on the field. Also the continuous spectrum associated with ionization or recombination will extend to the red of the normal limit. From the above expression, the limit of the continuous spectrum is calcd. for the series of H (Balmer), He (2s), Cs (2P and 2D), for which the max. of the continuous spectrum has been measured under conditions which allow an estimate of the mean stray field existing in the ionized gas. The positions of the apparent series limits as calcd. from the theory agree with the measured maxima as well as can be expected in view of the uncertainty in the estd. field strengths.

F. A. J.

Multiplets in the Co II spectrum. WM. F. MEGGERS. *J. Wash. Acad. Sci.* 18, 325-30(1928).—New measurements of the Co spark spectrum have been made the basis for an analysis of Co II. The multiplets found represent combinations between high quintet D', F and G' terms with a low F' term, of high triplet P, D' and F terms with a low D term, and of the intersystem combinations ^3D with $^1\text{D}'$ and ^1F . Practically all the intersystem lines are to be found in Rowland's list of solar lines (the other multiplets being beyond the range of Rowland's tables) thus indicating the existence of ionized Co atoms in the sun. The lowest term of Co II, not yet found, is $^3\text{F}'$ arising from the electron configuration d^8 , the terms $^3\text{F}'$ and ^3D already established being metastable terms arising from d^7s .

C. C. KIESS

Absolute intensity of the 2537 line of mercury. PAUL KUNZE. *Ann. Physik* 85, 1013-57(1928).—An exptl. procedure is described in which the intensity of the 2537 line of Hg is measured by means of a photoelec. cell. The light, emitted by a resonance chamber contg. excited Hg atoms, is measured both without and with the interposition of an absorbing cell in its path. This cell, of quartz, contains Hg vapor of various densities corresponding to different temps. The results of the measurements show a small variation of the abs. intensities, k , with vapor pressure (expressed in terms of that at 20°), and when extrapolated to vapor pressure zero, give $k_{20} = 5.78$. This value differs greatly from previous detns. by others which range from 2.97 to 3.77, because numerous corrections, heretofore neglected, have been applied. The effect on the abs. intensity of the Doppler widening of the line, produced by raising the absorption cell to high temps., was investigated and found to be negligible, the same limiting value for vapor pressure zero being obtained as for the lower temps.

C. C. KIESS

The excitation of the D lines by the green sodium band. E. L. KINSEY. *Nature* 121, 904-5(1928).—The green band at 5200 Å. U. emitted by the Na mol. on passing through a tube of pure Na vapor will excite the vapor to fluorescence with emission of the D lines. There is only a narrow temp. range between 400° and 450° for which the effect occurs, with max. at 410°. This is accounted for as the result of a collision between an atom and an excited mol. which leaves the atom in the 2P state. The effect of the presence of a foreign gas is to retard diffusion of the Na vapor to the cooler parts of the tube and thus increase the probability of the collisions.

C. C. KIESS

New regularities in the band spectrum of helium. W. E. CURTIS. *Nature* 121, 907-8(1928).—The analysis of addnl. bands of He₂ has led to the establishment of new energy levels of which the effective electronic quantum nos. are given. These appear to be addnl. to the ordinary at. levels, and furnish supporting evidence for Hund's view that in mol. spectra the term type is detd. by the component in the line joining the nuclei of the resultant orbital moment of momentum of the electrons.

C. C. KIESS

The sun's outer atmosphere. E. A. MILNE. *Nature* 121, 911-3, 943-5(1928).—An address.

C. C. KIESS

Infra-red emission of carbon dioxide. C. R. BAILEY AND K. H. LTH. *Nature* 121, 941(1928).—The infra-red emission spectrum of CO₂ has been remeasured, the source being burning CO. A table contains the new wave-length detns. between 1.70μ and 187.4μ. The band at 2.40μ is new. Comparison of the emission bands with those observed in absorption shows that the emission spectrum is shifted redward. The frequencies of the bands are multiples of $\nu = 16 \times 10^{-11}$.

C. C. KIESS

The spectrum of ionized sodium. OTTO LAPORTE. *Nature* 121, 941(1928).—Numerous strong lines of Na II have been classified as combinations of the terms ²P_{3/2,1,0} and ¹P₁ with its higher terms designated provisionally as p_1, p_2, \dots, p_{10} . The difference ³P₂ - ¹P₀ = 1357 cm.⁻¹ gives a screening const. 3.20 identical with that given by the corresponding difference 780 of Ne I. (For a similar classification cf. Majumdar, *C. A.* 22, 2716.)

C. C. KIESS

A nitrogen after-glow. S. P. MCCALLUM AND W. E. PERRY. *Nature* 121, 942(1928).—If pure A at about 1 mm. is admixed with air at 0.1 mm. in a discharge tube without electrodes, a glow of greenish yellow color appears when the tube is excited and persists for a few secs. after cessation of the discharge. Such a tube retains this property for a long period. No glow appears when Ne and He are the foreign gases.

C. C. KIESS

The pure rotation spectrum of ammonia. RICHARD M. BADGER. *Nature* 121, 942(1928).—Between 55μ and 130μ NH₃ had 6 absorption lines presumably due only to changes in the rotational energy of the mol. The wave nos. of the lines are given by $1/\lambda_m = 19.957m - 0.00508m^3$.

C. C. KIESS

The light-sensitivity of dyes II, 2. ALBERT STEIGMANN. *Kolloid-Z.* 44, 249-50(1928).—The presence of dyes accelerates the formation of vitamins in ergosterol and possibly does so even in ultra-violet light as well as in light of long wave lengths. Alc. eosin solns. are quickly bleached in quartz vessels when exposed to ultra-violet light. Methylene blue is affected differently than fluorescein on exposure; although the visible effect on dyes is the same as on ergosterol, the reaction is actually quite different.

R. H. LAMBERT

Excitation of the auroral green line in active nitrogen. JOSEPH KAPLAN. Princeton Univ. *Nature* 121, 711(1928).—The spectrum of the after-glow produced by a condensed discharge in a mixt. of N and 4% O shows the auroral green line λ5577.35 (5577.5 actually measured) as intense as the N₂ band at λ5442. Decreasing the amt.

of O causes the line to disappear gradually. A line at $\lambda 6654.8$ is also observed under the same conditions as the green line, although less O is necessary to bring it out. It is as intense as the N_2 band at $\lambda 6185$, and is probably due to O, as is the green line. The occurrence of the latter line with considerable intensity in active N suggests that the dissociation of O_2 and excitation of an atom occur in a single act. Other strong arc lines of O are absent, as in the spectrum of the aurora. F. A. JENKINS

The action of "active" nitrogen on iodine vapor. L. H. FASSON AND R. W. ARMOUR. *Proc. Roy. Soc. Edinburgh* **48**, 1-9(1928).—The fact that the yellow glow of N produced by elec. discharge disappears so slowly that its rate of decay can be measured, suggests that this rate might be studied in the presence of other substances. The description of N as being in the "active state" is rather vague, since there are possibly a number of different states of activation present simultaneously. The spectrum of I excited by active N shows a line at $185m\mu$ and also the I line at $206m\mu$. This indicates the presence of some form of N capable of imparting energy sufficient to dissociate the I and raise the atom to the energy level necessary to emit this line, which is calculated as 8.4 volts. This is somewhat higher than any previously recorded voltage for I lines and supports the view that the glow is produced by the combination of N atoms. When the pressure of I vapor is comparable to that of the active N, the visible reaction is an instantaneous flash, cinema studies indicating that even with imperfect mixing the duration of this reaction is less than 0.01 sec. It is extremely unlikely, however, that there is any chem. action. The I merely receives energy and radiates it again. A. W. KENNEY

Photophoresis in liquids. SATYENDRA RAY. *Kolloid-Z.* **45**, 7-9(1928).—Positive photophoresis was observed with emulsions of oil in water, water in oil and colloidal S. J. J. McNALLY

Some further notes on the hydrolysis of starch grains under polarized light. ELIZABETH S. SEMMENS. *Plant Physiol.* **1**, 201-2, (1926); *Physiol. Abstracts* **12**, 588.—Some added notes and photographs in regard to work already published (cf. *C. A.* **20**, 3133). H. G.

The spectrum of chlorophyll (GRILL) 11H.

ANGERER, E. VON: *Niederschläge durch Kathodenzerstäubung*. Brunswick: Friedr. Vieweg & Sohn Akt.-Ges.

SMITH, D. M.: *Visual Lines for Spectrum Analysis*. London: Adam Hilger, Ltd. 5s. 3d. postpaid. Reviewed in *Chemicals* **30**, No. 1, 6(1928).

Device for treating liquids or other materials with radioactive emanations. M. DICKINSON. *Brit.* **280,324**, Sept. 15, 1926.

4—ELECTROCHEMISTRY

COLIN G. FINK

The electric-furnace industry of Sweden. ANON. *J. four elec.* **37**, 175-7(1928).—Statistics are given covering recent years up to 1926 inclusive. About 84,000 tons of pig Fe is now produced annually. The ferro-alloy production in 1926 was 38,532 metric tons, ferro-Si constituting almost half of this total. About 10% of the steel produced in Sweden in 1926 was electric. C. G. F.

Large electric baking ovens. W. ELLERD-STYLES. *J. (Brit.) Inst. Elec. Eng.* **66**, 569-95(1928).—Constructional details of elec. ovens are dealt with as an indication of the suitability of each type for particular locations. British, American and Continental ovens are reviewed and compared. C. G. F.

Electric enameling used in Packard plant. R. J. GAUDY. *Elec. World* **91**, 1289-91(1928).—A modern installation is fully described. Elec. ovens for continuous process effect large savings. Filtered air in counterflow to work assures product of high quality and economy of heat. C. G. F.

Electrochemical oxidation of cerous salts solutions. I. A. ATANASIU. Univ. de Bucarest. *Bul. chim., soc. romând stiinte* **30**, 61-7(1928).—Cerous sulfate or nitrate can be quant. oxidized by electrolysis. The electrochem. yield is 4 times larger with the nitrate than with the sulfate; in both cases it is proportional to the reciprocal of the c. d. Dild. ceric solns. are perfectly stable. A. L. HENNE

The electrical resistance of the electrode-electrolyte transition layer. O. SCARPA and E. DENINA. School of Eng., Turin. *Z. physik. Chem.* 130, 449-71 (1927). (Italian).—The impedance, and very probably also the elec. resistance of the electrode-electrolyte transition layer, referred to a unit area of the electrode surface, depend on the sign of the polarization of the electrode, on the nature of the electrolyte and of the electrodes, on the current d . at the electrode, on the degree of the polarization of the electrodes, that is, on the time elapsed since the beginning of the polarization, on the history of the polarizing current, and on the temp. and probably the pressure. When H_2 and O_2 are evolved at the cathode and anode, resp., as a result of electrolysis, the relationship between the electrode-electrolyte resistance and the polarizing current depends essentially on the acidic or basic character of the electrolyte. These results were arrived at by using a special method for detg. the electrode-electrolyte resistance while the electrode was being subjected to various polarizing conditions. A variety of electrodes in solns. of NaOH and of H_2SO_4 were studied.

R. H. LOMBARD

Decomposition potentials of zinc sulfate and iron sulfate. BOGDAN KAMIENSKI. *Przemysl Chem.* 11, 374-81 (1927).—From thermochemical and electrochemical data K. calcs. that the decompn. potentials of Zn and Fe sulfates should be lowered by using the respective sulfides as anodes. His expts. substantiate these predictions. When a sulfide is conducting, as that of Fe, then it can be used directly; when not conducting, as that of Zn, then a C anode covered with a ground powder of that sulfide can be used. In electrolyzing $ZnSO_4$ soln. K. reduced the decompn. potential from 2.62 v. at a PbO_2 anode to 1.8 v. at a C anode covered with ground blende powder and moistened with the $ZnSO_4$ soln. By gently moving the C anode the voltage was further reduced to 1.7 v., and the resistance of the electrolyte was lowered from 20 ohms to 12 ohms. By such methods Zn has been extd. from a sulfate soln. under a potential of only 2 v. in place of the usual 3.5 v. The effect of c. d. on voltage for an Fe soln. is shown by a graph. The reactions taking place are discussed, and it is shown how this method helps purify the ore. A description of the app. is given. K. concludes that this method of Zn extn. provides a saving of blende roasting. High-grade (53.4%) Zn ores (Klauebegut und Stufenblende) were used.

A. C. ZACHLIN

Condition of thorium in thoriated tungsten filament. ANCEL ST. JOHN. Amer. Inst. Mining Met. Eng., *Tech. Publication* No. 22, 10 pp. (1927).—Examn. of a high-emission filament supposed to contain about 0.75% thoria indicated the presence of metallic Th, and in some cases an "alloy of W in Th." There is no evidence of Th as oxide, and none of an "alloy of Th in W." The "alloy of W in Th" has a characteristic parameter and probably a characteristic compn. During the investigation, methods were devised for detecting as small a quantity as 0.2% of a minor constituent.

W. H. BOYNTON

Electrolytic Cu (KÖSTER) 9. Purifying molasses and sugar juices electrolytically (Brit. 280,321) 28. Insulation for electric conductors (Brit. pat. 279,876) 13.

Electric dry cell batteries. CARL T. SCHUNK (to The Peerless Paper Box Mfg. Co.). U. S. 1,674,745, June 26. Structural features.

Storage battery. JAMES H. CHANNON. U. S. 1,674,887, June 26. Structural features.

Storage battery. EDISON SWAN ELECTRIC CO., LTD., and G. E. WEBSTER. Brit. 279,926, July 8, 1926. Positive electrodes of batteries of the Planté type are prepd. by subjecting them to electrolytic treatment in a forming soln. which may consist of H_2SO_4 with the addn. of $HClO_4$, and subsequently drying by heat without previous washing.

Storage battery. M. KUGEL. Brit. 280,197, Nov. 6, 1926. The electrolyte is formed of H_2SO_4 and ortho-, meta- or pyro-phosphoric acid. Pb phosphate, alone or with Pb oxides, may be used as active material. A mixt. of Pb oxide and H_3PO_4 may also be used.

Photoelectric cell. W. S. SMITH and N. W. McLACHLAN. Brit. 279,937, Aug. 3, 1926. The cathode may be formed of Na, K or Rb and in addn. to an anode and a control electrode, an earthed electrostatic screen is provided and a graded light filter is inserted in the path of the incident beam of light so that the cell current may vary as the beam moves.

Battery seal composition. LAUCHLIN M. CURRIE (to The Can. National Carbon Co.) Can. 281,108, June 19, 1928. A battery seal compn. consisting of 0.5% glycerol 1.5% tung oil, 0.17% paraffin, 0.01% lead resinate and up to 4% coloring matter, and the remainder about equal parts of rosin and mineral filler.

Rotating barrel apparatus for nickel-plating small articles. J. G. NEWBY and C. B. JERRED. Brit. 279,616, Oct. 9, 1926.

Electrolysis of zinc sulfate solutions. U. C. TANTON. Brit. 280,103, April 29, 1927. In electrolysis of ZnSO_4 solns. such as those obtained from ores and contg. Mn sulfate, anodes of Pb with a small proportion of Ag are used. The Zn deposit is free from Pb and the formation of "trees" is avoided. Mn, when present, is pptd. as MnO_2 at the anode in the form of a fine powder contg. so little Pb that it may be directly used in dry-cell batteries, for varnish or ink manuf. or for other purposes. Mn sulfate may be added to the electrolyte to produce addnl. H_2SO_4 for use in leaching the ore.

Electrolytic rectifier. H. ANDRE. Brit. 279,810, Oct. 29, 1926. In an electrolytic rectifier of the type described in Brit. 224,871, comprising a cathode coated with a layer of oxide conducting in one direction only and an anode of colloidal metal, the cathode is heated before immersion in the electrolyte to thicken the layer of oxide and in setting up the cell it is caused to exert pressure on the anode, to diminish internal resistance of the rectifier. The anode may comprise a Ag disk surrounded by powd. Ag and the cathode is formed of a rod of Ni-Si alloy which is heated to redness and pressed into the powder. Sand or other absorbent is placed around the cathode and concd. H_2SO_4 is added. Various other features are described.

Mercury-vapor rectifier. GENERAL ELECTRIC CO., LTD. AND E. WEINTRAUB. Brit. 280,438, May 6, 1927. Structural features. Cf. C. A. 22, 1550.

Mercury-vapor and similar rectifiers. F. REYNOLDS and W. T. SLATER. Brit. 280,377, Dec. 2, 1926. Structural features.

Low-pressure metallic-vapor electric rectifier. AKT.-GES. BROWN, BOVERI, ET CIE. Brit. 279,910, Nov. 1, 1926.

Electric induction furnace. E. F. NORTHRUP (Electric Furnace Co., Ltd.). Brit. 279,733, May 21, 1927.

Electric induction furnace. M. SURJANINOFF. Brit. 279,883, Oct. 30, 1926

Electric crucible furnace. MAGNUS UNGER (to General Electric Co.) U. S. 1,675,237, June 26. A crucible with a ring-shaped reservoir is provided with an annular depending channel which surrounds a primary winding with which it is inductively associated.

Electric furnace for use in glass manufacture or for other purposes. H. GEORGE. Brit. 279,818, Oct. 27, 1926. A furnace is heated by a conducting body such as Sn or Ga which is liquid under working conditions; this body is heated by electrodes in contact with it or forming one or more arcs above it or by induced currents. Various structural details are described.

Electric arc furnace for treating iron or other metals. WILLIAM E. MOORE (to Pittsburgh Research Corporation). U. S. 1,674,982, June 26. In carbonizing a metal charge, it is mixed with carbonaceous materials, heated until molten, and then agitated.

Electric resistance furnace adapted for making zinc oxide. EARL H. BUNCE and GEORGE T. MAHLER (to New Jersey Zinc Co.). U. S. 1,674,947, June 26.

Electric resistance apparatus for making hollow bodies of quartz or similar material. I. G. FARBERIND. A.-G. Brit. 280,291, Aug. 12, 1926.

Flexible braided and laminated electric contacts of copper or bronze, etc. G. A. JUHLIN and METROPOLITAN VICKERS ELECTRICAL CO., LTD. Brit. 279,960, Aug. 13, 1926.

Electrical conductor comprising titanium oxide. SIMON J. LUBOWSKY. U. S. 1,675,117, June 26. TiO_2 of a gray-black color, which has been subjected to a high temp. in a reducing atm., e. g., rutile heated to 800–1000°, is used for electrodes, conductors or containers.

Protecting electrical transformers and similar apparatus against overload. M. BUCHHOLZ. Brit. 280,209, Nov. 2, 1926. Gases of decompn. formed in the app. are caused to diffuse into a cell with porous walls so that the resulting change in pressure operates an elec. switch, which controls a signal or cut-out device.

Apparatus for generating ultra-violet radiations from electric arcs between tungsten or other metallic electrodes. G. G. BLAKE. Brit. 279,680, Jan. 4, 1927.

Electric incandescent lamp base. GENERAL ELECTRIC CO., LTD., G. H. IDE and R. J. KAULA. Brit. 279,654, Nov. 26, 1926. Molded parts are formed of a phenol- CH_2O synthetic resin and a filler; structural features are specified.

5—PHOTOGRAPHY

C. E. K. MEES

CLERC, L. P.: *La technique photographique*. Tome I. 459 pp. Tome II. Pp. 461-850. Paris: Paul Montel The. 2 vols. F. 90.

Photographic reduction. P. FLAGWITZ. Can. 278,039, Feb. 21, 1928. Photographic negatives, positives, films, bromide prints and gaslight prints are treated with a soln. of I, KI and $K_2Cr_2O_7$.

Photographic emulsion. H. MAUERHOFF. Can. 278,364, March 6, 1928. Protein decompn. products prepd. by acid hydrolysis are incorporated in photographic Ag halide emulsions.

Photographic emulsion. W. DIETERLE, O. MATTHIES and J. REITSTÖTTER. Can. 278,365, Mar. 6, 1928. Protein decompn. products prepd. by alk. and enzymic hydrolysis and a simultaneous partial oxidation are incorporated in photographic Ag halide emulsions. Cf. C. A. 22, 1918.

Photographic silver halide emulsion. O. MATTHIES, P. WULF, W. DIETERLE AND B. WENDT (to I. G. Farbenind. A.-G.) U. S. 1,673,522, June 12. There is added to the emulsion Na trithionate or other suitable water-sol. salt, the anions of which contain at least 3 atoms of an element of the S group, and which serves to increase the sensitivity.

Photographic and cinematographic films. I. G. FARBENIND. A.-G. Brit. 279,033, Oct. 16, 1926. The production of the film base and the coating and intermediate drying operations are carried out in daylight and in one continuous process (which may be combined with subsequent treatments for sensitizing, etc., with exclusion of light). App. is described.

Cinematographic films. J. H. THORNTON. Brit. 279,241, Sept. 11, 1926. Structural features.

Photomechanical printing surfaces. H. ENTWISTLE and W. ENTWISTLE. Brit. 279,186, Aug. 4, 1926. From a positive screen enlargement prints may be made on paper sensitized with ferro-prussiate or other ferric chromic or similar salts and these prints placed, without development or fixing, in contact with a layer contg. gelatin and ferrous or similar salts, as in the "true to scale" process. By this contact the gelatin layer is hardened at the parts in contact with the unreduced portions or the ferro-prussiate or like print. Various other details of procedure also are described.

System for producing composite photographs. R. J. POMEROY (one-half to Famous Players-Lasky Corpn.). U. S. 1,673,019, June 12.

Photographs in monochrome or in natural colors. S. M. PHELPS. U. S. 1,673,300, June 12. A matrix film is prepd. in which a dye is held by a mordant which is sensitive to light, a negative is printed upon the film thus prepd., and the dye thus released is transferred from the matrix film to another surface.

Color photography. R. GSCHÖPF. Brit. 279,381, Oct. 22, 1926. Three-component color-record images are successively printed from different color-record negatives on a single gelatin-coated base sensitized before each printing with a soln. contg. Fe and Ag salts such as Fe oxalate and Ag nitrate; after each printing, development is effected with a soln. contg. Cu thiocyanate and a salt of an org. acid such as NH_4 oxalate or with a soln. of I in alkali iodide or an alkali iodide and ferricyanide. Various details and modifications are given.

Color photography. W. V. D. KELLEY and D. TRONOLONE (to Kelley Color Laboratory). U. S. 1,674,174, June 19. An image is first formed in one section of a coating and the image is toned to a color such as blue-green; without fixing, a second image is formed in the same coating in a different section of the coating and the colloid surrounding the reduced light-sensitive salt of the second image is then rendered receptive to an acid or azo dye and is dyed to a color substantially complementary to the color of the first image. U. S. 1,674,175 (W. V. D. KELLEY) also specifies color photographs consisting of 3 separately developed and colored Ag images in one emulsion. Cf. C. A. 22, 1918.

Color photography. W. WITTE. Brit. 279,882, Oct. 28, 1926. A system is described involving the resensitization and reprinting, one from another of different color-selective reproductions.

Color photography. M. MARTINEZ. Brit. 280,252, May 17, 1926. Sensitive layers which print out, resp., in red, blue and yellow, comprise: (a) for red, a deriv. of

urea such as alloxan, alloxanic acid, alloxantine or murexide, which may be mixed with each other or with metal salts such as alkali oxalates, or Ag, ferric or Hg salts; (b) for blue, a mixt. comprising ferric salts together with a cyanide such as that of Hg or K, and $K_3FeC_6N_6$; and (c) for yellow, Ag lactate together with metal oxalates and ferric salts and preferably also an excess of lactic acid. The layers require no treatment after printing except washing in water, except with the red-sensitive layer, which may be treated with a fixing agent such as $HgCl_2$ or Sn chloride or $AgNO_3$. Various details are given.

Color-photography system using superimposed films of different speeds and color sensitivities. M. MARTINEZ. Brit. 280,053, May 11, 1926.

Polychromatic screens for color photography. R. C. M. DE BERCEGOL. U. S. 1,673,349, June 12. The surface of a plate or film is treated with a coloring agent and superfluous portions of the latter are removed; a waxy insulating material is then superposed on the layer of coloring agent, and parallel lines are cut across the film or plate and through the layers of coloring agent and waxy insulating material to produce parallel grooves. A layer of differently colored material is then applied to fill the grooves. An app. is described.

Color screen for use in photography. L. DUFAY. U. S. 1,673,350, June 12. Color screens are formed with separable layers with similarly colored parts in register and of different intensities for prepg. and viewing photographs in natural colors by reflection.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Beryllium: the history of its discovery, its preparation and its properties. GERMAINE MARCHAL. *Rev. gén. sci.* 39, 271-6(1928). E. H.

Titanium and titanium compounds. JOSEPH OTT. *Metallborse* 18, 91-2, 148-9, 481-2(1928).—A discussion of Ti and Ti compds. with special reference to the patent literature. J. BALOZIAN

Univalent iron, cobalt and nickel. III. The reduction of iron. W. MANCHOT AND H. GALL. *Ber.* 60B, 2318-22(1927); cf. *C. A.* 22, 199.—Ferrous mercaptide (I) reacts with NO with formation of dinitroso-iron mercaptide according to: $Fe(S.C_2H_5)_2 + 3NO = Fe(NO)_2.S.C_2H_5 + NO.S.C_2H_5$. I is obtained by treating $FeCl_3$ with an excess of C_2H_5SH and NH_3 . The role of S in the formation of compds. with univalent Ni, Co and Fe depends upon the affinity of S for NO, which enables the latter to remove from compds. of the general type $M(SR)_2$ the S.R.-radical as NO.S.R. Therefore, the following equation holds for Fe, Ni and Co: $Me(SR)_2 + nNO = (NO)_{n-1} M.S.R. + ON.S.R.$ where $n = 3$ for Fe and Co and 2 for Ni. EMIL KLARMANN

The action of aqueous ammonia on mercurous chloride. HAROLD S. KING. Dalhousie Univ. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 115-27(1928).—The action of NH_4OH on Hg_2Cl_2 gives Hg and $HgNH_2Cl$. If the gray ppt. is centrifuged in cold glycerol, it may be sepd. into a black component and a white one, thus proving that the initial material was not a definite chem. compd. such as Hg_2NH_2Cl . A. L. H.

Combination of sulfur with amorphous carbon; comparison with the behavior of sulfur toward graphite and diamond; the carbon sulfide of Ciusa. J. P. WIBAUT AND E. J. VAN DER KAM. *Verslag Akad. Wetenschappen Amsterdam* 37, 395-409(1928).—S combines with amorphous C on heating in a sealed tube at 500-600°. The resulting compd. contains 15-25% S. By heating at 600°, 50% of the combined S is removed; at higher temp., more S is liberated. After a long heating at 1100°, it is impossible to remove 2 to 3% S. No definite compd. has been isolated. The prepn. from tetraiodothiophene of $C_8I_4S_2$ and C_4S described by Ciusa (*C. A.* 20, 736) could not be duplicated. Native graphite or diamond will not combine with S. A. L. HENNE

Preparation of vanadium-ammonium salt from residues of radium manufacture. N. N. EFREMOV AND A. M. ROZENBERG. Northern Chemical Trust. *J. Chem. Ind. (Moscow)*, 4, 44-7(1927).—A V concentrate has been prepd. from by-products and residues of Ra manuf. which, on being dried, had the following compn.: V_2O_5 32.48, V_2O_4 29.63, U_2O_8 6.78, Al_2O_3 14.01, Cu 0.37, As 0.01, SO_3 0.14, Pb 8.69, Fe 2.06, Ni 0.01, CaO 0.95, SiO_2 0.25, Cl 5.59, org. matter 0.35%. To obtain pure V salts from this mixt. E. and R. first triturated it and obtained a homogeneous powder which was introduced in small portions under stirring into boiling HNO_3 , sp. gr. 1.24. Four cc. of the acid was taken per 1 g. of the powder. The latter dissolved rapidly with the exception of SiO_2 , Al_2O_3 and a portion of org. matter. The soln. was concd. by evapn.,

whereupon V_2O_5 gradually pptd. and the liquid thickened to the consistency of a paste, which was filtered hot over a thin asbestos plate by suction. The filtered-off V_2O_5 , while still hot, was washed 3–4 times with small quantities of 40° water; neither colder nor hotter water should be used. The filtrate and the wash-waters contg. a small quantity of V and all the U were evapd. until the nitrates began to decomp. for the purpose of removing the excess of HNO_3 , which increased the soly. of V_2O_5 . The evapd. substance was diluted with water and heated to 60° , whereupon everything dissolved except V_2O_5 ; the latter was filtered off and added to the first V_2O_5 ppt. The new filtrate still contained 4–5% of the total amt. of V_2O_5 contained in the concentrate. The combined V_2O_5 ppts. were, after washing, purified by mixing with a small quantity of hot water to form a paste which was poured under stirring and warming into a small excess of NaOH 1:3. $NaVO_3$ was formed and went in solution, leaving in suspension impurities which, after settling, were filtered off by suction. The filtrate, which contained $NaVO_3$, $Al(ONa)_3$ and an insignificant amt. of Na_2SO_3 , was, after being exactly neutralized by HNO_3 1:4 and heated to boiling, further purified by introduction of a very slight excess of Na_2CO_3 and boiling 1–1½ hrs., whereupon $Al_2(OH)_6$ pptd. The last traces of dissolved Al were removed by NH_3 , followed by filtration and the filtrate was heated to boiling and treated with a small excess of a hot satd. soln. of NH_4Cl . The reaction $NaVO_3 + NH_4Cl \rightarrow NH_4VO_3 + NaCl$ took place; the metavanadate pptd. The soln. was evapd. to thickness, a little water was added and, after 24 hrs., NH_4VO_3 was filtered off, washed at first 4 times with a soln. of NH_4Cl , then rapidly twice with cold water and dried in a desiccator. NH_4VO_3 was obtained as a white cryst. salt. The yield was 96–7% of the theoretical. U which remained in the HNO_3 filtrate may be recovered as $Na_2U_2O_7$.

BERNARD NELSON

The nature of complex compounds. FRITZ EPHRAIM. *Helv. Chim. Acta* 11, 431–6 (1928).—A discussion of the structure of complex compds., such as the Co ammonia chlorides, from the standpoint of the theory of field valence.

LOUISE KELLEY

The electromotive behavior of complex cyanides of manganese; potassium manganese cyanide containing univalent manganese. G. GRUBE AND W. BRAUSE. *Techn. Hochschule Stuttgart. Ber.* 60B, 2273–8 (1927).—Electrolytic reduction of $K_3Mn(CN)_6$ leads to $K_2Mn(CN)_6$, which was isolated in dry state. Thus the results of Manchot are corroborated according to which a soln. of a complex cyanide of univalent Mn is obtained by reduction of a complex cyanide of bivalent Mn by means of granulated Al or Devarda' alloy (cf. *C. A.* 21, 869).

EMIL KLARMANN

The composition of a series of bismuth sodium tartrates. W. F. VON OETTINGEN AND Y. ISHIKAWA. *J. Am. Pharm. Assocn.* 17, 124 (1928).—A bitartrate was prepd. by pptg. a soln. of $BiONO_3$ in $C_2H_5O_2$ with $Na_2C_4H_4O_6$, and washing the ppt. with H_2O . The product contained 58.3% of Bi. The formula is approx. $C_4H_5O_{12}Bi_2$; it is not sol. in H_2O but sol. in NaOH. The Na salt is formed by soln. of the compd. in NaOH and pptg. with EtOH. It is a white powder, with a Bi content 67–9% and approx. formula $C_4H_5O_8Bi_2Na$. Slight variations in the method of pptn. and washing tend to produce products of variable compn. The BiO group attached to the COOH group in the tartaric acid is named "bismuthyl" while the same group attached to the central OH group is named "bismutho." Twelve theoretical compds. are discussed: Some contain Na and some do not; some are anhydrides (produced in drying the ppts.). In general they are variants of bismuthyl-bismutho Na tartrates or of dibismuthyl-dibismutho Na tartrate.

L. E. WARREN

Stannic dichloride diacetate and related salts. FR. FICHTER AND SAMUEL HERSZBEIN. *Helv. Chim. Acta* 11, 562–7 (1928); cf. *C. A.* 19, 735.—To a mixt. of 40 g. glacial AcOH and 5 g. Ac_2O was added drop by drop 40 g. $SnCl_4$. After distg. off part of the liquid, stannic dichloride diacetate (I) sepd. (yield 10 g.). It is very sensitive to moisture, but stable in a dry atm. With dry HCl gas and I the products formed are $SnCl_4$ and AcOH. I reacts rapidly with pyridine giving the stannic chloride pyridine discovered by WERNER AND PREIFFER (*Z. anorg. Chem.* 17, 103 (1898); 71, 97 (1911)). F. and H. suggest that the first step in the reaction between $SnCl_4$ and AcOH may be the formation of an addn. compd., which then decomp. into I and HCl. Other salts prepd. were stannic dichloride dipropionate and stannic dichloride dibutyrate (3 g. from 40 g. $SnCl_4$).

LOUISE KELLEY

The occurrence of titanium tetrachloride in commercial disilicon hexachloride. FREDERIC S. KIPPING AND REGINALD A. THOMPSON. *J. Chem. Soc.* 1928, 1137.—The addn. of a small amt. of crude or of twice-fractionated Si_2Cl_6 (I) to purified Et_4O develops a yellow color in the mixt. When one cc. of Et_4O is added to 100 cc. of I a little yellow cryst. ppt. forms, which melts at $42-45^\circ$ and is probably $TiCl_4 \cdot (C_2H_5)_2O$ (II). This has been obtained by direct combination of $TiCl_4$ and Et_4O . That $TiCl_4$ is present in I

is also proved by the H_2O_2 reaction, and with thymol and H_2SO_4 . The twice-fractionated I contains 1.6% TiCl_4 . For complete sepn. of TiCl_4 (b. 135°) from I (b. 147°) repeated fractionation is required; after 5 or 6 operations the I gives no color reaction with H_2O_2 . II (b. $118\text{--}120^\circ$) is sepd. with difficulty from I by distn.; when it is decomposed by alkali and the aq. soln. then distd. the distillate shows a marked iodoform reaction.

E. O. ELLINGSON

AITA, ANTONIO AND MOLINARI, HENRY: Gli acidi inorganici—solforico, nitrico, cloridrico. Milan: Ulrico Hoepli. 464 pp. Paper covers, L. 48. Reviewed in *Chem. Trade J.* **82**, 652(1928).

MELLOR, J. W.: *Comprehensive Treatise on Inorganic and Theoretical Chemistry*. Vol. VIII. Nitrogen and Phosphorus. 1110 pp. \$20. Reviewed in *Mining Met.* **9**, 293(1928). Vol. IX. Arsenic, Bismuth, Vanadium, Columbium and Tantalum. \$20. Ready in the Fall. New York: Longmans, Green & Co.

7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Potentiometric stannometry. ERICH MULLER AND JOHANNES GÖRNE. *Z. anal. Chem.* **73**, 385–400(1928).—One objection to the use of SnCl_2 as a standard soln. in volumetric analysis is the difficulty in detg. the end points. This difficulty disappears when the end point is detd. potentiometrically. Excellent titration curves were obtained in the titration of SnCl_2 against I_2 , Fe^{+++} , $\text{Cr}_2\text{O}_7^{--}$, Au^{+++} , Pt^{+++} , Hg^{++} in $\text{Hg}(\text{ClO}_4)_2$ and MnO_4^- . In titrating $[\text{Fe}(\text{CN})_6]^{--}$ with SnCl_2 , the break in the e. m. f. curve was dependent upon the H^+ concn. of the soln. and the ppt. of $\text{Sn}[\text{Fe}(\text{CN})_6]$ also was troublesome.

W. T. H.

Behavior of indicators in the titration of ammonia, sodium and calcium phosphates, the methylamines, pyridine bases and boric acid. R. T. THOMSON. *Analyst* **53**, 318–21(1928).—An account of some expts. with about 12 different indicators, in titrating solns. of weak acids or bases. It is pointed out that a knowledge of the p_{H} range of an indicator does not always suffice and expts. are necessary to det. whether a given indicator is really suitable. Thus, bromophenol blue has about the same p_{H} range as methyl orange but is unsuitable for the titration of free acid present in $(\text{NH}_4)_2\text{SO}_4$, although methyl orange gives satisfactory results. In the main, however, the results are as would be expected from the theory of indicators.

W. T. H.

The use of pinachrome as a one-color indicator. I. M. KOLTHOFF. *Univ. Minn. J. Am. Chem. Soc.* **50**, 1604–8(1928).—Pinachrome, a deriv. of cyanine, proves to be an excellent one-color indicator for indicating p_{H} values between 5.8 and 7.8, e. g., for detg. the H-exponent of tap water and of distd. water. The salt error is negligibly small at low concns. but with large amts. of electrolyte the p_{H} value indicated is a little too low. A simple test is described by which the adsorption of a substance at the interface of water and air can be demonstrated and the increased concn. of the capillary active substance shown at this interface.

W. T. H.

Ceric sulfate as a volumetric oxidizing agent. Preparation and standardization of solutions. H. H. WILLARD AND PHILENA YOUNG. *J. Am. Chem. Soc.* **50**, 1322–38(1928); cf. *C. A.* **22**, 2123.—A correction. To prep. a stable soln. of $\text{Ce}(\text{SO}_4)_2$, dissolve CeO_2 in dil. H_2SO_4 . The bismuthate and persulfate oxidation of cerous salt causes the formation of ceric salt, and such an oxidation is useful in the analysis of Ce compds., but the resulting soln. is not stable enough to serve as a standard soln.

W. T. H.

Electrometric titrations: chloramine-T as a titrating agent. A. McMILLAN AND W. EASTON. *J. Soc. Chem. Ind.* **46**, 472T(1927).—"Chloramine-T" may be used for analytical work (*C. A.* **19**, 793) in the oxidizing operations involving the use of I to replace the latter if a few drops of KI contg. a little starch are added to serve as indicator. The same substance may be used as titrating reagent in conjunction with the electrometric app. for the detn. of As, Sb, Sn and Fe, no indicator being required in this case.

B. C. A.

Use of the centrifuge in quantitative analysis. A. GUNDER. *Z. anal. Chem.* **73**, 441–4(1928).—Expts. with ppts. of BaSO_4 , AgCl and CaC_2O_4 show that the analytical chemist can save time by means of the centrifuge. In these expts. the ppts. were washed, dried and weighed in the centrifuge tubes.

W. T. H.

The reaction between atmospheric oxygen and strongly acid iodide solutions in the absence of arsenic acid. FRIEDRICH L. HAHN. *Z. anal. Chem.* **73**, 412–3(1928).—The air error in iodometric titrations can be increased very markedly by the addn. of

a small quantity of Fe salt, but this catalytic effect can be prevented by adding phosphate or pyrophosphate ions. Probably the reason the air error is not noticeable in the titration of considerable arsenate is that the arsenate has a similar effect to that of the phosphate anion.

W. T. H.

Regulation of flow of carbon dioxide through a combustion train. J. C. RICE. *Ind. Eng. Chem.* 20, 627(1928).—To prevent too much backing up of acid in a Kipp generator used for developing CO₂ in a N detn., fit a small rubber balloon to a small glass tube and insert the tube through a stopper placed at the top of the generator.

W. T. H.

Methods of analysis in use in the metallurgical industry. L. PERSOZ. *Rev. chim. ind.* 37, 152-5(1928).—Detailed methods are given for the analysis of raw materials, finished products and by-products of this industry.

P. THAMASSET

Applications of the polarographic method. I. Analysis of abnormal mineral constituents. M. SHIKATA, I. TACHI AND N. HOZAKI. *Mem. Coll. Agr. Kyoto* 4, 49-57(1927); cf. *C. A.* 22, 930.—The polarographic method is applicable to the micro-detection of lead and copper. **II. Copper complex salts.** *Ibid* 59-74.—The deposition potentials of Cu complexes have been detd. On the assumption of the formation of Li trichlorocuprate in solns. of cupric and Li chlorides, the equil. const. $K = [\text{Cu}^{++}][\text{Cl}']^3/[\text{CuCl}_3']$ is 3.98×10^{-9} for LiCl concns. from 0.05 *N* to *N*. The equil. consts. of sulfate complexes are in general greater than those of chloride complexes. The existence of current max. and min. in the current-voltage curves is ascribed to varying adsorption of the Cu complexes. **III. Microanalysis of reducible substances in fermentation products.** M. SHIKATA AND K. SHOJI. *Ibid* 75-90.—Reducing substances such as cinnamaldehyde, furfuraldehyde and acetaldehyde in various fermented liquids can be detected by the polarographic method.

B. C. A.

The deposition of metals on copper from cyanide solutions. I. A new method for the separation and determination of small amounts of lead. B. S. EVANS. *Analyst* 53, 267-75(1928).—If a Cu spiral is dipped into an alk. cyanide soln., Pb and Bi deposit on the Cu even in the cold. Quantities of Pb ranging from 0.5 to 4.0 mg. were added to 5 g. of electrolytic Cu and nearly perfect recovery of the Pb was accomplished by the following method. Place 5 g. of sample in a 750-cc. flask and treat with 60 cc. of 6 *N* HNO₃ (except when Sn is present, when 35 cc. of HNO₃ and 25 cc. of HCl should be used). When the sample has all dissolved, boil off some of the excess acid and add 9 g. of KHC₈H₄O₆. Cool, make alk. to litmus with NaOH and add a satd. soln. of KCN until the ppt. first produced has all dissolved and the soln. is no longer blue if Cu is present. (Since K₂S in the KCN would cause pptn. of PbS it is best to treat the satd. KCN soln. with a few drops of Br-H₂O until a little of the soln. will not give the NaNO₂-Fe(CN)₅ test for S²⁻.) Prep. a deposition tube, as for the detn. of Hg (Evans and Clark, *C. A.* 20, 2631), using Cu filings which will not pass through a 30-mesh sieve. Make the tube 8.5 cm. long and constricted at one end. Plug the constricted end tight with cotton wool, about 1 cm. in depth, pushing it in through the open end. On top of this plug place about 4 cm. of Cu filings and on this place another plug, leaving about 3 cm. clear at the top to facilitate washing. Do not ram the packing too tight or the percolation will be too slow. Clean the tube and its contents by slowly sucking through it 10 cc. of acid soln. which is 3 *N* in HCl and 3 *N* in HNO₃. Finally wash with water and attach the tube to the end of the stem of the main funnel. Cause the soln. to percolate through this tube for 2 hrs. Then allow the contents of the main funnel to run completely through into the flask, detach the deposition tube and wash the contents 4-5 times with cold water. Transfer the contents to a small beaker, cover with 10 cc. of glacial AcOH and allow to stand for 15 min. Decant off the soln. from the Cu and wash twice with water. Finally drain off the acid as completely as possible and give a final washing. Add 12 drops of 9 *N* H₂SO₄ and 2-3 cc. of HNO₃ to destroy org. matter. Evap. to fumes, add more HNO₃ and repeat the evapn. Cool the residue and take up in 10 cc. of NH₄OAc soln. Dil. with 30 cc. of 5% KNO₃ soln., add a few drops of AcOH and an excess of K₂Cr₂O₇ soln. Boil 5 min., allow to stand overnight, filter through asbestos and wash with 5% KNO₃ soln. Dissolve in 30 cc. of 6 *N* HNO₃ which has been boiled to remove HNO₂ and cooled. Transfer the soln. to a Nessler tube and match the color with 0.01 *N* K₂Cr₂O₇ in another tube contg. HNO₃. A slight modification of the procedure is advised when large amts. of Sn, phosphate or mechanically interfering substances are present.

W. T. H.

Modification of Risdale's method for determining phosphoric acid. A simple device for washing the ammonium phosphomolybdate precipitate. A. SCOTT DODD. *Analyst* 53, 276-8(1928).—Treat 4 g. of fertilizer as directed in *Official Methods of Analysis*. Make the soln. up to 250 cc. and filter. Take 25 cc. and transfer to a special

flask which is provided with wash-bottle fittings with a cotton-wool pad on the bottom of the tube through which the water leaves the flask and a long piece of glass tubing replacing the usual exit tip. To the soln. add 30% NaOH until a slight ppt. forms and dissolve this in 4 *N* HNO₃, adding 5 cc. in excess. Place the flask in a water bath and, while heating, add 1% KMnO₄ soln. until there is a permanent coloration. Then add 1.75 g. of NH₄NO₃, 1.6 g. of NH₄Cl, 0.25 g. of (NH₄)₂C₂O₄ and enough water to make 60 cc. Next add 25 cc. of nitro-molybdate reagent (290 cc. of 15% NH₄ molybdate soln. poured into 110 cc. of concd. HNO₃) and 25 cc. of water. Rotate for 1 min. and allow the mixt. to settle 10 min. Attach the wash-bottle fittings and siphon off the supernatant soln. Refill with 0.1% KNO₃ soln., allow to settle for 2 min. and again siphon. Repeat the washings until they are neutral to litmus. Dissolve the ppt. in a measured vol. of *N* NaOH and titrate back with 0.5 *N* H₂SO₄ using phenolphthalein as indicator.

W. T. H.

The "Knight test" for feathers. HARLEY F. KNIGHT. *Analyst* 53, 278-9 (1928).—To test the cleanliness of feathers, weigh out 20 g. into a wide-mouthed bottle and shake with 1 l. of distd. water. After an hr. withdraw some of the water and filter through glass wool. To 100 cc. of the filtrate add 1 cc. of 6 *N* H₂SO₄ and 2 drops of 0.1 *N* KMnO₄. Should the color disappear in 1 min. add more KMnO₄, 2 drops at a time, until a persistent color is obtained. The O value thus obtained together with the Cl value gives pretty good evidence as to the cleanliness of the feathers and it is felt that both tests should be used.

W. T. H.

Method for determining small quantities of antimony in copper. HERBERT BLUMENTHAL. *Z. anal. Chem.* 74, 33-9 (1928).—To ppt As from a soln. contg. considerable Cu, it is common practice to add a little Fe⁺⁺⁺ to the fully oxidized soln. and enough Na₂CO₃ to ppt. the Fe⁺⁺⁺ as basic salt. The Fe ppt. carries with it, probably as a result of adsorption, all the AsO₄⁻⁻⁻ and PO₄⁻⁻⁻ present. A similar treatment has been recommended for the removal of Sb but the expts. here described show that only 0.038 g. of Sb is pptd. when 0.0486 g. is present. Similar expts. with other trivalent metal ions such as Bi⁺⁺⁺ and Al⁺⁺⁺ were likewise unsuccessful and so the attempt was made, this time with success, to accomplish the adsorption of the antimonious acid by an acid colloid. The colloid chosen was MnO₂ thrown down by the Guyard-Volhard reaction between Mn⁺⁺ and MnO₄⁻. The following method, therefore, is recommended for the rapid detn. of Sb in samples of commercial Cu. Dissolve 25-100 g. of metal in barely sufficient concd. HNO₃ and boil the soln. till no more oxides of N are evolved. If a turbidity due to sepn. of metastannic acid or antimonious acid appears, pay no attention to it at this time. Dil the soln. to 250-600 cc (according to the wt. of sample) with cold water and add dil. NH₄OH until a slight ppt. is formed. Redissolve this in a little HNO₃ and add 5 cc. of 5% MnSO₄ soln. Next add 3 cc. of *N* KMnO₄ and boil with frequent shaking. When the soln. has cleared and a ppt. of MnO₂ has coagulated add another 3 cc. of KMnO₄ soln. and again boil and shake. After a short time, filter and wash with hot water. The filtrate should be clear but will contain traces of Sb. Add 2 cc. more of the MnSO₄ and follow with 3 cc. of KMnO₄. Unite the ppts. and treat them with dil HCl contg. a little H₂O₂. Boil until no more Cl₂ is evolved and filter. Fuse the insol. residue with a little Na₂O₂ in a small Fe crucible, ext. the melt with water, make acid with HCl and add the soln. to the one previously obtained. Add NH₄OH until the soln. is only slightly acid and sat. with H₂S. Filter off the ppt. which contains all the Sb together with some Sn, As, Bi, Pb and Cu. Ext. it with 20 cc. of hot Na₂S soln. (1-5) and wash with water. From this alk. sulfide soln. reppt. Sb₂S₃ by adding acid. Filter and wash with hot water. Dissolve the ppt. in HCl-Br₂, evap. off the Br₂ and bring the vol. to about 30 cc. Add 40 cc. of concd. HCl and 3 g. of Na₂SO₃. Boil and again reduce the soln. to about 30 cc. Hereby the As is all volatilized as AsCl₃ and the Sb reduced to the trivalent condition. Add 30 cc. of water and titrate with KBrO₃ using indigo or methyl orange as indicator.

W. T. H.

Determination of cobalt and other alloyed elements in cobalt metal, cobalt steel, and high-speed tool alloys. E. SCHIFFER. *Stahl u. Eisen* 47, 1569-71 (1927).—The detn. of Co in the com. metal is most satisfactorily effected by electrolysis in the usual way after removing heavy metals and Fe; the deposited Co is subsequently tested for Ni by the dimethylglyoxime method. Equally good results are obtained by detg. the impurities and taking the Co by difference provided that O, S and included water-sol. salts are tested for. Co steel with a low content of Co is dissolved in HCl with the help of an oxidizing agent, the Fe pptd. with ZnO twice or as basic acetate, and the Co detd. by means of α -nitroso- β -naphthol in the first case or by electrolysis; for rapid control work the cyanometric method gives sufficiently accurate results. For the sepn. of Fe from Co in a high-Co steel the ether process is most satisfactory; the aq.

layer is evapd. with HNO_3 to convert the metals into nitrates and the soln. boiled with HNO_3 and KClO_3 to remove Mn and oxidize Cr to chromate, Co being subsequently sepd. by addn. of KOH and finally detd. by electrolysis. Stellite and similar tool alloys are preferably dissolved by fusion with peroxide in a porcelain crucible; the soln. is used for the detn. of W, Mo, Cr and V and the insol. residue for the detn. of Ni, Co and Mn by electrolysis. B. C. A.

Determination of aluminum as aluminum oxide. L. N. MURAVLEV AND O. V. KRASNOVSKII. State Exptl. Inst. of Silicates. *J. Chem. Ind. (Moscow)* 3, 1146-7 (1926).—Blum's procedure (cf. *C. A.* 10, 1970, 2564) is recommended using filter paper pulp to aid in filtration. BERNARD NELSON

Potentiometric determination of copper as cupric ferrocyanide. S. TAKEGAMI. *Z. anal. Chem.* 74, 39-41 (1928).—An attempt to titrate Cu^{++} with Na or Mg ferrocyanide was not wholly successful. The titration curves do not indicate the correct end point. W. T. H.

Potentiometric determination of gallium. H. DARWIN KIRSHMAN AND J. B. RAMSEY. Univ. Calif. *J. Am. Chem. Soc.* 50, 1632-5 (1928).— GaCl_3 solns. can be titrated electrometrically with standard $\text{K}_4\text{Fe}(\text{CN})_6$ in the presence of ferricyanide. The results are accurate within 0.2-0.3%. Under the conditions recommended the ppt. has the formula $\text{Ga}_4(\text{Fe}(\text{CN})_6)_3$ as was detd. by 2 independent methods. W. T. H.

The determination of gases in iron and steel. PAUL KLINGER. *Stahl u. Eisen* 46, 1245-54, 1284-88, 1353-8; *Chem. Zentr.* 1926, II, 2933.—Earlier work on the subject is reviewed, following which the hot extn. process *in vacuo*, and, with the aid of exptl. results, the evaluation of analytical data are discussed critically. Chem. methods, including those of Gontal and Vita, and the cold vacuum method are also considered. Expts. on the soly. of CO and CO_2 in Fe, which gave negative results, are described. So far, expts. on the detn. of gases in Fe and steel have had no practical value. N in steel can be detd. almost without loss by conversion to NH_3 . C. C. DAVIS

The potentiometric determination of iron by a new method. THEODOR HECZKO. *Z. anal. Chem.* 73, 404-11 (1928).—The Fe^{++} soln. is placed in a beaker and connected with a stirrer and electrode holder such as is used in electrolytic work with a rotating electrode. In each of the two electrode clamps of the electrode stand, place a bright Pt wire of 0.3-0.5 mm. diameter. Dip one of these wires into the soln. to be titrated and wind the free end of the other wire around a piece of pumice, so that it hangs in a vertical position. Connect the 2 wires with one another through a galvanometer, making the wire that dips into the soln. the positive pole. Before beginning the titration lower the pumice into the soln. and after a short time raise it a little above the level of the liquid. Now begin to titrate. Just before the end point is reached, again allow the soln. to wet the pumice for a few min., then raise it and continue titrating. There will be a marked change in the e. m. f. between the electrodes at the end point. By the added KMnO_4 the Fe^{++} ions in the beaker are oxidized, whereas those on the pumice are not. The e. m. f. of the couple thus formed is indicated by the galvanometer. Because of the strong polarization effect the galvanometer needle soon goes back to the position representing the strength of the residual current. This decreases with the lapse of time. The concn. changes, or the strength of the initial current, in the neighborhood of the end point with equal amts. of added KMnO_4 are in agreement with the well-known laws governing potentiometric titrations. In the course of the titration, as the liquid rises in the beaker, the internal resistance changes, as the projecting part of the little rod becomes smaller. The ratio of current/cc. is not seriously affected thereby if proper precautions are taken. Near the end point the KMnO_4 should be added dropwise so that the internal resistance will remain practically the same. The dipping of the pumice into the soln. at the start and again toward the end of the titration is necessary because of the residual current. Otherwise, it would assume such intensity that the galvanometer needle would be driven off the scale. The chief practical value of this method of titrating lies in the fact that the method is applicable to the titration of colored solns. W. T. H.

Determination of ferrous iron in silicate rocks. BYRON A. SOULE. Univ. Mich. *J. Am. Chem. Soc.* 50, 1691-4 (1928).—Pt ware is not essential for the detn. of ferrous Fe in rocks by the HF method. A sample of silicate can be boiled with HF and H_2SO_4 in Pyrex flasks, and, subject to the usual interference, the resulting soln. can be titrated with KMnO_4 . A correction factor for the Pyrex glass is given. W. T. H.

Volumetric determination of ferrous iron by means of potassium iodate. G. B. HESSIG. Univ. of Minn. *J. Am. Chem. Soc.* 50, 1687-91 (1928).— Fe^{++} is oxidized quantitatively by ICl and the liberated I_2 can be titrated with standard KIO_3 soln. after adding enough HCl to make the soln. at least 3 N. It is important not to add the

HCl first because of the ready oxidizability of Fe^{++} in HCl solns. Or, the Fe^{++} can be titrated by adding an excess of standard KIO_3 to the Fe^{++} soln. in dil. H_2SO_4 and then, after adding some concd. HCl, titrating with standard KI soln. The presence of acetic, succinic or tartaric acid, EtOH, filter paper or AcH does no harm. The iodate soln. does not change its titer on standing so that the method is good for those having to make only occasional detns. of Fe^{++} . W. T. H.

The estimation of iron in red lead. L. SPRINGER. *Glastech. Ber.* **4**, 458(1927); *J. Soc. Glass Tech.* **11**, 287A.—The values for Fe obtained by testing 10 g. of red lead colorimetrically in HNO_3 -perhydrol soln., as suggested by Heinrichs, were lower than when 2 g. was dissolved in HCl. By the use of only 2 g. in the first process, intermediate values were obtained. The loss was partly due to an Fe-contg. residue insol. in HNO_3 , partly owing to a mech. action of the acid. If HNO_3 were employed, 10 g. of the sample should be tested, after dissolving in HNO_3 -perhydrol, and the residue dissolved in HCl and also detd. for Fe. Most factories specified a red lead with not more than 0.005% Fe_2O_3 , since higher proportions gave a green color to the glass. H. G.

Gravimetric determination of molybdenum. IRWIN WENDEHORST. *Z. anal. Chem.* **73**, 452-7(1928).—The method of Hillebrand which depends on pptg. $\text{H}_2\text{g}_2\text{MoO}_4$ and igniting to MoO_3 requires considerable manipulative skill and is subject to a positive error due to adsorption and a negative error due to the soly. of the ppt. Pptn. of alk. earth molybdate, as recommended by Smith and Bradbury, is unsatisfactory because the ppts. are too sol. Rose's method of weighing MoO_2 is only useful for the analysis of pure Mo solns. with volatile components. Similarly, heating in H_2 in a Pt tube till metallic Mo is produced can hardly be regarded as useful in ordinary analytical practice. The method of v. d. Pfordten, however, gives accurate results and pure Mo when MoSe_2 is heated in H_2 . Treatment of the ammoniacal soln with yellow $(\text{NH}_4)_2\text{S}_2$ soln., allowing to stand 12 hrs., and then pptg. MoS_3 by adding acid and igniting to MoS_2 in H_2 , gives very accurate results. The best method of all, however, for ordinary work is that of weighing as MoO_3 after pptn. as MoS_3 as just outlined or by satg. the acid soln. with H_2S under pressure. The ppt. is likely to adsorb some alkali salts. W. T. H.

Test for platinum. F. DURDIK. *Chem. Listy* **21**, 10 2(1927).—To carry out the touchstone test for Pt heat the stone at $110-120^\circ$ in an air bath, placed in a wooden support and coated with almond oil. Then make streaks on the hot stone with the sample to be tested and with a standard and test the behavior of these streaks towards aqua regia. B. C. A.

Separation of the platinum metals. ANON. *Chem. Eng. Mining Rev.* **20**, 142-3, 170-1(1928).—A correction. This paper was copied without credit from one previously published by S. C. OGBURN, JR., in *J. Am. Chem. Soc.* **48**, 2507 (cf. *C. A.* **20**, 3663). In the abstract last published KNO_3 is recommended instead of KNO_2 for pptg. Rh and in the final treatment of Os and Ir, it is the Os and not the Ir that dissolves in NaClO soln. W. T. H.

A specific reagent for the rapid gravimetric determination of sodium. H. H. BARBER and I. M. KOLTHOFF. Univ. of Minn. *J. Am. Chem. Soc.* **50**, 1625-31.—Uranyl zinc acetate solns., prepd. by mixing AcOH solns. of $\text{UO}_2(\text{OAc})_2 \cdot 2\text{H}_2\text{O}$ and $\text{Zn}(\text{OAc})_2 \cdot 3\text{H}_2\text{O}$ when added to aq. soln. contg. not more than 8 mg. of Na per cc. gives a ppt. of the compn. $(\text{UO}_2)_2\text{ZnNa}(\text{OAc})_6 \cdot 6\text{H}_2\text{O}$, which can be weighed as such after washing with 95% alc. and ether and drying in the air. Both wash liquids should be satd. with the reagent. Alk. and alk. earth ions do not interfere seriously. Phosphate (arsenate) and large amts. of oxalate or tartrate anions must be absent. The method described appears to be the most satisfactory yet given for the direct detn. of Na in small quantities. W. T. H.

The volumetric determination of small quantities of thallium. J. PROSZT. *Z. anal. Chem.* **73**, 401-4(1928).—The volumetric detn. of Tl depends either upon the oxidation of Tl^+ to Tl^{+++} or upon the reduction of Tl^{+++} to Tl^+ . For the oxidation, a strong oxidizing agent is required and to make sure that the oxidation is complete it is best to add an excess of oxidizer. A test of the direct oxidation method with KMnO_4 showed that it is difficult to obtain good results on account of a coloration appearing before the oxidation is complete. This false end point is partly dependent on the acidity of the soln. but it is difficult to regulate the acidity so that only the true end point will be obtained. Better end points can be obtained by oxidizing first with Br aq. , removing the excess Br_2 with phenol, adding KI and titrating the liberated I_2 with thiosulfate. By this method the results are far from satisfactory, however. W. T. H.

Estimating tin by titration with iodine. W. FRAYNE. *Eng. Mining J.* **125**, 1019-20(1928).—To prevent oxidation after the hot soln. has been reduced, place in the

neck of the container a stopper carrying tubing that dips into alkali carbonate soln. Then, on cooling, alkali carbonate soln., will be sucked into the flask and provide an atm. of CO_2 . The device recommended has been in use for at least 35 years. W. T. H.

The potentiometric analysis of binary, ternary and quaternary tin alloys. H. BRINTZINGER AND F. RODIS. *Z. Elektrochem.* **34**, 246-50(1928); cf. *C. A.* **22**, 367.—The use of CrCl_2 as a reducing agent in the potentiometric analysis of Sn-Sb alloys is extended to include the analysis of other Sn alloys. For Cu-Sn systems the potential drop after the reduction of Cu^{++} to Cu^+ is marked; the drop after the reduction of Sn^{++++} to Sn^{++} is less apparent but is noticeable if a 3-min. period is allowed between the addn. of the CrCl_2 and the reading of the potential. In Bi-Sn systems, Bi^{+++} is first reduced to Bi and then the reduction of Sn^{++++} follows. The end points are both distinct. In Fe-Sn systems, Fe^{+++} is first reduced to Fe^{++} and then Sn^{++++} to Sn^{++} . The end point of the former is distinct, while that of the latter is made apparent by a period of wait. The addn. of Bi ions to the soln. makes the Sn end points more distinct in each of the above cases as well as in titrations of Sn alone. By similar methods the ternary systems, Cu-Sn-Bi, Fe-Sn-Bi and Sb-Cu-Sn may be analyzed accurately. Since CrCl_2 has no action on Pb and Cd ions, quaternary alloys contg. these metals can be detd. only by difference. In all cases the analyses were made in the presence of CaCl_2 and HCl at $90-100^\circ$ and with a Pt electrode. A comparison of the potentiometric with the gravimetric method shows the former to be more accurate and much faster.

H. F. JOHNSTONE

Investigations into the analytical chemistry of tantalum, columbium and their mineral associates. X. The separation of SiO_2 from the earth acids. W. R. SCHOELLER AND A. R. POWELL. *Analyst* **53**, 258-64(1928); cf. *C. A.* **22**, 201.—Treatment of a mixt. of SiO_2 , Cl_2O_6 and Ta_2O_6 with HF and H_2SO_4 is satisfactory only when the mixt. is chiefly SiO_2 . It is probable that some TaF_6 and CbF_6 are lost by volatilization unless an excess of H_2SO_4 is used and it is not good procedure to det. a minor constituent by difference. Accurate results can be obtained in the SiO_2 detn. if the oxides of Si, Cb and Ta are fused with $\text{K}_2\text{S}_2\text{O}_7$, the melt extd. with oxalic or tartaric acid soln., the insol residue weighed and treated with HF and H_2SO_4 . The residue from the SiO_2 detn. should then be fused with $\text{K}_2\text{S}_2\text{O}_7$ again to dissolve the last traces of Cb and Ta. **XI. The precipitation of titanium by tannin.** *Ibid* 264-7.—Tannin produces a red ppt. in oxalic or tartaric acid solns. of Ti and the pptn. is complete if the soln. is neutralized. Ti, therefore, interferes with the tannin sepn. of Cb and Ta if the Ti content is more than 1% of the Ta_2O_6 ; the Ta ppt. is discolored.

W. T. H.

Electrotitration of lanthanum, cerium and thorium as ferrocyanides. I. A. ATANASIU. *Inst. Ind. Chem. Bucarest. Bul. chim. soc. română stiinte* **30**, 51-9(1928).—The potentiometric curve indicates the formation of $\text{KLaFe}(\text{CN})_6$ in alc. soln. for equimolar quantities of $\text{K}_4\text{Fe}(\text{CN})_6$ and $\text{La}(\text{NO}_3)_3$. In the case of Th, $\text{ThFe}(\text{CN})_6$ is formed but the compds. vary with an excess of alkali salt; the presence of alc. causes perturbations in the curve. The electrotitration of a mixt. of La, Th and Ce salts is practically impossible.

A. L. HENNE

Titrimetric determination of potassium. O. PFUNDT. *Z. anal. Chem.* **73**, 439-49(1928).—Jander and Pfundt (cf. *C. A.* **21**, 3852) have published a method for the visual conductometric titration of K salt with NaClO_4 soln. One difficulty encountered in connection with the method was the necessity of vigorous shaking and if the vessel contg. the soln. was held in the hand it was likely to become heated somewhat, whereby the cond. of the soln. would change. This difficulty can be overcome by a mechanical shaking device which is described here.

W. T. H.

Zirconium sulfate as a reagent for the detection of potassium. RUFUS D. REED AND JAMES R. WITHEROW. *Ohio State Univ. J. Am. Chem. Soc.* **50**, 1515-22(1928).—A satd. soln. of $\text{Zr}(\text{SO}_4)_2$ will detect 0.5 mg. of K^+ in the absence of Na^+ and 1.76 mg. of K when Na is present. If the test is allowed to stand for a long time the reaction is nearly as sensitive for K^+ as the $\text{Na}_2\text{Co}(\text{NO}_2)_2$ as ordinarily applied.

W. T. H.

The electrometric determination of peroxide of hydrogen and the associated peracids. A. RIJUS. *Trans. Am. Electrochem. Soc.* **54**, preprint, 14 pp.(1928).—With Na_2SO_3 soln. as standard, a new electrometric titration method is described for the detn. of total H_2SO_5 and H_2O_4 in solns. contg. $\text{H}_2\text{S}_2\text{O}_8$, H_2SO_5 and H_2O_4 . H_2O_4 is detd. in the presence of H_2SO_5 by R.'s modification of Birkenbach's KMnO_4 method. An analogous method can be employed for monoperphosphoric acid. In mixts. of $\text{H}_2\text{S}_2\text{O}_8$, H_2SO_5 and H_2O_4 , $\text{H}_2\text{S}_2\text{O}_8$ is detd. by difference. The detection of small amounts of H_2O_4 with the aid of a calomel- H_2SO_5 cell is very sensitive.

C. G. F.

A procedure for the qualitative analysis of the magnesium, potassium, sodium group. HAROLD S. KING. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst.*

Sci. 16, 30-4(1928).—The following simple procedure gives satisfactory results with untrained students. After removal of the alk. earth metals, evap., add NH_4OH and H_3PO_4 . Filter. Extract the ppt. with H_2SO_4 , and ppt. Mg as MgNH_4PO_4 . To $1/4$ of the soln., add $\text{Na}_2\text{CO}(\text{NO}_3)_6$, detecting K; to the remaining, add $\text{K}_2\text{H}_2\text{Sb}_2\text{O}_7$, to detect Na. W. T. H.

A modification of the procedure for the qualitative separation of the metals of the alkaline-earth group. C. B. NICKERSON. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 25-9(1928).—The procedure involves no new feature but is satisfactory for students in elementary qual. analysis. The ppt. of CaCO_3 , SrCO_3 and BaCO_3 is dissolved in HOAc and the Ba^{++} pptd. as BaCrO_4 . In the filtrate, the Sr is pptd. as SrSO_4 with NH_4OH and $(\text{NH}_4)_2\text{SO}_4$ and the Ca is pptd. as CaC_2O_4 in the usual way. A. L. HENNE

Ceric salts as oxidizing agents in electrometry. I. A. ATANASIU. *Inst. Ind. Chem. Bucarest. Bul. chim. soc. română stinte* 30, 73-6(1928).—In the titration of nitrites with a ceric salt, the potential curve exhibits a very sharp break, which is independent of the temp. and H_2SO_4 concn. Better results are thus obtained with a ceric salt than with permanganate. A. L. HENNE

The albumin reactions of different metaphosphates. D. BALAREFF. *Z. anal. Chem.* 73, 411-2(1928).—Solns. of 4 different metaphosphates were prepd.—the tri- and tetrametaphosphates of Tammann, the metaphosphate prepd. by heating microcosmic salt to dull redness and that obtained by dissolving P_2O_5 in water. To 2 cc. of albumin soln. 1 cc. of the aq. metaphosphate soln. was added and 2 cc. of 0.2 N AcOH . The diln. at which the coagulation of albumin could be accomplished was detd. with each metaphosphate. The test with the trimetaphosphate was obtained in 0.005 N soln., with the tetraphosphate in 0.0004 N soln., with the metaphosphate from microcosmic salt in 0.00008 N soln., and with the phosphate from P_2O_5 in 0.000037 N soln. It appears that each metaphosphate is characterized by a limit beyond which it does not have the power of coagulating albumin. W. T. H.

Acidimetric determination of pyrophosphoric acid. E. V. BRITSKE AND S. S. DRAGUNOV. *J. Chem. Ind. (Moscow)* 4, 49-51(1927).—A rapid method of detg. $\text{H}_4\text{P}_2\text{O}_7$, which is also applicable to mixts. in which HPO_3 and H_3PO_4 are present, is based on the reaction $\text{Na}_2\text{H}_2\text{P}_2\text{O}_7 + 2 \text{ZnSO}_4 = \text{Zn}_2\text{P}_2\text{O}_7 + \text{Na}_2\text{SO}_4 + \text{H}_2\text{SO}_4$. To a definite vol. of pyrophosphate soln. or of a mixt. of ortho-, meta- and pyrophosphates, add 5-10 drops of bromophenol blue and 0.1 N NaOH till a blue coloration is obtained. (If the soln. was originally alk. it is best to acidify it first and then add NaOH till the color changes from yellow to blue.) Then add 2.5-3 times the amt. of ZnSO_4 necessary for reaction with $\text{H}_4\text{P}_2\text{O}_7$ and titrate the liberated H_2SO_4 with 0.1 N NaOH . If HPO_3 is absent, titrate rapidly; otherwise titrate slowly and allow the soln. to stand for 5 min. toward the last before adding the final drops of NaOH . In the presence of much HPO_3 the exactness of the analysis is somewhat impaired; otherwise very exact results are obtained. BERNARD NELSON

Sulfur dioxide and its aqueous solutions. I. Analytical methods, vapor density and vapor pressure of sulfur dioxide. Vapor pressure and concentrations of the solutions. CAROL E. MAASS AND O. MAASS. *McGill Univ. J. Am. Chem. Soc.* 50, 1352-68(1928).—A method for analyzing H_2SO_3 in which the use of sugar is necessary, is described, giving very accurate results. The vapor ds. from -6° to 32° , vapor pressures from 1° to 27° and those of aq. solns. from -5° to 35° of SO_2 are detd. by new methods. The vapor pressures of the two-liquid-phase system SO_2 - H_2O are measured from 10° to 27° . A method is devised for more exactly detg. the concns. of H_2O in the SO_2 phase. J. BALOZIAN

Comparison of methods for the analysis of potassium ferrocyanide. PETER P. BUDNIKOV. *Z. anal. Chem.* 73, 433-8(1928).—The analysis of a sample of yellow prussiate of K gave conflicting results with different methods so that it was thought desirable to study the various methods experimentally. The gravimetric methods proved tedious and not very accurate. Volumetric methods depending upon the pptn. of ferrocyanide of Zn or Ag proved unsatisfactory and it was impossible to obtain good results by the iodometric method. On the other hand, good results were obtained by KMnO_4 titration if the soln. was not stronger than 0.05 N. To 15 cc. of the dil. ferrocyanide soln., 10 cc. of 20% H_2SO_4 was added before titrating. The reverse titration of permanganate with ferrocyanide also gave good results. W. T. H.

Applications of ceric sulfate in volumetric analysis. IV. The potentiometric titration of vanadyl ion alone or in the presence of ferric and chromic ions. Note on the stability of vanadyl solutions. N. HOWELL FURMAN. *Princeton Univ. J. Am. Chem. Soc.* 50, 1675-80(1928).—Dil. vanadyl chloride or sulfate solns. are found to be stable for at least a year. The potentiometric titration of VO^{++} solns. with standard

$\text{Ce}(\text{SO}_4)_2$ soln. gives accurate results even in the presence of Fe^{+++} and Cr^{+++} . The reaction is slow at room temp.; so it is best to work at $50-60^\circ$. The titration of a soln. contg. VO^{++} and Fe^{++} with $\text{Ce}(\text{SO}_4)_2$ gives accurate results for both Fe and Cr; so the method is suitable for detg. V directly and Cr indirectly in Fe alloys. W. T. H.

Electrometric titration of the nitrite ion with potassium permanganate. I. A. ATANASIU. *Inst. Ind. Chem. Bucurest. Bul. chim. soc. română științe* 30, 69-71(1928).—This titration is essentially the same as the conventional Lunge method, except that the end point is indicated by a sharp break in the potentiometric curve which corresponds exactly to the color change. The best results are obtained at 45° . A. L. H.

Electrometric titration of the uranyl ion with potassium ferrocyanide. I. A. ATANASIU. *Inst. Ind. Chem. Bucurest. Bul. chim. soc. română științe* 30, 77-81(1928).—The results obtained in the electrometric titration of UO_2^{++} with $[\text{Fe}(\text{CN})_6]^{4-}$ are affected by the other anion present. The break in the e. m. f. curve is not sharp, except in the presence of alc., when $(\text{UO}_2)_2\text{Fe}(\text{CN})_6$ is formed. A. L. HENNE

Reaction between iodic and hydriodic acids in very dilute solution and the titration of the liberated iodine with thiosulfate. P. PUTZEYS. *Ann. soc. sci. Bruxelles* [i] 47B, 159-72(1927); cf. Vosburgh, C. A. 16, 2120-30; Rice, Kilpatrick, and Lemkin, C. A. 17, 2249; Bray and Miller, C. A. 19, 21; Popoff and Whitman, C. A. 19, 2921.—An investigation of reactions involved in iodometry, primarily concerned with their application to microanalysis. The reaction occurring in solns. about 0.001 N with respect to iodate and contg. excess of iodide and acid has been investigated, special attention being devoted to the elimination of the O error, and it is shown that the theoretical quantity of I is liberated and a satisfactory end point obtained on subsequent titration only when the product of the concns. of iodide and acid lies between certain limits. In the present instance these limits are 0.01 and 0.075 and apply to measurements made in artificial light. The limits are narrower for daylight. As the concn. of iodate is increased the quantity of I detd. by titration becomes more independent of these factors. Reacting mixts. should be kept for 5 min. before titration. Although reaction between $\text{Na}_2\text{S}_2\text{O}_3$ and I is practically instantaneous it is nevertheless, advisable to add the thiosulfate rather slowly toward the end of the titration, especially when extremely dil. solns. are involved. Because of the relative slowness of the reaction, titration with very dil. solns. of arsenite should be avoided. Alk. absorption of I commences at pH 6. Dil. solns. of thiosulfate should be prepd. by diln. of 0.1 N soln. with water approximating to conductivity water, and although when protected against acid vapors such solns. are not markedly unstable, they should be standardized immediately prior to use by means of a soln. of KIO_3 of corresponding concn., the quantities of KI and acid added to this latter being in accordance with the conditions stipulated above. 0.1 N solns. of thiosulfate should be standardized by the dichromate-iodide method (Vosburgh; Bray and Miller, *loc. cit.*) B. C. A.

Zinc chloride nitroprusside reaction of cysteine. YUZURU OKUDA AND YURAKU NISHIJIMA. *Bul. Sci. Fakultat Terakultura, Kjusu Imp. Univ.* 2, 209-12(1928).—This reaction is similar to the well-known nitroprusside reaction of cysteine, except that ZnCl_2 is added, which renders the color more stable and the test more sensitive. To a small amt. of cysteine soln. in a test tube, add a few drops ZnCl_2 soln. faintly acidified with HCl, and a freshly prepd. aq. soln. of sodium nitroprusside. Neutralize with NH_4OH or NaOH until $\text{Zn}(\text{OH})_2$ ppts. A ruby-red color results, which remains for a few hrs.; in the absence of Zn salt, it would turn yellowish. As the reaction is based on the absorption of the coloring matter and the cysteine by the white ppt. of hydroxide, $\text{Mg}(\text{OH})_2$ or $\text{Al}(\text{OH})_3$ are suitable also, but the results are much more satisfactory with $\text{Zn}(\text{OH})_2$. A. L. HENNE

Color reactions of certain alcohols. LAD. EKKERT. *Pharm. Zentralh.* 69, 289-96 (1928); cf. C. A. 22, 1933.—A study of the color changes observed in the interaction of the aldehydes vanillin, furalfural salicylaldehyde, sucrose, piperonal and anisaldehyde with normal and isopropyl alc.; normal, secondary and tertiary butyl alc.; normal and tertiary amyl alc., normal heptyl; and normal and secondary octyl alc. in the presence of H_2SO_4 . W. O. E.

Microchemical detection of lactic acid. J. GRÜSS. *Wochschr. Brau.* 45, 16-18 (1928).—The method consists in distg. 3 cc. of liquid with 1 cc. of concd. H_2SO_4 , collecting 2 cc. of the distillate, dividing it into 2 parts, and testing separately for acetaldehyde with $\text{NaNOFe}(\text{CN})_6$ and for formic acid by means of $\text{Ce}(\text{NO}_3)_3$. A. S.

Determination of methylglyoxal by alkaline iodine solution and the chemical mechanism of this reaction. F. FISCHLER AND R. BOETTNER. *Z. anal. Chem.* 74, 28-32 (1928).—F. (C. A. 20, 3722) published a method for the detn. of AcCHO in aq. soln. which was based on the assumption that the following equation was correct: $\text{CH}_3\text{CHO} + \text{I}_2 + \text{OH}^- \rightarrow \text{CH}_3\text{COO}^- + \text{I}^- + \text{H}^+$

$\text{COCHO} + 3\text{I}_2 + 5\text{OH}^- = \text{CHI}_3 + 2\text{HCO}_2^- + 3\text{I}^- + 3\text{H}_2\text{O}$. It is here shown, however, that $\frac{1}{3}$ more I_2 is required and that the true equation is: $\text{CH}_3\text{COCHO} + 4\text{IO}^- = \text{CHI}_3 + \text{C}_2\text{O}_4^{--} + \text{I}^- + \text{OH}^- + \text{H}_2\text{O}$. It was proved that 1 $\text{C}_2\text{O}_4^{--}$ is formed from each mol. of AcCHO , that 8 atoms of I are required for the oxidation and that the increase in alkyl also corresponds to the equation. W. T. H.

Determination of cresols. II. K. K. JÄRVINEN. *Z. anal. Chem.* **73**, 446-51 (1928).—J. has described (cf. C. A. **21**, 2451) a bromination method for the analysis of phenols and cresols. In this paper various notes are given regarding difficulties that are likely to arise. For drying the cresol, 30 min. at 100° has proved to be inadequate. Sometimes 2 hrs. is necessary. To obtain perfectly dry cresol it is best to heat to boiling for a short time until some of the cresol has distilled. The bromination method is not directly applicable to the analysis of very impure cresols. To purify these samples it is sometimes desirable to take about 5 g. and dissolve it in 25 cc. of 2 *N* NaOH and 300 cc. of water. Then, to ppt. soaps, add 10 cc. of *N* BaCl_2 soln., make up to 500 cc., mix and filter. A small aliquot can then be taken for the analysis. To recover large quantities of cresol a similar treatment can be carried out by using 50 g. of material, dissolving in 25 cc. of 15 *N* NaOH and pptg. hot with 20 cc. of 3 *N* BaCl_2 soln. Then, after filtering, the filtrate can be made acid with HCl and the cresols salted out with 40 g. of NaCl. After sepg. them, distil, collect the fraction that comes over above 180° and remove all moisture from the distillate by boiling it gently. To analyze this product bromometrically, take 10 cc. in a 500-cc. reagent bottle with 100 cc. of water and add 50 cc. of 0.2 *N* KBr-KBrO₃ soln. and 25 cc. of 5 *N* HCl. After half an hr. add 10 cc. of 20% KI soln. and titrate with thiosulfate. Titrate similarly a portion of the product obtained by the first purification method given above and a third portion of KBr-KBrO₃ soln. alone. A direct detn. of the vol. of cresol present can be made with the aid of graduated tubes such as those used in the detn. of butter fat by the Babcock method. Thus a suitable method is the following: Treat 10.2 g. of cresol with 8 cc. of 15 *N* NaOH and water to make 100 cc. Of this mixt. pipet off 10 cc. into a butyrometer tube and shake with 11 cc. of 6 *N* HCl which is satd. with cresol. Add 2 g. of NaCl, insert a rubber stopper in the tube, shake till the salt has all dissolved and allow to stand 15 min. at 50° before centrifuging. Various other helpful details are given which will be of interest to any one having similar analyses to make. W. T. H.

LAMBOURNE, H. AND MITCHELL, J. A. **Volumetric Analysis for Intermediate Students.** London: Humphrey Milford, Oxford Univ. Press. 64 pp. 2s. 6d.

MOORE, R. B. **Die chemische Analyse seltener technischer Metalle.** Die Bestimmungsmethoden Th, Ce, Mo, W, V, U, Ti und Zr. Translated and revised by Horst Eckstein. Leipzig: Akademischen Verlagsgesellschaft m. b. H. 295 pp. M. 13; bound, M. 15.

System of spectrum analysis. A. SCHÖNICKE (to C. Müller). *Brit.* 279,909, Oct. 29, 1926.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

The occurrence of pure arsenic in Chodskirudnik, Vladikavkaz district. P. CHIRVINSKII. *Rozprawy Čes. Ak.* **31**, Kl. II, No. 14, 1-4; *Chem. Zentr.* **1927**, I, 2640.—The As, which is assocd. with calcite, sphalerite and galenite in reniform masses, is probably of colloidal origin. Its d. is 5.78. The calcite contains 2.73% FeO and 0.06 MgO. C. C. DAVIS

Occurrence of native mercury at Lautersheim, Pfalz. HANS HIMMEL. *Centr. Mineral. Geol.* **1927A**, 409-10.—Droplets occur in a yellow, sandy, upper Oligocene conglomerate. J. E. GILL

The crystal structure of foliated dyscrasite from Andreasberg and the artificial alloy Ag₃Sb. FELIX MACHATSKII. *Mineral. Inst. Univ. of Oslo. Z. Krist.* **67**, 169-76 (1928).—Both natural dyscrasite and artificial Ag₃Sb give x-ray patterns which indicate a hexagonal close-packed structure, with $a = 2.985$ and $c = 4.816$ A. U. This cell would contain 2 atoms of at. wt. = $\frac{1}{4}$ (3 Ag + 1 Sb), which indicates that it is not a true chem. compd., but rather a solid soln. with both atoms structurally equiv. This would correspond to the ϵ -phase in the systems Ag-Zn, Au-Zn, Cu-Zn and Ag-Sn. With increasing Ag content, the structure becomes cubic. L. S. RAMSDELL

Argentite and acanthite. H. SCHNEIDERHÖHN. *Am. Mineral.* 12, 210-11 (1927).—It is proposed that the name acanthite be dropped because optical and x-ray methods show argentite to be orthorhombic; to use β -argentite for the orthorhombic modification of Ag_2S existing at ordinary temp., and to use α -argentite for the isometric modification existing above 179° . β -Argentite as a paramorph after α -argentite would then be called "lamellar argentite," following the chalcocite analogy. C. B. SLAWSON

Variation of the refractive indices of sphalerites and their iron contents. SHIGERU NISHIO. Univ. of Tokyo. *J. Faculty Eng. Tokyo Imp. Univ.* 17, 183-9 (1928).—Pure sphalerite must be ZnS ; native sphalerite generally contains FeS as solid soln. in it, and its phys. properties change in accordance with the Fe content. The optical dispersion of some Japanese sphalerites, especially of fissure-filling deposits, have been measured. If the n_s of these minerals are plotted against their Fe content, a smooth curve is obtained, the n increasing with the Fe contents although the relation is purely empirical. A. L. HENNE

The occurrence of cinnabar in Dutch Guiana. CHARLES PALACHE. *Am. Mineral.* 12, 188-9 (1927).—Cinnabar has been found in placers at the headwaters of the Tempati River but the original deposit has not been located. C. B. SLAWSON

Löllingite from Franklin, N. J. L. H. BAUER AND H. BERMAN. *Am. Mineral.* 12, 39-43 (1927).—Excellent crystals give new interfacial values and axial ratio of 0.5438:1:1.130. The analysis given shows insufficient As to give the theoretical 2:1 ratio with Fe. C. B. SLAWSON

Crystal structure of pyrrargyrite. B. GOSZNER AND F. MUSZNUG. Univ. München. *Centr. Mineral. Geol.* 1928A, 65-73.—X-ray studies show that the unit cell is a rhombohedron with angle $\alpha = 104^\circ 1'$ and edge $r = 7.07 \text{ \AA}$. U. It contains 2 mols Ag_2SbS_3 . J. E. GILL

Andorite from Felsobanya. S. KOCH. *Centr. Mineral. Geol.* 1928A, 28-34.—Crystallographic data and a chem. analysis are given. J. E. GILL

A reexamination of the lead sulfo salt, keeleyite, from Bolivia. E. V. SHANNON AND M. N. SHORT. *Am. Mineral.* 12, 405-13 (1927).—From mineragraphic study and chem. analysis, in comparison with *zinkenite*, it is concluded that keeleyite deserves species rank. C. B. SLAWSON

The status of keeleyite. EDGAR T. WHERRY. *Am. Mineral.* 13, 29-30 (1928).—The formula derived from the analysis by Shannon and Short (preceding abstr.) is $\text{PbS} \cdot \text{Sb}_2\text{S}_3$, identical with that universally adopted for *zinkenite*. Minor replacements of Pb by other metals are shown in 8 recorded analyses of *zinkenite*, so this is not a distinctive feature of keeleyite. S. and S. gave no data as to the compn. of the sulfosalt with which they compared keeleyite mineragraphically. "Instead of establishing its specific rank, it seems that they have thus demonstrated that keeleyite is, as previously suggested, only an impure variety of *zinkenite*." E. T. W.

The crystal structure of chromite from Tiszafa, Hungary. L. TOKODY. Budapest. *Z. Krist.* 67, 338-9 (1928).—An x-ray powder photograph gave 8.05 \AA . U. as the edge of the unit cube of a chromite, which analyzed as follows: $\text{FeO } 25.94$, $\text{Cr}_2\text{O}_3 \ 54.22$, $\text{MgO } 9.77$, $\text{Al}_2\text{O}_3 \ 2.29$, $\text{MnO } 0.94$, $\text{TiO}_2 \ 0.68$, $\text{SiO}_2 \ 6.16$, $\text{H}_2\text{O} + \ 0.09\%$. The intensity of the lines agreed well with the magnetite pattern. L. S. RAMSDALL

Biaxial calcite. JOSEPH L. GILLSON. *Am. Mineral.* 12, 357-60 (1927).—Biaxial calcite was produced in the lab. by artificially twinning calcite on (0110). These twins show incomplete extinction with anomalous interference colors and strong $\rho > v$ dispersion similar to that found in biaxial metamorphic calcite. C. B. SLAWSON

A reaction for the distinction of magnesite and dolomite. F. FEIGL AND H. LEITMEIER. *Centr. Mineral. Geol.* 1928A, 74-87.—Place 1-2 g. diphenylcarbazine in a test tube half filled with alc., warm till all is dissolved, and add 3 cc. 25% NaOH or KOH soln.; the mixt. turns red. Add 5 cc. of this soln. to a small grain or the powder of the mineral to be tested, boil for 2-3 min., decant the liquid and add and boil water over the solid phase until the liquid remains colorless. Magnesite so treated is colored reddish violet, while dolomite remains uncolored. Results of tests on many other Mg-bearing minerals are presented in a table and discussed in the text. *Analyses of magnesite from Snarum; breunnerite from Tyrol, Greiner, Pfitsch, Ingelsberg; mesitile from Traversella; and dolomite from Prägratten, Bordö and Greiner are included.* J. E. GILL

Euhedral orthoclase crystals from Sierra Blanca, Texas. J. T. LONSDALE AND W. S. ADKINS. *Am. Mineral.* 12, 256-9 (1927).—Six types of crystals were found in 556 specimens. Analysis shows: $\text{SiO}_2 \ 61.30$, $\text{Al}_2\text{O}_3 \ 17.15$, $\text{Fe}_2\text{O}_3 \ 3.47$, $\text{CaO } 2.05$, $\text{K}_2\text{O } 11.58$, $\text{Na}_2\text{O } 4.20\%$; $\alpha = 1.5180$, $\beta = 1.5234$, $\gamma = 1.5260$; $X_{\text{aa}} \ 6^\circ 37'$, $Z = b$. C. B. SLAWSON

The acmitic pyroxenes. H. S. WASHINGTON AND H. E. MERWIN. *Am. Mineral.*

12, 233-52(1927).—Acmites are shown to have a high ZrO_2 and rare earth content while in aegirites these oxides are very low. The difference in color and pleochroism does not seem to be dependent on rare earth content. Complete analyses of 13 high-Na pyroxenes accompanied by full optical data are given, also optical data on artificial acmite. A nomenclature for members of this and similar isomorphous series is given.

C. B. SLAWSON

Aegirite from Libby, Montana. R. W. GORANSON. *Am. Mineral.* 12, 37-9 (1927).—The aegirite is found in a dike of coarse syenite pegmatite as a hydrothermal replacement along fractures in the microcline. Optical data and a complete analysis, which shows a high TiO_2 content, are given.

C. B. SLAWSON

The relation of French and American grunerites to similar ferromanganese amphiboles of Sweden. STEPHEN RICHARZ. *Am. Mineral.* 12, 351-3(1927); cf. C. A. 21, 3329.—By plotting Fe + Mn against Mg, R. attempts to show that French and American grunerites do not form a continuous series with the high-Mn amphiboles of Sweden, although optical and sp. gr. data seem to indicate such a series.

C. B. SLAWSON

Olivine from Monehegan Island, Maine. E. P. WHEELER, II. *Am. Mineral.* 12, 259-61(1927).—Partial analyses of olivine from an olivine-gabbro show a FeO-MgO ratio of 22.39. $\alpha = 1.6807$, $\beta = 1.7057$, $\gamma = 1.7185$.

C. B. SLAWSON

An x-ray study of the garnet group. C. H. STROCKWELL. *Am. Mineral.* 12, 327-44(1927).—From the length of the unit cube and the intensities of the diffraction lines the approx. chem. compn. can be detd. By including either sp. gr. or n detns. a very close approximation can be made. Tables for these detns. are given. S also found that sp. gr. calcd. from diffraction data gave uniformly high values.

C. B. SLAWSON

Uranothorite from the MacDonald mine, Hybla, Ontario. α - and β -Hyblite—new sulfatic alteration products of Hybla thorite. H. V. ELLSWORTH. *Am. Mineral.* 12, 368-72(1927).—This is the first known occurrence of thorite in Ontario. Some of the crystals are $1/2$ inch in cross section and all contain occasional pyrite inclusions. Analysis of selected material shows: PbO 1.32, UO_2 7.67, UO_3 9.46, ThO_2 46.33, (Ce, La, Di) $_2O_3$ 0.08, (Yt, Er) $_2O_3$ 0.36%; hardness = 4.5-5, sp. gr. = 4.414; $n = 1.710$. Because of intensive alteration the age values from the Pb:U ratio are very low. II. Two new alteration products, α - and β -hyblite, could be obtained pure only in microscopic ams. Microchem. tests show Th and U to be the most important constituents. α -Hyblite appears as a white porcelainic isotropic mineral with no cleavage; its $n = 1.545$. It contains minute bubbles, probably entrapped He. β -Hyblite is yellow-brown with conchoidal fracture and is isotropic, with $n = 1.610$, also with bubble inclusions.

C. B. SLAWSON

Piedmontite from the Sulphur Spring Valley, Arizona. CARL LAUSEN. *Am. Mineral.* 12, 283-7(1927).—Cherry-red piedmontite is found in fan-shaped rosetts of crystals. The outer ends of the crystals are epidote, showing that after the supply of Mn ceased, the crystals continued to grow. It occurs in narrow veinlets filling fractures in the andesite country rock.

C. B. SLAWSON

Additional data on the properties of pumpellyite, and its occurrence in the Republic of Hayti, West Indies. W. S. BURBANK. *Am. Mineral.* 12, 421-4(1927).—This mineral, which is found in an amygdaloidal basalt similar to the original occurrence at Calumet, Mich., is identified optically, although it shows slight variations. It is optically +, with $2V = 75-80^\circ$, $\rho > v$ strong, $\alpha = 1.700$, $\beta = 1.707$, $\gamma = 1.718$; α and γ colorless, β bluish green; the elongation is Y, and γ makes an angle of 31° with the (001) cleavage. Pumpellyite is probably monoclinic elongated along the b axis.

C. B. SLAWSON

The nature of louisite. T. L. WALKER. Royal Ontario Museum of Mineralogy, Toronto, Ont. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 35-7(1928).—A thin section of "louisite," examd. between crossed nicols, shows that this mineral is an aggregate of radiating spherules of quartz in cleavable apophyllite. These 2 constituents can be separated by sp. gr. The chem. analysis verifies the results obtained by the optical examn.

A. L. HENNE

Further studies in the mica group. A. N. WINCHELL. *Am. Mineral.* 12, 267-79 (1927).—From an examn. of the analytical and optical data, W. suggests a K_2O-SiO_2 ratio of 1:7 for the phengite micas, and of 1:5 for the lepidolite micas.

C. B. S.

Study of the micas (not containing fluorine) by means of x-rays. CH. MAUGUIN. *Compt. rend.* 186, 879-81(1928).—It has been suggested that the important variations in the chem. compn. of the micas are due to the isomorphous mixt. of different mols., but the exact nature of these mols. has not been agreed on. A crystallographic study utilizing x-rays might therefore be profitable. The crystallographic index ratios and the thickness of the layers (d_{001}) being known for the different micas, the d. of the crystal

and the vol. of the crystal unit are used to calc. the no. of atoms of each of the elements given by chem. analysis which are associated with this unit cell. These data are given for margarite, muscovite, lepidolite, phlogopite and biotite. From these data it appears that there are always 12 atoms of O (the only electronegative element present) associated with the unit cell. The other elements are present in variable and, in general, in fractional numbers. Even the total number of electropositive atoms present in the elementary unit is variable, which suggests that the O atoms are the important structural elements forming a framework within which the other atoms are located irregularly.

A. W. KENNEY

Composition of two Madagascar minerals: amfangabeite and columbite. G. CHERNIK. *Bull. soc. franç. min.* 49, 127-35(1926).—Amfangabeite, d. 4.45, almost black, contained Cb_2O_3 50.78, Ta_2O_5 1.80, TiO_2 5.22, SnO_2 0.27, ThO_2 1.65, UO_2 11.98, Yt earths 4.71, Ce earths 0.67, Fe_2O_3 10.03, CaO 0.87, H_2O 11.04%; lighter-colored specimens had d. 4.39 and 3.36, resp. Columbite contained Cb_2O_3 62.71, Ta_2O_5 12.42, SiO_2 0.65, TiO_2 1.30, SnO_2 0.41, U_2O_5 2.28, FeO 11.02, MnO 8.24, Al_2O_3 0.11, CaO trace, $\text{K}_2\text{O} + \text{Na}_2\text{O}$ 0.09%.

B. C. A.

A new analysis of the Maberly, Ontario, euxenite. H. V. ELLSWORTH. *Am. Mineral.* 12, 365-7(1927).—An analysis of this radioactive mineral shows: PbO 1.01, UO_2 7.25, UO_3 1.51, ThO_2 2.64, (Ce, La, Di) $_2\text{O}_3$ 0.87, (Yt, Er) $_2\text{O}_3$ 24.95, TiO_2 25.04, Ta_2O_5 5.32, Cb_2O_3 22.28% and smaller amts. of more common elements. The Pb:U ratio gives an age of 870 million years, which is lower than that generally obtained for Ontario Precambrian, but higher than previous analyses of this mineral. E. believes that complex minerals such as this, which in general give low age values, have been subjected to leaching and possible replacement of Pb by silica. Microscopic examn. shows internal fractures developed by autooxidation, along which evidence of silicification may be found. E. concludes that the presence of 1.08 SiO_2 indicates the loss of lead, although not an equiv. amt.

C. B. SLAWSON

Lyndochite—a new mineral of the euxenite-polycrase group from Lyndoch Township, Renfrew Co., Ontario. H. V. ELLSWORTH. *Am. Mineral.* 12, 212-8(1927).—Lyndochite occurs in a dike composed chiefly of pink microcline, white and smoky quartz and green amazonstone. It is apparently rhombic, though it generally occurs in composite crystals which are reddish brown with a vitreous luster and perfect conchoidal fracture, hardness 6.5, sp. gr. 4.909, infusible. A very complete analysis includes oxides of U, Th, Ce, La, Di, Yt, Er, Zr, Ta and Cb, which comprise 73.53% of the mineral. The age detn. from the Pb/U ratio gives 1100 million years, which agrees with other Cambrian U values from this region.

C. B. SLAWSON

Ellsworthite crystals from Haliburton Co., Ontario. H. V. ELLSWORTH. *Am. Mineral.* 12, 48-53(1927).—Radioactive crystals showing the faces (111), (001), (110) and (311) were found in a high-temp. calcite vein. A very complete analysis includes UO_2 1.56, UO_3 20.46, (Ce, La, Di) $_2\text{O}_3$ 1.49, Cb_2O_3 23.54 and Ta_2O_5 9.97%. The CaO content, 8.94, shows the crystals to be ellsworthite rather than *belafite*. The Pb/U + Th ratio is 0.094.

C. B. SLAWSON

A chemical study of the yellow incrustations on the Vesuvian lava of 1631. F. ZAMBONINI AND G. CAROBBI. *Am. Mineral.* 12, 1-10(1927).—See C. A. 22, 1935.

C. B. SLAWSON

Holdenite, a new arsenate of manganese and zinc, from Franklin, N. J. CHARLES PALACHE AND E. V. SHANNON. *Am. Mineral.* 12, 144-8(1927).—Holdenite, $8\text{MnO}_2 \cdot 42\text{NaO} \cdot \text{As}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$, occurs as small well-developed pink to red crystals assoc. with franklinite, calcite, barite, galena, prochlorite and willemite. It is orthorhombic with an axial ratio of 0.3802:1:0.2755; hardness = 4, sp. gr. = 4.07; optically +, optic plane parallel to (010), $\text{Bx}_a \perp (100)$, $2V = 30^\circ 20'$, $\rho > \nu$ perceptible, $\alpha = 1.769$, $\beta = 1.770$, $\gamma = 1.785$. The analysis given was made upon a sample containing willemite and calcite. A table of interfacial angles is given.

C. B. SLAWSON

Mcgovernite, a new mineral from Sterling Hill, N. J. C. PALACHE AND L. H. BAUER. *Am. Mineral.* 12, 373-4(1927).—Mcgovernite occurs in veins as a granular coarse grained mass. It has a reddish bronze color and is uniaxial + with submicaceous basal cleavage. $\omega = 1.754$; sp. gr. = 3.719. Analysis shows: SiO_2 8.92, MnO 42.72, FeO 1.53, MgO 11.27, ZnO 10.22, As_2O_3 4.45, As_2O_5 12.48, H_2O 8.49%. Mcgovernite is the principal filling of a vein in massive ore.

C. B. SLAWSON

Cahnite, a new borarsenate of calcium from Franklin, N. J. C. PALACHE AND L. H. BAUER. *Am. Mineral.* 12, 149-53(1927).—Cahnite, $4\text{CaO} \cdot \text{B}_2\text{O}_3 \cdot \text{As}_2\text{O}_5 \cdot 4\text{H}_2\text{O}$, occurs as penetration twins of tetrahedron-like sphenoids. The crystals are white to transparent with a distinct glassy luster. They are tetragonal with the axial ratio 1:0.615; hardness = 3; sp. gr. = 3.156; optically +, $\omega = 1.662$, $\epsilon = 1.663$; because

of strong dispersion and low birefringence, the mineral exhibits abnormal interference colors. Tables of interfacial angles and an analysis are given. C. B. SLAWSON

An occurrence of pitticite in Nevada. W. F. FOSHAG AND H. G. CLINTON. *Am. Mineral.* 12, 290-2(1927).—Pitticite has developed as a secondary deposit in crusts upon the walls and floors in abandoned mine workings at Manhattan, Nevada. The analysis shows that the constituents are not present in mol. ratio and it is suggested that pitticite may be considered as a colloidal mixt. of normal Fe arsenate and Fe sulfates. C. B. SLAWSON

Kernite, a new sodium borate. WALDEMAR T. SCHALLER. *Am. Mineral.* 12, 24-5(1927).—Kernite, $\text{Na}_2\text{B}_4\text{O}_7 \cdot 4\text{H}_2\text{O}$, was found in Kern Co. Calif. in the Kramer boron district. It is orthorhombic, with hardness = 3, sp. gr. 1.953 and is colorless with perfect prismatic cleavage resembling satin spar. $2V$ nearly 90° , —, elongation, c axis, +; optic plane parallel to elongation. $\alpha = 1.454$, $\beta = 1.472$, $\gamma = 1.488$. Analyses of kernite and assocd. *ulexite* are given. C. B. SLAWSON

The selenite caves of Naica, Mexico. W. F. FOSHAG. *Am. Mineral.* 12, 252-6(1927).—Two caves show large selenite crystals up to 6 ft. in length and weighing 60 lbs. The larger crystals are generally colored by inclusions of mud. C. B. SLAWSON

Voltaite from Jerome, Arizona. CHARLES A. ANDERSON. *Am. Mineral.* 12, 287-90(1927).—The voltaite occurs in a brecciated quartz. The sulfate ore in levels below has been burning for a no. of years and the voltaite is formed as sublimate from the ascending vapors. It occurs as simple cubes or in combination with (111) or rarely (110). The crystals are transparent and pale green, with $n = 1.604$. Analysis shows: SO_4 47.83, Al_2O_3 6.06, Fe_2O_3 14.34, FeO 8.82, MgO 1.55, K_2O 4.52, H_2O 16.13%. It alters rapidly in air to a yellow powder. C. B. SLAWSON

Roemerite from California. R. E. LANDON. *Am. Mineral.* 12, 279-83(1927).—This is the first American occurrence of this mineral. It was found as an alteration of pyrrhotite at Island Mt., Trinity Co. The mineral is triclinic and a table of interfacial angles is given. Analysis gave: SO_4 38.30, Fe_2O_3 20.60, FeO 6.94, H_2O 33.40%. Slightly pleochroic, with $2V = 49^\circ$, $\rho > v$ strong and distinctly crossed dispersion, —, and $\alpha = 1.526$, $\beta = 1.571$, $\gamma = 1.582$. C. B. SLAWSON

Ammoniojarosite, a new mineral of the jarosite group from Utah. R. V. SHANNON. *Am. Mineral.* 12, 424-6(1927).—This mineral occurs in a black lignitic shale near Panguitch, assocd. with ammonium alum. Analysis gives: Al_2O_3 0.02, Fe_2O_3 49.30, CaO 0.05, MgO 0.13, Na_2O 0.22, K_2O 1.56, $(\text{NH}_4)_2\text{O}$ 4.23, SO_4 34.49, H_2O 9.86, insol. 0.76%. Microscopically it shows transparent pale yellow tabular grains some of which have hexagonal outlines. Probably uniaxial, —, $\omega = 1.800$, $\epsilon = 1.750$. C. B. SLAWSON

The Florence meteorite of Williamson Co., Texas. JOHN T. LONSDALE. *Am. Mineral.* 12, 398-404(1927).—This meteorite, which fell Jan. 21, 1922, is a breccia-like chondrite, weighing 3640 g. and consists mainly of olivine, enstatite, metallic Fe and FeS. The compn. is: metallic 17.62, troilite 5.01, rock 77.37%. Analysis of the metallic portion gives: Fe 91.277, Ni 8.270, Co 0.426, Cu 0.009 and P 0.018%. Analyses of various portions of the rock material are also given. C. B. SLAWSON

Meteorite (aumalite) which fell on October 16, 1919 in the Bur-Hecaba region, Italian Somali. ANTONIO NEVIANI. *Boll. soc. geol. ital.* 40, 209-22(1921); *Chem. Zentr.* 1927, I, 1144-5.—Two stones weighing 8.05 and 15.40 kg., resp., were found. One had a mineral content of enstatite, olivine and small quantities of Ni-Fe and troilite. The structure was chondritic, and there was little glass substance present. The other stone had a d. of 3.76 and consisted of 23% Ni-Fe and 77% silicates, olivine and enstatite. C. C. DAVIS

Colombian glass meteorites. TH. DÖRING AND O. STUTZER. *Centr. Mineral. Geol.* 1928A, 35-41.—Further chem. and phys. evidence is given supporting the idea that certain glass spheres and splinters found in southern Colombia are meteorites. A new analysis of the glass is given. The gas contd. is largely CO_2 , CO and H, while Cl and HCl, considered to be characteristic of volcanic glasses, are absent. J. E. G.

Microscopic replacement versus injection in ores. G. M. SCHWARTZ. *Am. Mineral.* 12, 297-304(1927).—From a detailed microscopic study of polished ore section S. concludes that replacement is more important than injection in the formation of ore deposits. C. B. SLAWSON

Magnesite. A. SAVARIZKII. *Nutzbare Fossilien* 4, No. 31, 1-12; *Chem. Zentr.* 1927, I, 52.—Russian magnesite deposits are described and distinguished according to their origin. In Satka, Zlatoust district, a large deposit is being worked. This magnesite is white and coarse-grained and has the compn.: MgO 46.90, CaO 0.40, SiO_2 0.20, Al_2O_3 0.07, Fe_2O_3 0.54, CO_2 51.73, H_2O 0.16%. C. C. DAVIS

The abrasive garnet industry. MANUEL BOIX. *Quim. ind.* 5, 93-6(1928).—

Review of occurrence, production, uses and markets of almandites. The Spanish garnets of Almería are superior to any other quality on the market. The Spanish method of mining and concn. is essentially the same as that used in the N. Y. State mines, except for a few variations detd. by local conditions. The specifications for abrasive garnets are: hardness not < 7.5, preferably about 8. The crystals ought to be large in order to yield an angular, sharp-edged abrasive. Granular garnets usually yield rounded instead of angular pieces. The surfaces of fracture must not be too well developed, since this reduces cohesion. The color in itself has no effect on the technical properties, but there is a prejudice against the rhodolite of North Carolina, although expts. have shown that its quality is equal if not superior to that of the Adirondack almandite.

MARY JACOBSEN

Chemical and geological hypothesis for the existence of larger available petroleum deposits in Germany and toward the edge of the Alpine and Bohemian massifs; petroleum formation from coal in deep geosynclines; a working hypothesis. ERICH SEIDL. *Z. deut. geol. Ges.* 1927B, 14-20.

J. E. GILL

The replaceable bases in the roofs of lignite seams. E. MCKENZIE TAYLOR. *Fuel in Science and Practice* 7, 227-8(1928); cf. *C. A.* 22, 1305.—In the roofs of bituminous coal seams, Na is the chief replaceable base present; in the roofs of lignite seams, the chief replaceable element is Ca. This indicates that the roofs of lignite seams have not undergone base exchange with solns. of Na salts and that they contain no Na-AlSi complex. The Ca-AlSi complex affords neither alk. nor anaerobic conditions to the underlying org. matter and therefore the products of decompn. are not fully reduced compds. The roof type detd. the product of bacterial decompn. of the org. matter beneath it—if the roof has undergone base exchange with Na, bituminous coal is formed; without this exchange, lignite.

D. A. REYNOLDS

The replaceable bases in the roofs of anthracite seams. E. MCKENZIE TAYLOR. *Fuel in Science and Practice* 7, 228-9(1928); cf. preceding abstr.—As bituminous and anthracite coals occur under similar roof conditions they are probably different products of similar reactions under alk. anaerobic conditions, the character of the reaction product being detd. by the decompn. of the accumulated material in the preceding stage. Base exchange and the formation of coal. *Ibid* 230-7.—The results of previous investigations (cf. above), are discussed together with older theories of coal formation. T. concludes that the final factor which detd. the conversion of peat to coal was the decompn. under alk. anaerobic conditions. The theory of coal formation by heat and pressure is discounted.

D. A. REYNOLDS

Contributions from the Mineralogical Institute of Bonn University. 57. The chemical composition of the granite and gneiss of the Fichtelgebirge. H. M. E. SCHÜRMANN. *Centr. Mineral. Geol.* 1927A, 310-3.—Analyses of granite from Ottengrün and gneiss from Seeberg are given.

J. E. GILL

The granite of Conway, New Hampshire, and its druse minerals. J. L. GILLSON. *Am. Mineral.* 12, 307-19(1927).—Characteristic minerals have been developed by emanations passing upward through the granite mass along pegmatitic zones. The same minerals are found in the granite mass showing that the emanations have penetrated the solid rock. The changing character of the emanations may be traced in variations in mineral deposition. No conclusions can be drawn as to the liquid or gaseous character of the emanations.

C. B. SLAWSON

Mineral replacements in pegmatites. WALDEMAR T. SCHALLER. *Am. Mineral.* 12, 59-63(1927).—Pegmatites are the result of 2 processes: (1) solidification by cooling to form a nearly pure K-feldspar rock, (2) subsequent hydrothermal replacement, the final pegmatitic rock being the resultant of the various solns., any one of which may have replaced the previous minerals in whole or in part. Evidence of this is found on detailed examn. of Calif. pegmatites.

C. B. SLAWSON

Alpine mineral deposits. IAN CAMPBELL. *Am. Mineral.* 12, 157-67(1927).—Hot carbonated aq. solns. have leached the country rock and upon cooling they have pptd. a series of minerals in cavities which were developed by tensional forces. The zone of leaching does not exceed twice the width of the cavities. The outer zone of deposition consists of small idiomorphic crystals of a quartz while the inner zone carries large well-developed crystals of typical alpine minerals. The total chem. compn. of each vein or cavity follows closely the total compn. of the adjacent rock. The deposition follows a "salt" soln. sequence and the order of deposition is that which would result from the cooling of a soln. whose compn. was the same as the country rock, the cooling range being from 450° down.

C. B. SLAWSON

The basalt of Weitendorf, Steiermark, its exogenous inclusions and vein and cavity

fillings. FELIX MACHATSCHKI. *Centr. Mineral. Geol.* 1927A, 367-74, 413-22.—Analyses of the basalt, inclusions and cavity fillings are given. J. E. GILL

The so-called "porphyrite" of Klotzsche near Dresden. F. TRÖGER. *Centr. Mineral. Geol.* 1927A, 1-6.—Microscopic studies indicate that the rock is a member of the Lausitz lamprophyre series. An analysis of this rock and one of the Weiszig porphyrite are included. J. E. GILL

Chemical compositions of a few alkaline rocks from the eastern Arabian desert of Egypt. E. SCHURMANN. *Centr. Mineral. Geol.* 1928A, 121-6.—New analyses are given for coarse-grained riebeckite granite porphyry from Bir Dara, fine-grained riebeckite granite porphyry from Geb. Mongul, dense riebeckite porphyry from Geb. Gharib, riebeckite granite from Ras-Zeit, bostonite from the Egyptian "Hochgebirge" theralite from Wadi Melaha and melaphyres from Ras-Zeit, Cherm Nagga and Abu Had. Amphibole from the Ras-Zeit granite calcd. to riebeckite 50%, actinolite 50%; that from the Wadi Melaha theralite, barkevikite 25%, pargasite 75%. J. E. G.

The eruptive rocks of Muno, Prov. Luxembourg, and the resulting metamorphism. ARMAND L. HACQUAERT. Univ. of Ghent, Belgium. *Natuurwetenschap. Tijdschr.* 10, 73-88(1928).—Petrological examn. of eruptive rocks found at Muno (Belgium) and of the metamorphism produced on the surrounding shales and phyllites. A. L. H.

Lateritic substances in marine limestones. M. FRANK. *Centr. Mineral. Geol.* 1928B, 273-91.—Analyses are included. J. E. GILL

Presidential address [weathering of rocks]. W. G. WOOLNOUGH. *J. Proc. Roy. Soc. N. S. Wales* 61, 1-53(1927); *Australian Sci. Abstracts* 6, 32.—The general chem. principles involved in the weathering of rocks during the last stages of highly perfect peneplanation are discussed, and it is shown that, if the rainfall of the region is markedly seasonal in distribution, the conditions favor the production of: (1) a very deep zone of completely leached rock, consisting essentially of kaolin and silica, (2) a sub-surface deposit typically concretionary in structure of amorphous silica, alumina and Fe oxides. All the alkalis and alk. earths are completely removed in soln. An attempt is made to prove that the very widespread "lateritic" and siliceous (opalinic) crusts in western and northern Australia, are parts of a single chemically formed deposit, produced under the conditions postulated in the first part. Such crusts have been referred to a no. of different geological formations, and endless confusion has resulted. It is believed that "Desert Sandstone," "Laterite," "Upland Miocene" and other formations in different states may be brought into harmony with one another. For the formation thus produced the name of *Duricrust* is suggested. Reasons are adduced for assigning a Miocene age to the structure. The main body of the paper deals with the origin and distribution of the *Duricrust*. It is of economic importance as it yields precious opal, fireclays, road metals, water supplies in arid regions and, possibly, bauxites of economic value. Its surface is mostly extremely barren, and its destruction has given rise to the great stony plains (Gibber Plains) so widely developed in the interior of the continent. Remnants of it give rise to the "tent hills" and "table hills" so characteristic of Central Australia. H. G.

Explanation of the anomalies in the position of the innermost rings of pleochroic uranium halos. FRANZ LOTZE. Göttingen. *Centr. Mineral. Geol.* 1928A, 87-9.—L. believes that changes in the phys. properties (particularly the cohesion) of the medium in which the halos are produced are competent to explain the anomalies observed. J. E. GILL

The Ra content of Stone Mountain granite (PIGGOT) 3. Oleic, palmitic and stearic acids as mother substances of petroleum (ZELINSKII, LAVROVSKI) 10.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST AND R. H. ABORN

The history of the Kongsberg Silver Works. R. STOEREN. *Tek. Ukeblad* 74, 181, et seq. (1927).—A historical review. C. A. ROBAK

Revisiting Arizona mining camps. VI. United Verde extension smelter. E. H. ROBIE. *Eng. Mining J.* 125, 813-5(1928); cf. *C. A.* 22, 2346.—Information regarding power production, roasting, dust recovery, reverberatory smelting and bessemerizing is given, together with a diagrammatic flow sheet. E. G. R. ARDAGH

Recent developments in fuel technology in iron and steel practice. E. C. EVANS. *Fuel Econ. Rev.* 7, 50-5(1928); cf. *C. A.* 22, 1841. E. H.

Gold, silver, copper, lead and zinc in Montana in 1926. C. N. GERRY. *Bur. Mines. Mineral Resources of the U. S. 1926*, Part I, 371-414 (preprint No. 00, published June, 1928). E. H.

The manufacture of cadmium. JOHN STERLING. *Metal Ind.* (London) 32, 563-6 (1928).—A review. E. H.

The present condition of mercury production in Austria. F. REUSS. *Metallbörse* 18, 201-2(1928).—The method now in use for obtaining the Hg in Cu, Ag ores in the Schwaz district is described, 6000 kg. being produced in 1926. J. BALOZIAN

Past and present production of zinc west of the Mississippi River and to what extent has the recent improvement in flotation affected the same. HOWARD I. YOUNG. *Bull. Am. Zinc Inst.* 11, 106-12(1928). E. H.

Investigations on the concentrating of poorer German limonites. H. GRÜSSNER. *Metallbörse* 18, 313-4(1928).—The rough ore is dried and ground to grains of about $\frac{1}{10}$ mm. It is then mixed with about 15% of coke and heated in a sintering machine (Dwight-Lloyd) at 1000-1100° for 2-3 hrs. By this treatment the character of the ore is partly destroyed, some metallic Fe resulting from the reduction. The sintered cakes are cooled, broken up and powdered in a mill to about $\frac{1}{4}$ mm., and made into lumps capable of being smelted. The loss on heating the dried ore in the sintering machine to 900° is 11%, increasing to 22% at 1100°. The Fe content of the larger grains is about 26% greater than that of the smaller. The practicability of this method has been shown by a large no. of small-scale expts., one set being given in detail. When other methods of dressing have failed on ores of similar compn., this one should be considered. J. BALOZIAN

The production of refined lead from lead residues. EDMUND R. THEWS. *Am. Metal Market*, Mag. Sect. 35, No. 111, 1-5(1928).—The process of smelting lead residues and by-products in reverberatory or blast furnaces and the fire refining of the lead thus produced are described. C. L. READ

Flue dusts from copper smelters of the Southwest: Composition and methods of treatment. WILLIAM A. SLOAN. *Bur. Mines, Repts. Investigations* No. 2871, 40 pp.—Flue-dust samples from 7 smelters were analyzed and examd. Varying amounts of the original sulfide copper ores were found to be sulfated or oxidized, thus making the Cu sol. in water or in acid. By roasting the dusts at 580° to 625° at least 80% of the Cu was obtained in the water-sol. form and 93 to 99% was sol. in 4 to 6% H₂SO₄, while acid ferric sulfate soln. gave increased soly. of Cu. Methods of briquetting and sintering the dusts are discussed. C. L. READ

The manufacture of alloy steel. E. C. SMITH. *Am. Metal Market*, Mag. Sect. 35, No. 111, 20-3(1928).—The common methods of manufg. alloy steel are described. C. L. READ

Refined chrome steel at low heat. NICOLAUS N. MENSCH. *Iron Age* 121, 1817-8 (1928).—In making Cr steel from charges contg. Cr, data are given to prove that the amt. of Cr remaining in the refined steel from the scrap depends entirely on the method of melting and the temp. of the bath reached during the refining period, and is independent of the amt. originally contained in the scrap. If a high proportion of Cr is left in the steel from that contained in the charge, the quality of the steel is adversely affected, which is explained on the supposition that one of the Cr oxides is dissolved in the steel at a relatively high temp., and is not reduced when the metal cools down but remains in the finished steel as a harmful inclusion. DOWNS SCHAAF

Uniformity in duplex steel. FOLKE W. SUNDBLAD. *Iron Age* 121, 1812-3(1928).—To produce a more uniform and better quality duplex steel, it is necessary that the temp. of the bath and the nature of the slag be made stable for all heats. It is possible with tar, oil or producer gas to regulate operating conditions so that by the time all the blown metal is poured into the furnace, the slag has a certain fluidity and the bath a certain temp. Coke-oven gas in combination with any of these fuels makes it very difficult, if not impossible, to control the aforementioned conditions. DOWNS SCHAAF

Cupola control by auxiliary tuyères. ANON. *Engineering* 125, 744(1928).—The Poumay system of auxiliary tuyères, when applied to 2 cupolas melting metal for steel casting manuf., demonstrated a 32% saving in coke and a 22% saving in time of melt. An elevation of the cupola with sections through the wind belt and the main tuyères shows this system consists of a no. of small tuyères arranged helically around the cupola and connected to the wind belt by pipes of different lengths, the supply of air being controlled by regulating cocks, the plugs of which are set at different angles to give the sp. opening required. DOWNS SCHAAF

Blast-furnace data and their correlation. EDGAR C. EVANS and F. J. BAILEY. *Iron Steel Inst.* May, 1928 (advance copy), 64 pp.; *Engineering* 126, 29-30(1928).—

From a study of 120 blast-furnace operating results a common basis for correlating output and fuel consumption was found in comparing the effective time of contact between the reducing gases and the ore before the hearth is reached. The greater this time the lower the fuel consumption. Factors affecting the time of contact are: slow driving of the furnace, prepn. of the burden prior to charging, suitable methods of charging, suitable furnace construction, quality of coke used. Tables giving the operating data for a no. of blast furnaces are included. J. W. SHIPLEY

Blast-furnace practice in Natal. J. E. HOLGATE AND R. R. F. WALTON. *Iron Steel Inst.* May, 1928 (advance copy), 26 pp.—A description is given of the establishment by the Union Steel Corp. of the first South African iron blast furnace, including the ore body, coke and limestone supply, labor and market. The ore body is largely Fe carbonate contg. 40 to 50% Fe and 5% of free C. At first this carbonate ore, as in recognized practice, was mixed with an oxide ore before smelting, but later because of the free C in the ore, it was found economical to use the carbonate ore alone and without previous calcining. Coke was secured from nearby coal mines in Northern Natal. Dolomite from near Johannesburg made a satisfactory flux. Native Zulu labor proved very adaptable and hard working, this cheap labor making the establishment of the iron and steel industry in S. A. possible. After 15 months operation the furnace was closed down for 9 months because of the excess of stocks of pig Fe. Cheaper coke and railway transportation would make it possible to export pig Fe. The corporation provides practically all of the foundries in S. A. with foundry Fe and its steel works at Vereeniging produce all kinds of railroad Fe and mining equipment, while a steel tube works and sheet and rail mill are soon to be built. Tables are included showing working costs of production, analyses of ores, coal, dolomite, pig Fe and slag and also a consideration of the economic conditions governing the pig Fe industry in S. A. J. W. SHIPLEY

The rotary tube furnace for pyrite roasting. C. P. DEBUCH. *Chem. App.* 15, 25-6, 51-3, 75-6, 89-90, 121-3(1928).—A discussion of Kauffmann's method of pyrite roasting, with a description of the Gröppel furnace, its advantages and disadvantages, results of operation, capacity and power requirements. J. H. MOORE

The static and fatigue properties of some cast irons. J. B. KOMMERS. *Proc. Am. Soc. Testing Materials* (preprint), 40, 24 pp.(1928).—Ten different kinds of cast Fe were tested, with 31 A. S. T. M. arbitration bars of each, in tension, compression, impact and fatigue; and transverse and hardness tests were also made. Full data regarding the history, chem. compn. and microstructure of the samples, as well as the results of tests, and the methods of prepn. of the specimens, are recorded. The endurance limit was detd. by less than 20 million cycles in the standard R. R. Moore machine. The results of hardness, compression and transverse tests were fairly uniform for a given Fe, but not those of tensile, impact and fatigue tests, which showed considerable scatter. Specimens showing surface pits had abnormally low endurance. The strongest series showed an endurance limit of 24,100 lbs. per sq. in. No improvement was noted from addns. of Ni or Cr. Brinell hardness tests proved more delicate for these alloys than Rockwell. The endurance was roughly proportional to strength, hardness and modulus of rupture, being about 50% of the tensile strength. These properties all showed a fairly simple relation to each other, but in plotting the correlation curves, low values were disregarded. An outline of desirable further work on cast Fe is given. GEO. F. COMSTOCK

Influence of phosphorus on strength properties of cast iron pipe. JAMES T. MACKENZIE. *J. Am. Water Works Assoc.* 19, 747-59(1928).—Up to about 0.80% by increasing the fluidity of the molten Fe, P, in general, acts to improve the product. Beyond 1%, strength and resilience decrease rapidly because of its embrittling effect. D. K. FRENCH

Heredity of iron castings. L. GUILLET. *Compt. rend.* 185, 1598(1927).—More precise methods for the detn. of the properties, and especially of the chem. compn. of the castings described by Le Thomas (*C. A.* 22, 1125) are required, in order to detect any small differences between them. B. C. A.

The electrochemical action of inhibitors in the acid solution of steel and iron. E. L. CHAPPELL, B. E. ROETHLI AND B. Y. MCCARTHY. *Ind. Eng. Chem.* 20, 582-7(1928).—Chem. reactions in pickling Fe are discussed, and the previous literature on inhibitors, to prevent soln. of metal, is reviewed. The effect of quinoline ethiodide on H evolution in pickling was studied; also its effect on the reactions at anode and cathode. The app. is illustrated, and the results are tabulated and plotted. The cathode potentials increased on addn. of the inhibitor, and the c. d. and H evolution decreased. Other inhibitors gave similar results. H was evolved at grain boundaries,

scratch marks and inclusions. The inhibitor is adsorbed at the cathode areas and builds up a protective layer there. Quant. relationships may be computed from the data presented.

Geo. F. Comstock

Service is best test of steel. H. M. BOVLSTON. *Iron Age* 121, 1665-8 (1928).—Accelerated corrosion tests are not reliable indicators of service results. Comparative acid tests of 2 materials may give opposite results, depending on the kind of acid used. Other variables affecting acid tests are also discussed. Service tests alone are conclusive and authoritative.

G. F. C.

X-ray investigation of the density of quenched steels and the internal stress existing within them. SINKITI SEKITO. Tôhoku, Imp. Univ. Sendai. *Z. Krist.* 67, 285-94 (1928); cf. *C. A.* 21, 3589.—The expansion of quenched steels may be explained by the expansion of the space lattice, and was found to amount to 0.45% for 1% C steel. The internal stress calcd. from the diffusion of the spectral lines of quenched steel is of the same order of magnitude as the tensile strength, being 192 kg./per sq. mm. This supports the view of Honda that the diffusion of the lines is due to the distortion of the Fe lattice by C atoms in the interspaces, rather than that of Westgren, who considers it due to refinement of crystal grain. The plane at right angles to the plane of greatest at. density is subject to the greatest internal stress and lattice distortion. L. S. R.

Influence of grain size on the mechanical properties of steel, especially on the notched-bar test. H. HANEMANN AND R. HINZMANN. *Stahl u. Eisen* 47, 1651-61 (1927).—The tensile strength and hardness of a plain C steel (C 0.12, Si 0.26, Mn 0.64%) and of a hardened Ni-Cr steel (C 0.23, Si 0.26, Mn 0.38, Cr 0.67 and Ni 2.90%) varied only slightly for grain sizes between 600 and 13,000 sq. μ and between 90 and 25,000 sq. μ , resp. The impact test values for notched bars, however, are considerably altered by varying the grain size, although no definite relation between the 2 can be ascertained. For small test pieces the curve falls rapidly with increase of grain size to a const. value for medium-sized grains; then decreases rapidly above 4500 sq. μ . For large test pieces the impact strength is a min. for large and small grains and a max. for medium-sized grains. If the specimen is polished before testing, a fairly well-defined "area of flow" is discernible on the polished surface after impact; the work done in breaking the specimen divided by the area of flow is called the "work constant" of the metal. The "work velocity" is the quotient $50 A_2/A_1$, where A_1 and A_2 are the work consumed in breaking a small and a large test piece, resp. Both the "work constant" and "work velocity" are shown to be sp. properties of a metal, the values of which are dependent on the grain size. Beyond a certain grain size, which varies for every metal, the value of these functions falls suddenly, indicating a serious deterioration in the valuable properties of the metal.

B. C. A.

The incremental permeability method for the magnetic analysis of high-speed steel.

W. B. KOUVENHOVEN AND J. D. TEBO. *Proc. Am. Soc. Testing Materials* (preprint), 1928, 19 pp.—This paper describes a new method of magnetic analysis by which the magnetic properties of high-speed W steel bars were investigated. Data were obtained which make it possible to differentiate between the heat treatments received by the specimens.

E. J. C.

Wearing tests of twelve-percent manganese steel. J. H. HALL. *Proc. Am. Soc. Testing Materials* 32 (preprint), 6 pp. (1928).—Wear-test figures for 9 steels were obtained by dividing the loss in g. per sq. in. of jaw surface by the total no. in thousand lbs. of stone crushed, in a small lab. crusher with jaws cast of Mn steel, C steel, Cr steel and Ni-Cr steel.

Downs SchAAF

The properties of nickel steels, with special reference to the influence of manganese. J. A. JONES. *Iron Steel Inst.* (advance copy), May, 1928, 36 pp.; cf. *C. A.* 22, 566.—The crit. ranges and Brinell hardnesses of numerous steels contg. 0.2-0.5% C, 3-10% Ni, 0.1-1.6% Mn and 0-0.2% Cr were detd. A_{c1} was lowered 10° for each 1% of Ni; A_{r1} was lowered more, the amt. depending on compn. and the rate of cooling. These crit. points are lowered slightly by Mn only when over 0.3% is present. The heat-treating temps. of com. Ni steels are not affected appreciably by Mn up to 0.8%. The addn. of Cr caused a rise in A_{c1} only. The results of Brinell tests after different rates of cooling are tabulated and plotted. Mn above 0.5% increased the hardness materially, but Cr had a greater hardening effect. Bars $1\frac{1}{4}$ by $\frac{3}{4}$ in., quenched in oil from 850° , and tempered at 500° to 640° , were tested in tension and impact. The mech. properties were improved with Ni up to 6%, or in the presence of 0.8% Mn, up to 4.5%, if tempered below 600° . Raising the Mn from 0.4 to 0.7% gave in general improved elastic properties with no loss in ductility. For structural purposes, these steels should be tempered no lower than 500° to insure freedom from quenching strains and good elastic properties; and tempering at too high a temp. may also impair the elastic prop-

erties. With 3 to 4% Ni, 0.5 to 0.8% Mn is almost essential to secure adequate hardening of any but very small sections, and 0.8% Mn is much better than over 0.4% C. Cr up to 0.2% is more powerful than Mn in counteracting mass effect. Inadequate hardening may be partly allowed for in tempering, but elastic and impact values are never as good in such steel as in one properly hardened before tempering. Increase of either Mn or Ni resulted in less ferrite pptn. during a given heat treatment. G. F. C.

The rapid normalizing of overstrained steel. W. E. WOODWARD. *Iron Steel Inst.* (advance copy), May, 1928, 10 pp.—Mild steel bars were strained in tension, normalized by passing up to 600 amp. d. c. through them for 3 to 5 min., and tested with uniformly good results. The ordinary method of normalizing in a furnace did not give such good results in healing overstrain, as shown especially by fatigue tests. By using a large a. c. for 3 min. on strained steel bars contg. up to 0.48% C, the metal was well restored in properties, but not quite so well as by d. c. Photomicrographs show the uniform structures produced by this elec. normalizing. G. F. C.

Endurance of high-speed cut-off tools in relation to magnetic and other measurements. HAAKON STYRI. *Proc. Am. Soc. Testing Materials* 30 (preprint), 10 pp. (1928).—Magnetic and elec. tests, Rockwell hardness and durosopic readings were made on high-speed steel tools, and the relation between these values and the no. of rings of Cr ball-bearing steel cut per grind by them, are shown. The test results show good correlation of both the hardness figures and the elec. measurements with the endurance of the tool. The magnetic tests readily show deviation in heat treatment of the steels, but do not seem to be related in any way with tool life. DOWNS SCHAAF

Aluminum alloys in motor construction. H. STEUDEL. *Z. Metallkunde* 20, 165-78 (1928).—A table is included which lists the motor parts in which Al alloys can replace cast Fe or steel, with the type of alloy or desirable property required. In general a change in design is needed to take care of lower tensile strength, greater elongation and tendency toward fibrous structure. This is particularly true with cast alloys such as "German alloy" (10% Zn, 2% Cu, Fe and Si about 1%), "American alloy" (about 8% Cu), the Al-Si alloy *Silumin*, *KS*—sea water alloy (2.5% Mg, 3% Mn, a small quantity of Sb), *KS*—piston alloy (16% Cu, 0.5% Si, 0.5-1.0% Fe), and *Supra piston alloy* (5% Cu, 20% Si, 0.5-1.0% Fe). Particularly promising are the Al alloys which can be forged, rolled and heat-treated, such as *Duralumin* (4% Cu), *Skleron* (3% Cu, 6% Zn), *Aeron* (4% Cu, 1% Si), *Lautal* (4% Cu, 2% Si) and *Konstruktal* (1% Cu or 8% Zn). *Duralumin* and *Skleron* are self-hardening; *Konstruktal* is partially so. H. STOERTZ

Report of Committee B-2 on non-ferrous metals and alloys. WM. CAMPBELL, et al. *Proc. Am. Soc. Testing Materials* (preprint), No. 18, 1-31 (June, 1928).—Minor changes in tentative standards for various non-ferrous alloys are presented. New chem. requirements for bronze bearing metal in ingot form are recommended; also changes in the methods of chem. analysis of Mn bronze and of Al and light alloys. Appendices describe the methods planned for an investigation of die-castings, given dimensions of test-specimens, compns. of Al-base and Zn-base alloys to be tested, and specifications for Rockwell hardness tests on soft alloys. The nature, production and uses of die-castings are discussed by S. Tour, and European die-casting alloys and practice are described by E. V. Pannell, with a bibliography. G. F. C.

Aluminum casting alloys. A review of recent progress. GEORGE MORTIMER. *Metal Ind.* (London) 32, 593-6, 612-5 (1928); cf. *C. A.* 21, 1439. E. H.

Heat treatment of aluminum and its light alloys. IV. Aging treatment of aluminum alloys after quenching. ROBERT J. ANDERSON. Fairmont Mfg. Co., Fairmont, W. Va. *Fuels and Furnaces* 6, 763-4 (1928); cf. *C. A.* 22, 1941, 2738.—Al alloys contg. Mg_2Si will age-harden at ordinary temps. while those contg. no Mg_2Si but $CuAl_3$, require artificial aging. *Duralumin* will age-harden at room temp. in 4 days after quenching. By varying the heat treatment, variations in tensile strength, hardness, elongation and resistance to impact are obtained. The usual aging temps. for wrought alloys lie in the range 120-160°, while cast alloys may be aged up to 235°. The correct heat treatment for several specific alloys is given. J. W. SHIPLEY

The influence of sodium on the tensile properties of aluminum-copper alloys (cast aluminum alloys). WILLI CLAUS AND FRITZ GOEDERTZ. *Giesserei* 15, 3, 55-61 (1928).—Because of the unsystematic character of previous investigations, the influence of Na on Al-rich Al-Cu alloys is studied. In order to obtain a satisfactory exptl. method, preliminary expts. are made on the 86% Al, 14% Si alloy with Archer and Kempf's method (*C. A.* 20, 3424) of treating the melt. Various tensile properties of the 92/8 alloy are detd., with (0.1 or 0.2% acting for 5 or 10 min.) and without Na, melting at 800° and pouring at 700°, into sand and cast-Fe molds. Na causes a considerable lowering of the tensile properties. Photomicrographs show that the permanent-mold

castings, not previously treated with Na, have the largest grain size, those which have been acted on by 0.1% Na for 10 min. possessing a distinctly smaller one. There is no apparent change in the grain size of the sand castings. With the addn. of 0.2% Na the tensile properties of the sand castings decrease proportionately, while there is no effect on the permanent-mold type. There is a decrease in the grain size of the latter castings, the former showing a slight increase. *Ibid* 82-8.—The Al-rich Al-Cu 96/4, 80/20, 68/32 alloys are next investigated, the exptl. methods and conditions being similar to those used for the 92/8 alloy. From tensile tests it is apparent that, apart from a slightly greater hardness, the mech. properties of the 96/4 alloy are not affected by Na addns. The photomicrographs do not show the decrease in grain size, apparent in the castings of the 92/8 alloy when made in an Fe mold. Na, when added to the 80/20, does not change the elongation but decreases the tensile strength of castings made in sand or cast-Fe molds, the ball hardness decreasing in the first and increasing in the sec. case. Photomicrographs show a considerable decrease in the grain size of Fe-mold castings, with slight increase in the sand type. Tensile tests were limited to ball hardness detns. on the eutectic 68/32 alloy because of its brittle character, due to the high CuAl₂ content. The Na added shows no influence on the hardness values of both types of castings, but photomicrographs show the extremely fine eutectic structure. Castings made in Fe molds show a decrease in the grain size in the interior as well as at the exterior of the casting, while those in sand molds show a decrease at the exterior and an increase in the interior. In general Na is detrimental to all the tensile properties of both casting types.

J. BALOZIAN

The effect of heat treatment on some mechanical properties of 85:5:5:5 copper-tin-lead-zinc alloy. ROBERT J. ANDERSON. *Am. Metal Market Mag.*, Sect. 35, No. 111, 9-12(1928); cf. *C. A.* 22, 2537.—Tests of tensile properties of the 85:5:5:5 Cu-Sn-Pb-Zn alloy gave erratic results after annealing the specimens at specific temp. Annealing had little effect on the tensile properties of the 85:4:5:6 alloy but quenching from 500° had a harmful effect. The differences in properties are claimed to be due to variation in methods of melting and casting rather than chem. compn. C. L. R.

The structure of the iron-chromium-carbon system. A. WESTGREN, G. PHRAGMEN AND TR. NEGRESKO. *Iron Steel Inst.* (advance copy), May, 1928, 18 pp.—Analysis of the Fe-Cr-C system by x-rays proved that no true double carbide occurs in it. Alloys for this study were prepd. by remelting the fairly pure elements in a C-tube furnace, and the products were analyzed. The binary Fe-Cr and Cr-C systems are reviewed, the former being an unbroken series of solid solns, and 3 carbides being shown to exist in the latter. The ternary equil. diagram was constructed from microscopic and x-ray examns., and is described. Four carbides exist in this system, as follows: Fe₃C in which Cr may be present beyond 15%; Cr₃C in which Fe may occur up to 25%; Cr₇C₃ with Fe up to 55%; and Cr₃C₂ with possibly a little Fe. The α phase dissolves only a slight quantity of C. Numerous photomicrographs are presented to illustrate the micro-structures, and x-ray photographs are also shown. In cementite the lattice contracts with rising Cr. In annealed ball-bearing steel nearly all the Cr is in the cementite, and the groups of carbides often found in such steel are due to ordinary segregation of cementite. Large particles of this carbide may etch differently from smaller particles, though the compns. are practically the same. In stainless steel the carbide is Cr₇C₃, contg. Fe.; in ferro-Cr and some high-C steels, Cr₇C₃ occurs.

GEO. F. COMSTOCK

Advantages of electron metal. ANON. *Apparaturbau* 40, 131-2(1928).—Notes on Mg alloys.

J. H. MOORE

Recrystallization of α -brass. A. BASS AND R. GLOCKER. *Z. Metallkunde* 20, 179-83(1928).—Complete recrystn. diagrams of 70-30 and 63-37 brass were detd. for degrees of deformation up to 75% and temp. of treatment up to 850°. The lower limit of temp. for the beginning of recrystn. as detd. by grain size is 300° for rolled samples with 50 and 75% deformation. As detd. by Brinell hardness this lower limit is placed at 200° for 75% deformation and 250° for 50% deformation. In both brasses as the annealing temp. rises, grain growth is slow up to about 600°, after which it becomes very rapid. Thus for the 70-30 brass, rolled to 25% deformation, grain size is 0.0108 mm. at 300°, 0.040 mm. at 600°, 0.080 mm. at 700° and 0.212 mm. at 850°. The type and velocity of cold working have no influence upon the size of the recrystd. grains. X-ray photographs show that with a high degree of rolling the orientation of the newly formed crystals of α -brass is identical with that of recrystd. Ag rather than that of Cu. Pb admixts. up to 1.2% have practically no effect upon tensile strength elongation and grain size, while with Fe content up to 0.79%, the grain size remains very fine up to 700°, after which it increases rapidly.

H. SROGATZ

Structure of brass tubing. F. OSTERMANN. *Z. Metallkunde* 20, 186-8(1928).—Surface failures in brass tubing produced by bending were investigated photomicrographically. A desirable grain structure consisting of fine α -mixed crystals with β -residues between the grain boundaries is not obtained with less than 61% Cu. A Cu content of 61 to 61.3% with heat treatment not above 600° is recommended. In the zone of pure α -phase (above 63% Cu) the danger of coarse crystal structure is too great.

H. STOERTZ
Electrolytic copper. W. KÖSTER. *Z. Metallkunde* 20, 189-91(1928).—Com. electrolytic Cu plate, electrolytic Cu plate annealed at 600°, and rolled Cu were studied. The variation of hardness with annealing temp. for various degrees of rolling (3-93%) was detd. In each case there is a lower limit of annealing temp. below which, for a given degree of rolling, hardness is const. This lower limit of temp. falls as the degree of rolling increases. Thus for both electrolytic and rolled Cu it is about 425° at 3% rolling, and 75° at 93% rolling. With electrolytic Cu the max. hardness at 93% rolling is about 128, compared with about 108 for rolled Cu. The increased hardness of electrolytic Cu as compared with rolled Cu is attributed to its H content, which is given up on heating to 450-500°, thus accounting for the lower values of hardness obtained when this Cu is annealed to 600°. With rolled Cu, no change in d. occurs either on cold rolling or annealing, but with electrolytic Cu, with 1-hr annealing periods, the d. is const. at about 8.93 up to 600°, after which it falls rapidly to 8.60 at 1000°. Cold rolling to 67% decrease in thickness restores the original d.

H. STOERTZ
Metallurgical study of antique bronzes. D. BUTTESCU. Inst. of Ind. Chem., Bucarest. *Bul. chim. soc. română stinte* 30, 83-98(1928).—The analysis of archeologic bronze weapons found in Roumania indicates about 87% Cu and 12% Sn, no Zn and no Pb. They are thus older than the Roman period (possibly 1200 B. C.) Their compn. is comparable with the compn. of articles found in France and dating to that period.

A. L. HENNE
Wear and mechanical tests of some railroad bearing bronzes. H. J. FRENCH. *Proc. Am. Soc. Testing Materials* (preprint) 34, 28 pp(1928).—Two series of bronzes were studied: in one the ratio of Cu to Sn was 92.5 to 7.5, and the Pb varied from 0.25 to 25%; in the other the Cu-Pb ratio was 84 to 16, and the Sn varied from 0 to 10%. Tests were made under various kinds of friction, tension, impact and repeated pounding. The difficulties of wear testing are discussed. After a brief period of wearing-in, lubricated specimens of bearing showed very little wear, so that wear tests without lubrication were necessary to show differences between the samples. Chill castings wore more rapidly than sand castings. Cu-Pb alloys with little Sn wore rapidly; bronze with only 0.25% Pb also wore badly, except at normal temp. under lubrication, alloys contg. 5 to 10% Sn and 12 to 25% Pb showed in general the least wear. Pb had a bad effect on the notch-toughness, but Sn within the α -range improved it. In general with 10 to 25% Pb sand castings had better notch-toughness than chill-castings, but with very low Pb this difference was reversed. Above 350° F. the notch toughness was reduced. Increased Pb impaired the tensile properties, but increased Sn up to 10% improved them. Chill castings generally showed a higher strength and greater resistance to pounding than sand castings. Pb decreased, and Sn increased the resistance to pounding. In practice, chill castings are easier to machine, but fail more often from wear, while sand castings are apt to fail from breakage. Bearing bronze should contain over 5% Sn, and for most purposes variations in Pb between 12 and 25% make little difference. If wear is not considered, the best mech. properties were obtained with low Pb and 8 to 10% Sn. The present specifications for bearings used by many railroads are shown to be widely different, and considered unnecessarily precise. Methods of casting may be more important than certain changes in compn.

G. F. C.
Measurement of brittleness. P. L. IRWIN. *Proc. Am. Soc. Testing Materials* (preprint) 95, 8 pp.(1928).—Results of tests on spring steel embrittled by electrolytic cleaning are given, which show the effect of duration of treatment, c. d., and time and temp. recuperation. Flexure tests were made of straight flat spring material by measuring the load and deflection at the center of a span of 1½ in. The degree of brittleness is taken as the percentage decrease in normal load or deflection required to cause fracture.

DOWNES SCHAAF

The recovery and sinking-in or piling-up of material in the Brinell test, and the effects of these factors on the correlation of the Brinell with certain other hardness tests. A. L. NORBURY AND T. SAMUEL. *Iron Steel Inst.* (advance copy) May, 1928, 15 pp.—Various steels, other alloys and vulcanite were subjected to scleroscope, pendulum, cone and Brinell hardness tests, and the changes in shape of the tested surfaces were studied. The Brinell results on all except Mn steel obeyed Meyer's law (load = const.

$\times d^n$). The shape of the tested surface was derived from spherometer measurements of a larger ball placed in the impression. The sinking-in or piling-up for a given material was proportional to the depth of the impression, being up to 30% of the depth in some cases. It varied linearly with " n " in Meyer's formula. The flattening of the impression increased with the depth divided by the diam. Elastic recoveries on releasing the load increased generally with the hardness of the material tested. This recovery, if multiplied by the diam. and divided by the depth of impression, was a const. for a given material. Amsler depth-indicator readings require correction for agreement with ordinary Brinell readings. Factors affecting the correlation of Brinell results with scleroscope and Herbert pendulum values are discussed, both of the latter depending somewhat on elastic properties. Cone tests are comparable with Brinell tests at certain angles of impression.

GEO. F. COMSTOCK

Equilibrium diagrams. W. ROSENHAIN. *Iron Steel Can.* 11, 165-73 (1928).—The practical value and applications of the study of equil. diagrams for alloys are described in non-technical language. Technical terms are explained and some of the properties of alloys are discussed. Accuracy, even in exploratory work, is considered essential. Changes in solid soly., resulting in susceptibility to age-hardening, are treated in special detail.

GEO. F. COMSTOCK

Detection of plastic deformation in the interior of materials. G. TAMMANN AND M. STRAUMANIS. *Z. Metallkunde* 20, 184-5 (1928).—When the heat treatment and mech. working of a metal or alloy are such as to produce a definite crystallite orientation in the material, any alteration in this orientation, such as produced by the stamping of coins, can be detected on a section cut from the interior, by etching with a suitable reagent. Stamped Cu, Fe, Zn, Ni and Ag plates are examd. Fe and Cu plates rolled 60% and stamped show very clear etching impressions on interior sections, but if the samples had been previously heated to 800° producing recrystn., the impression of the stamping is hardly distinguishable.

H. STOERTZ

Pyrometric regulation of heat-treating operations. WM. P. WOOD. Univ. of Michigan. *Fuels and Furnaces* 6, 347-50 (1928).—A descriptive article drawing attention to the necessity for accurate heat treatment in the production of steel for modern construction purposes. A brief description of the thermocouple and its application in automatically controlling furnace temps. is included.

J. W. SHIPLEY

Some factors involved in corrosion and corrosion-fatigue of metals. D. J. MCADAM, JR. *Proc. Am. Soc. Testing Materials* (preprint) 41, 29 pp. (1928).—In the simultaneous action of corrosion and alternating stresses, if the stress is below the endurance limit, accelerated corrosion first causes pitting. The stress rises at the pits, eventually passing the endurance limit. When the stress is above the endurance limit, fatigue is accelerated by corrosion. Tests of various C and alloy steels and Al alloys were made by corrosion at low stresses to obtain pitting, followed by fatigue. The corroding effects of soft water, carbonate water and Severn River water were investigated. The chem. compn., heat treatment, tensile and impact values of all samples are tabulated. The elastic limits are all reported higher than the resp. proportional limits. Corrosion lowered the ordinary endurance graph, and the extent of lowering depended on the stress applied during the prior corrosion. Steels contg. Cr were possibly a little less damaged by corrosion than the plain C or Ni steels. In the corrosion period of the tests, increase of stress first caused increase in depth of pitting, but at a certain stress called the "notching limit," the depth of pitting ceased to increase until the corrosion-fatigue limit of stress was reached. Steels did not fail at the notching limit, but endured further increase of stress. The endurance limit at the bottoms of the notches was raised somewhat by previous stressing. Stainless Fe and Ni-Cu alloys did not form pits below the corrosion-fatigue limit, which was thus the same as the notching limit. Carbonate water and soft water gave similar results. Steel in salt water showed less difference between the notching and corrosion-fatigue limits than in fresh water; stainless Fe in salt water had a lower corrosion-fatigue limit than in fresh water. Most Al alloys showed severe pitting at no stress, so that stressless corrosion was nearly as damaging as corrosion-fatigue. The stress-concn. due to corrosion pits depends chiefly on the electrolytic soln. pressure of the alloy, but somewhat also on the hardness. The effect of time and no. of cycles on corrosion was studied by tests at from 100 to 1450 r. p. m. The penetration of corrosion pits per cycle increased with increase of stress. The notching limit is a variable, decreasing with increase in time and no. of cycles. The corrosion-fatigue limit of deep-pitting alloys is reduced by thinning the test-specimen. Tests with large specimens up to 2.3 in. in diam. showed that the corrosion-fatigue limit was slightly less than for the normal specimen $1/2$ in. in diam. In general this limit and the notching limit are concluded to be independent of size of specimen, provided

the diam. is large compared to the notch-depth. Torsional corrosion-fatigue tests of Cr-V steel showed a much lower limit than that detd. by the rotating cantilever tests. The notches in torsion are shown by photomicrographs to be shaped like crosses, and it is suggested that the torsional corrosion-fatigue limit may be near the notching limit of the rotating cantilever tests. G. F. C.

Prevention of sub-aqueous corrosion by electrochemical polarization process. O. W. CARRICK. *J. Am. Water Works Assocn.* 19, 704-13(1928).—By proper control of an externally applied current, As is plated upon Fe and furnishes a resistant protective film against corrosive action. As is used because of ease in deposition and for the high discharge potential it has when a protective H film has been formed. D. K. F.

Comparison of the most important methods employed in the cleaning of blast-furnace gas (HARBORD) 21. Decreasing corrosion in the ice tank (GIBBS) 13. Calculation of the combustion temperature in blast furnaces (MÜHLBRADT) 21. Impact and rebound device for testing hardness of materials (Brit. 280,182) 1.

WENDT, R. E.: **Foundry Work.** 2nd ed. revised. New York: McGraw-Hill Book Co. 236 pp. \$2. Reviewed in *Chem. Met. Eng.* 35, 367(1928).

Preliminary treatment and magnetic separation of ores. H. A. MUELLER (to Aktiebolaget Ferriconcentrat). Brit. 279,797, Oct. 28, 1926. Weakly magnetic Fe ores are rendered more strongly magnetic, *e. g.*, by heating with 0.25-0.50% of powd. coal for $1/4$ - $1/2$ hr. at 600° , and are then subjected to magnetic sepn. "Blast furnace mould" contg. Fe oxide and C may be used in mixt. with ore, and carbonate ore is first converted into oxide.

Roasting ores. WILLIAM E. STOKES (to United States Processes, Inc.). U. S. 1,674,806, June 26. Ores such as a V ore, *e. g.*, roscoelite, are roasted at a temp. below their fusion point, with an alkali metal bicarbonate which serves to assist disintegration by action of the CO_2 evolved. NaNO_3 and NaCl also may be added.

Treating ores for sintering, desulfurizing, etc. METALLBANK UND METALLURGISCHE GES. A.-G. Brit. 279,693, Feb. 28, 1927. The air supply to an ignited charge which may be mixed with added fuel is passed through the material on a moving grate so that the main part of the reaction is effected in a limited zone near the ignition point, and air for cooling is supplied in a further zone. Volatile constituents such as water, CO_2 , Zn, Cd, As, Sb, Hg or metallic oxides may be obtained or NaCl or other chlorides may be added for obtaining chlorides of noble metals. An app. is described.

Treating zinc ore. COMPAGNIE DES METAUX OVERPELTLOMMEL. Brit. 279,697, Jan. 26, 1927. The ore is formed into sized grains, which may be dried or baked, and with sulfide ores may be roasted on the grate of a blast app., and charged with reducing agent into retorts for reduction. Calamines may be mixed with pre-roasted sulfide ore before treatment. Oxide ore may be agglomerated with water only and in some cases Zn and NaCl may be added and the drying operation omitted.

Mineral flotation. ELMER K. BOLTON (to E. I. du Pont de Nemours and Co.). Can. 281,647, July 10, 1928. Ores and minerals are concd. by flotation in the presence of a froth-producing agent (pine oil, hardwood creosote or terpinol) and one of the following flotation agents: mercaptothiazole or a sodium or zinc salt thereof, mercaptobenzothiazole, 1-mercapto-3-methylbenzothiazole, mercaptanaphthiazole, 1-mercapto- α -naphthothiazole.

Flotation Agent. F. T. WHITWORTH. Can. 280,916, June 12, 1928. Cresylic acid is mixed with P_2S_5 , heated to 140 - 180° for 1 hr., and the supernatant liquor is drawn off. This is used as a flotation agent.

Recovering zinc compounds in lead refining. JESSE O. BETTERTON. Can. 281,281, June 26, 1928. Zn compds. are recovered from the blue powder residue of Pb refining, by heating ZnCl_2 to fusion, adding the blue powder, agitating the mixt., subjecting the mixt. while heated to negative pressure to draw off the volatilized ZnCl_2 , increasing the heat applied to form slag, heating and rabbling the slag at red heat, and collecting the volatile products.

Cupola furnace. ARCHIBALD H. COPLAN (to Economy Metal Products Corporation). U. S. 1,675,255, June 26. A furnace suitable for melting iron comprises an outer casing and a lining of heat-resisting steel spaced from the outer casing to form a continuous heating chamber between the lining and the casing; the outer surface of the lining is formed with spirally wound fins or corrugations.

Apparatus for pickling tin plates, etc. R. THOMAS & CO., LTD. AND E. A. JONES. Brit. 280,025, Oct. 25, 1926.

Heat-treating metal strip. W. E. WATKINS. Brit. 279,787, Oct. 28, 1926. Metal strip is treated with oil, heated in a furnace (the construction of which is described) to 870–1100°, cooled in a reducing atm., pickled, washed, dried and wound on a spool. Instead of the oil a reducing agent and a compd. of a metal which is to form a coating on the strip may be applied before the heat treatment.

Burner for removing scale from metal surfaces. G. RUTSCHE. Brit. 280,099, April 13, 1927.

Protection of oxidizable metals. GIBBERT MICHEL. Can. 281,069, June 19, 1928. Mg, Al, Ca and other metals are protected against oxidation by cleaning or pickling the surface, applying phenol to produce a solid layer, crust or film which adheres and is united to the metal object, and if desired applying varnish or paint to the phenol crust. Cf. C. A. 22, 1946.

Metal coating baths. EDWIN R. MILLRING (to American Machine & Foundry Co.) U. S. 1,674,694, June 26. Metal coating baths such as those of Pb or Pb contg. Sn 16% or less are protected from oxidation by use of a mixt. of rapeseed oil and a petroleum product having a fire point above 350°.

Coating iron or steel sheets with spelter. HENRY A. ROEMER and DAVID A. WILLIAMS. U. S. 1,675,134, June 26. After coating iron and steel sheets with spelter the coated sheets are subjected to cold rolling to produce a coating which will withstand severe forming and heating without scaling or peeling and which may be spot welded or directly coated with enamel or paint.

Spray-coating of riveted joints, etc., with iron, nickel, copper or other metals. METALLISATION, LTD., AND A. A. ARNOLD. Brit. 279,584, Aug. 25, 1926. The sprayed surfaces may be protected by a thin coating of Al further coated with a reducing substance and subjected to heat treatment as described in Brit. 259,289 (C. A. 21, 3343) or a coating of Al alone may be used for packing the joint.

Lead shot coated with a harder metal such as copper. J. M. OLIN and A. G. SCHURICHT (to Western Cartridge Co.) Brit. 279,781, Oct. 28, 1926. After coating, *e. g.*, by electrodeposition, the shot is smoothed and the plating consolidated by a tumbling operation.

Rust-proofing. MATTHEW GREEN and HOBART H. WILLARD (to Parker Rust-Proofing Co.) Can. 281,317, June 26, 1928. Immerse articles in a bath contg. a dil. soln. of H_3PO_4 and dihydrogen phosphates of Fe and Mn, there being $\frac{1}{3}$ as much Mn as Fe in the soln. and sufficient dihydrogen phosphates in proportion to free acid to rust-proof the articles without reducing their wt. Cf. C. A. 22, 1754.

Cold-rolling band iron or similar metals. KALKER MASCHINENFABRIK A.-G. Brit. 280,159, Nov. 5, 1926. Comparatively thick material (2–10 mm.) is rolled at high speed (30–100 m. per min. or more) with substantial reduction (30–75% of the original thickness), without preliminary treatment or intermediate annealing except for an annealing before the final rolling after which the metal may be further annealed to soften it.

Rolling iron around refractory material to form hollow bars. T. S. WHEELWRIGHT. Brit. 280,382, Dec. 7, 1926. Mech. features.

Apparatus for cooling steel car wheels after forging or casting. JOHN BRUNNER. U. S. 1,674,884, June 26.

Mild steel plates. FRANCIS G. MARTIN. U. S. 1,675,190, June 26. Mild steel plates which by rolling or forging treatment have acquired inequality of longitudinal and lateral elastic limits are heated to 800–900° and then rapidly cooled to equalize the elastic limit in all directions and to increase it without increasing the hardness of the steel.

Porous metals or alloys. KAJ HANSEN. Danish 37,071, Jan. 31, 1927. The melted metal is heated with an indifferent substance, for instance a sulfate, carbonate, oxide, chloride or carbide in suitable disperse form. After solidification the foreign substance is removed by means of suitable solvents which are indifferent to the metal.

Non-ferrous alloys. WILLIAM B. PRICE (to Scovill Mfg. Co.). Can. 281,482, July 3, 1928. An alloy comprises not less than 98% of a mixt. of Cu, Ni and Sn. Cu is not less than 61.6% of total of said three metals, Sn not less than 0.5% of said total and the ratio of Ni to Cu does not exceed 3:7.

Alloys suitable for leading electric conductors. W. S. SMITH and H. J. GARNETT. Brit. 279,549, July 27, 1926. Alloys having high magnetic permeability at low magnetizing forces comprise Fe 14–15, Cu 14–16% and the remainder mainly Ni to which Mn not more than 0.5% and a deoxidizer may be added. The alloys may be heated

to 880° and cooled at 80° per min. and used in tape or wire form. Cf. *C. A.* **21**, 3343, 3597.

Copper alloys. OSCAR VON ROSTHORN. U. S. 1,675,008, June 26. In making Cu alloys contg. components of low m. p. such as Cd and Sn and a high proportion of Cu, by use of intermediate alloys, the intermediate alloys are added to the Cu in 2 portions, the first addn. contg. the component of lowest m. p. and the second those of higher m. p.

Hardened lead alloy. REGINALD S. DEAN and WILLIAM E. HUDSON (to Western Electric Co.). U. S. 1,674,955, June 26. See Can. 265,042 (*C. A.* **21**, 888). U. S. 1,674,954. Pb is alloyed with 2.45% of Sb, and after forming a supersatd. solid the soln. alloy is converted into a more stable condition by heating at 240°, quenching and aging. U. S. 1,674,956 specifies producing cable sheath of Pb by alloying it with not more than 2.5% Sb (but with more Sb than is sol. in solid Pb at room temp.), casting the alloy into ingot form and heating the ingot at a temp. (suitably about 240°) slightly below the fusion temp. to produce a substantially homogeneous solid soln., then extruding, quenching and aging. U. S. 1,674,957 specifies rolling hot ingots of Pb-Sb alloy to form the metal into a sheet, stamping storage battery plates or other articles from the sheet, quenching to a temp. below 100° to produce a supersatd. solid soln. and aging at a temp. below 100°. U. S. 1,674,958 specifies a Pb-Sb alloy in which Pb is the major constituent carrying finely divided particles of Sb substantially uniformly dispersed throughout the Pb.

Alloys of lead and antimony. REGINALD S. DEAN (to Western Electric Co.). U. S. 1,674,959, June 26. A solid alloy such as one contg. Pb 97.5 and Sb 2.5% may be heated at a temp. of about 240° to effect a supersatn. at a controlled rate. The product is then cooled and aged.

Alloy formed from nickel, bronze, copper and zinc. CHRISTINE S. CUSSEN. U. S. 1,674,640, June 26. Charcoal, Ni, bronze and Cu are heated together to a temp. above the m. p. of the metals, while agitated, Zn is added during further agitating and heating and, after discontinuing the application of the heat, As_2O_3 is added to the molten material and agitated with it to promote union of the metals.

Nickel-copper-aluminum alloys. TRUMAN S. FULLER (to General Electric Co.). U. S. 1,675,264, June 26. The phys. properties of an alloy consisting largely of Ni and Cu and contg. a small proportion of Al, e. g., an alloy of Ni 65, Cu 35 and Al 3-5 parts, are improved by deforming the alloy at a temp. of about 1000° and thereafter finishing the deformation of the material at a lower temp. but above 500° (suitably about 600°).

Silver alloys. R. P. JOSEPH and W. F. SCHNORR. Brit. 280,073, Feb. 7, 1927. Alloys (for uses such as those of sterling silver) contain Ag in preponderating proportion together with Sn, Zn, Au and Al. The combined quantity of Sn and Zn is preferably greater than the combined quantity of Au and Al, and Cd may replace the Sn or Zn or both. In casting the alloys, a stream of illuminating gas may be used to protect the molten metal from oxidation.

Removing aluminum from alloys. J. B. M. PEDERSEN. Danish 37,645, June 27, 1927. A mixt. of about 30% Fe_2O_3 , 40% SiO_2 , 10% water glass and 10% paraffin wax is worked into the melted alloy to form an Al-contg. slag.

Electrodes for arc welding. ALLGEMEINE ELEKTRIZITÄTS-GESELLSCHAFT (to International General Electric Co.). Brit. 279,886, Oct. 30, 1926. Structural features of electrodes are specified which may comprise flat, grooved or centrally cored material surrounded by a metal tube with an intervening layer of flux. MeOH or other suitable gas or liquid may be supplied for effecting the arc welding in a protective atm.

Ore flotation. C. H. KELLER. Can. 280,567, May 29, 1928. An ore contg. a mineral value and gang is concd. by agitating an aq. pulp of the ore with a sulphydic aromatic compd. contg. a single phenyl group and also a mineral-frothing agent so as to form a mineral-bearing froth. The froth is being sepd.

Ore flotation. C. H. KELLER. Can. 280,566, May 29, 1928. Fe-bearing ores are concd. by agitating a suitable pulp of the ore with a mineral frothing agent and with Et_3SnNa adapted to cooperate with the mineral frothing agent to produce by the action of both a mineral-bearing froth contg. a large proportion of a value and a diminished proportion of the Fe of the ore.

10—ORGANIC CHEMISTRY

CHAS. A. ROULLER AND CLARENCE J. WEST

Stereoisomerism and local anesthetic action. Separation of dimethylaminodimethylethylcarbinol into its optical isomers and preparation of two active stovaines. E. FOURNEAU AND L. RIBAS. *Bull. sci. pharmacol.* **35**, 273-8(1928).—See *C. A.* **22**, 761. L. W. RIGGS

The industrial production of citric acid. G. MALCOLM DYSON. *Chem. Age* (London) **18**, 528-30(1928).—A review of the manuf. of natural and synthetic citric acid. E. H.

The slow combustion of hydrocarbons. STANISLAS LANDA. *Bull. soc. chim.* **43**, 529-36(1928).—See *C. A.* **22**, 1948. E. H.

Complete history of Wöhler's first organic synthesis. W. H. WARREN. *Ber.* **61A**, 3-7(1928). H. G.

Action of strong sulfuric acid on olefins and alcohols. W. I. ORMANDY AND F. C. CRAVEN. *J. Inst. Petroleum Tech.* **13**, 844-54(1927).—Both olefins and alcs. (except the lowest members in each series) in the presence of an excess of concd. H_2SO_4 form satd. hydrocarbons and highly unsatd. substances remaining in acid soln. Alcs. and olefins from open-chain paraffins give open-chain paraffins, while alcs. from cyclic paraffins yield cyclic and polycyclic paraffins. When olefins and aromatics are brought together in contact with concd. cold H_2SO_4 , some of the aromatics join with the sepd. paraffins. BRIAN MEAD

The action of zinc on mixtures of polyhalogenated hydrocarbons with ketones and aldehydes. I. CUCULESCU. *Bul. chim. soc. română științe* **30**, 39-41(1928).—Whenever the mixts. of polyhalogenated hydrocarbons and ketones or aldehydes react with Zn, Zn halide is formed, together with an unsatd hydrocarbon, but no organo-metallic compd. is obtained. The mixts. contg. an aldehyde react better than those contg. a ketone. Iodides react more readily than bromides, and bromides better than chlorides. These reactions may be used to prepare cryst. products contg. the ketone or aldehyde and the Zn halide. A. L. HENNE

Synthesis under high pressure. Interaction of carbon monoxide and hydrogen. GILBERT T. MORGAN, RAYMOND TAYLOR AND THOMAS JOHNSON HEDLEY. *J. Soc. Chem. Ind.* **47**, 117-22T(1928).—The Chem. Research Lab. at Teddington, devoted to general investigations of high-pressure synthesis, is described in detail. Numerous illustrations and drawings of high-pressure equipment are reproduced. A "Tantiron" app. for generating CO from HCO_2H and H_2SO_4 is described. MeOH has been synthesized at 400 atm. in relatively large quantities by circulation of CO-H mixts. over any one of several catalysts made by mixing ZnO with other metallic oxides. Other ZnO catalysts contg. alk. substances were used to synthesize mixts. of methanol and higher alcs. These mixts. invariably contained small quantities of aldehydes, acids and esters. It was observed that primary alcs. only were identified; the aldehydes formed corresponded to the alcs.; addn. of Co to the basic Zn chromate catalyst favored the production of higher alcs.; rise in temp. of the catalyst favored MeOH formation. The reactions are assumed to involve primary HCHO synthesis. The results so far obtained on the MeOH equil. are in agreement with Audibert and Raineau's equation: $\log K_p = P_{MeOH}/P_{CO} \cdot (P_{H_2})^2 = 27,000/(4.517T) - 3.5 \log T - 3.6$. R. L. DODGE

Inhibition of esterification by pyridine. KENNETH C. BAILEY. Trinity College, Dublin. *J. Chem. Soc.* **1928**, 1204-6.—Under the exptl. conditions employed an esterification of 3.1% in 6 hrs., in the absence of any negative catalyst, was reduced to about 1.7% by addn. of about 70 parts of C_5H_5N per million; but further addn. (up to 800 parts per million) only reduced esterification to 1.37%. When the effective surface was increased by the insertion of glass tubes, the total surface area of which was approx. the same as that of the vessel, esterification, in the absence of C_5H_5N , reached 4.7%; by the addn. of about 300 parts of C_5H_5N per million, the esterification was again reduced to 1.7, the addn. of further C_5H_5N having comparatively little effect. C. J. WEST

Chelate compounds of thallium dialkyl. ROBERT C. MENZIES, NEVIN V. SMOG-WICK, ERIC F. CUTCLIFFE AND JOHN M. C. FOX. *J. Chem. Soc.* **1928**, 1288-91.—Thallium dimethyl acetylacetonate, m. 214-5° (some decompn.), results in 64% yield from Me_3TlI and TI acetylacetonate in EtOH; it sublimes at 170°; it dissolves slowly in cold and readily in hot H_2O ; it has an alk. reaction and gives a ppt. of Me_3TlI with KI . The benzoylacetone deriv., m. 128-9°, sublimes at 120° at 20 mm., results in 78.7%

from boiling TIOEt and Me_2TlBr in EtOH and then adding BzCH_2Ac ; it is also formed from the carbonate and BzCH_2Ac . The *salicylaldehyde deriv.*, lemon-yellow, decomps. 200° , sublimes at $160-70^\circ$ at 20 mm., results in 63% yield from *o*- $\text{HOC}_6\text{H}_4\text{-CHO}$ and the carbonate in C_6H_6 . *Et Tl dimethyl acetacetate*, m. $128-30^\circ$ (66% yield), by evapg. the filtrate from TIOEt and Me_2TlI and adding $\text{AcCH}_2\text{CO}_2\text{Et}$; the *diethyl deriv.*, m. $88-90^\circ$ (58% yield). *Thallium diethyl acetylacetone*, 81% yield. *Benzoyl-acetone deriv.*, m. $116-8^\circ$ (72% yield); 100 g. petrol. ether, b. $40-60^\circ$, dissolves 3.29 g. at 19° .

C. J. WEST

Refractivity and dispersivity of normal saturated monobasic aliphatic acids. I. H. WATERMAN AND S. H. BERTRAM. *Rec. trav. chim.* 47, 576-7(1928); cf. *C. A.* 22, 1326.—The oscillation phenomenon of properties of substances in the liquid state is real though smaller than in solids. The contradictory assertions of Verkade and Coops are declared invalid. Other authors confirm this phenomenon. R. H. LAMBERT

Oleic, palmitic and stearic acids as mother substances of petroleum. N. D. ZELINSKII AND K. P. LAVROVSKI. Univ. Moscow. *Ber* 61B, 1054-7(1928).—It was shown in an earlier paper (*C. A.* 22, 89) that decompn. of cholesterol with AlCl_3 gives a mixt. of hydrocarbons entirely similar in chem. and phys. properties (even as to optical activity) to natural petroleum. Of course, cholesterol cannot be the sole mother substance of petroleum and Z. and L. undertook to det. whether oleic, palmitic and stearic acids, so widely distributed in nature, would in and of themselves yield petroleum hydrocarbons under the same conditions as cholesterol. Oleic acid begins to react with AlCl_3 at room temp. but heating later becomes necessary and after a time there results a solid mass slightly elastic when broken. As the heating is continued to 150° the reaction becomes very rapid, with formation of CO_2 , combustible gases which decolorize KMnO_4 , and liquid products with a bluish green fluorescence. The yields are: gases about 10%, liquids 60-5%, tar 20-5%. The liquid, treated successively with concd. KOH, H_2O , CaCl_2 and Na, shows d_4^{20} 0.9280, and 600 g. on distn. with steam from alkali yields 155 g. of easily volatile products sepd. by distn. over Na into 68 g. of a fraction b. $35-150^\circ$, n_D^{20} 1.4115, and 75 g., b. $150-250^\circ$, n_D^{20} 1.4432, both of which rapidly decolorize KMnO_4 and of which 30 and 37%, resp., are absorbed by concd. H_2SO_4 , this being the chief difference from the product obtained from cholesterol, which contains less unsatd. compds. The portion non-volatile with steam, after drying with CaCl_2 and Na, yielded 97.5, 103, 67 and 40 g. b. $108-60^\circ$, $160-230^\circ$, $230-70^\circ$ and $270-310^\circ$, resp., n_D^{20} 1.4651, 1.4950, 1.5110, 1.5259; the first 2 fractions reacted with KMnO_4 . The $35-150^\circ$ fraction still reacted with KMnO_4 after treatment with H and Ni-asbestos at 180° and H_2SO_4 absorbed about 30% of the product. The insol. portion, distd. over Na, b. $70-160^\circ$, d_4^{20} 0.7149, n_D^{20} 1.4036, and had the odor and properties of a benzine in which the paraffin hydrocarbons predominate, differing in this respect also from the product obtained from cholesterol. The $119-25^\circ$ fraction, d_4^{20} 0.7193, of this product gave with Br and AlBr_3 a very small quantity of tetrabromo-*o*-xylene. The $150-250^\circ$ fraction, after hydrogenation under 30-5 mm. over Ni-asbestos and treatment with concd. H_2SO_4 , gave products b. $145-90^\circ$ and $190-215^\circ$, with n_D^{19} 1.4255 and 1.4351. The greenish color of the fraction b. $108-60^\circ$ is replaced by a blue fluorescence on hydrogenation *in vacuo* and about 27% now dissolves in concd. H_2SO_4 ; the non-fluorescent insol. portion b. $88-160^\circ$, d_4^{20} 0.8003, n_D^{19} 1.4488. That no hexahydroaromatic derivs. were present in the fractions previously treated with H_2SO_4 was indicated by the fact that no H was evolved and n did not change when they were subjected to dehydrogenation catalysis over Pt-charcoal at 300° . It is worthy of note that oleic acid with AlCl_3 yields liquid paraffins but neither cyclohexanes nor solid paraffins. The decompn. of palmitic and stearic acids with AlCl_3 over a free flame is much more rapid than that of oleic acid. Palmitic acid yielded a very small quantity of a liquid product b. $70-130^\circ$ and 60% of a cryst. product b. $240-360^\circ$, m. 79.5° after treatment with hot concd. KOH, hot H_2O and concd. H_2SO_4 , and recrystn. from alc.; the latter is a mixt. of paraffins with an av. mol. wt. of 412 (Rast). Stearic acid gave very little liquid, b. $130-90^\circ$, a little fluorescent oil, b. $100-40^\circ$, and 60% of a solid, b. $140-300^\circ$, m. 80.5° after treatment as above, mol. wt. 511. It is not unlikely that these 2 acids are the mother substances of the paraffin-rich petroleum.

C. A. R.

The reaction between magnesium derivatives and ethylene oxides. I. A. I. RIBAS. *Anales soc. españ. fis. quim.* 26, 122-32(1928).—The main product of the reaction of BrMgPh and $\text{MeOCH}_2\text{CH}_2\text{CH}_2\text{O}$ or $\text{CH}_3\text{OCH}_2\text{CH}(\text{OH})\text{CH}_2\text{Cl}$ is $\text{PhCH}_2\text{CH}(\text{OH})\text{CH}_2\text{-}$

OMe. Also $\text{PhCH}_2\text{CH}(\text{CH}_2\text{O}) + \text{MeOH} = \text{PhCH}_2\text{CH}(\text{OH})\text{CH}_2\text{OMe} + \text{PhCH}_2\text{CH}(\text{OMe})\text{CH}_2\text{OH}$, and the product so obtained is identical with that obtained with the Mg compd. This gives the constitution and course of the Grignard reaction for this chlorohydrin and ethylene oxide. The reaction with ethylene oxide is parallel to that of $\text{ClCH}_2\text{CH}(\text{CH}_2\text{O}) + \text{BrMgPh}$ and $\text{MeCH}(\text{CH}_2\text{O}) + \text{BrMgMe}$, so that sub-

stitution of the Cl of epichlorohydrin and the H of propylene oxide by the MeO radical has no influence on the opening of the ethylene oxide ring by the Grignard reagents hitherto employed.

Complex salts of β -methyltrimethylenediamine with bivalent platinum. FREDERICK G. MANN. Univ. of Cambridge. *J. Chem. Soc.* 1928, 1261-3.—In an attempt to obtain decisive evidence regarding the uniplanar or tetrahedral configuration of complex salts of bivalent Pt, salts of $\text{MeCH}(\text{CH}_2\text{NH}_2)_2$ were studied; the 6 salts prepd. showed no sign of *cis-trans* isomerism, which they should if they are uniplanar; the salts from active acids could not be resolved into optically active forms, which should be the case if they are tetrahedral. Thus no conclusion can be drawn. *Bis-[\beta*-methyltrimethylenediamine]platinous dichloride, m. $266-7^\circ$ (decompn.); *dibromide*, m. $266-8^\circ$ (decompn.); *diiodide*, m. $263-4^\circ$ (decompn.); *dinitrate*, deflagrates violently on heating; *di-d-camphor- β -sulfonate monohydrate*, m. $279-81^\circ$, $[\alpha] 15^\circ$ (H_2O , c 1.467%); *di-d- α -bromocamphor- π -sulfonate*, decomp. $278-85^\circ$, $[\alpha] 69.2^\circ$ (H_2O , c 0.8453%); *ditartrate*, thick sirup.

E. M. SYMMES

C. J. WEST

Polymerization and condensation. II. Products of inter-reaction of potassium acetate and epichlorohydrin. P. A. LEVENE AND A. WALT. Rockefeller Inst. *J. Biol. Chem.* 77, 685-96(1928); cf. *C. A.* 22, 59, 2741.—When epichlorohydrin is heated with dry AcOK, the following substances may be isolated from the reaction product by fractional distn.: acetylgycidol, diacetin, diacetylglycerylglycidol, triacetylglycerylglycidol and higher condensation products. Thus acetylgycidol has a tendency to condense into di- and polymol. substances in the same manner as free glycidol. *Diacetylglycerylglycidol*, m. 125° .

A. P. LOTHROP

Configurational relationships of 2-hydroxyvaleric acid and lactic acid. P. A. LEVENE AND H. L. HALLER. Rockefeller Inst. *J. Biol. Chem.* 77, 555-62(1928); cf. *C. A.* 21, 3599.—*d*-PrCH(OH)CO₂H yields *l*-MePrCHOH on reduction. In this acid, therefore, the OH group is allocated on the same side of the chain as *d*-4-hydroxyvaleric acid which gives *d*-MePrCHOH on reduction, since it is evident that on reducing the CO₂H groups of these 2 acids to Me groups, 2 carbinols which are enantiomorphous to each other will be obtained. "An important practical significance of this conclusion lies in the fact that it furnishes additional evidence of the validity of the indirect method of correlating the configurations of substituted aliphatic acids. The *d*-PrCH(OH)CO₂H on passing to its anion changed its rotation to the left, and, according to the rule developed in this lab., the acid should belong to the *l*-series, and now it has been shown by the direct method that it does belong to the *l*-series."

A. P. LOTHROP

An x-ray examination of saturated dicarboxylic acid and amides of the fatty acid series. JAMES WALKER. *Proc. Roy. Soc. Edinburgh* 48, 20-7(1928).—The study of x-ray diffraction by normal satd. di-CO₂H acids has been extended to include the following acids: C₃H₄O₄, C₄H₆O₄, C₅H₈O₄, C₆H₁₀O₄, C₇H₁₂O₄, C₈H₁₄O₄ and C₁₀H₁₈O₄. The *d*₁ spacings agree with the data of Trillat. The series of acids shows the difference in properties between odd- and even-numbered acids with respect to x-rays that it does in its other phys. properties, and there is no const. increment of *d*₂ as the length of the C chain increases. With the monoalkylmalonic acids (the C₆, C₈, C₇, C₁₀ and C₁₂ acids are reported) *d*₁ increases fairly regularly (1.0-1.3 A. U. per CH₂) with the no. of CH₂ groups; and this spacing is concluded to be a measure of the length of the mol., with only 1 mol. between successive reflecting planes. This is a different arrangement from that postulated by Stewart and others for the fatty acids, where it is assumed that they are arranged with the terminal polar groups together. This may be because the two terminal CO₂H groups mutually satisfy the residual valences within the mol., leaving insufficient affinity to orient another group. The dialkylmalonic acids resemble the monoalkyl acids. In dioctadecylmalonic acid the *d*₁ spacing is the same as that of the mono-acid, suggesting that the two long CH₂-chains are parallel to one another; whereas, in the lower members of the series, the chains must diverge, since the *d*₁ spacings are smaller for the di-substituted acids than for the corresponding mono-acids. The fatty acid amides give results similar to those of the acids themselves. The cleavage planes are sepd. by the length of 2 mols. which are oriented in

opposite directions. In no homologous series so far investigated are the $\delta d_1/\delta n$ values exactly const. but only approx. so. The chains may have a spiral structure with the angles between adjacent C atoms not necessarily const., but only approx. equal to the tetrahedral angle.

A. W. KENNEY

Imide ring closure in derivatives of diketosuccinic acid phenylosazone. FREDERICK D. CHATTAWAY AND WM. G. HUMPHREY. Queen's College, Oxford. *J. Chem. Soc.* 1928, 1094-8.—Diketosuccinic anhydride phenylosazone (I), fused with $\text{CO}(\text{NH}_2)_2$ for 10 min., gives *diketosuccinimide phenylosazone*, orange-yellow, m. 189° ; it is stable towards HCl but with boiling aq. NaOH gives 4,5-diketo-1-phenylpyrazoline-3-carboxylic acid 4-phenylhydrazine. I and PhCH_2NH_2 in Et_2O give the *benzylamine salt of benzylldiketosuccinamic acid phenylosazone*, light yellow, m. 165° (decompn.); Ac_2O gives I; AcOH or HCl gives *benzylldiketosuccinimide phenylosazone*, orange-yellow, m. 179° . *Dibenzylamine salt*, light yellow, m. $161-2^\circ$ (decompn.), of *dibenzylldiketosuccinamic acid phenylosazone*, orange-yellow, m. 180° . PhNH_2 and I, boiled 10 min., give a mixt. of *diketosuccinanilic acid phenylosazone*, orange-yellow, m. 201° (decompn.), crysts. with 1 AcOH and m. $135-200^\circ$, according to rate of heating, the AcOH is removed by washing with Et_2O or EtOH; and *diketosuccinanil phenylosazone*, orange-red, m. 252° (decompn.). PhNHNH_2 and I in AcOH give *diketosuccinophenylhydrazide phenylosazone*, orange-yellow, m. 270° (decompn.); the *phenylmethylhydrazide deriv.*, bright yellow, m. 243.5° (decompn.). The *p*-tolylhydrazine (corresponding to I) and PhNH_2 , boiled 1 min., give *diketosuccinanil p-tolylhydrazine*, yellow, m. 199° (decompn.); *2,4-dichlorophenylhydrazine*, orange-yellow, m. 308° (decompn.); *2,4-dibromophenylhydrazine*, orange, m. 309° (decompn.). *Diketosuccinophenylhydrazide o-tolylphenylosazone*, orange-yellow, m. 250° (decompn.), *2,4-dibromophenylhydrazide o-tolylphenylosazone*, orange-yellow, m. 295° (decompn.).

C. J. WEST

Steric series. IX. Configurations of the monosubstituted propionic and succinic acids. KARL FREUDENBERG AND ALFRED LUX. Univ. Heidelberg. *Ber.* 61B, 1083-9 (1928); cf. *C. A.* 22, 943.—The configurations of the $\text{MeCHBrCO}_2\text{H}$ having been established by optical comparison with the lactic acids, it was logical to det. in the same way the relationships between the bromosuccinic (I) and malic acids. The (–)-I proved to belong to the *l*-series. The configurations of chloroaliphatic acids can be derived directly from those of the corresponding Br acids. If the $\text{Et}(-)\alpha$ -azidopropionate is also assigned to the *l*-series, its conversion by Forster and Pierz into natural *l*(+)-alanine is another stone in the edifice of the interrelationships between the substances of these groups. In Paper VIII it had already been possible to classify the reactions of the lactic acid group according as they were or were not accompanied by inversion and this can now be done for the succinic acid group also. Comparison of the 2 series of reactions shows that in both groups the most varied reagents have the same effect (rearrangement or non-rearrangement). Kuhn and Wagner-Jauregg have recently (*C. A.* 22, 2145), by an entirely different method, reached the same conclusions as F. and L. as to the configurations of the chlorosuccinic acids, and that the natural (+)-lactic (sarcosuccinic) acid, (–)-halopropionic acids, (+)-alanine, (–)-malic acid, (–)-monohalosuccinic acids and (+)-asparaginic acid all belong to the *l*-series seems to be established with certainty. As the result of these investigations it may be stated that in the liquid state only without a solvent and in the form of derivs. in which all dipolar and associating groups (CO_2H , HO, NH_2) are blocked off, α -hydroxy-, amino- and haloaliphatic acids of the same configuration undergo, almost without exception, a change of rotation in the same direction under the influence of the same substituents. (–)-I, m. 179° , $[\alpha]_D^{20} -70.2^\circ$ (AcOEt). *Dichloride* (10 g. from 10 g. of the acid with PCl_5 in CHCl_3), b_1 56° , $d^{22}_4 1.796$, $[\alpha] -85.3^\circ$, -104.81° -130.5° for the lines 625, 589, 546, $[\alpha]_D^{22} -58.4^\circ$. *Di-Me ester*, b_1 79° , $d^{19}_4 1.513$, $[\alpha] -82.2^\circ$, -98.8° , $-119.4^\circ(?)$ (given as -19.4° in the original.—ABSTR.), $[\alpha]_D^{19} -65.3^\circ$. *Di-Et ester*, $[\alpha]_D^{20} -48.2^\circ$, prepd. from a I contg. 94% active acid, whence $[\text{M}]_D^{20}$ calcd. for the optically pure ester is -130° . *Di-Pr ester*, b_1 108° , $d^{21}_4 1.279$, $[\alpha] -43.8^\circ$, -53.1° , -64.0° , $[\alpha]_D^{21} -41.5^\circ$. *dl-I bisdimethylamide*, from the active or inactive chloride in Et_2O at -15° with Me_2NH , m. 79° . *l*(–)-*Methoxysuccinyl dichloride*, $d^{22}_4 1.341$, $[\alpha] -51.3^\circ$, -59.8° , -69.2° , $[\alpha]_D^{22} -44.6^\circ$, $[\alpha]_D -54.0^\circ$ (6.4% soln. in C_6H_6). *l*(–)-*Acetylmethyl dichloride* (3 g. from 3 g. of the acid), b_{14} 118° , $d^{22}_4 1.377$, $[\alpha] -15.5^\circ$, -18.0° , -20.1° , $[\alpha]_D^{22} -13.1^\circ$.

C. A. R.

History of the isomerism of fumaric and maleic acids. RICHARD ANSCHÜTZ. *Ann.* 461, 155-91(1928); cf. *Ann.* 254, 168(1889).—I. *Action of NH_3 and primary amines upon CO_2 , citraconic, ethylmaleic and dimethylmaleic anhydrides.* (WITH OSWALD

SCHARFENBERG, FERDINAND HAAS AND PAUL TRUMMEL.)— NH_3 and citraconic anhydride in Et_2O give 11–12 g. of the NH_4 salt of citraconamidic acid (I), m. 120–3°; in C_6H_6 , 8–9 g., m. 128–9°; in PhMe , 10–11 g., m. 135–6°; the free I m. 125°; on diln. of an aq. soln. there remains acid NH_4 citraconate, m. 139–40°, of which 2.07 g. dissolves in 100 g. 99% EtOH at 12°. This change was followed by pptn. with AgNO_3 ; the Ag salt of I was analyzed. The equil. is given for 0, 30, 60 and 120 min. at 0°, 50°, 70°, 90° and 100°. The Ag salt and MeI give the Me ester of I, m. 84–5°. The Ag salt of citraconanilidic acid and MeI give the Me ester, m. 126–7°, transformed by boiling H_2O into the anil and by KOH into the anilide. *Et* ester, m. 158°. *Citracono-p-toluidic acid*, m. 170–1°; NH_4 salt, yellow, hygroscopic product; *Ag* salt; *Me* ester, m. 105°; *Et* ester, citron-yellow, m. 168–9°; H_2O gives the anil, m. 114–5°; the anhydride and PhNHNH_2 give the *phenylhydrazide*, m. 108.5°. The action of Br and then of BaCO_3 upon $\text{AcCHETCO}_2\text{Et}$ gives β -mono-*Et* methylmesaconate or ethylfumarate, $\text{EtO}_2\text{CCEt:CHCO}_2\text{H}$, m. 88°; with KOH , there results ethylfumaric acid, m. 194–5°; with EtOH and HCl , the di-*Et* ester, b_{12} 122–3°; partial sapon. of this ester gives the α -mono-*Et* ester, $\text{HO}_2\text{CCEt:CHCO}_2\text{Et}$, m. 53°. The NH_4 salt of ethylmaleamidic acid (II), slightly hygroscopic, m. 123–4° (decompn.). The free acid could not be obtained, since HCl gives ethylmaleic acid. The anhydride and NH_4OH give ethylmaleic imide, m. 141°. Ethylmaleanilidic acid, m. 106–7°, citron-yellow. The *Ag* salt of II and MeI give the *Me* ester, m. 118–9°. Ethylmaleic anil, yellow, m. 129–30°. $\text{AcCHMeCO}_2\text{Et}$ and HCN give the cyanohydrin (III), $\text{MeC(OH)(CN)CHMeCO}_2\text{Et}$, b_{12} 127–8°, d_4^{25} 1.0549; sapon. with HCl and distn. gives dimethylmaleic anhydride, b_{12} 105°, m. 95–6°. The *Ac* deriv. of III, b_{12} 148–9°, does not split off AcOH on distn. at atm. pressure, as was hoped. NH_3 gives the NH_4 salt of dimethylmaleamidic acid, m. 123–4° (decompn.). The *Ag* salt and MeI give the *Me* ester, m. 57–8°. The free acid could not be prepd., since it decomp. into $\text{NH}_3(\text{NH}_4\text{Cl})$ and the anhydride. The anhydride and EtNH_2 in Et_2O give the ethylammonium dimethylmalecthylamide, hygroscopic. NH_4 salt dimethylmaleinanilide; *Ag* salt; *Me* ester, m. 69–70°. Dimethylmale-*p*-toluidic acid, m. 74–7°; NH_4 salt, hygroscopic; the *Me* ester, on crystn., gives diethylmaleic *p*-tolil, m. 110°. II. Action of ammonia and primary amines upon xeronic or dimethylmaleic anhydride, diphenylmaleic anhydride and bromocitraconic anhydride. (WITH ALEXIS VON VOLBORTH.)— NH_4 salt diethylmaleamidate, m. 136–7°; *Ag* salt. The PhNH_2 salt of diethylmaleic anhydride, m. 52–3°; boiling with H_2O gives diethylmaleic anil, m. 62–3°. *p*-Toluidine salt diethylmale-*p*-toluidate is pale yellow, m. 57°; heating with H_2O gives the *p*-tolil, m. 107°. The NH_4 diphenylmaleamidate, m. 147–8°, gradually turns yellow on standing and loses NH_3 over H_2SO_4 . *Ag* salt; warming the NH_4 salt in H_2O gives the anhydride, while AgNO_3 ppts the *Ag* salt of diphenylmaleic acid. *p*-Toluidine diphenylmale-*p*-toluidate, m. 119–20°, heated above 80°, it gradually decomp. into the *p*-tolil, m. 194°. NH_4 bromocitraconamidate, m. 27–9°; warming 0.5 hr. at 100° completely converts it into NH_4 bromocitraconate. Aniline bromocitraconanilide, m. 127–8°; warming the aq. or alc. soln. gives the anil; the NH_4 salt decomp. at 80°; *Ag* salt. *p*-Toluidine salt bromocitracon-*p*-toluidate, m. 123°; NH_4 salt, m. 108–9°; *Ag* salt. Heating the *p*-toluidine salt gives the *p*-tolil, m. 135.9–6°, yellow. III. Aniline, *p*-toluidine and β -naphthylamine derivatives of bromofumaric acid and bromomaleic acid. (WITH OTTO NEUHAUS.)—Bromofumaric acid and PCl_5 give the chloride, b_{14} 93°, the calcd. quantity of PhNH_2 in Et_2O gives the monoanilide (IV), m. 154°, of the chloride, H_2O gives the free acid, m. 147°. *Me* ester, m. 126°; the dianilide, m. 162°. Warming IV with 2 *N* NaOH gives anilinomaleic dianilide, m. 175°; heating a longer time with dil. NaOH gives the fumaric acid isomer, m. 194°. The *p*-toluidide (V), corresponding to IV, intensely yellow, m. 159°; the ditoluidide, yellow, m. 184°. The free acid from V, yellow, m. 169°; *Me* ester, yellow, m. 105–6°. The β -naphthylamide, corresponding to IV, yellow-red, m. 160°; the free acid, m. 176–7°; *Me* ester, yellow, m. 117°; dinaphthylamide, yellow-green, m. 234°. Bromomaleanilidic acid, yellow, m. 141°; *Ag* salt; *Me* ester, pale yellow, m. 122°, *p*-toluidic acid, yellow, m. 162°; *Me* ester, pale yellow, m. 92°; β -naphthylamidic acid, deep yellow, m. 173°; *Me* ester, yellow, m. 112°; β -naphthylimide, dark yellow, m. 208°. Fumaryl bromide, b_{32} 113–5°. (WITH PAUL BAUMGES.)—*Me* fumaryl monochloride, b_{17} 83°; *Et* ester, b_{17} 84°; dibenzyl fumarate, m. 60–1°; benzyl acid ester, m. 98°. Benzyl acid citraconate, m. 86°; benzyl acid itaconate, m. 92°; dibenzyl mesaconate, b_{65} 160–5°; acid ester, m. 71.5°.

C. J. WEST

Actions of Grignard reagents upon α -aminodicarboxylic acids. S. KANAO AND S. INAGAWA. *J. Pharm. Soc. Japan*, **48**, 238–52(1928).—Paal and Weidenkaff (*C. A.* **1**, 718) obtained $\text{Ph}_3(\text{HO})\text{CCH}_2\text{CH}(\text{NH}_2)\text{C(OH)Ph}_3$ from $\text{EtO}_2\text{CCH}_2\text{CH}(\text{NH}_2)\text{CO}_2\text{Et}$

and PhMgBr . But unexpected results were obtained when K. and I. tried the above reaction on homologous aminodicarboxylic esters. Thus, $d\text{-EtO}_2\text{CCH}_2\text{CH}(\text{NH}_2)\text{CO}_2\text{Et}$ and PhMgBr gave, instead of the expected $\text{Ph}_2(\text{HO})\text{CCH}_2\text{CH}(\text{NH}_2)\text{C}(\text{OH})\text{Ph}_2$, α' -[α -pyrrolidonyl]diphenylmethanol, needles, m. 191° , $[\alpha]_D^{20} = -86.38^\circ$ (CHCl_3). *dl-Compd.*, m. $182-3.2^\circ$. The pyrrolidonyldialkylcarbinols prep'd. in this way gave color reactions resembling those of diketopiperazines with $3,5\text{-(O}_2\text{N)}_2\text{C}_6\text{H}_3\text{CO}_2\text{H}$. They undergo ring rupture when sapon'd. with $\text{Ba}(\text{OH})_2$ or alkali hydroxide and give α,α -dialkyl- γ -amino- α -hydroxyvaleric acid. By reduction with Na and AmOH , they give α -pyrrolidylalkylcarbinols. E. g., α' -pyrrolidonyldiethylcarbinol, on reduction, gives α -pyrrolidyl-diethylcarbinol, whose phys. and chem. properties resemble those of Hess's α -pyrrolidylethylcarbinol (C. A. 8, 127) and Putochin's α -pyrrolidylcarbinol (C. A. 18, 983). These reactions give not only the dialkyl or diaryl derivs. of the pyrrolidone series, but also those of the piperidine series. Thus, $\text{Et-}\alpha$ -aminoadipate and PhMgBr gave α' -[α -piperidonyl]diphenylmethanol, needles, m. $225-6^\circ$. Di-Et *l*-aspartate (I) and PhMgBr gave tetraphenylaminobutanol, m. $147-8^\circ$, $[\alpha]_D^{20} = 31.37^\circ$, which differed from the *dl*-compd. (m. $149-50^\circ$) of P. and W. I and PhMgBr gave 2,5-dimethyl-3-aminoheptane-2,5-diol (III), b. $137-9.5^\circ$, m. $87-8^\circ$, $[\alpha]_D^{20} = -17.7^\circ$. *HCl* salt, m. $89-9.5^\circ$. *Bz* deriv., m. $146-7^\circ$. Boiling of III with 33% H_2SO_4 gave $\alpha,\alpha,\alpha',\alpha'$ -tetramethyl- β' -aminotetrahydrofuran, b. $66-7^\circ$, d_4^{20} 0.9021, n_D^{20} 1.4412, mol. refr. 41.91, $[\alpha]_D^{20} = -8.03^\circ$. *HCl* salt, m. 262° . *Bz* deriv., m. 136° . Conclusions: Grignard reagents give aminoglycols, with the esters of aspartic acid, while with the esters of α -aminoglutaric or of α -aminoadipic acid, α' -dialkyl- or diarylcarbinols of heterocyclic α -pyrrolidone or α -piperidone will result. Besides the compds given above, the following new ones are described 3,6-Diethyl-4-amino-octane-3,6-diol, b. $182-3^\circ$. $\alpha,\alpha,\alpha',\alpha'$ -Tetraethyl- β' -aminotetrahydrofuran, b_{15} 113-3.5 (cor.), d_4^{20} 0.9168, n_D^{20} 1.4678, mol. refr. 60.33, $[\alpha]_D^{20} = -9.59^\circ$. *HCl* salt, m. $270-5^\circ$. 4,7-Dipropyl-5-aminodecane-4,7-diol, light yellow, b_{15} 173-4°. 5,8-Dibutyl-6-aminodecane-5,8-diol, light yellow, b_{15} 180-4°. α' -[α -Pyrrolidonyl]-1-methylethanol-1-ol, b_{15} 201-2°. α' -[α -Pyrrolidonyl]-1-ethylpropan-1-ol, m. $91-2^\circ$, b_{11} 209-10°, $[\alpha]_D^{20} = -7.1^\circ$. 1-[α -Pyrrolidyl]-1-ethylpropan-1-ol, b_{15} 214-8°, d_4^{20} 0.95769, n_D^{20} 1.4718, mol. refr. 45.93. *HCl* salt, m. $160-1^\circ$, $[\alpha]_D^{20} = -9.22^\circ$. chloroaurate, m. $103-4^\circ$. picrate, m. $147-8^\circ$. 1, α' -[α -Pyrrolidonyl]-1-butylpentan-1-ol, m. $102-5-3-0^\circ$. 1, α' -[α -Pyrrolidonyl]-1-benzyl-2-phenylethanol-1-ol, m. 202° . Di-Et α -aminoadipate, b_{11} 155-6°. Et α -piperidonecarboxylate, b_{15} 181-2.5°.

NAO UYBI

Influence of the "conversion yield" and of the temperature of condensation on the purity and on the "condensation yield" in the synthesis of phosgene. FRANCESCO GIORDANI. Reale Scuola Ingegneria Napoli. *Ann. chim. applicata* 18, 90-6 (1928).—Mathematical. It is shown that the condensation process, which with the compn. of the gases issuing from the converters, indicates the % and purity of the condensate, can be calcd. The *conversion yield* is the proportion of the equimol. mixt. which reacts. The *condensation yield* is the ratio of the quantity of COCl_2 condensed to that formed. The *integral yield* is the product of the conversion and condensation yields. The following calcd. data give the temp. of condensation, the mol. concn. of COCl_2 in the liquid product, the condensation yield, and the integral yield, resp. (the calcs. being based on an original mixt. contg. 98% of $\text{CO} + \text{Cl}_2$ and a 90% conversion yield): 0° , 0.973, 0.378, 0.340; -10° , 0.942, 0.824, 0.741; -15° , 0.935, 0.888, 0.799; -20° , 0.928, 0.924, 0.831; -25° , 0.924, 0.948, 0.849; -35° , 0.810, 0.994, 0.894. Similar calcs. can be made for other temps., original mixts. and conversion yields. The data show that it is not economical to employ a temp. below -20° , and very low condensation temps. are economical only for the production of gas for use where purity is not essential and free Cl is unobjectionable. The method described is of particular value because of the analytical difficulties involved in detg. COCl_2 , Cl, CO, CO_2 , O and N to obtain the conversion yield (cf. Berthelot, *Bull. soc. chim.* [2], 14, 15 (1870)).

C. C. DAVIS

Reactions of carbonylhydrazide. II. ANDREW M. MUNRO AND FORSYTH J. WILSON. Royal Tech. College, Glasgow. *J. Chem. Soc.* 1928, 1257-61; cf. C. A. 21, 1248.—The view that in the thermal decompn. which carbonylhydrazones (or δ -amino-semicarbazones) undergo at their m. p. the hydrazidicarbonylhydrazide (or hydrazidicarbonylhydrazide itself) is the intermediate product has been confirmed by investigating the thermal decompn. of dibenzaldehydehydrazidicarbonylhydrazide (heating at 250° for 3 hrs. gives benzylideneazine and 4-aminourazole (I)); hydrazidicarbonylhydrazide (N_2H_4 ,

of isolating the native lignin in unchanged form from the plant-cell membrane. The method most used at present is based on the destruction of the saccharifiable constituents of the cell wall with highly concd. HCl. The acid treatment must not be continued too long, to avoid alteration of the lignin, and on the other hand it must not be too short, as the phys. and chem. union between the lignin and carbohydrates may in part not be destroyed and the carbohydrates not be completely converted into H₂O-sol. forms. The object of the present work was the study of the influence of time, temp. and concn. of the HCl on the purity and yield of the lignin. A prerequisite was a more thorough and qual. knowledge of the carbohydrates remaining attached to lignin obtained from wood insufficiently treated with HCl. For the detn. of the carbohydrate content of such preps. the usual indirect hydrolytic method (renewed treatment with concd. acid and detn. of the sugar in the hydrolyzate by the Bertrand method) gives quite consistent results if the hydrolysis is sufficiently long and always carried out under the same conditions, but the abs. values obtained are, for various reasons, not without objection (the formation of the sugars may be accompanied by their decomn. under the influence of the acid, the pentoses always present are calcd. as hexoses, and possibly the lignin itself may yield reducing substances such as HCIO or sugars). Reliable results were to be expected, therefore, only from methods which permit of isolating the carbohydrates in substance. By the Schmidt ClO₂ method the lignin substance in the cell membrane is oxidized and rendered sol. in NaHSO₃, Me₂CO or alc., while the carbohydrates remain unchanged; treatment of the product with NaHSO₃ leaves undissolved the complex of cellulose, galactose-free hemicelluloses (H₈) and polymeric acids designated as "skeletal substance," while with Me₂CO are obtained all the carbohydrates (in addn. to the "skeletal substance," the so-called hemicelluloses of the incrustations (H₇), which contain galactose). These 2 methods, together with a 3rd described below, were applied to the lignin preps. and the carbohydrates thus obtained were characterized by hydrolysis and fermentation. The ClO₂-NaHSO₃ products were about 67% fermentable by both *Saccharomyces cerevisiae* and *Schizosaccharomyces pombe* and were, therefore, free of galactose. Fermentation of the ClO₂-Me₂CO products with *S. cerevisiae* indicated the presence of at least as much pure hexosan as was found of crude polysaccharides in the same preps. by the NaHSO₃ method, showing that the Me₂CO process gives more carbohydrates than the NaHSO₃ method. Whether this is due to the presence of hemicelluloses of the incrustations could not be detd. because no fermentation with *S. pombe* was carried out, but in an earlier investigation (Hannemann, *Diss. Munchen*, 1922) the carbohydrates (about 8%) of a similar lignin prep. had been hydrolyzed off by renewed treatment with concd. HCl and galactose had been qual. identified, along with glucose, fructose, mannose and xylose. The hemicelluloses of the incrustations are possibly not alone responsible for the larger quantity of carbohydrates found by the Me₂CO method; it may be that parts of the skeletal substance, hydrolyzed by the concd. HCl to dextrin-like products, become sol. in NaHSO₃ and therefore are missed in that process; in lignin preps. contg. only very little carbohydrates, the latter can be isolated comparatively less readily than when large quantities are present and it can hardly be assumed that as hydrolysis proceeds the hemicelluloses of the incrustations would accumulate in the last carbohydrate residues remaining attached to the lignin. The compn. of the carbohydrates in lignin preps. and the ability to sep. them in the form of insol. polysaccharides permits of concluding that they consist of residues of the saccharifiable wood constituent, with cellulose predominating, which have escaped the disintegrating action of the concd. HCl. This view was confirmed by isolating the carbohydrates in an entirely different way without destroying the lignin substance, viz., by extn. with CuO-NH₄; from the filtered ext. they are pptd. in most part (contaminated with some lignin) by acids and hydrolysis and selective fermentation shows that they are qual. and approx. quant. the same as those obtained by the ClO₂-NaHSO₃ process. The extn. with CuO-NH₄ affords a practical method for prep. lignin free of carbohydrates. It is improbable that the lignin is hurt by such a treatment. No absorption of N could be detected and there is no decrease in the MeO content (as is usually the case on oxidation of lignin) but an increase; thus, in one prep. the MeO content rose from 12.2 to 15.4% while the carbohydrate content decreased from 19.5 to 0.23%. Furthermore, the extd. lignin, like the normal product, can readily be further methylated until it contains about 30% MeO. This latter fact further indicates that HCl lignin is a definite product closely related to native lignin and not a condensation product of a hypothetical purer lignin with carbohydrates. For the main expts. the ClO₂-NaHSO₃ method was used because, although it does not yield the carbohydrates as completely as the other methods, it does yield them rapidly and

readily in the form of pure, colorless, directly weighable polysaccharides. The values for the carbohydrate content thus obtained are always somewhat lower than those obtained by hydrolyzing 48 hrs. at 15° with 30 parts of HCl (d. 1.21); the values obtained on various preps. by the 2 methods, resp., were as follows: 24.8, 21.9; 24.0, 19.5; 10.0, 9.2; 9.0, 8.5; 3.8, 1.7; 3.5, 1.6; 0.60, 0.46; 0.63, 0.17. Systematic expts. were then carried out on pine wood to det. the mildest conditions of HCl treatment under which a practically carbohydrate-free product can be obtained, the wood being first treated 4 hrs. with concd. HCl to dissolve the cellulose and liberate the lignin ("chief hydrolysis") and then 18 hrs. with more dil. acid to break down the polysaccharides just to the point where smooth filtration becomes possible ("after-hydrolysis"). At room temp. (17–20°) an acid of at least d. 1.205 must be used; at lower temps. products contg. carbohydrates are obtained and at –10° this is true even with an acid of d. 1.21, but such an acid can be used at 1°. The "chief hydrolysis" is complete in 2 hrs. The conditions prescribed by Willstatter and Kalb (C. A. 17, 982) (HCl of d. 1.21 at 15°) therefore give a lignin practically free of carbohydrates. The yield of pure lignin (crude lignin minus carbohydrate content) is in all cases around 26–7% of the wood, *i. e.*, the lignin content does not increase during the treatment with HCl, a fact which speaks against the assumption of a condensation of the lignin with carbohydrates. In another series of expts. the wood was treated for varying lengths of time with HCl of d. 1.22 at 0° and poured into H₂O and the ppt. extd. with CuO-NH₃. Repeated extn. of wood with CuO-NH₃ dissolves out a considerable portion (Ungar's "lignocelluloses") but it is not possible in this way to obtain a carbohydrate-free lignin even when the wood has previously been treated 20 min. or less with HCl; after treatment for at least 2–2.5 hrs. with the d. 1.22 acid at 0°, however, a practically carbohydrate-free lignin can be obtained. Here again the yields of pure lignin, calcd. by subtracting from the yields of crude products their carbohydrate contents as detd. by the ClO₂-NaHSO₃ method, are in the neighborhood of the "normal" values (25–6%). There is, however, a remarkable difference between the carbohydrate-contg. products obtained by the Willstatter-Kalb and the HCl-CuO-NH₃ methods; in those obtained by the 1st method, the carbohydrate can be removed with CuO-NH₃, as mentioned above; possibly the "after-hydrolysis" breaks up the chem. although not the phys. adsorptive union between the lignin and the carbohydrates; in agreement with this is the fact that the HCl compds. of the products prepd. by the W.-K. method, even when they contain much carbohydrate, always have the black-brown color of the HCl compd. of the carbohydrate-free lignin and not the green color which seems to be specific to the HCl compd. of the still phys. and chem. combined lignin-carbohydrate complex.

C. A. R.

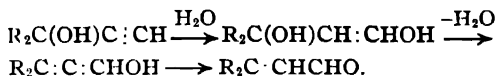
Chemistry of polycyclic structures in relation to their homocyclic unsaturated isomerides. IX. The effect of the spirocyclopentane grouping on the five-carbon intra-annular tautomeric nucleus. FRANK R. GOSS Univ. of Leeds. *J. Chem. Soc.* 1928, 1306–10; cf. C. A. 21, 3187.—Oxidation of 5-cyclopentanespirodi-cyclopentan-3-one-1-carboxylic acid (I) with K₃Fe(CN)₆ and K₂CO₃ gives principally 5-cyclopentanespirocyclopentan-3-ol-1,4-dione (II), yellow, m. 154° (isolated as the *Me* ether, m. 65°); it gives a cherry-red color with alc. FeCl₃, liberates CO₂ from NaHCO₃ and decolorizes alk. KMnO₄, the 2nd fraction of the esterification product is *Me* 5-cyclopentanespirodi-cyclopentan(or cyclopenten)-4-ol-3-one-1-carboxylate, m. 145°; the free acid, m. 110° (decompn.). Oxidation of 5-cyclopentanespirodi-cyclopentadien-3-ol-1,2-dicarboxylic acid (III) with alk. K₃Fe(CN)₆ gives only II. Oxidation of I with alk. KMnO₄ gives α,α -dihydroxycyclopentane-1,1-diacetic acid (IV), m. 98°. Oxidation of III with alk. KMnO₄ gives IV and α -ketocyclopentane-1,1-diacetic acid, mainly the former.

C. J. WEST

Conversion of hydroaromatic into aromatic compounds. II. Action of bromine on 5-chloro- and 5-bromo-1-phenyl- Δ^4 -cyclohexen-3-one. LEONARD E. HINKEL and DONALD H. HEY. Univ. College, Swansea. *J. Chem. Soc.* 1928, 1200–4; cf. C. A. 19, 267.—Phenyldihydroresorcinol and PBr₃ in CHCl₃, heated 3 hrs. at 70°, give 5-bromo-1-phenyl- Δ^4 -cyclohexen-3-one, m. 81.5°, which has an irritating effect on the skin and gradually splits off HBr in a moist atm. Br in CHCl₃ gives 4,5,5-tribromo-1-phenyl-cyclohexan-3-one, m. 82° (decompn.). Heating on the H₂O bath until evolution of HBr ceases gives a mixt. of 4,5-dibromo-3-hydroxydiphenyl, m. 81° (3 α deriv., m. 104°), and the 5-Br deriv., b₁₁ 208–10° (B α deriv., m. 108°). EtOH-KOH gives 5-bromo-3-ethoxydiphenyl, m. 70–1°, as well as the above 2 Br derivs. 5-Chloro-4,5-dibromo-1-phenylcyclohexan-3-one, m. 98.5°; crystn. from Et₂O gives an unstable form, m. 88.5°; EtOH-KOH gives a mixt. of 5-chloro- and 5-bromo-3-ethoxydiphenyl in mol. proportions, m. 68–9°, in addn. to a mixt. of dihalogen derivs.

C. J. WEST

Aldehydes from acetylenecarbinols. I. Cyclohexylideneacetaldehyde. H. RUPP, W. MESSNER AND E. KAMBLI. *Helv. Chim. Acta* 11, 449-62(1928).—Cyclohexanone with Na or NaNH₂ and C₂H₂ gives 45-55% acetylenecyclohexanol (I), b₁₂ 74-76°. I (15 g) with Ac₂O gives the acetate (14.5 g.), b₁₀ 87°, and some acetylenedicyclohexanol (II) m. 109-10°. II with Ac₂O and AcONa gives the diacetate, m. 46-7°. II with HCO₂H gives 92.3% cyclohexylideneacetaldehyde (III), b₁₂ 84-5°, d₄²⁰ 0.9694, n_D 1.49081, n_{H_α} 1.48743, n_{H_β} 1.50055; semicarbazone, m. 214-5°; oxime, m. 61-2°, phenylhydrazone, stable in H₂ and decomp. in air into a red oil. III with H₂ and Ni catalyst and with AcOH and Zn gives cyclohexylacetaldehyde, b₁₂ 69°, d₄²⁰ 0.9187, n_{H_α} 1.45029, n_D 1.45273, n_{H_β} 1.45856; semicarbazone, m. 171-2°. With O₃, KMnO₄, CrO₃ or H₂O₂ III gives adipic acid, m. 147-8°. With EtMgBr III gives ethylcyclohexylacetaldehyde, b₁₀₋₁₁ 84-5°, and 1-ethyl-2-cyclohexylidenethanol, b₁₂ 97°. The latter with Ac₂O and AcONa gives a hydrocarbon which is probably 1-cyclohexylidene-1-butene, b₁₂ 77-8°. The rearrangement of the acetylenecarbinols into aldehydes is a general reaction whose mechanism is considered to be:



J. S. REICHERT

Carbon rings. X. Monocyclic diketones of 16-, 18- and 30-membered carbon rings. I. RUZICKA, W. BRUGGER, C. F. SEIDEL AND H. SCHINZ. *Helv. Chim. Acta* 11, 496-512(1928).—The decompn. of metallic salts of the ω,ω'-dicarboxypolymethylenes, particularly the salts of the Al and Ti groups, gives cyclic monoketones and diketones. Th salt of azelaic acid decomp. with heat, giving 0.6% cyclohexadecane-1,9-dione (I), b₂ 180°, m. 83-4°, disemicarbazone, m. 240°; dioxime, m. 185-6° and an unidentified diketone, m. 75-6°; semicarbazone, m. 128-30°. The reduction of I with Zn and HCl gives cyclohexadecane, m. 61°. With BzCHO and Na, O₂ and CrO₃, and MeOH, I gives the di-Me ester of 7-keto-1,14-dicarboxytetradecane, m. 45°. The free acid, m. 109-10°, upon reduction with Na-Hg and HCl gives 1,14-dicarboxytetradecane, m. 121°. Azelaic ester with Fe gives the di-Me ester of 8-keto-1,15-dicarboxypentadecane, m. 57-9°; free acid (II) m. 115-6°. Th salt of II upon heating gives I. Th salt of sebacic acid gives cyclooctadecane-1,10-dione (III), m. 96-7°, dioxime, m. 166-8°; disemicarbazone, m. 230° with (decompn.). The reduction of III with Zn-Hg and HCl gives cyclooctadecane, m. 72°; semicarbazone, m. 184°. Cyclopentadecanone with BzH gives benzylidenecyclopentadecanone, b₁ 190°, which with O₃ and CrO₃, and MeOH gives the di-Me ester of 1,13-dicarboxytridecane, m. 43°. Residues from the prepn. of cyclopentadecanone from Th salt of 1,14-dicarboxytetradecane yielded (a) bis[tetradecyl] ketone, m. 65-6°, b₂ 225-30°, d₄⁷⁰ 0.8100 (oxime, m. 41-2°; isoxime, m. 84°), and (b) cyclotriacontane-1,16-dione (IV), m. 74-5° (disemicarbazone, m. 218-9°; dioxime, m. 130-1°). With BzH, IV gives a reaction mixt. which with O₃ and CrO₃ gives 14-keto-1,28-dicarboxyoctacosane (V), m. 101-3°. Upon reduction V gives 1,28-dicarboxyoctacosane, m. 108°. With Zn-Hg and HCl IV gives cyclotriacontane, m. 53-4°, and cyclotriacontanone (semicarbazone, m. 149-50°).

J. S. REICHERT

Nature of the alternating effect in carbon chains. XXV. The mechanism of aromatic side-chain substitution. CHRISTOPHER K. INGOLD AND EUGENE ROTHSTEIN. Univ. of Leeds. *J. Chem. Soc.* 1928, 1217-21; cf. *C. A.* 22, 1963.—The general problem of the influence of nuclear substituents on reactions in the side chains attached to an aromatic nucleus is greatly simplified by the assumption that side-chain reactions fall into 2 main categories, in 1 of which (A) facilitation occurs by the influx of electrons toward, and in the other (B) by a recession of electrons from the side chain concerned. If mechanism B (prior ionization of H) were to operate in the side-chain halogenation of PhMe and similar substances, there are few substituents which would facilitate its action more strongly than an *o*- or *p*-NO₂ group, for *o*- and *p*-Me₂C₆H₃NO₂ are known to undergo reactions indicating that their side-chain H is prone to ionization. In the bromination of 2,1,4-O₂NC₆H₂Me₂, side-chain substitution occurs to the extent of at least 76% in the side chain adjacent to the NO₂ group; thus side-chain halogenation (and probably also nitration) of alkylbenzenes and their nuclear substitution products proceeds by mechanism A; a similar mechanism probably applies to the substitutions of methanes and other aliphatic hydrocarbons. 3-Nitro-*p*-xylyl bromide, m. 76°; 3-nitro-*p*-xylyl-ω-trimethylammonium picrate, m. 138°. XXVI. The nitration of ω-chloro- and ω-bromo-*p*-xylene. *Ibid* 1278-80.—*p*-MeC₆H₄CH₂Cl (16.1 g.) in 30 cc. Ac₂O, gradually added to 9 g. fuming HNO₃ in 20 cc. Ac₂O at 10-12°, gives, after

6 hrs., 14.9 g. of the 3-NO₂ deriv.; about 3 g. of 3-nitro-4-methylbenzyltrimethylammonium picrate was isolated from the liquid portion and also 1.7 g. of a mixt. of 2- and 3-nitro-4-methylbenzyl Et ethers. Thus the predominating substitution occurs in the position ortho to the Me group. XXVII. Nitration of some aromatic phosphonium, arsonium and stibonium salts. C. K. INGOLD, FLORENCE R. SHAW AND IAN S. WILSON. *Ibid* 1280-6.—The proportions of *m*-derivs. formed on nitration are: R=Ph, RNMe₃, 100; RPhMe₃, 100; RAsMe₃, 98.2; RSbMe₃, 86.3%; R=PhCH₃, RNMe₃, 88; RPhMe₃, 10.1; RAsMe₃, 3.4. *Phenyltrimethylphosphonium picrate* (I), yellow, m. 132-3°; *benzyl deriv.* (II), m. 173°; *benzyltrimethylarsonium picrate* (III), yellow, m. 175-6°; *phenyltrimethylstibonium picrate*, m. 153°. Nitration of I at 60° for 7 hrs. gives the *m*-NO₂ deriv., m. 166-7°. Nitration of II at -17° for 2 hrs. gives the *p*-deriv., m. 188-9° (71% yield); the *m*-deriv., m. 171-2°; the *o*-deriv., m. 152-3°. Nitration of phenyltrimethylarsonium picrate was effected by heating with HNO₃ (d. 1.52) at 100° for 5 hrs., the *m*-NO₂ deriv., orange-yellow, m. 180°. The *p*-NO₂ deriv. of III, m. 203°.

C. J. WEST

Action of sulfur monochloride on diphenylamine. E. I. ORLOV. *Z. Furben-Ind.* 20, 121-2 (1928).—*Trithiodiphenylamine* (I) is formed by the action of S₂Cl₂ on Ph₂NH in benzene. Nitration of I gives a dye which from NH₃ soln. gives fast red shades on wool.

FREDERICK C. HAEN

Diphenylamine-*p*-arsonic acid. CHARLES S. GIBSON AND JOHN D. A. JOHNSON. Univ. of London. *J. Chem. Soc.* 1928, 1286-8; cf. Burton and Gibson, *C. A.* 20, 1606.—The m. p. of *p*-PhNHC₆H₄AsO₃H₂ (I) having been questioned by Lieb and Wintersteiner (*C. A.* 22, 1577), the prepn. of I was again repeated. Reduction of *p*-O₂NC₆H₄NACPh with Fe in EtOH and AcOH gives *N*-acetyl-*p*-aminodiphenylamine-*(p*-acetophenylaminoaniline), m. 127-8°; this was converted according to B. and G., into I, which m. 295-7° (decompn.); the *HCl* salt m. 153-5° (decompn.); the Na salt seps. from solns. in warm 25% NaOH.

C. J. WEST

The chemotherapeutic activity of some arsonic acids and its relation to the chemical constitution. W. KOLLE, H. BAUER AND F. LEUPOLD. *Tschirch-Festschrift* 1926, 9 pp.; *Chem. Zentr.* 1927, I, 481-2.—The influence of the CO group in arsonic acids of *o*-aminophenol and *o*-C₆H₄(NH₂)₂ on their biol. activity was studied. The compds. tested included 3,4-H₂N(HO)C₆H₃AsO₃H₂ (I), oxazolone deriv. (II) of I, 4,3-isomer (III) of I, oxazolone deriv. (IV) of III, *N*-Me deriv. of II, *N*-MeAc deriv. of I, 3,4-(H₂N)₂C₆H₃AsO₃H₂ (V), imidazolone (VI) of V, 3-*N*-Me deriv. (VII) of V, 4-*N*-Me deriv. (VIII) of V, imidazolone deriv. of VII, imidazolone deriv. of VIII (1-methyl-benziminoazolone-5-arsonic acid or 1-methyl-2-ketobenzimidazole-2,3-dihydrate-5-arsonic acid), 3-amino-4-ethylaminophenylarsonic acid (IX), imidazolone deriv. of IX, 4,3-Pr(H₂N)C₆H₃AsO₃H₂ (X), imidazolone of X, 4-allyl analog (XI) of X, imidazolone of XI, hydroxyethyl deriv. (XII) of V, imidazolone deriv. of XII, benzyl deriv. (XIII) of V, and imidazolone of XIII. I, II, V and VI were prepd. by the action of COCl₂ on the hydroxyamino- and the diamino phenylarsonic acids. The method of prepn. of IV has been described elsewhere (cf. U. S. patent 1, 539,798, *C. A.* 19, 2210). No simple relation between the biol. activity and the substituents could be established. The imidazolone deriv. of VIII showed a surprisingly good effect, showing itself when administered *per os*, superior to "spirocide" and to "tryparsamide."

C. C. DAVIS

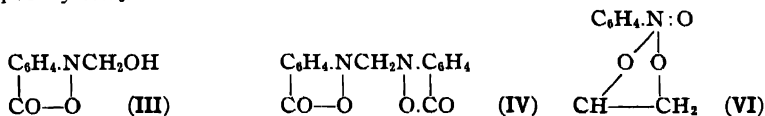
Condensation of formaldehyde with β-hydroxynaphthoic arylides. KURT BRASS AND PAUL SOMMER. Deutsch. Forschungs-Inst. Textil-Ind., Stuttgart-Reutlingen. *Ber.* 61B, 993-1002 (1928).—This work was undertaken to study the mode of action of HCHO in the stabilization of the naphtholate solns. in the so-called "naphthol AS" dyeing. In the belief that this action of HCHO might be similar to that in the long-known condensations of HCHO with β-naphthol and 2,3-C₁₀H₆(OH)CO₂H (I), HCHO was added to an alk. soln. of 2,3-C₁₀H₆(OH)CONHPH ("naphthol AS") (II) in concns. comparable to those used in practice. After a few hrs. the yellow di-Na salt of *methylemed-β-hydroxynaphthoic anilide*, CH₃(C₁₀H₅(OH)CONHPH)₂ (III), could be pptd. quant. with NaCl. The reaction is general for the arylides of I, and I itself also gives CH₃(C₁₀H₅(OH)CO₂H)₂ (IV) in alk. soln., as had already been found by Hosaeus in acid soln. The free III is yellow and difficultly sol. in alkalies and forms a yellow, difficultly sol. mono-Na salt. The dinaphthylmethane constitution of III was confirmed by acetylation, analysis, mol. wt. detns. and reductive cleavage (Fries and Hüner) to 1-methyl-2-hydroxy-3-naphthoic acid (V), characterized by its intense greenish yellow color and tannin-like odor. Although the presence of two HO groups in III and IV has been established it has not been possible to convert them into the corresponding dinaphthopyrans with either POCl₃ or HCl; on the other hand, on heating IV in the air

at 285° there is obtained, with loss of H₂O, a characteristic red-violet melt. **IV** also colors concd. H₂SO₄ a deep red-violet. Earlier investigations indicate that β -naphthol and HCHO yield CH₂(C₁₀H₇OH)₂ in both acid and alk. soln., but the acid condensation becomes somewhat more complex as soon as substituents are introduced into the naphthol. Thus, the **IV** obtained in alk. soln. is not completely identical with the product prepd. in acid soln. (Strohhach); the latter cannot be acetylated or recrystd., resinifying in both cases, apparently by-products are formed in the acid condensation. In AcOH-H₂SO₄ **II** and HCHO gave 20% **III**; the other 80% of the product was an alkali-insol substance with the same compn and mol. wt. as **III** but had no m. p., could not be recrystd. or acetylated and gave no red color with concd. H₂SO₄. Alk. solns. of the arylides of **I** therefore contain the di-Na salts of the arylides of **IV** which are more stable than those of the arylides of **I**, probably because the α -positions to the HO groups are occupied by the CH₂ bridge. **III** couples with 2 mols. PhN₂Cl to *benzenearazo- β -hydroxynaphthoic anilide* (**VI**), also obtained from **II** and PhN₂Cl, *i. e.*, in the coupling of **III** the CH₂ residue is split off. **III** (76.42% from 30 g. **II** in 60 cc. of 30% NaOH and 2 l. H₂O with 20 cc. of 40% HCHO), m. 263.5°, mol. wt. in camphor 539.5, in boiling C₆H₅N 523.28. *Diacetate* of **III**, m. 252°. *Acetate* of **II**, m. 160°. *α -Naphthalide* of **IV** (yield, 65.1%), light yellow, m. 268-9°, mol. wt. in boiling C₆H₅N 607.1, easily sol. in C₆H₅N with brown-red color and green fluorescence, in cold concd. H₂SO₄ with orange color quickly becoming red at 50-60°. *β -Naphthalide* (59.00%), yellow, m. 287-8°, mol. wt. in boiling C₆H₅N 635.83. **V**, sublimes at 205° under 12 mm., mol. wt. in boiling Et₂O 198.95, m. 231°, is strongly irritating to the mucous membranes, gives in H₂O with FeCl₃ a steel-blue color, dissolves easily in alkalis with yellow color, the soln. coupling with diazotized *p*-O₂NC₆H₄NH₂ only after some time, with faint red color, *acetate*, colorless needles with a faint greenish yellow, ivory-like luster, m. 184-4.5°, gives no color with FeCl₃, is odorless and has no antipyretic action or other useful therapeutic properties. C. A. R.

Syntheses with diazomethane. III. *o*-Nitrophenylethylene oxide and the substances obtainable from it. F. ARNDT, B. EISTERT and W. PARTALE. Univ. Breslau. *Ber.* 61B, 1107-18(1928); cf. *C. A.* 21, 2897.—"Nitraldin," the chief product of the action of CH₂N₂ on *o*-O₂NC₆H₄CHO, is *o*-nitrophenylethylene oxide (**I**), O₂NC₆H₄CH₂CH₂O, and the isomer obtained by mild treatment of **I** with acids is *o*-

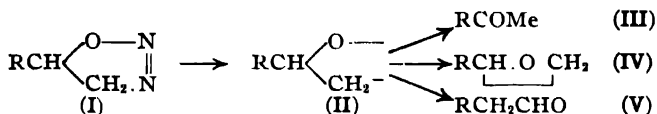
nitrosobenzoylcarbinol, ONC₆H₄COCH₂OH (**II**), which in turn isomerizes into **III**. This last change can be effected smoothly only in the presence of excess of HCHO; the HCHO prevents the disocn. of **III** into HCHO and benzisoxazolone, which would lead to resinification or, in the presence of acids, to the formation of **IV**. These reactions had already been described and the structures of **III** and **IV** had been established but had led to an erroneous conclusion as to the structures of **I** and **II**, *viz.*, that in these compds. also the two C atoms of the side chain were not joined to each other. When, however, **II** is treated with alkali, it gives, although in only small yield, *N*-hydroxyisatin, showing that the two C atoms are still joined to each other, probably as shown in formula **II**. The best way to establish this seemed to be by reduction of **II** to *o*-aminobenzoylcarbinol (**V**), but as **II** undergoes deep-seated change under the influence of the very weakest acids or alkalis, in fact on mere heating alone, a reducing agent acting rapidly and specifically in almost neutral medium had to be used. Dil aq. N₂H₄ H₂CO₃ was found to answer the purpose; on gentle warming it smoothly reduces the NO group in **II** to NH₂ with evolution of the calcd. quantity of N₂. That the product is really **V** is shown by the fact that it can be diazotized, yields mono- and diacyl derivs and a phenylhydrazine and on warming with alkalis smoothly forms indoxyl, with loss of H₂O. For nitraldin there remained possible, in view of the lack of C=O and HO reactions, only the structures **I** and **VI**. **VI** takes into account the apparently peculiar position occupied by *o*-O₂NC₆H₄CHO, representing, as it does, a structural coöperation of the NO₂ group, moreover, the 2 formulas are interchangeable into each other by a simple shifting of bonds and explain in essentially the same way all the reactions of the compd. That **I** is the correct formula was established by the observation that aldehydes other than *o*-O₂NC₆H₄CHO with CH₂N₂ give, instead of Me ketones, isomers which can be considered only as ethylene oxides (see following abstr.). Unfortunately, the formation of ethylene oxides from aldehydes and CH₂N₂ was first discovered with *o*-O₂NC₆H₄CHO, where the ethylene oxide properties of the product are so greatly modified by the *o*-NO₂ group; *e. g.*, HCl, instead of giving the chlorohydrin, O₂NC₆H₄CH(OH)CH₂Cl (**VII**) yields **IV**. Ac₂O as such does not appreciably react with **I**, but in the presence of a little FeCl₃ there is a very vigorous reaction. This is typical of ethylene oxides but, whereas ordinarily the corresponding diacetylglycols are formed,

I gives the acetate of II, and mild treatment with acid gives II instead of the glycol and, under the influence of the NO group, on gentle warming the whole CH_2OH group breaks away from the C and migrates to the N with formation of III, which dissociates into HCHO . The liberation of HCHO from the ethylene oxide I directly probably takes place in the same way. The influence of the NO_2 group on the transformations of the ethylene oxide ring is not manifested in alk. soln. In $\text{C}_6\text{H}_5\text{N}$ I smoothly adds HCl to form VII, whose structure was established by oxidation to $o\text{-O}_2\text{NC}_6\text{H}_4\text{COCH}_2\text{Cl}$. VII is converted back into I by cold dil. alkali but, unlike I, smoothly forms a benzoate by the Schotten-Baumann method (also obtained by addn. of BzCl to I in $\text{C}_6\text{H}_5\text{N}$). The addn. of acid chlorides in $\text{C}_6\text{H}_5\text{N}$ is a general reaction of ethylene oxides. These addn. products, in which the tension of the ethylene oxide ring is released, are no longer explosive and behave like normal NO_2 compds., e. g., dissolve in concd. H_2SO_4 without reaction. Just as the NO_2 group influences the reactions of the ethylene oxide ring, so the latter influences the reduction of the NO_2 group. Under certain conditions is obtained a little anthranil, under others some indole; the main reaction, in all cases, is general resinification. On the other hand VII is smoothly reduced to the NH_2 compd. (VIII), converted by alkalis partly into indole, partly into polymers of indole or of the hypothetical aniuophenylethylene oxide. The rearrangement of ethylene oxides into aldehydes observed by Tiffeneau is prevented in I by the NO_2 group; that a relationship exists between I and $o\text{-O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{CHO}$, however, is indicated by the fact that among the by-products in the formation of I are $o\text{-O}_2\text{NC}_6\text{H}_4\text{COPh}$ and *o*-nitrophenylacetone (IX), also synthesized in the usual way from $\text{AcCH}_2\text{CO}_2\text{Et}$, the production of IX is attributed to the intermediate formation of $\text{O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{CHO}$, which then reacts normally with the CH_2N_2 . IX was actually obtained from the aldehyde (prepd. according to Weerman) with CH_2N_2 . The aldehyde, however, cannot be formed from the I itself, which does not isomerize into the aldehyde; it is probably produced from the 1st product of the reaction, dihydrofurodiazole (see following abstr.). *o*-Nitrophenylethylene chlorohydrin (VII) (3 g. from 5 g. I), m. $60\text{--}1^\circ$, $b_{17} 170^\circ$ (considerable decompn.); acetate, $b_{18} 186\text{--}8^\circ$, $b_{18} 192\text{--}4^\circ$, m. $69\text{--}70^\circ$, benzoate, m. $87\text{--}8^\circ$. *o*-Amino compd. (VIII) (2–3 g. from 5 g. VII with $\text{SCl}_2\text{--HCl}$), m. $86\text{--}7^\circ$. Acetate of II, m. 104° to a green liquid which turns brownish. V (2.5–3.0 g. from 5 g. II), light yellow, m. 98° , almost odorless when cold, evolves a sweetish odor when heated, especially in soln., immediately reduces Fehling soln., becomes red-violet above its m. p., gives a dark blue dye with concd. HNO_3 or FeCl_3 ; *N*-Ac deriv., obtained by short boiling with a little Ac_2O , m. 141° , easily sol. in 2 *N* NaOH with formation of indoxyl on heating; *di*-Ac deriv., prepd. by short boiling in $\text{C}_6\text{H}_5\text{N}$ with 3 mols. AcCl , easily sol. in a little hot NaOH , forms no indoxyl on heating; *di*-Bz deriv., m. $167\text{--}8^\circ$; phenylhydrazone, faintly yellow, becomes reddish in the air, m. 198° . IX, m. $26\text{--}7^\circ$, gives an intense violet color with alc. KOH ; semicarbazone, m. $213\text{--}4^\circ$ (decompn.). Et α -[*o*-nitrophenylacetyl]acetoacetate (13 g. from 15 g. $\text{AcCH}_2\text{CO}_2\text{Et}$, Na and $\text{O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{COCl}$ in Et_2O) m. $76\text{--}7^\circ$, sol. in 2 *N* NaOH , slowly in Na_2CO_3 , also in dil. alc. KOH , with yellow color, in 20% alc. KOH with dark blue color soon changing to brown, gives in $\text{C}_6\text{H}_5\text{N}$ with a drop of concd. alc. KOH an intense blue color changing to brown, decompd. by concd. H_2SO_4 with brown color; 12 g. refluxed with 2 *N* H_2SO_4 yields 3.5 g. IX, together with 3 g. *o*-nitrophenylacetylacetone, m. $62\text{--}3^\circ$, not further hydrolyzed by boiling 2 *N* H_2SO_4 , sol. in dil. alkali with yellow color, forms with concd. alc. KOH the yellow K enolate, gives with concd. alc. KOH in $\text{C}_6\text{H}_5\text{N}$ a dark green-blue color, yields with aq. $\text{N}_2\text{H}_4\cdot\text{H}_2\text{O}$ 3-methyl-5-*o*-nitrophenylpyrazole, m. $120\text{--}1^\circ$, sol. in 2 *N* HCl , reprecipitated by NH_3 .



IV. The reaction between aldehydes and diazomethane. F. ARNDT and B. EISTERT. *Ibid* 1118–22.—Schlotterbeck was so convinced that aldehydes give with CH_2N_2 the corresponding Me ketones, that he believed that this synthesis proved the structure of the compd. (I) obtained from CCl_3CHO to be CCl_3COMe , but in view of the work described in the preceding abstr., A. and E. suspected it might well be the isomeric 1,1,1-trichloropropylene 2,3-oxide and such proved to be the case, for in the presence of a little FeCl_3 it adds 1 mol. Ac_2O and it readily combines with HCl to a stable product which can be distd. Work to be reported on later has shown that *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$ with CH_2N_2 gives only $\text{O}_2\text{NC}_6\text{H}_4\text{COMe}$ and the *p*-compd. about equal parts of the ke-

tone and the ethylene oxide, *i. e.*, the disturbing influence of the NO₂ group increases in the order $m \rightarrow p \rightarrow o$. Accumulation of NO₂ groups, on the other hand, seems to destroy this disturbing influence, for according to Sonn 2,4,6-(O₂N)₃C₆H₂CHO gives the ketone (yielding a phenylhydrazone). The tendency of an aldehyde to form an ethylene oxide seems to be related with the introduction into it of substituents which impart a disinclination to the presence of a doubly bound O atom. Thus, CCl₃-CHO readily forms a hydrate, and *o*-O₂NC₆H₄CHO an acetal, and while no hydrate of this aldehyde has been isolated its soly. in concd. alkalis and repptn. by acids may well be due to the presence of such a hydrate in aq. soln. The *p*-aldehyde is likewise sol., although to a lesser extent, in alkalis, while the *m*-compd. is not. A. and E. believe the mechanism of the reaction can be represented by the scheme



In certain cases (V) the O atom combines not singly but doubly with the C atom of CH₂ group while 1 of the H atoms of the latter migrates to the aldehyde C atom (cf. preceding abstr.: formation of O₂NC₆H₄CH₂COMe, presumably through O₂NC₆H₄-CH₂CHO, from *o*-O₂NC₆H₄CHO and CH₂N₂). After repeated distn. *in vacuo*, I b₁₃ 44-5°, b₇₆₀ 149°. 1,1,1,3-Tetrachloro-2-hydroxypropane, from I and HCl, b₁₇ 95-6°, has a faint CHI₃-like odor. 1,1,1-Trichloro-2,3-diacetoxypyrane, b₁₆ 126-8°. V. The reaction of acid chlorides with diazomethane. F. ARNDT AND J. AMENDE. *Ibid* 1122-4.—According to Nierenstein and Staudinger acid chlorides with CH₂N₂ give ClCH₂ ketones while A. and his co-workers had found that *o*-O₂NC₆H₄COCl gives almost exclusively O₂NC₆H₄COCHN₂. This is even less peculiar to the *o*-O₂N compd., as was at first supposed, than in the case of the aldehydes (preceding abstrs.); the expts. hitherto carried out with BzCl, AcCl and ClCH₂COCl indicate that all acid chlorides first give the diazo ketone, the end result depending primarily on the exptl. conditions. If the chloride is gradually added to a soln. of several mols. of the CH₂N₂, so that the latter is always present in excess, the CH₂N₂ takes up the liberated HCl and the diazo ketone is the chief product; conversely, if the CH₂N₂ is added gradually to the chloride so that it is at once used up by the latter, the liberated HCl decomps. the diazo ketone with formation of the Cl ketone. The nature and stability of the diazo ketone also have some influence; *o*-O₂NC₆H₄COCl gives almost only the diazo ketone even by the 2nd of the above methods. *o*-Diazouacetophenone (4.5 g. from 6 g. BzCl in 100 cc. Et₂O slowly dropped into 2.5 mols CH₂N₂ in 300 cc. Et₂O, concd. to 40 cc. after several hrs. and cooled to -15°), m. 49°, smoothly converted into BzCH₂OH by hot dil. H₂SO₄. MeCOCHN₂, faintly yellow, b₁₃ 49°, solidifies in a CO₂ freezing mixt 1-Diazo-3-chloroacetone, light yellow, m. 3°, b₁₃ 75°.

C. A. R.
Tautomerism of *o*-nitrobenzaldehyde. F. ARNDT. *Ber.* 61B, 1125-6(1928).—Very brief discussion of the evidence pointing to the incorrectness of Tanasescu's views (C. A. 22, 951) on the tautomerism of *o*-O₂NC₆H₄CHO. C. A. R.

Hydrochalcones and hydrochalcals. P. FRIEGER, E. KALCKBRENNER, W. KUNZE AND K. LEVIN. Univ. Bonn. *J. prakt. Chem.* 119, 109-30(1928).—In general the chalcones were reduced by H and Pt to hydrochalcones, which were then reduced by Na-Hg in EtOH to the hydrochalcals. Hydrochalcals are a light yellow oil, which cannot be purified by distn. *in vacuo* because of the splitting off of H₂O; d₂₀ 1.0614, n_D²⁰ 1.5724; the *p*-nitrobenzoate, m. 89-90°; heated at 130° for 6 hrs. with ZnCl₂, there results 30-47% of PhCH₂CH:CHPh. 3,4-Dimethoxyhydrochalcals, m. 67.5-8.5° (70% yield); oxime, m. 109°, PhMgBr gives the *tert. alc.*, C₁₃H₂₄O₃, m. 102-3°. 3,4-Methylenedioxyhydrochalcals, m. 57-8° (Bargellini and Bini, C. A. 6, 625, give 39-41°); on standing in the sunlight the compd. becomes canary-yellow after 8 days; the color persists in the dark. MeMgI gives the *alc.*, C₁₇H₁₈O₃, m. 50-2°. 3,4,4'-Trimethoxyhydrochalcals, m. 57°; this does not change color in the sunlight. *o*-ClC₆H₄CHO and BzMe give 85-95% of 2-chlorochalcals, pale yellow, m. 51.5°. Reduction gives 66% of 2-chlorohydrochalcals, m. 46.5°; oxime, m. 113°. 2-Chlorohydrochalcals, light orange oil, d₂₀ 1.1636, n_D²⁰ 1.5831; *p*-nitrobenzoate, m. 115°; phenylurethan, m. 100.5°. With dry HCl at 60° there results about 70% of α -chloro- α -phenyl- γ -[*o*-chlorophenyl]-propane, b₁ 151-4°; analysis indicates 10% of the Cl deriv. 2-Chloro-4'-methoxychalcals, m. 91.5-2°; the hydro deriv., m. 48°; oxime, m. 90-1°. 2-Bromo-4'-methoxychalcals, m. 79.5°; the hydro deriv., m. 65°; oxime, m. 99.5-100°. Dihydrobenzal-

2-aceto-1-naphthol, light yellow, m. 98° (75% yield); *Ac deriv.*, m. 89–90°. *Dihydro-piperonal-2-aceto-1-naphthol*, m. 103–4° (90% yield). *o-Chlorobenzal-7-methoxychromanone*, m. 132°; the *hydro deriv.*, m. 75° (*oxime*, m. 162–3°). *o-Bromobenzal-7-methoxychromanone*, m. 164°. *Benzalnaphthochromanone*, yellow, m. 131–2° (50% yield); *piperonal deriv.*, light yellow, m. 170–1° (25% yield); *fural deriv.*, CdS-yellow, m. 145° (50% yield).

C. J. WEST

Use of chromic mixtures for oxidation of *o*-toluenesulfamide into saccharin. V. S. ZAIKOV AND P. I. SOKOLOV. *J. Chem. Ind.* (Moscow) 3, 1304–7 (1926).—The use of chromic mixts. in the oxidation of *o*-MeC₆H₄SO₂NH₂ into saccharin presents the difficulty that acids have a hydrolyzing action on saccharin which results in the formation of *o*-HO₂CC₆H₄SO₂NH₂ and of HO₂CC₆H₄SO₂H. To study the extent of this hydrolyzing action by H₂SO₄ of various concns. at different temps., Z. and S. worked with pure crystd. saccharin, which they submitted to the action of 20, 70 and 90% H₂SO₄ at 50°, 60°, 70°, 90° for 2.5 hrs. at a time. The amt. of pure H₂SO₄ taken was 45 g. (no matter in what diln.) for 4 g. of saccharin. The method used was based on the circumstance that the 2 org. acids formed by hydrolysis, being more sol. in water than saccharin, remain in soln. and can thus be sepd. from residual saccharin. It was found that the extent of hydrolysis depends but little on the concn. of the acid, but depends chiefly on the operating temp. The reaction sets in with marked speed at 60° and further rise of temp. increases the speed of hydrolysis. It is advisable to operate with 70% H₂SO₄ at 50–60° so as to hydrolyze as little saccharin as possible. The next series of expts. were devoted to the study of the course of the reaction of oxidation of pure *o*- and *p*-MeC₆H₄SO₂NH₂ by mixts. of K₂Cr₂O₇ and H₂SO₄ as a function of temp. and of concn. of H₂SO₄ and of K₂Cr₂O₇. It was found that the character of the reaction of oxidation depends chiefly on the concn. of H₂SO₄. Good yields of saccharin are obtained by operating at about 45° with oxidizing mixts. contg. 70% H₂SO₄ and a max. concn. of K₂Cr₂O₇. Elevation of temp. (not above 60°) and increasing concns. of K₂Cr₂O₇, all other conditions being equal, accelerate the reaction. The oxidation of *p*-MeC₆H₄SO₂NH₂ goes on with greater speed than that of the *o*-amide. Chrome alum present in the oxidizing mixt. increases the speed of the reaction. By operating under favorable conditions yields of saccharin above 90% of the theoretical are obtainable. Three diagrams are given.

BERNARD NELSON

2-Bromo-3-nitrobenzoic acid. PAUL J. CULHANE. *Org. Syntheses* 7, 12–4 (1927).—The following should be added to *C. A.* 21, 3898. The use of a soln. of I (255 g. I and 166 g. KI in 250 cc. H₂O) with anhydro-2-hydroxymercuri-3-nitrobenzoic acid gives 61% of 2,3-I(NO₂)C₆H₃CO₂H (based on the 3-nitrophthalic acid used).

C. J. WEST

Oxidation of nitrophenylcyanoacetates. II. ARTHUR FAIRBOURNE AND HAROLD R. FAWSON. King's College, London. *J. Chem. Soc.* 1928, 1077–80; cf. *C. A.* 21, 1257.—Studies of the oxidation of nitrophenylcyanoacetates indicate that the nature of the product depends upon the nitrophenylcyanoacetate rather than upon the agent employed. 2,4-(O₂N)₂C₆H₃CCl(CN)CO₂Et with CrO₃ in glacial AcOH or with concd. H₂SO₄ gives *Et 2,4-dinitrophenylchloromalonate*, m. 121°, which gives a purple color with EtOH-KOH; the corresponding *Br deriv.*, m. 157°, was previously termed *Et 2,4-dinitrobromophenylhydroxycyanoacetate*. 2,4-Dinitrophenylchloroacetamide, m. 134°, results from the cyanoacetate and H₂SO₄ at 120–30° for 0.5 hr.; the *Br deriv.*, m. 160°. The Ag deriv. of (O₂N)₂C₆H₃CH(CN)CO₂Et, boiled with I in EtOH for 0.25 hr., boiled with an equiv. amt. of (O₂N)₂C₆H₃CCl(CN)CO₂Et in EtOH for 4 hrs., or boiled with EtOH alone for 2–3 hrs., gives *Et α,β-bis-2,4-dinitrophenyl-α,β-dicyanosuccinate*, m. 156°. The position of the halogen atom in the side chain of the product of the chlorination or bromination of 2,4-(O₂N)₂C₆H₃CNa(CN)CO₂Et was definitely established by the prepn. of *Et 2,4-dinitrobenzoylformate phenylhydrazone* from both products by warming with 0.5 N NaOH at 40–50°, boiling the product with CrO₃ in AcOH and adding PhNHNH₂. *Et 2,4,6-trinitrophenylchlorocycanoacetate*, m. 118°; oxidation with H₂O₂ in AcOH gives *Et α,β-di-p-nitrophenyl-α,β-cyanosuccinate*, m. 209°; 20% HNO₃ at 100° gives the same product; concd. HNO₃ gives *p*-O₂NC₆H₄CO₂H. 2,4-(O₂N)₂C₆H₃CH(CN)CO₂Et with concd. HNO₃ or with H₂O₂ gives *Et 2,4-dinitrobenzoylformate*, m. 89°.

C. J. WEST

Condensation of α-cyanocinnamic acid by potassium cyanide. M. HENZE. Univ. Innsbruck. *J. prakt. Chem.* 119, 157–72 (1928); cf. *C. A.* 20, 2996.—In the attempt to prep. PhCH:C(CN)CO₂H from BrCH₂CO₂H, BzH and KCN no trace of acid could be obtained; it is now believed that the acid forms as an intermediate step and then reacts with KCN, giving the compd. PhCH(CN)CK(CN)CO₂H, which in neutral or slightly alk. soln. adds a mol. of the acid, giving β,δ-diphenyl-α,γ,δ-tricyanovaleic acid,

$C_{20}H_{15}O_2N_3$, previously reported; this has been obtained from $PhCH_2C(CN)CO_2H$ and KCN in alk. soln. The nitrile groups cannot be sapon. $Ba(OH)_2$ gives a *compd.*, $C_{18}H_{16}O$, m. 112° (*Br deriv.*, m. 119°). Ten percent EtOH-KOH splits off CO_2 , giving 2,4-diphenyl-1,3,4-tricyanobutane, existing in 2 forms, m. 228° and 183° , easily sepd. by crystn. from AcOEt and then from EtOH. Sapon. with 20% $Ba(OH)_2$ for 30 hrs. gives β,δ -diphenyl- γ -carboxyadipic acid, m. 220° (decompn.); *Me ester*, m. 61° ; in the sapon. a small quantity of an isomeric acid, m. $195-6^\circ$, is also formed. Heating the acid, m. 220° , at $220-30^\circ$ gives 3-keto-2,5-diphenylcyclopentamethylene-1-carboxylic acid, $C_{18}H_{16}O_3$, m. 158° ; *oxime*, m. 183° (decompn.); *Me ester*, m. 99° ; oxidation with HNO_3 gives an acid $C_8H_6O_4(?)$, m. 225° ; $KMnO_4$ gives $BzCH_2CHPhCH_2CO_2H$, m. 152° . Zn and HCl gives 2,5-diphenylcyclopentamethylene-1-carboxylic acid, m. $119-20^\circ$; *Ba salt*. In addn. to the *compd.* $C_{20}H_{15}O_2N_3$, there also crysts. the *compd.* $C_{17}H_{13}N_3$, m. 198° ; warming with alkali gives a violet color, or in the presence of EtOH, a deep indigo-blue, changing to red-brown in the air; with $Ba(OH)_2$ there results a *compd.* pale greenish blue, m. $194-7^\circ$; warming with concd. HCl or H_2SO_4 (1 acid: 2 H_2O) gives a *compd.* m. 156° . C. J. WEST

Separation of phthalic and homophthalic acids. HARRY G. POOLE. Univ. of Melbourne. *J. Chem. Soc.* 1928, 1378-9.—The mixt. is neutralized with NaOH, dild. considerably and cold $CuSO_4$ added. After 12 hrs. the insol *Cu homophthalate*, greenish blue, is filtered, washed and treated with concd. HCl and sufficient H_2O to dissolve the mass on boiling; 90% of homophthalic acid may be recovered in this way from mixts. contg. 66% phthalic acid. The *Cu homophthalate* is sol. in 5000 parts H_2O at 25° and less than 0.01% at 100° . *Cu phthalate* is sol. in about 30 parts H_2O at 230° . C. J. WEST

Mellitic acid. EMILIO LURIA. *Quim. ind.* 5, 35-8(1928); abstr. of *Diss. Inst. Chimie Toulouse*.—The following salts were prepd. from the Na salt; $C_6(CO_2)_6(UO_2)_3 \cdot 12H_2O$, yellow, microcryst., insol. in water; $C_6(CO_2)_6Ce_2 \cdot 9H_2O$, white amorph., insol. in water; Cd, white needles, insol.; $C_6(CO_2)_6Li_6 \cdot 9H_2O$, very sol. in water, pptd. by 96% alc. These and 31 other salts already known crystallize with 3 or multiples of 3 mols. H_2O . This phenomenon does not seem to be detd. by the ternary symmetry or the alternating polarities alone, since trimesic acid forms salts with 1, 2 and 5 H_2O . It is apparently not detd. by the 3 maleic and 3 succinic acid groupings in the mol., since there is no simple multiple relation between the H_2O mols. of maleates or succinates on one hand and mellitates of the same metal on the other. *Hexaphenylhydrazine mellitate*, $C_6(CO_2)_6(PhNHNH_2)_6$, prepd. from a 96% alc. soln., is white, very sol. in water, easily decomp. by light. When heated with N_2H_4 to 80° mellitic acid yielded 2 substances: the *tetrahydrazine-monoammonium salt of tetracarboxyphenylglyoxaline* or its tautomer (it combines with 6 KOH), $(H_2N_2HO_2C)_4C_6(CO.NH)_2NNH_4$ or $(H_2N_2HO_2C)_4C_6(CO.NH)_2NNH_4$, yellow needles, very sol. in water, scarcely in alc., insol. in ether, benzene, CCl_4 , very sol. in alkalis, NH_3 and carbonates. The alk. soln. has an intensely red color produced already by 0.005 g./l., which deepens with the alkali content until neutralization is reached. It contains 5.12% H_2 , absorbs 67.56% KOH; the Ag salt contains 40.6% Ag. The *monoammonium-trihydrazine salt of 1,2,3,4-tetracarboxy-phenyl-5,6-glyoxaline-4-hydrazide*, $H_2NNHCO(H_2N_2HO_2C)_4C_6(CO.NH)_2NNH_4$, is red, contains 4.5% H_2 , absorbs 59.3% KOH; the Ag salt contains 59.3% Ag. In order to prepare *mellitic acid* 120 g. wood charcoal was treated with 400 g. HNO_3 (d. 1.3), and, after cooling, with 500 cc. HNO_3 (d. 1.5). The brown mass was heated 40 hrs., the excess HNO_3 distd. off with const. stirring, the residue heated a few min. to 140° , treated with water and stirred with purified C, neutralized with NH_3 and pptd. with $Pb(OAc)_2$. The Pb salt was decompd. with H_2S and the acid recrystd. from water and alc. MARY JACOBSEN

Higher-boiling constituents of the essential oil of hops. A. CHASTON CHAPMAN. *J. Chem. Soc.* 1928, 1303-6; cf. *Ibid* 67, 54(1895).—The higher-boiling fraction of oil of hops was divided into 7 fractions, b_4 87° to 200° . From the fraction b_4 $87-97^\circ$, n_D^{20} 1.4769, d_4^{20} 0.8948, there was obtained a small quantity of *luparone*, $C_{13}H_{22}O$, b_3 $74-6^\circ$, n_D^{20} 0.8861, n_D^{20} 1.485, $[\alpha]_D -0.4^\circ$; *semicarbazone*, m. 98° . The fraction b_4 $97-110^\circ$, n_D^{20} 1.4900, d_4^{20} 0.9091, consisted almost entirely of humulene. The fraction b_4 $110-50^\circ$ was treated with $C_6H_4(CO)_2O$, by which was isolated the alc., *luparenol*, $C_{15}H_{24}O$, b_2 $125-8^\circ$, d_4^{20} 0.9738, n_D^{20} 1.5023, $[\alpha]_D^{20} -3.7^\circ$; *phenylurethan*, m. 157° ; addn. of Br indicates 1 ethylene bond. The remainder of the fraction was treated with EtOH. $AgNO_3$, giving a phenol, *luparol*, $C_{16}H_{26}O_2$, pale yellow, mobile oil, b_2 $122-4^\circ$, d_4^{20} 0.9170, n_D^{20} 1.4942; $FeCl_3$ gives an intense red color; with 50% KOH it yields isovaleric acid

and a phenol; the same products were obtained on oxidation with KMnO_4 ; the *phenol*, $\text{C}_{11}\text{H}_{16}\text{O}_2(?)$, b_4 117°, d_{40}^{20} 0.9448, n_D^{20} 1.4670. No definite products could be isolated from the fractions b_4 above 150°. The greater part of the acid removed from the original oil consists of isovaleric acid.

C. J. WEST

Constitution of isocampholic acid. JULIUS V. BRAUN AND ALBRECHT HEYMONS. Univ. Frankfurt a. M. *Ber.* 61B, 1089–92 (1928).—Recent studies on the behavior of a large no. of *N*-monoalkyl amides of CO_2H acids towards the P halides has shown consistently that when the acid has no H atom adjacent to the CO_2H group the alkylamide is converted only into the imide chloride by even an excess of PCl_5 ; if there is a H atom adjacent to the CO_2H group, it is replaced by Cl in addn. to the imide chloride formation; if there are 2 such atoms they are replaced by 2 atoms of Cl. The methylamide of campholic acid (I) had already been found to give, as expected, only the imide chloride with PCl_5 . For the present comparison with isocampholic acid (II), the ethylamides were used. *Ethylamide* of I, b_{20} 160°, m. 88°; the imide chloride obtained with 3.5 mols. PCl_5 on the H_2O bath regenerates almost quant. the Cl-free amide when decompd. with H_2O . The *ethylamide* of II, m. 41–2°; with PCl_5 and subsequent decompn. with H_2O it gives a *di-Cl deriv.* (III), m. 73–7°, $b_{0.2}$ 125–7°, the intermediate *imide chloride*, $\text{C}_{12}\text{H}_{20}\text{NCl}_4$, strongly unsatd., faintly yellow oil, b_{15} 145–50° practically without decompn. III can apparently be hydrolyzed to the acid only under special, as yet undetd. conditions, when it was heated in the usual way with concd. HCl 5 hrs. at 140° it gave a dark oil not completely sol. in Na_2CO_3 ; the sol. part, b_6 chiefly at 125°, is a faintly yellow, strongly unsatd. oil, $\text{C}_{10}\text{H}_{16}\text{O}_2\text{Cl}$. v. B. and H. conclude that II has the structure, CH_2CHMe

$\begin{array}{c} | \\ \text{CMc}_2 \end{array}$, of α -campholanic acid; the small differences in m. ps. between the $\text{CH}_2\text{CHCH}_2\text{CO}_2\text{H}$

amides and anilides of the 2 acids observed by Lipp can readily be explained by the presence of small quantities of I in his II; this may perhaps also explain the formation of small quantities of camphoric acid in the oxidation of II noted by Rupe and Briellmann.

C. A. R.

The catalytic reduction of hydrocyclic compounds. H. RUPE AND K. SCHÄFER. *Helv. Chim. Acta* 11, 463–77 (1928).—I. Derivs. of pulegone. Pulegone with BzH gives 70% *benzalpulegone* (I), b_{13} 205°, d_4^{20} 1.0245, $[\alpha]$ –24.62°, –28.64°, –32.20°, –39.00°, –46.48°, –53.84° for C, Ca, D, Hg, Cu and I^* at 20°. Reduction of I with H_2 and Ni catalyst gives 90% *benzylmenthone*, $b_{10.5}$ 191°, b_{13} 195°, b_{18} 206°, d_4^{20} 0.9915, n_D^{20} 1.51834, n_B^{20} 1.53604, n_D^{20} 1.52279, $[\alpha]$ 9.25°, 10.90°, 12.37°, 15.42°, 18.97°, 22.26°. Pulegone with Br_2 and Na gives 70% *pulegenic acid* (II), b_{12} 144–50°, d_4^{20} 1.0050, $[\alpha]$ 37.32°, 43.14°, 48.18°, 58.08°, 68.84°, 78.28°. Reduction of II with H_2 and Ni catalyst under 19 atm. at 100–30° gives 91% of *dihydropulegenic acid*, b_{11} 138°, d_4^{20} 0.9642, $[\alpha]$ –0.31°, –0.34°, –0.36°, –0.48°, –0.56°, –0.72°. With PCl_5 100 g. of II gives 76 g. *pulegenyl chloride* (III), $b_{11.5}$ 97–100°. With Me_2Zn 52 g. of III gives 24 g. *Me pulegyl ketone*, b_{135} 98°, d_4^{20} 0.9126, $[\alpha]$ 31.24°, 36.18°, 40.48°, 48.74°, 57.86°, 65.82°; semicarbazone, m. 144°; oxime, $b_{10.5}$ 130°. With Et_2Zn 5 g. of III gives 10 g. *Et pulegyl ketone*, b_{10} 107–12°, m. 136°. *Dihydropulegenic acid* (36 g.) with PCl_5 gives the acid chloride (32.5 g.), b_{11} 80–90°. The acid chloride (33 g.) with Me_2Zn gives 16 g. *dihydropulegyl Me ketone*, b_{10} 86°, d_4^{20} 0.8862, $[\alpha]$ –2.58°, –3.08°, –3.56°, 4.62°, –5.98°, –7.40°; semicarbazone, m. 174°. II. The catalytic reduction of hydroxymethylenetetrahydrocarvone. Tetrahydrocarvone (100 g.) with Na gives 53 g. hydroxymethylenetetrahydrocarvone (I), b_{12} 118–9°. Reduction of I with H_2 and Ni catalyst gives (a) *1-methyl-2-oxido-3-methylene-4-isopropylcyclohexane*, formed by the reduction of both CO and HOCH and elimination of H_2O , b_{12} 112°, d_4^{20} 0.9262, $[\alpha]$ 24.75°, 28.45°, 31.72°, 37.83°, 44.41°, 50.08°; (b) *tetrahydrocarvylcarbinol*, formed by the reduction of only the HOCH, b_{11} 142°, d_4^{20} 0.9947, $[\alpha]$ –29.07°, –34.80°, –40.16°, –51.36°, –64.97°, –78.16°; benzoate, m. 105°; (c) *methylene-tetrahydrocarvone* formed by the elimination of H_2O from the carbinol above, b_{11} 102°, b_{13} 104°, d_4^{20} 0.9152, $[\alpha]$ –4.17°, –5.00°, –5.81°, –7.56°, –9.76°, –12.00°; semicarbazone, m. 177°; (d) *ethylenebis[tetrahydrocarvone]*, b_{11} 219–21°. Oxidation of methylenetetrahydrocarvone with CrO_3 gives a product, b_{12} 105–17°; semicarbazone, m. 182°.

J. S. REICHERT

Artificial musks. II. Notes on the elimination of side chains in the nitration of

complex, quickly assume a yellowish color with H_2SO_4 (d. 1.84) and then dissolve to some extent with a greenish yellow color, while the 92° crystals are not colored by H_2SO_4 and dissolve only slowly to a colorless soln. which becomes golden yellow after some hrs. Dicyclohexylphenylcarbinol with Pt-charcoal gives CO_2 and 9-phenylfluorene, with ordinary charcoal CO_2 and $\text{Ph}(\text{C}_6\text{H}_{11})_2\text{CH}$. From MePh_2COH with Pt-charcoal is obtained 60% of 9-methylfluorene, with ordinary charcoal MePh_2CH . EtPh_2COH behaves in the same way. $\text{Me}_2(\text{PhCH}_2)\text{COH}$ with both catalysts gave $\text{Me}_2\text{CHCH}_2\text{Ph}$. $\text{MePh}(\text{PhCH}_2)\text{COH}$ with Pt-charcoal gave 9-methylphenanthrene, m. 94° , with ordinary charcoal $\text{PhCH}_2\text{CHPhMe}$. $\text{MeEt}(\text{PhCH}_2)\text{COH}$ is reduced by Pt-charcoal to $\text{MeEtCHCH}_2\text{Ph}$. Me_2EtCOH with both charcoals yields a pentane b. $30-0.5^\circ$, d_4^{20} 0.6281, only after several passages through the tubes at 300° . PhOH can also be reduced to C_6H_6 by activated charcoal but only after repeated treatment at 300° . C. A. R.

Acid-basic dyestuffs. G. V. KAGAN. *J. Chem. Ind. (Moscow)* 3, 1307-8(1926).—In order to clear up the effect of replacing the H atoms of two OH groups standing in *o*-position by some bivalent hydrocarbon group, such as $\text{CH}_2=$, on the color of basic dyestuffs, K. operated with piperinol and with protocatechualdehyde, which he condensed with bases such as PhNMe_2 , etc., and obtained 2 groups of dyestuffs, namely (1) those which have 2 hydroxyls replaced by the CH_2O_2 group and consequently possess only basic properties, and (2) those which have 2 free hydroxyls and possess both basic and acid properties. K.'s conclusion is: "whereas the introduction of 2 hydroxyl groups (in *o*-position to each other) in the benzene ring of a dyestuff of the malachite green class communicates to it acid properties, at the same time strongly changing its color from green, through blue, to violet, the closing of these 2 hydroxyls by the CH_2 group forces the dyestuff to conserve the original color of the parent dyestuff of its class." BERNARD NELSON

Relative migration tendencies of acyclic radicals in the semipinacolin rearrangement of phenyldialkylglycols. Their relation to affinitive capacities. M. TIFFENEAU and JEANNE LÉVY. *Compt. rend.* 186, 84-6(1928); cf. *C. A.* 21, 1111, 3609; 22, 585.—In the semipinacolin rearrangement of 1-phenyl-2,2-dialkylglycols 1 alkyl radical migrates alone or in large part. Glycols yielded ketones as follows: 1-phenyl-2,2-ethylmethylglycol, 3-phenyl-4-pentanone; 1-phenyl-2,2-isopropylmethylglycol, 2-methyl-3-phenyl-4-pentanone; 1-phenyl-2,2-butylmethylglycol, 3-phenyl-2-heptanone, 1-phenyl-2,2-isobutylmethylglycol, 5-methyl-2-phenyl-3-hexanone; 1-phenyl-2,2-propylmethylglycol, both 3-phenyl-2-hexanone and 2-phenyl-3-hexanone; 1-phenyl-2,2-ethylmethylglycol, 3-phenyl-4-heptanone; 1-phenyl-2,2-ethylisopropylglycol, 3-phenyl-5-methyl-4-hexanone; 1-phenyl-2,2-ethylisobutylglycol, 2-methyl-5-phenyl-4-heptanone; 1-phenyl-2,2-butylethylglycol, 5-phenyl-6-octanone; 1-phenyl-2,2-butylpropylglycol, 5-phenyl-6-nonanone; 1-phenyl-2,2-benzylethylglycol, 90% of 1,2-diphenyl-3-pentanone and 10% of 1,3-diphenyl-2-pentanone; 1-phenyl-2,2-benzylpropylglycol, 1,2-diphenyl-3-hexanone; 1-phenyl-2,2-benzylisopropylglycol, 4-methyl-1,2-diphenyl-3-pentanone. Since the relative migration tendencies are measures of affinitive capacities, radicals may be arranged in the following order of decreasing affinitive capacities: iso-Bu, Me, Pr, Bu, Et, iso-Pr, Bz. MARGARET W. MCPHERSON

Preparation of 4,4'-dinitrobenzil. FREDERICK D. CHATTAWAY and EDWARD A. COULSON. Queen's College, Oxford. *J. Chem. Soc.* 1928, 1361-4.— $(\text{PhCHOH})_2$ (2.5 g.), gradually added to 15 cc. HNO_3 (d. 1.5) at -10° to -5° , the temp. allowed to rise to 0° , dild. after 2 hrs. with 7 cc. H_2O and boiled 0.5 hr., gives 1 g. 4,4'-dinitrobenzil (I), yellow, m. 213° , identical with the product obtained by Biltz on nitrating 4,5-diphenylglyoxal (II). Oxidation of I with Cr_2O_3 gives $p\text{-O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$. Equiv. quantities of I and PhNHNH_2 give the *monophenylhydrazone*, deep orange, m. 257° ; an excess of PhNHNH_2 (with P_2O_5) gives the *osazone*, red, m. 293° (decompn.). 2,3-Di-*p*-nitrophenylquinoxaline, m. 201° . II (10 g.) and 20 g. HNO_3 (d. 1.5) at 0° give 4 g. 3,3'-dinitrobenzil, m. 132° . II (27 g.) in 315 g. concd. H_2SO_4 and 90 g. HNO_3 at -5° give 7 g. I; from the AcOH mother liquors 10 g. of the 3,3'-isomer was isolated. C. J. WEST

Deamination of tertiary amino alcohols. S. KANAO and T. YAGUCHI. *J. Pharm. Soc. Japan* 48, 252-8(1928).—The work was completed 2 yrs. ago, but its publication was postponed for fuller study. The appearance of Bettzieche's paper (*C. A.* 21, 567) necessitates the publication of this paper. K. and Y. have succeeded in converting tertiary amino alcs. into ketones of the alkyldeoxybenzoin type by diazotization: $\text{C}_6\text{H}_5\text{CH}(\text{NH}_2)\text{C}(\text{OH})\text{R}_2 \rightarrow \text{C}_6\text{H}_5\text{CHRCOR}$. The rearrangement of groups and the change in the sign of rotation were the notable results of the reaction. *l*-Leucine Et ester (I) and *p*- $\text{MeC}_6\text{H}_4\text{MgBr}$ (II) gave *l*-1,1-ditolyl-4-methyl-2-aminopentan-1-ol, m.

108.5°. *dl*-Isomer (III), m. 121°, from the *dl*-isomer of I and II. III, NaNO₂ and HCl gave *dl*-isobutyldeoxy-*p*-toluoin (IV), b. 205-6°, n_D^{20} 1.5562. IV was also obtained by heating desoxy-*p*-toluoin, iso-BuI and NaOEt. I and PhMgBr gave *l*-1,1-diphenyl-4-methyl-2-aminopentan-1-ol (V), m. 133°, $[\alpha]_D^{20}$ -89.74°. Yield, 56%. The HCl salt of V and NH₄NCO gave 1,1-diphenyl-4-methyl-2-ureidopentan-1-ol, Me₃CHCH₂-CH(NHCONH₂)C(OH)Ph₂·H₂O, m. 106°. The HCl salt of V and NaNO₂ gave *d*-isobutyldeoxybenzoin (VI), b₁₄ 187°, m. 33-6°, $[\alpha]_D^{20}$ 109.18°. Yield, 90%. Semicarbazone, m. 204°. *dl*-Isomer of V, m. 110°, from the *dl*-isomer of I and PhMgBr. *dl*-Isomer of VI, m. 78°, PhCH₂MgBr and I gave *d*-2-benzyl-1-phenyl-5-methyl-8-amino-hexan-2-ol, m. 89°, $[\alpha]_D^{20}$ 7.48. EtMgBr and I gave 3-ethyl-6-methyl-4-aminoheptan-3-ol, b₁₇ 109-16°. HCl salt, m. 178°. Chloroplatinate, m. 204°. *N*-Di-Me deriv., b₁₀ 97-9°. HCl salt, m. 193°. NAO UYER

α -Chloronaphthalene. I. The chlorination of naphthalene in the vapor phase. P. FERRERO AND R. WUNENBURGER. Univ. de Genève. *Helv. Chim. Acta* 11, 416-25 (1928).—An app. is described for the chlorination of C₁₀H₈ (I) in the vapor phase. The optimum temp. is 350. The Cl₂ is introduced at the rate of 15 l. per hr. and in the proportion of 1.5 moles for 1 mole of I. The yield is 59% of the total I introduced and 85% of the I used up. The use of 0.5% I₂ as a catalyst increases these yields to 70 and 94%, resp. FeCl₃ is less effective. REYNOLD C. FUSON

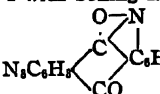
Action of chlorosulfonic acid on naphthalene. A. CORBELLINI. *Giorn. chim. ind. appl.* 9, 118-20 (1927); cf. C. A. 22, 1972.—ClSO₃H behaves towards C₁₀H₈, not only as a sulfonating agent (cf. Armstrong, *J. Chem. Soc.* 24, 173 (1871); *Proc.* 1886, 231; 1887, 42; 1889, 10), but also, as is the case with C₆H₆, as a chlorosulfonating agent. When solid C₁₀H₈ (1 mol.) is treated at 15-45° with ClSO₃H (2 mols.), 1,5-C₁₀H₆(SO₃H)₂ is formed, together with varying proportions of the corresponding disulfonyl chloride. When CCl₄ is used as a diluent and the C₁₀H₈ (1 mol.) is treated with either 2 or 4 mols. of the acid, sulfonyl chlorides are always formed in addn. to the mono- and di-SO₃H acids. In all cases, the C₁₀H₈ is attacked only in the 1- and 5-positions. It is probable that the 1st phase of the reaction consists of the formation of the SO₂H acid, which then passes to the chloride, C₁₀H₇SO₃H + HO-SO₂Cl → C₁₀H₇SO₂Cl + H₂SO₄, these changes being accompanied by the secondary reactions, C₁₀H₈ + H₂SO₄ → C₁₀H₇SO₃H + H₂O and HO-SO₂Cl + H₂O → H₂SO₄ + HCl. The final yields of the various products evidently depend on the velocities of these different reactions, these being governed by the conditions employed. The sulfochlorinating action is favored by low temps. B. C. A.

Synthetic anthraquinone. MAX PHILLIPS. *Z. Farben-Ind.* 20, 122-4 (1928).—A review of the various developments leading to the manuf. of synthetic anthraquinone from C₆H₄(CO)₂O, benzene and AlCl₃. FREDERICK C. HAHN

Migration of the sulfonic acid group in naphthalene compounds. H. H. HODGSON. *Z. Farben-Ind.* 20, 124-6 (1928).—A review of literature on the sulfonation of C₁₀H₈, C₁₀H₇OH and C₁₀H₇NH₂ and a discussion of conditions influencing the migration of the SO₃H groups. FREDERICK C. HAHN

The diazides of anthraquinone. KURT BRASS AND FRIEDRICH ALBRECHT. Deutsch. Forschungs-Inst. Textil-Ind., Stuttgart-Reutlingen. *Ber.* 61B, 983-93 (1928).—The diazides were prepd. by the action of NH₃ on the perbromides of the corresponding bisdiazonium compds. These perbromides show the same instability as those of the simple diazonium salts. In the 1,4-series were obtained products contg. 51.2% Br at most, while the calcd. value for 6 atoms Br is 64.6%; apparently the products were mixts. of the bisdiazonium bromide (37.88% Br) with the perbromide or a Br addn. product of the bromide. The ability of the diazides to exist depends on the position of the 2 azide residues in the anthraquinone nucleus and on whether they are homo- or heteronuclearly distributed. An *o*-C.O group always tends, in the anthraquinone series, to break down the azide residue; the α -diazides (1,4-, 1,5-, 1,8-) are unstable, while a β -diazide (2,6-) is perfectly stable. The instability of the α -compds. diminishes in the order given above; the 1,4-compd. begins to evolve N in abundance as soon as it is formed so that it is impossible to isolate a product with anything like a satisfactory N content. The 1,5-diazide also splits off N very easily but with the proper precautions a product with 19.68% N can be isolated; this seems to be a mixt. of equal parts of the diazide and of the dianthranil (calcd. for such a mixt., 20.3% N); the change into the dianthranil proceeds more rapidly on standing or treating with boiling H₂O, most rapidly on recrystn. from xylene or C₆H₅N. On the other hand, a 1,8-diazide (I) with 26.24% N can be obtained at low temps. On standing the N falls to 24.63% in 24 hrs. and finally to 21.53% (= 4 atoms N); the same product

(II) with a const. N content is obtained by treating the I with boiling H_2O or by

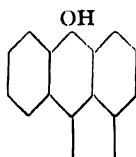
recrystg. it. II is 1-anthraniloanthraquinone 8-azide, . The

presence of an azide group in II is shown by the liberation of exactly 2 atoms N with concd. H_2SO_4 and by the fact that II reacts with Ph_3P . The stability of II, as compared with the α -azides, shows that the N_3 residue can enter the α -position of the anthraquinone nucleus without hindrance provided the residual valences of the adjacent CO group are satd. The 2,6-diazide (III) resembles in general the phenanthrene-quinone diazides; it crystals well and reacts readily with 2 mols. Ph_3P to form the well-crystd. anthraquinone-2,6-di(triphenylphosphinimine) (IV), but it has not as yet been possible to convert it into a 2,6-bisbenzenediazoaminoanthraquinone with $PhMgBr$ in $PhMe$ or into a bistriazoleanthraquinone with $AcCH_2CO_2Et$ or with Na alcoholates. Acid decompn. of the 1,4-dianthranil did not give 1,4-diaminohystazarin and, as by-product, 1,4- $C_6H_4(CO)_2C_6H_2(NH_2)_2$. The anthranil ring is so stable that concd. H_2SO_4 at 200° had to be used to effect complete reaction and under these drastic conditions the reaction does not follow the expected course. Oxidation of the crude decompn. product yields phthalic acid and treatment with 2% KOH showed that it consists of about equal parts of 1,4- $C_6H_4(CO)_2C_6H_2(NH_2)OH$ and of 1,4- $C_6H_4(CO)_2C_6H_2(NH_2)_2$ contaminated with products of high mol. wt. The production of the di- NH_2 compd. is explained as resulting from the intermediate formation of a radical which dehydrogenates other participants in the reaction, but it is not clear how the $C_6H_4(CO)_2C_6H_2(NH_2)OH$ is formed; it cannot be produced by hydrolysis of the di- NH_2 compd. for the latter is unchanged by concd. H_2SO_4 at 200° . Acid hydrolysis of the freshly prepd. product of the 1,5-series (still consisting, therefore, in most part of the 1,5-diazide) gave about 90% 4,8-diaminoanthrarufin (V) but no 1,5- $H_2NC_6H_3(CO)_2C_6H_3NH_2$ could be isolated from the insol. residue. Sepn. of the decompn. product into its components could not be effected with alkali because of the slight soly. of the V but acetylation proved successful. Acid decompn. of I led to the same results, 90% of 4,5-diaminochrysazin (VI) but no $H_2NC_6H_3(CO)_2C_6H_3NH_2$ being obtained. Here again, sepn. of the products could not be effected with alkali because VI loses NH_2 with hot alkalis and, moreover, is not sufficiently sol. The only compd. which it has thus far been possible to isolate from the products of the decompn. of III by acid is 2,6-diaminoanthrarufin (VII). I, brown, dissolves in ice-cold concd. H_2SO_4 with red color, deflagrates with concd. H_2SO_4 at room temp. or on dry heating, gives with Ph_3P in $PhMe$ a red color and fluorescence increased by heating, and on long standing needles, presumably of anthraquinone 1,8-di(triphenylphosphinimine), sep. II, light brown. III (yield, 96%), light brown scales sensitive to light, deflagrates 202° on rapid heating, explosively when heated in a test tube or treated with a drop of concd. H_2SO_4 , dissolves in concd. H_2SO_4 , on cautious addn., with blood-red color before decompn. begins, is unchanged by boiling H_2O or dil acids or by $SnCl_4$ in $PhMe$, even on heating. IV, yellow-red, m. above 280° , sol. in concd. H_2SO_4 with red color. VII, dark red, sol. in concd. H_2SO_4 with yellow color, unchanged by H_3BO_3 , sol. in alkalis with red color, the red-brown alkali salt sepg. on standing or warming; it dissolves slowly in cold Ac_2O with yellow-brown color changing to orange-brown on heating; it colors a cold Ac_2O soln. of pyroboracetate a violet-red, which changes to yellow-red on long boiling, and on cooling the red-brown 2,6-diacetyldiaminoanthrarufin seps. The yellow xylene soln. of VII is colored red-violet by $SnCl_4$ and deposits a brown cryst. Sn complex salt.

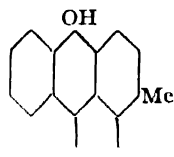
C. A. R.

Free organic radicals. VII. Aryl-*peri*-pyrrolinoanthranolazyls. ROLAND SCHOLL WITH EDMUND STIX, JOACHIM AND WALTER LEONHARDT. Techn. Hochschule Dresden. Ber. 61B, 968-82(1928); cf. C. A. 22, 76.—Further investigation of *m*-xylyl-*peri*-pyrrolinoanthranolazyl (I) has shown that: (1) The elec. cond. of pure alc. and C_6H_5N is not increased by the I, i. e., there is no disproportionation by a shifting of electrons. (2) The solns. changed by the light of a quartz-Hg lamp from blue to red under N or to yellow in air are not restored to blue by darkness nor by cold $PhNHNH_2$ and therefore probably contain no *peri*-pyrrolinoanthrone; on heating with alc. alk. $Na_2S_2O_8$ or long boiling with $PhNHNH_2$ they become an impure blue (red in thick layers), probably as the result of regeneration of the radical from an unknown dehydrogenation or oxidation product. (3) Me_2SO_4 and NaOH convert the I into the *O*-*Me* ether (II), which is considerably more similar to I than is the benzoate; it forms violet needles and the color of its solns. is shifted somewhat towards the red accom-

pared with that of solns. of I. Like I it has a tendency to form solvates; it dissolves in Et_2O , dioxan and xylene with red color and orange fluorescence, in $\text{C}_6\text{H}_5\text{N}$ with violet-red color with vivid red fluorescence, in alc. with violet color and red fluorescence, in AcOH with blue color and faint red fluorescence. Ultra-violet light increases the fluorescence considerably. The solns. are quickly decolorized in the light of the sun or a Hg lamp. The absorption curves of II in alc. (violet) and xylene (red) are very similar to each other and to those of I, the max. being shifted somewhat towards the ultra-violet as compared with those of I. The max. and min. for II in alc. are at 1739–54 and 2439 Å. U., resp., in xylene at 1818 and 2420. II is not sensitive towards NaOH and NH_4OH . Conc'd. acids convert it into radical azylum salts. Its solns. in Et_2O , dioxan or AcOH are turned deep blue by conc'd. H_2SO_4 or HClO_4 and at appropriate concns. deposit the salts which are at once decomp'd. by H_2O . The violet alc. NH_3 soln. is decolorized by Zn dust, presumably with the formation of the *anthranol Me ether*, which, after removal of the Zn dust, at once oxidizes back in the air and could not be isolated. On titration to decolorization in PhNO_2 or AcOH with KMnO_4 , H_2SO_4 , II consumes 5 equivs. of O instead of 3, which, to be sure, is an indication of its radical nature but is remarkably different from the behavior of I and the oxanthronyls. The consumption of the first 3 atoms can be represented by the scheme proposed for I but the resulting tri-HO deriv. apparently decomps. into H_2O_2 , MeOH and the anthrone instead of into H_2O and the anthraquinonyl ketonimide, the H_2O_2 consuming the remaining 2 atoms of O. This view is confirmed by the fact that the soln. decolorized by the absorption of 5 atoms O becomes blue again when allowed to stand (autoreduction of the anthrone) and slowly consumes more KMnO_4 (presence of MeOH). (4) A no. of analogs of I (Ph, *p*- ClC_6H_4 , *p*- MeC_6H_4 , *p*- MeOC_6H_4 instead of $\text{Me}_2\text{C}_6\text{H}_3$) are described. The ketoximes used in prep. them are (with the exception of the brownish yellow MeOC_6H_4 deriv.) yellowish white and the color of their solns. in conc'd. H_2SO_4 (as of those of the azyls in H_2SO_4 and org. solvents) deepens from yellow (Ph, ClC_6H_4) to orange-yellow (MeC_6H_4), dark orange-yellow ($\text{Me}_2\text{C}_6\text{H}_3$) and orange-red (MeOC_6H_4). The color and fluorescence phenomena of the new azyls in org. solvents at room and at high temps. agree as a whole with those of I, apparent deviations being the result of the much less soly. of the ClC_6H_4 and MeOC_6H_4 derivs. (5) Azyls of the type III (R = Ph, *m*- and *p*- $\text{Me}_2\text{C}_6\text{H}_3$) have also been prep'd. The 2-Me group deepens the color of the ketoximes from which they are prep'd to a vivid lemon-yellow, whereas in the azyls themselves the blue to violet-blue of the non-methylated I is shifted strongly towards the violet. All the above azyls (of both types) are very sensitive to light when in soln. The titration with KMnO_4 or Br cannot be carried out in direct daylight. The titration with Br, even in hot $\text{C}_6\text{H}_5\text{N}$, did not always give



...N—CHC₆H₃Me₂ (I)



...N—CHR (III)

a sharp end point. (6) In their properties as a whole, these azyls are reminiscent of ordinary dyestuff mol's. with normal valencies and more closely resemble non-radical compds than any other known kind of radicals. Ph α -anthraquinonyl ketoxime (60% from 1-BzC₆H₄(CO)₂C₆H₄, $\text{NH}_2\text{OH}\cdot\text{HCl}$ and Na_2CO_3 refluxed in alc.), darkens 215–20°, m. 223°, gives in alc. with conc'd. NH_4OH and Zn dust in the dark 50% of *py-1-phenyl-1,9(N)-pyrrolino-10-anthranolazyl*, violet-blue needles with Cu luster, m. 266°. *p*-Tolyl α -anthraquinonyl ketone, from 1-C₆H₄(CO)₂C₆H₃MeCO₂H, PhMe, PCl_5 and a little sublimed FeCl_3 , light yellow, m. 207–8°; oxime, m. 230–1° on rapid heating; azyl (yield, 60%), dark blue, apparently decomps. 310° (benzoate, red). II (yield, 80%), m. 181°, is unchanged in alc. NH_3 by $\text{K}_3\text{Fe}(\text{CN})_6$; perchlorate. *p*-Chlorophenyl α -anthraquinonyl ketoxime (yield, 25–30%), m. 251–2° (decompn.) on rapid heating; azyl (40–50%), violet-blue needles with faint Cu luster, sinters about 310° and seems to m. about 330° (decompn.). Anisyl α -anthraquinonyl ketoxime (30%), m. 235–6° on rapid heating; azyl (about 40%), violet-blue needles with Cu luster, sinters 300°, m. about 310° (decompn.). 1-Cyano-2-methylantraquinone (with Lothar Wanka), obtained in 74% yield from diazotized 2,1-C₆H₄(CO)₂C₆H₃MeNH₂ by the Sandmeyer method, yellow, m. 268°, nearly quant. hydrolyzed by $\text{H}_2\text{SO}_4\text{-H}_2\text{O}$ at 160–70° to the acid (IV), yellow, m. 263–4°, whose chloride (V) (45 g. from 50 g. of the acid with PCl_5

in C_6H_6 or 8.5 g. from 9 g. of the acid in boiling $SOCl_2$ (WITH KURT KLEMM), decomps. about 192° . *1-Benzoyl-2-methylantraquinone* (*Ph 2-methyl-1-anthraquinonyl ketone*) (WITH HEINRICH DEHNERT) (11 g. from 150 g. V refluxed in thiophene-free C_6H_6 with 0.2 mol. sublimed $FeCl_3$), m. $207-8^\circ$; *oxime* (50%), sinters about 234° , m. $239-40^\circ$; *py-1-phenyl-1,9(N)-pyrrolino-2-methyl-10-anthranolazyl* (50%), m. $232-3^\circ$, decomps. about 285° . *p-Xylol ketone* (3.5 g., together with 6.5 g. IV, from 10 g. V and 0.2-0.5 g. $FeCl_3$ in boiling xylene), m. $192-3^\circ$; *oxime* (45-50%), m. $226-6.5^\circ$; *azyl. m-Xylol ketone* (WITH ERICH WEBER), obtained in 10% yield from V in xylene at 80° with $FeCl_3$ or at 0° with $AlCl_3$ (WITH ILSE JULIUS), m. 175° ; *oxime*, m. $232-3^\circ$; *azyl*. The microanalyses were done by MAX BOETIUS.

Rotenone, the active constituent of derris root. SANKICHI TAKEI. Univ. Heidelberg. *Ber.* 61B, 1003-7(1928); cf. C. A. 19, 3483.—The compn. of rotenone (I) was formerly given as $C_{17}H_{16}O_6$, although this could not be reconciled with the MeO content found (15.4%). Further study has shown that this MeO value is correct but mol. wt. detns. in C_6H_6 and camphor gave higher values than before, corresponding to $C_{23}H_{22}O_6$, a formula which also agrees with the analytical results on I and is confirmed through the phenylhydrazone and the oxime. The formula of isorotenone (II), the isomer formed by rearrangement of I in concd. H_2SO_4 , requires the same revision. I and II seem to be *cis-trans* isomers, for I gives with HCl a HCl salt converted by Zn into II, or perhaps a double bond migrates. Rotenic acid (III), the cleavage product obtained by fusion of I with KOH and formerly given as $C_9H_{10}O_3$, must now be assigned the formula $C_{12}H_{12}O_4$; it yields a Tl salt and an acetate and in its *di-Me deriv.* (IV), prep'd. with CH_2N_2 , one Me group is saponifiable and the other in phenol ether combination. III is therefore a phenolcarboxylic acid (probably of the *o*-series, since it gives a deep blue-violet color with $FeCl_3$). On distn., III gives, with loss of CO_2 , a phenol $C_{11}H_{11}O(OH)$ (V), which can likewise be methylated. All attempts to make the 4th O atom, in III, react failed. Neither V nor its Me ether forms an oxime. The Me ether of III reacts with NH_2OH , but the product may be considered as a hydroxamic acid, even though the $FeCl_3$ reaction is not as pronounced as might be expected. With aq. $KMnO_4$, III gives a small quantity of iso- $PrCO_2H$, and the Me ether of V gives $AcOH$. III may therefore with some probability be assigned the structure of an *isopropylhydroxycoumaronecarboxylic acid*, $HO_2C(HO)C_6H_2C(CHMe_2)CH_2O$, in which,

however, the positions of the substituents have not been established. The Me_2CH group is possibly on the C_6H_4 nucleus. Mol. wt. of I in camphor $398-410$, in C_6H_6 $361-402$. *Oxime* of I, m. 239° . Mol. wt. of II in camphor $387-418$. *Oxime*, m. 230° (mixed with the oxime of I, $215-20^\circ$). I, *HCl*, m. 188° . *Tl salt* of III, m. 203° . *Acetate*, m. 155° . IV, oil, sapon'd. by 2% KOH in MeOH to the *Me ether* of III, m. 115° . Nitration of III gives no homogeneous comp'd. but when the reaction product is treated with CH_2N_2 , there is obtained *Me nitromethylrotenate*, $C_{11}H_9O(NO_2)(OMe)CO_2Me$, faintly yellow, m. 120° . *Hydroxamic acid*(?), from the Me ether of III with $NH_2OH \cdot HCl$ and $NaOAc$ in abs. alc. on the H_2O bath, m. 120° , gives a dark red-yellow color with $FeCl_3$ in alc. V, b. 760 271° , m. 42° ; along with it is formed a small quantity of an alkali-insol. substance of approx. the same compn. but double the mol. wt., m. 136° , mol. wt. in camphor $384-423$. *p-Toluenesulfonate* of V, m. $105-6^\circ$. *Me ether* of V, prep'd. with alk. Me_2SO_4 , mobile oil, b. 137° , b. 260° .

Some transformations of 2-methyl-3-carbethoxypyrrole, 2-methylpyrrole and 2,3-dimethylpyrrole. H. FISCHER, H. BELLER AND A. STERN. Techn. Hochschule München. *Ber.* 61B, 1074-83(1928); cf. C. A. 21, 381.—2-Methyl-3-carbethoxypyrrole (I) with 2 mols. Br in AcOH at $15-6^\circ$ gives the *4,5-di-Br deriv.*, m. $138-9^\circ$ (with 1 mol. Br is obtained a blue comp'd., m. $255-6^\circ$, contg. only about 1% Br and becoming colorless without appreciable change in m. p. on recrystn. from C_6H_5N ; it is probably the bis-methylcarbethoxypyrrole holding tenaciously a blue pyrrole dyestuff). With $NCCO_2Et$ and dry HCl in alc. I gives the *imide chloride* $C_{12}H_{11}N_2O_4Cl$, m. $180-1^\circ$ (decompn.), hydrolyzed almost immediately by cold H_2O to the *Et glyoxylate*, $C_{12}H_{11}NO_6$, m. 128° . 2-Methylpyrrole (II), b. 148° , is obtained in 70% yield from I boiled 1 hr. in aq. alc. KOH, evap'd. and dist'd. with superheated steam from KOH at $170-200^\circ$; 35 g. gives with $MeMgBr$ in Et_2O and subsequent treatment with $CICO_2Et$ 24 g. 2-methyl-5-carbethoxypyrrole (III), m. 100° . II is also obtained by reduction by the Wolff-Kishner method of pyrrole- α -aldehyde, which, in turn, is obtained in 6 g. yield from 30 g. pyrrole in $CHCl_3-EtOH-H_2O$ at $50-5^\circ$ slowly treated with concd. KOH, heated 15 hrs. at $50-5^\circ$ and evap'd. as rapidly as possible on a sand bath, the distillate then being treated with $NaHSO_4$, evap'd. to dryness under 12-18 mm. below 60° , heated just to boiling with sat'd. K_2CO_3 and ext'd. with Et_2O . Treated in AcOH at 40° with 3 mols. Br.

III does not yield the corresponding dicarbethoxymethane but the *di-Br deriv.* $C_8H_9O_2NBr_2$ (brominated on the nucleus), m. 176°. With hot 40% HCHO and concd. HCl III gives *bis*-[2-methyl-5-carbethoxypyrrol-4]-methane, m. 195-6°; with Me_2CO the dimethylmethane, m. 217°; with $MeOCH_2CH(CO_2Et)_2$ the compd. $C_{16}H_{23}O_6N$ (presumably $(EtO_2C)CHCH_2C(=CH)_2$), m. 75°, which with Br in $CHCl_3$ gives a β -Br



deriv., m. 105°; with $ClCH_2CN$ in Et_2O the imide chloride $C_{10}H_{12}O_2NCl$, m. 190°. 2-Methyl-5-carbethoxy-3-formylpyrrole (IV) with $NCCH_2CO_2Et$, $MeNH_2.HCl$ and K_2CO_3 in abs. alc. gives the compd. $C_{14}H_{16}O_4N_2$, m. 196° (cor.). The IV, m. 119°, is obtained in 22 g. yield from 24 g. III in cold Et_2O suspension with anhyd. HCN and dry HCl; if the operation is carried out in soln. instead of in suspension the product is the imide chloride, converted by NH_3 into the free aldimide, m. 215-6°. *Semicarbazone* of IV, m. 258°; *phenylhydrazone*, m. 216°. With Na in alc. and $N_2H_4.H_2O$ heated in an autoclave to 160°, 22 g. IV gives 6.5 g. 2,3-dimethylpyrrole (V), b₂ 63°. 2-Ethyl-3-formyl-5-carbethoxypyrrole, prep'd. like IV, m. 89-90° (cor.); *phenylhydrazone*, m. 188° (cor., decompn.), *oxime*, m. 194° (cor.); the aldehyde is reduced by the Wolff-Kishner method to 2-ethyl-3-methylpyrrole and with HCHO and concd. HCl gives *bis*-[2-ethyl-5-carbethoxypyrrol-4]-methane, m. 197°. 2-Methyl-5-formylpyrrole, from the 3- CO_2H acid *in vacuo* at 200°, m. 68°. 2,4-Dimethyl-3-nitropyrrole, from the 4- CO_2H acid, yellow, m. 138°, easily sol. in NaOH, gives with HCN and HCl in Et_2O the 5-formyl deriv. *Br deriv.* of 2,3-dimethyl-5-carbethoxypyrrole, from the pyrrole in CCl_4 with 1 mol. Br at 70°, m. 157° (cor.). V with $EtMgBr$ and $EtCOCl$ yields the *EtCO deriv.*, m. 128° (cor.). C. A. R.

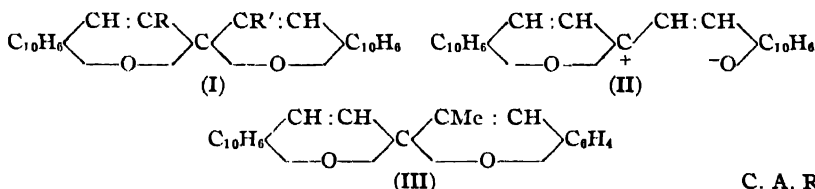
Some observations on pyrroles and complex salts. H. FISCHER and BRUNO PÜTZER. *Techn. Hochschule Munchen. Ber.* 61B, 1068-74 (1928).—Bromocitraconimide having been obtained by the oxidation of bromoporphyrin I (C. A. 22, 75), it became of interest to confirm this reaction, so important in the determination of the constitution of the porphyrin, on synthetic material of indubitable origin. The brominated methene (I) obtained from 2,4-dimethylpyrrole (C. A. 18, 372), the prep'n of which has been improved, was accordingly oxidized with $CrO_3.H_2SO_4$ and found to give bromocitraconimide in good yield. F. and P. also describe a no. of α -ethylpyrroles which were synthesized at a time when the indigoid formulation of the porphyrins still seemed possible and α -ethylpyrroles could be expected as reductive cleavage products of hemin. 3,5-Dicarbethoxy-4-methylpyrrole-2-aldehyde (II) heated with N_2H_4 gives a hydrazone which with II yields the aldazine (III), also obtained directly from II and N_2H_4 in AcOH, and III with $CuO.NH_4OH$ yields a well-crystd. Cu salt contg. one Cu atom to 2 pyrrole nuclei; either two H atoms of the pyrrole nuclei have been replaced by Cu or the substance contains univalent Cu as in the Cu salt of the methene of methylketol (cf. Schmitz-Dumont and Motzkus, C. A. 22, 2164). Attempts to settle this point by detg. the active H led to peculiar results which will be reported on later. Other aldazines were tested with respect to their ability to form such Cu complexes but without success. With $MeMgI$, II reacts smoothly through its CHO group, giving the corresponding sec. alc. (IV) in good yield, a reaction worthy of note. In connection with attempts to decarboxylate mesoporphyrin (V) to etioporphyrin, piperidine was tried. Decarboxylation was not effected but there was obtained a well-crystd. substance (VI) holding piperidine with extraordinary firmness, whose compn. agrees best with that calcd. for a mol. compd. of V with 2 mols. piperidine. It yields a well-crystd. Cu salt, but some further reaction must take place in the formation of the latter, as its compn. can be made to harmonize only with that of the Cu salt of a dipiperide of the V. V and its di-Me ester form well-crystd. Sn salts but no formula can be deduced theoretically to agree with their compn.; only from the di-Me ester and $SnCl_2$ was there obtained a salt having approx. the compn. $C_{24}H_{42}O_4N_4SnCl_2$. I is obtained in 96% yield from 30 g. pyrrole in cold AcOH with 144 g. Br. 2-Ethyl-3-acetyl-4-methyl-5-carbethoxypyrrole (VII) (13 g. from 13 g. 2-ethyl-4-methyl-5-carbethoxypyrrole, $AcCl$ and $AlCl_3$ in CS_2), m. 134°. Free 5-carboxylic acid, m. 204° (decompn.), loses CO_2 on dry distn., giving 2-ethyl-3-acetyl-4-methylpyrrole, m. 112°, b. 285-93°. 2,3-Diethyl-4-methylpyrrole, from VII, $NaOEt$ and $N_2H_4.H_2O$ at 175°, b₂₀ 95-7°, isolated through the Hg salt and picrate, m. 104.5°. 2-Ethyl-3,4-dimethylpyrrole picrate (2.6 g. from 2 g. 2-ethyl-4-methyl-5-carbethoxypyrrole-3-aldehyde by the Wolff-Kishner method), m. 122.5° (cor.). 3,5-Dicarbethoxy-2-bromomethylpyrrol-4-carbinol, from the 2-Me compd. and 1.25 mols. Br in AcOH at 18°, m. 96.5°, gives with $PhNH_2$ in the H_2O bath an antilde, $C_{19}H_{20}O_6N_2$, m. 95°. Nitration of the 2-methylcarbinol gives the di- NO_2 compd., m. 186° obtained from 2,4-dimethyl-3,5-dicarbethoxypyrrole.

2-Bromo-3,5-dicarbethoxy-4-methylpyrrole (0.6 g. from 1 g. II with Br in AcOH), m. 147° (cor.). *Hydrazone* of II, m. 100° (cor.). III, lemon-yellow, m. 196° (cor.), hydrolyzed by excess of hot 10% NaOH and a little alc. to the lemon-yellow *tetra-carboxylic acid*, $C_{16}H_{14}O_8N_4$. *Cu salt* of III, $C_{24}H_{18}O_8N_4Cu$, bronze-colored, m. 203° (cor.). *Aldazine* of 2,4-dimethyl-5-formylpyrrole, yellow, m. 251° (cor.). **3,5-Dicarbethoxy-4-methyl-2-[α -hydroxyethyl]pyrrole (IV)**, m. 95° (cor.). VI, $C_{44}H_{80}O_8N_8$; *Cu salt*, $C_{44}H_{80}O_8N_8Cu$; *Zn salt*, m. 286° (cor.). C. A. R.

Action of aniline on *d*-glutamic acid. WM. H. GRAY. Wellcome Chem. Research Labs., London. *J. Chem. Soc.* 1928, 1264-7.—Abderhalden and Schwab (*C. A.* 20, 3169) state that *d*-glutamic acid(I) and $PhNH_2$ give 2-hydroxypyrroline-5-carboxylic acid; working under the same conditions G. reports a compd. of the same m. p. and giving the same color reactions, which he considers to be *l*,2-pyrrolidone-5-carboxyanilide(II), m. 191°, $[\alpha]_D^{15}$ 17.9° (80% EtOH, c 4.8); this also results from the corresponding acid and $PhNH_2$. Br (2 atoms) gives the *p*-bromoanilide, m. 212°. Boiling II with 11 mols. Ac_2O gives the *l*-Ac deriv., m. 166°. II and $PhCH_2Cl$ give the *l*-di-benzyl deriv., m. 158°. II could not be catalytically reduced. *dl*-2-Pyrrolidone-5-carboxyanilide, m. 204°; it is much less sol. than the *l*-form. Heating I with Ph_2NH also gives II. C. J. WEST

Pyrlyene. JULIUS V. BRAUN AND WILHELM TEUFFERT. Univ. Frankfurt a. M. *Ber.* 61B, 1092-9(1928).—Willstätter found that the I or Br addn. product of the so-called dimethylpiperidine, $CH_2:CHCH_2CH_2CH_2NMe_2$ (the product of the Hofmann cleavage of piperidine), undergoes intramol. alkylation with formation of the pyrrolidine deriv. I, which then with alkalis or Ag_2O gives the unsatd. cyclic quaternary base II and this on distn. yields the so-called dimethylpiperideine (III) whose methiodide with alkali forms NMe_3 and pyrlyene (IV). W. assumed that the ring opening in II occurs between the N and CH_2 groups and that III has the structure $Me_2NC(CH_2)CH_2CH(CH_2)CH_2$ without considering the possibility of the structure $CH_3 \cdot C \cdot CHCH_2CH_2NMe_2$ (V) (resulting from opening of the ring between the N and the $C(CH_2)$ group). A repetition of W.'s work on II and its salts confirmed all his observations except that his conversion of the iodide into an isomer with Sn and HCl could not be reproduced. Catalytic hydrogenation of III, however, gave homogeneous $AmNMe_2$, showing that it has the structure V. But IV has not the structure $CH_2 \cdot C \cdot CHCH \cdot CH_3$, as might be expected, for it contains only 2 double bonds; it has therefore undergone a secondary change, with ring formation. Of the 5 possible structures for IV, that of cyclopentadiene is excluded by the fact that the latter compd. is known and is entirely different from IV. That IV is a methyleyclobutadiene is improbable because cyclobutadiene itself is unstable and decomps. into C_2H_2 at high temps., and moreover the mol. refraction of IV is somewhat higher than that calcd. for such a compd. It is also higher than that calcd. for a compd. VI. It agrees well, however, with the calcd. values for the compds. VII and VIII and v. B. and T. give the preference to VII, as the change $CH_2 \cdot C \cdot CHCH \cdot CH_2 \rightarrow VII$ seems the simpler one; this point could not be established by degradation, as the only oxidation products of IV which could be isolated were $AcOH$ and $(CO_2H)_2$ and these could be produced equally well from VII or VIII. The influence of the blocking of the β - and γ -C atoms to the N on the change piperidine $\rightarrow III \rightarrow IV$ was studied with tetrahydroisoquinoline. The 1st stages of the transformations are the same as in the piperidine series; there is obtained through *o*- $CH_2 \cdot CHC_6H_4CH_2NMe_2$ (IX) the quaternary compd. X which is smoothly converted into XI, whose structure is established by hydrogenation to the satd. salt (XII) but which, when treated with alkalis like I above, gives a diamine, probably $[Me_2NC(CH_2)C_6H_4]_2O$ (XIII). Characteristic of both series of reactions is the disinclination to the formation of an end $-C:CH$ group. α -Methylene-*N*-dimethylpyrrolinium chloride (chloride of II), very hygroscopic, m. 217° (chloroaurate, m. 265° (W. gives 226°)); α -methyl compd., readily obtained by catalytic hydrogenation with colloidal Pd or Rupe's Ni, does not m. 280°. III, b. 136-8°, d_4^{19} 0.7979, n_D^{19} 1.4635; chloroaurate, yellow flocks, gradually softening and liquefying on heating (W. describes it as an oil). The base is hardly altered by short warming with dil. H_2SO_4 . IV, b. 60°, shows no indication of polymerization on long standing, d_4^{19} 0.7443, n_D^{19} 1.4505, absorbs 4 atoms Br in CS_2 and 4 atoms H in MeOH with Pd. α -Bromomethyl-*N*-dimethyldihydroisoindolium bromide (X), m. 181-2° (decompn.); chloroplatinate, yellow, decomps. 198°. α -Methylene-*N*-dimethyldihydroisoindolium chloride (XI), hygroscopic, m. 159° (chloroaurate, m. 184°, decomps. 190°; chloroplatinate, m. 218-9°), easily reduced with Pd or Ni to the α -methyl salt (XII), m. 229°, also obtained from the bromide (*C. A.* 11, 2785). XI heated in concd. aq. soln. with 2 mols. KOH forms a

tion is accompanied by a hypsochromic effect. (2) 3,3'-Trimethylenespirodinaphthopyran (IV) forms salts which are not deep blue but only violet and are less stable than those of the I which are not substituted in the 3,3'-position. In agreement with the observations of Dickinson and Heilbron IV shows no color phenomenon in either alc., C_6H_5N , xylene or $PhCl$ but in higher boiling solvents (e. g., Ph_2O) there appears a distinct violet color which fades out on cooling and reappears on heating. The influence of 3,3'-disubstitution is therefore only quant., not specific. A further argument in favor of ionoid dissoen. is that in the 3-Am deriv. (V) of I ($R = Am$, $R' = H$) the appearance of the color is favored and bathochromically influenced by a little H_2O ; boiled in abs. dry C_6H_5N it gives only a dirty violet color which is changed to a deep blue by a couple drops of H_2O ; as more H_2O ppts. the unchanged colorless IV there can be no chem. action of the H_2O . The decrease in basicity with substitution in the 3- and 3'-positions can be seen quite distinctly in the 3,3'-di-Ph deriv. (VI) of I; the VI forms colored solns in concd. H_2SO_4 and CCl_3CO_2H , to be sure, but the salts are exceedingly unstable and cannot be obtained from dil. solns. The perchlorate obtained from 2,1- $C_{10}H_6(OH)CHO$ (VII) and $(PhCH_2)_2CO$ is a 2-benzyl-3-phenylnaphthopyrylium salt (VIII), which, however, loses its acid quite easily and changes into the anhydro base, 2-benzyl-3-phenyl-5,6-benzo-2-chroman (IX). V, from VII and $MeCOCH_2Am$ in alc. satd. with HCl and subsequent decompn. of the deep blue HCl salt in alc. suspension with NH_3 , m. 182° ; perchlorate, deep blue needles with brass luster, m. 256° , converted by boiling Ac_2O into the Ac deriv., $C_{22}H_{23}O_7Cl$, brown, m. 204° (decompn.). IV-HCl, from cyclohexanone and 2 mols. VII in alc. with HCl , dark brown needles with a violet streak, m. about 172° , loses its acid on attempted recrystn.; perchlorate, violet, begins to decomp. about 160° , decompn. being complete only at 190° . Free IV can be obtained from C_6H_6 or dil. C_6H_5N in colorless crystals, m. 238° ; the orange-red soln. (acid salt) in concd. H_2SO_4 is changed by diln. with alc. to violet (neutral salt); it dissolves in glacial $AcOH$ without color or salt formation; the non-fluorescent C_6H_6 soln. is turned brown-red by picric acid and petroleum ether ppts a brown-violet picrate but on heating the soln. becomes decidedly lighter. 3,3'-Di-Me deriv. of I, from VII and Et_2CO , m. $237-8^\circ$; the orange soln. in concd. H_2SO_4 is changed to orange-red by alc.; it dissolves in CCl_3CO_2H with brown-red color, it shows no color phenomenon in hot solvents, the picrate is very unstable toward heat. VI, from $(PhCH_2)_2CO$ and a large excess of VII, m. $247-8^\circ$, forms in concd. H_2SO_4 a brown-red soln. gradually becoming lighter and fluorescent, in CCl_3CO_2H a dichroitic green-red soln.; the C_6H_6 soln. is turned orange by picric acid but no picrate could be isolated, it shows no color phenomenon on heating. VIII, from 1.7 g. VII, 4.2 g. $(PhCH_2)_2CO$ and 70% $HClO_4$ in $AcOH$ satd. with HCl , dark brown crystals with garnet luster and a yellow streak, m. about $212-4^\circ$, loses its $HClO_4$ on short boiling in alc., giving IX, vivid red-orange, m. 146° , regenerates VIII with $HClO_4$, sol. in concd. H_2SO_4 with red-orange color and green fluorescence.



C. A. R.

Isomerization of an isoxazole into a triazole derivative. G. WITTIG, F. BANGERT and H. KLEINER. Univ. Marburg. *Ber.* 61B, 1140-3 (1928).—An attempt to prep. 3-methyl-4,5-diphenylisoxazole from NH_2OH and $PhCHBzCOME$ was unsuccessful; the diketone is not attacked by NH_2OH or, under more energetic treatment, decomps. 3-Methyl-4-benzeneazo-5-phenylisoxazole (I) was accordingly made from $PhN_2CH-BzCOME$ and NH_2OH in the hope of being able to remove the PhN_2 group directly or indirectly. When I is heated above its m. p. there occurs an explosive reaction which can be moderated by the addn. of Cu powder or sand but the product, which has the same compn. and mol. wt. as the original I and forms an oxime and nitrophenylhydrazones, is 2-phenyl-4-methyl-5-benzoyl-1,2,3-triazole (II). The isomerization takes place only far above (at about 180°) the m. p. of the I. All attempts to synthesize II from the phenylhydrazones (III) of $BzC:(NOH)COME$ gave only 3-methyl-4-nitroso-1,5-diphenylpyrazole, but the methylphenylhydrazones (IV) on short boiling with Ac_2O yielded II, with loss of $MeOH$. In the prepn. of IV 3 of the 4 possible isomers were obtained: these m. 126° , $150-1^\circ$ and $164-5^\circ$, resp., but after the most

stable form (164-5°) had once been prepd. it was no longer possible to isolate the 150-1° isomer originally prepd. by heating the 126° compd. above its m. p. The isomerism is not due to differences in intermol. arrangement in the crystal lattice (polymorphism), since the Na salts of the isomers have different solubilities and II is formed with different velocities from the 3 forms; the 126° compd. gives II on merely bringing to a boil in Ac_2O , whereas the other 2 yield an acetate (V) which changes into II only after boiling 15 min. As the Beckmann oxime rearrangement gave no conclusive results no suggestion as to the configuration of the isomers is ventured. PhCHBzCOMe (12 g. from 20 g. PhCH_2Bz boiled in Et_2O under H with NaNH_2 and then treated with cold AcCl), m. 99-9.5°, gives no color with FeCl_3 . I (yield, 95%), red-yellow, m. 99-9.5°. II, m. 74°, *p*-nitrophenylhydrazone, yellow, m. 231-1.5°. (C. A. R.)

The action of formic ester on dibenzyl ketone. FRICH BENARY AND GUSTAV A. BITTER. *Ber.* 61B, 1057-60 (1928).—In attempts to condense $(\text{PhCH}_2)_2\text{CO}$ with HCO_2Et in the presence of NaOEt it was found that, contrary to the usual course of such reactions, the resulting Na salt on decomn. with mineral acids yielded only in part a hydroxymethylene deriv.; along with the latter was obtained a cryst. compd. of faintly basic instead of acid properties, sol. without change in concd. HCl . In part one CH_2 group of the ketone reacts with formation of the mono- CHOH compd. but the 2nd also partly reacts, especially when a large excess of ester and NaOEt is used. The resulting di-Na salt, however, does not give the free bis- CHOH deriv. with acids but the anhydride, β,β' -diphenylpyrone (I). The actual presence of the di-Na salt in the reaction product is shown by the formation of the dianilide, $(\text{PhC}(\text{CHNHPh}))_2\text{CO}$ (II), with $\text{PhNH}_2 \cdot \text{HCl}$. The ring in I is much more stable than in pyrone; to convert I into the γ -pyrnone (III), it must be heated to boiling with AcONH_4 . III on distn. with Zn dust in H gives β,β' -diphenylpyridine (IV). The mono- CHOH compd. obtained along with I, an oil which cannot be distd., is the chief product when 1 mol. each of $(\text{PhCH}_2)_2\text{CO}$, HCO_2Et and NaOEt are used. With PhNHNH_2 it yields 1,4-diphenyl-5(or 3)-benzylpyrazole (V). Et_2CO with HCO_2Et gives no pyrone but only $\text{MeC}(\text{CHOH})\text{COEt}$ I, m. 186-7°. III (β,β' -diphenyl- γ -hydroxypyridine), m. 376° sol. in concd. mineral acids, reprecip. partially by H_2O , completely by alkalis, reduced, by Na in boiling alc. to the piperidine (yield, very small), turns brown 290°, m. about 310°. IV, m. 193-4°, picrate, yellow, m. 276°. Bishydroxymethylenedibenzyl ketone dianilide (II), orange-yellow, m. 165.6°. V, m. 128°. (C. A. R.)

Condensation of chloral with substituted phenols. FREDERICK D CHATTAWAY AND FERNANDO CALVET. Queen's College, Oxford. *J. Chem. Soc.* 1928, 1088-94; cf. C. A. 21, 1965.—Condensation of $p\text{-H}_2\text{NC}_6\text{H}_4\text{OH} \cdot \text{HCl}$ and $\text{Cl}_3\text{CCHO} \cdot \text{H}_2\text{O}$ in concd. H_2SO_4 gives 6-amino-2,4-bis(trichloromethyl)-1,3-benzodioxin(I), m. 174.5°, identical with the reduction product of the corresponding NO_2 deriv. (C. A. 21, 233); the alk. soln. contains 2,4- $\text{HO}_2\text{S}(\text{H}_2\text{N})\text{C}_6\text{H}_3\text{OH} \cdot 7 \text{ Br deriv. of I}$, m. 171-3° (Ac deriv., m. 231-32.5°). Boiling I with KOH in EtOH gives 6-amino-2,4-bis(dichloromethylene)-1,3-benzodioxin, m. 113.7° (Ac deriv., m. 191-4°). $p\text{-MeC}_6\text{H}_4\text{N}_2\text{C}_6\text{H}_4\text{OH}$ gives 6-*p*-tolueneazo-2,4-bis(trichloromethyl)-1,3-benzodioxin(II), reddish yellow, m. 152-3°. Reduction of II with SnCl_2 in EtOH gives I and $p\text{-MeC}_6\text{H}_4\text{NH}_2$. *m*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$ and chloral give 5-hydroxytrichloromethylphthalide, m. 199-200°. 3,4- $\text{Me}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{OH}$ and chloral give 6-nitro-7-methyl-2,4-bis(trichloromethyl)-1,3-benzodioxin, pale yellow, m. 148-50°; alc. KOH gives 5-nitro-2-ethoxy-4-methylmandelic acid, m. 155°, which on oxidation yields a mixt. of 5-nitro-2-ethoxy-*p*-tolylglyoxylic acid, m. 194° (*p*-phenylhydrazone, m. 199°) and 6-nitro-3-ethoxy-*p*-toluic acid, m. 166°. *o*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{H}$ and *o*- and *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{OH}$ also condense with chloral but in each case a viscid and resin-like product has been obtained (C. J. WEST)

Flavanone glucosides. Y. ASAHINO, J. SHINODA, AND M. INUBUSE. *J. Pharm. Soc. Japan* 48, 207-14 (1928).—During the study of the constitution of sakuranin, the authors found that methylation of sakuranetin (I) (5,4'-dihydroxy-7-methoxyflavanone) resulted in the rupture of the flavanone ring to form a chalcone deriv. Perkin and Hummel (*J. Chem. Soc.* 85, 1459) also found that the methylation of butin resulted in the rupture of the flavanone ring to give butein, a methylated chalcone deriv. It was therefore suspected that acetylation might also cause the opening of the flavanone ring. As suspected, boiling of I with Ac_2O and AcONa gave triacetylsakuranetin, a chalcone deriv., m. 146°. These facts necessitate the reexamination of the constitution of some of the compds. to which a chalcone structure has been ascribed. The proof for the chalcone structure of hesperetin(II), according to Tutin (C. A. 5, 1078) is based upon the identity of the completely methylated product with the synthetic 2',4',6',3,4-pentamethoxychalcone and the formation of a tetra-Ac compd. Since II gives a violet color reaction by reduction (Tiemann and Will, *Ber.* 14, 951) a characteristic

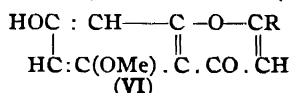
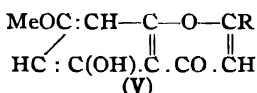
reaction for hydroxy- and methoxyflavanones, not possessed by chalcone derivs., T.'s formula for II is open to criticism. The acetylation of II with Ac_2O and a drop of H_2SO_4 gives a tri-Ac deriv. of II, m. $80-2^\circ$, colored red by reduction. Boiling of II with Ac_2O and AcONa gives a tetra-Ac deriv., m. 127° , not colored by reduction. These facts indicate that II has a flavanone structure easily convertible into a chalcone deriv. Moreover the absorption spectrum of II speaks in favor of the flavanone structure. Oesterle and Kueny's argument in favor of the chalcone nature of hesperetin (C. A. 10, 2472) is based upon the conversion of a Br deriv. of II into luteolin mono-Me ether by an alkali, but this reaction can also be considered as a conversion of 3-bromo-flavanone into a flavone. The chalcone formulas of T. for eriodictyol and homoeryodictyol are also open to the similar criticism. The four products of nature, butin, naringenin, sakuranetin and hesperetin, are all flavanone derivs. and occur in plants as glucosides.

NAO UYEI

Color reactions of flavone and flavanol derivatives and the like. J. SHINODA. *J. Pharm. Soc. Japan* 48, 214-20(1928).—K. had reduced 22 synthetic and natural flavone and flavanol derivs. in alc. with Mg and HCl in the presence or absence of Hg in order to study the color reactions of these compds. The results showed that the compds. having HO or MeO groups on the side Ph group give red to reddish violet color reaction, while compds. with Ph or other groups such as Me, $\text{PhCH}:\text{CH}$ or $\text{Ph}(\text{CH}_3)_2$ showed only a yellow coloration. Among the natural coloring matters, fukugetin and garcinin gave a reddish violet color. Of 7 synthetic flavanone derivs. tested, including sakuranetin and hesperetin Me ether, all except the non-substituted flavanone and 5,7-dimethoxyflavanone gave more or less strong reddish, or bluish violet colors. Of 18 synthetic chalcone derivs., none gave a color. Among 8 xanthone derivs., 1,3-dihydroxyxanthone, gentisin, isogentisin and gentisein gave a reddish violet color, while 1,3-dihydroxy-5-nitroxanthone gave a dark yellow color. Among Ph_2CO derivs., only maclurin gave a red color, while 2,4,6- $\text{Me}_3\text{C}_6\text{H}_2\text{COPh}$ and hydrocotoin gave no color. The following new compds. were prepd.: 2',4'-Dihydroxy-4-methoxychalcone, orange-yellow, m. 186° , from resacetophenone, anisaldehyde and alkali. 2-Methyl-3-acetyl-5,7-dihydroxychromone, m. 252° , from phloracetophenone, Ac_2O and AcONa . 7-Methoxyflavanone, m. 89° , from 2'-hydroxy-4'-methoxychalcone and $\text{EtOH}-\text{H}_2\text{SO}_4$. 7,8-Dihydroxyflavanone, m. 184° , from 2',3',4'-trihydroxychalcone and $\text{EtOH}-\text{H}_2\text{SO}_4$. 5,7-Dimethoxyflavanone, m. 140° , from 2'-hydroxy-4',6'-dimethoxychalcone and $\text{EtOH}-\text{H}_2\text{SO}_4$.

NAO UYEI

Phloracetophenone monomethyl ether. J. SHINODA AND S. SATO. *J. Pharm. Soc. Japan* 48, 220-2(1928).—Sonn (C. A. 20, 375) described 2 forms of phloracetophenone mono-Me ether, one m. $205-7^\circ$ (I) and the other m. $136-7^\circ$ (II). S. and S. obtained I and phloracetophenone di-Me ether from phloracetophenone tri-Me ether and AlCl_3 . Asahina, Shinoda and Inubuse (C. A. 22, 1592) obtained a mono-Me ether, m. $139-40^\circ$ (III), as a decompn. product of sakuranin (IV). III is probably identical with II. A., S. and I. could not arrive at the final constitution of IV because of the doubtful nature of the positions of the MeO group in I and II as assigned by Sonn. To make this point clear, I was converted into luteorin tri-Me ether by veratric anhydride and Na veratrate according to Robinson and Venkataraman's method for acacetin (C. A. 21, 93). The reaction should give either compd. V or VI ($\text{R} = 3,4-(\text{MeO})_2\text{C}_6\text{H}_3$). V, already been obtained by Perkins and Horsfall (*J. Chem. Soc.* 77, 1319), m.



$161-3^\circ$; acetate, m. $156-8^\circ$. S. and S. obtained VI, m. $285-6^\circ$, which gave a characteristic color reaction for flavones, yielded Herzig's luteorin tetraacetate, m. $225-7^\circ$, was converted into luteorin by HI, and into luteorin tri-Me ether by Me_2SO and KOH. These reactions show I has the MeO group ortho to the Ac group and III should have the MeO group para to the Ac group. Therefore the MeO group of sakuranetin should be at position 7.

NAO UYEI

Synthesis of 1,3-dihydroxy-7-nitroxanthone. H. YUMOTO. *J. Pharm. Soc. Japan* 48, 258-60(1928).—2,5- $\text{HO}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$ and 1,3,5- $(\text{HO})_3\text{C}_6\text{H}_2$ by Hoesch's reaction gave 1,3-dihydroxy-7-nitroxanthone, m. $281-2^\circ$. Diacetate, m. 162° . N. U.

Nitration of 3-ethoxypyridine. ERNST KOENIGS, HANS C. GERDES AND ALFRED SIROT. Univ. Breslau. *Ber.* 61B, 1022-30(1928).—3-Methoxypyridine (12 g. from 20 g. 3- $\text{C}_6\text{H}_4\text{NBr}$ with Na in MeOH), b. 179° (chloroplatinate, reddish yellow, m. 269°), gives no pure mono- NO_2 deriv. but when cautiously dissolved in concd. H_2SO_4 and

Constitution of lycorine. H. KONDO AND K. TOMIMURA. *J. Pharm. Soc. Japan* **48**, 223-37 (1928); cf. *C. A.* **21**, 3622.—After repeated recrystn. from hot alc. lycorine (I), $C_{18}H_{17}NO_4$, m. 280° . Two of the four O atoms are in a CH_2O_2 group, while the other 2 belong to alc. OH groups. I and Ac_2O give *diacetyllycorine* (II), m. $215-6^\circ$, $[\alpha]_D^{20}$ 31.5° . *HCl salt*, contains 1.5 mols. H_2O , decomps. 258° , $[\alpha]_D^{19}$ $96-8^\circ$. I and $ClCO_2Et$ give *tricarbethoxylycorine*, m. 68° . Heating of I with MeI in a closed tube gives *lycorine-MeI*, decomps. 247° , which with AgOH gives the *methohydroxide* (III). When III is heated with concd. KOH, *methyllycorinemethine*, $C_{18}H_{16}NO_4Me$ and *methyllycorine-isomethine* (IV) are obtained. By heating with 20% KOH, III gives *lycorine ψ -methohydroxide* (V) $C_{18}H_{17}NO_4Me(OH) \cdot 4H_2O$, decomps. 219° , which on drying in vacuum at 60° or below loses 4 mols. H_2O and at $65-100^\circ$, it loses another mol. of H_2O to give a neutral *isomethine* (VI) $C_{18}H_{16}NO_4Me$, m. 234° , and a small quantity of a *methine* sol. in HCl. When V is heated with MeI in a closed tube, it loses 1 mol. H_2O and gives

methylanhydrolycorine-MeI (VII), $C_{16}H_{13}NO_2Me$. MeI, decomps. 235° , whose methoxyhydroxide and 20% KOH give VI having 4 mols. of H_2O of crystn. VI and MeI also give VII. Dihydrolycorine (VIII) and MeI give its *methiodide* (IX), m. 282° , $[\alpha]_D^{17} -7.65^\circ$. VIII and Ac_2O give the *di-Ac deriv.*, m. 224° , $[\alpha]_D^{16} -8.61$. *HCl salt*, m. 211° , liberates VIII when treated with EtOH-KOH. II, H_2 and Pt oxide also give VIII. IX, after conversion into the methoxyhydroxide does not undergo Hofmann's exhaustive methylation. I and PCl_5 or $POCl_3$ give *isolycorine* (XI), $C_{16}H_{17}NO_4$, m. $201-2^\circ$. *HCl salt*, m. 266° . XI, H_2 and Pt oxide give *dihydroisolycorine*, decomps. 103° . *HCl salt*, decomps. 118° . VIII and $POCl_3$ give *anhydrosdihydrolycorine*, $C_{16}H_{13}NO_2$, m. 102° . The above reactions indicate that I has the structure $C_{16}H_{13}(OH)_2(:N)(:O_2CH_2)$. On heating or with a dehydrating agent, two OH groups are eliminated as H_2O by taking H from neighboring C atoms to give the anhydro base. I can be conceived of as 2 cyclic compds. jointed by the N atom. The compd. V and the methoxyhydroxide of IX do not undergo Hofmann's exhaustive methylation, probably because their N is the quinoline type or tetrahydroquinoline type. Therefore, Gorter's assumption (C. A. 15, 1711) of a tetrahydroisoquinoline ring in I and the production of hydraetic acid as an oxidation product is open to question. NAO UYEI

Synthetical experiments on the aporphine group. II. Synthesis of bulbocapnine methyl ether. JOHN M. GULLAND AND ROBERT D. HAWORTH. Univ. of Durham. *J. Chem. Soc.* 1928, 1132-7; cf. C. A. 22, 1978.—2,3,4- $O_3N(MeO)_2C_6H_2CH_2COCl$ (from 6 g. of the acid) and 5 g. $CH_2(O)_2C_6H_3CH_2CH_2NH_2$ in C_6H_6 give 8 g. of 2'-nitro-3',4'-dimethoxyphenylacetate- β -3,4-methylenedioxyphenylethylamide, m. 158° ; with PCl_5 in $CHCl_3$ (36 hrs.), 5 g. of the amide give 3.8 g. of 2'-nitro-3',4'-dimethoxy-6,7-methylenedioxy-1-benzyl-3,4-dihydroisoquinoline, pale yellow, m. 230° (decompn.); the *HCl salt*, very pale yellow, m. 230° (decompn.); *methiodide* (I), bright yellow, m. 215° (decompn.); with dil. alkali I yields oxyhydrastinine and 2-nitrohomoveratrole. Reduction of I with Zn and HCl gives 2'-amino-3',4'-dimethoxy-6,7-methylenedioxy-1-benzyl-2-methyltetrahydroisoquinoline, oily, analyzed as the *di-HCl salt*, m. 231° (decompn.); the diazo soln. gives a crimson azo dye with β - $C_{10}H_7OH$. Diazotizing in $MeOH-H_2SO_4$ gives *dl*-bulbocapnine Me ether, isolated as the *III salt*, m. 250° (decompn.); *methiodide*, m. 243° . C. J. WEST

Membranes of spores and pollen. I. Lycopodium clavatum L. FRITZ ZETZSCHE AND KARL HUGGLER. *Ann.* 461, 89-108(1928).—Extn. of *Lycopodium clavatum* spores with AcOH does not remove hydrocaffeic acid or albumins; these are removed, however, by a subsequent extn. with HCl or alkali. Alternatively, they may be removed in 1 stage by extn. with alkali. The membrane remaining (25% of the original spores) contains no lignin, and when treated with diacetylorthonic acid gives pure cellulose (about 2% of the crude spores). By boiling the crude spores with 5% alkali and extg. with alc. and H_2O (both boiling) a residue corresponding with 23-5% of the spores is obtained. This, after prolonged digestion with HCl, followed by boiling with 5% alkali, affords a new brownish yellow substance, *sporonin*, $(C_{16}H_{16}O_3)_x$. This appears to be a chem. individual, since the reactions which can be effected with it are reproducible with great exactness. Sporonin contains 1.26% OMe and forms about 21% of the crude spores. It is insol. in all common solvents, contains neither CO nor CO_2H groups, and is very stable towards mineral acids, alkalis and heat, beginning to decomp. first at 300° . When heated in $C_2H_5(OH)_1$ with KOH it affords *anhydrospononin*, $C_{16}H_{12}O_{21}$. Br converts sporonin in cold CCl_4 into *bromospononin I*, while free Br gives *bromospononin II*. These are not readily attacked by HNO_3 . Bromospononin I is converted by cold alkali into *bromospononin III*, the latter being brominated in CCl_4 to *bromospononin IV*. H_2O_2 oxidizes sporonin in AcOH to *oxidospononin*, $C_{16}H_{14}O_{31}$ or $C_{16}H_{14}O_{31}$. Boiling Ac_2O converts sporonin into a compd. contg. 13% Ac, which, however, on hydrolysis gives a substance other than sporonin. Me_2SO_4 and alkali transform sporonin into a substance contg. 2.2% OMe. C. J. WEST

3,4,5,6-Tetrahydro-4-carboline. JULIUS N. ASHLEY AND ROBERT ROBINSON. Univ. of Manchester. *J. Chem. Soc.* 1928, 1376.—3,4,5,6-Tetrahydro-4-carboline (tetrahydronorharman) (Asahina, Irie and Ohta, C. A. 21, 3622) is readily prep'd. by the reduction of 3-keto-3,4,5,6-tetrahydro-4-carboline (Manske and Robinson, C. A. 21, 1263) with Na and BuOH. Oxidation with CrO_3 gives a poor yield of norharman. C. J. WEST

Coloring matters of saffron. II. P. KARRER AND HARRY SALOMON. Helv. Chim. Acta 11, 513-25(1928); cf. C. A. 21, 2474.—The 3 substances isolated from saffron are identified as follows: α -crocetin (I) is a di- C_6H_3 acid, $C_{22}H_{24}O(CO_2H)_2$; β -crocetin (II) is its mono-Me ester; and γ -crocetin is its di-Me ester. The 5th O

atom is probably present in an ether or an inactive C:O linkage. OH and CO could not be detected. I is present in saffron as a sugar ester, α -crocin (IV), m. 186°. Hydrolysis of IV gives 4 mols. of glucose, which are present in IV as 2 disaccharide groups II also appears to be present in saffron as a sugar deriv., while III, being a di-Me ester, is not. III adds on 8 mols. of H to form $C_{22}H_{40}O(CO_2Me)_2$, b_p 198–200°. Crocetin is therefore an open-chain aliphatic di-CO₂H acid. The 8 double bonds are conjugated since decompn. with O₃ gives glyoxal bis- $\{p$ -nitrophenylosazone $\}$, m. 302–4°. Both I and II are converted into III with CH₂N₂, and II and III give I by sapon. I takes up over 40 atoms of O but no definite compds. were isolated from the reaction.

J. S. REICHERT

Conjugated double bonds. V. Constitution of carotin and bixin. RICHARD KUHN AND ALFRED WINTERSTEIN. *Helv. Chim. Acta* 11, 427–31 (1928); cf. C. A. 22, 1767.—To explain its color the 11 double bonds in carotin must be largely conjugated. The following formula for bixin is suggested: $MeO_2CCH=CH(CMe=CHCH=CH)_4CO_2H$. The 2 CO₂H groups are dissimilar since 2 Me Et esters are known. It adds on 18 H but only 10 halogen atoms. With O₃ Me bixin gives methylglyoxal and Me β -acetylacrylate indicating the presence of the $MeOCC=CHCMe=$ group. The formation

of *m*-xylene by dry heating suggests the presence of the $=CHCMe=CHCH CMe=$ group.

J. S. REICHERT

Chromoproteins of red algae. I. RUDOLF LEMBERG. *Ann.* 461, 46–89 (1928). Phycoerythrin (I) and phycocyan (II) have been extd. from *Ceramium rubrum* and from *nori* (Japan). The former in winter contains about 1.9% of total pigment, of which 15–25% is I. In the spring, the total pigment is only about 0.9%, of which about 35% is I. *Nori* contains 1.7–2.2% of total pigment, of which 32–50% is I. Incomplete investigations of the similar pigments in *Phyllophora nervosa* and *Rhodomela subfusca* are recorded. I is very strongly fluorescent. The effects of alkali, NH₃, ZnCl₂, CuSO₄·NH₄OH, concd. H₂SO₄, Br-H₂O, H₂O₂, (NH₄)₂S, H₂SO₃ and Molisch's reagent are mentioned. II is less fluorescent than I. That from *Ceramium* forms large, rhombic leaflets, showing dichroism in polarized light. That from *nori* has a different cryst. form. The effect of different H-ion concns. on aq. solns. of both pigments has been investigated. I has an appreciable Ca content but no other metal could be detected. Scission of I with pepsin in acid soln. produces "phycobitin". Solns. of I and II obey Beer's law.

C. J. WEST

Carotin. RUDOLF PUMMERER AND LUDWIG REBMANN. Univ. of Erlangen. *Ber.* 61B, 1099–102 (1928).—Because of the appearance of the paper of Zechmeister, v. Cholnoky and Vrabély (C. A. 22, 2169) P. and R. report now the results of some expts. in connection with rubber (I) carried out partly to test analytical methods for measuring double bonds and partly to det. why the still more unsatd., colored carotin (II) shows so little similarity to I in respect to viscosity, associating power, etc. Quant. measurements (by G. SCHEIBE AND A. ROSENBERG) of the spectrum of II showed a quant. unusually strong absorption ($\log K > 5$, K being the extinction coeff.) in the visible regions; there is a double max. at 451 ($\log K$ 5.3) and 482 $m\mu$ ($\log K$ 5.2). The most interesting fact is that the chief band is drawn together into one and is of such a height that this plant hydrocarbon can well be compared as to absorption with many very powerful dyestuffs and is approx. equiv. to eosin ($K > 5$). Besides the chief band there is a much weaker secondary band at 273 $m\mu$. I with the Pileshaeiev reagent in CHCl₃ at 0° gives rapidly a normal oxide (C₄₀H₅₈O)₂, 1 double bond reacting for every C₈H₈ group. Of II, C₄₀H₅₆, each mol. consumes 8 atoms O, indicating the presence of 8 double bonds if the reaction proceeds normally. II adds only 1 mol. Br₂. According to Escher (*Diss. Zürich*, 1909) it uses up 22 atoms of Br but at the same time 20 mols. HBr are split off. Cl, on the other hand, gives a product very rich in Cl with liberation of only very little HCl. Titration with ClI (by FRANZJOSEF MANN) showed that at room temp. II absorbs 11–11.5 mols., while Z., v. C. and V.'s crude perhydrocarotin, C₄₀H₇₈, corresponds to the absorption of 11 mols. H₂. But in the reaction with ClI about 3 mols. halogen acid are liberated. Apparently, then, 8 double bonds react like normal aliphatic double bonds with BzO₂H and ClI, while 3 do not react with BzO₂H and react abnormally with ClI. Possibly these 3 "sluggish" double bonds are present in a C₈H₆ (cymene) nucleus. Xanthophyll unexpectedly showed the presence of 8 double bonds with BzO₂H.

C. A. R.

Cortex of Byrsonima crassifolia. G. HEYL AND H. HEIL. *Festschr. A. Tschirch* 1926, 62–71.—The cortex of *Byrsonima crassifolia* contains byrsonimol, C₂₃H₄₀O, m. 197.5°, $[\alpha]$ 96.94° (Ac deriv., m. 242°; Bz deriv., m. 232°), giving in concd. H₂SO₄ a yellow soln. becoming brown on addn. of Ac₂O or reddish yellow to dull red when

warmed. The substance, when treated with Ac_2O and (dropwise) with concd. H_2SO_4 , gives a deep violet-red soln. These and other color reactions are given by naturally occurring higher alcs. of the character of phytosterols. B. C. A.

Organic catalysts with H-ion optimum (LJUNGGREN) 2.

CHAMBERLAIN, JOSEPH SCUDDER: **A Textbook of Organic Chemistry**. 2nd ed. revised. Philadelphia: P. Blakiston's Son & Co. 901 pp. \$4. Reviewed in *Chemicals* 29, No. 25, 22(1928).

CONANT, JAMES BRYANT: **Organic Chemistry**. A brief introductory course. New York: The Macmillan Co. 291 pp. \$2.60.

COURTOT, C.: **Le magnésium en chimie organique**. Paris: A. Blanchard. 351 pp. Cloth bound, F. 40.

LABOUREUR, MAURICE: **Initiation à la chimie organique**. Cours donnant très rapidement sous une forme simple et imagée et précise les méthodes de préparation et de synthèse des corps organiques. Paris and Liège: Ch. Béranger. 126 pp.

Richter-Anschütz **Chemie der Kohlenstoff-verbindungen oder Organische Chemie**. Band I. Die Chemie der Fettkörper. 12th ed. Revised and rewritten by Dr. Reindel. Akademischen Verlagsgesellschaft m. b. H. 850 pp. Price about M. 55.

Oxidation products from gaseous hydrocarbons. JOSEPH H. JAMES (to Clarence P. Byrnes, trustee). U. S. 1,675,029, June 26. A gaseous stream contg. O and a proportion of gaseous hydrocarbons such as CH_4 or higher hydrocarbons which is greater than comes within the explosive range is passed through a catalytic layer such as Mo oxide or a similar compd. at a temp. (suitably about 550° with CH_4 and Mo oxide) below the volatilizing point of the catalyst and at such velocity as to produce partial oxidation products, e. g., CH_2O from CH_4 . An app. is described.

Oxidizing alcohols. A. I. MAKOVEZKII and V. V. YANOVSKII. Russian (Soviet) No. 1420, July 31, 1926. Air is blown through a container with alc. and a catalyst at a rate sufficient to form aldehyde. The water is condensed and the aldehyde mixed with fresh air is blown again over another catalyst and oxidized to acid.

Pyrogenous treatment of organic acids. G. L. STADNIKOV, N. N. GAVRILOV and A. A. VINOGRADOV. Russian (Soviet) No. 1245, Sept. 15, 1924. Org. acids are led in vapor form at $250\text{--}400^\circ$ over iron reduced from iron oxide pptd. on pumice stone, asbestos or similar material. *Lubricating oils* are obtained by this treatment of fatty acids from vegetable or animal fats.

Column apparatus for hydrolysis of alkylsulfuric acids. MAURICE DUCHANGE (to Compagnie de Bethune). U. S. 1,674,891, June 26. Alkylsulfuric acid to be hydrolyzed is introduced into filling material in the lower portion of a column after passing in heat-exchange relation with vapors arising from contact plates in the upper part of the column; steam and a neutralizing agent may also be admitted into the lower part of the column; residue is withdrawn at the bottom and vapors are led off from the top.

Aromatic acid anhydrides. BRITISH DYESTUFFS CORPORATION, LTD., J. B. PAYMAN and N. HALL. Brit. 280,373, Nov. 29, 1926. Benzoic anhydride is obtained by treating benzotrichloride at $100\text{--}105^\circ$ with water in the presence of pumice contg. ZnCl_2 , or by heating benzotrichloride to $110\text{--}115^\circ$ with dry FeSO_4 or FeCl_3 and benzoic acid, or by heating benzotrichloride at $100\text{--}105^\circ$ with FeSO_4 crystals. Similarly, other aromatic acid anhydrides may be produced by use of catalysts such as chloride, sulfate, oxide, benzoate or sulfonate of Zn, Cu, Fe, Al or Sn.

Acetic anhydride, etc. H. DREYFUS. Brit. 279,916, June 1, 1926. Ac_2O or other aliphatic acid anhydrides are made by heating the corresponding acid in vapor form and condensing or extg. the anhydride from the reaction products without condensing or extg. the water. Dil. or concd. HOAc may be used and a temp. of $200\text{--}1200^\circ$ may be used in reaction tubes of Cu, Fe, earthenware or other materials in the presence of a catalyst and under either reduced or increased pressure. Among the solvents which may be used for the selective extn. of the anhydride are: PhCl , *p*-dichlorobenzene, benzyl ether, $\text{C}_6\text{H}_5\text{Cl}$, paraffin oil, triacetin or other acetyl glycerols, phenetole, anisole, cresols and *p*-cresol acetate.

Alkylguanidines. CHEMISCHE FABRIK AUF AKTIEN, VORM. I. SCHERING. Brit. 279,884, Oct. 28, 1926; Can. 281,121, June 19, 1928. Isoamyl-, hexyl-, heptyl- and phenylethylguanidines are prepd. by heating a salt of the corresponding alkylamine with cyanamide in aq. or alc. soln. Pentamethylene-, hexamethylene- and deca-

methylene-diguanidines are made from the corresponding diamines and cyanamide. *N*-methyl-*N'*-hexylguanidine is made by heating hexylamine with methylcyanamide in alc. Propyl-, amyl-, isoamyl- and hexylguanidines are made by allowing a salt of the corresponding amine to stand with a soln. of cyanamide in NaOH.

Thiuram disulfides. SILESIA VEREIN CHEMISCHER FABRIKEN. Brit. 279,790, Oct. 30, 1926. Alkyl-aryl-substituted dithiocarbamic acids are oxidized in alk. soln. by a mixt. of NO and air; e. g., dimethyldiphenylthiuram disulfide is made from the NH_4 or alkali metal salt of methylphenyldithiocarbamic acid.

Acyl naphthalenes and acenaphthenes. I. G. FARBEIND. A.-G. Brit. 279,506, Oct. 23, 1926. Monoacyl derivs. such as α -benzoylnaphthalene or 5-benzoylacenaphthene are treated with an aromatic or aliphatic acid chloride such as benzoyl chloride in the presence of AlCl_3 to obtain diacyl derivs.

Acetone. HOLZVERKOHLLUNGS-INDUSTRIE A.-G. Brit. 280,184, Nov. 4, 1926. In the catalytic manuf. of acetone from C_2H_2 and steam, a suitable catalyst such as Fe oxide is rendered more active by the addn. of a "promoter" such as Fe, Mn oxide, Al_2O_3 , BaCO_3 , ZnCO_3 , lime or MgO and the catalyst and promoter are preferably used on a metallic carrier. The partial pressure of O in the reaction mixt. should be adjusted in accord with the reaction temp. employed. Several examples are given.

Menthol. HANS JORDAN, WALTER SCHOELLER and REINHARD CLERC (to Chemische Fabrik auf Aktien, vorm. E. Schering). Can. 281,116, June 19, 1928. Menthol is produced by action of H under pressure in presence of catalyst and menthane on a product of condensation of *m*-cresol and acetone at about 280° until 16 atoms H have entered into the combination.

Thymol. HANS JORDAN (to Chemische Fabrik auf Aktien, vorm. E. Schering). Can. 281,117, June 19, 1928. Thymol and its isomers and homologs are produced by treating the condensation product of *m*-cresol and acetone at about 180 – 190° in the presence of about 0.1% Al 3-methyl-6-isopropylphenolate and about 1% of a Ni catalyst with H until 4 H atoms have entered into the combination, and sepg out the thymol.

Products from cresols and ketones. HANS JORDAN (to Chemische Fabrik auf Aktien, vorm. E. Schering). Can. 281,118, June 19, 1928. The product of condensation from *m*-cresol and acetone is distd. and the vapors are slowly conducted over a layer of frankonite heated to about 320°C . The product of decompn. is mixt. of dimethylcoumaran and 3-methyl-6-isopropylphenol. If *m*-cresol is replaced by *p*-cresol there are obtained dimethylcoumaran and 4-methyl-6-isopropylmethylphenol. Cf. C. A. 22, 2756.

Phenols. HANS JORDAN, WALTER SCHOELLER and REINHARD CLERC (to Chemische Fabrik auf Aktien, vorm. E. Schering). Can. 281,114, June 19, 1928. The products of condensation of phenols with ketones are treated under pressure with H in the presence of a catalyst. E. g., hydrogenation of the product of α -naphthol and AcMe gives as a new compd. 4-isopropyl-1-naphthol.

Phenols and coumarans. CHEMISCHE FABRIK AUF AKTIEN, vorm. E. SCHERING. Brit. 279,857, Oct. 26, 1926. Alkylisopropylphenols and alkylcoumarans are made by bringing the etheric condensation products of *m*- and *p*-cresol with ketones (such as acetone) into contact with a surface catalyst, preferably at a temp. of about the b. p. Bleaching earths, silica gel and charcoal may be used and their activity may be increased by depositing on them Ni or Ni oxide or other metals or metal compds. of catalytic properties. The products may be hydrogenated to produce thymol and menthol.

Hydrogenating phenols. CHEMISCHE FABRIK AUF AKTIEN, vorm. E. SCHERING. Brit. 279,855, Oct. 26, 1926. Alkylisopropylphenols and the corresponding cyclohexanols are made by hydrogenating the mixt. of alkylisopropylphenols and alkylcoumarans, described in Brit. 273,686 (C. A. 22, 1982), without previous fractionation. After hydrogenation (which may be effected in the presence of a Ni catalyst), the mixt. is fractionated, preferably *in vacuo*. Thymol, menthol and their isomers may be obtained.

Alkylisoalkylphenols. WALTER SCHOELLER and HANS JORDAN (to Chemische Fabrik auf Aktien, vorm. E. Schering). Can. 281,120, June 19, 1928. Alkylisoalkylphenols are manufd. by first decompg. by heating the condensation products obtainable from alkylated phenols and acetone, thereafter hydrogenating the mixt. of the products of decompn. until 2 H atoms have entered into combination, and finally sepg. from the mixt. the alkylisoalkylphenols.

Hydrogenated alkylisoalkylphenols. WALTER SCHOELLER and HANS JORDAN (to Chemische Fabrik auf Aktien, vorm. E. Schering). Can. 281,119, June 19, 1928.

Alkylisoalkylphenols hydrogenated in the nucleus are produced by heating the condensation products obtainable from *m*-cresol and acetone, hydrogenating the mixt. of the products of decompn. until 8 H atoms have entered into combination, and finally sepg. from the mixt. the hydrogenated alkylisoalkylphenols.

Phenolic compounds. HANS JORDAN, WALTER SCHÖELLER and REINHARD CLERC (to Chemische Fabrik auf Aktien, vorm. E. Schering). Can. 281,115, June 19, 1928. Thymol or its isomers and homologs are produced by acting with H under pressure in the presence of a catalyst and a diluent (menthane) on the product of condensation of a cresol and a ketone at about 280° until 4 H atoms have entered into the combination.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Studies on the influence of benzoic acid and of the three isomeric hydroxybenzoic acids on succinodehydrogenase. SVEN MÅHLÉN. *Skand. Arch. Physiol.* 53, 152-75 (1928).—The K salts of benzoic and hydroxybenzoic acids have been used in expts. with succinodehydrogenase extd. from horse flesh. The methylene blue method was employed. The discoloration, *i. e.*, the oxidation, was inhibited by all these substances, the order of their action being: salicylic acid > *m*-hydroxybenzoic > *p*-hydroxybenzoic > benzoic acid, and a 10% reduction in enzyme activity was attained with 0.5, 5, 12 and 24 millimol. concns. of the 4 acids. S. M.

Heparin. W. H. HOWELL. *XII Int. Cong. Physiol.* 1926, 80; cf. *C. A.* 17, 3349.—Heparin, an anticoagulant prepd. from liver, contains Ca and sulfate, but no protein, amino acid or P. It may be a conjugated glucuronic acid of glucosidic structure. B. C. A.

Influence of x-rays on certain blood constituents. A. GIGON and M. LÜDIN. *Schweiz. med. Wochschr.* 56, 814-6(1926). B. C. A.

The free-energy decrease of alcoholic fermentation. E. I. FULMER and EINAR LEIFSON. *Iowa State Coll. J. Sci.* 2, 159-77(1928).—The method of applying the concept of free energy decrease to microbiological processes is explained and illustrated. The difference between heat evolved, ΔH and free energy ΔF is emphasized. A comparison of symbols used by Gibbs, Plank, W. McC. Lewis, MacDougal, G. N. Lewis, Eucken and Jette & LaMer's translation of Eucken, for equiv. thermodynamic functions and a summary of the relation involving A , the available energy, at const. volume and F , the free energy, at const. pressure are given. The formation of alc. from sucrose is assumed to be quant. $C_{12}H_{22}O_{11} + H_2O \rightarrow 4C_2H_5OH + 4CO_2$. Tables give: the fugacity of CO_2 from 1 to 800 atms.; $-\Delta F$ for CO_2 from 10^{-10} to 800 atms.; $-\Delta F$ for EtOH solns. from 0.21×10^{-10} to 4.94 *M*; ΔF for the effect of the presence of 0%, of 20%, and of 50% EtOH on the diln. of solns. of $C_{12}H_{22}O_{11}$ from 5.35 to 0.001 *M*; and $(\Delta F - K)$ for initial concns. of sugar from 1.00 to 0.30 *M* in each of 3 initial concns. of EtOH, 0.21×10^{-10} , 0.21×10^{-1} and 0.21. In the last table ΔF is the free energy decrease under the initial conditions indicated, and K the free energy decrease for standard states. The average value of $(\Delta F - K)$ is 27 Cal., or $-\Delta F$ at ordinary conditions for fermenting sugar is 23% greater than $-\Delta F$ for standard states. For standard states, $-\Delta F^\circ_{-298} = 116.6$ and $-\Delta H = 51.2$ Cal. The paper is written primarily for biological, and not for physical, chemists. F. E. BROWN

Hemoglobin. J. BARCROFT. *Chemistry and Industry* 47, 609-17(1928).—A review of the chemistry and properties of hemoglobin and its decompn. products protoporphyrin, hemochromogen, cytochrome; the differences in the hemoglobin of various species, especially in their affinities for O_2 ; the mol. wt. of hemoglobin and its equilibria with O_2 . F. A. CAJORI

The question of the electrodialysis of serum. G. ETTISH, R. BRADFELD and W. EWIG. Kaiser Wilhelm Inst. Physik. Chem., Berlin. *Kolloid-Z.* 45, 141-5(1928).—When a d. c. of 120 v. and about 96 ohms resistance is passed through a dil. soln. of serum with a collodion and hemoglobin membrane at the anode and a parchment membrane at the cathode, serum globulin is pptd. The p_H of the soln. shows a remarkable shift, becoming at first more alk. and later, if the dialysis is continued, more acid, a change which is explained by the character of the membranes at the anode and cathode. F. A. CAJORI

Considerations concerning the "protein sugar" in blood. G. QUAGLIARIELLO. *Arch. sci. biol. (Italy)* 11, 106-38(1928).—A review of recent work. The exact amt. of protein sugar formed cannot be definitely detd. as it varies according to conditions under which the hydrolysis takes place, and sugar is never sepd. from the mol. without also affecting the protein radical. A. W. CONTIERI

Formation of lactic acid in the oxidation of glucose in the presence of animal carbon. V. BOLCATO. *Boll. soc. ital. biol. sper.* 2, 884-7(1927).—Many org. acids and salts are oxidized in the presence of bone black activated by H_3PO_4 , but there have been conflicting results obtained in the oxidation of glucose. Ten cc. of glucose soln. (2-3%) (sterile) was added to 0.3 g. of bone black (not activated) and kept 75-100 hrs. at 40° with occasional stirring. The remaining glucose was detd. iodometrically according to Lehmann. In about 20 detns. amts. of glucose varying from 1 to 5% were consumed. Traces of lactic acid were found in residual liquid. Lactic acid is itself oxidized by bone black; therefore, only traces are found. A. W. CONTIERI

The effect of gradual removal of oxygen from inspired air. R. ROMANESE. *Boll. soc. ital. biol. sper.* 2, 887-9(1927).—Two methods were used; in the first a rabbit was placed in a closed space and tubes were so connected that aspirated air passed through NaOH, thus removing CO_2 . The air became rarified from loss of O_2 by fixation, this was neglected. The rate of breathing gradually decreased from 55 to 33 per min and the heart beat slowed down till breathing and heart-beat stopped practically at the same time. In the second expt., N_2 was added to replace the O_2 removed by CO_2 fixation. The vol. of air breathed increases although the rate decreases, as above. Blood pressure remains fairly const. until O_2 is down to 10% when several rapid drops occur. Breathing stopped about 2 min. before heart-beats stopped. A. W. CONTIERI

Chemical composition of follicular liquor. G. B. TAFURI AND M. TESTA. *Boll. soc. ital. biol. sper.* 2, 893-4(1927).—The physicochem. compn. of the liquid from the follicles of the cow's ovary has been studied. It is a yellow, somewhat viscous, turbid liquid with d. 1.027 at 11°, 1.022 at 29°, surface tension 0.958; mol. lowering of f p 0.589-0.63°; viscosity (H_2O at 37° = 1.50") = 3.39"; cond. at 12° = 175.8×10^{-4} , p_H 7.40; N 1.34612, loss at 105° (moisture) = 92.49%; total N_2 = 11.083%, residual N_2 (pptd. with $COOH\ CCl_3$) = 0.443%; residual N_2 (pptd. with phosphotungstic acid) 0.3187%; proteins pptd. by $(NH_4)_2SO_4$ = 22.85%; protein coagulable 34.1. 35.08 = av. 34.59%; reducing power (glucose) 0.987%. The figures given, except water, are % of the dry residue. Protein N_2 (total N_2 minus N_2 pptd. by $CCl_3\ COOH$) = 10.64%, so that there are 66.5% proteins; of these 22.85% = % pptd. by $(NH_4)_2SO_4$, and 34.59% coagulable, leaving 9.07% which is not coagulable by heat, and which is pptd. by EtOH, probably ovomucoids. Traces of fat and lipoids in the liquid have not been identified. A. W. CONTIERI

The biological-chemical trend in research in dermatology. ERICH URBACH. *Wiener klin. Wochschr.* 41, 581-4, 634-6(1928).—A review with bibliography. D. B. DILL

The chemistry of sputum. II. HELMUT MÜLLER AND HELMUTH REINWEIN. *Z. physiol. Chem.* 176, 200-6(1928); cf. *C. A.* 20, 3700.—From 2.5 l. of sputum collected over a period of 2 months from a bronchiectatic and preserved with PhMe and $CHCl_3$, arginine and choline were isolated and identified. The presence of urea could not be demonstrated. The choline may possibly account for the contraction of cat intestine observed by Harkaw (C. A. 20, 232) with the alc. ext. of a similar sputum and attributed by him to histamine. A. W. DOX

Composition of intraocular fluids. 1. Ox and horse. F. TRON. *Arch. Ophthalm.* 117, 677-92(1926). H. C.

The inactivation of urease. E. G. SCHMIDT. Mercy Hospital, Baltimore. *J. Biol. Chem.* 78, 53-61(1928).—The inactivating action of $HgCl_2$ on urease is suggested as a means of standardizing the latter. Hg , however, could not be detected in the blood of patients poisoned with $HgCl_2$ when this method was employed. The inactivating power of Ag^+ , Hg^{++} , Cu^{++} , Zn^{++} , Cd^{++} , U^{++++} , Au^{+++} , Pb^{++} , CO^{+++} , Ni^{+++} , Ce^{+++} and Mn^{++} are in the order named. ARTHUR GROLLMAN

Review of recent developments in histochemistry. MAURICE PARAT. *Biol. Rev. Biol. Proc. Cambridge Phil. Soc.* 2, 285-97(1927). E. H.

Biochemical experiments practical for elementary biology classes. HENRY J. FRY. Washington Square College. *Science* 68, 16-8(1928). E. H.

The common ground of the chemist and biologist. WM. CHARLES WHITE. *Science* 68, 21(1928). E. H.

Effect of ultra-violet radiation on the blood alkali reserve of children. E. LEEN-

HARDT AND J. CHAPTAL. *Bull. sci. med. biol. Montpellier* **8**, 425-8(1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 494.—Irradiation with a Hg-quartz lamp causes in rachitic and dystrophic children a rapid increase of the alkali reserve, in normal children an increase to the adult level.

MARY JACOBSEN
Scleroproteins. R. O. HERZOG. *Helv. chim. Acta* **11**, 529-33(1928).—X-ray investigation of natural albumin-like fibers shows that they consist to a large extent of submicroscopic crystals. These crystd. portions H. calls scleroproteins. Measurement of the x-ray diagram shows that the crystallographic elementary cell of the scleroproteins is relatively small. The structure of the scleroproteins is probably different from that of the true proteins (albumins). The study of collagen and fibroin indicates that each substance is a mixt. of probably 1 crystd. and several amorphous compds., the nature of the mixt. varying with the source. The material obtained by treating fibroin with resorcinol dissolves in *m*-cresol to give a polydisperse soln. of av. mol. wt. of about 320

LOUISE KELLEY

The inhibition of acid irritation by sugars. WALTER R. PENDLETON. Univ. of Chicago. *Am. J. Physiol.* **82**, 358-69(1927).—The irritating effects of lemon juice, citric, tartaric, lactic, nitric and sulfuric acids on frogs' skin were reduced by the presence of sucrose, levulose, glucose and lactose in the acid soln., the degree of reduction being related to the sweetness of the sugar rather than to mol. wt. HCl and AcOH were only slightly inhibited. The addn. of sugar did not change the p_H of the acid solns. It is suggested that the sugar mols. are adsorbed at the cell surfaces. J. F. LYMAN

The effect of carbon monoxide and oxygen at high pressure on the power of animal tissue to cause the oxidation of guaiacum. ARTHUR L. MEYER. Johns Hopkins. *Am. J. Physiol.* **82**, 370-5(1927).—When hemoglobin combined with CO its behavior toward guaiacum in the presence of H_2O_2 was altered; more H_2O_2 was needed to produce the guaiacum reaction than was needed with blood free from CO. CO in a concn. of 10% seemed to have no effect on the power of muscle tissue to give the guaiacum reaction. When brain tissue in water suspension was exposed to O_2 at 4 atm. the guaiacum reaction was much reduced, indicating a definite retarding influence on the metabolic activity of the brain tissue. J. F. LYMAN

The oxidation of sodium lactate by red blood cells. GEORGE B. RAY. Western Reserve Univ. *Am. J. Physiol.* **82**, 405-14(1927).— CO_2 production by red blood cells, measured by the method of Osterhout, shows that such cells in a proper substrate have an appreciable metabolism. In the absence of air (O_2) acetaldehyde (recognized by its odor) is the end-product of sodium lactate oxidation by red blood cells. In the presence of O_2 the acetaldehyde probably forms acetyl peroxide, which in turn oxidizes the hemoglobin to methemoglobin. J. F. LYMAN

Colloid properties of the surface of the living cell. III. Electric impedance and reactance of blood and muscle to alternating currents of 0 to 1,500,000 cycles per second. J. F. McCLENDON, WITH F. A. COLLATZ, J. BARTON AND R. M. JOHNSON. Univ. of Minn. *Am. J. Physiol.* **82**, 525-32(1927).—A new high-frequency Wheatstone bridge with heterodyne detection and 2-stage amplification and all parts, including the A and B batteries, shielded in Cu is described. The sp. impedance of erythrocytes at 1,500,000 cycles per sec. seems to be about the same as that of erythrocyte interiors and to be about 400 ohms or roughly that of a 0.02 *N* NaCl soln. The elec. resistance of the erythrocyte surface is very high, but probably much less than that of *Valonia*. It seems improbable that Osterhout's conclusions as to the impermeability of *Valonia* to ions can be applied to ox erythrocytes. J. F. LYMAN

Simultaneous study of the constituents of the sweat, urine and blood; also gastric acidity and other manifestations resulting from sweating. IV. Ammonia nitrogen. G. A. TALBERT, R. FINKLE AND D. KATSUKI. Univ. of N. Dak. *Am. J. Physiol.* **82**, 639-43(1927); cf. *C. A.* **21**, 3917.—Sweat contained from 0.05 to 0.35 mg. NH_3 N per cc. An increase in NH_3 of the urine as a result of sweating is indicated. There was a correlation of 41% between NH_3 N and urea N of the sweat; but no correlation between NH_3 of the sweat and NH_3 of the urine. J. F. LYMAN

Capillary permeability. III. The effect of lack of oxygen on the permeability of the capillary wall to fluid and to plasma proteins. EUGENE M. LANDIS. Univ. of Penn. and Woods Hole. *Am. J. Physiol.* **83**, 528-42(1928).—Lack of O_2 increased capillary permeability in frog mesentery. The movement of fluid through the asphyxiated capillary wall was directly proportional to the difference between capillary pressure and the effective osmotic pressure of the plasma proteins. Exposure of the mesentery to Ringer soln. 0.5 satd. with CO_2 produced no change in permeability. Complete satn. with CO_2 increased the rate of fluid movement slightly but the wall remained impermeable to protein. Increase in acidity produced almost no change in fluid movement

within physiol. limits, though at p_H 4.0 the characteristic effects of injury appeared.

J. F. LYMAN

The response of smooth muscle in different ionic environments. H. B. VAN DYKE and A. BAIRD HASTINGS. Univ. of Chicago. *Am. J. Physiol.* **83**, 563-77(1928).—

The response of the isolated virgin guinea-pig uterus to pituitary ext. was obtained in various ionic environments. Variations in all physiologically essential ions singly or together altered the response. Changes in Ca ions produced the greatest relative change in response. The uterus was sensitive to changes in the carbonate ion. J. F. L.

Oxidation processes occurring in the system plasma (serum)-potassium ferri-cyanide. G. LITARCZEK. Cambridge. *J. Physiol.* **65**, 1-14(1928).—A mixt. of plasma (or serum) and $K_3Fe(CN)_6$ absorbs O_2 when exposed to the air. K_4FeCN_6 or $FeCl_3$ cannot replace $K_3Fe(CN)_6$ in the system; but hemoglobin can do so. The ether-sol. lipoids seem to be an important factor in the part played by the plasma since (1) in lipemia the plasma was most highly active; (2) the removal of the lipoids by ether extn. greatly reduced the O_2 adsorptions; (3) serum filtrates after removal of lipoids and proteins were quite inactive; (4) the extd. lipoids when redissolved had some power of absorbing O_2 in contact with $K_3Fe(CN)_6$, though not so great as did the original plasma from which they were extd. The estn. of O_2 in blood by the use of $K_3Fe(CN)_6$ is subject to error. The Van Slyke method is the only one suitable for lipemic blood. Other methods in which $K_3Fe(CN)_6$ is used are accurate in proportion as they can be manipulated rapidly. The absorption of O_2 by the system plasma-hemoglobin is thought to have physiol. importance.

J. F. LYMAN

Autoxidation and reduction. E. AUBEL and I. GENEVOIS. *Rev. gén. botan.* **40**, 53-62, 120-7, 184-9, 244-50(1928).—A review, with bibliography, of oxidation-reduction reactions as applied to biology.

LAWRENCE P. MILLER

The physiological action of radiant energy. HENRY LAURENS. Tulane Univ. *Sci. Monthly* **26**, 353-62(1928).—A general article on the various aspects of the use of radiation in the treatment of disease.

LAWRENCE P. MILLER

Studies on iodine metabolism. I. The iodine excretion in the urine of inhabitants of Norwegian goiter regions. GULBRAND LUNDE. *Biochem. Z.* **193**, 94-104(1928).—See C. A. **22**, 1785.

S. MORGULIS

The rate of reaction between enzyme and substrate. J. BERKSON and L. B. FLEXNER. *J. Gen. Physiol.* **11**, 433-57(1928).—The course of change of viscosity in a mixt. of gelatin and pancreatin is accurately described by an equation of the form, $v_t - v_\infty = (v_f - v_\infty) / [1 - \{(v_0 - v_f) / (v_0 - v_\infty)\} e^{-rt}]$, in which v_t = time of flow of the mixt., v_∞ the time of flow for water, v_f the time of flow of the mixt. when proteolysis is complete, v_0 the time of flow at the beginning of the expt., t time of observation, r a const. An equation of the same general form has also been found to apply to the reaction between urease and urea, diastase and starch, and yeast juice and a polypeptide. The equation can be derived theoretically by assuming a bimol. autocatalytic reaction between enzyme and substrate. Preliminary expts. show that the correlation between r and the concn. of enzyme used is linear. Further expts. are in progress. C. H. R.

Combination of salts and proteins. III. The combination of $CuCl_2$, $MgCl_2$, $CaCl_2$, $AlCl_3$, $LaCl_3$, KCl , $AgNO_3$, and Na_2SO_4 with gelatin. J. H. NORTHROP and M. KUNITZ. Rockefeller Inst. *J. Gen. Physiol.* **11**, 481-93(1928).—The equiv. combining value of Cu is about 0.9 millimols. per g. gelatin, the same as that for H; the value for deaminized gelatin is approx. 0.4-0.5 millimols. per g., again the same as that for H. The sum of the H and Cu ions combined with gelatin in the presence of an excess of either ion is 0.9 millimols., indicating that there is an equil. between Cu, H and gelatin and that Cu and H are attached to the same group in the gelatin mol. The equiv. combining value of La and Al ions is approx. 0.5 millimols. per g. gelatin, the value for deaminized gelatin being about the same. This suggests that these salts combine only with gelatin groups which are not affected by deamination. Ca is not combined on the acid side of p_H 3; the no. of millimols. combined rises rapidly from p_H 3 to 4.7 and then remains const. K, Li, Na, NO_3 and SO_4 apparently do not combine with gelatin. Cl combines less than bivalent and trivalent metals, gelatin therefore being positive in $CaCl_2$ and negative in KCl. Methods are described. C. H. RICHARDSON

The vapor pressure of dog blood at body temperature. A. GROLLMAN. Johns Hopkins Univ. *J. Gen. Physiol.* **11**, 495-506(1928).—The vapor pressure of dog blood and blood plasma was detd. at 37.5° by the dynamic method of Washburn and House (C. A. **9**, 1143) and the osmotic pressure calcd. from the exptl. data. The observed vapor pressures ranged from 48.08 to 48.12 mm. Hg., the calcd. osmotic pressures from 7.6 to 8.8 atm. The vapor pressures calcd. from f. p. values agreed closely with those

obtained by the dynamic method. The vapor-pressure lowering produced by the blood colloids was minimal compared with that of the other blood constituents. C. H. R.

Microirrigal studies in cell physiology. VI. Calcium ions in living protoplasm. H. POLLACK. Cornell Univ. *J. Gen. Physiol.* 11, 539-45(1928).—Alizarinsulfonate will ppt. Ca ions quant. as purplish red crystals of Ca alizarinate. When it is injected into the living ameba an appreciable amt. of free Ca ion can be demonstrated. The toxicity of phosphate, sulfate, tartrate and oxalate anions to the ameba is in some degree related to the soly. product of the Ca salt. The carbonate does not follow in the same order. It is suggested that toxicity depends upon the ability of the salt to remove Ca ions from the protoplasm. The apparent deviation of carbonate from the rule is explained by the specific toxic effect of CO_2 resulting from hydrolysis of the carbonate. The ameba has a Ca reserve which enables it to recover from sublethal doses of these anions and from alizarinsulfonate. Ca appears to be present in large crystals in the ameba. The behavior of the ameba is nearly the same when either the intracellular Ca ion concn. is diminished or the Na or K ion concn. is increased. C. H. RICHARDSON

Intracellular oxidation-reduction studies. I. Reduction potentials of Ameba dubia by micro injection of indicators. B. COHEN, R. CHAMBERS AND P. REZNIKOFF. Hygienic Lab., Washington, D. C., and Cornell Univ. *J. Gen. Physiol.* 11, 585-612 (1928).—Under anaerobic conditions, the ameba was able to reduce completely all the reversible oxidation-reduction indicators injected into the cell down to and including indigodisulfonate in a group of 25 of these indicators. Under the same conditions only 6 of the most easily oxidizable indicators were reoxidized by the ameba. In the presence of oxygen, the ameba reduced completely all indicators down to and including 1-naphthol-2-sulfonate indo-2,6-dichlorophenol. Toluylene blue, methylene blue and indigotetrasulfonate may be completely or only partly reduced according to the quantity injected and the duration of the observation. Time of reduction varied approx. with the amt. of indicator injected. It was more rapid under anaerobiosis than under aerobiosis, in active than in sluggish cells and was retarded by toxic compds. Sulfonated compds. were generally somewhat toxic. The results show that the ameba has a high reducing potential lying on the r_H scale (Clark and Cohen, *C. A.* 17, 2667). Reducing capacity is relatively great in the region of the simple indophenols and progressively diminishes as the zone of the indigos is approached. Substance of high reduction potential seems to be generated within the ameba at a measurable rate. These results parallel closely those obtained in reduction electrode studies on bacterial cultures. C. H. RICHARDSON

The idea of relativity and biologic problems. First study. L. TIXIER. *Bull. sci. pharmacol.* 35, 293-5(1928). L. W. RIGGS

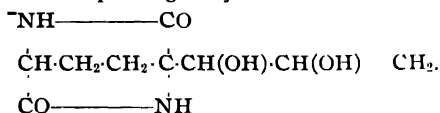
Microincineration and the content of fixed inorganic matter in the different parts of the cell. A. POLICARD. *Compt. rend.* 186, 1066-7(1928); cf. *C. A.* 18, 698; 19, 1297.—Cultures of the spleen of the white rat were sectioned and fixed in alc., then dried and incinerated by the method already described. The resulting films of ash were studied by reflected light with a stereoscopic microscope with the greatest magnification possible. A pair of 12 Zeiss objectives and a pair of orthoscopic periplanetic 28 oculars giving a magnification of 336 diams. were used. Intense illumination is indispensable. The cell nucleus contains a notable quantity of inorg. matter and is shown in its characteristic form and dimensions. The nucleolus was indistinguishable. The cytoplasm contains but little ash, but enough to indicate the outline of the cell. L. W. RIGGS

Analogies between physiological rhythms and the rhythmical reactions in inorganic systems. RALPH S. LILLIE. *Science* 67, 593-8(1928).—The arrangements of Fe wire and HNO_3 for producing rhythmical reactions are described. In general increase in active area accelerates the rate of rhythm. Within the limits of 60 to 80 vol. % of acid the rate increases with the concn. in a manner approx. linear. Within the limits of 10 to 30° and a concn. of 65 vol. % the rate of rhythm increased with the temp. but not directly; thus from 10° to 15° the rate was increased 100% while from 25° to 30° the rate increased 45%. Other factors such as elec. polarization and length of wire are considered. The biologic analogies of ciliary beats and heart beats are indicated. L. W. R.

Adsorption of the active principle of the posterior lobe of the hypophysis by animal charcoal. GINICHI SATO. Pharm. Inst. Freiburg. *Arch. exptl. Path. Pharmacol.* 130, 323-5(1928).—Both the uterus-stimulating agent and the melanophore-expanding principle are adsorbed by animal charcoal. G. H. S.

A new product of the catalytic decomposition of the collagen of tendons. V. S. SADIKOV. *J. Russ. Phys.-Chem. Soc.* 58, 775-8(1926).—Collagen was hydrolyzed by 1% HCl in an autoclave (*C. A.* 19, 1869). The water-sol. portion of the AmOH ext.

gave on evapn. an amorphous sirup. When treated with CuCO_3 a green sirupy mass was obtained sol. in EtOH and MeOH. It was pptd. from EtOH by the addn. of 3 vols. Me_2CO , decompd. by H_2S , again converted into the Cu compd. and analyzed for Cu (20.55, 20.48%), C (33.15%), H (4.87%) and N (9.30%). This corresponded to the compn. $\text{C}_{17}\text{H}_{28}\text{N}_4\text{O}_{12}\text{Cu}_2$, *i. e.*, the Cu salt of tetraaminotetrahydroxytridecanetetra-carboxylic acid, and the corresponding anhydride would be



It contains two bipeptide rings analogous to the two bipyrrrole rings of bilirubin.

BASIL C. SOYENKOFF

Thermophile bacteria and the radiation pressure of the sun (ARRHENIUS) 2. The permeability of gelatin membranes (COLLANDER) 2. Ionization and adsorption iso-electric points (HARVEY) 2. Composition of the fatty acids present as glycerides in elasmobranch oils (HILDITCH, HOULBROOKE) 27.

HARVEY, H. W.: *Biological Chemistry and Physics of Sea Water*. New York: The Macmillan Co.; London: Cambridge University Press. 191 pp. \$4.25.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Serum lipase, its determination by the stalagmometric method, significance and clinical value. S. KATZENELBOGEN AND H. WOHLERS. *Ann. med.* 20, 373-91 (1926). The Rona and Michaelis' method was employed. Blood serum gives velocity coeffs. of 0.006-0.008; turbid serum gives higher values, but hemolysis produces no change. The lipase titer falls in general cachexia. B. C. A.

The reaction of bromine upon histidine and tyrosine. OTOMATSU FUJII. *Bul. Sci. Fakultato Terkultura, Kjusu Imp. Univ.* 1, 127-36 (1926).—The method of Plummer and Phillips (*C. A.* 18, 2015) cannot be used in the presence of cystine. Moreover, tyrosine and histidine react with more than 2 atoms Br, depending on the temp. and time of bromination. This method is not satisfactory. A. L. HENNE

Experiments on the determination of phenylalanine by oxidation. G. KOLLMANN. *Biochem. Z.* 194, 1-14 (1928).—A method for detg. phenylalanine in protein is proposed depending upon the formation of benzoic acid on oxidation with $\text{K}_2\text{Cr}_2\text{O}_7$ in an acid medium. The benzoic acid is extd. with ether in Linot's rotating extn. app. and after washing free from impurities is weighed as the pure acid. It is absolutely necessary carefully to remove any fat adhering to the protein which can only be accomplished by extg. the hydrolyzate with ether. The results give only min. values inasmuch as the yield in expts. with phenylalanine or the recovery of added material is 95% on the av. The method has the addnl. advantage that relatively small quantities of protein (15-20 g.) are required for the analysis. The results for various proteins were on the av. as follows: casein 3.10, fibrin 2.11, edestin 3.47, hemoglobin 3.57, zem 6.57, legumin 5.10, gelatin 0.24%. S. MORGULIS

Studies on the solubility of cystine under various conditions and a new method of cystine preparation. LEN OKABE. *J. Biochem. (Japan)* 8, 441-57 (1928). In salt solns. of definite concn. the soly. of cystine varies with the H-ion concn. Its min. soly. coincides with its isoelec. point. The soly. of the cystine also varies with the concn. of the salt and the nature of the salt of the medium. NaCl , $(\text{NH}_4)_2\text{SO}_4$, and Na_2SO_4 increase while NH_4Cl or $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$ has no effect on the cystine soly. EtOH decreases its soly. Temp. below 20° has no influence on the soly. The soly. of cystine in a hydrolyzate from hair is quite different from that of a pure cystine soln. Method for prepn.: washed and dried hair, or completely defatted wool can be used. To 100 g. is added 300-500 cc. 20% HCl and the mixt. is boiled 7-10 hrs. under a reflux. After adding 10-20 g. of animal charcoal and stirring heating is continued for $\frac{1}{2}$ hr. until completely decolorized. The soln. is filtered, evapd. *in vacuo* to a thick sirup. This is dissolved in 100 cc. H_2O and 50 cc. 90% alc. is added and enough 10% NH_4OH until the soln. turns bluish. The p_{H} will then be about 4.8, or this may be more carefully controlled colorimetrically with dil. NH_4OH and AcOH . The hydrolyzate is cooled for 2 hrs. at 0° , and the crystd. cystine filtered off by suction. This crude cystine can be purified by dissolving in 10% NH_4OH , completely decolorizing with charcoal and again adjusting the reaction to p_{H} 4.8 with 36% AcOH . S. M.

The cystine content of several kinds of protein determined by a modification of Okuda's method. YUTAKA TERUUCHI AND LEN OKABE. *J. Biochem. (Japan)* **8**, 459-67(1928).—Folin and Looney's colorimetric method gives somewhat high results for the cystine content of protein. By a modification of the Okuda method the authors found the following cystine content: serum albumin 1.58, egg white 2.01, serum globulin 1.64, fibrin 1.48, beef 0.66, chicken 0.64, salmon 0.58, edestin 1.13, legumin 0.90, gliadin 2.19, zein 0.58, globin 0.61, gelatin 0.04, human hair 14.26, horse hair 11.07, wool 9.12 and casein 0.33.

S. MORGULIS

Nickel sulfate as a test for alkalies. (A useful reagent in urine analysis.) CLIFFORD MITCHELL. *Clin. Med.* **35**, 167(1928).—Several cc. of a 20% soln. of NiSO_4 are placed in a test tube and the urine is poured carefully down the side of the test tube. If a white ring, band or cloudiness is seen above the Ni soln. the urine contains excess of OH compds. such as $(\text{NH}_4)_2\text{CO}_3$ or Na_2CO_3 . Albumin and sugar do not interfere.

M. H. SOULE

Modifications of Katayama's formulas for computing the fecal nitrogen and fecal organic matter in samples of chicken's excrement. HARRY W. TITUS. *Poultry Sci.* **7**, 145-50(1928).—K.'s monograph is briefly reviewed and in place of his formulas, fecal N = {excrement N - (uric acid N + excrement NH_3 N) 1.146} 1.023, and % urinary org. matter in the excrement = $3.23 \times \% \text{ urinary N}$, the following formulas are suggested: fecal N = 0.9784 excrement N - 1.0253 uric acid N - 1.2641 excrement NH_3 N - 0.0554, and % urinary org. matter in the excrement = $2.16 \times \% \text{ urinary N} + 27.53\%$. (K.'s formula for fecal N is given incorrectly in *C. A.* **22**, 803; it is as given above.)

HARRY W. TITUS

C—BACTERIOLOGY

CHARLES B. MORREY

Adaptation of the bactericidal action of chloroform to the preparation of bacterins. HUBERT BUNYEA. *J. Agr. Res.* **34**, 623-30(1927).— CHCl_3 kills many nonspore-bearing bacteria with no important modification of their biochemical characteristics. It therefore serves to conserve potency in the prepn. of bacterins. It is not applicable, however, to the prepn. of killed cultures of spore-bearing organisms. The passage of 4.5% CHCl_3 in streaming vapor through a broth culture of *Staphylococcus aureus* is sufficient to produce sterilization.

M. S. ANDERSON

Chemical constitution and germicidal action. G. W. BACHMAN. *Proc. Soc. Exptl. Biol. Med.* **25**, 249-50(1928).—Computation of the germicidal action for *Bacterium coli A* was made for CH_3OH , aniline, *o*-toluidine, *p*-toluidine and malachite green, as compared with the germicidal action of the compds. produced by addn. of methyl and ethyl groups to these compds. The computed germicidal action was found to vary in a const. ratio with the addn. of alkyl groups.

C. V. B.

Inactivation of staphylococcus bacteriophage by trypsin. E. W. SCHULTZ. *Proc. Soc. Exptl. Biol. Med.* **25**, 280-2(1928).—Two "races" of staphylococcus bacteriophage were made inactive by trypsin within 48 hrs. A description of technique used is given. Various colon, typhoid and dysentery bacteriophages were not shown to be susceptible to trypsin action. A single expt. on plague bacteriophage showed this sample inactive after 5 days exposure to trypsin. Later this plague bacteriophage spontaneously became inactive, suggesting a lower resistance than is usual.

C. V. B.

Availability of carbon compounds for the streptococcus. F. KRASNOW AND M. L. ROSENBERG. *Proc. Soc. Exptl. Biol. Med.* **25**, 295-6(1928).—When added to synthetic media, dextrose shortens the period of the viability of streptococci markedly. A comparison of dextrose with other sugars in reference to their availability for growth gives a series such as sucrose > lactose, maltose > raffinose > mannitol, dextrose. Of the several sugars tested, sucrose seems to be the most easily utilized, though in some cases it was without effect. Similar results were obtained from glycerol, lactic, malic, tartaric and citric acids. These compds. are more often beneficial than the carbohydrates.

C. V. B.

A differential plating medium for lipase-producing bacteria. R. H. TURNER. *Proc. Soc. Exptl. Biol. Med.* **25**, 318-20(1928).—A differential plating medium for lipase-producing bacteria is described and its use in studying intestinal bacteria is discussed.

C. V. B.

Differentiation of acid-fast bacteria by means of complement deviation. L. HANDEL, L. LANGE AND G. HEUER. *Arbeit. Reichsgesundheitsamte* **77**, 716-24(1926); *Rev. Hyg.* **50**, 315-6(1928).—Agglutination and pptn. methods gave inconclusive results. Complement deviation though not entirely satisfactory served to differentiate

certain types of acid-fast organisms. By using certain sera it may be possible to differentiate the bovine from the human type of the tubercle bacillus. C. R. FELLERS

A time and labor saving method for the preparation of legume cultures. DONALD B. SHUTT. *Sci. Agr.* **8**, 665-7(1928).—A modification of Ashby's agar consisting of agar 20, sucrose 10, $\text{Ca}_3(\text{PO}_4)_2$ 1, $\text{Mg}_3(\text{PO}_4)_2$ 1, K_2SO_4 1, NaCl 0.1 g and tap H_2O 1000 cc. This medium gave an excellent growth of *B. radicicola* in 5-6 days at 25°. An atomizer greatly facilitates the seeding of slopes. C. R. FELLERS

Chemical action of quinones on proteins and amino acids. E. A. COOPER AND R. B. HAINES. *Biochem. J.* **22**, 317-25(1928).—The germicidal power of the quinones is not necessarily due to their chemical interaction with the cell proteins, but is associated with their reactivity towards the simpler cell constituents, such as some of the amino acids. BENJAMIN HARROW

Relation of the growth of certain microorganisms to the composition of the medium. III. The effect of the addition of growth-promoting substances to the synthetic medium on the growth of *Streptothrix corallinus*. VERA READER. *Biochem. J.* **22**, 434-9(1928); cf. C. A. **22**, 609.—The substance in tryptic beef broth that exerts a stimulating action on the growth of *S. corallinus* is org., water-sol. and dialyzable, and is not pptd. by neutral or basic lead acetate. It is present in yeast preps., rabbit muscle, serum and wheat embryo. The bacterial growth-promoting factor is present in Peters' yeast concentrates (see C. A. **20**, 436). BENJAMIN HARROW

Note on the Meningococcus as a source of growth factor for Streptothrix corallinus. JEAN ORR-EWING AND VERA READER. *Biochem. J.* **22**, 43-44(1928).—A strain of *Meningococcus* type 1 (National collection of type cultures, Strain Littleale, No. 668) grows readily upon a meat-ext. medium which had been completely freed from the *S. corallinus* growth factor by repeated charcoal extractions. Since the *S. corallinus* has been found to react to a vitamin B concn. of 2×10^{-6} pigeon dose (cf. preceding abstr.), the authors are convinced that the vitamin B factor, if present at all, was reduced below this value. On retesting the meat-ext. (vitamin-B-free) medium after the growth of the *Meningococcus*, it was found to be capable of supporting good growth of *S. corallinus*. BENJAMIN HARROW

Deamination and synthesis of L-aspartic acid in the presence of bacteria. R. P. COOK AND BARNET WOOLF. *Biochem. J.* **22**, 474-81(1928).—At 37° and p_{H} 7.4 the eleven species of bacteria examd. deaminate aspartic acid anaerobically to succinic acid. 2-4% PrOH , 0.1 *N* NaNO_2 , or toluene inhibits this reaction. The facultative anaerobes can effect a reversible equil. $\text{aspartic acid} \rightleftharpoons \text{fumaric acid} + \text{ammonia}$. BENJAMIN HARROW

The splitting products and the dissemination of the fermentation sarcines (Sarc. ventriculi Goodsir, and Sarc. maxima Lindner). JAN SMIT. *Verslag Akad. Wetenschappen Amsterdam* **37**, 278-88(1928); cf. C. A. **21**, 934.—With pure cultures of the sarcines an acidification with HCl can be tolerated to a p_{H} of 0.8, HNO_3 1.5 and lactic acid 2.9. The resistance against H_3PO_4 is considerable. On the alk. side the limit lies near p_{H} 9.8. The cellulose reaction with Cl-Zn-I is positive for *S. ventriculi* and negative for *S. maxima*; the former can split up only 1.5-2% sugar but the latter splits up even less, namely 0.5-1%. Among the splitting products of *S. maxima* there is no alc. but there are large amts. of butyric acid. Sarcines were found in all surface layers of the earth, but different kinds of soil often require entirely different acidification for propagation. Samples taken from greater depth in the ground were free from sarcines. Wind and dust play an important role in their dissemination, especially of *S. maxima* on grains. *S. ventriculi* is not present in healthy stomachs, and *S. maxima* has never been found even in abnormal stomachs. S. thinks it probable that the *S. pulidosa* is identical with the fermentation sarcine. The sarcines obtained from natural sources are much more resistant than those from pure cultures, and the latent form is much more so than the sarcine form. Efforts to obtain a large increase in latent sarcines did not succeed. J. C. JURRIENS

The production of bacteriophage by killed bacteria. WALDEMAR GOHS AND IRENE JACOBSON. Staatlichen Serotherapeutischen Inst., Wien. *Z. Immunitäts.* **53**, 12-9(1927).—Substances that kill bacteria but which destroy their enzymes permit the continuance of the formation of bacteriophage from bacteria killed in this way. The addn. of a trace of bacteriophage to a suspension of chemically killed bacteria increased the lysin titer 10 to 100,000 times after incubation for 24 to 48 hrs. Nevertheless formation of bacteriophage from killed bacteria is not const. When killed by heat bacteria do not form lysin. Bacteriophage is apparently not a secretion of diseased bacteria but is the result of autolysis. This postmortem lysin-forming autolysis is never as marked as in the living culture. JULIAN H. LEWIS

Potentially unlimited multiplication of yeast with constant environment, and the limiting of growth by changing environment. O. W. RICHARDS. Harvard Univ. *J. Gen. Physiol.* 11, 525-38(1928).—The decrease in rate of growth of a population of yeast cells which results in the maintenance of an equil. level of population is due to substances excreted by the cells. These toxic substances tend to destroy the young buds. EtOH is the primary compd. causing decline in growth rate, a concn. of approx. 1 mg. per cc. being associated with the beginning of decrease of growth rate in these expts. Increasing acidity of the medium, due to CO₂, pyruvic and other org. acids, has a retarding influence on the growth rate but is considered to be a secondary factor. When the accumulation of these toxic products is prevented, yeast grows at a const. rate and the growth is potentially unlimited. In these expts. growth was limited only by the size of the test tubes and the efficiency of the method used to remove toxic products. Methods are described.

C. H. RICHARDSON

Oxidation-reduction potential of media in which strict anaerobes and facultative anaerobes are growing. R. AUBEL AND E. AUBERTIN. *Compt. rend. soc. biol.* 97, 1729-30(1927).—The life of the organisms is possible only between certain limits characteristic of the organism. The limits are between $rH = 0$ and $rH = 20$ for the facultative anaerobes, and between $rH = 0$ and $rH = 12$ for the strict anaerobes. L. W. R.

Four new bacteria isolated from the monosulfide thermal waters of Bârges. RENÉ ROBINNE AND PAUL HAUDUROY. *Compt. rend. soc. biol.* 98, 24-6(1928).—A bacteriologic description of each organism is given and the following names are proposed: *Micrococcus baregensis purpureus*, *Bacterium baregensis oosporogenes*, *Bacillus fluorescens baregensis* and *Microbacillus citreus baregensis*.

L. W. RIGGS

Course of proteolysis in the cultures of dysenteric bacilli. A. BERDNIKOV. *Compt. rend. soc. biol.* 98, 210-1(1928); cf. *C. A.* 21, 2007; 22, 252.—A N partition was made of a bouillon when sterile, and when contg. cultures of Shiga bacilli, toxic and atoxic, Flexner bacilli and Y bacilli, the N being detd. in the following six fractions: (1) bacillary bodies, (2) substances precipitable by tannin, (3) precipitable by colloidal Fe after pptn. by tannin, (4) precipitable by phosphotungstic acid after pptn. by tannin and colloidal Fe, (5) non-precipitable N and (6) volatile N. The bacilli are named above in the order of decreasing virulence. The detns. show that the N of the "biuretic proteins" (pytd. by tannin and colloidal Fe) diminished with the virulence of the organism, while N under the forms of polypeptide, amino acid and volatile N compds. increased as the virulence increased.

L. W. RIGGS

Conditions of the pigment in cultures of *Bacillus prodigiosus*. M. BÉGUET. *Compt. rend. soc. biol.* 98, 937-9(1928).—The conditions of the medium are discussed under 6 topics: variations in pH , NaCl, surface tension, temp., oxygenation and exposure to light. In addn. to factors already well known with reference to the bacillus, certain physiof. factors, particularly hypertonicity and osmotic pressure, under which the bacillus is grown must be considered.

L. W. RIGGS

Culture of strict anaerobes in aerobic media. E. AUBERTIN, E. AUBEL AND L. GÉNEVOIS. *Compt. rend. soc. biol.* 98, 957-9(1928).

L. W. RIGGS

Vital coloration of the Koch bacillus by Nile blue. A. CH. HOLLANDE AND (Mlle.) G. CRÉMIEUX. *Compt. rend. soc. biol.* 98, 1379-81(1928).—The substance colored is of lipoidic nature, partly sol. in alc.-ether, xylene and acetone. Its reaction is acid.

L. W. RIGGS

The effect of ultra-violet radiation upon yeast culture media. J. W. WOODROW, A. C. BAILY AND E. I. FULMER. *Plant Physiology* 2, 171-5(1927); one figure.—Yeast culture media (*C. A.* 15, 694) contained in quartz "Vitrosil" Erlenmeyer flasks and Pyrex flasks developed a toxicity upon exposure to ultra-violet light which increased with duration of irradiation. The toxic factor is non-volatile and results from the action of the short rays (300-425 $m\mu$) on the sucrose in the culture medium. For the study of the effect of the direct action upon *Saccharomyces cerevisiae*, a medium must be used whose growth-promoting properties are not changed by the ultra-violet ray treatment.

WALTER THOMAS

Thermophile bacteria and the radiation pressure of the sun (ARRHENIUS) 2.

D—BOTANY

THOMAS G. PHILLIPS

The role of plastin of myxomycetes and its albuminoid nature. ALEXANDER KIRSEL. *Zhurnal ekspl. Biol. Med.* 5, 279-88(1927).—The supporting substance found in the plasmodia of myxomycetes, namely, the plastin, is an albuminoid, which, like the albuminoids of animal origin, shows changes with aging and cannot be brought into soln.

without alteration of its properties. The plastin was prepd. from *Lycogala epidendron* at 3 different phases of development by dissolving and pptg. the substance, which of course no longer corresponded to the original plastin. Apparently the guanidine group of arginine suffers the greatest changes in the prepn. of plastin by soln. in alkali, resulting in a splitting off of urea. This manifests itself in a diminution of the N content.

S. MORGULIS

South African flowers. J. MOIR. *J. S. African Chem. Inst.* **10**, 36-47 (1927) — The absorption spectra of dil. exts. of the coloring matter of various flowers were studied, with a modified direct-vision spectroscope. In order to find the pigment causing color, the spectra of the oxonium salts of the following substances were examd.: pelargonidin, cyanidin, delphinidin, myricetin, apigeninidin and luteolinidin. Glucosides of pelargonidin were detected in Barlberton daisy, brown nasturtium, scarlet salvia, and *Chelone barbata*. Other red flowers in which glucosides of other members of the class are regarded as contaminating the pelargonin or which are possibly glucosides of a methyl ether of pelargonidin are scarlet protea, bramble, eendagsbloem lily and the red canna lily. Glucosides of cyanidin were found in scarlet zinna, pink convolvulus, purple convolvulus, deep red Ards rose, pink hydrangea, blue hydrangea, crimson verbenia, *Lychnis coronaria*, scarlet geum, puce-colored hollyhock and the anthers of the agapanthus lily. Glucosides of delphinidin are present in nearly all bright blue flowers. Delphinin was detected in blue agapanthus lily, azure plumbago, blue jacaranda, scarlet pomsetta, royal-blue convolvulus and common larkspur. Petunin was found in the petunia, bramble, and habrothamnus. The yellow sunflower is colored with a mixt. of xanthophyll and quercitrin. The alkali-sol. pigment of sunflower is probably a quercetin glucoside. The common orange marigold probably contains glucosides of kempferol and myricetin. The brown Japanese sunflower probably contains lycopin and kempferol glucoside. Flowers yielding indefinite results were: the sulfur-yellow chrysanthemum, the yellow coreopsis and the *Montbretia* lily. Every stage in the origin of flower colors can be followed by examg. all the intermediate substances in concd. sulfuric acid soln.

B. C. A.

Chemical composition of the seeds of the wild hemp (*Cannabis ruderalis* Janisch). V. FOFONOV. *Ber. Saratower Naturforscherges.* (Russ.) **1**, No. 4, 33-6 (1925). (*Chem. Zentr.* **1927**, **1**, 466-7) — The air-dried seeds contained in %: water 6.62, ash 5.85, fat 29, total N 3.57, protein N 3.33 (corresponding to 20.8 protein) and crude cellulose 18.52. The oil was brownish green, with $d_{20}^{20} = 0.9233$, sapon no. 195.5, I no. 158.9.

C. C. DAVIS

Effect of certain alkaloids on germinating seeds of plants forming the same alkaloids. TH. SABALITSCHKA and M. W. ZÄHER. Univ. de Berlin. *Tschirch Festschrift* **1926**, 24 pp.; *Chem. Zentr.* **1927**, **1**, 113-4. — Germinating seeds of plants were treated with solns. of morphine, trigonelline, nicotine, atropine, strychnine and lupinine, the alkaloid solns. being added to the seeds of the plants producing the particular alkaloids. In no case were the seeds of the alkaloid-producing plants which contained alkaloid more resistant to the particular alkaloid than seeds of alkaloid-free plants. In agreement with the earlier conclusion of S. and Jungermann (*C. A.* **19**, 3286) that seeds contg. alkaloids do not when germinating under normal conditions liberate alkaloids, the results controvert the hypothesis that such germinating seeds create a protective zone of alkaloid. Moreover, alkaloids are probably not nutrients or stimulants during normal germination.

C. C. DAVIS

The development of mutase action in germinating barley. ZOLTÁN I. KERTÉSZ. *Z. physiol. Chem.* **176**, 144-50 (1928). — The aldehyde-mutase activity of germinating barley was detd. at intervals up to the 18th day. For each detn. a suspension of ground grains corresponding to 2 g. dry material was treated with 25-30 mg. AcH, phosphate buffer of p_H 6.4 and yeast cozymase, and the residual AcH detd. at intervals of 1, 2, 4 and 20 hrs. by the Ripper method with $KHSO_5$ and I soln. During this period of germination the mutase showed a regular increase of considerable extent. From the 15th to the 18th day the roots and leaves examd. separately showed a decrease of mutase in the roots and an increase in the leaves.

A. W. DOX

Effects of chemical treatments on dormant potato tubers. J. T. ROSA. *Hilgardia* **44**, 125-42 (1928). — Ethylene in concns. of from 1:400 to 1:2200 of air exerted a mild effect upon the hastening of sprouting of dormant, nearly matured, moderately suberized tubers placed in a gas chamber at harvest time and held for 4 weeks. Ethylene hastened the sprouting of fully matured White Rose tubers after treatment for only 6 days while the Idaho Rural variety showed max. stimulation after treatment for 15 days. Ethylene chlorohydrin proved to be very effective in reducing dormancy. Treatment for 14 to 21 days in a gas chamber or by soaking in a 0.5% soln. for 1 hr. showed

marked stimulation to sprouting without toxic effects. The momentary dipping of the cut sets in 3% or stronger solns., then storing in a closed container for 12 hrs. resulted in a great increase in decay of the sets after planting. The optimum concn. of ethylene chlorohydrin to use by the gas chamber method was 0.75 cc. per l. of space at 20–25° and with a fan to hasten volatilization and uniform distribution. NaCNS and NH_4CNS were toxic to cut sets in 2 and 3% solns. A concn. of 1% proved non-toxic but was also non-stimulative and hence of no value. Ethyl bromide hastened sprouting but the optimum concn. varied so widely according to tuber maturity, and degree of suberization that it was considered unsatisfactory. A 0.5 M soln. of NaNO_3 was a moderately effective stimulant but caused excessive decay of tubers in hot weather. Ethylene dichloride at concns. between 0.2 and 0.4 cc. per l. of space and exposure continued for 24 hrs. proved effective in reducing dormancy. R. concludes that from the practical viewpoint of elimination of seed piece decay and of stimulating prompt sprouting of potatoes planted during mid-summer, there is a considerable promise for combinations of storage periods known to hasten sprouting with the use of chem. stimulants

C. R. FELLERS

Nutritional studies with *Fragaria*. MALCOLM B. DAVIS AND H. HILL. *Sci. Agr.* 8, 681–92(1928).—A study was made of the effect of nutrient solns. of different ratios of N and minerals upon strawberry plants in both pure sand and soil. The quant. data showed danger of excess of N over minerals, indicating that a ratio of 1 N to 1 mineral was about as close as the ratio could be brought with safety. Excess of minerals over N, up to 1 N to $3\frac{1}{2}$ minerals, did not cause distress. The optimum was 1 N to 0.85 mineral. Total salt concns. varied from 0.009 to 0.070 without materially affecting the results. None of the solns. showed any interpretive effect upon the set of the blossoms

C. R. FELLERS

The reaction of wheat plants at two stages of growth, to stem rust. J. B. HARRINGTON AND W. K. SMITH. *Sci. Agr.* 8, 712–25(1928).—A two-yr. greenhouse study on Marquis, Marquillo, Lumillo and Vernal varieties of wheat showed a distinct correlation between seedling reaction and infection after heading.

C. R. FELLERS

Evolution of substances in the plant world and the fundamental laws of biochemistry. SERGIUS IVANOV. *Ber. deut. botan. Ges.* 44, 31–9(1926); *Biol. Abstracts* 1, 1026.—In biochemistry, development of knowledge has proceeded in 2 directions, chem. and physiol. Biochem. knowledge is now developing in a 3rd direction, "evolutionary." Each plant and its pure line has a const. chem. compn. which experimenters cannot alter, neither can they cause the plant to produce products which are not characteristic of the plant. Plants artificially fed in the dark utilize to form starch only such substances as can be used in the natural condition. In graft expts., the scion and stock each always produces characteristic products, as evidenced by *Helianthus tuberosus* and *H. annuus*. In pathol. cases there is only a quant. alteration in the products and never are products formed which are not characteristic of the plant. Each species preserves, in the constancy of its outer form, the ability to produce its characteristic substances. Each species shares its physiol. chem. characteristics with the species which are genetically related to it; species closely related have more characteristics in common. New physiol. chem. characteristics appear in species distantly related, i. e., the characteristics undergo an evolution

H. G.

Solution of calcium oxalate crystals in plants. W. G. ALEXANDROW AND A. S. TIMOFEEV. *Bot. Archiv.* 15, 279–93(1926); *Biol. Abstracts* 1, 1021.—This investigation was to det. the fate and role of Ca oxalate crystals in certain higher plants. In *Sterculia plataniifolia* it was found that at certain times of the year, especially at blossoming time, the crystals dissolve. No special enzyme is responsible for this disappearance. They dissolve in water, especially in water acidified with oxalic acid. After soln. in the onion scale, druses previously masked by crystals may be seen. Starch formation occurs in those cells from which the crystals have disappeared and it is assumed that disintegration products of the crystals furnish material for this, oxalic acid being an intermediate product in the assimilation of C. The various stages in the soln. of crystals are described and their similarity to the corrosion figures of starch grains is pointed out. Crystals formed artificially in elder pith did not dissolve under the conditions which caused soln. of natural crystals, which suggests that the latter are not pure Ca oxalate.

H. G.

Influence of stimulative chemicals upon seed germination. ANNELESE NIETHAMMER. *Jahrb. Wiss. Bot.* 66, 285–300(1927); *Biol. Abstracts* 1, 810; cf. *C. A.* 21, 2289; 22, 294, 613.—N. finds that the germination of wheat seed, dry stored for some time, is not stimulated in darkness by concns. of Mn salts that Popoff claimed effective, i. e., 1–2%. MnSO_4 showed little stimulation in these or other concns. in dark or light.

The germination of light-favored seed (*Verbascum thapsiforme* and *Apium graveolens*) was much stimulated by these salts in light but not in darkness. The author speaks of the salts as acting as light catalyzers. *Apium graveolens* seeds planted in soil were greatly stimulated by watering with solns. of MnSO_4 instead of water. Germination of light-inhibited seed (*Amaranthus caudatus*) was not favored by Mn salts either in dark or light. Immediately after harvest, seeds (wheat and *Chelidonium majus*) were much more favored in germination by Mn salts than they were after a considerable period of dry storage. Wheat was also favored by higher concns. of the salt immediately after harvest. H. G.

Microchemical detection and change of the organic phosphorus in plants. G. KLEIN. *Planta* 2, 497-506(1926); *Biol. Abstracts* 1, 1022.—The macrochem. method of Mandel and Neuberg for detg. organically bound P and S has been adapted for microchem. use. By carrying out the reactions on sections on hollow-ground slides, good localization of org. P in tissues (though not in cells) is possible. Seeds of *Phaseolus multiflorus* and *Zea mays* were germinated and the seedlings grown in P free nutrient solns. with controls in normal nutrient solns. In seedlings that were limited to the P reserve, chiefly org. of the seed, there was an unbroken change from organically bound P to inorg. and again to org. P. There was always inorg. P in the growing regions, little in the conductive tissues of the stem, and less in the older leaves. In the P-free cultures, 3-week seedlings of *Zea* showed marked P-chlorosis and the leaf veins of both *Zea* and *Phaseolus* were red, due to increased anthocyanin. Phosphate was added in concn. about $1/100$ of the control. In 48 hrs the distribution of P within these plants was similar to that in the controls. The inorg. P always moves to the growing regions, where it is assimilated. H. G.

Lipoids in plants. C. COLA. *Biochim. therap. spec.* 15, 65-76(1928).—Review with especial reference to *cytolipoids*. The chloroplasts contain a lipid which is probably derived from the chlorophyll phytol. Its quantity increases with the progressing inactivation of the chlorophyll, by either dry heat, excessive insolation or excess CO_2 . Cytolipoids have no doubt a part in C assimilation as evidenced by their higher content in the surface strata of the green leaves. On the other hand their greater abundance in fatigued chloroplasts and in non-assimilating plastids, the faculty of the latter to synthesize starch from lower carbohydrates, the presence of cytolipoids in latex and resins, their migration to and conversion into cuticular strata, the important part probably played by the chromolipoids in O_2 transportation and ultra-violet absorption suggests that all plants have a kind of *internal secretion* consisting mainly of cytolipoids or their isoprene precursors. These compds. are not further metabolized but are important for the metabolism and the protection of the plant. MARY JACOBSEN

Researches on the limiting factors of carbon dioxide assimilation. T. H. VAN DEN HONERT. *Verslag Akad. Wetenschappen Amsterdam* 37, 295-307(1928).—A review and discussion in detail of work done by other investigators is given, as well as a description of methods and app. used by H. Assimilation means the consumption of CO_2 in exposure to light, plus the CO_2 production in the dark. In order to get comparative values for the assimilation under different conditions, the values found must be calcd. to a certain unit of cell material. H. has taken as unit that quantity, which, under certain definite conditions, assimilates $100 \text{ mm}^3 \text{ CO}_2$ per hr. It was found that a CO_2 concn. over 0.040% was too high. With a high light intensity (6.18), and an excess of CO_2 , a Q_{10} of 1.87 was found between 12° and 20° . With a low intensity (1) a Q_{10} of 0.90 was found at the same temp. range. At 12° and a light intensity of 6.18 the same amt. of material assimilates $61 \text{ mm}^3 \text{ CO}_2$ per hr., if CO_2 is present in excess. It is possible to reduce the assimilation to a chain process, considering it to exist of: (1) a diffusion process of the CO_2 from the outside to within the chloroplast; (2) a photochem. process; (3) a dark chem. process, each in its turn detg. the velocity of the assimilation, when (1) the CO_2 concn., (2) the light intensity or (3) the temp. is the limiting factor. The cell wall and the protoplasm through which the CO_2 must diffuse can be regarded as an aq. medium. In order to penetrate to the inside of the cell, the CO_2 must begin by dissolving in the outer layer of the cell wall. In the extreme outer layer of the cell wall the CO_2 concn. is in equil. with that of the adjacent air. The soly. of CO_2 in water decreasing at increase in temp. means that one can deduce from an apparent $Q_{10} = 1$ a real $Q_{10} = 1.3$ for the diffusion process, as was found by H. The assimilating agent, be it chlorophyll or an enzyme, apparently possesses an immense affinity for CO_2 . The photochem. process is independent of the CO_2 concn. J. C. JURRYENS

The plant cell-membrane. II. MAX LÜDTKE. Kaiser-Wilhelm Inst. *Ber.* 61B, 465-70(1928); cf. C. A. 21, 3932.—Material from 15 species of plants was tested with ZnCl_2 -I and I- H_2SO_4 reagents before and after thorough grinding in a ball mill. Typical

cellulose tests were obtained only after grinding. Oak and mahogany did not give positive tests probably because of the interference of accompanying tannin and pigment. Cellulose acetates, nitrates and xanthate, and various Me and Et derivs. did not give positive reactions. Plant material often fails to give typical cellulose tests because of the structures surrounding the cell walls and not because the cellulose occurs in chem. combination with accompanying materials. LAWRENCE P. MILLER

The form of the iodine in certain Florideae. F. CHEMIN. *Rev. gén. botan.* 40, 129-45(1928); cf. *C. A.* 21, 943.—The formation of crystals with cresyl blue is not a characteristic test for free I. From studies with *Falkenbergia doubletti*, *Bonnemaïsonia asparagoides* and *Asparagopsis hamifera*, C. concludes, contrary to Sauvageau (*Bull. de la Slat. biol. d'Arachon* 24, 1927), that the I occurs not free but in very unstable combination, from which it is readily set free by very weak acids, even the cell sap itself in the case of the first two species, while with *A.* stronger acids are required. L. P. M.

The chemical elements indispensable to plants. CHAS. B. LIPMAN. Univ. of Calif. *Sci. Monthly* 26, 289-94(1928).—In addition to the ten elements acknowledged to be essential to the higher green plants, Mn, B, Zn and probably Si, Al and Cu are to be regarded as essential in small amounts, and it is not unlikely that further research will show others to be also essential. The function of these elements in plants is not understood. LAWRENCE P. MILLER

Do plants show anaphylaxis? R. OTTO AND HERRIG. *Inst. "Robert Koch," Berlin. Z. Immunitäts.* 53, 487-92.—The findings of Lumière and Couturier (*C. A.* 15, 2903) that plants could be anaphylactically sensitized with serum were not confirmed. J. H. LEWIS

Substances regulating the passage of material into and out of plant cells: the lipoids. D. T. MACDOUGAL. Carnegie Inst., Washington. *Proc. Am. Phil. Soc.* 67, No. 1, 33-45(1928).—A survey on the present knowledge of the role of the lipoids regulating the activity of the plant cell. M. showed that artificial cells represented by layers of protein pentosan jellies, when including lipoids as a lecithin-cholesterol combination, resemble living cells very much in regard to the ability of stabilizing the H-ion concn. and of controlling osmosis and permeability to ions. G. SCHWOCH

Carbohydrate transformations in carrots during storage (HASSELBRANG) 12. Cortex of *Byrsonima crassifolia* (HEYL, HEIL) 10. Membranes of spores and pollen. 1. *Lycopodium clavatum* L. (ZETTSCHKE, HUGGLER) 10.

II—NUTRITION

PHILIP B. HAWK

The so-called specific dynamic action of foodstuffs. G. MANSFIELD AND Z. HORN. Univ. of Pecs. *Deut. med. Wochschr.* 54, 646-8(1928).—The O consumption of typhus bacilli as measured by Warburg's micro-respirometer was found to be proportional to the concn. of the nutrient materials present in the culture medium. The specific dynamic action of food in the higher animals is considered as a process analogous to that found for the unicellular organisms. ARTHUR GROLLMAN

Human milk studies. V. A quantitative comparison of the antirachitic factor in human milk and cow milk. J. OUTHOUSE, I. G. MACY AND V. BREKKE. Merrill-Palmer School, Detroit. *J. Biol. Chem.* 78, 129-44(1928); cf. *C. A.* 21, 2724.—Human milk fed to rats in amts. of 40 cc. daily contains no antirachitic factor. Thirty cc. of cow milk under the same conditions induces healing of rickets in 7 days. A. G.

Effect of various substances on rickets of rats with especial reference to irradiated water. R. BARBACCI. *Pediatria Rivista* 35, 1113(1927).—Rat rickets produced by standard diet 84 was prevented or cured by irradiated olive oil and alleviated by well water or irradiated distd. water. A moderate case of rickets produced by an avitaminous diet was slightly aggravated by irradiated water. MARY JACOBSEN

Glutathione and reducing power of muscle in vitamin B deficiency. HIDEYAKE YAOI. Govt. Inst. for Infectious Diseases, Tokyo. *Japan Med. World* 8, 85-6(1928).—The muscle of pigeons fed on a vitamin-B deficient diet has a weaker reducing action on methylene blue than that of normal pigeon muscle, but no corresponding difference between the two is detectable in the glutathione content, according to the Tunnicliff methods. N. KOPELOFF

The effect of diet on the concentration of non-protein sulfur of blood. W. DENIS AND LUCILLE REED. Tulane Univ. *Am. J. Physiol.* 83, 47-51(1927).—The concn. of inorg. ethereal and neutral (unoxidized but non-protein) S of the blood of dogs seemed to be unrelated to the relative rate of excretion, to the concn. of these S fractions in the urine and to the level of S or N in the food. J. F. LYMAN

Studies in liquid exchange. VII. Intermediary liquid exchange in beriberi and in experimental human avitaminosis B (contribution to the question of the origin of beriberi edema). TOMOTAKA YAMAGUCHI. *Tôhoku J. Exptl. Med.* 10, 435-65(1928); cf. C. A. 22, 2605. L. W. RIGGS

The assay of a so-called cod-liver oil extract for vitamin-A content and calcifying properties compared to cod-liver oil (MUNSELL, BLACK) 17.

EDDY, WALTER H. **Nutrition.** Baltimore: The Williams & Wilkins Co. Reviewed in *Home Economist* 6, 155(1928).

F—PHYSIOLOGY

R. K. MARSHALL, JR.

The absorption of water and chlorides from the intestine. JACOB RABINOVITCH. Washington Univ., St. Louis. *Am. J. Physiol.* 82, 279-89(1927) -- When solns. of NaCl were placed in a loop of the intestine, equil. was established at a concn. of between 0.6 and 0.7%. Water absorption, i. e., H_2O absorbed $\div H_2O$ introduced, was at a max. with concns. of 0.2 to 0.8% NaCl. The amt. of NaCl absorbed increased with increasing concns. of the solns. introduced into the intestine up to 0.6 to 0.8%. With strongly hypertonic solns. salt absorption may be at a still higher rate but this was not invariably true. The absorption of both H_2O and Cl is somewhat increased by the presence of an excess of K ions and greatly increased by an excess of Ca ions. Acacia had no effect on the rates of absorption of H_2O or NaCl. Atropine increased absorption. J. F. L.

Differential metabolism in brain tissue as indicated by lactic acid determinations. J. A. HALDI, H. P. WARD AND LEO WOO. Catholic Univ. of America. *Am. J. Physiol.* 83, 250-3(1927) -- The amt. of lactic acid in the parts of the brain of the rabbit under anaerobic conditions increased in the following order: cerebral hemispheres, cerebellum, mid brain, medulla. More than twice as much lactic acid was formed in a unit wt. of medulla tissue as in the tissue of the cerebral hemisphere. J. F. LYMAN

Cardiac inhibition. I. The effect of vagal inhibition on the lactic acid content of the terrapins heart. C. L. GEMMILL. Johns Hopkins. *Am. J. Physiol.* 83, 415-9(1928) -- The av. resting concn. of lactic acid in the terrapins heart is: auricle 0.036% and ventricle 0.026%. The max. fatigue concn. is: auricle 0.137% and ventricle 0.141%. Stimulation of the vagus nerve had no effect on the lactic acid content of the heart. J. F. LYMAN

The response of the isolated segment of small intestine (rabbit) to extracts of yeast and other substances during their passage through the lumen. JOHN B. POLANSKY. Univ. of Rochester. *Am. J. Physiol.* 83, 488-98(1928). -- An app. is described by which the fluid being tested is passed through the lumen of the intestinal segment while longitudinal contractions and vol. changes due to contraction of the circular fibers and to peristaltic waves are simultaneously recorded. Yeast (52% alc. ext. or the Osborne and Wakeman yeast vitamin prepn.) had a definite stimulating effect on tonus. Vitamin B is probably the active stimulant. J. F. LYMAN

The determination of the amount of hemoglobin present in rat fetuses during development. J. S. NICHOLAS WITH E. B. BOSWORTH. Yale Univ. *Am. J. Physiol.* 83, 499-501(1928). -- The % of hemoglobin present in rat fetuses rose from 30% at 12 days of gestation to 65% at birth. J. F. LYMAN

The effect of carbon dioxide on the action current of nerve. H. DAVIS, W. PASCUAL AND L. H. RICE. Proc. Am. Physiol. Soc., *Am. J. Physiol.* 81, 471(1927) -- Increase in O_2 tension caused an increase in elec. response up to about 40% at 27 mm. Further increase was less favorable. At physiol. tensions the increase in response was negligible and from 60 to 100 mm. tension, the final effect was a depression of 5 to 8%. J. F. L.

The effect of varying amounts of oxygen, anoxemia and anesthetics on the sugar metabolism of animal cells. A. M. ESTES AND W. E. BURGE. Proc. Am. Physiol. Soc., *Am. J. Physiol.* 81, 474(1927). Paramecia cultures, through which small quantities of air and O_2 were bubbled as well as large amts. of air and O_2 , metabolized less sugar than did those through which a medium amt. of air and O_2 was bubbled. Organisms tightly stoppered in bottles and hence deprived of air and O_2 metabolized practically no sugar. N_2O and ethylene produced no anesthesia of the paramecia and no effect on sugar metabolism when administered with a liberal O_2 supply, but when administered with a small O_2 supply a decreased sugar metabolism was noted. The decreased sugar metabolism following excessive O_2 is thought due to injury of the organisms by the O_2 . J. F. LYMAN

The effect of temperature on the acidity of the skin. H. C. BAZZETT AND B. Mc-

GLONE. Univ. of Penn. *J. Physiol.* **64**, 393-404(1928).—The intravenous injection of a neutral soln. of phenolsulfonephthalein into white decerebrate cats resulted in colored skin areas whose shade of color indicated their acidity. Subdermal or subcuticle injections into spots on the human arm were also used to est. skin acidity. Acidity varied with temp., a leg immersed in a warm bath being more acid than one immersed in a cold bath. Acid production during arrested circulation was considerable, and after a long arrest the acidity did not disappear for 5 or 20 min. following release of the circulation. Hyperemia produced by immersion in water at 40° to 42° and persisting when the leg was subsequently immersed in water at a lower temp. was not assocd. with acidity.

J. F. LYMAN

A study of the basal metabolism, weight and blood chemistry following bilateral oophorectomy. S. H. GEIST AND M. A. GOLDBERGER. *Am. J. Obstet. Gyn.* **12**, 206-17 (1926); *Biol. Abstracts* **1**, 642.—In 48 cases the basal metabolism, urea, non-protein N, creatinine and cholesterol of the blood and blood plasma were detd. Observations were made 2 weeks preoperative, and at various intervals to 3 months postoperative. No consistent variation in basal metabolism or body wt. was observed, and there was no definite relationship between these variations. The blood chemistry and blood pressure were not influenced by the double ovariectomy.

H. G.

Origin of B bile. M. R. FEISSLY. *Arch. Malad. App. Digest. et Malad. Nutrition* **16**, 328-45(1926); *Biol. Abstracts* **1**, 835.—F. injected tetrabromophenolphthalein and demonstrated its presence in the gall bladder by x-rays. Then by a duodenal drainage with instilled $MgSO_4$, he secured B bile. With x-rays he observed emptying of the gall bladder and showed that the B bile was more opaque than the A or C fractions. He considers this conclusive evidence that $MgSO_4$ produces contractions of the gall bladder and that the B bile obtained in duodenal drainage is vesicular in origin.

H. G.

Origin of the hippuric acid excreted in the urine of ruminants. F. ROGOZINSKI AND M. STARZEWSKA. *Bull. intern. acad. Polonaise* **B1926**, (1/2): 157-75(1926); *Biol. Abstracts* **1**, 820.—Urine of ruminants is rich in hippuric acid although there is no obvious source for it, i. e., no benzoic acid, in the food. It is not derived from the lignin of straw and protein substances play little, if any, part in its production. The authors reduced hippuric acid in urine by treating food (oat straw, prairie grass and clover hay) with dil. alkali in the cold and feeding the washed and dried residue. They, therefore, believe the substance antecedent to hippuric acid to be a non-nitrogenous substance sol. in the cold in dil. alkali and relatively insol. in boiling water.

H. G.

Cycle of hydrochloric acid secretion determined by fractional analysis of gastric juice in dogs with a Pavlov pouch, after feeding with Ewald or Riegel-Leube test meals. ANTONIO FRAGOMELE. *Morgagni Rivista* **68**, 129-35(1926); *Biol. Abstracts* **1**, 1050.—With the Ewald meal, the peak of acid secretion is reached at 30 min.; this is followed by an abrupt drop. With the Riegel-Leube meal, secretion reaches its height at 50 min.; the acidity is greater. Thus, secretory reaction varies with different stimuli.

H. G.

The behavior of the circulatory proteins of human plasma under normal and pathological conditions. W. STARLINGER. *Medical Clinic, Freiburg. Deut. med. Wochschr.* **54**, 731-3(1928).—A summary of 1800 analyses of the blood proteins in 280 normal and pathological individuals. The variations which the concns. of these proteins undergo normally and in disease are indicated.

ARTHUR GROLLMAN

The distribution of sugar between blood corpuscles and blood plasma for several animal species. R. E. SHOPK. Rockefeller Inst. *J. Biol. Chem.* **78**, 107-10(1928).—The distribution of sugar between the corpuscles and plasma varies with different animal species.

ARTHUR GROLLMAN

The effect of posture upon the composition and volume of the blood in man. W. O. THOMPSON, P. K. THOMPSON AND M. E. DAILEY. *Mass. General Hospital. J. Clin. Investigation* **5**, 573-604(1928).

ARTHUR GROLLMAN

The quantitative changes in cystine, tryptophan and tyrosine in the proteins of hen egg during incubation. BAEKHYEN CHO. Kjusu Imp. Univ. *Bul. Sci. Fakultato Terkultura* **2**, No. 1, 6 pp.(1926).—The cystine content increases during the later part of the incubation. The tryptophan content increases during the middle period, then decreases. Tyrosine decreases gradually. No conclusions would be justified, because of the difficulty of accurate sampling.

A. L. HENNE

The cystine content of keratins. TEIZO TAKEDA. Kjusu Imp. Univ. *Bul. Sci. Fakultato Terkultura* **2**, 262-72(1926).—The detn. of the cystine content of keratins has been performed by Okuda's I methods (macro and micro) and Folin-Looney's colorimetric method. The results are generally the same; with certain proteins larger results are given by the color method. The cystine content of human hair is larger for

men than women; it is especially poor in rapidly growing youths. The same tendency is observed with other mammals. Monkey hair has a larger cystine content than human hair. Coarser wools contain less cystine than softer ones. Feathers contain less cystine than mammal hair. In feathers the barbs contain more cystine than the shafts.

A. L. HENNE

Seasonal periodicity in man. I. Basal metabolism and respiratory vascular changes. F. R. GRIFFITH, G. W. PUCHER, K. A. BROWNELL, M. E. CARMER and J. D. KLEIN. *Am. J. Physiol.* **81**, 483 (1927).—See C. A. **22**, 616.

E. H.

The effect of emotion on basal metabolism. HARRY L. SEGAL, HERBERT F. BINSWANGER and SOLOMON STROUSE. *Arch. Internal Med.* **41**, 834-42 (1928).—In emotionally stable patients with normal basal metabolism and in hyperthyroid patients who had received I treatment, the basal metabolism was not affected by the thought of impending operation, while it was markedly increased in patients, who had not received I. The basal metabolism detd. before the operation may serve as an index of sufficient or insufficient I treatment.

MARY JACOBSEN

Pancreatic function and upper intestinal digestion. A new method of study. SANFORD M. ROSENTHAL. *Arch. Internal Med.* **41**, 867-74 (1928).—Ten rabbits received by stomach tube 10 g. uncooked sol. starch and 0.2-0.3 cc. 1 N HCl in 50 cc. water. The blood sugar rose by 62 mg./100 cc. in 30 min. After ligation of the pancreatic duct there was no rise or one of 5-10 mg. The increase did not exceed 21-25 mg. when 1-4 cc. HCl was added to the starch. The inhibition of intestinal digestion was not caused by delayed emptying of the stomach contents, since similar expts. with glucose gave essentially the same results with and without HCl. From 1 to 2 g. dextrose produces the same glucemia as 10 g. starch. The rabbit secretes about 1-4 cc. HCl during a meal (calcd. from dog expts.). The inhibition of amylase by HCl probably also applies to trypsin and lipase and explains some of the disturbances of hyperchlorhydria. Bile plays an important role in the neutralization of gastric acids. A study of intestinal digestion in obstructive jaundice would therefore be of interest.

MARY JACOBSEN

The combined sugar and water tests for liver function. ANTONIO GUALDI. *Riv. patol. sper.* **2**, 197-213 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 66, cf. Klein and Lang, *Münch. med. Wochschr.* **73**, 187-90 (1926).—G concludes from 5 expts. with water-honey that the water only tends to introduce complications and that the sugar test alone is preferable.

MARY JACOBSEN

A few experiments on the respiratory quotient during muscle work of short duration. J. LINDHARD. *Biol. Mededel. danske videnskab. Selskab* **6**, 1 28 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 70-1; cf. C. A. **14**, 3099; Hill, C. A. **19**, 320.—The respiratory quotient for the entire period was consistently below 1 (12 subjects) in contrast to the results of Hill who found it equal to 1. Hill's results are probably caused by nervous disturbances of metabolism. Conclusion: The energy for work of short duration is supplied by both fat and carbohydrates in equal measure and not by carbohydrates alone.

MARY JACOBSEN

The expansion of frog melanophores as a biological test for hypophyseal extracts, and the influence of chloretone on it. P. DI MATTEI. *Bull. acad. med. Roma* **63**, 133-55 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 565.—Hypophyseal exts. share the above property with practically all organ exts.: liver, brain, thymus, thyroid and a no. of other substances. The effect is very pronounced for chloretone, the usual preservative of com. hypophyseal exts. The results of Hogben, Winton, etc., are therefore not convincing.

MARY JACOBSEN

The mineral constituents of woman's milk. OTAKAR LAXA. *Časopis lékařu českých* **66**, 1792-4 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 512.—The results obtained by direct evapn. and ignition are not correct. Milk is dialyzed through parchment and dialyzate and the residue charred, extd. with water, evapd. and ignited separately. The dialyzable portion contains 81.5% of the total mineral content, $\frac{1}{3}$ of which is water sol. The relations between woman's and cow's milk (the latter according to Soldner) are: NaCl 2:1, K citrate 3:1, K phosphate 1:3, Mg phosphate 1:2, Ca citrate combined with casein < 2:3, Ca citrate free < 1.

MARY JACOBSEN

Relation of blood coagulation time and fibrinogen content to the thyroid. K. ICHIKAWA and T. SASAKI. *Folia endocrinol. japon.* **3**, 825-62 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 85-6.—Blood clotting time and fibrinogen content are increased in hyperthyroidism, thyroidectomy and thyroid feeding, slightly increased or unaltered in hypothyroidism. There is no parallelism between coagulability and fibrinogen content.

MARY JACOBSEN

Thyroid and tissue respiration. M. MAEDA. *Folia pharmacol. japon.* **3**, 796-

824(1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 102.—The changes produced in the O_2 consumption and respiratory quotient of the thyroid and other organs by thyroid feeding and thyroidectomy indicate that the thyroid hormone promotes tissue respiration of almost all organs with the exception of the thyroid. MARY JACOBSEN

Supplementary report on the transportation of coloring substances into the amniotic fluid. H. SAKUMA. *Japan. J. Obstetr. Gynecol.* **10**, 34-6(1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 117.—Ten cc. 1-2% dyestuff soln. was injected into the ear vein of pregnant rabbits 24 hrs. before laparotomy. Trypan blue (I), trypan Congo and bengal reds appeared in the amniotic fluid 1-5 hrs. after the injection. The concn. of I was 0.04%, that of the other dyes 0.001%. The amniotic epithelium was stained by these dyes, the placenta also by aniline black. I is also adsorbed by the embryo and the stomach mucosa. The dye passes directly from the mother into the amniotic water. MARY JACOBSEN

Spleen and carbohydrate metabolism. VII. Lactic acid level in blood. ARATA NOMA. *Okayama Igakkai Zasshi* **39**, 1041-8(1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 90.—The blood lactic acid of normal rabbits as detd. at various intervals after glucose and glucose-electrargol injection is 0.0151-0.0298%. It is not materially affected by splenectomy. MARY JACOBSEN

Effect of gastric juice on lactic enzymes. C. SERONO AND R. DI MONTEZEMOLO. *Rass. clin. terap. sci. affini.* **26**, 1-7(1927).—When artificial gastric juice is added to an aq. emulsion of com. lactic enzymes or to a lactose broth culture all lactic cocci are destroyed in 45-60 min. at 37° and a HCl concn. of 0.8%. Only sporulating organisms survive such as *B. subtilis* and *mesentericus*, with which the preps. are frequently contaminated. Expts. with well-buffered HCl solns. on pure cultures of lactic cocci isolated from com. enzyme preps. showed that sterilization requires 1, 2 and 3 hrs., resp., for pH 2.05, 2.15 and 2.35. Loewenbergh has also shown that even HCl-free gastric juice has a definite germicidal effect. The administration of lactic enzymes is therefore not only useless but mostly dangerous because of the contamination. On the other hand acid milk has a high nutritive and therapeutic value because of its protein and lactic acid content and the abundance of lactic acid bacteria, some of which may escape the action of gastric juice and improve the intestinal flora. MARY JACOBSEN

Role of adrenals and thyroid in basal metabolism. C. DEMARIA MASSEY. *Rev. soc. argentina biol.* **3**, 5-19(1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 423.—The basal metabolism is lowered by either adrenal- (I) or thyroidectomy (II). A further decrease occurs when I is followed by II or II by I. Conclusion: The effects on basal metabolism are independent of each other. MARY JACOBSEN

The part of renal medulla in the regulation of arterial tension. A. BIASOTTI. *Rev. soc. argentina biol.* **3**, 279-302(1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 105.—Removal of the abdominal branch of the sympathetic and the large and small splanchnic nerves on the left and on both sides had no effect on arterial pressure. Single adrenalectomy detcs. only slight variations if any. Double adrenalectomy causes progressive hypotension. Removal of 1 adrenal and of the medulla of the other causes a transient hypotension of 3-4 cm. Dogs deprived of the adrenal medulla and with a blood pressure brought up to normal suffered a more pronounced hypotension than normal dogs from a loss of blood amounting to 1.5% of the body wt. Simultaneous adrenal- and sympathectomy was followed by transient hypotension. Bleeding stimulates adrenaline secretion; blood transfusion inhibits it. The quantity of adrenaline normally produced in 1 adrenal of the dog has a definite pressor effect and is sufficient to increase the beat rate of the enervated heart and to suppress glycoma in a dog with normal adrenals. MARY JACOBSEN

Experimental study of prostatic function in relation to basal metabolism. Experimental hyperprostatism. GIAN C. PERACCHIA. *Rev. sud-americana endocrinol. immunol. quimioterap.* **11**, 311-53(1928).—Grafts or injections of prostatic exts. (from young dogs) extended over a period of several months caused in young dogs pronounced symptoms of old age with loss of general and sexual activity, dull, rough hair with alopecia, and moderate loss of wt. toward the end in spite of good appetite and digestion. After the 5th transplant or the 40th injection the basal metabolism (I) was reduced by 15-30%, the rate of excretion of phenolsulfonephthalein and the quantity excreted in 4 hrs. (II) by 35%. The prostate was enlarged and showed the characteristic increase in connective tissue and muscle fibers, and enlargement or obliteration of the acini. All these phenomena were more pronounced when grafts or exts. of prostate from old dogs were used. Prostatectomy caused in young only a slight increase in I and II. Transplants or exts. of young prostates rejuvenated old dogs, increased I by 10-25% and improved II. Conclusion: The testicle is responsible for the general systemic and

prostate changes. The prostate has an important part in the control of the gonadal condition.

MARY JACOBSEN

Protein regeneration in the blood. N. ROZANSKII. *Russkij fiziol. zhurnal* 9, 582-4(1926); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 86.—Bleeding causes a decrease of the fibrin content followed by an 60-80% increase and return to normal within 2-3 weeks. A more transient and less pronounced decrease is produced by a NaCl transfusion. Conclusion: The formation of fibrin and its supply into the blood stream are detd. by its concn. in the blood.

MARY JACOBSEN

Adrenal secretion in angiotomized dogs. P. POPOV. *Russkij fiziol. zhurnal* 10, 227-37(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 104, cf. *C. A.* 21, 3669.--Blood drawn from the point of entrance of the *vena lumbalis* into the *vena cava inferior* (London's technic) inhibits the contractions and lowers the tonus of the isolated small intestine of the rabbit. This stage is followed by an increased tonus and finally return to normal. Blood from the femoral artery increases the tonus slightly and has no effect on the height of the contractions.

MARY JACOBSEN

Liver and pregnancy. OTAKAR SAITZ. *Sbornik lékarsky* 29, 15-42(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 123.—During the last month of normal pregnancy (25 women) the urea excretion was lowered in 88% cases and the levulose assimilation retarded. An increase of bilirubin in the blood was found in 8% and in the duodenal juice in 83% cases. The urine urobilin rose in 67%, the duodenal in 66 7%, the blood cholesterol in 56% cases. The changes can be explained by the effect of pregnancy on the thyroid, pancreas and adrenals. The conception of pregnancy liver is unfounded.

MARY JACOBSEN

Disappearance of adrenaline from circulating blood. C. G. SUNDBERG. *Uppsala lakareforenings forhandl.* 33, 301-25(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 469-70.—Adrenaline was infused continuously into the jugular and mesenteric inferior veins and into the femoral artery of cats whose spinal cord was severed between the 6th and 7th vertebra. About 70-80% adrenaline was destroyed by the liver, 50% by the femoral capillary territory. Expts. with ligated hepatic vessels confirmed the important but not exclusive part of the liver in adrenaline destruction. Expts. *in vivo* did not confirm Tatum's statement that arterial tissue destroys adrenaline. M. J.

Partial ligation of renal arteries in the dog. R. E. MARK. *Verh. deut. Ges. inn. Med.* 1927, 177-81; *Ber. ges. Physiol. exptl. Pharmacol.* 44, 561.—Partial ligation of the arteries of one kidney with subsequent removal of the other results in inhibited excretion. When urea is fed, the rate of decrease of blood urea is lowered. Meat feeding leads to compensatory polyuria, urea retention, rise of blood pressure, increased albuminuria and toxic symptoms. The latter are pptd. when water is withheld. Milk protein or cheese does not cause intoxication.

MARY JACOBSEN

The formation of methylglyoxal from hexose phosphate in the presence of tissues. NOBORU ARIYAMA. Wash. Univ. Med. School. *J. Biol. Chem.* 77, 395-404(1928).—See *C. A.* 22, 1784.

A. P. LOTHROP

The similarity of glucormont and synthalin. FRITZ BISCHOFF, N. R. BLATHERWICK and MELVILLE SAHYUN. Potter Metabolic Clinic. *J. Biol. Chem.* 77, 467-71 (1928).—Evidence is presented which indicates that the glucormont of von Noorden (*C. A.* 21, 3941) is either synthalin or a near homolog of it.

A. P. LOTHROP

Some chemical investigations of embryonic metabolism. I. The isolation of four pentose nucleotides from chicken embryos. H. O. CALVERY. Johns Hopkins and Univ. Mich. Med. Schools. *J. Biol. Chem.* 77, 489-96(1928).—Chicken embryos contain a β -nucleoprotein which yields all 4 of the pentose nucleotides of yeast on hydrolysis. The suggestion is made to substitute the term, "hexose nucleic acid," for thymus or animal nucleic acid and "pentose nucleic acid" for yeast or plant nucleic acid since the older terms no longer possess their original significance. The nomenclature for nucleic acid, nucleotide and nucleoside would then be uniform. The β -nucleoprotein is similar in many of its properties to the compd. obtained originally by Hammarsten from pancreas. The evidence shows that developing chicken embryos synthesize the pentose nucleotides. II. The isolation of a hexose nucleic acid from chicken embryos. *Ibid.* 497-503.—Chicken embryos also contain a compd. having several of the properties of a hexose tetranucleotide which is probably identical with the hexosenucleic acid of other animal tissues. Adenine and guanine were obtained on hydrolysis with 7% H_2SO_4 in amts. bearing quant. relationships to the original substance and to each other.

A. P. LOTHROP

Quantitative studies of β -oxidation. I. The conjugation of benzoic acid and phenylacetic acid formed as the end-products from the oxidation of phenyl-substituted aliphatic acids. ARMAND J. QUICK. Cornell Univ. Med. Coll. *J. Biol. Chem.* 77,

581-93(1928).—BzOH is conjugated in the dog with glucuronic acid and glycine in the ratio of approx. 3:1 and this conjugation also occurs in that ratio when the BzOH is derived from the oxidation of $\text{PhCH:CHCO}_2\text{H}$ or $\text{Ph}(\text{CH}_2)_2\text{CO}_2\text{H}$. $\text{PhCH}_2\text{CO}_2\text{H}$ is the end-product of the oxidation of $\text{PhCH:CHCH}_2\text{CO}_2\text{H}$ and of $\text{Ph}(\text{CH}_2)_3\text{CO}_2\text{H}$ and is combined with glucuronic acid and glycine in the ratio of 2:1 when fed or when derived from these 2 acids. The sum of the 2 conjugated forms of either BzOH or $\text{PhCH}_2\text{CO}_2\text{H}$ excreted during 24 hrs. accounts for more than 80% of the ingested acid, thus giving the expts. quant. significance. These results furnish addnl. evidence for the theory that the fatty acids are broken down in the body exclusively by β -oxidation. The idea is no longer tenable that these conjugations are more or less unimportant mechanisms concerned solely with detoxication powers of the organism. They are normal and common chem. reactions made manifest because the body is applying them to a foreign substance and a study of the conjugation of BzOH may help to solve various problems of metabolism quite unrelated to hippuric and glucuronic acids.

A. P. LOTHROP

The effect of insulin on protein metabolism. ADOLPH T. MILHORAT AND WILLIAM H. CHAMBERS. Cornell Univ. Med. Coll. *J. Biol. Chem.* 77, 595-602(1928); cf. *C. A.* 21, 2299.

A. P. LOTHROP

Muscular exercise and nitrogen metabolism of dogs. WM. H. CHAMBERS AND ADOLPH T. MILHORAT. Cornell Univ. Med. Coll. and Yale Univ. *J. Biol. Chem.* 77, 603-18(1928), cf. preceding abstract.—Dogs were exercised moderately on a horizontal treadmill and the total urinary N excretion was detd. An increase of as much as 50 to 100% in N metabolism is produced by work on the 3rd or 4th day of fasting and this is prolonged into the postwork period. This extra N can be completely spared by carbohydrate so that muscular work in the dog can be accomplished without any increase in protein metabolism in so far as it is possible to det. from the excretion of urinary N. It gradually disappears on continued fasting. These data and those obtained with insulin indicate the derivation of the extra N from an exhaustible reserve rather than from tissue protein.

A. P. LOTHROP

The influence of ingested methylxanthines on the excretion of uric acid. VICTOR C. MYERS AND EMMA L. WARDELL. Univ. of Iowa. *J. Biol. Chem.* 77, 697-722(1928).—The ingestion of caffeine by man is followed by an unmistakable increase in the excretion of uric acid and there is usually an increase following administration of theophylline. There is no increase after ingestion of theobromine. The origin of these increases has not been definitely established but it is suggested that it may be due at least in part to the transformation of caffeine and theophylline to uric acid or methyluric acid. Stimulation of metabolism alone seems insufficient to account for all the extra uric acid. "It is an interesting fact of circumstantial character that whereas 3,7-dimethylxanthine (theobromine) does not cause an increase in the excretion of uric acid as detd. colorimetrically and 3,7 dimethyluric acid does not give the color reaction, on the other hand 1,3-dimethylxanthine (theophylline) does increase the output of uric acid and 1,3-dimethyluric acid does give the color reaction. It is further significant that 1,3-dimethylxanthine (theophylline) causes a greater increase in uric acid excretion when estd. by the Benedict-Franke procedure than when estd. by the Benedict-Hitchcock method and that 1,3 dimethyluric acid does respond to the Benedict-Franke procedure but not to the Benedict-Hitchcock method." The accuracy of the Benedict-Franke colorimetric method was checked by gravimetric estns. of uric acid.

A. P. LOTHROP

The relation of smooth-muscle tone to biological oxidation-reduction. J. M. JOHNSON, W. T. MCCLOSKEY AND CARL VOEGTLIN. Hygienic Lab., U. S. Pub. Health Service, *Am. J. Physiol.* 83, 15-27(1927).—See *C. A.* 21, 3668.

J. F. LYMAN

Butterfat tests on first and later lactations. C. F. MONROE. Ohio Agr. Expt. Sta., *Bimo. Bull.* 12, 34 8(1927).—The av. fat content of the milk of 32 Holstein and 30 Jersey cows during the first lactation was 3.4 and 5.4%, resp.; 19 of the Holstein and 14 of the Jersey cows gave milk during their entire life, the av. fat content of which was within 0.1% of the av. for the first lactation. Butterfat percentages for individual lactations show differences as high as 0.9% for Holsteins and 1.1% for Jerseys. The av. difference between the highest and lowest av. for the individual lactations was 0.36% for the Holsteins and 0.57% for the Jerseys. The butterfat test in the first lactation is a very good indication of what to expect as an av. test of the cow during her entire lifetime.

A. L. MEHRING

Influence of pinching the hepatic veins on glucemia and chloesterolemia. J. J. ROUZAUD AND L. C. SOULA. *Compt. rend.* 186, 1378-80(1928).—In expts. with chloralosed dogs the glucose and cholesterol were detd. in the blood of the hepatic veins before, during and after the pinching. During the pinching of the veins the glucemia

increased progressively and was doubled in 1 hr., due probably in part or entirely to the suppression of the insulin output. The cholesterolemia diminished immediately but the diminution was transitory, lasting about 30 min. This may be caused by the sudden suppression of splenic venous blood in the general circulation. L. W. RIGGS

Female sexual hormones. CHAMPY C. BENCAN AND T. KELLER. *Compt. rend. soc. biol.* **97**, 229-32(1927).—The placenta contains the hormone of the follicles and the hormone of the corpus luteum; thus the secretion of sexual hormones is not confined to a definite class of histological elements. B. C. A.

Excretion of uric acid and diuresis. R. GOIFFON. *Compt. rend. soc. biol.* **98**, 941-3(1928).—The findings indicate that the concn. of uric acid in the urine tends to be fixed whatever the output of water or the concn. of urea. This shows the importance of aq. diuresis and renal permeability in the elimination of urea. L. W. RIGGS

Gastric juice from different levels of the stomach. FELIX RAMOND, PREVEDOURAKIS AND ZIZINE. *Compt. rend. soc. biol.* **98**, 945-6(1928).—The secretion of HCl occurs in the elevated parts of the stomach, and the max. of this secretion takes place in the vicinity of the lesser curvature. L. W. RIGGS

Velocity of oxido-reduction processes in cells of normal adult mammalian tissues. P. MAURIAC, E. AUBERTIN AND E. AUBEL. *Compt. rend. soc. biol.* **98**, 959-60(1928).—The results of tests with the guinea pig, rabbit and dog were comparable to those obtained by Voegtlin, Johnson and Dyer with the rat. cf. C. A. **19**, 2854. L. W. RIGGS

Ammoniacal and real acidity of the urine. MICHEL POLONOVSKI AND PAUL BOULANGER. *Compt. rend. soc. biol.* **98**, 961-2(1928); cf. C. A. **22**, 2000.—The formula of Raffin, $k = p_H/4 + \log(\text{ammonia N}/\text{total N})$, is discussed. L. W. RIGGS

A study of phosphagen. W. DULIERE. *Compt. rend. soc. biol.* **98**, 1252-4(1928); cf. Eggleton, C. A. **21**, 1485, 2278.—The relations of muscular contractility to the presence of phosphagen were studied. L. W. RIGGS

Histochemical study of the distribution of fixed mineral substances in the human placenta. R. NOEL AND H. PIGEAUD. *Compt. rend. soc. biol.* **98**, 1317-8(1928).—No trace of mineral substances was found in the sanguinous space (lac sanguin). The contour of the chorial villi and of the intercotyledonary partitions was always marked by an abundant deposit of ash. L. W. RIGGS

Calcium compounds in the cell nucleus. A. POLICARD AND D. PILLET. *Compt. rend. soc. biol.* **98**, 1350(1928).—A further application of the micro-incineration method in which Ca was recognized as CaSO_4 proved that the nucleus of animal cells contained a large quantity of this element. L. W. RIGGS

Action of peroxidase on the blood plasma. JAKOB MOELLERSTROM. *Compt. rend. soc. biol.* **98**, 1361-4(1928).—Reciprocal relations appear between the action of peroxidase on the blood plasma, velocity of sedimentation of the red corpuscles, temp., I index and no. of white cells per cu. mm. L. W. RIGGS

Intestinal secretin as an excitant of the secretion of the gastric juice. Preparation and effects. JULIAN WALAWSKI. *Compt. rend. soc. biol.* **98**, 1371-2(1928).—Expts. with dogs proved that the gastric secretion is stimulated not only by exts. of the pyloric mucosa, but also by exts. of any segment of the intestine. The intensity of stimulation diminishes as the samples are taken from the pylorus toward the rectum. **Mode of action.** *Ibid.* 1373-4.—The secretin formed under the influence of HCl acts on the gastric glands by the humoral route. **A study in man with a gastric fistula.** *Ibid.* 1374-5.—Intestinal secretin stimulates the secretion of the gastric juice in man as well as in dogs. L. W. RIGGS

Existence of a difference of variable potential between the mouth and stomach during gastric secretion. JEAN SWYNGEDAUW. *Compt. rend. soc. biol.* **98**, 1431-2(1928).—Variations of potential developed in the gastric mucous during secretion. *Ibid.* 1433-4. L. W. RIGGS

Relation between the external and internal secretions of glands. I. G. MANSFELD AND L. SZIRTES. *Univ. Pecs. Arch. expil. Path. Pharmacol.* **130**, 1-27(1928).—Partial ligation of the pancreas in normal dogs is followed by a persisting increased production of insulin. II. G. MANSFELD. *Ibid.* 28-36.—From the results of blood sugar detns. in dogs whose parotid glands have been extirpated or ligated it appears that secreting glands may undergo functional changes indicative of glands of internal secretion. G. H. S.

Place of formation of bilirubin. K. TANIGUCHI. Kiushu Univ. of Fukuoka. *Arch. expil. Path. Pharmacol.* **130**, 37-48(1928).—Within 6 to 8 hrs. after a total extirpation of the liver in dogs or after an operative procedure which leaves the circulation of the liver intact, bilirubin appears in the blood, and the amt. present increases with time. This bilirubin is of extrahepatic origin, although in normal animals the liver

functions as the principal site of its formation. After complete removal of the liver the injection of hemoglobin results in an increase in the extrahepatic formation, but the response is less than in the normal animal. Tolylenediamine and phenylhydrazine act only on the liver, since injections of these compds fail to lead to icterus after extirpation of this organ. G. H. S.

Influence of moderate altitudes on artificial hyperthyroidization in dogs. II. Effect of different diets. ROBERT E. MARK. Univ. Wien. *Arch. expl. Path. Pharmacol.* 130, 257-79(1928); cf. C. A. 21, 766.—Dogs being fed upon a diet consisting solely of meat and kept at a moderate altitude (1040 m.) react to thyroid feeding with an increased diuresis, increased excretion of N, an accelerated pulse rate and a gain in wt., while if upon a carbohydrate diet these effects are lacking. If the same dogs are fed thyroid at sea-level the diet (protein or carbohydrate) is without influence upon the results. G. H. S.

Origin of bile acids. I. Methods for the determination of bile acids, of cholesterol and of the unsaponifiable residue in the bile of dogs. M. JENKE. *Arch. expl. Path. Pharmacol.* 130, 280-91(1928).—By means of two newly devised methods for the direct detn. of bile acids it is shown that in dogs not only are combined bile acids excreted but also cholic acid. Bile acids given by mouth are excreted quant. in the bile. Decompn. of cholic acid in the body is improbable. The new methods permit simultaneous detns. of the cholesterol and unsaponifiable residue. Polarimetric detn. is the basis of the procedure for detg. the bile acids. **II. Cholesterol-bile acids balance in dogs with a complete biliary fistula.** E. ENDERLEN, S. J. THANNHAUSER AND M. JENKE. *Ibid* 292-307.—The formation of bile acids in the body with oral or intravenous administration of cholesterol proceeds independently of the exogenous or endogenous supply of sterols. As basic material for the synthesis of bile acids the fatty acids are of chief importance. **III. Spatial configuration of the sterols and its influence on the formation of bile acids.** *Ibid* 308-18.—Coprosterol and allocholesterol, both of which possess the same spatial configuration, cause, when given intravenously to dogs with a biliary fistula, a definitely increased excretion of bile acids. This in no way shows that these compds. are transformed directly into cholic acid, since they may simply exert a stimulus for the formation and excretion of the bile acids. G. H. S.

G—PATHOLOGY

H. GIDRON WELLS

The fasting gastric secretion in man. W. MORRELL ROBERTS. *Quart. J. Med.* 21, 7-19(1927).—The gastric secretion is depressed by $\frac{1}{100}$ grain of atropine sulfate. Doses of $\frac{1}{32}$ to $\frac{1}{16}$ grain inhibit secretion by paralyzing vagus endings. Gruel then fails to stimulate secretion but caffeine can stimulate it. Decrease of secretion follows doses too small to affect the pulse. Atropine will inhibit the "after secretion" following emptying the stomach after a test meal. There is evidence of incomplete mixing in the stomach consisting of a usual difference of 0.07% acidity between the cardiac and pyloric ends, and it may be much greater. The most copious fasting secretions occur in reflex dyspepsia assocd. with duodenal or appendiceal lesions. This is probably identical with the "psychic secretion" of Pavlov. JOHN T. MYERS

Studies in pernicious anemia. IV. The relationship between corpuscular hemoglobin and chloride contents in the anemias. A. T. CAMERON AND MARIAN E. FOSTER. *Can. Med. Assoc. J.* 18, 673-7(1928); cf. C. A. 21, 2729.—In pernicious anemia the hemoglobin content of a given vol. of red blood corpuscles is invariably above the av. normal and usually much above this value. The Cl content is almost always below the av. normal value, suggesting that a causal relationship may exist between these 2. In secondary anemias the Cl content is usually above the av. normal value, but all variations of hemoglobin values are found. In a single case of anemia from *Diphyllobothrium latum* high Cl and very low hemoglobin values were found. A. T. CAMERON

The occurrence of a raised basal metabolic rate in new growth without hyperthyroidism. E. H. MASON. *Can. Med. Assoc. J.* 18, 681-2(1928).—A case of melanoma-sarcoma with extensive involvement of the liver showed rates of + 40% and over for several weeks. There was no evidence of thyroid disorder. A. T. CAMERON

The production of sugar by animal tissues. Favoring influence of asphyxia and of traumatism. F. MAIGNON. *J. physiol. path. gén.* 25, 626-37, 644-53(1927).—Total ligature of a limb, and traumatism (crushing of muscles below the skin) both cause appearance of sugar (chiefly glucose) of the order of 0.1% in the urine. Asphyxia and traumatism both augment the production of sugar in muscle, whether this has

been perfused with saline to remove blood, or not. Both factors accelerate the decompn. of glycogen. Myocardial muscle produced more sugar than striated muscle, and the latter than smooth muscle. Other tissues also produce glucose. The sugar formed following traumatism of muscle is initially maltose, which prolonged autolysis transforms completely to glucose. A. T. CAMERON

A consideration of the results of albuminuria occurring during pregnancy, with special reference to the relationship between pregnancy kidney and chronic nephritis. G. F. GIBBERD. *Proc. Roy. Soc. Med.* **21**, 831-43(1928).—The paper is mainly clinical. It is considered that the term "functional albuminuria of pregnancy" should be abolished. The condition recurs in the majority of subsequent pregnancies, and points to permanent renal damage. A. T. CAMERON

New Zealand views on goiter. D. W. C. JONES. *Proc. Roy. Soc. Med.* **21**, 1217-30 (1928).—Endemic goiter is of great antiquity among the Maoris and has been described among Europeans in New Zealand for 50 years. It occurs in both men and animals. Its incidence varies greatly in different districts. The only cause consistent with the variation in distribution is lack of I in the soil. An inverse ratio has been demonstrated between the I content of the soil and the incidence of goiter in school children in 33 districts. The I content of the soil is reflected in the food raised upon it. The daily I intake is estd. as 35 micrograms in a non-goitrous and 20 in a goitrous district. The intake of the necessary amt of I is ensured by use of NaCl for ordinary consumption contg. 4 parts of KI per million. If starved of I the thyroid adapts itself either by increasing its colloid or by a diffuse hyperplasia, both may occur in different parts of the same gland. Adenomatous areas may occur and degenerations. If such goiters are treated with I, in children readjustment is readily made, but in adults long accustomed to a low intake excess often causes too great production of the endocrine secretion with toxic symptoms, so that a minimally iodized salt is alone permissible. A. T. CAMERON

Cholesterol examinations in the blood in pulmonary diseases. MARIE V. BABARCY. *Beitr. klin. Tuberk.* **66**, 568-72(1927).—In pulmonary tuberculosis there can occur a normal, hyper- and hypo-cholesterolemia. With increased tuberculin hypersensitivity there usually occurs a hypocholesterolemia. In addn. to the immunobiologic condition in pulmonary tuberculosis the exudative or productive focal character appears of significance for the cholesterol content of the blood. H. J. CORPER

The possibility of differentiating human and bovine tubercle bacilli by means of complement fixation. O. KIRCHNER. *Beitr. klin. Tuberk.* **66**, 581-7(1927). By utilizing bacillary suspensions as antigen, and varying the amts. of both antigen and serum, no differences were found which would permit a differentiation of human and bovine tubercle bacilli by means of the complement-fixation technic. H. J. C.

Experimental demonstration of complement-binding antibodies towards fatty substances of simple constitution. J. E. WOLF. *Beitr. klin. Tuberk.* **66**, 710-8 (1927); cf. *C. A.* **21**, 2730.—The energetic investigations of Much on fats and lipoids and their antigenic property have been taken up by various authors. W. has in addnl. expts. verified these earlier observations experimentally on rabbits, geese and goats and demonstrated that human fat, a relatively simple fatty body, possesses antigenic properties and that under suitable conditions (in the presence of high mol. protein bodies) can form serum antibodies. These expts. are believed to clarify certain biological reactions and to be a valuable index for the therapy. H. J. CORPER

Lipase in tissues, especially in the granulation tissues in surgical tuberculosis. H. TAKEBAYASHI. *Beitr. klin. Tuberk.* **67**, 748-55(1927).—Tuberculous granulation tissues were found to be richer (0.0019) in lipase than non tuberculous (0.00071). Tuberculous pus was also richer in lipase but not to so great an extent. Higher than normal lipase values were found for non-tuberculous granulation tissues from open wounds. The lipase values were not dependent upon lymphocytic content. H. J. CORPER

Therapy of pulmonary tuberculosis by diminished metabolism. G. JACOBSON. *Z. Tuberk.* **48**, 299-300(1927).—The low oxidative conditions in gout, opposite to those of diabetes and Basedow's disease, explain the antagonistic influence of the former tuberculosis. The blood uric acid mirror indicates the oxidation possibility as it occurs in the tissues. Therefore, nuclein-rich materials (Acurogen) cause an unfavorable medium by increase of the uric acid mirror for the development of the tubercle bacillus, and a diminution of metabolism results in a slowing of respiration with rest to the lung, so that there occurs a diminution of the bacilli in the sputum as well as an inhibition of the liberation of toxins. H. J. CORPER

Microchemical gold reactions in the organs of tuberculous sanocrysin-treated individuals. JOSE A. GALLINAL. *Z. Tuberk.* **48**, 433-42(1927).—Au was found in sections of organs of 6 cases of phthisis treated with sanocrysin and examd. microchemi-

cally by means of the Kurosu $ZnCl_2$ reaction. The main depot in man was the liver, thus differing from the exptl. animal. A pos. reaction was also obtained in the blood and though slight in the intestine (in the Lieberkuhn cryptus and submucosal connective tissue). In one of the cases the muscles proved free from Au. There was no definite relation between the tuberculous disease process and the type of deposit. A measure of the deposit in the lungs was difficult since the Au deposit could not be distinguished from coal pigment.

H. J. CORPER

The lipolytic enzyme of the blood, the lymphocytes and the Pirquet reaction in tuberculosis. N. GRGETCHKORI. *Z. Tuberk.* **48**, 460-2(1927).—There exists a relation between the Pirquet skin reaction, the lymphocyte percentage and the amt. of lipolytic enzyme in the blood in tuberculosis, dependent upon the pathologic-anatomic character of the disease. A high grade of allergy with marked pos. Pirquet reaction, lymphocytosis and high lipase content of the blood were assoc. with favorable cirrhotic-productive forms of pulmonary tuberculosis, while anergy, lymphopenia and low lipolytic enzyme content occurred in prognostically unfavorable exudative forms of the disease.

H. J. CORPER

Mineral salts and phosphorus in tuberculosis. RÜCKLE. *Z. Tuberk.* **48**, 462-6 (1927).

H. J. CORPER

Complement fixation in tuberculosis with a simplified antigen. ALFRED SALOMON. *Z. Tuberk.* **48**, 467-9(1927).—A simplified antigen equal in value to Besredka's antigen in comparative tests was prepd. by extg. 0.3 g. of dried and ground up tubercle bacilli in a Soxhlet app. with 300 cc. of ether and dissolving the dried ether ext. in 200 cc. of 96% alc. by several hrs. agitation in a shaking machine.

H. J. CORPER

Studies on the adenoid state. IV. Sedimentation velocity of the red cells. GIOVANNI DONADEI. *Arch. Ital. Otol. Rinol. e Laringol.* **37**, 70-8(1926); *Biol. Abstracts* **1**, 490.—The velocity of red-cell sedimentation was studied in 21 babies with adenoidism, and in 4 normal controls. In 15 cases examd. before operation, there was retardation, in 2 a normal rate, and in 4 acceleration. Operation was usually followed by a return towards normal. D. discusses the theoretical significance of the sedimentation rate in this and other conditions, in particular the correlation between sedimentation, viscosity of blood and protein content of the blood serum.

H. G.

Functional examination of the stomach by physical-chemical methods. SEWERYN CYTRONBERG. *Arch. Malad. App. Digest. et Malad. Nutrition* **16**, 653-79(1926); *Biol. Abstracts* **1**, 1049.—Observations have been made on 134 gastrointestinal cases and 51 normal subjects, including color, n , surface tension, pH , HCl, total acidity and biuret reaction, on: (1) fasting contents; and (2) 45 min., (3) 90 min. and (4) 4 hrs. after ingestion of an albumin test meal. A discussion of the comprehensive data includes functional as well as org. conditions. The n appears to be of considerable significance.

H. G.

A contribution to the study of the deposits containing calcium and iron in the brain. ELIZABETH COWPER FAVES. *Brain* **49**, 307-32(1926); *Biol. Abstracts* **1**, 1075.—A quant. chem. analysis of calcified areas in human brains demonstrates that no other method is conclusive as regards increase in Ca. The staining reaction of calcified tissue with fresh hematoxylin so frequently used is not specific; neither is the microchem. formation of $CaSO_4$ crystals by treatment with H_2SO_4 satisfactory in all cases. Two cases with angionata were investigated by chem. analysis; quant. figures are given for Ca and Fe, phosphates and carbonates. Only traces of Mg were present. In epidemic encephalitis considerable Fe was found localized in various parts of the brain. In the midbrain of 1 case deposits similar to so-called psammoma bodies were present; some gave an Fe reaction, while others did not. A dense neuroglial overgrowth was present and appeared related to the deposits. In 5 of 6 cases of general paralysis of the insane, Fe-contg. pigment was found in the walls of the blood vessels, particularly of the cerebral cortex.

H. G.

Neoplasms and blood potassium. PIETRO OTTONELLO. *Policlinico Sez. Med.* **33**, 511-6(1926); *Biol. Abstracts* **1**, 257.—Using the method of Kramer and Tisdall (cf. C. A. **15**, 1912) O. found the normal variations in K content of blood to be 20-34 mg. per 100 cc. of blood. He cites other observations showing a variation of 18-70 mg. per 100 cc. In cases of carcinoma the K content of the blood was somewhat higher (40-85 mg. per 100 cc.). The differences between these figures and those obtained in cases of cirrhosis of the liver, Malta fever, mitral insufficiency, etc., were not sufficiently pronounced to make the detn. of blood K diagnostically valuable.

H. G.

Physicochemical investigation on the blood of cancerous patients. ED. PEYRE AND C. SANNIE. *Progrès med.* **1926**, 515-23; *Biol. Abstracts* **1**, 258.—This gives the pH and osmotic pressure of plasma, total hemoglobin concn. and vol. of red blood cells

of the blood of patients with cancer of uterus, rectum, face and mouth before and after x-ray or Ra treatment. Venous blood is defibrinated by shaking with glass beads. The plasma p_H is measured electrometrically at 38°. Hemoglobin is detd. by the Sahli-Gowers method. Cell vol. is detd. by 24-hr. sedimentation. Osmotic pressure is calcd. from the f. p. of the plasma. Conclusions are that there is no definite change in p_H ; no apparent variations in f. ps. beyond the normal; but there is a slight diminution of the total hemoglobin and the cell vol. H. G.

The distribution of sugar between corpuscles and plasma in blood from normal human beings, and from diabetics with and without insulin therapy. R. E. SHOPE. Rockefeller Institute. *J. Biol. Chem.* **78**, 111-5(1928).—No abnormality in the distribution of sugar between red blood corpuscles and plasma was found in diabetics. Insulin caused no change in this distribution. ARTHUR GROLLMAN

Studies in blood composition of animals under pathological conditions. I. Broncho-pneumonia in cows. A. A. HORVATH AND R. B. LITTLE. Rockefeller Institute. *J. Clin. Investigation* **5**, 541-6(1928).—Pneumonia in cows caused a drop in the blood-plasma Cl and a rise in the globulin and fibrin fractions. The chemical analysis of blood in pneumonia is of great diagnostic and prognostic value. A. G.

Immune processes associated with syphilis. I. Spirochete specific antibodies in man. H. KRÓO AND F. O. SCHULZE. *Klin. Wochschr.* **7**, 246-8(1928).—A vaccine was made of killed spirochetes in liquid cultures and was injected into normal persons in various concns. some of them receiving as much as 240 cc., containing 3000 million spirochetes per cc. over a period of 6 weeks. Serum obtained from these persons fixes complement with an alc. ext. of *Sp. pallida*. The complement fixation is specific for *Sp. pallida*. Complete fixation was obtained at a dilution of 1:80 in some cases. Of the vaccine, 0.1 cc. was injected intracutaneously before the immunization was begun. A wheal appeared at the site of injection at definite intervals during the period of immunization. A wheal is obtained only when the serum contains complement-fixing antibodies. MILTON HANKE

The amino acid content of blood in tuberculosis. LEO HANTSCHMANN AND MAGDALENE. *Klin. Wochschr.* **7**, 637-8(1928).—The amino acid content of the blood is elevated in tuberculosis, in cases with fresh lesions or with exacerbation, and it is low in cachectic patients or those that are persistently lean. MILTON HANKE

Basal metabolism. II. The basal metabolic rate in relation to symptoms and signs of hyperthyroidism. JAMES H. SMITH. *Arch. Internal Med.* **41**, 830-3(1928); cf. *C. A.* 2599.—An arbitrary numerical index of symptoms was chosen: nervousness 1, tremor 2, loss of wt. 3, tachycardia 4, exophthalmos 5, goiter 6, total 21. In 102 patients an index below 10 was assocd. with a basal metabolism below 20 and absence of hyperthyroidism, although many had nontoxic goiter. Of 44 patients 41 had an index > 10, a basal metabolism over 20 and presented hyperthyroidism. The index is of no value in toxic adenoma because of the absence of exophthalmos. M. J.

Acromegaly and diabetes. Report of six cases. WALLACE M. VATER. *Arch. Internal Med.* **41**, 883-912(1928).—The assumption that acromegaly and diabetes are of the same origin is supported by the following facts: Acromegaly is frequently, hypopituitarism very rarely, associated with diabetes or lowered glucose tolerance. The sugar tolerance in diabetics and normal persons is increased by hypophysectomy. Injections of pituitary ext. produce transient hyperglucemia and glucosuria in normal persons and prevent or relieve insulin hypoglucemia and convulsions. Unlike diabetes alone diabetes associated with acromegaly sometimes shows spontaneous recovery. The common cause of acromegaly and diabetes is perhaps an insufficient production of insulin or its partial neutralization. MARY JACOBSEN

Serum and urine diastase in pregnancy and puerperium. CATELLO DEL PIANO. *Arch. ostetr. ginecol.* **14**, 423-8(1927); *Ber. ges. Physiol. expil. Pharmacol.* **44**, 572-3.—In normal women the blood-urine diastase index is 0.25-0.04. The blood diastase is never > 7. A min. in the blood corresponds to a max. in the urine and *vice versa*. The index is almost regularly increased toward the end of pregnancy and returns to normal during the puerperium. The diastase content is a reliable index of kidney function. In pathol. conditions the index may rise above 1. MARY JACOBSEN

Creatinuria and creatininuria in normal and pathological conditions. Importance of determination of the concentration of the creatine substances in the urine. GAETANO SALVIOLI. *Arch. patol. clin. med.* **6**, 429-47(1927); *Ber. ges. Physiol. expil. Pharmacol.* **44**, 561; cf. *C. A.* 22, 2202.—In normal children the total and % excretion run parallel, so the detn. of the former may be dispensed with. The urine output increases with the age at a much lower rate than the creatinine output. The latter is 0.6 g. daily for 6 months, 1.2225 g. for 14 years of age. In tuberculous children the creatine out-

put, total as well as in % and in g./kg. body wt., is increased. A further increase is caused by fever. The exhaustion in protracted cases may be assocd. with a decline, but the no. g./kg. is still above normal. Non-tuberculous pulmonary diseases with fever cause a transient increase in the abs. and relative values. The curves for the different ages show in pathol. cases the same relation to each other as the normal ones.

MARY JACOBSEN

Biochemistry of thyroid diseases. U. G. BIJLSMA. *Ber. staatl. Gesundheitsfuersorge Nederland.* 6, 1086-111(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 103.—The metabolism of the non-thyroxine I of the thyroid is still little known. The convincing proof of I deficiency as a cause of thyroid enlargement has not been furnished yet. However, the prophylactic administration of minute I doses to school children or the admixt. of I to salt and water seems to have beneficial effects. The I content of Dutch foodstuffs is only slightly below the min. requirements. The I content of the water alone would not suffice to prevent goiter if combined with an I-deficient diet. M. J.

Lipoids and their relation to proteins and immunity. S. BELFANTI. *Biochim. terap. sper.* 15, 33-40(1928).—In order to elucidate the role of the protein "vehicle" in lipid immunization the compd. of ovolecithin (I) with ovovitellin (II) was studied. On treating egg yolk directly or in a physiol. saline emulsion with ether-acetone 4:1 until all fats and most of the lecithin are dissolved a white residue is obtained consisting of alc.-sol. I proper, a water-insol. and a water-sol. protein. The latter is pptd. by alc. and acetone, is not coagulated by heat or AcOH, redissolves after pptn., and gives a very intense Millon, $K_4Fe(CN)_6$ and tannic acid reactions. The chem. constitution has not been detd. In contact with an animal poison the soln. or emulsion of either protein with the I which it carries forms lysocithin (III) rapidly. III can be detached from II by alc. and especially by acetone, but not by physiol. saline in spite of its high soly. in it. It may, therefore, be concluded that II, a complex of 2 proteins, serves as a vehicle for I and that the hemolytic protein consists of II + III. From the immunological point of view the following is of importance: II has also a detoxifying function, since the insignificant hemolytic effect of II + III is most conspicuously raised by the addn. of alc. which is a protein coagulant and lipid solvent. On the other hand it has been found previously by B. that III is inactivated by the energetic action of wasp poison, but may be reactivated by any fat solvent, e. g., ether. The inactivation is here apparently the result of a sudden liberation of fatty acids which envelop the active groups of III. In these 2 cases hemolysis is counteracted without the intervention of an antibody. When just enough III is added to red cells to effect hemolysis III cannot be liberated from the heat-coagulated cell albumins by washing with hot water; but it may be extd. with alc. Similar adsorption of antigen was reported by Calmette for cobra poison-antiserum and by Morgenroth for toxin-antitoxin. The question whether I and III are antigens or only haptens which require a vehicle for their antigenic action is not solved yet. II immune serum (only the sol. protein was used) gave a sp. zone reaction. III gives turbidity with and is detoxified by III immune sera, normal and syphilitic sera. A III soln. of the hemolytic titer 1:10,000 is completely ad-orbed and neutralized by the sol. II. Complement deviation with the Wassermann antigen could not be obtained. It is, however, to be borne in mind that antigenic properties are not always assocd. with the ability to react with the antibody. MARY JACOBSEN

A urinary calculus of unusual composition. FRANCESCO NICOLA. *Giorn. farm. chim.* 6, 163-7(1928).—The stone weighed 0.23 g. and consisted almost exclusively of cystine: 5.30% moisture, 25.82% S. Tests for ash, fibrin, uric acid, xanthine and tyrosine were negative.

MARY JACOBSEN

Experimental calculosis. F. C. VAN LEERSUM. *Handl.* 21 *Nederland. Natuur-Geneeskund. Congr. Amsterdam* 1927, 228-31; *Ber. ges. Physiol. exptl. Pharmacol.* 44, 528.—Of 645 rats fed on a diet free from vitamin A, 197 had calculosis (males twice as frequently as females), some xerophthalmia. The stones consisted mostly of Ca phosphate alone or in combination with CaC_2O_4 , in a few cases of $Ca_3(PO_4)_2$. The urine was clear and acid. Occasional hematuria was not always coincident with calculosis. The latter is apparently not of inflammatory origin. About 88% of these rats and 12% rats fed on a rachitic diet had concrements in the renal tubules, attributable to keratinization of the renal epithelium.

MARY JACOBSEN

Eosinophilia and fibrinogenesis. PAULO ALFONSO VERGNE DE ABREU. *Rev. chim. farm. militar* 3, 87-94(1927).—Eosinophilia is a result of hypercoagulability of the blood caused by toxic agents, which upset the humoral equil. (dermatoses, intestinal parasites, other diseases). The protective mechanism of the body opposes fibrinogenesis. The excess substance set free by the leucocytes crystallizes inside the white cells causing general eosinophilia. Or it is deposited in the skin, intestinal walls, pleura,

lungs and bronchi and crystallizes in the leucocytes, endothelial or connective cells encountered there, thus giving rise to local eosinophilia. Outside of the cell elements the substance forms the Charcot-Leyden crystals.

MARY JACOBSEN

Studies of anaphylaxis. VI. Anaphylaxis and mineral waters. ENRICO SERENI. *Riv. patol. sper.* 2, 171-84(1927); *Ber. ges. Physiol. explil. Pharmacol.* 44, 143; cf. *C. A.* 22, 2203.—An intraperitoneal injection of 3 cc of the water of Fiuggi before or after sensitization reduces shock or abolishes an existing sensitization, but does not prevent passive anaphylactic shock. Conclusion: The water modifies the process of sensitization and not the susceptibility to the anaphylactic "poison." Distd. water has no effect.

MARY JACOBSEN

Behavior of serum lipase in hemolytic icterus. L. AVELLONE. *Riv. patol. sper.* 2, 353-8(1927). *Ber. ges. Physiol. explil. Pharmacol.* 44, 128-9; cf. *C. A.* 21, 2324; 22, 1803.—The content in total and quinine-resistant lipase of dog serum is not altered in icterus produced by tolylenediamine. Since this icterus is characterized by the presence of bile pigment and absence of bile salts in the blood it may be assumed that the former have no effect on serum lipase.

MARY JACOBSEN

Blood nitrogen in pregnancy. JAROSLAV JUNG. *Sbornik lekárský* 29, 87-98 (1927). *Ber. ges. Physiol. explil. Pharmacol.* 44, 123.—Toward the end of normal pregnancy or in mild cases of albuminuria and nephropathies the nonprotein and urinary N reach the lowest physiol. values or are even below normal. The highest physiol. values are reached or exceeded in eclampsia and during labor. The normal condition is restored after labor.

MARY JACOBSEN

The diagnosis of rabies by the precipitin reaction. PUIS LASSER. Bundesanstalt f. Tierseuchenbekämpfung, Modling. *Z. Immunitäts.* 53, 1-11(1927).—Antirabic rabbit sera give precipitin reactions not only with brains contg. the rabies virus but also with those contg. other neurotropic viruses and sometimes with normal brains.

JULIAN H. LEWIS

The titration of the derivatives of diphtheria toxin by means of the ring test. E. HOEN, L. CHERTKOV AND V. ZIPP. Staatlichen Bakteriolog. Inst., Odessa. *Z. Immunitäts.* 53, 20-38(1927).—Increasing heat decreases the antigenic properties of diphtheria toxin and at the same time decreases its pptg. action on diphtheria antiserum, the ring test of Bacher, Kraus and Lowenstein (cf. *C. A.* 20, 1268) being used. The antigenic property of anatoxin is influenced much less than that of toxin by heat. As long as the p_H is within 8.4 and 6.0 the titration of toxin by the ring method is not changed as the result of reaction. Toxin pptd. with CH_3COOH and dissolved again at its original reaction also remains unaffected. Changes in the antigenic value of toxin and anatoxin were followed by *in vivo* expts. and were found to correspond to changes in the ring test.

JULIAN H. LEWIS

The latent period of passive anaphylaxis with homologous serum. F. FRIEDBERGER AND S. SEIDENBERG. Forschungs-Inst. f. Hyg. und Immunitätslehre, Berlin-Dahlem. *Z. Immunitäts.* 53, 39-48(1927).—In answer to reports of unsuccessful attempts to confer passive anaphylaxis from guinea pigs to guinea pigs with a negligible latent period, F. repeated his former expts (cf. *C. A.* 20, 235). To produce precipitins in the guinea pig, which is a difficult procedure at best, 2 methods were used. In 1 series 1 cc. of sheep serum was injected intraperitoneally every other day until 13 injections were given. Only 15% lived 3 weeks after the last injection at which time they were bled. In the 2nd series 0.5 cc. of serum was injected intraperitoneally 3 times a day for 7 days. After an interval of 7 days they were bled, there being only 5 of 30 surviving. The sera from these 2 groups injected intravenously sensitized guinea pigs to fatal anaphylaxis after an incubation period of 1 to 5 min. There is some indication that the serum of guinea pigs immunized in winter do not passively sensitize either after a short latent period or the usual one of 24 hrs. This might explain the negative results of Doerr and Bleyer (*Z. Hyg.* 106, 119(1926)) and Schwarzmann (*ibid.* 371).

J. H. L.

The antigenic properties of the distillate of certain bacterial cultures. Z. YERMOLEYEVA. Biochem. Inst. Kommissariats Volksgesundheit, Moskau. *Z. Immunitäts.* 53, 101-12(1927).—The distillate from bouillon cultures of cholera vibrio and diphtheria bacilli contg. neither proteins, fats nor carbohydrates show distinct antigenic properties.

JULIAN H. LEWIS

The preservation of hemolytic sera. V. S. KALININ AND S. I. GINSBURG. Inst. f. Infektionskrankheiten "Elias Metschnikoff," Moskau. *Z. Immunitäts.* 53, 112-7(1927).—Boric acid in concns. of 1% preserves hemolytic sera without affecting its properties in any way.

JULIAN H. LEWIS

The role of complement. G. D. BELONOVSKII. Staatlichen Inst. f. ärztliche Fortbildung, Leningrad. *Z. Immunitäts.* 53, 118-32(1927).—Larger doses than the

mineral hemolytic amt. of complement increase the activity of amboceptor and the amt. of amboceptor which combines with the red cells. Immune bodies which do not ordinarily require complement (precipitins, agglutinins, antienzymes) are increased in their action in the presence of complement.

JULIAN H. LEWIS

Production of artificial immune sera by the method of Mez and Ziegenspeck. M. EISLER. Staatlichen serotherapeutischen Inst., Wien. *Z. Immunitäts.* 53, 136-50(1927).—Artificial immune sera prepd. by the method of Mez and Ziegenspeck react entirely unsp. Their reaction depends on unsp. colloidal reactions between certain constituents of the serum and the exts. A seemingly sp. reaction is sometimes obtained due to the absence or presence of the essential constituents in certain exts. J. H. L.

Preservation of complement. S. I. GINSBURG AND V. S. KALININ. Staatlichen serotherapeutischen Inst., Wien. *Z. Immunitäts.* 53, 219-26(1927).—Complement is preserved, sterile and active, by the addn. of 4% boric acid and one of several electrolytes, the best being 5% SrCl₂ and 10% NaCl.

JULIAN H. LEWIS

Diagnosis of filterable viruses by complement fixation. Third report. J. MICHALKA. Bundeanstalt f. Tierseuchenbekämpfung, Mödling. *Z. Immunitäts.* 53, 227-32(1927).—The antigen was prepd by extg the infected brain with NaCl soln. There was little or no specificity among the various viruses and normal brain gave about the same results.

JULIAN H. LEWIS

The nature of antibodies. L. A. SILBER AND E. P. SHAECHTER. Mikrobiol. Inst. d. Kommissariats f. Volksgesundheit, Moskau. *Z. Immunitäts.* 53, 263-9(1927).—The loss of agglutination properties of immune serum as the result of heat depends not on the destruction of the antibodies but on changes in their phys. state coincident with coagulation. If coagulation is inhibited by mixing the serum with fermentoid, a high mol. deriv. of the polymethane series, antiserum can be heated 1 hr. at 70° without affecting its titer. Likewise, by increasing the reaction of antiserum to Ph 8.3-10.14, which inhibits coagulation, it can be heated 1 hr. at 70-96° without losing its antibody action.

JULIAN H. LEWIS

The pathogenesis of hemoglobinuria in malaria (blackwater fever). M. K. EBERT. Mikrobiologischen Inst. des Volkunterrichtskommissariats, Moskau. *Z. Immunitäts.* 53, 297-314(1927).—This article is partly polemic over the theory of Krichevskii (cf. *C. A.* 18, 552) that hemoglobinuria in malarial fever is the result of the activation of lecithin with quinine to produce hemolysis. Expts. are also given to show the quant. relations of quinine and lecithin in the *in vitro* production of hemolysis of washed human red blood cells. Attention is called to the similarity of lecithin-quinine hemolysis to cobra toxin-lecithin hemolysis and that other medicaments, as caffeine, can be activated to hemolysis with lecithin.

JULIAN H. LEWIS

The production of precipitating serum of high titer for protein differentiation. E. G. DRESSEL AND G. MEISSNER. Univ. Greifswald. *Z. Immunitäts.* 53, 332-8(1927).—Immuneization of rabbits with mixts. of serum with lipid-containing alc. exts. of meat, homologous or heterologous, or pure fatty acids or lecithin has no practical advantage in the production of antisera of high titer.

JULIAN H. LEWIS

The distribution of isohemagglutinins in the protein fractions of serum. L. BLEYER. Hygienischen Institut, Basel. *Z. Immunitäts.* 53, 386-90(1927).—Human sera fractionated either with (NH₄)₂SO₄ or electro-ultrafiltration showed that α - and β -agglutinins were for the most part in the euglobulin and only in traces in the pseudoglobulin. Contradictory to the results of Rona and Krebs (*C. A.* 20, 3504) both types of agglutinins are divided in the same way among the serum fractions.

JULIAN H. LEWIS

The formation of antibodies in children with relation to age. Second report. W. HALBER, H. HIRSZFELD AND M. MAYZNER. Staatlichen Inst. f. Hyg., Warschau. *Z. Immunitäts.* 53, 391-418(1927).—Children in the first yr. of life form little or no natural antibodies. Immune antibodies are developed in small quantities and quickly disappear. Immunization acts unspecifically and heterologous antibodies are formed.

JULIAN H. LEWIS

Isohemagglutinogens in human serum. IDSURU OUCHI. Hokkaido Univ., Sapporo, Japan. *Z. Immunitäts.* 53, 462-7(1927).—Human serum, as well as the red blood cells, may contain group sp. isohemagglutinogens. They are pptd. undestroyed by alc.

JULIAN H. LEWIS

Double-ring formation in toxin-antitoxin mixtures. E. HOEN AND T. CHERTKOV. Staatlichen Bakteriolog. Inst., Odessa. *Z. Immunitäts.* 53, 468-77(1927).—A layer of toxin superimposed on antidiphtheria serum forms 2 rings, one sp. and the other unsp. The unsp. ring is formed at exactly the plane of contact and is also produced by stratifying toxin on normal horse serum or Martin bouillon and other antigens on antidiph-

theria or normal serum. The sp. ring is more or less removed from the plane of contact.

JULIAN H. LEWIS

Peroral immunization of mice against paratyphoid B. ERNST FRÄNKEL AND ERNST SCHULTZ. Inst. f. Krebsforschung, Berlin. *Z. Immunitäts.* 53, 478-86(1927).—Peroral administration of killed paratyphoid B bacilli to mice along with Na benzoate gave better results than the subcutaneous injection of the vaccine. Bacterial filtrates and exts. were just as effective as the whole bacilli.

JULIAN H. LEWIS

The importance of the Meinicke turbidity reaction in the diagnosis of syphilis. B. ELBERT AND V. GERKESS. Weissrussischen Staatlichen Bakteriolog. Inst., Minsk. *Z. Immunitäts.* 53, 493-505(1927).—The Wassermann and the Meinicke turbidity reactions were compared. The Wassermann is preferred in the primary stage, and the Meinicke in the secondary and tertiary stages, while in hereditary syphilis there is no choice. The 2 methods agreed in 90% of the tests. The Meinicke turbidity test is much better than the 3rd modified Meinicke test and the Sachs-Georgi reaction.

JULIAN H. LEWIS

The relation of chemotherapy and chemoprophylaxis to the reticulo-endothelial system. I. KRICHIVSKII. Mikrobiol. Inst. d. Volksunterrichtskommisariats, Moskau. *Z. Immunitäts.* 53, 506-31(1927).—The functional elimination of the spleen by any method leads to a marked reduction of the prophylactic and therapeutic action of chem. substances. This phenomenon is not due to the anti-infectious action of the spleen but to the absence of some action on the therapeutic substance, such as storing it in the reticulo-endothelial cells preventing its quick elimination.

JULIAN H. LEWIS

The influence of active and inactive serum on the formation of nitrites by bacteria. OSKAR WELTMANN, OTTO BSTEH AND KARL NEUMAYER. *Z. Hyg. Infektionskrankh.* 107, 126-9(1927).—Active serum, unlike inactive serum, causes a definite inhibition of the nitrite-forming power of certain bacteria, particularly with typhoid and proteus bacilli, and in regulated dosage with *B. coli* and paratyphoid A and B bacilli. No effect was noted with *B. fecalis alkaligenes* and the *Staphylococcus albus*. As shown by plate cultures the inhibiting action on nitrite production parallels the bactericidal property of the serum. The principle responsible for inhibiting the nitrite production is of complex structure, consisting of thermostable and thermolabile components. The latter may be replaced by fresh guinea pig or human serum.

E. R. LONG

The relations between the reticulo-endothelial system and chemotherapeutic action. CLAUD W. JUNGERLUT. Georg-Speyer Haus, Frankfurt a. M. *Z. Hyg. Infektionskrankh.* 107, 357-79(1927).—Doses of silver neoarsphenamine which invariably effected a sterilization of recurrent spirochetal infection in otherwise normal mice are of much less effect in splenectomized mice and mice with the reticulo-endothelial system blocked. Primary trypanosome infections are likewise much less susceptible to treatment with Bayer 205 and other chemotherapeutic agents after these operations than in controls. These results indicate the necessity of an intact reticulo-endothelial system for chemotherapeutic action, and suggest that a conversion of chemotherapeutic agents from a non-bactericidal to a bactericidal form takes place in the cells of this system.

E. R. LONG

The role of the reticulo-endothelial system in chemotherapy. ADOLF FELDITZ AND ALIX SCHOTT. Robert Koch Institute, Berlin. *Z. Hyg. Infektionskrankh.* 107, 453-71(1927).—The curative action of chemotherapeutic agents was greatly weakened in white mice with the reticulo-endothelial system largely thrown out of action by splenectomy and injection of Fe saccharate. This held for arsphenamine, neoarsphenamine, their corresponding oxides, solganol, trypaflavin, Bayer 205 and antimosan, when used as curative agents in the infections for which they are ordinarily sp. The reticulo-endothelial system plays an important part in chemotherapeutic action.

E. R. LONG

The varying behavior of the toxins and the protein antigens toward the sodium salts of the alkylresorcinolcarboxylic acids; the hydrotropic properties of these salts. H. L. BLEYER. Univ. Basel. *Z. Hyg. Infektionskrankh.* 107, 702-15(1927); cf. *C. A.* 21, 2327. —Toxins are detoxicated by treatment with the Na salts of alkyl compds. (tetanus toxin and ricin by amyl compds.) *in vitro*, the inactivation depending not on the abs. amt., but on the concn. of the alkyl compd. The detoxication takes place within 1 min. Subsequent diln. with water does not bring about a disoccn. with restoration of toxicity. Toxins and proteins behave differently toward the alkyl combination: the former lose their toxicity and antigenic action at the same time, whereas the proteins do not lose their antigenic activity, as measured by their capacity to engender anaphylactic sensitiveness. The alkyl compds. acquire "hydrotropic" properties (cf. C. Neuberg, *C. A.* 11, 256). In relatively low concn. they inhibit the heat coagulation of sera and under certain conditions convert water-insol. substances into sol. The length of

the C chain in the alc. radical is important in this connection. III. *Ibid* 108, 302-7(1928).—The anaphylactogenic and lysinogenic capacity of proteins is not weakened by concg. the alkyl linkages. No loss of antigenic action occurs in the heated mixts. of protein and alkylresorcinolcarboxylic acids, in cases where the presence of the alkyl compd. prevented the heat coagulation of the protein. The agglutinating, hemolyzing and antitoxic antibodies of immune sera are not harmed by toxin-destroying concns. of alkyl linkages at room temp. At 100° the antibodies are completely destroyed, although the proteins of the immune sera suffer no change. This difference supports the view that the antibodies and proteins of immune sera are not identical. E. R. L.

The nature of the material in liver effective in pernicious anemia. II. EDWIN J. COHN, GEORGE R. MINOT, GORDON A. ALLES AND WILLIAM T. SALTER. Harvard Med. School. *J. Biol. Chem.* 77, 325-58(1928).—The material in liver effective in pernicious anemia is sol. in H₂O, insol. in Et₂O and pptd. by EtOH. It is found in the filtrate from basic Pb acetate and is pptd. by phosphotungstic acid. A fraction of the phosphotungstates contg. about 19% N contains the active principle which must therefore be considered either a nitrogenous base or a polypeptide. As little as 0.6 g. daily has sufficed to produce a marked response of reticulated red blood corpuscles in a patient with pernicious anemia. The growth of immature red blood corpuscles has also been stimulated by the purest fractions thus far prepd. A. P. LOTHROP

The state of plasma calcium in parathyroidectomized dogs. C. I. REED. Baylor Univ. *J. Biol. Chem.* 77, 547-54(1928); cf. *C. A.* 22, 2203.—"Detns. of diffusible Ca in parathyroidectomized dogs show that certain individuals undergo a pronounced diminution of 1 fraction or the other, but there is no constancy of response among different animals, tetany occurring both at high and low concns. and proportions. There is less stability between the 2 fractions than in the normal animal. The incidence of tetany in the early postoperative period is associated with a change in the proportions of Ca and inorg. P sufficient to lower the Ca:P ratio to 1 or less. But in latent tetany there is an adaptation that enables the animal to survive a low ratio without tetany for long periods (as much as 10 days or longer with a ratio continuously as low as 0.6)." A. P. LOTHROP

The chemical reaction of the crystalline lens and the acidosis theory of cortical cataract. NOE SCALINCI. *Arch. sci. biol.* 8, 465-9(1926).—Principally an argumentative paper in answer to Lo Cascio (*Ann. di Oftalmol. e Clin. Oculistica* 1918-1919). The *p_H* of lens extract is 7.38, showing that the protein is slightly alkaline and is present as alkali proteinate. S. advances these facts to explain his theory that the opalescence of the crystalline lens in cataract is due to acidosis. PETER MASUCCI

Liver and thyroid; hepatic hyperfunction in Basedow's disease. N. PENDE. *Boll. soc. ital. biol. sper.* 3, 192-6(1928).—A clinical study of liver hyperfunction in Basedow's disease and hyperthyroidism. PETER MASUCCI

Studies on the hydrogen-ion concentration of the feces in health, in achylia gastrica, colitis simplex and gastrogenous diarrhea. N. C. LUNDING. *Acta med. Scand.* 68, 97-107(1928).—The H-ion concn. of the feces of normal individuals varies from *p_H* 6 to 8, but for the same person the daily variations are not more than 1.1 *p_H*. The solid content in well-formed or slightly soft but still formed feces of normal persons is 31 to 14%, and with a solid content below 14% the feces become fluid. The *p_H* increases parallel to the increase in solids so that in hard fecal masses a *p_H* of 8.5 is found. The *p_H* is also detd. by the length of time the feces are retained. The *p_H* of feces of achylia gastrica patients does not vary from the normal, and the administration of HCl does not influence the *p_H* value. In colitis the *p_H* variations extend more to the alk. side, reaching values of 9 and more; this is probably due to admixt. of the alk. intestinal juice. In a case of gastrogenous diarrhea the *p_H* values of the feces were normal. S. MORGULIS

Disturbance of sugar metabolism in trypanosomiasis and spirochetosis. KURT SCHERN. *Biochem. Z.* 193, 264-8(1928).—Infection with trypanosomes leads to a hypoglucemic condition preceded by a hyperglucemia. S. MORGULIS

The mechanism of complement action in hemolysis. KEIZO NAKAMURA. *J. Biochem. (Japan)* 8, 409-39(1928).—The amt. of the combination of complement with sensitized red blood cells is generally more or less proportional to the concns. of these substances. The product of hemolysis inhibits the combination of complement with sensitized red cells according to its concn. S. MORGULIS

Biochemical study on the urine of carcinomatous rats. YOSHIO KIMURA. *J. Biochem. (Japan)* 8, 469-94(1928).—The av. daily urine output of rats is about 1.0 cc. The fresh urine is acid. In carcinomatous rats the quantity of urine is more or less parallel to the amt. of Cl excreted. The compn. of the urine is influenced by the soften-

ing of the tumor. With the development of the tumor the total N increases. The NH_3 N is also increased but the % of NH_3 N is actually diminished. Uric acid N increases with the total N but the % is again lowered. The NH_3 N diminishes during the period of active growth but increases later. The allantoin N increases. The total H_2SO_4 varies with the NH_3 N. The neutral S is greatly increased. K, Na, Ca and Mg increase in direct relationship to the condition of the tumor. Ca increases with the increase in H_2SO_4 . It is concluded that the tumor causes an increased splitting of body protein, especially of the nucleated cells. The increased protein cleavage is accompanied by insufficient oxidation. The increased elimination of allantoin indicates an increased destruction of the nuclei. The softening of the tumor leads to a great increase in the salt content of the urine. The diminished excretion of NH_3 N in spite of the increased protein destruction is interpreted to mean that there is simultaneously also a new formation of protein.

S. MORGULIS

Antigenic function of lipids. Z. YERMOLYEVA. *Zhurnal expl. Biol. Med.* **8**, 180-6(1928).—Ether exts of egg yolk possess antigenic properties. Cholesterol and lecithin have no immunizing effect, but pig serum changes these from lipid haptens into typical antigens. Separate injection of serum and lipid gives only neg. results. Immunization with 2 or more non-antigens (cholesterol and lecithin) produces immunity reactions in the serum against one of these haptens.

S. MORGULIS

Experimental immunization with carbohydrates. V. A. CHERNOKHIVOSTOV. *Zhurnal expl. Biol. Med.* **8**, 260-4(1928).—Intravenous injection of starch soln. into rabbits causes the appearance of properties for binding alexin, which is not observed either with agar gels or agar sols. The curve of rise in immunity obtained with starch is entirely analogous to that obtained with protein.

S. MORGULIS

The specific and non-specific reaction of alexin fixation. V. A. CHERNOKHIVOSTOV. *Zhurnal expl. Biol. Med.* **8**, 265-9(1928).—Both the specific and non-specific alexin fixation reactions depend upon the same mechanism; this consists of certain physico-chem. changes.

S. MORGULIS

Experimental immunization with iodine preparations. I. KATZ. *Zhurnal expl. Biol. Med.* **8**, 398-403(1928).—Preliminary expts. indicate that colloidal I_2 prepns. can produce an immunizing effect.

S. MORGULIS

Sugar content of the blood in diphtheria. P. LEREBoullet and P. PIERROT. *Arch. med. enfants, Paris* **31**, 148(1928); *J. Am. Med. Assoc.* **90**, 1593.—In the cases observed the malignant type of diphtheria was usually accompanied by hypoglycemia, whereas in ordinary diphtheria hypoglycemia was rare. The hypoglycemia is attributed to suprarenal insufficiency caused by diphtheria intoxication. When suprarenal ext. was given a patient with malignant diphtheria and hypoglycemia, the sugar content of the blood usually returned to normal and the condition of the patient improved.

L. W. RIGGS

Hydrogen concentration and the flocculation of normal and syphilitic serums by acetic acid. R. DOURIS, CH. MONDAIN and J. BECK. *Compt. rend. soc. biol.* **98**, 901-3(1928).—Under identical conditions syphilitic serum gives a more abundant ppt. than normal serum. The addn of AcOH increases the slight difference in the concn. of H ions in the normal and syphilitic serums.

L. W. RIGGS

The p_{H} and the alkaline reserve of the blood in the anxious. M. LAIGNEL-LAVASTINE, R. CORNELIUS and M. VINCENT. *Compt. rend. soc. biol.* **98**, 941(1928).—In a study of 7 cases, the 3 with the highest p_{H} of the blood, 7.43 to 7.47, also had a p_{H} of the urine of 7.0 to 7.4. A lower p_{H} of the blood was accompanied by a lower p_{H} of the urine. In 6 of the cases the alk. reserve was above 64 and in 4 of the 6 it was above 70.

L. W. RIGGS

Improvement of the functional efficiency of the pathologic kidney by the ingestion of lacto-serum. MAURICE RENAUD, J. MULLER and A. MIGET. *Compt. rend. soc. biol.* **98**, 945-7(1928); cf. *C. A.* **22**, 2604.—In a series of 20 nephritic patients the renal output during 90 min. following the ingestion of 200 cc. of water was: urine 210 cc., urea 0.85 g., Cl 0.65 g., Ambard const. 130. The figures for the same patients after the ingestion of 200 cc. of lacto-serum were 240 cc., 2.70 g., 1.90 g. and 78. L. W. R.

Application of the histo-chemical technic of micro-incineration to the study of anthracic pulmonary pigments. A. POLICARD, S. DOUBROW and D. PILLET. *Compt. rend. soc. biol.* **98**, 985-6(1928).

L. W. RIGGS

Variations in the glucemia in depancreated dogs carrying a pancreatic graft, after the operation and following the ingestion of glucose. L. KÉPINOR and S. PETIT DUTAILLIS. *Compt. rend. soc. biol.* **98**, 1193-5(1928).—In depancreated dogs carrying a pancreatic graft under the skin of the abdomen, the glucemia was about double the normal figure on the 3rd, 4th and 5th days following the operation. By the 7th day the glu-

cemia had fallen to about the normal figure. With a dog carrying a large graft there was only a slight rise in the glucemia. After the administration of glucose the dogs carrying large pancreas grafts showed little or no rise above normal in their blood sugar content.

L. W. RIGGS

The curve of weight and the amount of diuresis in diabetes insipidus. MARCEL LABBÉ, P. L. VIOLÉ AND GILBERT DREYFUS. *Compt. rend. soc. biol.* **98**, 1293-5(1928).—Report of a case. The modifications of body wt. coincident with modifications of diuresis have a relation to the absorption of water by the tissues. Medication by hypophysis ext. increases this absorption.

L. W. RIGGS

Acid-base equilibrium of urines in pulmonary tuberculosis. R. GOIFFON AND R. BLASKO. *Compt. rend. soc. biol.* **98**, 1308-10(1928).—Analyses of the urine of 70 patients with pulmonary tuberculosis were made, and in some cases the urine of the same patient was analyzed for many days in succession. The factors detd. were p_H , titration acidity, formol acidity, org. acids, phosphates and the usual N constituents. The numerical results of this study are not given, but the variations and ratios of one constituent to another are discussed at length.

L. W. RIGGS

Reaction of takata-ara in the cerebrospinal liquid. A. PRUNELL. *Compt. rend. soc. biol.* **98**, 1315-6(1928).—The method consists in treating 1 cc. of the spinal fluid with 1 drop of 10% Na_2CO_3 soln. and 0.3 cc. of a soln. made by mixing equal parts of a 0.5% soln. of $HgCl_2$ and a 0.02% soln. of diamond fuchsin in H_2O . From the time necessary for flocculation and the colors observed a sp. diagnostic for metasyphilis is claimed. On repeating the test P. found that while it indicated pathol. spinal fluid, it was not sp. for metasyphilis, and that its clinical value depended on the concn. of albumin in the spinal fluid.

L. W. RIGGS

Distribution of organic and inorganic phosphorus in human blood in the course of pulmonary tuberculosis. A. MOREL AND F. K. AALAM. *Compt. rend. soc. biol.* **98**, 1345-6(1928).—The org. P in comparison with the inorg. P is increased in human blood during pulmonary tuberculosis.

L. W. RIGGS

The physical factors involved in phagocytosis. ERIC PONDER. New York Univ. *Protoplasma* **4**, 611-26(1928).—A review.

M. H. SOULE

Blood uric acid in nephritis. WILLIAM P. HOLBROOK AND HOWARD D. HASKINS. *J. Lab. Clin. Med.* **12**, 10-5(1926).—Uric acid detn. cannot be used clinically as a reliable indication of kidney impairment. It is not retained in the blood at an earlier stage of nephritis than is urea. Creatinine estn. is much more valuable, agreeing approx. with the urea results and serving as a check on the latter. High estns. are very significant for prognosis. Urea estns. are the most reliable and significant of the blood chemistry findings in nephritis. Estn. of urea in blood filtrate by Folin's method using titration instead of nesslerization is very advantageous. NaCl estn. yields such variable results that its value in nephritis is very doubtful.

ETHEL W. WICKWIRE

The influence of magnesium salts on amboceptor and complement titrations. WILFRED H. KELLOGG AND L. AMY WELLS. *J. Lab. Clin. Med.* **12**, 153-6(1926).—Mg salts in proper amt. added to physiol. saline soln. aid in the specific lysis of red blood cells, thus increasing the titer of amboceptor and of complement. The optimum amt. for this purpose is 0.1 g. of the Cl or sulfate to the l. of N NaCl.

ETHEL W. WICKWIRE

A contribution to the nature of diabetes. A mathematical derivation of the blood-glucose curve. DWIGHT M. ERVIN. *J. Lab. Clin. Med.* **12**, 318-25(1926).—A mathematical equation for the blood-glucose curve of the blood is derived from the 3 factors, absorption from the intestinal tract, formation of glycogen and oxidation. The consts. of the curve detg. the rate at which absorption, glycogen formation and oxidation take place are detd. From these consts. the effect on each function on the curve can be investigated. The curve derived from failure to burn glucose differs only insignificantly from the normal and in no way approaches the curve found in diabetes. By investigating mathematically the condition of diabetes from the blood-glucose curve no evidence of the failure to burn glucose can be obtained. It is found that the curve depends only upon a decreased rate of glycogen formation.

ETHEL W. WICKWIRE

Hypoglycemia. With and without insulin: with and without symptoms. BENJAMIN I. ASHE, HERMAN O. MOSENTHAL AND GEORGE GINSBERG. *J. Lab. Clin. Med.* **13**, 109-16(1927).—Cases are reported which demonstrate that hypoglycemia may develop with marked suddenness both in diabetics and non-diabetics, in patients receiving comparatively small doses of insulin and those who have never had insulin. Symptoms vary greatly and may lead to incorrect diagnosis. Especial attention is called to the serious situations created when hypoglycemia, brought on by insulin administration, results in loss of voluntary control with resultant irresponsible actions. Inanition and dehydration are discussed in their relation to the production of hypoglycemia;

these factors may have been responsible for the low blood sugar found in one case.

ETHEL W. WICKWIRE

Occurrence of lipoids in urine and their diagnostic importance. EDWARD L. MILOSLAVICH. *J. Lab. Clin. Med.* 13, 542-6(1928).—A study of urinary sediments by means of Reichert's polariscopic attachments, which can be applied to any microscope, revealed lipiduria in the following pathologic conditions: (1) lipid nephrosis of unknown origin (genuine lipid nephrosis); (2) lipid nephrosis of luetic etiology (secondary stage of syphilis); (3) subacute and chronic glomerulonephritis (combination forms of nephritis and nephrosis); (4) amyloid nephrosis with edema; (5) Grawitz tumor (so-called hypernephroma) of the kidney; (6) lipid carcinoma of the prostate. Further observations and studies are suggested.

ETHEL W. WICKWIRE

An antigen for use in serum tests for syphilis. B. S. KLINE. *J. Lab. Clin. Med.* 13, 586-96(1928).—A method of obtaining an acetone-insol. lipid wax, thoroughly satisfactory in serum tests for syphilis, within a few days, is described. Antigen emulsions from this lipid base gave better results in the microscopic slide pptn. test for syphilis than the Kahn antigen diln. and also good results in the Wassermann test.

ETHEL W. WICKWIRE

RIEBERT, H.: *Lehrbuch der allgemeinen Pathologie und der pathologischen Anatomie*. Revised by Carl Sternberg. Leipzig: F. C. W. Vogel. 727 pp. M. 45.

H—PHARMACOLOGY

A. N. RICHARDS

The effect of the internal secretions and temperature on the metabolism of amino acids and simple sugars by animal cells. W. E. BURGE, A. M. ESTES, G. C. WICKWIRE and MAUDE WILLIAMS. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 81, 408(1927).—Cultures of paramecia utilized the 3 sugars, glucose, levulose and galactose; glucose and levulose were used more rapidly than galactose. The addn. of insulin to the medium increased the rate of utilization of all 3 sugars. Pituitrin also increased sugar consumption by paramecia, while thyroxine decreased it. Insulin and pituitrin had no effect on the utilization of amino acids by paramecia while adrenaline and thyroxine increased amino acid utilization slightly.

J. F. LYMAN

Experience with dilaudid, the morphine derivative. GRACE. *Deut. med. Wochschr.* 53, 1979-81(1927).—Dilaudid (cf. *C. A.* 21, 2934) is recommended as an analgesic, particularly against tabetic pain and the pain arising from the use of febrifuges. It is much less habit-forming than other morphine derivs.

ARTHUR GROLLMAN

Danger of intravenous calcium therapy. W. D. M. LLOYD. *Brit. Med. J.* 1928, I, 662-4.—The intravenous use of 4 cc. 10% CaCl_2 soln. is dangerous. In one case the electro-cardiogram indicated a sino-auricular heart-block.

A. T. CAMERON

A fatal case of poisoning by a non-arsenical weed-killer. A. H. D. SMITH. *Brit. Med. J.* 1928, I, 714-5.—A patient who drank less than 56 g. of com. cresylic acid died within 2 hrs.; the corrosive action was negligible, but there were profound toxic effects on the nervous system.

A. T. CAMERON

The treatment of malignant disease by colloidal lead. STANLEY WYARD. *Brit. Med. J.* 1928, I, 838-40.—Of 40 patients who had received 0.2 g. or more of colloidal Pb only 1 showed any improvement. The results afforded no evidence in support of the view that colloidal Pb exerts a beneficial influence upon the progress of a malignant growth.

A. T. CAMERON

Two cases of hematuria caused by insulin treatment. R. D. LAWRENCE and A. S. HOLLINS. *Brit. Med. J.* 1928, I, 977-8.—Only 7 previous cases had been reported in the literature. There seems to be no common underlying explicatory factor. But no cases have been reported on small dosage. The condition seems transient, and to cause no inconvenience, and does not seem to need even the temporary discontinuance of insulin treatment.

A. T. CAMERON

The insulin-glucose treatment of traumatic shock. E. C. PADGETT and T. G. ORR. *Surgery Gynecol. Obstet.* 46, 783-8(1928).—This is considered to be probably no more beneficial than intravenous hypertonic glucose or NaCl soln.

A. T. CAMERON

The biological effects of atmospheres containing excess of oxygen. C. ACHARD, L. BINET and A. LEBLANC. *J. physiol. path. gén.* 25, 489-94(1927). See *C. A.* 21, 2033.

A. T. CAMERON

Pharmacological investigations on various derivatives of pyrrole. I. Preliminary studies on the action of α -acetylpyrrole on frogs. ANGELO RABBENO. *Boll. soc. ital. biol. sper.* 2, 830-4(1927).—Injected into a lymph sac, 0.000092 g. mol./100 g. causes loss of voluntary movement: 0.000275 g. mol./100 g. causes complete paralysis of all

muscles except those of eyes. Min. lethal dose (0.000735 g. mol.) kills by cardiac depression; 0.002062 g. mol. causes strychnine-like convulsions followed by complete paralysis and death. Recovery from sub-lethal doses is complete. Skeletal muscles after death are still electrically excitable, but fail to react if the substance is applied directly. The action on the heart is much less powerful than on reflexes. Pyrrole itself is 2-5 times less toxic than α -acetylpyrrole.

A. W. CONTIERI

Influence of insulin on the amylolytic power of the saliva and blood. TULLIO GAYDA. *Boll. soc. ital. biol. sper.* 2, 849-53(1927).—The amylolytic power of the saliva of the rabbit shows marked increase during insulin action: that of serum is unchanged.

A. W. CONTIERI

Atropine, emetine, strychnine and nicotine may all favor experimental pancreatic amylolytic action. G. M. PICCININI. *Boll. soc. ital. biol. sper.* 2, 860-3(1927).—These alkaloids in doses above 1:50,000 decrease the amylolytic power of the pancreas; lower concn. increase it (max., 10%).

A. W. CONTIERI

Action of caffeine on the resistance of erythrocytes outside of the organism. G. B. ZANDA. *Univ. Sassari. Studi sassaresi* 3, 587-8(1926); *Chem. Zentr.* 1927, I, 1177; cf. C. A. 22, 459.—Caffeine increases the resistance of erythrocytes. When 0.5-1.0% caffeine is added, defibrinated blood is laked only after 1 week instead of a few hrs. Hypertonic hemolysis is retarded.

C. C. DAVIS

Glucolysis in blood rendered incoagulable by morphine. GIOVANNI LO MONACO. *Arch. farmacol. sper.* 45, 1-6(1928).—Injection of 1 cc. of 1% morphine-HCl per kg. of body wt. into the mesenteric veins of the dog renders the blood incoagulable. When injected elsewhere into the general circulation the morphine has no such effect. Blood thus rendered incoagulable has a higher sugar content than normal blood from the same animal. If the blood is then treated with oxalate and kept in the thermostat 24 hrs. at 37° with thymol as antiseptic, the sugar sinks to a lower value than that of normal blood similarly treated, the total glucolysis being about twice that of normal blood. This phenomenon contrasts with that observed by Doyon, where blood rendered incoagulable by injection of peptone did not show glucolysis.

A. W. DOX

The significance of the hypoglucemic action of some alcoholic extracts of plants and the nature thereof. UBALDO SAMMARTINO. *Arch. farmacol. sper.* 45, 7-32(1928).—Exts. of *Poa pratensis*, *Spinacia oleracea*, *Cichorium endivia* and *Beta vulgaris* were prepd. by steaming the fresh plant 3-5 min., reducing to a pulp, adding EtOH to 60-70%, macerating several days, evapg. the filtrate *in vacuo* at 35-40°, filtering off the chlorophyll, shaking with Et₂O and pptg. the aq. soln. with 6 vols. of EtOH. Other active exts. were obtained by the use of a press without steaming the plants, the maceration and subsequent treatment being performed as above except that the EtOH was removed by Et₂O instead of evapg. The final product was sol. in dil. EtOH, very sol. in H₂O, insol. in 95% EtOH, Et₂O and MeAc. The Millon, Adamkiewicz and biuret reactions were negative, and no ppts. were obtained with picric and picrolonic acids. When administered subcutaneously to normal fasting rabbits these exts. brought about a lowering of blood sugar, the max. effect being obtained about 3 hrs. after injection. The effect was only moderate, however, and no relationship appeared to exist between the amt. of ext. administered and the extent of hypoglycemia. Only in one instance was the syndrome characteristic of insulin observed. A diabetic patient on the Noorden diet, after being given a no. of daily injections of ext. of *Poa pratensis* each corresponding to 40 g. of the plant, developed an increased tolerance to carbohydrates, from 40 g. to 100 g. This effect persisted a no. of days after suspension of the treatment. In more severe cases where ketonuria was also present, the treatment diminished the glucosuria but had no apparent effect on the ketonuria. The effect of these exts. in promoting glucolysis was shown also by a marked acceleration of sugar fermentation by beer yeast. The factor or factors in the plant exts. which bring about these phenomena are believed to be of a vitamin character and not related to insulin.

A. W. DOX

The influence of alcohol upon the urinary secretion. JUJI OKUTO. *Folia Japonica Pharmacol.* 2, 70-83(1926); (In Japanese; English résumé, p. 4); *Biol. Abstracts* 1, 66.—Intravenous injection in rabbits of a small quantity of EtOH, especially with a large amt. of Ringer-Locke's soln., exerts a diuretic action, while larger amts. diminish the quantity. With per oral administration alc. diuresis occurs only when abundant water has been given. When injected into the vein alc. in small doses causes a slight increase of the arterial pressure together with a scant augmentation of the vol. of the kidneys, but in large doses these effects are reversed. From these facts O. believes that an ample supply of water with the alc. is the most important factor for alc. diuresis. H. G.

Influence of acids, especially lactic acid, and their sodium salts on the vessels. HYŌJIRŌ TANAKA. *Folia Japonica Pharmacol.* 2, 94-119(1926); (In Japanese;

German résumé, 6); *Biol. Abstracts* 1, 298.—When lactic, acetic and HCl acids course through the vessels of frog's leg, contraction always takes place, irrespective of concn. of the soln. The vessels of rabbit's ear contract only with concd. solns.; dil. solns. produce only dilation. The transition point from vessel contraction to vessel dilation occurs at higher concns. with strong acids, like HCl, than with weak acids, like lactic and acetic acids. This is ascribed to differences in dissociation and the attendant different degrees of neutralization attained in the process of coursing through the vessels. The nature of the effects of acids on the vessels appears in the main to be due to H-ion action. Na salts of the above acids always caused vaso-dilation in the frog; only with relatively concd soln. of Na acetate (at the beginning of the expt.) was the no. of drops reduced, accompanied at times by peristaltic movement of the vessels. In general, Na salts likewise cause vaso-dilation in the rabbit's ear, Na lactate, however, only in concd. soln. (in dil. soln. it causes contraction). H. G.

The paradoxical action of insulin. Endocrine dysfunction. G. P. SACHAROV AND J. S. DANENKOV. *Rev. franç. Endocrinol.* 4, 416 28(1926); *Biol. Abstracts* 1, 1059.—Rabbits received different salts (CaCl₂, MgCl₂, KCl, NaCl, Na citrate, Na₂HPO₄) together with insulin injections, and the blood sugar was detd. before and 2-3 hrs. after the injections. In 1 series CaCl₂, NaCl, KCl in small, MgCl₂ in both small and large doses (20 and 200-300 mg., resp.) augmented the insulin effect. Large doses of CaCl₂, NaCl, KCl, Na citrate and Na₂HPO₄ inhibited or reduced insulin action. Glycocoll in large doses (400 mg.) and distd. H₂O (3-5 cc.) augmented the insulin effect. In a 2nd series of expts. results were contradictory. CaCl₂ in all doses and large doses of MgCl₂ decreased the insulin effect. H. G.

The effect of insulin and of pancreatectomy on the distribution of phosphorus and potassium in the blood. S. E. KERR. American Univ. of Beirut. *J. Biol. Chem.* 78, 35-52(1928).—The org., acid-sol. P content of corpuscles was not significantly altered by insulin overdosage. Pancreatectomy increased it slightly. Lipoid P was also not affected by insulin. The K which disappears from serum after insulin did not enter the corpuscles. ARTHUR GROLLMAN

Electrical changes in tissue as the cause of the toxic action of poisons. R. BRUNER. *Klin. Wochschr.* 7, 648-9(1928); cf. *C. A.* 21, 3979; 22, 991-2.—A detailed report will appear in *J. Pharmacol.* MILTON HANKE

The antagonism between insulin and pituitary extract. Its demonstration in a patient with acromegaly. HELMUTH ULRICH. *Arch. Internal Med.* 41, 874 82(1928).—The hyperglucemia of a patient with pituitary neoplasm did not respond to insulin. MARY JACOBSEN

Effect of narcotics on oxygen consumption in rats. U. G. BIJLSMA. *Ber. staatl. Gesundheitsfuersorge Nederland* 8, 1112-20(1927); *Ber. ges. Physiol. explil. Pharmakol.* 44, 151.—Unlike the majority of authors B. finds that chloralose, somniphene and urethane anesthesia sometimes reduce the O₂ consumption of the rat, apparently by lowering the irritability of the respiratory centers. This may account for the injurious effect of anesthesia on rats. MARY JACOBSEN

Resuscitation after carbon monoxide poisoning with air, oxygen and five percent carbon dioxide. D. G. COHEN TERSAERT AND U. G. BIJLSMA. *Ber. staatl. Gesundheitsfuersorge Nederland* 8, 1141-8(1927); *Ber. ges. Physiol. explil. Pharmakol.* 44, 82.—Henderson's expts. were repeated on normal and decerebrated cats and dogs with 375 l. air contg. 1.4-2% CO. Resuscitation was started with onset of unconsciousness or convulsions. O₂ is incomparably more effective than air. Addn. of CO₂ to the O₂ hastened recovery with the exception of 1 case. MARY JACOBSEN

Does insulin increase the glucolytic power of liver, muscle and blood in vivo? GIUSEPPE ROSSI. *Biochim. terap. sper.* 15, 41-53(1928).—Insulin "Bellanti" was given to rabbits subcutaneously and intravenously in 3-4 units/kg. after a 48 hrs.' fast. A 24 hrs.' fast is not always sufficient for a full hypoglycemic effect. Even after a 48 hrs.' fast and with a blood sugar content of 0.03-0.025%, a temp. drop of 4° and general atony convulsions were frequently absent. The diastatic power of liver and blood was not increased by insulin. The liver and muscles contained no glycogen, while definite quantities were found in the controls. The glucolytic power of liver, muscle and serum was somewhat increased when 20% of the Tyrode soln. in which the glycolysis took place was replaced by Na₂HPO₄ of pH 8.3. MARY JACOBSEN

The alkaline reserve of rabbits injected with massive doses of glucose. BRUNO BORGHI. *Biochim. terap. sper.* 15, 99-107(1928); cf. *C. A.* 22, 615, 1399.—Rabbits received every 2nd day 10 cc. 30% glucose intravenously. The animals remained in a perfect nutritional and general condition. The alk. reserve showed a perceptible though slight

decrease after the 1st injection. The effect was attenuated on repeated injections, perhaps as a result of adaptation. The hypothesis of a compensated acidosis must therefore be abandoned and another explanation sought for the glycogen losses.

MARY JACOBSEN

The mechanism of action of sodium hyposulfite in hydrocyanic acid poisoning. TUPI CALDAS. *Boll. assoc. Brasil pharm.* 8, 25-32(1927).— $\text{Na}_2\text{S}_2\text{O}_3 + \text{HCN} = \text{HCNS} + \text{Na}_2\text{SO}_3$. The reaction is promoted by nascent S which in the organism is set free by CO_2 or HCl .

MARY JACOBSEN

Effect of adrenaline on the endocrines. S. IGURA. *Folia endocrinol. japon.* 3, 863-928(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 104.—The histological changes in the endocrine organs of adult rats were studied 1-3 weeks after an injection of 0.05-0.1 cc. 1% adrenaline-HCl. The thyroid showed parenchymatous hyperthyroidism and increase in wt. The cwt. and no. of the Hassal bodies of the thymus were reduced and the borderline between cortex and medulla was blurred. The pancreas showed loss in wt. and atrophied cells. The eosinophilic cells of the anterior pituitary were reduced in size and no., while the no. of main cells was increased. Adrenals and gonads were not essentially changed.

MARY JACOBSEN

Changes produced in endocrine organs by injections of choline, with special reference to the choline-adrenaline relation. S. IGURA. *Folia endocrinol. japon.* 3, 929-45(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 54, 152.—Injections of choline (I) and adrenaline (II) produced in rats colloid struma of the thyroid. The thymus was hyperplastic after I, atrophic after I + II. The anterior lobe of the pituitary showed an increase of the no. of eosinophiles and hypertrophy after I. Pancreas, adrenals and gonads were not altered. An antagonism between I and II seems to exist.

M. J.

Effect of tannic acid on vessels in normal and inflamed tissue. AKIRA OCHIAI. *Folia pharmacol. japon.* 6, 37-45(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 149.—Tannin in concns. of 0.01-1% has no effect on the frog's femoral vessels or the rabbit's ear vein. From 1 to 5% causes vasodilatation. A whitish opacity is produced in the skin and mesentery of the frog, especially when it is inflamed (mustard oil). Only high concns. cause a reduction of the caliber of the vessels in the normal mesentery and grave circulatory disturbances, while the inflamed tissue is not affected.

MARY JACOBSEN

Pharmacological study of the intestine of the chicken with special reference to age. HAYASHI SUGANO. *Folia pharmacol. japon.* 6, 66-82(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 157-8.—The intestine of the chicken is stimulated by pilocarpine, acetylcholine, strophanthin and Ba, inhibited or paralyzed by quinine, papaverine, adrenaline and Mg. Veratrine stimulates in small and inhibits in large doses. The reverse obtains for nicotine, morphine and atropine. The adult intestine is more susceptible to stimulation, the young one to inhibition.

MARY JACOBSEN

Effect of chlorine on the surviving rabbit intestine. SAKAYE ODA. *Folia pharmacol. japon.* 6, 157-64(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 148.—Low concns. always cause stimulation, higher ones depression and death after a transient stimulation. The effect is attributable chiefly to Cl_2 , partly to nascent O_2 and HCl .

M. J.

Experimental studies of the photodynamic action of sensitizing dyes. II. Conditions under which photodynamic effects take place in the heart. HAYASHI SUGANO. *Folia pharmacol. japon.* 6, 165-73(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 337.—Eosin and erythrosin have a noticeable photodynamic effect on the heart only when the heart itself has been impregnated with the dye *in vivo* or immediately after excision and provided it is directly illuminated.

MARY JACOBSEN

Effect of certain drugs on the healing of wounds. EKIZO KOBAYASHI. *Folia pharmacol. japon.* 6, 183-92(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 149.—Drugs were applied in salve form to an aseptic wound produced on the rabbit's ear by complete removal of the skin. Healing was promoted by HgCl_2 , AgNO_3 , thymol, resorcinol, protargol, KMnO_4 , CHI_3 , PhOH , lysol, cresol, naphthol, salicylic acid, balsam of Peru, orthoform and cocaine in small, and H_2O_2 and ichthyol in moderate, doses and inhibited by large doses. Tissue was frequently destroyed by large doses. Chloral hydrate inhibits healing even in 0.1% soln.

MARY JACOBSEN

Pharmacology of rutamine (β -indolethylamine). I. Experiments on the surviving uterus. RYO KANSHI. *Folia pharmacol. japon.* 6, 232-46(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 150.—Rutamine (I) in any concn. increases the tonus and stimulates the contractions of the isolated guinea pig and rabbit uterus regardless of its physiol. condition. Atropine has no effect; adrenaline causes an immediate fall of tonus which lasts several min. The stimulation caused by adrenaline may be completely suppressed by I. Its effect seems to consist mainly in muscle stimulation, per-

haps also in a paralysis of the sympathetic fibers. II. Experiments on the intestine, vessels, pupil and blood pressure of rabbits, frogs and chickens. *Ibid* 247-62.—The rabbit intestine is stimulated by small, paralyzed by large, doses. The peripheral vessels of the frog are constricted by I in any concn., the ear vein of the rabbit only by low and very high concns., while moderate concns. have a varying effect. I produces intense mydriasis in the frog pupil, even after dilatation with atropine. Adrenaline is an antagonist with regard to the mydriatic and vascular actions, while atropine has no effect. Repeated intravenous injections of I cause in chickens paralysis of the femur and cyanosis of the comb, but no definite gangrene.

MARY JACOBSEN

Experiences with plasmochin. F. R. A. LUYKE ROSKOTT AND R. SÉNO. *Geneeskund. Tijdschr. Nederland. Indie* 68, 80-98(1928).—Plasmochin destroys the malaria parasites energetically. The remarkably rapid degeneration of the gametes of tropical malaria may be observed under the microscope. It definitely counteracts splenic enlargement. The side effects are mostly slight, but sudden, mostly fatal blood destruction with methemoglobin formation may occur. The cyanosis is chiefly of enteric origin.

MARY JACOBSEN

Occurrence and treatment of pulmonary plague and pulmonary septicemia in Tenger, Java. J. SCHUT. *Geneeskund. Tijdschr. Nederland. Indie* 68, 99-111(1928).—The best results were obtained with a combination of prophylactic *omnadin* (I) treatment given to all suspected persons before the temp. rose above 37° and of *quinine* (II) -*arsitochine* (III) as soon as fever and a high pulse rate set in. II (with urethan) was given in 1-2 g doses subcutaneously for 2-3 days; then 0.4 g. III was given *per os* 3 times a day. Out of 18 patients treated 10 developed a grave condition and 5 died. I given in the fever period aggravates the disease, probably because of the sudden liberation of toxins through the death of bacteria. It has a certain bactericidal, but no antitoxic, effect. Of 9 patients treated with I-III 8 died. *Neosphenamine-digalen* treatment was of no avail.

MARY JACOBSEN

Sterilization of sodium bicarbonate solutions. ANNA PIRONETTI. *Gior. farm. chim* 6, 167-70(1928); cf. Guerbert (C. A. 18, 1178) and Chambon (C. A. 20, 2686).—Isotonic NaHCO₃ is used in large quantities for intravenous injections in diabetes. Sterilization in streaming steam at 100° (0.5 hrs.) is preferable to 56 days' tyndallization at 55-60°. Besides being more rapid and reliable it causes less loss in NaHCO₃: 0.0924 g. instead of 0.2518 g. per l. isotonic soln.

MARY JACOBSEN

Experimental study of insulin. KUNITAKO KITAMURA. *Kyoto Ikadai-gaku Zasshi* 1, 861-9(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 154.- Insulin, 0.2 cc. (?), is sufficient to produce in a fasting rabbit hypoglycemia (of a varying degree) and to abolish the hyperglycemia and glucosuria caused by 0.5 cc adrenaline. It has no effect on normal or raised (adrenaline) blood pressure. Its action is balanced by 1 cc. pituitrin.

MARY JACOBSEN

The effect of inhaled chloroform on blood and blood serum. S. TAKIYAMA. *Japan. J. Obstet. Gynecol.* 10, 28-30(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 467.- One hrs.' CHCl₃ anesthesia (8-10 cc.) caused no change of hemoglobin, red cell count and cholesterol content in the blood of rabbits. The decrease of the white count was followed by an increase and return to normal within 48-72 hrs. The corpuscular resistance to hypotonic NaCl and saponin was not altered; that to K soap was lowered after 1-4 days. The hemolytic complement was lowered and returned to normal after 3-5 days. The anticomplement was unaltered, the antitrypsin content rose to a max. in 24 hrs. and gradually returned to normal within 10-14 days. The sedimentation velocity rose; the plasma stability decreased. The inhibition of antibody and immune body formation which lasted several days could be obviated by an adrenaline injection before or after anesthesia.

MARY JACOBSEN

Indirect paravertebral alcohol injections. LA CHAPPELLER. *Ned. Maandschr. Geneeskunde* 15, 180-8(1928).—Severe abdominal pain with a history of gallstone, appendix and pylorus operations, Röntgen irradiation for postpartum hemorrhage and morphine habit was abolished for the period of 8 months by injections of 80% alc. into the intercostal space below the 9th rib. The treatment is indicated in the abdominal crises of tabes, pains in inoperable cases and some cases of angina pectoris. It is not without danger.

MARY JACOBSEN

Intravenous injections of lecithin. ALFONSO CRUTO. *Rass. clin. terap. sci. affini* 26, 8-15(1927); cf. C. A. 20, 2874.—Highly dispersed emulsions of 10-15% lecithin and 1-3% cholesterol and its ethers were injected into the marginal ear vein of the rabbit. It disappeared from circulation in 5-6 hrs. The urine was examd. for degradation products of choline (Hoesslin). Traces of N(Me)₂ (10-15 mg. per 3 days) were found. The increase in HCO₂H excretion was more pronounced but HCO₂H is not necessarily

derived from choline. Conclusion: the rate of decompn. of intravenously injected and of ingested lecithin is about the same.

Antihypoglycemic effect of adrenaline and pituitary-adrenal extracts. E. TROCELLO AND A. CRUTO. *Rass. clin. terap. sci. affini* 26, 23-6(1927).—One cc. Ipovagol (a pituitary-adrenal ext.) corresponding to 1 mg. adrenaline was sufficient to suppress the convulsions caused in a rabbit by 1 insulin unit and to restore the normal blood sugar level, while 1 mg. synthetic adrenaline was either insufficient to produce this effect or produced it very slowly.

Insulin in fattening cures. E. TROCELLO. *Rass. clin. terap. sci. affini* 26, 63-77 (1927); cf. *C. A.* 21, 2738.—The treatment is started with 10 units a day given 0.5 hrs. before the meals and followed by 50 g. sugar soln. orally. The dose is gradually raised to 50 units daily, the treatment extending over 4-6 weeks. It is very useful in under-nutrition with no evidence of other diseases except endocrine-sympathetic disturbances. It is contraindicated by the presence of any inflammatory processes and must be discontinued as soon as the patient shows swelling of joints, signs of latent disease or fails to gain wt. It has a beneficial effect in neurasthenic syndromes. MARY JACOBSEN

Effect of glucose-insulin therapy on liver function. A. FORTUNATO AND F. MACCATIONE. *Rass. clin. terap. sci. affini* 26, 99-104(1926); cf. *Gazz. internat. med. chir.* Sept. 18, 1926.—Rabbits received 1 mg. P and were treated with 3 units insulin and 10 g. glucose daily. As soon as the control died (2-5 days) the insulin rabbit was killed and the liver glycogen compared. It was higher in the treated animals. Conclusion: Liver function is related to the glycogen content and is improved by insulin. M. J.

Pharmacotherapy of pulmonary tuberculosis. GUIDO M. PICCININI. *Rass. clin. terap. sci. affini* 27, 26-33(1927); cf. *Riforma medica* 43, No. 40(1927). M. J.

A new cure for trachoma. Preliminary note. ANTONIO D'ANGELO. *Rass. clin. terap. sci. affini* 27, 77-8(1928).—Three patients were cured by the injection of Sero's Rame Coleolo, a double oleate of Cu and cholesterol. MARY JACOBSEN

Hyperglucemic effect of injections of Bayliss-Starling secretion. H. HERMANN. *Rev. franç. d'endocrinol.* 4, 381-415(1926); *Ber. ges. Physiol. expll. Pharmacol.* 44, 89.—A rapid injection of secretin causes a hyperglucemia of max. 0.03% and 10 min. duration, followed by hypoglycemia. Expts. prepd. according to Bayliss-Starling also lower the blood pressure by vasodilatation. Secretin prepd. from a mucosa extd. with alc. has neither a hypotensive nor a hyperglucemic effect, while the alc. ext. has both, but does not influence pancreatic secretion. The hyperglucemia must be attributed to some effect on the adrenals rather than to inhibited insulin secretion since it occurs in depancreatized, but not in adrenalectomized dogs and since it promotes the adrenaline secretion of the normal dog. MARY JACOBSEN

Experimental histological and clinical observation on the chemical sympathectomy of the spermatic cord. AUGUSTO CASSUTO. *Rev. sud-americana endocrinol. immunol. quimioterap.* 11, 221-42(1928).—Brief review of physiopathology and therapy of gonadal diseases and senescence. In 4 young men, 3 of whom presented slight testicular hypoplasia impotence was cured by painting the internal and deferential spermatic arteries with 5% phenol. The sympathetic fibers investing the adventitia are paralyzed. Injury to the sensory and motor nerves must be avoided. MARY JACOBSEN

Effect of guanidine on the degeneration of tissues. MARIO D'ALISE. *Riv. patol. sper.* 2, 204-7(1927); *Ber. ges. Physiol. expll. Pharmacol.* 44, 38.—When kept in guanidine soln. the brain, kidney and liver of guinea pigs reduce PhNO, more energetically than when kept in Ringer soln. Conclusion. Guanidine promotes the vital activity of tissues similarly as it increases the irritability of muscle tissue. M. J.

Effect of glycocholate and taurocholate on serum lipase. G. DI MACCO. *Riv. patol. sper.* 2, 359-63(1927); *Ber. ges. Physiol. expll. Pharmacol.* 44, 129.—The content in quinine-resistant lipase of dogs serum is increased by 0.8 percent Na taurocholate and by 2.5% Na glycocholate. MARY JACOBSEN

Effect of atropine on gastric secretion and evacuation of the stomach. V. JOFFE. *Russkaja Klinika* 8, 236-44(1927); *Ber. ges. Physiol. expll. Pharmacol.* 44, 540.—In 50 patients atropine caused the following decreases: total acid 76.5%, free HCl 89%, juice vol. 76.5%, evacuation rate 58%. This effect permits the study of the functioning of the pylorus. MARY JACOBSEN

Effect of hydrogen sulfide water on the vasodilators. N. USINSKIJ. *Zhurnal expll. Biol. Med.* 8, 314-7(1928); *Ber. ges. Physiol. expll. Pharmacol.* 44, 418-9.—Plethysmographic and elastometric detns. demonstrate a direct effect of H₂S baths on the tonus of the peripheral vessels through dilatation. MARY JACOBSEN

The value of iron salts in counteracting the toxic effects of gossypol. WILLIS D. GALLUP. *Okla. Expt. Sta., J. Biol. Chem.* 77, 437-49(1928).—Ferric citrate and Fe-

$(\text{NH}_4)_2(\text{SO}_4)_3$ in sufficient amts. to furnish 3 g. of Fe per g. of gossypol counteract the poisonous effect of diets contg. cotton seeds and allow rats to make nearly normal growth for some time. Fe_2O_3 is without effect probably because of its insol. A change in diet is more effective than the addn. of Fe for promoting recovery from gossypol poisoning. The Fe apparently delays the effects of the gossypol by combining with it to form an insol. compd. as test tube expts. show that the reaction is of a quant. nature. Food consumption was increased by the addn. of the Fe salt. A. P. LOTHROP

Effect of intraperitoneal injections of insulin upon the blood sugar of well-fed rabbits. MELVILLE SAHYUN AND N. R. BLATHERWICK. Potter Metabolic Clinic. *J. Biol. Chem.* 77, 459-66(1928).—The 1st intraperitoneal injection of insulin into well-fed rabbits not accustomed to insulin sometimes fails to produce hypoglycemia and it is impossible to offer any explanation for this puzzling observation. Subsequent injections, however, produce results similar to those following subcutaneous injections. When "educated" rabbits are used, they respond to the first injection and smaller doses are required. Intraperitoneal injections are more effective than intravenous in standard fasted animals. These results do not accord with the findings of Hoskins and Snyder (C. A. 22, 267). A. P. LOTHROP

The effect of anesthesia on the recovery process in mammalian skeletal muscles. C. N. H. LONG. McGill Univ. *J. Biol. Chem.* 77, 563-79(1928).—The recovery processes in mammalian skeletal muscle (cat) are profoundly affected by anesthesia. The initial breakdown of glycogen and the initiation of contraction are not affected but there is a blockage of the resynthesis of the formed lactic acid; that is, of the oxidative phase. Cats were used as the exptl. animals and studies were made of the effect of anesthesia (generally amytal) with and without stimulation on the glycogen content and on glycogen restoration. Lactic acid production in the muscles was also estd.; this disappears from the muscles and probably comes into diffusion equil. with the body fluids. Lack of knowledge of the fundamental oxidative mechanism of the cell prevents any attempt to state the exact reason why anesthetics should act in this manner on the carbohydrate cycle in muscles. The av. glycogen content of the cat gastrocnemius muscle was found to be about 0.9% but is subject to considerable variation (mean difference in 10 cats 3.2% with individual variations of from 0.0 to 7.3%). A. P. LOTHROP

The influence of certain camphors on the viscosity of the blood. P. TESTONI. *Arch. sci. biol.* 8, 310-22(1926).—*In vitro* tests show that Laurus, Borneo and mint camphor have the property of lowering the viscosity (η) of distd. H_2O , aq. solns. of gum arabic, egg albumin, blood serum and defibrinated blood. The decrease in η of the various liquids increases with the time of contact with the camphor. Various concns. of the 3 camphors dissolved in olive oil were injected into dogs fasted for 12 hrs. The dogs were bled 30 min. later and the η of the defibrinated blood was detd. Japanese camphor, borneol and menthol diminished the η of defibrinated blood. P. M.

Variations in the viscosity of blood after the injection of olive oil. PIRRO TESTONI. *Arch. sci. biol.* 8, 323-37(1926).—Thirty min. after the subcutaneous injection of olive oil in dogs fasted 12 to 14 hrs., there is an increase in the viscosity (η) of defibrinated blood. The increase is proportional to the quantity of oil injected until it reaches a max. with 2 cc. of oil per kg.; then it diminishes and tends to return to normal when 4 cc. are administered. For the same dose η increases with the time elapsing between injection of oil and bleeding till a max. is reached after which it gradually returns to normal. PETER MASUCCI

Does insulin exert any action on the blood pressure? S. VISCO AND S. CASTAGNA. *Boll. soc. ital. biol. sper.* 3, 355-7(1928).—Some brands of insulin lower blood pressure; others have no effect. The lowering of blood pressure attributed to insulin is not caused by this substance, but by impurities which are present in many com. preps. P. M.

The effect of a constant electric current on nerves treated with cyanide and arsenite salts. P. MAKAROV. *Zhurnal ekspl. Biol. Med.* 6, 144-54(1927).—KCN or Na_3AsO_3 in concns. of 0.01 to 0.001 M act on the nerve in the same way as does KCl. Na_3AsO_3 in 1.04-4.15% solns. has a slow and weak effect. Complete inhibition of the cond. of impulses appears only after 30-70 hrs. S. MORGULIS

The chemistry of vegetative stimulation. Further studies on the supposed role of ions. L. JENDRASSIK AND A. CZIKE. *Biochem. Z.* 193, 285-99(1928).—In a K-poor soln. the effect of pilocarpine and of K is antagonistic in the large intestine, stomach, uterus, esophagus and urinary bladder. Ca and adrenaline produce different effects on the rabbit uterus, the former paralyzing and the latter stimulating it, the stimulating effect occurring even in the absence of Ca. The antagonistic action of the Ca and adrenaline manifests itself also in most frog stomachs. Likewise, on the intestine of the cat it is

demonstrable that the 2 do not always act in a parallel manner. In a Ca-free medium the adrenaline paralyzes, while the addn. of Ca induces the stimulation. S. M.

Studies on the effect of insulin. III. Effect on the gaseous metabolism of the turtle. B. V. ISSEKUTZ AND F. V. VÉGH. *Biochem. Z.* 192, 383-9(1928).—See C. A. 22, 1405.

S. MORGULIS

The effect of insulin on the carbohydrate oxidation in the fasting animal. BÉLA FÖRSTNER. *Biochem. Z.* 194, 422-40(1928).—Expts. on fasting, curarized and artificially respiring dogs show that injection of insulin (without carbohydrate) increases the O_2 consumption which is perhaps to be attributed to the action of insulin. However, since the respiratory quotient is not altered it is concluded that the increased O_2 consumption is not indicative of a greater carbohydrate oxidation. S. MORGULIS

The influence of intravenous injections of magnesium chloride and calcium chloride on the gastric secretion in dogs produced by means of morphine injections. N. PYATNITSKII AND P. OLEFIRENKO. *Zhurnal expil. Biol. Med.* 8, 382-96(1928).—Intravenous injection of 30-75 mg. $CaCl_2$ per kg. of body wt. increases the gastric secretion stimulated by morphine. $MgCl_2$, when the vagus nerve is excluded, causes inhibition of secretion. The $MgCl_2$ and $CaCl_2$ produce the same effect on the gastric glands as on the heart.

S. MORGULIS

The influence of carbon dioxide on the respiratory center of the frog. N. A. POPOV AND L. B. WAGNER. *Zhurnal expil. Biol. Med.* 9, 150-60(1928).—Perfusion expts. on the isolated frog head lead to the conclusion that CO_2 affects the amphibian respiratory center.

S. MORGULIS

New principles in chemotherapy. MYER COPLANS AND A. G. GREEN. *J. Soc. Dyers Colourists* 44, 5-10(1928); cf. C. A. 21, 460.—The object of this study was to learn if a controlled and selective action could be exerted upon invading organisms or their toxins by the administration of compds. (derivs of dyestuffs in particular) which are themselves innocuous, but are converted in the body into active agents. To this end 2 classes of compds. were studied: leuco compds. which could give rise to dyestuffs by oxidation within the system, and derivs. of dyestuffs or their leuco compds. containing labile acidic groups such as the sulfato group or the omega sulfonic group. These compds. were tested for their actions on the animal organism, bacteria and toxins. The results support the belief in a rational system of chemotherapy based upon the slow generation of the curative agent in the blood or tissues.

L. W. RIGGS

Effects of subcutaneous injection of acetylcholine on the retinal artery of man. MAURICE VILLARET (MMR.) SCHIFF-WERTHEIMER AND L. JUSTI BESANÇON. *Compt. rend. soc. biol.* 98, 909-11(1928).—In 11 out of 25 subjects the injection of acetylcholine caused a dilation of the central artery of the retina, easily observed with the ophthalmoscope. Five subjects gave a doubtful reaction and 9 no reaction.

L. W. R.

Effect of saponin and of strophanthin on the excitability of the cerebral cortex. A. RIZZOLO. *Compt. rend. soc. biol.* 98, 939-41(1928).—Five or 6 local applications of a 2% soln. of saponin to the cerebral cortex (method of Baglioni and Amantea) of dogs did not affect the chronaxie or rheobase. Similar applications at 3 min intervals of 2% soln. of strophanthin at first diminished and afterwards increased the chronaxie, that is, after the 2nd application the chronaxie was at a min., by the 3rd or 4th application the figures had returned to normal and by the 6th application the chronaxie was several times the normal figure.

L. W. RIGGS

Action of ephedrine on the gastric chemism. FERNANDO FONSECA AND CARLOS TRINCAO. *Compt. rend. soc. biol.* 98, 1016-7(1928).—Ephedrine is a synthetic isomer of ephedrine with a very similar physiol. action. When administered by mouth ephedrine diminishes the gastric acidity. Administered by injection, in a few cases at least, it increases the gastric acidity. This discordance of results following administration by different routes may be explained by the vaso-constrictor action exercised directly upon the gastric mucous by ephedrine when administered by mouth.

L. W. RIGGS

Action of glukhormont on the glucemia and the glucosuria. A. MORAIS DAVID AND CARLOS TRINCAO. *Compt. rend. soc. biol.* 98, 1019-21(1928).—"Glukhormont" is a powder resulting from the fermentation of the pancreas, and is prepd by Hormont of Berlin. This prepn. is able to lower the glucemia of diabetes and consequently cause the glucosuria to disappear. It allows an increase of carbohydrate in the diet and it may be substituted in part at least for insulin. It is not recommended for the treatment of grave cases of diabetes or for combating a pronounced acidosis. No intolerance was observed attributable to a secondary action of glukhormont.

L. W. R.

Influence of intravenously injected neurotoxic serums on the blood pressure. M. GORDOYC AND P. KUBIKOWSKI. *Compt. rend. soc. biol.* 98, 1070-2(1928).—The in-

jection of neurotoxic serum of cerebral origin has slight effect on the blood pressure, while that of sympathetic origin always leads to a marked and prolonged lowering of the blood pressure. In many cases the neurotoxic serum of sympathetic origin causes glomerular hemorrhage, hemolysis, spasms of the extremities and often death.

L. W. RIGGS

Action of the lacrymal extract on the blood. D. MICHAÏL AND P. VANCEA. *Compt. rend. soc. biol.* **98**, 1083-4 (1928).—Intravenous injections of lacrymal ext. in dogs caused in 2 min. a sharp increase in the no. of red and white corpuscles followed by a progressive decrease, so that after 30 min. the no. of corpuscles was generally less than before injection.

L. W. RIGGS

Mechanism of the action of scopolamine in post-encephalitic Parkinson disease. G. MARINESCO, O. SAGER AND A. KREINDLER. *Compt. rend. soc. biol.* **98**, 1322-5 (1928); cf. *C. A.* **22**, 822.—Scopolamine diminishes all of the increased muscular chronaxies and to a less extent the nerve chronaxies. The muscles of which the chronaxies are diminished return to their normal values after the injection of scopolamine.

L. W. RIGGS

Pharmacodynamic properties of a glucoside of Adonis vernalis: adonidosisin. L. JUNG AND P. FONTENAILLE. *Compt. rend. soc. biol.* **98**, 1338-40 (1928); cf. Mercier, *Rev. pharmacol. exptl. therap.* **1**, 87 (1927).—Injections of 0.25 to 0.5 mg. of adonidosisin per kg. in dogs caused periods of violent vomiting alternating with quiet periods. The action on the heart varied between accelerations, retardations and changes in the amplitude according to the dose.

L. W. RIGGS

Do biliary salts cause bradycardia? HENRI BÉNARD AND M. BARIÉTY. *Compt. rend. soc. biol.* **98**, 1397-8 (1928).—Bradycardia is not caused in rabbits and dogs.

L. W. RIGGS

Hyperinsulinemia following the injection of a non-hypotensive solution of secretin. EDGARD ZUNZ AND JEAN L'ABARRE. *Compt. rend. soc. biol.* **98**, 1436-8 (1928). The results indicate a relation between the endocrine and exocrine activities of the pancreas.

L. W. RIGGS

Influence of the variation of calcium on the length-tension diagram of the muscle. J. COLLE. *Compt. rend. soc. biol.* **98**, 1439-41 (1928). By plotting the length of the muscle in mm as abscissas and the tension in g. as ordinates, the curve of a muscle in normal Ringer soln. was compared with the curve of a muscle in Ringer soln. deprived of CaCl_2 . The absence of Ca causes a diminution of contraction as well as diminution of tension.

L. W. RIGGS

Action of ergotamine on the basal metabolism and glucemia in ocular affections. D. MICHAÏL, T. BENDESCU AND P. VANCEA. *Compt. rend. soc. biol.* **98**, 1468-9 (1928).

In the course of ocular diseases, ergotamine causes a nearly const. lowering of the basal metabolism, and a lowering of the glucemia only when there exists a mild sympathetic hyperglucemia.

L. W. RIGGS

Action of lacrymal extract on respiratory movements. D. MICHAÏL AND P. VANCEA. *Compt. rend. soc. biol.* **98**, 1472-4 (1928).—The lacrymal ext. increases the amplitude of the respiratory movements and retards their rhythm by a direct action on the bulbar center of respiration.

L. W. RIGGS

Ergotamine and post-hypophyseal hyperglucemia. I. I. NITZESCU. *Compt. rend. soc. biol.* **98**, 1479-82 (1928).—Ergotamine, which has a definite inhibitory action on adrenaline hyperglucemia, had no influence in rabbits and an insignificant influence in dogs on hyperglucemia caused by injection of pituitary ext.

L. W. RIGGS

Yohimbine, glucemia and adrenaline hyperglucemia. I. I. NITZESCU. *Compt. rend. soc. biol.* **98**, 1482-5 (1928).—Intravenous injections of yohimbine in medium or large doses cause a pronounced hyperglucemia in the rabbit and a less marked hyperglucemia in the dog. Yohimbine, like ergotamine, had an inhibitory action on the sympathetic hyperglucemia caused by injections of adrenaline.

L. W. RIGGS

Action of insulin on hyperglucemia following hemorrhage. HIROSHI TACHI. *Tôhoku J. Exptl. Med.* **10**, 420-5 (1928).—If at the time of profuse bleeding (say 21 g. per kg. of an animal) 0.95 units of insulin per kg. is injected, a moderate hyperglucemia follows though less intense than without insulin. The administration of insulin in doses of 1.83 units per kg. completely masks the hyperglucemia action of bleeding.

L. W. R.

Excretion of barbituric acid derivatives by way of the urine in dogs. MARC REINERT. Pharm. Lab. Hoffmann-LaRoche & Co. *Arch. exptl. Path. Pharmacol.* **130**, 49-60 (1928).—With the diethyl, phenylethyl and allylisopropyl compds. of barbituric acid the posthypnotic effect is intimately assocd. with excretion in the urine. In the case of both the allylisopropyl and phenylethyl compds. about 80% of the amt. administered is destroyed in the body, while the balance is excreted in the urine in 48 hrs.

(allylisopropyl) or in 9 to 10 days (phenylethyl). Only some 25 to 30% of the diethyl compd. is broken down in the body, the remaining 70% being slowly excreted throughout a period of some 7 to 8 days. G. H. S.

Effect of some diuretics on the Starling heart-lung-kidney preparation. H. GREMELS. Univ. Hamburg. *Arch. expil. Path. Pharmacol.* 130, 61-88(1928).—Acting upon the surviving kidney of the dogs, caffeine, theobromine, theophylline, ephylline, novasurol, salyrgan, strophanthin and digitoxin cause diuresis. In addn. they exert a dilating effect upon the kidney vessels, the latter action being distinct from the sp. action on the kidney. G. H. S.

Relation of the absorption, fixation and decomposition of digitalis compounds to their action on the heart. HANS FISCHER. Univ. Zurich. *Arch. expil. Path. Pharmacol.* 130, 111-93(1928).—Prior to the fixation of digitoxin in an irreversible fashion to the heart there is a period of a few secs. when the action is reversible and which probably represents a phys.-chem. surface phenomenon involving an adsorption by the surface layers of the muscle fiber or a diffusion through the limiting membrane. Expt. shows that a diffusion of digitoxin takes place, both through artificial membranes and surviving tissue membranes, just as with crystalloid bodies although far more slowly. The toxic action of digitoxin becomes manifest only when the fixation is irreversible, and toxic action can only appear when a definite, abs. limiting dosage becomes bound to the heart. For the isolated frog heart this dosage is between 0.0016 and 0.0037 (av. 0.0026) mg. of digitoxin. The time required for fixation and for the toxic effect to become evident is related to the concn. To a slight extent unaltered digitoxin is excreted through the urine, but the greater portion is fixed to the muscle tissues. Whether other organs, such as the liver, fix the compd. and play a role in detoxication is uncertain. Detoxication by means of fixation seems to be but a transitory mechanism, for with continued administrations a breakdown to digitoxigenin occurs. Only in cases of repeated administration is digitoxin broken down in the heart and under these circumstances digitoxigenin is derived through a hydrolytic cleavage, just as strophanthin is derived from strophanthin. Both of these derived compds. exert a very strong irreversible action on the heart. Decompn. processes of digitoxin or strophanthin parallel the cumulative effect. Unlike digitoxin, genin is not in detectable amts. irreversibly fixed in the frog heart intoxicated with bigitaligenin. Obviously with such a compd. a cumulative effect cannot be obtained. Bigitaligenin is not broken down to any appreciable extent in either the heart or skeletal muscle and it is apparently excreted unchanged. No definite proof could be obtained of a hydrolytic splitting of gitalin. G. H. S.

Synergism between digitalis and calcium. HANS FISCHER. Univ. Zurich. *Arch. expil. Path. Pharmacol.* 130, 194-241(1928).—When present in the concn. found in Ringer soln. Ca has no influence upon the course of digitoxin intoxication of the isolated frog heart; the degree of increased tonus due to digitoxin and the velocity of the action are the same whether Ca is present or absent. Although Ca does not intensify the action of digitoxin, a heart exposed to the influence of digitoxin becomes sensitized to Ca, and will exhibit an increased tonus to unusually low concns. of Ca. This sensitizing effect of the digitoxin also renders the heart responsive to other agents, such as K and alc., in concns. inert upon normal hearts. Thus, although the effect is non-sp., it is particularly outspoken with Ca and Sr. While with digitoxin and Ca the synergistic action operates in only one direction, with bigitaligenin and Ca (or Sr) the synergism is more or less mutual, in that Ca favors the increase in tonus by bigitaligenin, and the latter likewise sensitizes to Ca. Just as digitoxin and Ca are not identical in the mechanisms underlying their action on the heart, so does the action of bigitaligenin differ from that of Ca. The sensitizing action of bigitaligenin lacks specificity just as does that due to digitoxin. G. H. SMITH

Effect of strychnine on the respiratory function of the blood. GÜNTHER ANTON. Univ. Heidelberg. *Arch. expil. Path. Pharmacol.* 130, 242-9(1928).—The effect of strychnine upon the gas relationships of blood is due solely to its action in limiting bacterial growth, for with sterile blood strychnine has no effect. Nor does strychnine inhibit *in vitro* the power of rabbit blood to fix O_2 and CO_2 , as is suggested by v. Miko and Pala. G. H. S.

Chemical constitution and activity. Aromatic fluorine compounds. FRITZ LEHMANN. Univ. Greifswald. *Arch. expil. Path. Pharmacol.* 130, 250-5(1928).—When F or Cl is introduced into the side-chain of such aromatic compds. as toluene and *m*-toluidine the toxicity for frogs is increased. F is somewhat more effective than Cl. The lethal dose (millimols. per 100 g. of frog) of toluene is 1.0-2.5, that of $C_6H_5CCl_3$ 1.1-1.2, of $C_6H_5CF_3$ 0.7-1.0 and of $C_6H_5CF_2$ 0.6-0.7. The introduction of an NH_2 group increases the toxicity to 0.4-0.5, while the introduction of NO_2 and of $COOH$

groups gives toxicity values of 0.3-0.6 and 0.4, resp. All of the compds. act upon the central nervous system, while that with the NH_2 group introduced causes cardiac paralysis. When the H of the side chain is replaced by a halogen any stimulating action the original compd. may have possessed is changed to a paralyzing action, and if the compd. originally was inhibitory this action is intensified. Unlike the NH_2 group, the NO_2 and COOH groups introduced into the *m*-position exhibit strong exciting properties. The water-sol. HCl salt of *m*-trifluorotoluidine can well be used as a narcotic for frogs, since the narcotizing effect becomes operative quickly and persists for a long time. G. H. S.

Magnesium narcosis through oral administration of magnesium sulfate and saponin. L. KOFLER AND R. FISCHER. Univ. Innsbruck. *Arch. expl. Path. Pharmacol.* 130, 319-22 (1928).—Narcosis is induced in mice and frogs by the oral administration of relatively small quantities of MgSO_4 if given in conjunction with saponin. Narcosis does not appear if an interval greater than 3 hrs. is allowed to elapse between the administration of the saponin and the Mg . G. H. S.

Mode of action of some analeptics. II. Coramine. WILHELM STROSS. Univ. Prag. *Arch. expl. Path. Pharmacol.* 130, 326-48 (1928); cf. *C. A.* 21, 276.—The most significant action of coramine is a diminution in conduction, assoc. with a retardation of pulse. With high concns. arrest of the heart takes place, the heart remaining susceptible to mech. stimulation. **III. Hexatone.** *Ibid.* 349-64.—Hexatone paralyzes the frog vagus as does camphor, and with the isolated frog heart it increases conduction and frequency, the last 2 effects not necessarily being related. Of the various toxic and mech. agencies leading to impairment of heart function only that due to alc. is influenced to any considerable degree and with any uniformity by hexatone. G. H. S.

Effect of repeated administrations of sodium bromide upon artificially produced convulsions. KARL MEYER-NOBEL. Univ. Heidelberg. *Arch. expl. Path. Pharmacol.* 130, 365-73 (1928).—The daily administration of 0.4 g. of NaBr per kg. to pigeons leads after about 3 weeks to a characteristic intoxication picture which quickly and completely disappears upon the administration of NaCl . If smaller quantities of Br are fed over a longer period the susceptibility to convulsion phenomena, as, e. g., those induced by picrotoxin, is diminished materially, the relation between susceptibility and the amt. of Br in the body being approx. linear. G. H. S.

Venom of the ringed adder (*Tropidonotus natrix*). I. Effect of the blood of the ringed adder upon the isolated heart of cold-blooded animals. OTTO GESSNER. Univ. Marburg. *Arch. expl. Path. Pharmacol.* 130, 374-83 (1928).—The plasma, serum or defibrinated blood of the ringed adder causes arrest of the isolated frog or toad heart. It is active both undil. and in dilns. (in Ringer soln.) of 1:5. The arrest is usually systolic and is always followed by an intense contraction of the heart muscle. The active principle resembles a saponin-like substance more closely than a digitalis-like substance. It does not sensitize to Ca , and in many pharmacol. actions resembles saponin. The amt. present in the blood of the adder is not const. G. H. S.

The aims and methods of modern pharmacology. DAVID I. MACHT. *J. Am. Pharm. Assoc.* 17, 7-17, 111-21 (1928).—The search for active principles, the study of pharmacodynamics, toxicology, conditions modifying drug action (including dosage and penetrating properties of the drug) and therapeutic data are cardinal lines of inquiry. The highest goal of the pharmacologist is the study of chemopharmacodynamic relations. The study of endocrines has increased, also the newer lines of phytopharmacology and photopharmacology. The training of a pharmacologist is discussed.

L. E. WARREN

The poison in illicit liquor. H. V. ATKINSON. *J. Am. Pharm. Assoc.* 17, 28-35 (1928).—Discussion. Many substances foreign to liquors are found in illicit beverages of the market. The evidence indicates that most of the cases of acute poisoning have been due to excessive doses of EtOH . The second in importance is MeOH . A few cases of poisoning have been traced to Pb derived from the solder. L. E. WARREN

Notes on the spectrum and pharmacology of chlorophyll. FREDERICK GRILL. North. Pac. Coll. Ore. *J. Am. Pharm. Assoc.* 17, 422-7 (1928).—The spectrum of chlorophyll varies with the solvent and concn. Heat does not affect the spectrum but age causes a darkening and widening of the bands and a reduction in the intensity; the green color changes to brownish. Exts. of chlorophyll have a stimulating action on all of the tissues and organs of animals. Earthworms are very susceptible to the action of chlorophyll exs. In the frog heart exs. increase the force of contraction and slow the beat, suggesting a similarity to digitalis. L. E. WARREN

Isopropyl alcohol—an investigation of its physiologic properties. HENRY C. FULLER. *J. Lab. Clin. Med.* 12, 326-49 (1928).—A series of studies on rabbits, guinea pigs, dogs, cats, chickens, monkeys and humans is presented in detail. When taken

into the system in strength to be ingested without apparent local discomfort, the animal economy is capable of absorbing $\begin{array}{c} \text{CH}_3 \\ \diagup \\ \text{CHOH} \\ \diagdown \\ \text{CH}_3 \end{array}$ in reasonable amt. without toxic re-

sults. A form of intoxication is apparent especially in the early part of the test, the violence and duration of it depending on the species. Barring perhaps cats, a tolerance is quickly established, and thereafter the outward appearance of the intoxication differs in no respect from that produced by $\text{C}_2\text{H}_5\text{OH}$.

ETHEL W. WICKWIRE

The action of adrenaline upon the cardiac rhythms. HAROLD L. OTTO. *J. Lab. Clin. Med.* 13, 70-4(1927).—Exptl. and clinical studies show that adrenaline can cause the appearance of cardiac arrhythmia, in many instances of a dangerous or unpleasant nature. It is therefore advisable to administer it with caution particularly to cardiac patients or those individuals presenting a history of having had one of the cardiac arrhythmias.

ETHEL W. WICKWIRE

The relation between cardiac reactions to drugs and the p_{H} of the blood. Experiments with mercury. WM. SALANT AND J. ERNEST NADLER. *J. Lab. Clin. Med.* 13, 117-23(1927); cf. *C. A.* 21, 776; 22, 811.—A small quantity of Hg, in the form of succinate, administered intravenously into anesthetized cats produces cardiac irregularity, depression and arrest of heart action, which occur after a latent period of about 3 min. and last several min. The latent period decreases and the duration of the attack increases with successive injections of Hg. Complete recovery may occur even after prolonged cessation of contraction. Acid given in sufficient quantity before Hg greatly increases its toxicity. The amt. of Hg necessary to produce the characteristic changes in heart action may be only half to a third of the dose required to cause the same effect without acid. Very small quantities of acid are toxic even after a moderate amt. of Hg. Alkali confers protection against Hg, provided a moderate amt. only is given. If sufficient alkali is introduced to increase the p_{H} of the blood by about 0.2 above normal, Hg becomes more toxic. Increased pulmonary ventilation increased the resistance to Hg. It was suggested that the effect was due to a decrease of the p_{H} of the blood as well as greater amt. of O.

ETHEL W. WICKWIRE

Barbital in parathyroid tetany. L. B. BRANNAN AND C. A. DRAGSTEDT. *J. Lab. Clin. Med.* 13, 732-3(1928).—Parathyroid tetany may be relieved by the adequate administration of barbital without any material change in the level of the blood Ca. The life of the parathyroidectomized dog can be slightly prolonged when tetany is controlled in this way.

ETHEL W. WICKWIRE

Morphine tolerance. III. The effect of cocaine upon dogs before, during and after habituation to morphine. ARDREY W. DOWNS, NATHAN B. EDDY AND J. P. QUIGLEY. *J. Lab. Clin. Med.* 13, 839-42(1928).—Cocaine produced convulsions that were less intense and of shorter duration in dogs habituated to the daily subcutaneous injection of morphine, 150 mg. per kg., than in normal dogs.

ETHEL W. WICKWIRE

The stability of mercurochrome solutions. G. F. REDDISH. *J. Lab. Clin. Med.* 13, 850-61(1928).—The bactericidal power and the toxicity of aq. mercurochrome soln. were not affected by holding at room temp. in a glass-stoppered bottle for at least 5 years.

ETHEL W. WICKWIRE

Morphine tolerance. I. The acquirement, existence and loss of tolerance in dogs. ARDREY W. DOWNS AND NATHAN B. EDDY. *J. Lab. Clin. Med.* 13, 738-44(1928).—Dogs habituated to the daily subcutaneous injection of morphine sulfate, 150 mg. per kg., showed a high degree of tolerance to the depressant action of the drug on the cerebrum and on the vomiting center. Tolerance to its action on the heart rate and size of the pupil was also shown. Body temp. was always lowered by morphine. II. The susceptibility of morphine-tolerant dogs to codeine, heroine and scopolamine. *Ibid* 745-9.—Dogs habituated to the daily injection of morphine, 150 mg. per kg., showed tolerance to codeine and heroine, but not to scopolamine.

ETHEL W. WICKWIRE

Digitalis (Focke) 17.

I—ZOOLOGY

R. A. GORTNER

Sensitization to quinine of quinine-resistant protozoa by means of arsenic. K. SEMELÉW. *Zhurnal ekspl. Biol. Med.* 8, 460-6(1928).—As reduces the natural quinine resistance of certain protozoa.

S. MOROGLIS

Some chemical investigations on Bombyx mori. I. The effect of hydrogen-ion concentration upon the coagulation of liquid silk. SINGERU NAKAJIMA. *Bull. Sci. Fakultato Terakultura, Kjusu Imp. Univ.* 2, 20-32(1926).—So-called "liquid silk" which

is a colloidal silk soln. in the silk glands of *Bombyx mori* has a negative elec. charge and is readily coagulated by the addn. of some acids. HCl, AcOH, MeCH(OH)CO₂H, PO₄H₃ and HO₂CCO₂H were used to det. the effect of the H-ion concn. The optimum coagulation points are at p_H 1.3 and 3.9. The latter point is very near the isoelec. point of sericin. II. Quantitative changes of cystine, tryptophan and tyrosine in proteins of silkworms. *Ibid.*—The cystine content has been detd. by the I method in the proteins of silk worms and the pupa. It decreases gradually during the development of the worms or silk formation, as silk contains very little cystine. After spinning the cocoon, or after the excretion of silk, most of the cystine remains in the pupa. The quant. changes of the tryptophan are somewhat similar. The tyrosine content increases during the silk formation, as silk is rich in tyrosine. A. L. HENNE

Researches on the osmotic pressure of the blood and urine of certain fishes in the Gulf of Naples. L. CONDORELLI. *Boll. soc. ital. biol. sper.* 3, 197-203(1928).—The Δ of 7 detns. made on the blood and urine of *Lophius piscatorius* is given. In every case the urine was hypotonic with respect to the blood. PETER MASUCCI

The antagonism between acetic acid and the chlorides of sodium, potassium and calcium as manifested in developing *Fundulus* embryos. P. B. ARMSTRONG. Woods Hole and Cornell Med. Coll. *J. Gen. Physiol.* 11, 515-23(1928).—Developing embryos of *F. heteroclitus* react similarly to AcOH in salt solns. whether or not their membranes have been removed. No specific function of the chorionic membrane therefore need be assumed. AcOH kills the surface of the embryo and heart stoppage results from the penetration of the acid after the surface has been killed. Salts (NaCl, KCl and CaCl₂) antagonize the action of AcOH by slowing or preventing the killing of the embryo surface. In certain KCl-AcOH mixts., the surface killing effect of the acid on the embryo is antagonized but the KCl penetrates and stops the heart in a manner characteristic of KCl alone. C. H. RICHARDSON

State of the protoplasmic proteins in the egg of the living sea urchin. F. VLÈS AND M. GEX. *Compt. rend. soc. biol.* 98, 853-6(1928).—An ultra-violet spectroscopic study. L. W. RIGGS

Pulmonary lipodieresis in inferior vertebrates. H. ROGER, LÉON BINET AND J. VERNE. *Compt. rend. soc. biol.* 98, 931-2(1928); cf. *C. A.* 18, 852, 3639.—The frog lung and fish gill are able to attack droplets of oil which are arrested in the capillaries of these organs. L. W. RIGGS

Action of certain anthelmintics on cestodes, ascaris and ankylostome. SILVIO REBELLO, S. F. GOMES DA COSTA AND J. TOSCANO RICO. *Compt. rend. soc. biol.* 98, 995-7(1928).—Essence of chenopodium, thymol, β -naphthol and CCl₄ had a strong toxic action on all 3 organisms. A dozen other preps. were toxic to 1 or 2 but not to all 3 of the organisms. Differences of reaction of the earth worm and of intestinal helminths toward certain anthelmintics. *Ibid.* 1021-2.—The differences are tabulated. Conclusions with reference to the toxicity of an agent to earth worms are not always applicable to intestinal worms. L. W. RIGGS

Utilization by aquatic animals of organic materials dissolved in water. J. POMIRADSKY. *Compt. rend. soc. biol.* 98, 1033-5(1928).—Tadpoles in media contg. peptone and sugars had their growth increased in the presence of KCl which increased the permeability of the skin, and their growth decreased in the presence of CaCl₂ which lessened the permeability of the skin. These changes were not dependent on the no. of bacteria in the medium. Tadpoles do not feed on bacteria, neither do bacteria appear to play any intermediate role in the utilization of the dissolved nutrients. L. W. RIGGS

Purinolytic diastases of the invertebrates. R. TRUSZKOWSKI. *Compt. rend. soc. biol.* 98, 1048(1928).—The purine N was detd. in leeches and mussels before and after autolysis. These animals excrete no uric acid and their ground tissues do not destroy uric acid. Guanase and adenase were present but not xanthinioxidase. L. W. RIGGS

Effect of inorganic salts on photic orientation in *Allobophora foetida* (sav.). II. Sulfates—MgSO₄, FeSO₄, Na₂SO₄ and K₂SO₄. IKITARO NOMURA AND SHINRYO OHFUCHI. *Sci. Repts. Tôhoku Imp. Univ.* [4], 3, 223-48(1928); cf. *C. A.* 22, 1830.—The object of this study was to det. what kind of sulfates would affect the + orienting function of the ventral nerve cord or the — orienting function of the brain of *A. foetida*. The expts. were made by submerging the worm in solns. of the single or mixed sulfates, with the following results: (1) In the ventral nerve cord, K₂SO₄ causes a weakening of the + orienting functioning, while MgSO₄, FeSO₄ and Na₂SO₄ cause a strengthening at first and then a weakening. (2) In the brain, FeSO₄ and K₂SO₄ cause a weakening of the — orienting functioning, Na₂SO₄ causes a strengthening at first and then a weakening, and MgSO₄ a weakening at first and then a strengthening which is followed by a

weakening. (3) When FeSO_4 is mixed with MgSO_4 , Na_2SO_4 or K_2SO_4 , the general change in orientation is much influenced by FeSO_4 . (4) When MgSO_4 is mixed with Na_2SO_4 or K_2SO_4 , the tendency of change in orientation in the ventral nerve cord follows that of the worms placed in MgSO_4 , while in the brain it follows that in Na_2SO_4 or K_2SO_4 , resp. (5) In $\text{Na}_2\text{SO}_4 + \text{K}_2\text{SO}_4$, the general tendency of change in orientation in the 5 cm. angles follows that in K_2SO_4 , while in the 10 cm. angles it follows that in Na_2SO_4 . (6) In MgSO_4 , Na_2SO_4 , $\text{MgSO}_4 + \text{Na}_2\text{SO}_4$ and $\text{MgSO}_4 + \text{K}_2\text{SO}_4$, the backward crawling is caused mainly by a weakening of forward crawling functioning in the ventral nerve cord. (7) In FeSO_4 , K_2SO_4 , $\text{MgSO}_4 + \text{FeSO}_4$, $\text{FeSO}_4 + \text{Na}_2\text{SO}_4$, $\text{FeSO}_4 + \text{K}_2\text{SO}_4$ and $\text{Na}_2\text{SO}_4 + \text{K}_2\text{SO}_4$, the backward crawling is caused by a relative weakening of forward crawling functioning in both the brain and the ventral nerve cord. (8) The returning movement is caused by a functioning in the brain, and it tends in general to weaken in relation to the prolongation of the duration of submergence. (9) In the mixts. contg. K_2SO_4 , the no. of winding individuals tend to increase with the prolongation of the duration of submergence. The expts. were made at a temp. of 22.8° to 25.6° . III. Nitrates $\text{Mg}(\text{NO}_3)_2$, $\text{Ca}(\text{NO}_3)_2$, NaNO_3 and KNO_3 . *Ibid* 379-403.—The exptl. procedure was the same as described above. In the ventral nerve cord, NaNO_3 causes a weakening of the positively (+) orienting functioning, while $\text{Mg}(\text{NO}_3)_2$, $\text{Ca}(\text{NO}_3)_2$ and KNO_3 cause a strengthening at first, then a weakening. In the brain, $\text{Mg}(\text{NO}_3)_2$ causes a weakening of negatively (−) orienting functioning, while the Ca, Na and K nitrates cause a strengthening at first and then a weakening. When $\text{Ca}(\text{NO}_3)_2$ is mixed with $\text{Mg}(\text{NO}_3)_2$ or NaNO_3 , the general tendency of change in orientation appears to follow mainly that of worms placed in $\text{Ca}(\text{NO}_3)_2$. When KNO_3 is mixed with Mg or Ca nitrates, the tendency of change in orientation is to follow that in KNO_3 . In mixed Mg and Na nitrates the tendency of change in orientation follows mainly that in $\text{Mg}(\text{NO}_3)_2$. In $\text{NaNO}_3 + \text{KNO}_3$, the change in + orientation appears to follow that in NaNO_3 , while the change in − orientation follows neither that in NaNO_3 nor KNO_3 . In NaNO_3 and KNO_3 , the backward crawling is caused mainly by a relative weakening of forward crawling functioning in the ventral nerve cord. In the nitrates of Mg, Ca, Mg + Na, Ca + Na, Mg + K and even in Na + K, the backward crawling is caused by a relative weakening of forward crawling functioning in both the brain and the ventral nerve cord. In the nitrates of Ca + K and Ca + Mg, however, backward crawling is caused mainly by a weakening of forward crawling functioning in the brain, and in Mg + Ca the forward crawling functioning in the ventral nerve cord appears to be strengthened. The returning movement is caused by a functioning of the brain. In nitrates of Mg, Ca, Mg + Ca, Ca + Na, Mg + K and Ca + K, the movement becomes frequent after submergence, while in Na, K, Mg + Na and Na + K it becomes less frequent. KNO_3 causes in worms a notable frequency of winding movement.

L. W. RIGGS

Chemical effects upon the lengthening of Caudina muscle. LIEH TAO. *Sci. Repts. Tôhoku Imp. Univ.* [4], 3, 417-20(1928).—*Caudina* muscle under loading shows an initial contracture, when it is transferred from sea water to hypertonic sea water, distd. water, isotonic solns. of NaCl, KCl, CaCl_2 and sucrose or nicotine in sea water. Hypotonic sea water, hypotonic NaCl soln. and alkalinized sea water (p_H 11) cause a gradual contracture. Acid in sea water (p_H 3) causes a progressive shortening. Isotonic MgSO_4 and MgCl_2 solns., strychnine, pilocarpine and atropine in sea water accelerate the lengthening; the Mg salts in elastic form and the alkaloïds in plastic form. *Caudina* muscle shows a contracture when it has been immersed in the isotonic solns. of KCl, MgCl_2 and sucrose, and is returned to sea water. The initial contracture may be considered as an excitatory process or a membrane effect, while the gradual contracture may be regarded as a swelling effect due to osmotic relation; and the progressive shortening is a chem. phenomenon of the muscle substance itself. These results suggest an existence of an osmotic and excitatory active membrane in *Caudina* muscle, contrary to Meigs's opinion; and it seems to be more sensitive to the effect of salts than are striated muscles or the smooth muscles of vertebrates.

L. W. RIGGS

12—FOODS

F. C. BLANCE AND H. A. LEPPER

Scientific control in the food industry. J. VALENTINE BACKES. *Food Manuf.* 1, 7-8(1927).

Food and future. ROBERT WHYMPER. *Food Manuf.* 1, 9, 8, 68, 69, 149-150; 2, 206, 210(1927).—"The psychology of human beings in relation to diet....."

W. shows the "mutual relations existing between the character of the foodstuff and the social human character of the consumer in Japan, the United States and North Africa." J. A. KENNEDY

Foodstuffs from yeasts. STANLEY SMITH. *Food Manuf.* 1, 118(1927). J. A. K.

The spoilage of foodstuffs. E. H. CALLOW. *Food Manuf.* 1, 10-1, 13(1927). J. A. KENNEDY

Recent advances in cereal chemistry. D. W. KENT-JONES. *Food Manuf.* 1, 129-30, 160-1(1927); cf. *C. A.* 19, 683.—This article is based on a thesis entitled "A study of the effect of heat upon wheat and flour, especially in relation to strength," which was presented by the author to London University. J. A. KENNEDY

Baby foods. E. H. CALLOW. *Food Manuf.* 1, 95-6, 98(1927).—The author discusses the ideal baby food, "humanized" milk, dried milk preps., peptonized foods, condensed milks and carbohydrate foods, and compares various milks. J. A. K.

Lead in carbonated beverages. H. W. PETHERICK. *Ann. Rept. of Pub. Health to June 30, 1927.* Great Britain.—A study of the source of Pb in carbonated beverages. The max. permitted and method of removing the source are given. G. R. G.

Determination of dextrose in the presence of proteins; application to the determination of starch in bread stuffs, particularly in "gluten bread." P. FLEURY AND G. BOVELDIEU. *J. pharm. chim.* 7, 249-55(1928).—See *C. A.* 22, 2417. S. WALDBOTT

Flour as a raw material. C. W. HERD. *Food Manuf.* 1, 65-8(1927). J. A. K.

Determination of butter in margarine. L. V. COCKS AND E. NIGHTINGALE. *Analyst* 53, 322(1918).—The Reichert-Meissl, Poleuske and Kirschner values are used for the detn. of the butter content of margarine but errors due to the personal equation and to the danger of volatilizing a little H_2SO_4 with the fatty acids makes it necessary to take special precautions. In fact the analyst should know the actual values of the butter used; the assumption of normal values is likely to lead to very appreciable errors. W. T. H.

The neutralization of milk and its detection. R. STROHECKER. *Z. anal. Chem.* 74, 1-28(1928); cf. *C. A.* 21, 3396-7. During the war, owing to the limited supply of milk, it was sometimes the practice to neutralize milk with $NaHCO_3$ to prevent it from curdling when it was no longer fresh. Such treatment has always been regarded as adulteration and considerable attention has been paid to the method of detecting the fraud. After discussing the effect of neutralizing milk and the reasons why none of the methods hitherto used to detect this neutralization are wholly successful, a new method is described which is more sensitive. If the sp. cond. of the serum obtained after treatment with dialyzed $Fe(OH)_3$ sol is detd. after adding HCl, it will be found that there is a loss in cond. when the milk has been neutralized and a gain in cond. when the milk has been watered. This loss is due to the fact that the HCl reacts with the Na lactate setting free lactic acid of inappreciable cond. When, on the other hand, the milk has been watered the lessened amt. of casein present makes its effect on the HCl less appreciable. To carry out the test by the new procedure, first det. the degree of acidity by the Soxhlet-Henkel method. Then to 50 cc. of milk add half as many cc. of 0.25 N NaOH as was required for 100 cc. in the above detn. dild. with doubly distd. water to make 10 cc. Mix and add 40 cc. of Merck's dialyzed ferric hydroxide. Stir vigorously and filter. Treat 20 cc. of the filtrate with 30 cc. of doubly distd. water and det. the sp. cond. at $18^\circ (L_I)$. To another 20 cc. of the filtrate add 25 cc. of doubly distd. water and 5 cc. of 0.2 N HCl. Mix well and again det. the sp. cond. (L_{II}). Then det. the sp. cond. of 5 cc. of the 0.2 N HCl mixed with 45 cc. of the water (L_{III}). This value holds as long as the same HCl and water are used. The loss in sp. cond. is then $L_A = L_I + L_{III} - L_{II}$. From an empirical table, find the acid degree (S_A) corresponding to (L_A). The difference between S_A and S (the degree shown by the Soxhlet-Henkel detn.) gives the no. of degrees corresponding to the neutralization of the sample. W. T. H.

Test for keeping qualities of milk, modified. E. D. DEVEREUX. *Mich. Agr. Expt. Sta., Quarterly Bull.* 10, 190-4(1928).—The use of p_H detn. as an indicator of milk quality is affirmed. In order to overcome the time-factor criticism of the Coolidge test, it was shown that the milk-inoculated tubes could be iced following as long as 6 hrs.' incubation, thus interrupting the test until the following day. The results checked in 93% of the cases with the control tubes. C. R. FRILLES

A study of the apparent viscosity of milk as influenced by some physical factors. G. M. BATEMAN AND P. F. SHARP. *J. Agr. Research* 36, 647-74(1928).—The viscosity coeff. of skim milk is dependent on the shearing force used in detg. it. Viscometers such as the ordinary Ostwald type operate at shearing forces in the region where the

coeff. of viscosity is changing most rapidly with change in shearing force. Mech. agitation may cause a decrease in the viscosity of milk contg. clumps of fat globules, but agitation causes no change in the viscosity of either fresh skim milk or homogenized milk. Skim milk progressively increases in viscosity with age. The aged material cannot be brought back to its value when fresh by repeatedly running through a viscometer, although it can be somewhat lowered in viscosity in this manner. Homogenization causes a distinct rise in the viscosity of whole milk, while it produces practically no change in the viscosity of skim milk. Pasteurization and freezing each produce a slight decrease in viscosity of skim milk. Viscosity values obtained by dilig. skim milk indicate that viscosity is not strictly a linear function of total solids.

M. S. ANDERSON

The influence of temperatures and certain other factors upon the percentage of fat in milk. EARL WEAVER AND C. A. MATTHEWS. Ia. Agr. Expt. Sta., *Research Bull.* 107, 158-80(1928).—The % of fat in milk was highest in Jan., declined gradually until Aug., and rose rapidly during the autumn. Ayrshire and Holstein tests were approx. 0.6% lower in the second half of the summer than in the first half of the winter. Guernsey and Jersey tests were approx. 1.1% lower. As measured by regression coeffs., butter fat tests were affected more by changes in environmental temps. than by other factors studied. High outside temps. are probably assocd. with low fat tests. The fat tended to be high immediately following freshening, declining for 2-3 months, then rising during the rest of the lactation. The literature bearing on this subject is fully discussed.

C. R. FELLERS

The effect of minute doses of iodine on milk secretion. O. STINER. *Schweizer med. Wochschr.* 57, 846-8(1927); *Bull. Hyg.* 3, 407.—One mg. of I added to the food of a cow increases the total milk yield, fat content and the tendency to become pregnant. In no case was it injurious.

GEORGE R. GREENBANK

Sanitary quality of some commercial milk powders. J. H. SHRADER, C. L. EWING, F. A. KORFF AND LILLIAN W. CONN. *Am. J. Hyg.* 8, 386-97(1928).—The analysis of 100 samples of milk powder from widely scattered geographical sources and collected in Baltimore showed them to be entirely free from living tubercle organisms. The milk supply from which these powders were made is excessively high in bacteria. Proper sanitation has not been followed in either plant or trade channels. Chem. analysis of 74 of the samples shows that the excessive bacteria count before manuf. is indicated by the presence of an approx. proportional content of ammoniacal products. A description in detail of the methods used is given, and results are extensively tabulated.

J. C. JURRJENS

Studies in cream viscosity. G. T. PYNE AND J. LYONS. *J. Dept. Lands and Agr. Ireland* 27, 121-8(1928).—An investigation was made to det. the possibility of increasing the viscosity of pasteurized cream by treatments which could be carried out in a creamery. Cream prepd. by sepn. at about 90°F. of milk which had been previously pasteurized and chilled overnight was much more viscous than pasteurized cream. Cream prepd. by resepn. at 90°F. of a lighter cream which had been previously pasteurized and chilled showed greatly improved viscosity but not quite so good as that obtained by the preceding method. Addn. of as much as 0.292% lactic acid to cream contg. 34% fat had no effect on the viscosity. Larger amts. increased the viscosity but imparted a sour taste to the cream. When cream contg. 53% fat was treated with 0.13% lactic acid the product was very viscous and no marked alteration in flavor and aroma resulted.

K. D. JACOB

Tests for reconstituted cream. F. W. RICHARDSON. *Analyst* 53, 334-5(1928).—Sometimes cream is made from milk powder, unsalted butter and water. It is pretty hard to detect such falsification by the taste. If, however, 5 g. is treated with equal quantities of benzene and alc. and the mixt. is centrifuged lightly, an amber upper layer of butter fat will be obtained with the fictitious cream, whereas with real cream the fat will remain emulsified in the test. By strong centrifuging, 3 distinct layers will be observed, whereas true cream will only give 2 layers. After sterilizing at 145° there is no reduction reaction with methylene blue in the imitation product whereas with fresh cream an instantaneous reaction is obtained.

W. T. H.

Glycerol in cream. A. F. LERRIGO. *Analyst* 53, 335-6(1928).—Heat 2 g. of cream in a flat-bottomed dish on the water bath for 20 min. and then in a steam-heated oven for 30 min. If 1% of glycerol is present the contents of the dish will fume when taken from the oven. Cool, weigh and again heat in the oven. As a result of the second heating there will be a slight increase in wt. with pure cream and a loss if glycerol was present. It has been suggested that glycerol is a suitable preservative for cream but the expts. here described indicate that it does not prevent souring.

W. T. HALL

Scientific control in the chocolate industry. H. W. BYWATERS. *Food Manuf.* 1, 113-6, 117(1927). J. A. KENNEDY

The composition of tea extracts prepared by various methods. ANON. *Ind. Mercur* 1926; *Ber. Afdel. Handelsmuseum Ver. Koloniaal Inst.* No. 28, 19 pp.—A survey of the influence of the extrn. procedure on the flavor of the tea and on the repartition of the caffeine. A. L. HENNE

Chemical composition of American-grown French cider apples and other apples of like character. J. S. CALDWELL. *J. Agr. Research* 36, 391-406(1928).—Analytical data are presented upon 21 French cider apples and 61 astringent varieties. Detns. are made of reducing sugar, sucrose, acid, total astringency, tannin, non-tannin astringency and total solids. French cider apples show no very large or const. modification in chem. character when grown near sea level and at 2170 feet elevation. The astringent apples are grouped into 3 classes: (1) astringent fruits of low acid content; these are fairly high in sugar but less than 0.5% acidity; (2) fruits whose acid ranges from 0.5 to 0.75%; (3) fruits with acidity of 0.8% or more and contg. a considerable degree of astringency. Each group contains varieties presenting a fairly wide range in astringent substances. M. S. ANDERSON

Chemical composition of the juices of some American apples. J. S. CALDWELL. *J. Agr. Research* 36, 407-17(1928).—Data are given upon the chem. compn. of the juices of 98 varieties of American-grown apples. Analyses of fruit grown in the same locality in different seasons show considerable variation in most chem. constituents due to seasonal variations. The acid-astringency-sugar ratio is an attempt to sum up in one expression the factors responsible for the collective effect upon taste organs of the constituents which they perceive. This ratio varies, not only for different varieties, but for the same variety grown during different seasons. M. S. ANDERSON

The effect of freezing upon the respiration of the apple. DONALD B. CARRICK. Cornell Univ. Agr. Expt. Sta., *Memoir* 110, 1-28(1928).—Incipient ice formation did not result in any visible color changes in the cells. Even slight freezing increased the granular texture and insipidity of the pulp, predisposed the fruit to fungus invasion and caused rapid break-down when held in cold storage. The speed of autolysis varied directly with the degree of freezing and was especially hastened when relatively large areas assumed the characteristic brown discoloration of dead tissue. An app. used in *respiratory measurements* is described. The rate of air flow through this respiratory app. affected the total amt. of CO₂ formed. Winesap apples frozen for 3 and for 6 hrs. after ice formation at air temps. of -7.5° to -8.5°, when measured at 0°, increased their respiration as much as 85% over the previously detd. normal performance. This acceleration lasted for several days, gradually declining for over 30 days. Winesap apples frozen sufficiently to kill $\frac{1}{4}$ of the cells at 0° excreted only $\frac{1}{4}$ the amt. of CO₂ which they had formerly produced as normal, unfrozen fruit. *Penicillium* soon invaded frozen apples held at 20°, the infection giving a marked rise in CO₂ production when compared to the previous rates. McIntosh and Baldwin varieties reacted similarly to Winesap. There are 20 literature citations. C. R. FELLERS

Jerusalem artichoke. C. E. CORMANY. Mich. Agr. Expt. Sta., *Quarterly Bull.* 10, 156-8(1928).—This crop yielded from 5 to 6 tons per acre but unless some cheap method of extg. the carbohydrates, chiefly *inulin*, is developed, the crop will never be of great importance. It is inferior to other crops as a silage crop or hog pasture. C. R. F.

The Jerusalem artichoke. L. E. DUNTON. *Forecast* 34, 295, 296, 332(1927); *Expt. Sta. Record* 58, 290.—The av. values obtained in analyses of 12 samples of Mammoth White French Jerusalem artichoke are given as moisture 81.2, total ash 1.263, P 0.0992, Ca 0.0227 and Fe 0.0034%. Attention is called to the relatively high content of P and Fe as compared with other root vegetables and the relatively low content of Ca. This would make a combination of artichokes with milk desirable for furnishing bone-building material. The fact that the carbohydrate of the artichoke is chiefly *inulin*, which is probably not available to the human organism, suggests the desirability of the use of artichokes in diets for diabetes and obesity. H. G.

University of Bristol fruit and vegetable preservation research station, Campden, Gloucestershire. ALFRED APPLEYARD. *Food Manuf.* 1, 145-7(1927). J. A. K.

Research in the canning industry. E. H. CALLOW. *Food Manuf.* 1, 143-4, 147(1927). J. A. KENNEDY

The new British food canning industry. STANLEY SMITH. *Food Manuf.* 1, 148-9(1927). J. A. KENNEDY

The practice of meat preserving and canning. E. W. LEWIS. *Food Manuf.* 1,

155-8(1927).—The basic principles of meat canning are brought out and an outline is given of the methods used in practice. J. A. KENNEDY

Carbohydrate transformations in carrots during storage. HEINRICH HASSELBRING. U. S. Bur. of Plant Industry. *Plant Physiology* 2, 225-43(1927).—Nine varieties of commercial stock and of table carrots were stored for varying periods of time at 39-40°F. and also at 32-35°F. The principal changes in compn. consisted in (1) an increase of reducing sugars resulting from the inversion of sucrose and (2) the hydrolysis of dextrins and hemicelluloses. Little change in compn. occurred after the first 10 weeks. No starch was found. The flavor of carrots is due chiefly to their natural sucrose content; accordingly, for cooking and canning purposes, the quality of the roots is highest immediately after they are dug. WALTER THOMAS

The composition of swedes. ALEXANDER LAUDER. *Scottish J. Agr.* 10, 428-33 (1927); cf. *C. A.* 20, 2550.—The av. dry matter content of different varieties of swedes grown from the same lots of seed varied from 10.32 to 12.66% depending on the locality. Likewise, the sol. solids varied from 7.83 to 9.48, insol. solids 2.49 to 3.17 and sugar 6.41 to 7.33%. No definite relation could be established between the quality of the roots and their content of N, P₂O₅, CaO, sugar and sol. and insol. solids. The total dry matter content appeared to be the best index of the quality of swedes. In feeding expts. on sheep varieties with different contents of dry matter gave the same results when the total dry matter fed was the same in each case. K. D. JACOBS

Note on the losses in mangels during storage. G. T. PYNE. *J. Dept. Lands and Agr. Ireland* 27, 33-5(1927); cf. *C. A.* 21, 967.—In a 5-months storage test, from Dec. 4 to May 3, on Yellow Oval mangels the percentages of the original constituents lost were H₂O 8.8, total dry matter 27.0, protein 22.2 and fiber 3.8. The total wt. decreased 10.1% during this period, and the total sucrose content decreased 29.5% during the first 2 months. The decrease in dry matter appeared to be independent of any changes in wt., "drying out," etc., in the roots due to local conditions. The roots were stored in a detached clamp protected by a thick covering of straw and located in an open position in a field. K. D. JACOBS

The iron content of plant and animal foods. W. H. PETERSON AND C. A. ELVEHJEM. Univ. of Wisconsin. *J. Biol. Chem.* 78, 215-23(1928).—The Fe content of about 150 common food-materials is given. Arranged in descending order with respect to their Fe content, these classes of foods are dried legumes, green leafy vegetables, dried fruits, nuts, cereals, poultry, green legumes, roots and tubers, non-leafy vegetables, fish and fruits. Samples of the same food vary widely in their Fe content. Orange and tomato juices contain less of the total Fe per unit weight than the whole fruit. Salt water fish contain more Fe than fresh water fish. The dark meat of poultry or fish contains more Fe than the light colored tissue. ARTHUR GROLLMAN

The variation of phosphorus content in South African vegetation. J. P. VAN ZIJL. *J. S. African Chem. Inst.* 11, 3-11(1928).—Analyses of pasture samples showed that new growth was richer in P₂O₅ than older material; e. g., stalks varied from 0.225 to 0.097% and blades from 0.533 to 0.148%. In pot-grown plants where a uniform water supply was maintained no such marked variations occurred. Field plants grown under conditions of abundant rainfall also showed only slight differences in P₂O₅ content of grasses with the advance of the season. W. C. EBAUGH

High-protein grains supplement to pasture for dairy cows. C. C. HAYDEN AND A. E. PERKINS. Ohio Agr. Expt. Sta., *Bimonthly Bull.* 13, 99-102(1928).—Pasture grass carries a considerably higher C₆ protein than the same plants have when full grown and made into hay. Therefore less protein is needed in the summer than in the winter ration. Exptl. data indicate that the use of high-protein grain mixts. in summer is not economical. C. R. FELLERS

Dairy cattle need phosphorus in ration. O. C. REED AND C. F. HUFFMAN. Mich. Agr. Expt. Sta., *Quarterly Bull.* 10, 151-6(1928).—A depraved appetite, such as a craving for wood or bones, is usually caused by a P-deficient ration and is often assocd. with soils poor in this element. Protein concn. or steamed bone meal were valuable sources of P for dairy cattle. Ground raw rock phosphate gave unsatisfactory results and disturbed the digestion of the animals. The possibility of F in the rock phosphate being responsible for the bad effects, is being investigated. C. R. FELLERS

The nutritive requirements of poultry. G. S. ROBERTSON AND R. G. BASKETT. Queen's Univ., Belfast. *Scottish J. Agr.* 11, 176-83(1928).—Addn. of 2.2% of a mineral mixt. contg. CaCO₃, NaCl, Ca₃(PO₄)₂, S, Fe₂O₃ and KI to a cereal mash increased the yield of eggs 20% and improved the size of the eggs and condition of the birds. Addn. to the ration of protein-rich foods such as soy bean meal resulted in a further increase of 10 to 20% in egg yield but had no effect on the size or wt. of the eggs or on the con-

dition of the birds. Fish meal was an effective source of both protein and minerals.

K. D. JACOB

Hydrocyanic acid in linseed cake and toxicity of some cakes. CH. BRIOUX AND A. RICHART. *Ann. sci. agron.* **45**, 27-41 (1928).—Analyses of 19 samples of linseed cake showed 0.005 to 0.86% of HCN. The content depends upon the content of the cyanogenetic glucoside, linamarin, in the cake, as well as the nature of the prior treatment. Feeding expts. indicate that, with young ruminants, linseed cake unusually high in the glucoside may cause poisoning when eaten as mash prepd. in advance with tepid water. Such conditions favor the rapid and more or less complete evolution of HCN. However, if the mash is prepd. with boiling water and from well-pulverized cake, particularly if cooked for a short time, the linase is destroyed and there is no danger from HCN. Glucose and molasses added to macerations of the cake appear to exercise a protective action against HCN poisoning. Linseed cake proved harmless when fed dry.

P. R. DAWSON

The disintegration of rice straw. H. IWATA. *J. Dept. Agr., Kyushu Imp. Univ.* **1**, 217-40 (1926); *Expt. Sta. Record* **58**, 166.—Expts. were undertaken to det. the effect upon the compn. and nutritive value of rice straw of boiling it in water and of distintegrating it with dil. alk. solns. The dry matter of rice straw has a starch value of about 20%. Boiling the straw in water for 3 hrs. did not change the compn. or nutritive value. Soaking in a 0.25% soln. of NaOH for 4 hrs. did not change the straw materially from the untreated state. Soaking in 0.75 or 1.5% soln. of NaOH for 4 hrs. or boiling in a 1% milk of lime soln. for 3 hrs., caused an extn. of a considerable quantity of in-crusting substances, an increase in the digestible matter, and raised the starch value of the dry matter to from 53 to 58%. As the lignin and Cl decreased the starch value increased, but not proportionally.

H. G.

Precautions for feeding spoiled sweet clover hay. L. M. RODERICK AND A. F. SCHALK. *N. Dakota Agr. Expt. Sta., Circ.* **35**, 1-4 (1928).—Sweet clover hay or silage which has molded or otherwise spoiled produced a specific disease in cattle known as "sweet clover poisoning." Loss of coagulating power of the blood resulting in hemorrhages usually causes death of the animal. Suspected fodder may be tested by feeding to rabbits which show the same bleeding symptoms a week or 10 days earlier than cattle fed upon the same hay. Death of the test rabbits should be a warning as to the poisonous character of the hay. The toxic principle has not been identified.

C. R. FELLERS

The poisoning of sheep on mountain grazing ranges in Nevada by the western chokecherry (*Prunus demissa*). C. E. FLEMING AND ROBERT DILL. *Nev. Agr. Expt. Sta., Bull.* **110**, 1-14 (1928); cf. *C. A.* **21**, 756. Post mortem findings based on field exams. proved chokecherry to be poisonous to sheep in the spring and early summer. The leaves lose their poisonous properties, which was found to be HCN, in the late summer and are quite harmless in the autumn. The poison is often set free in the sheep's stomach only after drinking water. Chokecherry poisoning is fatal and no known remedy has been suggested. Proper range and herd management are of value in reducing loss of animals.

C. R. FELLERS

The mass production of yeast for feeding purposes (STRICH) **16**. Elm seed oil [for food purposes] (KARDASHEV) **27**. Water pollution wastes: Milk-product wastes (HEPLER, *et al.*) **14**. Apparatus for sterilizing milk (Brit. pat. 279,902) **1**. Drum drier for fluid egg material (Brit. pat. 279,722) **1**.

Foods. M. FUJII. *Brit.* **279,985**, Sept. 11, 1926. Glutamic acid or one of its salts such as the hydrochloride or di-Na glutamate is used for neutralizing products prepd. from protein or carbohydrate materials such as fish, meat, wheat, maize, starch, casein or egg yolk by treatment with acid or alkali. The glutamic acid or its salt is preferably prepd. by heating animal or vegetable protein material in an autoclave with a catalyst such as powd. Fe or Fe oxide and a mineral acid under a pressure of 4 atm. or lower.

Treating flour. INDUSTRIAL APPLIANCE CO. *Brit.* **279,958**, Aug. 10, 1926. Flour is treated with a gaseous mixt. produced by bringing Cl contg. a small quantity of nitrosyl chloride into contact with aq. NH₃ dild. with an inert gas such as air. An app. is described.

Coloring for butter and oleomargarine. ADINO F. FILES. *Can.* **281,375**, July 3, 1928. A dry coloring material for butter (5 grains of coloring material per lb. of butter) consists of trituration dye (benzeneazo- β -naphthylamine and *o*-tolueneazo- β -naphthylamine) and rice flour in the proportions of 1 of dye to 24 of flour. *Cl. C. A.* **22**, 468.

Treating margarine mass. CARL HILDEBRANDT-SØRENSEN. Danish 37,435, May 9, 1927 and 37,723, July 18, 1927. Mech. details of app.

Apparatus for pasteurizing milk by the "holding" method. A. G. ENOCK & Co., LTD. AND E. C. ENOCK. Brit. 280,328, Sept. 21, 1926.

Cheese. LAKESHIRE CHEESE Co. Brit. 280,257, July 5, 1926. Comminuted cheese is exposed to direct contact with steam to heat it and render it semi-liquid or plastic and may be further treated with CO₂ before packaging. An app. is described.

Baking powder. ALFRED POLLOCK (to Fleischmann Co.). Can. 280,753, June 5, 1928. Compressed yeast (25-30% based on the final quantity of baking powder to be produced) is mixed with sugar materials (sugar, sirup or malt ext.) to the amt. of 10-25% of the yeast employed. The yeast is liquefied with development of CO₂ and marked fermentation. After liquefaction there are added filler (starch, flour, casein, dried milk, etc.) and if desired acid-supplying ingredient of baking powder (tartar, ammonium tartrate, tartaric acid, casein, calcium phosphate, etc.) and the mixt. is dried at low temp. The dry, ground mixt. is used in prepn. of baking powder.

Food flavoring or coffee substitute. A. E. KIENZLE. Brit. 280,432, Aug. 11, 1926. Sugar cane disks or chips are roasted and powdered.

Standardizing and solubilizing dry pectin preparations by adding sodium chloride. ALBERT LEO. U. S. 1,675,035, June 26.

Carbonating beverages. BRITISH DYESTUFFS CORPORATION, LTD., C. HOLLINS and E. CHAPMAN. Brit. 280,302, Aug. 19, 1926. To assist in retaining the CO₂, sulfonic acids are added (usually in the form of their Na salts) such as those of CH₃O-C₁₀H₈ or CH₃O-phenol condensation products, alkyl-naphthalenesulfonic acids, lignin-sulfonic acids, sulfonated higher fatty acids and the substances prep'd. from mineral oils and isopropyl alc. sulfonated as described in Brit. 274,611 (C. A. 22, 2268).

Feeding stuff emulsion. ALFRED OLSEN & Co., A. S. Danish 36,481, Sept. 6, 1926. An emulsion is prepared from oil, especially marine oils, in water, by means of casein and a phosphate, particularly Na₂HPO₄.

Food for animals. A. E. KIENZLE. Brit. 280,284, Aug. 11, 1926. Dried and ground fodder is made from sugar cane, which may be graded and mixed with various other foods.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Chemical industry. ARTHUR D. LITTLE. *J. Chem. Education* 5, 641-55(1928).—An address outlining the development of chem. industry "A specific chemical industry has its origin in a discovery in the lab. Its early development is commonly beset with difficulties. It grows through the reaction upon it of developments in other industries and through the conversion of its wastes into valuable products. It has no assurance of stability other than that furnished by continued research and the studied consideration of the trend of scientific progress and industrial development. When, however, competent technical ability is adequately backed by educated money and both are made subject to wise business management, chem. enterprises have shown remarkable earning power and a capacity for growth of which the du Pont company in this country and the I. G. in Germany are the outstanding examples." The need of close coöperation on the part of chemist, technician and selling side is emphasized. Illustrations are adduced from a long series of domestic and foreign industrial concerns.

W. C. EBAUGH

Imperial Chemical Industries, Ltd. ALFRED MOND, *et al.* *Chemistry and Industry* 47, 588-94(1928).—M. reported that 99% of shareholders of the 4 merging companies had agreed to an exchange of shares, that profits for 1927 were 4,567,000 pounds sterling, from which 125,000 pounds went for income taxes, 408,000 pounds were posted to reserve, 1,145,000 pounds were used for dividends of preferred shares, 82,000 pounds were carried forward, and the remainder was paid out as 5% dividends on ordinary capital, and 1 1/4% dividends on deferred shares. The nominal capital has been increased from 65,000,000 to 75,000,000; pounds new shares are issued at 33 s. for ordinary and 10 s. for deferred. The Company has now complete controlling interest in 40 mfg. and trading concerns and a large measure of control in 30 others, and their ramifications extend all over the world. More than 40,000 employees are in its various factories; freedom from labor disputes are due to "inheriting a happy tradition" of wise conduct on the part of the management, friendly relations with trade unions and personal contact with the workers. A system of works councils

has been put into operation; 653,000 ordinary shares are owned by the staff and workers; foremen's pensions, a works' magazine and the creation of a "real I. C. I. spirit" are factors in this happy condition. Useful contacts had been made with the (German) "I. G." but there was no agreement that would hamper the legitimate development of its activities or militate against Great Britain and the British Empire. All the Company's factories are working full time. In developing synthetic fertilizers, especially N-products, an immense industry was built up entirely by British scientists and engineers. A research organization has been developed to enable the fertilizer needs of any country to be studied so that the farmers can get the best results. Chilean nitrate can no longer be taken as a real competitor of synthetic N. The Company will soon be mfg. synthetic MeOH. Extensive investigations on the production of hydrocarbons from coal are under way. The honored custom of const. research is being continued, with adequate equipment, finances and staff. A research council includes some of the best-known scientists in Great Britain. A program of considerable expansion of the Company's program, with the financial arrangements necessary, is outlined. Harry McGowan, President, discussed the com. conditions in Great Britain, the Empire and in foreign countries, explainning the Company's relationship to each section. The Company has substantial investments in the Du Pont Co., the Allied Chemical Co. and the General Motors Corporation. The Company holds to its 4-fold responsibility, viz., to Great Britain and the Empire, to the shareholders, to the workers and to the consumer. The Company was formed to enable it to take care of itself against foreign competition, and was not designed to raise prices and create monopolies.

W. C. EBAUGH

The export industries of Norway. S. KLOUMANN. *Teknisk Ukeblad* **74**, 363-6, 380-2(1927).—A review.

C. A. ROBAK

Chemical industries and Merseyside. A. HOLT. *J. Soc. Chem. Ind.* **46**, 439-44T (1927).—The paper gives a brief résumé of the history and development of chem. industries in South West Lancashire and on the banks of the Mersey from early times till about the commencement of the present century.

B. C. A.

Chemical process efficiency. G. FIRTH. *J. S. African Chem. Inst.* **11**, 27-32 (1928).—The application of efficiency studies to the production of H_2SO_4 , nitroglycerin and fertilizers is outlined.

W. C. EBAUGH

Water supply and drainage for industrial plants. D. D. JACKSON. *Proc. Am. Assoc. Textile Chem. Colorists* **1928**, 171-8; *Am. Dyestuff Rept.* **17**, 383-90. An illustrated lecture.

L. W. RIGGS

Patents and colloid chemistry. HAROLD E. POTTS. *Chemistry & Industry* **47**, 636-43, 664-8(1928).

E. H.

Air separation and classification. E. C. BLANC. *Rev. matériaux construction trav. publics* **1928**, 177-83, 225-9.—The fundamental theory, the field of application and the historical development are reviewed. App. involving horizontal and rising currents of air and centrifugal force and regulating mechanisms are described.

F. O. A.

Pressure regulation in vacuum distillations. G. H. RICHTER. *Ind. Eng. Chem.* **20**, 682(1928).—A needle valve easily made from the base of a Tirrill burner, capable of adjustment to ± 0.5 mm., is described for use in adjusting pressures.

J. B.

Specifications—a new buying technic. F. J. SCHLINK. *Chem. Markets* **22**, 611-3 (1928).—Many industries exert increased sales pressure at a cost in amazing contrast to their expenditures for research, testing on specifications and due appraisal by modern methods. The use of specifications eliminates waste, forces business to follow direct lines from need to product, sharpens the edge of inspection, enables better judgment to be made as to the real cost of a product, and compels unenlightened manufacturers to effort to bring their products up to higher standards.

W. C. EBAUGH

Report of Committee D-9 on electrical insulating materials. H. S. VASSER, *et al.* *Proc. Am. Soc. Testing Materials* **1928**, 34 pp. preprint 77. Existing standards and tentative standards for many insulating materials are critically reviewed and 4 proposed tests are submitted for ratification as tentative standards. Existing standards discussed include those for molded insulating materials and tentative methods of testing insulating varnishes, elec. porcelain, elec. insulating materials for voltage effects at radio frequencies, untreated insulating papers, laminated sheet insulating materials, and insulated materials for resistance to impact. The "life test" of liquid insulation is regarded as too sensitive and modification of the test is being studied. A table, prepd. by A. E. Flowers, gives a summary of oxidation tests for evaluating insulating oils. The 4 proposed tentative methods of test are: for volatile matter and dielec. strength of insulating varnishes; for laminated sheet insulating materials; for testing

insulating materials for resistance to impact; and for testing varnished cloth tapes.

W. H. BOYNTON

Decreasing corrosion in the ice tank. R. E. GIBBS. *Power* 67, 1020-3(1928).—When the brine is maintained at a p_H of 7.5 to 8.5 by occasional addns. of CO_2 , corrosion is at a min.

D. B. DILL

Testing a carbon monoxide gas-mask. F. HEINRICH AND E. PETZOLD. *Chem. Fabr.* 1928, 19-22.—The Degea gas-mask for use in atms. contg. CO consists essentially of a filter impregnated with a catalyst, which promotes the oxidation of the CO to CO_2 by the O in the air, and is provided with an indicator which liberates C_2H_2 as a warning when the efficiency of the filter begins to be impaired. In air contg. 1.5% CO the life of the filter is about 40 min., and in air contg. 4.4% about 10 min. To test the efficiency of the mask the gases are passed through at a definite velocity, thence through K mercuric iodide to remove C_2H_2 , concd. H_2SO_4 to absorb hydrocarbons, $CaCl_2$ and P_2O_5 to remove moisture, and soda-lime and P_2O_5 to absorb CO_2 , and finally over CuO at 300° , any CO_2 formed being absorbed in soda-lime after drying in the usual way. For qual. detection of minute traces of CO the blood test gives the most dependable results; the ammoniacal silver soln. and palladous chloride tests are uncertain in the presence of H, C_2H_2 and CO_2 .

B. C. A.

Hair felt [for insulation] (U. S. pat. 1,674,948) 25.

BLACHER, C.: Vom Laboratoriumspraktikum zur praktischen Wärmetechnik. Eine Art Lehrbuch für technische Experimentieren Beobachten und Denken in der Energienutzung. Monographien zur Feuerungstechnik, Band 10. Leipzig: Otto Spamer. 328 pp. Paper, M. 17; bound, M. 18.50. Reviewed in *Ind. Eng. Chem.* 20, 667(1928).

Grafes Handbuch der organischen Warenkunde. Band I. Hlbdd. 2. Rohstoff- und Warenprüfung. Mit Einschluss der mechanischen Technologie und technischen Warenprüfung. Edited by Victor Grafe. Stuttgart: C. E. Poeschel. 355 pp. Subscription price M. 21.50; bound M. 24. Cf. *C. A.* 22, 2170.

Apparatus and system for classifying powdered materials contained in dilute pulps. L. ANDREWS. Brit. 280,121, July 30, 1926. Brit. 280,122-3 also relate to app. for similar purposes.

Apparatus and system for hydraulic and mechanical classification of finely divided solids in pulp form. L. ANDREWS. Brit. 279,932, July 30, 1926.

Filtration system for deposition of tapered sheets of asbestos, sand and cement mixtures, etc. F. W. YOUNG (to Filtration Engineers, Inc.). Brit. 280,170, Nov. 4, 1926.

Surface condenser operation. F. HODGKINSON (to Metropolitan-Vickers Electrical Co., Ltd.). Brit. 279,901, Oct. 30, 1926. Gases are removed from the condensate collecting within a condenser by subjecting the condensate to a pressure lower than the vapor pressure corresponding to its temp. The condensate is collected in a water-seal integral with the condenser and divided into 2 zones which are exposed to different pressures so that evapn. of the zone under the lower temp. may be effected. Various structural features are described.

Distilling or evaporating liquids, etc. SYNTHETIC AMMONIA & NITRATES, LTD., R. E. SLADE, A. F. BURSTALL and W. F. CAREY. Brit. 279,526, April 30, 1926. Turbulent thick films of liquid flowing by gravity down pipes or other surfaces at a rate not less than 300 cc. per min. per cm. of periphery of the surface are employed in heat exchange, evapn., rectification, etc., or absorption of gases in liquids. An app. is described and among the processes mentioned are absorption of NH_3 in water, carbonation of NH_3 liquor, absorption of N oxides in water and evapn. or distn. of alc., NH_3 or salt solns.

Purifying gases. D. L. JACOBSON and H. A. GOLLMAR (to Koppers Co.). Brit. 280,165, Nov. 5, 1926. In removing acidic impurities such as H_2S and HCN from fuel or other gases by a process in which the gas is washed with an alk. liquid contg. a metal compd. and the sulfided liquid is regenerated by air or O to recover S, the washing liquid comprises a soln. of compds. such as those of As, Sb, Sn, Mo, V, W, Ge, U, Ir, Bi, Hg, Rh, In, Au or Pt, the sulfides of which are sol. in an alk. sulfide soln. Numerous details are given. Cf. *C. A.* 21, 2784.

Purifying sugar or other crystals. RAFFINERIE TIRLEMONTOISE SOC. ANON. Brit.

280,152, Nov. 4, 1926. The crystals are treated in centrifuges operated at high speed to remove substantially all mother liquor.

Emulsions. W. A. WHATMOUGH. Brit. 280,096, May 13, 1926. A protein soln. such as a bran ext. with which a small quantity of alkali is admixed is added to a fatty oil or the like contg. a small proportion of fatty acid, and other ingredients may be added, e. g., for making cosmetics.

Refrigerating apparatus of the absorption or adsorption type. I. AMUNDSEN (to Aktieselskabet Amundsen Refrigerator Co.). Brit. 279,850, Oct. 29, 1926.

Refrigerating apparatus of the absorption type. ALVAR LENNING (to Electrolux Servel Corporation). U. S. 1,674,830, June 26

Continuous-cycle absorption refrigerating system. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 279,898, Oct. 30, 1926.

Electrical insulation. I. G. FARBENIND. A.-G. Brit. 280,178, Nov. 6, 1926. Insulation which does not become conductive by charring (as by arcing of a switch) is formed of asbestos, slag-wool or the like, nitrocellulose, a softening agent such as tricresyl phosphate and may also include fillers and resins and solvents.

Electrical insulation. L. V. ADAMS (to British Thomson-Houston Co., Ltd.). Brit. 280,189, Nov. 8, 1926. Laminations of paper and mica flakes are cemented with a drying oil such as linseed, perilla or china-wood oil which has been heated for a sufficient time to carry it through the gel stage to the condition of a thick liquid. Degelled linseed oil 1% may be added to china-wood oil to assist its degelling. A semi-drying oil such as castor oil also may be used and gums such as copal may be added to the oils. The materials may be consolidated by pressure and baked at about 140°.

Insulation for electric conductors. P. H. BRACE (to Metropolitan-Vickers Electrical Co., Ltd.). Brit. 279,876, Oct. 28, 1926. A metal such as Mg is electrolytically deposited on the surface of the conductor and then subjected to an oxidizing atm. at high pressure and temp., e. g., to the action of high-pressure steam.

Heat-insulating material. WILLIAM K. NELSON (to The Insulex Corp.). Can. 281,140, June 19, 1928. An insulating compn. consists of 2 lbs. calcined gypsum, 4 oz. $Al_2(SO_4)_3$, 3 oz. $CaCO_3$, 6 g. soap, 10 g. gum arabic and 26 liquid oz. H_2O . Cf. C. A. 22, 2802.

Vacuum-insulated vessels. W. D. COOLIDGE (to British Thomson-Houston Co., Ltd.). Brit. 279,897, Oct. 30, 1926. Vessels with a filling of finely divided solid material such as lampblack, graphite, SiO or SiO_2 , Al_2O_3 or powd. carbides or borides within the vacuum space have a water-absorptive substance such as P_2O_5 assocd. with the inert material, to improve the insulation

14--WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Peroxidolytic activity of mineral waters; its expression by a numerical index. A. MONGEOT AND V. AUBERTOT. *Compt. rend. soc. biol.* 98, 905-7(1928).--Abandoning the technic of Glenard (cf. C. A. 5, 1477, 1956) the waters were tested as follows: To 20 cc. of the mineral water was added 5 cc. of H_2O_2 (100 vol. dild. to 10%), and the H_2O_2 present was detd. by titration with a 1 to 1000 soln. of $KMnO_4$ at the time of adding the H_2O_2 and 2, 24 and 48 hrs. later. The same operations were performed on 20 cc. of distd. water as control. The max. lysis of the H_2O_2 occurred in 24 to 48 hrs. The quantity of H_2O_2 which disappears from the mineral water divided by the quantity which disappears from the control gives the peroxidolytic index. For 3 fresh samples of Royat water from different sources the index was 14.5, 14.5 and 2.3. Bottled water from 3 other sources gave 10.0, 9.1 and 2.6. This action of mineral waters is attributed to the presence of ions, especially those of Fe and Mg. Boiling the water to remove CO_2 raises the index to 40 or above.

L. W. RIGGS

Spectrochemistry of Portuguese mineral waters; the Gerez water. A. PEREIRA FORJAZ. *Compt. rend.* 186, 1366-7(1928).--Fifty l. of the water was strongly concd., the alk.-earth elements were removed and the spectrum of the residue was obtained with a Cornu quartz spectrograph. Ge, Co, Ag and Pb were found in addn. to the elements previously found by chem. analysis. These 4 elements were identified by the rays 3269.7, 4555.4, 3280.8, 3639.7 and 3683.6.

L. W. RIGGS

Use of uranine dye in tracing underground waters. A. W. CROUCH. *J. Am. Water Works Assoc.* 19, 725-8(1928).--Uranine, a coal-tar deriv. from resorcinol, is a

reddish brown powder but dissolves in water, producing a green color. It is easy to handle, is easily detected and, in small quantities, is not harmful to public health. As a result it is considered a very satisfactory dye to use in tracing underground waters.

D. K. FRENCH

Interference of *Clostridium welchii* with Bact. coli tests in water analysis. JOHN F. NORTON AND MARION BARNES. *J. Am. Water Works Assocn.* 19, 729-30 (1928).—When *Clostridium welchii* are present, acidity is increased to p_H values of 4.2 to 4.3 in 24 hrs. as against a p_H of 5.0 to 5.3 for *B. coli*, and under such conditions the recovery of *B. coli* is uncertain. A possible interference is indicated.

D. K. FRENCH

Hydrogen-ion concentration of the water of Lake Geneva. W. H. SCHOPFER. *Arch. sci. phys. nat.* 8, 22-5 (1926); *Biol. Abstracts* 1, 17.— p_H detns. are given for water samples taken in series of depths at 4 stations in Lake Geneva on 4 dates. Surface readings varied between 7.6 and 7.85; bottom readings, between 7.2 and 7.65. p_H figures on Lake Lioson and Lake Chaussy also are given. Brief comparisons are drawn between lakes of Wisconsin and of France.

H. G.

Determination of gases dissolved in water. A. DE SALLES TEIXEIRA. *Rev. Brasil. med. farm.* 4, 86-9 (1928).—A modification of A. Florence's app. is described, which permits the absorption of gases and withdrawal of the absorbing solns. without disturbing the vacuum. The buret is provided at its upper end with a stopcock and funnel, closed by a stopper with capillary. The lower end is connected with a bulb, and the latter with the flask and the Hg container, both connections being made by three-way cocks. The flask of known vol. is filled with water, bulb and buret are evacuated and the water is boiled out. After the total gas vol. is read the KOH, pyrogallol and $CuSO_4$ or $CdSO_4$ are introduced in the proper sequence through the upper stopcock.

MARY JACOBSEN

Design and construction of small filtration plants. H. K. BELL. *J. Am. Water Works Assocn.* 19, 653-64 (1928).—A general summary of the various points to be considered, based on a wide experience in the practice of filtration.

D. K. FRENCH

Aeration of water. W. S. MAHLIE. *J. Am. Water Works Assocn.* 19, 692-703 (1928).—Aeration is especially valuable in the removal of Fe, and the reduction of tastes and odors and of objectional gases. It also results in some bacterial reduction.

D. K. FRENCH

Variations in the salinity of estuaries measured in situ by electrical conductivity. A. CHAUCHARD AND (MME.) CHAUCHARD. *Compt. rend.* 185, 1503-4 (1927).—A modified Kohlrausch cond. method is described for the detn. from a boat of the salinities of rivers and lakes in terms of the elec. cond. of the water. A correction must be applied for temp., but for depths of less than 10 m. the pressure has no appreciable effect.

B. C. A.

Purification of drinking waters. E. ROLANTS. *Rev. hyg.* 50, 373-92; 51, 449-66 (1928).—A general review of water purification methods and recent researches on this subject.

C. R. FELLERS

Simplified procedure for measuring the index of water pollution. CHARLES GAUSSEN. *Compt. rend. soc. biol.* 98, 1405-8 (1928).—The test medium was prepd. by the addn. of 30 parts of peptone (Poulenc, free from indole) and 5.0 parts of NaCl to 1000 of water. After boiling and filtering the solu., 1 drop of satd. 95% alc. soln. of toluidine blue was added and the mixt. sterilized at 115° for 20 min. The medium thus prepd. was distributed in tubes and flasks to which is then added the water to be tested in amts. from 1 drop to 100 cc. and the mixts. are kept at 37° for 36 to 48 hrs. From the color developed the no. of *B. coli* per unit vol. of water is estd.

L. W. R.

Report of committee on cross-connections. *J. New England Water Works Assocn.* June, 1928, 191-234.—The dangers of pollution by sewage, etc., are emphasized and a "partial list is given of epidemics caused by polluted water entering drinking water systems through cross-connections."

D. K. FRENCH

Sewage-polluted surface waters as a source of water supply. H. W. STREETER. *Public Health Repts.* 43, 1491-522 (1928).—The studies have shown that the efficiency of each sep. process involved in water purification, such as, e. g., coagulation, sedimentation, filtration and chem. disinfection, is influenced by a no. of factors, some of which are, and some are not, subject to phys. control. Among the former may be noted the various conditions of plant design, such as retention periods provided in basins and depths and sizes of filtering material; likewise certain measures of operation, such as the amts. of coagulants and disinfectants used, the p_H of the chem. reactions, notably those of temp., and variations in the turbidity and bacterial content of the raw water. The av. well-designed and well-operated rapid sand filtration plant, treating river waters such as are found in the Ohio and other river basins of the great Middle-Western

plains, is capable of producing, with a fair degree of consistency, a final chlorinated effluent of acceptable palatability and conforming to the revised U. S. Treasury Department standard, if the *B. coli* index of the raw water does not exceed approx. 5000 per 100 cc. A preliminary survey, now in progress, of a group of water-purification plants located along the Great Lakes has indicated thus far, however, that the av. plant treating raw waters derived from these lakes cannot produce consistently a final effluent of acceptable palatability and meeting the same standard of bacterial quality if the *B. coli* index of the raw water exceeds an amt. falling somewhere below 2000 per 100 cc. Under the most favorable conditions thus far met in practice, the av. water filtration plant treating river waters of the type above noted cannot produce consistently an unchlorinated effluent conforming to the Treasury Department standard if the *B. coli* index of the raw water exceeds 60 to 100 per 100 cc. In so far as plants treating Great Lakes waters are concerned, the corresponding av. limit appears to fall somewhere less than 10 per 100 cc. C. R. FELLERS

Oil pollution. C. H. ROBERTS. *Conseil Permanent Int. Explor. Mer. J. Conseil* 1, 245-75(1926); *Biol. Abstracts* 1, 790. —Gas oil, Diesel oil, 600 seconds oil and 1500 seconds oil were used in the expts. These oils represent the 4 types most commonly used at sea. It was found that (1) oil-films slow down absorption of O from air, but in very thin films, likely to be met with at sea, the slowing down was not appreciable. (2) Agitation, such as would be met with at sea, markedly increases the rate of absorption through an oil-film. (3) A simple method is suggested for checking spread of oil-fuel in restricted waters. (4) All the oils tested were found to be toxic to fish; this is believed to be due to sol. toxic substances and to emulsions. (5) On exposure to air, exts. of gas oil and Diesel oil lose much of their toxicity. An ext. of 600 secs. oil was unaffected by exposure but an ext. of 1500 secs. oil was more toxic. (6) Oil-films do not prevent the growth of fresh-water plants. H. G.

Water-pollution wastes: Milk-products wastes. J. M. HEPLER, H. S. MURPHY AND E. F. ELDRIDGE. Mich. Dept. Health and Conservation, unnumbered *Pamphlet*, 1-15(June, 1927).—A survey of methods of treatment of milk-products wastes was undertaken and previous results are carefully considered. Preliminary lab. expts show that in the chem. pptn. method a good flow is obtained and efficient settling occurs when sufficient quantities of FeSO_4 and NaOH are used. At least 0.6 p. p. m. of FeSO_4 must be used or the ppt. will be red in color. CaO or NaOH in quantities sufficient to produce a p_{H} of 7.5 to 8.0 will give a good flow and satisfactory settling, but produces a large amt. of sludge. Broad irrigation of milk-products wastes is recommended as a temporary expedient where possible. C. R. FELLERS

Water sterilization by chlorine. M. DIENERT. *Tech. sanit. munic.* 1928, No. 4, 75-83; cf. *C. A.* 22, 2629.—The dose to be employed should vary with the org. content, clearness and degree of contamination. The Cl must be thoroughly mixed with the water to ensure complete germ destruction. If the Cl water mixt. is agitated for at least 30 min. better results are obtained, not because of the long-continued action of the Cl but simply because of good mixing. Water properly treated with Cl will conform to the standards recommended by the Superior Hygiene Council. If water tastes of CH_3I special treatment must be used. This taste is due to oxvechlorides and may result from new pipes. Addn. of NH_3 is often useful in eliminating obnoxious odors and tastes from chlorinated waters. C. R. FELLERS

Removal of manganous salts from water. II. Mechanism of adsorption by manganese dioxide. J. TILLMANS, PAUL HIRSCH AND HEINZ GROHMANN. Frankfurt. *Gas u. Wasserfach* 71, 481-7(1928); cf. *C. A.* 21, 784. —Natural and synthetic MnO_2 adsorb Na^+ and Ba^{++} as well as Mn^{++} from solns. of the corresponding salts, but to a much slighter extent. No appreciable change in hardness of water is noted in practice. The adsorption of Mn^{++} decreases with decreasing water content of the hydrated MnO_2 and is proportional to the surface (for similar material only). A test for adsorptive efficiency has been developed, which depends on the catalytic decompn. of H_2O_2 . This test may be used for comparing similar material and for following changes in activity of the same material during use, but not for material from different sources. **III. Transformation from manganous to manganic state after adsorption.** *Ibid* 515-9.—Adsorbed Mn^{++} may be oxidized to Mn^{+++} by dissolved oxygen in the water in a purely chemical manner or by the aid of microorganisms, the latter more rapidly. The increase in activity of filters in removing Mn^{++} is due to the formation of hydrated MnO_2 on the surface of the filter material. Free CO_2 should be low. The manganese-fixing bacteria are harmed by low temperatures so the filter bed should be protected from freezing. When iron is present in water it should be removed before Mn^{++} . Chlorination should follow removal of Mn^{++} . R. W. RYAN

The microdetermination of iodine in potable waters. III. The oxidation method. MARIO SETTIMI. Lab. Chim. Sanità Pubblica. *Ann. chim applicata* 18, 104-7 (1928); cf. *C. A.* 22, 654.—0.002 *N* solns. of pure I and $\text{Na}_2\text{S}_2\text{O}_3$ in CO_2 -free water were prepd. for titration under different conditions to det. the source of error in the oxidation method of Fellenberg. The influence of temp., of concn. and of oxidation by Cl and by NaClO were studied individually. When the concn. of I is not much below 0.002 *N* and normal room temps. are used, titration with $\text{Na}_2\text{S}_2\text{O}_3$ gives satisfactory results. Only when the diln. approaches 0.0002 *N* does the temp. have a great influence on the results; the farther the temp. from 15° the greater the error. Even at 15° , however, the results are not reliable at dilns. as great as 0.0002 *N*. The influence of the I concn. is very small, and if at ordinary temps. the concns. of I and of $\text{Na}_2\text{S}_2\text{O}_3$ are not less than 0.002 *N*, microtitration gives reliable results. Oxidation with Cl water by the Fellenberg method, with NaClO by the Brubaker method (cf. *C. A.* 20, 3052-3) and with NaClO after EtOH extn. gave erroneous results, the expts. indicating that there is some unidentified oxidizing agent or other substance which complicates the reactions.

C. C. DAVIS

The new plant for removing oil from waste water at the chemical factory of C. F. Boehringer and Sons, Mannheim-Waldhof. SCHMEITZNER. *Chem.-Ztg.* 52, 388 (1928).—Oil-contg. waste waters (50 cu. m. per hr.) are led into the center of a clarifier (cf. Weickert, *C. A.* 21, 3693) 5 m. in diam., and then pass radially through the clarifying space (15.8 sq. m. area and max. depth of 2.9 m., holding 25 cu. m.) and under a peripheral ring to the discharge. The sepd. oil remains within the ring and is drawn off periodically by hand. The app. is made of concrete, and is entirely below ground level.

W. C. EBAUGH

Precautions necessary to prevent scaling in heating plants. H. BALCKE. *Gesundh. Ing.* 51, 386-90 (1928).—Softening with permutite is recommended. Another method is the decompn. of the carbonates of Ca and Mg by means of HCl . The CaCl_2 and MgCl_2 formed are very sol. and will not cause scale. Photographs of scaling before and after the treatment are given.

WAYNE L. DENMAN

Effect of certain Illinois waters on lead. O. W. REES AND A. L. ELDER. *J. Am. Water Works Assn.* 19, 714-24 (1928).—Waters high in excess CO_2 with or without O can dissolve Pb. NaCl is of importance in the corrosion of Pb but not in its soln. The addn. of lime or alk. silicates and the retention of a pH of 7.0 to 9.5 are all suggested remedies.

D. K. FRENCH

Modern boiler problems. A. G. CHRISTIE. *Power* 67, 946-9 (1928).—A discussion.

D. B. DILL

Pumping station practice. F. W. DEAN. *J. New England Water Works Assn.* June, 1928, 109-31.—A general discussion of the most effective types of boilers, their proper setting, construction and operation, to get their highest efficiency. Space is also devoted to direct acting and centrifugal pumps.

D. K. FRENCH

Iodine in the public water supplies of Massachusetts. N. W. CLARK. *J. New England Water Works Assn.* June, 1928, 132-6.—There are recorded the results of all I detns. made by the Mass. Dept. Public Health on public supplies during 1925 and 1926. The amts. run from none to 6.33 pt. per billion in surface waters and from none to 4.30 in ground waters. Modifications of analytical methods used are outlined.

D. K. FRENCH

Common errors and beliefs regarding ground waters. ALFRED SALMON. *L'eau No. 3*, 35-6 (1928).—A discussion indicating the ease with which ground waters may become polluted.

C. R. FELLERS

Engineering analysis applied to municipal waterworks. WM. SHAW. *Proc. Eng. Soc. Western Penna.* 44, 47-86 (1928).—The object of this study was to det. which was the more economical (a) to expend money for the improvements, necessary for the continued successful operation of the present Pittsburgh steam-operated system, or (b) to erect a new station equipped with electrically driven units. The necessary calcs. are well presented. Although the data indicate steam operation is the cheaper, no conclusions are drawn.

C. R. FELLERS

Boiler-feedwater treatment in the Southwest. PAUL F. HOOTS. *Elec. World* 91, 1340 (1928).—A detailed statistical report.

C. G. F.

Availability of nitrate oxygen in filter effluents. O. M. URBAIN. Urbain and Hunt, Columbus, O. *Ind. Eng. Chem.* 20, 634-5 (1928).—Nitrate O is available only after the dissolved O is depleted whether the dilns. be made from sewage or filter effluents. Bacteria use the O in nitrates only if no other source is available. Such conditions usually obtain only under anaerobic conditions. Nitrate O does not increase the available O balance of the receiving waters.

CARL R. FELLERS

The disposal of the sewage of the sanitary district of Chicago. CHAS. B. BURDICK AND L. R. HOWSON. Ill. State Water Survey, *Bull.* 23, 1-195(1928).—The present sewage discharge of the Chicago Sanitary District is approx. 800 million gals. per day and carries an org. load much higher than any other city furnishing reliable data. This excessive load is partly due to a few large industries which produce an amt. of pollution equiv. to that of 1.5 million people. Max. pollution standards recommended for the Chicago Drainage Canal and to be based on samples taken for 30 consecutive days are: (a) shall be practically free from settleable solids deposited in 2 hrs.; (b) shall contain dissolved O equal to or exceeding the biochem. O demand of said liquid for 5 days when incubated at 20°; (c) shall contain not less than 3 p. p. m. of dissolved O. Specific recommendations relating to the protection and metering of the water supply and sewage and waste disposal are outlined. Filtration is considered a prerequisite to the adequate disposal of Chicago sewage. Chicago can secure pure, clean water at all times by the filtration of its present supply. CARL R. FELLERS

Some methods of analysis of sewage and water. O'SHAUGHNESSY, C. H. HEWITT AND A. S. MILLER. *Surveyor* 72, 494-5(1927); *Bull. Hyg.* 3, 421(1928).—A review and criticism of recent methods of analysis. GEORGE R. GREENBANK

Comparative colon-aerogenes indices of water and sewage. RALPH E. NOBLE. *J. Am. Water Works Assoc.* 19, 733-46(1928).—Over 76% of samples examd. by the cyanide-citrate agar pour plate equalled or exceeded indices obtained by the standard fermentation method. From this and other evidence given in detail, the conclusion is drawn that "the plate method is a sharper or more sensitive measure of the actual mean density of organisms of the colon-aerogenes group in water or sewage than is the lactose fermentation method." D. K. FRENCH

The removal of phenols from waste liquors of by-product plants and its economic importance (WEINDEL) 21. The purification of ammoniacal waste liquors (OTT) 21. Influence of P on strength properties of cast iron pipe (MACKENZIE) 9. Apparatus for carbonating water (U. S. pat. 1,674,993) 1.

Purifying and softening water. HÖGANAS-BILLESOLMS AKTIEZOLAG AND NORDISKE NATROLITH AKTIESELSKABET. Brit. 279,788, Oct. 29, 1926. Silica gel or gels contg. siliceous substances are used and may be regenerated; e. g., clay formed under the sea and naturally contg. 1-2% Na₂O may be used and subsequently regenerated by HCl. The clay may be preliminarily purified by treatment with molten alkali bisulfate, washing and calcining at temps. up to 750° and may be formed into grains before or after calcining.

Automatic apparatus for softening water by treatment with reactive chemicals. CHARLES P. EISENHAEUER (to The Duro Co.). U. S. 1,674,717, June 26.

Boiler-scale remover. ALFRED BIAGINI. Can. 281,528, July 10, 1928. A boiler-scale remover consists of H₂O 100 gals., Na₂CO₃ 360 lbs., Na silicate 48 lbs., tannum 36 lbs. and NaOH 6 lbs.

Scale remover. JOHANN BILLWILLER. Can. 281,216, June 26, 1928. Artificial resin acids (abietic acid, pimaric acid), oxidized and polymerized, are mixed with vegetable products (glycerol, wood gum, tragacanth) to form a paste which may be added to boiler water to remove scale.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Classification of the soils of Quebec. AUGUSTE SCOTT. *Sci. Agr.* 8, 668-74 (1928).—A general discussion. C. R. FELLERS

Diversity of soil type in the Prairie Provinces and causes of the same. A. H. JOEL. *Sci. Agr.* 8, 651-64(1928).—The origin, classification, natural vegetation and crop suitability of prairie soils are investigated. C. R. FELLERS

Degree of acidity of Norwegian soils. K. O. BJØRLYKKE. *Tids. norske landbruk* 1926; *Proc. Internat. Soc. Soil Sci.* 3, 36(1927-8).—Examn. of a large no. of Norwegian soils revealed the following general relationships. Surface soils generally have lower p_H values than subsoils. Acidity is more pronounced in the older and more completely weathered soils. Soils rich in colloidal matter are usually less acid than sandy soils and cultivated soils than uncultivated. B. C. A.

Soil phosphorus studies. I. The colorimetric determination of organic and in-

organic phosphorus in soil extracts and the soil solution. F. W. PARKER AND J. F. FUDGE. Alabama Agr. Expt. Sta., *Soil Sci.* 24, 109-17(1927).—A detailed procedure for the colorimetric detn. of total and inorg. P in soils is given. Moderate amts. of SiO_2 do not influence the detn. Deniges' method is recommended as more sensitive than that of Fiske and Subbarow. The latter method may be more valuable for some other classes of work. II. The concentration of organic and inorganic phosphorus in the soil solution and soil extracts and the availability of the organic phosphorus to plants. W. H. PIERRE AND F. W. PARKER. *Ibid* 119-28.—Displaced solns. from 20 soils collected in 9 states contained an av. of 0.09 p. p. m. inorg. and 0.47 p. p. m. org. PO_4 . The 1:5 soil exts. averaged 0.35 inorg. and 0.22 p. p. m. org. phosphate. Plants absorbed all of the inorg. P but none of the org. from either soil ext. or soil soln. Corn made no growth when sol. org. phosphate was the only source of P but made good growth in the same soln. contg. inorg. PO_4 . The growth was almost proportional to the amt. of the latter present. The bearing of the results on plant nutrition is discussed. III. Plant growth and the absorption of phosphorus from culture solutions of different phosphate concentrations. F. W. PARKER. *Ibid* 129-46.—Culture solns. of low phosphate concn. to be favorable for plant growth must be supplied in large vol. per plant, the phosphate concn. must be kept up by very frequent renewals, and it must be free of Fe. Fe must be supplied occasionally for a period of 1 day. Max. growth of corn and soy beans was obtained in a soln. contg. 0.50 p. p. m. PO_4 . With 0.25 p. p. m. the dry weight was 75% of the max. If the concn. could be maintained const. good growth might be secured with 0.10 p. p. m. Plants do not obtain all of their P from the soil soln. as obtained by the displacement method. The solid phase of the soil has an important function in the P nutrition of corn and soy beans. The theory of the solvent action of CO_2 from plant roots does not adequately explain the absorption of P from soils. 33 references are given in the 3 sections. A. L. MEHRING

Determination of the phosphate requirement of soils. F. TERLIKOWSKI, S. MICHNIEWSKI AND M. KWINTCHIDZE. *Rocz. Nauk Rolniczych i Lesnych* 17, 309-35(1927).—In a critical examn. of methods for estg. soil fertility the importance of adapting the exptl. process to suit local soil conditions is emphasized. Fresh soil samples are essential in detg. phosphate requirements. Drying alters the proportion of sol. phosphate in soils to an extent peculiar to each soil. The amt. of soil phosphate assimilable by plants bears no definite relationship either to the total, water-sol. or citric-sol. phosphate present. Many soils, showing no phosphate requirement by the Mitscherlich method, were deficient according to the Nemec standard. There is a definite inverse relationship between the humus contents of soils and their water-sol. phosphate contents. B. C. A.

Distribution of phosphoric acid and potassium in soils. S. GERICKE. *Z. angew. Chem.* 41, 52-6(1928).—The absorption of phosphoric acid and K by plants from the soil depends not only on the presence of these materials in a readily assimilable form, but also on the phys. properties of the soil itself. The variation in size of the soil particles is an important factor; this may be detd. by shaking the soil with water, allowing to settle for a definite time, and pouring off the liquid contg. the smaller particles in suspension, thus dividing the sample into fractions of decreasing particle size. The results obtained depend largely on the method of prepn. of the analysis sample, which must be shaken or boiled with water or rubbed with a pestle to sep. the particles. P_2O_5 is found in all fractions, but chiefly in the fraction contg. particles of 0.02-0.2 mm., while K salts are concd. in the smaller particles (less than 0.002-0.02 mm.). Both substances are more readily assimilated by germinating roots from the fractions of larger particle size than from the closely packed soils of small particle size. B. C. A.

Active reaction of the soil solution as a factor controlling plant distribution. E. V. BELYAKOV. *Ber. Saratov Naturforscherges.* 2, 21-6(1927); Russian with German summary.—Some of the semiarid plant assocns. of the Saratov region showed no relation to the soil pH ; others were closely dependent on it. The semiaridity is not assocd. with marked alk., the greatest pH value being 7.4, and as low as 4.7 being noted. The alk. of semiarid and desert soils is usually overstd. Strongly alk. and strongly acid soils are rare; weakly acid, widespread. The acidity arises from CO_2 , weak org. acids and Fe sulfates. The reaction is less a matter of climate than of the chem. nature of the underlying rock-formations. The rocks investigated showed pH 3.2-8.0, a wider range than the derived soils. E. T. WHERRY

Comparative study of the state of saturation and the exchangeable bases of the red soil in the original condition and in thirty years' coffee culture. THEODURETO DE CAMARGO AND PAULO CORREA DE MELLO. *Landw. Vers. Sta.* 107, 189-206(1928).—The red soils of the virgin forest are as a rule well provided with adsorbable bases and

possess an alk. or very weak acid reaction. By the more or less complete leaching out of bases and the substitution by H ions of carbonic acid of the water the soil will little by little become poorer in bases and finally acid. The loss in adsorbable bases, chiefly Ca, contributes to the modification in structure of the soil, whose adsorptive power is considerably decreased and whose acidity by exchange is increased and the soil thereby made less suitable for the thriving of bacteria and plants. A characteristic of the red soils becoming poor in base exchange is the relative poorness in Ca and Mg and the abundance in Na. The absorption capacity of the red soils increases with the percentage content of replaceable Ca.

E. F. SNYDER

The deflocculation and plasmolysis of soil coatings. B. GANOSSIS. *Compt. rend.* 186, 1234-6 (1928).—The results of the effect of different salt solns. on soil permeability are given. The solns. reestablishing the permeability of the soil have been applied to the soil made impermeable by Na_2CO_3 as in previous expts. Besides the alkali carbonate, NaOH, NaCl and NaNO_3 finally bring about the complete impermeability of the soil, each soln. after different intervals. On the contrary $\text{Ca}(\text{NO}_3)_2$ and CaSO_4 as well as KCl, KNO_3 , HCl and HNO_3 behave as CaCl_2 in reestablishing the permeability of the soil.

E. F. SNYDER

Chemical corrosion of lead in soil. O. HAEHNEL. *Elektr. Nachr. Techn.* 5, 171 (1928).—An address. H's observations do not check those of American investigators. In general, bare cable sheaths buried in the soil seldom last for 25 to 30 years. Furthermore, there is considerable divergence in protective qualities of the various pitches and tars used for impregnating. Six photographs are shown.

C. G. F.

Contribution to the knowledge of the hydrogen peroxide-decomposing property of soils. K. SCHARER. *Landw. Vers. Sta.* 107, 112-87 (1928). Although the values for the catalytic action of soils exhibit no direct function of the p_{H} values of the soils, in this work it was again confirmed that undoubtedly relationships exist between the reaction of the soil and its H_2O_2 -splitting power, in that in general acid soils show this property in much less degree than neutral or strongly alk. soils. The content of Fe and Mn compds. in soils is indeed a very important, but not conclusive factor for the quantity of catalytic activity of soils. A higher content of total lime corresponds in general to a greater H_2O_2 -splitting power. A similar relationship is shown between the NH_4Cl -dissolved Ca and the catalytic action. Sandy soils show in general the least, loam and clay soils the highest, catalytic values. There are no clear relationships to be observed between the hygroscopicity of the soils and the H_2O_2 -splitting property. If one analyzes a soil mechanically and detcs. the catalytic power of the fractions, the coarser fractions show in general a less catalytic value than the fine. The catalytic power of soils is differently influenced by treatment with inorg. salts and org. substances; by treatment with HCl, AlCl_3 , HgCl_2 and CuSO_4 it is lowered and by NaOH and NH_4OH increased. By boiling and heating the air-dried soil at 100° to const. wt. the catalytic power is somewhat lowered, just as by sterilization. By ignition there follows a diminution of the H_2O_2 -splitting property. By exposure to ultra-violet light the catalytic action of the soil is somewhat removed. There exists no direct relationship between the total no. of bacteria and the H_2O_2 -splitting action. A large no. of references are given.

E. F. SNYDER

The cultivation of lucerne. ANDREW CUNNINGHAM. *Scottish J. Agr.* 11, 41-50 (1928).—An investigation was made of the factors affecting the growing of lucerne in southeast Scotland. In 4 expts. on soils of p_{H} 5.00-5.49 lucerne failed to grow, while it was successfully grown in a no. of expts. on soils of p_{H} 6 to 7.4. Inoculation of the soil with N-fixing bacteria resulted in some cases in an increase of more than 100% in the % of N in dry matter from lucerne. During the first season, the N content of the dry matter from lucerne grown on uninoculated soil varied from 1.63 to 2.28% while that from inoculated soils varied from 2.76 to 3.47%. Some strains of bacteria were more effective than others in increasing the wt. of the crop and the % of N in the oven-dried material.

K. D. JACOB

Chemical fertilizers for greenhouse lettuce. J. H. GOURLEY. *Ohio Sta. Bull.* 408, 22 (1927); *Expt. Sta. Record* 58, 137-8. —The results of expts. undertaken to det. to what extent chem. fertilizers, lime and green manures may be substituted for animal manures in the production of greenhouse lettuce indicate that, with soils such as used, heavy annual applications of 1 ton of 3-12-4 or 3-7-9 (N-P-K) per acre of complete chemicals plus a turned-under crop of soy beans may produce crops averaging 80% as large as those obtained from 30 tons of manure per acre and in certain seasons almost equal the yields from manure. It is suggested that in event of manure shortage half the material supplemented with 0.5 ton of high-grade chem. fertilizer should give excellent results. Complete fertilizer composed of NaNO_3 , acid phosphate and muriate

of potash proved superior to any single ingredient or to a combination of N and P or N and K. NaNO_3 used alone failed to increase yields and in fact depressed them about 8% below the control. Acid phosphate used alone in the same series gave a 26% increase and lime a 15% increase. In respect to soil reaction the strongly alk. soils used produced no deleterious effect provided ample plant foods were present. Not until a pH value of nearly 8.5 was reached was there any indication of lime injury manifested in spotting and injury to the edge of the leaves. H. G.

"Edelmist." ANDREW CUNNINGHAM. *Scottish J. Agr.* 10, 434-9(1927).—The manuf. of "Edelmist," or artificial barnyard manure, by the German process, is described. The product is superior to ordinary barnyard manure in fertilizer value and in keeping qualities. K. D. JACOB

The hygroscopicity of a few artificial fertilizers. ANON. *Ind. Mercur* 1926; *Ber. Afdel. Handels museum Ver. Koloniaal Inst.* No 27, 15 pp.—The hygroscopicity of several commercial fertilizers and their mixts. at different degrees of atm. moisture was studied. A. L. HENNE

Ammonia vs. nitrate (fertilizer). KABATÉ. *Rev. agr. Maurice* 5, 69-72(1928).—Field tests made in France on sugar beets during 1927 have given results which are summarized as follows. The max. yield of both roots and sugar was obtained by using NaNO_3 as the only source of N, in spite of the rainy weather; $(\text{NH}_4)_2\text{SO}_4$ gave the lowest yield, the difference between that and the max. being 10 times the mean error of the expt. NH_4 sulfate-nitrate gave yields in between the other 2. F. W. ZERBAN

Manganese as a fertilizer for coastal-plain soils. I. G. WILLIS. N. C. Agr. Expt. Sta., *Fertilizer Green Book* 9, No. 6, 17-20(1928).—Coastal-plain soils in N. C. which show marked Mn deficiency do not respond to heavy applications of phosphate even though the soils are low in P. Soils rendered neutral or alk. by liming frequently respond readily to applications of MnSO_4 and there is no evidence that strongly acid soils require treatment with Mn salts. Apparent Mn deficiency may often be remedied by free use of S, $(\text{NH}_4)_2\text{SO}_4$ and org. matter. K. D. JACOB

Manganese in agriculture. G. A. FRACANZANI. *Il coltivatore* 75, 432-8(1928).—Hyacinth bulbs, treated with $\text{Mn}(\text{NO}_3)_2$ injections, had a better and earlier root and aerial development than untreated bulbs or those raised on soil treated with Wagner's soln. The best results were obtained with relatively frequent 1-cc injections of a 2% soln. in conjunction with complete fertilization with Wagner's soln. A. R. M.

Experiments with fertilizer in the cultivation of sugar cane. VII. Ammophos 20 20. WM E. CROSS. *Rev. ind. agr. Tucuman* 18, 27-30(1927); cf. *C. A.* 21, 190.—The av. increase in yield obtained with 6 kg. Ammophos per furrow was 18.96 kg. sugar and 1873 kg. cane per ha., with 12 kg. Ammophos per furrow it was 19.07 kg. sugar and 1071 kg. cane. An excess of fertilizer apparently extends the vegetative period and delays the formation of sugar. The result obtained with 6 kg. is quite satisfactory as it reduces the cost of production, increases the resistance of the cane to diseases, speeds up growth and "closing" of the cane and permits the production of more cane within a smaller radius around the plant, thereby reducing the cost of transportation and the deterioration caused by delays. MARY JACOBSEN

Fertilizing meadows with mineral nitrogen. GISEVIUS and KLITSCH. *Z. Pflanzenernähr. Düngung Bodenk.* 7B, 1-15(1928).—Analyses of hay from fertilized meadows indicated that $\text{K-P}_2\text{O}_5$ applications produced larger crops with greater N content than did N applications. Complete artificial fertilizers yielded the largest crops, but the N content was lower than when K and P_2O_5 only were applied. When more than one cutting of grass was made in a season on plots receiving N only, the total yield and N content were higher with 3 cuttings than with 2. Meadows treated with P_2O_5 and K alone yielded larger crops and higher N contents with 2 cuttings than with 3. $(\text{NH}_4)_2\text{SO}_4$, NaNO_3 , and urea did not show very definite differences in their effects on herbage; NaNO_3 was generally superior in dry weather. P. R. DAWSON

Rhenania phosphate and its use in Hungary. LADISLAUS ERDÉLY. *Fortschritte Landw.* 3, 66-8(1928).—In numerous field and pot expts. the citrate-sol. P_2O_5 of Rhenania phosphate proved equiv. to the water sol. P_2O_5 of superphosphate. Rhenania phosphate is an acid-free substance robbing the soil of no active Ca; on the other hand it adds appreciable amts. of Ca to the soil. Hence in many cases it may surpass superphosphate in results. P. R. DAWSON

Examination and fertilizing of acid mineral soils. H. KAPPAN. *Z. Pflanzenernähr. Düngung Bodenk.* 7B, 16-29(1928).—The various methods of measuring soil acidity are compared and discussed. Detn. of the pH value must always be made and should be carried out on the soil suspension. For measuring the quantity of lime to be

applied to plants less sensitive to acid, the exchange acidity is to be employed. For more sensitive plants the quantity of lime is to be detd. by the hydrolytic acidity. The detn. of the abs. neutralization value (Kappen-Hilkowitz) and the degree of satn. (calcd. from the latter values) give a deeper insight into the acidity condition of the soil. The effectiveness of liming is governed by the fineness of grinding of the material, the thoroughness of distribution through the soil and the temp. and moisture content of the soil. In the application of the usual fertilizer materials to acid soils no change of procedure is necessary, provided adequate lime has been applied or is applied with the fertilizer. Without lime, however, fertilizer compds. tending to acidity should be avoided. The value of detg. the buffer capacity (Jensen) in selecting general fertilizer materials is discussed. P. R. DAWSON

Studies on nitrification and its relation to crop production on Carrington loam under different treatments. LEWIS W. ERDMAN and HARRY HUMFELD. Ia. Agr. Expt. Sta., *Research Bull.* 110, 262-91 (1928).—The nitrifying power of the soil from the sample plots was detd. by nitrification of (a) the N present in the soil, (b) $(\text{NH}_4)_2\text{SO}_4$ and (c) $(\text{NH}_4)_2\text{SO}_4$ in the presence of CaCO_3 . The incubation period was 30 days, after which the soil reaction was detd. Soil moisture was not affected by crop rotation or soil treatment. Crop rotation did not effect appreciably the nitrifying power of the soils which had been untreated for 12 years nor those which were fertilized, fertilized and limed or treated with crop residues and lime. Definite correlations were obtained between crop yields, the nitrifying power as measured by $(\text{NH}_4)_2\text{SO}_4$, and the reaction of the soils after 30 days' incubation. Perfect correlations were not obtained between the nitrifying power of the soils and crop yields when the test was made by measuring the nitrification of $(\text{NH}_4)_2\text{SO}_4$ in the presence of CaCO_3 , although all soils showed a high nitrifying power in all cases where the crop yields were high. The presence of lime increased the nitrifying power of soils. There was a definite correlation between soil reaction and soil nitrifying power. C. R. FELLERS

Chemical treatments for controlling the growth of buds of plants. F. E. DENNY. *Ind. Eng. Chem.* 20, 578-81 (1928). The use of Na thiocyanate, ethylene chlorohydrin, ethylene dichloride, thiourea and others, has been found effective in influencing plant growth. Such chemicals have been successfully employed in causing early development of dormant buds, such as those of potato tubers, gladiolus bulblets or various woody plants (lilac, crabapple, azalea, etc.). Gains of 2 weeks to 2 months in the time required to produce sprouts or blooms have been obtained. These chem. treatments have also increased the no. of buds that will grow, influenced the subsequent rate of growth and modified the relative amt. of leaf and flower development. E. F. SNYDER

Disinfection of flax seed. ERNST SCHILLING. *Faserforschung* 6, 105-15 (1928).—In field tests it was shown that the disinfection of flax seed does give increased yields and better straw when suitable materials are used. However, some recommended disinfectants actually restricted germination and gave smaller crops than were obtained when seed believed to carry fusarium and colletotrichum sickness was planted without treatment. Other disinfectants gave no definite results. Of the useful materials, "Agfa No. 30," gave the best results. No chem. identifications are given. E. R. CLARK

Dry disinfection of grain with continuous dusting machines. G. FRIEDRICHS. *Fortschritte Landw.* 3, 58-66 (1928).—The results are presented of expts. on the efficiency of several types of com. dusting machines and the factors involved are discussed. P. R. DAWSON

Determination of lime requirement. KURT MANTEUFFEL. *Fortschritte Landw.* 3, 68-9 (1928).—A discussion of the significance of lime requirement and its detn. under practical conditions, with particular emphasis on plants as indicators. P. R. D.

Experiments with weed-killers on garden paths at Craibstone. ALFRED HILL. *Scottish J. Agr.* 11, 203-9 (1928).— NaCl and H_2SO_4 temporarily reduced the no. of weeds on garden paths but ultimately appeared to stimulate growth. Fe sulfate and Na_2CO_3 had no pronounced weed-killing properties and dil. solns. of phenol, Na_3AsO_4 and gas-works liquor were not satisfactory. The best results were obtained with powder CuSO_4 at the rate of 1 lb. per 100 sq. ft., and with 1% solns. of NaClO_3 , the efficiency of both compds. decreasing with increase in rainfall during the first week of application. Fe sulfate was effective in killing moss on walks and solid NaOH removed green growth on concrete paths. K. D. JACOB

Killing field bindweed with sodium chlorate. W. L. LATSHAW and J. W. ZAHNLEY. *Kan. Agr. Expt. Sta., Circ.* 136, 1-15 (1928).—Aq. soln. of NaClO_3 , 8-9%, proved effective in killing bindweed in 3 applications without injury to surrounding trees or

shrubs. About 100 gals. will treat 1 acre. NaClO_2 is non-poisonous to livestock and does not injure the soil.

C. R. FELLERS

Attempts to control bunt (*Tilletia tritici*, Wint.) in wheat with a formalin-gypsum dust. H. H. STIRRUP AND H. T. CANFIELD. Midland Agr. and Dairy Coll., England. *Ann. appl. Biol.* 15, 245-50 (1928).—Variable control of the fungus was obtained with this dust. *T. tritici* probably comprises several biol. forms.

C. H. RICHARDSON

The use of tetrachlorethane for commercial glasshouse fumigation. T. PARKER. Abol Research Lab., Kent, England. *Ann. Appl. Biol.* 15, 251-7 (1928).—The white fly can be controlled by a dosage of 2.5-5 fluid oz. $\text{C}_2\text{H}_2\text{Cl}_4$ per 1000 cu. ft. of space at a temp. of 15.5-21°, the exposure being 12 hrs. Various methods of application are discussed. The compd. seems to have a selective action on white fly and mealy bug; certain species of aphids are unaffected. The effects of the compd. on various plants has been studied, a considerable no. of plants being unharmed by doses that are toxic to insects.

C. H. RICHARDSON

The toxicity of certain sulfur compounds to *Synchytrium endobioticum*, the fungus causing wart disease of potatoes. W. A. ROACH AND M. D. GLYNNE. Rothamsted Expt. Sta., England. *Ann. Appl. Biol.* 15, 168-90 (1928).— H_2SO_4 , H_2SO_3 , $\text{H}_2\text{S}_2\text{O}_4$, $\text{H}_2\text{S}_2\text{O}_5$ and $\text{H}_2\text{S}_2\text{O}_6$ were toxic to the winter sporangia of *Synchytrium*. The order of toxicity was the same in each case at the same p_{H} . The neutral salts were non-toxic. The toxicities of these acids are probably due chiefly to their H-ion concns. Acidified solns. of $\text{Na}_2\text{S}_2\text{O}_3$, $\text{Na}_2\text{S}_2\text{O}_4$ and Na formaldehydesulfoxylate were about 10 times as toxic as H_2SO_4 . The toxicity of the acidified solns. is tentatively held to be due to the thiosulfuric acid in them. NaOH was slightly more toxic than H_2SO_4 and persulfuric acid about 10 times as toxic, whereas H_2O_2 , Ca polysulfide and H_2S were only slightly toxic.

C. H. RICHARDSON

Control of chlorosis of the pineapple and other plants. MAXWELL O. JOHNSON. Calif. Pkg. Corp. Wahiawa, Oahu, T. H. *Ind. Eng. Chem.* 20, 724-5 (1928); cf. C. A. 11, 275. The yellowing or chlorosis of pineapple or sugar cane plants on highly calcareous Hawaiian soils is due to Fe deficiency. This disease has been erroneously called Mn poisoning. A spray of FeSO_4 , 4-6%, applied once a month effectively controlled chlorosis. On acid soils contg. only a normal amt. of CaCO_3 , this defect is affected by the availability of Fe in the soil, i. e., the relative acidity or alky. and the relative oxidizing or reducing agents in the soil. With soils of p_{H} above 4.5, the MnO_2 present constantly oxidizes any Fe to the unavailable ferric condition. Marcasite, a by-product of coal mining, when powd. and mixd. with infusorial earth and sprayed on the plants every 2 months at the rate of 8 lb. per acre effectively prevented chlorosis on pineapples and sugar cane. Applications of FeSO_4 or marcasite directly to the soil have been uniformly unsuccessful.

CARL R. FELLERS

Modern methods of disinfection and rat destruction. M. SILLEVAERT. *Bull. service med. du travail, Bruxelles* 5-6, Nos. 3-4, 57-72 (1926); *Rev. hyg.* 50, 213.— SO_2 was found to be a splendid insecticide and rat killer but a poor bactericide. CO was valuable only as a rat killer, and had little value as a house fumigant. HCN when used with due caution probably gave best results in the fumigation of ships, railroad cars or isolated buildings. CNCl was both a rat destroyer and an insecticide but its use is still limited. Because of its lachrymatory effects it is safer than HCN. Chloropicrin, though an efficient fumigant, proved very difficult to remove from the air, several days being required in some cases. Phosgene ranked high as an insecticide and rat killer. The principal objection to it is its extreme toxicity, causing pulmonary edema.

C. R. FELLERS

Chemical process efficiency [for production of fertilizers] (FIRTH) 13. Modification of Risdale's method for determining phosphoric acid (DODD) 7.

ERNST, FRANK A.: **Fixation of Atmospheric Nitrogen.** New York: D. Van Nostrand Co. \$2.50, postpaid. Reviewed in *Sugar* 30, 326 (1928).

WORTHEN, E. L.: **Farm Soils—Their Management and Fertilization.** New York: John Wiley & Sons. London: Chapman & Hall. 410 pp. Reviewed in *Expt. Sta. Record* 58, 116 (1928).

Fertilizer. I. G. FARBENIND. A.-G. Brit. 280,447, Aug. 11, 1926. A hot soln. of NH_4NO_3 contg. a Ca or K salt is solidified by spraying or cooling and the product is mixed with solid diammonium phosphate or hot concd. solns. of the latter can be used for prepg. fertilizers such as described in Brit. 256,972 (C. A. 21, 3101).

Fertilizer. E. BAUER and L. SZOLD (trading as Eisler & Szold). Brit. 280,219, Nov. 5, 1926. Spent molasses waste which has been concd. (but not beyond 35° Bé.) and cooled to 60° is mixed with the lime sludge obtained in refining sugar or with similar material from other treatment of lime with CO₂ and the product is dried at 100-105°.

Fertilizer. SOC. ANON. UNION AGRICOLE DE JODOIGNE. Brit. 280,226, Nov. 4, 1926. A mixt. of natural phosphates contg. a high proportion of phosphoric acid, and CaCO₃, with KCl is treated with H₂SO₄ and (NH₄)₂SO₄ is added to the product and it is then neutralized by adding a natural phosphate contg. a low percentage of CaCO₃, allowed to dry and harden and then ground.

Fertilizer. ERIC H. RICHARDS and HENRY B. HUTCHINSON (to Adco Ltd.). Can. 281,607, July 10, 1928. In prepg. a fertilizer by aerobic fermentation N is supplied by a compn. of 50% CaCN₂, 25% ground chalk and 25% ground mineral phosphates admixed together to such a fineness that substantially 60% of the mixt. will pass a 100-mesh sieve.

Fumigating with hydrocyanic acid. FLOYD J. METZGER and GEORGE C. BAUER (to Calif. Cyanide Co.). U. S. 1,675,123. A solid cyanide-contg. material such as Ca(CN)₂ is subjected to the action of moist air or other suitable moist gaseous medium capable of evolving HCN from the solid material, and the HCN is delivered to the space to be fumigated. An app. is described.

Insecticides and sheep dips. McDUGALL & YALDING, LTD. and P. J. FRYER. Brit. 280,256, Nov. 24, 1926. Active plant exts. such as Derris ext. are used with phenols and hydrocarbon oils and formed into emulsions.

16--THE FERMENTATION INDUSTRIES

C. N. FREY

Preparation of water-free alcohol. HEINRICH PINCASS. *Metallborse* 18, 117 8 (1928).—A description of processes to be found in the patent literature. J. B.

Chemical composition of the white wines of L'Herault. E. HUGHES and H. PAU. *Prog. agr. vit.* 89, 572-5 (1928).—A table of analyses of different wines of the 1927 vintage is given. P. R. DAWSON

Presence of glucuronic acid in wine from musty grapes. D. CHOCHAK. *Ann. chim. anal. chim. appl.* 10, 97 8 (1928), cf. C. A. 22, 1649.—It has been known that the conventional analysis of the total solids of wine made from musty grapes does not yield a summation sufficient to account for the entire amt. of solids present. This indicates that there is something present in the solids from wine made from musty grapes which is not present in wine made from grapes of good quality. This substance appears to be glucuronic acid which is present normally only in traces but is fairly abundant in musty grapes. In the wine from musty grapes, one sample showed 0.4 g. and another sample 1.25 g. of glucuronic acid per l. The method of Chirav or that of Brulé can be used for the detn. of glucuronic acid. W. T. H.

The mass production of yeast for feeding purposes. I. E. G. STICH. *Chem.-Ztg.* 52, 149-50 (1928).—A discussion in detail of the Delbruck process for the production of yeast in large quantities, and its economical value. II. *Ibid* 170 1.—A critical discussion of different processes for the production of yeast on a large scale. Production costs are given for one process and extensively tabulated, from the raw materials to the finished product. J. C. JURKJENS

Reinforced concrete vats and casks in breweries. EUGENE BORSAKI. *Ciment* 33, 154-5 (1928).—Concrete tanks lined with an org. material called "Ebony" have given good satisfaction when properly built. F. O. A.

The free-energy decrease of alcoholic fermentation. (FULMER, LEIFSON) 11A.

HEWITT, J. T.: **The Chemistry of Wine Making.** Report on Oenological Research, London: H. M. Stationery Office. 57 pp. 1s.

Device for drawing off fermented liquor from containers. S. A. GANTE. Brit. 279,552, July 28, 1926.

Filtering beer, wort, etc. HANSENA A.-G. and L. NATHAN. Brit. 280,395, Dec. 28, 1926. A filtering medium is mixed with a portion of the liquid under pressure and the medium is deposited on a support such as wire netting to form a filter for all of the liquid. An app. is described.

Sterilization of wort. EJNAR A. MEYER. Can. 281,067, June 19, 1928. Worts are treated with a material capable under operating conditions of liberating a halogen, e. g., a satd. aq. Cl soln.

Yeast. R. L. CORBY and W. H. F. BÜHRIG (to The Fleischmann Company). U. S. 1,673,735, June 12. In a continuous-addn. process of mfg. yeast by propagation with aeration over a period of about 8 hrs., the propagation of yeast may be initiated with aeration in a small portion of dil. nutrient soln. at a temp. of about 33° and yeast-nutrient soln. then gradually added, and after a few hrs. the temp. is slowly lowered to below 30°.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Determination of pepsin. K. HOFFMANN. *Pharm. Ber.* 2, 45-7(1927).—By Bachstetz's modification of Gross' method various com. pepsin preps. showed scarcely any activity. B. C. A.

Californian lemon and orange oils. L. BONACCORSI. *Boll. ufficiale staz. sper. ind. essence* 2, 1-3(1927).—A sample of pale yellow Californian lemon oil had d^{15}_4 0.8580, α^{15}_D + 63.8°, n^{20}_D 1.4709, aldehydes (as citral) 2.35%, sapon. value 9.33, fixed residue (water bath) 2.75% having sapon. value 193.9, soly. in 90% alc. 1:7. A sample of Californian orange oil gave d^{15}_4 0.8518, α^{15}_D + 98.5°, n^{20}_D 1.4693, aldehydes (as citral) 2.62%, sapon. value 4.58, fixed residue (water bath) 3.46% having sapon. value 160.91, soly. in 90% alc. (turbid) 1:8. B. C. A.

Characters of essences of aromatic plants cultivated in Calabria. L. BONACCORSI. *Boll. ufficiale staz. sper. ind. Essence* 2, 4-5(1927).—The flowerheads (leaves) of *Majorana hortensis* gave 0.48 (0.43)% of pale yellow essential oil having d^{15}_4 0.8912 (0.8868), α + 7.2° (9°), acid value 0.28 (0.56), sapon. value 13.07 (11.20), sapon. value after acetylation 64.72 (73.77), carbonyl compds. (as citral) 1.67 (2.03)%, soly. in 82.5% alc. 1:2.2 (1:1). The essence of *Thymus citriodorus* gave d^{15}_4 0.9020, α + 3.6°, acid value 4.48, sapon. value 30.01, carbonyl compds. (as citral) 13.50, phenols trace; sol. in 2 vols. of 70% alc. The essence of *Salvia trilobica* gave d^{15}_4 0.9200, α + 10.4°, acid value 1.68, sapon. value 8.66, sapon. value after acetylation 50.38, carbonyl compds. (as citral) 5.84; sol. in 1 vol. of 80% alc. Oil of *Pelargonium radula*, Ait (?) cultivated on the plain (hill) gave d^{15}_4 0.8970 (0.8966), α — 9° (—9.2°), n^{20}_D 1.4639 (1.4643), acid value 13.44 (12.30), sapon. value 62.71 (70), sapon. value after acetylation 277.81 (260.32), esters (as geranyl tiglate) 26.43 (29.50)%, total alcs. (as geraniol) 76.40 (72.12), free alcs. 59.20 (52.88), citronellol 36.70 (33.36), soly. in 70% alc. 1:2.1 (1:2.7). B. C. A.

Ergot. A. DAMONTE. *Giorn. farm. chim.* 76, 127-31(1927).—"Stabilization" of ergot by means of alc. under pressure is useless. Water extracts only part of the alkaloids, and the yield is scarcely increased when acidified water is used. B. C. A.

Determination of dextrose insulin equivalents. K. L. E. LAMERS. *XII Int. Cong. Physiol.* 1926, 94.—For the detn. of the dextrose equiv. of insulin, the sugar must be administered subcutaneously. Part of the sugar actually undergoes combustion, and part may be converted into acid products. B. C. A.

The ethereal oil content of fragrant plants of the southeastern territory. O. SOBOLEVSKII. *Ist. of Agr. Saratov. Ber. Saratov. Naturforscherges.* (Russia) 1, No. 2-3, 3-38(1925); *Chem. Zentr.* 1927, I, 112-3.—The ethereal oils were obtained by steam distn. of the finely divided plants. The yields increased with the quantity up to a const. value. With *Hyssopus officinalis*, *Origanum vulgare* and *Salvia officinalis*, the oil distd. rapidly, 90% of the yield being obtained during the first 30 min. With *Matricaria chamomilla* the rate of distn. was slow and const. over a long period of time. Intermediate in the rate of distn. were the oils from *Achillea nobilis*, *Angelica archangelica*, *Cannabis indica*, *Ocimum basilicum*, *Satureja hortensis*, *Tanacetum vulgare* and *Thymus marshallianus* Willd. The yields from the fresh plants and from dried and remoistened plants were considerably smaller than from the dry plants. To det. the losses of oil during the distn., the oil was completely removed from a sample of *Artemisia austriaca* Jacq., the residue was then impregnated with a known quantity of oil and steam-distd. Under these conditions the loss was small. The following % yields were obtained: *Artemisia absinthium* L. (blooming shoots) 0.47 (a paraffin-like solid sepd. from the distd. oil); *Artemisia austriaca* Jacq. 0.32-0.46; *Artemisia dracunculus* 0.44-0.47; *Artemisia vulgaris* 0.30; *Artemisia scoparia* 0.14; *Artemisia armenica* 0.08; *Artemisia campestris* 0.04; *Artemisia pontica* 0.03 (this was a sapphire-

blue color, whereas the oils from all other varieties of *Artemisia* were bright yellow); *Achillea millefolium* (flowers) 0.47-0.63 (leaves) 0.51; *Achillea nobilis* L. (flowers) 0.22-0.44 (leaves) 0.19-0.20 (whole plant) 0.20-0.26; *Angelica archangelica* L. (leaves) 0.08-0.14 (sharp pepper odor) (roots) 0.15-0.47 (sharp spicy odor); *Cannabis indica* Lam. (flowers) 0.13-0.20; *Hyssopus officinalis* L. (flowering) 0.47-0.48 (d. 0.9325; the yield diminished after flowering); *Matricaria chamomilla* L. (flowers 14 months after being picked) 0.08-0.25; *Mentha piperita* L. (flowering) 0.5-0.8; (leaves) 0.6-0.72; *Ocimum basilicum* L. (flowers) 0.4 (flowering plant) 0.4-0.5 (plant after flowering) 0.23; *Ocimum minimum* (after flowering) 0.19; *Origanum vulgare* L. (flowers) 0.74-0.76 (leaves) 0.21-0.41 (whole plant) 0.12-0.32; *Salvia officinalis* (leaves) 0.85-1.29; *Salvia nemorosa* (leaves) 0.04; *Satureja hortensis* L. 0.23-0.43; *Tanacetum vulgare* (flowers) 0.25-0.59 (leaves) 0.28-0.39; *Thymus marschallianus* Willd., 0.78-1.50; *Valeriana wolgensis* nov. sp. Kasakevich (roots) 0.53; *Melissa officinalis* 0.05.

C. C. DAVIS

Determination of santonin in Flores cinnae. H. BECKURTS. *Festschrift A. Tschirch* 1926, 6-12; *Chem. Zentr.* 1927, I, 2585-6.—Numerous expts. on the purification of crude santonin were carried out. To sep. santonin from resinous ingredients, various org. solvents were tried without success. Purification by means of KMnO_4 removed all impurities and completely pure santonin was obtained, though analyses showed losses of 6-10%. Conversion of santonin to difficultly sol. Pb santoninate proved to be impracticable, because of losses of 7.2-8.3%. A similar result was obtained when an adsorption agent was used or $\text{Al}(\text{OH})_3$ was tested as a clarifying agent. In further expts., attempts were made to remove impurities by coagulation with electrolytes or with colloids. K alum and FeCl_3 proved to be practicable, though with the former 2.1-2.3% losses were encountered and with FeCl_3 1.3-1.5% losses. The colloidal resin acids could be coagulated with $\text{Fe}(\text{OH})_3$ sol. Filtration of crude santonin solns. through Pukall filter candles gave losses of 1.9-2.4% of santonin. The best method of obtaining pure santonin crystals was ultra-filtration through a regular ultra-filtration app., in which case ultra-filtration should be carried out as late as possible in order to combine it with the Fromm method. Even this process does not, however, give complete sepn.

C. C. DAVIS

Noteworthy observations on recent investigations on digitalis. FOCKE. *Jahresbericht d. Caesar & Loretz A.-G. in Halle a. S.* 1925, 115-9; *Chem. Zentr.* 1927, I, 2448-9.—A report on the most important practical results of recent investigations on digitalis, with particular reference to the expts. of Sluyters (C. A. 19, 1324). The proportions of active substances in digitalis leaves are 35% gitalin, 14% digitalcin and 50% digitoxin. The essential effect of digitalis on warm-blooded animals is a diminution of the heart vol., though the heart-muscle performance is increased, and the vol. of blood discharged also becomes greater. The latest method of calcg. doses and the rectal administration of digitalis are also discussed.

C. C. DAVIS

An apparatus for the determination of alkaloids in lupines. F. KAMINSKI. *Chem.-Ztg.* 52, 467(1928).—A glass bottle is provided with a side tube at a certain distance from the bottom, connecting with a buret tube of 2-25-cc. bulbs by means of a 2-way stopcock, the other opening of which discharges the contents of the buret. The glass stopper of the bottle has a tube and stopcock blown into it. The lupine sample is extd. with NaOH and $\text{Et}_2\text{O}-\text{CHCl}_3$ mixt. for 24 hrs., and the ext. then blown into the buret. Filtration is thus avoided.

W. C. BAUGH

Observations on the preparation and action of thyroxin. BRCE NEPPI. *Boll. soc. ital. biol. sper.* 3, 165-72(1928).—Mostly a review of the work of Kendall and Harrington on the preparation of thyroxin. The I_2 content of thyroid glands from a Miland abattoir was detd. monthly. There was a slight increase during the summer months; the amt. varied from 0.126 to 0.20%. The lack of quant. parallelism between the physiol. action of thyroxin and thyroid is discussed. The hypothesis is advanced that during the extn. of the gland racemic thyroxin is obtained, which is not as active as the optical substance in the gland.

PETER MASUCCI

Method of differentiation and determination of the value of rhubarbs based on fluorescence. J. MAHEU. *Bull. sci. pharmacol.* 35, 278-88(1928).—All official rhubarbs show a deep reddish brown fluorescence under the Wood rays. The rhizomes of rhubarb may be divided into 2 classes: (1) True rhubarbs: *Rheum officinale* H. B., *R. languticum* Wall. and *R. emodi* Wall. which give the brown fluorescence and may be considered official. (2) The rhubarbs produced by *R. compactum* L., *R. undulatum* L., *R. ribes* L. and *R. raponticum* L., which give a violet fluorescence and are considered non-official. All rhubarb powders whose tinctures under the Wood rays give a violet fluorescence should be rejected.

L. W. RIGGS

Seeds of *Euphorbia verrucosa* jacq. PAUL GILLOT. *Bull. sci. pharmacol.* 35, 288-91(1928); see *C. A.* 22, 2676. L. W. RIGGS

A reaction of cocaine. P. GUIGUES. *Bull. sci. pharmacol.* 35, 292-3(1928).—The test for cocaine by Guerbet (cf. *C. A.* 15, 923) is commended and attention is called to the necessity of a rigid following of Guerbet's directions, particularly with reference to the fuming HNO_3 used. It is also recommended to prep. the SnCl_2 by dissolving Sn in HCl and evapg. the soln. on the water bath, the residue to be taken up with water and evapd. to dryness twice. The resulting salt was completely sol. in water giving the necessary very faintly acid soln. of SnCl_2 . L. W. RIGGS

Ultra-violet absorption spectra of the alkaloids of the tropan group and of certain biologic and pharmaceutical products. Applications to toxicology and practical pharmacy. A. CASTILLE AND (MLLE.) E. RUPPOL. *Bull. soc. chim. biol.* 10, 623-66(1928); cf. *C. A.* 21, 206.—Fifty-two new ultra-violet spectra were detd. for various substances and were illustrated in 15 charts of curves. Conclusions in part: The absorption spectrum of cyanuric acid in neutral or alk. soln. leads to the detn. of its constitution and to the exptl. verification of the partial enolization of its mol. A study of barbituric acid led to the detn. of the chem. configuration of veronal and luminal, this being a new contribution to the subject of tautomerism. Alkaloids were detd. in pharmaceutical preps., and in mixts., with large quantities of other org. matter. By this method 4 mg. of cocaine was detd. in completely putrefied cadaveric residues, and tryptophan was identified in the viscera. L. W. RIGGS

Researches on percolation. Rapidity of solution of immediate principles during percolation. I. Press cake of bitter almonds. M. BRIDEL AND (MLLE.) M. DEMAREST. *J. pharm. chim.* 7, 153-62, 201-7(1928); cf. B. and Barel, *C. A.* 20, 1302.—A parallel detn. of sucrose and amygdalose in bitter-almond press cake by the Bourquelot optical rotation method (a) in an ext. made with hot alc., (b) an ext. obtained by rapid percolation with 70% cold alc. showed quant. recovery of both principles by the percolation method, i. e., they practically remained unaffected by the enzymes present (sucrase and β -glucosidase). The enzymes also remained unchanged. In hot alc. extn. of the cake, 4 times as much alc. was needed as in percolating the same quantity. Sucrose passes entirely into soln. within 9 hrs., amygdalose within 12.5 hrs. of percolation. To ext. emulsin from the percolation residue, macerate the latter for 48 hrs. with 4 times its wt. of H_2O contg. $\text{C}_6\text{H}_5\text{Me}$, press out and filter, then ppt. casein with AcOH , filter and ppt. emulsin with EtOH and dry *in vacuo* over H_2SO_4 . The yield is 14 g. per kg. of press cake. The enzymic activities of this emulsin are practically identical with those of emulsin from sweet almonds, which also yield 14 g. per kg.; but the press cake of bitter almonds is 6-7 times cheaper. The yield of amygdalose is 30 g. per kg. II. Press cake of cotton seed. *Ibid* 433-47.—Raffinose (A) contained in cottonseed cake (cf. *C. A.* 17, 3017; 20, 171; 22, 2674) rapidly dissolves in 60% alc. upon percolation. In operating on 500 g. of cake contg. 36.464 g. A, 54.23% thereof passes into soln. (250 cc.) in 105 min., 92.93% in 5 hrs., soln. being complete in 10 hrs. By a modification of the Ritthausen method, a yield of 3.3% of A per wt. of the cake is obtained: Moisten 10 kg. of cottonseed cake with 5 l. of 60% alc., begin percolation at once with 10 l. of 60% alc. and collect 3 fractions each of 5 l.; to obtain the last fraction, displace it from the powder by addn. of 6 l. H_2O . From the 1st fraction distil off the EtOH until 2 l. of aq. residue is obtained; add 2 l. H_2O and 500 cc. of Goulard's ext. (basic Pb acetate) (B), filter and remove Pb with H_2S . Evap. the colorless soln. to dryness under reduced pressure, not above 50° to avoid hydrolysis of A by AcOH near the end of evapn. Take up with 85% alc., evap. to a sirup and recrystallize from 85% alc. Repeat the process on the 2nd and 3rd fractions without, dilg. before pptg. with B. Use 400 cc. of B for the 2nd, 300 cc. for the 3rd fraction. S. W.

The quality of compressed tablets, particularly as to solubility and ease of disintegration. WM. J. HUSA. *J. Am. Pharm. Assoc.* 17, 38-41(1928).—Specimens of tablets of 13 manufacturers were tested for their disintegrating properties by dropping them into H_2O at 80° . Most disintegrated at once but 2 were not dissolved in 2 days. Tablets of ovary and thyroid disintegrated in approx. 1 hr. H. notes that the U. S. P. and N. F. have not standardized tablets as completely has been done for many other preps. L. E. WARREN

The assay of a so-called cod-liver oil extract for vitamin-A content and calcifying properties compared to cod-liver oil. HAZEL E. MUNSELL AND HILDA BLACK. *J. Am. Pharm. Assoc.* 17, 139-44(1928).—The results given show that the EtOH -sol. ext. used in these tests contained a negligible amt. of vitamin-A and had no greater calcifying properties g. for g. than cod-liver oil. L. E. WARREN

Plasticity measurements on milk of magnesia. S. S. ARZOOMANIAN. *Lab. E. R.*

Squibb and Sons. *J. Am. Pharm. Assoc.* 17, 443-9(1928).—The consistometer is a 50-cc. buret with the stopcock removed and a capillary tube attached by rubber tubing. The diam. of the capillary is detd. either by viscosity measurements with standard liquids or by the Hg-thread method. The buret is filled and the contents are stirred with a long wire to remove bubbles, the plug in the capillary is removed and the time for stated fractions of the contents to run through the app. is noted by a stop-watch. Certain corrections are applied.

L. E. WARREN

Flueckiger's test for thymol and carvacrol. H. G. HEWITT. *J. Am. Pharm. Assoc.* 17, 524-5(1928).—The substance is dissolved in CHCl_3 and warmed gently with NaOH or KOH. In the presence of either phenol the CHCl_3 layer becomes red. The reaction takes place in 2 stages. Thymotinic or carvacrotinic aldehyde is first formed. These aldehydes combine with an excess of the remaining phenol to form one of the rosolic acid dyes, $\text{CH}(\text{C}_{10}\text{H}_{12}\text{OH})_3$.

L. E. WARREN

Analysis of tincture of lemon. L. B. FRANCHINA AND FRANK A. LEE. *J. Am. Pharm. Assoc.* 17, 553-5(1928).—The investigations followed the same lines as the studies on tinct. of sweet orange peel (*C. A.* 19, 1757). Five grades of lemons from California, 2 from Florida and 1 from Sicily were used. Tincts. were prepd. from each. The tincture from *Ponderosa* was less aromatic and less colored than from the other varieties. EtOH about 65%; oil of lemon 1.2 to 2.1. Tincts. were prepd. from the spent drug in each case. The vol. of oil varied from 0.1 to 0.6% and the EtOH content averaged higher than in the genuine tincts. F. and L. suggest that the oil content should not be less than 1% and the EtOH 75%.

L. E. WARREN

The discoloration of aloes in Mauritius. N. CRAIG. *Rev. agr. Maurice* 5, 83-5(1928).—A series of tests, results of which are tabulated, show that the darkening of aloes during storage is primarily due to oxidation by the air. Exposure to light increases the darkening, but has little effect in absence of air. The effect of humidity was not uniform in these expts., and no conclusion can be drawn. Treatment of aloes with SO_2 does not prevent darkening.

F. W. ZERIAN

Stereoisomerism and local anesthetic action. Separation of dimethylaminodimethylethylcarbinol into its optical isomers and preparation of two active stovaines (FOURNEAU, RIBAS) 10. Emulsions [for making cosmetics] (Brit. pat. 280,096) 13.

BECKURTS, HEINRICH. *Chemisches Praktikum für Pharmazeuten*. 3rd ed. completely revised of "Analytischen Chemie für Apotheker." Stuttgart: Ferdinand Enke. 605 pp. M. 36; bound M. 38.40.

STEWART, FRANCIS G. *Compend of Pharmacy*. 10th ed. revised and enlarged. Philadelphia. P. Blakiston's Son & Co. 200 pp. \$2. Reviewed in *Am. J. Pharm.* 100, 425(1928).

WASER, ERNST. *Synthese der organischen Arzneimittel*. Stuttgart: Ferdinand Enke. 436 pp. M. 16; bound in linen, M. 18.

Solid tincture of iodine. KARL JUNGSMANN and OSWALD KOLBERT. Can. 281,519, July 10, 1928. Forty-six g. pure stearic acid is dissolved in 800 cc. of alc. by heating. At the same time 3.68 g. of metallic Na is dissolved in 200 cc. of alc. The 2 solns. are combined at 55° to 70° and to the resulting soln. 30 g. of NaI is added. A soln. of 20 g. of I in 200 g. of alc. is added to the hot soln. with continuous stirring and the resulting liquor is run off into glass tubes and rapidly cooled. About 1 kg. of solid tincture of I is obtained.

Arsenobenzene derivatives. A. ALBERT. Can. 280,834, June 12, 1928. The semicarbazone of 3-hydroxybenzaldehyde-4-arsonic acid in the presence of glacial acetic acid is reduced by means of about 5 to 6 mols. of H_2PO_3 and 1 mol. of H_2SO_4 , calcd. upon 1 mol. of the arsenic compd. A new compd. of therapeutic value, colorless and mostly sol. in ammonia, is obtained.

Carbohydrate-acridine compounds. CARL SCHNORF and FRITZ HEFTI. U. S. 1,674,923, June 26. 2-Ethoxy-6,9-diaminoacridine galactose hydrochloride, formed from the components, is a yellow crst. solid, m. 208.0° (decomp.), sol. in water and not altered in aq. soln. by alkali or salt solns. Similar compds. which also are suitable for therapeutic purposes may be prepd. with lactose, mannose, glucose and maltose.

Propyl ester of 2-phenylquinoline-4-carboxylic acid. J. A. VON WULFING. Brit. 279,745, June 17, 1927. This compd., which is a therapeutic agent, may be prepd. by the usual esterification methods, e. g., with use of PrOH .

Metal salts of sulfarsenol. FREDERIC L. WYLD. U. S. 1,674,711. June 26. Complex metal compds. which may be used by *subcutaneous injection* are formed by the reaction of sol. metal salts such as $ZnCl_2$ or compds. of Mg, Cd, Cu or Ag with sulfarsenol in MeOH soln. and adding NaOH soln.

Vitamin preparations. S. GRONINGSATER and FISCHER-HOLLINSHED CO., INC. Brit. 280,212, Nov. 2, 1926. In transferring vitamins from one substance to another, *e. g.*, from cod-liver oil to cottonseed oil, a soln. is formed of the vitamin and the latter is then transferred from the soln. to the desired vehicle. Cod-liver oil may be first saponified with alkali in the presence of an org. solvent such as alc. and the cottonseed oil then added together with water and, after agitation, the materials allowed to sep. into layers.

Separation of enzymes from their solutions. HANS ALTGELT and OTTO HOCHMUTH (to Kalle & Co. Aktiengesellschaft). Can. 281,306, June 26, 1928. A ppt. is produced from Na phosphate and $CaCl_2$ in the satd. sol. of the enzyme, a salt of aromatic sulfonic acid is added, the ppt. filtered, dissolved in H_2O and the residue filtered off. Then the enzyme is pptd. together with the salt of the aromatic sulfonic acid by adding NaCl.

Germ-gland substance. WALTER HOHLWEG. Can. 281,054, June 19, 1928. Hormone oil is dissolved in alc. mixed with a powdery hydrate of an alk. earth until a thick paste is formed; water is added, the mixt. boiled with stirring, filtered and treated with CO_2 to ppt. the alk. earth.

Cosmetics, medicinal preparations, etc. H. H. VON KORNATZKI. Brit. 279,575, Aug. 7, 1926. Oil of amber obtained by the dry distn. of amber is washed with water, the extd. succinic acid is recrystd. and is mixed with the rectified oil in the same proportion as in the crude oil and the product is used as an ingredient of massage creams, dentifrices and other preps. for local application. Various formulas are given.

Lotion for treating foot-rot in sheep. P. G. MORGAN and G. R. PLOWMAN. Brit. 280,312, Sept. 1, 1926. HNO_3 (1.14 sp. gr.) 20, cryst. $CuSO_4$ 11.27, soap 0.25, vinegar (contg. 4% HOAc) 3, $NaNO_2$ 1 and water 64.48 parts.

Removing nicotine from tobacco. C. PORT. Brit. 279,757, July 16, 1927. Cigars, cigarettes, pipe or chewing tobacco, or snuff is subjected for 2-6 days to warm moist air and then heated quickly in a closed vessel to about 150° while the steam generated is drawn off by a pump or other suction device.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Kinetics of the chamber process. V. P. ZALESSEKII. *J. Chem. Ind.* (Moscow) 3, 1279-83 (1926); 4, 128 (1927). From theoretical considerations Z. expressed previously the opinion that SO_3 is formed in the chambers, and advised injection of H_2SO_4 . To obtain exptl. evidence to support his contentions, a series of Orsat gas analyses in the pipe from the Glover tower, in the pipe connecting the first chamber with the second, and in the pipe leaving the Gay-Lussac tower were made. If gas samples taken directly from the chambers, instead of from the pipes, had been analyzed, the results would be misleading. Vol.-% of acid gases and of O_2 were detd. All the acid gases obtained in excess of the amt. corresponding to the change in O_2 content must be regarded as SO_3 . From these analyses and from tables and calcs. it is shown that the chambers contain 15-21% SO_3 , in spite of the reaction $SO_3 + H_2O = H_2SO_4$. The chamber process goes on chiefly through SO_3 formation as follows: Exceedingly small droplets of H_2O , by creating elec. fields attract SO_3 mols. in 3 concentric, spherical layers, the first consisting of 1 row of SO_3 mols., fairly stable, and its particles seldom detached. The second layer is not so stable, but is kept in comparative equil. by new mols. replacing those torn off. The third, comparatively thick layer consists of constantly inflowing and outflowing mols. Normally NO_2 acts chiefly on the third layer, oxidizing it to SO_3 , which dissolves in H_2SO_4 . If there be in the chambers a relative abundance of H_2O droplets, *i. e.*, a shortage of SO_3 , the third layer may be wholly absent, and the reaction of NO_2 takes place with the SO_2 which is close to the kernel, in which case a large amt. of polymerized anhydride (S_2O_8) is formed, which delays the oxidation of SO_2 . It is also shown that excessive increase of H_2O and increase in temp. must give losses of N oxides. Nevertheless it is not advantageous either to decrease the amt. of H_2O unreasonably, or to operate at exceedingly low temps., since H_2O acts as a catalyzer and also prevents formation of chamber crystals, and lowering of temp. slows up the reactions. The operating temp. should be kept between 0° and 100° .
Replacing air by O_2 would improve the operation.

BERNARD NELSON

New continental sulfuric acid plant operating on the Schmiedel-Klencke system. ARTHUR GROUNDS. *Ind. Chemist* 4, 155-8(1928); cf. *C. A.* 21, 2534—Flow sheet, illustrations, detailed dimensions, and operating data are given for the new Saaran H_2SO_4 plant of the Silesia Verein chemischer Fabriken. The plant differs from the usual in its use of Schmiedel boxes, which are preparatory units in which the gases are converted into a chem. and phys. state such that they will react readily and vigorously in a succeeding tower. The plant has a rated capacity of 27 tons of 142°Tw . acid per day, with a niter consumption equiv. to 2.94 parts NaNO_3 per 100 parts S burned, based on a 95.2% conversion of S to H_2SO_4 . The gas flows from 2 Lurgi furnaces through a hot-gas Cottrell precipitator to the Glover tower, from which it passes successively through Schmiedel box No. 1, tower No. II, Schmiedel box No. 2, towers III and IV and thence to the Gay-Lussac towers. The raw material for SO_2 production is Meggen pyrites. R. L. DODGE

Treatment of insoluble sulfates, particularly of celestite, with sodium carbonate solutions. I. YA. BASHILOV AND M. N. SOBOLEV. Institute of Applied Mineralogy and Metallurgy. *J. Chem. Ind. (Moscow)* 4, 113-7(1927).—Present com. methods of converting insol. sulfates into compds. of com. use consist in either fusing with Na_2CO_3 or reducing with charcoal, and are relatively expensive. Boiling BaSO_4 with an excess of an Na_2CO_3 soln. gives quite satisfactory results as regards speed and extent of conversion to BaCO_3 . With uncalcined, technical BaSO_4 reaction with Na_2CO_3 ceases when the ratio of the latter to BaSO_4 formed equals 3.07. If the Na_2CO_3 present is such that after all BaSO_4 is converted to BaCO_3 the ratio $\text{Na}_2\text{CO}_3 \cdot \text{Na}_2\text{SO}_4$ equals 2, after 11 hrs. about 77% of the BaSO_4 has been converted. This reactivity, at first very rapid, slackens gradually, as shown in diagrams. The excess of Na_2CO_3 has a decisive influence on the speed of reaction; e. g., if the Na_2CO_3 is 8 times the BaSO_4 , boiling 1 hr. is sufficient to transform 98.78% of the latter. The concn. of the Na_2CO_3 solns. has but a slight importance. In com. operation large excesses of Na_2CO_3 should be used to obtain a rapid conversion; the unused Na_2CO_3 can be used for another batch of sulfate or recovered by crystn. The conversion of CaSO_4 is even easier and more rapid than that of BaSO_4 . The equil. const. on boiling, $\text{Na}_2\text{CO}_3 \cdot \text{Na}_2\text{SO}_4$, is 0.032 for anhyd. CaSO_4 , vs. 3.07 for BaSO_4 . Hydrated CaSO_4 has a still lower equil. const. and the reaction is still faster, e. g., when gypsum is stirred with a 2% Na_2CO_3 soln. the reaction is finished in 1 hr. With SrSO_4 the equil. const. is 0.015, and reaction with Na_2CO_3 solns. is easy on warming and stirring. Stirring is all important with other sulfates also. Similar expts. were made with a Russian celestite contg. SrO 50.4, CaO 3.01, Fe_2O_3 + Al_2O_3 0.7, SO_3 39.65, CO_2 3.04, SiO_2 2.7, H_2O 0.37, calcd. total SrSO_4 89.32. The speed of reaction depended upon the fineness of the celestite, increasing on heating and on increasing the Na_2CO_3 excess. Impurities slow the reaction. The Na_2CO_3 concn. has no essential influence. In com. operation an excess of Na_2CO_3 should be used. With PbSO_4 the equil. const. is less than 0.01, and its conversion to PbCO_3 is, therefore, very easy. The above method may be used in chem. analysis to sep. BaSO_4 from CaSO_4 and SrSO_4 by using adequate amts. of Na_2CO_3 . R. N.

Preparation of sodium nitrite from Chile salt-peter. S. SAWA. *J. Pharm. Soc. Japan* 48, 260-3(1928).—In the manuf. of NaNO_2 from Chile salt-peter by the Pb method, the yield depends largely upon the H_3BO_3 content found as an impurity in the raw material. Other impurities have no influence. When the H_3BO_3 content exceeds 0.2% the yield falls to 41-55%, while below 0.15% nearly the theoretical yield can be obtained. NAO UYER

Natural amorphous silica. T. HEDLEY HARRY. *Ind. Chemist* 4, 226-8(1928).—A review of occurrence and uses. E. H.

Occurrence of indium in commercial iron sulfide and its extraction. J. G. F. DRUCE. *Z. angew. Chem.* 41, 79(1928).—A residue contg. In was found after continued treatment of com. FeS with H_2SO_4 . In oxide was eventually sepd. The original proportion was about 6 pts. in 100,000. B. C. A.

Georgian manganese regaining its old standing in world markets. L. J. BUCK. *Eng. Mining J.* 125, 1016-7(1928).—Caucasian Mn, which before the war made Russia the leading Mn producer during all but 4 yrs. (1908-11), is again on the market. An American company holding a concession from the Soviet govt. is now marketing a product of at least 85% MnO. ALDEN H. EMERY

Extraction of bromine from aqueous solutions of its salts. K. I. SHEDT. Crimean Research Institute. *J. Chem. Ind. (Moscow)* 3, 1200-3(1926).—In the Betts method of Br pptn. by phenol (*Mon. sci.* 16, 1(1902)) half the Br is lost as HBr according to the reaction $3\text{Br}_2 + \text{C}_6\text{H}_5\text{OH} = \text{C}_6\text{H}_4\text{Br}_2\text{OH} + 3\text{HBr}$. The following method is recommended: 100 cc. $\text{Br-H}_2\text{O}$ contg. 0.5634 g. Br is pptd. by the theoretical amt. of

phenol (11.3 cc. cryst. phenol in 1 l. H_2O), $Cl-H_2O$ is added in the calcd. amt. needed to decompose the HBr formed (35.7 cc. contg. 3.224 g. Cl per l.), then half of the previous amt. of phenol is added to fix the free Br , and alternate addn. of phenol and Cl each time decreased by half is repeated twice. The $C_6H_5Br_2OH$ is then filtered. By this quadruple pptn. with phenol 98% of the Br is recovered as $C_6H_5Br_2OH$, which can easily be decomposed into Br . $C_6H_5Br_2OH$ first ppts. in H_2O as a colloidal gel difficult to filter, but it coagulates after standing 5 min. and can then be easily filtered and washed on a Büchner funnel.

BERNARD NELSON

Nitrogen industry problems. F. C. O. SPEYER. *Chem. Trade J.* **82**, 575-7(1928).—The economics of the future of N fixation is considered.

E. H.

The fixation of nitrogen as oxide by electric discharges; its industrial future. E. BRINER. Univ. Geneva. *Bull. soc. chim. Belg.* **37**, 169-85(1928).—Discussion of the conditions required to permit the arc process to compete favorably with the Haber-Bosch process.

A. L. HENNE

Camphor: natural and synthetic. C. L. DeVULT. *Chemicals* **30**, No. 1, 9-11 (1928).—Comparative production statistics are given.

E. H.

The influence of acids on fuller's earth. O. ECKART. *Ölmarkt* **9**, 61-2; *Chem. Zentr.* **1927**, I, 2615; cf. C. A. **21**, 1717.—It is not believed that the activation of fuller's earth depends upon the formation of hydrated silicic acid, for in the waste liquors of the manuf. of fuller's earth no silicic acid could be found. It results from more profound decompn., in which case the decolorizing power is bad. The concn. is immaterial to obtain the desired result and the latter is dependent only upon a requisite quantity of acid. Org. acids are much inferior to mineral acids in dissolving out completely lime and alumina. Drying at 130° is necessary. The loss on ignition of activated earth is the same as that of the raw earth. With too much mineral acid, the clay skeleton is apparently destroyed, the surface area is diminished and the decolorizing power is in turn diminished.

C. C. DAVIS

Metal cements. P. MARTELL. *Apparatebau* **40**, 130-1(1928).—Directions are given for the prepn. of 23 cements for patching flaws in metals, joining metal to metal or to glass, porcelain, leather, etc.

J. H. MOORE

Evolution de la fabrication de l'acide sulfurique. Paris: L'Industries Chimique. 457 pp. F. 60. Reviewed in *Chem. Met. Eng.* **35**, 367(1928).

Hydrocyanic acid. I. G. FARBENIND. A.-G. Brit. 279,530, June 26, 1926. Formamide vapor is submitted to the catalytic action of natural or artificial zeolites, $CaCl_2$ or alkali carbonates (suitably at a temp. of $400-450^\circ$). When Na_2CO_3 is used, $NaCN$ is formed.

Sulfuric acid (contact process). ALPHONS O. JAEGER (to The Selden Co.). U. S. 1,675,308, June 26. A gaseous mixt. of SO_2 and O is passed at an elevated temp. (suitably about $420-550^\circ$) over a catalyst which contains at least one catalytically active non-siliceous base-exchange material such as a V compd. Numerous examples and details are given. U. S. 1,675,309 specifies the use of at least one multi-component zeolite having combined with it chemically a catalytically active component. Numerous examples and details are given.

Distillation of persulfuric acid. GUSTAV BAUM (to Niagara Electro Chem. Co., Inc.). Can. 281,156, June 19, 1928. $H_2S_2O_8$ is continuously distd. by heating in a no. of unit app. made of stoneware by a. c. of frequency lower than 500 per sec. with C electrodes preliminarily lixiviated with $H_2S_2O_8$, the intensity of current being below 1 amp. per sq. cm. and the electrodes being maintained at temp. not exceeding that of boiling $H_2S_2O_8$.

Separating constituents of alkaline mixtures containing oxysalts of arsenic or tin or both. HENRY HARRIS. U. S. 1,674,042, June 26. An aq. mixt. such as results from refining of Pb with $NaOH$, which contains $NaOH$ in strong hot aq. soln. together with oxysalts such as those of As , Sb and Sn , is brought to such a concn. that the oxysalts will substantially all sep. out on cooling, and cooling and sepn. are then effected.

Catalytic combustion of ammonia. H. PAULING. Brit. 279,511, Oct. 22, 1926. NH_3 and air or O are distributed over the catalyst by diffuser chambers, which may be in the form of orifices arranged with their larger cross-sections toward the catalyst. An app. is described.

Ammonia and acetylene. L. TOCCO and M. LANDI (to Soc. anon. ommium ind. chim.). Can. 280,980, June 12, 1929. $Ba(CN)_2$ prepd. by treating at 900° BaO with C and N , is heated at 200° in a stream of H to form NH_3 and BaC_2 . The NH_3 is re-

covered in the usual manner. The BaC_2 is treated with water to form C_2H_2 and $\text{Ba}(\text{OH})_2$. BaO is regenerated for use in the process.

Alumina. CHARLES M. BROWN. U. S. 1,675,157, June 26. In a cyclic process of treating alunite or other similar aluminous material in which some of the Al is combined with SO_3 , the raw material is sufficiently heated to drive off combined SO_3 , the calcined material is heated with an NH_4 sulfate, and the material is leached with water to obtain a soln. of NH_4 alum; Al is pptd. as hydrate by NH_3 released in the heat treatment, thus forming NH_4 sulfate.

Alumina. G. SCHOENBERG (to Metallbank und Metallurgische Ges., A.-G.). Brit. 279,870, Oct. 26, 1926. Aluminiferous material is fused with a reducing agent such as C in the presence of small quantities (preferably less than 3%) of sulfides or substances forming sulfides. Silicic and titanitic acids are first preferably sepd. from the raw material by use of inorg. acid and the remaining mixt. of Fe and Al salts may be converted to oxide before the first-mentioned treatment. S may be introduced as a gas or S-bearing combustion gases may evap. or decomp. the mixt. of Fe and Al salts.

Purification of ammonium bicarbonate. WILHELM GLUED and WILHELM RIESB. Can. 281,357, July 3, 1928. Crude NH_4HCO_3 is decompd. by heat; the gaseous products are kept at a temp. above that at which NH_3 and CO_2 combine; the solids are sepd. by mech. and elec. means without the use of absorbing substances; then the tech. pure gaseous products of decomposition are combined to form NH_4HCO_3 in the presence of H_2O . The NH_4HCO_3 seps. from the mother liquor in cryst. condition, whereby it undergoes a further purification.

Calcium molybdate. A. KISSOCK. Brit. 280,240, Nov. 6, 1926. Mo sulfide is roasted to produce MoO_3 substantially free from S, the MoO_3 is mixed with CaO and the mixt. is heated, suitably to about 760° . The process may be carried out continuously in a multiple hearth furnace of the gravity type into the lower part of which the lime may be fed. Cf. C. A. 22, 2444.

Cyanamides. N. CARO and A. R. FRANK. Brit. 279,812, Oct. 28, 1926; Can. 280,817, June 5, 1928. Cyanamides of alk. earth metals, including Mg, are made by passing gaseous HCN (which may be dild. with inert gases or NH_3) over the oxides, carbonates or oxide-forming salts, heated to above 400° . Cf. C. A. 22, 2816.

Cyanamides. N. CARO and A. R. FRANK. Brit. 279,811, Oct. 27, 1926; Can. 280,819, June 5, 1928. Cyanamides of Ca or Mg are formed by reacting on the carbonates, or mixed carbonates such as dolomite, with NH_3 at a temp. (suitably 700 – 850°) with CaCO_3 , 500 – 600° with MgCO_3 and 550 – 700° with dolomite) near or slightly above the dissocn. point of the carbonate. Ceramic or SiO_2 vessels are used and fluxes such as CaF_2 , CaO or Na_2CO_3 may be added.

Complex aurothiosulfate compounds. EINAR KEIDING. Danish 38,293, Dec. 27, 1927. A soln. of AuCl_3 is treated with an excess of iodide or bromide of the metal desired in the final product. The liberated I or Br is treated with thiosulfate to colorless soln. after which is added an adequate amt. of thiosulfate to form the complex aurothiosulfate. Cf. C. A. 21, 3425.

Complex aurothiosulfate compounds. EINAR KEIDING. Danish 36,761, Nov. 8, 1926. Complex aurothiosulfates of alkali, ammonium or alkaline earth metals are produced by dissolving gold iodide or bromide in an excess or iodide or bromide of the metal desired in the final product. The soln., which is prepd. in an alc. liquid, is made to react with a partly alc. soln. of thiosulfate according to the equation: $\text{AuBr} + 2\text{Na}_2\text{S}_2\text{O}_3 = \text{NaBr} + \text{Na}_2\text{Au}(\text{S}_2\text{O}_3)_2$. Cf. C. A. 21, 3425.

Phosphine. F. HEBLER. Brit. 279,751, July 1, 1927. In order to control or delay the action of water on Ca phosphide or other phosphide for generating spontaneously inflammable PH_3 (e. g., for use as a location indicator of torpedoes in naval training) the phosphide is coated with substances such as $\text{K}_2\text{Cr}_2\text{O}_7$, NaCl , sol. silicate, an alkali pyrophosphate or fused borax or with cellulose esters.

Anhydrous sodium sulfate. A. A. YAKOVKIN and Y. A. GROZHAN. Russian (Soviet) No. 1323, June 30, 1926. Vapors of compds. completely miscible or sol. in H_2O are used at temps. higher than required to obtain anhyd. Na_2SO_4 from the crystal hydrates or aq. soln. EtOH and MeOH are specified.

Recovery of zinc sulfate from dross. JESSE O. BETTERTON. Can. 281,282, June 26, 1928. Zn dross contg. flux, C and metallic Zn is screened. The screened fines are heated to volatilize the flux and oxidize the C and metallic Zn; the flux and oxide of C are passed to a condensing chamber and the flux is condensed therein; and the residue is leached to recover the Zn as ZnSO_4 . Cf. C. A. 21, 49.

Aluminum compounds. S. S. SVENDSEN (to Clay Reduction Co.). Brit. 279,515, Oct. 25, 1926. Bauxite, feldspar or other suitable aluminous material is heated to

34–100° with a soln. of NH_4F or NH_4 bifluoride to form NH_4 fluosilicate, fluotitanate or fluovanadate and AlF_3 and other fluorides. The soln. is dried and the residue is heated to 400–500° to volatilize SiF_4 , NH_3 and V and Ti fluorides. The residue is treated with a reducing gas to aid volatilization and reduce Fe to the ferrous state and is then treated with dry NH_3 and HCl gases at a temp. above the temp. of disoccn. of NH_4Cl to form NH_4F and chlorides of Al, K, etc. NH_4F and AlCl_3 are sepd. by fractional condensation and may be further utilized to produce other compds.

Removing phosphorus from gases. I. G. FARBENIND. A.-G. Brit. 279,710, April 11, 1927. P is removed from gases contg. it in the form of a fog by projection of very finely divided drops of liquid (such as water, acid or other aq. solns., org. liquids or liquid P) in a centrifugal or rotary gas-washing device or like app. The gases treated may be such as are obtained in the treatment of phosphate, silicic acid and C in an elec. furnace, consisting largely of CO and P.

Reducing solutions containing titanium and iron. TITAN CO. AKTIESELSKABET. Brit. 279,786, Oct. 28, 1926. A soln. such as that obtained by treating ilmenite with H_2SO_4 is treated with metallic Fe or material contg. mainly Fe. Solns. are used contg. 90–130 g. TiO_2 per l., at a temp. below 60° (although the temp. may rise above 60° near the end of the reduction). Sponge Fe in calcd. proportion may be used, or the reducing agent may be in excess.

Treating casein to obtain gelatinous solutions. AKTIESELSKABET SADOLIN & HOLMBLAD. Danish 38,291, Dec. 16, 1927. Casein particles are coated with a suitable amt. of a mucilaginous or gelatinous aq. ext. Before the treatment some alkali and a disinfectant may be added to the casein.

Casein compositions for making buttons or other molded articles. I. G. FARBENIND. A.-G. Brit. 279,863, Oct. 26, 1926. Glyoxal, or one of its derivs. or homologs, is used as a hardening agent in casein compns. which may also contain fillers, coloring substances, clarifying and softening agents, etc. Formulas are given of different mixts.

Phenol-ketone condensation products. CHEMISCHE FABRIK AUF AKTIEN, VORM. E. SCHERING. Brit. 279,856, Oct. 26, 1926. A crude mixt. comprising *o*- and *p*-cresols is condensed with a ketone such as acetone in the presence of a condensing agent such as gaseous HCl , at a temp. somewhat below 100°; the products may be sepd. by soln. in ether or the mixt. may be hydrogenated to obtain isomeric thymols or menthols.

Molding algin-containing material. CHAUNCEY C. LOOMIS and ARTHUR L. KENNEDY (to Plastic, Inc.) Can. 281,319, June 26, 1928. Dry and pulverize the algin-contg. material to a fine powder, add filler, then moisten with a min. amt. of H_2O or aq. soln. of NH_3 or alkali hydroxide or carbonate and subject to pressure in a mold. A hard homogenous mass is obtained contg. so little H_2O that only slight shrinkage occurs and warping is obviated. Cf. C. A. 21, 161.

Protein composition. MICHAEL LEVIN. U. S. 1,675,181, June 26. A gelatinous compn. suitable for use as an *adhésive* comprises a protein such as glue or gelatin and the mother liquor resulting from the production of sugar by the hydrolysis of starch obtained in concns. of about 42–52° Bx.

Adsorbent catalyzer. ALBERT GODEL (to Soc. de recherches & d'exploitations pétrolières). U. S. 1,674,897, June 26. An agglomerated mass of active charcoal is coated with a harder but less active C such as may be formed by use of sucrose and FeCl_3 and calcining. The product thus formed is suitable for use in recovery or sepn. of hydrocarbon vapors. Cf. C. A. 21, 305.

Absorbent materials. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDILEY and E. CHAPMAN. Brit. 280,262, July 15, 1926. The absorptive properties of blotting paper, kieselguhr and other absorbent materials is improved by treatment with a small proportion of a naphthalenesulfonic acid or sulfonate or other suitable higher sulfonic acids.

Composition for cleaning and polishing varnished surfaces, etc. AUSTIN B. REEVE. U. S. 1,675,227, June 26. A non-saponaceous emulsion is formed of water 35–45, an oil such as a light mineral oil 35–50, a non-escharotic astringent, *e. g.*, tannic acid or alum 1, and a vegetable gum such as gum tragacanth 1 part which serves as an emulsifying agent. Colloidal clay, borax and rotten stone may be added.

Polishing composition for use on varnished or enameled surfaces, etc. E. R. ALEXANDER, R. B. ALEXANDER and A. J. KNIGHTS (trading as E. Roberts & Co.). Brit. 280,116, May 18, 1927. An aq. ext. is formed by soaking gum benzoin 4 oz. in water 1.5 pints for 3 days and to the strained ext. thus obtained there is added white petroleum oil $\frac{1}{2}$ pint, pptd. CaCO_3 4 oz., cochineal or other coloring material 1 oz. and sufficient addnl. water to make a total of 1 gal. The mixt. is heated and then allowed to cool.

Producing foam for fire-extinguishing or for other purposes. N. SANDOR. Brit. 280,208, Nov. 3, 1926. Compressed gas in finely divided state is introduced into a foam-forming liquid such as an aq. soln. of saponin, to which substances such as sugar or glue may be added for increasing the tenacity of the foam. The process may be applied to the production of "petrol air foam" for use as a fuel. An app. is described.

Composition for fireproofing and preserving wood, paper, cloth, etc. TAISAN SHIGA. U. S. 1,674,802, June 26. See Can. 270,490 (C. A. 21, 3434).

Washing and drying silica or other gels. I. G. FARBERIND. A.-G. Brit. 279,941, Aug. 4, 1926. The material is washed and dried while in the form of sheets or plates supported by open frames in which the gel has been caused to set.

Metallic piston packing. HAMPTON P. RHODES. U. S. 1,674,839, June 26. A cylindrical core of rubber is surrounded by a mixt. of babbit, graphite and oil, and by an outer protecting covering of fabric.

Porous materials. ERIK CHRISTIAN BAYER. Danish 38,216, Dec. 12, 1927. Foam-forming org. substances are added to the mass, for instance org. alkali salts, saponin, etc., or the mass is mixed with a foam previously produced by means of the like substances. Cf. C. A. 22, 469.

Sealing composition. MADP P. EBBESEN. Danish 36,438, Aug. 20, 1926. A mixt. of alkalies and fatty oils, starch and water glass is specified in which the mixt. of alkalies and fats is all or in part replaced by soaps.

Adhesive composition. JOHN MCGAVACK (to Dominion Rubber Co., Ltd.). Can. 281,646 July 10, 1928. A tacky rubber compd. is formed by treating resinous material of vegetable origin (wood pitches, oleoresins, balsams, hard, soft and liquid resins) with a solvent (pinene, turpentine, spindle oil and solvent naphtha), emulsifying the softened material in H₂O and intermixing the emulsion with an aq. dispersion of rubber.

Chewing gum. H. W. MATHESON (to Canadian Electro Products Co., Ltd.). Brit. 280,247, Nov. 8, 1926. Synthetic resins such as those made from a vinyl ester and an aldehyde (as described in Brit. 280,246; cf. C. A. 22, 3056) are used together with, or as a substitute for, gum chicle.

Oxidizing, bleaching and purifying composition. H. BLUMENBERG, JR. (to Amos M. Buley). Can. 280,815, June 5, 1928. Al₂(SO₄)₃·18H₂O partly dehydrated by heating to 120° and ground to pass a 200-mesh screen is mixed with Ca(OC1)₂ in proportions of 1 to 3 mol. and 5-10% inert material (diatomaceous earth) is added.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Study on the manufacture of ceramic liquid gold. TOSAKU YOSHIOKA AND KENJI NAKANISHI. *J. Japan. Ceram. Assoc.* 33, 573-80 (1925).—The manuf. of liquid Au has been studied, chiefly the Schwarz process. Conclusions: (1) Turpentine or resin is as good as turpentine oil for the manuf. of liquid Au. (2) In the prepn. of balsam contg. S too long boiling increases the reducing quality of the product and renders the liquid Au inferior, while that made of balsam contg. free S due to insufficient boiling produces a spotted film of Au on firing. (3) There is no material difference in the quality of Au balsam contg. S between the Schwarz and the Dutertor processes. (4) Bi added to the liquid Au increases the thermal stability, luster and adherence of Au film. These actions are encouraged by the presence of Co and other metals. (5) The reducing quality of turpentine oil can be removed without any loss by exposing it to the sun in an air-tight vessel of quartz glass. S. KONDO

The resistance of glass toward corrosion by water. Study of ordinary window-glass. Principal constituents: silica, soda, lime, magnesia. MAURICE SCOHV. *Bull. soc. chim. Belg.* 37, 186-203 (1928).—The optimum compn. for Fourcault glass is SiO₂ 72.5, Na₂O 13.5, CaO 10.5, MgO 2 and (SO₃, F₂O₃, Al₂O₃) 1.5%. This glass is very easily machined, does not devitrify and is very resistant toward the atm. agents.

The devitrification of old glass. H. RITCHIE CHIPMAN. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 144-6 (1928).—Expts. carried out with 20-30-year-old bulbs verify Germann's conclusions (cf. C. A. 15, 934). Devitrification is a surface phenomenon. A. L. HENNE

Losses in sheet-glass production. STANG. *Keram. Rund.* 36, 287-8 (1928).—

Attention is devoted to the prepn. of the raw materials and especially the advantages of using cullet in the melting of wire glass. Sand should be well dried before using. Excessive mixing of batch materials is wasteful, since some gr. sepn. of the batch constituents takes place during storage in the batch bins. Good economies may be effected in the wire-glass industry by carefully scpg. the wire from the waste glass, usually by grinding the glass thoroughly, then dissolving the wire and making a final sepn. with a magnet. Cullet thus recovered shows only a 2% loss in wt. in melting whereas a 21% loss in wt. is incurred when raw batch materials are used. Cost of recovery of cullet is given as 40% of the cost of raw materials per ton of glass produced.

H. INSLEY

The brown coloration of glasses by sulfides. R. ECKERT AND F. H. ZSCHAOKE. *Keram. Rund* 36, 203-6(1928).—Two glasses with the comps SiO_2 70, CaO 10, Na_2O 20 and SiO_2 73, CaO 10 and Na_2O 17% were melted in small batches in fireclay crucibles and in larger batches in pots. Various reducing agents and compds. contg. S were added to cause the brown coloration. Conclusion: It is not advantageous to add S in any form in which it oxidizes easily to SO_2 or SO_3 during the melting because of lack of control of reducing conditions and loss of coloring agent and difficulties in refining. Coal is not a perfect reducing agent and when used in excess produces foaming and consequent refining difficulties. H_2S is satisfactory as the carrier of sulfide but cannot be economically used in melts of com. size. FeS_2 introduced as a batch material with just enough coal to give the necessary reducing conditions is a satisfactory coloring agent. The molten colored glass may again be decolorized by introducing O.

H. INSLEY

Relative deformations of glass and fused silica under the influence of temperature variations. A. ARNULF. *Rev. d'optique* 6, 316-27(1927); *Science Abstracts* 31A, 15.—With an interference method tests were made on slabs of glass and fused silica, the slabs being 20 mm. in diam., 9 mm. thick and having plane parallel faces. Whether for reflection or refraction the silica has the advantage of a much smaller coeff. of dilatation than glass and a thermal cond. 9 times as great. The effects of heat on one face of the slab were tested to imitate the case of reflection, and of heat throughout the slab to imitate the case of refraction. In the former case the silica is deformed 50 times less than the glass. In the latter case, if steady states are reached, the 2 substances are practically equally affected, the variation of the n being the predominant factor for silica and dilatation for glass. If temp. changes are rapid silica is less affected on account of its greater cond. The objection to the silica is its want of homogeneity and residue of birefringence, and these are against its use for refraction, but it is of most importance for mirrors.

H. G.

Dielectric data on Pyrex. C. L. DAWES AND P. H. HUMPHRIES. Harvard Univ. *Elec. World* 91, 1331-2(1928); 8 illus.—A piece of Pyrex "A" glass 20.3 cm. square (chem.-ware glass) was tested in a high-voltage bridge at a const. potential of 5000 v. Up to 5000 v. and more the voltage had no effect on the power factor and capacitance. The curves for the watt loss per cu. cm. are practically straight lines. The dielec. const. decreases with increase in frequency and increases with temp. These relationships are common with dielectrics. Over wide ranges of frequency and temp. there is no ionization and apparently no hysteresis lag. The total power loss is not proportional to frequency; the increase of loss over that at zero frequency is proportional to frequency.

C. G. F.

Elementary proof of the shale-likeness of clay particles. DMITRY P. KRYNINE. *Public Roads* 8, 250(1928).—A description of method and photograph of app.

A. E. GRAY

The refractory clays of the Ural. M. O. KLER. *Trans. Inst. Econ. Mineral. Met. (Moscow)* 1927, No. 33, 1-123.

E. H.

Developments in refractory materials. ALFRED B. SEARLE. *Fuel Econ. Rev.* 7, 65-71(1928).

E. H.

The measurements of the thermal expansion of refractory materials up to 1600°. K. ENDRELL AND W. STEGER. *Arch. Eisenhüttenwesens* 1, 721-4(1927-8); *Stahl u. Eisen* 48, 722(1928).—A critical review of the methods used for the detn. of the thermal expansion of refractory materials disclosed the fact, that only comparative methods are reliable. An app. developed to be used up to 1600° is described in detail. Fire-clay bricks with medium or high Al_2O_3 content show up to 1300° little and very uniform expansion; above 1300° they show contraction. Fireclay bricks high in SiO_2 exhibit irregularities due to the transformation of SiO_2 , i. e., a considerable expansion up to 1450°, followed by contraction at higher temps. Magnesite bricks show a uniform strong expansion up to 1500°, followed by little contraction. Silicate bricks with a

sp. gr. up to 2.35 do not expand from 600° to 1600°, a silicate brick with a sp. gr., of 2.40 has a const. vol. up to 1400°. Silicate bricks with a sp. gr. of 2.45 and 2.54, in which the transformation of the SiO_2 is not complete, show a strong expansion above 1200° and attain a total expansion of 2.85 and 3.35%, resp., of their total length.

J. A. SZILARD

Analysis of refractory materials. I. H. J. VAN ROYEN. *Stahl u. Eisen* **47**, 1696-9(1927).—Silica in quartzite and silica brick is detd. by loss in wt. after the usual HF treatment; the residue is dissolved in fused pyrosulfate and the Fe detd. by titration with TiCl_3 . In a sep. portion, also treated with HF, the Ti and Al are pptd. together as phosphate and weighed; the ppt. is dissolved in fused pyrosulfate and the Ti detd. colorimetrically, the amt so found multiplied by 3.15 being subtracted from the wt. of mixed phosphates to obtain the wt. of AlPO_4 . Mn is detd. by the Vollhard method, and CaO and MgO are detd. as usual. The analysis of clays and grog is carried out in a similar manner, except that the sample is decomposed by fusion with alkali carbonate and the mixed Al and Ti phosphates obtained are redissolved in HCl and repptd. to remove absorbed Na salts. Cr should be tested for and, if found, the corresponding wt. of Cr phosphate is deducted from the wt. of combined phosphates. To det. Ti gravimetrically in this ppt. it is fused with a large excess of Na_2CO_3 , the mass leached with water, the insol. Na titanate collected and dissolved in HCl, and the Ti pptd. by Gooch's acetate method.

B. C. A

An outline of the manufacture and application of vitreous enamels. WILFRED MAVOR. *Metal Ind.* (London) **32**, 641-3(1928); *Chemistry & Industry* **47**, 435-7.

F. H.

Investigations on the one-component system SiO_2 (NIEUWENBURG, NOOIJER) **2**. The determination of specific heats and heat tone from temperature-time curves. COHN **2**. Colors for glass painting (RASSER) **26**. Developments in gas works carbonizing plant, with special reference to refractory materials (GILL) **21**. The abrasive-garnet industry (Borx) **8**. Electric furnace for use in glass manufacture (Brit. pat. 279,818) **4**. Apparatus for making marbles or other spherical bodies from glass (Brit. pat. 279,920) **1**.

Feeding mold charges of molten glass. JOHN R. KELLER (to Hartford Empire Co.). U. S. 1,675,273, June 26. Mech. features.

Forming figured glassware from separate films of glass united into a single sheet while still soft. EDWARD DANNER. U. S. 1,674,856, June 26. An app. is described.

Apparatus for producing and handling rolled glass sheets. SOCIÉTÉ ANON. DES MANUFACTURES DE GLACES ET PRODUITS CHIMIQUES DE ST. GOBAIN, CHARENTY-ET-CHER. Brit. 279,860, Oct. 30, 1926.

Apparatus for continuous manufacture of sheet or plate glass. CHARLES HEIZE. U. S. 1,675,217, June 26.

Apparatus for annealing glassware. KARL E. PEILER (to Hartford-Empire Co.). U. S. 1,674,794, June 26.

Continuous annealing-leer for glassware. A. W. RUSSELL (to British Hartford-Fairmont Syndicate, Ltd.). Brit. 279,835, Oct. 26, 1926.

Reinforced glass. W. C. TAYLOR (to Corning Glass Works). Brit. 280,196, Nov. 6, 1926. Transparent sheets are formed by joining glass sheets with an intervening reinforcing material having approx. the same index of refraction as the glass. "Pyralin" may be used with lime tank glass.

"Splinterless" glass. L. BARTELSTONE. Brit. 279,671, Dec. 21, 1926. A film of non-solvent such as castor oil or linseed oil is applied to sheets of celluloid, cellulose acetate or the like and glass sheets are united to these by the action of heat and pressure.

Purifying clay, etc. T. W. PARKER and DARTMOOK CHINA CLAY CO., LTD. Brit. 279,694, Feb. 28, 1927. Clay or like material contg. Fe is bleached and decolorized by treatment with acid, with or without a reducing agent, and with aq. solns. of salts the bases of which do not form colored compds. with non-chromophoric acid radical. Among the salts which may be used are: Al sulfate, Na, K or NH_4 alums, and various salts of Al, Ca, Ba or Mg.

Refractory articles. GRANT S. DIAMOND (to Electric Refractories Corporation). U. S. 1,674,961, June 26. In forming crucibles, muffles or other refractory articles, MgO and cryst. graphite are mixed with a binder such as tar, molasses or a synthetic resin and with a glazing material, e. g., a neutral silicate, and the articles are molded, baked, further coated with glaze, and rebaked.

Continuously operating plant for burning refractory materials, etc. HEINRICH KOPPERS (to The Koppers Development Corporation). U. S. 1,674,985, June 26.

Circular kiln suitable for firing ceramic products. THEODORE C. PROUTY and WILLIS O. PROUTY (to American Encaustic Tiling Co., Ltd.). U. S. 1,674,992, June 26.

Cast metal crucibles. JOHN W. MARDEN (to Westinghouse Lamp Co.). U. S. 1,675,119, June 26. A cold cast refractory metal crucible such as may be formed of Mo, Ta, W or like metal is provided with a lining of thoria or other inert refractory material which is cold-cast in the crucible.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Evolution and progress in the manufacture of limes and cements. P. FERON. *Rev. matériaux construction trav. publics* 1928, 201-3. F. O. A.

Lime and cement in the State of Sao Paulo. ERNST SCHNEIDER. *Tonind.-Ztg.* 52, 912-3(1928). F. O. A.

The origin of the theories regarding hydraulic lime and cements. J. MERCEYRON-VICAT. *Ciment* 33, 1826(1928).—Historical. F. O. ANDEREGG

The determination of lime in cement raw mixes. FRANZ KUBIK. *Tonind.-Ztg.* 52, 678(1928).—Because of the presence of $MgCO_3$, both the titrimetric and gasometric methods gave high results, especially the latter. Either method may be used if the correction is const. Although the difference of 0.5% CaO in the finished cement may have considerable influence on its hydraulic properties, this is about the exptl. error in the analyses. F. O. A.

Cement making from waste materials. II. E. T. ELLIS. *Concrete* 31, [6], 96-7 (1927); *Building Sci. Abstracts* 1, 28.—E. discusses briefly the manuf. of Parian cements from old wall plaster, superphosphate-factory residues and water-softening wastes; the production of calcareous cements from the residues arising from the manuf. of $KClO_3$ and from the production of HNO_3 from the N of the air, and, finally, the recovery of lime suitable for the manuf. of cement from the waste products of caustic-soda plants. H. G.

Slag cement, its nature and properties. JEAN C. DE LANGAVANT. *Rev. matériaux construction trav. publics* 1928, 87-90, 139-43, 171-6, 208-15.—A general review of the properties of slag cements, including setting time, strength, constancy of vol. resistance to corrosive waters. F. O. A.

Definition of slag cement in Germany. ANON. *Tonind.-Ztg.* 52, 681-2(1928).—Slag cement may contain 15-69% portland cement ground with basic granulated blast-furnace slag of which the ratio $(CaO + MgO + \frac{1}{2} Al_2O_3) : (SiO_2 + \frac{2}{3} Al_2O_3)$ shall be greater than 1. The slag must not contain more than 5% MgO and the retarder shall not exceed 3% of the mixt. F. O. A.

A new method of burning cement. KARL BIEHL. *Tonind.-Ztg.* 52, 1015-7 (1928).—Claims are made that by the use of the Andreas system a raw material can be burned in a shaft kiln without briquetting, into a clinker fully as good as that of the rotary kiln. Saving of fuel, elimination of ring formation, sharp burning and rapid cooling are advantages of this system. F. O. A.

The behavior of trass cement in corrosive waters. H. RACH. *Tonind.-Ztg.* 52, 1059-60(1928).—Standard briquets were made from a ready-mixed trass cement and immersed in 2.5% $MgSO_4$ without any perceptible effect for 3 yrs. Other briquets only partly immersed suffered partial disintegration of the half extending into the air (due to efflorescent action). F. O. A.

Lime in cement-trass mixtures. TH. KIKKE. *Tonind.-Ztg.* 52, 1037-8(1928).—A mixture of 1 part portland cement, 0.5 part Bavarian trass, 0.75 part lime putty and 5 parts standard sand gave strengths similar to 1:3 cement-sand mortars and also low permeability. F. O. A.

New experiments with aluminous cements. R. FERET. *Rev. matériaux construction trav. publics* 1928, 135-9, 166-71; cf. C. A. 22, 149.—The importance of using as little water as possible with aluminous cement is emphasized. F. O. A.

The action of a large excess of water on aluminous cement. HUGO VIERHELLER. *Tonind.-Ztg.* 52, 611-4(1928).—Aluminous cement can be drowned out by an excess of water. CO_2 from the air of ground water does not affect the hardening reactions. F. O. A.

Aluminous cement in practice. FRITZ BÜCHI. *Beton u. Eisen* 27, 174-8(1928).—From a series of tests in comparison with regular specimens, the conclusion is reached that flexural tests with beams made on the job should give reliable indications of the strength of concrete made with aluminous cement. F. O. A.

Comparative setting-time observations with the Vicat needle and the "automat." NITZSCHE. *Tonind.-Ztg.* 52, 1036-7(1928).—The height reached by the wheel of the "automat," which is similar to that used in the ceramic industry, was observed when the initial set of several different cements was reached, as detd. by the Vicat needle. A fairly const. value was obtained which was nearly independent of the load on the wheel. F. O. A.

Review of the literature of the constitution of portland cement clinker. H. RICHARZ. *Tonind.-Ztg.* 52, 586-9, 634-7, 786-8, 826-9, 852-4, 1078-81(1928); cf. *C. A.* 22, 2041. A bibliography of 81 references is included. F. O. A.

Study of the health hazard in a large portland-cement plant. L. R. THOMPSON, DEAN K. BRUNDAGE, ALBERT E. RUSSELL AND J. J. BLOOMFIELD. *Pub. Health Rpts.* 43, 1497-8. *Public Health Bull.* 176, 1-138(1928).—Detns. were made of the no. of dust particles in the air in several parts of the plant. Careful phys. exams. were made of all employees over a 3-year period. Ca. dusts generated in the manuf. of portland cement do not predispose workers to tuberculosis or to pneumonia, though exposed workers experienced an abnormal no. of attacks of diseases of the upper respiratory tract, especially colds, acute bronchitis, tonsil and pharynx diseases and influenza. About 60% more time was lost from work by workmen in dusty departments over that lost by employees in non-dusty departments at the same plant. Limestone dust was slightly more deleterious than cement dust. When the dust in the atm. is less than about 10 million particles per cu. ft. it probably does not constitute a health hazard. Work in a cement-dusty atm. predisposes to certain skin diseases such as boils, conjunctivitis and to deafness. Improved ventilating systems and general plant modernization are the chief remedies advocated. C. R. FELLERS.

The construction and destruction of the Helgoland harbor. RICHARD GRÜN. *Tonind.-Ztg.* 52, 500-4(1928).—A description of the construction of the concrete work of the harbor and its destruction by means of wave action, explosives, washing away of supporting sand and sulfate action. F. O. A.

The compressive strength of non-cubic concrete specimens. BERNWARD GARRE. *Tonind.-Ztg.* 52, 504-5(1928).—The shorter the specimen the higher the strength, perhaps this is due to the greater amount of the stronger surface material. F. O. A.

The application of protective coatings on concrete. RICHARD GRÜN. *Tonind.-Ztg.* 52, 824-6(1928); cf. *C. A.* 21, 4041. A heavy asphalt coating upon a concrete made with a cement low in lime gives best results with acids. Bituminous coatings are valuable against the aggressive action of most salts, while phenolic condensation products are valuable against fatty oils. The concrete should be carefully made with plenty of cement, with trass admixtures, with properly graded aggregates and with about 10% water. The concrete should be allowed to age as much as practical and the surface must be dry and clean. The greatest of care should be used in applying the protective material. The first coat of bitumen should be well diluted, the second and third, however, undiluted. Each coat should have adequate opportunity to dry out. F. O. A.

Strengthening and enduring concrete with sulfur. W. H. KONNER. *Stone Tr. J.* 46, [5], 217(1927); *Building Sci. Abstracts* 1, 21-2. --Tests carried out on concrete impregnated with S showed in some cases an increase of tensile strength from 151 to 2000 lb. per sq. in. and compressive strengths up to 10341 lb. per sq. in. were obtained. The method of impregnation is discussed and it is stated that creosoting cylinders can be adapted for use with S. The cause of the increased strength may be the contraction of the S on solidifying. Impregnated concrete is not so fire resistant as untreated, but the fire hazard is very slight. No satisfactory method of treating existing structures has been yet devised. H. G.

The action of sulfate water on concrete. Further tests of specimens immersed in Medicine Lake, S. Dakota. DALTON G. MILLER. *Public Roads* 8, 203-12(1927). --Compressive tests made after exposures of cement cylinders up to 3 1/2 years in Medicine Lake, S. Dak., (2.34-4.72% $\text{MgSO}_4 \cdot \text{Na}_2\text{SO}_4$) give rise to the following conclusions: standard portland cements from different plants vary greatly in compression resistance. High alumina cements are satisfactory with one exception. Cylinders cured in steam at 100° are satisfactory after 3 years. Photographs and tables are given. A. H. G.

Relation between sodium sulfate soundness test and the absorption of sedimentary rock. D. O. WOOLF, JR. *Public Roads* 8, 225-8(1927). --There is no abs. correlation between Na_2SO_4 soundness test and failure of sedimentary rock through frost action, but it is of value in indicating questionable concrete aggregates. Photographs and tables are given. A. E. GRAY.

Effect of various salts in the mixing water in compressive strength of mortars.

F. E. GIESECKE, H. R. THOMAS AND G. A. PARKINSON. *Univ. of Texas Bull.* No. 2730; *Public Roads* 8, 248-9 (1928).—Investigation shows (1) NaCl , Na_2SO_4 , and Na_2CO_3 are injurious to portland cement mortars; (2) MgCl_2 and MgSO_4 have little effect on mortar strength; (3) strength ratios increase with age whether the salt reduces or increases mortar strength; (4) sulfates are not necessarily injurious to mortar strength; (5) 6% FeSO_4 increases mortar strength approx. 20%; and (6) relatively few natural waters contain high enough total solids to make them unsafe for use in concrete. A. E. G.

Stone preservation and decay. A. P. LAURIE. *J. Roy. Inst. Brit. Architects* 35, 283-9 (1928); *Carp. & Build.* 102, 396-8; *Building Sci. Abstracts* 1, 69.—L. deals with the chief mech. and chem. causes of decay, and draws attention to the part played by the mortar in the joints and by salts introduced from the subsoil water. The importance of examg. the site from a geological point of view is emphasized. Under the subheading "Stone Preservatives," the use of "Si ester" and the practice of mixing trass with the mortar are discussed. H. G.

A rapid method for determining iron in hydraulic products. MARC ELBER. *Rev. matériaux construction trav. publics.* 1928, 161-2.—The permanganate method is used. F. O. A.

Principles of kiln-seasoning of timber. I. Types of commercial kilns in use. S. T. C. STILLWELL. Dept. Sci. Ind. Research Forest Prods. Research *Special Rept.* No. 2, 11 pp (1928). B. C. A.

The use of portland cement for cementing the casings of petroleum wells (ZEVADA)
22. Stock for building boards, roofing, etc. (U. S. pat. 1,675,244) 23.

BLANC, E. C. and ECKEL, EDWIN C.: *Le ciment portland. Ciments portland artificiels. Ciments de laitier. Ciments alumineux. Ciments à hautes résistances. Matières premières. Matériel de fabrication. Ensembles d'usines.* Paris and Liège: Ch. Béranger. 482 pp.

BRADLEY, HAROLD and HANCOCK, C. C.: *Modern Road-making.* London: Contractors Record, Ltd. 280 pp. 15s. net. Reviewed in *Chem. Trade J.* 83, 8 (1928)

Cement. HARVEY R. DURBIN (to International Cement Corp.). Can. 281,304, June 26, 1928. In the production of high-grade cement, more than the normal amt of lime is admixed with the usual constituents of normal Portland cement, and the whole is burned to incipient fusion, permitted to cool, ground and reburned to incipient fusion.

Waterproof cement. MCKINLEY GANNON (to Gannon Products Co.). U. S. 1,675,265, June 26. A cement suitable for general purposes, mending, etc., is formed of acetone 5 gals., celluloid 10 lbs., shellac gum 4 lbs., denatured alc. 0.5 gal., camphor 2 oz. and "banana oil" 4 oz.

Composition for floors. FREDERIC E. BOELKOW and FRIEDRICH W. O. LISTING U. S. reissue 17,010, June 26. See original pat. 1,635,982 (C. A. 21, 2974).

Porous cement products, etc. A. MENAGER. Brit. 280,116, May 20, 1927. The press cake obtained in sugar refining and composed mainly of CaCO_3 and colloidal substances is used with an acid to generate bubbles in plastic materials such as plaster or cement compns., insulations contrg. MgO , etc.

Artificial stone. F. TRACHSEL, J. WIEDMER and P. ZIGERLI. Brit. 280,104, May 2, 1927. A cement mixt. is used contrg. org. fibers which have been treated with a water-glass soln. to which about 1% of turpentine oil has been added and with a reagent which will ppt. an insol. Si compd. on the fiber. Various other ingredients such as fillers and coloring substances or waterproofing agents may be added.

Tile, etc. L. F. BARRINGER (to Can. General Elec. Co., Ltd.). Can. 280,936, June 12, 1928. A tile or stoneware article comprises asbestos and an inorg. binder, and is provided with a water-impervious, heat-resisting coating of a resin or mixt. of ester resins, made from a polyhydric alcohol and a polybasic acid capable of becoming infusible and insol. by heating, a plasticizer and an opaque filler.

Paving. H. H. SHORTER. Brit. 280,251, May 14, 1926. A paving suitable for tennis courts comprises a "hardcore" or clinker foundation, a porous "cushioning" layer which may be formed of clinker, ragstone or slag sprayed with cold emulsified bitumen and a top layer which may comprise aggregate 62, cement 3, coloring such as Reading green 15 and bitumen emulsion 20 parts.

Paving blocks. N. THOMAS. Brit. 280,120, June 10, 1927. Molds for concrete blocks or similar products are lined at their base with oiled paper which crinkles irreg-

ularly on contact with the wet materials and thus gives the molded product a slightly undulated surface.

Paving composition. TRINIDAD DEUTSCHE OEL-UND ASPHALT-A.-G. Brit. 279,885, Oct. 30, 1926. An emulsion suitable for coating stone for road-making may be formed of asphalt bitumen 500, oleic acid 20, and a 2% NaOH or KOH soln. 120 parts. A vibrating app. for coating and laying the stone is described.

Road-making material. A. C. BROWN and J. T. HINES. Brit. 280,011, Oct. 11, 1926. In order to preserve road-making material in soft condition suitable for laying, crushed stone or like material is treated with a colloidal soln. of resin oil dispersed in kerosene or the like, before mixing with the bituminous binder and filling materials. The colloidal soln. should contain about 25% of resin oil and the entire mixt. may comprise: crushed stone 2030, colloidal soln. 12, asphaltic or bituminous material 123, filler 60 and lime 11 parts.

Tar macadam. J. HINGS. Brit. 279,628, Oct. 22, 1926. Warm moist aggregate is dipped into a bituminous or tarry coating material which may be in the form of an aq. emulsion.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Calculation of the combustion temperature in blast furnaces. K. MÜHLBRADT. *Stahl u. Eisen* 47, 1813-6(1927).—A theoretical discussion of the mechanism of the combustion of coke in a blast furnace, with special reference to the temp. distribution. In the blast furnace the reaction takes place between heterogeneous phases; hence all calcs. of the initial temp. of the glowing C based on the principles of gas combustion lead to erroneous results. Thermodynamic considerations of the equilibria in the furnace indicate that there are 2 initial temps. very different from one another, one due to the reaction in the solid phase and one to that in the gaseous phase, and that the temp. in any zone of the furnace is dependent on the extent to which each reaction takes place in that zone, modified by the effects of convection, conduction by the hot blast and radiation. This theory is shown to account for observed facts in the distribution of temp., effect of varying wind pressure and reactivity of the coke.

B. C. A.

A study of energy. MARIANO B. OBREGÓN. San Luis Potosí. *Mém. rev. soc. cient. "Antonio Alzate"* 47, 73-110(1927).—This is a somewhat general study of the many factors which det. the efficiency with which the energy of various fuels is converted into mechanical energy by means of engines and motors, including steam and internal-combustion types. Formulas, data and illustrative calcn. are given.

R. H. LOMBARD

The heat-power plant with Benson boilers in the Gartenfeld cable factory of the Siemens-Schuchert works. H. GLEICHMANN. *Apparatebau* 40, 121-5(1928). Descriptions of boilers for gas and powd.-coal firing with plans showing pipe-line connections to the various units.

J. H. MOORE

Solid fuels available for steam production. A. A. POTTER AND H. L. SOLBERG. *Power* 67, 905-7(1928).—Various types of coal and of waste fuels are discussed.

D. B. DILL

How powdered coal stands today. HENRY KREISINGER. *Power* 67, 958-61(1928).—The powd. coal plant is relatively independent of the kind of coal and is readily adaptable to changes in demand for steam. Heat liberation at the rate of 50,000 B. t. u. per cu. ft. of combustion space is probably near the max. and can only be reached under special conditions and with incomplete combustion. Of the 75% of ash normally passing out the stack, about 9/10 can be recovered by electrostatic pptn.

D. B. D.

Water and coal as sources of power. A. A. POTTER AND H. L. SOLBERG. *Power* 67, 802-5(1928).—The classification of fuels and coal resources of the U. S. are discussed.

D. B. DILL

Pulverized coal in stationary railway power plants. I. ANON. *Power* 67, 1032-6(1928).—A report by a sub-committee on "Coal Fired Plants" of the *International Railway Fuel Assoc.* Without considering powd. coal a panacea, its advantages are as follows: less trouble due to poor coal; flexibility in operation; more rapid and complete combustion; lower banking, standby and low-load losses; higher rating or more boilers per stack; less operating labor; lower maintenance cost. II. *Ibid* 1072-5. —Pulverizer units, furnace design and wall construction are discussed. III. *Ibid* 1118-21. —Ash disposal, wall construction and method of firing are discussed. IV. *Ibid*

1160-1.—Fundamental requirements of the ideal unit pulverizer are reliability, efficiency and low maintenance. D. B. DILL.

Pulverized-lignite experiments. R. L. SUTHERLAND, N. T. BOURKE AND E. J. O'KEEFE. *Power* 67, 1141-4(1928).—Preliminary drying was necessary. The av. rate of fuel consumption was 2.44 lb. of lignite as fired or 16,540 B. t. u. per cu. ft. of effective furnace vol. as compared with 19,100 B. t. u. with Pocahontas coal. D. B. D.

Nitrogenous matter in coal. C. W. SHACKLOCK AND J. DRAKELEY. *J. Soc. Chem. Ind.* 46, 478-81T(1927).—The quantity of N extd. by means of dil. H_2SO_4 from peat, lignite, sub-bituminous, bituminous and anthracite coals decreases in the order given, and is not influenced under the conditions of the expt. by particle size provided the coal is first passed through a 30-mesh sieve. N in the form of amide compds., monoamino and diamino acid has been distinguished and detd. The monoamino acids appear to be the most persistent compds., and with coals account for over 70% of the extd. N. The diamino acids exist in coals in quantities which are too small to det. by the methods employed in this investigation. The amide compds. are present in all the fuels, and account for 15-20% of the N extd. from the coals. B. C. A.

Lancashire coalfield. Wigan Four-foot seam. ANON. Dept. Sci. Ind. Res., *Fuel Res.* 1927; Physical and Chemical Survey of the National Coal Resources, No. 10, (60 pp. 1927).—Samples of coal taken from the Wigan Four-foot seam in 10 different districts have been examd. in detail. The seam is of good quality, consists of fairly hard and moderately bright coal contg. a certain amt. of durain, and is seldom split by thick shale or dirt bands. The thickness varies from about 2 ft. on the east to a max. of 6 ft. 3 in. at Garswood, thence thinning slightly towards St. Helens. The seam yields a good coking coal, which is used chiefly as a house or as a gas coal; it produces a coke which is usually only slightly swollen. The moisture content is normal, about 2-3%, except for the Garswood sample (5.6%). The ash content varies from 2.6 to 9.9%, the av., however, lying between 3 and 4%. The av. volatile matter content is high. The S. content tends to be high in the Tyldesley and Atherton districts, but elsewhere is comparatively low. The results of lab. carbonization assays at 600° indicate the suitability of this coal for gas manuf. Washing tests made on 3 of the samples show that the coal lends itself to purification by both float-and-sink and froth-flotation methods. B. C. A.

Gas-works practice. H. HOLLINGS. *Fuel Econ. Rev.* 7, 21-4(1928).—A review. E. H.

The new gas works at Prague. LININGER. *Z. österr. Ver. Gas Wasserfach.* 68, 55-62(1928). L. C.

New developments in gas-works carbonizing plant, with special reference to refractory materials. G. M. GILL. *Gas J.* 182, 724-6(1928).—A review. F. S. G.

A short history of the gas industry in Japan. SAKURA OKAMOTO. *J. Fuel Soc. Japan* 7, 31-6(English Section) (1928).—The development of the gas industry in Japan is discussed. F. I. NAKAMURA

Recent developments in the purification of gas. H. ZOLLIKOFER. *Monats-Bull. Schweiz. Ver. Gas-Wasserfachmännern* 7, 78-86; *Chem. Zentr.* 1927, 1, 2496.—A detailed review and discussion of the "Seaboard" process of the Am. Koppers Co. for the removal of H_2S and HCN by means of soda lye, with the recovery of S. The C_1H_4 purification process of Lenze and Rettenmaier (Hamborn) is also described, in which the crude gas is cooled to 0° or -2°, with recovery of concd. NH_4OH , the sepn. of tar by the Cottrell process with the "Lurgi" app. (Lurgi Apparatebau-Gesellschaft, Frankfurt) and the drying of gas (with the object of preventing corrosion) by compression, cooling, absorption with $CaCl_2$ and SiO_2 gel through storage in a water-free gas container, are all described. C. C. DAVIS

The separation of coke-oven gases by intense cooling. OTTO HUPPERT. *Metallbörse* 18, 509-11(1928).—A brief description of the methods in use and statistics. J. BALOZIAN

Comparison of the most important methods employed in the cleaning of blast-furnace gas. V. HARBORD. *Iron Steel Inst.* May, 1928 (advance copy), 28 pp.—The actual works records for a no. of large British plants were used in compiling data for comparing the efficiency of different types of installations. The "efficiency" of dust removal is conditioned by the fineness of the particles, almost any method being efficient for coarse particles. The "efficiency" is further conditioned by the effect of the treatment on the sensible heat of the gas. Certain types of gas cleaners are designed to preserve the heat of the hot gas, while others necessitate the cooling of the gas prior to treatment. The Kling-Weidlein wire mattress cleaner and the Lodge-Cottrell electrostatic cleaners belong to the first class. Wet cleaning plants reduce

the temp. of the gas and also remove the moisture, thus providing a more combustible gas than the high-temp. dry treaters. If a dust content of about 0.5 g. per cu. m. is sufficient, electrostatic plants or a washer of the tower and spray type without disintegrators will do. If a lower dust content is required a washer of the disintegrator type or a Halberg-Beth filtration plant is necessary. The Kling-Weidlein plant is only satisfactory as a primary cleaner, or in conjunction with an electrostatic cleaner if retention of sensible heat is required. The cost of operation of the electrostatic cleaners is less than that of other types but the av. dust content of the cleaned gas is higher. The Halberg-Beth bag cleaner gives a lower dust content in the final gas and its cost of operation is no more than that of any other type of cleaner. The high capital cost and the handling of the dry dust are the 2 main objections to this plant. The most efficient kinds of wet washers are of the combined tower and disintegrator type. A comparison table contg. data on the operation of 12 plants, and tables contg. the observed results in the operation of all the types of plants investigated are included. Also in *Blast Furnace Steel Plant* 16, 901-5. J. W. SHIPLEY

Investigations on the temperatures and composition of gases in the combustion chamber of a shaft furnace. DIEPSCHLAG. *Giesserei* 15, 3-6(1928).—The combustion chamber of a shaft furnace may be divided into 2 parts, the lower, in which the oxidation of C to CO_2 takes place, and the upper, in which the CO_2 is reduced by further C to CO. Based on theoretical considerations, a gas compn-temp diagram is plotted, it being assumed that the max. CO_2 content is 21%. The curve shows that in the oxidizing zone the temp increases, with increasing CO_2 , to a max 1605°, and decreases in the reducing zone to a final value of 314°, there still being CO_2 present, indicating that the Boudouard equil. had already been reached. The oxidizing and reducing zones not being sharply sep'd in practice, the actual curve is more rounded at the point than the theoretical. This is verified by a plot of calcd. values from the data of Kreisinger (*Stahl u. Eisen* 1923, 1351), for a roasting hearth. To test the theoretical conclusions further, a small exptl. shaft furnace is constructed and expts are conducted using varying sizes of fuel and air velocities. In general these values confirm the theoretical conclusions. Thus, the temp. of the combustion chamber increases to a max. and then falls off, this temp. being higher the greater the air velocity. When the size of the fuel is decreased, the highest temp. zone is lowered and the oxidizing zone is smaller. A zone of complete combustion where the CO_2 content is 21% could not be detected, the max. being 16.5%. An explanation accounting for the mechanism of combustion in the furnace is given. J. BALOZIAN

Removal of carbon-sulfur compounds from coal gas by oil washing. K. L. DAWSON. Nova Scotia Tramways and Power Co., Halifax. *Eng. J* 11, 266-81(1928).—A description of the app. and the theoretical considerations upon which the efficiency of the operation is based are given. No. 1, Pale Paraffin oil with a mean mol wt. of 250 is used in a series of 3 scrubbers for removing the S compds. $\text{C}_2\text{H}_4\text{S}$ is also removed. After the S compds. and $\text{C}_2\text{H}_4\text{S}$ are removed by distn. the oil is returned to the scrubbers. After several months the mol. wt. of the conditioned oil increased to 300 and its S content was slightly increased. Scrubber 1 removes but little of the S, while in scrubber 3 the greatest transfer of S compds. occurs. This is explained by the existence of 2 S compds. in the gas, CS_2 and $\text{C}_2\text{H}_4\text{S}$. The $\text{C}_2\text{H}_4\text{S}$, which has been removed increases the absorption of the S compds. by the oil. The lower the temp. of the gas passing through the scrubbers the greater is the efficiency of absorption. A reduction of 50% in the S content of the gas is obtained and less than 35 grains of S per 100 cu. ft. is left in the gas. Tables contg. operating costs and log sheets for the scrubbing units are included. J. W. SHIPLEY

Analysis of lignite oils. A. LABAD OCÓN. *Quím. ind.* 5, 33-5(1928).—Oil from Aragon lignites distd. under technical conditions yielded the following fractions: 14.8% b. up to 220°, 10.4% b. 220-250°, 17% b. 250-300°. The 1st fraction yielded: 4.7% b. up to 150°, 5.8% b. 150-185°, 4.3% b. above 185°. The neutral oils obtained by washing with H_2SO_4 66° Bé. and NaOH had the following compn.:

B.p.	Up to 150°	150-200°	200-250°	250-300°	Up to 150°	150-210°
Percent, $\text{C}_8\text{H}_{18}+2$	8 }					
Percent naphthenes	17 }	20	25	30	25	33
Percent aromatic	24	18.4	18.4	17.0	29.6	28.8
Percent olefins	15	14.7	11.3	11.6		
Percent unsatd. to Br_2	36.7	37.7	31.9	32.7	38.6	31
Percent cyclic satd.	38.3	42.3	45.1	37.3	36.4	47

MARY JACOBSEN

Determination of unburned flue gases by combustion over copper oxide. HANS MIRS. *Gas u. Wasserfach* 71, 509-15(1928).—Methane can be detd. in flue gases contg. 2% methane with an accuracy of 92%, by burning on Cu oxide at temps. from 780° to 890°, depending on the length of the Cu oxide catalyst and the gas rate. H₂O, CO, H or CO₂ has no influence on the combustion of CH₄ at the given temps. H, however, retards combustion at temps. 50-100° lower. The velocity of the combustion is greatest at the front of the Cu oxide and decreases toward the rear. In order to secure concordant results in the tests, the Cu oxide was repeatedly oxidized and reduced until further oxidation and reduction gave no further change in the percentage of methane oxidized at a given temp.

Low-temperature tar oils. F. D. MARSHALL. Carlton Main Colliery Co., Barnsley. *Gas J.* 182, 727(1928).—A permanently water-white spirit is obtained by treating low-temp. tar distillate up to 170°, after extn. of tar acids and bases, with petroleum ether. The thick oil thrown out has drying and elastic properties, forming a good varnish for metal surfaces.

Continuous tar distillation. W. KARSTEN. *Teer u. Bitumen* 26, 297-9(1928).—A description of present industrial standard practice. The preheated tar passes down through downward-pointed nozzles in the diaphragms of a column, against a counter-current of superheated steam passing through upward-pointed nozzles to avoid interference. Here the tar is distd. down to pitch, the consistency of which is controlled by the quantity and temp. of the steam. The vapors pass on through a series of other columns in which various fractions are removed in succession by partial condensation. Heat is economized by interchangers at suitable points. Advantages over batch distn. are heat, labor and space economy and short exposure to heat, resulting in less pitch and a lower free C content.

The removal of phenol from ammonia liquor with recovery of raw phenol or phenolate lye. ERICH KOCH. *Teer u. Bitumen* 26, 281-4(1928).—A description and discussion of present industrial practice. The recovery of the considerable quantity of benzene, retained by the ammonia liquor, after the phenols have been washed out with benzene, is necessary to the economic success of the process. It is successfully accomplished by washing with a paraffin oil.

The removal of phenols from waste liquors of by-product plants and its economic importance. A. WEINDEL. *Glückauf* 63, 401-9; *Chem. Zentr.* 1927, 1, 2233.—The harmful effect of phenols is described, particularly with reference to their effect on flora and fauna of streams which they usually enter from the waste liquors of gas works and coke-oven plants. Their origin, methods of treating the NH₃ liquor in which 1.5-4.5 g. per l. are present and the necessity for sanitary and economical reasons for their removal are also discussed. Methods for removing the phenols without recovering them are described. The use of waste liquors from NH₃ plants for quenching coke, their treatment with gases of combustion and steam in special towers and their biol. decompn. by the Fowler process improved by Bach, are almost wholly replaced by processes in which the phenols are recovered. The Preiss process, i. e., neutralization with H₂SO₄ of waste liquors freed from lime sludge, extn. with C₂H₆ and pptn. with NaOH, is uneconomical, and essentially more advantageous is the process introduced by the "Emscher Genossenschaft," which involves direct extn. with C₂H₆ of the NH₃ liquor, washing with H₂SO₄ and removing pyridine so that pure, white (NH₄)₂SO₄ is produced. The process is described in detail.

The problem of the purification of ammoniacal waste liquors. E. OTT. *Monats-Bull. Schweiz. Ver. Gas-Wasserfachmännern* 7, 75-8; *Chem. Zentr.* 1927, 1, 2496.—A discussion of the special importance of removing phenols from NH₃ waste liquors by destruction or extn. as a means of maintaining surface and ground waters in a pure condition. Particular stress is laid on conditions in Switzerland. The Bach process perfected at the Emscher Genossenschaft, in which the phenols are oxidized biologically and rendered harmless by decompn., and the purification accomplished by such means, are described in detail.

Heat of coking of gas and coking coals. II. ERNST TERRES and MARTIN MEIER. *Tech. Hoch. Braunschweig. Gas u. Wasserfach* 71, 457-61, 490-5, 519-23(1928).—Errors in previous detns. of heat of coking by Terres and Wolter (*C. A.* 22, 1457) are noted and corrected. Heat of coking is now defined as the quantity of heat necessary to convert 1 kg. air-dry coal at 20° into coke and gaseous products at any given temp. by including the energy in kg. cal. corresponding to the external performance of work by the gaseous products. Addnl. precautions are given in regard to the calibration of the app., which must be carried out under conditions as nearly like those of the detns. as possible. Curves for the heat of coking are given for 15 German and English coals between

600° and 1100°. These curves vary widely and explain abnormalities noted in coking coals on a com. scale. Heats of coking cannot be estd. from the analysis of the coal and small-scale gasification expts., but can be detd. directly with little more difficulty than a B. t. u. detn. A simplified method for detg. heats of coking is being developed. The low heats of coking found for these coals lead one to believe that excessive heat is required in com. coking installations on account of losses due to radiation and conduction. R. W. RYAN

The determination of volatile matter in coke. FREDERICK J. EATON AND STUART PEXTON. *J. Chem. Soc.* 1928, 1215-7.—This method combines the rapidity of the A. S. T. M. method with the trustworthiness of the Bone and Silver method for coals. The coke, in a Pt crucible, is heated in an elec. furnace. Errors due to oxidation are avoided by passing a current of N through the furnace. Variations in check detn. should not exceed $\pm 0.05\%$. A table shows comparative results. DAVID GORDON

Reactivity of coke. J. H. JONES, J. G. KING AND F. S. SINNATT. H. M. Fuel Research Station, Greenwich. *Iron Steel Inst.* May, 1928 (advance copy), 20 pp.; cf. C. A. 22, 1841.—A large number of British coals were examd. for the velocity of the reaction between CO₂ and the carbon of the coke in forming CO at a temp. of 950°. The reactivity values are measured by the vol. of CO produced when a definite vol. of CO₂ is passed at a constant rate over a definite vol. of sized coke at a const. temp. The value is not const. for a given sample but alters as the treatment with CO₂ is prolonged. The previous heat treatment of the coke appears to have an effect upon the reactivity value. Coals from various localities differ quite markedly, although carbonization was carried out in similar ways. Coals from Yorkshire coal gave higher values than Durham or South Wales coal. No correlation between the shatter test and the reactivity values for detg. the quality of coals could be discovered. Reactivity values are persistent and characteristic for any one coal and may be arrived at by using CH₄, CO or O₂, as well as by using CO₂. No reactivity is exhibited by any coal examd. when it is cooled down in the presence of CO₂ instead of N. The authors do not offer any satisfactory explanation of the phenomena. Plates showing the values for the various coals examd. and of the app. accompany the paper. J. W. SHIPLEY

Review of coke-oven technology during the year 1927. G. E. FOXWELL. *Fuel Econ. Rev.* 7, 25-9 (1928). E. H.

Equilibrium relations in the water-gas reaction (NEUMANN, KÖHLER) 2. Purifying gases (Brit. 280,165) 13.

BLEIBTREU, H.: **Kohlenstaubfeuerungen.** 2nd ed. revised and enlarged. Berlin: V. D. I. Buchhandlung. Price bound about R. M. 20.

MORGAN, JEROME J.: **Manufactured Gas. Vol. II. Distribution.** New York: J. J. Morgan, Broadway at 119th St. 447 pp. Reviewed in *Gas J.* (London) 182, 1014 (1928).

MUHLERT, F. AND DREWS, K.: **Technische Gase, ihre Herstellung und ihre Verwendung.** Leipzig: S. Hirzel. 416 pp. Paper, R. M. 22; bound, R. M. 24.

Fuel. W. H. ROGERS. Brit. 280,349, Oct. 25, 1926. A small proportion of petroleum or crude benzene or similar material is added to road sweepings together with water, clay or other ingredients and the mixt. may be molded into lumps or briquets. Ashes, saw-mill sweepings, sawdust and spent hops also may be used.

Fuel briquets. HUGH H. HANSARD. U. S. 1,675,268, June 26. A mixt. of pulverized coal and liquid hydrocarbon material such as Mexican petroleum is heated to drive off volatile constituents and those of low b. p. and the residue of coal and high b. p. constituents of the liquid hydrocarbon material is formed into briquets.

Fuel briquets. PETER JUNG. U. S. 1,675,272, June 26. Briquets are formed contg. a large proportion of a solid fuel such as small coke together with a small quantity of peat or other solid fuel ground to substantially colloidal fineness so that it is capable of forming a permanent suspension in water; this colloidal material is evenly distributed throughout the mass and is in addn. to such colloidal material as may naturally occur in the solid fuel.

Liquid fuel (a liquefied mixture containing butane and butylene). M. MÜLLER-CUNRADI (to I. G. Farbenind. A.-G.). U. S. 1,673,620, June 12. A fuel suitable for lighting, welding or operating internal-combustion engines may be produced by mixing butane and butylene.

Carbureting apparatus. O. A. SAARINEN. Brit. 280,242, Nov. 5, 1926. Liquid fuel is evapd. from blocks of porous material such as gypsum, asbestos, pumice, brick or coal, provided with air passages. Various structural features are described.

Continuous distillation of carbonaceous fuels. WALTER E. TRENT (to Trent Process Corporation). U. S. 1,675,315, June 26. In distg. coal to produce coke and recover different fractions of oils, the material is introduced into a series of coking containers in one of which it is heated sufficiently to vaporize volatile constituents and form a coke residue; exhaust combustion gases and vaporized products from this container are passed successively through the series of containers to heat the material to progressively decreasing temps. and substances thus volatilized are condensed in sep. fractions; the different containers are successively heated to coking temp. An app. is described.

Hydrogenation of carbonaceous material. CARL KRAUCH, WALTER SIMON and MATTHIAS PIER (to I. G. Farbenind. A. G.). Can. 281,651, July 10, 1928. Carbonaceous material is treated with H in the presence of a catalyst selected from the groups 4 and 3 of the periodic system, Cu-Fe mixts, porous C, active SiO_2 , hydrosilicates, Al_2O_3 and MgO . The resulting product is treated with H with the aid of a catalyst selected from the group Co, Mo, W and their compds. Both operations are carried out under an elevated pressure with streaming H and with a low partial pressure of the material to be converted.

Apparatus for carbureting fuel gas. E. FAUCONNIER and A. SIMPERE. Brit. 280,203, Nov. 4, 1926. The app. may be controlled by a pyrometer in a kiln or other app. heated by the gas under treatment.

Water-gas generator. MADS P. EBBESEN. Danish 37,567, July 7, 1927.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 279,825, Oct. 28, 1926. Destructive hydrogenation and other heat-treatment of coal, tar, oils, etc., is effected in vessels, the walls of which serve as elec. resistances, e. g., tar may be passed through a long tube formed of an alloy contg. Ni 60-65 and Cr 10-15% assocd. with Fe and low in C, which is elec. heated to about 420° .

Washing coal and recovering values from the wash water by settling and pressure filtration. WIGAN COAL & IRON CO., LTD. AND A. E. LEEK. Brit. 279,766, April 22, 1926.

Gravity separation of slurry from coal washings, etc. A. E. LEEK and WIGAN COAL & IRON CO., LTD. Brit. 279,525, April 22, 1926. An app. for filtration and other treatment is described.

Purification of coal gas. CHARLES J. RAMSBURG (to Koppers Co.). Can. 281,670, July 10, 1928. A hygroscopic medium such as H_2SO_4 or HPO_3 of relatively high concn. (60°Bé) is used to dry the gas, and the acid which has become dild. in the drying operation is used for the removal of NH_3 from the gas prior to the drying operation.

Supplying oil and gas for internal-combustion engine operation. MOTORENFABRIK DEUTZ A.-G. Brit. 280,239, Nov. 5, 1926. A mixt. of air and poor-quality gas or a dil. mixt. of a gas of better quality is compressed to not over 32 atm. and ignition is effected by injecting a small quantity of oil less than would itself alone suffice for running the engine.

Gas meter. PARKINSON & COWAN (Gas Meters), LTD. AND F. THORP. Brit. 280,049, Dec. 8, 1926.

Reducing corrosion in gasometers. J. A. FLETCHER and C. R. NORMAN. Brit. 280,134, June 24, 1927. In order to minimize corrosion, an oil emulsion is used as a liquid seal; the emulsion may be formed of cottonseed oil, mineral oil, fish oil, NH_3 and water by violent agitation.

Recovering oils, tars, etc., from emulsions. H. W. ROBINSON and D. W. PARKES. Brit. 280,059, Dec. 24, 1926. Emulsions of water-gas tar or the like or of oils are made slightly acid and mixed with a finely divided solid hydrocarbon such as C_{10}H_8 (unless this is already present in sufficient proportion). Creosote oil or like material also may be added and the acidity may be produced by use of CO_2 , SO_2 or flue gases.

Coke-oven construction. FOUNDATION OVEN CORPORATION. Brit. 279,955, Aug. 7, 1926.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

World's petroleum production in 1927. RYUICHIRO YENOMOTO. *J. Fuel Soc. Japan* 7, 26-8 (English Section) (1928).—A review. F. I. NAKAMURA

The role of cracking in the petroleum industry. P. BURGART AND A. GRABETZ. *Tech. moderne* 20, 377-87 (1928); cf. *C. A.* 22, 676.—A review is given of the history of cracking, the different methods now in use and the influence of catalysts. P. T.

The flow and measurement of petroleum products in pipe-lines. S. W. ADY. *J. Inst. Petroleum Tech.* 14, 222-35 (1928).—The Reynolds, Fanning and Weymouth equations for measuring the flow of liquids and gases in pipes are stated and discussed. Measurement by Venturi or orifice meters and by the Pitot tube is discussed and formulas are given for the necessary calcs. with each. Viscosities of paraffin hydrocarbons from methane to octane inclusive are given for normal temp. and pressure as calcd. by the formula $\eta = \lambda/\sqrt{3/\rho p}$, in which η = viscosity of the gas, λ = mean free path, ρ = pressure of the gas and p = d of the gas. D. F. BROWN

The flow of fluids in pipes. E. S. L. BEALE AND P. DOCKSEY. *J. Inst. Petroleum Tech.* 14, 236-62 (1928).—A theoretical discussion is given of the Reynolds criterion and its use in detg. the friction factor $R/\rho v^2$, in which R is the frictional force per unit area of pipe surface, ρ is the fluid density and v is the mean linear velocity of fluid in the pipe. The effect of pipe roughness is discussed and a set of "Stanton Curves" connecting $R/\rho v^2$ and the Reynolds criterion given. The equations of flow for liquids and gases are derived from first principles, and put in form for use by the practical engineer. D. F. BROWN

Flow and measurement of gases in pipes. J. S. M. AULD. *J. Inst. Petroleum Tech.* 14, 263-4 (1928).—The papers by Adey and by Beale and Docksey (preceding abstracts) are discussed. D. F. BROWN

Operating a continuous plant for refining distillates. J. C. MORRELL AND D. J. BERGMAN. *Chem. Met. Eng.* 35, 350-4 (1928).—App. and methods of operation for the continuous treatment of petroleum distillates with acid and plumbite solutions are described with drawings and photographs. D. F. BROWN

The behavior of Emba crude oil in the refinery. EDWARD PYHALA. *J. Inst. Petroleum Tech.* 14, 330-50 (1928).—Light medium and heavy crude oils are obtained from the wells at Emba. The kerosene content in the light and medium oils varies from 1.8 to 27.5%, and rises to 20% in the heavy oils. Naphthenic acid content of Emba kerosene distillate varies from 0.2 to 1.27%. The crude oil contains practically no paraffin. High-grade lubricating oil distillates can be obtained from this crude if special distn. methods are used to prevent the formation of ceresin due to decomposition phenomena which occur with ordinary distn. methods. Careful attention to certain proportions in the lye treatment during the treating process is also necessary to remove certain constituents which easily emulsify and are not removed by the usual treating methods. D. F. BROWN

Commercial oil deposits and main structural features. T. H. R. GARRETT. *J. Inst. Petroleum Tech.* 14, 351 (1928).—Discussion of Stamp (*J. Inst. Petroleum Tech.* 14, 38-63 (1928)). The theory that oil fields could have been destroyed by burning underground or by distn. is refuted. D. F. BROWN

The mineral-oil industry in 1927. RICH. KISSLING. *Chem. Umschau Fette, Oele Wuchse u. Harze* 35, 126-31, 145-9 (1928).—An annual review bearing the following captions: I. Production. II. Transportation and storage. III. Treatment. IV. Application. V. Examn and testing. VI. Scientific investigations. VII. Literature, with 21 titles of books or pamphlets and 380 references. P. ESCHER

Transformer oils. MAURICE VAN RYSELBERGE. *Bull. feder. ind. chim. Belg.* 7, 217-28 (1928).—General survey. A. L. HENNE

Flame characteristics of "pinking" and "non-pinking" fuels. G. B. MAXWELL AND R. V. WHEELER. *J. Inst. Petroleum Tech.* 14, 175-89 (1928).—Explosions within a closed steel cylinder, without a moving piston, are investigated photographically. The cylinder, 38 cm. long and of 15.2 cm. internal diam., is provided with a window of plate glass along one side, a plug for igniting at one end and an optical pressure indicator at the other. In the explosion of a mixt. contg. 3% of C_4H_{10} by vol. in air (the mixt. for max. power) at 1 atm., the flame passes through the charge with an accelerated speed until it is slightly beyond the mid-point of the cylinder where it is checked and then

continues until it strikes the end of the cylinder and an actinic after-glow is started. During the explosion, the pressure rises evenly and no sound is heard. Increasing the initial pressure of the 3% C_4H_{12} -air mixt. to 2 atms. causes an audible "ping" on explosion and rapid vibrations of the pressure of the exploded mixt. As the flame in the explosion of a mixt. contg. 3.5% of C_4H_{12} in air at 1 atm. accelerates and approaches the end of the cylinder, the pressure record shows vibrations of the same frequency as those of the flame and synchronizing with them. The explosion of all mixts. contg. from 3.2 to 3.8% of C_4H_{12} in air at 2 atm. produces a high-pitched squeal and a violent "kick" on the pressure records. Explosions of "max.-power" (3.0%) C_4H_{12} -air mixts. at 1 and 2 atms. initial pressure are inaudible and a highly actinic after-glow is almost continuous behind the flame front. "Pinking" is suppressed in a 3.5% C_4H_{12} -air mixt. at 2.5 atms. by decreasing the length of the cylinder to 25.4 cm., and in a 3.8% C_4H_{12} -air mixt. at 2.5 atms. by turbulence caused by the revolution of a fan at 2500 r. p. m. mounted within the cylinder at the ignition end. The addn. of $PbEt_4$ as vapor, in quantity corresponding to 2.5 fluid ounces per gal. of C_4H_{12} , to a 3.8% C_4H_{12} -air mixt. causes violent pinking, but when the $PbEt_4$ vapor is decompd. before ignition of the C_4H_{12} -air mixt. the explosion is silent. These results confirm the view (C. A. 22, 870) that the decompn. products of $PbEt_4$, and not $PbEt_4$ itself, have antiknock action.

R. E. SCHAAD

The extraction and refining of paraffin wax. W. ALLEN. *J. Inst. Petroleum Tech.* 14, 328(1928).—The common process of removing wax from oil consists in rapid re-distn., chilling and filter-pressing of a cracked paraffin distillate. After its removal from the press, the wax is melted and run into the trays of the sweating plant where the sweating is continued until the required temp. is reached. The sweated wax is refined further and graded according to its m. p.

R. E. SCHAAD

Decomposition of paraffin wax on heating. H. I. WATERMAN, J. N. J. PERQUIN AND H. A. VAN WESTEN. *J. Inst. Petroleum Tech.* 14, 318-27(1928); cf. C. A. 22, 497.—An improvement of Rast's method (C. A. 16, 2060) for detg. mol. wts. by the lowering of the m. p. of camphor gives 417 and 427 as the mol. wt. of ordinary Rangoon paraffin wax, and 282 to 328 and 266 to 342 for the mol. wts. of its cracking and Bergmization residues, resp. The n and mol. wt. of the wax remain unchanged after being heated intermittently in a closed, previously evacuated glass tube for 64 hrs. at 306° by vapors of boiling Ph_2CO . Rangoon paraffin wax, mol. wt. (Rast) 410, no Br addn., d_{20} 0.7744, setting-point (Shuokff) 58.0°, is relatively thermoresistant in an atm. of N up to 370°. Heating it for 10 hrs. at 370° causes decompn. and lowers the av. mol. wt. to 360. The gas, low-boiling distillate, and residues contain unsatd. hydrocarbons. The residues have approx. the same n and sp. gr. as the original wax. The heating temps. are maintained const. to within about 2° by a specially constructed thermoregulator.

R. E. SCHAAD

Treatment of benzine obtained by cracking processes and low-temperature carbonization with sulfuric acid and with liquid sulfur dioxide. A. ERDÉLY AND L. ALMÁSI. *Brennstoff-Chem.* 8, 358-60(1927).—The action of H_2SO_4 was tried in various concns. on samples of benzine from cracked Russian petroleum, and cracked and uncracked low-temp. tar from brown coal. The action began with acid of 40% concn. It acted both as a solvent and as a polymerizing agent. The polymers were not removed from the benzine even by 100% H_2SO_4 . Liquid SO_2 was tried but it effected only partial sepn. of aromatics and unsatd. compds.; the refined product, however, was water-white.

J. D. DAVIS

Determination of aromatic and unsaturated hydrocarbons in benzine by means of sulfuric acid. R. KATTWINKEL. *Brennstoff-Chem.* 8, 353-8(1927).—Previous methods based on the solvent action of H_2SO_4 for aromatics and unsaturates are discussed. K. detg. aromatics + unsaturates in a 10-cc. sample by shaking with 30 cc. of a mixt. of 30 g. P_2O_5 in 100 cc. H_2SO_4 (d. 1.840). Unsaturates alone are detd. by shaking the sample with a mixt. of 5 g. boric acid in 100 cc. H_2SO_4 (d. 1.840). The boric acid mixt. does not dissolve aromatics; P_2O_5 in H_2SO_4 catalyzes sulfonation and thus aids soln. of aromatics.

J. D. DAVIS

Flash-point determinations in the standard flash-point tester. G. MEYERHEIM AND FR. FRANK. *Chem. Lab. Handel u. Ind., Berlin W 35. Erdöl u. Teer* 4, 272-3 (1928).—Satisfactory checks were obtained on various oils with the Marcusson, Schütter-Göckel and Sommer-Runge app. when the precaution was observed of keeping the thermometer bulb 2-5 mm. from both the bottom and the side of the crucible. F. S. G.

The recovery of gasoline from field and refinery gases with special reference to the Bayer charcoal process. I. EDELEANU. *J. Inst. Petroleum Tech.* 14, 286-317(1928).—In the charcoal adsorption process for recovering gasoline from natural and refinery

gas the quality of the charcoal depends upon (1) the development of inside capillary surface per unit of wt., (2) the capillary vol. per unit of wt., (3) the diam. of the capillaries and (4) the chem. character of the surfaces. Typical charcoal adsorption plants are described in detail with the aid of sketches and photographs. Use of the Ejector Vacuum-Evaporator has resulted in great economy of the rinsing steam used.

D. F. BROWN

Separation of lead tetraethyl from solution in petroleum spirit. F. W. TOMS AND C. P. MONY. *Analyst* 53, 328-9(1928).—Since, for the present at least, the use of "ethyl gas" is prohibited at Jersey, Channel Islands, it was interesting to see how the poisonous Pb compd. could best be removed. By passing SO_2 into the gasoline the Pb was converted eventually into PbSO_4 and the gasoline could be decanted off from the insol. powder.

W. T. H.

Rept. of Committee D-2 on petroleum products and lubricants. F. A. HULL, *et al. Proc. Am. Soc. for Testing Materials* (preprint) No. 72, 104 pp.(June, 1928).—Reports from the following subcommittees are included: petroleum, paraffin wax, pptn., oxidation at high temp., sampling and gaging, cloud and pour points, gas oil, nomenclature, crude petroleum, C residue, autogenous ignition of petroleum products and fuel oil. The report on the "Testing of Petroleum Products" is designed to give authoritative information on gravity, color, cloud and pour points, m. p. of paraffin wax, and petroleum, viscosity, consistency, volatility, tests for illuminating oils, wick feed test, water and sediment, pptn., emulsification, oxidation at high temps., dielec. strength, C residue, acidity in gasoline, neutralization no., total S, doctor test, sapon. no. and analysis of grease. There are also included in the report proposed tentative definitions of terms relating to petroleum, and proposed tentative methods of test for distn. of crude petroleum; for the detn. of autogenous ignition temps.; and for the gravity of petroleum products by means of the hydrometer.

M. R. FENKE

Petrol engine lubricants and lubrication. J. M. EVANS. *J. Inst. Petroleum Tech.* 14, 352(1928); cf. Kelly, C. A. 22, 1846.—Lubricating oil of sp. gr. 0.919, closed-cup flash 385° F., viscosity at 70° F. 1330", 100° F. 380", 140° F. 125", 200° F. 54" and cold test (below) 0° F. is now being made from California crude by a special adaption of the Edeleanu process. Conradson carbon values are of the order of 0.03 and resistance to oxidation is very marked.

D. F. BROWN

The use of portland cement for cementing the casings of petroleum wells, and for plugging the wells. M. J. ZEVADA. *Bol. petroleo* 24, 410-2(1927).—The necessity is emphasized of using for these purposes only cement which conforms to approved specifications. The specifications adopted in Sept., 1916, by the Am. Soc. for Testing Materials are recommended, and a Spanish translation of them is given. In mixing cement for the above uses 40% H_2O is suggested. This cement mixture can be injected easily by pumping and it sets readily.

R. H. LOMBARD

Kentucky rock asphalt. W. R. JILLSON. *Kentucky Geol. Survey* [6], 30, 95-103 (1927); *Eng. Mining J.* 125, 1011-3.—In Kentucky the Chester (Upper Mississippian) and Pottsville (Lower Pennsylvanian) rocks contain bituminous sandstones averaging 8.19 and 7.94% of bitumens, resp. This material is finding an extensive market as a road-surfacing material.

ALDEN H. EMERY

The importance of wood turpentine in chemical industry. M. J. RIEMERSMA. *Chem.-Ztg.* 51, 823-5(1927); cf. C. A. 21, 1703.—Wood turpentine is just as valuable as gum spirits for most purposes. It must be free from impurities and water and should be purchased for its pinene content.

G. G. SWARD

Hardwood tar and the future of wood distillation. A. KAROLYI. *Chem. Markets* 22, 623-4(1928).—In a (Yugoslavia) plant working up 175 cords of beech wood daily 14 gal. of tar per cord is obtained. From this come 15 lbs. water with 10% AcOH , MeOH etc., 5 lbs. light oil (75-100°), 1 lb. light oil (100-130°), 25 lbs. heavy oil (130-180°), 17 lbs. hard pitch and 12 lbs. water and gas. The dil. acid is worked up with crude pyroigneous acid by the Suida (patented) process of distg. a mixt. of heavy tar oils, esters, phenolic oils, water and acid (without the use of lime and H_2SO_4), and thus getting a product that can be coned. *in vacuo* to a high-grade AcOH . The detarred and dealcoholized pyroigneous acid is transformed continuously into AcOH of 95% in 1 operation. By 2 subsequent operations 98-99% acid is obtained. Instead of the former cost of \$1.40 per cord for CaO and H_2SO_4 , there is a consumption of tar oils of only \$0.16 per cord.

W. C. EBAUGH

Report of Committee D-15 on thermometers [for use in testing petroleum products] (FULWELER, *et al.*) 1. Oleic, palmitic and stearic acids as mother substances of petroleum (ZELINSKI, LAVROSKI) 10. Action of strong H_2SO_4 on olefins and alcohols

(ORMANDY, CRAVEN) 10. Recovering oils, tars, etc., from emulsions (Brit. pat. 280,059) 21. Destructive hydrogenation (Brit. 279,825) 21. Producing foam [for use as fuel] (Brit. pat. 280,208) 18.

Petroleum Development and Technology in 1927. New York: Am. Inst. Mining and Metallurgical Engineers. 844 pp. \$6 (cloth bound).

SCHWARZ, R.: **Petroleum Vade Mecum: International Petroleum Tables.** 5th ed revised. Berlin: Verlag für Fachliteratur. 407 pp. Reviewed in *J. Inst. Petroleum Tech.* 14, 354(1928).

Cracking and distilling petroleum oil. WILLIAM R. HOWARD (to Universal Oil Products Co.). U. S. 1,674,827, June 26. An app. is described comprising a still in which a steam pump is placed which feeds oil to the still and discharges exhaust steam into the still.

Apparatus for cracking hydrocarbon oils in the vapor phase with or without accompanying use of steam or permanent gases. R. K. COLLINS. Brit. 280,034 and 280,039, Nov. 12, 1926

Distilling emulsified mineral oils. GUSTAV EGLOFF and HARRY P. BENNER (to Universal Oil Products Co.) U. S. 1,674,819, June 26. A bulk supply of oil contg. emulsified water is introduced into a still and heat is applied directly to the surface of the oil in the still by steam pipes and the point of application of the heat to the oil in the still is lowered as the oil level descends in consequence of evapn.; external heat is finally applied to the still to vaporize remaining oil. An app. is described.

Refining hydrocarbons. HENRY BLUMENBERG, JR. (to Amos M. Buley). Can. 280,816, June 5, 1928. To remove objectionable color or odor from cracked gasoline and distillates add $Al_2(SO_4)_3$ and $Ca(OCl)_2$ mix for about 30 min., and gradually heat to 50° or 60°. Sep the gasoline from the sludge formed and distil.

Refining and stabilizing hydrocarbon products. EUGENE A. PRUDHOMME (to Soc. intern procédés Prudhomme). U. S. 1,674,796, June 26. Material such as a fraction b. 200–400° is vaporized at a temp. below 400° and the vaporized products are all passed at a temp. above 180° through purifying material contg. Ni and Cu oxides or other suitable metallic oxide and through catalytic material such as a Ni, V or Co catalyst and then through activated C with the addn. of CO, H, water gas or other reducing gas without further heating. An app. is described, and the treatment specified serves to produce a product b. 60–220°.

Purifying hydrocarbon oils. HERBERT G. M. FISCHER (to Standard Oil Development Co.) Can. 281,168, June 19, 1928. Ash constituents are removed from hydrocarbon oils, by treatment with H_2SO_4 to remove asphaltic constituents, neutralizing with NaOH, injecting steam to distil off naphtha and kerosene and decomposing the soap into Na_2SO_4 and liberation of SO_2 , hydrating the Na_2SO_4 with H_2O and an alc. at 150–200° F. Oil is allowed to stand and $Na_2SO_4 \cdot 10H_2O$ speedily seps. out.

Condenser for liquefying hydrocarbon oil vapors. ARTHUR G. BOGARDUS (to Universal Oil Products Co.). U. S. 1,674,850, June 26.

Recovering liquid hydrocarbons from vapors and gases by absorption. ALEXANDER CLARKE (to United Hydrocarbons Co.) U. S. 1,674,852, June 26. Hydrocarbons which have been absorbed from casing head gas or natural gas are distd. from the absorbing medium and evolved vapors and gases are compressed and cooled to obtain a liquid fraction and a vapor and gas fraction; these fractions are sepd. and the gases and vapors are reheated and admixed with fresh quantities of vapors and gases evolved in the distg. operation. An app. is described.

Carbonaceous fuel. ALFRED OBERLE (to Universal Oil Products Co.). U. S. 1,674,837, June 26. Residue from destructive distn. or cracking of petroleum hydrocarbons is treated with steam under pressure, dried under reduced pressure and then caused to absorb a combustible gas such as the gas formed by oil cracking.

Internally reinforced cylindrical petroleum still. ARTHUR E. FEW, JR. (to Sun Oil Co.). U. S. 1,674,918, June 26.

Apparatus for gasifying heavy oil in an incandescent chamber containing a catalyst. C. CHILOWSKY. Brit. 279,834, Oct. 27, 1926.

Recovery of oil from oil-field emulsions. W. K. HOLMES (to The Texas Co.). Can. 280,797, June 5, 1928. The emulsion is treated with an equal vol. of solvent (preferably a petroleum distillate having gravity between 35° and 50° Beaumé), agitated with air and heated to 150–175° F.

Separation of naphthenic acid compounds from coastal oils. O. E. BRANSKY (to Standard Oil Co.). Can. 280,795, June 5, 1928. A distillate having a flash pt. of about

500° F., viscosity 200 sec. Saybolt at 100° F. is treated with alkali (10 to 20% soln. soda ash and sufficient is added, say from 5 to 20% completely to neutralize the oil); the oil is then agitated with from 10 to 20% MeOH, EtOH or iso-PrOH. The alc. ext. is removed and distd. for removal of alc., the naphthenic acid compds. remaining as a residue. This residue is purified by acid treatment and steam distn.

Treating hydrocarbon oils with liquid sulfur dioxide. WILHELM HESS (to Allgemeine Ges. für chemische Industrie). U. S. 1,674,676, June 26. See Brit. 268,726 (C. A. 22, 1470).

Purifying mineral and tar oils with liquid sulfur dioxide. ALLGEMEINE GES FÜR CHEMISCHE INDUSTRIE. Brit. 279,774, Nov. 1, 1926. In a counter-current process, the velocity of the ascending oil is reduced immediately before or after leaving the treatment tower to facilitate sepn. of entrained SO₂. An app. is described.

Separating oils from tars, tar oils, etc. HERBERT WITTEK. U. S. 1,674,710, June 26. Vapors of tar, tar oil or pitch or the like substantially free from paraffin are confined with an org. solvent such as alc. which will dissolve the acid constituents not miscible with paraffin oil and with vapors of an oil such as paraffin oil composed mainly of hydrocarbons of the paraffin series; the vapors are condensed and the resulting layers which form are sepd. Cf. C. A. 21, 3123.

Wetting agents. BRITISH DYE STUFFS CORPORATION, LTD., J. BADDILEY and F. CHAPMAN. Brit. 279,990, Sept. 20, 1926. Mineral-oil fractions of which the bulk is susceptible of sulfonation and which have an initial b. p. above 200° (preferably above 240°) are sulfonated to produce wetting agents. Fractions of the ext. obtained by treating Borneo petroleum with liquid SO₂ and fractions obtained in oil-cracking processes may be used.

Revivifying fuller's earth. RUDOLPH R. ROSENBAUM. Can. 281,077, June 19, 1928. Fuller's earth which has been used in filtering hydrocarbons, is treated with liquid SO₂ to flush out and dissolve the hydrocarbons remaining in the earth. The resulting liquid, is collected, the insol. are sepd. from the sol. hydrocarbons, and the SO₂ is converted to gaseous form to remove it from the fuller's earth and from the extd. hydrocarbons. Cf. C. A. 22, 485.

Use of thallium and its compounds to prevent knocking in internal-combustion engines. ASIATIC PETROLEUM CO., LTD. and A. C. EGERTON. Brit. 279,560, July 29, 1926. Tl or Tl oxide may be vaporized outside the cylinder by an elec. arc or a Tl compd. may be mixed with the fuel or otherwise injected into the engine. Compds. which may be used include. Tl ethyl, benzylate, phenylethylate, oleate, amyl-alcoholate and acetoacetate.

Lead tetraethyl. W. S. CALCOTT, A. E. PARMELEE and F. R. LORRIMAN. Brit. 280,169, Nov. 3, 1926. See U. S. 1,664,021 (C. A. 22, 1677).

Lubricant. LUTHER B. LOCKHART (to The Standard Oil Co.). Can. 281,329, June 26, 1928. A lubricant is produced by admixing 92 parts of a viscous lubricant oil (of paraffin type) having a viscosity of 340 to 350 sec. Saybolt at 100° F. and 8 parts of a light distillate oil having a boiling pt. range of 320° to 460° F. The mixt. has a viscosity of about 184 sec. Saybolt at 100° F., a flash pt. of about 150° F. and contains about 8% of fractions boiling between 320° and 450° F.

Solid lubricant for axles on carriages, etc. NIELS P. SÖGAARD. Danish 37,978, Sept. 26, 1927. Two parts of light resin is mixed with 10 parts of petroleum and the mixt. is poured successively under const. stirring into 2 parts of freshly slaked lime which has been stirred up with 1 part of water. The stirring is continued until the mixt. becomes viscous and adhesive, after which 2 parts of melted Mexico bitumen is added.

Regenerating used lubricants. N. E. FUNK and ALFA-LAVAL CO., LTD. Brit. 279,636, Oct. 29, 1926. Used lubricating oils are washed with water, sepd. from the water and from impurities and reused. An app. is described.

Cracking of asphalt and heavy mineral oils. D. PYZEL. Can. 280,902, June 12, 1928. Inert material is passed through a combustion zone, and the asphalt or oil is sprayed on the material as it enters the zone. Air is introduced into the zone, and steam introduced into the lower end of the zone beneath the air inlet. The inert material is withdrawn from the zone and recycled therethrough and the vapors from the upper end of the zone are condensed to recover light hydrocarbon oils.

Emulsion of asphalt in water. AAGE H. MICHELSEN. Danish 38,178, Nov. 21, 1927. Asphalt is added with heating and stirring to a primary emulsion consisting of a mixt. of glue, drilling oil, soap and K₂CO₃. Finally water is added.

Bituminous composition. NAAMLOOZE VENNOOTSCHAP NEDERLANDSCHE BIMS-CEMENT- EN ASPHALTINDUSTRIE. Brit. 280,085, March 7, 1927. Liquefied bitumen is mixed with a porous filler under the action of heat and pressure. Ground natural

limestone, with or without burnt limestone, tuff, infusorial earth, trass or dolomite may be used, as may also solvents such as C_6H_6 , CS_2 , ligroin or CCl_4 .

Bituminous coatings and linings for metal and concrete pipes and tubes, etc. R. ILLEMANN and R. A. WHITSON. *Brit.* 279,687, Jan. 26, 1927. Natural rock asphalt or powd. artificial asphalt or mixts. such as limestone or silica and bitumen are used. *Cf. C. A.* 22, 1226.

Recovering neutral pitch and acid from oil-refining sludges. J. PICKERING and J. JUBB. *Brit.* 279,613, Oct. 4, 1926. Sludges obtained in refining mineral oil with H_2SO_4 or oleum are sprayed with a solvent such as acetone while heated and agitated and the sludge is further treated with water or an aq. soln. such as a soln. of $NaCl$ or Na_2CO_3 and different materials are sepd. An app. is described.

Portable furnace and retorts for carbonizing wood in bulk, sawdust, olive stones, etc. A. ENDERS, R. BILLEN AND SOC. ANON. LA CARBONISATION INDUSTRIE. *Brit.* 279,700, April 9, 1927. Two retorts are internally heated by gases from furnaces or gas generators on which the retorts are mounted and condensers are arranged for connection to each retort in turn.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Does the theory of micellar complexity apply in the study of cellulose? M. CATOIRE. *Bull. soc. chim. biol.* 10, 714-35(1928).—The details of swelling and of deflocculation of the cotton fiber denote a complex structure which is degraded by stages acting as voluminous polymers which do not decomp. by the immediate liberation of their mols of their constituents, but by the formation of other polymers and these in turn still others, before the final monoses are reached. The demineralization of cellulose effected on the acetyl deriv. in clear acetic soln. by repeated pptn. is never complete. There remains after the last operation a mol. of SiO_2 for 1000 mols of $C_6H_{10}O_5$. This demineralization occurs by the division between certain micelles, the more voluminous contg. SiO_2 as a constituent and not as an impurity, and the less voluminous which perhaps contain a biologic complex of polymers of $C_6H_{10}O_5$ and (SiO_4) . Swelling, deflocculation and depolymerization of cellulose are influenced by the presence of minerals especially by the alk. earth bases, which cellulose contains in the natural state, and to a less extent by mineral elements artificially incorporated. The desiccation of nitrocellulose, especially when it is poor in alk. earth salts, has a depolymerizing action, since it becomes more sol. in acetone or alc.-ether as the desiccation is prolonged. Acetocellulose having stood in 0.1 N alkali and then dried loses its property of swelling and it dissolves in ordinary solvents. L. W. RIGGS

Röntgen diagrams of nitrocellulose and acetylcellulose. ST. V. NÁRAY-SZABÓ AND G. V. SUSICH. *Z. physik. Chem.* 134, 264-70(1928).—The characteristic fiber diagrams of nitrocellulose were prepd. The identity period along the fiber axis is for nitrocellulose 26.6 ± 0.5 A. U.; for acetylcellulose 10.3 ± 0.3 A. U. The diagrams infer different degrees of esterification since a well-defined lattice is only obtained with a completely substituted product. M. R. FENSKE

The study of cellulose and cellulose acetates by means of x-rays. JEAN J. TRILLAT. *Compt. rend.* 186, 859-61(1928).—By means of Coolidge tubes with either Cu or Cr targets and a cylindrical spectrograph, many samples have been studied. In the amorphous compds. the halos were studied by means of a microphotometer. Cotton linters give a characteristic cryst. but little accentuated diagram. There is exptl. evidence of the existence of very small interplanar distances of the order of 1.2 A. U. which are attributed to the arrangement of the C atoms. Oxycelluloses and hydrocelluloses give very good cryst. diagrams, identical with those of cellulose, except that the orientation of the crystallites has disappeared in almost all cases, showing that these materials are formed for the most part from the same structural elements as cellulose itself. Hydrocelluloses give a cryst. diagram different from that of cellulose, which is the same for all regenerated products prepd. in a homogeneous phase (viscose silk, denitrated nitrocellulose, etc.). Alkali cellulose gives a cryst. diagram analogous to that of the hydrocelluloses but the lattice is enlarged, and there are indications of the formation of compds. between the cellulose and the alkalies. Cellulose acetates possess a portion which is very clearly cryst., dispersed in an amorphous phase. Their soln. and transformation into homogeneous acetates leaves this structure intact so long as the degree of acetylation is high. Hydrolysis causes the disappearance of the cryst. part first. This is doubtless the triacetate. The principal halo obtained corresponds to an inter-

mol. distance of 5.2 A. U. and the outer halo to a distance of 2 A. U. When the material becomes acetone-sol., the cryst. part disappears and the halo is enlarged, indicating sepn. of the mols. As the degree of acetylation decreases, the mols. draw closer together again, and the inner halo becomes much more acute, while the outer halo disappears. The differences in the diagrams are sufficient to enable them to be used for chemical control.

A. W. KENNEY

Preparation of cellulose nitrate. E. BERL AND E. BERKENFELD. *Z. angew. Chem.* 41, 130-2(1928); cf. Berl and Klaye, *C. A.* 2, 184, 898.—The N content and viscosity in acetone soln. of a sample of cellulose nitrate depend rather on the compn. of the waste nitrating acid than on that of the original acid mixt. used, since an equil. is set up between cellulose nitrate and acid. Curves showing the N content and viscosity corresponding to varying waste acid compns. are given for both linters and wood cellulose, and the results are much more regular than those obtained when these properties are correlated with the compn. of the starting acids. Increase of the H_2SO_4 content above 60% causes a sharp diminution in the viscosity of the product, and the viscosity of nitrated linters is greater than that of nitrated wood cellulose with the same waste acid compn.

B. C. A.

A contribution to the knowledge of the ligninsulfonic acid. M. SAMEC. *Archiv. hem. farm.* 1, 104-11(1927); cf. *C. A.* 17, 634; 18, 2248; 21, 2796.

J. K.

Paper mill motorization improves production and quality. R. S. LOWRY. *Flec. World* 91, 1395(1928).

C. G. F.

Process steam for paper mill produced by hog fuel and oil. P. SANDWELL. *Power* 67, 849-52(1928).—Hog fuel is burned in Dutch ovens to supply 30% of the steam. The remainder is supplied by fuel oil, the burners being mounted on the rear wall of a common combustion chamber.

D. B. DILL

Isolation of lignin (KALB, *et al.*) 10.

HESS, KURT: *Die Chemie der Zellulose und ihrer Begleiter.* Leipzig: Akademischen Verlagsgesellschaft m. b. H. 900 pp. Price about M. 60.

Cellulose. KARL Y. KYLANDER. *Can.* 281,568, July 10, 1928. In a preliminary boiling process for cellulose, the cuttings are moistened and satd. with liquids to which acetic acid is added by means of air, gas or steam pressure. Without subsequent washing, this is followed by the usual boiling with the addn. of acids and phosphates.

Regenerated cellulose structure. BRNO BORZYKOWSKI AND JOHANNES HECK (to Borvick-Syndikat, Ltd.) *Can.* 280,724, June 5, 1928. A regenerated cellulose structure is pptd. from viscose contg. dissolved or mixed therein oily materials, e. g., liquid or solid fatty oils, soaps, textile oils, also emulsified mineral oils and tetralin and other hydrogenated hydrocarbons. The setting bath may be dil. H_2SO_4 with or without added salts, alcs., NH_4 salts, glucose, etc.

Amino derivatives of cellulose. I. G. FARBERIND. A.-G. *Brit.* 279,801, Oct. 30, 1926. Alkali cellulose is esterified by treatment with benzenesulfonic acid, the product is acetylated, and the mixed ester boiled with $PhNH_2$ and alc. Cellulose toluene-4-sulfonic acid is boiled with diethylamine and alc., and the product is acetylated. The aminocellulose derivs. produced are sol. in org. solvents and may be used for making threads or films. They can be easily dyed fast tints. Other similar starting materials also may be used in the formation of similar derivs.

Cellulose acetate solutions or plastic compositions. I. G. FARBERIND. A.-G. *Brit.* 279,771, April 26, 1926. A formate, acetate or phthalate of ethylene glycol monomethyl ether is used with cellulose acetate compns. which may also contain natural or artificial resins, coloring substances, drying oils and various other solvents and plasticizers. Cf. *C. A.* 22, 2663.

Cellulose esters. I. G. FARBERIND. A.-G. *Brit.* 279,796, Oct. 26, 1926. Cellulosic material such as cotton (preferably after swelling for at least 4 hrs. at 10° in a 40% NaOH soln.) is esterified by treatment with a chloride of an inorg. acid such as P oxychloride or sulfuryl chloride to form esters such as cellulose phosphate or sulfate. Cf. *C. A.* 22, 1237.

Artificial silk. I. G. FARBERIND. A.-G. *Brit.* 279,888, Oct. 30, 1926. In spinning "viscose silk," the thread, while passing from the spinning nozzle to the collecting spool, is either not bent at all or at most through an angle of 150° and the thread preferably issues in a vertical direction from the bath. The method is applicable to viscoses of high viscosity and low cellulose content such as unripened viscose or viscose prepd.

from unripened alkali cellulose. The threads obtained dye well and possess an extensibility of 18% or more. An app. is described. Cf. C. A. 22, 2664.

Artificial silk. O. FAUST. Can. 280,860, June 12, 1928. Immature viscose (from immature alkali cellulose) is spun from a nozzle into a bath contg. naphthalene-sulfonic acid condensed with CH_3O . Or, mature viscose is spun in a mineral acid bath for production artificial horsehair, the bath contg. also naphthalenesulfonic acid condensed with formaldehyde.

Centrifugal apparatus suitable for the manufacture of artificial silk. KABRI-FABRIK A.-G. Brit. 279,911, Nov. 1, 1926.

Moistening and stretching artificial silk. HOLKENSEIDE GES. Brit. 279,791, Oct. 26, 1926. In a process in which the material, in skein form, is alternately stretched and slackened by jerking rollers which carry it, the material is dried and then moistened again before or during the stretching treatment.

Improvement in tenacity or elasticity of artificial silk. S. OHSAKA. Can. 280,894, June 12, 1928. The colloidal soln. for artificial silk is mixed with a colloidal soln. of vegetable protein or animal albumin and forced through a spinning orifice and at same time is coagulated. The yarn is then heated with H_2O at 70-100, and finally dried.

Conical wood-chip distributor for chemical pulp boilers. EINO CASTREN and EINARI OKSA. U. S. 1,675,211, June 26. A cone-shaped device is suspended at the inlet of a pulp boiler and in the path of the charge, and connections are provided for admitting steam under pressure under the cone to assist in evenly distributing the charge inside the boiler.

Alkali pulp. G. A. RICHTER (to Brown Co.). Can. 280,726, June 5, 1928. To produce a fiber high in α -cellulose a kraft pulp is washed and sepd. from black digesting liquor, screened and thickened with liquor contg. alk. compds. The thickened pulp mixed with a soln. of caustic soda (between a max. concn. at which mercerization takes place and a min. concn. at which purification of the pulp is not effected) or other alk. compds. and treated at 30° to permit alk. solutions to remove non- α -cellulose.

Wood pulp. LINN BRADLEY and EDWARD P. MCKEEFE (to The Bradley-McKeeffe Corp.). Can. 281,105, June 19, 1928. Wood is treated with a liquor contg. Na_2SO_3 and Na_2CO_3 in the ratio of 16.5 to 10 parts) to ($1\frac{1}{2}$ to 2 parts). Cf. C. A. 22, 2841.

Wood pulp. LINN BRADLEY and EDWARD P. MCKEEFE (to the Bradley-McKeeffe Corp.). Can. 281,285, June 25, 1928. Wood is cooked under pressure at an elevated temp. with a liquor contg. 40 to 60 g. per l. of NaOH , 10 to 30 g. per l. of $\text{Na}_2\text{S}_2\text{O}_3$ and 15 to 45 g. per l. of Na_2S . The total Na content of liquor is at least 12% on the bone-dry wt. of wood cooked.

Wood pulp. WALLACE H. HOWELL, JR. Can. 280,056, June 19, 1928. Wood is cooked under pressure, the spent liquor is withdrawn from the digester and without cooling is coned in an evaporator heated by hot vapor from the digester. The pulp is washed while in the digester with hot wash liquor at a temp. above that at which lignin becomes set, the wash liquor is withdrawn and without cooling coned in an evaporator. The pulp is washed in hot H_2O at temp. above that at which lignin sets, the second wash liquor is withdrawn and utilized for the first step wash in a succeeding batch.

Paper. A. L. KENNEDY (to The Plastic, Inc.). Can. 280,789, June 5, 1928. To 454 g. cotton rag fiber thoroughly pulped add 22 g. kelp contg. both algin and algulose reduced to aq. soln. by incorporation of 2 g. NaOH dissolved in 25 cc. water. Mix to produce a homogeneous mass. Add 16 g. of ZnSO_4 dissolved in 200 cc. water to act as precipitant. Wash the mass until the wash water shows the presence of no sulfates. Paper made from this mass is flexible, with increased resistance to electricity, heat, cold, oils and moisture.

Newsprint paper. WILLIAM H. MILLSPAUGH (to The Paper & Textile Machinery Co.). U. S. 1,674,980, June 26. Paper of extra strength but of usual compn. and thickness is made by simultaneously forming wet sheets of half the usual thickness of the ordinary wet sheet and consolidating them into a single sheet.

Bleaching pulp. OTTO KRESS (to Am. Lakes Paper Co.). Can. 281,008, June 19, 1928. Sulfate or kraft paper pulp is treated with a quantity of bleaching powder $1\frac{1}{2}$ less than that required to produce the desired degree of whiteness; the partially bleached pulp is washed to remove residual Cl and decompn. products; the pulp is washed into laps and sprayed with NaHSO_3 soln. until 60 to 100 lbs. per ton of dry pulp has been added. The treated pulp is stored to complete action of the NaHSO_3 . Cf. C. A. 22, 868.

Suction roll for paper-making apparatus. BELLOIT IRON WORKS. Brit. 279,528, June 24, 1926.

Suction roll for paper-making apparatus. W. H. MILLSAUGH. Brit. 279,643, Nov. 5, 1926.

Suction rolls for paper-making apparatus. BELOIT IRON WORKS. Brit. 279,768-9, June 24, 1926.

Automatic steam control and differential for paper machines. COLE STICKLE. U. S. 1,674,845, June 26.

Finishing paper by moistening and subjecting to heavy pressure. STUART W. WEBB, JOHN G. CALLAN and ALBERT ALLEN (to Eastern Mfg. Co.). U. S. 1,674,848, June 26.

Stock for paper, building boards, roofing, etc. GEORGE F. BLOMBERG. U. S. 1,675,244, June 26. A fibrous stock is incorporated with a pulpy jelly obtained by macerating or digesting prewashed kelp and with rubber.

Apparatus for coating paper with coloring compositions. CLARENCE O. THORNH (one-half to Philip G. Baltz). U. S. 1,675,066, June 26.

Impregnating paper, cardboard, etc., with waterproofing or other compositions. MANUFACTURE DE MACHINES AUXILIAIRES POUR L'ELECTRICITE ET L'INDUSTRIE. Brit. 280,386, Dec. 10, 1926. Mech. features.

Waterproof paper and pasteboard. BENNETT, INC. Brit. 280,083, Feb. 28, 1927. A paper furnish of waste wax paper is disintegrated and the wax dispersed, e. g., with Na silicate, and the material is run off on a paper-making app. Other fibrous material and auxiliary ingredients also may be added.

Pulp from waste paper. L. GRENAUDIER. Brit. 279,516, Oct. 25, 1926. Disintegrated printed paper such as that formed from wood pulp is boiled in a 0.1% soap soln. with const. stirring and skimming until the scum has become nearly white, then rinsed, pulped in a beater, boiled in a 0.1% Na_2CO_3 soln., dild. with hot water, stirred and skimmed until the scum is white, and then rinsed.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Roger Bacon's gunpowder and his secret wisdom. TENNEY L. DAVIS. Mass. Inst. Tech. *Ind. Eng. Chem.* 20, 772-4 (1928). E. H.

Fifty-second annual report of His Majesty's inspectors of explosives. T. H. CROZIER, R. A. THOMAS, H. E. WATTS, J. HARCOURT GIBBS. *Home Office Repts.*, May, 1928, 40 pp.—This report for 1927 is divided into Part I Explosives, and Part II Petroleum. Brief discussions of chem. work on explosives include the following: TNT contg. 34% H_2O was found to be capable of detonating satisfactorily; a fireworks compn. contg. KClO_4 , Al and As_2S_3 (orpiment) was found to be extremely sensitive to friction and violently explosive. Such compns. are condemned as being entirely unsafe to mix: the volatility of glycol dintrate now being used in explosives has necessitated considerable modification of methods of analysis. Statistics are given on accidents in manuf., storage transportation and use of explosives for each year from 1919 to 1927 inclusive. Three accidents occurred with *Pb trinitroresorcinolate*; in one an explosion occurred during the breaking up of lumps of the explosive between the fingers during the drying operation, only a small part of the charge on the drying table exploding; in another the entire charge of 15 lbs. detonated in the dryhouse from unknown cause, killing the attendant; in the third, 16 lbs. of the dry, sifted explosive detonated, probably from the dropping of a pasteboard container, or from static electricity generated on the person of the operator, who was insulated by rubber boots and a thick felt floor covering. The operator was killed. The explosion of a pressure kier in which 400 lbs. of nitrocellulose had been heated for nearly 5 hrs. under a pressure of 20 lbs. per sq. in. was attributed to sudden decompn. of a part of the charge. The steel cover of the kier was blown through the roof of the building. Reference is made to progress in the development of the radial pressure bar test for strength of detonators, but no details are given. Under the heading of Petroleum are discussed numerous explosives and fires involving gasoline, two with C_2H_2 , and one with CS_2 . C. G. STORM

The testing of blasting caps. M. TAKLÉ. *Z. ges. Schiess-Sprengstoffw.* 23, 51-3 (1928).—In the usual methods of testing, the cap is exploded by the spit from a safety fuse, it being assumed that this method produced complete explosion. Usually the kind and grade of fuse to be employed is not prescribed. Comparative Pb plate tests of No. 6 and No. 8 Hg(ONC)₂-tetrayl blasting caps were made, with ignition by means of safety fuse (110 sec. per m.), fireworks fuse (60 sec. per m.) primer caps from rifle cartridges.

and primer caps from grenades. For ignition by the percussion caps, the open end of the blasting cap shells was cut off so as to bring the charge close to the primer, which was held in a suitable fixture and fired by means of a firing pin struck by a falling wt. A limited no. of tests showed that the effectiveness of the blasting caps varies appreciably with the mode of ignition, increasing in the following order; (1) fireworks fuse, (2) safety fuse, (3) rifle primer, (4) grenade primer. Facilities for more accurate quant. tests of strength, such as the methods of Wöhler or Sucharewsky (*C. A.* 21, 3744) were not available.

The new nitrating process of Dr. A. Schmid. R. NEUBNER. *Z. ges. Schiess-Sprengstoffw.* 23, 44-6(1923).—N. discusses the many striking safety and economic advantages of the new continuous process for nitration, sepn. and washing in the manuf. of nitroglycerin (*C. A.* 21, 4070). Among safety advantages are reduction in quantity of explosives in process, continual agitation of reacting materials and finished product, reduction in no. of attendants, elimination of separate buildings for each process.

The development of airplane bombs. K. REICHERT. *Z. ges. Schiess-Sprengstoffw.* 23, 9-12, 37-41(1928).—The construction of various types of high-explosive bombs is described. A soln. of yellow P in CS_2 , which ignites spontaneously in air, was used as a charge for incendiary bombs. The soln. contained lumps of the P and also bundles of celluloid strips, for the purpose of spreading fire.

Liquid-air explosives in non-gaseous coal mines. F. STEPHAN. *Z. ges. Schiess-Sprengstoffw.* 23, 46-51(1928).

Liquid air, a new safety explosive, or the problem of safe blasting solved. C. BUNGE. *Z. ges. Schiess-Sprengstoffw.* 23, 44(1928).—Controversial B. states that claims made for greater safety in use of liquid-air explosives are not supported by accident statistics or by various investigations. Such explosives are more sensitive to impact than is dynamite, and undergo marked changes in compn., and hence in energy content, as a result of evapn. during preps. for firing the shot.

The risk of detonating-gas explosions in electric steam plants with electrode boilers. LARS VIERMANN. *Teknisk Ukeblad* 74, 269-72(1927).—It has been shown by practical expts. at a Norwegian plant that the design and dimensions of the active parts, particularly the electrodes, have a decided influence upon the formation of H_2 . The occurrence of d. c. has to be kept under efficient control and can in some cases be compensated.

Firedamp explosions: The projection of flame. II. M. J. BURGESS. Safety in Mines Research Board (London). *Paper No.* 42, 9 pp.(1928); cf. *C. A.* 20, 3815.—The distance of flame projection from firedamp explosions, initiated by spark from the closed end of a steel gallery 7.5 ft. in diam. was detd. for columns of explosive mixt. 26.75 and 53.5 ft. long. The columns were closed off by a shutter which was opened immediately before firing. With the shorter column, flame from a mixt. contg. as little as 6.3% CH_4 was projected 60 ft. through the gallery beyond the shutter. Max. lengths of projection were obtained with mixts. of about 10.5% CH_4 , viz. 120 ft. with the shorter column and 220 ft. with the longer (4.1 and 4.5 times the length of column.). The extent of flame was measured by the ignition of thin strips of cordite suspended at intervals near the top and in the center of the gallery. Except with the weaker mixts., the flame traveled farther in the center than along the top of the gallery, indicating a pointed flame-front. In general, the results confirm conclusions reached from lab. expts. in tubes 5.5 and 9 cm. diam. and 15-17 cm. long.

The occurrence and detection of hydrogen in mines. HEYER. *Z. ges. Schiess-Sprengstoffw.* 23, 77-8(1928).—The probable causes of the presence of H in potash, salt and coal mines, and the usual methods for its detection and detn. are discussed. A color comparison method for the detn. of quantities as small as 0.01 to 0.05% is described which depends upon the production of a blue color in a contg. soln. colloidal Pd.

A method for the photographic examination of moving flames. A. GREVILLE WHITE. Nobel Labs., Ardeer. *J. Chem. Soc.* 1928, 1159-61.—The method depends on the fact that progress of flame causes an abrupt change in the optical properties of the medium through which it passes. Light passing through the seat of disturbance is refracted, so that if a beam passing through the tube contg. the gas mixt. falls on a photographic film moving at right angles to the direction of the flame, the progress of the flame is indicated on the plate by two lines, one dark and one light. The velocity of the film being known, the angle between the lines and the direction of its motion gives a measure of the velocity of the flames at any selected portion of the tube.

Explosion of liquid-air-cooled charcoal tubes. J. TAYLOR. *J. Sci. Instruments* 5, 24 (1928).—An explosion may be caused by liquid air coming into contact with highly activated charcoal through cracking of the charcoal tube. It is suggested that the latter should be surrounded by a thin metal tube. B. C. A.

Lead shot coated with a harder metal such as Cu (Brit. pat. 279,781) 9.

Explosives. O. MATTER. Brit. 280,249, Nov. 8, 1926. Percussion ignition charges are formed of Pb azide alone or mixed with substances such as trinitrotoluene, tetranitromethylamine or pentaerythritol tetranitrate.

Explosives comprising gelatinized nitrocellulose. R. K. HEZLET and A. HIGHFIELD. Brit. 279,529, June 25, 1926. In the prepn. of explosives such as blasting gelatin, gelignite, ballistite and "solventless" cordite, nitroglycerin or a nitric ester for gelatinizing nitrocellulose has sufficient alc. added to it to make it a good solvent for the nitrocellulose, e. g., 2-5% of alc. may be used.

Fuse composition. JORDON HOMER STOVER and JOHN PARSONS (to John Parsons). Can. 281,349, June 26, 1928. A fuse compn. for use with self-lighting cigars and cigarettes consists of a mixt. of 10 parts wood flour, 4 parts KNO_3 , 8 parts of a 12 oz. nitrocellulose soln. and 5 parts EtOAc.

Igniting composition. JORDON H. STOVER and JOHN PARSONS (to John Parsons). Can. 281,350, June 26, 1928. An ignition compn. contains 4 parts KClO_3 , 1 part S, 3 parts of a frictionizer, $\frac{1}{2}$ part red P mixed in dry form. Two parts of the powder are mixed with 1 part nitrocellulose soln. of consistency of 12 oz. of nitrocellulose to a gal. of the soln. in a dispersing agent, as benzene and EtOAc. The resulting mixt. is spread on a fuse band and dried.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

The dyeing of millinery materials. E. GILLON. *Ind. Chemist* 4, 223-5 (1928).—A review. E. H.

Fluorescence of dyed fabrics. L. KUMMERER. *Melliand's Textilber* 9, 415-6 (1928).—A tabulation of fluorescence colors seen with a screened Hg arc. H. R. C.

Some causes of uneven dyeing. H. R. HIRST. *J. Soc. Dyers Colourists* 44, 163-70 (1928).—This study is limited to fabrics made of wool. The causes of uneven dyeing are classed as follows: (1) tendency of the dye to uneven distribution on account of its great affinity for the textile material; (2) local modification of the fabric whereby its affinity for dyes is altered; (3) faulty mech. manipulation. The causes and their removal are considered in detail. L. W. RIGGS.

Dyeing of "Tubize" rayon fabrics. B. L. HATHORNE. *Am. Dyestuff Rept.* 17, 401-2 (1928).—Tubize is yarn made by the nitrocellulose process and named for the Belgian town where Chardonnet erected the first artificial silk factory. Tubize is the strongest of the synthetic yarns and is benefited by a hard boil. Its affinity for the general run of direct cotton colors is about midway between that of scoured raw cotton and of highly mercerized cotton. It can be dyed with basic colors in light and medium shades without a previous mordanting. Dyes of the triphenylmethane group show affinity for Tubize and give bright shades with good fastness to washing. Peroxide bleaching may be used if the temp. does not exceed 65°. NaClO is not recommended but can be used if carefully handled. The 3 points emphasized in dyeing are: selection of proper dyes, boiling the goods and avoidance of soap or sol. oil. L. W. RIGGS.

Report of the sub-committee on light fastness. II. Fading of dyed textiles in the light transmitted by various glasses. W. D. APPEL and WM. C. SMITH. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 180-92; *Am. Dyestuff Rept.* 17, 410-22. Twenty selected dyeings were exposed to sunlight without glass cover and under window glass, Correx, Vita and 6 other glasses of known transmission. The fading was recorded in the form of quant. reflection measurements. The spectral distribution of the radiation and the extent to which the fading of the dyeings was effected by changes in the distribution and intensity produced by passage through the glasses was reported and illustrated in 10 charts of curves. The visible and long-wave-length ultra-violet radiation in sunlight was relatively more important in comparison with the short-wave-length ultra-violet than is commonly supposed. Window glass was considered satisfactory for covering the samples in the standard sunlight exposure tests. L. W. R.

Addition of pyridine to dye vats. M. FREIBERGER. *Z. angew. Chem.* **41**, 133 (1928); cf. Binz and Prange, *C. A.* **22**, 779.—The author refers to his previous publication (*C. A.* **15**, 3752), not cited by Binz and Prange, in which the improvement in the rate of reduction of indigo obtained by the addn. of pyridine and similar bases to the vat is described. B. C. A.

Production of aniline black from aniline. A. LINKE AND W. SCHRAMKE. *Melliand's Textilber.* **9**, 328-30(1928).—In the quick process using Cu there are losses of 30-50% between the PhNH_2 used and the increased wt. of the goods. The loss is partially the result of evapn. promoted by the disocn. of aniline salt at high temp. and partially caused by reaction with excess Cr in the after-treatment. E. R. C.

Effect of light on indigo. R. HALLER, J. HACKL AND M. FRANKFURT. *Melliand's Textilber.* **9**, 415(1928).—Since isatin was identified in an indigo-dyed cotton fabric which had been faded by exposure to sunlight under glass, it appears that the fading of indigo is due to oxidation. With other vat colors, for example Indanthrene Yellow, the effect of light is reduction. Cf. *C. A.* **21**, 4075. E. R. CLARK

Reserve salts. CHARLES M. KEYWORTH. *J. Soc. Dyers Colourists* **44**, 177-8 (1928).—Methods for the identification and detn. of reserve salts are described. L. W. RIGGS

Ultra-violet light in chemical textile research. M. NOPITSCH. *Melliand's Textilber.* **9**, 136 8, 241 4, 330(1928).—Fluorescence colors seen with a screened Hg arc are valuable for rapid identification of fibers and textile chemicals. The cellulose fibers appear yellowish and the protein in fibers bluish. Viscose rayon appears distinctly yellow, while acetate rayon is distinctly blue-violet. The violet fluorescence seen with jute disappears upon extrn. with petr. ether. The results of the examn. of current color cards and of starches, fats, wetting agents and the like gave data of definite value. E. R. CLARK

Photomicroscopy of textile materials with dark-field illumination. A. KLUGHARDT. *Faserforschung* **6**, 129-32(1928).—A series of photomicrographs obtained with the aid of a Hauser condenser (Emil Busch, Rathenow) show a wealth of detail. E. R. C.

Mbocaya fiber. FRIEDRICH TOBLER. Sorau Research Inst. *Faserforschung* **6**, 126 8(1928). A South American palm, *Coccotheca totai*, yields a fiber known in the Argentine as "mbocaya." This fiber is fine, slightly lustrous and somewhat wool-like in feel. It occurs in bundles about 40 cm. long and 2-4 mm. in diam. Strands of fibers may be readily combed out, giving a product of the general appearance of flax. The single fibers are rather weak. Chemically they are of but a slightly lignified type. Fabric manuf. is not impossible. E. R. CLARK

A method for detecting damaged wool. WILHELM SIEBER. *Melliand's Textilber.* **9**, 326 8(1928). Damaged wool has been detected by the biuret reaction, by the estn. of KOH-sol. N compds., and by Allworden's reaction using phosphotungstic acid. A newer method is based on the dyeing of tyrosine with alk. diazo soln. This can be prepd as follows: 2 g. sulfanilic acid, 3 cc. H_2O and 2 cc. concd. H_2SO_4 are added slowly to 1 g. NaNO_2 in 2 cc. H_2O . This is filtered and dissolved in 10% Na_2CO_3 . While the reagent decomposes rapidly it dyes only the tips of undamaged wool red, while wool which has been attacked with alkali or acid, or which has been excessively damaged mechanically is uniformly colored. Similar results may be obtained more conveniently by use of a 1% soln. of benzopurpurin. Micrographs are reproduced. E. R. CLARK

Comparison of South American and German-grown flax. ANNEMARIE LAUCHE. Techn. Hochschule, Dresden. *Faserforschung* **6**, 227-33(1927).—Cross-section micrographs illustrate the coarser nature of the fiber as grown in Uruguay for seed and cut, as compared with that grown in Germany for fiber and pulled. The same strain of seed was used in each case. E. R. CLARK

Measurement of the resistance of flax yarns to wear. G. F. NEW. *J. Textile Inst.* **18**, 595-605T(1927).—The test samples, suspended vertically and carrying tension pieces, are submitted to rubbing through the oscillatory motion in a vertical plane of hardened steel bars of cylindrical cross-section. The angle of contact between the yarn and the rubbing surface, and the tension in the yarn largely affect the no. of oscillations withstood, and must be suitably chosen according to the material tested. Increase in fiber quality (as estd. in the trade), yarn twist or amt. of pre-spinning treatment given (within ordinary limits) produces a yarn with higher resistance to wear; boiling decreases this resistance while sizing greatly increases it. The results, in general, are concordant with the actual weaving behavior of a series of yarns or sizes. B. C. A.

The ability of aminated and pyridinated yarn to combine with acid substances. P. KARRER AND S. C. KWONG. *Helv. Chim. Acta* **11**, 525-9(1928); cf. *C. A.* **20**, 3819;

22, 2062.—The aminated yarn was produced by treatment of yarn with NH_3 and contained 0.71% or 0.05 g. equiv. of N. This yarn fixed on the av. about 0.05 g. equiv. of the following acids: H_2SO_4 , HCl , HClO_4 , H_2CO_3 , AcOH , H_3PO_4 , and $p\text{-CH}_3\text{C}_6\text{H}_4\text{SO}_3\text{H}$. This seems to prove that the taking up of these acids by aminated yarn is a salt formation process. With more complex substances, such as acid dyes, the combinations between them and the aminated cellulose does not follow strictly stoichiometric proportions. This may be due to incomplete taking up of the dye or to adsorption processes. Pyridinated cellulose did not combine with H_2SO_4 , HCl , HClO_4 , H_2CO_3 , AcOH or H_3PO_4 in dil. aq. soln., and did not fix exactly equiv. wts. of the 5 dyes tested.

LOUISE KELLEY

Improvements in dry-cleaning and laundry processes. A. E. HATFIELD AND E. A. ALLIOTT. *J. Soc. Dyers Colourists* 44, 170-7 (1928).—This paper gives an account of the various factors affecting dry-cleaning, and traces the basis of recent improvements which give better results with greater economy. Analogous methods can be applied to wet-cleaning and laundry washing.

L. W. RIGGS

Laundering with hydrocarbon-containing soap followed by perborate bleaching. E. V. DRATHEN AND K. SOGSTETTER. *Melliand's Textilber.* 9, 416-8 (1928).—Excellent results were obtained in the laundering of soiled wool by the use of suds made with naphtha-contg. soap followed by bleaching with neutralized perborate soln.

E. R. C.

A distinction between raw and bleached cotton present together. WILHELM SIEBER. *Melliand's Textilber.* 9, 404 6 (1928). The unbleached cotton shows some affinity for Victoria Blue.

E. R. CLARK

The bleaching process. W. KIND AND H. KORTE. *Melliand's Textilber.* 9, 330-2, 409-15 (1928).—The accelerating or retarding action of constituents of the bleach bath is traced to p_{H} value following Chibbrens and Ridge (*C. A.* 21, 2192).

E. R. CLARK

Iodometric evaluation of enzymic desizing agents. R. HALLER, J. HACKL AND M. FRANKFURT. *Melliand's Textilber.* 9, 309-12 (1928). Since the aldoses formed by the degradation of starch have a low viscosity in soln. making for easy rinsing out, a measure of the rate at which they are formed is a measure of the activity of the desizing agent. For estn. of the aldoses, iodometric methods are preferable to the use of Fehling soln., being both more simple and more accurate. The method of Auerbach and Bodlander (*C. A.* 17, 512) gave best results of the several which were tried. From the consumption of oxidizing agent in the alk. soln. a value per kg. of the enzyme prepn. may be calcd.

E. R. CLARK

Bombyx mori. I. The effect of H-ion concentration upon the coagulation of liquid silk. II. Quantitative changes of cystine, tryptophan and tyrosine in proteins of silkworms (NAKAJIMA) 111. Acid soaps (HARTMANN; KAGE) 27. Acid basic dye-stuffs (KAGAN) 10. Methods of analysis of leather dyes (JONES) 29. Apparatus for acidulating wool (U. S. pat. 1,674,786) 1.

SCHULTZ, GUSTAV. **Farbstofftabellen.** Band I und II. 7th ed. revised and enlarged by Ludwig Lehmann. Berlin Weidmannsche Buchhandlung M. 8; subscription price M. 6

Dye. I. G. FARBENIND. A-G. Brit. 280,436, May 5, 1927. A greenish yellow dye fast to light and oil is made by coupling diazotized 4-chloro-2-nitroaniline with acetoacetic *p*-chloroanilide. The dye may be deposited on a substratum to form a lake.

Dyes. L. CASSELLA & Co., Ges. Brit. 280,217, Nov. 2, 1926. Halogen derivs. of anthanthrone are prepd. by condensing 1,1'-dinaphthyl 8,8'-dicarboxylic acid to anthanthrone in H_2SO_4 soln. and then halogenating the product in the same soln. without sepn. Br and I may be used together for the halogenation.

Dibenzanthronyl derivatives. KARL ZAHN AND PAUL OERIWAT (to Grasselli Dye-stuff Corporation). U. S. 1,675,014, June 26. By heating the ethers of Bz-1-iodo-Bz-2-hydroxybenzanthrones with Cu powder in an inert solvent such as PhNO_2 new diethers of Bz-2-Bz-2'-dihydroxy-Bz-1-Bz-1' dibenzanthronyls are obtained which by the action of alk. condensing agents can be converted into dyes. The intermediate forms brown needles, m. 387-390°.

Fast colors on vegetable fibers. F. STRAUB (to Soc. anon. pour l'ind. chim. à Bâle). Can. 280,981, June 21, 1928. A dye bath is prepd. with 2 parts of Cr compd. of the azo dyestuff from diazotized 2-amino 4-chloro-5-nitro-1-phenol and 2,5-amino-naphthol-7-sulfonic acid (acid coupling) 50 parts of Glauber's salts or 30 parts of common salt; 100 parts of cotton is introduced into the bath at 60-70°, boiled up within $\frac{1}{4}$ hr. and dyed a further $\frac{1}{2}$ to $\frac{1}{4}$ hrs. The dyed cotton is rinsed and dried.

Dyeing "viscose silk," etc. BRITISH DYESTUFFS CORPORATION, LTD. AND J. BADDILEY. Brit. 280,320, 1926. Monoazo dyes are used as are obtained by coupling diazotized amines and their derivs., including sulfonic and carboxylic acids, with 2-amino-5-naphthol-7-sulfonic acid or its *N*-substituted derivs. Numerous examples are given.

Dyeing acetylcellulose. GEORGE H. ELLIS and ERNEST GREENHALGH (to Henry Dreyfus to The Can. Celanese, Ltd.). Can. 281,180, June 19, 1928. Colored patterns are produced on material comprising acetylcellulose by locally applying a prepn. comprising a thiocyanate and an org. compd. capable of coloring acetylcellulose which has been solubilized by pretreatment with sulfuricnoleic acid or other substance of oils or fatty characteristics contg. salt-forming groups or with salts of such compds. such as their alkali or ammonium salts or with mixts of said solubilizing agents. Cf. C. A. 21, 3752.

Dyeing cellulose derivatives. HENRY DREYFUS. Can. 281,193, June 19, 1928. Cellulose acetate, etc., are dyed with an aq. colloidal soln. of a coloring compd. which comprises at least one alc. group linked to an anthraquinone dye nucleus through C only, said colloidal soln. being prepd. by preheating the compd. with a solubilizing agent.

Dyeing cellulose derivatives. HENRY DREYFUS. Can. 281,194, June 19, 1928. A cellulose deriv. is treated with an aq. soln. of NH_4SCN and then dyed with an aq. dispersion of a relatively water-insol. coloring compd. The dispersion is prepd. by preheating the compd. with a solubilizing agent comprising a Na salt of sulfuricnoleic acid.

Dyeing cellulose derivatives. HENRY DREYFUS. Can. 281,195, June 19, 1928. Cellulose acetate material is treated with 15% solns. of aliphatic acid salts of mordant metals (especially with salts of hydroxy aliphatic acids) and after absorption of the mordant metals is dyed with mordant dyes. Mordant salts particularly useful are those of lactic, citric, glycolic and acetic acids.

Dyeing furs and other materials. BRITISH DYESTUFFS CORPORATION, LTD., R. S. HORSFALL and L. G. LAWRIE. Brit. 279,942, Aug. 4, 1926. Furs, bone, ivory, horn, resins such as "synthetic glass" and celluloid films are colored by concd. dye solns. contg. water and hydroxyl derivs. of benzene hydrocarbons, e. g., furs may be dyed a deep blue with a soln. of Alizarine cupra blue B and resorcinol.

Dyeing, printing and stenciling. GEORGE H. ELLIS, HENRY C. OLPIN and ERIC E. WALKER (to Henry Dreyfus.). Can. 281,192, June 19, 1928. Materials which are deleteriously affected by alkali sulfide, are dyed by applying S dyestuffs in conjunction with both alkali sulfide and alkali hyposulfite to reduce the quantity of alkali sulfide sufficiently to avoid deleterious action on the fibers.

Printing fabrics with vat dyes. I. G. FARBENIND. A. G. Brit. 279,864, Oct. 26, 1926. The material is first printed with the dye thickened with a soln. of cellulose ester or ether and is then treated with a reducing agent and an alkali and steamed. Water sol. cellulose alkyl ethers are suitable for the process.

Fabric-printing apparatus. A. CROMPTON AND CALICO PRINTERS' ASSOCIATION, LTD. Brit. 280,376, Dec. 2, 1926.

Textiles. CAMILLE DREYFUS. Can. 280,645, June 5, 1928. Textiles are prevented from becoming fluffy and losing appearance by treating the yarns with a soln. of cellulose acetate, or other org. deriv. of cellulose to give a permanent finish.

Treatment of fabrics. GEORGE H. ELLIS (to Henry Dreyfus.). Can. 281,189, June 19, 1928. Woven or knitted fabrics contg. cellulose esters or ethers are treated to render them immune from development of faults by lack of cohesion between the threads, by impregnating at 100° with strong aq. solns. or dispersions (10% concn.) of oily or fatty substances, of salt-forming carbocyclic compds. or salts thereof, of sulfonated aromatic fatty acids or salts thereof, of resin soaps or salts or soaps of resin acids.

Retting flax, etc. BRITISH DYESTUFFS CORPORATION, LTD., C. HOLLINS and E. CHAPMAN. Brit. 279,583, Aug. 24, 1926. A retting bath is used contg. 0.5-2.0% of wetting agents such as sulfonic acids derived from $\text{CH}_3\text{O}-\text{C}_{10}\text{H}_7$ condensation products or CH_3O PhOH condensation products, alkylnaphthalenesulfonic acids, substances prepd. by sulfonating mineral-oil fractions and condensing the products with isopropyl alc., ligninsulfonic acids, naphthenic acids, taurocholic and sulfonated higher fatty acids.

Treating hemp or similar fibers. L. LAPIERRE. Brit. 279,946, Aug. 5, 1926. In order to give hemp or other similar ligneous fibers a silky appearance the material after degumming is treated for about 2 hrs. at 120° with a soln. formed from water, KNO_3 , ammoniacal K sulfide, NaCl, Na borate, Mg sulfide and ammoniacal Cu oxide,

then washed, rinsed with 2% HCl soln., treated with 1% "oxaline oil," then with a 1% KNO_3 soln., dried and sepd.

Cleansing and bleaching compositions. R. VIDAL. Brit. 280,193, Nov. 5, 1926. Comps. for washing and bleaching textile materials are prepd. by treating with NaOCl or other alkali hypochlorite fatty acids or animal fats or oils, with or without admixt. with mineral oils. Oleic acid or oils such as those from peanut, copra, whale, soy, maize or tallow may be used.

Detergents suitable for use on textile materials. I. G. FARBERIND. A.-G. Brit. 279,877, Oct. 27, 1926. Stable solid solns. are obtained by dissolving an alkali or NH_4 salt of an alkylated or cycloalkylated aromatic hydrocarbon in an org. solvent with or without the addn. of a water-binding agent. Among the substances which may be used are: Na butylnaphthalenesulfonate, Na isopropylnaphthalenesulfonate, Na or NH_4 dibutylnaphthalenesulfonate, Na cyclohexylnaphthalenesulfonate and the sulfonates of butylbenzene, isopropylxylene and dibutyltetrahydronaphthalene together with solvents such as dipentene (as obtained as a by-product in making camphor from turpentine oil), diacetone alc., heavy benzine, $\text{C}_2\text{H}_2\text{Cl}_4$, solvent naphtha and 1,3-butyleneglycol. Na_2CO_3 , pumice or kaolin is also specified in some of the formulas given. The comps. are mixed with H_2O to prep. them for use.

Delustering cellulose acetate products. GEORGE H. ELLIS (to Henry Dreyfus). Can. 281,352, June 26, 1928. Patterns are produced on fabrics contg. cellulose acetate by the local application of substances which accentuate or which diminish the delustering action of hot aq. media or moist steam, and thereafter treating the fabrics with hot aq. media or moist steam.

Mercerizing. CHEMISCHE FABRIK VORM SANDOL. Brit. 279,784, Oct. 29, 1926. The action of alkali mercerizing liquor on natural or artificial cellulosic fibers is accelerated and made more uniform by adding a small proportion of a mixt. of phenols and hydrogenated aromatic compds. such as those derived from C_{10}H_8 , naphthols and phenols. The treatment also renders the material susceptible of more even dyeing.

Weighting artificial silk. R. CLAVEL. Brit. 280,094, March 30, 1927. In a process as described in Brit. 277,602 (C. A. 22, 2 63) successive weighting baths are used without intermediate washing or neutralization, and at least one of the baths, prior to the pptg. bath, has an acid reaction or contains a protective colloid. After weighting, and preferably before squeezing, the material may be treated with an alk. bath contg. dyes and tanning substances.

Weighting cellulose acetate fabrics, etc. C. DREYFUS and H. PLATT (to British Celanese, Ltd.). Brit. 279,502, Oct. 23, 1926. Weighting of fibers, yarns or fabrics of cellulose acetate or other cellulose esters or ethers is effected with a soln. of metallic salts such as SnCl_4 or ZnCl_2 ; the cellulose deriv. is subjected to a swelling or gelling action before or during the treatment and the weighting is fixed in insol. form by washing or soaping. Formic acid, HOAc , PhOH , furfural or pyridine may be used as gelling agents, and pptn. of Sn may be effected by Na_2CO_3 , NaHCO_3 , NH_3 , NaOH , KOH , or $\text{Ca}(\text{OH})_2$.

Apparatus for singeing yarns. SCHWARZ & CO. Brit. 280,201, Nov. 2, 1926.

Fabrics comprising cellulose esters or ethers. C. DREYFUS (to British Celanese, Ltd.). Brit. 280,195, Nov. 4, 1926. Designs are produced on fabrics such as those comprising cellulose acetate or propionate or ethyl cellulose, by engraved rollers under heat and pressure or by similar treatment.

Hair felt. ALBERT L. CLAPP (to Beckwith Mfg. Co.). U. S. 1,674,948, June 26. Rag or sulfite pulp or other similar cellulosic material is beaten with a soap such as Na or K oleate or stearate and long hair is then added and the fibers are combed out and the mixt. is run off on a wet paper machine. The product is suitable for heat and sound insulation, etc. Cf. C. A. 22, 2848.

26 · PAINTS, VARNISHES AND RESINS

H. SABIN

English standard specifications for paints. ANON. *Farben-Ztg.* 33, 622-3(1927).

J. S.

Preparation of luminous paints. R. DECKERT. *Farbe u. Lack* 1927, 172, 182.—A series of formulas is given.

J. S.

Origin and prevention of watermarks in white coatings. ANON. *Farbe u. Lack* 1927, 149.—When exposed to the atm. in the presence of Fe and Cu, paints contg.

ZnO become watermarked; those contg. basic Pb carbonate do not. The Fe and Cu hydroxides formed appear first as colloids which are easily washed off by the rain. As they coagulate very slowly in the presence of white lead their removal is complete. The coagulating action of the ZnO is immediate and the coagulated metal hydroxide stays with the paint film.

Accelerated kneading of coating materials. PAUL GRUNDLACH. *Farbe u. Lack* 1927, 138-9.—Various kneading app. used in the paint, varnish and lacquer industry are described. J. S. SCHALCH

History of the chrome colors. H. BING. *Farbe u. Lack* 1927, 111, 129, 158. J. S.

The use of gas in making dry colors. ISMAR GINSBERG. *Chem. Markets* 22, 635-6, 694(1928).—By reason of the greater efficiency with which it can be burned, the ease of regulation of combustion, its cleanliness, convenience and the simplicity of the appliances for using it, gas fuel serves well in the dry-color industry for effecting chem. reactions, roasting minerals and burning the dry colors. W. C. EBAUGH

Colors for glass painting. E. O. RASSER. *Farbe u. Lack* 1927, 314, 333.—Formulas are given for the prepn. of china paints. J. S.

German standards for white lead. ANON. *Farben-Ztg.* 23, 621(1927). J. S.

Plasticity and flow determination of paints. H. VOLLMANN. *Farben-Ztg.* 32, 1904-6(1927).—The plasticity of a paint is the result of coagulation of the disperse phase, the coagulation depending on the properties of the vehicle as well as of the pigment. Expts. made with blanc fixe and various vehicles, such as benzene, benzine, tetralin, turpentine, linseed oil, and paraffin oil, show that in a medium of colloidal structure the pigment is pptd., although much more slowly, to a denser sediment than in a non-colloidal liquid. The plasticity, of which the flow is a certain function, is detd. by measuring the latter with the flow meter of Mallison, modified by V. The app., consisting of a system of calibrated grooves, the latter being provided on one end with receptacles of known capacities, is set in a vertical position. For operation it is lowered to a certain level, whereby the liquids are allowed to flow along the grooves. The progress of flow is marked at intervals. Flow curves are given for paints consisting of equal parts of pigments, such as blanc fixe, lithopone, chromium yellow, zinc white and vehicles, such as linseed oil varnish, a 1:1 mixt. of linseed oil and standoil, and ester gum varnish. J. S. SCHALCH

The red lead question. H. RAHDER. *Farben-Ztg.* 33, 741-3(1927).—The advantages claimed for modern "high-dispersion" red leads are: non-settling, easy brushing, good spreading power and consequent cheapness. R. complains, however, that no attention has hitherto been paid to questions of actual rust prevention, and his preliminary tests indicate that in adhesion, resistance to water, etc., the "modern" red lead is inferior to the "classic." B. C. A.

The analysis of paints with graphite base. RAYMOND JACQUES. *Ann. chim. anal. chim. appl.* 10, 98-100(1928). A convenient method for the analysis of graphite paint is given in detail and the compn. of 2 typical paints is shown. Twenty-five g. of the paint was extd. with ether several times, filtered through a tared Gooch crucible, and resin was removed by washing with alc. Oil of turpentine was detd. by distn. of 25 g. of varnish with 100 cc. H_2O , measuring the vol. of oil in the distillate, with a correction of 0.35 cc. for oil absorbed by H_2O . The pigment of one of the paints contained 30% of graphite, 14.5% of $ZnCO_3$, 12.5% of Fe_2O_3 plus Al_2O_3 and 30.8% of ZnO. The method of analyzing the pigment involved no new feature. W. T. HALL

Studies on the physiological properties of titanium dioxide and titanium white. K. B. LEHMAN and LUDWIG HERGET. *Chem.-Ztg.* 51, 793-4(1927).— TiO_2 fed for six months to various animals proved harmless. Two methods for the detn. of Ti are given. G. G. SWARD

Basic sulfate liquor in lithopone manufacture. W. N. HIRSCHL. *Chem.-Ztg.* 51, 599(1927).—Zinc salts present in the mother liquor in lithopone manuf. are, during clarification, pptd. as $3ZnO \cdot ZnSO_4 \cdot 8H_2O$. G. G. SWARD

Oil absorption of highly dispersed pigments. F. HÜLSKAMP. *Farbe u. Lack* 1928, 254-5.—Forty g. of highly dispersed red lead ground in 100 g. linseed oil occupied 2.3 times the vol. of 20 g. ordinary red lead also ground in 100 g. oil. The discrepancy is due to the formation of foam with the former. G. G. SWARD

General interpretation of the drying processes of fatty oils. B. SCHEIFELE. *Farben-Ztg.* 33, 739-41(1927).—The drying processes of all drying oils, whether of the tung oil, linseed oil or poppyseed oil groups, are explained with reference to the relative unsatn. of their mols. and consequent tendency to gel formation. B. C. A.

Polymerization as the cause of the drying of fatty oils. JOH. SCHEIDER. *Farbe u.*

Lack 1927, 75-6, 135-6.—A review of various theories covering the drying process of fatty oils. J. S.

Aging of boiled oil. F. WILBORN. *Farben-Ztg.* 33, 864(1927).—Over a period of 10 months, samples of boiled oil were prepd. monthly by incorporating a standard amt. of Pb-Mn resinate (the same "melt" being used throughout) in the same well-preserved linseed oil. A similar series was prepd. with Co linoleate as drier. At the end of this time no appreciable sedimentation had occurred in any sample, and the drying times of the oils showed no significant "aging" variation. This is contrary to previous statements to the effect that the driers in boiled oil gradually lose effectiveness by pptn. B. C. A.

Influence of driers on the drying of oil of amber. F. WILBORN. *Farben-Ztg.* 33, 862-4(1927).—Addns. of Pb-Mn resinate and of Co resinate to redistd. oil of amber are graphically shown to accelerate the drying by catalyzing resinification. The results are briefly discussed. B. C. A.

Molecular and absolute drying action of various metals. F. QUINCKE AND K. KAMPHAUSEN. *Farbe u. Lack* 1927, 341-3.—The usual method of detg. the relative dryness of paint films with the fingers does not give const. results. Q. and K. successfully used for this purpose the capillary action of filter paper. The height of rising of the oil gives a direct measurement for the drying action of the metal whose salt was used as drier. The amt. of drier necessary to obtain the optimum drying action is proportional to the mol. weight of the corresponding metal and is 0.003 mol. per 100 g. linseed oil. Charts and tables are given showing the drying action of various metals in combination with linseed and tung oil or linseed-tung oil mixts. With the following the drying time of linseed (a) and tung oil (b) in the presence of a drier is given in fraction of the drying time of the drier-free oil $\frac{1}{10}$ to $\frac{1}{15}$: a Co, b Co, Fe, Mn, Cu. $\frac{1}{10}$ to $\frac{1}{4}$: a Mn, Pb; b Cr, Pb, Zn, Ni $\frac{1}{2}$: a Fe, Ni, U, Cr; b—. $\frac{3}{4}$: a Ba, Cu, Mg, Sr, Mo, Zn, Ca, W; b Ba, Mg, Sr, Cd. J. SCHALCH

Manganese compounds as drier bases. FELIX HEBLER. *Farbe u. Lack* 1927, 258-60.—Review of various Mn compds used as drier bases. J. S.

Water-resistance tests [on paints and varnishes]. H. WOLFF. *Farben-Ztg.* 33, 921-3(1928).—In a series of expts. on water-resistance of paints and varnishes under varying conditions, conflicting results were obtained according to whether the immersion was continuous or intermittent, and whether temporarily or permanently hard water or distd. water was used. The following standard method of procedure is suggested: Films (1 or 2 coats, according to the type of material) on clean glass and iron plate are half-immersed in water after 48 hrs. air drying. If tap water be used, it should be freed from temporary hardness. The immersion is continuous, daily examn. being made for milkiness, softening, etc. A parallel series of tests should be run, the films being allowed to dry out after each 2 days' immersion, and the reversibility of any changes observed. R. C. A.

The numerical determination of drying time and hardness of paints and varnishes. RICHARD KEMPF. *Z. angew. Chem.* 40, 1296-301(1928). The character of the mark made by the rim of a wheel, knife edge or a point indicates the degree of drying or hardness of a film. The marking piece is fixed at the end of a beam and the film is caused to travel while in contact with the former. Provision is made for either a const. or a gradually increasing load on the wheel, etc. At the end of each detn. the film is automatically shifted for the succeeding detn. Details of the construction of the app. are given. The author recognizes three periods, fluidity, gel and hard. G. G. SWARD

Newer manufacturing methods for varnishes. HANS REBS. *Farbe u. Lack* 1927, 128.—A review. J. S.

Painting and lacquering of railroad cars. ANON. *Farbe u. Lack* 1927, 92.—The painting and lacquering process and cost calcs. are described. J. S.

Nitro-oil or combination lacquers. F. KOLKE. *Farben-Ztg.* 33, 861. 2(1927). The combination of nitrocellulose varnishes with oil varnishes is discussed. Curves are given showing the limits of compatibility of tung oil with 20% $\frac{1}{4}$ -sec. nitrocellulose solns. in butyl acetate and in hexalin acetate. B. C. A.

Newer results of the study of cellulose and their importance for the lacquer industry. JOH. SCHEIBER. *Farbe u. Lack* 1927, 190-1.—Under the influence of ultra violet rays and temp. changes cellulose esters become brittle; this is apparently due to crystn. The ability of these esters to crystallize is proved by the discovery of well-defined acetylcellulose crystals and by the fact that cellulose esters when mixed with true solns. do not follow the adsorption law of Freundlich, but follow the distribution law of Henry. J. SCHALCH

Clarification of nitrocellulose lacquers. ADOLF HECK. *Farbe u. Lack* 1927, 151.—

The construction and efficiency of the "Union Filter Centrifuge," used for the clarification of lacquers, are described. J. S.

Plasticizers for nitrocellulose lacquers. ANON. *Farbe u. Lack* 1927, 297.—The usefulness of various plasticizers is discussed. J. S.

Examination of plasticizers for nitrocellulose lacquers. E. v. MÜHLENDahl AND H. SCHULZ. *Farbe u. Lack* 1927, 276; cf. C. A. 22, 1861.—The *evaporation rate*, detd. by heating 10 g. of the plasticizer in a glass dish of 75 mm. diam. to 100° and expressed in g. product lost per 100 g. sample, is after 10 days for castor oil 0.1, tricresyl phosphate 0.5, triphenyl phosphate 1.0, amyl phthalate 8.1, "Elaol" 8.2 and after 2 days for camphor 99.8. The influence of the plasticizer on the nitrocellulose under the *action of light and heat* is judged from the color of a mixt. of equal amts. of the 2 products which was heated to 100° or exposed to the rays of a quartz lamp. In order to det. the *solvent power* of the plasticizer for nitrocellulose, 4 g. of the latter are dissolved in 8 g. alc. and 8 g. plasticizer. The no. of cc. of benzene necessary to ppt. the cotton from the soln. is a direct measure of the solvent power. This varies with different nitrocelluloses; with "AB 100-collodion cotton" it is for camphor 88, "Elaol" 44, amyl phthalate 41, triphenyl phosphate 38, and tricresyl phosphate 35. In castor oil the collodion cotton is only partly dissolved J. SCHALCH

Sulfur-phenol resins for the manufacture of shellac substitutes. ANON. *Farbe u. Lack* 1927, 286.—Phenol resins are made water-insol. by sulfuration. Formulas for the manuf. of sulfur-phenol resins are given. J. S.

Hardening and esterification of rosin. F. PYHÄLA. *Farben-Ztg.* 33, 801-3 (1927).—P. describes a new process for the esterification of rosin in open kettles, the customary losses and darkening being avoided. Finely divided Ca compds. of the appropriate higher alcs., phenols, etc., are gradually added, with stirring, to molten rosin. The temp. is maintained at 180-220° until effervescence ceases and a calm melt is obtained. By careful working a pure ester is produced, lime being deposited quantitatively as a sediment in the kettle. Exptl. details are given for the prepn. of esters of rosin with glycerol (mono- and tri-glycerides), phenol, cresol, β -naphthol, resorcinol and borneol. B. C. A.

Exploitation of the euphorbias in South Africa; obtaining resins and rubber. W. SPOON. *Ind. Mercur* 1927; *Ber. Afedel. Handelsmuseum Ver. Koloniaal Inst.* No. 32, 28 pp.—The latex of the euphorbias from South Africa contains little rubber and much resin; the plants cannot be cultivated, nor regularly tapped; their economical exploitation is not very promising. A. L. HENNE

Are there resinogenic and resinophoric groups? HANS WOLFF. *Z. anorg. Chem.* 40, 1010-11 (1927). Resins are the result of conditions rather than of certain chem. groups. As a heuristic principle resinogens may be considered as reaction groups which tend to the formation of compds. of high mol. wt. G. G. SWARD

Report of Committee D-15 on thermometers [for use in testing tung oil] (FULWELLER, *et al.*) 1. Low-temperature tar oils (MARSHALL) 21. Apparatus for drying veneer (U. S. pats. 1,675,284-5) 1.

CHAMPOUR, MALEPEYRE, VILLON, and CHAPLET, A.: *Nouveau manuel complet de la fabrication des encres de toutes sortes.* Paris. Encyclopédie Roret L. Mulo. 380 pp. P. 15.

Titanium pigments. B. LAPORTE, LTD., H. E. ALCOCK and I. E. WEBER. *Brit.* 280,435, April 27, 1927. A white pigment is made by mixing a paste of Ti hydrate and a paste of BaSO₄ which has been prepd. as described in *Brit.* 252,768 (C. A. 21, 2537) and heating to above 650°; examples are also given in which C is used as an addnl. ingredient and the temp. is carried to 700-950°.

Grinding and mixing plant for making paints, ink, etc. J. R. TORRANCE AND TORRANCE & SONS, LTD. *Brit.* 280,041, Nov. 30, 1926.

Ink. U. A. D'INZEO. *Brit.* 280,088, March 9, 1927. An indehble writing or printing ink for use on paper sensitized with an aq. or alc. soln. of gallic or tannic acids comprises Fe(NO₃)₃ or a chromate such as that of K in water or other suitable solvent.

Inks. BRITISH DYE-STAUFFS CORPORATION, LTD., C. HOLLINS and E. CHAPMAN. *Brit.* 279,908, Aug. 19, 1926. The fluidity of inks is improved by adding a dispersing or wetting agent such as a sulfonic acid of the CH₃O-C₁₀H₇ or CH₃O-phenol condensation products, alkylnaphthalenesulfonic acids or sulfonated mineral oils which may

be isopropylated or not. Mention is also made of the possible use of ligninsulfonic acids, naphthenic acids, taurogallic acid and sulfonated higher fatty acids and products such as described in Brit 274,611 (*C. A.* 22, 2268).

Printer's ink. M. LUDVIGSEN. Danish 37,548, May 20, 1927. Waste products from the manuf. of sulfite cellulose such as waste liquor or terpenes and resins are evapd to the desired concn. (40-60% dry matter) and the residue is mixed with oil or fat. The latter may be replaced by linseed-oil fat. The sulfite liquor residue or terpenes should amount to between 60 and 90% of the total wt. of the ink mass.

Printers' ink. AKTIESELSKABET SADOLIN & HOLMBLAD. Danish 38,262, Dec. 19, 1927. In a paste brayed from oil and pigment is emulsified up to 50% of an oil free aq. soln. contg. not less than 10% of a glutinous org. substance with the exception of gum and casein.

Lacquer. JOSEPH G. DAVIDSON (to The Carbide and Carbon Chemicals Corp.). Can. 281,640, July 10, 1928. A thinner for pyroxylin lacquers comprises not more than 30% EtOAc and EtOH, not more than 20% of $\text{HOCH}_2\text{CH}_2\text{OMe}$ and $\text{AcOCH}_2\text{CH}_2\text{OMe}$ and the remainder a suitable hydrocarbon solvent (toluene, or mixt. of toluene with other hydrocarbons such as xylene or petroleum naphthas). Cf. *C. A.* 22, 2850.

Cellulose ester and ether compositions. H. BRADSHAW (to E. I. DuPont de Nemours & Co.). Brit 279,520, Oct. 25, 1926. In forming pyroxylin lacquers or other similar compns., tetrahydrofurfuryl alc. or a similar alc. of high b. p. is used as a solvent and may be mixed with other solvents, fillers, plasticizing agents, etc.

Synthetic resins. H. W. MATHIESON and F. W. SKIRROW (to Canadian Electro Products Co., Ltd.) Brit. 280,246, Nov. 8, 1926. Gummy or resinous products are made by reaction of vinyl acetate, vinyl formate or other suitable vinyl ester with a satd. aldehyde such as AcH , with or without an inorg. acid or other catalyst.

Molded articles of synthetic resins. K. A. STUBBS. Brit. 280,017, Oct. 14, 1926. Cups, saucers, plates or other articles are formed from synthetic resin or similar moldable powder with a lace or other openwork pattern pressed into the material during molding to produce a decorative effect.

Coating composition. R. H. KIENLE and L. V. ADAMS (to Can. General Elec. Co.) Can. 280,937, June 12, 1928. A soln. of resin prepd. from glycerol and phthalic anhydride and contg. phthalic acid is treated with an alk. material to neutrality, and the clear soln. decanted from the compd. of the alkali and the acid constituent of the resin and any excess of uncombined alkali. Basic pigments or fillers (ground) may be suspended in the soln. of resin without coagulation.

Condensation products of urea with alcohols and ketones. I. G. FARBENING A.-G. Brit. 280,238, Nov. 6, 1926. Oily or resinous products are obtained by condensing urea or one of its derivs. with an alc. or ketone, at a temp. below 120° in the presence of strong H_2SO_4 or other suitable catalyst. Butylene glycol, the acetal from glycerol and acetaldehyde and diacetin may be used in various examples which are given. Cf. *C. A.* 22, 2673.

Phenolic condensation products. FRANZ KURATH (to Economy Fuse and Mfg. Co.) Can. 280,747, June 5, 1928. A phenol and a compd. contg. a reactive methylene group (e. g., formaldehyde) are boiled under a reflux condenser in the presence of furfuralamide.

Phenolic condensation products. O. A. CHERRY and F. KURATH (to Economy Fuse and Mfg. Co.) Can. 280,746, June 5, 1928. Phenol and com. formaldehyde are boiled under a reflux condenser in the presence of furfuralamide until the mixt. seps. into 2 layers and slight thickening occurs. The mixt. is concd. by distn. under reduced pressure until the substance is anhydrous, or the supernatant liquid is treated with furfuralamide and the resultant water decanted. A potentially reactive resin is obtained which is hardened by heat at low temp. without application of pressure, or may be mixed with fillers to form hard, infusible compact, resistant articles by combined action of heat and pressure. Or, a fusible resin is made by heating a phenol and CH_2O under pressure in absence of a condensing agent. To this permanently fusible resin is added a quantity of CH_2O or polymer thereof sufficient to render the product infusible upon heating, and a quantity of furfuralamide (from 20 to 75% by wt. of the fusible resin). After admixt. with filling material, the product may be hardened by heat and pressure. Cf. *C. A.* 22, 2818.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Statistics of fats and oils. ANON. *Oil and Fat Ind.* 5, 176-9(1928). E. S.

Organic peroxides as bleaching agents. F. VISSERT HOOFT. *Oil and Fat Ind.* 5, 180-2(1928).—Benzoyl peroxide is used by making a paste with the oil after ascertaining by trial the proper amt., which varies from 0.05 to 0.2%. The oil is heated to 80° to 90° and the paste mixt. stirred in thoroughly. The time of the treatment varies greatly with the nature of the oil. Sometimes 20 min. is enough and sometimes even after a few days an after-bleaching is seen. No deposits are formed and no filtering is necessary. After the benzoyl peroxide has lost its available O there remains a small quantity of benzoic acid which can be volatilized readily if desired. E. S.

Problems of the oil refiner. G. G. FOX. *Oil and Fat Ind.* 5, 167-70(1928).—A discussion of the relation of the refiner to the buyers and chemists. E. S.

Relation between analysis and properties of sulfonated oils. F. G. A. ENNA. *J. Intern. Soc. Leather Trades Chem.* 12, 204-10(1928); cf. *C. A.* 22, 182.—The superior nourishing property of sulfonated fish oils, as compared to sulfonated castor oil, is ascribed to lower degree of sulfonation, resulting in a less stable emulsion, which produces a more desirable distribution of the oil throughout the skin. The method of Stiasny and Riess (*C. A.* 20, 302, 998) for detg. sulfonated oil in admixture with unsulfonated is recommended. H. B. MERRILL

Chemistry of the Kreis reaction. J. PRITZKER AND R. JUNGKUNZ. *Am. Perfumer* 23, 280-1(1928); *Seifensieder-Ztg.* 54, 946(1927).—The investigations of Powick furnish satisfactory explanations for a series of phenomena when fats and oils become rancid. The most essential results are as follows: (1) As a result of direct tests the following compds. do not come under consideration: formic, acetic, butyric, capronic, heptylic, nonylic, caprylic, acrylic, azelaic, hydroxystearic, dihydroxystearic and diketostearic acids, and azelaic, butyric, heptylic, nonylic, crotonic aldehydes and formaldehyde, methylglyoxal, acrolein, dihydroxyacetone and oleic acid ozonide (2) Glycerol and the unsapon portions of fats play no part in rancidity. (3) The color of the Kreis reaction was examd. spectroscopically and found identical with that of acrolein- H_2O_2 and phloroglucinol-HCl. (4) From the mixts. acrolein, H_2O_2 and HCl colorations are obtained both with resorcinol-benzene and with naphthoresorcinol-ether which were identical with those that under equal conditions were obtained from spoiled fats. (5) Synthetically prepd. epihydrinaldehyde diethylacetal yielded a positive Kreis reaction, the color of which, spectroscopically examd., agreed with that obtained from rancid fats. (6) From epihydrinaldehyde diethylacetal it was possible to prep. a red phloroglucide of epihydrinaldehyde, which is easily sol. in glacial AcOH and concd. HCl. The HCl soln. is spectroscopically identical with the soln. which is obtained from spoiled fats in the Kreis reaction. (7) When fats become rancid there is presumably formed the glycerylacetate of the epihydrinaldehyde. Epihydrinaldehyde acetal is volatilized neither with H_2O vapors nor in a vacuum. (8) The evolution of the Kreis reaction must be conceived in such a way that the epihydrinaldehyde is first formed from the acetal under the influence of HCl, which with phloroglucinol forms the red condensation product, epihydrinaldehyde phloroglucide. (9) An hypothesis regarding the chemistry of rancidity is illuminated by the possibility of the formation of epihydrinaldehyde by autooxidation of oleic acid. In addition to this the formation of other aldehydes such as have been observed by other investigators in rancid fats and oils is not excluded. E. SCHERUBEL

Determination of iodine numbers by the Margosches method. G. BRACHMANN AND A. MOROSOV. *Oil & Fat Ind.* (Russia) 1926, No. 2-3, 73-7; *Chem. Zentr.* 1927, I, 2616.—EtOH contg. 1-2% AmOH was used as solvent for the fats which were studied. This mixt. readily dissolves hard fats, so that methods which on account of the difficult soly. of solid fats in pure EtOH are limited to liquid fats are open to much wider application with this solvent. C. C. DAVIS

A simple method for determining the oil content of seeds and other oil-bearing plants. DAVID A. COLEMAN AND H. C. FELLOWS. U. S. Dept. Agr., *Tech. Bull.* 71, 1-13(1928); cf. *C. A.* 22, 692.—The Wesson or refractometric method of detg. of the oil content of such materials as cottonseed, cocoa, chocolate, cacao meats, cacao shells, flaxseed, linseed meal, peanuts and soy beans was investigated. Briefly the method consists in measuring the change in % of the fat or oil solvent as it becomes diluted with the oil extd. from the sample. The solvent used was halowax, grade No. 1000 or 1007, the trade name for an impure monochloronaphthalene. The lab. set up

of app. is shown. Conversion tables are necessary to det. the actual % of oil in the oil-halowax mixt. Refractometer readings are read to 5 decimal places. Comparisons of the optical with the standard ether-ext. method showed a striking agreement for several types of oily substances. In only 3 of 70 instances was the difference greater than 0.25%. Substances contg. over 8% of oil may be analyzed by the optical method with more accuracy than where the oil content is less than this figure because the n of the halowax changes to a greater extent than where only a small quantity of oil is present. The method is reliable, safe and rapid. Detns. can be made in 15 min. at a cost for materials of less than 1 cent per test. C. R. FELLERS

A simplified method for the determination of oil contents in seeds. G. BRACHMANN. Brakhman Krasnodar. *Oil & Fat Industry* (Russia) 1926, No. 9, 5-8. —Put about 4 g. of seed in a bottle with cork stopper. Add 100 cc. of ether minus the expected amount of oil, stopper the bottle and let stand overnight. An equil. is reached in that time; i. e., the % of oil left in the seed and the % in ether are same. The error is far below the limits. Draw off 50 cc. of the soln. of oil in ether and evap. in a tared dish. The wt. of dried residue after evapp. the ether multiplied by 200 is the % of oil. A. A. BOEHTLINGK

Analytical aspects of the oil and seed-crushing industry. HARRY THOMPSON. *Fertilizer, Feeding Stuffs and Farm Supplies J.* 13, 292-3 (1928). —Comparative analyses were made with ethyl and petroleum ethers as solvents in the detn. of the oil content of seed. With Egyptian cotton oil cake, Egyptian cottonseed and linseed cake, Et₂O gave 5.12, 23.75 and 9.50% and petroleum ether 4.62, 22.75 and 8.80% oil, resp. Problems in connection with the analysis of oils and oil cakes are briefly discussed. K. D. JACOB

Elm-seed oil. K. KARDASHEV. *Oil & Fat Ind.* (Russia) 1926, No. 2-3, 78-84; *Chem. Zentr.* 1927, 1, 2615-6. —A study was made of the seeds of 2 types of elm growing in Russia (*Ulmus effusa* Willd and *Ulmus scabra* Mill.) to ascertain their oil content and the possibility of using the oil for food purposes. The yield of oil from the dry seeds by pressing was 20-25% by wt. It was a thin light yellow, odorless liquid. In phys. and chem. properties it resembled coconut oil or palm oil. The Reichert-Meissl no. was 4.62-5.77, Polenske no. 37.4-41.50 and I no. 15.90-25.00. Expts. showed that it is suitable for food purposes. Because of the small yield of seeds per tree (35 kg. per 1000 trees), the production of oil is promising only in regions thickly grown with elms. Comprehensive data and tables appear in the original. C. C. DAVIS

Perilla oil from Far-East provinces. E. LYUBARSKIY. Vladivostok. *Oil & Fat Industry* (Russia) 1926, No. 4-5, 10-12. —This oil was obtained from *Perilla ocymoides* seed cultivated in the above provinces. The oil is easily obtained from this seed. It is transparent, of slightly yellow tint, has a faint odor disappearing after standing and also seps. some foots. Extn. with Soxhlet yields 44% oil having acidity 1.11, sapon. no. 192.25, I no. (Hubel) 206.32. A. A. BOEHTLINGK

The oil-palm industry and its future. H. M. LANGTON. *Chemistry & Industry* 1927, 655-64 (1928) E. H.

(Extraction of oil from) oil palm in Malaya. B. BUNTING, B. J. EATON AND C. D. V. GEORGI. *Malayan Agri. J.* 15, 353-71 (1927). —The prepn. of a palm oil of low acidity necessitates modification of the native processes of West Africa; the essential features of the process adopted in Malaya are (a) use of only ripe, undamaged fruit, (b) sterilization of the fruit before treatment to destroy the naturally occurring enzymes which promote development of free fatty acidity, and (c) rapid extn. of the oil. The sterilization is effected by heating the fruit under slight steam pressure, after which it is transferred to a digester consisting of a vertically arranged cylindrical vessel fitted with beaters whereby disintegration of the oil cells is effected. It is then transferred to a centrifugal extractor contg. a perforated basket and having a well-fitting lid provided with a jointed steam pipe whereby steam is injected into the mash while the centrifuge is being operated, thereby facilitating the expulsion of the oil. The period of oil extn. is 15 min. and the oil is purified and freed from sludge and moisture by centrifuging in a machine of the De Laval type. Between 85 and 87% of oil in the pericarp can be recovered efficiently. The acidity of the oil is about 3% (as palmitic acid). B. C. A.

Composition of the fatty acids present as glycerides in elasmobranch oils. THOMAS P. HILDITCH AND ALBERT HOUTERROOKE. *Analyst* 53, 246-57 (1928). —The work described in this paper was undertaken to obtain quant. data on the compn. of the fatty acids present as glycerides in shark-liver and other fish-liver oils which are characterized by a high content of non-saponifiable matter, chiefly squalene. Shark-liver oil contains 61% of solid acids and 38.8% liquid acids but practically the same acids

are present in each, except that myristolic acid was identified only in the liquid acids and arachidic acid only in the solid acids. The combined acids analyzed as follows: myristic acid, 1.0%; palmitic acid, 13.2%; stearic acid, 1.3%; arachidic acid, 1.2%; myristoleic acid, 0.2%; palmitoleic acid, 3.5%; oleic acid, 35.4%; gadoleic acid, 16.4%; cetolic acid, 15.8% and selacholeic acid, 12.0%. The presence of highly unsatd. C_{22} and C_{30} acids and of palmitoleic acid has hitherto been a typical feature of marine animal oils and also exclusive to this class. It would seem probable that there is some connection between the deficiency of these derivs. and the presence of large quantities of squalene in the shark-liver oils. Have the acids in question disappeared in the elaboration of the hydrocarbon in the shark or are they present as decompn. products from squalene? The analytical data given here indicate that the biochemical relationships between squalene and the unsatd. fatty acids of typical marine animal oils merit detailed study.

W. T. H.

Oil from mustard seed and husks. V. MOLODOVSKII. N. Novgorod. *Oil & Fat Industry* (Russia) 1928, No. 2, 37.—The following data are, resp., for the original oil and the oil blown 10, 40 and 75 hrs.: d_4^{20} 0.918, 0.924, 0.944, 0.966; Engler viscosity at 20° 9.9, 13.0, 42.0, 238.0; acid no. 0.6, 0.36, 0.205, 4.0; sapon. no. 188.4, 261.0, 244.0, 254.0; I no. 116.2, 112.6, 85.3, 62.6; hydroxy acids —, 2.92, 10.82, 24.04%; unsapon. 0.6, 1.57, 1.76, 4.78%. The oil was blown at 90–110°. The high I no. for unblown oil is explained by the presence of mushroom seed (I no. 135–142). The blown oil could be used for aviation motors instead of castor oil. The husks contained moisture 5.15–8.2%, protein 5.2–26.28%, oil 11.8–14.1%, cellulose 22.0% and ash 5.58%.

A. A. BOEHLINGK

Report on the value of certain trees in Congo as a source of oil. J. PIÉRAERTS AND F. DE WINTER. *Mut. grasses* 20, 8194–8(1928).—*Glyphea grevilloides*, extd. by petr. ether, gives a pale greenish yellow oil, of agreeable taste and almost without odor. In its physical and chem. properties it is nearest to cottonseed oil. *Cephanolema polyandrum*. This oil also belongs to the same group as cottonseed oil. The economic value of these oils under the present conditions is doubtful. Tables show in detail the constns. of these oils compared with those of cottonseed oil.

P. THOMASSET

Hydrogenation of vegetable oils with water-gas. K. BUTKOVSKII. *Oil & Fat Industry* (Russia) 1926, No. 2, 3, 45–7.—A mixt. of equal parts of sunflower and cottonseed oil was hydrogenated. Seven expts. were made at temps. from 180° to 250°. Ninety-five g. of oil and 5 g. of Ni catalyst were used. The av. I no. was 78.3 and duration of expt. in each case 5 hrs. The water-gas before entering the app. was treated with 2 N NaOH, Fe_2O_3 powder and 10% sawdust, hydrated lime and 10% sawdust. Best results were obtained at 220–250°, the titer of the solid product was 36°, the I no. 66.92. Hydrogenation of same mixt. under similar conditions but only for 2 hrs. 15 min. by means of H_2 resulted in an av. I no. of 35.7. The most unfavorable results obtained were with a titer of 43.6° and I no. of 55.02.

A. A. BOEHLINGK

Action of carbon monoxide on the nickel catalyst in the hydrogenation of fats. E. MASHKILLEISON. *Oil & Fat Industry* (Russia) No. 2–3, 47–50.—In the presence of CO more time is required to hydrogenate oleic acid, either that originally present in the sunflower oil used or that produced from the linoleic acid that also was present. The % of oleic acid never dropped below 77.1. M. advises working towards a certain low I no. without considering the time required to obtain it. In this case the difference between H_2 -CO gas and H_2 could be noticed easily.

A. A. BOEHLINGK

Hydrogenated rape (colza) oil. I. F. KITAEV. Kharkov Tech. Inst. *J. Chem. Ind. (Moscow)* 3, 1150(1926).—A sample of com. hydrogenated rape oil used in soap manuf. had the following constns. I no. (Hubl) 48.5, Hehner no. 95.2, sapon. coeff. 188, sp. gr. at 100° 0.85; m. p. 47°; av. mol. wt. of fatty acids 312–15; titer of fatty acids 46; neutralization no. 177.5, I no. of fatty acids 46. The fatty acids of this hydrogenated oil are as follows: behenic acid 10.40, stearic acid 33.75, erucic acid 41.60 and rapic acid 11.25%. The process of hydrogenation of rape oil takes place chiefly at the expense of rapic acid and to a lesser degree at the expense of erucic acid. The particular characteristics of the soaps obtained from this hydrogenated oil are due to behenic, erucic and rapic acids. The characteristics in question are not favorable: the soaps do not take up marble, crystallize badly, become yellow in the course of time and, above all, the oil saponifies badly.

BERNARD NELSON

Production of fatty acids and fats from the hydrocarbons of petroleum. S. IVANOV. *Oil & Fat Ind.* (Russia) 1926, No. 4–5, 7–10; *Chem. Zentr.* 1927, I, 2619.—A comprehensive review of the expts. of Ubbelohde, Eisenstein, Grün and others on the oxidation of com. hydrocarbons to fatty acids, and the possibilities of the com. application of the individual processes.

C. C. DAVIS

The transformation of fats into hydrocarbons. B. MELIS. Reale Ist. Industriale Palermo. *Ann. chim. applicata* 18, 108-14 (1928).—The hydrocarbon oil distillates obtained from the distn. of animal and vegetable fats with KOH, CaO and water (cf. C. A. 19, 1340) were fractionated and examd. qualitatively. Concd. H_2SO_4 brought about an intense polymerization and the formation of resinous oxidation products, SO_2 being evolved. Dil. H_2SO_4 indicated the presence of olefins, AgNO_3 the presence of aldehydes or perhaps alcs. and phenols, Br the presence of aromatic compds., and concd. HNO_3 the presence of terpenes. The results in general indicate that the hydrocarbon oils obtained by the distn. of fats with Ca(OH)_2 contain members of all series of hydrocarbons present in natural petroleum. If the distn. were carried out under pressure to promote rehydrogenation, the compn. would approach closely that of natural petroleum. Even at atm. pressure, however, the distillates are more nearly like natural petroleum than those of Mailhe, who used ZnCl_2 . The hydrocarbon oil always condenses above a layer of water formed by extensive dehydration of the org. compds. by the alkalis. C. C. DAVIS

Bleaching of fats for soap making. E. RICHARDSON. *Am. Perfumer* 23, 277-9 (1928).—This is a discussion of well-known methods. E. SCHERTBEL

Acid soaps. M. HARTMANN AND H. KAGI. *Z. anorg. Chem.* 41, 127-30 (1928); cf. C. A. 19, 1757.—The higher fatty acid N-carboxyl derivs. of asymmetrically substituted ethylenediamine, e. g., (diethylaminoethyl)oleamide ("sapamine"), yield readily sol. neutral salts with most inorg. and org. acids possessing the properties of soaps. The bases are readily obtained by heating the fatty acid or its chloride with diethyl-ethylenediamine, and may be distd. in a high vacuum. The salts are viscous liquids in the anhyd. condition, and their aq. or acid solns. form a lather even at great diln., the limit being at 0.5 pt. per million. Addn. of alkali causes the base to be pptd. and destroys the lathering power, while the salt is pptd. in a colloidal hydrated form from concd. soln. on addn. of NaCl. Unlike alkali soaps, these salts are not pptd. by metallic salts in dil. soln., since, when pptn. would normally occur, the insol. metallic salt remains in colloidal soln.; thus, on adding AgNO_3 to the HCl of the base colloidal AgCl , which is not coagulated by HNO_3 , is formed. Colloidal solns. of Au and other metals may be readily obtained by this method. The aq. solns. of the salts have remarkable oil-emulsifying properties, the surface tension at the oil-aq. soln. interface being too small to measure by known methods. This property makes the solns. of value in the textile and dyeing industries, as in their presence, even in min. quantity, vegetable and animal fibers are very readily wetted. In certain cases where sensitivity to alkali is an objection, the base is converted into a quaternary NH_4 base, stable to alkali, by heating with methyl chloride, dimethyl sulfate or a similar substance. Also in Soap 3, No. 4, 33-5. B. C. A.

The use of naphthenic acids in boiling soap. A. BRUSILOVSKII. *Oil & Fat Ind.* (Russia) 1926, No. 2-3, 66-70. *Chem. Zentr.* 1927, I, 2616. In the refining of petroleum, considerable quantities of Na naphthenate are present in the waste liquors. This product can be utilized to advantage in the prepn. of curd soaps, filled soaps, etc., as a substitute for coconut oil. Detailed directions are given for its use. C. C. DAVIS

The glycerol content of curd soaps. JOSEF GROSSER. *Allgem. Öl-Fett-Ztg.* 24, 76-8; *Chem. Zentr.* 1927, I, 2143. The literature on the subject is scarce and inaccurate. A great no. of analyses of curd soap produced in Czechoslovakia showed a glycerol content over 2%, in some cases over 7% (detd. by the dichromate method). It is proved mathematically that 2% glycerol in the curd represents a loss of about 25% of the original quantity of glycerol, when neutral fats were the chief ingredients of the mixt. C. C. DAVIS

Polymerization of soaps from linseed and sunflower oils. G. PETROV AND S. DIMAKOV. *Oil Fat Ind.* (Russia) 1926, No. 4-5, 16-8. The process of Brit. Pat. No. 127,814 (C. A. 13, 2462) was applied to sunflower-oil soap (I) and linseed-oil soap (II). Four expts. were made with I on (a) fatty acids of soap before heating, (b) slightly alk. 50% soap, (c) 50% soap, (d) 50% soap. The products had acid no. 203.0, 203.5, 195.8, 202.2; sapon. no. 205.5, 206.8, 197.3, 205.1; I no. 136.4, 100.52, 92.2, 138.1; viscosity 4, 6, 15 and 4 sec.; color light yellow, yellow, dark, dark. Heating times were 0, 5, 5 and 5 hrs.; temps. 0° , 190° , 205° , 180° and 160° 170° ; pressures in the autoclave 0, 12, 10.5 and 0 atm. Five expts. with II on (a) fatty acids of soap before heating, (b) 50% soap, (c) 50% soap and 40% Na_2CO_3 , (d) slightly alk. 50% soap, (e) 50% soap in presence of 35% NaOH 40° Bc. gave acid no. 203.2, 203.5, 205.5, 201.9, 192.2; sapon. no. 205.7, 206.5, 208.2, 204.8, 202.0; I no. 200.88, 194.9, 141.81, 154.8, 58.96; viscosity 3.10, 3.10, 7.5, 6 and 31 sec.; color light yellow, light yellow, dark, —, —. Temps. were 0° , 180° , 200° , 180 - 190° and 200° ; heating times

0, 5, 5, 5 and 5 hrs.; pressures 0, 0, 0, 0 and 0 atm. Conclusion: Presence of Na_2CO_3 and particularly of NaOH increases the viscosity and lowers the I no. When large quantities of caustic are not present iron autoclaves are the most suitable containers
A. A. BOEHLINGK

Filtration apparatus for washing nickel catalyst (SOSENSKII) 1. Soaps as colloidal electrolytes (McBAIN) 2.

Purifying fatty materials. CARL VAN OVERSTRAETEN. Can. 281,267, June 26, 1928. The residuums or ppts. resulting from the purifying of the waste waters from the washing of wool and like fatty substances are washed with lukewarm H_2O , boiled in alkali, dried by a current of air, heated under pressure in a digester at 500° , the floating fat is decanted and boiled in H_2O to remove the remaining impurities.

Soap. J. TENGLER. Can. 280,911, June 12, 1928. Coconut oil (2 parts) is mixed with NaOH soln. of 38°Bé and let stand 5 or 6 hrs. A hard compn. results, which is melted with 80 parts of benzene (warm or in form of vapor), and the mass is cooled and then pulverized. A saponaceous mass with fat content 10% and high alkali content is hardened until pasty or semi-fluid, and to this is added the pulverized benzene-contg. saponaceous mass and mixed to coat the pulverized particles with semi-fluid mass. The resulting mass is cooled to form a hard soap. The pulverized particles are thus sealed to prevent escape of benzene.

Detergents. I. G. FAKHRENDI. A.-G. Brit. 280,110, May 31, 1926. Saponaceous compns. for use with sea water or in dyeing, fulling or other baths which are acid or contain Ca or Mg salts comprise mixts. of soaps or Turkey-red oils with an aromatic or hydroaromatic sulfonic acid or salt of such acid of high wetting power. There may be added ingredients such as sulfite cellulose liquor, borax, $\text{C}_{12}\text{H}_{25}$, glycerol, cyclohexanol, alcs. or ethylene glycol monoethyl ether. Several examples of suitable mixts. are given.

Washing compound. G. S. PETROV. Russian (Soviet) No. 1448, July 31, 1926. Polymerized drying or semi-drying oils are mixed with mineral oil, or aromatic or aliphatic aromatic sulfonic acids and neutralized or made slightly alk.

28-- SUGAR, STARCH AND GUMS

F. W. ZERBAN

The English beet-sugar industry. C. D. ADAMS. *J. Soc. Chem. Ind.* 47, 179-85T (1928)

Manufacture of sugar direct from cane in India, 1926-27. WYNNE SAYER. *Agr. I. India* 23, 58-9 (1928).--Statistical. K. D. JACOB

Experiments in planting sugar cane without burning the trash. WM. E. CROSS. *Rev. ind. agr. Tucuman* 18, 116-23 (1928).--It is practically feasible to leave the trash without burning, in every second middle, cultivating the other one, and every yr. to alternate the middles so treated. The soil benefits from the N and org. substance and the sugar yields are increased. The procedure is particularly recommended for plantations invaded by weeds. MARY JACOBSEN

Influence of cane variety on field yields. L. BAISSAC. *Rev. agr. Maurice* 5, 74-9 (1928).--The pedigree of P.O. 2878 is shown in form of a diagram. Through the rapid expansion of this variety in Java sugar yields per acre are quickly increasing over those obtained with the older varieties. In Hawaii also total sugar production is rising much faster than total acreage, through the planting of superior varieties and other cultural measures. In Mauritius little progress has been made along this line. The new Java varieties may or may not prove successful there. Care should be taken not to import diseases with them, and they should be subjected to warm-water treatment before being planted. F. W. ZERBAN

The "Uba Marot" or "Gros Cailloux" variety of sugar cane. N. CRAIG. *Rev. agr. Maurice* 5, 68-9 (1928).--The principal cane variety in Mauritius, the White Tauna, is showing signs of deterioration. The Uba Marot is a bud variation of the Uba, gives high tonnage and is highly resistant to disease, but it is low in sucrose and purity, and matures slowly. As it is a promising variety for certain lands, it is being used in fertilizer tests. F. W. ZERBAN

High-pressure evaporation in cane-sugar factories. P. HONIG AND J. F. BOGSTRÅ. *Arch. Suikerind. Mededeel. Proefsta. Java Suikerind.* III, 377-441 (1928).--The evapn. of cane juices at high temp. was studied in a carbonatation and in a defecation factory. A survey is given of the literature on the technical problems involved. Expts. were made

in 2 mills with a specially constructed small app. which was running parallel to the factory evaporator in order to have the factory sirup and the exptl. sirup comparable. The exptl. app. was a triple-effect of semi-Kestners. Each body consisted of 1 tube of 3 m. length, and the juice was preheated in a small heater. The temp. of the juice in the 3 bodies was, resp., 114.5°, 108° and 102° and the juice was 8.5 min. in the app. But by feeding less thin juice, several expts. were made to study the influence of the time during which the juice was exposed to high temp. Thin juice and sirup of all expts. were analyzed for sucrose, reducing sugar, p_H , color and turbidity. The results are tabulated and discussed. If the time during which the juice was in the exptl. app. did not exceed 9 min., and if the juice was concd. to 50 Brix, the destruction of sucrose and of reducing sugars was in case of carbonatation juice perhaps a little higher than in common factory evapn. when the juice was slightly acid, and a little lower when the juice was slightly alk. In defecation juices no destruction of sugars was found. An exact control of p_H is necessary. The change in color between thin juice and sirup was in high-pressure evapn. the same as in factory evapn. The sirup from carbonatation juice was slightly more turbid in high-pressure evapn. Incrustation formed rapidly in the high-pressure app. with defecation juice and it will perhaps be necessary to use superheat defecation (Deming).

P. R. PEKELHARING

Determination of the hydrogen-ion concentration of sugar juice without hydrogen or quinhydrone on bare platinum. MAX TRÉNEL. Preuss. Geolog. Landesanstalt, Berlin. *Fortschritte Landw.* 3, 455 6(1928).—Expts with samples of juice showed that definite potentials sufficiently reproducible for the purpose of controlling satn. of juice can be obtained with bare Pt and without quinhydrone. The electrometric detns. were carried out in "half elements" connected by KCl bridges with diaphragms made from pressed-filter-paper stoppers. The concn. element corresponded to the scheme: $+Pt|0.01\ HCl|satd.\ KCl|sugar\ soln.|Pt-$. The p. d. was measured by T's "acidimeter" and a Siemens and Halske self-registering galvanometer served as a zero instrument. While the results are not abs., they enable the detn. of the end points of the 1st and 2nd satns. with satisfactory accuracy.

P. R. DAWSON

Can the Petree process be used to advantage in Tucumán? W. M. GRAYSON. *Rev. ind. agr. Tucumán* 18, 67-76(1927).—The av. increase in purity from mixed to defecated juice for the past 4 yrs. by using the Petree Process was 0.4 higher than that obtained by ordinary defecation and during the last yr. it was 1.1 higher. The sugar quality is better and the losses are lower. The saving in filter material, fuel and manual work amts. to 0.47 pesos per ton cane.

MARY JACOBSEN

Influence of starch on the manufacture of sugar, and its removal from the juice. E. HADDON. *Rev. agr. Maurice* 5, 80-2(1928); cf. *C. A.* 21, 3761.—The trouble experienced with juice from the Uba cane is due not to cane wax, as claimed by some, but entirely to starch and its hydrolysis products. The starch cannot be removed by carbonatation. Filtration with kieselguhr removes it, but very large filtering surfaces are required. Better results are obtained with a diastatic enzyme, sold under the trade name of "Ubase." Its optimum activity is at p_H 7.0 to 7.5, but the useful range is 6.5 to 8.0. It liquefies 2400 times its own wt. of starch in 30 min. The optimum temp. is 60-80°. The amt. to be used is detd. by the I test. The abnormal viscosity of the juice is entirely destroyed, and filtration becomes easy. The enzyme process may be combined with kieselguhr filtration.

F. W. ZERRAN

Accurate temperature measurement in sugar boiling. J. VALENTINE BACKES. *Food Manuf.* 1, 119-22, 136(1927).—The ideal thermometer which combines ease of reading with most accurate results is the long-stem dial type.

J. A. KENNEDY

Starch products in the paper and textile industries. ROBERT P. WALTON. *Am. Dyestuff Rept.* 17, 371-4(1928).

L. W. RIGGS

Barium compound of technical interest from starch. E. STERN. *Z. angew. Chem.* 41, 88-91(1928).—The pptn. of starch by means of its BaO compd. avoids the necessity of evapn. large quantities of water in prepg. sol. starches and starch pastes. The solns. obtained by treating starch with dil. $NaOH$ solns. yield the whole of their starch content as a ppt. on addn. of the equiv. quantity of $BaCl_2$; the ppt. is readily collected on a filter and dried, and on treatment with a sol. sulfate (e. g., Na or Al sulfate) in presence of water regenerates the sol. starch compd. with pptn. of $BaSO_4$. The probable compns. of the various starch preps. and compds. are discussed.

B. C. A.

Experiments with fertilizer in the cultivation of sugar cane (CROSS) 15. NH_4 vs. nitrate [fertilizer] (RABATÉ) 15. Purifying sugar (Brit. pat. 280,152) 13. Porous cement products [obtained in sugar refining] (Brit. pat. 280,116) 20.

Starches. A List of References Dealing with the Chemistry and Technology of Starches, Dextrins and Amylases. Compiled by Robert P. Walton. New York: The New York Public Library. 360 pp.

Purifying molasses and sugar juices electrolytically. JOSEPH DE BRIEV. Brit. 280,321, Sept. 13, 1926. An app. is described in which the material is treated first to eliminate acids and then to eliminate salts. Air, steam or other gas may be blown in to prevent emulsifying.

29—LEATHER AND GLUE

ALLEN ROGERS

Robert Lepetit. AUGUST GANSSER. *J. Intern. Soc. Leather Trades Chem.* 12, 187-92(1928).—An obituary.

Henry Richardson Procter. *J. Intern. Soc. Leather Trades Chem.* 12, 93-130 (1928).—Procter Memorial Issue. A collection of biographical and appreciative articles by associates of the late "Father of Leather Chemistry," with a complete bibliography of his writings.

Action of acids on vegetable-tanned leathers. A. DEFORGE. *Haute aux cuirs* 1928, 164-71.—A review of recent work.

Methods of analysis of leather dyes. A. JONES. *Ing. chim.* 12, 47-59(1928).—J. gives details for the detn. by usual means of the d., ash, sepn. of solvents by fractional distn. and presence of MeOH and EtOH; also for the identification of the residue after distn. The dyes are sepd. into 4 groups (cf. *Chem.-Ztg.* 22, 437(1898)) according to their reaction toward a soln. of SnCl₂ and HCl. The individual dyes are sepd. according to tables included in the article.

Label glues. H. GLASER. *Farbe u. Lack* 1927, 173.—Formulas are given for the manuf. of label glues.

The evaluation of glue. J. WETZLER. *Kunststoffe* 24, 546; *Chem. Zentr.* 1927, I, 2154.—According to Rudeloff (cf. *C. A.* 14, 2429) the strength (100R) is related to the viscosity η by the equation: $R = a\eta + b$, where a is 8 for all solns., $b = 75 - 0.26A$ and A is the % water added. Errors are conditioned by variations of the electrolytic const. and by the H-ion concn., which must therefore be maintained const. By dialysis, glue solns. can be made practically free of electrolytes, but thereby become turbid and opalescent and diminish in strength. Examples are given of the power of absorbing water as a measure of the quality of glue.

C. C. DAVIS

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Homogeneous rubber and the idea of an elastic molecule. HEINRICH FEUCHTER. *Kautschuk* 1928, 103-6.—An analogy is drawn between the structure and properties of racked rubber and of liquid crystals, which are known to be bundles of long mols. in parallel orientation. F. has assigned a melting temp. to racked rubber in the same sense that there are definite melting temps. for liquid crystals. There is a limit or optimum length of mol. for the formation of liquid crystals. But there may be endless mols. or chains in rubber and in other substances subject to polymerization. These may account for the similarities with liquid crystals, and also the differences such as plasticity and the absence of x-ray interferences for liquid crystals as compared with the definite fiber patterns for racked rubber.

G. L. CLARK

Plasticity and elasticity of rubber. A. VAN ROSSEM AND H. VAN DER MEIJDEN. *Congrès international pour l'essai des matériaux* (Amsterdam) Sept. 12-17, 1927 (preprint), 8 pp.—The compression method was chosen for measuring the plasticity of uncured and cured rubber, but the Williams app. (*C. A.* 18, 1763), was not used, because it does not measure plasticity. Instead of maintaining a const. total pressure over an increasing area, a const. pressure per unit area was used, which was readily accomplished by compressing the rubber on a raised circular plate of 1 sq. cm. area. If deformation under stress or compression is not permanent, a substance is either viscous or elastic, and therefore it is of great importance in detg. plasticity to measure not only the decrease in thickness but also the recovery and its rate. Three properties may be distinguished during deformation under shearing stress: (1) *plasticity*, i. e.,

instantaneous deformation and instantaneous recovery; (2) *plastic flow*, i. e., no recovery after removal of stress, and (3) *pseudo-plastic flow*, i. e., slow recovery (elastic after-effect) after removal of stress. In the expts. described, all these properties were investigated. Masticated crepe was maintained under pressure at 16°, 30°, 45°, 50°, 60° and 70° and the rate of deformation and the rate and extent of recovery after release were detd. The higher the temp., the softer was the rubber, judged by the extent of compression. At 16° a small elastic recovery was followed by a large elastic after-effect, with ultimate complete recovery. At 30° complete recovery took place, but more slowly. At 45° there was only partial recovery, and therefore at this temp. the masticated rubber was partly plastic. At 60° the plasticity became greater, and at 70° the rubber was almost completely plastic, the elastic after-effect being very small. The results show that compression-time curves are misleading, since masticated rubber at 16° is not plastic but shows pseudo-plastic flow with an elastic after-effect, whereas at 70° it is truly plastic. Vulcanized rubber S (92.5-7.5) mixts. in different states of cure were then tested in a similar way, the rate of compression and recovery being measured at 18°, 100°, 130° and 147°. At 18° and after short cures, there was elastic recovery and elastic after-effect but no evidence of plasticity. With increase of cure, the elastic recovery increased rapidly so that after long cures it became the only effect. At 100° and short cures, there was elastic recovery, as well as some elastic after-effect and plasticity. The last 2 properties became relatively smaller with increase in time of cure until at long cures only elastic recovery was manifest. At 130° the phenomena were much the same as at 100°, with relatively more elastic after-effect. At 147° and short cures, the elastic recovery and after-effect were relatively less and the plasticity was greater. With increase in time of cure the elastic recovery increased, the elastic after-effect decreased and the plasticity decreased slowly, the latter so slowly that even after the longest cure it still played an important part in the properties. Cured rubber is therefore plastic to a considerable degree. When under-cured, the plasticity is evident even at 100°, but when cured for longer times it shows considerable plasticity only at 147°. The results are given in detail in tabular and graphical form.

C. C. DAVIS

An explanation of some of the difficulties in abrasion testing of rubber. HARLAN A. DEPEW. *Trans. Am. Soc. for Testing Materials*, Preprint No. 98, 9 pp (June, 1928).—Resistance to abrasion is not a fundamental property of vulcanized rubber, but is the resultant effect of resistance to cutting and resistance to tearing. The relative importance of these 2 component effects varies under different conditions of wear, and therefore an abrasion test can duplicate any particular condition of wear only if the cutting and the tearing factors are balanced in the same proportion as in the actual conditions of wear. This means a discontinuance of present abrasion tests and the development of a test for detg. resistance to cutting and to tearing where the proportional effect of these 2 actions can be controlled. This conclusion is based on expts. with different types of mixts. in different states of cure, abrasion being obtained on the original N. J. Zinc Co. app. and on a modified form in which wear was made intermittent by continual lifting and rebound of the rubber from the track. The first type with different types of mixts. in different states of cure, abrasion being obtained on the original N. J. Zinc Co. app. and on a modified form in which wear was made intermittent by continual lifting and rebound of the rubber from the track. The first type is largely a cutting test, whereas in the second type tearing is accentuated and cutting is minimized, the latter type more nearly simulating the effect on a tire. On the first type, the resistance to abrasion increases with the time of vulcanization, whereas on the second type the resistance is a max. at about the same cure at which the tensile strength is a max. Most abrasion machines accentuate the tearing effect, so that only the second type of app. is comparable with many conditions encountered in actual wear.

C. C. DAVIS

Further experiments on the influence of fatty acids on vulcanization. G. STAFFORD WHITBY AND BURKE A. EVANS. *J. Soc. Chem. Ind.* 47, 122-6T(1928); cf. W. and Greenberg, *C. A.* 21, 341.—The conclusion of Martin and Davey that with a sufficiently high proportion of ZnO, accelerators are activated equally well either in the presence or absence of resin acids (cf. *C. A.* 17, 2203; 19, 3037) is true only of certain accelerators. Expts. show that with other accelerators, fatty acids have an activating effect even with a high proportion of ZnO. The expts. were carried out by curing resin-free rubber (acid no. of 20) with mercaptobenzothiazole (I), anhydroacetaldehydeaniline (II), "808" (III) and hexamethylenetetramine (IV), with different proportions of ZnO and with and without the addn. of different proportions of stearic, oleic or linoleic acid. With I, the addn. of an org. acid was necessary to effect vulcanization, regardless of the proportion of ZnO. Stearic acid had the greatest activating effect, oleic acid a weaker effect and linoleic acid the weakest effect. The rate of vulcanization increases with increase in the acid content, and the best results were obtained with a proportion

of acid higher than that normally present in crepe or sheet, so that in general it should be advantageous to add stearic acid or its like to mixts. accelerated by I. The addn. of stearic acid to mixts. accelerated by II, III or IV also increased the rate of vulcanization, regardless of the proportion of ZnO, though not nearly so much as with I. The readiness with which *stearic acid* and *ZnO* react is shown by expts. in which stearic acid (1.5 g.) and ZnO (2.5 g.) in toluene (100 cc.) were (1) shaken 20 min. at room temp. and (2) boiled 40 min., 15% and 96%, resp. of the stearic acid reacting. Also in *India Rubber J.* 75, 872-5(1928).

C. C. DAVIS

Important shortening in the time of cure of dipped goods in sulfur chloride vapor. RUDOLF DITMAR and GUSTAV BALOG. *India Rubber J.* 75, 911(1928).—An English version of *C. A.* 22, 1060.

C. C. DAVIS

The vulcanized racking of broken rubber. HEINRICH FEUCHTER. *Kautschuk* 1928, 48-51.—While racking is easily demonstrated with raw rubber it is very difficult with vulcanized. The action of heat upon the vulcanized racking of broken rubber (calendering) is the opposite of unvulcanized racking. Specimens 50 × 50 mm. of calender-racked vulcanized rubber were used. There was no sensible release of tension in the sense of an anisotropic elastic change in form (longitudinal or direction of calendering as compared with transverse) up to 100°. Thus vulcanized racking is thermo-elastically form-conservative. The swelling is anisotropic: in 30 min. at 20° in benzene the dimensions increased 30%, longitudinal, and 104% transverse. Upon deswelling, the original dimensions are restored. The racking tension of vulcanized racking is reversibly removed by swelling, the *swelling defect*, is calcd. and plotted as a function of temp., decreasing with increase in temp.

G. L. CLARK

Racking and restoration of unbroken rubber. HEINRICH FEUCHTER. *Kautschuk* 1928, 8-12, 28-30; cf. *C. A.* 21, 1898, 1902, 1903, 3487.—The phenomenon of racking is of the greatest importance both theoretically and practically, since the most essential structural elements of animal and plant tissues are similarly fibered. Methods of racking are reviewed. A small strip of rubber (best *Hevea* sheet) is grasped at the ends with both hands, and as quickly as possible stretched almost to the breaking point. After this max. adiabatic extension, the warm strip is cooled for a min. while held under tension. Upon release there is only a slight contraction, and a tough fiber is obtained. For racking at higher temps. the strip is immersed in warm water for 1 min., removed and instantly stretched. The following are representative data:

Racking in %	500	600	750	1000	2000	4000	10,000
Original cross section	2 × 2	2 × 2	2 × 2	2 × 2	2 × 2	2 × 4	2½ × 5
Original length	12	13	13	10	5	2.5	1
Racked length	72	91	110.5	110	105	103	101
No. of rackings	1	1	1	1	4	12	50
Preheating in H ₂ O		30°	50°	80°	80°	90°	90°

The breaking strength shows a max. of 130 kg. at 500% racking, and a min. elasticity at the same point on curves which do not include all of the tabulated data. Tables present also the time function of thermal release from racking, e. g., the % release at 95° for racking of 2000% is 1840% after 1 sec., 1900 after 1 min. and 1920 after 10 min. Next the heat function of thermal racking release is illustrated in S-shaped melt-lines (temp. vs. % residual set after racking release), e. g., a piece racked 10,000% with a length of 10.1 cm. had the following lengths and % set: 20°, 10.1, 10,000%; 30°, 9.8900%; 40°, 4.1, 4000%; 50°, 1.4, 1300%; 70°, 1.15, 1050%. With 500% racking at 20°, the breaking strength is 790 kg. per sq. cm. and the elongation at breaking is 60%, while at 30° the vastly different values are 125 and 540, resp.; at 95° 40 and 630. The crit. point for 4000% racking is at 40°, changing from 910 and 20 at 20° to 300 and 260. Data on the racking and relaxation of rubber D (diffusion-rubber) are presented. The melt line is much steeper than for crepe rubber, since by a change from 25° to 30° as the temp. of racking release, the % of residual set falls from 1000% to 55%. Conclusion: The racking of rubber is a function of the presence of the more sol. rubber D, which is the carrier of the elastic properties of raw rubber. The elasticity cannot be ascribed to mols. or aggregates of pure compds. or to the simple unit cell detd. by x-rays, but to a particle which embodies the necessary properties. In the colloidal micelle, a higher phys., chem. and thermodynamic entity, in which all parts are harmoniously bound, is to be found the source of elasticity.

G. L. CLARK

The swelling of rubber. A contribution to the knowledge of swelling phenomena. P. STAMBERGER. *Rubber Age (N. Y.)* 23, 321-2(1928).—An English version of *C. A.* 22, 2078.

C. C. DAVIS

Diffusion of oxygen through rubber. S. E. HILL. *India Rubber J.* **75**, 710(1928).—
See C. A. 22, 2091. C. C. DAVIS

The thermal and calorific values of rubber and rubber-like substances. M. LE BLANC AND M. KRÖGER. Univ. Leipzig. *Z. Elektrochem.* **34**, 241-4(1928); cf. C. A. 20, 2431.—As a means toward the ultimate explanation of mol. phenomena such as polymerization, the absorption of heat as a function of temp. was measured in rubber under various conditions of rest and stress. Measurements of the sp. heat of rubber, stretched and unstretched, heated and not heated, vulcanized and unvulcanized, showed that in general the sp. heat increases with the temp. (-80° to 40°). There were certain irregularities noted, but these were not sufficient to render doubtful the conclusion cited. Max. points, *c. g.*, in the sp. heat-temp. curves, occurred close to the temp. of hardening and loss of elastic properties (in the range of -40°). C. C. DAVIS

The rubber fiber and the cellulose fiber. HEINRICH FEUCHTER. *Kautschuk* **1928**, 73-5.—To account for the properties of rubber for which simple theories of valence and at.-mol. ideas are inadequate, F. has proposed the principle of shell-aggregates and shell-crystn. with irrational indices—a crystal system with distorted space lattice arrangement. The elastic property of racking vulcanized rubber is compared with the optical properties of nitrocellulose (Ambronn). An analogy is estd., since in both cases a chem. action (vulcanizing with S, and nitrating, resp.) upon a fiber leaves intact an individual group or crystallite, whose disperse cryst. property is estd. as the elementary particle of an elastic colloidal aggregate. G. L. CLARK

The coloring of cold-cured rubber. W. E. SANDERSON. *J. Soc. Dyers Colourists* **44**, 137-42(1928).—The use of org. coloring substances in rubber goods cured with S_2Cl_2 is surveyed in a concise yet comprehensive manner, with the inclusion of formulas and details of processes used in the best modern practice. I. W. RIGGS

Degree of fineness and reinforcing power of rubber fillers. WERNER ESCH. *Gummi-Ztg* **42**, 1921(1928).—The relation between the apparent *d* and the true *d*, as a criterion of fineness, a concept already developed by E. long ago, is discussed. C. C. DAVIS

Studies on the aging of vulcanized rubber. V. Action of sunlight and heat on the mechanical properties of vulcanized rubber. TAKEJI YAMAZAKI. *J. Soc. Chem. Ind. (Japan)* **31**, 233-42(1928); Suppl. binding, 65-6. (In English.) Five series were prepd. from the same mixt. of 92.5% rubber and 7.5% S by vulcanization at the same temp. for 5 different periods of time (60-180 min.). They were then exposed to bright sunlight in summer at room temp., and in winter at room temp., in early spring at $60-64^{\circ}$ in an air oven and in darkness in a Geer oven. The time of exposure varied from 8 to 64 hrs. After treatment, they were tested for stress at 500% elongation, tensile strength and ultimate elongation, and in some cases the free S and acetone ext. were detd. Some test pieces were made especially thick, and slices were cut after exposure from outer and inner layers and were tested. The time of vulcanization had a remarkable effect on the aging properties. The deterioration due to sunlight was great even in winter and was very marked in spring at 60° . The acetone-sol components increased during aging and the free S decreased. The outer layers of the test pieces exposed to sunlight were brittle and non elastic, but the inner layers were in fairly good condition. The test pieces subjected to the Geer test showed only small differences between the outer and inner layers. For detg. the degree of deterioration, mech. tests are quicker and more reliable than chem. tests, and in aging tests the influences of light must be taken into account. VI. Action of sunlight filtered through colored glass on the mechanical properties of vulcanized rubber. *Ibid* 243-57; Suppl. binding, 66-7. (In English).—The test pieces were prepd. in the same way as in the preceding paper. The sunlight was filtered through one of 2 colored glass filters, (1) transparent down to 3300 Å. U. and (2) down to 4360 Å. U. The samples were exposed to the filtered light at 40° or 65° for various lengths of time and from 8 to 250 hrs. After treatment, they were tested for the stress at 500% elongation, tensile strength and ultimate elongation. The test pieces exposed to the light through the filter (1) showed serious deterioration even at 40° , but those exposed to the light through the filter (2) showed slow deterioration at 40° , and somewhat marked at 65° . The stress at 500% elongation was somewhat higher in the test pieces exposed to the light through filter (1) than those exposed to the light through the filter (2), showing greater stiffening in the former case. It is concluded that if light is used in the aging test, the selection of the light source is an important question. SHUMPEI OKA

The lamellar packing of rubber. M. KRÖGER. Univ. Leipzig. *Kolloid-Z.* **45**, 47-52(1928).—The paper is the beginning of a study of the capacity for potential

energy as a function of the magnitude of deformation, state of cure and temp., a microscopic study of surfaces, the influence of compounding ingredients on longitudinal and lamellar deformation, the optical effects accompanying lamellar deformation in distinction to longitudinal deformation, heat effects, changes of d. during deformation and elec. cond. during lamellar deformation. The absorption of energy in the transformation of rubber to a state of lamellar packing takes place in a different way from the absorption of energy during transformation to rod packing. With increasing deformation, the internal tension passes through a max. and then a min. The capacity for potential energy is at its max. value smaller than in longitudinal stretching. Lamellar effects caused by the addn. of ingredients, which are common to all ingredients of similar particle size, are described. A new app. for observing microscopically the surface configurations during lamellar packing is described. C. C. DAVIS

The double refraction of rubber in the undeformed and in the deformed state. M. KRÖGER. Univ. Leipzig. *Kolloid-Z.* 45, 52-6(1928) —In its normal undeformed state, raw rubber shows double refraction, but when stretched it shows biaxial positive double refraction. This change is unmistakable as soon as it can be observed in the direction of extension. Vulcanized rubber can be considered to show only uniaxial and biaxial positive double refraction. Lamellar deformation (cf. preceding abstr.) leads in all cases to weak biaxial negative double refraction. C. C. DAVIS

Report on "Revertex." IMPERIAL INSTITUTE *Trop. Agr.* (Ceylon) 70, 5-11 (1928).—Revertex is difficult to handle quantitatively. ZnO made into a paste with H₂O can be mixed into revertex merely by stirring. Three revertex mixings: (1) 10% S, (2) 5% S and 5% ZnO and (3) 3% S and 47.5% ZnO, were tested. When the revertex S mixing was plasticized for the standard time of the Imperial Institute, it was more plastic than plantation rubber, judged by the rate of extrusion (14-18). The mixing high in ZnO took 24 min. to plasticize, while plantation rubber required 30 min. for the same degree of plasticity, 665 watt-hrs. being required to plasticize the revertex and 1025 watt hrs. to masticate and mix the plantation rubber. No satisfactory est. of the mixing and drying costs of revertex can be given. Revertex mixings easily scorched after addn. of S. After heating at 100° for 20 and 90 min., n. detd. with the plate plastometer was 109 and 168. The revertex-S mixing vulcanized 10 times as quickly as sheet or crepe mixings. In the presence of ZnO, revertex vulcanized nearly as quickly as the corresponding sheet or crepe mixings contg. 1% diphenylguanidine. Continued vulcanizing for 45 min. did not alter the properties of the revertex ZnO mixing appreciably. The tensile strength, elongation under a load of 1.04 kg. per sq. mm. and slope for the 3 mixings were 2300, 2440 and 2690 lb. per sq. in., 805, 694 and 573%, and 39, 33 and 41, resp. When a revertex-S mixing was vulcanized 8 mm. at 148° and then artificially aged in an oven at 70°, the tensile strength increased from 1590 lb. per sq. in. at the start to 2260 after 96 hrs. and then decreased to 1460 after 300 hrs. and to 850 after 600 hrs. The elongation under the load mentioned above remained approx. const. to the end. Crepe and smoked sheet in the same tests decreased in strength from the beginning and much more rapidly than the revertex, and also decreased in elongation after only 144 hrs. Revertex mixings were not superior in tensile strength to the corresponding dry rubber mixings contg. a suitable org. accelerator. A. L. MEHRING

The reclaiming of rubber. A. M. MUNRO. *Chem. Eng. Mining Rev.* 20, 281 (1928).—A review. E. H.

Exploitation of the euphorbias of South Africa; resins and rubber (SPOON) 26.
Adhesive composition (Can. pat. 281,646) 18.

Treating rubber stock. HENRY R. MINOR (to General Carbonic Co.). U. S. 1,675,124, June 26. Solidified CO₂ is used to control the temp. of rubber during processing.

Apparatus for drying rubber, etc., in circulating air. TOMLINSONS (Rochdale), LTD. AND E. W. SMITH. Brit. 280,016, Oct. 14, 1926.

Apparatus for calendaring rubberized sheet material. ARTHUR A. FRANK (to The Fisk Rubber Co.). U. S. 1,674,772, June 26.

Finishing rubber articles. SKAPHIS D. SHINKLE (to The Dominion Rubber Co., Ltd.). Can. 281,123, June 19, 1928. Vulcanizable articles are finished by coating with a varnish, comprising boiled linseed oil and S₂Cl₂, and then to a gaseous current contg. NH₃.

Rubber shoe soles. L. C. BATEMAN. Brit. 279,531, June 26, 1926. Crepe or sheet rubber is used together with sheet material obtained by impregnating woven, felted or loose fibers with latex, drying and consolidating under heat and pressure.

Rubber vulcanization accelerators. S. M. CADWELL (to Naugatuck Chemical Co.). Brit. 279,815, Nov. 1, 1926. Vulcanization is accelerated by use of halogen derivs. of aldehyde-amine condensation products such as those obtained from aliphatic aldehydes contg. 2-7 C atoms by condensation with a primary amine. Numerous examples are given.

CHEMICAL ABSTRACTS

Vol. 22.

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No. 17

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Welded construction produces safer and cheaper pressure equipment. R. S. McBRIDE. *Chem. Met. Eng.* 35, 396-400(1928).—The principles of design, welding and testing of high-pressure app. are discussed.

Chemical engineering memoranda. III. Drying and calcining plant. CHARLES H. BUTCHER. *Ind. Chemist* 4, 91-2(1928), cf. C. A. 22, 1875; **IV. Condensing and cooling units.** *Ibid.* 135-7. Ordinary calcus. are made for surface condenser or heater design, except that a table is given (source not stated) of heat transfer coeffs. for H_2O velocities of 0.008 to 4.0 ft. per sec., and vapor velocities of 3 to 15 ft. per sec. **V. Condensing and cooling units.** *Ibid.* 199-200.—*Cooling ponds* (without sprays) will dissipate generally 3 to 4 B. t. u. (exceptional cases up to 20) per sq. ft. per °F. per hr. *Spray ponds* should cool 15-20 gal. per sq. ft. superficial pond area per hr., from 110-120° F. to 70° F. *Cooling towers* cool 1-2 gal. per min. per sq. ft. ground area for atm. towers, 6 gal. for natural or forced draft towers. Forced draft towers may be 30 ft. high, natural draft up to 60-80 ft.

W. L. BADGER

An automatic mercury cleaner. F. J. DEBT. *Chemistry and Industry* 47, 618 (1928).—In the device described and illustrated, the filtered Hg is lifted up a tube 130 cm. long, 3 mm. internal diam., is deposited in a tube 30 cm. long, 2.5 cm. outer diam., is broken up into a fine spray by passing through cotton fabric, falls through a 50 cm. column of 5% HNO_3 and returns by a tube 50 cm. long, 5 mm. internal diam. to the original vessel.

RUBY K. WORNER

The unimeter, a new measuring device for chemical control. L. BLOCH and H. G. FRÖHLING. *Chem. Ztg.* 52, 488-90(1928).—The app. is a polarizing photometer for the detn. of the color and light-transmitting and reflecting powers of solids and liquids, the candle power of lights, etc. It resembles a compd. microscope. Directions for use are given.

J. H. MOORE

Calculation shows minimum heating surface for evaporators. Bo HÖGLUND. *Chem. Met. Eng.* 35, 157(1928). If F is the heating surface per effect in sq. m., P is metric ton heats per 24 hrs., r is heat of vaporization in cal. per kg., d_1 and d_2 , ... are the water evapd. in each effect in kg., k_1 and k_2 , ... are the heat transfer coeff. in each effect, and T is the total available temp. drop in degrees, then for min. heating surface, $2F = (10 Pr/24.60) (\sum \sqrt{d/k})^2 / T$.

W. L. BADGER

The first multiple-effect evaporator. W. L. BADGER. *Ind. Eng. Chem.* 20, 55 (1928).—A reference to an article in 1836 apparently mentioning a multiple-effect salt evaporator at "Kenhawa Salt Springs, Va."

W. L. BADGER

Revised psychrometric chart assists high-temperature design. IRVIN LAVINE and R. L. SUTHERLAND. Univ. of North Dakota. *Chem. Met. Eng.* 35, 224-8(1928).—The Grosvenor humidity chart is extended to 680° F. Methods of calcn. are given and typical problems are solved.

W. L. BADGER

A McLeod gage of wide range. A. A. BLISS. *Science* 68, 38-9(1928).—A reservoir of 0.01 the vol. of the main reservoir is sealed in parallel to the main one and increases the range down to pressures that can be read on an ordinary Hg manometer.

J. H. MOORE

Periodically operating emulsifying apparatus. A. SIVOLOBOV. *J. Chem. Ind.* (Moscow) 4, 152-3(1927).—The app. employed to emulsify oil and water, i. e., for the purpose of extg. phenols from oils, consists in a rapidly revolving conically shaped piece, or else disks in a centrifugal mill. To avoid the use of a motor S. constructed a different app. in which water pressure was utilized, a circumstance which reduced the costs of the operation practically to nothing. A detailed description of the app. and a drawing are given. Expts. have shown that the app. works satisfactorily. Its defects are: periodicity of operation and abundance of faucets which are subject to deterioration.

BERNARD NELSON

A new design of apparatus for the moving boundary method of determining transference numbers. EDGAR R. SMITH. Bur. of Standards. *J. Am. Chem. Soc.* **50**, 1904-6 (1928).—A new app. for the detn. of the transference no. by the moving boundary method eliminates the need of a calibrated measuring tube and makes possible repeated detns. on the same soln. One half the cell is closed during the detn. and after the current has passed Hg is withdrawn from the closed side sufficient just to restore the motion across the boundary. The Hg is weighed to det. the vol. of soln. passing the boundary. D. H. POWERS.

Apparatus for the determination of the boiling-point elevation. FRANZ RUSCH. Techn. Hochschule, Munich. *Ann. Physik* **85**, 647-8 (1928). A test tube 4 × 24 cm. is fitted with a stopper which carries a Beckmann thermometer and a reflux condenser. In the bottom of the test tube is a simply made geyser pump, which throws against the thermometer the liquid and vapor mixt. in 2 streams. A. L. HENSE.

A still for the preparation of pure water. HAROLD S. KING. Dalhousie Univ. Halifax, Nova Scotia. *Proc. Trans. Nova Scotia Inst. Sci.* **16**, 176-7 (1928). K. describes an improved way to connect the flask and the tin condenser. A. L. HENSE.

The balance. JOHN J. SWILDENS. *Patron. Weekblad* **65**, 562 (1928). An elementary discussion of the fundamental principles of weighing. A. W. DOX.

Note on the McBain-Bakr balance for the sorption of vapors by fibrous and film materials. P. T. NEWSOME. *Chemistry and Industry* **47**, 594. *Ind. Eng. Chem.* **20**, 827 (1928).—An illustrated description of a modification of the quartz fiber spring balance previously described (*et. C. I.* **20**, 1151). The sorption of vapors by fibrous and film materials may be measured by suspending the sample from the spring, evacuating and introducing by stopcock controls a small quantity of liquid. The pressure and elongation of the spring are measured with a cathetometer. The complete app. includes a device for admitting the vapors from a liquid which attacks stopcock grease. This device also makes possible a study of the successive absorption of 2 different liquids. RUDY K. WERNER.

Sensitiveness and time of oscillation of simple and compound balances. MAX RAUDNITZ. *Z. Ver. deut. Ing.* **72**, 43-7 (1928). A mathematical paper on the influence of the form and arrangement of the beams, the arrangements of the knife edges, and the load, with 6 cuts and 8 tables. J. H. MOORE.

An apparatus for delivering gas at a constant pressure. THOMAS GRAY. *J. Soc. Chem. Ind.* **47**, 187-ST (1928). A simple modification of the aspirator type of app. J. H. PERRY.

A proposed automatic spectrum analyzer. ARTHUR S. BRODER. *Instrumentry* **1**, 281-3 (1928). The app. is proposed primarily for the identification of gases. A characteristic bright line from any type of spectroscopic is allowed to fall on a photoelectric cell which operates a recorder or signal. J. H. MOORE.

Colorimeter for determinations. I. LORBER to the Firm of C. Zeiss. *Brit.* **280,552**, Nov. 10, 1928.

Filter. ERNEST J. SWEETLAND. U. S. 1,677,503, July 17.

Filter for gasoline or other liquids. AUGIE L. HANSEN to Herbert S. Strauss. U. S. 1,676,024, July 3.

Multi-ply fabric filter for air or other gases. ANDERS JORDAHL. U. S. 1,676,191, July 3. Structural features.

Pressure and vacuum filter for oil, etc. GASTON J. LIPSCOMB. U. S. 1,676,268, July 10.

Funnel for permanent attachment with a receptacle to be filled. R. A. L. VOLLET. *Brit.* **280,501**, Nov. 12, 1926. Structural features.

Funnel and vent tube construction. GLEN G. HILFORD. U. S. 1,676,986, July 10.

Photometric reflectometer. FRANK A. BENFORD to General Electric Co. U. S. 1,677,014, July 10.

Still for water. ERNEST V. OLIVER. U. S. 1,677,795, July 17.

Electron-emitting cathodes. GUSTAV LIEBERT to Sueddeutschen Telefon Apparate, Kabel u. Drahtwerke A. G. U. S. 1,676,701, July 10. Alk. earth oxides or other suitable electron emitting substances are first mixed with a C compd. of high mol. wt. such as resin or paraffin (both materials being in finely pulverized form), the materials are heated and fused together and then used as a coating on cathodes which may be formed of Pt or Pt-Ir.

Röntgen-ray apparatus. P. E. HARTH. *Brit.* **280,636**, Aug. 17, 1926. Shields opaque to Röntgen-rays comprise 75-95% of finely divided BaSO₄ together with a binder such as pitch, bakelite, rubber or polymerized China wood oil. Mention is

also made of shields made from rubber and finely divided metals such as Bi and Pb. Structural features are described.

Furnace for producing and diluting products of combustion for use in drying cores, etc., or for other purposes. GUSTAVE BLUEMEL (to Drying Systems, Inc.). U. S. 1,676,070, July 3.

Heat-exchange apparatus suitable for forming froths, etc. CECIL R. HOUSEMAN (to Air Reduction Co.). U. S. 1,677,777, July 17.

Press for the cold extruding of tubes from metal disks. EWALD WALTHER. U. S. 1,675,676, July 3.

Conduit and associated apparatus for measuring the quantity of powdered coal or other materials carried in suspension. ARTHUR R. SMITH (to Bailey Meter Co.). U. S. 1,677,691, July 17.

Apparatus for testing pipe fittings, etc., for blowholes and cracks. FERDINAND A. HAMILTON (to Southern Calif. Gas Co.). U. S. 1,675,802, July 3.

Time- and temperature-controlled electric switch. AUGUST J. MOTT LAU (to Westinghouse Elec. & Mfg. Co.). U. S. 1,677,361, July 17.

Apparatus for automatic moisture control in storage chambers. WALLACE C. WRIGHT (to American Shoe Machinery Co.). U. S. 1,677,856, July 17.

Apparatus for indicating or controlling atmospheric humidity. W. M. TRAFTON (to American Modeling Co.). Brit. 280,821, March 23, 1927.

Apparatus for humidifying bakers' ovens, proof boxes, etc. FRANK A. ANETSBERGER and W. M. ANETSBERGER. U. S. 1,676,763, July 10.

Controlling air supplied to drying apparatus. ADOLPH W. LISSAUER (to Louisville Drying Machinery Co.). U. S. 1,676,786, July 10. The vol. of air circulated in drier is varied in accord with the temp. of the products of evapn. carried off by the air. An automatic thermostatic control device is described. U. S. 1,676,787 specifies a heat exchange app. suitable for driers.

Apparatus for compressing gases and storing and utilizing liquefied gases. STUDIENGES. FÜR GAS INDUSTRIE. Brit. 280,568, Nov. 10, 1926.

Apparatus for liquefaction of gases to obtain helium, etc. RICHARD C. TOLMAN, WILLIAM L. DELBAUER, JOHN W. DAVIS and MONTAGUE H. ROBERTS. U. S. 1,676,225, July 3.

Liquefaction and rectification apparatus for obtaining oxygen and nitrogen from air. MESSER & CO., GES. Brit. 280,581, Nov. 15, 1926.

Apparatus for transferring and transporting liquefied oxygen or other gases. STUDIENGES. FÜR GAS INDUSTRIE. Brit. 280,588, Nov. 15, 1926.

Absorption plant for gases and vapors. FRITZ ROTTMANN and FRIEDRICH BROHMMEYER. U. S. 1,677,000, July 17. An app. is described which is adapted for use in making HNO_3 , treating coke oven gases or for other purposes.

By-pass valve for gas-washing apparatus. RUDOLPH ROSNER. U. S. 1,677,148, July 17.

Safety device for acetylene gas lines. JAMES I. ANDERSON (to Air Reduction Co.). U. S. 1,677,225, July 17.

Thermostat for gas burners. CLARENCE H. HARGOOD (to The C. C. C. Co.). U. S. 1,677,340, July 17.

Thermostatic electric switch. ALFRED DANIKER. U. S. 1,677,710, July 17.

Thermostatic electric switch. ROY D. MAILEY (to Cooper Hewitt Electric Co.). U. S. 1,676,794, July 10.

Thermostatic electric switch. LOUIS A. M. PHELAN and CLIFFORD HOTCHKISS (to Absolute Con-Tac-Tor Corporation). U. S. 1,676,921, July 10.

Thermostatic electric switch. LOUIS A. M. PHELAN (to Absolute Con-Tac-Tor Corp.). U. S. 1,676,922, July 10.

Thermostatic electric switch. LOUIS A. M. PHELAN and CLIFFORD HOTCHKISS (to Absolute Con-Tac-Tor Corp.). U. S. 1,676,923, July 10.

Thermostatic control device for electric circuits. REUEL C. CHESHER (to Schlosser Bros., Inc.). U. S. 1,676,478, July 10.

Thermostatic device for control of electric circuits. HARLAN S. GANO (to Westinghouse Electric & Mfg. Co.). U. S. 1,675,340, July 3.

Thermostatic device for control of gas or other fuel burners. WILLIAMS OIL-O-MATIC HEATING CORP. Brit. 280,771, March 7, 1927.

Thermostatic valve. JEAN V. GIESLER (to Fulton Syphon Co.). U. S. 1,675,341, July 3.

Thermostatic water valve. LOUIS M. SPENCER (to General Motors Corp.). U. S. 1,675,620, July 3.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

- Jean-Baptiste Dumas.** C. MATIGNON. *Rev. sci.* **65**, 417-24(1926). An address, with portrait, reviewing Dumas' career. A. PAPINEAU-COUTURE.
- Alessandro Volta and his times.** GIOVANNI CAU. *Rev. sci.* **65**, 481-7(1927). Biographical, with portrait. A. PAPINEAU-COUTURE.
- Jeremias Benjamin Richter.** LUDWIG DARMSTAEDTER AND RALPH E. OESPER. *J. Chem. Education* **5**, 785-90(1928). E. H.
- In memory of H. A. Lorentz.** VITO VOLTERRA. *Nuovo cimento* [N. S.], **5**, 41-3 (1928).—Obituary with portrait. L. T. F.
- Svante August Arrhenius.** J. W. *Proc. Roy. Soc. (London)* **A119**, No. A783, IX-XIX(1928).—Obituary with portrait. E. H.
- Paul Heinrich Ritter von Groth.** H. A. M. *Proc. Roy. Soc. (London)* **A119**, No. A783, XX-XXII(1928).—Obituary with portrait. E. H.
- Peter Klason on his eightieth birthday.** CARL KULLGREN. *Papier-Fabr.* **26**, 205-8(1928).—A review of his work, with portrait. R. H. DOUGHTY.
- Recent advances in science: Physical chemistry.** R. K. SCHOFIELD. Univ. of Durham. *Science Progress* **23**, 32-7(1928).—A review of recent work on the electron theory of valence. JOSEPH S. HEPBURN.
- Recent advances in science: History of chemistry.** E. J. HOLMYARD. Clifton College. *Science Progress* **23**, 37-41(1928). Review of recent works on the history of chemistry in ancient, Arabic, medieval and later times. JOSEPH S. HEPBURN.
- History of Russian platinum.** B. MENSHUTKIN. *Ann. inst. platine* **5**, 201-6 (1927). H. G.
- Industry and science.** MARC VAN LAER. *Bull. assoc. élèves inst. sup. fermentation Gand* **29**, 192-201(1928).—An address. A. PAPINEAU-COUTURE.
- The mechanical and physical laboratories for testing metals, lime and cement at the Polytechnic Institute of the University of Grenoble.** PIERRE DEJEAN. *Rev. sci.* **66**, 46-52(1928).—Descriptive. A. PAPINEAU-COUTURE.
- The elementary chemistry courses at Princeton.** GREGG DOUGHERTY. Princeton University. *J. Chem. Education* **5**, 851-3(1928). E. H.
- New-type versus old-type [educational] tests: a comparison.** KENNETH D. DOBBS. *J. Chem. Education* **5**, 854-7(1928). E. H.
- The principle of the chemical problem.** PAUL V. MCKINNEY. WOOSTER College. *J. Chem. Education* **5**, 858-60(1928). The method of explaining to students the solution of chem. problems is discussed. E. H.
- Deceptive advertisements.** CHARLES F. MASO. Mt. St. Mary's College, Emmitsburg, Maryland. *J. Chem. Education* **5**, 876-8(1928). Dry mixts. advertised for the generation of H_2S in school and college labs. are shown to be less satisfactory than the usual $FeS-HCl$ method and to be more than 18 times as expensive. E. H.
- The fourth census of graduate research students in chemistry.** CLARENCE J. WEST AND CALLIE HULL. *J. Chem. Education* **5**, 882-3(1928). E. H.
- A study in units of volume.** K. M. PERSING. *J. Chem. Education* **5**, 725(1928). Direction sheets for prepg. 3 cardboard measures of l., cc. and qt. are shown. Students are required to construct these models outside of class periods, and the results are satisfactory in making the units real to them. W. C. EBAUGH.
- Free space numbers.** II. W. HERZ. *Z. anorg. allgem. Chem.* **171**, 14-7(1928).—The ratio of the diff. between mol. vols. at the critical temp. and at 0° abs. to the "free space" (cf. *C. A.* **19**, 1213) of 30 org. and inorg. compds. approximates 0.87. HCl is an exception, 0.714. G. B. TAYLOR.
- The preparation of optically clear selenium for use in index media.** L. T. BROWN-MILLER. *Am. Mineral.* **12**, 43-8(1927). The microscopic opaque particles which are produced in molten Se are shown to be SeO_2 . These may be removed by three distns. in a CO_2 atm. C. B. SLAWSON.
- The density of sodium azide.** E. MOLES. *Anales soc. españ. fis. quim.* **26**, 133-5 (1928).—In a previous article (*C. A.* **18**, 1217) the d. of NaN_3 was given as 1.481 to 1.483. It was found later that this was a misprint and should have been 1.841 to 1.843. Redtn. of a sample from the same source as before gave $d_4^{25} = 1.8656$ (crude) 1.844 (1 recrystn.) and 1.8443 (2 recrystns.). Further drying over P_2O_5 gave $d_4^{25} = 1.8473 \pm 0.0004$ as the most probable value. E. M. SYMMES.
- Some modern aspects of crystallography.** F. IAN G. RAWLINS. *Science Progress*

23, 106–17(1928).—A review with bibliography devoted to x-ray data, infra-red spectra, deformability of crystal units, coordination nos. and thermodynamics of assemblages.

JOSEPH S. HEPBURN

Crystal structure of α -manganese. G. D. PRESTON. *Phil. Mag.* [7] 5, 1198–206 (1928).—Laue photographs of α -manganese show that this material crystallizes in the cubic system. The oscillating-crystal method shows that the lattice is of the body-centered type, and a powder photograph gives the side of the cube as 8.894 ± 0.002 A. U. The d. is detd. to be 7.44 g./cc. Observed intensities of reflection of the oscillating crystal photographs are satisfactorily accounted for by placing the crystal in the space group T_d^2 .

GEORGE GLOCKLER

Crystal structure of β -manganese. G. D. PRESTON. *Phil. Mag.* [7] 5, 1207–25 (1928).—The β modification of Mn stable above 742° has been examd. at room temp. by the Laue oscillating-crystal and powder methods. The results show that the material crystallizes in the cubic system O_c (or O_h), the unit having a side of 6.29 A. U. and contg. 20 atoms. The groups O^6 and O^7 are enantiomorphous and indistinguishable by x-ray methods. These 2 groups are the only possible ones which can account for the observed intensities of reflection.

GEORGE GLOCKLER

X-ray investigations of SnS_2 , TiS_2 , TiSe_2 , TiTe_2 . IVAR OFTEDAL. *Z. physik. Chem.* 134, 301–100(1928). The line positions and intensities of the powder diagrams of TiS_2 , TiSe_2 and TiTe_2 can be satisfactorily explained by means of the CdI_2 type of structure. The same was also detd. earlier for SnS_2 . The dimensions of the elementary cells of SnS_2 , TiS_2 , TiSe_2 and TiTe_2 are given.

M. R. FENSKE

Röntgenographic studies on the structure of complex iron cyanides. RUDOLF BRILL AND H. MARK. *Z. physik. Chem.* 133, 443–55(1928).— $(\text{NH}_4)_4[\text{Fe}(\text{CN})_6]$ and 8 of the substances resulting from its step wise reduction at 400° with time were subjected to diffraction analysis. Three cryst. phases were found, and in some cases many more. Besides the initial compd. and the final α -Fe, another compd. certainly was $(\text{Fe}(\text{CN})_2)_n$, cubic, $d_{100} = 15.9$ A. U., mol. formula $(\text{Fe}(\text{CN})_2)_3 = \text{Fe}_3[\text{Fe}(\text{CN})_6]$. Hence the reduction mechanism must be $(\text{NH}_4)_4[\text{Fe}(\text{CN})_6] \rightarrow (\text{Fe}(\text{CN})_2)_3 \rightarrow$ intermediate carbinides, nitrides, etc., $\rightarrow \alpha$ -Fe.

G. L. CLARK

Röntgenographic researches on iron catalysts for ammonia synthesis. O. EISENHUT AND E. KAUPP. *Z. physik. Chem.* 133, 456–71(1928), cf preceding abstract.—The Debye-Scherrer method of powder analysis was used for catalysts which were prepd. according to the patent of the B. A. S. F., Ger. 249,447, and from complex Fe salts $\text{KAlFe}(\text{CN})_6 + x\text{KCl}$. All of these showed principally pure α -Fe, independently of the method of formation or use. The B. A. S. F. catalyst consisted primarily of Fe_3O_4 in the beginning. The catalyst from the complex salts after reduction also contained Fe_3N , Fe_3C , C, etc., in small quantities.

G. L. CLARK

The form of the carbon atom in crystal structure. I. E. KNAGGS. Davy Faraday Lab., Royal Institution. *Nature* 121, 616–7(1928).—Objections are raised to the conclusion of Gerstaecker, Moller and Reis (*C. A.* 22, 2089) that the crystal structure of pentaerythritol tetraacetate has the space-group C_{4h}^2 with the tetragonal lattice Γ_4 . Their assumption of a simple four-fold axis of symmetry, with the bonds from the central C atom directed towards a square base is regarded as improbable. Independent exptl. work by K. has led to the conclusion that the space-group is C_{4h}^4 and the symmetry a four fold alternating axis. This is in keeping with the usual space-relations of the C atom. The exptl. decision between the space-groups C_{4h}^2 and C_{4h}^4 depends on the absence or presence of all odd-order reflections from the (001) plane. Only the second order is found, the first order being definitely absent. First-order reflection from the (001) plane was reported by G., M. and R. From their data it is not possible to det. to which plane the reflection was due, nor to rule out the possibility of its being the Cu-K β reflection from the (011) plane. Dimensions of the unit cell are given which do not agree well with those given by G., M. and R. They are $a = 11.98$ A. U., $c = 5.47$. By taking the d. as 1.273, this gives the number of mols. in the unit cell as 1.99.

F. A. JENKINS

The crystal structure of thiourea. LÁSZLÓ DEMÉNY AND ISAMU NYITA. Inst. of Phys. and Chem. Research, Hongo, Tokyo. *Bull. Chem. Soc. Japan* 3, 128–36(1928).—The cryst. structure of $\text{CS}(\text{NH}_2)_2$ has been detd. by the Laue photographic and x-ray spectrometric methods. The unit of structure built upon the simple orthorhombic translation group Γ_0 , is of the dimensions $a = 5.47$, $b = 7.64$ and $c = 8.5$ A. U. and contains 4 mols. The density is 1.408. The plausible space group being Γ_1^{16} , a possible atomic arrangement, neglecting H atoms, is as follows:
 $4C|u, v, 0; -u, \frac{1}{2} - v, \frac{1}{2}; \frac{1}{2} - u, \frac{1}{2} + v, 0; \frac{1}{2} + u, -v, \frac{1}{2}|$ with $u = 0.186$,
 $v = 0.144$;

4S{u, v, 0; -u, $1/2 - v$, $1/2$; $1/2 - u$, $1/2 + v$, 0; $1/2 + u$, -v, $1/2$ } with $u = -0.095$, $v = 0.270$

and $8N \begin{cases} x, y, z; -x, $1/2 - y$, $1/2 + z$; $1/2 - x$, $1/2 + y$, -z; $1/2 + x$, -y, $1/2 - z$; \\ -x, $1/2 - y$, $1/2 - z$; x, y, -z, $1/2 + x$, -y, $1/2 + z$; $1/2 - x$, $1/2 + y$, z. \end{cases}$ with $x = 0.300$, $y = 0.164$ and $z = 0.144$. The mol. has the symmetry of C_{2v} , it has one plane of symmetry in it. In such a model, the distance C-S is 1.81 Å, U, and C-N is 1.39 Å. U. Discussion is given of the cryst and mol. structures in comparison with those of urea.

A. L. HENKE

The crystal form of urea nitrate. ALBRECHT HESTERMANN. *Z. Biol.* **86**, 561-8 (1927).—The crystals are neither hexagonal nor rhombic. They are usually monoclinic. The usual hexagonal forms show (in converging light between crossed Nicol prisms) the biaxial interference figure. The rhombic forms are "Klinopinakoid" crystals.

FRANCES KRASNOW

The order of magnitude of the ideally built-up lattice regions in actual crystals.

A. SMEKAL. *Ann. Physik* **83**, 1202 (1927); *Science Abstracts* **31A**, 7. Attention is called to the high values found for the magnetic moment of certain liquid crystals, which indicate the existence of carriers made up of from 10^4 to 10^5 mols. S has, on various ground, upheld the theory that solid crystals are built up of elements of about this size, in which the mols. are arranged ideally. A no. of facts connected with photo-electric sensitiveness, phosphorescence and elec. cond. point to the existence of these ideally built structural units. Other phenomena which may depend on them are the change in size of grain in metals due to a small trace of impurity, the fact that the action of Lenard's phosphores depends on an optimum value of the amt. of added heavy metal, some of Kohlschütter's topochem. reactions, and perhaps the structure of "high molecular" org. substances.

H. G.

A memoir by W. G. Burgers on optically active uniaxial crystals. G. FRIEDEL. *Compt. rend.* **186**, 1788-90 (1928); cf. *C. A.* **22**, 1507. Polemic with respect to the relation of pseudo-symmetry and twinning in crystals.

A. P. SACHS

The diffraction of Röntgen rays in liquid compounds. CARL DRUCKER. *Physik. Z.* **29**, 273-81 (1928).—A survey of the information obtainable by means of x-ray diffraction patterns on the structure of mols. in a liquid compd.

A. L. HENKE

Direct verification of Maxwell's law of molecular velocities. JAMES F. ANDREWS. *East London Coll. Science Progress* **23**, 118-23 (1928).—A review of recent work in this field.

JOSEPH S. HERRICK

The gaseous condition of normal substances. KURT WOHL. *Univ. Berlin. Z. physik. Chem.* **133**, 305-49 (1928).—A Wohl's equation of condition, $p + \{a f_1(T)/v(r-b)\} = \{c f_2(T)/(r-b)\} = RT$ (cf. *C. A.* **16**, 868), holds for normal substances below the crit. temp. for the entire stable gaseous condition with an error of 1% for pressure; at the crit. temp. to the crit. vol. and below $T = 2.53T_c$, the vol. approaches $v_c/4$ as a limit. Above the crit. temp. the formula applies within an error of 2% for pressure with a limit which varies between r_c and $1.1r_c$ for $T_c = 175.1^\circ$. Isopentane, Et_2O and CO_2 can be represented by the equation, and C_2H_6 by a slight change in the temp. function of the 3rd member, also falls within the limit $\pm 2\%$. The current belief that SO_2 is assocd. in the gaseous condition is found to be in error. The 2nd virial coeffs., a measure of the deviation of the gas from the ideal condition, in the reduced condition agree very well with each other. For CO (0.198), CH_2Cl_2 (0.385-115%) and HCl , N_2O , C_2H_2 , C_2H_6 , C_2H_4 , Me_2O , Cl_2 , SO_2 , the calc'd. values agree well with those det'd. exptly. in the range $0.8T_c$ to $2.5T_c$. Below $0.8T_c$ the abs. values of the coeff. falls more rapidly with temp. than is indicated by the equation. From his investigation W. concludes that the theorem of corresponding states has the same form from the highly attenuated state to the crit. d. The normal substances included in the study extend from those of quadrupolar mols. to those with high dipolar moment. It is not the high dipolar moment of an associating substance which is characteristic, but rather the preponderance of the polarizing effect due to the fixed dipolar moment over that due to the shifting of the electrons and atoms. As a consequence, the theories of Keesom and Falkenhagen are not in agreement with the expts. with normal substances.

E. R. S.

Measurement of the kinetic heat effect in air, hydrogen and argon. K. RECKNER. *Ann. Physik* **85**, 831-65 (1928).—If a directional motion is superimposed mechanically upon the unidirectional motion of the mols. of a gas due to its temp., both the translatory and rotatory energies of the mols. act upon a thermometer or pyrometer in the same manner, provided the free path of the gas mols. is greater than the linear dimensions of the thermometer. This effect is known as the *Garde effect* or *kinetic heat effect*, and its mechanism is thoroughly studied in connection with a mol. air pump, the temp. being measured in a high vacuum (rotated at from 2500 to 4000 r. p. m.) by means of a

pyrometer consisting of 12 Cu constantan elements. The temp. difference between the mols. as they approach the surface of the thermoclement and after they are repelled divided by the temp. difference between the approaching mols. and the surface itself, gives what is known as the accommodation coeff. (a). This depends upon the mol. wt. of the gas and the character of the surface, but is independent of the material of which the surface is composed. The rougher the surface the more nearly a approaches the upper limit of 1. Detn. of a gave the following results for air, $0.938 \pm 0.4\%$; for H_2 , $0.434 \pm 0.3\%$, for A, $0.789 \pm 0.3\%$. In measuring the kinetic heat effect at very low pressures, the accommodation coeff. consists only of the translatory temp. motion and is designated by a_1 , the rotatory accommodation coeff. being designated a_2 . With A, a monatomic gas, a and a_1 are identical, while with polyatomic gases this is not so and a_2 is also different from a_1 . For air, measurements give for $a_1 = 0.94$ and for $a_2 = 0.52$, while for H_2 , $a_1 = 0.43$ and $a_2 = 0.20$. The results thus show that for polyatomic gases $a_2 < a_1$ and the equalization between the surface temp. and the translation temp. is more complete than the equalization between the surface temp. and the rotation temp. of a gas.

H. STOERTZ

Characteristics of homogeneous exothermic gas reactions. ROBERT N. PEASE AND PAUL R. CHESBRO. *Proc. Nat. Acad. Sci.* 14, 472-5 (1928). The rates of reaction of such gases as CH_4 and H_2 with O_2 may be greater in an empty reaction tube of Pyrex glass than in a tube filled with broken Pyrex, although the latter should favor the surface reaction. This result was more pronounced after poisoning. The explanation is believed to lie in the development of reaction centers in the body of the gas. These reactions are all exothermic. Newly formed mols. of products possess not only the energy subsequently to be liberated as reaction heat but also the original heat of activation of the reacting mols. The energy thus accumulated probably leads to the development of miniature explosion waves which, if unhindered, produce cumulative effects. When the tube is filled with broken glass the development of such reaction centers is limited because the available vol. is decreased and the bits of glass act as temporary reservoirs for the excessive energy of reaction centers. These conclusions are also in accord with the exptl. results of Hinshelwood and Thompson (*Proc. Roy. Soc.* 118A, 170 (1928)).

E. R. SMITH

The laws of expansion of gases and vapor tension. A. AMERIO. *Nuovo cimento* [N. S.] 5, 39-40 (1928). The historical development of these laws. L. T. FAIRHALL

Diffusion of hydrogen through iron. W. E. DEMING. *Phil. Mag.* [7], 5, 1081-4 (1928). The usual method of studying diffusion of gases through material bodies has been to apply a pressure P on one side and to make the pressure on the other side of the slab equal to zero. This procedure does not permit distinguishing between the two theoretical equations $x \text{ vol.} = K_1 A t (P_1 - P_2)^{1/2}$ and $x \text{ vol.} = K_2 A t (P_2 - P_1)^{1/2}$, where m = amt. of gas, x = thickness, t = time, A = area, P_2 and P_1 are high and low pressure, α and K are consts., because for $P_1 = 0$ the two equations become identical. D. GEORGE GLOCKLER

The molecular structure of liquids and solids. G. ANTONOFF. *Bull. soc. chim.* 43, 163-77 (1928). A crit. study of the variation in vapor pressure and other properties as a function of temp. in systems in which one or more condensed phases are present, leads to the following conclusion: The number of mols. per unit vol. is the same in two or more phases in equil. The degree of assocn. κ of a liquid can therefore be calcd. from the vapor density d_v and the liquid density d_l as $\kappa = d_l/d_v$. A close study of the variation of d_l of liquids with temp. shows discontinuities corresponding to changes in the degree of assocn. Over a temp. range from the crit. point down, A. calcs. the following values for κ for EtOAc and PrOH, resp.: 2, 6, 18, 36, 144, 864 and 2, 12, 36, 144. Similar results are obtained with SO_2 , CO_2 and the monatomic gases at low temps. These facts do not confirm the difference between normal and assocd. liquids, since there is no marked dissimilarity between EtOAc and PrOH. The theory applies probably also to the case of solids. G. CALINGAERT

Vapor pressures of binary systems. ALFRED W. PORTER. *Trans. Faraday Soc.* 25, 343-7 (1929). P. discusses the application of the law of Duhem Margules to the vapor pressure of binary systems. Data on water-sugar and water-KCl solns. are utilized to illustrate the relations derived. C. H. GREENEWALT

The vapor pressure of single substances and binary mixtures. Vapor pressure of mercury and graphite. J. J. VAN LAAR. *Z. anorg. allgem. Chem.* 171, 42-60 (1928).—A. Vapor-pressure equations are derived theoretically. B. Vapor pressure of mercury in mm. is given by equation $\log p = -(3167/T) + 7.985 - 0.000135 T$ from -40° to $+800^\circ$. From formulas and other data the crit. consts. are 1480° and 1150 atm. to $+800^\circ$. For graphite the calcd. m. p. is $3850^\circ K.$, b. p. $5300^\circ K.$, crit. temp. $8000^\circ K.$ and C.—For graphite the calcd. m. p. is $3850^\circ K.$, b. p. $5300^\circ K.$, crit. temp. $8000^\circ K.$ and

critical pressure 1500 atms - *D.* Polemical against Weissenberger on vapor pressure of binary mixts. *G. B. TAYLOR*

Boiling-point curves of mixed liquids. ROY R. DENSLOW. *J. Chem. Education* **5**, 727-32(1928). - Because of the simplicity of app., speed of operation, use of small amt of liquid and fair accuracy, the b. p. method of Siwoloboff (*Ber.* **19**, 795(1886)) was adopted. It consists in placing about 0.5 cc. of the liquid in a small fairly thin-walled tube (made from 6-mm. tubing) which, with a thermometer, is immersed in a well-stirred bath of a suitable heating liquid. In the liquid under examn. is placed a capillary tube about 2 cm. long and 1 mm. diam., open at the bottom and closed at the top. With the capillary in the liquid, the bath is heated with const. stirring until a rapid stream of bubbles comes from the capillary. The outer bath is then allowed to cool (with const. stirring) and when the bubbles cease and the liquid starts to suck back, the thermometer is read, giving the b. p. With 5-cc. samples of one liquid, mixts. contg. 0, 20, 40, 60, 80 and 100 mol. % of the other are prepd. B. p. detns. on such solns. are then made rapidly and the results plotted (temp. against % compon.). the graphs show the possibility of sepg. benzene-toluene and ether-EtOH solns., as they approach ideal b. p. curves, and the impossibility of sepg. CHCl_3 - Me_2CO and CHCl_3 - MeOH solns., since they show a max. and a min. b. p. curve, resp. If a class is divided into sections this expt., taking only one lab. period, illustrates the meaning of mol. %, gives practice in calcg. with it, illustrates an important method for detg. b. p. of pure liquids and mixts., the relation between vapor pressure and external pressure when the liquid is at the b. p. and when superheated, the difference between ideal solns. and others, and the behavior of 3 types of binary mixts. of miscible liquids; at the same time it gives data with which to prep. temp.-compu. diagrams for such 2 component systems. *W. C. E.*

Contribution to the study of molecular forces. I. The variation of the vapor pressure of a few liquids produced by gases under high pressure, and its relation to the van der Waals constant a_2 . A. ECKEN AND F. BRISLEF. *Z. Physik. Chem.* **134**, 230-42(1928). The increase in vapor pressure of a liquid in the presence of a compressed gas affords a simple method of computing the van der Waals constant of attraction between mols. of different species. The vapor pressure of CS_2 under increasing pressure of CO_2 , N and H is measured by means of an interferometer. Values of a_{12} for these and other substances are calcd. from the author's own data as well as for some from the literature. The Bertholet equation relating the mutual mol. attraction a_{12} to the individual mol. attractions a_1 and a_2 , $a_{12} = \sqrt{a_1 a_2}$, applies satisfactorily to the diatomic gases. *G. CALINGAERT*

Heat transmission of liquids flowing through tubes. L. SCHILLER AND TH. BOCKBACH. *Physik. Z.* **29**, 340-2(1928). From theoretical considerations, it is calcd. that $ad/\alpha_w = 0.0395 (\sqrt{d\rho_w/\lambda_w})^{0.75}$. This equation resembles the empirical Nusselt equation: $ad/\alpha_w = 0.0292 (\sqrt{d\rho_w/\lambda_w})^{0.85}$. Exptl. facts are better represented by $A. L. BENNE$

Measurement of diffusion constants in liquids. G. VON BÉKEV. *Physik. Z.* **28**, 812-4(1927). An interferometric method is described for the measurement of diffusion constants of liquids; data are cited relating to aq. 0.25 N carbamide and water, and to aq. 0.25 N KCl and water, which show that the accuracy of the method is approx. 0.1%. *B. C. A.*

The action of magnetic, electric and mechanical forces upon mesophases. H. ZOCHER. *Physik. Z.* **28**, 790-6(1927). A new statistical definition of mesophases is given. The latter comprise the systems known as "liquid crystals" or "anisotropic liquids." Only in the case of enantimorphous systems can a magnetic field induce an elec. polarization. The elec. anisotropy depends upon the chem. constitution. A derivation of mechanical characteristics of mesophases is given together with a mathematical detn. of equl. in a magnetic field with consideration of mechanical hindrances. The existence of an orientation owing to an anisotropic inner friction has been confirmed by expts. *EMIL KLARMANN*

Cohesion and intermolecular repulsion. R. K. SCHIFFIELD. *Phil. Mag.* [7], **5**, 1171-6(1928). The cohesion in a number of highly compressed liquids and gases has been calcd. over a wide pressure range. As the vol. is reduced the cohesion first increases to a max. and then decreases. The results cannot be reconciled with the view that mols. resemble rigid spheres, but are readily accounted for on the view that the force between two mols. is repulsive when they are very near together, and attractive when they are further apart. *GEORGE GLOCKLER*

The dipole momentum and the anisotropy of liquids. J. EMERT AND H. V. HARTER. *Physik. Z.* **28**, 786, 90(1927). The directive mol. forces cannot in a first approximation

be derived from dipole forces. Better results are to be expected by a further mathematical development of the general premise of Oseen (cf. *C. A.* 19, 1646). E. K.

Some experiments on intensive drying. RONALD H. PURCELL. *J. Chem. Soc.* 1928, 1207-15.—The effect of removing the last traces of water from the reactants in the reduction of the oxides of Cu, Bi, Hg and Ag by CO is described. With Cu and Bi oxides the temp. required for reaction increased with the time of drying up to 425-30°. When this max. was reached further drying had no effect. Either these oxides react with CO at 430° in the absence of water or appreciable amts of water are given off by the glass app. or by the oxides at that temp. With HgO and Ag₂O no change in the rate of reduction was observed with drying for as long as 6-8 months. The effect of other substances as catalysts in the absence of water on the reduction of CuO with CO was studied. Et₂O, EtOH and C₂H₆ appeared to catalyze the reaction to some extent but not so efficiently as water. SO₂ and Br₂ had no catalytic effect. The org. liquids may have undergone incipient decompn. with CuO or they may not have been sufficiently dried. The reduction of CuO with H₂ was not affected by drying nor was the formation of HgO from Hg and O₂. J. S. REICHERT

Separation of binary liquid mixtures by silica gel. I. H. G. GRIMM AND H. WOLFF. *Z. angew. Chem.* 41, 98, 103 (1928).—An investigation of the efficiency of processes involving silica gel in effecting a sepn. of binary liquid mixts. which cannot be sepd. by fractional distn. Three methods have been investigated. The first consists in allowing the liquid mixt. to percolate through a column of gel. In the second method the liquids are boiled and the vapors passed into a fractionating column packed with gel. In the third method the fractionating column is surrounded by a vapor jacket, so that both substances are maintained in the vapor phase. Liquid retained by the gel is recovered by heating to about 250° and collecting various fractions. The gel is regenerated by heating at 250-300° in a vacuum. The present measurements have reference to the mixt. of EtOH (15.85%) and CCl₄ (84.15%) of min. b. p. The comps. of the various fractions were detd. refractometrically. In all cases the first fractions consist almost entirely of CCl₄. The degree of sepn. increases with decreasing grain size, decreasing size of pores, and increasing diam. of the column used. With a gel of fine grain and having narrow pores, about 60% of pure CCl₄ was obtained by the percolation method. The sepn. effected under comparable conditions by the 3 methods are roughly the same. On account of its simplicity the first method is to be preferred. II. H. G. GRIMM, W. RAFFENBUSCH AND H. WOLFF. *Ibid.* 104-7.—The sepn. effected when certain binary mixts. of various org. liquids are allowed to percolate through a column of silica gel have been investigated. When the heat changes produced by wetting silica gels with the components of the binary mixts. are compared with the results of the percolation expts. it is found that the component producing the greater heat effect is most strongly adsorbed and that the degree of sepn. increases with increasing difference between the heats of wetting. The heat of wetting is influenced by various factors, e. g., grain size, size of pores. The following values (g.-cal./g. of gel) refer to a gel of grain size 0.2-0.5 mm. having very narrow pores: cyclohexane, 6.25; hexane, 6.5; CCl₄, 7.3; chloroform, 10.9; toluene, 11.3; benzene, 11.3; propyl alc., 20.8; water, 20.95; MeOH., 22.95; EtOH., 23.7. A gel having much wider pores gave values about 50% smaller. Addn. of small quantities of EtOH to CCl₄ produces a remarkable increase in the heat of wetting, addn. of 0.125% of alc. raising the heat of wetting to a value which is approx. the arithmetic mean of the values for the 2 components. B. C. A.

Diminution of index of refraction and density in binary liquid mixtures. L. COUSNON. *Arch. sci. phys. nat.* 10, 136-41 (1928).—A mathematical proof is given that the changes in n and d are of the same sign for binary liquid mixts. C. H. G.

Some miscibility relations of acetic anhydride. DAVID C. JONES AND HAROLD F. BETTS. *J. Chem. Soc.* 1928, 1177-92.—Solv. curves were detd. for binary systems composed of Ac₂O with C₂S₆ (I), cyclohexane (II) and decane (III). Based on calcd. internal pressures Ac₂O should be completely miscible with these solvents. The concn. by wt. of Ac₂O at the crit. soln. temp. is as follows: for I, 36.17% at 29.83°; for II, 47.33% at 52.45°; for III, 52.11% at 85.50°. The mean concn. curves for Ac₂O with I and II are straight lines, while with III it is slightly curved though it intersects the soly. curve at the crit. concn. point. In the phase rich in the less polar constituent these systems show a good agreement of the soly. values with the theory of corresponding states. The position of Ac₂O in the internal pressure series is considered in relation to its soly. The influence of HOAc on the crit. soln. temp. of Ac₂O with I, II and III was in no case greater than 1° for 5% of HOAc. J. S. REICHERT

Some physical properties of acetic anhydride and related substances and their

constitutional significance. DAVID C. JONES. *J. Chem. Soc.* **1928**, 1193-1200. —The lowering of the f. p. of cyclohexane and benzene by Ac_2O was detd. For cyclohexane the ratio of mols. found/mols. calcd. varies from 1.09 to 2.67 for concns. of 0.335 to 5.33 g./100 g. solvent. Only the results for very low concns. are regarded as true values for the mol. wt. of Ac_2O in this solvent. The increase in values with increasing concns. probably is a pos. deviation from Raoult's law. For benzene the mol. wt. is normal up to a concn. of 3.8% with a slight tendency to increase in the higher concns. The temp. coeff. of mol. cohesion and of mol. surface energy for Ac_2O , CS_2 , PhNH_2 , and cyclohexane are normal whereas HOAc gives about half the calcd. values. The parachor and the constitution of HOAc , Ac_2O and EtOH are discussed. Since the associated OH groups in ales. are more polar than the ethereal oxygen Et_2O is more sol. in the satd. hydrocarbons than EtOH . The assocd. HOAc is less polar than Ac_2O and consequently is less sol. The following groups are arranged in the decreasing order of their effect on soly. in water: $\text{COH} > \text{CO} > \text{CHOH}$, $\text{CHOH} > \text{O} > \text{O} > \text{O}$, there being little difference between CO and OH . J. S. REICHERT.

The capillary action of mercury in the absence of gas-grown skins. I. J. MANLEY. *Phil. Mag.* **37**, 5, 958-962 (1928). —After removal of the adsorbed layer of gases from a barometer tube the curvature of the Hg lessened. Hg wets a perfectly clean glass surface like other liquids, although there is no liquid film of Hg remaining on the gas-free glass-surface that has been in contact with Hg. GEORGE GLOCKLER.

The surface layer of liquids and the size of molecules. SERGIUS G. MOKRISHIN. *J. Phys. Chem.* **32**, 879-884 (1928). —Ostwald's equation, connecting the heat of evapn., λ , with surface tension, σ , and the area of liquid surface A , $\lambda/2 = \sigma A$, has been used to calcg. the diam. of a mol. The application of this equation to such a calcn. is open to objection because of the lack of data on the shape of mols. and the structure of surface layers of liquid. Fresh support is adduced for the correctness of the author's formula for calcg. the diam. of mols. cf. *C. I.* **19**, 594. From theoretical considerations the surface layer of liquid should have a smaller d. than the main liquid. R. L. DOTY & E.

A colloidal theory of surface tension. SATYENDRA RAY. *Kolloid Z.* **45**, 9-12 (1928). —The consequences of molecular orientation in liquids on surface tension phenomena are discussed. J. G. McNALLY.

Adsorption at crystal-solution interfaces. III. Individual macroscopic ammonium alum crystals grown in presence of gelatin and dyes. G. W. BENNETT AND W. G. FRANCE. Ohio State Univ. *J. Exp. Chem.* **11**, 571-584 (1928). cf. *C. I.* **21**, 35608, 37890. The present work covers a study of adsorption of dyes, gelatin, and amino acids by the various faces of NH_4 alum. The growth ratios of this alum were detd. both with and without these foreign substances. Adsorption was found only at the cube faces and was specific in character. The effects are explained on the basis of residual valences, polar groups and interionic distances in the crystal lattice. Extending these ideas to the study of flocculation of suspended sols is suggested. The growth ratio $V_{100} : V_{111}$ for pure ammonium alum was found to be 1.53. C. H. KERR.

Sorptive power of lignin. E. WIEBERKIND AND G. GARBE. *Z. anorg. Chem.* **41**, 107-112 (1928). Lignin is a gel carrying a neg. charge capable of adsorbing alkalis, NH_3 and basic dyes. The sorption is irreversible and hence indicative of subsequent formation of compds., probably of a mol. type. The quantity of substance taken up depends on various factors (water content of the lignin, duration of the process, etc.). H_2SO_4 and HCl are also fixed, the latter acid by most lignin only, formation of solid solns. being followed by a chem. combination. Lignin takes up considerable quantities of I. Of the amt. taken up only a fraction can be removed by thiosulfate. The fact that the soln. of I. acquires no measurable acidity, even on long keeping in contact with lignin, indicates that there is no substitution of H in the lignin mol. by I, but rather the satn. of some unsatd. linking. Neutral salts are not adsorbed, although there is considerable sorption of KHSO_4 . Three types of lignin were used, obtained by Willstätter's method from oak, beech, and a wood of Japanese origin, resp. The sorptive powers were, in general, very similar. B. C. A.

The color produced by iodine in the presence of starch. E. ANGELESCU AND J. MIRESCU. Inst. chim. agr., Bucharest. *J. chim. phys.* **25**, 327-42 (1928). No expts., whether carried out by the present or former authors, demonstrate the formation of a chem. compd. between iodine and starch. Harrison's hypothesis, that I forms a colloid soln. protected by starch is erroneous because in the presence of cholic acid, the color appears at the time the acid saps from the soln. as a colloid, and the protective power should have reached a max. when the acid was in true soln. The coloration of *mol. starch* or cellulose by I cannot be regarded as a protection phenomenon. A more plausible explanation is based on *adsorption*. The blue color characterizes iodine,

not starch; other colloids give it also. The role of KI has been explained as follows: KI transforms I in I_2 ; the latter is easily adsorbed by starch, whereas I is only little adsorbed, and KI not at all. KI has also a physical effect, increasing the dispersion of starch; it intensifies the blue color, beyond a certain concn it changes the blue into purple.

A. L. HENNE

Adsorption from solution by ash-free adsorbent charcoal. V. ELROY, J. MILLER AND SELMA L. BANDEMER. *J. Phys. Chem.* **32**, 829-42 (1928); cf. *C. A.* **21**, 3147.—An attempt was made to det. the isoelec. point of charcoal by measuring its adsorption from buffer solns. Unpurified charcoals gave anomalous results. Purified ash-free blood charcoal decreased the acidity of acid buffer mixts. by adsorption of the acids, and increased the alk. of the less alk. buffers through hydrolytic adsorption of acid from salts, with the liberation of alkali. From the results it is certain that the method of adsorption from buffer solns. cannot be used for the detn. of the isoelec. point of charcoal.

R. L. DODGE

Extraction of iodine from weak iodine-water solutions. O. YU. MAGIDSON. *Scientific Chem. Pharm. Inst. J. Chem. Ind. (Moscow)* **4**, 3-8 (1927).—M.'s method consists in acidifying weak I ion solns. by H_2SO_4 , treating them with a nitrite to liberate I_2 , and bringing them in close contact with an adsorbent by means of filtration, mixing, etc. The adsorbent contg. I is sep'd from the soln. and treated chemically first for the retransformation of I into the ion state, and finally for the recovery of the adsorbent in its previous condition. $2I^- + 2H^+ \rightarrow O_2 + H_2O + I_2$; $I_2 + \text{adsorbent} \rightleftharpoons (I_2 \text{ adsorbent})$; $(I_2 \text{ adsorbent}) + H_2O + SO_2 \rightarrow 2I^- + 2H^+ + SO_4^{2-} + \text{adsorbent}$. If the adsorbent is well selected, an I concn. 200-300 times as great as that of the original soln. is obtainable, and the usual chem. treatment for sep'n. of I can be employed. Various adsorbents have been tried, particularly charcoal, solid starch, different kinds of cellulose, albumins. The best results were obtained by filtering acidified weak I waters with liberated I through a layer of potato starch. The starch contg. I is then treated with an acid soln. of sulfite which exts. the I and passes it into soln.: $I_2 + 2NaHSO_3 + H_2O \rightarrow 2HI + Na_2SO_4$. (The starch which is thus regenerated is used again for another adsorption of I.) When the concn. of I in the new soln. reaches 0.5% and over, the soln. is oxidized by the addn. of about 250 g. of permanganate per 1 kg. of dissolved I, and this permits the sep'n. of crystals of I. This method was tried on waters of some Russian lakes contg. I salts in very dil. soln., and its applicability for economic large scale I extns. has been demonstrated. The expense in the cost of H_2SO_4 used represents 84% of the total expense of all materials employed and of the elec. energy consumed. Tables and diagrams are given.

BERNARD NELSON

The application of our adsorption equation. M. N. CHAKRAVARTI AND N. R. DHAR. *Kolloid Z.* **45**, 12-21 (1928). The adsorption equation given by C. and D. (cf. *C. A.* **22**, 1073) is in closer agreement with exptl. values given by other authors than the logarithmic equation. The following cases of adsorption are considered: various Ag salts by AgI , acids and alkali by humic acid, acids and AsO_4^{3-} by $Fe(OH)_3$, HCl by animal membranes, $HIOAc$ by carbon, I_2 by charcoal and ions of different valence by $BaSO_4$ and charcoal. Results with $BaSO_4$ indicate an adsorbed layer not greater than one mol. thick.

J. G. McNALLY

The influence of a few colloidal substances on the velocity of absorption of carbon dioxide by sodium carbonate solutions. PAUL RIGU AND LEON LORTIE. *Compt. rend.* **186**, 1543-6 (1928). Peptone, pepsin, gelatin or starch was added to Na_2CO_3 solns. The velocity with which CO_2 is absorbed by these solns. decreases first very rapidly. As soon as a 1/1000 concn. of the colloid is reached, a further addn. no longer influences the CO_2 absorption velocity. The new velocity is then about 2% of the initial one.

A. L. HENNE

The rate of absorption of sulfur dioxide by alkaline solutions. PAUL RIGU AND P. A. BÉRARD. *Compt. rend.* **186**, 1433-6 (1928). The effect of temp. and concn. on the rate of absorption of SO_2 by milk of lime has been detd. The rate of absorption was found to increase with decrease of temp. and increase of concn. over the range 5-55° and 0-13.6 mol. % $Ca(OH)_2$.

C. H. GREENEWALT

The adsorption kinetics for molecules attached at more than one point. ROBERT E. BURK AND DAVID C. GILLESPIE. *Proc. Nat. Acad. Sci.* **14**, 470-2 (1928). The atoms of an adsorbed mol. should be considered to be separately attached to individual atoms of the surface. If the atoms of P mols. of A-B were thus attached the rate at which they would be desorbed is $PM^{\alpha+\beta}e^{-(E_A+E_B)/RT}$ ($\alpha + \beta$), where M is the vibration rate of the underlying surface atoms, E_A and E_B are the energies necessary to break the adsorption bonds and α and β are the av. times that A and B, resp., are loose before returning to the surface. If the mols. were attached by a single point the rate of desorption would

be $2PMe - E_T/RT$, where E_T is the energy involved in the single bond. Singly and doubly attached bonds would thus come off at equal rates only if $M(\alpha + \beta) = 2$. Such a kinetic complexity may be related to the rough proportionality between the assocn. of substances and their b. ps.

E. R. SMITH

The rate of absorption of water by Bakelite. II. GENEVA LEOPOLD AND JOHN JOHNSTON. *J. Phys. Chem.* **32**, 876-8(1928).—The rate of increase in wt. of brown Bakelite strips 42, 71 and 139 mils thick, on immersion in distd. H_2O was measured. A 6% gain in wt., attained in about 28 months by the 42-mil strip, represented satn. The results are expressed in such a way that one may predict from the curve that sheets 140 mils thick would not attain satn. in 26 years. The rate of penetration of H_2O into this type of Bakelite is so slow that under all ordinary atm. conditions the amt. of H_2O absorbed would be negligible. From these expts. alone little may be said as to the mechanism of the absorption.

R. L. DODGE

Studies on the stability of suspensions of coarse particles dispersed in solution. III. Influence of concentration of disperse phase and of salt on clarification. HANS WERNER. *Ber.* **61B**, 802-9(1928).—The process of coagulation is divided into (1) coagulation of disperse particles to form aggregates, (2) pptn. of particles, (3) formation and pptn. of the sediment, (4) accompanying processes, (5) formation of peculiarly structured sediment, (6) foam formation and (7) particles half suspended clinging to the walls of the container. Diagrams explain the effect of salt concn. on kaolin suspensions. Such suspensions may be either reversible or irreversible in coagulation, although large particles are usually reversible. The structure of the deposit depends on the concn. of both salt and disperse phase. Increase in concn. of salt or disperse phase increases the tendency to foam.

RAYMOND H. LAMBERT

Ferric oxide filaments obtained by desiccating colloidal solutions. PAUL BARY. *Compt. rend.* **186**, 1539-41(1928). Ferric oxide hydrosols are made by hydrolyzing a 10% $FeCl_3$ soln. and dialyzing through a cellophane membrane for ten days. A small quantity of the sol when brought to dryness in an oven at 50-60° leaves tiny fragile filaments in concentric rings. A more dil. sol which had been dialyzed longer showed radial rather than concentric filaments. B. ascribes an elongated shape to the particles in the sol and explains the formation of filaments by assuming that the particles are attracted to the container-sol junction by capillary forces.

WILLIAM F. EHRET

The effect of temperature on the rate of flocculation of colloids. K. JABLECZYNSKI AND M. KNASTER. *Bull. soc. chim.* **43**, 156-9(1928). J. and K. det. the rate of flocculation of $Fe(OH)_3$ by KCl at different temps. by measuring the increase in opacity of the sol (cf. Jableczynski, *C. A.* **21**, 684). With 10 cc. of $Fe(OH)_3$ soln. contg. 7.435 g. Fe per l. and 10 cc. of 0.2 N KCl, the const. K is: 0.26, 0.54, 1.31 and 2.58, resp., at 5, 15, 25 and 35°. The temp. coeff. of K is 2.19. According to Schmoluchowski, coagulation is caused by shock of the particles, and depends, therefore, on the rate of diffusion. The latter increases only 30% per 10°; other factors must, therefore, affect coagulation.

G. CALINGAERT

Kinetics of coagulation of colloids. K. JABLECZYNSKI AND M. SOROCZYNSKI. *Bull. soc. chim.* **43**, 159-63(1928).—The rate of coagulation of colloids measured photometrically, is governed by the equation $\log t_{\alpha} - \log t_{\alpha\infty} = Kt$ (cf. Jableczynski, *C. A.* **21**, 684). However, K remains const. only if the limiting value of the angle of rotation is nearly 90°, or corresponds to a high degree of opacity. A more general equation postulates that the rate of increase in opacity is proportional to the difference between the opacity at a given time and the final opacity. This gives: $\log \{(\log t_{\alpha\infty} - \log t_{\alpha})/(\log t_{\alpha\infty} - \log t_{\alpha})\} = Kt$, of which the first equation is only a special case. The general equation was tested by using 2 vols. of $Fe(OH)_3$ soln. (2.04 g. Fe/l.) and 1 vol. of 0.4 N KCl, at 15°, under yellow light.

Thickness of colloid	50 mm.	30	20	10	5
α_{∞}	About 90°	87.5°	86.6°	80.4°	67.3°
Total time, min.	3	7	10	9	27
$K \times 10^3$	174	97.6	67.9	850-42	34-15
$K_1 \times 10^4$				28.0	29.8

Low values of α_{∞} increase the time required for flocculation, but also affect the actual value of K_1 . It would seem preferable therefore to use values of α_{∞} close to 90°, in order to obtain more comparable values of K when studying the kinetics of flocculation.

G. CALINGAERT

The stability of colloidal solutions in the presence of electrolytes. A. BOUTARIC. *Bull. soc. chim.* **43**, 146-55(1928).—All the methods of detg. the stability of colloidal solns. towards electrolytes which are based on the observation of flocculation are in-

accurate and incorrect. B. measures the increase in coeff. of absorption of the colloidal soln. during the time between the addn. of the electrolyte and the flocculation, by means of a Fery spectrophotometer. The opacity increases at a decreasing rate, tending asymptotically towards a limiting value in the neighborhood of which the sol becomes very unstable. Temp. affects the rate of flocculation in either way, depending on the electrolyte. Strong agitation sometimes accelerates flocculation, while darkness or irradiation with light of various wave lengths does not affect the rate of increase in opacity. The rate of flocculation depends not only on the final concn., but also on the concn. at which the electrolyte is added, usually decreasing with a decrease in initial concn. of electrolyte, until a limit is attained for a certain diln. The stability of a soln. is detd. by measuring the time t required for flocculation with increasing concns. C of electrolyte. The curve t vs C has an asymptote parallel with the t axis, and corresponding to the min. concn. of electrolyte which will cause flocculation. The curve is fairly well expressed in the neighborhood of the asymptote by $C = acm.t$. By plotting $\log C$ vs $1/t$, a straight line is obtained which for $1/t \rightarrow 0$ gives the value of $\log a$. Another satisfactory equation is $(C - a) = Kt^n$, which can be plotted as $\log (C - a)$ vs. $\log t$. When multivalent electrolytes are used, some sols show 2 zones of flocculation, with two or three corresponding limiting concns. of stability. The addition of minute amts. of some foreign substances may greatly affect the stability of colloids. Very low concns. of so-called protective colloids (gelatin, albumin, etc.) actually accelerate flocculation, while very high concns. may cause flocculation in the absence of electrolytes. Small concns. of some electrolytes may act as a protective agent for the pptn. by other electrolytes. Finally, the prior addn. of a given electrolyte in an amt. insufficient to cause flocculation, may protect the colloid against flocculation by an amount of the same electrolyte in excess of the min. concn. which will ppt. the untreated colloid. G. C.

The conductivity of copper hydrosols. H. MURFREY D. MURRAY. *J. Chem. Soc.* 1928, 1235-9. Measurement of the cond. of metal hydrosols was undertaken to exam. the ionic equil. in such sols. The concn. of the stabilizing electrolyte was so large that no evidence could be obtained on the equil. between the ions on the particle surface and those in soln. Cu sols give a considerably smaller cond. than Pt or Ag sols. When NaCl soln. is added to a Cu sol the cond. of the mixt. is nearly equal to the sum of the calcd. cond. of its components. With NaOH and other hydroxides and with HNO_3 and AlCl_3 the cond. of the mixt. is less than that of its components while with Na_3PO_4 it is greater. The surface in Cu hydrosols is covered by $\text{Cu}(\text{OH})_2$, which sats. the water in which the particles are dispersed. J. S. REICHERT

Contribution to the study of colloidal clay. A. DEMOLON AND G. BARBIER. *Riv. gen. colloid.* 6, 29-31 (1928), cf. *C. A.* 22, 710, 836. A discussion of previously reported observations on the viscosity and the adsorption power of clay suspensions is given which leads to a partial explanation of the structural transformations produced under different influences. H. M. McLAUGHLIN

Comparative studies of sols made by peptizing iron oxides with silicic acid. A. FODOR AND A. REIFENBERG. *Kolloid Z.* 45, 22-31 (1928). Ferric oxide sols were made (1) by peptizing hydrous ferric oxide with silicic acid, (2) by peptizing ferrous oxide with silicic acid and oxidizing with H_2O_2 , and (3) by mixing colloidal ferric oxide with silicic acid. (1) was colored brick red, (2) was green before oxidation and red-yellow after and (3) was brown-red. The final concn. of each sol was Fe_2O_3 , 0.028% and SiO_2 , 0.18%. The micelles of all carried a negative charge. The av. particle sizes in μ were (1) 3.375, (2) 2.221 and (3) 0.672; the relative viscosities were 1.0143, 1.0208 and 1.0400 in the same order. Max. alkali adsorption is given as 13×10^{-3} equivalents for (1) and 8×10^{-3} for (2). J. G. McNALLY

The influence of mercaptans on the stability of colloidal sulfur solutions. EICHENWASE. *Kolloid Z.* 45, 31-6 (1928). Colloidal S sols. contg. 1.25 millimoles per l. were prepd. by mixing a 0.4% alc. soln. of S with aq. solns. of EtSH of various concns. The sols, with a final concn. of approx. 0.004 millimoles per l. of EtSH showed greater stability than sols. contg. either a greater or less amt. of mercaptan. At low concn. of EtSH the suspension is destroyed by the clumping of the S particles, while the mercaptan dissolves the S at high concn. J. G. McNALLY

Slow hydrolysis of ferric chloride. E. HEYMANN. *Z. anorg. allgem. Chem.* 171, 18-41 (1928). The hydrolysis of FeCl_3 was studied by ultrafiltration and cond. measurements. There is an apparent equil. in the amt. of colloid formed by complete hydrolysis at 80° , and subsequent aging at a lower temp. and by aging a fresh soln. at the lower temp. The Cl content of the colloid is not the same in the two cases. Theories to account for the results are presented. G. B. TAYLOR

The optical activity and colloidal behavior of aqueous gelatin dispersions. ELMER

O. KRAEMER AND J. R. FANSELOW. *J. Phys. Chem.* **32**, 894-911(1928).—The optical rotation of gelatin was studied at various temps., with change in p_H and in the presence of electrolytes. Very different results occur in the sol form than in that of the gel. Gel formation in dil. solns. produces mutarotation and a high sp. rotation. A discussion is given of the internal structure of gel as deduced from exptl. results. R. H. L.

Viscosity factor in emulsification. R. C. SMITH. *Phil. Mag.* [7], **4**, 820-8(1927). —Solids giving good emulsifiability give, as a rule, high interfacial tensions. G. G.

Optical isomers of cystine and their isoelectric solubilities. JAMES C. ANDREWS AND EDWIN J. DE BEER. *J. Phys. Chem.* **32**, 1031-9(1928).—Cystine from its structure should have 2 optical isomers, a meso-compd. and possibly a racemic compd. Soly. varies with size of sample, indicating presence of more than 1 phase. All 4 pos. forms are shown to be present and the calcd. soly. figures suggest that *d*-cystine is 4 times as sol as *l*-cystine. A. P. SACHS

Magnetic susceptibility and the supposed second isoelectric point of gelatin. M. FALLOT. *Compt. rend.* **186**, 1287-8(1928). L. W. RIGGS

The theory of the process of solution. HANS SCHWERDTFEGGER. *Chem. App.* **15**, 73-4, 99-100, 123-5(1928).—A mathematical paper on soln. with and without stirring, with formulas for the detn. of consts. J. H. MOORE

Liquid ammonia as a solvent and the ammonia system of compounds. I. Liquid ammonia as a solvent. W. CONRAD FERNELIUS AND WARREN C. JOHNSON. *J. Chem. Education* **5**, 664-70(1928).—A résumé of the work of Franklin and Kraus and their collaborators, comparing the behavior of H_2O and NH_3 and showing the remarkable results obtained in metathetic reactions in NH_3 solns. This solvent is dissocd. to only 5×10^{-11} Kohlrausch units, or less than one-one thousandth as much as water; thus "ammonolysis," the ability to reverse the neutralization reactions by which salts of weak acids or weak bases are formed, is much weaker than the similar power (hydrolysis) of water. Salts like $Al(CN)_3$ can, therefore, be prepd. in NH_3 , but not in aq. solns. W. C. EBAUGH

The solubility of cadmium sulfide in hydrochloric acid. MAURICE AUMERAS. *Compt. rend.* **186**, 1541-3(1928).—The soly. is detd. under an atm. of N to eliminate any oxidation of H_2S . The following relation expresses the soly. in dil. HCl soln. at 16° : $[HCl] = 970\sqrt{[H_2S][CdCl_2]}$. $[HCl]$, etc., represent total concn. This expression is in accord with the idea of complete dissocn. of the HCl and the $CdCl_2$ in dil. soln. It also shows that in the dil. solns. employed the H_2S undergoes practically only primary dissocn. WILLIAM F. EHRET

Solubility of lead monoxide and basic lead carbonate in alkaline solution. MERLE RANDALL AND HUGH M. SPENCER. Univ. Calif. *J. Am. Chem. Soc.* **50**, 1572-85(1928).—The solubilities of red (tetragonal), yellow (orthorhombic) and hydrated PbO , and $Pb_2(OH)_2(CO_3)_2$ are detd. in dil. aq. KOH solns. at 25° . The assumption that the activity coeffs. of the $HPbO_2$ and NO_3 ions are equal in dil. solns. is found to be approx. correct. The free energies of formation of the $HPbO_2$ ion from the OH ion and the red and yellow forms of PbO , and those for the reactions between $PbO \cdot \frac{1}{2}H_2O$ and $Pb_2(OH)_2(CO_3)_2$ and the OH ion are detd. from extrapolated values of the resp. equil. consts. J. BALOZIAN

The solubility of thallos chloride in water and aqueous solutions of magnesium sulfate and lanthanum nitrate at 25° . MERLE RANDALL AND K. S. CHANG. Univ. of California. *J. Am. Chem. Soc.* **50**, 1535-6(1928).—The soly. of $TlCl$ is detd. in H_2O , in aq. $MgSO_4$ and aq. $La(NO_3)_3$ solns., at 25° , by the method of Randall and Vietti following abstract, equil. being approached from both sides. The soly. of $TlCl$ in H_2O , at 25° , is detd. as 0.01611 moles $TlCl$ per 1000 g. H_2O , the sp. gr. 1.0034 and $d.$ as 1.0004. J. BALOZIAN

The solubility of lead bromide in aqueous salt solutions and the calculation of the activity coefficient from solubility measurements. MERLE RANDALL AND WILLIAM V. A. VIETTI. Univ. California. *J. Am. Chem. Soc.* **50**, 1526-34(1928).—An accurate method of detg. solubilities is developed and is used for those of $PbBr_2$ in aq. solns. of $Pb(NO_3)_2$, $Ba(NO_3)_2$, $CdBr_2$ and KBr , at 25° . A method for detg. the activity coeff. from soly. data by graphical treatment is described, applications being made to $PbBr_2$ and $TlCl$. The use of this method is justified if the satg. salt is non-associated or when the soly. is very small, but may lead to considerable error with fairly sol. associated salts as $PbBr_2$. J. BALOZIAN

The activity coefficients of ions in aqueous solutions of nonelectrolytes. J. N. BRÖNSTED AND JOHN W. WILLIAMS. Polytech. Inst. of Copenhagen. *J. Am. Chem. Soc.* **50**, 1338-43(1928).—The variation of the activity coeff. of a satg. salt with change in the dielec. const. (to 15%) of the solvent is further studied. The activity coeffs. are

detd. from the effect of a solvent salt (NaCl) on the soly. of insol. satg. salts (croceo-tetranitrodiammino cobaltiate and luteo-tetranitrodiammino cobaltiate); the dielec. consts. are varied by adding Et_2O or sugar, in varying amts., to H_2O . A plot is made of the values of the soly. ratio $\log s/s_0$ (obtained from expt) against the sq. roots of the ionic strength for various mixts. and the slopes of the resulting straight lines detd. The change produced in the slope by change in the solvent agrees with that required by the Debye and Hückel interionic-attraction theory.

J. BALOZIAN

Solubilities and molecular weight determinations in liquid chlorine. K. H. BUTLER, M. A. MCINTOSH AND D. MCINTOSH. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 198 (1926); cf. *C. A.* 22, 2087. Fifty-nine of the commoner salts are insol in liquid Cl_2 at its b. p. S, As lumps, Ag, Cu and Zn do not react; Al is changed quickly into AlCl_3 , which is insol; I, P and Sn react violently, but only in the last case does the b. p. rise, showing that soln is taking place. The ebullioscopic consts. measured were: CHCl_3 , 1.75; CCl_4 , 1.76; SnCl_4 , 1.72; POCl_3 , 1.59; SCl_2 , 1.55; Br_2 , 2.83-2.70.

A. L. HENNE

Liquid hydrogen sulfide as an ionizing medium. H. RITCHIE CHIPMAN AND D. MCINTOSH. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 189-96 (1928). An app. has been constructed to measure the cond. of substances in liquid H_2S , and a satisfactory method of stirring the soln. has been obtained by blowing puffs of cold air through the liquid. The cond. of 15 substances has been examd. I, triisobutylamine, tripropylamine and SbCl_3 possess an appreciable cond., which was measured over a considerable concn. range. All these substances act as if they were forming complex compds. with the solvent, with the exception of I, which conducts the current like an electrolyte in aq. soln. Conclusion. The cond. of the solns. of the amines and SbCl_3 is due to the dissoen. of a compd. formed with H_2S , while with I, it is due to the dissoen. of I into pos. and neg. ions.

A. L. HENNE

Affinity between asymmetric ions. II. S. W. BERGMAN. *Arkiv. Kem. Mineral. Geol.* 9, No. 42, 11 pp. The assumption previously made by B. (*Ibid.* No. 34) that the difference observed in the soly. of diastereomeric salts depends on the content of energy in the crystals, was established in the present work. In view of the theories of Fajans (*C. A.* 14, 682) and the work of Butler (*C. A.* 19, 764) and Flatt (*C. A.* 17, 3122), according to which soly. depends on crystal energy and ion hydration, it was assumed that the ions of 2 diastereomeric salts yield the same hydration work on dissolving. The difference in the solubilities of these salts then depends on the ionization work only; i. e., the potential lattice energy cannot be the same for 2 diastereomeric salts. B. further assumes that the ionization work of complicated ions is detd. by laws which are similar to those of the simple lattice types and that the ionization work of diastereomeric salts, therefore, may be expressed by the formula $Q = k\sqrt{s/M}$, which corresponds to that advanced by Born and Lande for simple salt lattices (cf. *C. A.* 13, 1557). Q is the ionization work, s the sp. gr., M the mol. wt. and k a const. By considering the case where a racemic acid is decomposed with an optical active base, the equation $P_l - P_d = K(\sqrt{s_d} - \sqrt{s_l})$ is derived, in which P_l and P_d are positive, increasing functions of the soly. of the l - and d - salt, resp., $K = k/\sqrt{M}$, and k is considered the same for both salts, and s_l and s_d are the sp. grs. of the l - salt and d -salt, resp. In detg. the sp. gr. and soly. of a series of diastereomeric salts it was found that of 2 diastereomeric salts the one possessing the highest soly. had the lowest sp. gr., which thus fulfills the above equation. The mechanism of the decompn. could therefore be comprehended as follows: In a soln. of a racemic acid and an optically active base 2 isomeric salts may be formed. The configuration of the ions requires (because of the arrangement of the charges) more densely constructed crystal lattice in one salt than in the other. The densest salt possesses a higher potential electrostatic energy and in dissolving it more work must therefore be produced than in dissolving its isomer. When the energy at disposal, the hydration energy of the ions, is to be considered the same for both salts, the soly. of the sp. heavier salt will be less than that of the lighter. The expts. which are described in detail were carried out with the d - and l -tartrates and mandelates of cinchonine, quinine, strychnine and brucine. A modification of Pasteur's decompn. method is described.

D. THUSEN

Substances changing color in the presence of neutral salts, and the constitution of a series of indicators of graduated indices which allow the comparison of salt solutions. FRED VLÄS, PAUL REISS AND MADELEINE GEX. *Compt. rend.* 185, 1127-30 (1927); cf. *C. A.* 22, 1719. The color changes of a series of 12 dyes have been studied with solns. of KCl , LiCl , NaCl , BaCl_2 , CdCl_2 , SeCl_4 , KOAc , NH_4Cl , K_2SO_4 , and $\text{Hg}(\text{CN})_2$ of various concns. A concn. of 0.0001 N of BaCl_2 or SrCl_2 visibly changes the color of

sulfonecyanine. The following relation has been found to be valid: $p\mu = pM_0 - pX_{1/2}$, where $p\mu$ is the relative massivity of the salts to a standard, $pX_{1/2}$ is the neg. log of the salt concn., and pM_0 that for KI with the same dye. J. H. PERRY

Further experimental results on the dependence of electrolytic conductance upon the field strength. M. WIEN *Physik. Z.* **28**, 834-6(1927); cf. *C. A.* **22**, 906. In fields of high potential gradient, the cond. of electrolytes is increased. This increase $\Delta\lambda$ is occasioned not only by the heating effect of the current which causes an increase $\Delta\lambda_h$ but also by a voltage effect $\Delta\lambda_v$, $\Delta\lambda = \Delta\lambda_h + \Delta\lambda_v$. $\Delta\lambda_v$ increases markedly with the valence of the ions and with the voltage. The values of $\Delta\lambda_v$ were detd. for aq. solns. of the salts $K_3Fe(CN)_6$, $CeCl_3$, $K_4Fe(CN)_6$, $MgSO_4$, $CuSO_4$, $Al_2(SO_4)_3$, $Ca_3[Fe(CN)_6]_2$ and $Ba_3[Fe(CN)_6]_2$ at concns. of 0.001, 0.002, 0.004, 0.008 and 0.016. It was found that $\Delta\lambda_v$ decreases with the concn. Acetone solns. of $Ca(NO_3)_2$, $NaCl$, $CoCl_2$, CdI_2 and KI were also investigated. As in the case of aq. solns., $\Delta\lambda_v$ increased with the valence of the ions but was about 4 times greater in acetone than in water for ions of the same valence because of the smaller dielec. const. of acetone. E. R. S.

A study of the activity of cadmium-iodide in aqueous solution. FREDERICK H. GETMAN *J. Phys. Chem.* **32**, 940-6(1928). The activity of CdI_2 has been obtained from 13 to 0.005 *M* solns. by e. m. f. measurements. $CdBr_2$ lies approx. midway between $CdCl_2$ and CdI_2 with respect to activity coeffs. R. H. LAMBERT

Activity coefficients of hydrogen chloride in ethyl alcohol. J. W. WOOLCOCK AND H. HARTLEY *Phil. Mag.* [7], **5**, 1133-44(1928). The activity coeffs. of solns. of HCl in C_2H_5OH have been obtained by measurements of the electromotive force of the cell $H_2|HCl|AgCl|Ag$ at 25°. A comparison has been made with the results obtained by Danner (*C. A.* **17**, 664) and by Harned and Fiesher (*C. A.* **19**, 923). The equation $-\log f = 3.40 C^{1/2}$ has been found to represent the course of the activity coeff. in the range 0.0003 *M* to 0.004 *M*, the value of the coeff. being greater than that demanded by the Debye theory. It is suggested that this is due to incomplete dissociation. G. G.

Electroösmosis and the effect of anions. A. RABINERSON *Koll. id. Z.* **45**, 122-9(1928).—With a diaphragm of talcum, R. measured the amts. of water transported electrically for HCl , H_2SO_4 , citric acid, $NaCl$, Na_2SO_4 , Na citrate, $BaCl_2$, and $FeCl_3$ solns. for concns. of 0.5 to 40 millimols. The max. water transported occurs at a concn. of 2 to 5 millimolal, which is a higher concn. than expts. with single capillaries require. The order of the effect on the water transport is $Cl < SO_4 < citrate$ for anions, for cations $Fe < H < Ba < Na$. Expts. with mixed electrolytes were made to study the competitive action of anions. Sulfate and citrate raised the concn. of $FeCl_3$ and $Th(NO_3)_4$ necessary to give the max. water transport while Cl and NO_3 had no effect. M. D.

Lecture experiments on the hydrogen-ion concentration changes in the rusting of iron. W. R. G. ATKINS *Marine Biol. Lab., Plymouth, Eng. Nature* **121**, 615(1928).—In the rusting of Fe a trace of acid must be present. The Fe^{II} salt is first formed, and this on oxidation to the Fe^{III} salt regenerates the acid, because of the larger degree of hydrolysis. Expts. demonstrating the course of the reaction are described. Bromophenol blue (0.04%) gives an acid reaction ($p_H < 3.2$) in a dil. soln. of a Fe^{III} salt. $FeSO_4$ soln. gives a purple color, indicating no greater acidity than p_H 4.2. On standing, the latter is oxidized, resulting in an increased acidity of the soln., as shown by the indicator. The reaction may be made instantaneous by adding a dil. H_2O_2 soln. (p_H 5.6). The action of CO_2 in soln. may be shown with a bright Fe wire in distd. H_2O contg. bromothymol blue (0.04%). A trace of $NaHCO_3$ is first added to bring the p_H to 6.7 (yellow-green). On standing, the Fe is attacked by the H_2CO_3 present, and the soln. becomes less acid, particularly around the wire. The color changes may be projected on a screen. When the initial soln. has a higher acidity, the rate is slower, indicating that it is the $Fe(OH)_2$ resulting from hydrolysis, which is oxidized. The reaction also proceeds slowly with slightly alk. solns. With 0.02% phenol red, an alk. reaction ($p_H = 8$) is finally obtained, and also with xylenol blue ($p_H = 8.4-8.6$). Fe wire standing in a tube of distd. H_2O causes a continuous absorption of CO_2 , and when the acid is set free by adding H_2O_2 soln. as above, the resulting p_H is about 4.6, showing that the soln. is nearly satd. with CO_2 . F. A. JENKINS

Selective permeability of membranes. Influence of the ion mobility on the polarization. M. L. E. CHOUROVSK. *Compt. rend.* **186**, 1548-51(1928); cf. *C. A.* **21**, 3791.—If 2 solns. of an electrolyte are unequally concd. and sep'd by a "charged" membrane, the membrane becomes polarized only when the ion carrying the same charge has a mobility equal to or greater than the mobility of the ion with the opposite charge. $K_3Fe(CN)_6$ verifies this assumption. A. L. HENNE

The region of existence of unimolecular reactions. LOUIS S. KASSAL, Calif.

Inst. Tech. *J. Am. Chem. Soc.* **50**, 1344-52(1928).—The decompn. of polyat. mols. is bimol. at high pressures (there is also present a negligible unimol. portion) and is due to collisions. As the pressure is lowered the unimol. part becomes dominant obscuring the bimol., the principal factor being the spontaneous decompn. of the activated mols. At still lower pressures the rate of the unimol. part decreases until the reaction becomes sec.-order, nearly all the activating mols. decompg. and collisions becoming infrequent. The const. for the low-pressure sec.-order reaction exceeds that of the high-pressure and may be greater by a factor of millions for complex mols. Dushman's formula for unimol.-reaction rates is in disagreement with exptl. data. That all unimol.-reaction rates are the same for temps. where E_0/RT is the same is only roughly correct. J. B.

Reaction velocity at a liquid-liquid interface. RONALD PERCY BELL. *J. Phys. Chem.* **32**, 882-93(1928). The velocity of the oxidation of benzo-*o*-toluidide to benzovanthranilic acid by neutral KMnO_4 was studied at the water-benzene interface of the 2-phase system. After a short initial stage the reaction rate is independent of rate of stirring, within limits. For concns. of benzo-*o*-toluidide in benzene of 5-6 g. per l. the reaction velocity is independent of concn. The interfacial tension between the benzene and H_2O layers was measured by the drop-wt. method. Results obtained bear out the hypothesis that permanganate ions striking an adsorbed layer of benzo-*o*-toluidide and diffusion from one solvent to the other is not an important factor. Studies of thermal activation gives inconclusive results. R. H. LAMBERT

Method of generalizing the law of mass action for heterogeneous surface reactions. F. HERN CONSTABLE. *Proc. Cambridge Phil. Soc.* **24**, 307-14(1928). To the conditions of reaction in homogeneous systems is added the condition that adsorption of the reactant occurs on the centers of activity of the surface. The surface is treated as if it were homogeneous, reaction taking place as if those centers on which the heat of activation is smallest were alone responsible for chem. change. The general equation is obtained in terms of the rate of bombardment and the mean lives of the mols. on the surface. The same areas assoc. with the forward reaction must also catalyze the backward reaction. Since a general solution is impracticable, only special cases of irreversible syntheses and decompn. are considered. JAMES M. BELL

Studies in homogeneous gas reactions. II. Introduction of quantum theory. LOUIS S. KASSEL. *J. Phys. Chem.* **32**, 1065-79(1928). K.'s theory of unimol. reactions (*C. A.* **22**, 1517) is extended by the introduction of quantized degrees of freedom. The cases of quantum oscillators of a single frequency and of 2 frequencies whose quotient is an integer are worked out and the methods for more complex cases are indicated. There is no longer any difficulty in accounting for the rate of decompn. of N_2O_5 at moderately high pressures. The theory does not account for the complete maintenance of the rate at low pressures, but the discrepancy is not large. Several ways of overcoming this difficulty are discussed. For azomethane the results may be completely accounted for by assuming oscillators in such numbers and of such frequencies as to give reasonable values to the mol. heat and the internal energy. With these assumptions the necessary diam. for collisional deactivation is of the order of magnitude of kinetic theory diams. JAMES M. BELL

Influence of the oxygen atom of the ring on the reaction velocity of several lactones. ELIAS HOLLO. Univ. Turku, Suomi, Finland. *Ber.* **61B**, 895-906(1928).—The prepn. of $\text{OCH}_2\text{CH}_2\text{OCOCH}_3$, $\text{OCH}_2\text{CH}_2\text{OCOCHMe}$, $\text{OCH}_2\text{CH}_2\text{OCOCHEt}$, $\text{OCH}_2\text{CH}_2\text{OCOCHMe}_2$, $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCOCH}_2$ and $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCOCHMe}$ has been

greatly improved. Their hydrolysis and lactonization velocities have been detd. in acid $\text{H}_2\text{O} + \text{Me}_2\text{CO}$ soln. at 25° . The presence of an alkyl group in the α -position retards the reactions; the hydrolysis is more affected than the lactonization. The order of magnitude of the phenomenon is $\text{Me} < \text{Et} < \text{Me}_2$. If 100 represents the reaction velocity of the simpler δ lactone, it may be assumed that the O of the ring diminishes by 56-57% the hydrolysis velocity and by 39-41% the lactonization velocity. A. L. H.

Reaction regions. XVIII. Velocity of propagation of the reaction in iron-sulfur mixtures. W. P. JORISSSEN AND C. GROENEVELD. *Rec. trav. chim.* **47**, 737-42(1928).—The velocity of propagation of the reaction Fe-S is measured in a quartz tube 10 mm. in diam., and 11 cm. long, on mixts. contg. 50 to 90% Fe. The velocity is at a max. around 75% Fe. **XIX. Reaction regions in which one of the substances is guncotton.** W. P. JORISSSEN AND H. A. STARINK. *Ibid.* 743-51.—Binary and ternary mixts., 1 component of which was guncotton (12.12% N) contg. various proportions of the constituents were prepd. and their ability to react was tested. The time of reaction was measured in the gelatinized mixts.; it varies with % guncotton. The mixts. can be

gelatinized without difficulty, except when the compn. approaches the limit of reactivity.

G. CALINGAERT

Equilibrium in solutions. A note on "The Activity Theory of Reaction Velocity." W. F. KENRICK WYNNE-JONES. *J. Chem. Soc.* **1928**, 1230-3, cf. *C. A.* **22**, 1263 and following abstract. An evaluation of Soper's equations connecting the activity coeff. with the ionic strength for aq. solns. at 25°. Bronsted's formula is considered entirely satisfactory when applied in the region of dil. solns.

J. S. REICHERT

Equilibrium in electrolyte solutions and the reaction velocity equations. FREDERICK G. SOPER. *J. Chem. Soc.* **1928**, 1233-5 (1928), cf. preceding abstract. A reply.

J. S. REICHERT

Present position of the theory of centers of activity in heterogeneous catalysis. F. HURN CONSTABLE. *Proc. Cambridge Phil. Soc.* **24**, 291-306 (1928). From this summary C. concludes that there is evidence from many diverse branches of science showing that catalysis is due to the action of strong sp. fields of force that emanate from special configurations of atoms upon the catalyst surface, and that the main outlines of the exptl. facts dealing with adsorption and catalysis can be explained quantitatively by this means.

JAMES M. BELL

Oxidation of unsaturated hydrocarbons by free oxygen in presence of catalyzers. S. S. MEDVEDEV AND E. N. ALEKSEYEV. *Papers Karbov. Khim. Inst. Bach. Memorial Vol.* **1927**, 110-27. Investigations of Willstätter and Sonnenfeld (*C. A.* **9**, 308) having shown that a soln. of cyclohexene in presence of Os and in an atm. of O rapidly absorbs the latter and furnishes oxidation products, an investigation was made of the catalytic action of Os moderated by the presence of less active substances on the process of oxidation of cyclohexene and Δ^2 -methylcyclohexene. The catalyzers used were OsO₄ deposited (1) on fibrous asbestos, (2) on Al₂O₃, (3) on FeO, (4) on Mn₂O₃, (5) on CuO. The first named was the most active, whereas the activity of the last named was very small. The difference in the effects of these catalyzers is apparently chiefly due to interaction of unknown nature between OsO₄ and the catalytically less active oxides of other metals. The character of the oxidation process depends very much on the nature of the solvent used for the hydrocarbon. Contrary to the statement by Willstätter and Sonnenfeld that benzene is not a suitable solvent, whereas with acetone there is an energetic O-absorption, the absorption of O is more energetic with benzene as solvent than with acetone. With oxidation of cyclohexene in the presence of Os deposited on asbestos as catalyzer and benzene as solvent, the following products are obtained: Δ^2 -cyclohexenol, an unknown aldehyde, adipic acid and some unknown substances in the form of peroxides. With acetone taken as solvent the products of reaction are apparently different.

BERNARD NELSON

Behavior of aluminum triethyl with nickel catalyst at high temperatures. A. MÜLLER AND A. SAUERWALD. *Monatsh.* **48**, 757-9 (1927). AlEt₃ is not affected by Ni-black I (Zelinski, cf. *C. A.* **19**, 3053) in presence of H₂.

B. C. A.

Mechanism of hydrogen-ion catalysis. ERICH MÜLLER. *Z. physik. Chem.* **134**, 190-2 (1928).—An explanation is given of esterification of an alc. by an acid involving complex addn. compds. with the H⁺ ion.

M. R. FENSKE

Changes of inter-atomic energy according to thermodynamics and catalytic action. R. D. KLEEMAN. *Phil. Mag.* [7], **5**, 1191-8 (1928), cf. *C. A.* **22**, 1888. Mathematical. The kinetic energy of a mol. is not exactly proportional to the temp., but also depends on the vol. of the gas, especially when it is large. A substance may permanently change the internal energy of another substance by contact when both are in the perfectly gaseous state. When the substances are not in the perfectly gaseous state, the effect is likely to be much more pronounced. Since a change in the internal energy of an atom must be accompanied by a change of its nature, it follows that the nature of matter is constantly changing, these changes being, however, as far as is known, immeasurably small, at least in most cases. An atom would accordingly bear the impression of all of its previous history. Contact catalytic action, when the catalyst does not change, is shown to be a consequence of the laws of thermodynamics.

GEORGE GLOCKLER

Application of an electromagnet force to "thermobalance." ZEN-ICHI SHIHATA AND MASAJI FUKUSHIMA. Tohoku Imp. Univ., Sendai. *Bull. Chem. Soc. Japan* **3**, 118-23 (1928). Honda's thermobalance (cf. *C. A.* **9**, 2610) has the following defects: by magnifying the sensitiveness of the balance, the movements on its scale are multiplied even by a small change of weight, and hence it is necessary to interrupt the measurement and change its weight on the beam of the balance during an expt.; during this manipulation, the change in the weight of a sample cannot be measured, as the up and down movements of the arms of the balance cause the spring to stretch and contract, the hysteresis of the spring causes an error; the thermocouple cannot be fixed with the

sample, so that when the position of the latter is displaced by the change of its weight, it recedes from the former and the exact reacting temp. is not observable by the thermocouple. To remedy these drawbacks, an electromagnet is attached to one side of the beam; the current is adjusted in the observing position so that the scale is always set at the zero point. The change in the wt. of the sample can be indirectly found from the amt. of current, the sensitiveness can be magnified, the hysteresis eliminated, and the reaction temp. is read correctly. The sensitiveness compares favorably with that of the chem. balance. In order to verify the accuracy, the decomn. curves of the following pure compds. have been detd.: CaCO_3 , CuSO_4 , CdSO_4 , BaCl_2 and Mohr salt.

A. L. HENNE

Newton's law for the emission of heat in carbon dioxide. SYBIL MARSHALL. *Proc. Phys. Soc.* **39**, 429-34(1927); *Science Abstracts* **31**, A38. This paper is an extension of the investigation, started by M. and Vick (cf. *Proc. Phys. Soc.* **37**, 312-21(1925)), of the justification of employing Newton's law of cooling when estg. the external heat loss from the surface of a solid in a gaseous medium. In this case, the loss in a vertical system, contg. in turn CO_2 , O and N, was examd., the app. consisting of compensated Pt wires mounted along the axis of ice-water-cooled glass tubes and connected to the terminals of a Callendar Griffiths bridge. The results show that, for tubes between 1 cm. and 3 cm. diam., the law is applicable only as far as 10° for pressures between 1 atm. and 6 cm. Hg. The deviation above this temp. depends on the width of the tube and the d. of the gas, being greater for CO_2 than for O or N.

H. G.

Development of a method of radiation calorimetry and the heat of fusion or of transition of certain substances. LUKE E. STEINER AND JOHN JOHNSTON. *J. Phys. Chem.* **32**, 912-39(1928). Time temp. curves of cooling and heating are discussed with respect to their interpretation. A special radiation calorimeter is described in which a Dewar flask is used together with thermocouple regulation. Heating and cooling curves agree for *m*-dinitrobenzene. Heats of fusion obtained in cal. per mol. were: phenol, 2690 and benzophenone, 4600. Heats of transition of the various modifications of NH_4NO_3 and HgI_2 were also obtained as follows: orthorhombic to tetragonal NH_4NO_3 , 310 and tetragonal to isometric, 980, red to yellow HgI_2 , 640 cal. per mol.

R. H. L.

The heat of vaporization at zero absolute. J. E. VERSCHAFFELT. Univ. Ghent, Belgium. *J. chim. phys.* **25**, 408-9(1928). Criticism of Kolosovskii (*C. A.* **22**, 1069, 2000). K.'s argument is based on obviously erroneous mathematical discussions. None of its conclusions has been demonstrated.

A. L. HENNE

The free energy and fugacity in gaseous mixtures of hydrogen and nitrogen. ALBERT R. MERZ AND COLIN W. WHITTAKER. U. S. Bur. Chem. and Soils. *J. Am. Chem. Soc.* **50**, 1522-6(1928). The molal vols. of H_2 - N_2 mixts. as well as the partial molal vols. and free energies of the individual gases are tabulated. Max. deviations from a perfect soln. do not exceed approx. 20%, even at 1000 atms.

ALBERT R. MERZ

Critique of the electric differential method for measuring C_p in gases. II. The experimental deviation from the principles of the C_p determination. The obtainable accuracy of C_p . MAX TRAUTZ AND OTTO TRAUTZ. *Phys. Inst. Leipzig. Ann. Physik* **86**, 1-65(1928), cf. *C. A.* **21**, 3534. A discussion of the exptl. errors and their corrections. The exptl. procedure is described. The following improved values of C_p have been obtained: air, 4.98; N_2 , 4.99; O₂, 4.99; CO_2 , 6.89; H_2 , 4.87; CH_4 , 6.52; C_2H_6 , 5.55; AcOEt , 5.8; Me_2CO , 6.3; A, 3.07.

A. L. HENNE

Contribution to the theory of the specific heat C_v of monatomic fluids at high temperature. A. EUCKEN AND H. SEEKAMP. *Z. physik. Chem.* **134**, 781-89(1928).—The assumption has been made that the atoms are surrounded by an elastic shell, and that the energy of shock of the atoms may be calcd. as an exponential function of the distance between atoms. On the basis of this hypothesis, E. and S. attempt to calc. the decrease in sp. heat of liquid A with increase in temp. The calcns. do not agree very closely with the exptl. data, giving only a qual. confirmation of the hypothesis.

G. CALINGAERT

The specific heat of solid substances at low temperatures. K. CLUSIUS AND P. HARTECK. *Z. physik. Chem.* **134**, 243-63(1928).—C. and H. measure the sp. heats of Au, Ga, Zn, CuO , ZnO , Ag, Cl and NH_4 carbamate from 200° down to about 15° abs. Only the exptl. data are reported, and the discussion will be published later.

G. CALINGAERT

New measurement of the heat conductivity of solid crystalline substances at 0° and --100°. A. EUCKEN AND G. HUHN. *Z. physik. Chem.* **134**, 193-219(1928).—E. and K. measure the heat cond. at 0° and --100° of 55 cryst. substances or mixts. of cryst. substances, comprising alkali halides and some common salts and minerals. The effect of particle size on cond., as expressed by Eucken and Neumann (*Z. tech. Physik.* **6**,

691(1925); cf. *C. A.* 19, 1086) is apparent only in feldspar, and not in crystals of high symmetry. It is also apparent in mixts. of crystals. The formation of mixed crystals lowers considerably the cond. and its neg. temp. coeff. The influence of impurities can be expressed also by the law of Matthiessen for the elec. cond. of metals contg. impurities. In the alkali halide series, the cond. is maximum when the masses of the 2 atoms are approx. equal. Within series of compds. of closely related structure, the hardness parallels the cond. The data in general corroborate Debye's theory, but cannot be reconciled with his more specialized equations. G. CALINGAERT

Thermodynamics of dispersed systems. A. MARCH. *Ann. Physik* 84, 605-23 (1927).—From a thermodynamic analysis of dispersed systems it is shown that for particles of radius less than 10^{-7} cm. the degree of dispersion decreases with increasing concn. and increases with rise of temp., and that the conditions governing the stability of such systems are not to be sought in the thermal agitation or in the elec. charge of the particles. B. C. A.

Null point [absolute zero] state. W. JAZYNA. *Physik Z.* 28, 908-11 (1927). Theoretical. The thermodynamical implications of a distinction between the "quasi-permanent" equil. state, corresponding with the expression $(Q_2/Q_1 = T_2/T_1)$, and the "permanent" equil. state corresponding with $(Q_1 = ST)$ are discussed. B. C. A.

The electrostatic explanation of complex formation. A. E. VAN ARKEL AND J. H. DE BOER. *Rec. trav. chim.* 47, 593-605 (1928). A discussion is given of the literature on complex-compd. formation. The Born lattice theory is of great importance together with polarity considerations for explaining complex formation. Ions of a nearby series of the periodic system and complex-ion building and crystal structure may be explained by this fact. Mols. may enhance complexity by proximity to ions. Energy considerations are given in the form of formulas. The formation of $\text{Ag} + \text{NH}_3$ and of hydrated Ag is calcd. both when polar and non-polar. Three forms of complex ions are considered, i. e., ions on ions, dipole mols. on ions and non polar mols. on ions. R. H. L.

Behavior of dilute electrolytes in strong fields. M. BLUMENTRITT. *Ann. Physik* 85, 812-30 (1928).—The deviation from Ohm's law with strong external fields is studied mathematically and the increase in cond. with an increase in the external field x is given by the expression: $\Delta\eta = Ax^2(1 - \beta x^2)$. The increase for low field strength is given by the first member of the equation Ax^2 and the const. A is found to be proportional to

$\frac{1}{\sqrt{D}\eta} g(z)$, in which η is the equiv. concn. per l., z is the valency, D the dielec. const., and for binary electrolytes with ions of equal friction const. $g(z) = z^{3.6}$. The initial rise in cond. increases with decreasing concn. and dielec. const. inversely proportional to the square root of the concn. and D . The 2nd member of the equation βx^2 produces a decrease in the initial rise in cond. and β is found to be proportional to $\frac{D}{\eta} f(z)$, in which

$f(z) = z$ for binary electrolytes with ions of equal friction const. Values of A obtained by calcn. for various electrolytes agree well with those experimentally obtained by Wien for electrolytes in which the valency relations are 2-2, 2-3 and 2-4, but where these relations are 1-3 and 1-4 large differences occur. Thus for $\text{K}_3\text{Fe}(\text{CN})_6$ with $x = 0.0005$, $A \cdot 10^{11}$ is 1.7 as calcd. and 0.44 as observed, while with $\text{K}_4\text{Fe}(\text{CN})_6$ with $x = 0.0005$, $A \cdot 10^{11}$ is 4.4 as calcd. and 0.88 as observed. Conclusion: The Debye-Huckel theory is no longer applicable to these cases. H. STOERTZ

Effect of tension upon the conductivity of electrolytes in weak fields. MAX WIEN. *Ann. Physik* 85, 795-811 (1928).—The resistance of electrolytes deviates from Ohm's law when the flow consists of short current impulses under high tension. This deviation is affected by the intensity of the field, and W. has studied this effect for weak fields of the order of 3000 to 30,000 v./cm., in solus. contg. ions in which the valency relations are 1-2, 1-3, 1-4 and 2-2. In all the solns. investigated the effect of tension is given by the expression: $\Delta\eta_s = Ax^2(1 - \beta x^2)$, in which $\Delta\eta_s$ is the so-called "tension effect," A and β are consts., and x is the external field in v./cm. A is found to be approx. proportional to the square of the product of the valencies of the ions involved ($z_1 z_2$), and inversely proportional to the square root of the cond., as indicated by the formula: $A = 5.5 z_1 z_2 \sqrt{\kappa_0} \times 10^{-11}$, in which κ_0 is the cond. $\times 1/1000$. Values of $A \cdot 10^{11}$ are given for various values of x as follows: for $\text{K}_3\text{Fe}(\text{CN})_6$ with $x = 0.001 - 0.40$, with $x = 0.0005 - 0.44$, with $x = 0.00125 - 0.77$; for $\text{Li}_3\text{Fe}(\text{CN})_6$ with the 3 values of x above, 0.51, 0.68, 0.96; for $\text{K}_4\text{Fe}(\text{CN})_6$ with the 3 values of x above, 0.66, 0.88 (0.82); for $\text{Li}_4\text{Fe}(\text{CN})_6$, 0.91, 1.57, (1.64); for MgSO_4 , 1.11, 1.49, 2.5; for MgCrO_4 , 1.02, 1.21, 1.8; for $\text{Mg}_3(\text{Fe}(\text{CN})_6)_2$, 2.3, 3.3, 4.6; for $\text{Ba}_3(\text{Fe}(\text{CN})_6)_2$, 2.6, 3.9, 5.6; for $\text{Be}_3\text{Fe}(\text{CN})_6$, 3.6, 6.0, (12.4); for $\text{Mg}_2\text{Fe}(\text{CN})_4$, 3.8, 5.8 (12.0); for $\text{Ba}_2\text{Fe}(\text{CN})_4$, 4.2, 5.0 (11.6).

The const. β also increases with the product Z_1Z_2 and decreases with the concn. or cond. Values of β for the values of x given above are as follows: for $K_3Fe(CN)_6$, 1.7, 1.1, 3.4 for $Li_3Fe(CN)_6$, 2.1, 2.3, 3.8; for $K_4Fe(CN)_6$, 1.7, 1.7 (3.8); for $Li_4Fe(CN)_6$, 1.5, 2.1, (3.8); for $MgSO_4$, 1.7, 1.7, 6.0; for $MgCrO_4$, 2.4, 3.0, 7.5; for $Mg_3(Fe(CN)_6)_2$, 1.9; 2.1, 4.5; for $Be_2Fe(CN)_6$, 2.5, 3.1 (4.0); for $Ba_2Fe(CN)_6$, 1.9, 3.2 (6.9). In acetone, A is greater and β smaller than in H_2O solns. Thus for $CoCl_2$ in acetone, with $x = 0.0002$, $A = 1.1$ and $\beta = 0.6$.

H. STOERTZ

Dipolar moment of symmetrical compounds and cis-trans isomerism with simple linkages. ARNOLD WEISSBERGER. *Physik. Z.* 29, 272-3(1928).—The fact that some symmetrical compds. are dipolar could possibly be explained by a constitution similar to the cis-trans isomerism; this constitution would be rendered stable by residual valencies. Another explanation would be a deformation of the C tetrahedron into a pyramid. Not much argument is given to support these assumptions. A. L. H.

The electric moment and the spatial disposition of the atoms of a few p -derivatives of benzene. JOHN W. WILLIAMS. *Physik. Z.* 29, 271-2(1928).—The elec. moment of several derivs. of C_6H_6 has been measured in electrostatic multiplied by 10^{-18} units: p -xylene, <0.1 ; p -dichlorobenzene, 0; p -dinitrobenzene, <0.3 ; hydroquinone diethyl ether, 1.7; hydroquinone diacetate, 2.2. Conclusion: The oxygenated groups of the 2 last compds. are not located on a straight line.

A. L. HENNE

Decomposition of carbon monoxide in the corona due to alternating electric fields. ERWIN OTT. *J. Chem. Soc.* 1928, 1378; cf. *C. A.* 19, 1999; 21, 2436.—O. disagrees with Lunt and Venkateswaran, who give the formula $C_3O_{2.5}xH_2O$ for the brown solid formed in the decompn. of CO in the corona. Based on definite evidence of the production of unimol. CO in the gases leaving the Siemens ozonizer, the equation of the decompn. is: $4CO = C_3O_2 + CO_2$ and the brown solid is the product of polymerization of gaseous C_3O_2 .

H. STOERTZ

Measurement of the displacement of negative carriers in flames. ERICH MARX AND PAUL KAPPLER. *Physik. Z.* 29, 261-9(1928).—M. and K. atomize alk. salts in flames and measure the velocities of the neg. carriers. They find that $\bar{K}_2 \sim \sqrt{1/\text{concn.}} + \text{const.}$ K_2 : (velocity in $\frac{\text{cm.}}{\text{sec.}} / \frac{\text{volt}}{\text{cm.}}$) is 1500-1800 for Li, 1000-1200 for Na, 800-1000 for K, 500-700 for Rb and about 2000 in the pure flame.

A. L. HENNE

The ratio of the electric units of charge. GEORGE C. LAWRENCE. Dalhousie Univ., Halifax, Nova Scotia. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 183-9(1928).—Essentially a duplication of Rosa and Dorsey's work (*C. A.* 2, 500). The capacity of a cylindrical condenser, calcd. in e. s. u. from its dimensions, was compared with its capacity in electromagnetic units measured in a Maxwell bridge. A value of $2.9963 \times 10 \pm 0.05\%$ was obtained which agrees with the value of R. and D. Several simplified devices are described.

A. L. HENNE

The electrical conductivity of calcite. W. J. JACKSON. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 46-53(1928).—In calcite crystal, there is a polarization effect possibly due to a space charge near the electrodes or throughout the crystal. There is a displacement current as well as a conduction current. The relation between the current and the temp. is approx. exponential. The cond. is directional. An exposure of the crystal to x-rays increases the cond.; the return to a normal value is completed within 1 or 2 hrs.

A. L. HENNE

Visual method of showing the high-temperature coefficient of resistance of metals as compared with alloys. PAUL ROOD. *J. Optical Soc. Am.* 16, 357-9(1928).—A diagram of a circuit is given in which the grid potential on a UX201A tube is controlled by the voltage across the terminals of a short section of wire. This gives essentially grid amplification. The large increase in resistance due to rise in temp. when a metal such as Fe, Cu or Al is used is shown by an increase in plate current as read by the milliammeter. However, when an alloy of low temp. coeff. of resistance is used, the plate current remains almost const. regardless of the temp. of the wire. W. W. S.

New method of conductivity measurement by means of an oscillating valve circuit. E. F. BURTON AND A. PITT. *Phil. Mag.* [7] 5, 939-43(1928).—A primary valve oscillating circuit and subsidiary measuring circuit have been developed which enable one to obtain remarkable indications of the conductivities of very dil. aq. solns. and of various org. liquids.

GEORGE GLOCKLER

Construction of a valve oscillator for use in conductivity measurements. J. W. WOOLCOCK AND D. M. MURRAY-RUST. *Phil. Mag.* [7], 5, 1130-3(1928).—A valve oscillator similar to that described by Ulich (*C. A.* 19, 2904) has been constructed and applied to the measurement of the cond. of dil. solns. of acid and salts in non-aq. solvents. Ex-

cellent minima are obtained even with resistances as high as 100,000 ohms, provided that not only the resistances but also the capacities in the bridge circuit are accurately balanced.

GEORGE GLOCKLER

The diffusion potential and the dissociation of hydrochloric acid. ALFONS BUHL. *Physik. Z.* **28**, 767-70(1927).—The following conclusion has been reached on the basis of the detn. of difference of potential of the chain HgCl₂ soln. 1, air/soln. 2, soln. 1/HgCl. The decrease of cond. of an electrolyte following an increase of concn. is not caused by a decrease of the degree of dissociation, but rather by a reduction of migration velocity of the ions. The latter is therefore not a const. but a function of the concn. E. K.

Theory of passivity. I. Theory of polarization by anodic deposition and passivation of metals. W. J. MÜLLER AND K. KONOPICKY. *Monatsh.* **48**, 711-25(1927), cf. *C. A.* **19**, 1221, **21**, 3536, 3784; **22**, 347. Electrometric investigations of the passivity of certain metals in acid media have led to the conclusion that the observed effects are most readily explained by assuming the existence of a sparingly conducting film on the metal anode. The formation of such a film, which probably consists of metal salt or basic salt, causes a progressive diminution of the effective surface of the electrode and a consequent increase in ϵ d. By postulating the existence of such a film, an equation is derived which represents the variation of current strength with time. The equation in its abbreviated form is $i = C + A[1 - (i_0 - i) + 2.3 i_0 \log[(i_0 - i)(i - i_r)]]$, where t represents the time elapsed, i the current strength after time t , i_0 the original and i_r the residual current strengths. The quantities C and A are functions of various phys. and electrochem. quantities, but may be considered as consts. characteristic of the metal concerned. The equation represents in a very satisfactory manner the behavior of Cu, Ni and Fe in solns. of H₂SO₄. The behavior of Cr is, however, anomalous, the values of A increasing with time. Calculs. of the cond. of the liquid in the pores of the anode sheath show that with Fe and Cu, but not with Ni, the constituent salts are probably the stable hydrated sulfates. During the deposition the potential of the metal does not change, the observed variation in potential being due to the change in resistance consequent on the growth of the deposit. The similarity between the current time curves for Cu, where no passivation occurs, and Fe, which becomes actually passive, shows that passivation is due to a change in the metal and that this change occurs only at the high ϵ d.s. resulting from the deposition. The present data are not sufficiently comprehensive to permit the precise evaluation of the ϵ d. necessary for passivation. Previous values of the order 10 amp./sq. cm. are now held to be too low, the true values being probably 5-7 times as great. B. C. A.

Contribution to the study of the Wiedemann-Franz law. III. A. ECKEN. *Z. physik. Chem.* **134**, 220-9(1928). Grunisen and Goens in a study of the elec. and thermal cond. of metals at low temps. (*C. A.* **21**, 3776) concluded that the Wiedemann-Franz law applies accurately to the whole temp. range only if the true metallic resistivity, and not the insulator resistivity is considered. Their data, however, can be reconciled readily with the equations given by E. (*C. A.* **21**, 1584) if λ_1 is affected by impurities or deformations of the lattice. At low temps. the Wiedemann-Franz law deviates from its normal high-temp. value. It is, however, affected very little at any temp. by impurities or by deformations of the lattice. G. CALINGAERT.

Determination of dielectric constants in intense electric fields. J. MALSCH. *Ann. Physik.* **84**, 841-79(1927). Modifications in the technique of Wien (*Physik. Z.* **23**, 399(1922)) are described which permit of the ready detn. of dielec. consts. of conducting liquids such as water as well as those of good insulators in intense elec. fields. A very full discussion is given of the theory of the method and of the probable accuracy. Measurements on water, glycerol and Et₂O, using heavily damped oscillation at frequencies of the order of 10³ kilocycles, indicate that, within the order of exptl. error, no change can be observed in the dielec. constant with field strength, the max. exst. field strength used was 10⁶ v./cm.⁻¹. The effect of intense fields is discussed at length with reference to Debye's theory, on which, it is shown, an increase of the dielec. const. of from 10 to 20% is to be anticipated in the fields employed. B. C. A.

Magnetic susceptibility of binary liquid systems. N. TRIFONOV. *Ann. inst. anal. physico-chim., Leningrad* **3**, 434-5(1926). *Chem. Zentr.* **1927**, I, 2635. Corrections of a previous article (cf. *C. A.* **20**, 2612). CHCl₃ + Me₂O should read CHCl₃ + Me₂CO. Besides the systems already described, the system CH₂:CHCH₂NCS-PhNMe₂, in which the susceptibility is a linear function of the molar fraction, and the system Me₂CO-CS₂, which shows a curve convex to the compn. axis, were studied. C. C. D.

Magnetic characterization of hydrated ferric oxide. II. E. WRECKIND AND W. ALBRECHT. *Ber.* **60B**, 2230-43(1927); cf. *C. A.* **21**, 526.—It is known that hydrates of Fe₂O₃ are more distinctly magnetic than the anhyd. oxide. The magnetic

susceptibility depends upon the method of prepn. even when the final products do not differ considerably regarding their water contents.

EMIL KLARMANN

Report of the Du Bosq Colorimeter Committee. DAVID WESSON *et al.* *Oil and Fat Ind.* 5, 173-5(1928).—The Du Bosq colorimeter is satisfactory for measuring the relative amts. of the same coloring matter in 2 different liquids, providing they are optically the same. Cottonseed oil contains several different coloring matters. The effects of decompn. of the seed and the various conditions used in refining processes affect the light absorption of the oils, and the characteristics of the color. These differences are made apparent by the colorimeter. The limitations of the human eye and the great differences of hue and brilliancy of different oils being taken into consideration, it seems that any system of numerically recording color differences must allow reasonable tolerances. Although results to date appear discouraging, it is believed that by the aid of a modified Du Bosq instrument a satisfactory practical method of oil colorimetry may yet be developed.

E. SCHERUBEL

Reflection from glass. P. AMY *Rev. d'optique* 6, 305 15(1927); *Science Abstracts* 31A, 14. —A series of tests was carried out on various surfaces of glass, some of which had been recently polished and others not. A parallel beam of light was used, the light being reflected from the surface to be tested and then measured in a photometer. Rayleigh's results on the change of the reflecting power produced by polishing were confirmed. The changes produced by chem. action, when glass was dipped into various solns. were tested. The reflecting power decreased to a min. as the length of time in the soln. was increased, but with further increase of time the reflecting power increased again. Change of the temp. of the soln. produced no effect. The max. effect is obtained by using cleaned surfaces in a soln. of $(\text{NH}_4)_2\text{S}$ diluted with an equal vol. of distd. water. Fresnel's theory shows that the polarization is total for $\tan i = n$, where i is the angle of incidence and n the index of refraction. Chem. treatment of the glass surface did not alter this relation.

H. G.

Molecular scattering of light in solid bodies. II. Dependence of scattered light on temperature. G. LANDSBERG *Z. Physik* 45, 442-8(1927); *Science Abstracts* 31A, 88. The exptl. arrangements were little changed from earlier tests (cf. *C. A.* 22, 2104) but an Osram point light was used. The light scattered by the quartz crystal at different temps. was received on the photographic plate, and for each temp. a series of small spots obtained very close together corresponding to different light intensities. Taking Δ as the depth of blackening of the photographic plate, and i_0 and i the intensities of the light proceeding to the Pulfrich photometer through the unblackened and the blackened parts of the plate, resp., a linear relation was found of the form $\Delta = \log(i_0/i)$. This linear relation is in accordance with theory for mol. scattering. In the case taken 24% of the scattering was due to want of homogeneity in the quartz crystal and the remaining 76% is directly proportional to the abs. temp.

H. G.

Determination of refractive indices of minerals by Becke's immersion method. V. BILLIET. *Natuurwetensch. Tijds.* 9, 97-103(1927).—An account of the method and of the practical details of manipulation, with a discussion of the theoretical basis.

B. C. A.

Application of the spectrographic and spectrophotometric method to the study of the hydrolysis of some alkaline salts. P. JOB. *Compt. rend.* 186, 1546-8(1928).—J.'s method for studying complex formation (*C. A.* 21, 2230) can be applied to any reaction between 2 substances in soln. provided the absorption spectra of the products differ sufficiently from those of the initial substances. The method permits detn. (accurate within 10%) of hydrolysis consts., $k = (\text{C}_{\text{acid}} \times \text{C}_{\text{base}}) / \text{C}_{\text{salt}}$, for the alk. salts of a (weak) acid; k was studied for salts of various phenols formed by action of NaOH and found to be: phenol, 4.5×10^{-4} (15°); *p*-chlorophenol, 2×10^{-5} (12.5°); *o*-nitrophenol, 1.55×10^{-5} ; *p*-nitrophenol, 1.45×10^{-5} ; *o,p*-dinitrophenol, 1.5×10^{-5} . The reaction of 10^{-3} to 10^{-2} molar K_2CrO_4 with H_2SO_4 was studied and the sol reaction found to be $\text{CrO}_4^{2-} + \text{H}^+ \rightleftharpoons \text{CrO}_4\text{H}^-$ with a disson. const. $K = 7 \times 10^{-5}$ (15°).

A. P. S.

Velocity of sound in liquids at high frequencies by the sonic interferometer. J. C. HUBBARD AND A. L. LOOMIS. *Phil. Mag.* [7], 5, 1177-90(1928).—A new method of measuring the velocity of sound in liquids at high frequencies is described. A circular plate of quartz 2 in. in diam. with plane-parallel faces, is caused to vibrate piezoelectrically at such frequencies that the compressional waves produced by it in a column of liquid are of short length as compared with the diam. of the plate and of the liquid column. Under these conditions it is found that the velocity of sound, measured by resonance, is independent of the materials or dimensions of the vessel contg. the liquid; the method is thus free from the troublesome corrections that have hitherto been neces-

sary in measuring the velocity of sound in tubes by resonance. Sound-velocities are reported for a no. of temps. for H_2O and for Hg and for a no. of concns., each at several temps., of KCl and 2 of NaCl at several temps. are reported. Several thermodynamic coeffs. for H_2O and for Hg have been computed from the results. **GEORGE GLOCKLER**

Ultrasonics. R. W. BOYLE. Univ. of Alberta. *Science Progress* **23**, 75-105(1928).—Ultrasonic waves are of the same type as sound waves, but their pitch is too high for audibility. Their chem. and biological effects are noted, and a bibliography is given. **JOSEPH S. HEPBURN**

The oscillation method of x-ray analysis of crystals. The use of the oscillation method in determining the structure of analcite (GRUNER) **8**.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

Recent advances in science: Physics. L. F. BATES. Univ. of London. *Science Progress* **23**, 14-23(1928).—A review of recent work on cosmic rays, electrons and spectra. **JOSEPH S. HEPBURN**

Modern alchemy. J. G. F. DRUCE. *Science Progress* 23, 138-40(1928).—Review of recent attempts to transmute the chem. elements. A bibliography is given.

The discontinuity of matter. JEAN PERRIN. *Rev. sci.* 66, 97-104, 129-36(1928).—An address on the at. theory. JOSEPH S. HEPBURN
A. PAPINEAU-COUTURE

Evidence for the continuous creation of the common elements out of positive and negative electrons. R. A. MILLIKAN AND G. HARVEY CAMERON. *Proc. Nat. Acad. Sci.* 14, 445-50(1928); cf. *C. A.* 22, 1900. J. E. S.

Theory of Hartree's atomic fields. J. A. GAUNT. *Proc. Cambridge Phil. Soc.* 24, 328-42(1928).—A mathematical paper. The conclusion is reached that of all methods of approximating to the wave-function and energy of a complicated atom by solving equations for the individual orbits, Hartree's method (*C. A.* 22, 1269) is the most generally effective in reducing the first-order error in the wave-function and the second-order error in the energy. The expressions for the total energy of the atom are theoretically more sound than those for the sep. x-ray terms, though of less practical value. J. M. B.

Temperature radiation. W. E. FORSYTHE. *J. Optical Soc. Am.* 16, 307-28 (1928).—A general review of the development of our ideas of temp. radiation during the past 50 years is given, with special emphasis on the investigations made since 1900.

W. W. STIFLER

The contours of stellar absorption lines, and the composition of stellar atmospheres. CECILIA H. PAYNE. *Proc. Nat. Acad. Sci.* 14, 399-406(1928).—Unsold's (*C. A.* 22, 539) formula is applied to spectral data of some stars. The theory gives excellent comparative data about the atms. of stars. ARTHUR FLEISCHER

Width of the lines of the Balmer series. (MLLE.) M. HANOT. *Ann. phys.* [10], 8, 555-625(1927); cf. *C. A.* 21, 1226.—The width of a line is defined as the wave-length interval over which the av. intensity of illumination is equal to one-half of the intensity max., although this does not necessarily completely characterize the distribution of energy over the line as supposed by some. The width of the primary lines in the Balmer series has been studied for a spark spectrum in H, the conditions being closely defined by measurements of capacity, potential and frequency of the circuit. The width of the lines was measured by a photomicrometric method, a Rowland grating being used. For a given initial temp. and pressure, the width l of the lines is detd. by the intensity of the current traversing the spark, according to the law $l = f(I_0)$, where I_0 is given by $I_0 = V\sqrt{C}/L$ and so represents the max. intensity of current in an undamped circuit. The width increases very rapidly with rising I_0 for small intensities and then tends to a max.; its variation with pressure p is given approx. by $l = l_1 \times p^m$, where l_1 is a const. and m is very close to unity for small intensities but decreases with increasing I_0 down to $2/3$. The chief causes of the enlargement of lines are (a) the absorption by the source of some of its own radiation and (b) the intermol. field due to ions and quadruplets. The magnitude of the former was studied experimentally by passing radiation from one spark through a second; for $I = 300$ amp. the width of the lines due to a very small region of the source is thus found to be 85-90% of the total width. The main cause of enlargement, however, is the intermol. field due to the ions, which has a mean value of 10^6 v./cm., and is proportional to the $2/3$ power of the ionic d. The effect of the quadruplets is secondary, being greater for large currents than for small, while the absorption effect is greater in the small-current region, as expected by theory. The sum of these 2 effects is approx. const. at 10-15% of the width of the line. Like l , the c. d. in the spark follows a law of the form $i = \phi(I_0)$, so that the theory explains the independence of the width of the lines and the damping of the circuit. B. C. A.

Simple derivation of the hydrogen energy levels in wave mechanics. A. E. RUARK. *J. Optical Soc. Am.* 16, 40-3(1928).—Math. The values of the energy levels corresponding with the circular orbits in Bohr's theory of the H atom have been derived by wave mechanics. B. C. A.

Experiments on transmutation. JOHN A. N. FRIEND. *J. Chem. Soc.* 1928, 1321-4.—Au exposed to Rn gave spectroscopic evidence of the appearance of Ca. Careful examn., however, indicated this was due to traces of Ca in the original specimens. D. G.

A projection electroscop for standardizing radium preparations. L. F. CURTISS. *J. Optical Soc. Am.* 16, 363-6(1928).—By projecting on a glass scale the image of a fiber attached to the Au leaf of an electroscop, the eye-strain due to the use of a microscop and the danger to the observer from proximity to γ -radiation are eliminated. D. G.

Extraction of radium and mesothorium from radioactive chlorides in the cold. I. BASHILOV. *Z. angew. Chem.* 41, 57-9(1928).—A description of a tech. method al-

ready patented, for the sepn. of Ra or mesothorium chloride from BaCl₂ without evapn. The mixed chlorides are dissolved in water, and a quantity of strong CaCl₂ soln. is added sufficient to ppt. at most $\frac{1}{2}$ of the BaCl₂ present, which then contains about twice as much active chloride as the original mixt. By repeated fractional pptn. a product rich in Ra or MsTh is obtained, together with a soln. of Ba and Ca chlorides, which are recovered by evapn. and crystn. The process is suitable for working up chloride mixts. contg. as little as 0.1 part per million of radioactive chloride. Al and ferric chlorides may also be used as pptg. agents, but as they are susceptible to hydrolysis CaCl₂ is preferred.

B. C. A.

Free electrons, atoms and light. SUZANNE VEIL. *Rev. sci.* 66, 9-13(1928).—A discussion showing the value of the quantum theory as a working tool, but also showing that it cannot explain certain phenomena (such as interference, polarization, etc.), which can readily be explained by the undulatory theory, and that as yet there are hardly any exptl. facts which can be explained by both theories.

A. PAPINEAU-COUTURE

Sommerfeld's electron-theory of metals. EDWIN H. HALL. *Proc. Nat. Acad. Sci.* 14, 370-7(1928).—H. criticizes adversely the Sommerfeld theory (*C. A.* 22, 1538). According to S.'s theory, calcn. shows that the kinetic energy of an electron in a metal at 0° abs. is 80 times the kinetic energy of a gas mol. at 300° abs. and 22 times the kinetic energy at 1100° abs. (extensive thermionic emission from metals at this temp.) The theory does not give an adequate conception of mean free path of electrons in the equation for elec. cond., and gives no explanation for supra-cond. New data on the Wiedemann-Franz law support Drude's equation and not the equation derived by S. S.'s theory gives inadequate explanation and questionable equations on thermionic emission, electron emission from cold metals, the Volta effect, and the Thomson and Peltier effects.

ARTHUR FLEISCHER

The Fermi statistical postulate: examination of the evidence in its favor. EDWIN H. HALL. *Proc. Nat. Acad. Sci.* 14, 366-70(1928).—The basis of the Fermi statistical mechanics is the extension of Pauli's principle to a large no. of mols. This is a doubtful step when applied even to a mol. of gas. The Fermi postulate is directly opposed to the Bose-Einstein statistics regarding the direction of deviation of ideal gases from the classical laws at low temp. The Fermi hypothesis is on trial and depends on the success of Sommerfeld's electron-theory of metals.

A. F.

Electron "free-path" and supra-conductivity in metals. EDWIN H. HALL. *Proc. Nat. Acad. Sci.* 14, 377-80(1928).—The mean free-path is defined as the distance during which the electron is subjected to the accelerating force of the potential gradient which maintains the current. The free path terminates when the electron is captured by a positive ion. From these definitions it is shown that the elec. cond. of a metal is independent of the no. of free electrons. This disposes of the difficulty in the classical theory of the thermal agitation of the free electrons increasing the sp. heat, since few free electrons may be assumed to be present. The change of cond. with temp. is explained on the basis of a quicker capture of the electrons by the positive ions. With supra-cond. the no. of electrons which may go over to ions is exceedingly small. These ions continue under an initial potential at the low temp.

ARTHUR FLEISCHER

Ions and electrons in the vacuum lamp. P. SELÉNYI. *Physik. Z.* 29, 311 8 (1928).—The electron and ion phenomena which take place in a vacuum lamp or which can be produced by it are described systematically. The behavior of the lamp or that of the ions and electrons towards electrostatic, magnetic and electromagnetic influences are discussed. It has been shown that the vacuum lamp can function as detector, rectifier, voltmeter, magnetron, photocell and vacuum meter. Some investigations carried out with vacuum lamps are mentioned (detection of Th in the burning filaments, detection of O formed in the electrolysis of glass). Some methods of the detn. of vacuum in the ready-made lamps are discussed briefly.

M. R. FENSKÉ

Angular distribution of slow electrons on passing through metal films. E. RUPP. *Ann. Physik* 85, 981-1012(1928).—Films of Al, Pb, Ni, Cu, Ag, Au, Cr, Sn and Zn were formed by condensing the metallic vapor on polished rock-salt plates in a high vacuum. The films were from 2 to 8×10^{-8} cm. thick. Electrons, with velocities corresponding to 180 to 320 v., after passing through these films were recorded photographically. A no. of these photographs are reproduced. In addn. to the spot corresponding to the direct beam, there are distinct evidences of electrons scattered in coherent rings about the central spot. These "electron diffraction rings" are similar in appearance to the patterns formed in the Debye-Scherrer method of x-ray spectroscopy. R. shows that these can be coordinated with the known lattice planes of the metals forming the films by the expanded de Broglie-Schrödinger relation, $\lambda = h/\sqrt{2em} \times 1/\sqrt{V + E}$, where λ is the "wave-length" according to the de Broglie-Schrödinger theory, V is the measure of

the velocity and E is a const., the "inner lattice potential," which is characteristic of the given metal and independent of the velocity of the electrons. For the metals investigated, E lies between 10 and 20 v. The results are coordinated with those of Davisson and Germer (*C. A.* 22, 350). The original paper should be consulted for the tabulated numerical results as well as for the excellent reproductions of the "diffraction patterns" and the detailed theoretical discussion.

W. W. STIFLER

Further experiments on the passage of electrons through slits. R. WHIDDINGTON, Univ. of Leeds. *Proc. Leeds Phil. Lit. Soc.* 1, 242-5(1928); cf. *C. A.* 21, 2221; 22, 2877.—Averages are given from several hundred photographs. The accuracy is about 0.2 v. The slit was 0.1 mm. wide in Cu foil. The oxide-coated filament was placed less than 10 mm. from the slit *in vacuo*. The impacting voltage was about 100 v. and the thermionic current was a few milliamperes. The electrons passing through the slit were deflected by a magnetic field. Beside the full velocity line, there were lines 3.9, 9.6, 11.4, 19.8, 22.6, 26.4, 32.3, 38.7, 45.0 and other variable lines up to 60 v. below the full potential line. When a pure Pt emitter was used lines 4.0 and 7.5 v. below the full potential line were found. The strongest line below the full potential line with the coated emitter is the one 11.4 v. below, and 22.6, 32.3 and 45.0 might be 2, 3 and 4 times this line. H in contact with Cu has a radiation line at 11.2 v. Multiple collisions would account for this series of lines. The lines at 9.6 and 19.8 might be a pair of such lines due to collision with O_2 from the coated filament. The lines from the uncoated filament could be due to Cu. With a W-emitter and high voltages, lines above the full velocity appeared. This is probably due to the fact that the elec. field penetrates through the slit.

F. E. BROWN

Some experiments on Geiger ion counters. RALPH D. BENNETT. *J. Optical Soc. Am.* 16, 339-54(1928).—The Geiger ion counter consists of a gas-filled chamber into which an insulated electrode, terminating in a more or less sharp point, is inserted. The point is usually kept neg. with respect to the chamber. The method of constructing satisfactory points from fine Pt wire is outlined. B. gives the results of expts. on the reliability and usefulness of the counter as influenced by varying the size of point and chamber, and the position of point in chamber. He also investigated the effect of voltage on sensitivity, effect of nature and pressure of gas used, sensitivity to ultra-violet light and to ions of small energy, effect of various properties of the elec. circuits used for amplification or detection, and the time lag of the action of the counter. Conclusion: While the counter can be made very sensitive for the detection of single ions, it is only a moderately sensitive detector of ultra-violet light. The conditions under which it can be used quantitatively as well as qualitatively are indicated and some theoretical suggestions are made as to the exact mechanism of its action. The original paper should be consulted by anyone working with an ion counter. A bibliography is included.

W. W. STIFLER

Photoelectric and thermionic properties of iron. ALVIN B. CARDWELL. *Proc. Nat. Acad. Sci.* 14, 430-45(1928).—A narrow strip of electrolytic Fe was suspended inside a Ni receiving cylinder and the whole was enclosed in a Pyrex tube which was connected through a liquid-air trap and Hg cut-off to the pumps. A quartz window, sealed directly to the Pyrex tube, admitted radiation from a quartz Hg lamp. The significance of the results lies in the great care taken *completely to outgas* the Fe. This preliminary rept. includes the following results: (1) As the Fe undergoes a process of outgassing extending over more than 200 hrs., the photoelec. current at first increases enormously and then decreases as greatly during the first 10 hrs. of heating at 300°. Later heating up to 875° produces a rather irregular increase in photoelec. current, but eventually after about 120 hrs. a steady value is reached which shows no fatigue over a period of several hrs. (2) Even after thorough outgassing (pressure 10^{-8} mm. of Hg) the variation of photoelec. current with temp. is quite complex. The decrease in photosensitivity between 475° and 768° is interpreted as a pure temp. effect. From 768° to 910° the sensitivity remains const. or increases slightly. This is probably due to the transition from α to β Fe, which involves a slight increase of the edge of the unit cube without change in cryst. form. The transition at 910° from β to γ Fe (involving a change from body-centered to face-centered cubic lattice), is marked by a sudden decrease in sensitivity, followed by an increase. (3) The thermionic current curve shows a sudden break at 910°. (4) The long wave-length limit lies between 2580 Å. U. and 2652 Å. U.

W. W. STIFLER

Mobilities of gaseous ions in sulfur dioxide and in sulfur dioxide-hydrogen mixtures. L. DUSAULT AND LEONARD B. LOEB. *Proc. Nat. Acad. Sci.* 14, 384-93(1928); cf. *C. A.* 22, 1903.—The previously described app. was used. It was shown that fine gauzes give variable results. SO_2 was very difficult to purify. Four av. results

gave mobilities of 0.336 cm./sec. (on the new scale) for pos. ions and 0.316 for neg. One sample of SO_2 , probably very pure, gave values of 0.484 and 0.443 for pos. and neg. ions, resp. There is an increase in the mobilities for both ions with decrease in pressure, agreeing with the theory of Alexeievsky, but deviating from the inverse-pressure law. Electrons attach to SO_2 to form neg. ions nearly as readily as they do to Cl_2 . Small quantities of SO_2 in H_2 increased the mobilities of the pos. ions to very high values, up to 22 cm./sec. This is higher than any neg. mobility found in H_2 . A. F.

Focusing electrons reflected or emitted at equal angles from a plane surface. D. A. WELLS. *J. Optical Soc. Am.* 16, 355-6(1928).—A method is outlined for using a transverse magnetic field to bring to a line focus electrons reflected or emitted with the same energy and at any given angle from a plane surface. The theory is given briefly by means of 2 diagrams and it is shown that when the breadth of the reflecting surface is small in comparison to the radius of the path of the electrons, this straight line focus lies on the surface of a cylinder having the same radius as the path of the electrons. No exptl. details or data are given. W. W. STIFLER

The dielectric constant of a mixture of benzene and toluene under the action of short electric waves. R. D. SHULYAS-SOROKINA. *Z. Physik* 48, 426-36(1928).—By the examn. of the refractive index of a benzene-toluene mixt. with damped elec. waves, A. R. COLLEY (*C. A.* 4, 15) found an effect comparable to the photoeffect. S. investigates the dielec. const. of the same mixt. with undamped waves, and finds nothing comparable to the photoeffect. One half of the paper is devoted to the description of the technical details. A. L. HENNE

The spectral system of Röntgen rays and atomic structure. A. DAUVILLIER. *Rev. Sci.* 65, 705-16(1927).—An address reviewing the work done during the last 20 yrs. A. PAPINEAU-COUTURE

Experimental study of the absorption formula of the x-rays. I. M. ISHINO AND S. KAWATA. *Mem. Coll. Sci. Kyoto Imp. Univ.* 10, 311-6(1927).—The variation of the absorption coeff. of x-rays with the at. no. of the absorbers has been studied for the absorption of the $K\alpha$ line of Mo. The absorbers were chiefly used in the form of salts dissolved in water. The results are in substantial agreement with those of Wingårdh (*C. A.* 16, 2072). B. C. A.

Dispersion of long-wave-length x-rays in platinum and calcite. ELMER DERSHEM. *Proc. Nat. Acad. Sci.* 14, 380-4(1928).—Anomalous dispersion of the type predicted by theories of Kronig and of Mark and Kallman was found for Pt and calcite, although quant. agreement is doubtful. ARTHUR FLIJSCHER

The absorption of ultra-violet light by carbohydrates. L. KWIECINSKI, J. MEYER AND L. MARCHLOWSKI. *Z. physiol. Chem.* 176, 292-3(1928).—The selective absorption reported by Niederhoff for certain sugars is believed to be due to impurities the complete removal of which is extremely difficult. A. W. DOX

Spectroscopic analysis of light obtained by molecular diffusion of monochromatic radiation within a fluid. J. CABANNES AND P. DAWÉ. *Compt. rend.* 186, 1533-4(1928).—C. and D. analyzed the diffused light obtained in the Raman effect (*C. A.* 22, 1079), using an interferometer and spectrograph. The diffusion spectra for lines Hg 4358 and 4046 show in each case at least 4 secondary λ 's of lower frequency than exciting λ . The differences between the exciting frequency and the secondary frequencies are the same in both cases. The expected symmetrical higher frequencies have not been observed. A. P. S.

Sensitiveness of the spectral lines. TR. NEGRESKO. *J. chim. phys.* 25, 363-403(1928); cf. *C. A.* 21, 3553.—N. studies the influence of decreasing the percent of an element in an alloy on its spectrum. The range of his study is from 2000 to 6500 Å. U Bi, Si, Cd, Co, Zn, Mg, Hg, Al, Ag, Cu, Sb and C have been examd. in numerous alloys. The results are tabulated, with special reference to the concn. limit at which a definite line disappears. When the percent of an element decreases, all its lines fade progressively. The lines which remain longer visible are also the stronger ones. At each moment the line's intensity is proportional to the concn. of the element in the volatilized material, no matter what the state of excitation of the atom is. In flames or metallic vapors bombarded by electrons the more sensitive lines are emitted by the neutral atom; in spark, they are emitted by the ionized atom. A. L. HENNE

An ultra-violet light filter. FELIX SAUNDERS. *J. Optical Soc. Am.* 16, 382(1928).—A 0.2 M aq. soln. of *K H phthalate* is completely opaque to ultra-violet light at and beyond 3000 Å. U. wave length. D. G.

Optical properties of selenium in the conducting form. (Miss) P. M. NICOL. *J. Proc. Roy. Soc. New South Wales* 60, 60-72(1928).—The extinction coeff. x and n of Se for wave lengths of 4400-7100 Å. U. detd. from measurements with Se mirrors, are

independent of the temp. at which the Se was transformed into the conducting variety, and alter little, if at all, with exposure to light and with increasing age. With increasing wave length, α decreases and n increases. B. C. A.

Contributions to the knowledge of the sulfide phosphors. ILSEMARIE SCHAPER. Univ. Heidelberg. *Ann. Physik* 85, 913-52(1928).—Exhaustive details are given of the prepn. and properties of CaSSb , SrSSb , CaOSb , SrOSb , MgS phosphors with respect to regions of excitation and emission, effect of temp., behavior towards infra-red radiation and excitation by flames. The general behavior of the new phosphors is in accord with that previously reported by Lenard and his co-workers. The dielec. consts. of the new phosphors are surprisingly low, varying between 3.94 and 7.57 for CaSSb according to conditions of prepn.; phosphors prepd. without addn. of alk. phosphates, etc., have specially low dielec. consts. W. WEST

Fluorescence of electrically excited mercury vapor. S. PIENKOWSKI. *Compt. rend.* 186, 1530-2(1928); cf. *C. A.* 21, 3561.—An annular transparent silica tube with plane parallel windows, liquid Hg electrodes and Hg vapor in motion was used. The density of Hg vapor varied by changing the heating current. This Hg vapor was illuminated by a flat luminous beam from a Hg-vapor lamp. Decreasing vapor density renders well-known green fluorescence feebler and the path of the exciting beam becomes finally invisible. Colored filters show fluorescence to be due to a blue-violet region of the spectrum, chiefly line 4358. A preliminary spectrum analysis of the fluorescence shows the lines $2^3\text{S} - 2^1\text{P}_2$ and $2^3\text{S} - 2^3\text{P}_1$ to have the greatest intensities. The emission of fluorescence is bound up with the return of the latter atoms to their original state. A. P. S.

Active nitrogen. BERNARD LEWIS. Univ. of Minn. *Nature* 121, 938-9(1928).— O_2 , whose presence has been thought to be necessary in the production of glowing active N_2 , was introduced into a vessel contg. pure "glowless" N_2 immediately after discontinuing the discharge. No glow was induced by this procedure. Furthermore little or no glow was produced when the mixt. (1% O_2 at 0.1 mm. total pressure) was subjected to the discharge. Absolutely glowless N_2 could only be obtained by baking out the discharge vessel thoroughly. The results are substantiated by similar results of Herzberg (cf. *C. A.* 22, 1911). L. was able to obtain N_2 after-glows in mixts. contg. up to about 57% O_2 at low pressures (about 0.2 mm.). At higher pressures the type of after-glow changes to one possessing a continuous spectrum, which is attributed to O_2 .

BERNARD LEWIS

Active nitrogen. BERNARD LEWIS. *Nature* 121, 864-5(1928).—Polentical against Willey, *C. A.* 22, 1830. In active N there must exist mols. of energy content greater than 2 v. (as W. assumes), since it is well known that active N can produce many metallic spectra and other actions in which the needed excitation reaches as much as 10 v. W. held that the fact that NH_3 extinguishes the active N after-glow raises a serious objection to L.'s theory of NH_3 formation from active N and H. L. replies that he did get NH_3 , though some of it undoubtedly was decompd. by active N after having been formed but that this is no criterion for or against the theory of NH_3 formation G. G.

The after-glow of nitrogen and oxygen in air. KARL STÖCK. *Z. Physik* 48, 358-9(1928).—A supplement to the work of Herzberg (cf. *C. A.* 22, 1911). Similar observations were made with a spark discharge. A. L. HENNE

Apparatus for observing fluorescence by ultra-violet illumination. G. KÖGEL. *Chem. Fabr.* 1928, 55-6.—The light from a "spot-light" W arc lamp is filtered through a water-cooled quartz filter silvered on the outside to remove visible rays, and the remaining ultra-violet rays are reflected on to the illuminating mirror of a microscope if transparent objects are to be examd., or on to the surface of opaque objects by means of a spherical dark-field illuminator. In order to photograph the fluorescence the ultra-violet rays must be absorbed by passing the emergent light from the eye-piece of the microscope through a 5-mm. layer of a soln. contg. 0.5 g. of triphenylmethane in 70 cc. of alc. The luminescence rays pass unabsorbed through this soln. and are photographed on panchromatic ultra-rapid plates. B. C. A.

The nature of the photoluminescence of uranyl salts. S. T. VAVILOV AND V. L. LEVSHIN. *Z. Physik* 48, 397-425(1928).—The fading of the glow of uranyl salt crystals, U glasses and liquid solns. obeys generally the law $I = I_0 e^{-t/\tau}$. Only when the exciting light is short-wave ultra-violet, a second fading process can be detected in a few substances. In every case investigated, only phosphorescence was present; fluorescence was totally absent. With soln., the temp. and the concn. are the more important factors of the fading duration. The exponential law is always obeyed, and the initial intensity j_0 remains const. In general the fading and the extinction depend on the viscosity of the soln. The light is always unpolarized. It is assumed that the photo-

luminescence of the uranyl salts represents the radiating transition of the metastable state of the excited mol. Several phenomena connected with the disappearance of the luminescence are quantitatively accounted for by means of this assumption.

A. L. HENNE
Radiation hypothesis of chemical reaction. FARRINGTON DANIELS. Univ. of Wisconsin. *Chem. Reviews* 5, 39-86(1928).—The existence of unimolecular reactions has been fully established, but there is no completely satisfactory explanation for their mechanism. The hypothesis that radiation is the important factor underlying chem. reaction was originally based on the existence of unimolecular reactions and the difficulty in explaining them on the basis of collision. This argument is no more valid, since several possible hypotheses based on collisions have been brought out. At present, the most promising explanation lies in the collision hypothesis and the utilization of the internal energy of the mol. and many degrees of freedom. The argument for the radiation hypothesis which was based on the large temp. coeff. of chem. reactions is not valid. The calcn. of the crit. increment and the conception of activated mols. seems satisfactory; neither has been disproved, but the exptl. evidence in favor of them is meager. The simple radiation hypothesis involving the quantum theory has been disproved by a no. of expts. Objections to this hypothesis may be met in several ways, but there is no exptl. backing for them. The reversibility of the relation between chem. reaction and radiation has not been explored very far. Here again the majority of the evidence does not support the radiation hypothesis, but it cannot be said that this postulate of the radiation hypothesis has been disproved. This postulate explains very easily the phenomena of chemiluminescence and fluorescence. Photochem. reactions and chemiluminescence reactions do exist, and radiation must be a factor. Radiation is not important in ordinary thermal reactions.

A. L. HENNE
The mechanism of some chemical photoreactions. II. V. KONDRAT'EV. *Z. Physik* 48, 310-22(1928); cf. *C. A.* 22, 28.—The reaction between alkali metals and CuCl_2 or CuBr_2 vapors at a relatively low temp. occurs on the solid surface as with HgCl_2 and Na. The spectra emitted by these reactions seems to be identical with the CuCl or CuBr spectra. The calcn. of the energy balance shows that the production of these spectra is accounted for by the mechanism proposed for "surface reactions" in the first paper. The "volume reaction" between Na and HgCl_2 is investigated and its mechanism is discussed. A crit. examn. is made to ascertain the conditions required for the transition from "surface" to "space" reaction.

A. L. HENNE

Helium and the genesis of petroleum (FARR, ROGERS) 8. The ultra-violet absorption curves of pulegone and isopulegone (SAVARD) 10.

ALLEN, H. STANLEY: *The Quantum and Its Interpretation*. London: Methuen. 288 pp. 12s. 6d., net. Reviewed in *Nature* 121, 977(1928).

BORCHARDT, BRUNO: *Wandlungen der Atomvorstellung*. Berlin: J. H. W. Dietz Nachf. 85 pp. Cloth, M. 2.75.

CABRERA, BLAS: *El átomo y sus propiedades electromagnéticas*, Vol. II. Madrid: Editorial Pacz. 191 pp. Biblioteca de Ensayos.

HAAS, ARTHUR: *Materiewellen und Quanten-Mechanik*. Introduction to the foundation of the theories of de Broglie, Schrödinger and Heisenberg. Leipzig: Akadem. Verlagsgesellschaft. 160 pp. M. 6.50; bound, M. 7.50.

JÖNSSON, EDVIN: *Absorptionsmässungen im langwelligen Röntgengebiet und Gesetze der Absorption*. Uppsala: A. Lundequistska Bokh. 102 pp. Schwed. Kr. 3.25.

KOLKMEYER, N. H., BYVOET, J. M., AND KARSSSEN, A.: *Voordrachten over röntgen-analyse van kristallen*. Amsterdam: D. B. Centen. 170 pp. Fl. 2.60.

SLUITER, C. H.: *Electronen en atomen. Handleiding teer aanvulling van het middelbaar en voorbereidend hooger onderwijs in natuur en scheikunde*. Groningen: P. Noordhoff. 53 pp. F. 1.40.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electric furnace for fusing caustic soda. J. S. KEENAN. *Elec.-News* (Toronto) 36, 48-9(1927); *Science Abstracts* 31B, 129.—A description of two 500-kw. elec.-heated furnaces used for fusing caustic soda, in this case a by-product of pulp-bleaching. The

Ni-Cr resistors are hung from fire-brick walls and heat the cast-iron pot by radiation. The temp. of the pot is automatically regulated within \pm or -5° F. by thermocouple control. The pot, which holds 2600 gallons, is supplied with and evaporates 75,000 lbs. of 40% caustic soda soln. in a run of 50 hrs., finally fusing 30,000 lbs. of caustic soda at 800° F. (427° C.). The output of the two furnaces is 60 tons per week, and a saving of \$10,000 per annum over coal firing is estimated.

Electric annealing and normalizing at Timkin plant. M. T. LOTHROP. *Elec. World* 92, 201(1928).—Details of a 1850-kw. furnace installation are described.

C. G. F.

The electrochemistry of alloys (tin-lead). FRIEDERICH VOGEL. *Metallbörse* 18, 145-6(1928).—In preliminary expts., electrolytic Cu (yield 63%) is obtained from a Cu, Sb, Sn, Pb cathode, using as an electrolyte aq. HNO_3 -Cu(NO_3)₂ and CuSO_4 (in sufficient quantity to ppt. any Pb dissolving), over 86.4% of the original metal going into the anode mud. Using dil. aq. HNO_3 -Cu(NO_3)₂, CuSO_4 , and sufficient NaCl to form Na_2SnCl_6 , the yield of Cu increases to 80% (a yield of over 95% by redissolving the anode sludge and electrolyzing), the Sn, Sb and Pb passing quantitatively into the mud. Such electrolytes as those contg. the Cu salts of H_2SO_4 and phenolsulfonic acid were found to be impracticable. *Ibid* 202-3.—Using anodes of alloys contg. 50% Sn, and electrolytes of weak HCl -SnCl₂ with NaCl as the conducting salt, a material contg. 97.5-98.5% Sn deposits on the cathode. All the Pb and Sb go into the anode mud, none going into soln. From a table of potentials it is apparent that under the proper conditions Pb-Sn and Cu-Sb alloys can be formed. In discussing the roles played by the Pb and Sn ions, it is considered that they combine to form a single cation. *Ibid* 371-2.—In the expts. made, a pure Pb electrolyte is used together with an anode of a normal white-metal alloy contg. Sn, Sb, Pb and Cu. The diagrams show that there is a rapid decrease of the Pb ion concn., in the electrolyte, while that of the Sn ion shows an equiv. increase, provided that the voltage necessary for the deposition of Sb or Cu is not reached. Pb deposits until the point of intersection of the two curves, when Sn begins to deposit also. If a Sn electrolyte is used instead of the Pb, analogous curves are obtained; this time the Sn curves decrease while the Pb increase. By varying the proportion of Pb to Sn in the electrolyte, all possible alloys of the two metals may be obtained. A disadvantage of the method is that the exact nature of the alloy cannot be predicted. At these small potentials the amt. of Sb and Cu is so small that their effect is negligible. By remelting and electrolyzing the anodic residue, all of the Pb and 90% of the Sn may be utilized. The regeneration of the electrolytes obtained during the processes is discussed.

J. BALOZIAN

Contact electromotive force. The supposed incompatibility of the law of thermodynamics and the Vasesco Karpen piles. I. Discussion of the calculation of the electromotive forces and of the kinetic theory of diffusion. E. DENINA. *Gazz. chim. ital.* 58, 160-77(1928).—Mathematical, involving a crit. examn. of the exptl. and theoretical work of Vasesco Karpen (cf. *C. A.* 17, 670; 18, 193, 2638, 3135; 22, 545). In conjunction with a theory already developed by D. (cf. *Elettrocista* 35, No. 18(1926)) the present paper shows the generality of the calcn. of contact e. m. fs., based on the concept of mol. forces acting on the various constituent monads and causing the latter to distribute themselves between the 3 phases of contact. The calcons. can be based on the use of distribution coeffs., on an explicit expression of the mol. forces (as was done by K. under the designation "La Place forces"), on thermodynamic potentials, on expansibility tensions, etc. The electrolytic potential calcd. by means of the soln. tensions of Nernst is a special case. The contact e. m. f. between 2 metals can be calcd. by applying the general expressions derived, which are practically equiv. to those obtained from the electronic theory of Lorentz. Certain criticisms of K. of the Nernst theory are discussed and rectified. The phenomena of diffusion are then examd. from the statistical point of view, the equivalence of the formulas of Einstein and of K. being shown, and a general proof is given, the object of which is to define precisely certain indefinite features in the formulas. The relations between the calcd. coeff. of diffusion and the nature of the soln. are discussed. The relations among the distribution equil., the e. m. f. of contact between the 2 solns. and the 2nd law of thermodynamics are analyzed from the theoretical point of view, and a reason is found for the contradictions found by K. in an arbitrary hypothesis introduced *a priori* in the calcons. and incompatible with the 2nd law of thermodynamics. The latter, correctly applied, leads, instead, to sound relations which are more reasonable than those of K. Finally, it is shown why the circulation suggestion by K. for isothermal contacts is improbable in this case, but is necessary for a rise of temp., and furnishes a plausible explanation of the anomalies encountered in the study of these phenomena by Sorét.

C. C. DAVIS

The new dry rectifiers (copper-cuprous oxide). O. IRION. *Siemens Z.* **8**, 293-7 (1928).—I. reviews the work of Wiedemann and of Pawlowski on the copper sulfide rectifying films and mentions other combinations that have been tried such as those of Pb, Fe, brass, Ag bronze, etc., with their oxides or sulfides. The first dry combination that showed promise of good current-passing ability, reasonable life and small loss was the Cu-Cu₂O element of Grondahl (*C. A.* **21**, 14). The "Protos" rectifier based on Grondahl's idea is described in detail. The efficiency (50%) is claimed to be better than that of most rectifiers on the market today. **ARTHUR H. KOPP**

High-voltage mercury-arc rectifiers. L. SMEDE. *Elec. J.* **25**, 403 (1928).—The new large-output glass rectifiers are described. Two 3-phase rectifiers connected in series give 30 amp. at 10,000 to 15,000 v. **C. G. F.**

Radiation measurements on tungsten lamps. H. C. v. ALPHEN. *Ann. Physik* **85**, 1058-88 (1928).—The energy distribution of radiation from an incandescent W lamp filament in the visible spectrum was investigated by two essentially independent methods. In the photographic method (due to Ornstein), a series of real images was formed by practically monochromatic light isolated by a suitable optical system from different regions of the continuous spectrum. These images were photographed and, simultaneously, energy measurements were made on them with a thermopile. The arrangement was calibrated by substituting for the image the filament of a lamp of known distribution. The pyrometric method is based on the exptl. fact that to any given temp., T , of the W filament there corresponds a temp., T_e , for a black body such that the visible part of the spectrum of the black body at T_e has practically the same relative energy distribution as the W filament at T . Full details of exptl. arrangements for both methods are given, and the various corrections to be applied are discussed. Results for a 6 v. N-filled W lamp by the two methods are concordant. The emission from W in the ultra-violet was detd. photographically as a function of the wave length by comparison with a C-filament lamp of known energy emission. Results are compared with those of Hulbert (*Astrophys. J.* **45**, 149 (1917) and *C. A.* **10**, 1300). **W. W. S.**

Effects of corona in various gases on insulation and losses. C. F. HILL. Westinghouse Lab. *Elec. J.* **25**, 402 (1928).—With the possibility of using various gases and mixts. of gases, other than air, for cooling elec. machines, the question of the life of insulation as affected by corona in the various gases becomes of interest. The exptl. setup consisted of a conducting layer placed inside of a glass tube about 1 in. in diam. and 3 ft. long. Insulation is wound around the outside of the tube and a wire helix around this with a pitch of about one inch. The whole is placed inside a larger glass tube which is arranged so that a gas can be circulated through the system as desired. In the presence of air and the conducting layer and the outer wire helix connected to opposite poles an intense corona takes place around the helical wire and O₂ is formed. This O₂ rapidly attacks all organic insulation materials. They usually become hard and brittle. In pure hydrogen and N this org. insulation retains its good qualities. **C. G. F.**

Pressure electrolysis of water eliminates need for compressors. J. E. NOEGGERATH. *Chem. Met. Eng.* **35**, 421-4 (1928).—See *C. A.* **22**, 2114. **E. H.**

The electrolytic preparation of the borides of calcium, strontium and barium. L. ANDRIEUX. *Compt. rend* **186**, 1537-9 (1928).—A description of A.'s method of obtaining CaB₂, SrB₂ and BaB₂ by electrolyzing a melt of the borate and fluoride of the resp. metals. The electrolysis is carried out at 1000° with a voltage of from 5 to 7 and an amperage of 20. **WILLIAM F. EHRET**

The Cottrell electrical precipitation processes (SULTZER) 21. Hydrogen in electrolytic zinc (ELLIOT) 9. Coating other materials with Pt (Brit. pat. 240,697) 9. Pb alloys [for storage battery grids] (U. S. pat. 1,675,644) 9.

Pfannhauser, W.: Die elektrolytischen Metallniederschläge. Lehrbuch der Galvanotechnik mit Berücksichtigung der Behandlung der Metalle vor und nach dem Elektroplattieren. 7th ed., revised and enlarged. Berlin: J. Springer. 912 pp. R. M. 40. Reviewed in *Chemistry and Industry* **47**, 728 (1928).

Electric battery. HENRY CSANYI (to Dry Storage Battery Corp.). U. S. 1,675,973, July 3. The negative electrode is formed of metal such as Zn, the positive electrode of C, the electrolyte of NH₄Cl and the depolarizer of C, Mn hydroxide, MnO₂, NH₄Cl and AlCl₃.

Dry-cell electric battery. HENRY CSANYI. U. S. 1,676,007, July 3. A depolarizing mixt. is formed of Mn hydroxide, C, MnO₂ and NH₄Cl.

Dry-cell electric battery. LAURENCE V. ELLIS. U. S. 1,676,945, July 10. Structural features.

Photoelectric cell. VLADIMIR K. ZWORYKIN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,677,316, July 17.

Storage battery. CORNELIUS AMBRUSTER. U. S. 1,675,321, July 3. Structural features.

Storage battery. RAYMOND A. KLOCK and THEODORE B. ENTZ (to Gould Storage Battery Co.). U. S. 1,675,978, July 3. Structural features.

Storage battery grid. REGINALD S. DEAN and WILLIAM E. HUDSON (to Western Electric Co.). U. S. 1,675,643, July 3. Grids are formed of a Pb alloy which may also contain Sb 2.25% and which carries finely divided particles of solute material such as Sb uniformly dispersed throughout the Pb.

Separator for storage batteries. RAYMOND C. BENNER (to Prest-O-Lite Storage Battery Corp.). U. S. 1,677,512, July 17. Separators are formed of fibrous material such as sulfite pulp bonded with rubber or other suitable acid-resisting plastic material and the pores of the separator are initially obstructed by material such as silica gel which is capable of yielding a gelatinous, acid-proof decompn. product or residue permeable by the electrolyte. Cf. C. A. 22, 734.

Hydrometer suitable for use with electric batteries. FRANK E. SODE. U. S. 1,677,801, July 17. Structural features.

Carbon electrodes. IMRE SZARVASY. U. S. 1,675,674, July 3. A gas contg. CH_4 , e. g., natural gas, is dissoed. by heat in such a manner that a mixt. of finely divided C and tar-like products and also solid coherent C are formed; all these materials are mixed together, coked and ground and used with a binder, molded into electrodes and burned.

Electrode holder for electric furnaces. FERDINAND WECKERLE (to Studiengesellschaft für Wirtschaft u. Industrie, G.m.b.H.). U. S. 1,675,742, July 3.

Electrode holder for closed electric furnaces. JACOB DION (to I. G. Farbenind., A.-G.). U. S. 1,677,712, July 17.

Film-forming electrolyte. HUMPHREYS O. SIEGMUND (to Western Electric Co.). U. S. 1,675,828, July 3. An electrolyte suitable for power plant condensers comprises an aq. soln. such as may be formed from NH_4OH and H_3BO_3 or other suitable base and acid in such proportions as to give a specific resistance value of 150–800 ohms per cc. and a p_{H} of 6.8–7.8.

Electrolytic rectifiers. H. G. ANDRE. Brit. 280,751, Jan. 28, 1927. The cathodes are surrounded by colloidal Ag above which is a mass of H_2SO_4 and sand covered with petroleum jelly or similar material. Various other features are described.

Electric resistances. H. ANDRE. Brit. 280,862, Nov. 17, 1926. A resistance material of high negative coeff. is formed by melting Ag with a metalloid such as P. The resistance may have Ag terminals and may be protected by a layer of cast S.

Electric induction furnace. REINHOLD GROSS (To Siemens & Halske, A.-G.). U. S. 1,676,545, July 10.

Rotary-firing electric induction furnace. EDWIN F. NORTHRUP (to The Ajax Metal Co.). U. S. 1,677,528, July 17. A furnace is specified which is adapted for melting metals.

Electric resistance furnace of the shaft type. THADDEUS F. BAILEY. U. S. 1,675,744, July 3. A furnace is described adapted for producing Fe, Si and graphite. The molten charge may be passed downwardly through loose carbonaceous resistor material.

High-frequency electric furnace adapted for treating rare or refractory metals. HARVEY C. RENTSCHLER and JOHN W. MARDEN (to Westinghouse Lamp Co.). U. S. 1,676,926, July 10.

Constant-temperature electrically heated oven. WINFIELD H. STANNARD (to Central Scientific Co.). U. S. 1,676,876, July 10. Structural features.

Rotatable apparatus for electroplating small articles. JOSEPH DE VERRE. U. S. 1,677,817, July 17.

Tungsten. COLIN G. FINK. U. S. 1,675,486, July 3. There is incorporated in a slug of W material a small quantity of an addnl. substance such as Zr 1.4 and Cu 2–3% which has a high affinity for H at elevated temps. and is capable of reacting with intercryst. impurities and the slug is then heated in H to remove the impurities. The product is ductile and relatively soft and non-sagging in filament form.

5—PHOTOGRAPHY

C. E. K. MEES

Bleachout paradoxes. LÜPPO-CRAMER. *Phot. Ind.* 25, 1099-1100(1927).—Un-ripened lantern slide emulsions were thoroughly washed to remove all traces of sol. bromide. When flashed and then bathed in phenosafranine (1:5000 and 1:20,000) the dil. soln. gave the greater bleaching action with white light. Similar results were obtained with pinakryptol green, tetramethylphenosafranine and tetraethylphenosafranine. When tried with ripened plates or faster emulsions the bleach action was proportional to the concn. of the bath. The plates flashed and then bathed in tetramethyl- and tetraethylphenosafranine gave a higher max. density in the re-reversal when bleached with white light than was obtained on the shoulder of the normal negative curve for untreated plates with the same development. This is ascribed to sensitization by desensitizer. Addn. of bromide to the desensitizing bath gave increased bleach and less re-reversal. Bleaching with red light gave less speed but no re-reversal.

C. E. MEULENDYKE

Fastness to washing of dyed silver bromide. LÜPPO-CRAMER. *Phot. Korr.* 63, 193(1927).—Lumière and Seyewetz have concluded that the action of sensitizing dyes on AgBr is fundamentally different from that of desensitizing dyes; a complex that is more stable, as shown by its greater resistance to dissocn. on washing, is formed with the sensitizing dyes. L.-C. cannot agree with this conclusion. In L.-C.'s experience, the degree of stability on washing is a "quite individual property" of the particular dye. Using plates of a pure AgBr emulsion that had been well washed and had received no further addn. of sol. bromide before coating, and sensitizing to yellow by bathing in 0.002% soln. of erythrosin, pinaflavol nitrate, rhodamine B and isoquinoline red, resp., he has observed that after washing for several hrs. the yellow sensitivity is diminished with rhodamine and pinaflavol although actually increased with erythrosin and isoquinoline red.

E. R. BULLOCK

Defects in sulfide-toned images. K. KIESER. *Phot. Ind.* 25, 1257-8(1927).—Bluish spots or flecks may occur on toned prints especially with age. This is caused by insufficient washing in which unremoved ferricyanide reacts with Fe^{+++} impurity in the paper base or wash H_2O to form Prussian blue. Acid bleach baths tend to hold back ferricyanide to a greater degree. The reaction between ferricyanide and Fe^{+++} is inhibited by presence of alkali such as that obtained by a final bathing in a weak soln. of Na_2CO_3 . Careless washing after the bleach bath may be partly compensated by careless washing after the Na_2S redeveloper, caused by the retaining of slight alkyl.

C. E. MEULENDYKE

Sensitometry of reversal emulsions. L. LOBEL AND J. LAFÈVRE. *Bull. soc. franç. phot.* 14, 288-97; *Kinochnik* 9, 503-7(1927).—The reversal process involves 3 essential steps. (1) development; (2) soln. of the Ag; (3) (complete) blackening of the remaining AgBr. The gamma of the positive curve equals the gamma of the negative curve, and the height of the positive curve above the exposure axis depends on the max. black of the emulsion. If the max. black is lowered by a solvent developer, the positive curve is also lowered. A pure white in the subject must be reproduced in the film by a Ag density of zero, and the contrast of the picture must equal the contrast of the subject. It follows that the solarization density must equal the max. black and the negative gamma infinity must equal one, since the solarization density is reached only by developing to gamma infinity. The camera exposure must be sufficient to make the $I. t$ value for a pure white equal the solarization exposure. The sensitivity of a reversal emulsion is detd. by the exposure necessary to reach the solarization value. It can be expressed as the abscissa of the intersection of the straight-line portion of the positive curve with the exposure axis.

C. E. IVES

Denuculation and desensitization. LÜPPO-CRAMER. *Phot. Korr.* 63, 362-3(1927).—L.-C. calls attention to his article (*C. A.* 19, 18), and describes a repetition of those expts. giving, however, the same standard exposure after each kind of treatment. One strip of a plate of each of 5 different brands was bathed in chromic acid mixt. for 3 min., washed for 2 hrs. and dried; another strip was bathed in 0.01% phenosafranine soln. for 2 min., and dried; and a third was treated first with the chromic acid and then with the phenosafranine. These 3, together with an entirely untreated strip, were exposed under a Goldberg wedge, developed and densographed. Six lantern or process plates were then treated similarly, with the exception of being given 10 times the exposure. It is seen that the denucleated (that is, chromic acid treated) plates are appreciably less affected by the desensitization (that is, phenosafranine treatment) than are the origi-

nal plates; and from this L.-C. concludes, as before, that desensitizers attack predominantly the original ripening nuclei. It does not follow, however, that a plate containing originally less nuclei would be more strongly desensitized than a high-speed plate.

E. R. BULLOCK

Constitution of the flavinduline desensitizers. G. KÖGEL. *Phot. Korr.* **63**, 193-5 (1927).—An account is given of K.'s work in 1922 on the prepn. and properties of several derivs. of flavinduline. It is mentioned that nitro groups cause the disappearance of "bleaching-out" but not of the desensitizing property.

C. E. MEULENDYKE

Errors produced in slow development with glycine. A. AND L. LUMIÈRE AND A. SEVEWETZ. *Bull. soc. franç. phot.* **14**, 306-8; *Photographe* **14**, 467-8 (1927).—Almost invisible oxidation scum which forms on the surface of glycine developers has ruined many negatives. As the negative is put into the developer the scum becomes attached to all or part of the surface and prevents development. The defect is worse than that sometimes encountered with pyro. Skimming or filtering the developer is of no help but if the negative is soaked in H_2O previous to development the spotting usually does not occur. It is preferable to use an elon-hydroquinone slow developer which produces negatives equal to those developed in glycine.

C. E. IVES

Coloring photographs (U. S. pat. 1,676,739) **18**.

Photograph for viewing as a positive by reflected light or for use as a negative in printing by transmitted light. SAMUEL B. SHEPPARD (to Eastman Kodak Co.). U. S. 1,676,580, July 10.

Photographic process. EASTMAN A. WEAVER (to Technicolor Motion Picture Corp.). U. S. 1,677,665, July 17. In producing a photographic printing matrix, a film is printed with light distributed to produce a latent image in the film and the contrast gradations of the image are altered by exposing the film with correspondingly distributed light, the altered latent image is then converted into a photographic printing matrix.

Photographic developers. I. G. FARBERIN. A.-G. Brit. 280,525, Nov. 13, 1926. A cyanide such as that of Hg, Co or Cd is added to a photographic developer to desensitize the sensitive Ag halide layer in the first stage of development and permit the completion of development in bright yellow light. $Hg(CN)_2$ 0.03% may be added to a developing soln. contg. metol and hydroquinone. Tendency to fogging is checked by the treatment.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

The complex chloro salts of bismuth. H. REMY AND L. PELLENS. *Chem. Staatsinstitut, Hamburg, Univ. Ber.* **61B**, 862-8 (1928).—This is one of a series of papers (cf. C. A. **15**, 3007; **20**, 25; **21**, 3846) of which the object is to study the mechanism of coordinative combination. Calcn. from the Coulomb law and Goldschmidt's ion radius of the energy of formation for chloroferriate ions shows that the tetrachloroferriate ion is most stable. The agreement between expt. and theory for the chloro complexes of Fe and Bi seems to indicate that from atom or ion radius can be predicted the possibility of existence and the compn. of complex compds. The exptl. work included a study of many known complex Cl derivs. of Bi together with the following new compds.: *methylammonium enneachlorodibismuthate*, $(MeNH_2)_3Bi_2Cl_9$, m. 302°; *methylammonium hendecachlorodibismuthate*, $(MeNH_2)_3Bi_2Cl_{11}$, decomp. slowly above 240°; *methylammonium heptachlorobismuthate*, $(MeNH_2)_3BiCl_7$, softens 210° and then melts with decompn.; *dimethylammonium pentachlorobismuthate*, $(Me_2NH)_2Bi_2Cl_5$, m. 228°; *dimethylammonium heptachlorobismuthate*, $(Me_2NH)_2BiCl_7$, m. 208°; *trimethylammonium enneachlorodibismuthate*, $(Me_3NH)_3Bi_2Cl_9$, softens 260°, m. (not sharply) 284°; *trimethylammonium hexachlorobismuthate*, $(Me_3NH)_3Bi_2Cl_6$, m. (not sharply) 272°; *tetramethylammonium tetradecachlorotribismuthate*, $(Me_4N)_3Bi_3Cl_{14}$, m. 286° (decompn.); *ethylammonium tetrachlorobismuthate*, $EtNH_2BiCl_4$, m. 158°; *ethylammonium pentachlorobismuthate*, $(EtNH_2)_2BiCl_5$, m. 268°; *ethylammonium hexachlorobismuthate*, $(EtNH_2)_2BiCl_6$, m. 239°; *ethylammonium heptachlorobismuthate*, $(EtNH_2)_2BiCl_7$, m. 199°; *propylammonium tetrachlorobismuthate*, $PrNH_2BiCl_4$, m. (not sharply) 157°; *propylammonium pentachlorobismuthate*, $(PrNH_2)_2BiCl_5$, m. 243°; *propylammonium heptachlorobismuthate*, $(PrNH_2)_2BiCl_7$, m. (not sharply) 170°; *butylammonium*

pentachlorobismuthate, $(\text{BuNH}_2)_3\text{BiCl}_2$, m. 225° ; and *butylammonium enneachlorobismuthate*, $(\text{BuNH}_2)_9\text{BiCl}_3$, m. 180° . A. L. HENNE

The metallic cyanates. III. The amines of the simple cyanates with hexamethylenetetramine. R. RIFAN. Univ. of Cluj. *Bull. soc. stiinte Cluj* 4, 28-42 (1928); cf. C. A. 22, 1740.—The diaquoammonohexamethylene tetramino metallic cyanates,

$\left[\text{M}^+ \text{Urt}_p \right] (\text{H}_2\text{O})_2 (\text{CNO})_2$, were prepd. by treating aq. solns. of the metallic salts with solns. of KCNO and then adding a soln. of urotropine (Urt_p). M⁺ corresponds to Co, Ni, Mn, Fe, Cu and Cd. These compds. all hydrolyze in hot H₂O. They are insol. in alc. ether and benzene. They all dissolve in pyridine (Py) to form the corresponding tetrapyrindine complexes. They are all sol. in aq. NH₃ solns, probably forming another sol. ammine. Their color depends upon the nature of the metallic element in the complex.

The Cu complex was changed by boiling in MeOH into the green, stable $\left[\text{Cu} \text{Urt}_p \right] (\text{MeOH})_2 (\text{CNO})_2$. In a similar way $\left[\text{Cu} \text{EtOH} \right] (\text{CNO})_2$ was formed. The formulas given for the

aquoammines are supported by the fact that the diaquoammino Cu salt loses both mols. of H₂O simultaneously when heated to 80° . Attempts to prep. the corresponding complexes of Pb, Ag, Be, Mg, Al and Cr were unsuccessful. Further conclusions: (1) The introduction of a mol. of a base into the simple metallic cyanate makes the mol. more stable and less sol. (2) The replacement of a H₂O mol. in the ammine by an alc. mol. increases the stability of the complex. (3) Urotropine acts as a bivalent base (4) One mol. of EtOH is equiv. to 2 of H₂O in the complexes. IV. Study of chromium. A new reaction and a new gravimetric method for the determination of this element. *Ibid* 57-61.—The hydrolysis of Cr salts by solns. of KCNO is similar to that described for salts of Al (C. A. 22, 1740). The hydroxide produced from hot solns. is granular and is easily filtered and washed. The reaction serves as the basis of an accurate gravimetric detn. of Cr in the presence of Zn and Mn. The directions for the analysis are the same as those given for Al. The ppt. is ignited and weighed as Cr₂O₃. The inaccuracy is about 0.1%. As little as 0.0002 g. of Cr can be detected. H. F. JOHNSTONE

A new class of amines, the selenocynoamines. I. G. SPACU AND R. RIFAN. Univ. of Cluj. *Bull. soc. stiinte Cluj* 4, 3-22 (1928).—The tetraquodihexamethylene tetramine metallic selenocyanates, $\left[\text{M}^+ \text{Urt}_p \right] (\text{H}_2\text{O})_4 (\text{SeCN})_2$, were prepd. by treating solns. of the metallic nitrates with a soln. of urotropine (Urt_p). M⁺ corresponds to Co, Ni, Mn, Fe and Zn. The compds. are sensitive to light and to air, in which they slowly decompose liberating Se. These amines, as well as those subsequently described, are sol. in pyridine but insol. in alc., ether and benzene. They are hydrolyzed by hot H₂O and by acids. Attempts to prep. the pyridine analogs under similar conditions were unsuccessful, probably because of their rapid hydrolysis. The tetrapyrindine metallic selenocyanates, $\left[\text{M}^+ \text{Py}_4 \right] (\text{SeCN})_2$ (Py = pyridine) (where M⁺ = Co, Ni and Cu) were prepd., however, by first adding a soln. of KSeCN in alc. to a similar soln. of the metallic nitrates, filtering off the metathesized KNO₃, and then adding pyridine. The Mn compd. decomposes in air with the sepn. of Se and formation of the diammine. By dissolving the Ni compd. in hot pyridine and cooling the soln. the hexapyridine Ni complex, $[\text{NiPy}_6] (\text{SeCN})_2$, was obtained in the form of violet crystals. It is less stable in air than the tetrammine. The tetrapyrindine Fe salt, $[\text{FePy}_4] (\text{SeCN})_2$, was prepd. by adding KSeCN in alc. to a similar soln. of FeCl₃·6H₂O. The ferric ions were thus reduced to ferrous. On adding pyridine the yellow tetrammine pptd. The dipyrindine Zn salt, $[\text{ZnPy}_2] (\text{SeCN})_2$, was obtained by using smaller proportions of pyridine. By cooling a hot pyridine soln. of this diammine the tetrapyrindine Zn complex was formed. It decomposes in air and in acids with the sepn. of Se. By using small proportions of pyridine the dipyrindine Cd salt was prepd. in the usual way. The tetrapyrindine Cd compd. was also formed from a hot pyridine soln. of the diammine. It is stable in air but hydrolyzes with ease in hot H₂O. The colors of the complex salts depend on the nature of the metallic element in the mol. In general the properties of the amino-selenocyanates resemble those of the corresponding aminothiocyanates. H. F. J.

The specific action of the oxime group on metal salts. I. Reactions of cobalt, nickel and copper salts with aldoximes. WALTER HIEBER AND FRITZ LEUTGART. Univ. of Heidelberg. *Ber.* 60B, 2296-310 (1927).—The general formula of the additive

compds. is $\left[\text{X}_2\text{M} \left(\begin{array}{c} \dots \text{N} : \text{CH} \cdot \text{R}_1 \\ \text{OH} \end{array} \right)_{2 \text{ or } 4} \right]$, in which X is a halogen and M the metal.

The compds. are nonelectrolytes. They are obtained by direct crystn. of the alc. soln. of the components. The following additive compds. have been obtained: CoCl_2 , CoBr_2 , NiCl_2 and NiBr_2 , with 4 mols. of acetaldoxime; CoCl_2 , NiCl_2 , CuCl_2 with 4 mols. of isobutyraldoxime; CoCl_2 , CoBr_2 , NiCl_2 , NiBr_2 with 4 mols. β -benzaldoxime. α -Benzaldoxime is used for this prepn.; it undergoes rearrangement into β -benzaldoxime, whereupon the additive compd. is formed. Cinnamaldoxime gives the following additive compds.: $\text{CoCl}_2 \cdot 4\text{C}_6\text{H}_5\text{CH}(\text{CH}=\text{CH} \cdot \text{NOH})$ and $\text{CuCl}_2 \cdot 2\text{C}_6\text{H}_5\text{CH}(\text{CH}=\text{CH} \cdot \text{NOH})$. By treating Cu acetate with aldoximes, compds. of a salt-like nature are obtained; Co and Ni do not react in this manner. Upon addn. of a trace of the metal chloride to an alk. soln. of the oximes intensive color reactions are produced which depend upon the formation of complex compds. CuCl_2 gives a compd. with α -benzil α -dioxime having the formula: $\text{C}_6\text{H}_5\text{C}(\text{NOH})\text{C}(\text{NOH})\text{C}_6\text{H}_5 \cdot \text{CuCl}_2 + 2\text{H}_2\text{O}$. II. Reactions of ketoximes with metal salts. *Ibid* 2310-7.— CoCl_2 does not react with acetoxime in aq. soln. Suspensions of CoCl_2 in inert solvents (CHCl_3 , Et_2O , $(\text{CH}_2\text{Br})_2$) are colored blue by addn. of acetoxime. The reaction is very sensitive. It is impossible to isolate a compd. of definite compn. The soln. in $(\text{CH}_2\text{Br})_2$ probably contains an additive compd. of 1 mol. CoCl_2 and 2 mols. acetoxime. CoI_2 reacts with acetoxime with formation of $2\text{Me}_2\text{C} \cdot \text{NOH} \cdot \text{CoI}_2 + \frac{1}{2} \text{Me}_2\text{CO}$. CoBr_2 gives a similar compd. Another type of Co compds. corresponding to $\text{Co}(\text{I}, \text{Me}_2\text{C} \cdot \text{NO})_2$ also was obtained. NiI_2 gives additive compds. contg. 2-3 mols. of acetoxime. Cu^{II} halides are reduced by acetoxime with simultaneous formation of compds. of the type $2\text{Me}_2\text{C} \cdot \text{NOH} \cdot 2\text{CuX}$. It was possible, however, to obtain $\text{Me}_2\text{C} \cdot \text{NOH} \cdot \text{CuCl}_2$. With Cu acetate $\text{Me}_2\text{C} \cdot \text{NOH} \cdot \text{Ac}_2$ was obtained. CuCl_2 reacts with acetophenone oxime to form a mixt. of additive compds. with 1 and 2 mols., resp.; it gives with benzophenone oxime $\text{Ph}_2\text{C} \cdot \text{NOH} \cdot \text{CuCl}_2$. The oximes are also capable of formation of salt-like compds. with Co, Cu and Ni.

EMIL KLARMANN

Contributions to the study of the constitution of double salts. XV. The double amines of the class of the iodides. G. SPACU and O. VOICU. Univ. of Cluj. *Bull. soc. stiint. Cluj* 4, 42-56(1928), cf. C. A. 22, 2334.—Their properties and the case with which they are formed make the amines of double salts valuable in detg. the formula for the original double salts. The following new amines have been prepd., their properties studied and the formulas of the original salts deduced: Treatment of the anhyd. $\text{ZnI}_2 \cdot (\text{NH}_4\text{I})_2$ (I) with a benzene soln. of pyridine (Py) gives after several days (in the absence of light) an unstable yellow ppt., the analysis of which corresponds to the dipyridine Zn complex, $[\text{Zn}^{\text{I}_4}_{\text{Py}}](\text{NH}_4)_2$. The salt is quickly hydrolyzed in the presence of H_2O . Addn. of dry $\text{ZnI}_2 \cdot 2\text{NaI} \cdot 3\text{H}_2\text{O}$ (II) to a soln. of aniline (An) in benzene produces after 5-6 days a rather stable white ppt., the formula of which corresponds to the dianiline Zn salt, $[\text{Zn} \text{An}_2] \left[\text{NaI} \right]^{\text{I}_2}_2$. These results show that the formulas of I and II are, resp., $(\text{NH}_4)_2\text{ZnI}_4$ and either $[\text{Zn} (\text{H}_2\text{O})_2] \text{Na}_2 \cdot \text{H}_2\text{O}$ or $[\text{Zn} (\text{H}_2\text{O})_2] \left[\text{NaI} \right]^{\text{I}_3}_2 \cdot \text{H}_2\text{O}$. $\text{PbI}_2 \cdot \text{KI} \cdot 2\text{H}_2\text{O}$ (III) is transformed into the light yellow triammine, $[\text{Pb}^{\text{I}_3}_{(\text{NH}_3)_3}] \text{K}$, in which the Pb is coordinatively satd., by passing a current of dry NH_3 over it. The ammine loses NH_3 on exposure to air and becomes dark yellow. In H_2O it decomposes with sepn. of PbI_2 . Attempts to prep. the aniline and pyridine analogs were unsuccessful. The authors conclude that the formula of III is either $[\text{Pb}^{\text{I}_3}_{(\text{H}_2\text{O})_2}] \text{K}$ or $[\text{Pb}^{\text{I}_3}_{\text{H}_2\text{O}}] \text{K} \cdot \text{H}_2\text{O}$. The addn. of $\text{CdI}_2 \cdot \text{BaI}_2 \cdot 5\text{H}_2\text{O}$ (IV) to a soln. of aniline in benzene gives after 4 days a white ppt., which decomposes in the light and the analysis of which corresponds to the diaquodaniline complex, $\text{CdI}_2 \cdot [\text{Ba}^{\text{An}_2}_{(\text{H}_2\text{O})_2}]$. Attempts to prep. the corresponding amines with NH_3 and pyridine were unsuccessful. With NH_3 IV breaks up and takes on 14 mols. of the gas, of which 8 are held by the BaI_2 and 6 by CdI_2 . The formula for IV is $\text{CdI}_4 [\text{Ba} (\text{H}_2\text{O})_4] \cdot \text{H}_2\text{O}$. On addn. of small proportions of $\text{HgI}_2 \cdot \text{CuI}$ (V) to anhyd. pyridine a green soln. forms which gives a light green ppt. when a little benzene is added. The color and analysis of this corresponds to the pentapyridine complex, $[\text{Hg}^{\text{I}_5}_{\text{Py}}] \text{CuPy}_4$. The formula is supported by the fact that the compd. loses a mol. of pyridine on exposure to air and

forms the dark green *tetrapyridine complex*. The formula for V, therefore, is HgI_2Cu . The conclusion previously stated that, in general, double salts in the solid state are really complex compds. is supported by these results. XVI. The amines corresponding to the double salts of the class of the bromides. G. SPACU AND J. DICK. *Ibid* 84-103.—The following new amines were prepd. from the hexabromostannates of the heavy metals, $\text{SnBr}_6\text{Me}^{\prime}n\text{H}_2\text{O}$ (I), where $\text{Me}^{\prime} = \text{Mn, Ni and Co}$ and $n = 6, 8$ and 10, resp., for these metals: The anhyd. hexaurotropinehexabromostannates of Mn Ni and Co, $[\text{SnBr}_6]_4[\text{Me}^{\prime}\text{Urtpr}]_6$ (II) were prepd. by adding a soln. of I in abs. alc. to a similar soln. of urotropine (Urtpr) and filtering off the resulting ppt. after about 5 min. The hydrates (III) corresponding to these (Mn, 2 H_2O , Ni, 2 H_2O ; Co, 4 H_2O) were prepd. by the same method with 95% alc. as the solvent. In order to prevent hydrolysis the pptd. amines were removed from the mother liquor immediately after formation. If the ppts. of III were allowed to stand in contact with the soln. for 15-20 min. they were partially hydrolyzed while simultaneously a mol. of urotropine was replaced by H_2O . In this way $[\text{Sn}^{\text{Br}_6}(\text{OH})]_4[\text{Mn}^{\text{Utrpr}_6}(\text{H}_2\text{O})]_6 \cdot 4\text{H}_2\text{O}$ (IV) was isolated. The anhyd. hexapyridinehexabromostannates of Mn and Co, $\text{SnBr}_6\text{Me}^{\prime}\text{Py}_6$ (V) were obtained by triturating I in a soln. of pyridine in abs. ether. The anhyd. complex Ni ammine could not be obtained in this way. However, the hexapyridine monohydroxypentabromostannate of Ni (VI) and hexapyridine dihydroxypentabromostannate of Ni (VII) were obtained by adding a soln. of I in abs. alc. to a soln. of pyridine in MeOH and then pptg. the complexes, after the hydrolysis had begun, by adding abs. ether. In this case the hydrolysis is due to the H_2O liberated in the substitution of the base. The compds. contg. urotropine are cryst. substances, stable in air. They are hydrolyzed by H_2O and by acids. The pyridine compds. are unstable. They are hygroscopic and lose pyridine in the air. The color of all the complexes depends on the nature of the metallic element contd. in the mol. Attempts to prep. the amines with aniline, ethylenediamine and toluidine were unsuccessful. Conclusions. (a) The H_2O held in the mols of I exists in 2 categories; viz., that which is held by the heavy metal, called H_2O of constitution, and that which compensates for the difference in vol. of the electronegative and electropositive parts of the mol., called H_2O of crystn. (b) The mols of the H_2O of constitution, which coordinatively sats. the metal, may be replaced by mols. of certain bases. The no. of mols. remains the same in all cases. The no. of mols. of H_2O of crystn. depends upon the nature of the heavy metal and varies directly with the at. vol. thereof. (c) The formula for I is $\text{SnBr}_6\text{M}^{\prime}(\text{H}_2\text{O})_6m\text{H}_2\text{O}$, where $m = 0, 2$ and 4, resp., for Mn, Ni and Co. XVII. The amines corresponding to the double salts of the class of the bromides. *Ibid* 110-24.—By treating solns. of the double salts, $\text{SnBr}_6\text{M}^{\prime}(\text{H}_2\text{O})_6m\text{H}_2\text{O}$ (I) (where $\text{M}^{\prime} = \text{Mn, Ni and Co}$ and $m = 0, 2$ and 4, resp., for these metals) in anhyd. acetone with a similar soln. of piperazine (Ppz), the mols of H_2O of constitution were substituted by mols of the base. Since the solvent in this case was not a dehydrating agent, the resulting complexes always contained H_2O of crystn. Inasmuch as piperazine is a bivalent base the compds. first produced have 2 mols of H_2O substituted by 1 mol. of the base. In this way the tri-piperazinehexabromostannates of Mn, Co and Ni, $\text{SnBr}_6\text{MnPPz}_3 \cdot 6\text{H}_2\text{O}$, $\text{SnBr}_6\text{NiPPz}_3 \cdot 8\text{H}_2\text{O}$, and $\text{SnBr}_6\text{MnPPz}_3 \cdot 8\text{H}_2\text{O}$ (II) were obtained. By increasing the proportion of piperazine in the reaction and by allowing a greater time for the reaction, the tetra- and hexapiperazinehexabromostannates of Mn, Ni and Co (III) were obtained. The no. of mols. of H_2O of crystn. are the same as in the mols of the triamines. All of the amines are stable in air, sol in H_2O and acids with hydrolysis and insol in the usual org. solvents. Their colors depend upon the nature of the metallic element in the complex and do not differ greatly as the no. of mols of piperazine is changed. H. F. JOHNSTON

Chemistry of the silicates. A. ENDREÉDY. Univ. of Budapest and Geol. Anstalt, Hungary. *Földtani Közlemény* 57, 105-12 (1927).—Garnet is fractionally dissolved in HCl; the process seems to indicate an orthosilicate mol. This constitution is in opposition with the thermic decompn. of garnet. An essay to replace HCl by org. acids failed. The same study was repeated with aq. chromic acid; it gave the constitution of garnet as $3\text{CaO} \cdot \text{Fe}_2\text{O}_3 \cdot 3\text{SiO}_2 = \text{Ca}_3\text{Fe}_2(\text{SiO}_4)_3$, or $14\text{CaO} \cdot 5\text{Fe}_2\text{O}_3 \cdot 14\text{SiO}_2$. A. L. H.

The preparation of ammoniacal silver solution by impregnation methods. B. J. DEKUN. Med. Inst. Kiew. *Z. wiss. Mikroskopie* 43, 382-4 (1926); *Chem. Zentr.* 1927, I, 327-8.—A criticism of earlier methods. Absolutely clean app. and pure reagents (AgNO_3 , aq. NH_3 and NaOH) are essential. Forty % NaOH is added dropwise to 10% AgNO_3 until no more ppt. is formed, the soln. is decanted, the ppt. washed with water until phenolphthalein soln. no longer gives evidence of OH ions, and finally the ppt. is dissolved in the least possible aq. NH_3 . C. C. DAVIS

Proof of the existence of ferrous chloride hexahydrate. G. AGDE AND FR. SCHIMMEL. *Z. anorg. allgem. Chem.* 173, 111-4(1928).—If a soln. of FeCl_2 satd. at 10° is cooled until crystn. occurs, then filtered at low temp. and the crystals are dried in a refrigerator, analysis indicates the compn. $\text{FeCl}_2 \cdot 6\text{H}_2\text{O}$. The soly. curve is detd. and indicated decompn. into the tetrahydrate at 12.3° .

H. STÖBERTZ

The preparation of chemically pure chromic anhydride. A. V. RAKOVSKIĬ. *J. Russ. Phys.-Chem. Soc.* 60, 13-7(1928).—The method of Zittnaw (*Pogg. Ann.* 143, 468 (1871)) gave a 50-60% yield of chem. pure CrO_3 . Larger yields (81%), though not always as pure, were obtained from $\text{Na}_2\text{Cr}_2\text{O}_7$ by treatment with Ca(OH)_2 and CaCl_2 , decompn. of CaCrO_4 with H_2SO_4 and fractional crystn. Technical CrO_3 is best obtained from $\text{Na}_2\text{Cr}_2\text{O}_7$.

BASIL C. SOYENKOFF

The preparation of hydrobromic acid in the presence of charcoal. V. N. BOZHOVSKIĬ AND P. P. DANILCHENKO. *J. Russ. Phys.-Chem. Soc.* 59, 851-8(1927).—The reaction between H_2O and Br_2 at room temp. in the presence of activated charcoal depends on the adsorption of Br_2 and reaches equil. before the whole of Br_2 is used up. It proceeds to completion if HBr is removed by the addn. of CaCO_3 . At high temps. neither HOBr nor HBrO_2 exists; the reaction is $\text{Br}_2 + \text{H}_2\text{O} \rightleftharpoons 2\text{HBr} + \text{O}$, the necessary energy being derived from the oxidation of C. A quartz tube (or one of Fe lined with asbestos) was charged with Br-treated charcoal, steam passed through for 1 hr. and then a current of Br started. The concn. of HBr can be varied with the stream of Br_2 . The yields increase with temp, reaching 97-100% at 500° . The amt. of CO_2 is max. at 500° , decreasing again at 800° . The method is cheap and capable of an industrial application.

BASIL C. SOYENKOFF

The action of iron, cobalt and nickel carbonates on benzal chloride. I. I. VANIN AND A. A. CHERNOYAROVA. *J. Russ. Phys.-Chem. Soc.* 59, 891-4(1927).— PhCHCl_2 , after 3 hrs. at $120-60^\circ$ with an excess of NiCO_3 , gives 70.6% BzH . A 70.1% yield is obtained with CoCO_3 at 60° for 3 hrs., while with Fe carbonate at the same temp. a violent reaction takes place, leaving a charred residue. The activities of the 3 metals thus follow their order in the periodic table.

BASIL C. SOYENKOFF

Colloidal barium sulfate. W. A. LOTT. *J. Am. Pharm. Assoc.* 17, 454-6(1928).—Three methods of prepn. were tried. In each a cold soln. of H_2SO_4 in EtOH was added to a cold soln. of a Ba salt. The best results were obtained with $(\text{AcO})_2\text{Ba}$ as follows. Sixty g. of $\text{Ba(OH)}_2 \cdot 8\text{H}_2\text{O}$ were moistened with H_2O to form a paste. Glacial $\text{C}_2\text{H}_5\text{O}_4$ was added to neutrality and the concd. soln. cooled to 65° . A mixt. of 16.2 g. of H_2SO_4 and 65 g. of EtOH was cooled to 0° . The H_2SO_4 soln. was added with stirring to the Ba soln. and the mixt. dried in a vacuum desiccator at 60° .

L. E. WARREN

Critical study of the notation used for the mercurammonium salts. MAURICE FRANCOIS. *Ann. chim.* 8, 341-62(1927).—The ammoniated compds. of Hg, which still have some H linked to N, give compds. of the general type Hg_2NX when they are treated with NH_4OH , KOH , NaOH or even H_2O . Rammelsberg (*J. prakt. Chem.* 38, 558 (1888)) and Pesci (*Gazz. chim. ital.* 20, 485(1890)) believe that compds. of the type Hg_2Ni pre-exist in the mols., because they appear instantaneously after treatment with KOH . This opinion has been widely accepted in France [though not in other countries] and regarded as a rule. It is grossly misleading. Their process to count the number of NH_4X groups to be added to the Hg_2NX group in order to complete the mol. is thus worthless. $\text{HgI}_2 \cdot 2\text{NH}_3$ is beyond doubt a mol. combination of HgI_2 and NH_3 gas; the same is probably true of $\text{HgBr}_2 \cdot 2\text{NH}_3$ and $\text{HgCl}_2 \cdot 2\text{NH}_3$. The ammonium theory (as outlined in Wurtz's dictionary and modified by Hofman and Marburg (*Ann.* 305, 191(1899))) is sufficient to explain the formulas of all the ammoniated compds. of Hg, including compds. like HgH_2NI .

A. L. HENNE

Black nickel oxide. Observations to the conclusions of Gulbrand Lunde concerning nickel oxides. M. LEBLANC AND H. SACHSE. *Z. anorg. allgem. Chem.* 168, 15-16 (1927); cf. Lunde (*C. A.* 22, 2521).—Pure NiO_2 prepd., at high temp., has never been obtained or even characterized with accuracy. The Ni_2O_3 prepd. by L. was probably a system comprising NiO , active O and H_2O with possibly a max. of 10% of a higher Ni oxide.

A. L. HENNE

Black nickel oxide. GULBRAND LUNDE. *Z. anorg. allgem. Chem.* 169, 405-6 (1928).—Polemical with LeBlanc and Sachse (cf. preceding abstr.). LeB. and S. had overlooked a previous article of L. (*Skrifter Norske Videnskaps-Akad. Oslo. I. Matemat.-Natur.-Klasse* 1, 536-7(1925)).

A. FLEISCHER

Production of tenorite, specular hematite and crystallized CoO (DUBOIN) 8.

- DOBBERNBURGH, W. J. D. VAN: *Chemisch en physisch zuivere stoffen. Zilver-iodide*. Bergen op Zoom: P. Harte. 126 pp. Fl. 3.50.
- RISSENFELD, ERNST HERMANN: *Anorganisch-chemisches Praktikum. Qualitative Analyse u. anorgan. Präparate*. 7th ed., revised by R. Klement. Leipzig: S. Hirzel. 371 pp.

7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Theory of certain electrometric and conductimetric titrations. Correction. E. D. EASTMAN. *J. Am. Chem. Soc.* 50, 418(1928); cf. *C. A.* 19, 945. E. H.

Interpretation of the reactions of oxidation and of reduction in analytical chemistry by the electronic theory. L. DUPARC, E. ROGOVINE AND P. WENGER. *Helv. Chim. Acta* 11, 577-83(1928).—The ideas of Otis Coe Johnson published in 1883 and later expressed in terms of the electron theory by K. G. Falk some 16 years ago are explained as if they were new. W. T. H.

Electrometric titrations with a retarded auxiliary electrode. ERICH MÜLLER. *Z. physik. Chem.* 135, 102-6(1928).—If 2 similar electrodes are immersed in a soln. which is being titrated and the arrangement is such that diffusion of soln. around one electrode is prevented so that the concn. there is kept different from the concn. of reacting substance around the other electrode, a current will flow between the 2 electrodes and the max. e. m. f. will be reached at the end point. Such an arrangement can be accomplished by placing one of the electrodes in a T-tube, of which the opposite end is drawn out into a capillary and the third arm is sealed with rubber tubing through which the soln. in the T-tube can be withdrawn by suction. With such an electrode, the soln. has to be changed several times during a titration. This inconvenience can be overcome by placing one electrode (a fine Pt wire) in a capillary tube holding about 0.03 cc. of soln. The other electrode can be wound around this capillary tube. The soln. in the capillary will not diffuse out to any extent during a titration and the vol. of soln. in it is so small that it can be neglected. W. T. H.

Application of the quinhydrone electrode in electrometric titrations. II. ADOLPH I. RABINOVICH AND V. A. KARGIN. *Z. Elektrochem.* 34, 311-6(1928).—The discrepancy between the results obtained in titrating a weak acid with the quinhydrone electrode and the values as obtained with the H₂ electrode can be explained by the effect of the CO₂ in the air. In fact, the difficulty can be overcome by bubbling N₂ or other inert gas, through the soln. This introduces a complication which lessens the desirability of using the quinhydrone electrode. Kolthoff and Bosch have thought that the trouble was due to an acid impurity in the quinhydrone but this cannot be so in the work here described, as special precautions were taken with respect to the purification of the quinhydrone. The 2 max. of $\Delta E/\Delta V$ observed by MacInnis were reproduced and it was proved that the second max. was caused by CO₂. The observed displacement of the first max. can be produced by adding another weak acid such as alloxan. W. T. H.

Ceric salt as oxidizing agent in electrometric titrations. II. I. A. ATANASIU AND V. STEFANESCU. *Ber.* 61B, 1343-7(1928).—Ce salts have an advantage over KMnO₄ as oxidizing agent with respect to the facts that the solns. are more stable and the reactions of oxidation are not influenced much by changes in temp. or H-ion concn. Ce(SO₄)₂ soln., easily prepd. by electrolytic oxidation of the Ce⁺⁺—Ce⁺⁺⁺ soln. or by dissolving CeO₂ in concd. H₂SO₄, has not been used much in the past as oxidizer because the end point is not easy to recognize if one depends upon the change in color of the soln. (yellow to colorless). This difficulty disappears if the end point is detd. potentiometrically. In this paper titrations made with 0.1-0.01 N Ce(SO₄)₂ are described with HNO₂, H₂C₂O₄, H₄Fe(CN)₆, H₂O₂, Fe⁺⁺, As⁺⁺⁺, Sn⁺⁺ and Ti⁺⁺⁺. W. T. H.

The use of a cathode of dropping mercury in chemical analysis. EDMOND BAYLE AND LUCIEN AMY. *Compt. rend.* 186, 1610-2(1928).—The current produced by the dropping Hg is likely to give rise to oscillations which make accurate work difficult. This trouble has been overcome by replacing the capillary from which the Hg drops by a fine point which permits the dropping of 4-5 cc. of Hg per min. The oscillations are so rapid that they are not noticeable. It is shown how the method can be used for the detn. of small quantities of elements in the presence of considerable quantities of other cations, the strength of the current being dependent on the concn. and unaffected by less electropositive ions. Thus small amts. of Bi or Pb can be detd. in the presence of H₂SO₄ and Sb can be detd. in the presence of considerable Pb. W. T. H.

Stable thiosulfate solution. L. W. WINKLER. *Pharm. Zentralhalle* **69**, 369-71 (1928).—The addn. of 0.1 g. of $\text{Hg}(\text{CN})_2$ per l. to 0.1 and 0.01 *N* solns. of $\text{Na}_2\text{S}_2\text{O}_3$ serves to stabilize this reagent by keeping the solns. sterile. W. O. E.

Hypophosphoric acid. W. D. TREADWELL AND GEROLD SCHWARZENBACH. *Helv. chim. Acta* **11**, 405-16(1928).—A good method for the detn. of hypophosphoric acid (I) was found to be titration with UO_2SO_4 in H_2SO_4 soln. (not more than *N*) in an atm. of CO_2 with electrometric detn. of the endpoint. From the neutralization curve of I can be detd. accurately its last 3 ionization const.; for the first const. only the order of magnitude can be estd. $K'_1 \geq (10^{-2.2})$; $K'_2 = 10^{-2.81}$; $K'_3 = 10^{-7.27}$; $K'_4 = 10^{-10.02}$. The ionization const. indicate a sym. constitution for I. LOUISE KELLEY

The titration of phosphoric acid in the presence of boric acid by means of the citrate method. W. M. DEERNS. Rijksinstituut voor Chem., microbiol. en Hydrogr. Birscheljongerzoek, Helder, Netherlands. *Chem. Weekblad* **25**, 268-71(1928).—When H_3PO_4 and HBO_3 are titrated by the citrate method, the color change indicating the end of the phosphate detn. is not sharp, especially in the presence of a large quantity of HBO_3 and citrate. The amt. of indicator is likely to influence the end point. A mixt. of primary phosphate, boric acid and citrate reaches equil. very slowly.

A. L. HENNE

New indicator for the volumetric determination of phosphoric acid. L. DUPARC AND E. ROGOVINE. *Helv. Chim. Acta* **11**, 598-9(1928).—When Na salicylate soln. comes in contact with $\text{UO}_2(\text{OAc})_2$ soln., an intense orange color is produced. Expts. with aspirin and with salol show that the cause of the coloration is the phenolic and not the carboxylic group of salicylic acid. The reaction is sufficiently sensitive so that it can be used to det. the end point in the titration of H_3PO_4 with $\text{UO}_2(\text{OAc})_2$. The expts. were successful with dil. solus. so that it was possible to adapt the method to the analysis of urine. To buffer the HNO_3 soln. it is necessary to use Na salicylate instead of acetate. W. T. H.

Analysis of lead arsenates of various brands. A. A. RAMSAY. *Agr. Gaz. N. S. Wales* **38**, 945-8(1927).—Nine samples of com. Pb arsenate pastes and powders contained 62.85 to 65.73% PbO and 30.80 to 33.05% As_2O_3 , both on the dry basis, the content of PbHAsO_4 varying from 80.97 to 100% and of $\text{Pb}(\text{AsO}_4)_2$ from 0 to 22.94%. Comparison of these results with analyses of samples of the same brands obtained in 1910 showed an av. increase of 49% in the total As content, due in part to higher content of PbHAsO_4 in the 1927 samples. K. D. JACOB

Microtitration of lead cations and of chromate anions by a centrifugo-volumetric method. ROBERT F. LE GUYON AND ROGER F. AURIOL. *Compt. rend.* **186**, 1551-3 (1928).—Successful titrations of Pb^{++} with CrO_4^{--} and *vice-versa* were made with 0.5-10.0 cc. of 0.1 *N*, 0.02 *N* and 0.01 *N* solns., the end point being detd. by the failure to obtain a ppt. on adding an additional drop of reagent after centrifuging or by the appearance of a yellow color in the soln. W. T. H.

Analysis of silicate by fusion with alkaline hydroxide in a nickel crucible. C. J. VAN NIEUWENBURG AND H. H. DINGEMAUS. Technische Hoogeschool, Delft, Netherlands. *Chem. Weekblad* **25**, 266-8(1928).—The decompn. of a no. of technical silicates can be successfully accomplished by molten KOH or NaOH at about 400° in a Ni crucible. Besides economizing on expensive Pt crucibles, this procedure has the advantage of permitting the digestion of the fusion product with H_2O in the crucible itself. The time of contact between the alk. soln. and glass or porcelain is reduced. Direct contact between the flame and the Ni crucible must be prevented; then the crucible will last a practically unlimited no. of times. The degree of completeness of the decompn. has been measured with some glasses, porcelain, orthoclase, china clay, orthite and some samples of fire-clay brick. It proves to be of the same order of magnitude as with molten Na_2CO_3 , *e. g.*, about 99.5%. A. L. HENNE

The use of α -hydroxyquinoline for the chemical analysis of silicates. JOS. ROBERT-SCHERK. *J. Am. Ceram. Soc.* **11**, 587-94(1928).—A method devised by Berg for the detn. of different metals (cf. C. A. **21**, 1237, 1778, 2449, 2630, 3849, 3850) is used for silicates. Al_2O_3 and MgO are pptd. with α -hydroxyquinoline and the ppts. can be either dried and weighed or dissolved and titrated. Both can be detd. in the presence of SiO_2 , thus saving time, if the detn. of SiO_2 is not required. Details are given; also for the detn. of alkalis. C. H. KERR

The estimation of potassium as potassium chloroplatinate. MARGARET MCCURDY. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* **16**, 142-3(1928).—After Na_2PtCl_6 has been removed from K_2PtCl_6 with alc., it is more convenient to ignite the latter at a high temp. (Fischer burner) and from the weight of Pt, calc. the amt. of K, than to dry K_2PtCl_6 to const. wt. There is no loss in accuracy. A. L. H.

The analytical valuation of technical casein. FRITZ BAUM. *Chem.-Ztg.* **52**, 517-8(1928).—A discussion of methods proposed for the testing of com. casein. Analyses of 4 samples are given. W. T. H.

The evaluation of barium hydroxide, $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$. ED. V. DRATHEN. *Chem.-Ztg.* **52**, 518(1928).—Samples of $\text{Ba}(\text{OH})_2$ were dissolved in CO_2 -free water, the solns. filtered and titrated with 0.2 N HCl, H_2SO_4 and $\text{H}_2\text{C}_2\text{O}_4$, phenolphthalein being used as indicator. Correct results were obtained with HCl alone. Apparently there is absorption of alkali by ppts of BaSO_4 or BaC_2O_4 corresponding to about 2% of the total alkali present. W. T. H.

New method for determining water by distillation with xylene and tetrachloroethane. KURT SCHAEFER. *Chem.-Ztg.* **52**, 408(1928).—A new construction of the app recommended by S. in 1924 is shown. The distg. flask which serves to hold the excess reagent is provided with a ground-glass stopper connecting with a condenser at the top of which is a siphon tube which carries the excess reagent back to the flask through another tube leading through the ground-glass stopper. In the condenser is a measuring tube which is filled with xylene or tetrachloroethane at the start. During the expt. the water collects in this tube, replacing the reagent. When tetrachloroethane is used, which has the advantage of not being combustible, a slight change in the construction of the app. is necessary. W. T. H.

Modification of the pyrogallol method for determining the amount of oxygen in air. L. A. MUNROE. Univ. of Manitoba. *J. Chem. Education* **5**, 741-2(1928).—The app. recommended consists of a test tube fitted with a 2-holed rubber stopper. Through one hole connection is made with a leveling bulb contg. alk. pyrogallol. The bulb carries at the top a cork stopper with a small perforation so that air does not enter and leave the bulb as readily as if it were left open. With the pyrogallol soln level with the upper surface of the stopper in the test tube, a glass is inserted in the other hole of its stopper and the pyrogallol is forced up into the tube by lowering the test tube. W. T. H.

Helium studies. I. Method for the detection of small quantities of helium. FRITZ PANETH AND KURT PETERS. *Z. physik. Chem.* **134**, 353-73(1928). Kirchhoff and Bunsen, in their classic spectroscopic researches, estd 3×10^{-10} g as the limit of detectability of Na. They had in mind what Eimich has called the *theoretical* sensitivity of the spectroscopic method for detecting Na because in their work K. and B. always had more Na present. As a rule the *practical* sensitivity, or the smallest quantity which can actually be worked with and detected, is usually 10 or 100 times as great. Lord Rayleigh (Strutt) succeeded in detecting He when only 5×10^{-7} cc was present and in detecting Ne at about half this concn. The present writers, however, by taking pains to overcome several sources of error have succeeded in refining the work with the spectroscope so that 10^{-10} cc of either He or Ne can be detected. They have made the practical sensitivity coincide with the theoretical sensitivity. The presence of Ne can be detected in 10^{-4} cc of air. With the method now described it is possible to detect the evolution of He from the invisible active ppt of Th; in this case the γ -activity of Th B and Th C in radioactive equil must be equiv. to only 0.1 mg of Ra. In order to obtain this precision it is necessary to free the gas under examn. from all constituents other than Ne and He. This is accomplished for gases other than H_2 by absorption with charcoal chilled by liquid air. With H_2 , the method of exploding with O_2 is of course permissible, the excess O_2 being removed by cold charcoal but it is better to effect the combustion with a catalyzer preferably Pd sponge. Larger quantities of H_2 can be removed more readily by means of Ca filings. The method when carried out with the greatest precision, requires attention to a great many details concerning which the original paper must be consulted. An interesting table is given of some 33 wave lengths showing the concn. at which the different spectral lines of He and Ne can be identified. W. T. H.

The influence of some of the elements in iron on the oxygen determination by the hydrogen reduction method. P. BARDENHEUER AND CHR. A. MÜLLER. *Arch. Eisenhüttenwesen* **1**, 707-12(1927-8), *Stahl u. Eisen* **48**, 795(1928).—The effect of N, P and S on the detn. of O in steel was investigated. During the detn. of O by the H reduction method volatile N-HI compds are formed, which are possibly retained in the U-tubes by the P_2O_5 and erroneously calcd as O. In 8 samples of an acid-Bessemer steel with 0.0203% N, the O was detd. by the H reduction method and found to be 0.003%. Next the N remaining in the samples and absorbed by the P_2O_5 in the U-tubes was detd. The av. decrease of the N content of the samples was 28%; the amt. of N absorbed by the tubes, on the other hand, was negligible. Expts. with nitrized samples disclosed the fact, that while the total N content of the samples escaped, only 0.75-0.95% of the

N present in the samples was absorbed by the P_2O_5 tubes. If, however, the O detn. was carried out without the addn. of Sb, 15.62–18.45% of the N present was absorbed by the P_2O_5 tubes, which shows that the usual addn. of Sb minimizes the effect of N. In order to investigate the effect of P, 10 g. Sb, 0.06 g. MnO and 0.1 g. of Fe-P contg. 21.1% P were added to 10 g. of electrolytic Fe and then the O was detd.; only 73% of the O of the MnO was obtained as H_2O . The distribution of P was more uniform, the same as it is in steel, in the 2 following tests: to samples with 0.154 and 0.240% P, 0.06% MnO was added and the O content detd. With 0.154% P, 59% of the O of MnO was obtained as H_2O , with 0.240% P only 47%. The effect of S was investigated in the same way. To samples with 0.270 and 0.115% S 0.06% MnO was added; with 0.270% S 80%, with 0.115% S 95% of the O of the MnO was obtained as H_2O . The N and S contents of steels do not influence the O detn. by the H reduction method; the P content however causes considerable differences in the results of the O detn. J. A. SZILARD

The Bunsen method for analyzing pyrolusite, etc. E. RUPP. *Chem.-Ztg.* **43**, 429–30 (1928).—Directions are given for constructing a suitable app. from materials available in every lab. Place 2.5 g. of KI in a stout 750-cc. bottle carrying a 2-holed rubber stopper. Through one hole a $CaCl_2$ drying tube is inserted and through the other hole the gas enters from the distg. flask. Dissolve the KI in 250–300 cc. of water. Place about 4 milli-equiv. of the oxide in a distg. flask with a 30 cc. bulb and treat it with 25 cc. of concd. HCl. (It is best to introduce the substance in a small glass vessel so that no powder touches the sides of the flask.) Distil over half of the acid, using a small flame protected from drafts. In order to protect the KI soln. from sucking back into the flask, and herein lies the special feature of the app., the distn. tube of the flask is cut off, leaving about 5 cm., and this short tube is bent so that it feeds into the large bottle with the latter upright and the distg. flask inclined at about 45° . This short tube is connected with a tube, 18–20 cm. long, leading to the bottom of the bottle contg. the KI soln. The tube is a capillary of 2.5–2.8 mm. internal bore. It is also well to insert in the neck of the distg. flask a tube with rubber tubing at the top and a pinch-cock, as in a vacuum distn. To reduce the expense, a mixt. of 1 g. KI and 2 g. of KBr can be used instead of the 2.5 g. of KI. Or, the KI can be replaced altogether by 0.1 N arsenite soln., in which case an open beaker can be used as receiver. Good results can also be obtained by using an alk. soln. of KI so that NaI or $NaIO_3$ is formed and after the evolved Cl_2 has all been absorbed, an equiv. amt. of I_2 is liberated upon the addition of acid. W. T. H.

Simple detection of cobalt in cobalt steels. JAMES MOIR. *J. S. African Chem. Inst.* **11**, 33 (1928).—Dissolve enough of the sample to yield at least 0.1 mg. of Co in aqua regia and exam. the soln. with the spectroscope using a wide slit. With considerable Co, the red end of the spectrum is cut off entirely and 2 narrow absorption bands (γ 621 and γ 607) are visible in the orange area. With little Co, the 2 bands in the orange are not seen but towards the red end a very deep band appears at γ 700 and a fairly deep band at γ 661. With high Co these bands can be obtained by dilg. the soln. with concd. HCl soln. (not H_2O). 0.0002 g. (10 mg. of steel with 2% Co) Co is easily detected by this method when dissolved in 8 cc. of aqua regia. W. T. H.

Vanadium in chrome-vanadium-tungsten steels. Volumetric determination. H. H. WILLARD AND PHILENA YOUNG. Univ. of Michigan. *Ind. Eng. Chem.* **20**, 764–8 (1928).—V can be oxidized in the presence of W, Cr, Mo and Fe by $KBrO_3$ in a soln. contg. NH_4 salt and a definite concn. of HCl. The excess bromate can be removed by boiling and the vanadic acid titrated electrometrically with $FeSO_4$ soln. The end point can also be detd. by the use of diphenylbenzidine as internal indicator which gives a purple color with vanadic acid. In this case, however, it is necessary to remove all H_2WO_4 which prevents the formation of the color. A correction must be applied when diphenylbenzidine is used for the amt. of HVO_3 reduced by the indicator and the small quantity of V carried down by the WO_3 should be estd. by dissolving the ppt. in 4% NaOH soln. and comparing the color of the soln. with that of a known quantity of vanadotungstic acid. W. T. H.

Persulfate method for chromium plus vanadium in chrome-vanadium-tungsten steels. Modified procedures. H. H. WILLARD AND PHILENA YOUNG. Univ. of Mich. *Ind. Eng. Chem.* **20**, 764–8 (1928).—In the persulfate method for the detn. of V and Cr in steel it has been necessary in the past to remove tungsten as WO_3 from the oxidized, acid soln. of the sample. This is unfortunate because the WO_3 ppt. is likely to carry with it a little V. If, however, the ppt. of WO_3 is dissolved in 4% NaOH (not over 15 cc.) the alk. soln. can be added to the main filtrate from the WO_3 being used and there will be no pptn. of WO_3 if the acid soln. contains sufficient Fe^{+++} . It is recommended, therefore, to take 1–1.5 g. of the original steel and, after removing the WO_3 in the usual

way, to add an addnl. g. of Fe. Then on adding the soln. of WO_3 in NaOH to the main soln. there will be no pptn. and the persulfate method can be carried out as in the absence of W. The end point in the Cr and V titrations can be detd. electrometrically or diphenylbenzidine can be used as inside indicator. In that case, after the addn. of the HCl to reduce the MnO_4^- formed by the persulfate oxidation, it is necessary to reduce the acidity by adding NaOAc before introducing the indicator. W. T. H.

Microchemical determination of calcium. F. ROGOZINSKI. Cracoeire Univ. *Bull. soc. chim.* 43, 464-9(1928).—Quantities of Ca ranging from 0.27 to 1.1 mg. were detd., with accuracy as $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ by pptn. with 1 cc. of H_2SO_4 and 4 vols. of alc. in a centrifuge tube. The ppt. was dried at $100-104^\circ$. W. T. H.

The determination and colorimetric determination of traces of aluminum. I. M. KOLTHOFF. *J. Am. Pharm. Assoc.* 17, 360-1(1928)—In weakly acid solns. hydroxymethylanthraquinone is a very delicate indicator for Al, a purple color being produced. A buffer soln. consisting of 10 vols. of 5 N AcOH and 9 vols. of 5 N NH_4OH is used. To 10 cc. of soln. contg. 0.02-1.0 mg. of Al per l. 0.25-1.0 cc. of buffer solution and 0.3 cc. of 0.1% indicator in EtOH are added. After 15-30 min. the color is compared with a blank and with a standard soln. of Al. At 50° the test is decisive in 5 min. Cu salts have a disturbing effect but the difficulty may be overcome by adding an excess of $\text{Na}_2\text{S}_2\text{O}_4$. Fe, Sb Sn and Bi interfere but this may be overcome by the addn. of $\text{KNaC}_4\text{H}_4\text{O}_6$ or better $\text{Na}_2\text{C}_4\text{H}_4\text{O}_6$. The sensitivity to the reaction for Al is thereby diminished. L. E. WARREN

Titrimetric determination of aluminum. II. ALFRED WÖHLK. *Dansk Tids. Farm.* 1, 525-36(1927); cf. *C. A.* 18, 953.—To the soln. of Al^{+++} salt, add NH_4Cl and NH_4OH till basic to methyl red. Boil, allow the $\text{Al}(\text{OH})_3$ ppt. to settle and filter. Dissolve the ppt. in acid and repeat the pptn. Dissolve the washed ppt. in a measured vol. of hot, N $\text{H}_2\text{C}_2\text{O}_4$ and titrate the excess acid with N NaOH using methyl red as indicator. O. A. NELSON

Rapid method for the separation of aluminum and beryllium. I. M. KOLTHOFF AND ERNEST B. SANDELL. Univ. of Minn. *J. Am. Chem. Soc.* 50, 1900 4(1928).—Treat the soln. of Be and Al salts (contg. not more than 0.1 g. of either oxide in 100 cc.) with oxime in AcOH soln. at $50-60^\circ$. Add 2 N NH_4OAc until a permanent ppt. is obtained and then 20-25 cc. in excess. Filter, wash with cold water, dry at $120-40^\circ$ and weigh as $(\text{C}_2\text{H}_5\text{ON})_2\text{Al}$. In the filtrate ppt. Be by adding NH_4OH , filter, ignite and weigh as BeO . W. T. H.

Colorimetric determination of titanium by hydrogen dioxide. FREDERICK G. GERMUTH. *J. Am. Chem. Soc.* 50, 1910(1928).— H_2PO_4 causes a slight fading of the color characteristic of Ti^{+++} .— H_2O_2 reaction but the addition of 1 cc. of 0.1% $\text{UO}_2(\text{OAc})_2$ soln. for each mg. of Ti present counteracts this effect. W. T. H.

Adsorption of cadmium sulfide and its importance in the estimation of cadmium. HARRY B. WEISER AND EDWARD J. DURHAM. *J. Phys. Chem.* 32, 1061-4(1928).—It has been known for a long time that the ppt. produced by H_2S in HCl soln. of Cd^{++} is likely to be contaminated with chloride. Treadwell has assumed this to be caused by the formation of a double salt but it is here shown that the best explanation is that of adsorption by CdS . The adsorption was studied at 25° with varying concns. of HCl and also in a soln. kept satd. with H_2S when it cooled from 80° to 25° . All the evidence seems to be in favor of the adsorption theory. The adsorption is sufficient and so varied under slightly different conditions that it would seem that the detn. of Cd as CdS cannot be regarded as an accurate analytical method. W. T. H.

Determination of lead in gold by spectral analysis and a new method for emission spectral analysis. IV. WALTHER GERLACH AND EUGEN SCHWEITZER. *Z. anorg. allgem. Chem.* 173, 92-103(1928).—The intensity of the Pb lines tends to fall off after a short time and eventually increases and falls again. This was found due to the formation of PbO as a result of heating the electrodes. To avoid this effect it is necessary not to use over 1-1.5 ampere of primary current. In Ångström units, the Pb lines at 2614 and 3684 can be used for the detn. of Pb in Au. With 0.8% Pb the 2614 line has the same intensity as the 2544 line for Au. Some 28 Au samples with Au content ranging from 0.0027 to 0.985% Pb were analyzed by the spectrographic method, the exact details of which are given, and all of the results agreed closely with those obtained by the usual methods of chem. analysis. Another method of spectral analysis is described in which the spectrum of Sn is compared with that of $\text{Au} + x\%$ Pb, in which the Pb content is detd. by comparing the intensity of Au and Sn lines. W. T. H.

A spectroscopic method for the detection of deposition of impurities in a metal. V.

WALTHER GERLACH AND EUGEN SCHWEITZER. *Z. anorg. allgem. Chem.* **173**, 104–10 (1928).—A method of spectral analysis is described which gives data showing whether impurities are distributed uniformly or otherwise throughout the alloy. By this method it was found that in Au contg. 0.04–1.0% of Pb, the latter element was deposited, for the most part, at the grain boundaries of the Au crystals. W. T. H.

Analysis of chrome iron ore. **E. DITTLER.** *Z. angew. Chem.* **41**, 132–3 (1928).—Fusion of this ore with Na_2CO_3 is never complete, and the analysis is best carried out in the following manner. The finely ground mineral is fused with 10 times its wt. of NaOH in a Ag crucible, the melt dissolved in water, acidified with HCl, and the pptd. Ag and AgCl are removed. The filtrate, to which a few cc. of H_2O_2 have been added to reduce the Cr present, is evapd. to dryness and the silicic acid removed by evapn. with HF; the residue is decompd. with Na_2CO_3 and a little KNO_3 , and, after treatment with H_2O_2 , the combined oxides of Al, Fe and Cr are pptd. with NH_3 soln. Provided that excess of H_2O_2 is removed before pptn., all the Cr is obtained as oxide. The 3 oxides are treated with Na_2O_2 when the Fe remains as insol residue and the chromate is detd. volumetrically in the filtrate after conversion of the Mn present into MnO_2 while the Al content is obtained by difference. In the filtrate from the 3 oxides, Ca, Mg and Mn are detd. by the ordinary methods. B. C. A.

Improvements in the method used for the ultimate analysis of organic compounds. **A. WAHL AND J. P. SISLEY.** *Compt. rend.* **186**, 1555–8 (1928).—Dumas and Stas obtained excellent results in the combustion of org. substances by using 1 g. of substance and a layer of CuO about 1 m. long. With these materials, a combustion required about 8 hrs. The work of Berl and others has shown that good results can be obtained with very small quantities of substance by using a micro-balance sensitive to 0.01 mg. It is here pointed out that equally good results can be obtained with 0.08–0.10 g. of substance, a furnace 50–60 cm. long and heated by 6 burners, and with the ordinary chemical balance in 25 min. to 1 hr. When halogen is present calcined PbCrO_4 should be used instead of the CuO. The results on 16 different substances, including thiourea, which is regarded as hard to burn, were satisfactory for both H and C. W. T. H.

Note on the determination of arsenic in organic material. **A. W. ROWE.** *J. Lab. Clin. Med.* **12**, 150–3 (1926); *Physiol. Abstracts* **12**, 136.—The As is extd. by treatment with HCl, and distd. as AsCl_3 ; NH_4 arsenite is then formed, and treated with $\text{Fe}_2(\text{SO}_4)_3$. The ppt. is dissolved in HCl and the soln. treated with Zn and HCl, the resulting AsH_3 being estd. by Sanger and Black's method. H. G.

Determination of alcohols. **A. VERLEY.** *Bull. soc. chim.* **43**, 469–72 (1928).—As reagent use a mixt. of 2 parts of pyridine and 1 part of Ac_2O contg. 5% of AcCl . Carefully measure out 10 cc. of the mixt., dil. with water and det. how much NaOH is necessary to effect neutralization with phenolphthalein as indicator. To about 0.1 mol. of the alc. in a dry flask add 10 cc. of the above acetylating mixt. and heat under a reflux condenser until acetylation is complete. Rinse out the flask and titrate again with NaOH. From the loss in acidity, the amt. of AcOH used up in the acetylation reaction is easily detd. It is a measure of the amt. of alc. present. The acetylation was found to be complete in 1 hr. with butyl alc., but 4 hrs. was required with menthol and 3 hrs. with santalol and with methylphenylcarbinol. If proper precautions are taken, the results are accurate. W. T. H.

Examination of some tests for methanol. **E. W. TODD.** Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* **16**, 147–51 (1928).—A study of the various methods for detecting EtOH shows that the fuchsine color test is the most satisfactory. A. L. HENNE

Electrometric titration of phenols in alcoholic solution. **W. D. TREADWELL AND GEROLD SCHWARZENBACH.** Zürich techn. Hochschule. *Helv. Chim. Acta* **11**, 386–405 (1928).—It is often necessary to titrate weak org. acids in alc. solns., sometimes because the acid is not very sol. in water and sometimes because the salts of the weak acids are too much hydrolyzed in aq. soln. to permit an accurate titration. The addn. of the alc., however, always exerts an effect upon the ionization of the acid. It is desirable, therefore, to know the ionization of weak acids in alc. In this paper it is shown how the ionization const. can be computed, in many cases, by the result of electrometric titration and the consts. of 26 phenolic compds. of weakly acid character were detd. In abs. alc. the following 8 ionization consts. were obtained: phenol, $10^{-12.6}$; pyrocatechol, $10^{-12.0}$; resorcinol, $10^{-12.3}$; hydroquinone, $10^{-12.8}$; *o*-nitrophenol, $10^{-12.7}$; *p*-nitrophenol, $10^{-12.1}$; picric acid, $10^{-2.7}$; 2,4-dinitrophenol, $10^{-2.0}$. In 96% alc., the following 18 ionization consts. were detd.: *p*-nitrosophenol, $10^{-8.1}$; α -nitroso- β -naphthol, $10^{-8.7}$; α -monohydroxyanthraquinone, $10^{-8.8}$; β -monohydroxyanthraquinone,

$10^{-4.7}$; 1,4-dihydroxyanthraquinone, $10^{-4.3}$; 1,8-dihydroxyanthraquinone, $10^{-4.3}$; 1,2-dihydroxyanthraquinone, $10^{-4.4}$; 1,3-dihydroxyanthraquinone, $10^{-4.3}$; 2,3-dihydroxyanthraquinone, $10^{-4.7}$; 2,6-dihydroxyanthraquinone, $10^{-4.6}$ and $10^{-7.4}$ (the only one of these isomers in which the second hydroxyl group was acidic enough to be titrated); 1,2,4-trihydroxyanthraquinone, $10^{-4.0}$; 1,2,5-trihydroxyanthraquinone, $10^{-4.7}$; 1,2,6-trihydroxyanthraquinone, $10^{-4.8}$; 1,2,7-trihydroxyanthraquinone, $10^{-4.2}$; 1,2,3-trihydroxyanthraquinone, $10^{-4.6}$; 1,2,3,4-tetrahydroxyanthraquinone, $10^{-4.1}$; eriochrome yellow G, $10^{-4.6}$; eriochrome-blue-black R, $10^{-4.6}$. With respect to these last 2 compds., the former is obtained by conjugating diazotized *m*-nitroaniline with *o*-cresotinic acid and the latter from 1-hydroxy-2-aminonaphthalene-7-sulfonic acid and β -naphthol.

W. T. H.

Gasometric determination of primary aromatic amines. A. V. PAMFILOV. *J. Chem. Ind. (Moscow)* 4, 328(1927); cf. Grigoriev, *C. A.* 21, 37.—The method described by Grigoriev for detg. primary aromatic amines has been investigated and found more complicated and less exact than the method of diazometric detn. by titration. The latter works best under conditions described by Jones and Lee (*C. A.* 18, 3022), i. e., by operating in presence of an excess of nitrate which is titrated back by *p*-nitroaniline. To prevent volatilization of HNO_2 , HNO_3 is added to the soln. which is to be analyzed.

BERNARD NELSON

A new test for acrolein. J. PRITZKER. *Helv. Chim. Acta* 11, 445(1928).—Powick (*C. A.* 18, 1580) has worked out the following test for acrolein (I): treat 3 to 4 drops of dil. aq. I with an equal quantity of 3% H_2O_2 . Allow the mixt. to stand a min. and then add 5 cc. of concd. HCl and 5 cc. of phloroglucinol in Et_2O . Shake the mixt. 1 min.; the HCl layer assumes an intensely red color. Prittker has found this test thoroughly satisfactory.

REYNOLD C. FUSON

Possible extension of Stepanov's method to the determination of halogen attached to the benzene nucleus. G. FAYREL AND BUCHER. *Ann. chim. anal. chim. appl.* 9, 321-4(1927).—Stepanov's method (*C. A.* 1, 397) has proved successful for detg. halogen in org. substances but has not given good results with halogen attached to the benzene nucleus. In nearly every case, however, the difficulty can be overcome by using twice as much Na as S. originally recommended and raising the temp. at which the decomposition takes place. The latter end can be accomplished easily by substituting isoamyl alc. for EtOH. Introduce 0.4 g. of the org. substance together with 40 g. of isoamyl alc. into a flask which is connected to a reflux condenser. Through the top of the condenser, add in 2-3 portions, 50 times the wt. of Na theoretically required to combine with the halogen present. This usually raises the temp. to about 140° . Apply heat, if necessary, to keep the reaction temp. at about this point. Then, after all the Na has dissolved, continue boiling for half an hr. Allow to cool until the alcoholate begins to sep. out, then add 100 cc. of water, make acid with HNO_3 and transfer to a separatory funnel. Drain off the lower layer of liquid, and wash the alc. layer at least twice. To the aq. soln. add 40 cc. of 0.1 *N* AgNO_3 and titrate the excess Ag by the Volhard method.

W. T. H.

The metallic cyanates. IV. Chromium. A new reaction and a new gravimetric method for the determination of this element (RIPAN) 6. Injury of vegetation caused by factory fumes—methods of chemical analysis (VERPLANCKE) 13.

FICHTER, FRIEDRICH: *Anleitung zum Studium der chemischen Reaktionen und der qualitativen Analyse*. 4th ed. Stuttgart: F. Enke. 126 pp. Paper, M. 5.20; cloth, M. 6.70.

GIL, JOSÉ CASARES: *Tratado de análisis químico*. Tomo II. 3rd ed., revised and enlarged. Toledo: A. Medina. 990 pp.

KRAUS, F. J.: *Computation Tables for Volumetric Analysis. Part I. General. Part II. Permanganate Methods*. Aussig, Czechoslovakia: Verlag Stephan Tietze. Reviewed in *Chem. Trade J.* 83, 30(1928).

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8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

The plastic deformation of ore minerals. M. J. BUEGGER. Mass. Inst. Techn. *Am. Mineral* 13, 1-17, 35-51 (1928).—The position of slip striations on deformed *galena* indicate that it deforms along (001) by translation. The absence of striations on cleavage faces parallel with the load, when the latter is normal to a (110) plane, gives the translation directions as (110). The deformation involves a reorientation of crystallographic directions such that a (111) direction tends to become parallel to the load. *Sphalerite* deforms by gliding on (111), the character of the movement being that of secondary twinning, not of translation. *Chalcopyrite* deforms by translation on (111). The translation direction is predicted as (110) from a consideration of the at. arrangement. Good results were not obtained on pyrrhotite. Conclusion: Very pure minerals are to be expected to deform by translation, while concd. solid soln. minerals deform by secondary twinning. The results are interpreted in terms of crystal structure.

C. B. SLAWSON

Miargyrite and tetrahedrite from the Flint district, Idaho. EARL V. SHANNON. U. S. Nat. Mus. *Am. Mineral* 13, 18-21 (1928).—The paper contains crystallographic and micrographic descriptions of these sulfides, with notes on their occurrence and paragenesis.

C. B. SLAWSON

Zirklerite. A new mineral formed by thermodynamic metamorphism from the saline stocks of Northern Germany. E. HARBORT. *Kali* 22, 157-61 (1928).—The formula of the mineral is approx. $[\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O} + 4.5 (\text{Fe}, \text{Mg}, \text{Ca}) \text{Cl}_2 \cdot 2\text{H}_2\text{O}]$. It oxidizes in the air, is uniaxial, +, and cleaves on a rhombohedron, its hardness is about 3.5, sp. gr. 2.6.

A. L. HENNE

The natural history of the silica minerals. A. F. ROGERS. Stanford Univ. *Am. Mineral* 13, 73-92 (1928).—This presidential address is an excellent critical summary of the literature to date dealing with the following modifications of SiO_2 : *opal*, *chalcedony*, *quartz*, *tridymite*, *cristobalite* and *lechatelierite*.

C. B. SLAWSON

Production of tenorite, specular hematite and crystallized cobaltous oxide. A. DUBOIS. *Compt. rend.* 186, 1133-5 (1928).—CuO was added little by little to fused KF and the mixt. was allowed to cool slowly. On extn. with water crystals of CuO were obtained. Better crystals were made by adding to the fused KF the result of a previous fusion of hydrated KF and CuO or CuCl_2 , KCl being then added and the mass kept at a red heat for 2 or 3 days, the resulting crystals being larger as the heat treatment was prolonged. Analysis gave Cu 79.85%; sp. gr. 6.3. By a similar procedure with CoCl_2 in place of CuCl_2 , crystd. CoO was obtained.

L. W. RIGGS

Occurrence of hematite at Bernece, Kom. Hont, Hungary. FR. PAPP. *Földtani Közlöny* 57, 112-7 (1927).—A description of the crystals; the hardness = 6-7; $d^{20} = 5.31$.

A. L. HENNE

Manganiferous mineral from Kara-Chaguir in Fergana. A. SAUKOV. *Compt. rend. acad. sci. U. R. S. S. [Russia]* 1926, 77-9.—The black mineral has $d \ 2.985 \pm 0.09$ and contains: Fe_2O_3 2.7, Al_2O_3 9.8, ZnO 10.4, NiO 11.8, CoO 1.4, CuO 5.41, CaO 0.08, V_2O_5 4.3, MnO_2 23.6, H_2O (−110°) 4.6, H_2O (+110°) 19.9, insol. 2.95, Mo also is present.

B. C. A.

Natural hydrated magnesia. N. S. KURNAKOV AND V. ČERNÝH. *Mem. soc. russe min.* 55, 74-95 (1926).—*Brucite* has $d \ 2.360-2.396$, $\omega \ 1.5534$, $\epsilon \ 1.5840$, $2V = 2-8^\circ$; *nonulite* has $d \ 2.310-2.397$, $2V = 18-26^\circ$. Dehydrated brucite has $\omega_D \ 1.6282$, $\epsilon_D \ 1.6192$. The + double refraction becomes − on dehydration of brucite, and again + when the dehydrated mineral remains in the air. The 2 minerals cannot be differentiated by chem. or thermal investigation.

B. C. A.

Hydrotalcite and pyroaurite. N. S. KURNAKOV AND V. ČERNÝH. *Mem. soc. russe min.* [ii], 55, 118-28 (1926).—The brucite nucleus is present in both minerals; in hydrotalcite it is assocd. with Al_2O_3 and in pyroaurite with Fe_2O_3 . CO_2 (0-10.84%) and H_2O (about 8 mols.) are also present.

B. C. A.

Data on zoned plagioclase. I. E. LENGVEL. *Földtani Közlöny* 57, 95-102 (1927).—A petrographical study.

A. L. HENNE

Larsenite and calcium-larsenite, new members of the chrysolite group, from Franklin, N. J. C. PALACHE, L. H. BAUER AND H. BERMAN. Harvard Univ. *Am. Mineral* 13, 142-4 (1928).—Larsenite, PbZnSiO_4 , occurs as slender prismatic crystals in cavities in massive ore. It is orthorhombic, white, transparent with adamantine luster and good prismatic cleavage; sp. gr. = 5.90. Optically −, $2V$ about 80° , $\rho > v$ perceptible. Optic plane lies across the elongation with an optic axis nearly normal

to the cleavage. $Y = c$, $X = a$, $\alpha = 1.92$, $\beta = 1.95$, $\gamma = 1.96$. Analysis gave: SiO_2 16.87, PbO 56.66, ZnO 22.74, FeO 0.10, MnO 0.14, CaO 2.42, MgO 0.20, H_2O 0.76%. Calcium-larsenite is more abundant and occurs massive in the walls of the veins. It is white opaque with a greasy luster and indistinct cleavage, and fluoresces lemon yellow in ultra-violet. Sp. gr. = 4.421. Optically —, $2V = 5^\circ$; $\alpha = 1.760$, $\beta = 1.770$, $\gamma = 1.774$. Some samples yield higher ns . The compn is: SiO_2 24.10, FeO 0.48, MnO 0.57, CaO 16.36, ZnO 30.61, PbO 27.63, MgO 0.23, H_2O 0.12%. C. B. SLAWSON

The oscillation method of x-ray analysis of crystals. The use of the oscillation method in determining the structure of analcite. JOHN W. GRUNER. Univ. of Minn. *Am. Mineral* 13, 123-41, 174-93(1928).—Analcite has a cubic holohedral lattice and seems to belong to the space group O_h^9 , although the data agree practically as well with the requirements of O_h^{10} , and the correct choice must await further data. The unit cube contains 16 mols. of $\text{NaAlSi}_2\text{O}_6 \cdot \text{H}_2\text{O}$. Its edge is 13.64 Å. c. long. Full details of the technic of the oscillation method are given. C. B. SLAWSON

Zeolites from Ritter Hot Spring, Grant County, Oregon. D. F. HEWETT, E. V. SHANNON AND FOREST A. GONVER. *Proc. U. S. Nat. Museum* 73, Art. 16, 1-18(1928).—Samples of diabantite, levynite, calcite and heulandite are described as to their phys. features, while mesolite, pseudomesolite, thomsonite, stilbite, analcite and chabazite are described physically, and their chem. analyses are reported. The assocn. of the zeolite-bearing areas, fault fissure and active hot spring is considered in an attempt to interpret the mineral genesis. L. W. RIGGS

Anauxite from the Ione formation of California. V. T. ALLEN. Univ. of Calif. *Am. Mineral* 13, 145-52(1928).—A micaceous mineral, for which the name *ionite* had been proposed, is identified as anauxite. It was formed by the weathering of biotite or chlorite under tropical conditions. Four new analyses and optical data are given. C. B. SLAWSON

Anauxite, a mineral species, based on material from Bilin, Czechoslovakia. C. S. ROSS AND WM. F. FOSHAG. U. S. Geol. Survey. *Am. Mineral* 13, 153-5(1928).—Analyses of 2 specimens give the formula $2\text{H}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 3\text{SiO}_2$. The mineral is monoclinic with vermicular crystal habit. It shows perfect basal cleavage with hexagonal cross section. Color white, $\alpha = 1.559$, $\beta = 1.564$, $\gamma = 1.565$. Extinction nearly parallel; $a = Y$, $b = Z$, $c = X$, $2V = 30-40^\circ$, $\rho > \epsilon$. It is a widely occurring clay mineral in so-called *kaolins*. C. B. SLAWSON

Origin of metal in meteorites. GEORGE P. MERRILL. *Proc. U. S. Nat. Museum* 73, Art. 21, 1-7(1928).—The relations between the metallic and silicate portions of stony meteorites as interpreted by different observers are reviewed. The questions considered are: (1) What is the source of the material and its manner of deposition? (2) Will the same explanation apply to the pallasites, particularly those of the Rokycky group, which seems applicable to the stony forms? M. considers the metal as introduced at a temp. lower than that of the m.p. of the silicates and in the form of lawrencite (FeCl_2), which is reduced, at a temp. not exceeding 400° in an atm. of H_2 , to the condition of a metallic paste in which the silicate fragments become engulfed. L. W. RIGGS

A new tungsten (scheelite) deposit at Lower Sackville, Halifax County, N. S. HARRY PIERS. Provincial Museum Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 38-45(1928).—A description of a vein of scheelite (CaWO_4) recently prospected. The mineral occurred in the quartzite division of the gold measures, of lower Cambrian or possibly Pre-cambrian age. A. L. HENNE

Silica in Canada. Its occurrence, exploitation and uses. II. Western Canada. L. HEHER COLB. *Can. Dept. Mines, Mines Branch No. 686*, 56 pp.(1928).—The Beauséjour sand deposit, Black Island sandstone and 3 other deposits in Man., 2 in Sask., 3 in Alb. and 3 in B. C. are described. Over 20 chem. analyses and many granulometric analyses of the sands are reported. The developments of the silica industry in Eastern Canada since the last report (cf. C. A. 18, 369) are reviewed. L. W. RIGGS

The salt deposits in the upper valley of the Aller River at Wefensleben-Belsdorf. WALTER ZWANZIG. *Kali* 22, 45-9, 62-6, 76-9, 92-4, and 113-6(1928).—Descriptive. A. L. HENNE

Helium and the genesis of petroleum. C. COLERIDGE FARR AND M. N. ROGERS. *Nature* 121, 938(1928).—Using Lind and Bardwells' conclusions that hydrocarbons undergo chem. change when bombarded by α particles, and their quant. results, and assuming that He arises from α particles ejected by radioactive substances, F. and R. conclude that about 2 tons of liquid hydrocarbons should theoretically be produced per cu. ft. of He. The dense compds. in petroleum are possible remnants of the original hydrocarbon material from which such formation took place. Other evidence is also suggested. ALDEN H. EMERY

The repartition of the eruptive rocks. BARON FRANZ NOPCSA. *Földtani Közlemény* 56, 149-60(1927).—Petrographical. A. L. HENNE

Some rocks found in drilling (for petroleum) at Ripi, Lazio. G. CUMIN. *Atti accad. Lincei* [6] 6, 518-21(1927).—Andesine, labradorite and augite are the chief components, with biotite, olivine, magnetite, and apatite in small quantities. The mineralogic characteristics are described in detail. C. C. DAVIS

Hypersthene-andesite of Blair Duguid, near Allandale, N. S. Wales. W. R. BROWNE AND H. P. WHITE. *J. Proc. Roy. Soc. New South Wales* 60, 372-87(1926).—The hypersthene-andesite of the Blair Duguid hills appears some distance away in an altered form as the pebbles of a conglomerate. This change has apparently been effected by solns of magmatic origin, and has involved the addn. of both Na and K to the rock, and the transformation of the hypersthene into iddingsite in some places and into carbonates in others. B. C. A.

Andesite rocks in the vicinity of Helemba, Kom. Hont, Hungary. FRANZ PAPP. *Földtani Közlemény* 56, 195-200(1927).—A mineralogical description is given. A. L. HENNE

The petrogenesis of the Siebenbürg Eozoic. I. Petrography. ELEMER V. SZADECZKY KARDOS. *Földtani Közlemény* 56, 221-42(1927). A. L. HENNE

Differentiation products resembling gabbro in the vicinity of Szarvaskő, (Hungary). S. VON SZENTPÉTERY AND K. EMSZT. *Földtani Közlemény* 56, 200-16(1927). A. L. H.

Grünerite rocks of the Lake Superior Region and their origin. STEPHEN RICHARZ. *J. Geology* 35, 690-708(1927). In the Marquette iron district of Mich., grünerite was formed from siderite-bearing cherts through metamorphism induced by dioritic intrusions. Associated with the grünerite are magnetite, garnet and quartz (or calcite). In the Mesabi range district of Minn., the original rock was chert and greenalite. In the eastern portion of this range, at the gabbro contact, grünerite, fayalite and magnetite were developed. W. F. HUNT

The relative effectiveness of bacteria as agents of chemical denudation. GEORGE THIEL. *J. Geology* 35, 647-52(1927).—Seven types of crushed rocks—granite, syenite, monzonite, diorite, basalt, shale and ferruginous chert—were subjected to leaching under normal conditions and under sterile conditions. The salinities of the solns. under the 2 conditions were compared. The total of the analyzed constituents is 53% greater for solns. with bacteria than without, the increase in Ca and Na being especially noteworthy. W. F. HUNT

Stalactites. J. A. LEBEL. *Compt. rend.* 186, 1306(1928).—In a grotto at Eyzies in Dordogne stalactites and other CaCO_3 deposits were covered with a sort of calcareous growth which spread in all directions but in general upwards. The origin of this coating appeared to be due to a divided fall of incrusting water. The stalactites give sparks under the pick which are not due to included SiO_2 or firestone, but may be a kind of phosphorescence. L. W. RIGGS

Laboratory tests on physical properties of water-bearing materials. N. D. STEARNS. U. S. Geol. Survey, *Water-Supply Paper* 596F, 121-76(1927).—Methods of sampling water-bearing strata and of detg. their apparent sp. gr., mech. compn., porosity, moisture equiv., and permeability to water are described in detail, with reference to certain Am. water-bearing gravels; tables showing the phys. properties of these are included. B. C. A.

Helium content of uraninite from Karelia. V. KHILOPIN. *Compt. rend., acad. sci. U. R. S. S. [Russia]* 1926, 195-7.—Six samples contained 4-5 cc. per g., and two 0.3-0.4 cc. The He content is thus not proportional to the Pb:U ratio. B. C. A.

The radium content of some Nova Scotian minerals. CARL KENTY. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 174-5(1928).—The Ra content per g. of mineral has been measured for a few Nova Scotian specimens: NaCl or KCl salt, from Malagash, less than 5.10^{-10} ; light feldspar from Governor's Lake, $8.7.10^{-12}$; dark feldspar from the same, $14.0.10^{-12}$; siliceous slate from Upper Musquodoboit, $2.6.10^{-12}$. A. L. HENNE

Geologic age by lead uranium ratios. ALFRED C. LANE. *Science* 67, 631(1928).—A discussion of possibilities and sources of error, including the pointing out that 206.05 should be used as the at. wt. of U-Pb. L. W. RIGGS

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9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, R. H. ABORN

Charcoal for use in metallurgy. N. N. ROGATKIN AND V. A. BORETSKAYA. *J. Chem. Ind. (Moscow)* 4, 150-2(1927). Charcoal used in metallurgy must possess a high C content and must be able to withstand high pressures. The higher the temp. at which wood is carbonized the greater the C content of the charcoal and its ability to withstand pressure. Wood distn. plants usually do not yield good metallurgical charcoal on account of insufficiently elevated temps. at which the distns. are carried out. The authors' expts. had chiefly the purpose of clearing up the influence of the speed of the operation of wood carbonization on the quality of the charcoal obtained. They used Vik's needle to establish the weight which crushes a given sample of charcoal. The expts. have shown that rapid carbonization of wood, particularly of resinous variety, is not favorable to mech. strength of charcoal. The reason is that wood resins, on being rapidly decompd., inflate and swell the charcoal and thus decrease its mech. resistance. To obtain good charcoal it is advisable to carbonize wood slowly, thus giving the resins an opportunity of distg. off, and to attain a final temp. of at least 800°. Pine and birch wood were carbonized for a comparison and it was found that birch charcoal was twice as resistant to crushing efforts as pine charcoal. BERNARD NELSON

Flotation of fluorspar ores for acid spar. WILL H. COGHILL AND O. W. GREEMAN. *Bur. Mines Repts. of Investigations No. 2877*, 3 pp., *Pit and Quarry* 16, 79-80(1928).—Gravel spar (85% fluorspar, 5% SiO₂) glutts the market while acid spar (98% fluorspar, 1% SiO₂) is scarce. Lab.-scale flotation tests show that calcite is more floatable than silica and that flotation increases the yield of acid spar when the grinding causes almost perfect liberation of the silica. The flotation reagents consist of oleic acid, Na oleate, Na silicate, Na₂CO₃, heavy crude pine oil and steam-distd. pine oil. Some ores yield acid spar more readily if flotation is preceded by gravity concn. Conversion of some of the gravel spar to acid spar will give a healthier tone to the market. W. H. B.

The development of the dressing of roasted spars at the Storch & Schöneberg mines in Gosenback. RUDOLF LAMBERT. *Arch. Eisenhüttenwesen* 1, 11-17(1927).—The development of the dressing plant at this mine has kept in pace with advances in technic, the degree of concg. approaching the ideal. The methods and machines used are described, and comparisons made. J. BALOZIAN

The importance of air control in efficient cupola practice. P. H. WILSON. *Proc. Inst. Brit. Foundrymen* 20, 57-105(1926-7).—Control of the air blast in cupola operation by means of a recording vol. pressure gage results in (1) economy of fuel, (2) reduction in scrap castings and (3) saving in Fe losses. Exptl. test data are shown in tables and graphs of the temp., pressure and analyses of the gases at different points in the cupola. DOWNS SCHAAF

Non-ferrous foundry practice. A. LOGAN. *Proc. Inst. Brit. Foundrymen* 20, 378-94(1926-7).—Scientific metallurgical consideration is given to the melting and pouring operations of brass founding. DOWNS SCHAAF

Investigations on the reduction of oxide ores. B. BOGITCH. *Rev. métal.* 25, 247-61(1928); cf. *C. A.* 21, 1950.—An investigation into the mechanism of reduction of oxide ores, exclusive of highly refractory oxides (such as Cr, W, etc.) and those of more or less volatile metals (such as Pb, Zn, etc.), with a view to elucidating the causes of the numerous difficulties encountered in similar operations. The ores selected con-

sisted of a Ni ore (6.90% Ni) with a MgO gang (MgO 17.21, SiO₂ 48.60%) contg. relatively little Fe (11.70%), a Co ore (5.01% Co) with Al₂O₃ and Fe gang (Al₂O₃ 17.72, Fe 26.20, SiO₂ 28.80%), and a highly ferrous (Fe 57.40, SiO₂ 14.16%) Ni ore (Ni 5.30%), as they had been found to be exceptionally delicate to treat. After grinding and agglomerating with glue, the ore was calcined in contact with a solid reducer: with wood charcoal reduction is very slow below 700°; at 800° and above it is rapid, but slows down considerably towards the end of the reaction; with coke reduction is very slow below 900°, but above this temp. it is an almost linear function of the time of calcination, so that at the same temp. (950°) the same time is required for complete reduction by coke and by wood charcoal. The difference in behavior of the 2 reducers is due to the greater ease with which charcoal is gasified, presumably on account of the air and H₂O which it contains, as its reducing action is decreased if it has been previously calcined. Reduction takes place as well when the reducer is placed under the ore as when it is mixed with the ore, but if it is placed above, only the upper layers of ore are reduced, probably because CO₂ accumulates in the bottom of the furnace and prevents CO from reacting with the ore. With a mixt. of powd. coal and ore, reduction is very rapid at first, but soon slows down, and the time required for complete reduction is the same as with briquets. For very rapid reduction a gaseous or liquid reducer must be used (such as oil, petroleum or tar). Addn. of CaO or of silicates which are not fusible at the calcination temp. does not affect the rate of the reaction; but a few 0.1% of a Na salt appreciably slows down the end of the reduction. With cylinders or briquets cut out of the ore, the phenomena take place in the same way as with agglomerated cylinders or briquets, but the rate of reduction may vary with the compactness of the material. After reduction of agglomerated ore by calcination there is considerable shrinkage in size, partly because of decrease in size of the particles through loss of O and partly because of closer welding of the reduced particles, and this shrinkage is accompanied by considerable increase in the hardness and strength of the agglomerate. But if calcination is conducted in such a manner that reduction and contraction in size occur simultaneously (e. g., if coke is used), the agglomerate crumbles as it is reduced; and this is enhanced in presence of unreducible substances, particularly if they retard reduction (e. g., Na salts). Absorption of C by agglomerated ore depends on the reducing temp.: a Ni agglomerate heated 48 hrs. at 800–1000° can absorb up to 0.80% C and has a grayish white fracture; above 1000° absorption of C produces black spots inside the agglomerate which begin to appear as soon as the C content exceeds about 0.30%. When CO or fresh wood charcoal is used, absorption of C begins only after reduction is complete, while with coke the agglomerate can contain at the same time C in the superficial layers, pure metal further in, and unreduced ore at the center. Desulfurization begins only after reduction is complete and carburization has set in; though small, it is of importance in the production of certain pure metals, such as Ni or Co, which are used in the form of agglomerates. Addn. of 5–10% limestone to a slow reducer (coke) increases the rate of reduction; whatever the nature of the reducer, it accelerates carburization and desulfurization; these actions take place only during the decompn. of the CaCO₃ by heat, and CaCO₃ cannot therefore be replaced by CaO. B.'s expts. on the smelting of ores (described in some detail) lead to the following conclusions: (1) The degree of reduction depends only on the amt. of reducer used, provided the smelting temp. is sufficiently high to enable the metal to sep. from the slag, and provided also heating is sufficiently slow. (2) In the rapid fusion of Cu, Ni and Co oxide ores, it is only exceptionally that equil. between the ore and the reducer can be obtained; the absence of equil. can be observed either by analysis of the slag, which is too rich, or by the manner in which fusion takes place, it giving rise to sepn. of the reducer and swelling of the slag. (3) Addn. of various fluxes permits of increasing the rate of reduction and approaching nearer to the state of equil. (4) The action of fluxes varies with their nature and with the compn. of the ore, and the proportion to be used can only be detd. experimentally. B. has devised a method for the purpose, consisting essentially in first making a series of slow fusions at a suitable temp. (say 1550°) with varying amts. of reducer to det. the amt. required to obtain the desired degree of reduction (if the temp. is found to be too low, add 1 part CaO to 1 part ore), and then making a second series of quick fusions to det. the proportion of flux which must be added to give the most fusible and fluid slag. These results give the optimum compn. of the smelting charge, but not necessarily the most economical treatment. Starting from the results of these lab. tests com. operations are adjusted to obtain the most economical results.

A. PAPINEAU-COUTURE

Recovery of copper and zinc from brass scrap. I. A. KAZARNOVSKII and V. M. ZVENIGORODSKAYA. *Papers Karpov Chem. Inst. Bach. Memorial Vol.* 1927, 101–9;

cf. Vinogradov and Vinogradova, *C. A.* 22, 2814.—Brass is calcined in a current of air, the oxides formed are dissolved in H_2SO_4 , and the soln. obtained is boiled with brass turnings (non-calcined). The Zn of the latter, on dissolving, ppts. an equiv. amount of Cu. Whereas in neutral soln. the pptn. of Cu by brass is very slow, free H_2SO_4 in concn. of 2-3% acts as an excellent catalyzer and the pptn. of Cu can thus be made practically complete. Cu of 90% purity is thus obtained and can easily be transformed into $CuSO_4$. The $ZnSO_4$ which remained in soln. can be utilized in the manuf. of pigments, lithopone and $ZnCl_2$.

BERNARD NELSON

Xanthate and pine oil float native copper in amygdaloid ores. A. W. FAHRENWALD. *Eng. Mining J.* 126, 58-9(1928).—Cooperative research work by the Michigan Coll. of Mines and Technology and the U. S. Bur. Mines shows that fine grinding is unnecessary to unlock Cu in amygdaloid ores. With the proper reagent combination Cu as coarse as 28-35 mesh floated well and minus 65 mesh Cu floated readily. Flotation is easier when the Cu is mixed with a pulp of finely ground barren rock. Xanthate in a slightly alk. pulp in conjunction with a variety of oils is the best reagent tried. The lab. tests indicate that the use of flotation instead of the all-gravity process results in addnl. Cu recovery, lower smelting cost of concentrate, lower slag loss, and no table middling to regrind. Large-scale expts. are to be conducted in various plants in Michigan.

W. H. BOYNTON

The Harris process of lead refining. R. WINTER. *Eng. Mining J.* 125, 725-8 (1928).—The method and equipment are outlined for removing As, Sn and Sb from Pb bullion and alloys by passage through molten NaOH, NaCl and $NaNO_3$. The process represents the adoption in a cyclic process of exact principles of chem. engineering combined with the use of automatic self-contained machine for the metal treatment. The process may be applied in the treatment of secondary or residual scrap leads with recovery of the impurities sep. from one another in marketable form. In a dry treatment the molten impure metal is circulated through a molten mixt. of NaOH and NaCl. Impurities are oxidized and enter the reagent through the action of atm. O_2 , accelerated in the case of As, Sn and Sb by the gradual addn. of $NaNO_3$. The second treatment consists of sepgg. Na arsenate, stannate and antimonate, and ZnO in marketable form. The means of calcg. the amounts of NaOH, NaCl, and $NaNO_3$ needed are shown and the app. employed for circulating the molten Pb through the Na salts illus. W. H. R.

The precipitation of gold and silver from their dilute solutions. MATAICHI YASUDA. *Bull. Chem. Soc. Japan* 3, 113-8(1928).—A metallic alloy of Mn and Pb is suitable to ext. Au and Ag from their dil. solns. in sea water. The more efficient compn. seems to be 4% Mn. The technical details are: put the Pb and the Mn powder together in a steel case; hammer it strongly with an air hammer so that a plate 0.07 mm. thick is obtained; hang the plate in a beaker contg. 3 l. sea water, stir for a few hrs.; replace the sea water 6 times; roll the plate to a small vol.; put in a crucible; add 2-3 g. PbO and fuse to oxidize the remaining Mn; cupell the button; weigh the Au and Ag as usual. The metals should be tested for noble metals before use. The efficiency of the Au extn. is about 40-50% in 100 hrs.

A. L. HENNE

The relations between the slagging of iron and manganese in the Thomas process. E. FAUSR. *Archiv Eisenhüttenwesen* 1, 119-26(1927).—The equation $[Mn]_s/[Fe]_s = K \cdot [Mn]_l/[Fe]_l$, in which $[Mn]_s$, $[Fe]_s$, $[Mn]_l$ and $[Fe]_l$ are the resp. quantities of Mn and Fe in the slag and in the ingot steel, has been derived from phys.-chem. considerations. Its validity, for the Thomas process, is tested by blasting a large no. of charges under varying conditions, toward the end of a blast 80% ferro-Mn or a rich Mn ore is added, and the equil. between Mn and Fe in the steel and in the slag detd. Samples of pig Fe, ingot steel and slag from each run are analyzed and the temps. detd. at the moment of sampling. From these data curves are obtained showing the relation between the slagging of Fe and Mn, and, the Mn content of the pig Fe and of the ingot steel, the latter curve giving $K = 247$. Values are obtained from an altered form of the above equation which when plotted give the relation between the slagging of Mn and Fe in % of the combined amts. of both substances in the process. In any smelting process there is for the ratio Mn:Fe in the slag phase a definite ratio of Mn:Fe in the metal phase. The value of K depends upon the process, having an av. value of $K = 1350$ in the acid Bessemer process.

J. BALOZIAN

Platinum and the platinum metals. G. H. STANLEY. *J. S. African Chem. Inst.* 10, 3-48(1927).—An illustrated review and survey of the history, source, methods of refining, properties and uses of these metals is presented.

ALBERT THOMAS FELLOWS

Heat investigations on a Siemens-Martin furnace. G. NEUMANN. *Archiv. Eisenhüttenwesen* 1, 111-7(1927).—Investigations of the combustion relations in the heating chamber of a 40-ton tilting furnace, fired with producer gas from brown coal

briquets. The gases are analyzed here, it being found necessary to use a protective uncooled tube over the one cooled with a water jacket. The combustion is found to be incomplete (O_2 and unburnt gas being present) and extends over the entire hearth, being greatest over the bath and at the back wall. The O_2 content of the hearth decreases from the front backwards (specially at the flame end of the furnace) and the top down. The CO_2 concn. increases at the flame and from the front to the rear, but decreases in this direction at the outlet end. At the fire end it increases from the top downwards, no visible change in this direction being detectable at the middle door or the escaping end. Although the fresh gas contains CH_4 , none appears in the hearth it being burnt or decompd. The effect of increasing the air velocity and decreasing the gas velocity on the completeness of combustion, increasing the furnace efficiency and decreasing the fuel consumed is discussed. The decompn. of the gas in the chambers is studied, and is found to be retarded by cooling the chambers and flues. The temp. relations in the lattice work of the chambers and its effect on the gas current are investigated.

J. BALOZIAN

Contribution to the calculation of the useful heat in Siemens-Martin fusions. CARL SCHWARZ. *Arch. Eisenhüttenwesen* 1, 33-40(1927).—A more rigorous interpretation to the idea of "useful heat," being given with the aid of a cyclical process, some of the constns. to be found in the literature of metallurgy are tabulated and considered critically.

J. BALOZIAN

Modern scientific basis of the operation of high-production blast furnaces. MAURICE DERCLAYE. *Rev. métal.* 25, 1-13, 120-47, 195-211(1928).—A discussion, largely mathematical, of the theory of the operation of the blast furnace, showing that the 2 main economic factors, namely, max. production and min. fuel consumption, are not irreconcilable, and examg. the effects on production and on fuel economy of factors dependent on the fuel, on the blast, on the design of the furnace and on the phys. state of the constituents of the charge. It is also shown that American blast furnaces are operated as efficiently as European ones from the standpoint of Gruner's ideal.

A. PAPINEAU-COUTURE

The new heat diagram for iron blast furnaces. P. REICHARDT. *Arch. Eisenhüttenwesen* 1, 77-101(1927).—In this diagram the heat required in the various temp. zones of a blast furnace is compared with the heat available. Thus, the curves for a Rhine-Westfal Thomas furnace are plotted and discussed in detail, showing: (1) the heat consumed and that required in the various temp. zones against their temps. (for 100 kg. crude Fe ore); (2) the heat content of the gases (66.4 kg C_k) and that available against the temps. of the gases; (3) the heat required and that recovered against the temps. of the gases and the charge; (4) the min. amt. of coal required against the temps. of the charge. The heat diagrams of another Thomas, an American, a Minette Fe-steel blast furnace, and charcoal furnace are plotted, published figures being used. From these it is apparent that only in the highest part of the furnace do the throat gases have the large surplus of heat shown, the heat being practically completely used up to a temp. of 900° . Applying the heat diagram, a study is made of the influence of (1) $CaCO_3$ on the fuel consumption, (2) crude spathic Fe ore, (3) the quantity of slag, (4) the temp. of the blast, (5) its degree of dryness, (6) the sepn. of coal dust from the gas, and (7) the fuel consumed in the remelting of scrap in the blast furnace, (8) the prospect of using O_2 in the blast furnace, (9) the use of air enriched with O_2 instead of the heated blast, and (10) the possibility of regulating the furnace heat. It is shown that no benefit can be derived from (9), while the simultaneous injection of powd. coal and O_2 promises good results.

J. BALOZIAN

The injection of charges and fuels into the hearth zone of iron blast furnaces. E. BERTRAM. *Arch. Eisenhüttenwesen* 1, 19-32(1927).—No difficulty is encountered in injecting charges into blast furnaces working at low pressures. This is not suitable for the blasting of refined cast Fe, but may be used for the production of half-refined Fe or of castings from the first melt. Here the process is economical, only, when it is used in conjunction with cold air. Whether it may be used in steel works with profit is problematical; it acts unfavorably in the Mn reduction. The injection of fuels is not practical, expt. and theory showing this, at least when the fuel is injected through the main tuyères.

J. BALOZIAN

Annealing furnace for rolling mill heated with blast-furnace gas. J. MEISER. *Stahl u. Eisen*, 48, 822-3(1928); *Arch. Eisenhüttenwesen* 1, 639-46(1927-8). J. A. S.

Some parallels and comparisons in blast-furnace and cupola practice. J. E. FLETCHER. *Fuel Econ. Rev.* 7, 55-64(1928).—Instead of estg. the heat balance of a cupola or blast furnace simply in terms of amt. of C used in the production of a ton of Fe (neglecting the rate of smelting or melting, vol. of gases, the fuel, ore or metal and

the flux involved), it is shown that what may be good operating conditions for one type of furnace may not serve for the other. Special stress is laid upon the analysis of throat gases, as these may be interpreted to show the type of reaction (reduction of Fe_2O_3 by C or CO) taking place and the efficiency of the plant. The modifying effects of various factors entering into consideration are discussed fully. W. C. EBAUGH

Transformation of Cowpers with a view to improving their efficiency. A. COUSIN. *Rev. métal.* 25, 231-4(1928).—Diagrams are given and discussed showing the relation between gas consumption, temp. of the blast and calorific efficiency. A. P.-C.

Protection of steel against oxidation at the end of the open-hearth process and decrease in the amount of gas occluded. V. N. TSVIBEL. *Tekhnika i Proizvodstvo* 36-49 (1927); *Rev. métal.* 25 (Extraits), 135-7 (1928).—After discussing the advantages of elec. steel over open-hearth steel as generally made at the present time from the standpoint of the absence in the former of occluded gases, and after discussing also the mechanism of the re-oxidation of the metal at the end of the open-hearth process, T. proposes protecting the slag from the action of the oxidizing atm. by covering the bath towards the end of the process by a layer of solid or liquid heavy hydrocarbons. A no. of exptl. runs have been made, but the process has not yet been applied commercially. The advantages of the process are outlined. A. PAPINEAU-COUTURE

Modern galvanizing practice. HEINZ BABLIK. *Zentr. d. Hütten- u. Walzsch.* 30, 549-53 (1926); *Chem. Zentr.* 1927, I, 945-6—Descriptive C. C. DAVIS

Sponge iron as a melting base. N. K. G. THOLAND. *Iron and Steel of Canada* 11, 210-11 (1928).—Sponge iron as made by the Sicurin process for use as a melting base in the manuf. of open-hearth and elec. steel, contains 97% Fe, less than 4% FeO , 0.010-0.013% P, up to 0.025% S, 0.15% V, probably as V_2O_5 , 0.03% C, the remainder being a gang consisting, for the most part, of SiO_2 . Tests made by substituting sponge iron, for a certain portion of the charge in making steel for wire rope manuf., showed an improvement of from 6 to 20% in torsional properties, and from 20 to 35% in bending properties. Sponge-iron steels show less tendency to crack than other steels of good quality and are also practically free from red-shortness. DOWNS SCHAAP

Some experiences with malleable cast iron. H. FIELD. *Proc. Inst. Brit. Foundrymen* 20, 564-96 (1926-7).—Many practical data are given in connection with the manuf. and testing of malleable castings. DOWNS SCHAAP

Semi-steel. J. E. HURST. *Proc. Inst. Brit. Foundrymen* 20, 482-96 (1926-7).—The behavior of C in the remelting of mixts. of steel and cast iron in the cupola, the character of the steel adds, and the soundness, regularity and compn. of the final castings, are discussed. DOWNS SCHAAP

Technology of casting metals. HUGO MÜLLER. *Z. Ver. deut. Ing.* 72, 879-84 (1928).—A well-illustrated lecture covering the theory and practice used in modern foundries. W. C. EBAUGH

The manufacture of a large steel casting. P. A. MELMOTH AND T. W. BROWN. *Proc. Inst. Brit. Foundrymen* 20, 232-66 (1926-7).—The complete history is outlined of the production of a large cast steel propeller shaft bracket and the following operations are described at considerable length: the manuf. of the steel, the prepn. of the sand, the making of the cores and mold, the annealing, welding, inspection and testing of the castings. DOWNS SCHAAP

Carburizing with mixtures of hydrogen and natural gas. W. P. SYKES. *Fuels and Furnaces* 6, 913-8 (1928).—The most active carburizing constituent of natural or illuminating gas is CH_4 , comprising about 75% of the former and 25% of the latter. It decomposes at high temp., and at 1000° a gas contg. only 1.02% CH_4 is satd. with it. A W-wound furnace was used to heat Armco Fe samples up to 1100° in an atm. of CH_4 and H_2 of fixed compn., and the results were observed with the microscope. The rate and depth of C penetration in the Fe depended on the temp. An increase of CH_4 concn. at first increased the depth of penetration up to a certain point, then merely raised the C content of the outer layer. It is shown how the gas compn. may be adjusted for heating a steel of given C content so that the decarburizing effect of H_2 is just balanced against the carburizing effect of CH_4 at the desired temp. and the atm. will thus be neutral. For instance at 900° a 0.3% C steel was decarburized in H_2 plus 0.5% natural gas, and carburized in H_2 plus 0.9% natural gas. If the gas contained water vapor, much more CH_4 was required for carburizing. G. F. C.

Trend of engineering developments in steel. B. D. SAKLATWALLA. *J. Soc. Chem. Ind.* 47, 198-202T, 210-2T (1928). E. H.

The fracture tests of steel workers. F. JANSEN. *Arch. Eisenhüttenwesen* 1, 147-55 (1927).—Fracture tests are widely used in steel mills, because of their simplicity and rapidity, for detg. the course of fusion. A description of those for the detn. of P

and C is given. It is shown that the red-shortness, and the impaired malleability assocd. with it, is not dependent on the abs. amt. of the O_2 and Mn, but appears when the O_2 is in excess of the quantity necessary to unite with Mn to form MnO . The larger the excess of O_2 , the greater the red-shortness and the coarser the grain structure. Temp. influences the red-shortness between 700° and 1025° , its effect being greatest at the latter temp.

J. BALOZIAN

Stainless steel. ALBERT F. WHITE AND CLAUDE L. CLARK. Univ. of Michigan. *Eng. Research Bull.* No. 4, 9-82(1926).—A review.

E. H.

Behavior of steel under prolonged stress at high temperatures. A. POMP. *Chem. Fabr.* 1928, 53-4.—Recent work on the "creeping" of steel at high temps. is reviewed and the necessity of detg. the "permanent strength" of steels which are to be used for high-pressure work at elevated temps. is emphasized. The "permanent strength" of a steel is defined as the highest load which the steel will support at any given temp. without increasing in length after 3-6 hrs. by more than 0.001% per hr. For plain C steels this value remains fairly constant up to 300° , then falls very rapidly with rise in temp.; the permanent strength and the rate at which it decreases with rise of temp. increase with the C content of the steel up to the eutectoidal point, provided that the pearlite constituent is in the lamellar form. Steels in which the pearlite is in a granular form have a much lower permanent strength.

B. C. A.

Cyanide hardening of steel. SAM TOUR. *Fuels and Furnaces* 6, 883-92(1928).—Cyaniding introduces both C and N into steel. $K_4Fe(CN)_6$ was first used for cyaniding tools but NaCN is the chief reagent now used. The fumes arising from molten NaCN are oxidized at once in air and thus rendered harmless. The process of Merten using CN gas is described, also the Shimer cyanide process. As the temp. of case-hardening is increased, less N and more C are absorbed by the steel. The depth of penetration increased with both time and temp. A cyanide bath should not generally be used above 800° , and it is unnecessary to have over 25% NaCN in the bath, or to heat steel over 20 min. in it. Carbonate is formed by oxidation at the surface, and may decarburize a high-C steel though the same bath may contain enough NaCN to carburize a low-C steel. The best concn. and temp. of the cyaniding bath depend on the type of steel to be treated. When the temp. was kept well below the crit. point of the steel, and the time of treatment was not over 20 min., cyanide brittleness of the core was avoided. Although in practice baths contg. as much as 75% NaCN are used, it is more economical to keep the NaCN content at 30%. Cyaniding is used for cases not over 0.015 in. thick; the time of treatment is not over 40 min., and depends on the size of the piece treated. The temp. varies from 730° to 900° ; for a very thin skin on small pieces, 2 or 3 min. treatment at 900° is satisfactory. The cyanide pieces are usually quenched in water, and some kinds of oil cause trouble in cleaning.

G. F. C.

The effect of the form of the ingot mold and deoxidation on the crystallization of (steel) ingots. FRIEDRICH BADENHEUER. *Stahl u. Eisen* 48, 713-8, 762-6(1928).—Ingot molds of various conical forms were used to det. the influence of the form on the crystn. of basic open hearth steel melts. In general it was found, that the heavier the conical-shaped ingots used, the sounder the ingots obtained. The ingots so obtained were noticeably free from secondary piping. With increasing wall thickness the extent of the transcrystn. zone is increased. The deoxidation was investigated on 3 melts to which various amts. of Fe_3Si and Al were added. A cone-shaped central part consisting of globular crystallites was observed in every block. With small quantities of deoxidizing agents this cone extends through the whole length of the ingot; with larger amts. the cone ends below the head of the ingot. Through properly adjusted cooling rate this globular structure can be transformed into dendritic structure, the structure prevailing through the rest of the block. The relationship between the primary structure and segregation is shown and an explanation given of the phenomena observed during solidification.

J. A. SZILARD

Combined iron and steel. J. FERDINAND KAYSER. *Metallurgist* (Suppl. to *Engineer* 145, No. 21) 73-5(1928).—The method of manuf. is given and the microstructure is illustrated. The steel face may have a Brinell hardness of 600. D. B. DILL

The hardening of carbon steel during deformation as a function of temperature, time and structure. F. SAUERWALD, L. MICHALSKY, R. KRAICZEK AND G. NEUENDORF. *Stahl. u. Eisen* 48, 770-71(1928); *Arch. Eisenhüttenwesen* 1, 717-20(1927-8).—Cold and warm deformations are characterized by hardening and recrystn., resp. Cold deformation causes a hardening and the formation of a corresponding fiber structure; no hardening occurs during hot deformation, only a recrystn. The temp. line so detd. between cold and warm deformation depends for a given material on the velocity of deformation, which also governs both the hardening and the recrystn. This temp. line was

detd. for a perlitic steel and one with 1.71% C. Test pieces 10 mm. high were compressed by means of a drop hammer at various temps., and their Brinell hardnesses detd. before and after compression at test temp. There is a max. of the capacity of hardening in the range of blue brittleness. The whole temp. range below the perlite line is the sphere of cold deformation for steel. It was found that at 820° a steel with from 0.8 to 0.9% C shows no hardening shortly after a quick deformation so that this temp. range must be termed as the sphere of hot deformation. For pure Fe-C alloys the range of γ solid soln. and that of hot deformation are identical if the velocity of deformation is high. J. A. SZILARD

Surface decarburization of carbon steels. E. H. SCHULZ AND W. HÜLSBRUCH. *Arch. Eisenhüttenwesen* 1, 225-40(1927); *Stahl u. Eisen* 47, 1694-5(1927).—The decarburizing action of various atms. on the 3 steels contg. 0.5, 0.9 and 1.3% C has been detd. at 750-1050°. In all gases, except pure N and carburizing gases, such as coal gas, CH₄, or CO, severe decarburization takes place at 900° or above. Pure N and CH₄-H mixts. are inert, but even traces of CO₂ or steam in these gases causes severe decarburization to occur. A similar action ensues if very small quantities of steam or CO₂ are present in gases which, if pure, act as carburizing agents. In H or in a technical "reducing atm." decarburization commences at 550-600° and in steam, CO₂ or air at 800°; in pure O or perfectly dry air no action takes place below 850°. The depth of decarburization in a given time increases in all cases with rise of temp. and, above 850°, with increase in the C content. The ferrite crystallites formed on the surface by decarburization above 750° are extraordinarily coarse and columnar in shape, the long edges being perpendicular to the surface of the metal. In cases where a coating of scale is formed, this acts as a protective layer below 850°; the heaviest layer of scale is formed in a salt bath and only slightly thinner layers in O or steam. B. C. A.

Silicon-carbon sum is factor in high-duty cast iron production. ANDRE LEVI. *Foundry* 56, 478-80(1928).—Semi-steel made in the cupola with 20 to 30% steel scrap varies in strength inversely to the sum of the C and Si contents. When this sum is not over 4.6, the strength is over 28,000 lbs. per sq. in., and no strength above 35,000 lbs. per sq. in. can be obtained if this sum is over 4.6. The combined C and the Mn should each be 0.8%. With total C from 3 to 3.2%, which gives a fluid metal and is practical in cupola practice, Si should vary from 1 to 1.6%, to give a gray Fe of max. strength. The addn. of steel to the charge produces no bad effects, but it is better to attain the desired compn. with pig Fe alone if possible. The P may be as high as 0.3% to increase fluidity, without decrease in strength. The use of Cr involves heat-treatment and is costly. Certain kinds of pig Fe always give better results when remelted because the graphite in them dissolves completely at cupola temp., while in ordinary pig Fe some graphite does not dissolve and causes a coarse structure after remelting. GEO. F. COMSTOCK

Ways to improve gray-iron castings. RICHARD MOLDENKE. *Iron Age* 121, 1747-9 (1928).—The increased strength of cast Fe melted under conditions of super-heat, over that made in the ordinary practice of cupola operation, is explained on the basis of the phys. condition of the graphite pptd. during the change in the Fe from the molten to the solid state. The microscopically small graphite nuclei, which serve as the starting points of coarse crystal growth, are completely dissolved in Fe when the molten metal is heated to extremely high cupola temps., and thus the growth of large graphite crystals is inhibited. DOWNS SCHAAP

Strength and structure of iron and non-ferrous metals. CONSTANTIN REDICH. *Apparaturbau* 40, 133-8(1928).—The properties of cast Fe, Ni-steel, rustless steel, Cu and a few of its alloys are discussed with special reference to their use in contact with steam at high temps. Thirteen cuts, 6 graphs and 10 photomicrographs. J. H. M.

Hydrogen in electrolytic zinc. W. ROY ELLIOT. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 152-4(1928).—E. verifies the conclusions of Ralston (C. A. 19, 2303): electrolytic Zn contains 0.3-2 cc. of H per g. of metal, depending on the c. d. and ZnSO₄ concn. To measure the amt. of gas a strip of metal was placed in an evacuated Pyrex tube and melted by a resistance furnace; the gas evolved was pumped off and measured. A. L. HENNE

Studies on the resistivity of chromium-plated metals to the action of chemical reagents. TORU MURAKAMI. *J. Soc. Chem. Ind. Japan* 31, 132-6(1928).—Metallic Cr is generally in two states, passive and active. Commercial Cr is ordinarily passive and is highly resistant to acids and alkalis, excepting HCl. But the new surface obtained by breaking commercial Cr is not resistant to acids. Moreover, passive Cr which is in contact with Zn, Fe or some other metals in acids becomes active and is no longer resistant to acids. Electroplated Cr generally has pin holes and thus the base metal

beneath is exposed through them. The fresh Cr film is not resistant to acids, but after a time it becomes passive. The Cr film prep'd. by Y. Kato and M. (C. A. 22, 2329) is resistant to many reagents and gases. Tables showing the exptl. results for the action of many acids, alkalis, salts and the atmosphere on Cr-plated metals are given. Length of time after plating, and pin holes in the Cr film are the two important factors in testing the resistivity of Cr-plated metals.

K. KASHIMA

Effects of temperature on the properties of alloys. J. COURNOT. *Rev. sci.* 65, 589-90(1927).—A brief review of our knowledge of the variations of the properties of alloys with temp. and of their practical consequences. A. PAPINEAU-COUTURE

Alloys resistant to hydrochloric acid. B. WAESER. *Chem. Fabr.* 1928, 17-8.—A review of recent work, together with a table showing the compn. and resistance to attack by HCl soln. of various strengths of 39 Am. acid-resisting alloys, 3 German special steels, and 2 ferrosilicon alloys.

B. C. A.

Aluminum alloys. H. HYMAN. *Proc. Inst. Brit. Foundrymen* 20, 350-65(1926-7).—Methods of heat treatment and details of foundry practice are given for a few com. alloys of Al.

DOWNES SCHAAF

Heat-treatment of aluminum and its light alloys. ROBERT J. ANDERSON. *Fuels and Furnaces* 6, 901-2(1928); cf. C. A. 22, 1941.—Equipment used for the heat-treatment of light alloys and various installations are briefly described. For annealing, ordinary fuel-fired or elec. furnaces are largely used; for heating previous to quenching fused salt-baths are used; and for aging, hot oil, boiling water, or circulated hot air is used.

GEO. F. COMSTOCK

The structure of tin-antimony alloys. W. BRONIEWSKI AND L. SLIWOWSKI. *Compt. rend.* 186, 1615-6(1928).—A brief account is given of the compds. found in the Sn-Sb system by earlier investigators. Hardness, thermal, microscopic, elec. and other phys. tests carried out on samples annealed 1200 hrs. at 200° indicated that only a single compd., Sn_3Sb_2 , occurred. An equil. diagram is shown and explained. Alloys contg. up to 50 at. % Sn deposit first on freezing a solid soln. of Sn in Sb, and 10 at. % Sn remains in solid soln. at room temp. At 425° a peritectic reaction occurs, the compd. Sn_3Sb_2 retaining considerable Sb in solid soln. Alloys contg. 25% Sb deposit first on freezing a solid soln. of about 50 at. % Sb, which by chem. methods of examn. may appear like a compd., SnSb . Prolonged annealing softens the Sn_3Sb_2 crystals, and lowers the anti-friction value of the alloys.

GEO. F. COMSTOCK

Surface cracking of rails in service. SABOURET. *Rev. métal.* 25, 169-71(1928).—Controversial with Viteaux (C. A. 22, 1940). H. VITEAUX. *Ibid* 172.—Reply to Sabouret.

A. PAPINEAU-COUTURE

Embrittlement of boiler plate. SAMUEL W. PARR AND FREDERICK G. STRAUB. *Univ. of Illinois, Eng. Expt. Sta. Bull.* No. 177, 71 pp.(1928).—A résumé of 3 years' work on embrittlement, contg. information concerning failures due to this cause and data obtained from lab. and plant tests. Embrittlement was caused by the combined action of stress and chem. attack brought about by the presence of NaOH in the boiler. Photomicrographs showed cracks to be intercryst. The effects of heat treatment, steam pressure and temp. stress, hydroxyl-ion concn., and NaCl on the rate of embrittlement were studied. Sulfates in the water in the proper ratio to the Na_2CO_3 content will prevent embrittlement. Phosphates, tannates, chromates, acetates, etc., will also inhibit attack. Methods of treatment are given.

J. K. ROBERTS

Spectrographic researches on the stamping of sheets. JEAN J. TRILLAT. *Compt. rend.* 186, 1535-6(1928).—X-ray spectrography of cold steel stampings from which a specimen is punched for examn. and thinned to a thickness of 0.12-0.16 mm. by etching with dil. HNO_3 gives an easily applicable examn. method. Grain structure, orientation and other changes in properties are given for specimens tested.

A. P. S.

Mass effect in the heat treatment of large forgings. I. J. A. JONES. *Metallurgist* (Suppl. to *Engineer* 145, No. 21), 70-2(1928).—"The properties of large masses can only be substantially improved by utilizing an alloy steel in which the transformations of the steel on cooling are retarded, so that efficient hardening is secured at comparatively slow rates of cooling." Tests are given of properly treated forgings of different compns. II. *Ibid* No. 26, 86-90.—Illustrations and data are given showing that lack of uniformity after heat treatment is greatest when the rate of cooling imposed by the mass of material approximates the crit. rate of cooling for hardening. Ni steel, itself unsuitable for large forgings, becomes satisfactory when W is added.

D. B. DILL

Influence of welding on structure. A. HILPERT. *Z. Ver. deut. Ing.* 71, 1449-58 (1927); *Science Abstracts* 31B, 9.—The influence of the various methods of welding metals, especially the welding of articles of large size, on the form of the welded parts is described. The various methods of welding, arc, oxyhydrogen, elec., but and pres-

sure welding and the ordinary smiths' welding, are discussed and the results contrasted. Welds of great size on bridge girders, storage tanks, water-pipes and dynamo housings are described, and the alternative methods of construction are considered. H. G.

The welding of aluminum. H. HOLLER. *Apparatebau* 40, 145-54(1928); cf. C. A. 22, 211.—Directions are given for gas and hammer welding, with 30 cuts and 2 tables of the phys. properties of welded app. J. H. MOORE

Magnets control welding arc. A. F. DAVIS. *Iron Age* 121, 1810-11(1928).—The superimposing of a strong magnetic field on the flame of a C welding arc appears to give the arc a gyratory motion easier for the welder to control than the normal arc. The microstructure of the weld metal made by the controlled arc on $\frac{1}{2}$ " plates is very similar to that of a highly refined low-C steel. The cost of welding $\frac{1}{2}$ " plates by this method ranges from 3 to 7 cents per ft. DOWNS SCHAAF

X-ray diffraction measurements in the systems iron-silicon iron-chromium and iron-phosphorus. CARL KREUTZER. *Z. Physik* 48, 556-66(1928).—The x-ray method of Debye and Scherrer was used to study the effect of the addns. of Si and Cr upon the $\alpha \rightleftharpoons \gamma$ and $\gamma \rightleftharpoons \delta$ transformations in pure Fe. The elements and alloys, in the form of wires, were heated to various temps in a vacuum camera. With rising Si content in Fe the range of temps. over which γ -Fe can exist narrows down. No γ -Fe structure (face-centered cubic) was observed at any temp in Fe contg. over 2.5% Si. The same was true of Fe contg. over 15% Cr. In the temp.-equil. diagram of the latter system the line representing the A_1 transformation should meet the one representing the A_2 transformation at 15% Cr. The non-existence of a compd. between Cr and Fe is easily seen from the diffraction patterns. It was, however, not possible to state definitely whether Fe and Cr show limited miscibility or form a complete series of solid solns. More precise measurements, to settle this matter, are now in progress. The röntgenographic examn. of the system Fe-P at room temp. shows solid soln. of P in Fe up to 1.7% P. Definite diffraction patterns establish the existence of Fe_3P , Fe_2P and still another compd. of higher P content. WILLIAM F. EHRET

Pipe corrosion and protection (HAGAN) 21. The corrosion of iron return mains (HILL) 21. The use of corrosion-resisting steels in the paper industry (MATHEWS) 23. The mechanical and physical laboratories for testing metals at the Polytechnic Institute of the University of Grenoble (DEJEAN) 2. Theory of passivity. I. Theory of polarization by anodic deposition and passivation of metals (MULLER, KONOPICKY) 2. The H-ion concentration changes in the rusting of Fe (ATKINS) 2. Synthetic coke briquets for metallurgical uses (U. S. pat. 1,676,729) 21. Recovering Pb from sludge formed in petroleum refining (U. S. pat. 1,676,294) 22. Storage battery grids (alloys for) (U. S. pat. 1,675,643) 4. Gas-diffusing unit (for ore flotation) (U. S. pat. 1,677,502) 13.

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Ore sintering apparatus. PAUL ANDERSON. U. S. 1,676,720, July 10.

Ore concentration by froth flotation. BURNELL R. TUNISON. U. S. 1,677,416, July 17. The extd. oily sulfurous component of a sulfurous petroleum oil, which is sol. in caustic alkali and insol. in water, is used as a flotation reagent.

Apparatus for concentrating ores by jigging, etc. HOWARD E. PETRO. U. S. 1,675,955, July 3.

Reducing ores. H. WITTEK. Brit. 275,144, July 27, 1926. The process described in Brit. 274,803 (C. A. 22, 2136) is modified by using other cyanamides instead of Ca cyanamide.

Obtaining metals from sulfide ores. E. G. T. GUSTAFSSON. Brit. 280,540, Nov. 11, 1926. Sulfides such as complex sulfide ores are heated with Fe on a slag bath in an elec. furnace so that the Fe combines with the S and the metals, if volatile, are distd. The mat obtained, contg. most of the Fe, may be roasted and reduced to obtain the Fe for re-use. Various details are given.

Construction for cleaning slag pockets of open-hearth furnaces by use of gas burners. JAMES HORNE. U. S. 1,676,555, July 10.

Iron castings. MARK G. WOODMAN (one-third to David G. Fisher and one-third to Vivian F. Shantz). U. S. 1,677,420, July 17. Salicylic acid 1-3 lbs. per ton of Fe is added to the molten Fe before casting to produce a hard, fine-grained metal.

Apparatus for casting pipe and other annular articles centrifugally. ARTHUR LOSEY (to U. S. Cast Iron Pipe & Foundry Co.). U. S. 1,675,716, July 3.

Apparatus for annealing metals in continuous cold rolling. LEON CAMMEN. U. S. 1,676,685, July 10.

Reversible regenerative open-hearth furnace. JAMES S. ATKINSON (to Open Hearth Combustion Co.). U. S. 1,675,588, July 3. A furnace is described, suitable for manuf. of steel, glass, etc.

Operating open-hearth furnaces. ARTHUR L. STEVENS (to Arthur L. Stevens Corp.). U. S. 1,677,664, July 17. In operations such as melting steel a neutral atm. is created in the open-hearth furnace and the pressure is automatically maintained at substantially atm. pressure. App. is described.

Continuous furnace for carbonizing metal articles. WILLIAM M. HEPBURN (to Surface Combustion Co.). U. S. 1,677,136, July 17.

Grease-melting furnace for use with hot rolls of tin mills. WM. C. LLOYD AND ARTHUR R. MCARTHUR (to American Sheet and Tin Plate Co.). U. S. 1,675,813, July 3.

Furnace for heat treatment of packs of metal sheets and plates. RUDOLPH W. STILER. U. S. 1,676,590, July 10.

Discharging and quenching apparatus for heat treating furnaces. FRANK T. COPE (to The Electric Furnace Co.). U. S. 1,675,795, July 3. The app. is suitable for treating automobile gears or other small articles.

Blast-furnace tuyère cooler construction. JAMES E. LOSE. U. S. 1,675,811, July 3.

Wrought iron. ROBERT D. PIKE. U. S. 1,675,867, July 3. Wrought iron comprising layers of electrolytic iron in cathode sheets with intervening laminae of slag is formed by stacking the sheets with intervening slag-forming material and heating to effect welding.

Steel for bearings. HENRY T. CHANDLER. U. S. 1,676,384, July 10. A steel rod contg. free carbides in such proportion that the rod is unsuitable directly for making roller bearings is rendered suitable for this purpose by twisting so that the lines of segregation of the carbides extend helically.

Increasing the permeability of silicon steel. JOHN C. KARCHER (to Western Electric Co.). U. S. 1,677,139, July 17. Si steel is heated to 1000-1250°, cooled at a rate of not more than 10° per min., reheated to 550-800° and then cooled more slowly than quenching in water but faster than quenching in air, e. g., by effecting the cooling between Cu plates.

Permanent magnets. JOHN H. WHITE. U. S. 1,675,872, July 3. Molten magnet steel is poured into a chilled mold and the casting formed afterward is magnetized.

Permanent magnets. LESLIE E. HOWARD and ALLEN D. PORRS (to Simonds Saw and Steel Co.). U. S. 1,677,674, July 17. Magnets are formed of W steel contg. V 0.05-1.00%.

Composite metal sheets. F. KRUPP A.-G. Brit. 280,518, Nov. 11, 1926. Billets of 2 metals such as mild steel and Ni-Cr steel are assembled with their contacting surfaces scoured or otherwise prepd. for welding, and with kaolin between rough surfaces of like contacting metals which are not to be united, to prevent union of the latter, and the assembled materials are subjected to heating and rolling.

Heat-resisting alloy. NOAK V. HYBINETTE. U. S. 1,675,709, July 3. An alloy which is resistant to high temps and is suitable for making castings contains Ni 5-10, Cr 15-25, C 1-2, Al 0.5-2% and the remainder is mainly Fe.

Alloys of aluminum containing copper. ALFRED G. C. GWYER and HENRY W. L. PHILLIPS (to British Aluminum Co., Ltd.). U. S. 1,676,856, July 10. About 0.1-0.3% of Ca or other alk. earth metal is added to a molten alloy which contains at least about 6% Cu and at least about 50% Al, in order to give an increase of elongation.

Aluminum alloys. NOAK V. HYBINETTE. U. S. 1,675,708, July 3. An alloy which is suitable for making cooking utensils contains Al about 90% together with Fe 0.5-2, Ni 3-6% and at least one of the metals Cr, W and Mo in quantity below 1% (suitably about 0.2-1%).

Determining the composition of copper and zinc alloys. MICHAEL POLANYI and STEPHAN VON BOGDANDY. U. S. 1,676,709, July 10. See Brit. 268,306 (C. A. 22, 1130).

Alloys of iron, copper, chromium, etc. BYRAMJI D. SAKLATWALLA. U. S. 1,676,929, July 10. Fe alloys which are resistant to corrosion contain C 0.1-2, Cr 8-25, Cu 0.5-5 and Si 1-3%.

Iron alloys for electric resistances. W. E. RUDER (to British Thomson-Houston Co., Ltd.). Brit. 280,537, Nov. 9, 1926. Fe is alloyed with Al 2-6 and Cr 10-15% Si and Mn up to 1% each and C up to about 0.1% also may be present.

Lead alloys. REGINALD S. DEAN and WM. E. HUDSON (to Western Electric Co.). U. S. 1,675,644, July 3. An alloy which may contain Pb and Sb 2.25% is repeatedly raised to the temp. at which the max. quantity of solute material present will enter solid soln. and between heating stages it is rolled and stamped or otherwise worked; the alloy is then quenched and aged, and is suitable for storage battery grids.

Magnesium and its alloys. I. G. FARBENIND. A.-G. Brit. 280,530, Nov. 13, 1926. In a modification of the processes for purifying Mg or its alloys as described in Brit. 182,948 (C. A. 16, 4180) and Brit. 219,287 (C. A. 19, 461), finished products are made contg. up to 0.1% Ca and up to 0.4% Mn. Ca and Mn chloride or other Mn compd. may be added to the salt melts during the process, or a Ca-Mn or other Mn alloy or metallic Mn may be added.

Magnetic alloy. GUSTAV W. ELMEN (to Western Electric Co.). U. S. 1,675,884, July 3. A magnetic material having a higher permeability than Fe at low magnetizing forces comprises Ni 2 and Cu 1 part.

Nickel alloys. RUSSELL FRANKS and BURNHAM E. FIELD (to Haynes Stellite Co.). U. S. 1,675,798, July 3. Alloys which are suitable for "high-speed" tools comprise Al 3-5, Si 3.5-6, W 5-12, Zr 6-12, B 1% or less, the remainder being principally Ni.

Restricting corrosion of magnesium and its alloys. ARTHUR C. ZIMMERMAN. U. S. 1,677,667, July 17. The metal is treated with a soln. of H_2PO_4 until a protective coating of Mg phosphate is formed on the surface.

Bonding bearing metals. FREDERICK C. MATHISON (one-third to Casper L. Redfield). U. S. 1,677,354, July 17. In order to bond a bearing metal having a Pb base, to an Fe or steel body, the latter is coated with Cu and then with Sn and the bearing metal is deposited by the babbitting process on the Sn-coated surface.

Coating ferrous metal with zinc. JOSEPH G. FITZ GERALD (to Central Alloy Steel Corp.). U. S. 1,675,646, July 3. The metal to be coated is heated to about 450-500° and coated in a molten spelter bath to produce a tight coat, the character of which may be controlled by the cooling after coating. An app. is described.

Coating other materials with platinum. NAAMLÖÖZE VENNOOTSCHAP PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 280,697, Oct. 29, 1926. W or Ni wires for cathodes, etc., are coated with Pt by heating in an atm. contg. carbonyl platinum chloride or other suitable volatile Pt compd.

Galvanizing. THEODORE A. DISSEL (to Cameron Appliance Co.). U. S. 1,675,926, July 3. In galvanizing small articles, a flux such as NH_4Cl is vaporized and the vapor is passed through a mass of the hot Zn-coated articles, to effect uniform action. An app. is described.

Metallizing nonmetallic surfaces. A. I. G. WARREN and PRECIOUS METAL INDUSTRIES, LTD. Brit. 280,651, Aug. 24, 1926. Bakelite or other non-metallic material, while in finely divided or plastic condition, is impregnated with S or a S compd. which will combine with a compd. of Au, Ag or other metal subsequently applied to the surface of articles made from the material, and after application and reaction of the metal compds. the reaction products are reduced to metallic state on the surface by electrolytic or other action.

Apparatus for detinning tinned scrap. M. A. ADAM. Brit. 277,127, June 16, 1926.

Gas for cutting and welding with oxygen. JAMES R. ROSE (to Carbo-Oxygen Co.). U. S. 1,676,871, July 10. A gas is used contg. at least about 80% H, at least about 10% CH₄, at least about 1.5% of heavier gaseous hydrocarbons and not materially more than 5% CO. Cf. C. A. 21, 2117.

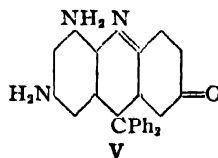
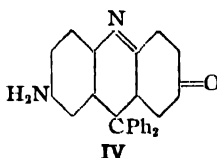
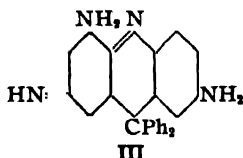
Composition for use in soldering or welding aluminum. WILHELM REUSS. U. S. 1,675,664, July 3. A mixt. of equal quantities of borax, H₃BO₃ and KOH is used as a flux.

Flux for welding cast iron. COLIN C. MARYAN (to General Electric Co.). U. S. 1,676,988, July 10. Fe₂(CO₃)₃ 4, NH₄Cl 12, Na borate 16, NaHCO₃ 20 and NaCl 12 parts.

10—ORGANIC CHEMISTRY

CHAS. A. ROULLIER AND CLARENCE J. WEST

Synthesis of carbazines. IV. HENRI GOLDSTEIN AND JEAN VAYMATCHAR. *Helv. Chim. Acta* 11, 245-9(1928); cf. C. A. 22, 1590.—Me 4,6,4'-triaminodiphenylamine-2-carboxylate on treatment with PhMgBr (I) gives a carbinol which rearranges to give 2,5,7-triaminodiphenylcarbazine (II). II on oxidation yields 2,5-diaminodiphenylcarbazine (III), which is identical with the compd. described by Kehrman, Goldstein and Tschudi (C. A. 13, 3178), proving that the formula assigned by them is correct. This synthesis may be used to prep. aminocarbazones, e. g., the Me ester of 4-amino-4'-hydroxydiphenylamine-2-carboxylic acid with I forms 2-amino-7-hydroxydiphenylcarbazine, which on oxidation gives 2-aminodiphenylcarbazone (IV). This confirms the formula assigned this compd. by K. and T. (C. A. 19, 1280; 20, 1801-2). Me 4,6-diamino-4'-hydroxydiphenylamine-2-carboxylate on similar treatment yields 2,4-diaminodiphenylcarbazone (V), m. 227°. This compd. is totally different from that described by K. and T. (C. A. 19, 1280).



HELEN COLLINS

Some derivatives of anthranilic acid. IV. HENRI GOLDSTEIN AND JEAN VAYMATCHAR. *Helv. Chim. Acta* 11, 239-45(1928); cf. C. A. 22, 1531.—2,3,5-Cl(O₂N)₂-C₆H₃CO₂H (I) condensed with *p*-C₆H₄(NH₂)₂ yields 4,6-dinitro-4'-aminodiphenylamine-2-carboxylic acid, m. 274°; on reduction and esterification, methyl 4,6,4'-triaminodiphenylamine-2-carboxylate, m. 151° is obtained. I with 4-amino-1,3-diacetamidobenzene, m. 218°, gives 4,6-dinitro-2',4'-diacetamidodiphenylamine-2-carboxylic acid (II), m. 255°. G. and V. were unsuccessful in their attempt to transform II into Me 4,6,2',4'-tetraminodiphenylamine-2-carboxylate. 2,5-Cl(O₂N)₂-C₆H₃CO₂H with *p*-H₂NC₆H₄OH in the presence of a Cu catalyst forms 4-nitro-4'-hydroxydiphenylamine-2-carboxylic acid, m. 210°; on reduction 4-amino-4'-hydroxydiphenylamine-2-carboxylic acid, 213° is obtained; Me ester, m. 164°. Me 4,6-diamino-4'-hydroxydiphenylamine-2-carboxylate, m. 162°, also was prepd.

HELEN COLLINS

Formation and properties of dithio ketones and dithio ethers. IV. Interaction of sulfur monochloride with organic compounds containing the reactive methylene group. KUNERJI G. NAIK AND YESHWANT N. BHAT. *Quart. J. Indian Chem. Soc.* 4, 525-30 (1927); cf. C. A. 17, 542.—S₂Cl₂ reacts with *N*-substituted derivs. of CH₂(CONH₂)₂ to form dithio ketones, and with *N*-substituted derivs. of CHMe(CONH₂)₂ to form dithio ethers. CH₂(CONH₂)₂ (2 g.) in 30 cc. dry C₆H₆ with 2 g. S₂Cl₂ refluxed 3 hrs., filtered and washed with dry petroleum gave a dithio ketone, C₇H₁₃N₂O₂S₂, shrinks at

186°, m. 202°. $\text{CH}_2(\text{CONHPr})_2$ gives a *dithio ketone*, $\text{C}_9\text{H}_{16}\text{N}_2\text{O}_2\text{S}_2$, shrinks 172°, m. 180°. $\text{CH}_2(\text{CONH-iso-Bu})_2$ gives a *dithio ketone*, $\text{C}_{11}\text{H}_{20}\text{N}_2\text{O}_2\text{S}_2$, shrinks 196°, m. 202°. *N,N'*-Diheptylmalonamide (12 g. from 11.5 g. $\text{C}_7\text{H}_{15}\text{NH}_2$ and 8 g. $\text{CH}_2(\text{CO}_2\text{Et})_2$, let stand for 24 hrs. in a sealed tube and then heated 7 hrs. at 125–30°), m. 132°. With S_2Cl_2 it gives the *dithio ketone*, $\text{C}_{17}\text{H}_{32}\text{N}_2\text{O}_2\text{S}_2$, m. 125°. *m*-Malonotoluide gives the *dithio ketone*, $\text{C}_{17}\text{H}_{16}\text{N}_2\text{O}_2\text{S}_2$, shrinks at 158°, m. 180°; it forms a *tetranitro deriv.*, m. 166° (decompn.). $\text{CHMe}(\text{CONHC}_6\text{H}_4\text{Me-}m)_2$ gives the *dithio ether*, $\text{C}_{20}\text{H}_{18}\text{N}_2\text{O}_4\text{S}_2$, m. 187–8°. *N,N'*-Dibenzyl- α -methylmalonamide (from $\text{CHMe}(\text{CO}_2\text{Et})_2$ and PhCH_2NH_2), m. 142°. E. H.

Oxidation of hexane. MAX BRUNNER AND ERIC K. RIDEAL. Univ. Cambridge. *J. Chem. Soc.* 1928, 1162–70.—The process of oxidation of hexane bears a striking resemblance to the autoxidation of BzH . The temp. of initial combustion is not a characteristic of the hydrocarbon, for rapid combustion will set in after a period of induction at lower temps. During this period of induction slow autoxidation proceeds together with the formation of peroxides. The period of induction at constant temp. is greatly affected by the O pressure and by the presence of inhibitors, such as PhNH_2 , or of surface catalysts, such as pumice. The temp. coeffs. of the reactions proceeding in the induction period are high. The suggestion is made that the reactions involve the formation at catalytic surfaces of an active "moloxide" (cf. Grün, *C. A.* 14, 3416), which is subsequently converted into a more stable peroxide. The peroxide can react either in the gas phase or at the surface, but when the peroxide concn. reaches a critical value, chain propagation ensues, causing excitation and combustion of mols. coming into contact with the reaction centers of the chain. C. J. WEST

The Wurtz reaction. Factors involved in the preparation of octane. HARRY F. LEWIS, ROBERT HENDRICKS AND G. ROBERT YOHE. *J. Am. Chem. Soc.* 50, 1993–8 (1928).—The following facts are established regarding the action of Na upon BuBr: optimum yields are obtained with an excess of Na (not greater than 50 mol. %); a vol. of Et_2O 2.5 times that of the BuBr should be used; low temp. favors the production of octane; the rapidity of the reaction depends upon the fineness of the Na wire; traces of H_2O cut down the yield; agitation accelerates the reaction; MeCN has no positive action in the formation of octane; small quantities of octane are easily recovered from the reaction mixt. by distn.; larger quantities are best obtained after the Na is destroyed. Phys. consts. are given for mixts. of octane and BuBr (d. and n_D^{20}). Directions are given for the prepn. of octane in 65–70% yields. Butene and at least 2 higher satd. hydrocarbons are also formed; the b. ps. of the hydrocarbons suggest dodecane and hexadecane. C. J. WEST

Hydrocarbon synthesis from carbon monoxide and hydrogen. O. C. ELVINS. *J. Soc. Chem. Ind.* 46, 473–8T (1927).—The interaction of CO and H was investigated at atm. pressure and in presence of catalysts at temps. of the order of 280°. A catalyst prepd. from a mixt. of 60 parts of cobalt, 30 parts of CuO, and 45 parts of Mn oxide was used in conjunction with varying gas mixts. Contrary to the original statements of Fischer and Tropsch that only aliphatic hydrocarbons are formed by this reaction definite amts. of water-sol. oxygenated compds. and olefins were found among the reaction products. A detailed account of the exptl. work is given and the prepn. of the catalyst from pptd. hydroxides, by ignition of nitrates, and from fused oxides, is described. The size of the granule was also investigated from the point of view of the inherent fouling effect of the waxy products of reaction. B. C. A.

Normal aliphatic alcohols and aldehydes. LOUIS DESCOLLONGES. *Am. Perfumer* 23, 237–8 (1928).—It is very seldom that aldehydes and aliphatic alcs. are used to impart a characteristic odor to a bouquet, their function being rather to give more freshness, "waxiness," sweetness and blending power. As the mol. wt. of these substances increases, their odor becomes less fatty and more tenacious. The odor of C_{10} is decidedly fresh and fruity, this quality becoming more so as one goes up to C_{15} . The C_{10} and C_{11} alcs. and aldehydes are therefore more readily used than the lower homologs. Because of the great potency of these products, only very dil. solns., 1/100 for example, are recommended for trial; aldehydes are as a rule more powerful than alcs. Aliphatic aldehydes and alcs. judiciously used should therefore complete the fundamental note given by the ordinary constituents and afford to the perfumer valuable help. Octyl alc., occurring in lemon, heracleum and male-fern oils, has an odor somewhat similar to that of opoponax. Nonyl alc., detected in orange oil, possesses a rose-like note recalling citronellol but of more fatty quality; its use is therefore indicated in rose perfume and in cologne waters. Decyl alc. has a rather indefinable fresh odor with an orange touch, hence indicated in jasmine, rose, orange blossoms, lily of the valley, lilac and fancy perfumes. Undecylenic alc. is successfully used in toning down the

violent note of aldehydes. Dodecyl alc. imparts freshness and tenacity, possessing an odor similar to that of nerolidol, which it can advantageously replace in most cases. Octyl aldehyde, a constituent of lemon and orange oils, combines perfectly with jasmine note, giving freshness and "waxing" quality. Nonyl aldehyde combines well with rose, geranium and neroli perfumes. Decyl aldehyde, detected in Manila orange, neroli, orange, orris, cassie, coriander and lemongrass oils, possesses a medium volatility which enables it to play the part of stabilizer, its presence giving a constant tonality to bouquets as long as evapn. lasts. It is therefore indicated with Sicilian oils in cologne waters, as also to impart a touch of originality to fancy perfumes. Undecyl aldehyde has a fine rose-like odor and imparts to compds. the "wax" note proper to natural flower oils. It is very useful in rose rouge, lily of the valley, tuberose and narcissus perfumes. Dodecyl aldehyde combines well with orange oil and greatly improves it. Appropriate also in combinations of tuberose, jasmine, lily of the valley, lily and violet.

W. O. E.
Nitrosyl chloride and ketones. H. RHEINBOLDT AND O. SCHMITZ-DUMONT. *J. Am. Pharm. Assoc.* 17, 134-5 (1928); see *C. A.* 22, 1152. I. E. WARREN

Action of nitrous acid on amino compounds. I. Methylamine and ammonia. THOMAS W. J. TAYLOR. *J. Chem. Soc.* 1928, 1099-1105.—No reaction was observed between 0.05 *N* MeNH₂ and 0.05 *N* HNO₂, with or without 0.05 *N* H₂SO₄ during 2.5 hrs. A fairly rapid reaction occurs with 0.1 *N* HNO₂, 1 mol. HNO₂ disappearing for each mol. of MeNH₂, the mean value of *k* at 25° is 1.14 (normality⁻², min.⁻¹). KCl diminishes the velocity. The reaction is increased by MeNH₂·HCl or Ba(NO₂)₂. The effect of H₂SO₄ was also studied. NH₃ (0.05 *N*) at 25° does not react with 1 equiv. of HNO₂ but reacts with 2, the velocity coeff. being of the order of 0.48; the velocity is lowered by addn. of mineral acids and of KCl; the velocity is accelerated equally by equiv. amts. of either NH₄Cl or Ba(NO₂)₂.

C. J. WEST

The mechanism of the reactions accompanying the formation of Cadet's oil. AMAND VALEUR AND PAUL GAILLIOT. *Compt. rend.* 185, 956-8 (1927); cf. *C. A.* 22, 572, 573.—Heating of KOAc and H₃AsO₃ gives a complex mixt., Cadet's fuming arsenical liquid. Probably arsenic methyl (I) is first formed and leads to the formation of compds. more or less methylated which tend, upon heating, to give Me₃As (II), the most volatile of the series, and As, the least volatile. Cadet's oil consists of As, a black polymer of I, and a liquid which gives a red polymer (III) of I, II, (Me₂As)₂ (IV), (Me₂As)₂O (V), Me₂As₂ and Me₃As₂. I, prepd. by Auger's method, b₁₀ 190°, d₁₅ 2.159, m. 10°, is (AsMe)₃; it gives III spontaneously. I in a sealed tube gives at 200-50° As, II and IV. IV in a sealed tube gives at 200-50° As and II. Therefore the heating of I leads to the following reactions: 4AsMe → 2As + (Me₂As)₂, (Me₂As)₂ → [AsMe] + Me₃As. Also, 2Me₂As + AsMe → Me₇As₃ and Me₂As + 2AsMe → Me₃As₃. The presence of V in Cadet's oil is due to the classic reaction of KOAc and As₂O₃ or to the accidental oxidation of IV. I may be formed analogously from KOAc and As₂O, the latter resulting from the reduction of H₃AsO₃.

MARGARET W. MCPHERSON

Organic titanous compound and a new method for the preparation of solutions of titanous salts. DONALD W. MACCORQUODALE AND HOMER ADKINS. Univ. Wisconsin. *J. Am. Chem. Soc.* 50, 1938-9 (1928).—An org. tervalent Ti compd. has been prepd. in an impure state by the reduction with Na of an EtOH soln. of Et₃TiO₄; this dark blue compd. acts as a reducing agent and also dissolves in HCl or dil. H₂SO₄ to form titanous salts. The solns. so obtained are entirely free from Fe or other metallic or acidic impurities. An improved method for the prepn. of Et₃TiO₄ is given. C. J. WEST

Synthesis and purification of hexamethylenimine. A. MÜLLER AND A. SAUERWALD. *Monatsh.* 48, 727-32 (1927).—Treatment of α,β-dibromohexane (1 mol.) and *p*-MeC₆H₄SO₂NH₂ (1 mol.) with aq. alc. KOH affords *N-p-toluenesulfonylhexamethylenimine*, m. 72-4°, together with α,β-di-*p*-toluenesulfonamidohexane. Treatment of the former compd. with concd. HCl at 160° gives hexamethylenimine·HCl, m. 236° (cor.) (lit. 222°). Pure hexamethylenimine b₁₀ 138.0-8.2°, d₁₅ 0.8841, d₄²⁰ 0.8799, d₄²⁵ 0.8770, n_D²⁰ 1.4654; the following derivs. are described: chloroplatinate, decomp. 190-7° (cor.) (lit. 149° and 191°); chloroaurate, decomp. 206° (cor.); picrate, m. 146.5° (cor.) (lit. 85°); phenylthiocarbimide, m. 143° (cor.); the *Bz* deriv., m. 36° (cor.), when treated with PCl₅ yields α,β-diphenoxy-hexane m. 83-3.5° (cor.). *N,N*-Dimethylhexamethyleniminium iodide [chloroplatinate, decomp. 233° (cor.)], m. 265° (cor.) with slight decompn. (lit. 214-5°).

B. C. A.

Nonaldehyde from the tetradecenoic acid from sperm oil. ALFRED WAGNER. *Allgem. Öl-Fett-Ztg.* 24, 340-1 (1927).—Tetradecenoic acid, d₄²⁰ 0.9018, n_D²⁰ 1.4549, I value 107, was isolated from sperm-whale oil, and converted into the ozonide, which

on decompn. with water yielded nonaldehyde (semicarbazone, m. 80–84°; after purification with H_2SO_4 , semicarbazone, m. 100°; oxime, m. 64°). B. C. A.

Reactions relating to carbohydrates and polysaccharides. XIV. Polymerization of aldehydes. HAROLD HIBBERT, W. F. GILLESPIE AND R. E. MONTANNO. McGill Univ. *J. Am. Chem. Soc.* 50, 1950–5(1928); cf. C. A. 22, 2141.—This is a confirmation and extension of the work of Stepanov (C. A. 20, 362; 21, 731) on the bromoparaldehydes. CCl_3CHO (1 mol.) and 2 mols. Me_3CCHO give a mixed paraldehyde, $\text{C}_{12}\text{H}_{20}\text{O}_4$, m. 114–5°; it is very stable toward alkalis but decomps on continued boiling with H_2SO_4 ; a trace of concd H_2SO_4 acts as a catalyst. EtCHO gives, with a few drops of dry HCl as a catalyst, 35–40% of the compd $\text{C}_8\text{H}_{13}\text{O}_4\text{Cl}_3$, m. 62.5°. Me_3CCHO gives the compd. $\text{C}_{10}\text{H}_{17}\text{O}_4\text{Cl}_3$, m. 68.5–9° (39% yield). Attempts to prep. compds. involving 3 different aldehydes failed. XV. The isomeric benzylideneglycerols. HAROLD S. HILL, MYRON S. WHEELER AND HAROLD HIBBERT. *Ibid* 2235–42(1928); cf. Irving, Macdonald and Soutar, C. I. 9, 1468.—Condensation of 150 g. BzH and 120 g. $\text{C}_3\text{H}_8\text{O}_3$ by heating in CO_2 1 hr. at 145–55° and 30 min. at 165° gives 170 g. of a mixt. b_D 140–9°; purification gives 120 g. mixed glycerols, b_D 142–7°, d_4^{17} 1.19838, n_D 1.5400; soln. of 60 g. of this mixt. in 150 cc. ligroin (b. 60–70°) and 90 cc. C_6H_6 and cooling to –15°, gives 7 g. 1,3-benzylideneglycerol (I), m. 83.5°; distn. of the product from the mother liquors gives the 1,2-isomer (II), b_D 143–4°, d_4^{17} 1.1916, n_D 1.5389. The same products were also obtained with H_2SO_4 as a catalyst. By the 1st method, the ratio of II to I was 7.5:1; by the 2nd method, the ratio was 3:1. The Bz deriv. of I m. 103°; that of II is an oil. Methylation of I with MeI and Ag_2O gives the β -Me ether, m. 52° (31 g. from 54 g. I), hydrolysis gives 64% of β -Me glycerol ether, b_D 123°, d_4^{17} 1.1300, n_D 1.4505, which should prove a reference compd. of some importance. The Me deriv. of II was sepd. into 3 fractions, b_D 138–9°, 130–41°, 141–5°, n_D 1.5128, 1.5135, 1.5159; hydrolysis of the lowest boiling fraction gave 87% of α -Me glycerol ether, b_D 110°, d_4^{17} 1.1202, n_D 1.4449, corresponding with the properties of the compd. of I, M. and S. Hydrolysis of the highest boiling fraction indicated the presence of some of the β -Me ether. When I is treated with a trace of dry HCl and heated at 100° for 1 hr., the ratio of II to I is 5:1; starting with II, the ratio is 5.5:1. XVI. Separation and identification of the isomeric ethylideneglycerols. HAROLD S. HILL, ALLAN C. HILL AND H. HIBBERT. *Ibid* 2242–9.—On passing 45 l. of C_2H_2 through a mixt. of 8 g. H_2SO_4 , 8 cc. concd. H_2SO_4 and 184 g. $\text{C}_3\text{H}_8\text{O}_3$ at 70°, there results 234 g. of a mixt. of ethylideneglycerols, b_D 86–101°; from 276 g. $\text{C}_3\text{H}_8\text{O}_3$, 5 cc. 50% H_2SO_4 and 144 g. $(\text{HCHO})_3$ at 100°, there results 233 g. of a mixt. b_D 79–89°. While these mixts. can be partially sepd. by fractional distn., they are best sepd. through the benzoates; the following products were isolated: 1,3-ethylideneglycerol (I), b_D 52°, d_4^{17} 1.1477, n_D 1.4532; 1,2-isomer (II), b_D 68–70°, d_4^{17} 1.1243, n_D 1.4413; Bz deriv. of I, m. 86°; of II, b_D 144–5°, d_4^{17} 1.1618, n_D 1.5145; Me ether of I, b_D 80°, d_4^{17} 1.0705, n_D 1.4375; of II, b_D 50–8°, d_4^{17} 1.0224, n_D 1.4177. The ratio of I to II in the C_2H_2 method of prepn. is 1:1.8; in the $(\text{HCHO})_3$ method, 1:4. The structure of I and II is established by hydrolysis to the corresponding α - and β -Me ethers of glycerol. C. J. WEST

Catalysis in the conversion of allyl alcohol and acrolein into propionaldehyde. PAUL E. WESTON AND HOMER ADKINS. Univ. Wisconsin. *J. Am. Chem. Soc.* 50, 1930–5(1928).—The behavior over a ZnO catalyst of $\text{CH}_2=\text{CHCH}_2\text{OH}$ (I) and mixts. of I with $\text{CH}_2=\text{CHCHO}$ (II) has been investigated as has also the reaction over Al_2O_3 of II and PrOH . All of the exptl. results indicate that the formation of EtCHO from I over ZnO results at least in part from the reaction of I with II and not through the hydrogenation of II nor through the intramol. rearrangement of I. C. J. WEST

Simpler derivation of the Cook formula for the determination of the acetyl value of fats and oils. WM. RIEMAN III AND ALFRED T. HAWKINSON. Rutgers Univ. *J. Am. Chem. Soc.* 50, 2311–2(1928).—A new method is given for the derivation of the formula $A = (S' - S)/(1 - 0.00075S)$. C. J. WEST

Purification of palmitic and stearic acids. A. I. WILKIE. *J. Soc. Chem. Ind.* 46, 471–2T(1927).—Reasonably pure palmitic and stearic acids can be obtained by fractional distn. under diminished pressure of a mixt. of the Et esters through a column of the Dufton type, 150 cm. long, maintained at a uniform const. temp. The appropriate fractions are hydrolyzed. B. C. A.

Oxidation of unsaturated acids by means of chlorates in presence of osmium. I. Oxidation of crotonic, cinnamic, oleic and elaidic acids and reciprocal transformation of oleic and elaidic acid. S. S. MEDVEDEV AND E. N. ALEKSEVA. *Papery Karpov*

Chem. Inst. Bach Memorial Vol. 1927, 128-42.—Hofmann's method (C. A. 7, 999, 3088; 8, 3297; 10, 303) was used by M. and A. for obtaining oxidation products of crotonic, cinnamic, oleic and elaidic acids. A mixt. of 9 g. *crotonic acid*, 15 cc. of 50% NaClO_3 , 48 cc. water, 3 g. NaHCO_3 and 3 cc. of 1% OsO_4 was heated on a water bath at 80°. In the course of 10 hrs. 96% of the theoretically needed O was utilized (judged by the extent of transformation of NaClO_3 into NaCl). The following 2 reactions took place: (1) $\text{MeCH:CHCO}_2\text{H} + 0.5\text{O}_2 + \text{H}_2\text{O} = \text{MeCH(OH)CH(OH)CO}_2\text{H}$; (2) $\text{MeCH:CHCO}_2\text{H} + 2\text{O}_2 = \text{AcOH} + (\text{CO}_2\text{H})_2$. Dihydroxybutyric acid and 1.2 g. $(\text{CO}_2\text{H})_2$ were thus obtained. Ten g. *cinnamic acid*, 3.4 g. Na_2CO_3 , 15 cc. 50% NaClO_3 , 2 cc. 1% OsO_4 and 65 cc. water were treated approximately in the same way as above. The products obtained were 50% phenylglyceric acid ($\text{C}_6\text{H}_5\text{O}_4$) and 20% BzH . $(\text{CO}_2\text{H})_2$ was not formed. Ten g. *oleic acid*, 3.5 g. Na_2CO_3 , 8 cc. 50% NaClO_3 , 3 cc. 1% OsO_4 and 154 cc. water were heated in a water bath 66 hrs., but the oxidation stopped after the 1st 50 hrs. when only 48% of the theoretically needed O was obtained and the reaction did not continue even on adding new amounts of NaClO_3 and OsO_4 . The products obtained were elaidic acid, m. 46-7°, and 3.5 g. of 9,10-dihydroxystearic acid, $\text{C}_{18}\text{H}_{34}\text{O}_4$, m. 134°. Stereoisomeric dihydroxystearic acid, m. 95°, was absent. *Elaidic acid* (10.5 g.), 10 cc. 50% NaClO_3 , 1.2 g. NaHCO_3 , 10 cc. 1% OsO_4 and 150 cc. water were heated on a water bath 100 hrs.; 91% of the O theoretically needed for oxidation had been used up. The products of reaction were oleic acid, m. 12-3°, and 4.5 g. low-melting 9,10-dihydroxystearic acid. The stereoisomeric variety of the latter acid, which m. 132°, was not obtained. By oxidizing in the same manner a mixt. of oleic and elaidic acids, both the high-melting and the low-melting varieties of dihydroxystearic acid were obtained. *Conclusions.*—(1) The high-melting dihydroxystearic acid is obtained as a product of oxidation of oleic acid, whereas its low-melting stereoisomer is obtained by oxidation of elaidic acid; the result is the same when KMnO_4 is used as oxidizing agent. (2) The reciprocal transformation of oleic and elaidic acids is a very important fact from the point of view of considerations on the stereochem. structure of these 2 acids, since it unsettles the question whether a *cis*- or a *trans*-formula should be attributed to oleic acid; it has hitherto been thought that while oleic acid can be transformed into the more stable elaidic acid, the inverse transformation was not feasible.

BERNARD NELSON

Isobleic acids. K. H. BAUER AND J. MITSOTAKIS. Univ. Leipzig. *Chem. Umschau Fette, Oele, Wachse u. Harze* 35, 137-9 (1928).—Isobleic acids may have their double C bond between any C atoms except at the 9,10-position, which is reserved for the normal acid. They are solid at room temp. Unsuccessful attempts to isolate isobleic acid from the solid acids after hydrogenating peanut oil, caused B. and M. to ozonize the liberated mixed acids, then to ext. the free acids and acid esters of the di- CO_2H acids with dil. Na_2CO_3 , liberate the acids with the H_2SO_4 and distil them finally with steam. They obtained a decamethylenedicarboxylic acid m. 123-4°, identified by ultimate analysis; also a small quantity of azelaic acid m. 106°, and the volatile caproic acid, identified by b. p., sapon. no., ultimate analysis and analysis of its Zn salt. These products point to the presence of 12,13-isobleic acid and this acid probably resulted from the satn. of the 9,10-double bond in linolic acid, leaving the 12,13 double bond intact.

P. ESCHER

Reaction of bromine with aliphatic acids. II. The relative speeds of bromination of acetyl bromide and acetyl chloride. HERBERT BEN WATSON. Univ. Coll. of North Wales. *J. Chem. Soc.* 1928, 1137-41; cf. C. A. 20, 42.—With AcBr in excess, the value of $k_1 = (1/t) \log [a/(a-x)]$ shows a progressive decrease, but const. are obtained if allowance is made for the "fixing" of Br in the equil. $\text{HBr} + \text{Br}_2 \rightleftharpoons \text{HBr}_3$. Small quantities of FeCl_3 or H_2SO_4 do not accelerate the reaction but IBr is a catalyst. Br reacts with AcCl more slowly than with AcBr . At 25°, with the concns. employed, the velocity is proportional to the concn. of Br during the 1st half of the reaction, extensive perbromide formation being prevented by the reaction $\text{HBr} + \text{AcCl} = \text{AcBr} + \text{HCl}$; the values of k_1 increase, however, as would be expected, when the quantity of AcBr becomes considerable. A CO_2H acid reacts with the bromide of another acid, $\text{RCO}_2\text{H} + \text{R}'\text{COBr} = \text{RCOBr} + \text{R}'\text{CO}_2\text{H}$; on distg. mol. quantities of BrCH_2COBr and AcOH , the 1st fraction is AcBr ; the f. p. of a soln. of the same acid bromide in AcOH indicated that the greater part had reacted after 1 hr. at 25°.

C. J. WESS

Effect of the cyanide group on the basicity of aliphatic amines as determined in water and alcohol solutions. T. D. STEWART AND VIVIEN COOK. Univ. Calif. *J. Am. Chem. Soc.* 50, 1973-83 (1928).—The basic dissocn. consts. of $\text{Et}_3\text{NCH}_2\text{CN}$ and of $\text{Et}_3\text{NCHPhCN}$ in H_2O are 1.0×10^{-10} and 1.7×10^{-11} , resp. In EtOH , the acidic dissocn. consts. of their salts (chlorides) are 3.4×10^{-4} and 5.2×10^{-4} , resp., while

those of $\text{Me}(\text{Et}_2\text{N})\text{CHCN}$ and of $\text{Me}_2\text{C}(\text{NEt}_2)\text{CN}$ in EtOH are 3.4×10^{-5} and 2×10^{-6} , resp. The base strength of some amino ethers in EtOH has been recalcd. Some of the factors which det. the apparent change in relative base strength with change of solvent are discussed.

C. J. WEST

Preparation of α,η -dihydroxyheptane (heptamethylene glycol) and α,η -dibromo- η -heptane. A. MÜLLER AND E. RÖTZ. *Monatsh.* **48**, 733-6(1927).—Reduction of Et pimelate by the Bouveault and Blanc method affords heptane- α,η -diol (60% yield) b_D^{20} 148-9° [phenylcarbimide, m. 137° (cor.); cf. Dionneau, *C. A.* **9**, 2057]. Treatment of the glycol with HBr at 130-40° yields α,η -dibromoheptane, b_D^{20} 132°, in 74% yield.

B. C. A.

Lower glycerides of palmitic acid. W. BRASH. *J. Soc. Chem. Ind.* **46**, 481-2T (1927).—The lower glycerides of palmitic acid were prepd. by heating Pb palmitate with the corresponding glycerol chlorohydrin. It was found impossible to prep. the β -monochlorohydrin in a satisfactorily pure condition. The m. ps of the glycerides obtained are: α -monopalmitin 68°, α,γ -dipalmitin 61.5°, α,β -dipalmitin 68.5°. B. C. A.

A general reaction of amino acids. H. D. DAKIN AND R. WEST. Scarborough-on-Hudson. *J. Biol. Chem.* **78**, 91-105(1928).—When α -amino acids are warmed with Ac_2O and pyridine, CO_2 is evolved and 2 Ac groups are introduced, one attached to N and one to C. The compds. formed are derivs. of acetylaminooacetone and have the general formula $\text{RCH}(\text{NHAc})\text{COMe}$. The following facts are adduced to substantiate this formula: In the cases of tyrosine, phenylalanine and leucine, in which the reaction goes virtually to completion, it was possible to show that 1 mol. of CO_2 was evolved for each mol. of the acid entering into the reaction. The presence of an Ac group attached to N was indicated by hydrolysis. Strong positive CHI_3 and nitroprusside reactions, and the formation of benzylidene derivs., on condensation with BzHI , indicate that the compd. is a Me ketone. The position of the latter group is shown by the fact that glycine, β -trimethylalanine and phenylaminooacetic acid undergo the reaction. After removal of the Ac group attached to N, alkali in the presence of HgCl_2 converts the compds. into pyrazine derivs., indicating their relation to acetylaminooacetone. By the action of $\text{O}_2\text{NC}_6\text{H}_4\text{NHNH}_2$ in hot dil. H_2SO_4 soln. the new ketones are converted into the characteristic bisnitrophenylhydrazones of glyoxals. Proline, alkylamino acids and α -aminohydroxy acids, do not react like the α -amino acids but undergo simple acetylation. The general reaction is considered as resulting by loss of CO_2 from intermediate β -ketonic acids. The pyridine is catalytic in its function. Lutidine, collidine and nicotinic acid are also effective as catalysts but PhNMe_2 and quinoline are not. The general reaction is shared by α -halogen acids and some unsubstituted acids like $\text{PhCH}_2\text{CO}_2\text{H}$ which gives MeCOBz . The biol. significance of the reaction is discussed and its possible use for the prepn. of pharmacol. active substances indicated. A. G.

Reciprocal action between α -oxides and esters of amino acids. II. A. KIPRIANOV. *Inst. angew. Chem. Charkov. Ukrainskii Khim. Zhurnal* **2**, 236-49(1926); *Chem. Zentr.* 1927, I, 2654-5, cf. *C. A.* **21**, 2467. Ethylene oxide (I) reacts easily (1 hr. on the water bath or 48 hrs. at room temp.) with $\text{H}_2\text{NCH}_2\text{CO}_2\text{Et}$ or $\text{MeCH}(\text{NH}_2)\text{CO}_2\text{Et}$. The formation of *N*-monosubstituted and *N*-disubstituted esters was to be expected, e. g., $\text{HOCH}_2\text{CH}_2\text{NHCH}_2\text{CO}_2\text{Et}$ and $(\text{HOCH}_2\text{CH}_2)_2\text{NCH}_2\text{CO}_2\text{Et}$, but actually EtOH was liberated and only *N*-disubstituted acids were isolated. When equimol. parts of I and of the amino acid ester were used, their yield reached approx. 30%, with no other products, but with excess I the yield is greatly increased. The primary reaction product is, however, not the *N*-disubstituted acid, but very probably its morpholine which is hydrated only by treatment of the reaction product with water. I (10 g.) and $\text{H}_2\text{NCH}_2\text{CO}_2\text{Et}$ (22 g.) let stand 48 hrs. in a sealed tube, the EtOH (4.5 g.) distd. off and the residual oil (II) let stand in the air, yields on recrystn. from EtOH , approx. 4 g. of dihydroxydiethylaminooacetic acid, $(\text{HOCH}_2\text{CH}_2)_2\text{NCH}_2\text{CO}_2\text{H}$ (III), m. 193° (decompn.), sweet taste. *Picrate*, $\text{C}_6\text{H}_5\text{O}_2\text{N}_2\text{C}_6\text{H}_3\text{O}_7\text{N}_3\text{H}_3\text{O}$, m. approx. 95°. *Cu salt*, $\text{Cu}(\text{C}_6\text{H}_5\text{O}_2\text{N})_2\cdot\text{H}_2\text{O}$, blue. *Dibenzate*, soft and readily fusible, decompd. by warming with EtOH . On dry distn. of the uncrystallizable part of II or of pure III, 1-hydroxyethyl-3-morpholine, $\text{HOCH}_2\text{CH}_2\text{N}(\text{CH}_2)_3\text{CO}_2\text{CH}_2\text{CH}_3$ (IV), is formed, b_D^{20} 175-6°, miscible

in all proportions with EtOH and with water; exposed to moist air it becomes covered with a cryst. coating of III. III is likewise formed in aq. IV, the yield being about 71% after 10 min. at room temp. and 99% on long standing. A small proportion of IV remains, however, in equil. with III, about 2.8% at 90-100° and 0.7% at 0° (cf. *Ann.* **307**, 199). Evapn. of III with PtCl_4 and HCl on a water bath ppts. the chloroplatinate of IV, $(\text{C}_6\text{H}_5\text{O}_2\text{N})_2\cdot\text{H}_2\text{PtCl}_6$, red, m. 190° (decompn.). $(\text{HOCH}_2\text{CH}_2)_2\text{NCH}_2\text{CO}_2\text{Et}$ (24.5 g.) heated with I (30 g.) in a sealed tube at 90°, excess I sepd., the residue (V)

dild. with water, evapd. on a water bath in an air current, and recrystd. from EtOH, yields 87% of α -[dihydroxydiethylamino]propionic acid, $(\text{HOCH}_2\text{CH}_2)_2\text{NCHMeCO}_2\text{H}$ (VI), m. 136° (decompn.). Picrate, $\text{C}_7\text{H}_{15}\text{O}_4\text{N}_3\text{C}_6\text{H}_3\text{O}_7\text{N}_3\cdot\text{H}_2\text{O}$, yellow, m. $80-5^\circ$. Cu salt, $\text{Cu}(\text{C}_7\text{H}_{14}\text{O}_4\text{N}_2)_2\cdot 5\text{H}_2\text{O}$, lilac color. Di-Bz deriv., soft, m. $42-3^\circ$. 1-Hydroxyethyl-2-methyl-3-morpholine, $\text{HOCH}_2\text{CH}_2\text{N}(\text{CHMe.CO.O.CH}_2\text{CH}_2)_2$ (VII), identical with V,

is also formed by the dry distn. of VI, b_s $171-2^\circ$, changes on exposure to air into VI, remains in water in equil. with VI, 96.5% of VII being hydrated at 100° and 99% at 0° . Chloroplatinate of VII, $(\text{C}_7\text{H}_{13}\text{O}_3\text{N})_2\text{H}_2\text{PtCl}_6$, m. $179-80^\circ$ (decompn.). The picrate of VII is amorphous, and the methiodide is a yellow oil which gradually crystallizes.

C. C. DAVIS

Synthesis of 4-dimethylamino-2,3-butenic acid methylbetaine (crotonobetaine). WILHELM LINNEWEH. *Z. physiol. Chem.* **176**, 217-21 (1928); cf. *C. A.* **22**, 1956.—By treatment with anhyd. HCN for 80 hrs. in a sealed tube at $70-5^\circ$ epichlorohydrin was converted into $\text{ClCH}_2\text{CH}(\text{OH})\text{CH}_2\text{CN}$, the latter saponified and esterified by means of HCl and EtOH to $\text{ClCH}_2\text{CH}(\text{OH})\text{CH}_2\text{CO}_2\text{Et}$, and this in turn dehydrated to $\text{ClCH}_2\text{CH}=\text{CHCO}_2\text{Et}$ by distn. with P_2O_5 . Condensation of this chlorocrotonic ester with excess of alc. Me_3N and a trace of NaI by heating several hrs. in a sealed tube at 100° yielded crotonobetaine-HCl, m. $203-5^\circ$ (decompn.). Other derivs. prepd. from the betaine were Et ester chloroplatinate, decomp. $223-5^\circ$, chloroaurate, m. $215-7^\circ$; chloroplatinate, decomp. $221-2^\circ$, free base, decomp. $200-5^\circ$; picrate, m. $187-9^\circ$. Hydrogenation with Pd catalyst yielded γ -butyrobetaine, identified as the chloroaurate. The chloroaurate and the Et ester chloroplatinate have the same m. ps. as the corresponding derivs. of the base isolated from beef muscle, and the mixed m. ps. showed no depression. The position of the double bond in the natural base is thus definitely located, and the identity with crotonobetaine established. This is the first naturally occurring betaine to contain a double bond.

A. W. DOX

Rearrangement of peptide-like substances. XXV. The so-called arginylarginine of E. Fischer, an α,δ -bisguanidovaleric anhydride. LEONIDAS ZERVAS AND MAX BERGMANN. Kaiser-Wilhelm Inst. Lederforschung Dresden. *Ber.* **61B**, 1195-203 (1928); cf. *C. A.* **22**, 2356.—Fischer and Suzuki assigned to their "arginylarginine" (I), obtained by autocondensation of Me-d-arginine, a dipeptide structure only with reserve because it could not be converted back into arginine on even long boiling with acids and the N content of the nitrate, as detd. by the Dumas method, was always too high. Z. and B. have now found that it is not an anhydride, peptide or peptide anhydride of arginine but a racemized α,δ -bisguanidovaleric anhydride, $\text{H}_2\text{NC}(\text{NH})\text{NHCH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{CO.NH.C}(\text{NH})\text{NH})$ (II). F. and S.'s picrate, m. 218° , is largely

the picrate of II; their nitrate is its pure dinitrate. Z. and B.'s conclusions are based on repeated analyses of the picrate and nitrate, the absence of HCHO-titratable and van Slyke N and the synthesis of II from d-arginine and $\text{H}_2\text{NC}(\text{NH.HBr})\text{SET}$; this gives first an optically active dinitrate of II which, after its very ready racemization, is completely identical with F.'s salt. Z. and B. explain the formation of II as follows: as soon as the arginine ester is liberated from its HCl salt, the guanido residue of 1 mol. reacts with a 2nd ester mol. to form a peptide of the hitherto unknown type $\text{H}_2\text{NC}(\text{NH})\text{NHCH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{NH}_2)\text{CONH.C}(\text{NH})\text{NHCH}_2\text{CH}_2\text{CH}(\text{NH}_2)\text{CO}_2\text{Me}$, with the peptide union on the guanido group. This, however, cannot be isolated and rapidly undergoes further change; the peptide-guanido group combines with the adjacent NH_2 group, with ring closure (formation of II) and splitting off of Me ornithine or some closely related deriv. As a matter of fact, the mother liquors from F.'s picrate give on benzoylation after removal of the picric acid more than 30% of d-ornithuric acid. The HCHO-titratable and van Slyke N found by Kossel and Staudt and by Edlbacher and Bonem must have been due to their using the 218° picrate, which is certainly not homogeneous; after purification through the nitrate it m. 10° higher. The same is probably true of the supposed hydrolysis of I, with formation of urea, by arginase. The dinitrate, as stated above, is optically active, but the free II autoracemizes with extraordinary rapidity as soon as it is liberated with the equiv. quantity of alkali (1.5 hrs. in dil. aq. soln. at 20°). The same phenomenon has been observed with d-phenylalanyl-d-arginine anhydride (unpublished investigation). In both cases the CO of the CO_2H group and the asym. C atom with its N form part of a ring and are under the influence of a guanido group. The formation of a ring by the center of asymmetry seems to be a prerequisite of the autoracemization which is initiated by the basicity of the guanido group and carried to completion with extraordinary rapidity. d-Dinitrate of II, m. 189° (cor.), $[\alpha]_D^{19} -28.6^\circ$ (H_2O); d-picrate, unlike the dl-salt, seps. in well-de-

veloped long yellow leaflets or rodlets, m. 228° (cor.). The mother liquors of the picrate with BzCl gave, in addn. to ornithuric acid, about 10% of dibenzoyl-*d*-arginine, m. 244°, $[\alpha]_D^{20}$ 10.12° (0.2 *N* NaOH), whereas Gulewitsch gives 217–7.5° as the m. p. When 5 g. *d*-arginine in 100 cc. H₂O was benzoylated in the usual way with 30 cc. BzCl and 55 cc. of 33% NaOH, pptd. with HCl, freed of BzOH with Et₂O-petroleum ether and crystd. from hot H₂O the product m. 218° but still contained much HCl which could be more or less completely removed only by repeated crystn. from H₂O; this was more conveniently effected by cautiously adding NH₄OH to an aq. soln. as long as a ppt. formed. The product then m. 244° (cor.) and formed long prisms with 1.5 H₂O; from 50°C. alc. it sepd. in long slender needles with 1 H₂O. C. A. R.

Continued studies on the behavior of polypeptides and their derivatives toward dilute alkali and dilute acid. VII. Further experiments with polypeptides substituted in the amino group. EMIL ABDERHALDEN AND PAUL MÖLLER. *Z. physiol. Chem.* 176, 207–16(1928); cf. C. A. 22, 1757.—New derivs. prepd. for detg. the influence of substituent groups on the alkali cleavage of leucylglycine are: *β*-naphthoyl-*dl*-leucylglycine (I), m. 193–4° (yield, 79%); benzylsulfonyl-*dl*-leucylglycine (II), m. 90° (yield, 61.5%); *p*-toluenesulfonyl-*dl*-leucylglycine (III), m. 120° (yield, 71.5%); phenylacetyl-*dl*-leucylglycine (IV), m. 170° (yield, 61%); *β*-phenylpropionyl-*dl*-leucylglycine (V), m. 187° (yield, 43%). The hydrolysis test was performed in each case with *N* NaOH at 37°. The cleavage invariably yielded glycine and the substituted leucine; in no case was the substituent group split off from the leucine. It was previously found that Bz accelerates and PhSO₂ retards the cleavage of leucylglycine. Similar results are now reported for analogous substituents. I undergoes cleavage more rapidly than the unsubstituted dipeptide but less rapidly than the Bz deriv. II and III are not attacked by *N* alkali at 37°. IV, which corresponds to II except that the linkage occurs through C instead of S, is hydrolyzed as rapidly as the Bz deriv. Lengthening of the substituent chain, as in V, decreases only slightly the cleavage velocity. In general, the derivs. of leucylglycine in which the N of the free NH₂ is linked to the C of a substituent group are hydrolyzed at a lower OH-ion concn. than the unsubstituted dipeptide. The PhNCO and α -C₁₀H₇NCO derivs. of leucylglycine are the most sensitive to alkali of any thus far examd. The *p*_H limit here is about 11.7, and at *p*_H 13 (0.1 *N* NaOH) complete hydrolysis occurred in 1.5 days. It is possible that other substituents, e. g. an enzyme complex such as erepsin, render the dipeptide sensitive to a still lower OH-ion concn. Perhaps erepsin functions in this manner. A. W. DOX

The conversion of dimethylisobutyrylcarbinol into methylisopropylacetylcarbinol. MILE. A. I. OUMNOFF (previously UMNOWA). *Bull. soc. chim.* 43, 568–71(1928); cf. *J. prakt. Chem.* 88, 646, 679(1913).—Boiling 2-chloro-2,4-dimethylpentan-3-one with aq. K₂CO₃ gives a HO ketone (I), b. 164° (semicarbazone, m. 195–6°), differing from the HO ketone (II), b. 161–2°, d_4^{20} 0.9301, d_4^{20} 0.9132 (semicarbazone, m. 178–9°), obtained from the corresponding *Br* ketone. II was converted by treatment with PhMgBr into a glycol, C₁₃H₂₆O₂ (III), m. 75–6°, which was then oxidized by CrO₃ and NaHSO₄, giving acetone and *Ph iso-Pr* ketone, b_{7H} 221–1.5° (semicarbazone, m. 167–7.5°). III, therefore, was 2,4-dimethyl-3-phenylpentane-2,3-diol and II was dimethylisobutyrylcarbinol, the oxidation of III causing a break between C atoms 2 and 3. By treating I in the same manner a glycol (IV), b₁₄ 153–5°, was obtained which oxidized to give PhCOMe. IV was, therefore, 2-phenyl-3,4-dimethylpentane-2,3-diol and I was methylisopropylacetylcarbinol, the oxidation of IV causing a break between C atoms 2 and 3. I was also obtained by heating 7.5 g. of II at 120° for 8 hrs. in a sealed tube with 20 g. of EtOH and 3 drops of concd. H₂SO₄. This rearrangement probably takes place through the oxide alc. form Me₂CHC(OH).O.CMe₂. A. S. CARTER

The conversion of oxoctanol into methyl-*tert*-butylacetylcarbinol. MILE. A. I. OUMNOFF (previously UMNOWA). *Bull. soc. chim.* 43, 571–3(1928).—Oxoctanol (6.6 g.), Me₂C(O).C(OH)CMe₃, b. 178–8.5°, m. 49.5°, was heated in 50 g. of EtOH with

2 drops of concd. H₂SO₄ for 8 hrs. at 120°. The product was poured into satd. aq. K₂CO₃ and extd. with Et₂O. Evapn. gave a HO ketone (I), b₁₄ 176–8°, d_4^{20} 0.9505, d_4^{20} 0.9362, M.R. 40.20; semicarbazone, m. 190–90.5°. 2.7 g. of I was oxidized by 1.2 g. of CrO₃ and 4.9 g. of KHSO₄ in 12 g. H₂O, steam-distd. and neutralized with K₂CO₃. The neutral product was distd. off and identified as *pinacolin* (II). The acids were pptd. as Ag salts and suggested a mixt. of HOAc and Me₃CCO₂H. The oxidation products proved I to be methyl-*tert*-butylacetylcarbinol, oxidation splitting off the Ac group to leave II. A. S. CARTER

Synthesis of heptane-1,5-dicarboxylic acid. ALBERT S. CARTER. Univ. Wisconsin. *J. Am. Chem. Soc.* **50**, 1967-70(1928).—*Di-Et γ -phenoxypropylmalonate*, b_{20} 228-35°, results in 76% yield from $\text{CH}_2(\text{CO}_2\text{Et})_2$, $\text{PhO}(\text{CH}_2)_3\text{Br}$ and Na; the free acid m. 72-8° (90% yield); heating at 175° gives 90% of $\text{PhO}(\text{CH}_2)_3\text{CO}_2\text{H}$, m. 55-6°; HI gives 68% of $\text{I}(\text{CH}_2)_3\text{CO}_2\text{H}$, whose *Et ester* b_{20} 108-18°; with $\text{EtCH}(\text{CO}_2\text{Et})_2$ and Na this gives the *tri-Et ester*, b_{20} 192-200°, of *heptane-1,5,5-tricarboxylic acid*, m. 88-8°, decomps. 140°, giving heptane-1,5-dicarboxylic acid, m. 41.5-3°, analyzed as the Ag salt. C. J. WEST

Determinations of the viscosity and of the melting point in the oxalic acid series. The alternating properties of homologous series. R. CEDER. *Ann. Univ. Fennicae Aboensis Series A2*, No. 4, 14 pp.(1926); *Chem. Zentr.* **1927**, I, 2398.—The viscosities and f. ps. of the di-Me and di-Et esters of the oxalic acid series from oxalic to sebacic acid were measured. The substances were first purified by distn. *in vacuo*. The following data give the f. p. (cor.) and the viscosity (η) at 20°, resp., of each compd. studied: *di-Me esters*—malonate, -59.6°, 0.02213; succinate, 20°, 0.02816; glutarate, -37.4°, 0.02711; adipate, 8.5°, 0.03292; pimelate, -20.6°, 0.03666; suberate, -3.1°, 0.04181; azelate, -3.9°, 0.04996; *di-Et esters*—oxalate, -41.7°, 0.01979; malonate, -51.4°, 0.02135; succinate, -21.8°, 0.02755; glutarate, -24.1°, 0.02862; adipate, -21.4°, 0.03568; pimelate, -23.8°, 0.04024; suberate, 5.9°, 0.04453; azelate, -18.5°, 0.05203; sebacate, above 51°, 0.06097. From these data can be calcd. the increments of viscosity from each di-Me ester and from each di-Et ester to the next. The magnitudes of these differences show an alternating effect. The introduction of a CH_2 group increases the viscosity, though di-Me glutarate is an exception, as a result of which the difference between di-Me glutarate and di-Me succinate is negative. The f. ps. also show noteworthy increases and decreases. Di-Me malonate was even at -84° a turbid, sirupy mass which at -59.6° (cor.) again became a transparent, clear liquid. At -73° di-Et malonate was a thick mass, which at -51.4° (cor.) again became a light liquid. Perhaps both esters form liquid crystals. C. C. DAVIS

Ethyl aminomalonate. R. LOCQUIN AND V. CERCHEZ. *Compt. rend.* **186**, 1360-2 (1928).— $\text{NH}_2\text{CH}(\text{CO}_2\text{Et})_2$ (I) is obtained in a 65% yield by reduction of $\text{HON}:\text{C}(\text{CO}_2\text{Et})_2$ (II) with Al-Hg. II, b_{12} 166°, is obtained in a 90% yield by dropping a satd. NaNO_2 soln. (3 mols.) into 1 mol. of $\text{H}_2\text{C}(\text{CO}_2\text{Et})_2$ in 3 mols. Ac_2O under const. stirring. I, b_{12} 116-8°, is easily sol. in H_2O and ordinary org. solvents, absorbs CO_2 from the air, and gives the following characteristic derivs.: $\text{NH}_2\text{CH}(\text{CO}_2\text{Et})_2\cdot\text{H}_2\cdot\text{C}_2\text{O}_4$, m. 138°, sol. in H_2O , alc., insol. in Et_2O , ligroin; $\text{NH}_2\text{CONHCH}(\text{CO}_2\text{Et})_2$, m. 167°; $\text{NH}_2\text{CH}(\text{CONH}_2)_2$, m. 196°; $\text{PhCONHCH}(\text{CO}_2\text{Et})_2$, m. 61°. I has a H atom which can be replaced by Na, making thus many syntheses possible; the alkyl derivs. are obtained from the Na deriv. in a 50% yield. When the alkyl derivs. are sapon. with superheated H_2O , they lose a CO_2 , yielding thus directly an α -amino acid $\text{RCH}(\text{NH}_2)\text{CO}_2\text{H}$; leucine and phenylalanine have been prepd. by this method. Contrary to the expectations, the acid chlorides link their radical on the N instead of the C bearing Na. The acylated derivs. thus obtained are incapable of forming a Na deriv. A. L. H.

Synthesis of hydroxyamino acids (the conversion of glutamic acids into δ,δ -dialkyl- δ -hydroxy- γ -aminovaleric acid). S. KANAO AND S. INAGAWA. *J. Pharm. Soc. Japan* **48**, 355-8(1928).— *δ -Hydroxy- γ -aminovaleric acid* (I), which has not yet been described in literature, was obtained in good yield. Di-Et glutamate and organo-magnesium halide gave α' -(α -pyrrolidonyl)-dialkylcarbinol (II), which on sapon. gave I. Thus an α -aminocarboxylic acid was converted into hydroxyamino acid. The *Et deriv.* of II could be easily sapon. by $\text{Ba}(\text{OH})_2$, but for the *Bu* or *di-Ph* derivs., sapon. with EtOH-KOH was necessary. The following new compds. are described: *δ,δ -diethyl- δ -hydroxy- γ -aminovaleric acid*, softens at 70-80°, m. 143°, $[\alpha]_D^{20}$ 3.36° (H_2O), -14.48° (in 0.3 N HCl). *$\delta\delta$ -Dibutyl- δ -hydroxy- γ -aminovaleric acid*, m. 147°. *δ,δ -Diphenyl- δ -hydroxy- γ -aminovaleric acid*, m. 204-5°, $[\alpha]_D^{20}$ 48.5° (in 5 N AcOH). NAO UYRI

Alkylation of hydromolybdenocyanic acid. F. HÖLZL WITH G. I. XENAKIS. *Monatsh.* **48**, 689-709(1927).—When K molybdeno-octacyanide is treated with Me_2SO , there is formed the compd. $[(\text{CN})_4\text{Mo}(\text{CNMe})_2(\text{H}_2\text{O})_2]\cdot 4\text{H}_2\text{O}$ (I). Methylation of Ag molybdenocyanide with MeI affords a complex mixt. of compds. from which the substance $[(\text{CN})_4\text{Mo}(\text{CNMe})_4]\cdot 2\text{MeOH}$ (II) is obtained by extrn. with abs. MeOH. When I is treated with KCN K molybdenocyanide is regenerated, while the action of water on II is to furnish I. These reactions suggest that the octa[methylcarbamylamine]molybdenum ion, $[\text{Mo}(\text{CNMe})_6]^{+}$, is unstable, whereas the corresponding Fe^+ ion is stable (cf. C. A. **22**, 224). When II is treated with alkali the carbamylamine odor is developed, and with AgNO_3 a light yellow ppt. is formed which also gives the carbamylamine odor with

alkali. **II** in H_2O when kept for a long time does not give a ppt. with $AgNO_3$. Extn. of the residue after removal of **II** with water furnishes the compd. $[(CNMe)_4(CN)_2Mo(O)_2]_2$ (**III**), which decomps. in air, gives no ppt. with $AgNO_3$, but reduces NH_4AgNO_3 . Treatment of the residue after removal of **II** and **III** with dil. HCl and subsequent evapn. of the acid-sol. products in a vacuum gives a residue from which by extn. with warm $MeOH$ and water, substances **IV** and **V** were obtained together with an insol. residue (**VI**). Compd. **IV** titrates as a tribasic acid (NH_4 salt described), develops a carbylamine odor in H_2O , and decomps. on keeping into **V**. Its constitution is probably $[(CN)_4Mo(H_2O)[C(OH)NHMe]_3] \rightleftharpoons [(CN)_4Mo(H_2O)(CO'NHMe)_3]H_3$. The compd. **V** is a weak acid in H_2O and loses 1 mol. of water when dried over P_2O_5 . It is represented $[(CN)_3(OH)Mo(H_2O)(CO'NHMe)]H \rightleftharpoons [(CN)_3Mo(H_2O)_2CNMe]OH$. The insol. residue (**VI**) is formulated as $[(CN)_2(H_2O)CNMe.Mo(O)_2]_2$. Ethylation of Ag molybdenocyanide gives a corresponding series of complex compds. B. C. A.

Carbonic acid azides. CHARLES V. HART, Stanford Univ. *J. Am. Chem. Soc.* 50, 1922-30(1928).—The product previously known as NCN_3 (carbon pernitride) is really *dicyanodiazide* (**I**), for which a method of prepn. is given (cf. Darzens, *C. A.* 6, 2075); **I** m. 40.3° (D. gives $35.5-6^\circ$), begins to decomp. at 70° and explodes with extreme violence at 170° ; when impure, **I** is dangerously explosive. With H_2O **I** gives CO_2 , $2HN_3$, and H_2NCN , with $NaOH$ the same products are formed. Reduction of **I** with H_2S in $EtOH$ gives $NCNC(NH_2)_2$. **I**, suspended in Et_2O , gives with NH_3 *dicyanamidazide* (**II**), m. 151.2° (decompn.). Two tests for proving the presence of azide groups are (1) heating the substance with $NaOH$ soln. to form NaN_3 , and (2) the reduction of the azide group to the NH_2 group by means of H_2S with simultaneous evolution of N and the pptn. of S . Aminotetrazole- $HN(CN)_3$, suspended in H_2O and neutralized with $NaOH$, then treated with $CNBr$, gives pure **II**. **II-HCl**, crystg. with 1 H_2O , loses its cryst. appearance above 150° . $NCNC(NH_2)_2$ and $PhNH_2$ in $EtOH$ give *dicyanophenylamidazide*, decomps. above 145° ; the Na salt results on neutralizing the azide. Reduction gives $NCNC(NH_2)_2NHPh$. *Dicyano- α -naphthylamidazide*, decomps. slowly when heated, Na salt, $MeNH_2$, $EtNH_2$, and $PhNH_2$ also react but the products were not purified. $C_2N_4(N_2)_2$ is reduced by H_2S to $C_2N_2(NH_2)_2$, thus eliminating the tetrazole structure. With NH_3 there results *cyanouramidodiazide*, starts to decomp. at 200° and decomps. with great violence when heated suddenly at 210° ; reduction gives $C_2N_2(NH_2)_2$. Cyanuric trichloride and NaN_3 give *cyanuric dichloride azide*, m. 85° . C. J. WEST

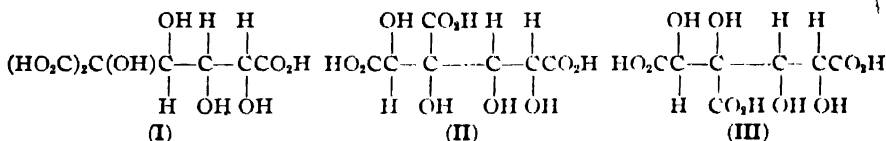
The preparation of *d*-arginine monohydrochloride. GERALD J. COX, *J. Biol. Chem.* 78, 475-9(1928).—A stable, pure final product is obtained from gelatin by the use of a modification of the flavianic acid method of Kossel and Gross (*C. A.* 18, 1681). Hydrolysis of the protein and decompn. of the arginine flavianate are accomplished by the use of HCl . Arginine- HCl is obtained as the final product and can be efficiently purified by pptn. with alc. from concd. aq. solns. In the prepn. of arginine- HCl from solns. contg. an excess of HCl , use was made of the convenient basicity of aniline and the soly. of aniline- HCl in alc. Arginine *disflavianate*, $C_{20}H_{24}N_8S_2O_{10}$, was prepd. and its identity confirmed by combustion analysis. It m. 170.5° (decompn.) when heated rapidly. Conversion to the monoflavianate by treatment with an excess of arginine- HCl gave 97.8% of the calcd. quantity. Arginine- HCl is assigned the formula $C_6H_{14}N_4O_2.HCl$, which corresponds to the analysis. The substance has no water of crystn., contrary to findings of some other investigators. The m. p. is 222° . No loss in wt. occurred on heating at 110° for 12 hrs. C. R. FELLERS

New derivatives of barbituric acid. ARTHUR W. DOX and EDWARD G. JONES, Parke, Davis and Co. *J. Am. Chem. Soc.* 50, 2033-6(1928).—*Tetrahydrofuranmethyl bromide*, b_{14} $168-70^\circ$, from the alc. and HBr or PBr_3 in 25% yields; *Et ethyltetrahydrofuranmethylmalonate*, b_{14} $155-7^\circ$; condensation with $CO(NH_2)_2$ gives 75% of *ethyltetrahydrofuranmethylbarbituric acid*, m. 190° . *Et amylmalonate*, b_{14} $134-6^\circ$ (62% yield); *amylmalonamide*, m. 206° , from the ester and concd. NH_4OH ; in $AcOH$, Cl gives *amylchloromalonamide*, m. 134.5° , has an intense sweet taste (a 0.005% aq. soln. showed the same degree of sweetness as a 2% sucrose soln.). *Amylbarbituric acid*, m. 215° . *Et diamylmalonate*, b_{11} $158-61^\circ$; *diamylbarbituric acid*, m. 118° . *Et amylethylmalonate*, b_{14} $139-41^\circ$; *amylethylbarbituric acid*, m. 135° ; this is an effective hypnotic with several times the potency of barbital. C. J. WEST

New (observations) in the chemistry of the sugars. VIII. H. KILIANI, Univ. Freiburg i. B. *Ber.* 61B, 1155-69(1928); cf. *C. A.* 20, 2985.—*I. Liability of l-mannosaccharic acid.*—When K. stated that the double lactone of this acid differs most surprisingly from all other analogously constituted substances of the sugar group in its behavior towards alkalis and Fehling soln. he was unaware that Peirce (*C. A.* 10, 1845)

describes the dilactone of his "*d*- α -mannooctaric acid" as also "powerfully" reducing Fehling soln. although Winger expressly states that the optically inactive " α -galactooctanehexol diacid," obtained from *l*-mannohepturonic acid with HCN, which is doubtless identical with P.'s acid, does not react with Fehling soln. On repeating the test both with W.'s original prepn. and with a new sample prepd. by K. himself, K. has been able to observe no trace of reduction when the dilactone is previously dissolved in KOH. P.'s finding may have been due to the fact that he used the solid free dilactone in large quantities or, since he prepd. his acid by HNO_3 oxidation, that his compd. was contaminated with aldehyde or ketonic acids. Since the mannosaccharic acids show such a peculiar high sensitivity to alkalis and alk. Cu solns. it must be concluded that at the instant when they so react they undergo an intramol. rearrangement with formation of an aldehyde or ketone radical. The possibility of aldehyde formation may be excluded, since it would involve an end CO_2H group; there thus remains only the possibility of ketonization which may provisionally be represented by the scheme $\text{RR}'\text{CHOH} \rightarrow \text{RR}'\text{CO} + 2\text{H}$. Representing the four C atoms between the 2 CO_2H groups in mannosaccharic acid by α , β , β' , and α' , then, if the ketonization occurs at the α - or α' -C atom this C atom will lose its asymmetry when the product is treated with KCN and hydrolyzed and there should result a single tri- CO_2H (I) acid, the mirror image of the acid obtained by Dull by oxidation of "levulosecarboxylic acid." On the other hand, if the ketonization occurs at the β -C atom, treatment with KCN and hydrolysis should give 2 tri- CO_2H acids (II and III). Expt. showed that a tri- CO_2H acid (IV) is actually formed and that it differs materially in its properties from D.'s compd. The fate of the H liberated in the ketonization remains uncertain. There is not the slightest indication of an evolution of H_2 during the reaction and no MeNH_2 , which might have been formed according to a reaction $\text{KCN} + 4\text{H} + \text{H}_2\text{O} = \text{MeNH}_2 + \text{KOH}$, analogous to osazone formation, could be detected. A search will therefore have to be made for a reduction product of mannosaccharic acid as to whose nature it is difficult to make any predictions. x g. of the mannosaccharic dilactone in 9.5x g. H_2O is treated in the course of 20–30 min. with 9.5x cc. *N* KOH, then, after 7.5 hrs., with 2 mols. com. (90%) KCN, allowed to stand 7–8 days at room temp., heated 5–6 hrs. in an open flask on a water bath, evapd. to 3x g., dild. with 2x cc. H_2O , slowly treated with a quantity of 50% AcOH equiv. to the total K present, allowed to stand 2 hrs. with occasional stirring under a hood, pptd. with 1:1 CaCl_2 ($\text{C}_6\text{H}_{10}\text{O}_6 \cdot 2\text{H}_2\text{O} : 1.5\text{CaCl}_2$), filtered after 12 hrs. and washed free from Cl with 20% alc. (The alc. washings ppt. from the filtrate a voluminous but relatively light Ca salt, possibly of a reduction product of the mannosaccharic acid.) The 1st Ca ppt., which contains about 10% of the salt of *l*-mannosaccharic acid, is dissolved in the calcd. quantity (calcd. by detg. the Ca in a portion of the ppt.) of cold 2 *N* HCl, treated with 75% of the calcd. quantity of cold satd. NaOAc, filtered after 24–36 hrs., washed with 20% alc., freed from Ca with $(\text{CO}_2\text{H})_2$, concd. at 35° to a thin sirup and drained from the mannosaccharic dilactone which crystallizes out. The filtrate (IV) does not reduce Fehling soln. and thus far has been obtained only as a thick sirup but its compn. is established by that of the Ca salt, $(\text{C}_7\text{H}_7\text{O}_{10})_2\text{Ca}_3 \cdot 9\text{H}_2\text{O}$, and basic Cu salt, $(\text{C}_7\text{H}_7\text{O}_{10})_2\text{Cu}_3 \cdot \text{Cu}(\text{OH})_2 \cdot 18\text{H}_2\text{O}$, light blue microcolumns. $[\alpha]_D$ for IV (calcd. from the rotation of the Ca salt in HCl) is -22.8° . II. *Prepn. of l-mannosaccharic acid, "levulosecarboxylic acid" and Dull's tribasic acid.*—In prepg. the *l*-mannosaccharic dilactone by his new method with concd. HNO_3 at room temp. K. regularly obtained yields materially smaller than in his earlier work (52.8%) because, as he finally discovered, his later work was done in winter and the temp. fell considerably at nights. The dilactone can be readily obtained in 52–5% yield by heating x g. (not more than 20 g. in 1 operation) 22–4 hrs. at 50° with 2x cc. HNO_3 (d. 1.2), concg. at 50° to 2x g., seeding, letting stand 2 hrs. in ice, draining off the crystals (30%), washing with the least possible quantity of H_2O , concg. the filtrate to 1.2x g., and freeing the filtrate from the 2nd crop (16–8%) of HNO_3 with Et_2O , whereupon a 3rd crop can readily be obtained. Levulosecarboxylic lactone, $[\alpha]_D$ 72.9° (H_2O), was prepd. by treating crystd. levulose in an equal wt. of H_2O with 1.2 times the calcd. quantity of 20–30% HCN, then, after 10 min. in ice, with a little NH_4OH , allowing to stand 24 hrs. in ice and 4–5 days at room temp., satg. in the cold with HCl, removing the excess of HCl after 24 hrs. by distn. *in vacuo*, the NH_3 with $\text{Ba}(\text{OH})_2$, the Ba with H_2SO_4 and the Cl with Ag_2CO_3 , and converting the acid through the brucine and Ba salts into the lactone. This (x g.) with 3x cc. HNO_3 (d. 1.2) 20 hrs. at 45° and 8–9 hrs. at 65°, gives Dull's $\alpha, \beta, \gamma, \delta$ -tetrahydroxybutane- α, α, δ -tricarboxylic acid; Cu salt, $(\text{C}_7\text{H}_7\text{O}_{10})_2\text{Cu}_3 \cdot 2\text{H}_2\text{O}$, very light blue microtables; the air-dry tri-K salt contains 3 mols. H_2O . III. *Use of oxalic (instead of sulfuric) acid for the detn. and pptn. of Ba in salts of org. acids.*— BaSO_4 forms with the Ba salts of the poly-HO acids of the sugar

group colloidal mixts. which introduce considerable difficulties into the working up of large quantities of these salts for the free sugar derivs. These can be obviated by detg. the Ba content in a portion of the soln. and using exactly the calcd. quantity of $(\text{CO}_2\text{H})_2$ instead of H_2SO_4 . For the detn. of Ba, about 2 times the calcd. quantity of $(\text{CO}_2\text{H})_2$ (1.12) is added, then enough 95% alc. to make the final mixt. about 50% EtOH, and the ppt is dried on the filter paper at 100° . The cryst. ppt. carries down and holds tenaciously considerable quantities of any humin-like substances present; in such cases a portion of the dried ppt. is converted into the carbonate by gentle ignition. To remove Ba, no alc. is added and the ppt. is filtered off only 12 hrs. after adding the $(\text{CO}_2\text{H})_2$.



C. A. R.

Relations between rotatory power and structure in the sugar group. XVIII. α -Methyl-*d*-lyxoside triacetate. F. P. PHELPS AND C. S. HUDSON. *Int. Standards. J. Am. Chem. Soc.* 50, 2049-51 (1928); cf. *C. A.* 20, 3159— *α -Methyl-*d*-lyxoside triacetate*, m. 96° , $[\alpha]_{\text{D}}^{20}$ 30.1°, $[\alpha]_{\text{D}}^{25}$ 31.7°, $[\alpha]_{\text{D}}^{26}$ 35.8°, $[\alpha]_{\text{D}}^{27}$ 62.0°; from a comparison of these values with the rotation of α -methyl-*d*-lyxoside, it is concluded that the lyxoside deriv possesses a 1,4-ring structure and that cryst. α -lyxose ($[\alpha]_{\text{D}} 5.5^\circ$) also has this ring structure, since its rotation differs normally from that of α -methyl *d* lyxoside.

C. J. WEST

The synthesis of cane sugar. C. S. GIBSON. *Chemistry and Industry* 47, 355-6 (1928).—An historical discussion, concluding with a description of the work of Pictet and Vogel (*C. A.* 22, 2743).

T. S. CARSWELL

Mechanism of carbohydrate oxidation. IX. The action of copper acetate solutions on glucose, fructose and galactose. W. L. EVANS, W. D. NICOLI, G. C. STROUSE AND C. E. WARING. Ohio State Univ. *J. Am. Chem. Soc.* 50, 2267-84 (1928); cf. *C. A.* 22, 2146.—Aq. solns. of fructose, glucose and galactose have been oxidized with $\text{Cu}(\text{OAc})_2$ at 50° for the purpose of ascertaining whether the general principles underlying the mechanism of carbohydrate oxidation in alk. solns. are sufficient to explain the course of such oxidations in acid soln. The advantages of the use of $\text{Cu}(\text{OAc})_2$ are outlined. The reaction mixts. were examd. for glucosone, HCO_2H , CO_2 , $(\text{CO}_2\text{H})_2$ and $\text{HOCH}_2\text{CO}_2\text{H}$. The presence of $\text{HOCH}_2\text{CO}_2\text{H}$ was proved qual. but it was not measured quant. The quantities of these are expressed both as functions of the time and the O consumed. The O consumed by each sugar is expressed as a function of the time. The H-ion concn. is expressed as a function of the O consumed. The hexose-1,2-enediols are regarded as being oxidized to the hexosones. The glucosone is obtained as the osazone. The galactosone was not obtained as a reaction product. It is probably used up as rapidly as it forms. The HCO_2H arises from the oxidation of the hydroxymethylene obtained by the decompn. of the hexose-1,2-enediols. That hydroxymethylene will undergo this change was shown by a study of the behavior of $\text{Cu}(\text{OAc})_2$ towards HOCH_2CHO and $\text{HOCH}_2\text{COCO}_2\text{H}$. It is thought that CO_2 arises from the decompn. of the unstable α -ketohexonic acids. $\text{HOCH}_2\text{COCO}_2\text{H}$ loses a mol. of CO_2 when oxidized with $\text{Cu}(\text{OAc})_2$. The hexosones may form hexosone-1,2-enediols, which are thought to decomp. into the active form of the tetrose (tetrose methylenol) and glyoxal (half active form). The latter is oxidized to $(\text{HO})_2\text{CHCO}_2\text{H}$, which in part is converted into $(\text{CO}_2\text{H})_2$ and $\text{HOCH}_2\text{CO}_2\text{H}$. $(\text{CHO})_2$ does not reduce $\text{Cu}(\text{OAc})_2$ solns.; hence it is thought that the $\text{HOCH}_2\text{CO}_2\text{H}$ comes from an activated form (glyoxal-half-methylenol). The increase in the H-ion concn. tends to reverse the equil. between the enediols in the direction of suppressing enediol formation. This would lead to a reduction in the HCO_2H yields with increasing time. The increase in the H-ion concn. would tend to suppress the enolization of the hexosone-2,3-enediol. This harmonizes with the fact that no derivs. were found of 2,3-diketohexones when the reaction mixts. were treated with PhNHNH_2 . The view is expressed that aldehydes exist in 2 forms, those active towards oxidizing agents and those not. The former are derivs. of methylenols; that is, the H is bound to O and the C is bivalent. In the inactive mols. the C is quadrivalent. An equil. exists between these 2 forms, which may be shifted by a change in the H-ion concn. The conversion of aldehydes to carbonates in alk. solns. is explained on this basis.

C. J. WEST

Acetone compounds of sugars and their transformation products. IX. Transfor-

mation of monoacetoneglucose. HEINZ OHLE and LADISLAUS VON VARGHA. Univ. Berlin. *Ber.* 61B, 1203-8(1928); cf. *C. A.* 21, 1968-9.—The *p*-toluenesulfomonoacetoneglucose m. 108° (I) obtained from monoacetoneglucose and 1 equiv. *p*-MeC₆H₄SO₃Cl splits off MeC₆H₄SO₃H with NH₃ in MeOH with surprising ease even in the cold, giving a small quantity of a N-free, Et₃O-sol. product which it has as yet not been possible to cryst., and, chiefly, a H₂O-sol., Et₃O-insol. aminomonoacetoneglucose *p*-toluenesulfonate (II) contaminated with MeC₆H₄SO₃NH₄. The free base (III) could not be obtained in cryst. form; it is strongly basic and easily combines with CO₂; II with Na₂CO₃ gives a well-crystd. substance (IV) which, from its N content, is not, to be sure, the carbonate but a carbamate, RCH₂NHCO₂ H.NH₂R, probably formed from the carbonate by loss of H₂O in the concn. of the aq. soln. In H₂O IV shows mutarotation, presumably because of the reverse transformation into the carbonate. II can readily be purified through this IV. With dil. acids IV gives 6-aminoglucose (V), identical with Fischer and Zach's product. V and its carbonate and toluenesulfonate are amorphous and its picrate, although isolated in deep yellow needles, had no sharp m. p.; the phenylhydrazone *p*-toluenesulfonate (VI), however, faintly yellow needles, m. 182-3° sharply. The NH₂ group in III must, therefore, be in position 6, and as III with HNO₂ gives the known monoacetoneglucose, it must have the same ring structure as the latter. Therefore, I must also contain a 1,4-O bridge (unless the very improbable assumption is made that it contains a 1,6-bridge) and since the 3-MeC₆H₄SO₃ deriv. is known, I can be only the 6- or the 5-deriv. IV, C₁₂H₁₄O₁₂N₂, m. 80° (gas evolution) on rapid heating, decomp. 180-90° on slow heating, $[\alpha]_D^{20}$ 0° (initial), -6.25° after 2 days (H₂O, c 4.002). II, m. 176-7° (decompn.), $[\alpha]_D^{20}$ -7.02° (H₂O, c 5.010). Carbonate of V, m. 96-8° (CO₂ evolution), $[\alpha]_D^{20}$ 12.5° (H₂O, c 2.077); *p*-toluenesulfonate, very hygroscopic, $[\alpha]_D^{20}$ 31.68° (H₂O, c 1.128); picrate, begins to decomp. 140°, m. 160°, $[\alpha]_D^{20}$ 7.4° (H₂O, c 2.036); VI, $[\alpha]_D^{20}$ 6.8° (initial), 1.3° after 16 hrs. (alc., c 2.514). X. A new *p*-toluenesulfodiace-toneglucose. *Ibid* 1208-10.—The observation of O. and Dickhäuser that I reacts with Me₂CO in the presence of anhyd. CuSO₄ was due to the fact that their material was impure. When the I is crystd. from PhMe, which is a wasteful method but gives a pure product directly, it cannot be acetonated with CuSO₄. With small quantities of mineral acids (best H₂SO₄) as catalyst, however, acetonation can be effected, but the resulting *p*-toluenesulfodiace-tone-d-glucose (VIII) is different from Freudenberg and Ivers' 3-*p*-toluenesulfodiace-tone-d-glucose- $\langle 1,4 \rangle$ (VIII). If I is the 6-MeC₆H₄SO₃ deriv., the formation of an isomer of VIII under the influence of acids can be explained by assuming that the 1,4-bridge in I is changed to a 1,3-bridge, leaving 2 adjacent HO groups on C atoms 4 and 5 with which the Me₂CO can react without the MeC₆H₄SO₃ group having to migrate. These results are of importance in connection with the reaction of I with HBr-AcOH, which, as O. and Spenger found, gives a product isolated as a toluenesulfotriacetyl- β -methylglucoside (IX), m. 155°. IX at the time was assumed to be 6-toluenesulfo-2,3,4-triacetyl- β -methylglucoside- $\langle 1,5 \rangle$, but this compd. has since been synthesized by Helferich, Brederick and Schneidmüller and found to be different from IX. Alk. sapon. of IX has hitherto given only sirupy products and VIII treated with HBr-AcOH and then MeOH and Ag₂CO₃ does not give IX but a small quantity of a cryst. substance m. 120° contg. S and reducing Fehling soln. only after hydrolysis with mineral acids. Apparently, therefore, VIII and IX do not have analogous structures. VIII (70-5% from 10 g. I in 200 cc. Me₂CO shaken 2 days with 20 g. anhyd. CuSO₄ and 0.5 cc. concd. H₂SO₄), m. 87°, $[\alpha]_D^{20}$ 27.1° (CHCl₃, c 5.244), does not react with Fehling soln., AgNO₃-NH₃ or PhNHNH₂. XI. Transformation of monoacetone-d-glucose into 3,6-anhydro-d-glucose. HEINZ OHLE, LADISLAUS VON VARGHA and HEINZ ERLBACH. *Ibid* 1211-6.—The striking behavior on hydrolysis with aq. alc. acids of the di-*p*-toluenesulfomonoacetone-d-glucose (X) obtained by O. and Dickhäuser from monoacetoneglucose and 2 mols. MeC₆H₄SO₃Cl, which they assumed to be a 5,6-di-MeC₆H₄SO₃ deriv., led the authors to make a more thorough study of its structure. On alk. hydrolysis, if the quantity of alkali is limited to 1 mol. or the boiling with an excess of alkali is continued only a short time there is obtained a compd. (XI), m. 132°, already obtained by O. and D. in small yield from monoacetoneglucose and 3 mols. MeC₆H₄SO₃Cl in C₂H₅N at 100°; they believed it to be a 3rd toluenesulfomonoacetoneglucose. More careful analyses have shown, however, that it contains 1 mol. of H₂O less and is, therefore, a toluenesulfomonoacetoneanhydroglucose. Alk. hydrolysis gives a well-crystd. monoacetoneanhydroglucose (XII), which regenerates XI with MeC₆H₄SO₃Cl in C₂H₅N and splits off the Me₂CO residue with mineral acids, giving the same anhydro-d-glucose (XIII) as Fischer and Zach obtained from aceto-

dibromoglucose. The above results confirm the 3,6-anhydro structure assigned by F. and Z. to **XIII**. That 1 end of the O bridge is on C atom 6 was established by them by their prepn. of **XIII** from acetodibromoglucose. The other end cannot be on C atoms 2, 4 or 5 for in **XII** the HO groups on these C atoms are closed by the Me_2CO residue, the lactol ring and the $\text{MeC}_6\text{H}_4\text{SO}_2$ residue, resp. **XIII** can, therefore, have only the structure $\text{O}.\text{CH}_2.\text{CH}(\text{OH}).\text{CH}(\text{OH}).\text{CHCH}(\text{OH})\text{CHO}$. This formulation in the alde-

hyde form has been chosen merely for the sake of simplicity. Although **XIII** is readily sol. in Me_2CO , it does not react with it and therefore probably exists in the form of a cyclohemiacetal or lactol; as to the length of the lactol O bridge, there are at present no certain indications. The above reactions show that the easily split off $\text{MeC}_6\text{H}_4\text{SO}_2$ group in **X** is in position 6 and the other cannot be in position 3, where the HO group must be free for the formation of the furan ring in **XIII**, leaving only position 5 for the 2nd $\text{MeC}_6\text{H}_4\text{SO}_2$ group, unless it be assumed that a change in the O bridge occurs in the formation of the **X**. With $\text{HBr}.\text{AcOH}$ **X** shows the characteristic play of colors through yellow and red to violet but no cryst. products could be isolated. **XI** should contain the same lactol ring but, as already pointed out by O. and Spenker, it does not give the color reaction with $\text{AcOH}.\text{HBr}$; an explanation for this, however, will be advanced in a forthcoming paper. Towards NH_3 in MeOH **X** behaves as towards alkalies, but under certain conditions a small quantity of an NH_3 compd. seems to be formed. **XI**, on the other hand, is not attacked even at 120° . Comparison of the behavior of **I** and **X** towards alkalies and NH_3 shows distinctly the influence of the 2nd $\text{MeC}_6\text{H}_4\text{SO}_2$ group. **XI**, $[\alpha]_D^{20}$ 39.3° (CHCl_3 , c 2.798). **XII**, m. $56-7^\circ$, $[\alpha]_D^{20}$ 29.33° (H_2O , c 3.172); *Bz deriv.*, m. $58-9^\circ$, $[\alpha]_D^{20}$ 22.28° (CHCl_3 , c 2.828); *Ac deriv.*, sirup, b_{0.05} $125-30^\circ$ (bath temp.), $[\alpha]_D^{20}$ 35.7° (CHCl_3 , c 4.920) C. A. R.

Oxidative synthesis of a dialdehydic carbohydrate, $\text{C}_{15}\text{H}_{22}\text{O}_{13}$, from dextrose. J. A. MANDEL AND J. B. NIEDERL. *XII Int Cong Physiol* 1926, 104 5. Oxidation of dextrose with $\text{Ba}(\text{OCl})_2$ yields an amorphous compd. of the compn. $\text{C}_{15}\text{H}_{22}\text{O}_{13}$, $[\alpha]_D$ 64° . Reduction affords a compd., $\text{C}_{15}\text{H}_{24}\text{O}_{13}$, $[\alpha]_D$ 98° (*Ac deriv.*, m. $112-4^\circ$). The bisosazone, $\text{C}_{30}\text{H}_{48}\text{O}_{11}\text{N}_8$, m. 194° . Oxidation yields mono- and di- $\text{CO}_2\text{H acids}$, $\text{C}_{14}\text{H}_{20}\text{O}_{14}\text{CO}_2\text{H}$ and $\text{C}_{13}\text{H}_{20}\text{O}_{13}(\text{CO}_2\text{H})_2$, resp. B. C. A.

Ring structure and optical relationships in the mannose-rhamnose-lyxose series of sugars. Isolation of a new form of lyxose. WALTER N. HAWORTH AND EDMUND L. HIRST. Univ. of Birmingham *J. Chem. Soc* 1928, 1221 30.—The first part of the theoretical discussion is polemical with Hudson (*C. A.* 20, 1981) regarding the optical relationships in the mannose-rhamnose-lyxose series. H. and H. suggest that the hypothesis of different ring structures in α - and β -mannoses affords little or no assistance in interpreting the exptl. observations; in the absence of definite chem. evidence to the contrary they consider it would be most helpful to the future study of the problem to regard α - and β -mannose as being not necessarily dissimilar in ring structure and to seek the reason for divergences in optical and other phys. properties occasioned by the special arrangement of HO groups in mannose and the related sugars rhamnose and lyxose. In their study of lyxose they have discovered a new cryst. variety. Lyxose was prepd. from Ca galactonate and isolated through the *p*-bromophenylhydrazine; β -lyxose, m. $117-8^\circ$; soly. in 90 and 85% EtOH at 18° , 0.8 and 1.7 g. per 100 cc., $[\alpha]_D^{20}$ -70° , equil. value 14° (H_2O , c 3.83); in EtOH , -80° and -9° . β -Lyxose remains unchanged after prolonged contact with 90% EtOH and the α -form has not been isolated from the soln. However, the β -form was converted into the known *p*-bromophenylhydrazine and osazone and α -Me lyxoside. C. J. WEST.

Alleged discovery of "caramelic acid." WALTER FUCHS. *Z. angew. Chem* 41, 85-8(1928).—The so-called caramelic acid which Marcusson claims to have isolated (cf. *C. A.* 22, 2126) both from humic acid and from dextrose by oxidation does not in fact exist. Material prepd. from humic acid, following exactly the directions given by Marcusson, is not a definite compd., does not give a Pb salt of const. Pb content, and proves in fact to be partly changed starting material. The product obtained from dextrose by following Marcusson's directions is entirely different from that obtained from humic acid. B. C. A.

Variation in rotation and conductivity of certain sugars in aqueous solution with and without boric acid. I. R. VERSCHUUR. *Rec. trav. chim.* 47, 123-52(1928).—According to Böeseken and Couvert (cf. *C. A.* 15, 2837), the rise in sp. rotation shown by certain sugars in the presence of H_3BO_3 is always accompanied by a marked increase in elec. cond. It is probable that there is a particular configuration of the terminal H atoms and HO groups which favors the formation of compds. with H_3BO_3 . Most

sugars, on soln. in water, undergo a transformation which can be followed with the polarimeter, and is due to the transition from the α - to the β -form, or the reverse, until equil. is attained. Such a change may involve an increase or a decrease in the power to combine with H_3BO_3 , and hence a corresponding change in cond. The behavior of α - and β -lactose in soln., in the presence and absence, resp., of H_3BO_3 , has been examd. The effect of H_3BO_3 on the rate of change of rotation of both forms is practically negligible. Although, from the structure of lactose, which resembles that of dextrose already examd. by Böeseken (*C. A.* 15, 2837), an increase in the equil. value of the cond. of the sugar soln., apart from that due to H_3BO_3 alone, might be expected, there is, on the contrary, a slight decrease. This suggests that the behavior of lactose is due to the galactose, and not to the dextrose portion of the mol. In addn., the equil. values for the 2 forms are not identical. The cond. of α -lactose alone, after soln., first increases and then decreases to the equil. point, but in the presence of H_3BO_3 there is a continuous decrease. The cond. of β -lactose alone remains const. at first and then decreases. In the presence of H_3BO_3 it increases continuously. In no case is the change unimol. The presence of a minute trace of impurity greatly affects the result. Expts. have been made at 12.9°, 15.5°, 20.0° and 25°. A few expts have been carried out with melibiose. In this case also there appears to be no increase in cond. in the presence of H_3BO_3 . Methods for the prepn. of pure α - and β -lactose are given. B. C. A.

Chemistry of lignin. II. Fractional extraction of lignin from corn cobs. MAX PHILLIPS. U. S. Dept. Agr. *J. Am. Chem. Soc.* 50, 1986-9(1928); cf. *C. A.* 21, 3056.—Lignin was fractionally extd. from corn cobs by a 2% EtOH-NaOH soln. at room temp., by 2% aq. NaOH at 100° and at 135° and finally by 4% aq. NaOH at 180°. Each method of extn. was continued until no further lignin was obtained, before the next method in the series was employed. The results justify the conclusion that the lignin in corn cobs is unequally combined with the carbohydrates, part of it being loosely bound, possibly in the form of an ester, and the remainder being more firmly held, probably in the form of an ether-like combination. C. J. WEST

Lignin. IV. Soluble pine lignin prepared by various methods. A. FRIEDRICH. *Z. physiol. Chem.* 176, 127-43(1928); cf. *C. A.* 21, 3203.—Further study of sol. pine lignin was undertaken to det. (1) the conditions under which the alc. method yields prepn. with max. alkoxy content, (2) the influence of the absence of H_2O during the prepn. of lignin, and (3) the stability of sol. lignin prepn. toward alkali. MeOH was used in place of EtOH in order to simplify the alkoxy detns., the extent of methylation which occurred being taken as the excess MeO over the 14.5% present in the original substance. From a series of expts. in which MeOH and HCl were used it appears that the absence of H_2O contributes only slightly toward increasing the MeO content of the prepn. On the other hand, the duration of the treatment with solvent is of greater significance. The same result is not obtained when the wood is boiled with MeOH-HCl and the dissolved lignin immediately pptd. as when the dissolved lignin is left in contact with the solvent for a longer period at room temp. The latter treatment, with 80% MeOH, yields a product with higher MeO content than the former with abs. MeOH. A combination of the 2 treatments, i. e. abs. MeOH and prolonged action, gave the max. MeO content of 23.2%. The other prepn. varied between 19.5 and 22.2% MeO. Treatment with alkali lowered the MeO content, but the quantity of Me thus removed varied with the different prepn. The greatest decrease was 4.5-5.0% from the prepn. with max. MeO content of 23.2%. On the assumption of a mol. wt. of about 650 for pure lignin, the addn. of 1 Me would raise the MeO content from 14.5 to 18.5%, and addn. of 2 Me would raise it to 22.8%. The prepn. with max. MeO represents, therefore, the addn. of 2 Me. On sapon. of this product the MeO dropped to 18.5%; hence 1 of the 2 Me groups introduced into the lignin mol. is in ester linkage. The 2 Me groups are evidently added simultaneously, since half of the added Me is split off by sapon. regardless of the MeO content of the prepn. The assumption of either an ester or an acetal linkage of lignin to cellulose is untenable. The taking up of alkyl groups is not a re-esterification, else it would occur immediately on rupture of the lignin-cellulose linkage. Actually, the addn. of alkyl is a secondary reaction between the lignin already dissolved and the solvent and reaches its max. only after 20 hrs. In attempting to prep. sol. lignin with only the MeO content of the original substance, 3 new methods of prepn. were developed, one of which, the AcOH method, is especially suitable by reason of simplicity and good yield and bids fair to supersede the usual EtOH method. If wood flour is added to AcOH contg. 3 vol. % concd. HCl and the mixt. warmed on a water bath, the lignin readily goes into soln. Within 0.5 hr. the liquid becomes yellow to brown; after 1 hr. it is deep brown or black. The wood residue is filtered off and the lignin pptd. from the filtrate by addn. of H_2O . The darker the soln. the greater is

the yield of lignin. However, it is advisable to interrupt the reaction as soon as a brown color has developed. Prepn. of lignin from dark brown or black solns. are discolored and resinify very rapidly to completely insol. products. To remove the adhering AcOH the product must be washed thoroughly with H_2O , then dissolved in EtOH and reprecip. by H_2O . The dried prep. then shows a MeO content of 10.5%, indicating that AcOH has been taken up. By warming the EtOH soln. with $N/45$ alkali and titrating back it is shown that 4 AcOH per mol. of lignin are present. The lignin thus treated now contains 14.4% MeO. Instead of the alkali treatment, reprecip. from $CHCl_3$ soln. by Et_2O may be used for removing this AcOH. The AcOH is merely "angelagert" and not in chem. combination. Purified lignin with a MeO content of 14.5% reacts with $PhNHNH_2$ to yield a product with 2.1% N and 13.5% MeO. This corresponds to 1 $PhNHNH_2$ per double mol. of lignin, and confirms F's previously stated view that the keto form of lignin is a double mol. Methylation of lignin with CH_3N_2 in EtOH or with Me_2SO_4 in alk. soln. raises the MeO to 23%, corresponding to the addn. of 2 Me. Sapon. then removes 1 Me. Titration of CO_2H in the sapon. product gives an equiv. of approx. 650, a value in agreement with the previously detd. mol. wt. of lignin. Benzoylation adds 3 Bz, and treatment with SO_2Cl_2 adds 3 Cl. Metallic salts of lignin were not obtained in sufficient purity for analysis because of the metallic hydroxide simultaneously occluded. Besides the AcOH method of prep. lignin, 2 other methods were used, involving the use of MeAc and $CHCl_3$. The last is the only one in which no reaction with the solvent occurs. The prep. of lignin by heating wood with alkali under pressure is believed to involve merely a change in the colloidal state of the lignin-cellulose aggregate and not a sapon. The same phenomenon of swelling occurs in the AcOH treatment. On the basis of analysis and mol. wt. detn. pine lignin has the empirical formula $C_{33}H_{36}O_{12}$. The mother liquor remaining after pptn from EtOH or $CHCl_3$ soln. by means of Et_2O or C_6H_6 contains various lignin substances which may be recovered by evap. the mother liquor, redissolving the residue and reprecip. Two such substances were thus obtained, one sol. in C_6H_6 and the other sol. in Et_2O . The wood residue also contains a small quantity of lignin which cannot be extd. by repeated treatments with AcOH.

A. W. DOX

Use of platinum-oxide platinum black in the catalytic reduction of aromatic hydrocarbons. XVII. ROGER ADAMS AND J. R. MARSHALL. Univ. of Illinois. *J. Am. Chem. Soc.* 50, 1970-3 (1928); cf. *C. A.* 21, 3053.—Pt oxide-Pt black is an excellent catalyst in the reduction with H of various types of aromatic hydrocarbons in glacial AcOH as a solvent. Results are given for C_6H_6 , PhMe, PhEt, m - $C_6H_4Me_2$, mixed $C_6H_4Me_2$, mesitylene, cymene, Ph_2CH_2 , Ph_3CH , α,α - $C_2H_5Ph_2$, $(PhCH_2)_2$, $PhCH_2CO_2H$ and $PhCH_2CH_2CO_2H$, the b. p., n_D and d. being given for each reduction product.

C. J. WEST

Cyclopropylmethylalkylacetic acids and their bactericidal action towards B. leprae. XIII. J. A. ARVIN AND ROGER ADAMS. Univ. Illinois. *J. Am. Chem. Soc.* 50, 1983-5 (1928); cf. *C. A.* 22, 2370.—*Di-Et cyclopropylmethylalkylmalonates*, $C_6H_5CH_2C(CO_2Et)_2R$, were prepd., where R is C_4H_9 , $b_{1,7}$ 122-5°, n_D^{20} 1.4459, d_4^{20} 0.9770 (this order will be used for n and d), C_6H_{11} , $b_{1,9}$ 130-42°, 1.4470, 0.9685; C_7H_{15} , $b_{1,7}$ 146-9°, 1.4481, 0.9613; C_8H_{17} , $b_{1,3}$ 149-54°, 1.4491, 0.9559; C_9H_{19} , $b_{1,3}$ 165-8°, 1.4503, 0.9512; $C_{10}H_{21}$, $b_{1,1}$ 162-6°, 1.4510, 0.9460; $C_{11}H_{23}$, b_1 186-9°, 1.4519, 0.9419; $C_{12}H_{25}$, b_2 183-7°, 1.4526, 0.9395; $C_{13}H_{27}$, $b_{1,1}$ 192-5°, 1.4530, 0.9377; H , b_1 129-33°, 1.4363, 1.0216. The yields were 60-6%. From the acids were prepd. in the usual manner the *cyclopropylmethylalkyl acetic acids*, $C_6H_5CH_2CH(CO_2H)R$, where R is C_4H_9 , $b_{1,4}$ 112-5°, 1.4469, 0.9375; C_6H_{11} , $b_{1,1}$ 130-2°, 1.4498, 0.9253; C_7H_{15} , b_2 136-9°, 1.4509, 0.9236; C_8H_{17} , $b_{1,1}$ 146-9°, 1.4529, 0.9142; C_9H_{19} , $b_{1,3}$ 162-4°, 1.4545, 0.9105; $C_{10}H_{21}$, $b_{1,7}$ 176-8°, 1.4553, 0.9004; $C_{11}H_{23}$, m 27-8°, b_1 186-9°; $C_{12}H_{25}$, m 29-30°, b_3 191-5°; $C_{13}H_{27}$, m 35-7°, $b_{1,3}$ 176-9°. The yields were 86-94%. No appreciable bactericidal effect appeared until the alkyl group was C_8H_{17} or larger, thus indicating as in previous researches that mol. wt. of the whole mol. plays an important role. No marked difference was found between mols. contg. 5-, 6- or 3-membered rings provided the mol. wt. was approx. the same.

C. J. WEST

Di(cyclohexylalkyl)acetic acids. LETHA A. DAVIES AND ROGER ADAMS. Univ. of Ill. *J. Am. Chem. Soc.* 50, 2297-8 (1928); cf. preceding abstr.—The following *di-Et di-[ω-cyclohexylalkyl]malonates* were prepd., with the general formula $C_6H_{11}(CH_2)_x-C(CO_2Et)_2(CH_2)_yC_6H_{11}$ (b. p., n_D^{20} and d_4^{20} are given). x and y are 0, 2, $b_{1,1}$ 192°, 1.4747, 1.016; 1, 2, b_2 186-8°, 1.4725, 1.003; 2, 2, $b_{1,1}$ 200-2°, 1.4722, 0.9931; 2, 3, $b_{1,1}$ 210-1°, 1.4713, 0.9928; 3, 3, b_2 216-8°, 1.4710, 0.9811; 2, 4, $b_{1,1}$ 208-10°, 1.4710, 0.9817. *Di-[ω-cyclohexylalkyl]acetic acids*, $C_6H_{11}(CH_2)_xCH(CO_2H)(CH_2)_yC_6H_{11}$, were prepd. as

follows: x and y are 0,2, b_4 182–6°, n_D^{25} 1.4852, d_4^{20} 0.9915; 1,2, b_4 207–8°, m . 50–1°; 2,2, $b_{1,4}$ 210–3°, m . 73–6°; 2,3, b_3 213–4°, m . 46.5–7°; 3,3, b_3 216–8°, m . 42.5–5°; 2,4, b_4 221–3°, n_D^{20} 1.4831, d_4^{20} 0.9647. These acids were no more effective bactericidally than those mols. contg. the same no. of C atoms which have only 1 ring present.

C. J. WEST

Separation of the optical isomers of a spirocyclic compound of the allene type. H. J. BACKER AND H. B. J. SCHURINK. *Verslag. Akad. Wetenschappen Amsterdam* 37, 384–5 (1928).—The prepn. of $\text{CH}_2\text{CH}(\text{CO}_2\text{H})\cdot\text{CH}_2\cdot\text{C}\cdot\text{CH}_2\cdot\text{CH}(\text{CO}_2\text{H})\cdot\text{CH}_2$ (Fecht,

C. A. 2, 75) has been improved and a yield of 80% obtained. The brucine salt, after decompn. with NH_4OH , gives an optically active NH_4 salt: if λ in μ is 656.3, 589.5, 546.3, 486.1, $[\alpha]$ is 0.11°, 0.13°, 0.15°, 0.19° and $[M]$ is 1.9°, 2.3°, 2.6°, 3.4°. The free acid being little sol. in water, its ether soln. has been examd. $[M]_D = 1.9^\circ$.

$\text{PhCH} \begin{array}{c} \diagup \text{OCH}_2 \\ \diagdown \text{OCH}_2 \end{array} \text{C} \begin{array}{c} \diagup \text{CH}_2\text{O} \\ \diagdown \text{CH}_2\text{O} \end{array} \text{CHPh}$, m . 162°; its crystals show about $\alpha_D = 2^\circ$ per mm.

but do not exhibit any optical activity when dissolved in alc., EtOAc or CHCl_3 . The x-ray pattern shows that the Ph groups must be located on the general axis of the mol. as indicated by the above formula.

A. L. HENNE

Tautomerism of cyclopentadienes. I. Some derivatives of methylcyclopentadiene. FRANK R. GOSS AND CHRISTOPHER K. INGOLD. Univ. of Leeds *J. Chem. Soc.* 1928, 1268–78.— $\text{CH}_2(\text{CO}_2\text{Me})_4$ (16 g.) and 20 g. Me dibromo- β -methylglutarate, added successively to MeONa (5 g. Na and 60 g. MeOH) give 12 g. of the Na salt (I), bright yellow, m . 270° (decompn.) and gives a deep violet color with FeCl_3 , of Me 5-methyldicyclopenten-3-ol-1,2,4-tricarboxylate, b_1 180°; Et ester. Digesting I 72 hrs. with 30% MeOH-KOH gives the di-K deriv., yellow, of MeH 5-methyldicyclopenten-3-ol-1,2 (or 1,4)-dicarboxylate, viscous liquid, which gives a deep violet color with FeCl_3 . Boiling I with an excess of EtI in EtOH for 24 hrs. gives Me 5-methyl-2 (or 4)-ethyldicyclopentan (or cyclopenten)-3-one-1,2,4-tricarboxylate, b_4 210°. Any but the Et deriv., boiled with HCl for 2 hrs., gives 5-methyldicyclopentan (or penten)-3-one-1-carboxylic acid (IV), m 60°; oxime, m . 216° (decompn.). The acid gives no color with FeCl_3 ; on oxidation it yielded only $(\text{CO}_2\text{H})_2$. Me 3-methyl- Δ^2 -cyclopropene-1,2-dicarboxylate and $\text{NCCHNaCO}_2\text{Me}$ give about 15% of Me 3-methyl-1,2-dicarboxymethoxycyclopropane-3-cyanoacetate, b_{10} 200°; with MeONa at room temp. for 12 hrs. and then boiled 4 hrs., there result 2 forms (II and III) of Me 3-amino-1-methyldicyclopentene (or cyclopentadiene)-2,4,5-tricarboxylate; III, m . 186° (decompn.), is extd. from the aq. soln. by Et_2O ; on standing it is converted into the more stable II; the mother liquor, satd. with CO_2 and extd. with Et_2O , gives II, m . 130° (decompn.); II gives a red ppt. with PhN_2X ; neither II nor III gives any noticeable color with FeCl_3 . II with 3 N MeOH-KOH for 24 hrs. gives di-Me H 3-amino-1-methyldicyclopentene-2,4,5-tricarboxylate, m . 226° (decompn.); FeCl_3 gives an intense purple color; the K salt is yellow. Boiling II with HCl for 1 hr. gives IV. Oxidation of II with H_2O_2 and FeSO_4 gives α - and β -methylglutamic and β -acetylacrylic acid. Et 3-amino-1-methyldicyclopentane-2,4,5-tricarboxylate (cyclopentadienetricarboxylate), m . 107°; Na salt, yellow. Di-Et H ester, m . 199°. The Na salt and MeI give the Me deriv., m . 113°; Et deriv., m . 118°.

C. J. WEST

Diveratrylidene and divanillylidene compounds of cyclohexanone, comprising several new indicators. B. SAMDAHL. Univ. Oslo. *J. pharm. chim.* 7, 162–73 (1928).—The prepn. of 9 new compds. is based on the type reaction: $-\text{CH}_2\text{COCH}_3 + 2 \text{OCH}_2\text{R} \rightarrow -\text{C}(\text{CHR})\cdot\text{CO}\cdot\text{C}(\text{CHR})-$ (Wallach, *Ber.* 29, 1595 (1896)). The 3 cyclohexanones $\text{C}_6\text{H}_{10}\text{CO}$ (I), p - $\text{MeC}_6\text{H}_4\text{CO}$ (II) and m - $\text{MeC}_6\text{H}_4\text{CO}$ (III) are made to react with 3 aldehydes: 3,4-(MeO) $_2\text{C}_6\text{H}_3\text{CHO}$ (IV) (Rosenmund, *C. A.* 5, 893); 3,4-MeO(AcO) $\text{C}_6\text{H}_3\text{CHO}$ (V) (Pschorr, *Ber.* 32, 3407 (1899)), and 3,4-MeO(HO) $\text{C}_6\text{H}_3\text{CHO}$ (VI). The following compds. are described: (1) I-IV, $\text{C}_{23}\text{H}_{32}\text{O}_8$, m . 149–50°; (2) II-IV, $\text{C}_{23}\text{H}_{30}\text{O}_8$, m . 154–5°; (3) III-IV, $\text{C}_{23}\text{H}_{30}\text{O}_8$, m . 134–5°; (4) I-V, $\text{C}_{23}\text{H}_{32}\text{O}_7$, m . 190°; (5) II-V, $\text{C}_{27}\text{H}_{34}\text{O}_7$, m . 189°; (6) III-V, $\text{C}_{27}\text{H}_{34}\text{O}_7$, 141–2°; (7) I-VI, $\text{C}_{27}\text{H}_{32}\text{O}_6$, m . 179–80°; (8) II-VI, $\text{C}_{27}\text{H}_{32}\text{O}_6$, m . 169°; (9) III-VI, $\text{C}_{27}\text{H}_{32}\text{O}_6$, m . 171–2°. In the prepn. of 1. and 3, Na alcoholate was used as a catalyst; in all others concd. HCl. To prep., e. g., No. 4, warm 40 g. of V with 10 g. of I on a water bath till melted, add 2 cc. concd. HCl with stirring, cool the red liquid; after 12 hrs. wash with H_2O (violet soln.), then with cold EtOH; then take up with boiling alc. and recrystallize from hot alc. The yields were nearly quant. in 1, 2, 4 and 5, about 80% in 7 and 8, and 50% in 3, 6 and 9. Nos. 7 and 8 form orange crystals, all others are lemon-yellow. No. 7 after the 5th crystn.

yields yellow crystals showing intense yellow fluorescence in ultra-violet light ($\lambda = 366\mu$); the orange crystals are indifferent to this light. The yellow crystals slowly turn back to orange. All these compds. (1-9) give a deep red-violet color with concd. H_2SO_4 (cf. Boedtker, *C. A.* 22, 585). Nos. 7, 8 and 9 in 0.1% alc. soln. (65%) are very sensitive indicators towards acids (greenish yellow) and alkalies (orange-red). They indicate a range of p_{H} 7.8-9.4 detd. by the method of Sørensen-Palitzsch (*C. A.* 4, 1929, 1956; 6, 522; 9, 2918). Changes of 0.1 in p_{H} are marked by distinct changes of color. The indicators are about twice as sensitive as phenolphthalein in indicating addns. of 0.01 *N* NaOH to CO_2 -free H_2O . S. WALDBOTT

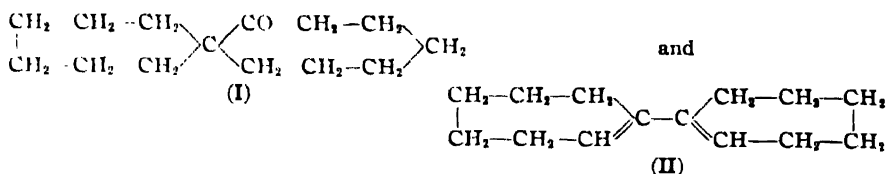
Orientation phenomena with α -methylcyclohexanone. R. CORNUBERT. *Compt. rend.* 186, 441-2 (1928); cf. *C. A.* 21, 3046.—When α -methylcyclohexanone is methylated with Me_2SO_4 , ethylated with EtBr, or allylated with $\text{C}_3\text{H}_7\text{Br}$ by the NaNH_2 method, 86, 85 or 88% of the resulting compds. are of the type $-\text{CH}_2\text{COCRR}'-$, while 14, 15 or 12% are of the type $-\text{CHRCOCHR}'-$. In order to det. whether this ratio is due to a "mol. orientation reflex," or the secondary influence of the reagents, C. investigates the action of NaOH (possibly present in NaNH_2), HCl and NaHSO_4 on each of the pure isomers and finds that no isomerization takes place. It is thus believed that the introduction of Na in the mol. gives generally 85% $-\text{CH}_2\text{COCNaMe}-$ and 15% $-\text{CHNaCOCHMe}-$. Kötze and Steinhorst (*C. A.* 5, 1407) found that during the introduction of Cl into the mol., the formation of $-\text{CHClCOCHMe}-$ was much favored. The polarity of Cl and Na being opposite an explanation of the orientation may possibly be sought there. A. L. HENNE

Quinitrols and quinamines. K. FRIES AND G. OEHMKE. *Tech. Hochschule, Braunschweig. Ann.* 362, 1-24 (1928).—The constitution of the quinitrols of Zincke is still in dispute; they are considered as nitro compds. and as nitrites of quinols. The following study of the behavior of these compds. with alc. alkali indicates that they are nitro compds. and not esters. 3,5-Dibromo-1,4-methylquinitrol (I), suspended in 5 parts ice-cold EtOH and treated with an ice-cold mixt. of 5 parts EtOH and 5 parts 30% KOH for 10 secs. (soln.), gives 70% of 1-methyl-1-nitro-2-ethoxy-3,5-dibromo-4-ketobenzene 1,2,3,4-tetrahydride (II), m. 145° (evolution of NO); slight warming with NaOH causes soln., with which acids ppt. III. AcOH-HBr and II in the cold give 5,3,4-Br(O_2N)(HO) $\text{C}_6\text{H}_3\text{Me}$ (IV). II is rather stable towards cold concd. H_2SO_4 ; warming gives a brown, amorphous product. Reduction of II with Zn and concd. HCl gives 3,4-Br(HO) $\text{C}_6\text{H}_3\text{Me}$. With 2 parts cold $\text{C}_6\text{H}_5\text{N}$, 18 g. II gives 7 g. IV and 6 g. 1-methyl-1-nitro-2-ethoxy-3,3,5-tribromo-4-ketobenzene 1,2,3,4-tetrahydride (V), m. 92° , which does not react with cold NaOH or H_2SO_4 . Reduction of V gives 3,5,4-Br $_2$ (HO) $\text{C}_6\text{H}_2\text{Me}$. If I is allowed to stand 2 days with the cold EtOH-KOH, there results 1-methyl-2-ethoxy-3,5-dibromo-4-hydroxybenzene (III), m. 91° (*Ac deriv.*, m. 67°). 2-MeO deriv. corresponding to II, m. 126° ; $\text{C}_6\text{H}_5\text{N}$ gives the 2-MeO deriv. corresponding to V, m. 105° . The Me ether corresponding to III m. 60° (*Ac deriv.*, m. 104°). With HBr III gives dibromocresorcinol, m. 85° (*Ac deriv.*, m. 67°). III and dil HNO_3 or NaNO_2 give 1-methyl-2-ethoxy-3-bromo-4-hydroxy-5-nitrobenzene, yellow, m. 73° ; fuming HNO_3 gives 1-methyl-1-nitro-2-methoxy-3,5-dibromo-4-ketobenzene 1,4-dihydride, decmps. about 75° . Dibromo-*p*-methylquinol cannot be an intermediate product in the formation of III from I for on treatment with EtOH-KOH there results a deep seated decompn. 3,6-Dibromo-1,2-methylnaphthoquinol with MeOH-NaOH gives the 6-bromo-4-methoxy-1,2-methylnaphthoquinol, m. 155° (*Ac deriv.*, m. 168°); 4-EtO deriv., m. 144° ; 4-HO deriv., m. 182° (*di-Ac deriv.*, m. 147°). Reduction of the 4-MeO deriv. gives 6-bromo-4-methoxy-1-methyl-2-naphthol, m. 143° (*Ac deriv.*, m. 125°). 6-Bromo-4-hydroxy-1,2-methylnaphthoquinitrol, m. 195° (decompn.), results in 60% yield from the di-Br deriv. and 1.5 parts 2 *N* NaOH. Dichloro-*p*-cresol and Br in AcOH give nearly quant. 1-methyl-3,5-dichloro-1-bromo-4-ketobenzene 1,4-dihydride, yellow, m. 106° ; heated on the H_2O bath, it gives 85% of 1-bromomethyl-3,5-dichloro-4-hydroxybenzene, m. 120° . 1-Methyl-1-anilino-3,5-dibromo-4-ketobenzene 1,4-dihydride (VI), yellow, gradually turns black above 100° , results in 40% yield by treating the 1,3,5-Br $_3$ deriv. in 5 parts EtOH with 3 parts PhNH_2 ; it decmps. on warming in any solvent, in the cold in AcOH. Reduction with Zn and AcOH gives dibromo-*p*-cresol. The 1-*o*-toluidino deriv., yellow, m. 112° (decompn.); the *p*-deriv., orange-red, m. 105° (decompn.); the 1-anilino-3,5-dichloro deriv., golden, m. 148° (decompn.). VI in 10 parts AcOH, treated with 25% of the vol. of concd. HCl gives nearly quant. 4-methyl-2,6-dibromo-4'-aminodiphenyl ether, m. 120° (*Ac deriv.*, m. 180°); 2,6-dichloro deriv., m. 99° (*Ac deriv.*, m. 187°); 4-methyl-2,6-dibromo-3'-methyl-4'-aminodiphenyl ether, m. $122-5^\circ$ (*Ac deriv.*, m. 211°). (With A. KUSTER.) 1,3-Dimethyl-1,5-dibromo-4-ketobenzene 1,4-dihydride, m. 59° (75% yield); warming on the H_2O bath gives 90%

of 3-methyl-1-bromomethyl-5-bromo-4-hydroxybenzene, m. 104°. 1,3-Dimethyl-1-anilino-5-bromo-4-ketobenzene 1,4-dihydrate, yellow, m. 107° (decompn.); 1-o-toluidino deriv., yellow, m. 103° (decompn.). 2,4-Dimethyl-6-bromo-4'-aminodiphenyl ether, m. 81° (Ac deriv., m. 163°); the 3'-Me deriv., m. 128° (Ac deriv., m. 187°). C. J. WEST

Stereochemical inversions and cross-saturation processes. A. LAPWORTH AND E. N. MOTTRAM *Mem. Manchester Phil. Soc.* 71, 63-73 (1926-27).—The evidence relating to cross-substitution, or simple stereochem. inversion, and cross-satn. processes is discussed. The former appears to be general when a linking between satd. C and halogen or O is involved in a substitution process in aq. or alc. soln. This is seen, for example, in Holmberg's expts. on halogenated succinic acid (cf. *C. A.* 20, 1600, 3281), or in the changes in optical rotatory effect observed when compds. of the acetochloroglucose type are used as "intermediates" in syntheses in the sugar group, or, finally, in the contrast between the reactions of esters of different types, *e. g.*, sulfonates as compared with carboxylates (Ferns and Lapworth, *C. A.* 6, 1742). When halogens, halogen hydrides, or hypohalogen acids are added to a pair of doubly-linked C atoms, cross-satn. usually takes place and does not necessarily mean that stereochem. inversion must have occurred at some stage in the reaction. Conversely, on elimination of the same elements, cross-desatn. results. It is suggested that in the series of reactions, cyclohexene \rightarrow cyclohexene chloro- or bromohydrin \rightarrow cyclohexene oxide \rightarrow cyclohexanediol, each one is a cross-reaction, resulting finally in a *trans*-compd. Oxidation of cyclohexene by KMnO_4 , however, results in the formation of the *cis*-isomeride of cyclohexanediol. It is possible that the latter case may be best explained by the intermediate formation of a ring compd. with the Mn. B. C. A.

Dehydration of the pinacol of cycloheptanone. MARCEL GODCHOT AND MISS G. CAUQUIL. *Compt. rend.* 186, 767-9 (1928).—The dehydration of 1,1'-dihydroxydi-cycloheptane, m. 78°, is easily realized with dil. H_2SO_4 or $\text{H}_2\text{C}_2\text{O}_4$. Two products are obtained.



I m. 72°; it does not give a semicarbazone or an oxime; by reduction with Na and abs. alc., an alc. $\text{C}_{14}\text{H}_{24}\text{O}$, m. 41°, is obtained whose phenylurethane, m. 156°; its oxidation with HNO_3 (d. 1.40) at 100° gives $(\text{CH}_2)_5\text{C}(\text{CO}_2\text{H})(\text{CH}_2)_5\text{CO}_2\text{H}$, m. 116°, and $(\text{CH}_2)_6\text{C}(\text{CO}_2\text{H})_2$. II b₁₀, 149-50°, d₁₀ 0.9736, n_D²⁰ 1.525; its oxidation with KMnO_4 yields mostly pimelic acid.

A. L. HENNE

Oxidation reactions. II. Oxidation of toluene with nitric acid and nitrogen oxides in the presence of oxygen. P. ASKENASY, E. FLÖD AND CARL TROGUS. *Ann.* 461, 109-30 (1928); cf. *C. A.* 21, 3326. Repetition of Fittig's work (*Ann.* 117, 192; 120, 222 (1861)) showed that the reaction product from boiling 44.1 g. PhMe with 75 g. HNO_3 100 hrs contains BzOH , $p\text{-O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$, $o\text{-O}_2\text{NC}_6\text{H}_4\text{Me}$, CO_2 and traces of picric acid. The results with varying concns. of HNO_3 are shown as curves. Working at 180-5° and 15 atm. pressure with 22.5% HNO_3 , the PhMe reacts almost quant. in 15-20 min.; from 53 g. PhMe, with and without a catalyst (0.0275 g. V_2O_5), there were formed: BzOH , 65.6, 69.6%; $p\text{-O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$, 12.8, 12.3; $o\text{-O}_2\text{NC}_6\text{H}_4\text{Me}$, 1.9, 1.9; picric acid, 0.58, 0.78; CO_2 , 2.4, 2.4; PhMe, 7.5, 8.5; total accounted for, 90.78, 95.48. There is little difference in the results obtained at 10 and 15 atm. pressure. The reaction proceeds very slowly at 150°, is very rapid at 180-5° and above 190° shows a tendency to explode. The effect of changing the concn. of the HNO_3 from 5 to 30% is also studied. $p\text{-O}_2\text{NC}_6\text{H}_4\text{Me}$ is not oxidized by 22.5% HNO_3 on boiling 24 hrs., while some acid is formed with 35-45% acid; at 15 atm. and 180-5°, 92-5% acid is formed with 22.5% HNO_3 in 20 min. $o\text{-O}_2\text{NC}_6\text{H}_4\text{Me}$ under the same conditions of temp. and pressure gives in 18-20 min. 38.4% picric acid, 35.6% CO_2 and 17.35% $o\text{-O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$. BzOH is recovered almost quant. after heating with 22.5% HNO_3 at 180-5° under 10-20 atm. O_2 . Picric acid results in small quantities in the oxidation of various org. compds.; this is specially true of *o*-substituted C_6H_5 rings, in which at least 1 of the 2 *o*-positions is occupied by a C atom. Oxidation in the vapor phase is also discussed.

C. J. WEST

***p*-Cymene studies. X. *p*-Cymylene-2,5-diamine and certain new dyes.** ALVIN

S. WHEELER AND R. W. BOST. Univ. of North Carolina. *J. Am. Chem. Soc.* **50**, 2000-5 (1928); cf. *C. A.* **22**, 228.—Reduction of 5-[4-sulfobenzeneazo]carvacrylamine-HCl with SnCl_2 and HCl gives 77.9% of the HCl salt of *p*-cymylene-2,5-diamine, isolated in an atm. of N in a special app., yellow; *dibenzoate*, m. 280° ; oxidation with CrO_3 gives 2,5-cymo-*p*-quinone, m. 45.5° . The following salts of the amine were prepd.: *HCl*, m. 323° (decompn.); *HBr*, m. 330° (decompn.); *nitrate*, m. 186° (decompn.); *chloroacetate*, m. 144° ; *dichloroacetate*, m. 165° ; *trichloroacetate*, m. 171° ; *bromoacetate*, m. 148° (decompn.); *benzenesulfonate*, decmps. on heating; *o*-chlorobenzoate, m. 161° ; *benzoate*, m. 145° ; *3,5-dinitrobenzoate*, m. 199° (decompn.); *2,4,6-trinitrobenzoate*, m. 130° (decompn.); *picrate*, m. 207° (decompn.). With KSCN there results 2,8-bis[thioureido]-1-methyl-4-isopropylbenzene, m. $235-7^\circ$; KCNO gives 2,5-diureido-1-methyl-4-isopropylbenzene, does not m. 350° . $(\text{CO}_2\text{H})_2$ gives *p*-aminocymyloxamido acid, m. $210-1^\circ$. *Diazo* dyes were prepd. with *m*- $\text{C}_6\text{H}_4(\text{OH})_2$, $\text{C}_{27}\text{H}_{22}\text{O}_6\text{N}_4$, m. $168-70^\circ$; 2- $\text{C}_{10}\text{H}_7\text{OH}$, $\text{C}_{30}\text{H}_2\text{O}_2\text{N}_4$, m. $295-8^\circ$ (decompn.); *p*- $\text{H}_2\text{NC}_6\text{H}_4\text{SO}_3\text{H}$, $\text{C}_{27}\text{H}_2\text{O}_6\text{N}_4\text{S}_2\text{Cl}_2$, m. 100° (decompn.); 2,3,6- $\text{HO}_2\text{C}_6\text{H}_3(\text{SO}_3\text{H})_2$, $\text{C}_{30}\text{H}_{12}\text{O}_{10}\text{N}_4\text{S}_4\text{Na}_4$, m. above 340° ; $\text{C}_{10}\text{H}_7\text{COSH}$, $\text{C}_{10}\text{H}_{22}\text{O}_6\text{N}_6\text{S}_2$, m. $270-2^\circ$ (decompn.); 2- $\text{C}_{10}\text{H}_7\text{SH}$, $\text{C}_{30}\text{H}_{22}\text{N}_4\text{S}_2$, m. $138-40^\circ$; the behavior of these dyes toward wool, silk and cotton and with cold, hot and dil. H_2SO_4 is given. Two dyes of the Eurhodine class were prepd.: *p*- $\text{ONC}_6\text{H}_4\text{NMe}_2$, $\text{C}_{18}\text{H}_{22}\text{N}_4$, blue black, m. 300° (decompn.); *p*- $\text{ONC}_6\text{H}_4\text{OH}$, $\text{C}_{18}\text{H}_{17}\text{ON}_4$, dark brown, m. $200-6^\circ$ (decompn.).

C. J. WEST

Comparative effects of the nitro, carboxyl and sulfonic acid groups on the hydrolysis of aryl halides. WM. DAVIES AND EDNA S. WOOD. Melbourne Univ. *J. Chem. Soc.* **1928**, 1122-31.—A comparison of the effects of the CO_2H , SO_3H and NO_2 groups on the reaction $\text{RCl} + 2\text{KOH} = \text{ROK} + \text{KCl} + \text{H}_2\text{O}$ is reported for compds. of the type *p*- $\text{ClC}_6\text{H}_4\text{X}$, 2,4- $\text{X}_2\text{C}_6\text{H}_3\text{Cl}$, 2,4,6- $\text{X}_3\text{C}_6\text{H}_2\text{Cl}$ and 4,2- $\text{X}(\text{O}_2\text{N})\text{C}_6\text{H}_4\text{Cl}$; the order of activation of the Cl atom is $\text{NO}_2 > \text{SO}_3\text{H} > \text{CO}_2\text{H}$. The activating powers of the 3 groups are, however, very different. So great is that of the NO_2 group in comparison with the other 2 groups that only extremely rough figures can be given. In compds. of the type 2,4- $\text{X}_2\text{C}_6\text{H}_3\text{Cl}$, the Cl in the NO_2 compd. is more than 700,000 times as reactive as that in the SO_3H and more than 200,000 times as reactive as that in the CO_2H acid. The Cl atom in *p*- $\text{ClC}_6\text{H}_4\text{SO}_3\text{H}$ is slightly more mobile than in *p*- $\text{ClC}_6\text{H}_4\text{SO}_3\text{H}$. 2,4- $(\text{HO}_2\text{S})_2\text{C}_6\text{H}_3\text{Cl}$ gives a very sol. *K* salt, and an *amide*, m. $206-7^\circ$. 2,4,6- $(\text{HO}_2\text{S})_3\text{C}_6\text{H}_2\text{Cl}$ forms a very sol. *K* salt, and gives diphenylamine-2,4,6-trisulfonanilide, light gray, m. 227° (decompn.). The original should be consulted for the exptl. details and results.

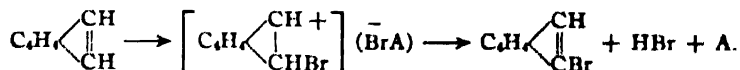
C. J. WEST

Physical properties of *o*-dichlorobenzene. T. S. CARSWELL. *Ind. Eng. Chem.* **20**, 728(1928)—*o*- $\text{C}_6\text{H}_4\text{Cl}_2$, synthesized from purified *o*- $\text{C}_6\text{H}_4\text{ClNH}_2$ through the diazonium compd., showed the following properties: Crystn pt. -16.7° , d_4^{25} 1.3112, d_4^{22} 1.3088, n_{D}^{25} 1.5518, n_{D}^{22} 1.5518.

T. S. CARSWELL

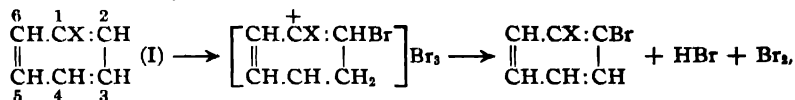
Theory of halogen substitution. P. PFEIFFER AND R. WIZNER. Univ. Bonn. *Ann.* **461**, 132-54(1928).—Gattermann (*Ber.* **22**, 1131(1889)) stated that compds. of the α,α -dianisylethylene series gave a violet color with Br vapor but that this color rapidly disappeared, the original compds. being recovered unchanged. This statement is correct as regards the color change but otherwise incorrect, for the compds. undergo bromination. The Br derivs. behave similarly until the limit is reached when no further bromination can occur. The colors observed intermediately are apparently those of unstable bromo-perbromides; this constitution is deduced from the fact that the depth of color given by a compd. with Br corresponds to that given with concd. H_2SO_4 or with HClO_4 . The reaction is formulated as

follows: $\text{R}_2\text{C}=\text{CH}_2 \xrightarrow{2\text{Br}_2} [\text{R}_2\text{C}(\text{CHBr})\text{Br}] \text{Br}_2 \rightarrow \text{R}_2\text{C}(\text{CHBr})\text{HBr} + \text{HBr} + \text{Br}_2$. It is suggested by analogy that the bromination of C_6H_6 in the presence of a Br carrier A (in the absence of which ordinary addn. occurs) may be expressed:



When $\text{C}_6\text{H}_5\text{N}$ is used as a Br-carrier, the compd. $\left[\text{C}_6\text{H}_5 \begin{array}{c} \diagup \text{CH} \cdot \text{C}_6\text{H}_5\text{N} \\ \text{CHBr} \end{array} \right] \text{Br}$ is the intermediate formed. Again, the *o,p*-directive effect of certain groups X(HO, MeO, NH_2 , etc.) receives explanation if it be assumed that in I the CH:CH linking 5,6 and the group X confer polar properties on the attached C atom (1) as similar groups are known

to do in the case of the types: $[R_2C^+-R]X$, $[R_2C^+-OH]X$, $[R_2C^+-OMe]X$, $[R_2C^+-NH_2]X$ and $[(H_2N)_2C^+-NH_2]X$. The bromination of PhX can thus be written:



p-substitution depending on a 1,4-conjugation-additive process. When X is NO_2 , the "negative" effect of this group is to cause the appearance of the positive charge in the 4-position, the position farthest from X ; as a result, *m*-substitution occurs. (*p*- $MeOC_6H_4$)₂C.CH₂, prepd. either from (*p*- $MeOC_6H_4$)₂CO and $MeMgI$ or from $AcOEt$ and *p*- $MeOC_6H_4MgBr$, is converted by Br (1 mol.) in C_6H_6 or CCl_4 , into the *β*-bromo deriv. (II), m. 84°, whose constitution follows from its oxidation to (*p*- $MeOC_6H_4$)₂CO. II is converted by Br in CCl_4 into the *β,β*-di-*Br* deriv. (III), m. 93–4°, also obtained by the action of the $MeOH$ - KOH upon the *β,β,β*-tri-*Br* deriv., m. 114° (from bromal and $PhOMe$ with concd. H_2SO_4). In $AcOH$, Br and III give the *β,β,3,3'*-tetra-*Br* deriv., m. 150°, also obtained from Br and (*p*- $MeOC_6H_4$)₂C:CH₂. Oxidation gives (3,4- Br (MeO) C_6H_3)₂CO. *p*- $MeOC_6H_4MgBr$ and Me_2CHCO_2Et give *α,α*-dianisyl-*β,β*-dimethylethylene, m. 64°. *α,α*-Dianisyl-*β*-methyl-*β*-bromoethyle, m. 57°; an excess of Br in CCl_4 gives *α,α*-dibromoanisyl-*β*-methyl-*β*-bromoethyle, m. 131°. *α,α*-Di-*p*-dimethylaminophenylethylene with 1% Et_3O-I yields an iodide periodide, dark violet, m. 107°, decomps. 150°; bromoperochloride, dark blue powder, changing to light green in a few hours; $NaClO_4$ gives the bromoperochlorate, deep blue. A table is given of the colors shown when Br , concd. H_2SO_4 or $HClO_4$ acts on a no. of *α,α*-diarylethylenes of the type $Ar_2C^+CX_2$, where X or Y is H , Me , Br or Cl . C. J. WEST

Benzylideneaniline and benzylidene-*p*-toluidine as ammonio aldehyde acetals. HAROLD H. STRAIN. Stanford Univ. *J. Am. Chem. Soc.* 50, 2218–23(1928).—Exptl. evidence is presented to show that $PhCH:NPh$ and *p*- $MeC_6H_4CH:NPh$ are aldehyde-acetals of the NH_3 system of compds. Allowed to stand in liquid NH_3 for 30–35 days there results amarine and $PhNH_2$ or *p*- $MeC_6H_4NH_2$; the reaction was completed in 10–14 hrs. by heating in the presence of NH_4Cl at 120–50°. With KNH_2 in liquid NH_3 , at room temp., the bases undergo the Cannizzaro reaction, yielding benzylphenylbenzamidine, identified as the benzenesulfonyl deriv., m. 148°, and benzyl-*p*-tolylbenzamidine, m. 127–7.5°, also prepd. synthetically. With an alkali cyanide in liquid NH_3 , these bases undergo the benzoin condensation, forming benzoinanilide, yellow, with a greenish fluorescence, softens at 185°, m. 200°, and benzoin-*p*-tolyl-*p*-toluide, m. 122°. $PhCH:NPh$ is nitridized with difficulty giving tar-like decompn. products with a small quantity of $PhCN$. When treated with small quantities of alkali, polymerized compds. are formed; $PhCH:NHPh$ gives a compd. $C_{11}H_{11}N_3$, m. 132–4°, which forms a sol. HCl salt. The polymer from *p*- $MeC_6H_4CH:NPh$, $C_{11}H_{11}N_3$, m. 136–7°. C. J. W.

4-Amino-5-bromo-1,3-dimethylbenzene. ALVIN S. WHEELER AND R. E. THOMAS. Univ. of North Carolina. *J. Am. Chem. Soc.* 50, 2286–7(1928).—1,3,5,4- $Me_2BrC_6H_3NH_2$ yields a HCl salt, which sublimes without decompn.; the *Bs* deriv. m. 186°. Through the diazo reaction the xenol, m. 228–30°, was obtained, whose *Me* ether b. 232°, d_4^{25} 1.362; *Et* ether, b. 246°, d_4^{25} 1.290. The diazo soln. with HCl and Cu gives the 4-*Cl* deriv., b. 250°. 1,3-Xyl-5-bromo-4-nitrile, m. 86–7°. 1-[5-Bromo-1,3-xyl-4-azo]-2-azonaphthol, red, m. 136°; the phenol deriv., orange, m. 166°. C. J. WEST

Second new method for the complete resolution of externally compensated acids and bases. A. W. INGERSOLL. Vanderbilt Univ. *J. Am. Chem. Soc.* 50, 2264–7(1928); cf. *C. A.* 19, 1415.—Continuing his earlier work, I. describes the resolution of a base when the half racemic salt, *d*-*B*-*dl*-A is less sol. than the inactive salt, *dl*-*B*-*dl*-A. *dl*-Isodiphenylhydroxyethylamine (I) (42.6 g.) and 48 g. *d*-camphor-10-sulfonic acid (II) in 1 l. H_2O , fractionally crystd., gives 35.2 g. of the pure *d*-I-*d*-II, m. 207–8° (all m. ps. cor.), $[\alpha]_D^{25}$ 61.2°; it is sol. in about 59 parts H_2O at 25°. *d*-I agrees in properties with that of Read and Steele (*C. A.* 21, 2254). From the more sol. fractions there was isolated *l*-I-*d*-II, m. 205–6°, $[\alpha]_D^{25}$ –37.5°; soly. in H_2O , 32 parts at 25°. A sample of base (16 g.) recovered from the intermediate fractions (46% excess *l*-I) was combined with *dl*-II in 450 cc. H_2O , so that about half of the total salt sepd. on cooling; by systematic crystn. was obtained 12.7 g. pure hydrated *l*-I-*dl*-II, m. 206–7°, $[\alpha]_D^{25}$ –50.3°; soly. in H_2O , 42 parts at 25°; from this *l*-I was obtained, m. 115.2°, $[\alpha]_D^{25}$ –125.6°. *d*-I-*dl*-II, $[\alpha]_D^{25}$ 48.2°. *dl*-I-*dl*-II, m. 198–9°. C. J. WEST

Action of cuprous hydride on diazonium salts. A combined Sandmeyer-Gattermann reaction. PANCHANAN NBOGI AND ANIL K. MITRA. Presidency College, Calcutta. *J. Chem. Soc.* 1928, 1332-3.—The action of CuH at 0° upon diazonium salts gives as a main product an aryl halide, or a phenol from a diazonium sulfate in H₂SO₄, and Ph₃ on addn. of alc. to the H₂SO₄ soln. A small quantity of the diazonium salt is, however, reduced, the corresponding hydrocarbon being formed. Results are given for a no. of amines. C. J. WEST

Interaction of benzoyl chloride and diazomethane together with a discussion of the reactions of the diazenes. WM. BRADLEY AND ROBERT ROBINSON. Univ. of Manchester. *J. Chem. Soc.* 1928, 1310-8.—BzCl and CH₂N₂ give BzCHN₂, m. 48-8.5°, yields of 91% being obtained. BzBr behaves similarly. The mechanism of the reactions of the aliphatic diazo compds. is discussed. C. J. WEST

Reaction between organomagnesium halides and aryl sulfonates. HENRY GILMAN AND LLOYD L. HECK. Iowa State Univ. *J. Am. Chem. Soc.* 50, 2223-30 (1928).—Alkylation is not the only reaction that takes place when alkyl sulfonates are treated with RMgX; alkyl halides are also formed. The following reactions are proposed to account for the formation of these compds.: $RSO_2O-Alkyl + R'MgX \rightarrow R' alkyl + RSO_2OMgX$; $RSO_2OMgX + RSO_2O-Alkyl \rightarrow Alkyl X + (RSO_2O)_2Mg$. According to these reactions the yield of alkylation product should be increased when 2 mols. of the sulfonate are used with 1 mol. of RMgX; this is verified by expt. When 2 mols. of esters are used for 1 of RMgX the R-alkyl and RX compds. are formed in essentially equiv. quantities. The correctness of the 2nd reaction was established by treating β -C₁₀H₇SO₃H with MeMgI to form β -C₁₀H₇SO₃OMgI and then treating this salt with *p*-MeC₆H₄SO₃Bu, to form BuI and (β -C₁₀H₇SO₃O)₂Mg. Various reactions are reported between sulfonates and RMgX compds. Mg cyclohexylsulfonate crystals with 6H₂O; Mg *β*-naphthalenesulfonate is anhyd. The reactions proposed above have a direct bearing on the formula for the Grignard reagent proposed by Jolibois. C. J. WEST

The action of magnesium on several *p*-bromomethylene derivatives of benzene. RAYMOND QUELET. *Compt. rend.* 186, 764-7 (1928) - *p*-Bromoallyl-, propenyl-, -Δ¹-butenyl-, -Δ³-butenylbenzene react normally with Mg. *p*-Bromostyrolene does not react. If the yield of the Grignard reagent is detd. by the MgO method or the I method, contradictory results are obtained. The low results given by the 2nd method are explained by assuming that compds. are formed analogous to *p*-BrMgC₆H₄CH(C₆H₅)CH·CHMe)CHMeMgBr. These compds. would react with H₂O, but not with I. In each case, a secondary reaction takes place which is substantially a Wurtz reaction. (*p*-C₆H₄CH·CHMe)₂, m. 185-6° has been isolated; it is little sol. in benzene, giving a blue fluorescence. A. L. HENNE

Grignard reaction. Preparation of tetraphenylphosphonium salts. JAKOB DOBONOV AND HERMANN MEDOX. Landwirtschaftl. Inst. Saratow. *Ber.* 61B, 907-11 (1928)—Ph₃P, m. 79.5°, is prepd. in a 76% yield from PhMgBr and PCl₃ in ether in a H atm. under const. cooling. If its Et₂O soln. is treated with PhMgBr in ether and a current of O is blown through the cooled mixt. during 1.5 hrs. Ph₄PBr is obtained; when the latter is anhyd. it m. 287°; it is sol. in alc. or CHCl₃, insol. in ether or C₆H₆, little sol. in cold H₂O, very sol. in hot H₂O. Ph₄POH is obtained from the bromide by long digestion with fresh Ag₂O; it is unstable; the carbonate is unstable too. The chloride crystallizes with 5H₂O; it m. 265° when anhyd. The sulfate crystallizes with 18H₂O; it does not melt sharply. The nitrate is anhyd. and m. 284°. The iodide m. 333°. A. L. HENNE

Action of thiocyanogen upon *O,N*-disubstituted hydroxylamines and primary amines. LAUDER W. JONES AND ELMER E. FLECK. Princeton Univ. *J. Am. Chem. Soc.* 50, 2018-28 (1928).—The (SCN)₂ from 11.3 g. Ph(SCN)₂ and 4.8 g. Br and 9.2 g. EtONH₂ give 40% of *O,N*-diethyl-*N*-thiocyanohydroxylamine, EtO(Et)NSCN, b₇ 45-6°; it decomps. rapidly on exposure to the air at room temp. Acid hydrolysis gives HCN, HSCN, H₂SO₄ and EtONEtH₂Cl, identified as EtONEtCONHPh. Alk. hydrolysis gives AcH, EtNH₂, NH₃ and K₂S₂O₈. *O,N*-Dibenzylcarbethoxyhydroxamic ester, b₇ 200-3°. *O,N*-Dibenzylhydroxylammonium thiocyanate, m. 91°, and *O,N*-dibenzyl-*N*-thiocyanohydroxylamine, m. 50-2° (47% yield), result from PhCH₂ONH(C₆H₅) and (SCN)₂. Alk. decompn. of EtONH₂ gives AcH and EtNH₂ when a 2% KOH soln. is heated at 180°; PhCH₂ONHCH₂Ph likewise gives (at 150°) BzH and PhCH₂NH₂. Ph₃CNH₂ and (SCN)₂ give triphenylmethylammonium thiocyanate, m. 173°, and triphenylmethylthiocyanamine, m. 142° (55% yield); the final product of the rearrangement of the latter with CaO is Ph₃C·NPh. Benzylthiocyanamine is an oil, which could not be purified; with HCl it gives PhCH₂NH₂Cl; with picric acid, the corresponding picrate. Evapn. to dryness of a soln. of PhCH₂ON(C₆H₅)H.HCl and KCNO gives 30% of

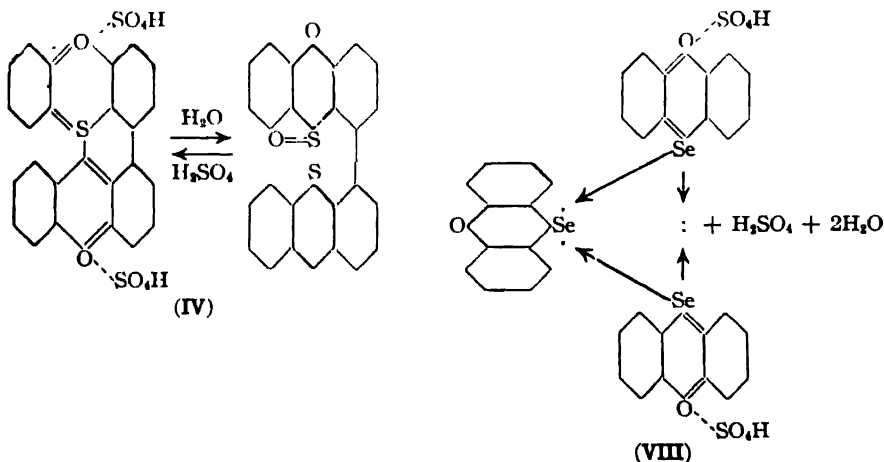
α, α' -benzylbenzylthiourea, m. 98–9°; α, α' -benzylbenzylthiourea, similarly prepd. in 24% yield, m. 94–5°. When the thiocyanate is dry-distd., the products are BzH and $\text{PhCH}_2\text{CSNH}_2$.

C. J. WEST

Diphenylamine- and triphenylamine-arsonic acids. II. O. WINTERSTEINER AND H. LIEB. *Ber.* 61B, 1126–35 (1928).—*p*- or *m*-Arsanilic acid does not condense with PhBr in the presence of Cu and K_2CO_3 in PhNO_2 or AmOH. *o*-Arsanilic acid, after a long heating at 130–90° with PhBr and CO_2K_2 , a trace of Cu and CuI or KI_2 give 50% *o*- $\text{PhNHC}_6\text{H}_4\text{AsO}_3\text{H}_2$ (I). After a long heating at 165° is obtained *o*- $\text{Ph}_2\text{NC}_6\text{H}_4\text{AsO}_3\text{H}_2$ (II), which is sepd. from I by its insoly. in Me_2CO ; it decomps. 150°. A similar condensation with acetoarsanilic acid yields easily *o*- $\text{PhNAC}_6\text{H}_4\text{AsO}_3\text{H}_2$ (III), decomp. 150°. *o*-Arsanilic acid and *p*- $\text{C}_6\text{H}_4\text{Br}_2$ yield *o*-(*p*- $\text{BrC}_6\text{H}_4\text{NH}$) $\text{C}_6\text{H}_4\text{AsO}_3\text{H}_2$ (IV) m. 80°, and *o*-[(*p*- BrC_6H_4) $_2\text{N}$] $\text{C}_6\text{H}_4\text{AsO}_3\text{H}_2$ (V), m. 215°. *o*-Arsanilic acid condenses with *o*- $\text{BrC}_6\text{H}_4\text{CO}_2\text{H}$, yielding quant. *o*- $\text{HO}_2\text{CC}_6\text{H}_4\text{NHC}_6\text{H}_4\text{AsO}_3\text{H}_2$ (VI), decomp. 237°; with *m*- $\text{BrC}_6\text{H}_4\text{CO}_2\text{H}$, the corresponding condensation product (VII) decomp. 238°. The condensation with *p*- $\text{BrC}_6\text{H}_4\text{CO}_2\text{H}$ is more difficult but the corresponding product (VIII) is obtainable and decomp. 210°. *p*- and *m*- PhNO_2 give a 60% condensation yield; *o*-(*p*'- $\text{O}_2\text{NC}_6\text{H}_4\text{NH}$) $\text{C}_6\text{H}_4\text{AsO}_3\text{H}_2$ (IX) decomp. 245–50°, while the *m*'-compd. (X) decomp. 205–10°, the *o*'-deriv. (XI) decomp. 245°, and is obtained by heating at only 100°. By melting one of the 3 nitrodiphenylamines with H_3AsO_3 , the yield is only 10% max., and the AsO_3H_2 group goes into the *p*-position. III and concd. HNO_3 are yellow, then green; addn. of H_2SO_4 makes the color blue. IV and HNO_3 are green becoming red after H_2SO_4 addn. V becomes yellow and greenish brown, then brown by analogous treatment; its AcOH soln. becomes green with a drop of H_2SO_4 . VI and HNO_3 are brown; addn. of H_2SO_4 makes the color purple. IX is red with H_2SO_4 ; HNO_3 addn. makes the color yellow.

A. L. HENNE

Cyclic organo-metallic compounds. V. Phenoxselenine and phenoxthionine from phenoxtellurine. Selenylum and thionylum compounds. H. D. K. DREW. *J. Chem. Soc.* 1928, 511–24; cf. *C. A.* 22, 2150.—Phenoxtellurine (I) (3 g.) and 0.35 g. S, heated until reaction sets in and then boiled 10 min., give 2.1 g. phenoxthionine (II), purified by adding a few drops of Br to the CHCl_3 soln., when it m. 58° (Mauthner, *Ber.* 39, 1344 (1906), gives 60–1°). II, warmed with a slight excess of H_2O_2 in AcOH, gives the oxide (III), m. 158–9°; reduction with Zn and AcOH gives II. The prolonged action of H_2O_2 or the action of CrO_3 or KMnO_4 upon II gives the dioxide, m. 147–8°, which is very resistant to reducing agents and is not affected by hot AcOH-HCl. II in cold concd. H_2SO_4 gives a deep violet soln.; after 3 hrs., when the evolution of SO_2 is



complete, decompn. with ice gives mol. proportions of II and III; since neither of these is stable towards H_2SO_4 , they must be combined as a *thionylum compd.* in the colored soln. III in concd. H_2SO_4 gives an intensely purplish violet soln., but SO_2 was not evolved; decompn. with ice gives pure II and a brown amorphous product, m. 215–20° (decompn.), which gives a blue soln. with H_2SO_4 , which is considered to be a complex of the type IV. When III is heated with concd. H_2SO_4 0.5 hr. on the water bath, II and IV are obtained. When the soln. of III in H_2SO_4 is kept only 5 min. before de-

compn. with ice, both **II** and **III** may be isolated, although some **IV** is produced. **I** and powd. Se, boiled gently 0.5-1 hr., give a S-yellow product contg. about 2 mols. **V** and 1 mol. **I**, sepd. by transforming the **I** into its insol. di-Br compd.; *phenoxselenine* (**V**) m. 87-8° and has a faint odor of rose leaves; the halogens in CHCl_3 give halides: *dichloride*, light yellow, m. 127° (decompn.); *dibromide*, orange-red, m. 147-8° (decompn.). With H_2O_2 **V** yields a *dihydroxide*, which loses H_2O at 100° *in vacuo* over H_2SO_4 , giving the *oxide* (**VI**), m. 171-2°, transformed into the *dihydroxide* with H_2O ; both vigorously decomp. H_2O_2 . The deep olive-green soln. of **V** in concd. H_2SO_4 evolves SO_2 ; decompd. with ice after 2 hrs., the soln. gives 57.4% of the original wt. of **V** and **VI** equiv. to 41.2% of **V**; the green soln. may thus consist of triphenoxselenylium dibisulfate (**VII**) together with rather less than a mol. proportion of diphenoxselenylium dibisulfate, both probably in combination with H_2SO_4 mols. **V** (1 g.) in 6 cc. concd. H_2SO_4 , warmed 5 min., cooled and treated with 4 cc. H_2O gives Cu-red **VII** *sulfuric acid dihydrate* (**VIII**), forming a purplish black powder, m. 168°; the H_2SO_4 soln. is olive-green, becoming green on warming. **VIII** is stable in moist air for only a few hrs., being then gradually hydroxylated with loss of color. Cautious diln. of the H_2SO_4 soln. with H_2O gives crystals of **VIII** as well as dark purple crystals, which may be **VIII** deprived of the mol. of attached H_2SO_4 , or a diphenoxselenylium compd. On treatment with cold H_2O **VIII** breaks up quant. into H_2SO_4 , **V** and **VI**.

C. J. WEST

Diphenylene sulfide. CH. COURTOT, L. NICOLAS AND TCHANG HAN LIANG. *Compt. rend.* **186**, 1624-6 (1928); cf. *C. A.* **20**, 2155.—*Diphenylene sulfide* (**I**) on nitration gives *nitrodiphenylene sulfide* (**II**), m. 184°, and *diphenylene sulfinone*. *Aminodiphenylene sulfide* (**III**), m. 133°, from **II** by reduction, gives *chlorodiphenylene sulfide* (**IV**), m. 113-4°, *bromodiphenylene sulfide* (**V**), m. 125-6°, and *iododiphenylene sulfide* (**VI**), m. 87-8°, by the Sandmeyer reaction. With Br_2 in CHCl_3 **I** gives **V** and 2,7-*dibromodiphenylene sulfide* (**VII**) m. 229°. With Mg **V** and **VII** give products from which *diphenylene sulfide-carboxylic acid*, m. 255°, and *-dicarboxylic acid*, m. 320°, are obtained. With SOCl_2 **II** gives **IV**. **V** is similarly obtained. With NH_3 and CuCl **V** gives **III**. 2,7-*Diaminodiphenylene sulfide* gives **VII**, *dichlorodiphenylene sulfide*, m. 205-6°, and *diiododiphenylene sulfide*, m. 219-20°, by the Sandmeyer reaction. Nitration of **V** gives *bromonitrodiphenylene sulfide* (**VIII**), pale yellow needles, m. 264-5°, and *bromodiphenylene sulfinone*, white, m. 171-2°. Reduction of **VIII** gives *bromoaminodiphenylene sulfide* (**IX**), m. 150-1°, which gives **VII** by the Sandmeyer reaction. The absorption spectra of these compds., with the exception of the CO_2H acids, were detd. from $\lambda/2500$ to $\lambda/4300$. The presence of 1 halogen has a bathochromic and hyperchromic effect, least marked with **I**. The effect is increased with 2 halogens, most marked with **I**. The effect of OH , NH_2 and NO_2 is more marked than that of 2 halogens. The bathochromic effect increases with the unsatn. of the S in the series sulfide, sulfinone, sulfone.

PAUL J. CULHANE

Nitration of aromatic thiocyanates and selenocyanates. FREDERICK CHALLENGER AND ARNOLD T. PETERS. Univ. Manchester. *J. Chem. Soc.* **1928**, 1364-75.—In the nitration of *o*- $\text{MeC}_6\text{H}_4\text{SCN}$ the principal product is the 5- NO_2 deriv., m. 117.5-8.5°; the 2nd product is the 4- NO_2 deriv., m. 70-1°; both of these were prepd. in 80% yields through the Sandmeyer reaction. The influence of the SCN group is, therefore predominant. *Phenyl selenocyanate*, b_p 134°, b. 250° (decompn.), results in 50% yield from PhN_2X and KSeCN ; nitration gives the *p*- NO_2 deriv., with a small quantity of the *o*-deriv. Nitration of *p*- $\text{MeC}_6\text{H}_4\text{SeCN}$ gives some 2-nitro-*p*-tolueneseleninic acid, m. 151°, and, as the principal product, *di* 2-nitro-*p*-tolyl diselenide, m. 60°, also obtained by the reduction of the acid with Zn and HCl and by the action of KOH on the SeCN deriv. Nitration without oxidation occurred at -10°, the principal product being the 2- NO_2 deriv., yellow, m. 69-70°; a small quantity of the 3- NO_2 deriv., yellow, m. 150°, is also formed. *p*- $\text{ClC}_6\text{H}_4\text{SeCN}$ and HNO_3 at 3° give principally *di*-*p*-chlorophenyl diselenide with some *p*-chlorobenzeneseleninic acid. At -10° there results principally the diselenide, with a small quantity of the 2- NO_2 deriv., pale yellow, m. 127°. HNO_3 and *p*- $\text{BrC}_6\text{H}_4\text{SeCN}$ give only *p*-bromobenzeneseleninic acid, m. 113°. *p*-Dithiocyanobenzene, m. 100°, slightly volatile with steam; nitration gives a yellow NO_2 deriv., m. 143-4°. *p*-Thiocyanoselenocyanobenzene, m. 109-10°, somewhat volatile with steam. HNO_3 at 3° gives *p*-thiocyanobenzeneseleninic acid, m. 154°. *p*- $\text{NCSC}_6\text{H}_4\text{NHAc}$ and HNO_3 at 3° give 2-nitro-4-thiocyanacetanilide, yellow, m. 138-9°, and a small quantity of 2-nitro-4-thiocyananiline, orange, m. 113°. Prolonged action of HCl on the latter probably gives *di*-3-nitro-4-aminophenyl disulfide, red, m. 169°; this crysts. with Me_2CO , yellow, which loses the Me_2CO at 100°, giving the red compd. 4-Chloro-3-nitrophenyl thiocyanate, m. 63°, from the free base through the diazo reaction; 4-Br deriv., pale yellow, m. 83°; 2-nitro-4-thiocyanophenyl selenocyanate, yellow, m. 147°, gives a purple

color with EtOH-KOH. *p*-Selenocyanacetanilide, m. 206°; HNO₃ at -20° gives the 2-NO₂ deriv., yellow, m. 157°; the corresponding aniline, orange, m. 118°.

C. J. WEST

Cyclic disulfides derived from diphenyl. HARRY J. BARBER AND SAMUEL SMILES. King's College, London. *J. Chem. Soc.* 1928, 1141-9.—A diazotized soln. of 32 g. *o*-H₂NC₆H₄SO₃H (500 cc.) contg. an excess of H₂SO₄ was stirred and warmed with 42 g. KI, giving 80% of *o*-IC₆H₄SO₃Na. *Di-o*-iodophenyl disulfide, m. 133°; 2-iodophenyl Me sulfone, m. 109°, was obtained from the sulfonic acid, m. 108°, by alk. methylation. 2-Iodotoluene-5-sulfonic acid forms a Ba salt, crystg. with 1.5H₂O; the chloride, m. 61-2°; the amide, m. 135°. 4-Iodotoluene-3-sulfonic acid forms a K salt crystg. with 1H₂O; chloride, m. 68°; amide, m. 161-2°. Reduction of the chloride with HI and H₂SO₄ gives di-4-iodo-*m*-tolyl disulfide, m. 104-5°. 1-Iodonaphthalene-2-sulfonic acid forms an anhyd. Ba salt; chloride, m. 94°; sulfonic acid, m. 143°; di-1-iodo-2-naphthyl disulfide, m. 154°. 2-IC₆H₄SO₃Na, boiled with finely divided Cu and a little CuSO₄ and the residue treated with PCl₅, gives about 75% of diphenyl-2,2'-disulfonyl chloride, m. 138°; the dianilide, m. 186°. Reduction with Zn and HCl gives 50-60% of 2,2'-dithioldiphenyl, m. 78-9°. ClCH₂CO₂Na gives 2,2'-dicarboxymethylthioldiphenyl, m. 201-2°. FeCl₃ and the dithiol give almost quant. diphenylene-2,2'-disulfide, yellow, m. 113°; Cu at 250° gives dibenzothiophene; HNO₃ gives the disulfoxide, m. 128°. Diphenylene-2,2'-dithiolcarbonate, m. 101.5°. The dithiol and BzH with HCl give diphenylene-2,2'-mercaptol of BzH, m. 105-6°; the Me₂CO deriv., m. 95°; the benzil deriv., m. 198°. 4,4'-Dimethylthioldiphenyl-2,2'-disulfonyl chloride, m. 117-8°; Zn and HCl give 60% of *m*-MeC₆H₄SH, identified as *m*-tolyl *p*-nitrothiobenzoate, pale yellow, m. 96°. 3,3'-Dimethylthioldiphenyl, m. 50°. 4,4'-Dichlorodiphenyl-3,3'-disulfonyl chloride, m. 179°; 4,4'-dichloro-3,3'-dimethylthioldiphenyl, m. 130°. Diphenyl-4,4'-disulfonic acid, m. 143° (decompn.); mineral acids convert it into an amorphous material of high mol. wt. 1,1'-Dinaphthyl-2,2'-disulfonic acid, analyzed as the K salt; chloride, m. 202-3°. 1,1'-Dinaphthylene 2,2'-disulfide, m. 202°, results from Cu and the disulfide, bright yellow, m. 214°. (*o*-IC₆H₄)₂S and Cu at 180° give thianthrene. C. J. WEST

Guaiacol cacodylate. A. ANGELETTI. *Giorn. farm. chim.* 76, 165-72(1927).—Besides the compd AsMe₂OOH.HOC₆H₄OMe, which is completely decompd. in H₂O, there is a eutectic, m. 18°, contg. 87.3% of guaiacol.

B. C. A.

The strength of the bond between phenolic ethers and an ethylene bridge. H. THOMS AND F. A. HEYDEN. Univ. Berlin. *Festschrift A. Tschirch* 1926, 211-20; *Chem. Zentr.* 1927, I, 2729-30.—The strength of bond between 2 phenolic ethers which are united by an ethylene group was studied by means of eugenol Et ether. By hydrogenation with Pd on BaSO₄ as catalyst, the allyl group was converted into the Pr group of ethylenedieugenol. The hydrogenated compd., which had a pearly aspect, m. 101°. By dissolving in AcOH and adding HNO₃, a di[nitrohydroeugenol] ethylene ether, was formed, m. 167.5°. Suspended in AcOH, added to SnCl₄ in AcOH into which HCl gas was passed, warmed, NaOH added, the liberated base treated with HCl, formed the HCl salt of the amino deriv., m. 245°. It was proved that the NO₂ and the NH₂ group in each nucleus entered the *p*-position to the MeO group. Hydrogenation of the allyl group of the di[eugenol]ethylene ether with Na in EtOH gave an orange odor, a result of a partial cleavage. Cleavage is not brought about by bases in different concns., and therefore in the organism rupture of the ethylene bridge probably does not take place. It probably does take place, however, by the action of nascent H in alc. alkalies. The cleavage products included the compd. C₁₂H₁₆O₃, an ethyleneglycol-[2-methoxy-4-propyl-1-phenyl]ether, and *m*-PrC₆H₄OMe. Besides this cleavage, a partially sym. cleavage occurred, whereby *m*-PrC₆H₄OMe and (CH₂OH)₂, were formed. C. C. D.

Chloromethyl benzyl ether and benzylformal. P. CARRÉ. *Compt. rend.* 186, 1629-30(1928); cf. *C. A.* 20, 581.—Benzyl alc. (I) with HCHO and HCl gas gives chloromethyl benzyl ether, ClCH₂OCH₂Ph (II), b₁₁, 103°, decompg. on distn. at ordinary pressure, and benzylformal, (PhCH₂O)₂CH₂ (III), also obtained by heating I with III. III disproportionates on heating to 330°, giving HCHO, PhMe and BzH. P. J. C.

Isomerism of the styryl alkyl ketones. IV. 4-Hydroxy- and some derivatives of 2-hydroxystyryl alkyl ketones. ALEXANDER MCGOOKIN AND DONALD JAMES SINCLAIR. Univ. of Liverpool. *J. Chem. Soc.* 1928, 1170-7; cf. *C. A.* 20, 2833.—The green Na salt of 5,5'-dibromo-2,2'-dihydroxydistyryl ketone seps. from the red soln. of the monostyryl Me ketone in alkali; acidification gives the free ketone, bright yellow, m. 188°; this is also obtained by the usual condensation methods. The mother liquor gives a colorless form, m. 174.5°, which gives a yellow color in alkali. 2-Hydroxy-4-methoxystyryl Et ketone, m. 123°, from 2,4-HO(MeO)₂C₆H₃CHO, MeCOEt and alkali; the alk. soln. is yellow, turning orange in 5 days. The Pr homolog exists in a yellow and a colorless form, both m. 111-2°.

2-Hydroxy-3-methoxystyryl *Et* ketone, m. 86.5°; the hydrated form, pale yellow, m. 77-9°; the *Pr* homolog m. 82.5°. 3-Nitrostyryl *Me* ketone, pale yellow, m. 99-100°. 4-Hydroxystyryl *Me* ketone, pale lemon-yellow or colorless, m. 111-2°. 4,4'-Dihydroxy-distyryl ketone, yellow, m. 237-8°. 4-Hydroxystyryl *Et* ketone, yellow and colorless needles, m. 115°; *Pr* homolog, yellow or colorless, m. 90°, the yellow hydrate m. 80-3°. 2-Hydroxystyryl *iso-Pr* ketone, yellow, m. 107°, readily passing into the colorless modification, m. 107°; the *tert-Bu* homolog, m. 128°, also exists in a colored and colorless modification; the *isobutenyl* homolog, m. 141°. These ketones belong to 3 classes: those which contain the group $\text{CH}:\text{CHAc}$, whose fission products recombine in alk. soln. to form the distyryl ketones; those which contain the group $\text{CH}:\text{CHCOCH}_2\text{R}$, where R is any alkyl group, whose fission products recombine in alk. media with the formation of high-melting, unsatd. substances of undetd. nature; those represented by the 2-hydroxystyryl ketones described above, on which alkali has no action (other than solvent action) and which are not attacked by boiling concd. HCl. C. J. WEST

Action of bromine on β -phenylbenzalacetophenone. R. BARRÉ AND E. P. KOHLER. Harvard Univ. *J. Am. Chem. Soc.* 50, 2036-40 (1928) - Br and $\text{Ph}_2\text{C}:\text{CHBz}$ in CHCl_3 give a mixt. of the α -Br deriv. I, m. 88.9°, and 1,2-dibromo 1,3-diphenylindene (II), m. 104-5°; the yield of I and II depends upon the presence and the concn. of HBr, which is formed during the bromination. If the CHCl_3 soln. is refluxed immediately after the addn. of the Br, the yield of I is about 90%; if the soln. is allowed to stand at room temp. for 15 hrs., II is also formed. II also results by the action of HBr on I in glacial AcOH. I is not affected by O_3 after 2 hrs.; reduction with Zn dust gives $\text{Ph}_2\text{CHCH}_2\text{Bz}$. II and O_3 give α - $\text{C}_6\text{H}_5\text{Bz}_2$; with boiling EtOH II gives the 1-EtO deriv., m. 130-1°. C. J. WEST

Comparative stability of different isomers with respect to their absorption spectra. Transpositions in the 1-aryl-2-phenyl-2-ethyl-1-butanol series. NMR. RAMAT-LUCAS AND ANAGNOSTOPOULOS. *Compt. rend.* 186, 1626-9 (1928); cf. C. A. 22, 2712 - The 1-aryl-2-phenyl-2-ethyl-1-butanols (I), from the corresponding ketones, Na and EtOH, when passed over infusorial earth at 300-350° at reduced pressure gave 1-aryl-1-phenyl-2,2-diethylethylenes (II). At 400-450° 1-aryl-2-phenyl 1,2-diethylethylenes (III) were obtained. The hydrocarbons II obtained by dehydration and by synthetic methods had practically the same absorption spectra. The curves for the hydrocarbons III obtained by dehydration were displaced towards the visible compared with those obtained by synthesis. This was due to the preponderant formation of the stable forms of the geometric isomers at higher temps. Compds. here prepd. for the 1st time are: 1-*p*-tolyl-2-phenyl-2-ethyl-1-butanone, m. 86°, b_{18} 205° (oxime, m. 205°; semicarbazone, m. 169°); 1-anisyl-2-phenyl-2-ethyl-1-butanone, m. 56°, b_{18} 222° (oxime, m. 180°); 1-*p*-tolyl-2-phenyl-1-butanone, m. 35°, b_{11} 185° (semicarbazone, m. 161°); 1-anisyl-2-phenyl-1-butanone, m. 45°, b_{20} 215-20° (oxime, m. 154°; semicarbazone, m. 118°); 1,2-diphenyl-2-ethyl-1-butanol, b_{20} 209° (phenylurethan, m. 157°); 1-*p*-tolyl-2-phenyl-2-ethyl-1-butanol, b_{11} 205° (phenylurethan, m. 166°); 1-anisyl-2-phenyl-2-ethyl-1-butanol, b_{20} 234° (phenylurethan, m. 122°); 1,1-diphenyl-2-ethyl-1-butanol, b_{11} 186°; 3-*p*-tolyl-4-phenyl-3-hexanol, b_{18} 190°; 1,1-diphenyl-2-ethyl-1-butene, b_{11} 160°; 1-*p*-tolyl-1-phenyl-2-ethyl-1-butene, b_{11} 172°; 1-anisyl-1-phenyl-2-ethyl-1-butene, b_{11} 190°; 3,4-diphenyl-3-hexene, b_{14} 168°; 3-*p*-tolyl-4-phenyl-3-hexene, b_{11} 170°; 3-anisyl-4-phenyl-3-hexene, b_{12} 204°. PAUL J. CULIANE

Synthetic homologs of dl-ephedrine. J. F. HYDE, E. BROWNING AND ROGER ADAMS. Univ. of Ill. *J. Am. Chem. Soc.* 50, 2287-92 (1928). Substituted α -amino propiophenones were prepd. from a bromo ketone and an amine. Compds. of the type $\text{BzCHRNHMe}:\text{HCl}$, where R is (m. p. of the HCl salt given) H, 219°, Me, 176.7°, Et, 190.2°, *Pr*, 183.5-4.5°; BzCH_2NHBu , 214.5°; $\text{BzCH}(\text{NBu}_2)\text{Et}$, 138.40°; of the type $\text{BzCH}(\text{NMe})\text{NHR}$, where R is Et, 183°, *Pr*, 180°, *iso-Pr*, 213.3-5° (free base b_2 105-10°), Bu, 158.9° (free base, b_2 140.2° (some decomposition)), Am, 150°; $\text{BzCH}(\text{MeNEt}_2)$, 167-8°. Reduction of the amino ketones with Pt oxide gives about 90% of α -phenyl- β -methylamino alcs. Compds. of the type $\text{PhCH}(\text{OH})\text{CHRNHMe}$, where R is (m. p. of base and HCl salt given) H, 75.6°, 105.6°; Me, 76.7°, 189-90°; Et, 89-90°, 201-2°, *Pr*, 76.7°, 224-5°; $\text{PhCH}(\text{OH})\text{CH}_2\text{NHBu}$, 58.9°, 218.20°; $\text{PhCH}(\text{OH})\text{CH}(\text{NBu}_2)\text{Et}$, —, 114.6°; compds. of the type $\text{PhCH}(\text{OH})\text{CHMeNHR}$, where R is (m. p. of HCl salt given) Et, 190.1°, *Pr*, 218°, *iso-Pr*, 193°, Bu, 220-1°, Am, 219°; $\text{PhCH}(\text{OH})\text{CHMeNEt}_2$, 205.6°. Blood sugar is increased as the alkyl group on the N is made larger; it is decreased as the alkyl group on the β -C is increased in size; the ketones showed a similar action; the dialkylamino compds. produced no physiol. action. The only homolog which gave a dependable increase in blood sugar was $\text{PhCH}(\text{OH})\text{CHNHMe}$. C. J. WEST

Tautomerism of the α -diketones. The constitution of the two forms of methylbenzylglyoxal. HENRI MOUREU. *Compt. rend.* **186**, 503-5 (1928); cf. *C. A.* **22**, 1341.—Two forms, *A* and *B*, of methylbenzylglyoxal are known. *B* oxidizes in the air, is sol. in alk. solns., gives instantaneously a brown salt with FeCl_3 , a cryst. salt, m. 184-5°, with SbCl_5 , a *Bz* deriv., m. 82-3°, fixes 2 atoms Br in the cold and evolves a gas with the Grignard reagents; *A* does not add Br, reacts only very slowly with SbCl_5 or FeCl_3 , evolves but little gas with a Grignard reagent. The formula $\text{PhCH}_2\text{COCOMe}$ is proposed for *A*, while *B* should be $\text{PhCH} \cdot \text{C(OH)COMe}$.

A. L. HENNE

The action of sulfuric acid on aromatic acids. Sulfo-aromatic acids. JEAN B. SENDERENS AND JEAN ABOULENC. *Compt. rend.* **186**, 1497 9 (1928).—*m*-Sulfobenzoic acid is best prepd. by heating BzOH with 4 parts of 20% fuming H_2SO_4 for 3 hrs. at 200°. Sulfo-4-*o*-phthalic acid is prepd. by heating *o*- $\text{C}_6\text{H}_4(\text{CO}_2\text{H})_2$ or its anhydride with 4 parts of 20% fuming H_2SO_4 at about 215°. The sulfonation of *o*-toluic acid is effected by heating it with 5 or 6 parts of H_2SO_4 (66° B ϵ .) for 3 or 4 hrs. at 150-160°. $\text{PhCH}_2\text{CO}_2\text{H}$ and $\text{PhCH}:\text{CHCO}_2\text{H}$ cannot be sulfonated by 66° B ϵ . H_2SO_4 . Sulfohydrocinnamic acid is obtained by treating $\text{PhCH}_2\text{CH}_2\text{CO}_2\text{H}$ with 8 parts of 20% fuming H_2SO_4 .

REYNOLD C. FUSON

Thyroxine. II. H. BAGGESGAARD-RASMUSSEN. *Dansk Tids. Farm.* **2**, No. 3 66-9 (1928); cf. *C. A.* **22**, 968. -B-R. has already suggested the constitution of thy-

roxine to be $\text{HO} \begin{array}{c} \text{I} \\ \diagup \quad \diagdown \\ \text{C} \quad \text{C} \\ \diagdown \quad \diagup \\ \text{I} \end{array} \text{O} \begin{array}{c} \text{I} \\ \diagup \quad \diagdown \\ \text{C} \quad \text{C} \\ \diagdown \quad \diagup \\ \text{I} \end{array} \text{CH}_2\text{CH}(\text{NH}_2)\text{CO}_2\text{H}$. The reason for this as-

sumption was that this compd. gives reactions characteristic of diiodo-substituted phenols where the I atoms are in the *o* position to the OH group, also that on fusing with an alkali pyrogallol is formed. Further proof for the correctness of this formula was obtained through the method of synthesis, which was as follows: *p*-nitroaniline $\rightarrow \text{I}_2(\text{H}_2\text{N})\text{C}_6\text{H}_4\text{NO}_2$, which, diazotized and treated with KI in acid, $\rightarrow \text{I}_3\text{C}_6\text{H}_4\text{NO}_2$ and condensed with *p*- $\text{MeOC}_6\text{H}_4\text{OH} \rightarrow \text{MeOC}_6\text{H}_4\text{OC}_6\text{H}_4\text{I}_2\text{NO}_2 + \text{HI}$. In this compd. the NO_2 group is changed to CHO and then condensed with hippuric acid as follows:

$\text{RNO}_2 \xrightarrow{\text{SnCl}_2} \text{RNH}_2 \xrightarrow{\text{Diazotize}} \text{RN}_2\text{Cl} \xrightarrow{\text{CuCN}} \text{RCN} \xrightarrow{\text{Reduce}} \text{RCHNH} \xrightarrow{\text{H}_2\text{O}} \text{RCHO}$.
 $\text{MeOC}_6\text{H}_4\text{OC}_6\text{H}_4\text{I}_2\text{CH} \xrightarrow{[\text{O} + \text{H}]} \text{C}(\text{NHOCPh})\text{CO}_2\text{H} \rightarrow \text{MeOC}_6\text{H}_4\text{OC}_6\text{H}_4\text{I}_2\text{CH} \cdot \text{C}(\text{NHOCPh})\text{CO}_2\text{H}$. By boiling with HI and red P, this is changed into $\text{HOCC}_6\text{H}_4\text{OC}_6\text{H}_4\text{I}_2\text{CH}_2\text{CH}(\text{NH}_2)\text{CO}_2\text{H}$. The 1st C_6H_5 group readily takes up 2 atoms I, proving the formula for thyroxine as given above.

O. A. NELSON

Synthesis of certain iodoalkoxy acids and the mechanism of the reactions by which they are formed. ERNEST L. JACKSON AND L. PASIUT. Western Reserve Univ. *J. Am. Chem. Soc.* **50**, 2249-60 (1928).— $\text{PhCHClCHICO}_2\text{H}$ (I) reacts with MeOH, PrOH, iso-PrOH, BuOH and tert-BuOH to yield the corresponding α -iodo- β -alkoxyphenylpropionic acids. A more suitable method for the prepn. of the iodoalkoxy acids was found to be the reaction of ICl with $\text{PhCH} \cdot \text{CHCO}_2\text{H}$ and the appropriate alc. This reaction has been applied to the above alcs. By the reaction of $\text{MeCH}:\text{CHCO}_2\text{H}$, ICl and MeOH, $\text{MeCH}(\text{OMe})\text{CHICO}_2\text{H}$ is formed. The $\text{PhCH}(\text{OMe})\text{CHICO}_2\text{H}$ and the corresponding EtO derivs. were also prepd. by reaction of Cl with solns. of $\text{PhCH} \cdot \text{CHCO}_2\text{H}$ and I or an alkali chloride, in the appropriate alc. That a β -lactone is not an intermediate compd. in the formation of the iodoalkoxy acids from I is shown by the prepn. of the $\text{PhCH}(\text{OMe})\text{CHICO}_2\text{Me}$ through the reaction of MeOH with the Me ester of I. Also the iodoalkoxy acids are not formed by the elimination of HCl from I followed by the addn. of the alcs. to the double linkage thus produced, since MeOH reacts with $\text{PhCHClCMeICO}_2\text{H}$ to give the β -MeO deriv. The iodoalkoxy acids are produced either by the direct replacement of the Cl atom by the alkoxy groups, or by the disson. of ICl from the mol., followed by its reaction with the alcs. to produce the hypiodites, which then add to the double linkage of the unsatd. acid. Facts supporting the latter mechanism have been submitted. The following derivs. of $\text{PhCH}_2\text{CHICO}_2\text{H}$ were prepd.: β -MeO, m. 168-9° (*Me ester*, m. 68-9°); α -methyl- β -methoxy, m. 169-70°; β -EtO, m. 137-8°; β -PrO, m. 110-1°; β -iso-PrO, m. 113-4°; β -BuO, m. 93-4°; β -iso-BuO, m. 89-90°; β -tert-BuO, m. 113-4°; iodomethoxybutyric acid, m. 83-4°.

C. J. WEST

The effect of nitrosulfuric acid on the ethyl ester of *p*-nitrocinnamic acid. G. GUASTALLA. *Atti accad. sci. Torino* **63**, 128-32 (1928).—G. found in trying further to nitrate the Et ester of *p*-nitrocinnamic acid "A" that an oxidation product, $p\text{-O}_2\text{NC}_6\text{H}_4\text{CHO}$, was formed instead. "A" was made by the action of fuming HNO_3 on $\text{PhCH}:$

CHCO_2Et at $25-30^\circ$ and dilg. with H_2O when a mixt. of the *o*- and *p*-compds. seps. The *p*-compd. may be isolated by dissolving the product from 60 cc. of $\text{PhCH}:\text{CHCO}_2\text{Et}$ in 400 cc. EtOH , boiling and allowing to cool, giving *p*-nitrocinnamic ester "B," b. 135° . Ten g. "B" was treated with 40 g. of 92% H_2SO_4 and 20 g. of 98% HNO_3 below 25° , cooled, dild. and allowed to stand 6-7 days, when the oil solidified; it b. $50-100^\circ$, and has the odor of bitter almonds. That it was *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$ was proved through the phenylhydrazone (N 17.3%), the α - $\text{C}_{10}\text{H}_7\text{NH}_2$ deriv. (N 9.5%), and the semicarbazone (N 26.7%).

A. W. CONTI†

New synthesis of tropic acid. MARC CHAMBER. *Compt. rend.* 186, 1630-1 (1928).—Tropic acid (I), m. 118° , is obtained in 50+ % yield from the condensation of $\text{PhCHBrCO}_2\text{Et}$, Zn dust and trioxymethylene in C_6H_6 to $\text{BrZnOCH}_2\text{CHPhCO}_2\text{Et}$. This decompd. with H_2O gives *Et tropate*, which on sapon. and crystn. from benzene and then from H_2O gives I.

PAUL J. CULHANE†

Constituents of Myoporium laetum, Forst. (The "ngaio"). III. The oxide rings of ngaione. FREDERICK HENRY McDOWALL Univ. College, London. *J. Chem. Soc.* 1928, 1324-31; cf. C. A. 21, 2263. —Ngaioi is unchanged after heating with 4 parts H_2O 10 hrs. at 250° . Catalytic reduction (Pt black) of ngaioi gives the *oxido-glycol*, $\text{C}_{15}\text{H}_{28}\text{O}(\text{OH})_2$, d_{20}^{20} 0.966, n_D^{20} 1.4664, slightly yellow oil, which gives a jade-green color with vanillin and HCl . Distn. of the product at 0.5 mm. ($160-80^\circ$) gives a compd. with d_{20}^{20} 0.9312, n_D^{20} 1.4707, H_2O being lost in the process. Tetrahydrongaione dioxide and HCl in AcOH give the compd. $\text{C}_{15}\text{H}_{28}\text{OClOAc}$, dark oil which does not solidify at -20° ; the Cl is lost by successive treatments with Zn and 80% EtOH and Zn and AcOH at 100° ; the product is a mixt. of acetates, formed by the opening of 1 oxide ring. HI and tetrahydrongaioi give a dark brown, unstable oil, $\text{C}_{15}\text{H}_{28}\text{I}_2(\text{OAc})_2$ (I); with Zn and 80% EtOH there results a compd., $\text{C}_{15}\text{H}_{28}\text{O}(\text{OAc})_2$, b_{22} $168-72^\circ$, d_{20}^{20} 0.868, n_D^{20} 1.4442, and a 2nd product, b_{22} above 172° , n_D^{20} 1.4488; hydrolysis with EtOH-KOH gives a mixt. of unsatd. hydrocarbons and monohydric alcs. One fraction b_{22} $166-73^\circ$, d_{20}^{20} 0.845, n_D^{20} 1.4524. In 1 expt., there was obtained the compd. $\text{C}_{15}\text{H}_{28}\text{O}(\text{OH})_2$, b_{22} $200-15^\circ$, n_D^{20} 1.4655. Reduction of I with Pd-HaSO_4 and H gives an I free product which, on hydrolysis, gives 2 fractions, b_{22} $155-65^\circ$ and $165-70^\circ$, a 3rd fraction, b_{22} $170-80^\circ$, d_{20}^{20} 0.904, n_D^{20} 1.4735, and a 4th, b_{22} $180-95^\circ$, d_{20}^{20} 0.924, n_D^{20} 1.4754. Reduction of I with Zn and EtOH , the resulting acetates distd. and catalytically reduced, gives the alc., $\text{C}_{15}\text{H}_{28}\text{OH}$, b_{22} $168-72^\circ$, d_{20}^{20} 0.841, n_D^{20} 1.4474; it did not absorb Br and only slowly decolorized dil. KMnO_4 in the cold. With PCl_5 followed by reduction with Zn and alc., and with Na and EtOH , there results a *paraffin*, $\text{C}_{15}\text{H}_{32}$, b_{22} $140-5^\circ$, d_{20}^{20} 0.796, n_D^{20} 1.4431; the product contained 2.3% O. Tetrahydrongaione and III in glacial AcOH give $\text{C}_{15}\text{H}_{28}\text{OI}(\text{OAc})$, yellowish oil; reduction with Zn and hydrolysis give 3 fractions, b_{22} $150-70^\circ$, $170-95^\circ$, 195° , n_D^{20} 1.4484, 1.4529, 1.4640, unsatd. and yielded semicarbazones and are therefore keto alcs. Reduction of tetrahydrongaioi with HI and red P gives a compd., $\text{C}_{15}\text{H}_{28}\text{OI}_2$ or $\text{C}_{15}\text{H}_{28}\text{OI}$; heating the alc. with HI for 20 hrs. and reduction with Zn and alc. gives a mixt. of hydrocarbon and alc., b. $220-50^\circ$. An isomer of ngaioi b_{22} $188-90^\circ$, d_{20}^{20} 1.013, n_D^{20} 1.4794. A fraction b_{22} $160-70^\circ$, d_{20}^{20} 0.9485, n_D^{20} 1.4894, analyzes for $\text{C}_{15}\text{H}_{28}\text{O}$, is probably a mixt. of mono- and dicyclic oxides. C. J. WEST

Formation of 3-*p*-menthone and 3-*p*-menthol from Δ^3 -*p*-menthene. A. KÖRZ and G. BUSCH. Univ. Göttingen. *J. prakt. Chem.* 119, 1-42 (1928).—Treatment of 8-*p*-menthanol with KHSO_4 at 200° gives Δ^3 -*p*-menthene, which when heated with Cl_2 - CCl_2H yields 4-*p*-menthanol. Consecutive treatment of Δ^3 -*p*-menthene with BzO_2H at -18° , EtONa at -10° and H_2SO_4 at -7° affords *p*-menthene oxide (I), b_{11} $70-5^\circ$, d_{14} 0.8989, $[\alpha]_D^{25}$ $45-40^\circ$, n_D^{25} 1.44809, reduced catalytically to *p*-menthane. Hot MeOH , PrOH , BuOH - and AmOH-HCl convert I into 3-*p*-menthone, while the action of HOCl is to form an impure *menthene chlorohydrin* (*chloromenthol*). It was not possible to esterify chloromenthol and oxidation expts. did not yield a ketone, thus indicating a *tert*. HO group, *i. e.*, 1 in position 4. Reduction with H and Pd black and dil. EtOH gives some 3-*p*-menthol (*H phthalate*, m. $98-100^\circ$). Most of the reduction expts. described give halogen-free products, although, in a medium of AcOH and AcONa , a Cl -contg. fraction b_{11} $72-93^\circ$ was obtained which, when treated with moist Ag_2O , yielded a product, b. 200° , with a strong menthol odor (*neomenthol*?). When chloromenthol is boiled for 3 hrs., HCl and I are produced, while heating with MeOH and PrOH and 3-*p*-menthol under pressure at $120-200^\circ$ affords 3-*p*-menthone (40-85%). Reduction of chloromenthol with Zn dust and AcOH gives 3-*p*-menthone and the action of AcCl and $\text{C}_6\text{H}_5\text{N}$ is to form *chloromenthene*, b_{11} $92-8^\circ$, d_{11} 0.9726 (89%). Δ^3 -*p*-Menthene with

PCl_5 yields a small quantity of chloromenthene, which when treated with an excess of Ag_2O or 50% KOH furnishes 3-*p*-menthone. Reduction of 2-chlorocyclohexanol with Na and EtOH gives 2-ethoxycyclohexanol (87%), b_D^{20} 82–90°, while similar treatment of chloromenthol gives *p*-menthene oxide (74%).

C. J. WEST

Optical activity and the polarity of substituent groups. VIII. Growing-chain effects and the *o*-effect in benzoic esters. H. GORDON RULE, WM. HAY and JACK PAUL. Univ. Edinburgh. *J. Chem. Soc.* 1928, 1347–61; cf. *C. A.* 22, 1342.—The rotatory powers of a no. of the homologous menthyl alkoxyacetates and menthyl H dicarboxylates have been investigated. The max. in the rotation curves of the 1 series correspond to minima in the other. This indicates that the terminal alkoxy and CO_2H groups of the growing chains produce opposite changes in rotatory power when they return to the neighborhood of the asym. atom. Similar effects are noted in the influence of substituents on the acidity of geometrically isomeric acids. Hence it is concluded that the characteristic influence of *o*-substituents in the optically active benzoic esters is propagated through space. The rotatory powers of the menthyl H dicarboxylates exhibit pronounced alternation, both in the homogeneous state and in soln. This alternation disappears in the Na salts. It is suggested that the alternation is a superimposed sec. effect due to assocn. of the ester-acids through the medium of the CO_2H group. *l*-Menthyl propoxyacetate, b_D^{20} 161°, d_4^{24} 0.9448, $[\alpha]_{5461}^{18}$ 69.44°. *Butoxyacetic acid*, b_D^{20} 115–6°, in 84% yield from 75 g. BuOH , 8 g. Na and 36 g. $\text{ClCH}_2\text{CO}_2\text{Na}$; *chloride*, b_D^{20} 108–10°; *l*-menthyl ester, b_D^{20} 172 5°, d_4^{20} 0.9397, $[\alpha]_{5461}^{20.6}$ 65.83°. *Amyloxyacetic acid*, b_D^{20} 134° (77% yield); *chloride*, b_D^{20} 103°; *l*-menthyl ester, b_D^{20} 148°, $d_4^{20.6}$ 0.9340, $[\alpha]_{5461}^{21.5}$ 61.99°. *Hexyloxyacetic acid*, b_D^{20} 143–4°; *chloride*, b_D^{20} 106–8°; *l*-menthyl ester, b_D^{20} 187°, $d_4^{24.3}$ 0.9270, $[\alpha]_{5461}^{21}$ 58.25°. *Heptyloxyacetic acid*, $m.$ 7.5–8.5°, b_D^{20} 156°; *chloride*, b_D^{20} 116°; *l*-menthyl ester, b_D^{20} 200°, d_4^{24} 0.9221, $[\alpha]_{5461}^{23}$ 55.11°. *Octyloxyacetic acid*, $m.$ 12.5–13.5°, b_D^{20} 166° (68% yield); *chloride*, b_D^{20} 125–6°; *l*-menthyl ester, b_D^{20} 183°, d_4^{28} 0.9214, $[\alpha]_{5461}^{17.8}$ 52.09°. The *l*-menthyl H esters of the satd. di- CO_2H acids were prepd. by the half hydrolysis of the di-ester by EtONa . *l*-Menthyl H glutarate, d_4^{21} 1.0318, $[\alpha]_{5461}^{21}$ 36.63°; *adipate*, d_4^{20} 1.0252, $[\alpha]_{5461}^{20}$ 33.47°; *trimellate*, d_4^{19} 1.0141, $[\alpha]_{5461}^{19}$ 31.73; *suberate*, $d_4^{19.2}$ 1.0049, $[\alpha]_{5461}^{19.2}$ 29.45; *azelate*, d_4^{20} 0.9952, $[\alpha]_{5461}^{20}$ 28.63°; *sebacate*, d_4^{20} 0.9923, $[\alpha]_{5461}^{20}$ 27.37°. Values for d and α are given for several temps. and wave lengths and in the case of the di- CO_2H esters for solns. in CHCl_3 , EtOH and C_6H_6 and for the Na salt in H_2O and EtOH .

C. J. WEST

Crystalline dihalogen derivatives of pinene. GEORGES BRUS. *Compt. rend.* 186, 87–9(1928).—From Cl and pinene, $[\alpha]_D^{25.6}$ Aschan (*C. A.* 14, 3751) obtained 2.6% of an orthorhombic bipyramidal dichloride (I), $m.$ 173–4°, $a:b:c = 0.8587:1:1.9320$. From Cl and pure pinene, $[\alpha]_D^{48}$ 1°, B. obtained 15% of a different dichloride (II), monoclinic, $m.$ 170–1°, $a:b:c = 1.337:1:1.384$. Addn. of Br to pinene yielded bornyl bromide, $m.$ 94°, liquid products and a cryst. dibromide, $\text{C}_{10}\text{H}_{16}\text{Br}_2$ (III), $m.$ 169–70°, which with Zn and EtOH yielded tricyclene. The cryst. dibromide of Pariselle (*C. A.* 15, 3287) was not obtained. III has hexagonal crystals with faces $p(001)$, $m(100)$ predominant. The clearest of numerous pyramidal faces are b^1 and b^2 . $\frac{c}{a} = 2.00$.

Angle between normals: pb^1 80.5°; pb^2 63.5°. Since III is not isomorphous with I or II, no conclusion can be drawn as to the constitution of I or II by comparison with III.

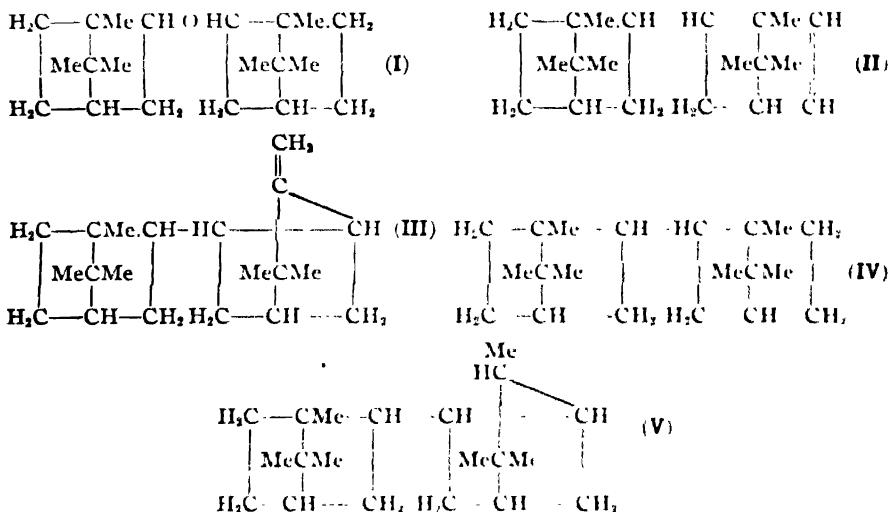
MARGARET W. MCPHERSON

The ultra-violet absorption curves of pulegone and isopulegone. JEAN SAVARD. Univ. Zurich. *Bull. soc. chim.* 43, 524–9(1928).—S. has detd. the ultra-violet absorption curves for pulegone (I) and isopulegone (II), finding I to have a max. at $1/\lambda = 41,254$ corresponding to the C:C group and at 30,664 for the C:C.CO group. II not having this latter group does not show the band, but as with I, it has a max. for the C:C at 41,237. In mixts. of I and II the band for C:C is const. and that for C:C.CO moves toward the violet and disappears at 20% of I. The curves for pure I and pure II intersect in 2 points, through which all of the curves for the mixts. also pass. The curve for pulegone from distn. of pennyroyal (III) follows that of a mixt. (IV) of 85% of I and 15% of II, of which it has been proved to consist, up to the 2nd intersection ($1/\lambda = 36,300$) but from there on going to a max. at 41,152 whereas IV goes to a max. of 41,254. If III is shaken with KOH , its absorption becomes exactly that of the mixt. IV, hence enolization is suggested to explain the variation.

A. S. CARTER

The dehydration of borneol. TETSUAKU IKEDA. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 7, 48–61(1928).—Three hundred g. of *d*-borneol is refluxed with 150

g. ZnCl_2 in C_6H_6 during 3 hrs. The products obtained are a little camphene and 20% of resinous non-volatile matter, 60% of which crystd. out at room temp., leaving a liquid behind. The crystals, m. $43-44^\circ$, after a purification from alc. + H_2O , b_{718} 317° , b_{10} $160-2^\circ$, n_D^{45} 1.48101, $[\alpha]_D$ 65.6° , sol. in Me_2CO , Et_2O , CHCl_3 , petroleum ether, C_6H_6 , PhMe , EtOAc , less sol. in cold MeOH or EtOH , hardly sol. in cold glacial AcOH and Ac_2O , do not react with Br , dil. KMnO_4 , Na , Ac_2O . The formula I is proposed, and the compd. has been called "bornyl ether (dibornyl ether)." I gives camphor with HNO_3 , borneol with HI , bornyl acetate with Ac_2O and H_2SO_4 ; its mol wt. detn in camphor shows that 2 mols. are associated; the correct mol. wt. is obtained in boiling Et_2O . The liquid portion was a mixt of I and unsatd. hydrocarbons. Sixty g. of borneol, 60 g. of ZnCl_2 and 50 cc. of C_6H_6 were boiled for 21 hrs.; a more important quantity of camphene was obtained, together with 32 g. of a brown liquid, of which 50% b_{10} 163° (fract. 1) and 36% b_{10} $169-74^\circ$ (fract. 2). Fraction 1 had $[\alpha]_D^{21}$ 3.2° , d_4^{30} 0.9411, n_D^{30} 1.50761 and 1 double bond for $\text{C}_{20}\text{H}_{32}$. Fraction 2 had $[\alpha]_D^{21}$ 2.7° , d_4^{30} 0.9441, n_D^{30} 1.50899 and 1 double bond per $\text{C}_{20}\text{H}_{32}$. Both are diterpenes, are sol. in Et_2O , petroleum ether, little sol. in alc. and glacial AcOH or Ac_2O , absorb Br_2 , resinify with HNO_3 . Formula II or III is proposed for fraction 1. The catalytic hydrogenation of II yields a mixt of a cryst and a liquid product, both having the formula $\text{C}_{20}\text{H}_{34}$; formula IV or V is proposed for the crystals, m. $80-4^\circ$. Fraction 2 was considered as a mixt of II and some other diterpene. It is the first time that diterpenes have been obtained from borneol.



A. I. HENNE

The formation of camphene from pinene hydrochloride. TETSUAKI IKEDA. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 7, 62-73 (1928). Pinene-HCl vapors are passed over various metallic oxides, at variable temps. and variable speeds. Camphene is formed in each case, but the majority of the oxides isomerize it and polymerize it immediately, so that the yield in camphene is small. A too high temp. and too low velocity have the same effect. A 91.2% yield of pure camphene was obtained with PbO at 250° and with BaO at 300° . The yield is somewhat less with CuO at 250° . No catalytic oxidation takes place during the reaction.

A. I. HENNE

Dynamic isomerism. XXVII. Absorption spectra of prototropic compounds. Physical properties of the stable and labile forms of benzoylcamphor. THOMAS M. LOWRY, CHARLES A. H. MACCONKEY AND HENRY BURGESS. Univ. of Cambridge. *J. Chem. Soc.* 1928, 1333-47, cf. C. A. 22, 723. Exact details are given for the prepn. of the 2 forms of benzoylcamphor; the following phys. properties are reported; the order is enol, ketone, equil. mixt., equil. proportion of enol. m. p., 89.5° , 112° , 84° , ---; α_{D}^{20} in EtOH , 331° , 152° , 258° , 10% ; in Me_2CO , 339° , 145° , 248° , 53% ; in C_6H_6 , 315° , 50° , 257° , 78% ; $\alpha_{\text{D}}^{20}/\alpha_{\text{D}}^{20}$ (rotatory dispersion), 2.393, 1.555, ---; soly. (g./100 g. soln.), EtOH at 17° , 3.37, 2.95, 5.83, 58%; Me_2CO , 17° , 19.0, 19.3, 36.4, 53%;

C_6H_6 , 17° , 37.3, 16.9, 43.1, 87% (the 3rd value in this set has for the solid phase the enol). Mol. extinction coeff. in EtOH ($M/10,000$) are given. Contrary to an earlier statement "that the 2 isomeric forms of benzoylcampbor give bands at the same wave length, but of unequal intensity," it has been found that the absorption bands are of nearly the same intensity, but differ widely in wave length. The absorption of the equil. mixt. in very dil. alc. solns. corresponds closely with that of a mixt. of 2 parts of enol and 1 part of ketone. van't Hoff's relation between the solubilities of the 2 forms and their equil. concns. has been tested for solns. in EtOH, Me_2CO and C_6H_6 and found to hold good within $\pm 8\%$. The ratio of the initial and final solubilities of the enolic form indicates that the equil. mixt. in a satd. alc. soln. contains about 58% of the enol, in close agreement with the proportion, 59%, deduced from the optical rotations of the solns.

C. J. WEST

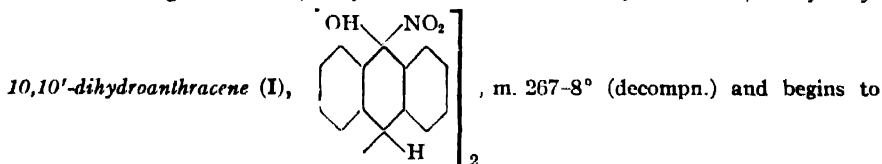
Preparation of benzophenone by means of organomagnesium derivatives. Mechanism of the reaction between the organomagnesium derivative and their carbonated derivatives. D. IVANOFF. *Compt. rend.* 186, 442-4 (1928); cf. *C. A.* 21, 3893.— Ph_2CO is prepd. in a 60% yield by treating 2 mols. of $PhMgX$ with 1 mol. of CO_2 at -20° , then shaking for 8 hrs. at 0° in a H atm. A 35% yield is obtained with $(BzO)_2Mg$ and $PhMgBr$. As it was believed that $Ph_2C(OMgX)_2$ was the intermediary product, it was treated with several acid chlorides, in order to obtain the corresponding esters $Ph_2C(OCOR)_2$ but not a trace of ester could be obtained. Conclusion: Ph_2CO is in a free state, and it has been found possible to distil it off the mixt. of $PhCO_2MgX$ and $RMgX$, before treating with H_2O . If the same mixt. is extd. in a Soxhlet app. with C_6H_6 or petroleum ether, no Ph_2CO is obtained. The intermediary compd. is $Ph_2CO \cdot xMgBr_2$. Ph_2CO is easily obtained from this compd. by treating it with an aliphatic ketone

A. L. HENNE

Photodecomposition of triphenylmethyl. SYDNEY T. BOWDEN AND WM. J. JONES. Univ. College, Cardiff. *J. Chem. Soc.* 1928, 1149-58.—This work was undertaken to ascertain whether ultra violet light is active in effecting autoxidation and reduction of Ph_3C , to det. the effective region of the visible spectrum in causing photodecompn. and to exam. the behavior of the free radical in various solvents. In ultra-violet light Ph_3C does not undergo appreciable autoxidation and reduction, either in the solid state or in soln. in C_6H_6 . The region of the visible spectrum which is most active in effecting the photodecompn. is the green-blue, viz., 5300-4000 Å. U. This corresponds to the region of greatest absorption. In yellow light Ph_3C does not undergo autoxidation and reduction. The nature of the solvent was found to exert a pronounced influence on the course of the photochem. reaction. In $PhMc$ decolorization was more rapid than in C_6H_6 ; in 1,3,5- $C_6H_3Me_3$ and m - $C_6H_4Me_2$ it was even faster; and in C_6H_4 it was most rapid of all. No perceptible loss in color was observed in SO_2 solus. The photochem. change in the solid state is of a low order.

C. J. WEST

Nitration of anthracene to bisnitrohydroanthranol (9,9'-dinitro-9,9'-dihydroxy-10,10'-dihydroanthracene). J. S. TURSKI AND A. BERLANDSTEIN. *Roczniki Chem.* 7, 457-66 (1927). —To a homogeneous mixt. of 50 g. com. pure (98%) distd. and dried anthracene in 200 g. AcOH and 80 g. Ac_2O 39 g. HNO_3 (d. 1.488) was added drop by drop during 2 hrs. at $7-8^\circ$. After 4 hrs.' stirring and 2 days' standing at room temp. the mixt. was heated to $50-5^\circ$, filtered, the deep yellow compd. sepd. from anthracene by cautious treatment with glacial AcOH, recrystd. and dried at 120° . 9,9'-Dinitro-9,9'-dihydroxy-



sublime 120° . The yield of the crude product, m. $240-50^\circ$, is 35 g. Anthraquinone, which is present in the crude product, may be easily removed with 70% H_2SO_4 . The pure product is sparingly sol. in org. solvents, sol. with decompn. in dil. hot NaOH. The Na salts are easily hydrolyzed. The NO_2 is not reduced by Na_2S or $SnCl_2-NaOH$ at $60-70^\circ$. The compd. burns explosively at high temp. or in contact with a flame. The mol. wt. (by b. p.) is 453-35. Oxidation with CrO_3 -AcOH yields anthraquinone quant. The meso-position of the NO_2 is thus established. Of the 2 formulas possible: that of a bisanthrol $C_{18}H_{16}N_2O_4$ and that of a bisanthrene $C_{18}H_{14}N_2O_4$, the latter is less probable because the compd. shows no fluorescence. A compd. $C_{18}H_{22}N_2O_{10}$, m. 290° and resembling I in all other properties, is obtained when the product of nitration is

heated to 50-5° after 3 hrs.' standing. It was given the provisional formula of *I dini-trate*.

MARY JACOBSEN

Tautomerism of brilliant cresyl blue. WALTER C. HOLMES. Dept. Agr., Washington, D. C. *J. Am. Chem. Soc.* **50**, 1989-93(1928).—A 0.1% soln. of brilliant cresyl blue in a *M*/15 acetate buffer soln. of 0.6 *M* NaCl content, having a *p*_H value of 3.42 is shaken with an equal vol. of CHCl₃; in this ext. most of the dye is present in its violet form. If the solid dye is dissolved in CHCl₃, the greater part of the dye is present in its blue form. The former tautomer is chemically inert whereas the latter is reactive. When the blue form is converted to the dye base and the dye regenerated the product is not the original dye but its mono-Me homolog. These facts are held to support H.'s hypothesis that the tautomerism is between structure of addn. product type and structure of NH₄ salt type.

C. J. WEST

New method for the preparation of phenolsulfonephthalein and bromosulfonephthalein. R. FREAS AND E. A. PROVINR. La. State College. *J. Am. Chem. Soc.* **50**, 2014-7(1928).—The procedure consists in heating 10 g. saccharin, 25 g. PhOH and 21 g. concd. H₂SO₄ at 120° for 48 hrs.; the yield is about 25%. AlCl₃, ZnCl₂, FeCl₃ and H₂PO₄ did not give as good results as H₂SO₄.

C. J. WEST

Mononitrobenzils and the heteronuclear dinitrobenzils. FREDERICK D. CHATTAWAY AND EDWARD A. COULSON. Queens College, Oxford. *J. Chem. Soc.* **1928**, 1080-8.—4-Nitrobenzil (I), m. 142°, is obtained in 42% yield by treating 100 g. benzoin in 500 cc. Ac₂O contg. 100 cc. concd. H₂SO₄ at -10° with 55 g. KNO₃ and oxidizing the semi-solid mass by boiling with 3 parts (by wt.) of concd. HNO₃; the Me₂CO mother liquors, on diln. with EtOH, give a mixt. of the 3- and 2-NO₂ derivs., from which the 3-NO₂ deriv. (II) was extd. with boiling EtOH; the mother liquors give the 2-NO₂ deriv. (III); the yields of the last two are about 1% each. Oxidation of I with CrO₃ in AcOH gives BzOH and *p*-O₂NC₆H₄CO₂H. I gives 2 isomeric phenylhydrazones, yellow, m. 200° (less sol. in alc.), and orange, m. 162°. The osazone, orange, m. 216°. 2-*p*-Nitrophenyl-3-phenylquinoxaline, m. 161°. Oxidation of II gives BzOH and *m*-O₂NC₆H₄CO₂H. Further nitration gives a mixt. of the 3,3'- and 3,2'-di-NO₂ derivs. III, on oxidation, gives BzOH and *o*-O₂NC₆H₄CO₂H. Further nitration gives 3,2'- and 2,2'-di-NO₂ derivs. Further nitration of I (13 g.) gives 7.4 g. 3,4'- and 1.7 g. 2,4'-di-NO₂ derivs. Benzoin (20 g.) in 60 cc. HNO₃ at 25-30° for 6 hrs. gives 4 g. 3,4'-, 0.5 g. 3,2'-, 0.2 g. 4,4'- and 0.5 g. 2,4'-dinitrobenzil. 3,4'-Dinitrobenzil exists in an unstable, deep yellow form, m. 127°, and a stable, pale yellow form, m. 137°; melting the unstable gives the stable form. The phenylhydrazone, orange, m. 182°; the osazone, orange-red, m. 287° (decompn.); 2-*m*-nitrophenyl-3-*p*-nitrophenylquinoxaline, m. 221°. 2,4'-Dinitrobenzil, pale yellow, m. 135°, it is phototropic and turns green in the sunlight. It yields 2 isomeric phenylhydrazones, bright yellow, m. 224° and orange, m. 201°; 2-*o*-nitrophenyl-3-*p*-nitrophenylquinoxaline, m. 186°. 2,2'-Dinitrobenzil phenylhydrazone, deep yellow, m. 199°; 2,3'-di-NO₂ deriv., deep yellow, m. 193°; 2-*m*-nitrophenyl-3-*o*-nitrophenylquinoxaline, very pale yellow, m. 168°.

C. J. WEST

Di-*tert*-butyltetraphenylethane. JAMES B. CONANT AND NEWELL M. BIGELOW. Harvard Univ. *J. Am. Chem. Soc.* **50**, 2041-9(1928).—Ph₃CClCMe₃, m. 71-2°, yields with 40% Na-Hg a brick-red Na salt, which gives with CO₂ *tert*-butyldiphenylacetic acid, m. 160° (60% yield); *p*-nitrobenzyl ester, m. 77°. Treating the Na deriv. with (Me₂CClBr), gives di-*tert*-butyltetraphenylethane, m. in the air at 40-50°, in N at 138-41°; after 12-18 hrs. in the air it becomes a sticky, brown mass. A 0.05 mol. soln. in PhBr absorbs O₂ as follows: 2 min., 70%; 5 min., 100%; 8 min., 122%; 25 min., 126%; 20 hrs., 165%. The ethane was cleaved by K-Na in Et₂O and C₆H₆ and by 40% Na-Hg in the same solvents. On heating a 0.05 mol. soln. in BzOEt, a reversible color change indicative of disson appears. On heating for a few min. in soln. at 100°, in the absence of air, it disproportionates completely. These results show that the effect of the *tert*-alkyl group in promoting the disson of the C linkage is similar to the effect of the *sec*-groups studied in the dixanthyl series. Ph₃CClCMe₃, shaken in Et₂O with 2 g. Na-K for 24 hrs., gives the isomeric ethane, m. 145°; this did not react with O₂ or with Na-K after shaking 12 hrs. in Et₂O. The isomeric chloride or Ph₃CCMeCMe₃:CH₃ yields a dark red K salt, which is not identical with the metallic deriv. above, since with CO₂ it yields an acid, C₁₈H₂₀O₂, m. 218-24° (decompn.), whose *p*-nitrobenzyl ester was an amorphous yellow powder. Decompn. of the K salt with (Me₂CClBr), gives an oil, which did not absorb O₂ in PhBr soln.; with CO₂ the acid, m. 218-24°, was obtained.

C. J. WEST

Molecular dissymmetry dependent on restriction of rotation about a single bond. Optically active benzenesulfonyl-8-nitro-1-naphthylglycine. WM. HOBSON MILLS AND KENNETH ALLAN CALDWELL ELLIOTT. Univ. of Cambridge. *J. Chem. Soc.* **1928**,

1291–1302.—If the mol. dissymmetry of certain diphenic acids is due to obstruction of the rotation of the $2C_6H_5$ nuclei of the diphenyl mol. about a common axis by substituent groups in the 6- and 6'-positions, it should be possible to obtain evidence of a similar restriction of rotation in other classes of compds. and especially among the *peri*-disubstitution derivs. of $C_{10}H_8$. This idea was tested with I. 1-Benzenesulfonylamido-8-nitronaphthalene, m. 198–9° (81% yield); the dibenzenesulfono deriv., m. 199°, is a by-product. With $BrCH_2CO_2Et$ and $EtONa$ there results 75% of *Et N-benzenesulfonyl-8-nitro-1-naphthylaminoacetate*, m. 173°; hydrolysis with dil. H_2SO_4 in $AcOH$ gives 81% of *N-benzenesulfonyl-8-nitro-1-naphthylglycine* (I), m. 214°. *Brucine l-I*, crystg. with 1 H_2O , m. 195–6°; $\alpha_{D_{40}}$ changes from -3.86° to -0.18° in 48 min. at 15.5° . The *brucine d-I*, crystg. with $3H_2O$, m. 195–6°, shows a change in $\alpha_{D_{40}}$ from 3.25° to -0.18° in 41 min. at 14.8° . *l-I* (from 0.378 g. brucine salt in $CHCl_3$) shows a change in $\alpha_{D_{40}}$ at 14.9° from -3.50° to -0.02° , while the *d-acid* at 15.3° shows a similar change from 4.19° to -0.05° , the slight final activity being due to a trace of unremoved brucine. In consequence of their ready autoracemization the brucine salts of the optically active modifications of I are evidently obtained as the result of processes of activation rather than of resolution. When equiv. quantities of brucine and *dl-I* are dissolved separately in $CHCl_3$ and the 2 solns. mixed, the initial *l*-rotation of the mixt., due to the brucine, is observed to fall gradually to an equil. value; the amt. of change depends on the temp., being greater at lower temps.; this was due to partial activation of I. *Et benzenesulfonyl-1-naphthylaminoacetate*, m. 89° (83.5% yield); *benzenesulfonyl-1-naphthylglycine*, m. 188–9° (89% yield); treatment with brucine as above gave no indication of mutarotation. C. J. WEST

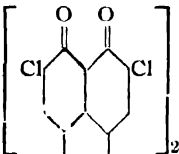
Acidic and basic catalysis of acetylation reactions. JAMES B. CONANT AND GEORGE M. BRAMANN. Harvard Univ. *J. Am. Chem. Soc.* 50, 2305–11 (1928).—Measurements are reported of the rate of acetylation of β - $C_{10}H_7OH$ by Ac_2O in glacial $AcOH$ solns. of definite H-ion activity. The rate varies nearly a million-fold and is dependent on the acidity or basicity of the medium. The max. rate is at $p_H(HOAc) -4.5$, the min. at about $p_H(HOAc) +2.0$; over this range the rate is approx. proportional to the H-ion activity. Between 2.0 and 5.0 the rate increases again, showing that the process is 1 which is subject to both acid and basic catalysis. C. J. WEST

Transformation products of anthranols and hydroxythionaphthene. F. KROLL-PFEIFFER, F. BRANSCHIED, F. THORN AND K. SCHNEIDER. Univ. Marburg. *Ann.* 462, 46–72 (1928); cf. C. A. 18, 1124.—10-Methoxy-9-anthryl Ph ketimide (I) forms a mol. complex with $PhCN$, $C_{27}H_{17}ON.HCl.PhCN$, red needles. *Ac deriv.* of I, pale yellow, m. 204–5°; HCl gives anthrone and $BzOH$. 10-Methoxy-9-anthryl *p*-tolyl ketimide, greenish yellow, m. 150° (HCl salt, yellowish red needles; *Ac deriv.*, pale yellow, m. 147°; $PhCN$ mol. compd., red); *m*-tolyl deriv., yellow, m. 127°; benzyl deriv., yellow, m. 202–3° (*Ac deriv.*, greenish yellow, m. 199–200°); *Et deriv.* HCl , pale yellow; *p*-chlorophenyl deriv. (II), pale green, m. 147–8° (*Ac deriv.*, pale yellow, m. 176–7°; $PhCN$ mol. compd., Cr_2O_3 -colored ppt.). $AcOH$ or HCl decomps. II into anthrone and *p*- $ClC_6H_4CO_2H$; cold H_2SO_4 , however, gives *p*-chlorobenzoylanthranol, pale brownish yellow, m. 206–8°; $EtOH-NaOH$ gives a deep bluish red soln., from which dil. H_2SO_4 ppt. *p*-chlorobenzoylanthranol, S-yellow. I and cold concd. H_2SO_4 give 10-hydroxy-9-anthryl Ph ketimide sulfate, red, which begins to hydrolyze during the washing with H_2O , losing N; Ac_2O gives the *di-Ac deriv.*, pale yellow, m. 206–7°. Sapon. of the ketimide gives a mixt. of benzoylanthrone, pale yellow, m. 155–7°, and benzoylanthranol, S-yellow, m. 140° (rapid heating); *Me ether*, pale green, m. 175–7° (decompn.); *Ac deriv.*, pale yellow, m. 194°. Anthranol *Me ether* (15 g.), 20 g. $AlCl_3$ and 30 cc. HCN give 15 g. 10-methoxy-9-anthracenealdehyde (III), golden, m. 165°; phenylhydrazone, yellow, m. 138–9°; oxime, yellow, m. 142–3°; the corresponding 10-*EtO deriv.*, greenish yellow, 93–4°. III with 10 parts concd. HCl yields anthrone, dianthrone, anthraquinone and HCO_2H . Anthrone (4 g.) and $CHCl_3$ with $NaOH-EtOH$ give 2.8 g. 10-hydroxyanthrylmethylene-9-anthrone (IV), dark red, and a small quantity of a compd., $C_{20}H_{16}O_3Cl_2$, pale green, m. 226–7°. *Me ether* of IV, orange, m. 221–2°. Heating IV in 5 parts $PhNO_2$ for 20 min. gives dianthrondimethemethane, m. 360°, which is reduced by Zn and $AcOH$ to IV. 3-Hydroxythionaphthene-2-aldehyde thioindogen (V) (*Ac deriv.*, yellow, m. 220°), heated with 7–8 parts $PhNO_2$, gives a bronze product, not further changed by continued heating with $PhNO_2$ and not reduced by Zn and $AcOH$. Hydroxythionaphthene (VI), HCN and HCl give 3-hydroxythionaphthene-2-aldimide, m. 145–50°, rapid heating); slowly heated to 135–55°, V is formed. 3-Methoxythionaphthene-2-aldehyde, b_p 185°, m. 84–5° (phenylhydrazone, m. 117–8°); this does not result from the methylation of the HO aldehyde, the product being 3-methoxythionaphthene-2-aldehyde-2'-thioindogen, orange, m. 218–20°. VI, $CHCl_3$ and HCl give

3-hydroxy-2,3'-dithionaphthene, m. 132-3°; soln. in H_2SO_4 , deep blue; Na salt, pale green leaflets; Me ether, m. 96-7°; 3-hydroxythionaphthenyl 2-ether, yellow, m. 198-9°.

C. J. WEST

Perylene and its derivatives. XVI. A. ZINKE, K. FUNKE AND H. IPAVIC. *Monatsh.* **48**, 741-54 (1927); cf. C. A. **20**, 1077; **21**, 1810.—Chlorination of perylene in ice-cold CCl_4 suspension affords a compd., $\text{C}_{20}\text{H}_{11}\text{Cl}_6$, m. 235° after previous darkening and sintering. Similar treatment of 3,9-dichloro- or 3,9-dibromoperylene gives, the compds. $\text{C}_{20}\text{H}_9\text{Cl}_7$ and $\text{C}_{20}\text{H}_9\text{Cl}_6\text{Br}_2$, m. 260° (decompn.) and 240° (decompn.), resp. When perylene is chlorinated in PhNO_2 at 130-40° there is formed hexachloroperylene (cf. C. A. **19**, 1568), while in presence of anhyd. AlCl_3 and PhNO_2 decachlorotetrahydroperylene, m. above 400°, is produced. This compd. is converted by fuming H_2SO_4 at 150-60° into octachlorooctahydroperylene-3,4,9,10-diquinone, m. above 400°, which when reduced with alk. $\text{Na}_2\text{S}_2\text{O}_4$ and treated with the appropriate aryl chloride affords the tetra-Bz, m. 322.5° (decompn.), and tetra-*p*-bromobenzoyle, m. 375° (decompn.), derivs. of tetrachloroperylene 3,4,9,10-diquinol. The Bz deriv is hydrolyzed and oxidized at the same time by warm concd. H_2SO_4 into tetrachloroquinone-3,4,9,10-diquinone (annexed formula), also produced from the above octachloroquinone by reduction with amalgamated Zn and HCl - AcOH . Reduction of the octachloroquinone with warm alk. $\text{Na}_2\text{S}_2\text{O}_4$ followed by atm oxidation affords a green substance (probably a quinhydrone) which when treated with cold concd. H_2SO_4 yields a dark brown substance, $\text{C}_{20}\text{H}_5\text{O}_4\text{Cl}_8$. Treatment of the octachloroquinone with boiling aniline furnishes a compd., $\text{C}_{28}\text{H}_{25}\text{O}_4\text{N}_3\text{Cl}_4$, m. 305-7° (decompn.), while distn. with Zn dust and ZnCl_2 gives perylene.



α -Furfurylamines. J. E. ZANETTI AND C. O. BECKMANN. Columbia Univ. *J. Am. Chem. Soc.* **50**, 2031-3 (1928).—The reaction of α -furfuryl bromide and $\text{EtOH}\cdot\text{NH}_3$ (satd. at 0°) for 1 week gives a mixt. of the 3 amines, sepd. by fractional distn. Difurfurylamine, b_1 102-3°; trifurfurylamine, b_1 136-8°; the colorless oils turn yellow on standing. The HCl salts, chloroplatinates, red and orange, and the chloroaurates, yellow, were prepd.

C. J. WEST

Rupture of the furan nucleus. II. R. TAKAMOTO. *J. Pharm. Soc. Japan* **48**, 366-70 (1928); cf. C. A. **21**, 3362.—Reduction of furylethylamine oxalate (m. 171-2°) which was obtained by electrolytic reduction of furylnitroethylene (C. A. **22**, 2354), with PtO_2 and H_2 gave, as a result of the rupture of the furan ring, γ -hydroxyhexylamine (I), $b_{16.3}$ 126° (yield 90.8%); chloroplatinate, m. 183-4°. I and PBr_3 gave γ -bromohexylamine-HBr (II), m. 89-90°. The free base (III) b_{22} 26-7°, b_{761} 154-5°. Picrate, m. 126-7°. Heating of III with satd. aq. KOH resulted in the closing of the 7-membered ring and gave hexamethylenimine, b_{248} 27-7.5°.

NAO UVEI

Autoxidation and the action of antioxidants. XXVII. The action of different catalysts on the autoxidation of furylethylene. CHARLES MOUREU, CHARLES DUFRAISSE AND JOHN R. JOHNSON. College of France, Paris. *Bull. soc. chim.* **43**, 586-90 (1928); cf. C. A. **21**, 2896.—The behavior of furylethylene (I) is very similar to that of styrene (II), its rate of autoxidation, however, being very much greater than that of II and even greater than that of BzH or $\text{CH}_2\text{:CHCHO}$, the O compd. so formed catalyzing polymerization. The following antioxidants are in the order of their increasing effectiveness: 0.001 β -naphthol, 0.007 phloroglucinol, 0.007 resorcinol, 0.00001 hydroquinone, 0.00035 hydroquinone, 0.007 α -naphthol, 0.0007 hydroquinone, 0.001 hydroquinone, 0.001 pyrogallol, the period of stability varying from about 1 day with 0.001 part of β -naphthol to 20 days with 0.001 part of pyrogallol. I contg. 0.001 hydroquinone became 43% nonvolatile in 3 years, whereas without the antioxidant, resinification was complete in a few days. Curves are given illustrating the oxidation rates in the presence of these and other compds.

A. S. CARTER

α -Furfuryl chloride (furyl-2-methyl chloride) and its derivatives. I. Preparation and properties of α -furfuryl chloride and a few α -furfuryl ethers. W. R. KIRNER. Rice Inst. *J. Am. Chem. Soc.* **50**, 1955-61 (1928).—Detailed directions are given for the prepn. of α -furfuryl chloride (I) from the alc., SOCl_2 and $\text{C}_4\text{H}_9\text{N}$ (63% yield); I b_{28} 49.1-9.4°, b_{28} 54.0-4.4°, d_{20}^{20} 1.1804, d_{20}^{20} 1.1783, n_D^{20} 1.4941 (Abbé). I is a relatively unstable substance but is obviously more stable than the corresponding bromide and iodide. The Cl atom possesses a high order of reactivity, comparable to that of the Cl in PhCH_2Cl . Ethers were prepd. by treating a given wt. of I in 75 cc. of dry Et_2O with 100% excess of dry KOH and 200% excess of the desired alc. Me, b_{761} 134-5°, d_4^{20} 0.1063, n_D^{20} 1.4570, 66% yield (the same order will be used below); Et, b_{770} 149.5-50.5°.

0.9844, 1.4523, 81%; Pr, b_{777} 168–70°, 0.9658, 1.4523, 79%; Bu, b_{777} 189–91°, 0.9516, 1.4522, 78%; allyl, b_{777} 173.5–4.5°, 1.0025, 1.4718, 88%; benzyl, b_1 108–9°, 1.0865, 1.5372, 83%; α -furfuryl, b_1 88–9°, 1.1405, 1.5088, 84%; cinnamyl, b_1 141–2°, 1.0802, 1.5661, 85%. C. J. WESER

Furylangelic acid. ALBERT S. CARTER. Univ. of Wisconsin. *J. Am. Chem. Soc.* **50**, 2299–305 (1928).—The so-called furylangelic acid of Baeyer (*Ber.* **10**, 1364 (1877)), which is obtained in 80% yields from furfural, PrCO_2Na and $(\text{PrCO})_2\text{O}$, m. 95.5–7° (B. gives 87–8°); O_2 gives CO_2 , EtCO_2H and possibly EtCOCO_2H , indicating that the acid is probably α -ethyl- β -furylacrylic acid; KMnO_4 oxidation gave furoic acid, AcOH and EtCO_2H . Reduction gives furylvaleric acid, b_{14} 174° (Tönnies, *Ber.* **12**, 1200 (1879)); with Br and Ag_2O this gives butyrofuronic acid, m. 149–50° (T. gives 140–2°), which should be 1-hepten-3-one-1,5-dicarboxylic acid. Reduction of this acid with HI and red P gives ethylpimelic acid and 3-heptanone-1,5-dicarboxylic acid, m. 83–4.5° (*Et ester*, b_{26} 198–200°); the latter was also obtained from furylangelic acid with HCl in EtOH, as the Et ester. C. J. WESER

Synthesis of indole derivatives. I. Synthesis of physostigmol ethyl ether. S. KIMATSU AND S. SUGASAWA. *J. Pharm. Soc. Japan* **48**, 348–55 (1928).—4- $\text{EtOC}_6\text{H}_4\text{NH}_2$ was converted into the corresponding diazonium chloride and poured into an EtOH-NaOH soln. of $\text{AcCH}_2\text{CO}_2\text{H}$ to give *Et* β -methylpyrrolacemate *p*-ethoxyphenylhydrazone (I), 4- $\text{EtOC}_6\text{H}_4\text{NHN}:\text{C}(\text{CH}_2\text{Me})\text{CO}_2\text{Et}$, orange-yellow, m. 113–4°. Boiling of I in 10% EtOH- H_2SO_4 resulted in the ring closure and gave *Et* 5-ethoxyscatole-2-carboxylate (II), m. 168–9°. The sapon. of II with 5% EtOH-NaOH gave the free acid (III), m. 184–5° (decompn.). When III was heated at 200°, CO was given off and it gave norphysostigmol *Et ether* (IV), m. 65–6°, which was purified by steam distn. and then by crystn. from EtOH. *Picrate* m. 133°. IV, Na and MeI gave physostigmol *Et ether* (V), m. 86°, also purified by steam distn. and by crystn. from EtOH. It was noted that the m. p. of IV is 20° lower than that of its *N*-Me derivs. (V). This is an unusual case in indole derivs. It was first thought that the Me group might have migrated from position 1 to 2. But the synthesis of 5-ethoxy-2,3-dimethylindole, m. 114–5°, showed this was not the case. Therefore this is one of the 2 cases where the *N*-Me compd. has a higher m. p. than the corresponding nor-compd., the other example being the 3- α -aminophenyl-1-methylindole of Kermack and Slater (*C. A.* **22**, 1355). NAO UYER

Tendency of wandering and relative firmness of union of organic radicals in the transformations of alkylated hydroxypyrazolines. K. V. AUWERS AND F. DERSCH. Univ. Marburg. *Ann.* **462**, 104–34 (1928).—This work starts from the observation of Knorr and Jochheim (*Ber.* **36**, 1275 (1903)) that by the action of concd. H_2SO_4 1-phenyl-3,4,4-trimethyl-5-hydroxypyrazoline yields 1-phenyl-3,4,5-trimethylpyrazole and extends the observations to other derivs. The following derivs. of 1-phenylpyrazol-5-one were prepd.: 3-methyl-4-propyl, m. 101–2°; 3-methyl-4-isopropyl, b_{11} 186–90°, m. 116–7°, in 6.2 g. yield from 5.7 g. $\text{AcCH}(\text{CHMe}_2)\text{CO}_2\text{Et}$ and 3.5 g. PhNHNH_2 ; 3-methyl-4-butyl, b_{12} 210°, m. 93.5–4.5°, in 9 g. yield from 18.6 g. $\text{AcCHBuCO}_2\text{Et}$ and 10 g. PhNHNH_2 ; 3,4-dimethyl-4-ethyl, b_{12} 163–5°, b_{760} 301°, m. 25.5–7.5°, in 6 g. yield from 8.6 g. $\text{AcCMeEtCO}_2\text{Et}$ and 5.4 g. PhNHNH_2 ; 3,4-dimethyl-4-propyl, b_{13} 185–9°, in 40 g. yield from 31 g. $\text{AcCMePrCO}_2\text{Et}$ and 18 g. PhNHNH_2 ; 3,4-dimethyl-4-isopropyl, m. 66–75°, from *Et methylisopropylacetacetate phenylhydrazone*, m. 111–3°; 3,4-dimethyl-4-butyl, pale yellow oil, b_{20} 205°, d_4^{20} 1.039, n_D^{20} 1.53519, n_D^{25} 1.54023, n_D^{30} 1.55339 at 16.1°, in 16 g. yield from 20 g. $\text{AcCMeBuCO}_2\text{Et}$ and 10.8 g. PhNHNH_2 ; 3,4-dimethyl-4-allyl, b_{12} 189°, $d_4^{16.7}$ 1.0708, $n_D^{16.7}$ 1.54995, n_D^{20} 1.55564, n_D^{25} 1.56978 at 16.7°; 3,4-dimethyl-4-benzyl, m. 81–2°; 3-methyl-4,4-diethyl, b_{11} 170°, m. 51–2°, in 15 g. yield from 20 g. $\text{AcCEtCO}_2\text{Et}$ and 11.6 g. PhNHNH_2 ; 3-methyl-4-ethyl-4-propyl, b_{12} 181°, in 23.5 g. yield from 25 g. $\text{AcCEtPrCO}_2\text{Et}$ and 13.5 g. PhNHNH_2 ; 3-methyl-4,4-diisopropyl, b_{13} 184° (55% yield); 3-methyl-4,4-diethyl, thick yellow oil, b_{11} 192°; 3-ethyl-4,4-dimethyl, b_{11} 177°, b_{760} 310°, in 10 g. yield from 17.2 g. *Et* α , α -dimethylpropionylacetate, b_{18} 83°, and 10.8 g. PhNHNH_2 . *Et* α -propylpropionylacetate, b_{30} 127°; α -*Et deriv.*, b_{40} 138–42°; 20.5 g. of this ester and 10 g. PhNHNH_2 give 8.5 g. of the 3,4-diethyl-4-propyl deriv., b_{40} 203–8°, $d_4^{19.5}$ 1.0352, $n_D^{19.5}$ 1.54083, n_D^{20} 1.54634, n_D^{25} 1.56018 at 19.5°. *Et* α , α -dimethylbutyrylacetate, b_{18} 99–104°; 14 g. of this ester and 8.1 g. PhNHNH_2 give 9 g. of the 3-propyl-4,4-dimethyl deriv., b_{30} 205°. *Et dibenzylacetacetate phenylhydrazone*, m. 112–3°; this could not be converted into a pyrazolone. Heating the 3-methyl-4-benzyl deriv. with PhCH_2Cl and Na gives a compd., m. 139–40°, which analyzes for the dibenzyl deriv., but its structure was not established. Reduction with Na and AmOH gives the following 1-phenyl-5-hydroxypyrazolines: 3,4-dimethyl-4-ethyl (I), m. 97–8° (0.8 g. based on 2 g. starting material); 3,4-dimethyl-4-propyl (II), m. 98° (0.7 g.);

3,4-dimethyl-4-butyl, m. 104.5-6° (1 g.); 3,4-dimethyl-4-allyl, m. 95.5-7.5°; 3,4-dimethyl-4-benzyl, m. 121°; 3-methyl-4,4-diethyl (III), m. 94-5° (0.6 g.); 3-methyl-4,4-diisopropyl (IV), m. 87-9.5° (0.4 g.); 3-ethyl-4,4-dimethyl (V), m. 78.5-9.5° (0.8 g.); 3-propyl-4,4-dimethyl (VI), m. 85-6° (0.8 g.). The following derivs. of 1-phenylpyrazole were prepd. either from the 1,3-diketone and PhNHNH₂ or by heating the corresponding pyrazolone with PBr₃ and a little yellow P: 3-methyl-4-propyl (VII), b₁₀ 155-64°; picrate, m. 111-2.5°; HgCl₂ compd., m. 180° (decompn.); HCl salt, hygroscopic, m. 84-91°; 3-methyl-4-isopropyl, b₁₀ 160-5°; picrate, light yellow, m. 100.5-1.5°; HBr salt, hygroscopic, m. 144°; 3-methyl-4-butyl, b₁₀ 170°; picrate, light yellow, m. 90-3°; 3,5-dimethyl-4-ethyl, b₁₀ 159°, m. 79-80°; picrate, m. 114.5-5°; HgCl₂ compd., m. 135-9°; 3-methyl-4,5-diethyl (VIII), b₁₀ 170°; picrate, light yellow, m. 89.5-40.5°; HgCl₂ compd., m. 142.5-3.5°; 3-methyl-4-ethyl-5-propyl, b₁₀ 175°; picrate, m. 53-65° and after standing several days or heating to 100° 84-5°; HgCl₂ compd., m. 126-7°; 3,5-dimethyl-4-propyl, b₁₀ 166°; picrate, m. 99-100°; HgCl₂ compd., m. 127.5-8.5°; 3,4-dimethyl-5-propyl, b₁₀ 190-2°, b₁₁ 160°; picrate, bright yellow, m. 75-6°; HgCl₂ compd., m. 102-4°; 3-methyl-4-propyl-5-ethyl, b₁₀ 172°; picrate, dull yellow, m. 85-7°; HgCl₂ compd., m. 136-7°; 3,5-dimethyl-4-isopropyl, b₁₀ 194°, m. 36-7°, d₄²³ 1.0208, n_D 1.55233, n_D 1.55810, n_B 1.57220 at 23.7°; picrate, citron-yellow, m. 92.5-3.5°; HgCl₂ compd., m. 128-30°; 3,5-dimethyl-4-butyl, b₁₀ 180-4°; 3,5-dimethyl-4-allyl, b₁₀ 205°, d₄²³ 1.0300, n_D 1.56332, n_H 1.56932, n_B 1.58435 at 17.4°; picrate, light yellow, m. 87-9.5°; 3,5-diethyl-4-propyl, b₁₀ 180-5°, d₄²³ 0.9930, n_D 1.53955, n_H 1.54474, n_B 1.55789 at 23.7°, from 4-propyldipropionylmethane, b₁₀ 100°, m. 160-1°; picrate, bright yellow, m. 103.5-5.5°; HgCl₂ compd., m. 102-5°. One g. III with concd. H₂SO₄ gives 0.45 g. VIII; IV gives a product from which VII was isolated as the picrate; 1 g. I gives 0.47 g. 1-phenyl-3,4-dimethyl-5-ethylpyrazole; 1 g. V gives 0.3 g. 1-phenyl-3-ethyl-4,5-dimethylpyrazole, b₁₀ 156°, b. 282° (picrate, m. 110-1°); HgCl₂ compd., m. 130.30.5°; 1-phenyl-3-methyl-4-ethyl-4-propyl-5-hydroxypyrazolone and H₂SO₄ gave in 1 expt. 1-phenyl-3-methyl-4-ethylpyrazole while in another a phenylmethyl-ethylpropylpyrazole was obtained, b. 205-7°, b₁₀ 173-5°, whose HgCl₂ compd. m. 133-5°. 1-Phenyl-3,4-diethyl 4 propyl-5-hydroxypyrazole and H₂SO₄ give IX. VI gives 1-phenyl-3-propyl-4,5-dimethylpyrazole, pale yellow, b₁₀ 180-5°, d₄²¹ 1.0120, n_D 1.54884, n_H 1.55435, n_B 1.56837 at 21.3°; picrate, light yellow, m. 72-4°; HgCl₂ compd., m. 110-1°. II gives 1-phenyl 3,4-dimethylpyrazole.

C. J. WEST

Replaceability of certain methylene groups and the relation of constitution to the stability of a C : C linkage. H. V. MOYER AND P. B. DAINS. Univ. of Kansas. *J. Am. Chem. Soc.* 50, 2293-7(1928).—4-Benzal-3-phenylisoxazolone (5 g.) and 4 g. diphenylformamidine, heated at 145° until melted and then at 120° for 45 min., give 2.5 g. 4-anilinomethylene-3-phenylisoxazolone; the piperonal, anisal-, m-nitrobenzal- and cinnamylidenephénylisoxazolones behaved similarly; furalalphenylisoxazolone gave negative results. Benzal and piperonal derivs. of 1-phenyl-3-methylpyrazolone give 4-anilinomethylenepyrazolone, m. 154°; 1,3-diphenylbenzalpyrazolone gives a similar deriv., m. 140°. 3-Hydroxy-1-phenyl-4-benzalpyrazolone, m. 275°, gives 1-phenyl-3-hydroxy-4-anilinomethylenepyrazolone, yellow, m. 272-3°; this was also obtained from the anisal deriv. 3-Phenyl- and 3-methyl-4-benzalpyrazolone do not react with diphenylformamidine. 3-Methyl-4-anilinomethylenepyrazolone, yellow, m. 204°, is obtained with difficulty. Benzal-3-phenylrhodanine, m. 192°, reacts with the formamidine to give the 5-anilinomethylene compd., m. 247°. The cinnamylidene deriv. was unaffected at temps. below 200° and above this temp., yielded only decompn. products. Benzal-di-o-tolylthiazolidone did not react after heating at 220° for 5 hrs. Benzalbenzyl cyanide, m-nitrobenzalacetylacetone and cinnamylidenacetylacetone did not react with the formamidine nor did acetyl coumarin. Benzalacetophenone gives 5% of the anil, m. 168°; p-chlorophenylimide, m. 167°; p-tolylimino deriv., m. 170°. The anil was obtained in 80% yield by heating the ketone with PhNH₂ and AcONa.

C. J. WEST

Color and chemical constitution. XXIII. Pigments of flowers. JAMES MORR. *Trans. Roy. Soc. S. Africa* 16, 121-30(1928); cf. *C. A.* 21, 2893.—M. has shown elsewhere that color is a mol. and not an at. function and that the position of an absorption band depends on the distance between 2 active positive centers in the mol.; e. g., two O, two N, an O and a N, and an O or a N and an unsatd. C atom. Eight hundred times this distance, expressed in Å. U., gives the band position. Anthocyanins show a regular gradation of shade as the anthocyanins are simplified to the parent substance by the gradual removal of hydroxyls. The greatest effects are produced by the removal of hydroxyls from positions 4' and 7. In his exptl. work M. used double oxonium chlorides with

chlorines on positions 1 and 4', although he suggests that the second HCl may be on any one of 3 pairs of unsatd. C atoms. The differences shown are claimed to be due to inactive hydroxyls, *i. e.*, those non-ionized in acid. Fifteen anthocyanidins were used and the centers of the bands range from 392 in flavylium chloride to 545 in delphinidin. M. has prepd. by Pratt and Robinson's method three new anthocyanidins without, however, giving exptl. details. *Resochrysinidin* (I), the 7-HO compd. with the band center at 435, is yellow; *protolapargonidin* (II), the 4'-HO compd., band center 438, is also yellow; *resoapigeninidin* (III), the 7,4'-(HO)₂ deriv., has its band center at 465 and is orange. The chlorides were isolated as chocolate-colored powders, insol. in ether but sol. in acid. M. believes the MeO group in other anthocyan derivs. is a mere "load" in acid soln. like the hydroxyl and has but little more effect on color. In solns. with p_H 5-6 I, II and III are apricot-orange. The central absorption is 487, 481, 489, resp. Delphinidin under these conditions gives 545 and 590. Without giving details M. indicates that he prepd. and examd. the following 2-phenylquinoline derivs.: the 7- and 4'-NH₂; 7,4'-(NH₂)₂; 5,7,4'-(NH₂)₃. The 4'-Me₂N and the 4'-HO compds. also were used. A comparison of these compds. with the corresponding O compds. indicates that the absorptions were 10 to 20% lower and that the quinoline compds. are not changed as the medium changes from acid to nearly neutral. A probable explanation of the "rise" in color in the oxonium as compared with the NH₄ type compds. is that a mutually combined configuration is possible in the former but not in the latter, *i. e.*, the pyrone O and the O of the HO group in positions 7 and 4' may be united through space or so affected that the 7- and 4'-O atoms are quinoid. Plant pigments also show a 3rd shade in definitely alk. solns. Here the hydroxyls act as positive centers and not as "loads" as they do in acid solns. The center of the absorption of II is at 538, of III at 540. Both are rose-colored. Delphinidin shows absorption centers at 690 and at 590. The compds. in this state are carbinols with a hydroxyl at 4 and ionized phenolic hydroxyls, and are not oxonium compds. Excess of alkali opens the ring at the central O and gives straight-chain compds. An elaborate table of 18 substances is given showing that gradual increases in the distance between the auxochrome and another active center in the mol., termed by M. the "hapton," here the oxonium atom, cause shifts in the center of the absorption bands, *i. e.*, give "height" to the color. Buck and Heilbron (*C. A.* 17, 2882) failed to report a strong band M. observed in the red, 675 for the 4', and 700 for the 3',4'-HO compds. of the 2-styrylbenzopyrylium series. Though having no connection with plant pigments, a table of 9 members is included showing the effect of S, O and NH in place of the ring CH:CH in otherwise similar compds.

G. ALBERT HILL

Purification of pyridine and α -picoline [2-methylpyridine] by fractional distillation. A. L. WILKIE AND B. D. SHAW. *J. Soc. Chem. Ind.* 46, 469-71T (1927).—Purification is effected by distg. the crude bases, after dehydration, through 2 fractionating columns of the Dufton type; the top portion of the 1st column and the whole of the 2nd, being encased in hot-air jackets, may be maintained at any desired temp. With 500 cc. of crude bases, after two distns., there was obtained more than 270 cc. of pure pyridine b_{760} 115.3°, d_{40}^{25} 0.9778 (cf. Heap, Jones and Speakman, *C. A.* 16, 97); the methiodide prepd. without purification from this product m. 116-7° (decompn.), while that from pyridine mixed with 5% of α -picoline softened at 100° and m. completely at 114°. α -Picoline, purified in the same manner, b_{760} 128-8.6°, d_{40}^{25} 0.9401, methiodide, m. 226-8°.

B. C. A.

Reduction of pyridine hydrochloride and pyridinium salts by means of hydrogen and platinum-oxide platinum black. XVIII. T. S. HAMILTON AND ROGER ADAMS. Univ. of Ill. *J. Am. Chem. Soc.* 50, 2260-3 (1928); cf. *C. A.* 22, 3144.—C₅H₇N in most solvents poisons Pt oxide-Pt black and no reduction takes place. C₅H₇N.HCl can be reduced readily, abs. EtOH being the best solvent, with glacial AcOH 2nd. H₂O inhibits the reduction markedly. With 0.1 mole C₅H₇N.HCl, 150 cc. solvent and 0.15 g. catalyst the reduction is complete in 6-7 hrs.; with 0.3 g. catalyst, in 1 hr.; and with 0.5 g. catalyst, in 30 min. The yield is quant. in all cases. Increase in the temp. from room to 50° decreases the time from 7 hrs. to 2 hrs. Small quantities of Fe salts and other mineral salts did not affect the reduction. Examples are given of the reduction of pyridinium and quinolinium salts. C₅H₇N gives hexahydro derivs.; C₈H₇N, tetrahydro derivs.

C. J. WESS

Dipiperidyls. C. R. SMITH. U. S. Dept. Agr. *J. Am. Chem. Soc.* 50, 1936-8 (1928).—The dipyridyls were reduced quant. to the corresponding dipiperidyls by H and Pt oxide catalysts; γ,γ -dipiperidyl, m. 172°; α,α -deriv., b. 259°; α,β -deriv., b. 269, m. 152°. β,β -deriv., b. 282°; m. 105°; β,γ -deriv., b. 270°, m. 159°; the dinitroso derivs. m. 149°, 159°, 88°, 102° and 149°; the PhNSC compds. m. 225°, 178°, 233°.

200°, 202°. The *picrate* of the β,γ -deriv. blackens at 200° but does not m. at 230°; the *chloroplatinate* turns gray at 235° but does not m. at 250°. C. J. WEST

The mercuric derivatives of isoquinoline. T. UKAI. *J. Pharm. Soc. Japan* **48**, 374-6(1928).—Isoquinoline and $\text{Hg}(\text{OAc})_2$, heated at 150-60°, gave a *compd.* $\text{C}_9\text{H}_7\text{N}\cdot\text{HgCl}$, m. 195-8°, which appears to be 8- or 5-chloromercuriisoquinoline. N. U.

Synthesis of 8-methyl-7-bromoquinoline and 8-methyl-5-bromoquinoline. T. UKAI, S. HASHIMOTO AND M. HIGASHI. *J. Pharm. Soc. Japan* **48**, 371-4(1928).—By using Skraup's synthesis on 2,6-Br(H_2N) $\text{C}_6\text{H}_3\text{Me}$ and 4,2-Br(H_2N) $\text{C}_6\text{H}_3\text{Me}$, 8-methyl-7-bromoquinoline (m. 47-8.5°; *HCl* salt, m. 223-4°; *dichromate*, decamps. 198-10°), and 8-methyl-5-bromoquinoline (m. 37-8°; *HCl* salt m. 102-3°; *dichromate*, decamps. 117-9°) were prepd. NAO UYRI

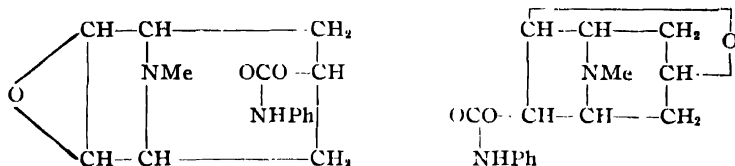
Synthetic glucosides from pyrimidine derivatives. AMANDUS HAHN AND W. LAVES. *Z. Biol.* **85**, 280-8(1926).—After 2-ethylmercapto-6-hydroxypyrimidine (12 g.) and PhNHMe (10 g.) were kept for 7 hrs. at 130-40° and the mixt. was poured into 150 cc. ether, white crystals rapidly settled out. These crystals (10 g.) were dissolved in 60 cc. boiling water, and 100 cc. of 10% AgNO_3 soln. was added; the Ag salt of 2-methyl-anilino-6-hydroxypyrimidine sepd. out immediately in amorphous flakes. To this hot mixt. 2.5% aq. NH_4OH was added slowly with stirring, thereby transforming the flakes into crystals. Further addn. gave the amorphous Ag salt of mercapto-hydroxypyrimidine (2 g.). When the filtrate was again brought to boiling and 2% NH_4OH added until neutral to litmus, the Ag salt of 2-methyl-anilino-6-hydroxypyrimidine sepd. out in amorphous form. The ppt. was pressed as dry as possible, washed in 200 cc. alc. and dried at 70°. This salt (24 g.) was dissolved in a xylene soln. of acetobromoglucose (32 g.) by heating at 155° in an oil bath. The AgBr which sepd. was filtered off and the residue treated with steam *in vacuo*. The residue after steam distn. was taken up with alc. On cooling the tetraacetyl-d-glucoside of 2-methyl-anilino-6-hydroxypyrimidine sepd. as beautiful crystals (m. 145°, *l*-rotatory, does not reduce Fehling soln.) Similar reactions gave 2-methyl-anilino-5-methyl-6-hydroxypyrimidine and 2-ethylmercapto-6-hydroxypyrimidine. F. K.

Azoxines. V. HENRI GOLDSTEIN AND ALFRED WARNÉRY. *Helv. Chim. Acta* **11**, 489-95(1928); cf. *C. A.* **22**, 1777. Turpin (*J. Chem. Soc.* **59**, 714(1891)) found that picryl chloride (I) reacts with $\alpha\text{-H}\cdot\text{N}\cdot\text{C}_6\text{H}_4\text{OH}$ in the presence of alkali to give picryl- α -aminophenol. This reaction has been applied by G. and W. to the naphthophenazoxine series. 1,2- $\text{C}_{10}\text{H}_6(\text{NH}_2)\text{OH}$ reacts with I in the presence of KOH to give 1,3-dinitro- α -naphthophenazoxime (II), m. 279°, sol. in C_6H_6 and glacial AcOH with reddish brown color, with KOH gives a violet-blue soln., H_2SO_4 blue. II on reduction with SnCl_2 and oxidation with FeCl_3 gives the base 1-amino- α -naphthophenazoxime (III). On treating the perchlorate of III with Ac_2O (anhyd. ZnCl_2 used as catalyst) the 1-acetamido- α -naphthophenazoxime is formed; the perchlorate is violet with bronze reflection. 1,3-Dinitro- β -naphthophenazoxime and its deriv. 1-amino- β -naphthophenazoxime are prepd. similarly to the α -derivs. II and III. 2,3- $\text{C}_{10}\text{H}_6(\text{NH}_2)\text{OH}$ with I gives 2',4',6'-trinitro-phenyl-2-amino-3-naphthol, m. 205°, orange; in presence of alkali, lin-1,3-dinitronaphthophenazoxime (IV), m. 313°, brick-red, with alc. KOH violet. On reduction IV gives lin-1-aminonaphthophenazoxime (V); the perchlorate in concd. H_2SO_4 gives a bluish violet changing to red, orange, and finally brownish yellow as the soln. is dild. with H_2O . On treating V with Ac_2O and ZnCl_2 , 1-acetamidonaphthophenazoxime is formed. 2,3- $\text{C}_{10}\text{H}_6(\text{NH}_2)\text{OH}$ heated with the *p*- $\text{Me}\cdot\text{C}_6\text{H}_4\text{SO}_3\text{H}$ ester of 2,4,1- $\text{C}_{10}\text{H}_6(\text{NO}_2)_3\text{OH}$ (Ullmann and Bruck, *C. A.* **3**, 435) gives [2',4'-dinitro-1'-naphthyl]-2-amino-3-naphthol, m. 205°, orange. G. and W. have been unsuccessful in their attempts to eliminate HNO_2 from this substance. HELEN COLLINS

Alkaloids of *Ouorparia rhynchophylla* Matsum. H. KONDO, T. FUKUDA AND M. TOMITA. *J. Pharm. Soc. Japan* **48**, 321-37(1928).—From the tendrils and stems of *Ouorparia rhynchophylla*, Matsum, a new alkaloid *rhynchophylline* (I) has been isolated. It has the compn. $\text{C}_{22}\text{H}_{24}\text{N}_2\text{O}_4$, m. 216°, $[\alpha]_D^{25}$ -14.7° (CHCl_3). *Chloroaurate*, m. 134°, decamps. 155°. *Chloroplatinate*, decamps. 238°. It contains 2 MeO, 1 NH group and 1 tertiary N. Sapon. of I with EtOH-KOH gives an acid, decomp. 245° (sinters at 180°). The structure of I can best be expressed by $\text{C}_{10}\text{H}_8\text{O}(\text{---CO---})\text{---OMe}_2$ ($<\text{NH}>(\text{---N}^+)$). There is a difference of 1 MeO between I and yohimbine, and a close resemblance between the 2, but I differs from the quinine alkaloids in many respects. NAO UYRI

The constitution of pseudoscorpine. MAX POLONOVSKI AND MICHEL POLONOVSKI. *Bull. soc. chim.* **43**, 590-603(1928); cf. *C. A.* **22**, 1361, 1592. The reactions of ψ -scopine (I) and its derivs. differ from those of *scopoline* (II) so greatly that they cannot be satisfied by a simple question of stereoisomerism as would exist if I were the ψ -form of II.

The evidence given in the previous papers is supplemented with exptl. details. **I** gives 2 esters with HSO_3Cl , one an ester of **II** and the other an ester of scopine. **I** gives only 1 ester, m. over 300° . **I** does not react with Na, whereas **II** yields an unstable Na deriv. When treated with PhNCO , **I** yields a phenylurethan (**III**) which is neutral, m. 229° ; *HCl* salt of **III** m. 244° ; chloroaurate of **III** slightly sol. in H_2O , m. 210° . **II** yields a phenylurethan (**IV**) which is definitely alk. This p_{H} difference requires more than stereoisomerism to be explained and the following structures are suggested for **III** and **IV**, resp.:



A. S. CARTER

Constitution of matrine. VIII. Dihydro- α -matrinidine. H. KONDO, E. OCHIAI AND T. AIHARA. *J. Pharm. Soc. Japan* **48**, 337–48 (1928); cf. *C. A.* **21**, 2135. —Catalytic reduction of α -matrinidine (**I**) with H_2 and colloidal Pd gave dihydro- α -matrinidine (**II**). Chloroaurate, decomps 202° . *HCl* salt, decolorizes at 310° . **II** and MeI gave dihydro- α -matrinidine-MeI (**III**). Chloroplatinate does not decomp. 260° . **III** and AgOH gave the methohydroxide (**IV**) of **II**, which on vacuum distn. gave des-*N*-methyl-dihydro- α -matrinidine (**V**), $\text{C}_{13}\text{H}_{24}\text{N}_2$, b_{p} $120-7^\circ$, chloroplatinate, decomps 282° , together with a weakly basic substance and a volatile base. The reduction of **V** with H_2 and Pd gave des-*N*-methyltetrahydro- α -matrinidine (**VI**), b_{p} $130-40^\circ$. MeI and **VI** gave des-*N*-methyltetrahydromethyl- α -matrinidine-MeI (**VII**). Chloroplatinate, decomps. 300° ; chloroaurate of the methochloride, m. 195° . Vacuum distn. of the methohydroxide (**VIII**) of **VI** gave besides des-*N*-dimethyltetrahydromethyl- α -matrinidine (**IX**), b_{p} $135-40^\circ$ (styphnate, softens at 60° and decomps 85° ; methochloride, decomps. 233°), Me_3N and a weakly basic compd. (**X**), $\text{C}_{12}\text{H}_{21}\text{N}$, b_{p} 110° . **IX**, Pd-C and H_2 gave des-*N*-dimethyl-hexahydromethyl- α -matrinidine (**XI**), b_{p} $115-6^\circ$, which with MeI gave the methiodide (**XII**). The chloroplatinate of the methochloride decomps. 272° . Vacuum distn. of the methohydroxide (**XIII**) of **XI** gave des-*N*-trimethylhexahydromethyl- α -matrinidine (**XIV**), $\text{C}_{16}\text{H}_{34}\text{N}_2$, b_{p} $125-31^\circ$ (chloroplatinate of the methochloride, decomps. 251°), a weakly basic substance $\text{C}_{13}\text{H}_{23}\text{N}$, b_{p} 96° , and Me_3N . Catalytic reduction of **XIV** gave des-*N*-trimethyloctahydromethyl- α -matrinidine (**XV**), b_{p} $120-30^\circ$, which with MeI gave the methiodide. Chloroplatinate of the methochloride, decomps 240° . Vacuum distn. of the methohydroxide (**XVI**) gave a base $\text{C}_{17}\text{H}_{33}\text{N}_2$, b_{p} $125-35^\circ$ (chloroplatinate of the methochloride decomps. 238°) and a weakly basic compd. $\text{C}_{13}\text{H}_{23}\text{N}$, b_{p} 95° . The above reactions are in complete harmony with the structure of **I** proposed in paper VII (*J. Pharm. Soc. Japan* **537**, 907).

NAO UYER

Alkaloids of some Indian aconites. (A. balfourii, A. deinorrhium and "chumbi aconite"). THOMAS A. HENRY AND THOMAS M. SHARP. Wellcome Chem. Res. Labs. *J. Chem. Soc.* **1928**, 1105–21; cf. *C. A.* **21**, 3623. —Both *Aconitum balfourii* and *A. deinorrhium* give pseudoaconitine (**I**), the yield from the latter being 0.4% of the air-dry roots. **I** m. 214° , $[\alpha]_{\text{D}}^{20}$ 17.06° (EtOH, c 1.18), 22.75° (CHCl_3 , c 4.76); the formula provisionally adopted is $\text{C}_{36}\text{H}_{61}\text{O}_{12}\text{N}$. *HCl* salt, m. $179-82^\circ$, $[\alpha]_{\text{D}}^{20}$ -18.1° (H_2O c 3.37); it crystals with 4 mols. H_2O but on standing in the air loses 1 H_2O . Oxalate, m. 216° ; perchlorate, m. 239° ; picrate, orange yellow, m. 196° . Hydrolysis of **I** gives pseudoaconine, $\text{C}_{28}\text{H}_{49}\text{O}_8\text{N}$, crystg. with 1 mol. Me_2CO , m. $93-4^\circ$, $[\alpha]_{\text{D}}^{20}$ 38.7° (H_2O , c 1.69); tetra-Ac deriv., m. 228° , $[\alpha]_{\text{D}}^{20}$ -8.1° (EtOH, c 0.956). Oxidation of **I** with HNO_3 (d. 1.42) for 6 hrs. at room temp. to 45° , gives a pale yellow compd. (**II**) and a bright yellow compd. (**III**). **II**, $\text{C}_{33}\text{H}_{40}\text{O}_{16}\text{N}_4$, blackens at 260° and decomps. 270° ; in the oxidation, the Ac group is unchanged but the veratroyl residue has been nitrated in position 6; the no. of MeO groups has been reduced to 5, 2 of which are in the nitroveratroyl radical; the MeN: group has been converted into a :NNO group; the remaining N is probably present as a NO₂ group, indicating the presence of a C_6H_5 ring in the nucleus. Of the 2 remaining O atoms, 1 is present as a OH group, since AcCl at 100° gives the compd. $\text{C}_{37}\text{H}_{48}\text{O}_{17}\text{N}_4$, m. $227-30^\circ$, contg. 3 Ac groups, the NO group being replaced by an Ac; hydrolysis by EtOH-KOH gives AcOH, 6-nitroveratric acid and a 3rd product, which could not be obtained cryst. Hydrolysis of **II** gives AcOH, 6-nitroveratric acid and the compd. $\text{C}_{22}\text{H}_{31}\text{O}_{10}\text{N}_3$ (**IV**), m. $165-70^\circ$ (decompn.), $[\alpha]_{\text{D}}^{20}$

30.9° (EtOH, c 0.59), with MeONa this yields the salt, $C_{22}H_{33}O_{11}N_3Na$, produced by the addn. of NaOH, which implies the presence of a lactim group in IV and also in II. While I, II and IV do not give the pyrrole pine-shaving test, the Na salt readily does so. The reaction of IV with $TiCl_3$ indicates the presence of a NO and a NO_2 group. IV and AcCl give a compd. $C_{26}H_{35}O_{12}N_3$, m. 257° (decompn.), in which the mol. of IV is probably changed, since it is not regenerated on hydrolysis. III, probably $C_{24}H_{34}O_{11}N_3$, has not been obtained definitely cryst.; it slowly decomps. at 195°; it contains a NNO group, which is removed by AcCl but a cryst. product could not be isolated. Hydrolysis of III gives AcOH, 6-nitroveratric acid and an amorphous, orange product. Oxidation of I with Cr_2O_3 gives the compd. $C_{24}H_{34}O_{11}N$, decomps. 255°, $[\alpha]_D^{20}$ 67.95° (HCl salt foams at 180°, $[\alpha]_D^{20}$ 39.5° (EtOH, c 1.006)); it rapidly dissociates on warming; *picrate*, yellow, m. 229–30°; *chloroaurate*, yellow, decomps. 185°. Hydrolysis of this oxidation product gives AcOH, veratric acid and a pink compd., m. 175–7°, which should be the compd. $C_{22}H_{33}O_7N$, though consistent analyses could not be obtained. *Chumbi aconite* roots contained 1.1% and the leaves 0.2%, of alkaloid; the alkaloid m. 203°, $[\alpha]_D$ 16.3°, analyzes for $C_{24}H_{34}O_{11}N$ and appears to be isomeric with the japaconitine of Dunstan and Read and aconitine from *A. napellus*; it resembles aconitine more than japaconitine. The HBr salt m. 175°, $[\alpha]_D$ –34.8°; the HCl salt m. 174°, $[\alpha]_D$ –35.9°; the HI salt m. 225°. Hydrolysis of the amorphous alkaloid gave evidence supporting the view that the cryst. alkaloid was aconitine.

C. J. WEST

Chemical nature of digitalic acid. P. BOURCET AND A. FOURTON. *Bull. sci. pharmacol.* 35, 345–7; *Compt. rend.* 186, 1577–8(1928).—The studies of Morin, Walz and Kolipinski are reviewed. Conclusion: The various substances called digitalic acid consist of succinic acid with more or less of impurities.

L. W. RIGGS

Nature of the hydrocarbon group of thymonucleic acid. P. THOMAS AND J. MAFREI. *XII Int. Cong. Physiol.* 1926, 159. —The 6-C sugar of thymonucleic acid is considered to be related to glucuronic acid.

B. C. A.

Some new procedures for obtaining hemin derivatives. I. O. SCHUMM. *Z. physiol. Chem.* 176, 122–6(1928).—Although hemin loses Fe and yields porphyrin when boiled with $AcCO_2H$ alone, a mixt. of $PhNH_2$ and $AcCO_2H$ or $N_2H_4 \cdot H_2O$ does not convert it into porphyrin but merely saturates the side chains. The product gives the spectrum of mesohemin. Treatment of this with $N_2H_4 \cdot AcOH$ removes the Fe with formation of mesoporphyrin. An Fe-porphyratin corresponding spectroscopically to the above intermediate may be obtained by boiling a soln. of hemin in $PhNH_2$ with AcOH and Fe powder. If hemin is boiled with pure $N_2H_4 \cdot H_2O$ such transformation does not occur. The reaction takes place when $N_2H_4 \cdot H_2O$ is added to hemin in boiling *p*-toluidine or $PhOH$, or to a boiling suspension of hemin in glycerol, glycol, $AmOH$, olive oil or liquid paraffin, or when hemin is heated with $N_2H_4 \cdot H_2O$ under pressure at 200°. Hemin undergoes a characteristic alteration when melted with pyrogallol or resorcinol. At first a product is formed which behaves spectroscopically like mesohemin. Further heating yields an Fe-porphyratin which behaves like the Fe complex of copratoporphyrin. The progress of this 2-stage reaction can be followed accurately by means of a grating spectrometer. On removal of the Fe by $N_2H_4 \cdot AcOH$ a porphyrin is then obtained which shows all the properties of copratoporphyrin. The above chem. method represents a distinct advance over the tedious and unpleasant prepn. of copratoporphyrin by means of bacterial putrefaction.

A. W. DOX

The bile acids. XX. MARTIN SCHENCK AND HENRY KIRCHHOFF. *Z. physiol. Chem.* 176, 187–99(1928); cf. C. A. 22, 2361. —The blue NO deriv., $C_{24}H_{35}N_3O_6$, prepd. by the action of HNO_3 on the diisoxime of bilianic acid, becomes colorless when treated with NaOH in excess, and from the alk. soln. a tribasic acid $C_{24}H_{35}NO_6$ (I) seps. on addn. of HCl. In the formation of this acid the 3 CO_2H groups and the lactam structure of the NO deriv. remain intact and a mere substitution of OH for NO takes place. The substance occurs in 2 isomeric modifications with different soly. and cryst. form, m. 200–5° and 260° (decompn.), resp., each of which may be converted into the other. When the dioxime of bilianic acid is treated with HNO_3 the soln. gradually becomes blue, gas is evolved, and the addn. of H_2O ppts. the reaction product which by recrystn. from 60% AcOH is obtained in light blue lustrous needles, m. 236–8° (decompn.). It contains 3 CO_2H and a NO group and has the formula $C_{24}H_{35}NO_6$. It is decolorized with loss of NO by excess of dil. NaOH, and from the alk. soln. the addn. of HCl ppts. bilianic acid, m. 276°. The dioxime yields the same tribasic acid (I) when oxidized by $KMnO_4$. Both the diisoxime and the blue NO deriv. when subjected to prolonged treatment with HNO_3 at ordinary temp. give a blue soln., which becomes green and finally yellowish brown. Addn. of H_2O then ppts. a substance $C_{24}H_{35}N_3O_{10}$, m. 212–4° (decompn.). It

is a tetrabasic acid, one of the acidic groupings probably being an OH in proximity to the NO.

A. W. DOX

The constitution of the bile acids. XIII. Catalytic reduction of some ketone acids of the bile acid group. W. BORSCHÉ AND E. FESKE. *Z. physiol. Chem.* **176**, 109-21 (1928); cf. *C. A.* **22**, 88.—The hydrogenations were performed in the Skita app., with Pt catalyst, a pressure of 3 atm. and a temp. of 90–100°. The solvent was AcOH twice distd. over KMnO_4 . Dehydrocholic acid, $\text{C}_{24}\text{H}_{44}\text{O}_8$, yielded cholic acid, $\text{C}_{24}\text{H}_{46}\text{O}_8$, which showed optical rotation identical with that of natural cholic acid. The higher rotation previously observed for the hydrogenated product is now attributed to a contamination with dihydroxyketochoholic acid, which has a *d*-rotation twice as great. Distn. of this synthetic cholic acid yielded a cholatrienic acid identical with that predp. from natural cholic acid. Hydrogenation of dehydrodesoxycholic acid, $\text{C}_{24}\text{H}_{42}\text{O}_8$, yielded desoxycholic acid, $\text{C}_{24}\text{H}_{40}\text{O}_8$, with the same rotation as the natural product, and the Me esters of the two were identical. In the same way 7,12-diketocholic acid yielded 7,12-dihydroxychoholic acid. Other reductions performed were: bilianic acid, $\text{C}_{24}\text{H}_{44}\text{O}_8$, to reductobilianic acid, $\text{C}_{24}\text{H}_{46}\text{O}_7$, m. 243° (*Me ester*, m. 135°), which on oxidation by CrO_3 in cold AcOH yielded bilibanic acid; desoxybilianic acid, $\text{C}_{24}\text{H}_{42}\text{O}_8$, to 7-hydroxylithobilianic acid, $\text{C}_{24}\text{H}_{44}\text{O}_7$ (*tri-Me ester*, m. 105°); pyrodesoxybilianic acid, $\text{C}_{23}\text{H}_{40}\text{O}_8$, to tetrahydropyrodesoxybilianic acid, $\text{C}_{23}\text{H}_{42}\text{O}_8$, m. 211–3° (*Me ester*, m. 168°), the next lower homolog of desoxycholic acid; isobilianic acid, $\text{C}_{24}\text{H}_{44}\text{O}_8$, to reductobilibanic acid, $\text{C}_{24}\text{H}_{46}\text{O}_7$. Treatment of the latter with 0.5 *N* NaOH converted it into 7,12-dihydroxylithobilianic acid, $\text{C}_{24}\text{H}_{46}\text{O}_8$, m. 162° with foaming and dehydration to the original reducto acid. Oxidation of reductoisobilibanic acid by CrO_3 in AcOH or by coned. HNO_3 removed 2 O with formation of isobilibanic acid. This analyzed low in C and its oxime and di-Me ester oxime high in N, indicating a simultaneous formation of isobilianic acid, which was difficult to remove.

A. W. DOX

Modifications of sucrose (LIPPMANN) 28. The preparation of 4-chaulmoogryl-aminobenzenearsonic acid (DEWAR) 17. The preparation of chaulmoogryl alcohol (DEWAR) 17. The synthesis of iododihydrochaulmoogric acid and its ethyl ester (DEAN, *et al.*) 17. Essential oil of *Myoporum latum* (McDOWALL) 17. The action of Fe, Co and Ni carbonates on PhCHCl_2 (VANIN, CHERNOYAROVA) 6. Oxidation of unsaturated hydrocarbons by free O in presence of catalyzers (MEDVEDEV, ALEKSEVA) 2. Influence of the O atom of the ring on the reaction velocity of several lactones (HOLLO) 2. Some physical properties of acetic anhydride and related substances and their constitutional significance (JONES) 2.

ADKINS, HOMER BURTON, AND McELVAIN, SAMUEL MARION: *Elementary Organic Chemistry*. New York: McGraw-Hill Book Co., Inc. 183 pp. \$2.25. Reviewed in *Mining and Met.* **9**, 339 (1928).

ROBST, J. F., AND MEELS, W. H. VAN: *Inleiding in de scheikunde. II. Koolstof-chemie*. Haarlem: H. D. Tjeenk Willink & Zoon. 168 pp. Fl. 2.50.

Treating methane to form hydrocarbons of higher carbon content. GEORGES OLIVIER (to Soc. anon. le Petrole synthetique). U. S. 1,677,363, July 17. See *Can.* 274,783 (*C. A.* **21**, 3907).

Catalytic production of oxygenated organic compounds. I. G. FARBERMIND. A.-G. Brit. 280,522, Nov. 15, 1926. Oxides of C are passed with H over an Fe catalyst contg. small addns. of alkalis and alk. earths at a temp. below 300° (suitably about 200°) either under ordinary pressure or under reduced or slightly increased pressure. The products may comprise resinous O-contg. substances, paraffinic compds., oily liquids, alc. and an aq. soln. of org. acids.

Halogen derivatives of the benzanthrone series. OTTO BRAUNSDORF, EDUARD HOLZAPFEL and PAUL NAWIASKY (to Grasselli Dyestuff Corp.). U. S. 1,677,545, July 17. Halogen compds. are formed by reaction of a halogen (or reagent splitting off halogen) on benzanthranyl mercaptans or benzanthrone disulfides or sulfides or other thio ethers of benzanthrone, *e. g.*, alkyl or aryl thioether of the general formula X-S-Y (in which X represents a benzanthranyl residue, substituted or not, and Y represents a substituted or unsubstituted alkyl, aryl, aralkyl, or aliphatic acylidyl group, or H). Examples are given of the production of a dibromo-Bz-1,Bz-1'-benzanthranyl disulfide, a dichloro-Bz-1,Bz-1'-benzanthranyl sulfide, a dichlorodiaminobenzanthranyl sulfide, a dibromo- and monobromo-Bz-1,Bz-1'-benzanthranyl sulfide, a tribromobenzanthranyl sulfide and a dibromo-Bz-1-benzanthranythioglycolic acid.

Amino alcohols. W. MERCK, K. MERCK, L. MERCK, W. MERCK and F. MERCK (TRADING AS THE FIRM OF E. MERCK). Brit. 280,574, Nov. 10, 1926. Catalytic hydrogenation of aryl aminoalkyl ketones to the corresponding carbinols is effected by use of a Ni catalyst. Examples are given for the production of: phenyl-*N*-methylaminomethylcarbinol, phenylaminomethylcarbinol, phenyl-*N*-methylaminomethylcarbinol and racemic adrenaline.

Monoalkylaminophenols. W. TRAUBE and E. HILLRIEGEL. Brit. 280,553, Nov. 15, 1926. Thiourea compds. of aminophenols (hydroxyphenylthioureas) are desulfurized, the resulting hydroxyphenylcyanamides are alkylated, and the cyano group is split off. Examples and details are given.

Solid diazo salts of *o*-aminophenol ethers. FERDINAND KELLER and KARL SCHMITZ-SPAHN (to Grasselli Dyestuff Corp.). U. S. 1,677,558, July 17. Diazo salts are obtained by double decompn. reaction of inorg. acid diazo salt solns of *o*-aminodiphenyl ether and its unsulfonated substitution products, either with a *p*-chlorobenzenesulfonic metal salt or with free *p*-chlorobenzenesulfonic acid. The salts thus formed sep. from their solns. as cryst. whitish to yellowish or brownish ppts. and can be easily filtered and dried.

Pyridine bases. H. T. BÖHME A.-G. Brit. 280,511, Nov. 10, 1926. A mixt. of aldehydes (or aldehyde-forming substances) and NH_3 is passed under a pressure of about 50 atm. and at a temp. of about 200–400° over catalysts such as oxides or carbides of Al, Fe, Cr, W or U or oxides of rare earth metals to form pyridine bases. A product composed mainly of picolines is formed when a mixt. of AcH and NH_3 (or of C_2H_2 , H_2O vapor and NH_3) is used, with W carbide as catalyst. By use of a gaseous mixt. of CH_2O , AcH and NH_3 , pyridines and picolines are obtained.

Tetrazoles. A. BOEHRINGER (TRADING AS C. H. BOEHRINGER SOHN) Brit. 280,529, Nov. 10, 1926. Azides or free hydrazoic acid is caused to react on esters of oximes such as the sulfonic esters or the so-called Beckmann transformation products of these esters (or the components necessary to the formation of the esters), either in water or org. solvents, in neutral or slightly acid soln. or in the presence of basic substances of org. or inorg. character. Examples are given for the production of: (1) 1,5-dimethyl-1,2,3,4-tetrazole from the benzenesulfonic ester of acetoxime and Na azide; (2) 1-benzyl-5-methyltetrazole from the *p*-toluenesulfonic ester of benzyl methyl ketoxime and Na azide; (3) 1,5-diphenyltetrazole from benzophenone oxime by esterifying with aq. alc. NaOH and PhSO_2Cl , adding Na azide and warming, or by treating a mixt. of benzophenone oxime and hydrazoic acid in CHCl_3 with thionyl chloride; (4) 1,5-pentamethylenetetrazole together with ϵ -leucine lactam from cyclohexanone oxime in NaOH, PhSO_2Cl and Na azide; (5) 1,5-pentamethylenetetrazole from cyclohexanone oxime and (a) PhSO_2Cl pyridine or NaOH, and CHCl_3 followed by Na, K or NH_4 azide, (b) hydrazoic acid in C_6H_6 , PhSO_2Cl and Na azide, (c) pyridine, P oxychloride, and Na azide.

Converting cyanonaphthalenesulfonic acids into other compounds. RICHARD HERZ, FRITZ SCHULTE and WERNER ZERWECK. U. S. 1,677,086, July 10. Cyanonaphthalenesulfonic acids contg. at least 1 sulfonic group in *o* or *p* position to the cyano group are heated with alk. reagents to effect exchange of the sulfonic group for another univalent radical, e. g., Na 2-cyanonaphthalene 1-sulfonate is mixed with powd. KOH and paraffin and the mixt. is heated to about 140° with stirring and after some time the mass is cooled, diluted with water and filtered and the filtrate is acidified; a colorless compd. seps. which forms long needles when recrystd. from dil. alc. m. 179° and corresponds to the formula, $\text{C}_{10}\text{H}_7\text{OH}(1).\text{CN}(2)$. Several other examples are given of reactions of the same general type. Cf. *C. A.* 22, 2170.

Acetic acid. H. SUIDA. Brit. 280,501, Nov. 9, 1926. In processes such as described in Brit. 230,447 (*C. A.* 19, 3272) there are employed as solvents acylated or acetylated products formed from compds. such as glycol, glycerol, BuOH , heavy wood tar oils, or brown coal creosotes or other alcs. and phenols. Am butyrate, hexyl acetate and AmOAc also may be used. Acetylation of the solvent may be effected in the same app. used for the extn. and production of concd. HOAc.

Acetic acid from acetaldehyde. HOWARD W. MATHESON (to Canadian Electro Products Co., Ltd.). U. S. 1,676,454, July 10. In oxidizing AcH with O while retaining the HOAc formed in the reaction liquid, after an initial rise in temp. and pressure at the beginning of the reaction, the pressure and temp. are further increased as the acid content of the mixt. increases during the continuance of the reaction.

Nitropyridinearsonic acids. ARTHUR BINZ and CURT RATH. U. S. 1,675,402, July 3. See Brit. 275,590 (*C. A.* 22, 2244).

Aryl-substituted quinoline-4-carboxylic acids. ALFRED HAUSMANN (to C. H.

Boehringer Sohn Chemische Fabrik). U. S. 1,676,862, July 10. In producing products of quinoline-4-carboxylic acid aryl-substituted in the second position, 1 mol. of pyrrolic acid is caused to react, in the presence of a solvent such as alc. with more than 1.5 mols. of a condensation product from an aromatic amine such as PhNH_2 and an aromatic aldehyde such as BzH .

2-Hydroxynaphthalene-3-monosulfo-6-carboxylic acid. FRIEDRICH KRECKE (to Grasselli Dyestuff Corp.). U. S. 1,676,698, July 10. This compd. is produced by heating 2-hydroxynaphthalene-6-carboxylic acid with H_2SO_4 or oleum and dilg. with water. It is sol. in hot water, difficultly sol. in dil. acids, its di-Na salt crystallizes in compact needles, and a blue fluorescence is shown by its solns. with dil. alkali carbonate and by its difficultly sol. neutral Ca salt.

1-Methoxynaphthalene-2-carboxamide. RICHARD HERZ, FRITZ SCHULTE and WERNER ZERWECK (to Grasselli Dyestuff Corp.). U. S. 1,676,692, July 10. This compd. is produced by heating KOH, MeOH and Na 2-cyanonaphthalene-1-sulfonate. It is a colorless powder, crystg. from water or dil. alc. as long colorless needles, m. $156-7^\circ$, insol. in alkalies.

Valerylresorcinol. ALFRED R. L. DOHME (to Sharp & Dohme, Inc.). U. S. 1,677,116, July 10. This compd., $\text{C}_6\text{H}_3(\text{OH})_2\text{CO}\cdot\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$, is made by reaction of valeric acid on resorcinol in the presence of ZnCl_2 . It is a cryst. compd., m. $58-60^\circ$ and b_{6-7} $190-2^\circ$.

Isobutyrylresorcinol. ALFRED R. L. DOHME (to Sharp & Dohme, Inc.). U. S. 1,677,117, July 10. This compd., $\text{C}_6\text{H}_3(\text{OH})_2\text{CO}\cdot\text{CH}(\text{CH}_3)_2$, is made by reaction of isobutyric acid on resorcinol in the presence of ZnCl_2 . It is a cryst. solid, m. $67-68.5^\circ$ and b_{6-7} $173-5^\circ$.

Chlorinating methane by use of antimony pentachloride. ERICH KRAUSE (to Holzverkohlungs-Industrie A.-G.). U. S. 1,677,831, July 17. Reaction of CH_4 with SbCl_5 at a temp. of about 300° forms CH_3Cl and other products.

Paraformaldehyde. KARL SATOR and WILHELM PFANNMÜLLER (to I. G. Farbenind. A.-G.). U. S. 1,677,730, July 17. In producing polymerized CH_2O , water is removed from a gas mixt. contg. CH_2O and water, e. g., by cooling, and the solid product is sepd. from the remaining gases. Cf. C. A. 22, 1163.

Polymerized styrene, etc. IVAN OSTROMUISLENSKII (to Naugatuck Chemical Co.). U. S. 1,676,281, July 10. Styrene or similar compds. such as *o*- and *p*-methylstyrene or sym. *m,m*-dimethylstyrene are emulsified, e. g., with aq. NH_3 and oleic acid, and polymerization may then be effected by heating, e. g., at 140° for 12-24 hrs. MeOH may be used to ppt. the product, and the latter may be used for making various molded articles and may be mixed with pigments or other materials.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Transport numbers of proteins. DAVID M. GREENBERG. Univ. of California. *Trans. Am. Electrochem. Soc.* (preprint), Sept., 1928.—Transport numbers for casein and the A, B and C fibrins dissolved in 0.1 *N* acids or bases indicate that definite compds. are formed between the acid or base and the protein. The electrode deposit is found to be (1) proportional to the current, and (2) inversely proportional to the amount of acid or base combined with the protein or to the charge carried by the protein. The transport numbers vary inversely as the mobility of the cation. These results indicate a salt-like behavior rather than the current colloidal theory of protein behavior. Complex formation between the protein and the hydroxides of the alkaline earth series is indicated by the exptl. evidence. C. J. BROCKMAN

Biochemical effect of high-frequency currents on rabbits. ALBERTO SCALA AND NICOLA SETTE. Univ. Rome. *Ann. Igiene* 36, 642-58 (1926); *Chem. Zentr.* 1927, I, 313.—Rabbits subjected to currents of high frequency immediately or very shortly excrete urine, the alk. and Ca content of which are abnormally low. The current hydrolyzes the colloidal complexes of all tissues, with liberation of acids, insofar as the complexes are not already injured through other agencies. As a result, the tissues become more strongly hydrophilic and the colloid components tend to form solns. or dispersions, Ca exercising an inhibitory action in this respect. In summer, bases in-

stead of acids are liberated, which render the organism alk. in reaction, because the high frequency hydrolyzes the second zone of electropositive ions of the tissue colloids when the first zone of electronegative ions is exhausted through the effect of high temps. The high frequency has the same influence as x-rays on rabbits, though the magnitude of the effect is smaller. The increased hydrolytic activity results in ammoniuria, and the disturbance of the equil. of the colloids of the kidney tissues results in albuminuria.

C. C. DAVIS

The fixation of nitrogen in the synthesis of protein in nature, and biological interest in the physiological oxidation reactions and their reversibility. F. KNOOP. Univ. of Freiburg. *Munch. med. Wochschr.* 73, 2151-3(1926); *Chem. Zentr.* 1927, I, 1027.—In 1910 K. succeeded, with the aid of nascent H, in forming small quantities of phenylalanine from the corresponding ketonic acid. With the aid of Pt and Pd as catalysts, K. has now succeeded in isolating up to 70% amino acids of the most varied types at room temp. and atm. pressure, i. e., under conditions existing in the living cell. Ketonic acids fix NH_3 with addn. of 1 mol. of H_2 much more easily than does H alone, with the formation of hydroxy acids. Accordingly where ketonic acids and NH_3 meet in the cell under conditions favorable to hydrogenation, amino acids form very readily. Amino acids were also isolated from the products of the action of cysteine on ketonic acids and NH_3 .

C. C. DAVIS

The enzyme index of catalase and protease during digestion. E.^o IVANIZKIJ-VASILENKO. *Uchenye zapiski saratovskogo gosudarstvennogo univ.* 3, 301-20(1925); *Chem. Zentr.* 1927, I, 1180.—The variations of the catalase index are sometimes independent of the absorption of nutrients. A meal of meat or of milk increases the index only after 2 hrs. After the removal of the pancreas, the index diminishes (expts. on cats).

C. C. DAVIS

Catalase, anticalase and phyllocatalase in animal tissue under various physiological and pathological conditions. I. Determination of catalase in blood. E. GAGARINA AND W. JANKOWSKI. *Zhurnal ekspl. Biol. Med.* 1926, 33-51; *Chem. Zentr.* 1927, I, 1193; cf. C. A. 21, 3636.—Besides catalase, anticalase and phyllocatalase are also present in the blood, which disturb the detn. of catalase in the blood. Expts. by G. and J. were directed toward eliminating the disturbing factors. Maintaining blood dild. from 1:25 to 1:50 for 30 min. in a thermostat at 37° with and without the addn. of EtOH had no influence on the action of the catalase. On the other hand the latter action diminished at dilns of 1:500 and 1:1000. The diminution can be prevented by EtOH even at dilns of 1:50,000. Subsequent addn. of EtOH activated again a greater part of the inactivated catalase, but not the total quantity. C. C. D.

Vital force. P. C. E. MEERTM TERWOGT. *Chem. Weekblad* 25, 306-7(1928).—A philosophical discussion suggested by the centenary of Wohler's synthesis of urea. The statement frequently met with in textbooks that this great discovery has resulted in banishing the concept of vital force from chemistry is true only insofar as mere chem. substances are concerned. Schopenhauer's view that the phys. and chem. forces at work in the animal organism are interrelated and directed by a vital force necessary for the existence of a purposive organism still holds. The creation of an organism by the chemist, although conceivable, is a vision belonging to the category of perpetual motion and squaring the circle.

A. W. DOX

Comparative investigations on light absorption in the ultra-violet by α -amino acids. EMIL ABDERHALDEN AND ERNST ROSSNER. *Z. physiol. Chem.* 176, 249-57(1928).—Detns. were made of the ultra-violet absorption of amino acids, mixts. of amino acids, mixts. of amino acids and their corresponding anhydrides, and hydroxyamino acids for the purpose of ascertaining any noteworthy variations. The results were for the greater part negative. Similar curves but at slightly different locations were obtained for: proline and hydroxyproline, and for phenylalanine, tyrosine and dihydroxyphenylalanine. With mixts. of amino acids the curves plotted between concns. of the components and A. U. of max. absorption showed no irregularity, while with mixts. of amino acids and their anhydrides the curves assumed a somewhat logarithmic form.

A. W. D.

Cozymase and the activation of fresh yeast fermentation by yeast extract. KARL MYRBÄCK AND HANS V. EULER. *Z. physiol. Chem.* 176, 258-68(1928).—The substance which increases the fermentation velocity of living yeast without increasing the no. of cells, and which is designated as "Factor Z," is essentially different from cozymase. It is readily sol. in 94% EtOH, is not pptd. by $\text{Ba}(\text{OH})_2$ or $\text{Pb}(\text{OAc})_2$, but pptd. by $\text{Pb}(\text{OAc})_2 + \text{NaOH}$, is diffusible through collodion, and is not affected by autolysis. While a quantity of boiled yeast ext. contg. 2 cozymase units accelerates the fermentation of fresh yeast more than 100%, purified cozymase of 30 units is without effect.

Conversely, solns. which contain no cozymase activate fresh yeast. Kostychev's assumption that added cozymase activates fresh yeast fermentation is erroneous and is therefore not relevant to the discussion of the question whether the fermentation by dried yeast is due to the presence of living cells.

The chromoproteins. The acid-binding power of globin. N. ISHIYAMA. *Z. physiol. Chem.* 176, 294-300(1928).—The chromoproteins are salts in which basic proteins are combined with acidic prosthetic groups. Thus hemoglobin consists of approx. 96% globin and 4% hemochromogen. It is readily split into these components by addn. of acid, but the free hemochromogen is so easily altered that when recombination occurs the resulting ppt. is a salt of hematin with globin. The globin-HCl salt obtained by cleavage of hemoglobin has an av. HCl content of 5.07%. If combined in the same mol. proportions, the H_2PO_4 content of globin phosphate should be 12.55%, which is in agreement with the values 11.80 and 12.07 actually found. Mineral acids, therefore, combine with globin in stoichiometric proportions. For org. acids, however, the binding power is lower. Eosin forms a salt with globin and this contained 32.10 and 32.59% eosin instead of the calcd. 37.98% on the basis of I content. Taurine, a still weaker acid, forms a globin salt with 1.16% taurine instead of 15.59%. This diminished binding power of globin for weak acids explains the low hemochromogen content of hemoglobin.

A. W. Dox

Specificity of animal proteases. XIV. Comparison of the activation performance of enterokinase of various origin. ERNST WALDSCHMIDT-LEITZ AND OSAMU SHINODA. *Z. physiol. Chem.* 176, 301-13(1928).—Kinase preps. from the intestinal mucosa of all the animals tested (pig, horse, steer, sheep, dog, cat, rabbit, goat, ape and sea lion) activate trypsin from pig pancreas. Noteworthy differences exist only in the activation performance of the individual kinases toward sea-lion trypsin, the activity of which is increased to a much greater extent by kinase from dog, rabbit and ape than by that from pig and steer. The differences in velocity of hydrolysis, which are considerable, are shown in the cleavage of both casein and clupein. One might be inclined to infer an identity of the various kinases, except for the non-equivalence of the systems: sea-lion trypsin-pig kinase and sea-lion trypsin-steer kinase, on the one hand, and sea-lion trypsin-dog, rabbit and ape kinase on the other hand. The sea lion represents a different order of mammals and before a sp. difference in its kinase can be considered established, other members of this order must be examd.

A. W. Dox

Methylglyoxalase and cozymase. ALFRED GOTTSCHALK. *Z. physiol. Chem.* 176, 314-6(1928).—Dried bottom yeast which has been freed from cozymase by washing is no longer capable of converting $AcCHO$ into lactic acid. With a very low content of cozymase the dried yeast has only a slight action on $AcCHO$. The methylglyoxalase activity of yeast is, therefore, dependent on the presence of cozymase. The three known components of the yzyme complex, the activity of which requires the complementary action of cozymase, are now phosphatase, aldehyde-mutase or reductase and methylglyoxalase.

A. W. Dox

Albrecht Kossel in memoriam. S. EDLBACHER. *Z. physiol. Chem.* 177, 1-14(1928).—A biographical sketch and appreciation.

A. W. Dox

The iron porphyratins. The reversible side-chain reaction of the hematins and the behavior of hemin and the hematins toward acids. Preparation of hemateric acid from hemin and organic acids. O. SCHUMM AND E. MERTENS. *Z. physiol. Chem.* 177, 15-23(1928); cf. *C. A.* 22, 245.—The reversible side-chain reaction of α -hematin (hematin \rightarrow dimethoxyhematin di-Me ester \rightarrow hematoporphyrin \rightarrow hemateric acid \rightarrow hemin) has now been performed also with β -hematin and hemin. The conversion of dimethoxyhematin di-Me ester, after removal of Fe, into hemateric acid (3rd stage) may be effected either by boiling HCl or more rapidly by $AcOH$ contg. a little H_2SO_4 . The view previously expressed, on the basis of spectrochem. analysis, that the unsatd. side chain of hemin becomes only partially satd. after prolonged boiling with $MeOH$ contg. 1% HCl is now confirmed by elementary analysis. The Fe complex obtained by this procedure is the tetra-Me deriv. of the Fe complex of Nencki's hematoporphyrin, now designated dimethoxyhematin di-Me ester. The reaction circle can be shortened to 2 stages by boiling this product (1st stage) several hrs. with $AcOH$, whereby reversion to the hematin stage occurs. By boiling with HCl this di-MeO deriv. and the Fe complex of Nencki's hematoporphyrin are converted into a hematin-like substance which differs from true hematin in its greater resistance to $N_2H_4 \cdot AcOH$. The same or an analogous substance is formed from hematin by boiling HCl, but from hemin only by prolonged boiling. In the action of boiling acids on hemin great differences are shown not only between 25% H_2SO_4 and HCl, but also between various org. acids. $AcOH$, 10% oxalic, 70% lactic and $AcCO_2H$ manifest an almost sp. behavior in each

AcOH maintains the original structure, oxalic forms 2 distinct porphyrins one of which is hemateric acid, lactic forms predominantly hemateric acid, while pyruvic easily splits off Fe from pure hemin with formation of hemateric acid but from hemin dissolved in PhNH₂ no Fe is split off although the substance is definitely altered. Malonic, succinic, tartaric and citric acids in 10% soln. do not convert hemin or hematin into a porphyrin or cause otherwise any noteworthy change. The hematins are distinguished to a certain extent by their varying resistance to boiling HCl. For the prepn. of hemateric acid in good yield the treatment of hemin with AcCO₂H is recommended.

A. W. Dorr

Glycocyclamase. JUNJI KARASHIMA. *Z. physiol. Chem.* **177**, 42 (1928).—Beef liver contains an enzyme which hydrolyzes glycoylamine into glycine and urea. The enzyme was not found in the kidney, pancreas, spleen or lung. It is possible that glycoylamine is an intermediate product of arginine metabolism. Its homolog, guanidinobutyric acid, is known to undergo a similar enzymic cleavage into urea and aminobutyric acid, and both of these guanidino acids might be formed in successive stages in the oxidation of arginine. The enzyme was not found in chicken liver or kidney. A. W. D.

Odor and constitution among the mustard oils. G. M. Dwyson. *Perfumery Essent. Oil Record* **19**, 88-91 (1928); cf. *C. A.* **22**, 1436.—The expts. previously described have now been extended to an examn. of the influence of halogen substituents on the odor of mustard oils. In order suitably to correlate the results obtained, it is necessary to adopt some theory of odor perception. The many exptl. findings on the phenomena of odor lead definitely to the conclusion that direct contact of the odorous substance with the processes connected with odor perception is necessary before perception can take place. The relation of odor intensity to vapor pressure at high diln. has been established, and in addn. it is known that all odorous substances exert a definite vapor pressure, while apparently odorless substances may be caused to excite the sensation of odor by the simple method of irrigating the olfactory processes with their isotonic salt solutions. Odor intensity then depends on the vapor pressure at lower dilns., the intensity increasing as the vapor pressure increases until a point is reached beyond which the increase of concn. produces little or no increase in the strength of perception of the odor, i. e., the olfactory satn. point. The mere existence of such a point indicates that such a process of odor perception must be bound up with actual mol. contact rather than with other phenomena. If odor perception is due to the intramol. vibrations of the mols. concerned, then there is a very sound parallel between the 3 senses of sight, hearing and smell, and one is able to correlate differences of odor with variations in mol. vibration. Variety in smell may, therefore, be due to 2 causes. In the first place it may be due to simple variations in olfactory frequency, or it may be due to the superposition of 2 or more olfactory frequencies leading to the receipt by the brain of a multiple effect—a process analogous in many ways to the perception of a musical concord or discord or of a mixed tint. It seems not improbable then that odor is as capable of fundamental measurement as any other property, and that when it is possible to measure the intramol. vibrations assocd. with a particular mol., then one can define mathematically its odor. In applying these considerations to the question of mustard oils and their odors it is essential that the idea of surface action be kept to the front, since it is capable of furnishing the reason for the apparently large variations of odor caused by comparatively slight constitutional changes. With *p*-chloro-, *p*-bromo- and *p*-iodo-phenyl mustard oils there is practically no difference between their odors, each having a powerful anise odor which appears to be sweeter with the Br compd. than with the Cl compd., the I compd. having the softest odor of the 3. With the *m*-, and *o*-substituted phenyl mustard oils a considerable difference is observed between the various halogen derivs. Thus, the *o*-Cl compd. has a very keen "mustard oil" odor, which is less apparent with the corresponding Br compd., and almost non-existent with the I compd. A similar set of relations is apparent with the *m*-compds. Touching the relation of orientation and odor in the monohalogen-substituted phenyl mustard oils it appears there are at least 2 fundamental intramol. vibrations assocd. with these oils, one with the pungent or "true mustard oil" odor (primary osmic frequency) and the 2nd with the sweeter or anise odor (secondary osmic frequency). In phenyl mustard oil the primary osmic frequency almost completely overwhelms the secondary, but it appears that any substituent in the *p*-position (Me, Cl, Br, I, CN, OMe, OEt, COOEt and COMe) have been successfully tried) either completely suppresses the primary osmic frequency or else alters it to such an extent that it is shifted out of the limits of odor perception. Interesting light is thrown on this matter when it is considered from the standpoint of chem. reactivity of the NCS group. The presence of a halogen substituent invariably accelerates the reaction between the mustard oil and alc., but this

acceleration is by no means produced when Me or MeO groups replace the halogen. This points to the fact that amplitude of the intramol. vibrations is connected with the reactivity, which is not greatly influenced by their frequency, and that in the mustard oils the *p*-substituent does not lead to complete suppression of the primary olfactory frequency, but merely shifts it out of the limits of odor perception. The application of the above theory to the presence of 2 or more halogen atoms in the same Ph residue simplifies any consideration of their behavior. On the assumptions that a *p*-substituent shifts the primary olfactory frequency outside the limit of odor perception, and does not appreciably affect the secondary osinic frequency; that an *o*-substituent tends to act as the *p*-group with respect to the shift in olfactory frequency, but to a smaller extent; and finally that a *m*-group tends to produce a shift in primary olfactory frequency in an opposite direction to that produced by an *o*- or *p*-group, one should predict that both dichlorophenyl mustard oils in which a *p*-group is present would retain their anise odor, but that the 3,4-deriv. would possess a more pungent odor than that of the corresponding 2,4-compd., that the 3,5-dichloro compd. would be wholly pungent, the 2,6-deriv. wholly sweet in odor, and the 2 remaining isomers (2,5- and 2,3-dichloro-derivs. of an equally pungent odor) both more pungent than the 2,4-deriv., but less so than the 3,5-compd. Five of these isomers have now been prepd. and examd. in a high state of purity, but so far the 2,6-compd. has not been obtained. The other 5 dichlorophenyl mustard oils fulfill the predicted odors with the possible exception of the 3,5-derivs. which are less pungent than the simple *m*-chlorophenyl mustard oil. In this case, however, the apparent difference is in all probability due to differences in volatility resulting in a difference in intensity rather than in nature. Investigation of the F compds. is at present under way.

W. O. E.

Odor and constitution among the mustard oils. G. MALCOLM DYSON. *Perfumery Essent. Oil Record* 19, 171-4(1928). cf. preceding abstract.—The author's previous work has now been extended to include compds. contg. both halogen and Me groups together. The conclusions which may be drawn from the investigation are: (1) The "pungent" and "anise" aspects of the olfactory sensation are probably due to sep. frequencies, and that *m*-substitution is more conducive to pungency than is *p*-substitution, which in all cases leads to the appearance of the "anise" note. (2) It seems clear that the chloro group is a more powerful alterant of olfactory frequency than the Me group, since in 4-methyl-3-chlorophenylthiocarbimide the pungent note almost overwhelms the anise odor, a state of things which is reversed in 3-methyl-4-chlorophenylthiocarbimide. The results of the present study uphold the generalization that the effect of the substituent groups upon the odor of aromatic mustard oils is governed by 3 empirical rules, as follows: (a) The effect is dependent on the orientation of the groups, *p*-substituents causing a marked anise note, *m*-groups contributing pungency, and *o*-groups having their effect mainly on the floral character of the odor. (b) The nature of the odor is dependent more upon orientation than upon the nature of the substituent group. (c) Where the Me and chloro groups occur together in the same mustard oil, the effect of the chloro group is invariably more strongly marked than that of the Me group.

W. O. E.

Relation of the action on microorganisms and chemical constitution of *p*-hydroxybenzoic acid. TIL. SARALITSCHKA. *Pharm. Monatshefte* 9, 129-30(1928). See C. A. 22, 2765.

W. O. E.

Does the irradiation of cod-liver oil increase its antirachitic potency? E. T. WYMAN, A. D. HOLMES, L. W. SMITH, D. C. STOCKBARGER AND M. G. FIGOTT. *Am. J. Diseases Children* 34, 753-64(1927); *Expt. Sta. Record* 58, 496.—Cod-liver oil irradiated for 20 min. under carefully controlled exptl. conditions had no greater antirachitic potency for rats, as judged by growth curves, blood Ca and P, and x-ray and histological examn. of the bones, than the same oil before irradiation. The same oil after irradiation for 2 hrs. had a noticeably lessened antirachitic effect.

H. G.

Chemical Abstracts as a source of reference material in dental research. H. C. BENEDICT. *Northwestern Univ. Dental Cosmos* 70, 717-20(1928).—A discussion of the subjects of dental interest which receive attention in Chemical Abstracts.

JOSEPH S. HERBURN

Recent advances in science: Biochemistry. R. KEITH CANNAN. *Univ. of London. Science Progress* 23, 23-32(1928).—A review of recent work on vitamins and enzymes.

JOSEPH S. HERBURN

Measurement of the biologically active ultra-violet rays of sunlight. L. HILL. *Proc. Roy. Soc. (London)* B102, 119-28(1927).

E. H.

Our search for chlorophyll and for the vitamins. F. M. SCHERTZ. *Dept. of Agr., Washington, D. C. Science* 68, 48-53(1928).—A review.

E. H.

I. The accurate measurement of the proportion of corpuscles and serum in blood.

II. The volume of red blood corpuscles in venous and oxygenated blood and after exposure to various saturations of carbon dioxide. F. H. SMIRK. *Brit. J. Exptl. Path.* 9, 81-9(1928).—By centrifuging small quantities of blood which have been drawn into capillary U-tubes between layers of paraffin an accurate microhemocrit method was developed in which the tension of the blood gases is unchanged. If blood is allowed to stand in capillary tubes of Jena and ordinary glass for 2 or more hrs. the percentage vol. of corpuscles diminishes slightly in both types of glass, but more so in ordinary glass. This difference is not more than 2% after 5 hrs.' exposure. It is suggested that this is due to the alkali of the glass causing an increase in p_H of the blood. This factor would be due to the enormous increase in glass surface relative to the vol. of blood. Oxygenation of venous blood causes a slight diminution in the percentage vol. of corpuscles. An av. of 55 hemocrit observations shows a variation of rather more than 1% of the vol. of corpuscles. Exposure of human blood to 50% CO_2 caused an increase of 11% in the vol. of corpuscles, which was maintained within 2% after 15 hrs.' exposure. 100% CO_2 produced a change of about 17% in the vol. of corpuscles, which was maintained within 3% after 21 hrs.' exposure. Complete restoration of the corpuscular vol. is obtained if the blood is removed from the CO_2 and desaturated. H. F. H.

Dehydrogenation of succinic acid. AMANDUS HAHN and W. HAARMANN. *Z. Biol.* 87, 107-14(1928); cf. *C. A.* 22, 1601 —When succinic acid is dehydrogenated by muscle tissue in a vacuum in the presence of methylene blue, the chief product is fumaric acid. This is converted to malic acid by hydrolysis. Further dehydrogenation of malic acid yields small quantities of other products, not yet identified. It was found possible to det. fumaric acid in the presence of malic and succinic acids. F. K.

The relation between viscosity and electrolytic dissociation in colloidal solutions. The behavior of gelatin hydrosols before and after treatment with proteolytic agents. S. VISCO. *Arch. sci. biol.* 8, 471-9(1926).—If, according to Loeb, it is true that the influence of electrolytes is a function of the micelles of solid gel present in protein solns., then by varying the micelles, the influence of the electrolytes should also vary between a max. and a min. If the micelles are present, the addn. of trypsin should reduce them into less complex substances down to amino acids. V. tried to prove the assumption by the following exptl. method: 30 g. gelatin was melted in 500 cc H_2O , a definite quantity of HCl was added and the vol. brought to 1 l. The flask was placed in the incubator for 1 hr. and the p_H detd. To 500 cc. of it 1 g. trypsin was added and the flask placed in the incubator together with the 500 cc trypsin-free gelatin as a control. After 1 hr. the flasks were placed in an Arnold sterilizer for 30 min. to destroy the enzyme and to sterilize the solns. after which they were again incubated. The p_H of both solns. was 4.6. Thirty-cc. samples were removed from each flask and placed in smaller flasks. Varying amts. of HCl were added to obtain different p_H . The flasks were incubated for 60 min. and the η detd. The results are given in the form of 6 graphs, showing the relation between η and p_H , when trypsin acted on the gelatin for 1, 2, 3, 4 $\frac{1}{2}$, 6 and 10 hrs. Beginning at the isoelec. point, the η reaches a max. at p_H 2.8, beyond which it diminishes again. The η of isoelec. gelation subjected to the prolonged action of trypsin is not modified by the action of HCl even if the p_H varies from 4.6 to 2.8. The influence of p_H on η is inversely proportional to the time trypsin acts. The data favor Loeb's hypothesis, namely, that micelles of solid gel are present and these play an important part in explaining the influence of electrolytes on the physicochem. properties of certain protein solns. PETER MASUCCI

Preliminary experiments on the nature and mechanism of formation of metal proteinates. A. BENEDICENTI and G. B. BONINO. *Arch. sci. biol.* 8, 241-7(1926); cf. following abstract.—The investigation aimed to develop exptl. methods for the detn. under various conditions and for various metals of the type of mechanism governing the formation of metal-protein compds. Two electrode tubes were connected by means of a capillary syphon with a glass stopcock. Into one tube was placed a Co-protein soln. and into the other the untreated protein soln. A Co electrode was immersed in the Co-protein soln. and a Pt electrode in the other. The p. d. between the two electrodes is expressed by the simplified formula: $E = (RT/F)(\frac{1}{2} \log [Co^{++}] - \text{Const.})$ The ratio E/I depends on the concn. of Co^{++} ions in the metal-protein soln. The relation of E to temp. was detd. The two electrodes were brought to the same temp. and by means of a galvanometer used as a voltmeter and with sufficient resistance interposed, the p. d. was measured. Graphs are given showing the relation of E to temp. for egg albumin and beef serum undild. and dild. and at various p_H . All the curves show a max. p. d. which coincides with the temp. at which protein is coagulated by heat. In most curves there is an inflection at 35-40°. PETER MASUCCI

Studies on metal proteins. I. G. B. BONINO AND M. BOTTINI. *Arch. sci. biol.* 8, 248-57 (1926).—Co electrodes were placed in distd. H_2O p_H 6.4 and in a soln. of Co-protein also p_H 6.4 made by shaking albumin with powdered Co. The potential of Co^{++} with respect to H_2O was calcd. from the formula: $E = (0.0577/V_2) \log_{10} ([M_2^{(n)}]/L_{M_2})$ 3.108 derived from Smits' and Aten's work (*C. A.* 11, 904). The calcd. value was -0.708 v.; the found value at 18° was -0.705 . The potential of Co^{++} with respect to Co-protein was -0.648 v. Curves are given showing the variation of potential with time. The potential found with respect to H_2O agrees very well with the calcd. values; that with respect to Co-protein indicates the presence of Co^{++} ions in greater numbers than the limit of concn. at that p_H . The presence of free ions in that concn. leads the authors to conclude that Co-protein salts are present. II. G. B. BONINO AND A. GRANDI. *Ibid* 258-76.—Expts. were made to prove that the reaction between a metal and a protein (Co and gelatin) is governed by the amphoteric properties of the gelatin. The following assumptions were covered: (a) the metal reacts with the protein and lowers its H-ion concn.; (b) the elec. cond. and η of the gelatin in the zone $[H^+] > [H^+]_i$ (isoelec.) are diminished by the action of the metal on the protein; (c) the same properties are increased by the action of the metal on gelatin when $[H^+] < [H^+]_i$; (d) the total quantity of metal fixed depends on the initial H-ion concn.; (e) the curve expressing the total metal fixed by gelatin at various p_H shows a min. at the isoelec. point. The p_H of the protein solns. were detd. by the quinhydrone electrode modified according to Sørensen to eliminate salt errors. Cond. measurements were made by the Kohlrausch method; η measurements by the Ostwald viscometer. One-g. portions of isoelec. gelatin prepd. according to Loeb were placed in various beakers; 100 cc. HCl of different concns. was added to each beaker, allowed to stand 30 min. at 20° and then the whole poured over filter paper to drain the excess liquid and finally washed with 25 cc. distd. H_2O . The gelatin was melted at 30° and brought to 100 cc. with H_2O . A portion was removed for control tests, the remainder was shaken with powdered Co reduced at red heat by H_2 and incubated at 30° for 24 hrs. The controls were also incubated. On removal the p_H , elec. cond., and η were detd. The expl. data are reported in the form of tables showing the relation between p_H and elec. cond.; p_H and η . The results confirm the hypothesis, that the reaction between Co and gelatin is similar to that of a metal and an amphoteric electrolyte: (a) there was a decrease in H-ion concn.; (b) a diminution in cond. and η when $[H^+] > [H^+]_i$; (c) an increase of cond. and η when $[H^+] < [H^+]_i$; (d) the amt. of Co fixed depends on the initial p_H ; (e) the curve representing the Co fixed with respect to initial p_H shows a min. at the isoelec. point. III. The application of the theory of membrane equilibrium in the case of cobalt and gelatin. *Ibid* 277-88.—If a soln. of Co-protein at a given p_H is sepd. by a collodion membrane from a soln. of $CoCl_2$, certain fundamental relations may be deduced from Donnan's theory of membrane equil.: (a) The value for E in systems contg. solns. qual. equal and quant. similar should be about equal or const.; (b) by increasing the concn. of total Co the ratios H_1^+/H_2^+ and $E\sqrt{(Co_{tot})_1/(Co_{tot})_2}$ should diminish but be greater than unity; (c) the same diminution should be noted if a strong electrolyte which does not alter the p_H is added to the system; (d) when the p_H of the system is less than 4.7 the values of the above ratios should be less than unity and increase in the same proportion as the increase in concn. of the anion of the acid outside the membrane. (1) Flasks contg. 1% gelatin at different p_H were prepd. as previously described. They were incubated at 30° for 12 hrs. with Co powder. They were removed and the p_H of the gelatin in each flask was detd. The gelatin was placed in 7 collodion sacs closed at the top with a perforated stopper through which passed a thin glass tube 40-50 cm. long. Each sac was placed in a beaker contg. 0.002 N $CoCl_2$. After 5-6 days the p_H and total Co were detd. on each side of the membrane. (2) Five flasks of gelatin at different p_H were also placed in sacs except that the gelatin had not been in contact with Co. The sacs were placed in beakers contg. distd. H_2O at the bottom of which was a 0.5-mm. layer of activated Co powder. They were left standing for 4-5 days after which the p_H and total Co were detd. on each side of the membrane. (3) Another series of flasks was treated similar to (1) except the sacs were immersed in 0.002 N $CoCl_2$ and HCl of different concns. (4) In this series the sacs were immersed in beakers containing 0.002 N $CoCl_2$ and N KCl. The data reported in tabular form confirm all the deductions (a), (b), (c), (d) derived from Donnan's theory and show that powdered Co acting on gelatin at p_H 2 to 7 forms Co-protein salts. IV. The action of cobalt on gelatin at $p_H > 7$. *Ibid* 289-92.—If powdered Co is placed in contact with gelatin of $p_H > 7$, the Co fixed by the protein should be inversely proportional to the p_H . The ampholyte functions as a weak acid and thus the elec. cond. increases. The increase, however, is inversely proportional to the p_H

until it reaches zero as a limit, a point where the protein no longer fixes the metal in the ionic state. Five 1-g. samples of isoelec. gelatin were treated at 10° with NaOH solns. of varying concns. The gelatin was washed and melted as already described. They were brought to 100 cc at 30° with distd. H₂O. Part of the solns. were kept as controls, the remainder incubated at 30° with powdered Co. After 24 hrs. the p_H and elec. cond. were detd. on the control samples, and p_H , elec. cond. and total Co on the samples treated with the metallic powder. The p_H was detd. by means of the H electrode. The results are given in tabular form and confirm the theoretical deductions. However, in some cases at high p_H where the increase in elec. cond. was nil or even negative, the fixation of Co was about 34% of that fixed in the sample with the max. increase in cond. Co-gelatin solns. formed at $p_H < 7$ had a weak rose color; those at $p_H > 7$ had a yellowish color almost brownish. The color is intensified if the Co-gelatin solns. are agitated with a current of air or other oxidizing agent. This treatment increases the total Co fixed, but there is not an analogous increase in elec. cond. or variation in p_H . Besides the cobaltous ion corresponding to Co-gelatin salts, there must be present also trivalent Co in the form of cobaltamines. PETER MASUCCI

Quantitative variations in the glutathione of isolated organs. S. VISCO AND S. CASTAGNA. *Boll. soc. ital. biol. sper.* 3, 282-3 (1928).—In isolated beef liver kept at a temp. 10° ± 1° the reduced glutathione content remains const. for the first 2 hrs. and then begins to decrease gradually until it reaches a min. after 24-32 hrs. After this min. a rapid increase takes place and reaches values greater than the initial one. From 90 to 96 hrs. after extirpation there is a complete disappearance of reduced glutathione. Tunncliffe's method was used for the detns. PETER MASUCCI

The present knowledge of the chemical constitution of leucocyte granules. I. Introduction. II. Indirect methods for studying the nature of leucocyte granules. ALFRED NEUMANN. *Folia Haematol.* 36, 95-144 (1928). **III. Direct methods for studying the chemical nature of leucocytes granules.** *Ibid.* 248-88. This is a very complete crit. review, including the literature. JOHN T. MYERS

New ultra-penetrating rays and the living cell. ALBERT NOBON. *Rev. sci.* 65, 609-17 (1927); cf. *C. A.* 16, 2636; 18, 1305, 1838. —The equipment used and results obtained are given in more detail. On the whole, the radioactivity of living vegetable tissues is of the same order of magnitude as that of U, and is greater in the reproductive organs than in other parts of plants: it is greater in freshly cut than in partially faded plants, and is entirely absent in dried plants. It undergoes slight variations from day to day, as with Ra and U, which seems to depend on the degree of activity of ultra-radiations. It is reduced by interposing a thick Pb screen in the path of the sun's rays. In the absence of sunlight, it is practically the same inside and outside a closed chamber (ultra-penetrating rays of cosmic origin). Very appreciable differences are sometimes observed in the emission of + or - ions, in which case the plant has an excess + or - charge, showing that a vegetable cell can spontaneously have a + or - charge. Soil freshly taken from the fields has a radioactivity comparable to that of fresh plants, which decreases as the soil dries out and is nil with soil from a damp cellar. The radioactivity of insects is from 3 to 15 times as great as that of U, the radioactivity of sick insects is appreciably lower than that of healthy ones, being of the same order of magnitude as that of plants, dead insects are not radioactive. N. suggests a theory whereby the results obtained would be accounted for by the action of ultra-penetrating rays (ultra rays), which may reach as far as wave lengths of 10⁻¹¹ cm.; and he also puts forth the suggestion that the origin of biological energy and the whole problem of living matter are dependent on these rays and their intraelectronic effects. A. PAPINKAU-COUTURE

The lipid question. BRUNO REWALD. *Chem. Ztg.* 52, 477-8 (1928). —The term *lipoid* is the best for this class of substances, "lipin," "lipide," etc., should be discontinued. The concept should not include the sterols, which are a class to themselves. So long as the constitution of individual lipoids is unknown they should be called *liver lipoids*, *egg-yolk lipoids*, etc. The purest "lecithin" is still a mixt., and many of the formulas given are very doubtful. Recommendations are made for the *deln.* of lipoids. AUSTIN M. PATTERSON

Temperature and life. Complex nature of the effects of temperature on the rates of certain biological processes. MERKEL H. JACOBS. *Am. Nat.* 62, 289-97 (1928). —**Temperature as an ecological factor in animals.** ROYAL N. CHAPMAN. *Ibid.* 298-309. —**Relation of temperature to the development of disease in plants.** JAMES G. DICKINSON AND JAMES R. HOLBERT. *Ibid.* 311-22. —Wheat seedlings blight in a warm soil but not in a cold soil. Corn seedlings blight in a cold soil but not in a warm soil. The cortical invasion and rotting are due largely to an unbalanced metabolism within the seed-

ling during the early stages of germination which resulted in the cell walls of the protective tissues composed of intermediate pectin-like substances instead of cellulose reinforced with lignin. These walls were easily hydrolyzed which allowed a rapid invasion by the parasite. The unfavorable environment was used in selecting resistant strains. Selecting for resistance in segregating inbred lines of corn grown in cold soils infested with the parasite has resulted in resistant lines growing well at low temps. These lines, in contrast with susceptible lines, show that the "inheritable resistance" is similar in nature to the "induced resistance" brought about by high soil temps. Resistance appears to be due to an intensification and stabilization of factors controlling a balanced seedling metabolism. This results in cellulose walls well reinforced with suberin and a cell compn unsuitable for the nutrition of the parasite over a wide range of unfavorable environmental conditions. L. W. RIGGS

Mineralogical forms of limestone in living beings and the problem of their determination. MARCEL PRENANT. *Biol. Rev. Biol. Proc. Cambridge Phil. Soc.* 2, 365-93 (1927) (In French, cf Johnston, Merwin and Williamson, *C. A.* 10, 2183).—The topics considered are the mineralogical forms of limestone, their properties, their distribution in living organisms and the causes which det. the production of the different forms. The subject is illustrated by equil. diagrams involving the pressure of CO_2 , concn of CO_2 , p_{H} and the log of the concn of the metallic ions (Cf. *C. A.* 22, 640) L. W. R.

Some physical and chemical properties of serum proteins. MAURICE PIETTRE. *Compt. rend.* 186, 1657-9(1928) From the phys. point of view, proteins are hardly to be considered as buffers, this role being attributed to mineral or org. impurities which accompany proteins. The p_{H} values of biologic media follow the dispersing medium more than the substances dispersed. Chemically the peptide groups are in the anhydride form. The indifference of the 2 principal proteins to acids and alk. bases guarantee to the humoral equal a precise stability L. W. RIGGS

Photometric determination of the permeability of olive oil toward ultra-violet light. E. ROUSSEAU. *Compt. rend. soc. biol.* 96, 611-2(1927); cf. *C. A.* 21, 2612. L. W. R.

Variations of the index of refraction of serum and plasma treated with ultra-violet radiations. J. CLUZET AND T. KOFMANN. *Compt. rend. soc. biol.* 98, 978-9(1928).—Normal horse serum at 20° increased progressively its n from 1.3466 to 1.3531 during 30 min. of irradiation. Another horse serum increased n from 1.3470 to 1.3527. With antitetanic, antistreptococic and antidiphtheritic serums there was a similar increase of n upon irradiation. Beef plasma showed an increase of n from 1.3504 to 1.3535 after 30 min. of irradiation. The change in n is attributed to a change in the state of the proteins present in the serum or plasma L. W. RIGGS

Adsorption of glucose by albuminoid precipitates. J. H. CASCAO DE ANCIA'S AND CARLOS TRINCAO. *Compt. rend. soc. biol.* 98, 1003-5(1928).—The sums of the reducing powers of 4 pairs of solns. of glucose and albumin were 1.87, 2.27, 1.74 and 2.38. When these pairs of solns. were mixed the reducing powers of the mixts. were 1.52, 1.90, 1.36 and 2.09. The differences, 0.35, 0.37, 0.38 and 0.29 represent the adsorption of glucose by albumin L. W. RIGGS

Means of preventing the adsorption of glucose by albuminous precipitates. J. H. CASCAO DE ANCIA'S AND CARLOS TRINCAO. *Compt. rend. soc. biol.* 98, 1586-8(1928); cf. preceding abstract.—By dissolving the albumin in a 5% soln. of NaCl instead of water, the adsorption of glucose by the albumin was almost completely prevented. L. W. RIGGS

Motility of the digestive tube in a decalcified medium, under the influence of ultra-violet rays. T. VACEK. *Compt. rend. soc. biol.* 98, 1025-6(1928). **Influence of ultra-violet rays on the motility of the muscular coats of the digestive tube.** *Ibid* 1027-8. L. W. RIGGS

Biologic role of calcium salts. L. AMBARD AND F. SCHMID. *Compt. rend. soc. biol.* 98, 1220-2(1928).—The subject is discussed from the equil. point of view of solns. of CaCl_2 , NaCl , H_2CO_3 , NaHCO_3 , and albumin. L. W. RIGGS

Study of the gaseous products which arise by the action of oxygen on glucose in an alkaline medium. Apparatus and technic. MAURICE NICLOUX. *Compt. rend. soc. biol.* 98, 1225-8(1928).—By the method employed, 0.250 g. of glucose dissolved in 0.1 N KOH and acted on by 50 cc. of O yielded 1.6 to 1.7 cc. of CO at a temp. of 84° . With 1.5 g. of glucose in 0.2 N KOH and 80 to 90 cc. of O at 84° enough CO was obtained to be kindled with a match. L. W. RIGGS

Imbibition by the vagal liquid. A. LAMBRECHTS AND H. FREDERICQ. *Compt. rend. soc. biol.* 98, 1244-6(1928).—The beginning of hemolysis of normal human red corpuscles takes place in a stronger concn. of hypotonized vagal liquid than in the analogous liquid of repose. The excitation of the vagosympathetic of the frog liberates

substances capable of diminishing the resistance of the corpuscles by increasing their imbibition. These expts. confirm the results obtained by aid of the muscle stria, which have also shown that the vaginal liquid favors the imbibition of protoplasmic colloids. **Action of acetylcholine on the imbibition of muscle stria.** *Ibid* 1246-7.—Acetylcholine increases the imbibition of the muscle stria of the frog and shows a close parallelism to the action of the vaginal liquid. L. W. RIGGS

Carotinemia and plasmatic xanthochrome. N. FLEISSINGER, H. WALTER AND J. E. THIERRY. *Compt. rend. soc. biol.* 98, 1297-9(1928).—In the colorimetric detn. of the biliary index of the blood plasma the subject should avoid foods rich in carotinoid pigments, such as carrots, pumpkins, oranges, etc., during the 24 hrs. before the samples for index detn. are taken. **Physiologic variations of the plasmatic xanthochrome in man.** *Ibid* 1299-1301.—The variations of the biliary index of the plasma are reported for several patients. The colorimetric estn. of the bilirubin of the blood serum gives an easily obtained approx. value of the cholemia, provided those foods which color the serum are excluded from the diet. L. W. RIGGS

Properties of filaments of coagulated gelatin. R. COLLIN. *Compt. rend. soc. biol.* 98, 1353-5(1928).—The color reactions of the filaments of coagulated gelatins are the same as those of fibrils of collagen. The probable relations of collagen and gelatin are discussed. L. W. RIGGS

Action of heat on the protein materials of the blood serum. SERVER KIAMIL AND RASSIM AALI. *Compt. rend. soc. biol.* 98, 1419-20(1928).—The protein materials of guinea pig serum show the least variations in the contents of globulin and albumin. Serums of guinea pig, rabbit and sheep when heated to 56° have varying quantities of their serum albumin transformed into serum globulin. The quantity transformed varies with the time but not always directly. The complement is not at all subject to the content of serum albumin and serum globulin in the serum. L. W. RIGGS

Fermentative processes. Action of amylase. YVONNE SCHAEFFER. *Compt. rend. soc. biol.* 98, 1491-4(1928).—The substrate was prepd. from potato starch according to the method of Mme. Gruzewska and the enzyme from saliva according to the method of Cohnheim. The amylose substrate after autoclaving for 2 hrs. at 130° was dild. to 0.05 to 0.007%, its p_H was adjusted to 6.7 when it was distributed in 10-cc. portions in tubes. To these samples was added 1 cc. of the saliva prepn. of variable prepn and concn. and the mixt. was placed in a thermostat. At varying intervals of time tubes were removed and plunged into boiling water for 3 min. to arrest the action of the enzyme, after which the sugar in the tubes was detd. according to Bertrand. The results expressed in curves show the total quantity of sugar produced, also the quantity produced per unit of time. This velocity of reaction was greatest during the period 75 to 100 min. after the addn. of the enzyme, when about 10 times as much sugar was produced as during any other 25 min. L. W. RIGGS

Relations between the increase of permeability of the hemato-encephalic barrier and the alterations of its morphologic substratum. L. STERN AND J. L. RAPOPORT. *Compt. rend. soc. biol.* 98, 1515-7(1928), cf. C. A. 21, 3973.—Exchanges between the cerebrospinal fluid and the cerebrospinal nerve elements. *Ibid* 1518-9. L. W. R.

Coagulation of egg white by biologic agents. E. LAGRANGE. *Compt. rend. soc. biol.* 98, 1527-9(1928).—Many tests are described and the possible relations of micro-organisms to the results are discussed. L. W. RIGGS

Absorption of ethylene by the blood, serum and water. Determination of the coefficient of solubility. MAURICE NICLOUX AND SCOTTI-FOGLIENI. *Compt. rend. soc. biol.* 98, 1544 7(1928); cf. C. A. 22, 1608.—Pure C_2H_4 , 85% or 36% C_2H_4 with air is absorbed by water, serum or blood in amts. proportional to the partial pressures of C_2H_4 , and according to Henry's law. The coeff. of soly. of C_2H_4 in water, serum or blood decreases regularly as the temp. rises and between 20° and 40° falls from 0.11 to 0.07. The coeff. is higher for blood than for its serum, for swine than for beef blood and has practically the same figure for water, swine or beef serum. Previous studies have shown that the coeffs. of soly. for vapors of $CHCl_3$ and C_2H_5Cl were higher for swine blood than for beef blood. L. W. RIGGS

Production of carbon monoxide by the action of oxygen or air on glucose in alkaline solution. Influence of temperature and alkalinity. MAURICE NICLOUX. *Compt. rend. soc. biol.* 98, 1548-51(1928); cf. C. A. 22, 2742.—A 0.5% soln. of glucose, a temp. of 84° to 85° and an alk. of 0.1 N are the most favorable conditions for the production of CO by the action of O or air on glucose solns. L. W. RIGGS

Modifications of glucemia in normal subjects by irradiation of the pancreas. FERNANDO FONSECA AND CARLOS TRINCAO. *Compt. rend. soc. biol.* 98, 1591-2(1928).—Irradiation of the pancreas by x-rays, $1/2$ of an erythematous dose being used, causes

a lowering of the glucemia in the fasting subject and modifications of the glucemia curve which are attributable to a hyperinsulinemia. Effect of irradiation of the pancreas on the glucemia and glucosuria of diabetes. *Ibid* 1593-4.—X-rays have an excitant action on the endocrine function of the pancreas. It is argued that x-ray treatment may supplement or replace in part insulin treatment of diabetes. L. W. R.

Reticuline-M, a product of the internal secretion of the reticulo-endothelial system. I. MOLDOVAN. *Compt. rend. soc. biol.* 98, 1617-9(1928).—The blockage of the reticulo-endothelial system by the intravenous injection of India ink is followed by the appearance in the blood of a substance which dialyzes readily through thick collodion membrane, is sol. in alc. and appears to resemble the amines. This product of the internal secretion of the reticulo-endothelial system is considered a hormone and is named reticuline-M in memory of Metchnikoff. L. W. RIGGS

Swelling as a function of the pH of organized membranes. M. CHANOT AND R. NOEL. *Compt. rend. soc. biol.* 99, 67-9(1928).—Fragments of the stomach of a calf recently killed showed a min. of swelling at the isoelec. point. The swelling increased as the medium was made more alk. with NaOH or more acid with citric acid. L. W. RIGGS

Spontaneous modification of the viscosity of fresh blood serum. LÉCOMTE DU NOUV. *Science* 67, 563-4(1928); cf. *C. A.* 21, 2499.—Horse serum centrifuged immediately after sepn. from the clot and placed in the viscometer behaved in the following way: At first its viscosity, which is rather high, increases for about 10 min., then decreases rapidly almost proportionally to the time, and finally reaches a stable value lower than the original one. Toward the end the curve is logarithmic. The total phenomenon requires from 1 to 2 hrs., the time depending apparently on the amt. of handling to which the serum has been submitted. An hypothesis is offered to account for this action. L. W. RIGGS

Enzymic mutation and enzymic formation of lactic acid from glycogen. HANS V. EULER AND EDVARD BRUNIUS. *Svensk Kem. Tids.* 39, 287-95(1927); cf. *C. A.* 22, 2384.—Experiments with two dried muscle preparations. HANS V. EULER AND STIG PROFFE. *Ibid* 295-7. (In German).—Mutase is identical with carbohydrate-dehydrogenase (Thunberg), perhydridase (Bach) and Schardinger-enzyme. Mutase activity was noted in press juice from liver and muscle, more active in the former than in the latter. Activity is not diminished by AcOH deproteinization but is diminished by dialysis and by colloidal Fe pptn. Mutase and cozymase are both present in dried muscle from ox and rabbit. Enzymes causing mutation and lactic acid formation do not show parallel activity factors in extracts from liver and muscle. Mutase activity was tested by destruction of AcH (Cannizzaro reaction) (*C. A.* 21, 3065). A. R. R.

The plasma membrane of ox erythrocytes as studied by Wheatstone bridge measurements. J. F. McCLENDON. Univ. of Minn. *Protoplasma* 3, 7-10(1927).—The measurements of elec. impedance of blood (Z_0) at $f = 0$ (direct current) were made with a Christiansen ionometer, those at $f = 1000$ with a Vreeland oscillator, Wheatstone bridge and 2-stage amplifier and those at $f = 1,500,000$ with an electron tube oscillator and Wheatstone bridge, with heterodyne detection and 2-stage amplification of the beat-note of 1000 cycles per sec. The oscillator, Wheatstone bridge, amplifier, heterodyne and all connections, transformers, and A and B batteries were enclosed in grounded Cu shields. The impedance of corpuscles (100% cell vol.) at 1000 cycles is from 4.705 to 7.06 times as great as at 1,500,000 cycles. This is not due to variations at 1,500,000 for they are only from 335.3 to 442.9 but to variations at 1000 cycles which are from 1747 to 2590. The specific impedance (resistance) of the corpuscle interior is probably very close to 335.3 to 442.9 or roughly about 400 ohms. The greater specific impedance of the corpuscle at 1000 cycles are due to the impedance (reactance) of the plasma membrane, and if 400 ohms are subtracted from this impedance, the impedance of the plasma membrane is calcd. to be 1747-400 to 2590-400 or 1347 to 2190 ohms. This great variation of the impedance of the plasma membrane is probably due to injury caused by handling, as it is observed that handling (centrifuging, defibrinating, storing) the blood always decreases the impedance. The impedance of the uninjured plasma membranes in 1 cm. of blood is probably 2190 ohms or higher. On laking the corpuscles the impedance at 1000 and 1,500,000 cycles is the same. M. H. SOULE

A general reaction of amino acids (DAKIN, WEST) 10.

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Composition of the blood of children. G. DE TONI. *Clin. pediatr.* **8**, 449-93 (1926).—A system of analytical methods is described. B. C. A.

Clinical methods for the determination of hemoglobin. E. M. F. ITHURRAT and V. MORERA. *Rev. asoc. med. Argentina* **39**, 401-26 (1926). Newcomer's method is recommended although Birker's method is more accurate. B. C. A.

Method for the determination of the weight of particles, based upon the phenomenon of isothermal distillation, and its application to the measurement of particle concentration in blood serum and of physiological solutions. AURELIA RYCHTEROWNA. *Arb. Kommission Math. Naturwiss. Posen*, Series A **2**, 29-71 (1925). *Chem. Zentr.* **1927**, I, 2582.—The expts. had as their object the detn. as precisely as possible of the compn. and properties (osmotic pressure, sp. cond., p_H value, etc.) of human blood serum, in order to utilize the results in the prepn. of a physiol. soln. as nearly identical as possible with blood serum. The most suitable method for detg. particle concn. appeared to be that of Barger (*Ber.* **37**, 1754 (1904)) improved by Rast (*C. A.* **16**, 519), since this had the advantage over the ordinarily used cryoscopic methods that all measurements could be made at the temp. of blood. Measurements with a cathetometer showed that the reason for the transfer of a solvent from a weaker soln. to a more concd. soln., which are sepd. by an air bubble in a narrow sealed tube, is not as maintained by Yamakami (*C. A.* **14**, 1913) solely an osmotic phenomenon, but results from isothermal distn. of the solvent. With the method of Rast it was proved that the error of 0.01 g.-mol. with nonelectrolytes is never exceeded. The times for equil. to be established at 36.5° in glass tubes with aq. solns. and with blood serum were detd. By modifying the method of Rast, including the use of a const. temp., the precision was increased to 0.005 g.-mols. even in measuring the particle concn. of electrolytes. By applying this micro-method to the detn. of particle concn. in serum, it was found that this was 0.200-0.302 g.-mols. per l. With the aid of this method and cond. detns., certain physiol. solns. used in medicine were compared, and the compn. of one physiol. soln. was derived.

C. C. DAVIS

Microchemistry and microphysics in the service of tissue hygiene. New methods for the diagnosis of lead poisoning. P. SCHMITT. *Mikrochemie* **5**, 8-11; *Chem. Zentr.* **1927**, I, 2122. The order of magnitude of the quantities of Pb in the blood, cerebrospinal fluid and urine is such that only a colorimetric method is suitable for its detn. The use of Arnold-Mentzel reagent on superoxide (tetramethyldiaminodiphenylmethane) (cf. *Ber.* **35**, 2902) gives satisfactory results if the microanalysis is improved in the following way. After destruction of org. substances ($\text{HNO}_3 + \text{H}_2\text{SO}_4$) ppt. the heavy metals by H_2S under pressure in ammoniacal soln., sep. on the asbestos filter Fe and Mn by means of $\text{EtOH} + \text{H}_2\text{SO}_4$ and Cu by KCN, dissolve the PbS in HNO_3 , oxidize with NaClO on the boiling water bath, filter off the PbO_2 on a Schott asbestos glass filter, after addn. of Arnold-Mentzel reagent dissolve in AcOH . A blue color indicates Pb. The optimum time of pptn. is 24-36 hrs., for too long a passage of H_2S increases the dispersion of PbS so that it passes through the filter. After soln. of the PbS in HNO_3 , it must be washed to recover any PbSO_4 formed. Before the oxidation it is essential to neutralize and oxidation should be effected with excess NaClO . Every trace of NaClO should be removed by washing with cold water. Microanalysis gives only approx. results and requires supplementary examn. by spectral analysis. By the use of C electrodes and an asbestos filter in the spark gap, the PbO_2 can be infiltrated on the smallest surface, so that the greatest possible concn. of Pb vapor in the elec. spark is obtained. Quantities of Pb under 0.005 mg. can thus be caught. Besides being useful in practical diagnosis, the new method also gives a clue to the character of Pb poisoning and the distribution of Pb in the organs and cells. Pb appears even in traces to act primarily as a poison to the cell nuclei.

C. C. DAVIS

The preparation of the unaltered modification of hydroxyhemin and chlorohemin. A. HAMSIK. *Z. physiol. Chem.* **176**, 173-86(1928).—In order to prep. the unaltered or α -modification of hydroxyhemin and chlorohemin from defibrinated blood it is necessary to avoid so far as possible the presence of free mineral acid in the pigment solns. The following procedure is the least likely to cause such alteration. Defibrinated blood is coagulated with MeAc, the coagulum freed from chlorides and extd. with a mixt. of MeAc and $(\text{COOH})_2$. For the prepn. of hydroxyhemin the ext. is treated with NaOAc; for the prepn. of chlorohemin it is treated with dil. HCl, until the pigment rapidly ppts. out. The ppt. is sepd. as soon as possible from the mother liquor and washed. Other prepn. in which EtOH was used in place of MeAc, or H_2SO_4 in place of $(\text{COOH})_2$, contained varying amts. of the altered or β -modification of the pigment. A. W. D.

Studies on the Folin method of analysis for glucose in normal urine. R. H. HAMILTON, JR. Univ. of Minnesota. *J. Biol. Chem.* **78**, 63-5(1928).—By using acid-treated Lloyd's reagent one can dispense with the use of permute in Folin's method for detg. glucose in urine. The reagent is acid-treated by extg. for 24 hrs. with concd. HCl, washing and drying and repeating the procedure with concd. HNO_3 . A. G.

Determination of total chlorine and weakly combined chlorine in the gastric juice. D. RAGUET AND PAGET. *Ann. chim. anal. chim. appl.* **10**, 161-2(1928).—It is sometimes desired to know not only the amt. of free HCl but also the Cl combined with org. material and that present as salt of a mineral base. Details are given for carrying out an argentometric detn. of these 3 kinds of Cl. By evapg. to dryness and calcining the residue, the Cl present as metallic chloride is obtained. By evapg. of the water bath, the free HCl is removed, and then by calcining with soda and niter, the Cl present as org. Cl compd. is obtained together with that of the inorg. salt. Finally the total Cl can be obtained by adding alkali at the start and then evapg., and calcining.

W. T. H.

Determination of traces of mercury. III. Determination of mercury in urine and feces and the influence of medication. N. E. SCHREIBER, TORALD SOLLMANN AND HAROLD SIMMONS BOOTH. Western Reserve Univ. *J. Am. Chem. Soc.* **50**, 1620-5(1928).—With normal urine, the method of Booth, Schreiber and Zwick gives Hg results within 0.01 and 0.02 mg. Long standing without freezing does not alter the Hg content of urine. Dosage of arsenophenamine, Bi subnitrate, chloral hydrate, barbital and small amts. of urotropine bromide do not interfere with the standard procedure. On the other hand, aromatic compds. such as Na salicylate, cinchophen and large quantities of urotropine complicate the oxidation so much that it is inadvisable to administer these drugs during a study of mercurial medication. Iodides and considerable bromide interfere seriously but such interference can be easily taken care of by a modified procedure which is described. In the analysis of feces decompn. with KMnO_4 and concd. HNO_3 proved satisfactory and 2-3 mg. in the daily stool can be detd. with a loss of 0.01-0.04 mg.

W. T. H.

Myothermic apparatus. A. V. HILL. Univ. of London. *Proc. Roy. Soc. (London)* **B103**, 117-37(1928).—The app. includes a moving-coil galvanometer of high sensitivity and short period, a thermostat in which the temp. is maintained const. within 0.001° for long periods, and an all-metal thermopile which responds quickly, settles down rapidly and is very completely insulated. Total heat is measured from the area of the deflection time curve. The gases employed (N_2 , O_2 and CO_2) are especially purified. A Ringer soln., contg. 7 to 10 mg. P as Na phosphate per 100 cc. and with a p_{H} of approx. 7.2, is the most suitable medium.

JOSEPH S. HEPBURN

Glyoxals. NORIYU ARIYAMA. Wash. Univ. Med. School. *J. Biol. Chem.* **77**, 359-94(1928); cf. C. A. **22**, 1784.—A new colorimetric method for the detn. of glyoxals is described based on their marked reducing action in alk. soln. in the presence of cyanide. The color is developed by using Benedict's arsenophosphotungstic acid reagent followed by NaCN and Na_2CO_3 . $\text{CCl}_3\text{CO}_2\text{H}$ is used to ppt. protein from the solns. to be analyzed. The glyoxals are quite stable up to a p_{H} of 8.0. At higher p_{H} values the transformation of glyoxal proceeds at the rate of a monomol. reaction, the rate increasing a trifle more slowly than the OH-ion concn. of the soln. The quant. formation of the corresponding hydroxy acid does not occur below p_{H} 12. The glyoxalase of tissue exts. is most active at p_{H} 7.0 and converts Me glyoxal quant. to lactic acid. It is most abundant in the liver. The "antiglyoxalase" of the pancreas inhibits the action of glyoxalase only when it has been kept in contact with it for some time before the addn. of the glyoxal. There is considerable doubt as to the enzymic nature of this substance. Insulin has no effect. Glyoxals are strongly decompd. catalytically by alk. KCN soln. but lactic acid is not produced and it has not been possible to identify the substance formed.

A high reduction intensity develops when glyoxals are destroyed by KCN; this has not been observed when the decompn. is effected by glyoxalase or alkali. A. P. L.

The validity of the ethyl iodide method for measuring the circulation. YANDELL HENDERSON AND HOWARD W. HAGGARD. Yale Univ. *Am. J. Physiol.* **82**, 497-503 (1927); cf. C. A. **21**, 431.—A defense of the author's method for the detn. of circulation in man. J. F. LYMAN

Comparative measurements of the circulation in man with carbon dioxide and ethyl iodide. R. J. BROCKLEHURST, H. W. HAGGARD AND YANDELL HENDERSON. Yale. *Am. J. Physiol.* **82**, 504-11(1927).—The arterio-venous CO₂ difference in a healthy man at rest is probably about 3.5 vols. % and his circulation, on the assumption of 234 cc. per min. CO₂ production, is, therefore, 6000 cc. This value agrees closely with that found by the EtI method. The procedure for detg. the circulation rate by means of CO₂ is described and consists essentially in finding the difference between samples of arterial alveolar air and venous alveolar air (the latter obtained from a rubber bag contg. O₂ and CO₂ and whose contents were rebreathed in such a way as to give CO₂ equil. with the venous blood coming to the lungs). J. F. LYMAN

Photographic methods of estimating the percentage saturation of hemoglobin with various gases. I. The ratio of oxyhemoglobin to carboxyhemoglobin. H. HARTRIDGE AND F. J. W. ROUGHTON. Cambridge. *J. Physiol.* **64**, 405-14(1928).—Photographs of the α -band of the absorption spectra of the unknown blood solns. were compared with spectra of solns. of known compn. By the use of a selenium densitometer the mid point of the α -band was detd. The difference between the mid points of the band in 100% oxyhemoglobin and 100% CO hemoglobin amounts to about 3.5 m μ ; the accuracy of the method is higher than that given by the revision spectroscope and has the added advantage of giving a permanent record free from subjective errors. J. F. LYMAN

A new method for staining reticular tissue. I. G. RASTELLI AND P. MASCHERPA. *Boll. soc. ital. biol. sper.* **3**, 188-91(1928).—A technic for staining reticular tissue is described. Histological sections are passed through an aq.-alc. soln. of pyrrrole, washed, and placed in a 0.1% sol. AuCl₃. The sections are washed again, passed through alc., xylene, and Canada balsam. A brown-violet to a black color appears in 3-6 hrs. The mechanism of staining is explained. Pyrrrole has a special affinity for the proteins of the reticular tissue, and this affinity is due to the mobile H. It is fixed by the proteins through the NH group. The AuCl₃ reacts with the carbon atoms of the pyrrrole and forms colored compds. PETER MASUCCI

Glassmann's method for the determination of sugar. G. B. TAFURI. *Boll. soc. ital. biol. sper.* **3**, 203-4(1928).—The assumption that alc. exts. sugar only from the blood and urine is not correct. Other substances are extd. capable of giving condensation products with resorcinol. The method is, therefore, not reliable for the detn. of sugar in biol. fluids. PETER MASUCCI

A buret for the pharmacological study of very unstable colloids. L. SABBATANI. *Boll. soc. ital. biol. sper.* **3**, 205(1928).—Certain inorg. colloids cannot be stabilized by means of protective agents and flocculate quickly. To study the pharmacol. action of these S. has devised a double buret in which the two reacting solns. meet in a small mixing chamber close to the injecting cannula. Agitation is facilitated by means of an automatic mech. agitator while the solns. flow towards the vein of the animal. By lengthening the distance between the mixing chamber and injecting cannula the time between the prepn. of the colloid and its injection may be varied at will. P. M.

New method for the extraction of liquids. E. P. WIDMARK. *Bull. soc. chim. biol.* **10**, 669-74(1928).—In the app. the solvent liquid is made to run from the compartment contg. the liquid to be extd. into a compartment contg. an absorbing liquid which changes the compn. of the substance extd. so that it is no longer sol. in the solvent liquid. The solvent liquid then runs back to make a further extn. The movements of the solvent liquid are made by placing the extn. app. on a rocker driven by a motor. The process is accordingly named "extraction en berceau." I. W. RIGGS

Preparation of absorbent papers used in the micro-analysis of Bang. F. NERVENUX AND A. THÉPÉNIER. *Bull. soc. chim. biol.* **10**, 699-701(1928).—The paper should be of pure rag stock, white, smooth and rather thin. It should be cut in rectangles 25 × 10 mm., the pieces to weigh 75 to 80 mg. The papers are boiled 1 hr. in 10% AcOH then are drained and rinsed in boiling water on a Buchner funnel until the p_H is between 6.4 and 7.0, when the papers are dried at 37° and are preserved in a stoppered flask. I. W. RIGGS

Application of the micro-carbon method of Nicloux to the determination of urea by the intermediary of dixanthylurea. ANDRÉ BOIVIN. *Bull. soc. chim. biol.* **10**,

684-97(1928); cf. C. A. 21, 929.—The technic is based on the detn. of C in dixanthylurea by the sulfochromic method of Nicloux, except that Ag_2CrO_4 is not used as it leads to the formation of important quantities of CO. The method is sensitive to 1 to 0.1 mg.

L. W. RIGGS

Quantity of the residue of fermentation. Test of the value of a method for estimating blood sugars. G. FONTES AND L. THIVOLLE. *Compt. rend. soc. biol.* 98, 1218-20 (1928).—Since the blood contains reducing substances which are not sugars, those methods of estg. blood sugar which depend on reduction are faulty. It is proposed to deprive the blood of all sugars, without modifying the nature or quantity of the other constituents, then add a known quantity of glucose and redet. the added sugar quantitatively. In carrying out this proposition the sugars were removed by fermentation with *Fala* or *Royale* yeast. The residue (*reste*) of fermentation in 17 expts. averaged 0.0074 g. per l. and in 8 of the 17 tests there was no residue. Apparently the difference between the sugar recovered and that added represents the reducing substances not sugar. This gives a factor for correcting the results of the usual blood sugar detn.

L. W. RIGGS

Improvement of the Nicloux apparatus for the micro-determination of carbon. MAURICE NICLOUX. *Compt. rend. soc. biol.* 98, 1222-5(1928); cf. C. A. 21, 1945, 3642, 3857.—The changes from the previous forms of app. are illustrated and described.

L. W. RIGGS

Colorimetric estimation in monochromatic light of cholesterol, glucose, uric acid and hemoglobin. P. LAURENT-GÉRARD. *Compt. rend. soc. biol.* 98, 1325-9(1928).—The utilization of the Vernes, Bricq and Yvon colorimeter with monochromatic screens specially selected for each color permits a more accurate estn. of the substances above named than by polychromatic light.

L. W. RIGGS

Method of estimating the oxidases in the tissues. J. LASKOWSKI. *Compt. rend. soc. biol.* 98, 1369-71(1928).—The method consists in the formation of iodophenyl blue under detd. conditions and its comparison with a colorimetric standard. L. W. R.

A note on the Koch and McMeekin method for the determination of nitrogen; with special reference to the non-protein nitrogen of blood and urine. H. A. DAVENPORT. *J. Lab. Clin. Med.* 12, 286-7(1926).—Ordinary 3% H_2O_2 (U. S. P.) instead of the 30% soln. may be used to clear the H_2SO_4 digests of blood and urine in microdetn. of non-protein N by the Koch-McMeekin procedure, provided a correction of 0.002 mg. N per drop (20 to 25 drops to the cc.) be made for N derived from the acetanilide.

ETHEL W. WICKWIRE

The estimation of plasma chlorides. ARNOLD E. OSTERBERG AND EDNA V. SCHMIDT. *J. Lab. Clin. Med.* 13, 172-5(1927).—Blood plasma chlorides checked in duplicate by the method of Whitehorn can be detd. in the presence of a protein ppt., AgCl and the yellow of FeC_2O_4 . Pipet 1 cc. of plasma into a 125-cc. Erlenmeyer flask; add 10 cc. of 1:3 HNO_3 from a buret slowly and with agitation of the blood plasma so that a white, flocculent ppt. of the plasma proteins is obtained. To this suspension add 5 cc. of N/35.46 AgNO_3 soln., then 1 cc. of 20% ferric ammonium sulfate soln. Titrate the excess Ag with N/35.46 NH_4CNS or KCNS . Since these solns. are of the same normality as that used in the Whitehorn method, calcs. are the same. One cc. of Ag soln. is equiv. to 1 mg. of Cl or 1.65 mg. of NaCl. The end point is the first trace of color which spreads throughout the whole soln. from the point at which the drop strikes while the flask is gently rotated.

E. W. WICKWIRE

Some useful modifications of the Haldane gas-analysis apparatus. VINCENT DU VIGNEAUD. *J. Lab. Clin. Med.* 13, 175-80(1927).

E. W. WICKWIRE

A modification of the McLean-Van Slyke method for the estimation of chlorides in blood. M. I. HANNA. *J. Lab. Clin. Med.* 13, 651-3(1928).—Dil. 1 part oxalated blood or plasma with 7 parts H_2O , wash the pipet with dil. blood, and drain twice. Add, as in the Folin-Wu method, 1 part 10% Na tungstate and 1 part $\frac{1}{2}$ N H_2SO_4 . Shake vigorously a few min., filter through a No. 40 Whatman filter paper into a dry flask. To 10 cc. of filtrate add 10 cc. of distd. H_2O and 5 cc. of M/29.25 AgNO_3 soln. Let stand 5 min., filter through 2 small No. 40 Whatman filter papers folded together. Pour a few drops down the sextupled side of the filter and allow to soak into the paper, then pour the remainder into the filter. To 10 cc. of filtrate, add 2 cc. of starch citrate nitrite soln. Titrate to the first permanent blue tint with M/73.1 KI soln., using a 5-cc. standardized buret with a capillary tip dropping from 50 to 60 drops per cc. 10.15—double the titration value = mg. NaCl per cc. of original blood. This method is shown to be accurate within 1% and requires a smaller amt. of time, work and blood filtrate for detn.

E. W. WICKWIRE

A simplified technic for studying the secretion of lymph. LESTER R. DRACUT

AND CARL A. DRAGSTEDT. *J. Lab. Clin. Med.* 13, 654(1928).—The thoracic duct can be made to stand out conspicuously if to the meal of fat previously given is added a small amt. of fat (butter) satd. with Sudan III. The intestinal lymphatics also stand out in marked contrast to the strands of fat in the mesentery and along the blood vessels.

E. W. WICKWIRE

The Bunsen valve in blood-urea determination. F. P. BROOKS. *J. Lab. Clin. Med.* 13, 668-70(1928).—The use of the simple Bunsen valve, which is described, is suggested as a substitute for the flutter valve devised by Johnson in blood-urea distn. by the Folin-Wu method. The use of fixing paraffin to prevent foaming is found to be satisfactory.

E. W. WICKWIRE

An aid in the estimation of blood calcium. E. M. WATSON. *J. Lab. Clin. Med.* 13, 670-1(1928).—An app. for titration of the pptd. CaC_2O_4 consists of a microburet contg. KMnO_4 , a centrifuge tube contg. the CaC_2O_4 dissolved in H_2SO_4 and immersed in a beaker of water heated to 75° , a thermometer and a piece of flask opal glass illuminated by an elec. bulb to serve as a background for detg. the end point.

E. W. W.

Note on the Volhard-Harvey method for the estimation of chlorides in urine. WILLIS H. JEFFERY. *J. Lab. Clin. Med.* 13, 687(1928).—Trials on different subjects showed that the ingestion of 1 aspirin tablet was sufficient to give a brownish violet color characteristic of the reagents employed in this method. In order to insure the observation of a sharp end point, the employment of an extra dish contg. an untitrated mixt. to serve as control, together with the first rough titration, was found indispensable.

E. W. WICKWIRE

BARRENSCHEEN, HERMANN K., AND WILHELM, ROBERT. **Die Laboratoriumsmethoden der Wiener Kliniken.** Vienna: F. Deuticke. 800 pp. M.44, cloth bound, M.48.

MULLER, P.: **Klinische methoden voor scheikunde en microscopie.** Utrecht: Erven J. Byleveld. 151 pp. Bound, F.5.25

SICKEL, HANS: **Handbuch der biologischen Arbeitsmethoden. Abt. I. Chemische Methoden. Tl. 2. Allg. chem. Methoden. Hälfte 2, H. 1. Aminieren u. Amidieren. Lfg. 244.** Berlin and Vienna: Urban & Schwarzenberg. pp. 1139-1338. M.10

Colorimetric comparison tests of blood. O. AMME. *Brit.* 280,551, Nov. 13, 1926. Strips of absorbent material may be dyed in different colors such as pompeian red, puré blue and blue with a slight greenish tinge; suspected diseased blood is placed on strips of the material, allowed to dry and the specimens are examd. by transmitted light and compared with healthy blood.

C - BACTERIOLOGY

A. K. BALLS

Some chemical changes accompanying the growth of tubercle bacilli on Long's synthetic medium. A preliminary study. TREAT B. JOHNSON AND ALICE G. RENFREW. *Am. Rev. Tuberculosis* 17, 508-19(1928).—The period of increasing growth of human tubercle bacilli (H37) on synthetic medium is characterized by continued changes in inorg. NH_3 content and in the p_{H} of the medium. When growth of the bacteria ceases, or the rate of growth is apparently balanced by the rate of cell autolysis, the p_{H} and NH_3 values become comparatively const. The use of protein free synthetic medium of known compn. for bacterial growth has made it possible to eliminate the ordinary complications arising from NH_3 and amines formed as a result of enzymic digestion of proteins. Exptl. data indicate that there is a correlation between the reaction changes and growth of bacilli, and the p_{H} curves obtained by Frothingham, Weinziel and Knapton, and by the authors are in close agreement. The sudden change in p_{H} at the end of 4 weeks' growth is concomitant with the appearance of reducing substances (sugars?) and coagulable protein in the medium. The growth of tubercle bacilli on Long's medium reached the max. during the sixth week of incubation. It remains to be detd. whether the intensity of color formation with Folin's uric acid reagent actually characterized the growth of other bacterial organisms as has been observed with tubercle bacillus used in this study.

H. J. CORPER

Biacetyl a metabolic product? HANS SCHMALFUSS AND HELENN BARTHEMEYER. *Z. physiol. Chem.* 176, 282-6(1928).—In cultures of lactic acid bacteria on sterilized milk Ac_2 was recognized by its odor and isolated and identified as the dioxime. From 5 l. of culture the yield was 1.7 mg. dioxime, m. 235° . It is possible that the Ac_2 is formed by oxidation of the known bacterial product AcMcCHOH .

A. W. D.

Alcohol fermentation. XVII. Pyruvic acid as an intermediary product of alcoholic yeast fermentation. S. KOSTYCHEV AND S. SOLDATENKOV. *Z. physiol. Chem.*

176, 287-91(1928).—Not only in lactic acid fermentation (*C. A.* 21, 3921) but also in alc. fermentation by yeast the formation of AcCO_2H can readily be demonstrated. If the fermentation is performed in the presence of $\text{NH}_2\text{CONHNH}_2$, NaOAc and CaCO_3 , the AcCO_2H is recovered as the Ca salt of its semicarbazone. No evidence was obtained of the presence of $(\text{NHCONH}_2)_2$ or of the disemicarbazone of AcCHO . The formation of AcCO_2H occurs, however, only when sugar is added to the fermentation mixt. Variations in temp. and reaction of the medium are of little influence. A. W. DOX

The porphyrin and blood pigment metabolism of the yeast cell. R. M. MAYER. *Z. physiol. Chem.* 177, 47-67(1928).—By means of the Konigsdorffler microspectroscope, with which the emission spectra of fluorescent solns. can be measured, the development of coproporphyrin in yeast grown on synthetic culture media was studied. The porphyrin is actually synthesized by the organism and not supplied by the culture medium. During successive cultures on a synthetic medium the yeast undergoes mutation to a degenerate form with greatly increased power of synthesizing coproporphyrin. Although there is no direct evidence that normal yeast is able to synthesize the porphyrin it is reasonably certain that such ability exists. So far as is known, pathologically degenerate cells in general do not acquire entirely new capacities, the pathological behavior being characterized merely by a decrease or an increase in the normal physiol. functions. Coproporphyrin has been found thus far only in dead yeast cells, and "coproyeast" would therefore represent a mixt. of such cells with living cells still capable of fermentation and proliferation. The synthesis of coproporphyrin may to a certain extent be regarded as the final effort of the coproyeast cell. Possibly the death of the cell is not a direct toxic effect of the high porphyrin content but occurs only through the influence of light. With light completely excluded living copro cells have been found in cultures 9 months old. A. W. DOX

The enzyme chemistry of acid formation by *Aspergillus niger*. K. BERNHAUER. *Z. physiol. Chem.* 177, 86-106(1928); cf. *C. A.* 21, 435.—In studying acid formation by *A. niger* a basal culture medium contg. KH_2PO_4 and MgSO_4 was used, and various substances were added as sources of C and N. After 4 days' growth on such medium at 35° , the soln. was replaced by a 2nd medium, usually a 10% glucose soln. to which CaCO_3 had been added, without disturbing the mycelium, and after another 4-day interval detns. were made of the gluconic acid formed. The conversion of glucose into gluconic acid is attributed to an enzyme "glucosidase," the term being understood to include any coenzyme complex involved in the reaction. Practically all substances capable of supplying C for development of the mycelium in the 1st medium appear to favor formation of glucosidase. The results were most uniform with sucrose, while with glucose, fructose, mannose, arabinose, glycerol and mannitol the acid production was variable and occasionally negative. Variations were also observed in the effect of different sources of N in the culture medium, the highest yield of gluconic acid being obtained with a mycelium grown on $(\text{NH}_4)_2\text{SO}_4$. Toxic substances in concns. sufficient to inhibit fungus growth do not interfere with gluconic acid formation by a fungus mat already formed. Addn. of such substances to the 2nd medium may even be advantageous in preventing contamination of the culture. On the other hand, these antiseptics completely suppress the formation of citric acid. It is, however, not definitely known that citric acid formation by molds is actually an enzymic process. Under certain conditions where the ability to form gluconic acid is lacking, the addn. of MnSO_4 to the 2nd medium promotes the reaction. For developing mycelia with the power to produce citric acid sucrose is a better nutrient than other carbon compds. When grown on glucose the fungus acquires this power only with nitrates as the source of N, and not with NH_4 salts, urea, asparagine, glycine or peptone. A. W. DOX

Cultural separation of bacteria on the basis of triphenylmethane coefficients. JOHN W. CHURCHMAN AND LOUIS SEGEL. *Stain Tech.* 3, 73-80(1928).—The general parallelism between the Gram reaction and normal selective bacteriostasis by the triphenylmethane dyes is well established, as is also the existence of a small number of organisms in each group which do not follow the rule. Reverse extrinsic bacteriostasis has been demonstrated, but only within a very limited field. The discovery of substances possessing reverse selective power, comparable in extent to normal selective power, would be of value. In the absence of such substances, the slight quant. differences in the behavior toward dyes, of organisms belonging to the same Gram group, may be turned to account. The authors detd. with great accuracy the crystal violet coeffs. of 5 Gram-positive and 5 Gram-negative organisms. These observations show that all known aerobic organisms could probably, on the basis of their triphenylmethane coeffs., be placed on a curve which would, on the whole, parallel the Gram reaction. The possibilities of sepg. Gram-negative organisms from Gram-positives by means of the

dyes are well understood. Similar sepns. can be within the Gram groups by making use of the quant. differences in triphenylmethane coeffs. C. R. FELLERS

The effect of the chemical nature of a decolorizer on its functioning. I. The Gram classification. ALLEN E. STEARN AND ESTHER W. STEARN. *Stain Tech.* 3, 81-6(1928).—Decolorizers which are distinctly acidic or basic in their chem. nature give abnormally high decolorization in the Gram stain for bacteria. Acidic substances yield more regular results. Ideally an "inert" decolorizer should be used, but ordinarily such substances will not dissolve the dye or dye-mordant ppt. from the smear. The most practical substances seem to be those so very slightly acidic in character as to be practically inert, such as acetone or EtOH or a mixt. of such substances. **II. The apparent isoelectric point.** *Ibid* 87-93.—The isoelec. point of a bacterial system is the H-ion concn. at which there is equal retention of anion and cation. By defining this point as that at which there is equal retention of acidic and basic stain when acetone is used as a decolorizer, it is shown that acidic decolorizers shift the experimentally detd. value. Thus basic decolorizers show abnormally high decolorizing power toward smears stained with acid dyes, and acid decolorizers show the same abnormal behavior toward smears stained with basic dye. By basic decolorizer is meant not one of high p_H value, but one which will form a salt with acids, as, for example, pyridine or aniline. This indicates an ionic chem. equil. as a factor in the mechanism of staining. C. R. F.

Certain factors influencing the staining properties of fluorescein derivatives. H. J. CONN AND W. C. HOLMES. *Stain Tech.* 3, 94-104(1928); cf. *C. A.* 21, 1287.—The behavior of certain fluorescein dyes (eosin, erythrosin, phloxin and rose bengal) in staining *bacteria in dried films of soil* was investigated. These dyes are ordinarily purchased in the form of di-Na salts and are indifferent staining agents for the purpose named. If there be added to the dye soln. a small quantity (0.001 to 0.1%) of a mineral salt of Ca, Al, Mg or Pb, the intensity of staining is greatly increased. The effect of such addn. is to convert the dye partly into a salt of the metal added, which in nearly every instance is relatively insol. and is in every case less sol. than the di-Na salt. Practically identical results can be obtained if the staining be performed with a suspension of the Ca, Al or Pb salt of one of these dyes, although very little of the dye goes into soln. Theories to account for the phenomenon are discussed, including in particular the soln. and absorption theories of staining. The evidences seem to favor the former, although not entirely disproving the latter. C. R. FELLERS

The preparation, by the bacterium of sorbose, of a new reducing sugar with seven carbon atoms. GABRIEL BERTRAND AND GEORGES NITZBERG. *Bull. soc. chim.* 43, 663-7(1928).—See *C. A.* 22, 2178. E. H.

The effect of hydrogen-ion concentration on the bacterial content of gelatin. A. C. FAY. *J. Dairy Sci.* 11, 313-24(1928).—A study of 34 samples of gelatin failed to reveal any relation between the reaction and the bacterial count. The bacterial counts ranged from less than 5 per g. to 20,000, and the reactions between p_H 4.8 and 6.6. The keeping quality test failed to check with the relative bacterial counts. The high acidity of some of the samples had a marked deterring action on the rate of growth of the microorganisms, but in no case did the reaction completely inhibit growth where a mixed microörganic population was added. Gelatin, contaminated in the drying alleys and having a high acidity, would show very little growth. On the other hand a nearly neutral reaction would show growth. In interpreting a low bacterial count of gelatin, one of the factors to be taken into consideration is the reaction. A low bacterial count is believed to be a fairly good index to gelatin of good sanitary quality, although the factors affecting bacterial destruction and growth, such as acidity, must be taken into consideration. J. C. JUKKJENS

Recent methods of investigating lactose-fermenting organisms as applied to Indian conditions. II. J. CUNNINGHAM AND T. N. S. RAGHAVACHARI. *Indian J. Med. Research* 14, 41-5(1926).—"The percentage of the high-ratio group (methyl red-neg., Voges-Proskauer reaction-positive) found in samples of soil varies according to the depth at which the sample has been taken. In samples of milk taken under sanitary conditions the proportion of the high- to the low-ratio groups is in the ratio of 42:58." The slow sand filtration process is most effective in bringing about a reduction in the high-ratio group. FRANCES KRAHOW

Disinfectant action. II. Relations of phenols and amines to proteins. E. ASHLEY COOPER AND JOHN MASON. *J. Phys. Chem.* 32, 868-75(1928); cf. *C. A.* 21, 846.—The distribution of several disinfectants (picric and sulfosalicylic acids, $EtNH_2$, $C_6H_5NH_2$, $(NH_2)_2H_2O$, $NH_4OH.HCl$) between H_2O and dissolved or suspended gelatin and albumin was detd. in an attempt to correlate germicidal activity with soly. or adsorption of the substances used. With coagulated albumin there was noted a rough

parallelism between bacterial action and soly. or adsorption, although no such correspondence occurred with the dissolved proteins. This seems to be contrary to the relationship between disinfectant action and the state of proteins in the cell. W. D. L.

The influence of certain amino acids on cultures of diphtheria bacilli. SBARSKII AND Z. YERMOLYEVA. Biochem. Inst. des Commissariats, Moscow. *Z. Immunitäts.* 54, 105-9(1927).—Previously the authors have shown that amino acids, especially tyrosine, inactivated diphtheria toxin. They now show the effects on the bacteria. Small doses of amino acids in cultures do not kill the bacteria. Tyrosine markedly weakens the toxicity of small toxicogenic cultures of diphtheria bacilli when injected subcutaneously. With toxic strains the effect is minimal. Alanine, leucine and glycine have no such action. Tyrosine in 0.5% concn. in cultures lessens the production of toxin 10 to 20 times. JULIAN H. LEWIS

Bacteriolysis of tubercle bacilli. M. P. ISABOLINSKII AND V. I. GITOVICH. Bakteriolog. Staatsinst., Smolensk. *Z. Immunitäts.* 54, 285-91(1928).—The incubations of tubercle bacilli for several months with various kinds of fatty substances brought about a lipolysis in the organisms. The virulence was so markedly reduced that the cultures were used successfully in a few expts. as a vaccine. JULIAN H. LEWIS

The resistance of bacteriophage to hydrocyanic acid. W. BORCHARDT. Inst. für Schiffs- und Tropenkrankheiten, Hamburg. *Z. Immunitäts.* 54, 403-8(1928).—HCN kills bacteria but does not destroy enzymes. Since it does not destroy bacteriophage the latter is believed to be an unorganized enzyme. JULIAN H. LEWIS

The term iron-organism. EINAR NAUMANN. Lund Univ., Sweden. *Ber. deut. botan. Ges.* 46, 135-40(1928).—The physiology of iron-organisms is too little understood to serve as a basis for classification. For the present the organisms are grouped according to ecological and morphological considerations. All organisms which can ppt. or dissolve Fe should be included. LAWRENCE P. MILLER

Iron-organisms and the formation of lake ore deposits. Certain fundamental aspects of this question. EINAR NAUMANN. Lund Univ., Sweden. *Ber. deut. botan. Ges.* 46, 141-7(1928). LAWRENCE P. MILLER

So-called iron-organisms and the Naumann method for their investigation. N. CHOLODNII. *Ber. deut. botan. Ges.* 46, 317-23(1928).—A criticism of Naumann (cf. preceding abstrs.). The term Fe-organism should be restricted to organisms which respire FeO. LAWRENCE P. MILLER

The viability of bacteria in antiseptic solutions. WM. BULLOCH. Univ. of London. *Centr. Bakt. Parasitenk., I Abt.* 106, 21-9(1928).—Fairly extensive expts. indicate that many reputed disinfectants practically fail when they have to operate on an org. material like catgut, which is exceedingly difficult to penetrate. If properly applied I always sterilizes catgut. JOHN T. MYERS

Bases for the living nature of the bacteriophage. CARL LAUSNITZ. Univ. of Breslau. *Centr. Bakt. Parasitenk., I Abt.* 106, 300-13(1928).—Its variability and its power to become resistant to injurious agents, as chloramine, are best explained by the hypothesis that the bacteriophage is a living organism, not a simple chem. agent. JOHN T. MYERS

Bacteria as a source of ultra-violet rays. M. A. BORON. Univ. of Moscow. *Centr. Bakt. Parasitenk., II Abt.* 73, 373-9(1928).—*B. anthracoides*, *Sarcina flavus* and *B. coli* produce ultra-violet rays as shown by the increased no. of germinating eyes in tubers and increased rate of growth of yeast. JOHN T. MYERS

Sulfate reduction by bacteria with cellulose-fermentation products as a source of energy. L. RUBENTSHIK. Odessa Scientific Inst. *Centr. Bakt. Parasitenk. II Abt.* 73, 488-95(1928).—Sulfate-reducing bacteria, *Microspora*, were isolated from slime of the Kujalnizki liman at Odessa, in the Omelianski medium for CH₄ formation. They form H₂S. The source of C was products accompanying CH₄ fermentation of cellulose, acetic and butyric acids. These organisms are halophiles, the optimum NaCl concn. being 5 to 7%. Metabolism can continue up to 20% NaCl. Sulfate reduction can occur in the absence of NaCl. JOHN T. MYERS

Vitamin effects in the physiology of microorganisms. C. H. WERKMAN. Iowa State College, Ames. *J. Bact.* 14, 335-47(1928).—The addn. of vitamin B to Ashbey medium exerts no stimulation of the rate of reproduction of *Asotobacter chroococcum* or *Rhizobium leguminosarum*. Vitamin B concentrates (Harris) do stimulate them purely because of the addn. of nutrients other than vitamin B. Until further knowledge is at hand the term vitamin should be restricted to those substances not carbohydrates, fats, proteins or minerals, which are essential to growth and reproduction of suitable animals. The term cannot at present justifiably include substances necessary for the

growth and reproduction of microorganisms and certainly not to any substance serving to stimulate growth or reproduction.

JOHN T. MYERS

Investigations of the inhibitory effect of metal salts. I. Silver salts. P. H. ANDRESEN. *Dansk Tids. Farm.* 1, No. 16, 471-89 (1927).—Earlier expts. have only measured the amts. of Ag salts necessary to inhibit bacterial growth. In this expt. the Ag concn. was measured to det. the significance of that quantity, and also to discover what dets the large amt. of Ag salts which must be added. The Ag ion was measured electrometrically. First it was shown that Ag salts react with peptone leaving only a few Ag ions remaining in the soln. The Ag-ion concn. never reached a definite value but decreased continually. Some of the Ag taken up by the peptone was liberated again, although very slowly. Obviously media contg. peptone media could not be used. On the other hand the "Mineral" culture media was unsuited, since the amts. of Ag sufficient to produce inhibition of growth are so small that the Ag-ion concn. cannot be accurately measured. By the addn. of $\text{Na}_2\text{S}_2\text{O}_3$ to a media contg. AgNO_3 , a definite Ag-ion concn. is obtained which is detd. by the ionization const. of $\text{NaAg}(\text{S}_2\text{O}_3)_2$. This concn. remains const. even after long standing. The Ag-ion concn. necessary to inhibit bacterial growth was 0.16×10^{-11} (for *B. coli*). Expts. show that Ag-ion concn. alone is the governing factor of the growth inhibition. The explanation is: (1) There must be a Ag-ion concn. in the medium great enough to react with the bacteria to a sufficient extent. (2) There must be present an amt. of Ag which within a certain time can be taken up by the bacteria. This amt. is larger than (1). (3) If not all the Ag is present in the ionized state, a sufficient quantity has to be present to fulfill conditions (1) and (2). This quantity of Ag salts is detd. directly in inhibition expts. **II. Silver salts.** *Ibid* 2, 57-65 (1928).—It was shown that the explanation regarding the growth inhibition produced by Ag salts is also valid when the growth takes place in the usual broth of the lab. (1% peptone). The const. and well-defined Ag ion concn. was obtained by adding AgNO_3 and a certain excess KI, thus having KI and colloidal AgI simultaneously present in the medium. A very concise method for obtaining the required Ag-ion concn. is given. The Ag ion was measured electrometrically. The expts. have shown that the min. concn. necessary here to produce growth inhibition had a value very close to that which was found with mineral media. The value found for *B. coli* was 0.6×10^{-11} . The same min. concn. was found for *B. typhi*. Also in *Centr. Bakt. Parasitenk., I Abt* 107, 392-7 (1928).

O. A. NELSON

Bactericidal action of dyes. A. PHILIBERT AND J. RISLER. *Compt. rend.* 186, 1583-4 (1928).—Defibrinated human blood samples contg. diphtheritic, streptococcic, colibacillic and staphylococcic cultures, resp., were irradiated for long periods when in no case was there a complete destruction of the organism, and only the staphylococcic culture was hindered in development. On the other hand, if the blood was sensitized by the addn. of 1 in 50,000 of methyl violet a rapid lysis of the organism followed and on irradiation of the blood thus sensitized an even more rapid destruction of the organism occurred.

L. W. RIGGS

Comparative study of the action of urea and thiourea on the growth and vitality of bacteria. E. NICOLAS AND J. LEHDUSKA. *Compt. rend.* 186, 1767-9 (1928).—Thiourea has a definite and more marked inhibitory action than urea on the development and vitality of the pathogenic organisms examd. This action is similar but less intense than that of thiourea on the higher plants (cf. E. and G. Nicolas, *C. A.* 19, 2513). With animals urea is more toxic than thiourea. The reverse is true with plants and microorganisms.

L. W. RIGGS

Influence of the p_H in staining by the Giemsa method. J. G. LACORTE. *Compt. rend. soc. biol.* 98, 1579-80 (1928).—In the study of blood smears of the guinea pig infected with *Trypanosoma gambiense* the preferable p_H of the dye solvent was 7.4.

L. W. RIGGS

Infertilizing power of certain cyclic and aliphatic terpenes against homogeneous cultures of the bacilli of human tuberculosis. P. COURMONT, A. MOREL AND I. BAY. *Compt. rend. soc. biol.* 99, 75-6 (1928), cf. *C. A.* 21, 2007, 3928.—The infertilizing power of long-chain alcs. of the terpene series is particularly noted.

L. W. RIGGS

BUCHANAN, R. E., AND FULMER, ELLIS J.: **Physiology and Biochemistry of Bacteria.** Vol. I. Growth Phases; Composition and Biophysical Chemistry of Bacteria and Their Environment; and Energetics. Baltimore: Williams & Wilkins Co. 516 pp. Cloth, \$7.50.

JORDAN, EDWIN OAKES, AND FALK, ISIDORE SYDNEY: **The Newer Knowledge of Bacteriology and Immunology.** Chicago: Univ. of Chicago Press. 120 pp. Buck., \$10.

Light-treatment for killing bacteria, etc. GEORGE SPERTI, ROBERT J. NORRIS, ROBERT B. WITHROW and HERMAN SCHNEIDER (to Daniel Lawrence, trustee). U. S. 1,676,579, July 10. In killing bacteria in solns. contg. enzymes, or in other processes, rays of special wave lengths having a selective action adapted for the desired purpose are used, *e. g.*, rays from a quartz lamp may be used after filtration through a 5% aq. Pb acetate soln. Reference is made to treatments of yeast and of cod-liver oil.

D—BOTANY

THOMAS G. PHILLIPS

Seasonal changes in conifer leaves, with reference to enzymes and starch formation. J. DOYLE AND P. CLINCH. *Proc. Roy. Irish Acad.* 37, 373-414 (1927).—The disappearance of starch from conifer leaves during the winter is assocd. with various tissue changes and in particular with a decrease in the activity of certain carbohydrate-splitting enzymes. B. C. A.

Does methylene blue penetrate living cells? MARIAN IRWIN. *Nature* 121, 939 (1928).—I. reiterates her former conclusions (*C. A.* 21, 3384) that the blue dye found in the vacuole of cells of *Valonia* after exposure to methylene blue is trimethylthionine, probably present as an impurity in the methylene blue and that the latter dye does not penetrate living cells of *Valonia* F. A. CAJORI

Carbon dioxide release and oxygen absorption by germinating seed. GEORG FRIETINGER. *Flora* 22, 167-201, 2 figs (1927).—F. studied the respiration of seed of peas, wheat, flax, oats and sunflower during the first 3 days of germination in still and moving air and still and flowing water, with coats intact and removed. Respiration is dominantly intramol. in early stages of germination due to coats and structures below hindering movement of O to respiring parts as well as that of CO₂ from them. In oats the glumes play a similar role. As germination progresses these parts are modified and finally broken so that normal respiration becomes dominant. Water increases the effectiveness of these structures in inducing intramol. respiration. Removal of coats greatly favors gaseous exchange and normal as against intramol. respiration. Intramolecular respiration is marked by a high respiratory quotient, which falls as respiration changes from intramol. to normal. The values of this quotient are surprisingly high; in the pea, in early stages of germination, even in air they run as high as 5.3. In flax, a fatty seed, values are 1.9-0.8. Previous authors have found values of about 1 for starchy seed and 0.6 to 0.8 for fatty seed. W. CROCKER

Relation of tuber maturity and of storage factors to potato dormancy. J. T. ROSA. *Hilgardia* 3, 99-124 (1928).—Although the cause of dormancy in potatoes is not definitely known, it is believed that its continuance is due largely to lack of O in the internal tissues. In Calif. seed potatoes are often planted before the tubers have lost their dormancy and thus often fail to sprout and decay occurs. Results show that the more nearly mature potato tubers are when harvested, the shorter is the dormant period. Emergence from dormancy is a gradual, not a sudden, change and is uninfluenced by cold storage or humidity. Twenty references are appended. C. R. FELLERS

Some observations on physiological diseases in apples in British Columbia. H. R. McLARTY. *Sci. Agr.* 8, 636-50 (1928).—The 3 common physiol. diseases are die-back, drought spot and corky core. Search for specific pathogens proved fruitless. Most of the growth in apples occurred at night, an actual loss sometimes occurring in the day. The responsible factor for these diseases appears to be that drought during the late summer and autumn causes excessive killing of rootlets. Super-moisture acts in much the same way. Hence there results a lack in balance in the manu. of the food in the tissues of tree or in the limb above the affected root area. If this lack of balance in the food supply exceeds the degree of tolerance allowed by nature for normal development, then a pathological condition is produced in the developing buds which are just in their formative period. The buds are unable to recover later even though the food supply be ample and normal. This pathological condition is passed along to the developing fruit as corky core or drought spot. C. R. FELLERS

A physiological study of the effect of light of various ranges of wave length on the growth of plants. H. W. POPP. *Am. J. Botany* 13, 706-36 (1926); *Expt. Sta. Record* 58, 124.—In an investigation to det. the effect on plants of removing definite regions of the spectrum in the blue-violet end, several widely different varieties of plants were grown in 5 sep. greenhouses so constructed that practically all conditions except the quality of light could be kept alike in all houses. General observations were made on vegetative vigor, flowering and fruiting. The height was measured weekly, chem. analyses and microchem. tests were made, and anatomical changes were followed in some cases.

The results obtained are detailed for the different wave lengths. The results as a whole indicate that, while ultra-violet rays are not indispensable, the blue-violet end of the spectrum is necessary for normal, vigorous growth of plants. H. G.

Factors influencing the p_H equilibrium known as the isoelectric point of plant tissue. W. J. YOUNG AND F. E. DENNY. *Am. J. Bot.* **13**, 743-53(1926); *Expt. Sta. Record* **58**, 122.—In making use of the method of detg. isoelec. points for plant tissue which consists in placing pieces of the tissue in a series of buffer solns. of varying H-ion concn and noting the p_H value of the buffer at which no change in reaction occurs, it was found that this equil. p_H with a no. of plants was the p_H of a water ext. of the tissue in contact with water instead of buffer soln. for the same time under the same conditions. Most of the effect upon the buffer soln. was not due to absorption of ions from the buffer by the tissue, but was caused by substances leaching out of the tissue into the buffer. The sol. substances which leached out of the tissue and which exerted a dominant effect in changing the reaction of buffers in content with the tissue dialyzed readily through collodion, were not coagulated by heat and were sol. in acid alc. This shows that proteins or other colloidal substances do not play an important role in causing the change in p_H . "Since the tissue itself is not mainly involved, and since the effect produced is not due to proteins or other amphoteric colloids, it is thought that this method does not give reliable information as to the p_H value of the isoelec. point of a tissue or furnish satisfactory evidence of the existence of such a point." H. G.

The germination of century old and recently harvested Indian lotus fruits, with special reference to the effect of oxygen supply. I. OHGA. *Am. J. Bot.* **13**, 754-9(1926). *Physiol. Abstracts* **12**, 590.—Fruits of *Nelumbium nucifera* which had lain buried in a peat bed probably for more than 200 years showed about 100% germination after treatment with H_2SO_4 to render the fruit coats permeable to water. Germination took place well in 100% O, N, H or CO_2 . An internal supply of O was available through the air contained in a cavity inside each fruit and in intercellular spaces. Each fruit contained about 0.2 cc. of gas, which contained on the av. in old fruits 18.33% O, 0.74% CO_2 and 80.93% N; and in young fruits 18.88% O, 0.81% CO_2 and 80.31% N. H. G.

Influence of the concentration of hydrogen ions in water of imbibition on the germinative energy of cereal seeds treated by the Jensen (hot water) method. L. PETRI. *Bol. Staz. Patol. Veg. [Rome] [n. ser.]* **6**, 161-71(1926); *Expt. Sta. Record* **58**, 214.—The data are tabulated, with discussion. H. G.

The physiology of organic acids in green plants. I. Reciprocal relations in nitrogen and oxygen changes in *Begonia semperflorens*. W. RUHLAND AND K. WETZEL. *Z. wiss. Biol., Abt. E, Plantu, Arch. wiss. Bot.* **1**, 558-64(1926); *Expt. Sta. Record* **58**, 212.—An outline is given of the formation of NH_4 and of oxalic acid, of the influence of N-contg. and N-free nutrients on oxalic acid content, and of the daily variations in N and O metabolism. II. Daily variations and otherwise conditioned changes in the content of several organic acids in green plants. H. ULLRICH. *Ibid* 565-8.—Details are given of studies with *Anemone nemorosa*, *Rubus idaeus*, *B. semperflorens*, *Lactuca sativa* and *L. virosa*. H. G.

Recent advances in science: Plant physiology. WALTER STILES. Univ. of Reading. *Science Progress* **23**, 50-5(1928).—Review of recent work on permeability and related questions. JOSEPH S. HEPBURN

Pigment types and their significance in the anthocyanin question. THEODOR LIPMAA. Tartu Univ., Estonia. *Ber. deut. botan. Ges.* **46**, 267-77(1928).—The assimilatory organs of over 300 species of plants were examd. microscopically for anthocyanin at 3 periods during their development. Plants could then be classified into types according to whether their assimilatory organs contain anthocyanin, or if not, whether they can form it under proper conditions, at each of these 3 periods. The data thus obtained cannot be brought into harmony with the idea of Noak (cf. C. A. **18**, 1139) that the system flavonol-anthocyanin plays an important role in CO_2 assimilation. Fall coloring of leaves and anthocyanin as a protective agent against excessive illumination are also discussed. LAWRENCE P. MILLER

A bluish-pigment in the roots of the plane tree. R. SCHARDE. Institute of Plant Physiology, Breslau. *Ber. deut. botan. Ges.* **46**, 298-300(1928).—The lower stem and the roots of a *Platanus acerifolia* cut in December contained large amts. of a bright red coloring matter, found mostly in the medullary rays and to a less extent in the wood parenchyma cells. This pigment is easily soluble in Me, Et, and Pr alc., and gives a tannin reaction with ferric chloride; when dissolved in water contg. a little KOH the color changes to a reddish brown. Roots obtained from another tree in April did not contain any of the pigment. LAWRENCE P. MILLER

Role of iron in the formation of chlorophyll. T. N. GODNEV. *Bull. polytech. inst. Ivanovo-Vosnesensk.* 1927, No. 10, 87-92.—Conforming to expts. of Pollacci and Oddo (cf. C. A. 10, 624) the role of Fe in the production of chlorophyll consists in bringing about the formation of an intermediate compd. of the type of Mg. salt of α -pyrrole-carbonic acid. G.'s investigation, however, confirms Deuber's findings (cf. C. A. 21, 3218) according to which the Mg. salt of α -pyrrolecarbonic acid in the absence of Fe not only does not aid the disappearance of chlorosis of leaves, but is even noticeably harmful.

BERNARD NELSON

Studies on glutelins. IV. The glutelins of corn (*Zea mays*). D. BREESE JONES AND FRANK A. CSONKA. U. S. Dept. of Agr. *J. Biol. Chem.* 78, 289-92(1928); cf. C. A. 22, 253.—Corn meal was extd. with alc. NaOH. Glutelin was pptd. from this ext. by adding HCl to p_H 6.7-6.8. The ppt. was redissolved in aq. NaOH and α -glutelin pptd. by adding $(NH_4)_2SO_4$ to 3% of satn. β -glutelin was obtained from the supernatant liquid by pptg. with $(NH_4)_2SO_4$ at 16% of satn. The isoelec. point of α -glutelin was 6.45. Detn. of N distribution gave the following percentages: amide N 7.73, cystine N 2.04, arginine N 15.11, histidine N 2.81, lysine N 7.99, amino N in filtrate from bases 59.64.

C. RIEGEL

Maturing of peas. LASAUSSE, GUÉRITHAULT AND PELLERIN. *Bull. sci. pharmacol.* 35, 337-45(1928); cf. C. A. 19, 1442; 20, 2546; 21, 1315.—Peas were collected at different dates and on one date at different heights on the vines, making in all 5 samples which were analyzed when fresh, after the usual cooking and when dried. The results are tabulated and the ratios cellulose/dry ext., cellulose/total N, starch/dry ext., starch/total N, starch/cellulose and dry ext./total N are discussed. Further work is in progress.

L. W. RIGGS

Influence of sodium carbonate and calcium chloride on the acidity of the juice of *Zea mays*. I. L. KARASIEWICZ. *Bull. soc. chim. biol.* 9, 841-50(1927); 10, 702-13(1928).—Corn plants were grown in a medium contg. $Ca(NO_3)_2$ 0.3192 g., K_2HPO_4 0.5, $MgSO_4$ 0.1, $FeSO_4$ 0.05, $MuCl_2$ 0.025, $ZnSO_4$ 0.02, K_2SiO_3 0.025, $CaCO_3$ 1.0, NaF 0.000002, $Al_2(SO_4)_3$ 0.00001, $Na_2B_4O_7$ 0.000004, KI 0.000002 and H_2O one l. To this medium was added either Na_2CO_3 or $CaCl_2$ in different amts. The p_H was detd. at the beginning of the culture, before and after the addn. of Na_2CO_3 or $CaCl_2$ and on the day of gathering the plants. The plants were washed, dried and analyzed for the usual vegetable acids. The addn. of Na_2CO_3 to the nutritive medium in which corn is growing lowers the total acidity of the plant and this diminution occurs in the acids insol. in water and fixed with Ca. The addn. of $CaCl_2$ to the medium increased the total acidity in proportion to the Ca added. The increase in acidity occurred in acids combined with Ca. In the change of acidity by the addn. of either Na_2CO_3 or $CaCl_2$ the quantities of free or combined acids which are sol. in water were not affected. The sol. Na salts are more readily excreted by the roots and the nocturnal excretions of the leaves, while the Ca salts are fixed in the plant as oxalate. The presence of 0.1 g. Na_2CO_3 or 2 g. $CaCl_2$ per l. in the nutritive medium hinders the growth of the corn plant.

L. W. RIGGS

Variations of calcium oxalate in certain grafted plants. LUCIEN DANIEL. *Compt. rend.* 186, 1143-4(1928).—The histologic examn. of the swellings at grafted points of Solanaceae, also in *Cannabis* and *Mercurialis*, shows the presence of gritty crystals of CaC_2O_4 , which are more numerous and better developed in the wounded portions where cell multiplication is most active.

L. W. RIGGS

Physiologic role of the pyrocatechol tannins. MICHEL-DURAND. *Compt. rend.* 186, 1145-7(1928); cf. C. A. 22, 1792.—The tannins of branches of *Aesculus hippocastanum* and of tubers of *Rumex hymenosepalus* were studied. The distinction of phlobatannins into compds. sol. and insol. in acetone is of minor importance because of the slight quantity of insol. tannins in tissues contg. no chlorophyll. These 2 kinds of compds. behave like starch, and appear to be utilized during the beginning of the formation of swellings and tubers. The tannins may be considered as plastic foods.

L. W. RIGGS

Influence of the host on the morphologic characters of the polypore of the birch. Antioxygenating role of tannin. L. LUTZ. *Compt. rend.* 186, 1231-2(1928); cf. C. A. 21, 3070.

L. W. RIGGS

Conditions for the liberation of free iodine in the laminaria. PIERRE DANGEARD. *Compt. rend.* 186, 1371-3(1928); cf. C. A. 22, 1993.—Cutting or bruising the tissue of the plant, or immersing the plant tissue in acid or alc. favors the liberation of free I.

L. W. RIGGS

Mechanism of action of x-rays on seeds. J. MAISIN AND S. MASY. *Compt. rend. soc. biol.* 98, 886-8(1928).

L. W. RIGGS

Method of silver impregnation in the study of seeds during germination. GONÇALVES DA CUNHA. *Compt. rend. soc. biol.* **98**, 1017-9(1928).—An histologic study.

L. W. RIGGS

Hypotonic condition of cells affected with mosaic disease. J. DUFRÉNOY. *Compt. rend. soc. biol.* **98**, 1499-1500(1928).—A cytologic study.

L. W. RIGGS

Osmotic value of plant cells in cultures. M. THIELMAN AND L. BERZINE. *Compt. rend. soc. biol.* **99**, 87-9(1928).—Cytological.

L. W. RIGGS

A new type of acid carbohydrate from sea weed. LEONARD H. CRETCHER AND WM. L. NELSON. *Science* **67**, 537-8(1928).—From *Lamanaria agardhii*, collected at Woods Hole, Mass., an acid was extd. by dil. Na_2CO_3 and pptd. by HCl. The formula was $(\text{C}_6\text{H}_8\text{O}_6)_n$. The compd. loses 24.5% of its wt. as CO_2 on boiling with dil. HCl. An acid was isolated from *Macrocystis pyrifera* (giant kelp) from the Pacific coast. This acid is also a polyuronic anhydride to the extent of at least 98.6%.

L. W. RIGGS

A study of the catalase of the fruits of pear varieties. E. L. OVERHOLSER. Univ. of Calif. *Am. J. Botany* **15**, 285-306(1928).—The O evolved by the catalase of pear pulp was almost directly proportional to the quantity of H_2O_2 used. Increasing the amt. of pear pulp increased the O evolved from a given quantity of H_2O_2 , but the relative increase was not as great as when the amt. of H_2O_2 was increased. The addition of increasing amts of H_2O reduced the O evolved within a given period of time. Boiling the pear pulp for 15 min. destroyed the catalase activity. The varietal catalase activities and p_{H} of the pulp of 10 varieties of pears were studied and high p_{H} values appeared to coincide with high catalase activities. With the varieties Louise, Clairgeau, and Fox, when the p_{H} of the reacting pulp was reduced to approx. 3.55 by the addition of 0.1 N HCl, the catalase was almost completely checked. As the p_{H} was raised by the addn. of 0.1 N NaOH the catalase activity increased to a max. with a p_{H} of from 6.00 to 6.50. This indicated that with pear pulp the max. activity was slightly on the acid side rather than at neutrality or under slight alk. conditions such as would be effected by the addition of excess CaCO_3 . Freezing at -10° for 2 months greatly decreased the catalase activities as compared with storage at 0° . The effect of the storage temp. upon catalase activity depended upon the duration of the storage period, which varied with the temp. Storage at -12° and 40° for 8 days increased the catalase activity, but the activity decreased with 14 and 22 days' storage. Storage at 0° and 30° resulted in a gradual increase in catalase activity throughout the storage period of 22 days. Storage at 20° gave a slight increase in catalase activity after 8 days' storage, and then a gradual falling off after 14 and 22 days. Storage at 7.5° resulted in a continuous decrease throughout the storage period of 22 days. The av. p_{H} value tended to be higher at the storage temps. resulting in catalase increase and lower where the catalase decreased.

J. J. SKINNER

Chemical treatment for shortening the rest period of pot-grown woody plants. F. E. DENNY AND E. N. STANTON. Boyce Thompson Inst., Yonkers, N. Y. *Am. J. Botany* **15**, 327-36(1928). **Localization of response of woody tissues to chemical treatments that break the rest period.** *Ibid.* 337-44. —Individual twigs of dormant lilac plants growing in pots were exposed to vapors of ethylene chlorohydrin, ethylene dichloride, and ethyl iodide, while similar twigs upon the same plant received no chem. treatment. The treated twigs started growth but the untreated twigs remained dormant. The sep. twigs on a given plant acted as units, and any one of them could be aroused from the rest period while adjacent twigs were inactive. Likewise, individual buds upon twigs were exposed to vapors of ethylene chlorohydrin under suitable conditions, and were forced into growth by this treatment, while the bud upon the opposite side of the twig received no treatment and remained dormant. Of the 2 buds at the tips of twigs of lilac either one could be caused to develop new twigs without breaking the dormancy of the other bud of the pair. Dormancy in the lilac is not systemic, that is, distributed throughout the plant. It is localized in the buds only. The roots, bark, and conductive tissues are not dormant, but are able to supply sap to the buds as soon as the buds are able to use it. The expts. indicate that, in studying the dormant period, evidence of changes accompanying the resumption of growth should be sought first of all in the buds themselves, and not in the surrounding storage tissue.

J. J. SKINNER

The hydron concentration of plant tissues. IX. Improved technic for the range indicator method (R. I. M.). C. TERENCE INGOLD AND J. SMALL. Queen's University, Belfast. *Protoplasma* **3**, 458-68(1928); cf. *C. A.* **21**, 2721.—The results of the present investigation indicate that when indicator solns. contg. more than 10% alc. are used without diln. with distd. H_2O in observations by the R. I. M., outward diffusion of electrolytes may lead to a mixing of diffusible substances remotely approaching the con-

ditions obtained when expressed sap is used for the detn. of the p_H of plant juices. Therefore the R. I. M. technic may be improved by: the use of standard alc. indicators only after diln. with fresh cond. H_2O to bring the alc. content to or below 10%; the use where possible of aq. indicators; the reduction of the period of immersion to a min. consistent with the obtaining of unequivocal color indications; the use of all indicators with the indicator brought as near as possible to its neutral point, so that even a slightly buffered plant fluid may be able to throw the indicator to one side or the other of the neutral point.

M. H. SOULE

Nitrogenous metabolism of *Pyrus malus* L. IV. The effect of sodium nitrate applications on the total nitrogen and its partition products in the leaves, new and one-year branch growth throughout a year's cycle. WALTER THOMAS. Penna. State College. *Plant Physiology* 2, 245-71 (1927); cf. *C. A.* 22, 1994.—Two Stayman Winesap trees of the same age growing in sod on a homogeneous soil were used. One of these trees was treated in two applications with 20 lbs. of $NaNO_3$ and the other left untreated. The period of most rapid absorption of the NO_3 ion is characterized by a large increase in the total water-sol. and non-protein N, concomitant with which is an increase in the amino, amide, basic and "rest" N fractions of the tree receiving N as compared with the control. A comparison of the total water-sol. N, the non-protein N and also of the amino N fraction in the two trees definitely shows that the first application of $NaNO_3$ at the end of April took 3 weeks to reach the one-year branch growth; but that the absorption and translocation of NO_3 ions of the second application in the early part of June is 3 times as rapid as in the earlier period. N is stored in the fall, as amide N and "rest" N compds., chiefly in the one-year branch growth, and this storage is much higher in the fertilized tree. A much higher plane of N metabolism is indicated in the N-treated tree. The importance of the need for further knowledge of the functions of the "rest" N compds. is pointed out. Methods of fractionation and complete analytical data and graphs are given.

WALTER THOMAS

Relation of composition to growth and fruitfulness of young apple trees as affected by girdling, shading, and photoperiod. R. H. ROBERTS. Univ. of Wisconsin. *Plant Physiology* 2, 273-86 (1927), cf. *C. A.* 20, 3485-6.—One hundred Wealthy trees grafted on standard seedling stocks were subjected to the different environmental conditions stated in the title. In addn. to growth measurements and anatomical studies on the stem new growth, the chem. compn. with respect to N and various carbohydrate fractions of the new growth and two-year branch growths were also detd. None of the external factors imposed had a consistent effect upon the compn., growth character or fruitfulness of the trees. Although girdling checked growth and induced fruiting, the shading of girdled trees annihilated the effects of girdling, giving growth typical of ungirdled, unshaded trees. Short-day trees growing without added N grew and blossomed like long-day N-treated trees. Growth character, including blossom bud formation, is primarily dependent upon internal compn. and secondarily upon external environment. Chemical analyses as developed at present provide only a limited means of measuring the responses of the trees to the various external environmental factors.

WALTER THOMAS

Preliminary examination of the corolla of *Monarda punctata*. H. G. HEWITT. *J. Am. Pharm. Assocn.* 17, 457-8 (1928).—Florets were collected in 1924. H_2O was detd. by the xylene method. Yields were 68.7 and 69%. According to the Fluckiger test thymol and carvacrol were absent. Total ash was 10.8%, insol. ash 5.88%; volatile oil 4-4.5%; $d_{20} 0.9652$; hydrothymoquinone was not found.

L. E. WARREN

Color and chemical constitution. XXIII. Pigments of flowers (Moir) 10.

II—NUTRITION

PHILIP B. HAWK

Vitamin B. C. FUNK. *XII Int. Cong. Physiol.* 1926, 58.—A mixt. of naphthol-yellow-S and Ag picrate ppts. the greater part of vitamin B, most of the other nitrogenous substances remaining in soln. Vitamin B appears to be separable into 2 fractions

B. C. A.

Avitaminosis and metabolism. A. PALLADIN. *XII Int. Cong. Physiol.* 1926, 123-4.—Metabolic disturbances due to avitaminosis and hunger, resp., are distinct; the differences observed are described.

B. C. A.

Substances with a vitamin action in the common garlic (*Allium sativum* L.). G. PARRINO AND A. DOMINICI. *Ann. igiene* 37, 1-8; *Chem. Zentr.* 1927, I, 3204.—Biol. tests of animals rendered it certain that vitamins B and C are present in garlic. Heat-

ing to 130° destroys these vitamins. The presence of a vitamin D or a substance with a similar action is very probable. The juice of the garlic contains other compds. which promote fermentation and cellular respiration. C. C. DAVIS

Basic principles of human nutrition, and an investigation of the dietary habits of 300 individuals of New South Wales with reference to diet and physique. G. Z. DUPAIN. *J. Proc. Sydney Tech. Coll. Chem. Soc.* 3, 37-54(1927).—Dietary records were usually taken for a week or longer. Of the diets examd only 2% indicated some idea of food values and diet planning. Carbohydrate consumption was about 5 times greater than either proteins or fats. Protein and fat consumption was about the same except for 2 classes: those individuals with a calorific intake nearing 2800 cal. consumed much less fat than protein, and those nearing 3600 cal. consumed a far greater amt. of fat. As the body wt. increased the cal. also rose. The highest food consumption was between the ages 13 and 18, all cases of active boys. A great consumption was noted between the ages 34 and 40. The females studied ate less in the majority of cases. RUSSELL C. EBB

Vitamin C in milk. Its relation to concentration, homogenization and sterilization. P. LAVALLE. *Bull. soc. chim. biol.* 9, 208(1927), *Rev. hyg. med. prev* 50, 556-7(1928).—Using dogs as subjects L. found no evidence of scurvy after 15 months with concd., homogenized or sterilized milk as the sole source of vitamin C. The controls were affected with scurvy after 9-10 months. C. R. FELLERS

Studies of protein metabolism, mineral metabolism, and digestibility, with clover and timothy rations. L. A. MAYNARD, R. C. MILLER AND W. E. KRAUSS. Cornell Univ. Agr. Expt. Sta., *Memoir* 113, 1-33(1928).—The results of 6 Ca and P balances with a clover ration and 6 with a timothy ration are presented. Though the Ca balances were negative in all but 1 case, they were nearer to being positive with the clover ration, with its larger content of this mineral element. The P balances were negative in all but two cases, but the losses were less with the ration supplying the larger amts. of this element; that is, the timothy ration, with its larger amts. of P-rich concentrates. The results suggest the desirability of considering the supply of both Ca and P and the ratio between them, in trying to secure a better assimilation of either. There was but little variation in the Ca and P content of the milk, under the conditions studied. The % of P in the milk seemed to increase slightly in response to an increased supply in the feed. A comparison of the observed digestibilities of the exptl rations with their theoretical digestibilities calcd. from av. coeffs show a marked depression from the calcd. values for protein and crude fiber and a slight depression for N-free ext. The results for fat are variable. The depression of the digestibility of the protein was greater in all cases with the clover ration than with the timothy ration. The same relation was apparent for the crude fiber in 2 out of 3 of the expts. No consistent differences were found for the other nutrients. The greater depression of the digestibility of the protein with the clover ration is not to be explained on the basis of a higher output of metabolic N. On the basis of relationships between protein and crude fiber in the two rations, it is suggested that the differences in the depression of digestibility noted were the result of some modifications in the fermentative processes of the digestive tract. A full bibliography is appended. C. R. FELLERS

Food consumption of rural school children in relation to their health. ESTER S. DAVIES. Mass. Agr. Expt. Sta., *Bull.* 241, 98-147(1928).—A field study of the dietary habits of school children. C. R. FELLERS

Diet and cholesterol elimination in the bile. HUGO SOLOMON AND L. SILVA. *Prensa Med. Argentina* 12, 840-4(1926); *Biol. Abstracts* 1, 468; cf. *C. A.* 21, 1295.—In man cholesterol in small quantities is eliminated in the bile (duodenal bucket) when the diet is low in this substance. With increased cholesterol content of the food, the elimination is augmented. The cholesterol balance may be pos. when the food contains 6-7 g. a day. H. G.

Honey contains vitamins. ALIN CAILLAS. *France Apicole* 32, 3-5; 54-5(1926); *Biol. Abstracts* 1, 623.—Definite symptoms of beriberi rapidly disappeared in pigeons when fed honey on polished rice. A ppt. of the vitamin had a similar but more rapid effect. H. G.

Studies in fractionation of the antirachitic vitamin. ELIZABETH M. KOCH AND M. H. CAHAN. *Proc. Inst. Med. Chicago* 1926, 1-4(1926); *Biol. Abstracts* 1, 624.—The antirachitic properties of irradiated and non-irradiated cholesterol, lecithin, oleic and stearic acids, and tyrosine were tested. Of these, cholesterol alone acquired antirachitic properties when irradiated with ultra-violet light. A yellow resinous material, extd. by liquid NH₃ from this irradiated cholesterol, when fed in amts. of 0.2 mg. daily entirely prevented rickets, and was 8-10 times more active. A similar active ext.

from the non-saponifiable fraction of cod-liver oil was made with liquid NH_3 . The Lifschütz and Rosenheim color tests indicated that it is similar to oxycholesterol, but the authors do not claim that it is identical with it. H. G.

Light in the prevention of rickets. F. H. HUMPHRIS. *Phys. Therap.* 19 (9), 497–501(1926); *Biol. Abstracts* 1, 876.—The facts leading to the conclusion that rickets is a light-deficiency disease are: (1) it is a disease or aberrancy of the bony tissues due to, or characterized by, Ca and P deficiency as well as by lack of fat-sol. vitamin A; (2) the ultra-violet ray therapy raises the Ca and P content in the body and also increases the energy of fat-sol. vitamin A. H. G.

Vitamins in green plants. N. BEZSSONOV. *Rev. Path. Vég. et Ent. Agr.* 14, 142–55(1927); *Biol. Abstracts* 1, 1023.—Vitamin A can be obtained from seedlings grown in the dark, but it is much more abundant after the seedling has been illuminated. Vitamin A is more abundant as the tissues are richer in chlorophyll, although it is neither chlorophyll nor carotin. It does not disappear when plants are transferred from the light to darkness. Vitamin A readily absorbs O_2 . It is one of the lipids that can be extd. from green tissues along with chlorophyll, and it may act as a sensitizing agent in respect to chlorophyll. Solns. of chlorophyll become more stable in the light when the accompanying vitamin A has been eliminated. Vitamin A may be extd. by treating 40 cc. of the sap obtained from green tissues with 16 cc. of an 8% soln. of Pb acetate. The ppt. is deposited on a filter, washed with 20 cc. water, and dried in a vacuum. A ppt. of about 0.2 g. can be obtained in that way. This is brought into the form of a powder, to which petroleum ether is added. A treatment of 24 hrs. brings vitamin A into soln. in ether, while chlorophyll is obtained from the ppt. H. G.

Streptothrix corallinus in the estimation of vitamin B. JEAN ORR-EWING AND VERA READER. *Biochem. J.* 22, 440–2(1928).—In testing the more active vitamin B_1 concentrates (0.1-mg. per day pigeon dose), a considerable difference was noted in bacterial growth between flasks contg. $\frac{1}{20}$ and $\frac{1}{40}$ dose, or between those contg. $\frac{1}{400}$ and $\frac{1}{800}$ dose in 20 cc. medium (cf. C. A. 22, 2960). It was then found that, given a fraction, say $\frac{1}{1000}$ part of a vitamin B_1 concentrate, it was possible to predict the number of doses found in the whole. The technic developed has been found capable, with certain limitations, of replacing the pigeon test in following the fractionation of the vitamin. BENJAMIN HARROW

Sterol and antirachitic vitamin. ADOLF WINDAUS AND ALFRED HESS. *Nachr. Ges. Wiss. Göttingen, Math.-physik. Klasse.* 1926, 175–84.—If cholesterol is purified by phys. methods (recrystn.), it retains its ability to become activated by irradiation. If it is purified by chem. methods (formation of derivs. from which it is liberated later on, treatment with mild oxidizing agents) the ability to become antirachitically active after irradiation is totally lost. Conclusion: The activity is due to an impurity which is decompd. during the chem. reactions, and neither cholesterol nor allo-cholesterol is the provitamin. Ergosterol may be the antirachitic provitamin, since it cannot be sepd. from cholesterol by phys. methods, is very sensitive toward oxidation and is active even in mere traces after irradiation. Also it presents an absorption band in the ultra-violet, corresponding to the one observed with active cholesterol. Ergosterol or one of its isomers should be regarded as the true antirachitic provitamin. A. L. H.

Chemical vitamin tests. J. BULIR. *Časopis lékařů českých* 66, 1779–84(1927); *Ber. ges. Physiol. expth. Pharmakol.* 44, 374.—Review of colorimetric tests. Detns. of vitamins A and C by the methods of Caro, Price and Bezssonov check well with biological detns. The colorimetric methods are useful but permit a rapid orientation only. MARY JACOBSEN

Insulin in fattening cures. VITTORIO SCIMONE. *Rass. clin. terap. sci. affini* 27, 108–14(1928).—Six patients in a very poor state of nutrition, suffering from anovarium asthma, asthenia with dyspepsia or intestinal ptosis and atony, pylorospasm, hyperchlorhydria, urticaria and neurosis received insulin, the doses rising gradually from 10 to 45 units a day. Wt., general condition and digestion improved considerably. The basal metabolism, and alkaline reserve were not changed. The asthma was not affected, the urticaria disappeared. With anovarium the pubic and axillary hair became more abundant; that on the *labia majora* became scarce. MARY JACOBSEN

Does oil of capivara contain vitasterol A? RODOLPHO ALBINO DIAS DA SILVA. *Rev. brasil. med. farm.* 3, 422–3(1927).—Machado, *Presse méd.* 1927, 1196, has obtained a positive Fearon test with the oil of capivara. The test is, however, not sp. for vitamin A and S. has failed to find vitamin A in the oil. MARY JACOBSEN

Biological values of certain types of sea foods. III. Vitamins in clams. D. BRESE JONES, E. M. NELSON, J. C. MURPHY AND J. P. DEVINE. *Ind. Eng. Chem.* 20, 648–52(1928); cf. C. A. 22, 1184.—Although oysters are rich in vitamin B, clams

are devoid of it. They contain less vitamin A than oysters. Five g. of hard-shelled clams daily were insufficient for a complete cure of xerophthalmia, while 3.5 g. of soft-shelled clams were barely sufficient to cure. Both varieties were superior to oysters in vitamin D and in factors essential for reproduction and rearing of young. A. L. V.

Acceleration of growth rates by dietary modifications. ALBERT G. HOGAN, JESSE E. HUNTER, AND HARRY I. KEMPSTER. Univ. of Mo. *J. Biol. Chem.* **77**, 431-6(1928).—Supernormal growth may be induced in chicks by feeding them the following ration: whole wheat 55.6, whole milk powder 8.2, com. casein 12.3, alfalfa meal 2.5, butter fat 4.2, NaCl 0.9, CaCO₃ 1.3, cod-liver oil 3.0, and dried yeast 12%. This ration is definitely inferior if either the cod-liver oil or the yeast is omitted. Similar results have been obtained with turkeys. It is not certain that the rapid growth rate was due to the ration alone. Confinement in pens, disinfection of quarters, and avoidance of exposure to cold or wet weather and to drafts may have contributed to the results obtained. Attempts are being made to devise a practical poultry ration that will support supernormal growth but it remains to be seen whether such a ration is of any value under com. conditions. A. P. LOTHROP

Sulfur metabolism and partition of sulfur in the urine of fasting dogs. SERGIUS MORGULIS. Univ. of Neb. *J. Biol. Chem.* **77**, 627-45(1928).—"The av. urinary N:S ratio in dogs on a fairly uniform diet ranges from 16:1 to 29:7. During prolonged fasting these dogs (with only 1 exception) show the same av. ratios. The N:S ratio is, therefore, peculiar to the individual dogs, some having high and others low ratios. The exptl. evidence fails to demonstrate a relationship between the N:S ratio of the food and of the urine. It is impossible to det. from the urinary N:S ratios the nature of the tissue undergoing catabolism. The variations in ethereal sulfate during fasting suggest that this S fraction must be chiefly of metabolic origin. The neutral S fraction is subject to very irregular changes, but the evidence does not permit the conclusion that these are associated with diminished oxidative processes in the fasting organism. The variations in the inorg. sulfate fraction are likewise irregular. This fraction is influenced more by the individuality of the dog than by the diet, some dogs voiding urine with a high % of inorg. sulfate and low neutral S, while others show the reverse condition. Upon feeding, the inorg. sulfates tend to assume the same proportion as before the fast, independently of the changes which this S fraction had undergone in the course of inanition." A. P. LOTHROP

The effects of inadequate vitamin A on the sexual physiology of the female. HERBERT M. EVANS. Univ. of Calif. *J. Biol. Chem.* **77**, 651-4(1928).—"Inadequate vitamin A injures the female reproductive system so that fertilization and implantation often fail. In this respect it differs radically from the reproductive impairment due to low vitamin B content, where, typically, the eggs are always healthy and implantation takes place but resorption follows. A level of inadequate vitamin A can be secured, denoted by continuous cornified cell vaginal smears, during which estrus and ovulation occur and are, in fact, fairly frequent. This is only demonstrable by the continuous presence of the male for no changes occur in the vaginal cell types. Four-fifths of the copulations eventuate in failed implantation. A great many of them fail even to establish the condition of pseudo-pregnancy since another estrus occurs in 5 days. About 1/5 of the copulations leads to the birth of litters. It is interesting that throughout gestation the cornified cell smear continues. Normally the vaginal epithelium in pregnancy is high columnar in type." A. P. LOTHROP

The possible role of aluminum compounds in animal and plant physiology. E. V. MCCOLLUM, O. S. RASK AND J. ERNESTINE BECKER. Johns Hopkins Univ. *J. Biol. Chem.* **77**, 753-68(1928).—"The spectrographic method was used for ascertaining the presence or absence of Al and for the approx. estn. of small quantities thus assuring the absence of all chem. reagents except at O₂. All chances of Al contamination were thus reduced to the lowest possible point. Al is not a constituent of the plant products examd.: wheat germ, yeast, navy bean, lima bean, potato, carrot and cottonseed meal. It is also absent from hens' eggs and the following organs and tissues of the rat: liver, kidney, spleen, testes, ovaries, bone and skeletal muscle. It is present in concns. less than 1 p. p. m. on the hair, intestinal wall and lungs as would be expected. Al compds. are not absorbed out of the stomach or intestinal tract when present in the diet and do not form any union or chem. compd. with the stomach or intestinal walls. In concns. in the diet as high as 600 p. p. m. of the element Al exerts no noticeably deleterious action on growth, reproduction, or general well-being of rats as judged by external appearance and autopsy. These results confirm the views of the Remsen Referee Board of Consulting Experts that the consumption of foods contg. added Al is not deleterious or injurious to health. These conclusions can probably not be regarded as

final until addnl. and confirmatory data have been obtained on a larger variety of materials and animals but until then there seems to be no other alternative than tentatively to accept them.

A. P. LOTHROP

Iron in nutrition. V. **The availability of the rat for studies in anemia.** J. WADDELL, H. STEENBOCK, C. A. ELVEHJEM AND E. B. HART. Univ. of Wis. *J. Biol. Chem.* **77**, 769-75 (1928); cf. *C. A.* **21**, 2017.—Young rats from the stock colony weaned at the age of 3-4 weeks develop a profound anemia after 6-8 weeks subsistence on a diet of whole milk (cow's). The hemoglobin titer is reduced from 10.83 g. per 100 cc. of whole blood to 4 g. or less. Other workers have found it necessary to carry rats into the 2nd generation before anemia appears. The diet of the stock females contains nothing in the way of table scraps or vegetable refuse and the intake of the mixed ration may be reduced because of the presence of considerable whole milk, this may be a primary factor in detg. the amt. of hemoglobin-forming substance with which the young rats are supplied at birth. VI. **Iron salts and iron-containing ash extracts in the correction of anemia.** *Ibid.* 777-95. Inorg. Fe salts (prepd. from pure Fe wire) fed at a level of 0.5 mg. of Fe 6 times a week do not materially increase the hemoglobin level in anemic rats. The ashed residue of dried beef liver, dried lettuce, and yellow corn and acid exts. of these ashes are very effective in curing anemia when fed at a level of 0.5 mg. of Fe under the same conditions. It is evident that the ashes and ash exts. contain in addn. to Fe some other inorg. substance or substances vitally concerned in the synthesis of hemoglobin. VII. **Copper as a supplement to iron for hemoglobin building in the rat.** E. B. HART, H. STEENBOCK, J. WADDELL, AND C. A. ELVEHJEM. *Ibid.* 797-812.—A com. prepn. manufactured from liver for the treatment of pernicious anemia in man cured anemia in rats kept on a whole milk diet supplemented with Fe. The ash of the prepn. was also active and the potent material was pptd. by H_2S from a HCl ext. of the ash. The active agent in the H.S. ppt. was found to be Cu and feeding expts. using $CuSO_4$ showed that rats receiving 0.05 mg. levels of Cu daily in addn. to 0.5 mg. of Fe rapidly recovered a normal hemoglobin content. Those receiving as little as 0.01 mg. showed marked increases with a final return to normal. An improvement in phys. well-being as evidenced by greatly increased appetite, smoother coats, and increased vigor and activity was a pronounced accompanying phenomenon. No evidence was obtained of an org. factor necessary for hemoglobin synthesis. The expts. point to the need for a more intensive study of the role of small quantities of inorg. substances in the diet.

A. P. LOTHROP

Studies on the influence of glucose and dihydroxyacetone on the blood sugar level under variable conditions. KENSUKE UCHIDA. *Biochem. Z.* **194**, 111-27 (1928).—The utilization of glucose in dogs depends upon the previous nutritive régime. Dogs fed a protein-rich and carbohydrate-free diet show certain peculiarities which are observed in totally depancreatized dogs which have become severely diabetic. These peculiarities manifest themselves even more strongly on such a preliminary diet in dogs whose pancreatic ducts have been tied. On the contrary, these conditions have no effect on the utilization of triose, and even totally depancreatized diabetic dogs utilize the dihydroxyacetone though not so well as normal dogs.

S. MORGULIS

The normal blood sugar content of the dog and its physiological variations. KARL SCHWARZ AND HERWIG HÄMP. *Biochem. Z.* **194**, 351-61 (1928).—On a uniform and abundant diet the blood sugar content of the same dog, 12 hrs. after feeding, is remarkably const., the variations being only 0.004-0.006 mg. per 100 cc. The abs. sugar quantities of dogs under uniform nutritive conditions do not vary much. The blood sugar of a well-nourished dog is lowered already after 2 days of fasting. One-sided nutrition, for instance with meat or nearly pure carbohydrate in sufficient amt. to supply the required amt. of energy, has no effect on the blood sugar. Following feeding the blood sugar rises rapidly, reaching a max. between 2 and 3 hrs. and returning to normal in about 12 hrs. The max. values are 28-50% above the normal concn.

S. M.

Comparative influence of lipids and carbohydrates of the diet on the evolution of avitaminosis B. (MME.) LUCIE RANDOIN. *Compt. rend.* **186**, 1438-41 (1928).—Rats receiving a basic diet of casein, fibrin, ovalbumin, butter, salts and glucose lived 22 to 53 days, while rats receiving practically the same diet except that lard replaced the glucose lived 53 to 134 days. Thus in the absence of vitamin B from the diet, fats without glucose appear to restrain the development of polyneuritis better than glucose with only a small amt. of butter fat.

L. W. RIGGS

Influence of diet on the ratios of the elimination of ammonia and the p_H of the urine. MICHEL POLONOVSKI AND PAUL BOULANGER. *Compt. rend. soc. biol.* **98**, 963-5 (1928).—A normal subject was placed on ordinary vegetarian and hypernitrogen diets for periods of 8 days and the ammoniacal coeff. and p_H of the urine were detd.

at 2-hr. intervals on the 8th day. The individual was also subjected to a 2-day fast with 125 cc. of water every 2 hrs. With the ammoniacal coeff. as ordinates and the p_H values as abscissas, 4 hyperbolic curves were constructed. These curves were displaced progressively upwards and toward the right, that is, toward the increased ammoniacal coeffs. and greater p_H values, in proportion as the diet was richer in sugars and poorer in N. The curve of fasting, which is a special case of high N diet, shows even a lower p_H and lower ammoniacal coeff. than the curve for a high N meat diet.

L. W. RIGGS

Dissociation of the factors of growth and antirachitism. È. LESNÉ, ROBERT CLÉMENT AND S. SIMON. *Compt. rend. soc. biol.* **98**, 928-30(1928).—In a study of the action of 4 samples of cod-liver oil on rats it was proved that the potency of the growth factor in a given sample is independent of the potency of the antirachitic factor.

L. W. RIGGS

Action of choline on the nervous phenomena of beriberi of pigeons. MARIE SKARZYNSKA-GUTOWSKA. *Compt. rend. soc. biol.* **98**, 1045-7(1928).—Exts. of vitamin B from wheat bran, when intravenously injected, have an action analogous to that of choline by causing a transitory lowering of arterial pressure. The disappearance of nervous symptoms, or their absence in many cases, accords with an intense mobilization of choline in the organism. Avitaminosis B is caused by the absence of several substances among which is choline.

L. W. RIGGS

Causes of the retention of water after the ingestion of fat. WACŁAW MORACZEWSKI. *Compt. rend. soc. biol.* **98**, 1058-60(1928).—See C. A. **22**, 2592.

L. W. RIGGS

Case of emaciation resistant to fattening treatment by insulin. FERNANDO FONSECA. *Compt. rend. soc. biol.* **98**, 1590-1(1928).

L. W. RIGGS

Comparative study of the elaboration of vitamin B by yeasts cultivated in extract of malt, cane molasses and beet molasses. (MME.) I. RANDOIN AND R. LECOQ. *Compt. rend. soc. biol.* **99**, 47-9(1928).—Pigeons fed a control diet without vitamin B lived 17 to 27 days, with yeasts grown on beet molasses added to the control diet the pigeons lived 18 to 26 days, with yeasts grown on cane molasses 40 to 57 days and with yeasts grown on ext. of malt 65 to 76 days.

L. W. RIGGS

Treatment of pernicious anemia with a high-caloric diet, rich in vitamins. K. K. KOESSLER AND S. MAURER. *J. Am. Med. Assoc.* **89**, 768-74(1927); *Expt. Sta. Record* **58**, 93.—The treatment of pernicious anemia by a "high-vitamin, high-caloric diet, furnishing the meats chiefly in the form of liver, kidney and other edible viscera," was continued with marked success.

L. W. RIGGS

The specificity of ergosterol as parent substance of vitamin D. O. ROSENHEIM AND T. A. WEBSTER. *Nature* **121**, 570(1928).—Evidence from the work of the authors and others indicates that in ergosterol "not only a typical ring structure, but also a sp. position of the 3 unsatd. bonds, is essential for photochem. conversion into vitamin D."

L. W. RIGGS

Vitamin B. CHAS. H. HUNT. *Science* **67**, 556(1928).—The vitamin originally known as "vitamin B" is made up of at least 2 other vitamins which have been sepd from yeast. The yeast residue still contains a third substance which meets all of the definitions of a vitamin. It activates the other 2 vitamins of the vitamin B complex and causes a greater growth than the 2 alone.

L. W. RIGGS

The content of vitamins A and C in water cress. KATHERINE H. COWARD AND P. EGLETON. Univ. of London and Pharm. Soc. of Great Britain. *Lancet* **1928**, **1**, 97-8.—Water cress is a remarkably rich source of vitamin A, 0.1 g. of the green leaf being necessary to promote normal growth in a rat which has become steady in wt. on a diet lacking this factor only. It contains also small quantities of vitamin D and its growth-promoting properties are even stronger in the spring and summer than in the winter. It is a very rich source of vitamin C, 1 g. daily being enough to protect guinea pigs completely for a period of 70 days.

F. B. SEIBERT

FREUDENTHAL, POUL: **Experimental Rickets.** Investigations on the growth-promoting, fat-soluble vitamin, specially elucidated by its relation to experimental rickets. Copenhagen: Levin & Munksgaard. 236 pp. \$10.

F—PHYSIOLOGY

E. K. MARSHALL, JR.

Ammonia of human blood. E. ADLER AND K. SCHWERIN. *Klin. Wochschr.* **6**, 1188-9(1927).—The NH_3 content (actual) of human blood 5-6 min. after withdrawal is 0.02 mg. per 100 cc., while that (virtual) of sterile blood kept at 37° for 24 hrs. is 2 mg. Violent muscular exercise has no effect on the values, but individuals with marked cyanosis

or moribund give high actual values (0.091 mg.). Blood-NH₃ values are independent of the variations in urinary NH₃ elimination. Insulin does not influence the blood-NH₃ value; in four of five cases of carcinoma low virtual and fairly high actual values were obtained. B. C. A.

Pancreas as a source of the fibrin enzyme in blood. V. N. BOLDUIREV AND A. V. BOLDUIREV. *XII Int. Cong. Physiol.* 1926, 22-3.—Total or partial extirpation of the pancreas increases the coagulation time. Later the blood regains its power of coagulation. B. C. A.

Buffering power of urine. S. P. SUNER. *XII Int. Cong. Physiol.* 1926, 135.—The buffering power of urine, which is much greater than that of blood, is a function almost exclusively of the phosphate content. The buffering curve, a straight line, is const. for an individual, but varies among individuals. B. C. A.

Determination of the alkali reserve of the blood. S. P. SUNER. *XII Int. Cong. Physiol.* 1926, 135-6.—The blood (10 cc.) is centrifuged for 10 min. with K oxalate (20 mg.), and 4 cc. of plasma mixed with 16 cc. of distd. water. The p_H is detd. electrometrically before and after the addn. of 0.1-cc. portions of 0.1 N HCl. B. C. A.

Relation between colloids, surface tension, and p_H of urine. S. P. SUNER. *XII Int. Cong. Physiol.* 1926, 135.—On acidification of normal urine, the fall in surface tension runs parallel with that of p_H ; with urine from which colloids have been removed with animal charcoal, the surface tension is unchanged by progressive acidification. B. C. A.

Relation of protein to mineral metabolism. S. LAUTER. *Verh. deut. Ges. inn. Med.* 1926, 330-1.—With a diet rich in carbohydrate and fat and poor in mineral matter, there was an increase in alveolar CO₂ tension and blood-alkali reserve, without change in N excretion, and a decrease in Cl, Na and K. Administration of HCl (oral) and Na dihydrogen phosphate (intravenous) reduces the alveolar CO₂ tension, the blood-alkali reserve, and the p_H of the blood, but there is a marked increase in the NH₃ and N elimination. B. C. A.

Elimination of yellow vegetable coloring matters in human milk. H. PAFFRATH AND A. CONSTEN. *Z. Kinderheilk.* 42, 51-9(1926).—Carotin and xanthophyll were separately detd. in human milk by a colorimetric method. The use of vegetables contg. carotin or xanthophyll increases the amt. of those substances, resp., in the milk. Both are present when white vegetables are employed, and must in this case originate from animal foods. B. C. A.

Influence of intramuscular injection of proteins on glycogen titer. B. RAPINESI. *Boll. soc. ital. biol. sper.* 2, 927-30(1927).—Parenteral injection of blood serum (horse) in dogs caused a marked lowering of free sugar in 4 dogs, although the lowering was not enough to be considered a hypoglycemia, and caused a slight raising of sugar content in two others. Fat-free milk lowered the sugar in 2 subjects only. Casein causes only a slight change either way. Removal of the pancreas before injection of the proteins causes hypoglycemia in 7 cases out of 9. A. W. CONTIERI

The spleen and carbohydrate metabolism. III. The permeability to grape sugar of the erythrocytes. A. NOMA. *Med. Univ. Okayama. Okayama Igakkai Zasshi* 1925, 1125-38; *Chem. Zentr.* 1927, I, 1181; cf. C. A. 22, 2969.—In normal rabbits, glucose is present only in the blood plasma. Even after glucose injections, almost no glucose appears in the erythrocytes. The permeability to sugar of the erythrocytes is not changed either by injections of "Elektrokollargol" or by removal of the spleen. C. C. DAVIS

The fate of *o*-nitrocinnamic acid in the dog's organism. ANAST. A. CHRISTOMANOS. *Z. physiol. Chem.* 176, 74-5(1928).—When *o*-O₂NC₆H₄CH:CHCO₂H is administered orally to dogs only a very small proportion is excreted unchanged in the urine and a still smaller proportion in the form of *o*-nitrohippuric acid. There is no evidence of quinoline ring formation. Intravenous injection of the substance results in a transient lowering of blood pressure. No such effect is obtained with cinnamic acid. A. W. D.

The iron, copper and manganese content of blood serum. EMIL ABDERHALDEN AND PAUL MÖLLER. *Z. physiol. Chem.* 176, 95-100(1928).—Analysis of the ash of horse blood serum showed Cu 1.85-2.11, Fe 1.26-2.35 and Mn 1.15 mg. per 1000 cc. The difference between total Fe and hemoglobin Fe in the serum is practically negligible. Only a small proportion of the Cu and Fe can be removed from the serum by dialysis, and it is doubtful if these metals are present in ionic form. Probably Cu as well as Fe occurs in org. combination. A. W. DOX

The formation of organic bases in the development of the egg. YASUO NAKAMURA. *Z. physiol. Chem.* 177, 34-41(1928).—Free choline occurs in the hen egg only in the yolk. The amt. is very small—0.64 mg. per egg. During incubation the free choline

gradually decreases and reaches a min. in 9 days. Further incubation then results in an increased content in the yolk and in the embryo, the total amt. reaching a value of 2.27 mg. In contrast to the free choline the combined choline is present in the yolk in much greater amt. The max. of 94.34 mg. of total choline is reached in 9 days' incubation, then a decrease occurs and the value drops to 29.54 mg. in 19 days. The increase in free choline during incubation is undoubtedly due to sapon. of the lecithin fraction. Free choline is not, however, the main product of lecithin decompn. since only 2.27 mg. appears during the loss of 65 mg. of combined choline. Whether the choline undergoes further conversion into creatinine is not known. A. W. DOX

The acid swelling of the liver in vitro and the participation of the liver cells in this process. M. A. MAGATH. *Z. ges. expthl. Med.* 52, 41-56(1926).—Micrometric studies of the sectioned surfaces of the liver show that the cells and their nuclei take part in the swelling. On the basis of finding two min. in the swelling curves M. suggests that the swelling in the region of p_{H} 6 is a vital swelling while that occurring around a p_{H} of 4 is a postmortem swelling. F. L. DUNN

Acid swelling of the epithelium of sections of the ureters. N. W. LAZARE. *Z. ges. expthl. Med.* 52, 57-73(1926).—Fresh sections showed a well-marked swelling in lactic acid solns. of p_{H} of 2.6. This was less marked in formalin-fixed specimens. Bibliography. F. L. DUNN

The activity of testicular extracts upon isolated organs. A. A. LIKHATSCHEFF AND M. P. NIKOLAEFF. *Z. ges. expthl. Med.* 52, 418-46(1926).—Perfusion of isolated organs with testicular exts. showed an increase in (1) the output of the heart, (2) the flow through the coronary circulation, and (3) the secretion of urine. Bibliography. F. L. DUNN

The composition of lipoids extracted from the kidney and their role in the secretion of certain dyes. H. S. LARPE. *Z. ges. expthl. Med.* 52, 469-75(1926).—Lipoid analyses of the kidneys of cats were made and compared with the rate of excretion of the dyes, trypan blue, methylene blue and neutral red. Trypan blue appeared in the urine in about 2 min., methylene blue in 16 and neutral red in 22 min. The appearance time is in inverse relation to the soly. of the dyes in lipoids. F. L. DUNN

Studies on local changes in blood composition. I. Alimentary irritation, electrolyte and water distribution. E. WOLLHEIM. *Z. ges. expthl. Med.* 52, 508-23(1926).—In normal dogs following the ingestion of 100-200 cc. of milk the blood peripheral to the liver shows an increase in erythrocytes and protein. At the same time the portal circulation shows an increase in K. Following section of the vagi the protein and erythrocyte contents of the blood of the hepatic vein and of the blood peripheral to the liver show a decrease while the portal vein shows a relative increase in Ca. Injection of K and Ca into the portal vein increases and decreases the concn. of the blood, resp., in the hepatic vein. F. L. DUNN

The physiology of the bile. V. The toxicity of bile acids. E. GILBERT. *Z. ges. expthl. Med.* 52, 779-90(1926); cf. *C. A.* 20, 2013.—The toxicity of the sodium salts of bile acids in rabbits was as follows: glycocholate, 0.09 g.; taurocholate, 0.11 g.; cholate, 0.05 g.; desoxycholate, 0.015 g.; apocholate, 0.009 g.; dehydrocholate 1.1 g. per kg. F. L. DUNN

The reaction of the organism to poisons and functional tests for endocrine secretions. A. STERNBERG. *Z. ges. expthl. Med.* 57, 346-52(1927).—A discussion. Bibliography. Cf. following abstracts. F. L. DUNN

The thyroid and atropine. M. W. IKONEN AND S. M. KUSNETZOWA. *Z. ges. expthl. Med.* 57, 353-60(1927); cf. preceding abstract.—Four parts of serum, 1 part of an atropine soln. and one drop of benzene were mixed and placed in an incubator at 37° for 24 hrs. Two drops of the mixt. were then placed in one eye of a cat and the pupillary dilatation and paralysis observed. The serum of normal cats will neutralize up to a 1.50 soln. of atropine. Following thyroidectomy this power is lost but returns when thyroid gland is transplanted. Similar results are obtained in patients with thyroid disorder and the method is suggested as a test for thyroid secretion. F. L. D.

The thyroid gland and physostigmine. S. ENDER AND M. PLITMAN. *Z. ges. expthl. Med.* 57, 361-5(1927); cf. preceding abstracts.—Physostigmine has the reverse action to atropine. Blood serum contains substances which have the property of inhibiting the action of atropine or physostigmine. Chem. studies showed that the property was in the albumin fraction. F. L. DUNN

The heart and internal secretions. LADISLAUS TAKÁCS. *Z. ges. expthl. Med.* 57, 514, 520(1927).—Using frog hearts and immersing them in Ringer soln. contg. various exts. T. showed that exts. of thyroid, hypophysis, spleen, adrenal, breast, testis, ovary,

sinus hormone, parathyroid, secretin, thymus, and corpus luteum, increased the contractility and response of the heart. F. L. DUNN

Experimental studies on bile secretions. J. SCHAFFLER. *Z. ges. expl. Med.* 57, 672-97(1927).—The effects of meat, rice, bacon, paprika, pepper, onions, cincho-phen menthol, dehydrocholic acid, "felagol" and "cholaktol" were detd. in bile fistula dogs. A definite cholagog action in the therapeutic dosages was found only for cincho-phen and dehydrocholic acid. Bibliography. F. L. DUNN

The inorganic phosphorus in human whole blood and corpuscles. HEINRICH SEIDEL. *Z. ges. expl. Med.* 57, 698-708(1927).—Embsden's method (*C. A.* 16, 267) was modified into a micromethod and compared with a nephelometric method. Normal inorg. concns. in whole blood were 3.2 to 4.5 mg. % and in the corpuscles 2.9 to 5.0 mg. Adrenaline gave an increase in healthy normals of 0.6 to 1.2 mg. %, while insulin had no effect. Insulin in diabetics produced a decrease. S. corroborates Lawasceck's values on the lowering of the inorg. P when the blood is treated with bicarbonate (*C. A.* 19, 100). F. L. DUNN

Studies on the refraction difference. I. F. HOGLER AND K. UEBERRACK. *Z. ges. expl. Med.* 58, 22-39(1927).—Refractometric detns. were made on plasma and serum, called as albumin, and the difference was recorded as the refraction difference. Long-continued hunger, thirst and loss of blood decrease the refraction difference (*R. D.*) Hard work increases the *R. D.* II. **Influence of swelling.** *Ibid* 40-50.—Under the action of swelling the *R. D.* decreases and even becomes negative. The fibrin content of the plasma remains unchanged or may increase a little. III. **Influence of electrolytes and nonelectrolytes.** *Ibid* 51-75.—In normal people the diuresis following the ingestion of water, K, Ca and Cl salts resulted in a reduction of the *R. D.* The fibrinogen content of the blood was not markedly changed. In pathol. cases the *R. D.* increased with the edema, and varied inversely with the diuresis. IV. *Ibid* 76-80.—Sweating decreases the *R. D.* F. L. DUNN

The physiological chemistry of the aging of tissues. II. **Studies on beef lens.** M. BURGER AND G. SCHLONKA. *Z. ges. expl. Med.* 58, 710-24(1928).—The water content of healthy beef lens changes from 68.5% in the first year to 63.4% in the fourth five-year period, the N content rising from 5.04 to 5.89%. N detns. on the dried lens were 16% in the first year, 16.5% in the second five-year period, and 16.1% in the fourth five year period, the cholesterol content being 40 mg. % at birth and 222 mg. in the 15th year. The ash constituents did not change appreciably with age. F. L. D.

The activity of the mammary gland as determined by analysis of mammary blood before and after milking. E. A. COCKEFAIR. *J. Dairy Sci.* 11, 230-9(1928).—Samples of blood from the mammary veins of lactating cows were taken just before milking, and samples of jugular blood immediately after the mammary samples. After milking another mammary sample was removed from the same vein as before. Six cows were so tested, with 10 to 20 tests per cow. Mammary blood before milking is higher in both inorg. and lipid P than systemic blood, and in a after milking mammary blood both forms of P, in approx. the same degree, are lower than in systemic blood. It is concluded that just before milking synthesis of milk is practically nil, which allows the blood to retain its load of lipoids. At the same time inorg. P liberated during the hours of active secretion is being absorbed by the blood. Just after milking lipoids are being used for milk fat synthesis, and inorg. P liberated by the process is not at once reabsorbed by the blood because the main osmotic current is toward the alveolar cells. Four to 6 hrs. later inorg. P in mammary blood increases because the osmotic interchange is sufficiently equalized to allow its return. Milk secretion is most active just after milking and proceeds in diminishing rate as the pressure and presence of accumulating synthesized milk interferes with cellular activity. W. C. EBAUGH

Respiratory metabolism in infancy and childhood. V. **Effect of moderate exercise on the respiratory quotient.** J. R. WILSON, H. RVKIN, S. Z. LEVINE AND F. BERLINER. *Am. J. Diseases Children* 33, 618-29(1927); *Physiol. Abstracts* 12, 567.—The respiratory quotient during moderate exercise was similar to that during rest in normal children (2 cases), in a girl with cyclic vomiting, and in a boy with mild diabetes, showing that the proportions of fat and carbohydrate burnt did not vary appreciably; with vigorous exercise the boy with diabetes showed some increased metabolism of fat. The respiratory quotient of the extra metabolism due to exercise was always less than unity—i. e., less than that obtained by combustion of pure carbohydrate. H. G.

Lipin metabolism and generative glands. R. JAFFÉ. *Arch. Frauenk. Konst.* 12, 368-76(1926).—A survey. H. G.

Respiration and glucolysis of the skin and the influence of hormones. E. KROCK. *Dermatol. Woch.* 83, 1468-71(1926).

Action of hormones on cell oxidations. E. SEGHI. *Riv. patol. sper.* 2, 280-7 (1927); *Physiol. Abstracts* 12, 575.—A small increase in oxidative activity of embryonic tissue of fowls and Rous sarcoma is produced by hypophysin. No change is produced by thyroïdin, paraganglin, adrenaline, nor is it produced in adult muscular tissue.

H. G.

Comparative studies of the metabolism of amino acids. I. Changes in the non-protein nitrogenous constituents of the blood following administration of amino acids. M. W. JOHNSTON AND H. B. LEWIS. Univ. of Mich. *J. Biol. Chem.* 78, 67-82(1928).—After the administration of an amino acid to rabbits, the rate of its metabolism is detd. by the rate of absorption and of deamination in the organism. Alanine and glycine were absorbed more rapidly than glutamic acid but the deamination of glycine is slower than the others. An increase in the "undetermined" N of the blood occurs regularly after the administration of glycine and occasionally after *dl*-alanine, possibly as a result of peptide synthesis.

ARTHUR GROLLMAN

The distribution of sugar in normal human blood. M. SOMOGYI. Jewish Hospital, St. Louis. *J. Biol. Chem.* 78, 117-27(1928).—The ratios of the sugar present in corpuscles and in plasma of human blood differ considerably when true and apparent sugar values are used. When the true values are used a const. ratio is obtained. The previously described method (*C. A.* 21, 752) for detg. the true sugar in blood is modified.

ARTHUR GROLLMAN

Studies in calcium metabolism. II. The calcium content of corpuscles, plasma and serum. C. P. STEWART AND G. H. PERCIVAL. Univ. of Edinburgh. *Biochem. J.* 22, 548-58(1928); cf. *C. A.* 21, 2923.—The Ca content of true plasma is 10-20% greater than that of the corresponding serum. The addn. of Na citrate to true plasma in concn. of 1% causes some of the Ca to be pptd. The Ca content of citrated centrifuged plasma is roughly equal to that of the corresponding serum. The corpuscles contain but traces of Ca. In plasma the concn. of ionic and of diffusible Ca appears to be equal to that in serum. The authors suggest that during the coagulation of blood some of the non-diffusible Ca is pptd. **III.** *Ibid* 22, 559-70(1928).—From expts. on the effect of Na citrate, NaF, NaCl and Na₂C₂O₄ on the coagulation time of ox blood and on the concn. of Ca, diffusible Ca and ionic Ca of the corresponding serum, the authors conclude that Vine's view (*C. A.* 15, 3313), that some complex, undissociated Ca compd. is necessary for coagulation, is correct. Ca ions are not necessary. BENJAMIN HARROW

Metabolism in infancy. PHILIP S. POTTER. *Arch. Pediatrics* 45, 410-23(1928).—Review on the basal metabolism and energy requirements of infants, with bibliography.

JOSEPH S. HEPBURN

Composition of milk from a lactating heifer calf. ANON. *J. Dept. Agr. Victoria* 26, 137(1928).—The compn. of milk from a 3-months old heifer calf, lactating since birth, was H₂O 87.57, fat 3.0, protein 3.65, ash 0.74, and sugar 5.04%. K. D. JACOB

Sugar in milk. J. F. TOCHER. *Scottish J. Agr.* 10, 408-15(1927).—The av. sugar content varied from 4.62% in milk from Freisian cows to 4.85% in that from Jersey cows. The sugar content of milk from 676 individual cows varied from 2.7 to 5.5%, 80% giving milk contg. 4 to 5% sugar. In general the % of sugar varied inversely as the albumin and the mineral content of the milk, and was directly proportional to the amt. of milk given at one time. The sugar content was highest at the beginning of lactation and decreased gradually and uniformly during 44 weeks. K. D. JACOB

Effect on basal metabolism of ligating lower extremities. ANNE TOPFER AND HANNAH MULIER. *Arch. Internal Med.* 41, 655-62(1928).—Expts. on 2 human subjects confirm Helmreich's statement that basal metabolism depends on the mass (amt. of active protoplasmic tissue) rather than on the body surface. MARY JACOBSEN

Muscle glycogen as a source of blood sugar. S. SOSKIN. Univ. of Toronto. *Am. J. Physiol.* 81, 383-91(1927).—The administration of adrenaline to dogs from which the intestines, spleen, pancreas and liver had been removed did not result in raising the blood-sugar level. Conclusion: The liver is the sole source of supply of blood sugar; glycogen, once deposited in the muscle, cannot be returned as sugar to the blood.

J. F. LYMAN

Medullary-adrenal secretion and carbohydrate metabolism. S. W. BRITTON AND E. M. K. GEILING. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 81, 467(1927).—The effect of insulin on blood sugar was 10 times as pronounced in animals in which the adrenal medulla had been inactivated as in normals. The depression of the sympathetic nervous system by ergotamine further, but only slightly, accentuated this hypersensitivity. Conclusion: A highly potent secretion from the adrenal medulla, tending toward depletion of the glycogen stores of the body while supplying sugar to the blood stream, takes place during insulin hypoglycemia.

J. F. LYMAN

The physiology of gastric secretion. I. Gastric phase. JAMES I. FARRELL. Proc. Am. Physiol. Soc., *Am. J. Physiol.* **81**, 475(1927).—H₂O, 0.1 N HCl and NaHCO₃ produced no change in gastric secretion after their introduction into a gastric pouch. Gastric juice of a high acidity did not increase the secretion; on the contrary the acidity of the juice introduced was lowered. Olive oil inhibited secretion. Alc., "bitters," *e. g.*, tincture of gentian, stimulated the flow of juice. An aq. soln. of gentian had no action; hence probably it is the alc. rather than the gentian which stimulates the gastric juice. Raw meat juice stimulates the flow of juice, but meat juice boiled 30 min. lost its stimulating power. Meat exts. and meat digested with pepsin were stimulating. Lactic acid, Armour's scale pepsin, NaCl, bread juice and sucrose had no action.

J. F. LYMAN

The bilirubin content of the blood following injections of chlorophyll. JESSE L. BOLLMAN, CHARLES SHEARD AND FRANK C. MANN. Mayo Foundation *Am. J. Physiol.* **82**, 239-40(1927).—There was no alteration in the rate of bilirubin. formation in dogs following the intravenous injection of chlorophyll.

J. F. LYMAN

Effects of thermal and chemical applications to the exposed medulla of the dog. E. S. GURDJIAN. Univ. of Mich. *Am. J. Physiol.* **82**, 261-8(1927).—When the exposed floor of the fourth ventricle (respiratory center) was heated to 75° respiration was arrested, normal respiration ensued again as soon as the temp. fell back to normal. Strong salt solns increased the respiratory rhythm. CO₂ and lactic acids poured over the nervous center had little effect, probably on account of their failure to penetrate the tissues fast enough. Crystals of NaCN placed on the center caused a marked rise in blood pressure.

J. F. LYMAN

Bone marrow reactions. IV. The influence of liver and meat diets on the bone marrow and the regeneration of red blood cells and hemoglobin. GULLI LINDH MULLER. Boston City Hosp. *Am. J. Physiol.* **82**, 269-78(1927).—Pigeons were starved until the bone marrow in the radius and ulna was reduced to comparative aplasia and the blood gave evidence of anemia; then 3 diets were fed. (1) grain (control), (2) boiled beef liver, (3) boiled beef muscle. The grain and meat diets permitted complete regeneration of the red blood cells and hemoglobin in less than 3 weeks. The liver diet was very effective for about 12 days. A decline then set in; appetite failed, weight declined and the red blood cells and hemoglobin fell. The suggestion is made that liver contains inhibitory factors which suppress blood formation in the megaloblastic stage.

J. F. L.

The efficiency of the heart, and the significance of rapid and slow pulse rates. YANDELL HENDERSON, HOWARD W. HAGGARD AND FRANK S. DOLLEY. Yale. *Am. J. Physiol.* **82**, 512-24(1927).—Results for circulation rate, O₂ consumption, pulse and respiration for 50 men including athletes and non-athletes are given. In athletes the pulse rate tends to be much slower and the stroke vol. distinctly larger both during rest and exercise than in non-athletes. Since there is ample time in athletes for the ventricles to relax and fill the stroke vol. during exertion may be increased considerably, 50% or more, over that at rest.

J. F. LYMAN

The alleged interrelationship of the pancreas and the thyroid. LEONARD BENJAMIN SHPNER. Univ. of Chicago. *Am. J. Physiol.* **83**, 134-40(1927).—The thyroid seems to influence carbohydrate metabolism only indirectly through its effect on the basal metabolic rate.

J. F. LYMAN

The gas exchange of isolated muscles during stimulation and recovery. WALLACE O. FENN. Rochester Univ. *Am. J. Physiol.* **83**, 309-22(1927).—The extra O₂ consumed by a small frog muscle in recovering from a 5-20-sec. tetanus was measured. The excess O₂ consumption was nearly but not quite doubled when the duration of tetanus was doubled. The lactic acid formation as measured by Embden would require about 5.7 times as much O₂ for its combustion as the muscles were observed to consume. The respiratory quotient of resting muscles was 0.92; that of the excess O₂ consumption was 0.93. After stimulation, O₂ diffused into a muscle faster than CO₂ diffused out; this was due to the greater soly. of CO₂ in the muscle fluids.

J. F. LYMAN

Relation of the hydrogen-ion concentration of the blood to the irritability of the vasoconstrictor mechanism. G. E. BURGET AND GEORGE CRISLER. Univ. of Chicago. *Am. J. Physiol.* **83**, 373-8(1927).—The greater irritability of the vascular system of the pithed cat to adrenaline in a more alk. medium (within the range p_H 6.85 to 8.0) is due to a change in irritability of the structure acted upon by adrenaline, rather than to any effects produced by a change in the rate of oxidation of adrenaline in the blood.

J. F. LYMAN

Gaseous metabolism of the dog's kidney. J. M. HAYMAN, JR., AND C. F. SCHMIDT. Univ. of Penn. *Am. J. Physiol.* **83**, 502-12(1928).—In 9 dogs the O₂ consumption of the kidney varied from 0.009 to 0.113 cc. per g. per min.; the higher figures usually

panied the greater blood flow and more profuse diuresis. The injection of urea, caffeine, Na_2SO_4 or some drugs was not followed by any characteristic effect on O_2 metabolism.

J. F. LYMAN

An attempt to strike a balance of carbohydrate metabolism at the time of rapid changes in blood sugar and liver glycogen. J. M. D. OLMSTED AND H. S. COULTHARD. Univ. of Toronto. *Am. J. Physiol.* **83**, 513-27(1928).—Glycogen, glucose and lactic acid of the liver, glucose in the blood and glucose used in metabolism were detd. in dogs. If the muscle glycogen is not involved in the carbohydrate changes noted, it seems likely that carbohydrate can exist in the organism in some form other than glycogen or glucose, which, therefore, escapes detection when the usual quant. methods are used for the detn. of these carbohydrates.

J. F. LYMAN

Bile salts and secretin as cholagoges. J. MELLANBY. St. Thomas's Hospital, London. *J. Physiol.* **64**, 331-40(1928).—Bile, placed in the duodenum, stimulated the secretion of both pancreatic juice and bile, placed in the ileum it stimulated the liver and not the pancreas. Injected into the blood, bile salts stimulated bile flow and had no effect on pancreatic secretion. Purified secretin, injected intravenously, stimulated both pancreatic and liver secretion. Conclusion: (1) Bile salts act as direct cholagoges. (2) The action of secretin as a cholagog is secondary to its action on the pancreas.

J. F. LYMAN

The diminution of the titratable alkalinity of the blood in rarified air. G. FERRALORO. *Arch. sci. biol.* **8**, 99-111(1926).—The diminution of titratable alk., of the blood caused by low barometric pressure (400-410 mm Hg) was detd. 5 min. after exposure to rarified air, the alk. diminished, the diminution increased with the time. Shortly after removal from rarified air, the alk. returned to normal. No hyperglucemia was noted. If O_2 , or O_2 and CO_2 , or air with a low O_2 tension and a high per cent CO_2 , was inspired the alk. remained const. Apnea is therefore caused by the diminution of the alk. The phenomenon is assumed to take place as follows: Anoxemia caused by low O_2 tension of the rarified air brings about hyperpnea, hyperpnea causes apnea which in turn sets free the bases. These are eliminated by the kidneys through the urine. Thus, the titratable alk. of the blood is diminished.

PETER MASUCCI

Experiments on the dehydrogenation processes of tissues in vitro. G. PENNETTI. *Arch. sci. biol.* **8**, 452-63(1926).—From expts. made with Lapschuetz's method on the dehydrogenation of tissues *in vitro* P. obtained the following results: Veronal and morphine-HCl do not exert any action on the dehydrogenation processes of hepatic, renal, or nervous tissues of recently killed dogs. Br. in the form of the Na and K salts inhibits respiration in a concn. of 1:1000. Digitalin, sparteine SO_4 , and heliochrom are inactive. Quinine in a diln. of 1:2500, quinidine in 1:200 inhibit the oxidation of the cells *in vitro*; phenocoll is inert.

PETER MASUCCI

The influence of nuclei of the brain on the equilibrium of electrolytes in the blood. LUIGI CONDORELLI. *Boll. soc. ital. biol. sper.* **2**, 252-4(1927).—The various brain centers were operated on in rabbits in order to study the changes produced in the equil. of electrolytes in the blood; the results showed very definitely that in the optic thalamus there are important regulatory centers for Ca, K and P. The results for Cl and Na were not as clean-cut.

PETER MASUCCI

The presence of phosphagen in the heart. G. MARTINO. *Boll. soc. ital. biol. sper.* **2**, 1019-22(1927).—Phosphagen is present in the ventricular muscles of the heart. The atrial muscles do not contain any. There is no important difference in the amt. found in the ventricular muscles of the rabbit, dog or pigeon.

P. MASUCCI

Muscle phosphagen and cadaverous rigidity. G. FALCO. *Boll. soc. ital. biol. sper.* **3**, 222-5(1928).—Phosphagen was found in relatively the same amts. in the muscles of animal and human cadavers in various conditions of rigidity. There was an increase in the amt. of inorg. phosphoric acid. The behavior of phosphagen in cadaverous rigidity is different from that of other muscle contractions so far studied.

PETER MASUCCI

Probable influence of pancreatic juice in the regulation of gastric acidity. ROBERT ELMAN. Washington Univ., St. Louis. *Arch. Surg.* **16**, 1256-65(1928).—During drainage of the total pancreatic juice, the gastric contents contain a far higher total and combined acid than normal. Acid solns. introduced into the stomach of animals during such drainage provoke an intense increase in the flow of pancreatic juice to the outside, but cannot be neutralized as in the normal animal. Such drainage is also accompanied by regurgitation of intestinal contents into the stomach. Analysis of this leads to the hypothesis that reduction of gastric acidity is normal and probably an essential phenomenon, caused by the reflux of alk. pancreatic juice into the stomach.

Bile being actually an acid rather than an alkali cannot take part in this neutralization.

JOHN T. MYERS

The two products of thyroid activity. GEO. S. WILLIAMSON, INNES H. PEARSE AND H. M. CUNNINGTON. St. Bartholomew's Hosp., London. *J. Path. Bact.* **31**, 255-64(1928); cf. *C. A.* **21**, 3226.—The morphology of secretory tissue permits its selection from the normal thyroid gland in comparative purity, and the same is true of colloid tissue. The capacity of the alveoli in each phase was about the same. Thyroid tissue in the phase of secretion is biologically inactive, but in the colloid phase is active even if the I content is as low as 0.008%. Secreting tissue in 94% of sample yields no I. Colloid tissue contains I in 100% of samples. The alveolar contents during the secreting phase contain no I, but it is always present during the colloid phase. The thyroid gland produces 2 substances, secretion proper and iodo-colloid; hence it has a dual function both in health and disease.

JOHN T. MYERS

Application of Meinicke's opacity reaction to the examination of cerebrospinal fluids. S. MUTERMILCH AND (MLLE) E. SALAMON. *Compt. rend. soc. biol.* **98**, 822-5 (1928); cf. Meinicke, *C. A.* **18**, 1855.—This procedure has similar advantages in the examn of cerebrospinal fluids to those already noted in the examn. of serums. This reaction has a certain independence of other reactions such as Bordet-Wassermann, colloidal benzoïn, elixir paregoric, etc.

L. W. RIGGS

Cadmiphile cells of the lungs. J. LECLOUX. *Compt. rend. soc. biol.* **98**, 943-5 (1928).—Guinea pigs were fed rations which were normal, lacking or rich in S. Some of the animals were given intraperitoneal injections of colloidal S, or a 3 to 7 months use of a sulfur drinking water. Sections of lung tissue in formol with 3% CdCl₂ were studied histologically. The diet did not influence the content of glutathione or cysteine in the lung tissue. Cadmiophile cells varied in different animals but had no relation to the glutathione content. The injection of colloidal S did not affect the glutathione content of lung tissue or the no. of cadmiophile cells. The epithelial cells of the intoxicated lung show no increase in cadmiophule cells.

L. W. RIGGS

Antagonism of the thymus and thyroid in their influence on body weight. J. KŘÍŽENĚCKÝ. *Compt. rend. soc. biol.* **98**, 1031-3(1928).—Feeding tests with pigeons proved that the diminution of wt. by hyperthyroidization was largely arrested by simultaneous hyperthymusization. These results confirm those of Sklower, cf. *Z. vergleich. Physiol.* **6**, 150, with white mice.

L. W. RIGGS

Absorption of fats by the frog skin. O. V. HYKES. *Compt. rend. soc. biol.* **98**, 1038(1928).—Not only sol. substances but fats in emulsion may be absorbed through the skin of the frog or tadpole.

L. W. RIGGS

Relation between the spleen and other hematopoietic organs. L. DRASTICH. *Compt. rend. soc. biol.* **98**, 1039(1928).—Fifteen white mice were kept in a rarified atm. at 300 mm. Hg whereupon their red corpuscle count increased from about 8.7 to 13.8 million. Five animals were kept as controls, 5 were splenectomized when their erythrocyte count fell to 11.0 million and 5 were splenectomized and given injections of ground spleen when the erythrocyte count fell to 12.3 million. The hemoglobin content passed through changes parallel to those of the erythrocytes. The vol. of the erythrocytes per 100 cc. of blood in the normal mice was 41.75 cc., in the 5 controls 65.1, in the 5 splenectomized 62.02 and in the 5 splenectomized and injected with ground spleen 67.37.

L. W. RIGGS

Lowering of the hemoglobin concentration in the erythrocytes of animals under the influence of rarified air. L. DRASTICH. *Compt. rend. soc. biol.* **98**, 1040-1(1928).—The slight decrease in hemoglobin per 100 cc. of erythrocytes in the blood of animals subjected to an atm. of 400 mm. of Hg is probably because the newly formed erythrocytes have not produced their normal quantity of hemoglobin. Possibly the older erythrocytes may have lost a part of their hemoglobin, or the vol. of the erythrocytes has increased while the hemoglobin per cell has not increased.

L. W. RIGGS

Study of the portal blood collected by the intermediary of a para-umbilical vein. A. DAMBOVICEANU, SERBAN BRATIANU AND N. VISINEANU. *Compt. rend. soc. biol.* **98**, 1075-7(1928).—The portal blood as compared with the peripheral blood has a higher pH, urea and uric acid content; an equal or nearly equal content of glucose, heterolysins, bilirubin and lipase, and a nearly equal globular resistance, but a lower content of erythrocytes, hemoglobin, leucocytes, cholesterol, catalase and amylase.

L. W. R.

Glycogen reserves and their physiologic role. H. BIERRY. *Compt. rend. soc. biol.* **98**, 1387-9(1928).

L. W. RIGGS

Technic of a study of adrenaline in human suprarenal capsules after death. MARCEL PAGET and PAUL LOHÉAC. *Compt. rend. soc. biol.* **98**, 1421-3(1928).—Existence of adrenaline in free and virtual states in the human suprarenals removed after death,

Influence of cadaverization. LANGERON, M. PAGET AND P. LOHÉAC. *Ibid* 1424-6.—No trace of adrenaline was found in human suprarenals removed 30 hrs. after death. The existence of virtual adrenaline appears to be proved. A more complete paper on this subject is to be issued. L. W. RIGGS

Influence of the time interval in taking samples of urine on the constant of Hasselbalch. MICHEL, POLONOVSKI AND PAUL BOULANGER. *Compt. rend. soc. biol.* 98, 1427-8(1928); cf. *C. A.* 22, 2972.—Samples of urine were taken every hr. for 6 hrs. and every 3 hrs. for 15 hrs. and one sample following these after a 9-hr. interval. The p_H and ammonia coeff. were detd. and tabulated. Samples taken at different hrs. were mixed and the same factors were detd. for the mixed samples. The application of the formula of Hasselbalch to the numerical findings is discussed. L. W. RIGGS

Precipitogenic properties of buffalo milk. K. KATRANJIEFF. *Compt. rend. soc. biol.* 98, 1508-10(1928).—It is concluded that casein, and not globulin, plays the principal role in the formation of precipitins of milk. L. W. RIGGS

Influence of pregnancy on the water content of blood, muscular tissue and certain organs. C. I. PARION, M. CAHANE AND V. MARZA. *Compt. rend. soc. biol.* 98, 1625-7(1928).—A study with guinea pigs showed that hydration is greater in pregnant females in the blood, muscles, liver and kidneys. L. W. RIGGS

Iron of mammalian lung and the formation of melanic pigment. F. GRANEL AND L. HÉDON. *Compt. rend. soc. biol.* 99, 22-4(1928).—Histological. L. W. RIGGS

Influence of the Krough method on the rate of respiration. E. SCHILL AND G. BAITZ. *Magyar Orvosi Arch.* 29, 231-5(1928).—Behavior of the respiratory metabolism in long-period experiments. E. SCHILL. *Ibid* 236-8. In prolonged fasting expts. with man the results are partly in agreement and partly differ by as much as 15%. Therefore, the influence of any factor on the respiratory metabolism can be considered only when the resulting difference is more than 15%. L. W. RIGGS

The copper peroxidase reaction of animal blood. KENJI SHOJI. *Tôhoku J. Exptl. Med.* 10, 293-8(1928).—The original Cu method of Sato and Sekiya (cf. *C. A.* 20, 2515) may be applied successfully to animal blood. With rabbit blood it is best to use twice as much H_2O_2 in Solution B as in the original method. Of all the animals tested (cat, guinea pig, rat, mouse, frog, domestic fowl, pigeon, sheep, carp and rabbit) in no species were the myeloid elements of the blood peroxidase-negative. In more than 700 rabbits tested no one was found peroxidase-negative except those successfully "peroxidase punctured." Differentiation of myeloid and lymphatic leucocytes of animal blood in the counting chamber. *Ibid* 299-304.—Certain modifications of the reagents as used for human blood are necessary in the application of the method to animal blood. These modifications are described at length. Rapid differentiation of lymphatic and myeloid leucocytes in the spinal fluid in the counting chamber. *Ibid* 305-6.—Histologic directions are given. L. W. RIGGS

Is the hyperglucemia-provoking capacity of asphyxial blood due to adrenaline? HOROSHI TACHI AND SHIZUKA SAITO. *Tôhoku J. Exptl. Med.* 10, 426-34(1928).—The asphyxiated blood of rabbits from the general circulation is capable, though not invariably, of causing a slight degree of hyperglucemia when intravenously introduced in amts. of 10 to 15 cc. in a rabbit of about 2 kg. wt. This hyperglucemia is in addn. to the increased sugar concn. due to sugar in the introduced blood. Practically no adrenaline was found in defibrinated asphyxial rabbit blood from the general circulation when tested by the rabbit intestine segment method. L. W. RIGGS

The formation of sacrolactic acid in the animal organism. AKISUKE MATSUMOTO. *Acta Schol. Med. Univ. Imp. Kioto* 10, 261-4(1928).—The influence of an addn. of glycerol on the lactic acid formation during autolysis was studied. Fresh, finely chopped testicles of bulls were digested for 4 days at a temp. of 37°, after adding chloroform-water and different amts. of glycerol. Then the lactic acid was detd. polarimetrically; its value was found to be slightly increased. The max. amt. obtained was 0.250%, while the controls without the addn. of glycerol contained 0.117 and 0.134%, resp. G. SCHWOCH

A note on the normal serum calcium content of man. JOSEPH H. ROE AND BERNARD S. KAHN. *J. Lab. Clin. Med.* 13, 762-3(1928).—Ca was detd. in the serums of 50 normal subjects by the method described in *C. A.* 20, 3474. The values vary from 9.0 to 11.6 mg. per 100 cc. of serum, the av. being 10.13 mg. These findings are in accord with the generally accepted normal of 9 to 11 mg. per 100 cc. of serum, as against the findings of Rosen and Krasnow (*C. A.* 22, 2179). ETHEL WICKWARE

GAUTIER, CLAUDE, AND WOLFF, RENÉ. Le métabolisme basal—ses applications en clinique. Paris: G. Doin & Cie, 172 pp.

G—PATHOLOGY

H. GIDEON WELLS

Kidney disease and serum calcium index. FERDINAND LEBERMAN. *Wiener klin. Wochschr.* 41, 695-8(1928).—A serum Ca index below 9.5 mg. % is evidence of kidney insufficiency. However, normal values are sometimes observed in kidney insufficiency and in early phases serum Ca may be above normal. D. B. DILL

The hepatic function in pregnancy examined by means of tetrachlorophenolphthalein. F. D'APRILE. *Arch. farmacol. sper.* 44, 193-224(1928).—A report and discussion of clinical tests, using the Rosenthal technic. The dye appears to have no sp. affinity for hepatic cells, reticulo-endothelial system or other tissues. Retention is most marked when pregnancy is accompanied by icterus. A. W. DOX

The physicochemical properties of the cerebrospinal fluid in tuberculosis meningitis. ENDRE TUDOS AND ALFRED EBEL. *Z. ges. expul. Med.* 57, 715-20(1927).—The elec. cond. of normal cerebrospinal fluid in children is 1.30×10^{-2} mho and in tuberculous meningitis is 1.26×10^{-2} mho as compared with serum which is 1.08×10^{-2} mho. The chloride content is higher than serum but is reduced in tuberculous meningitis. Analogous changes were obtained for the refractive index. F. L. DUNN

Basal metabolism and polarization capacity of the skin in relation to the function of the thyroid. WERNER LURG AND KURT GRASSHEIM. *Klin. Wochschr.* 7, 647-8(1928).—An elevation in the basal metabolic rate is associated with a roughly proportional elevation in the polarization capacity of the skin. MILTON HANKE

The sedimentation rate of erythrocytes. Its relation to fibrin value and cholesterol content and its application in tuberculosis. M. PINNER, K. KNOWLTON AND R. G. KELLY. *Arch. Path. Lab. Med.* 5, 810-27(1928).—The blood of persons in perfect health not infrequently had a sedimentation rate markedly higher than the usually accepted normal values. The fluctuations of the rate in normal persons were much greater than they are usually reported to be. A quant. relation between the fibrin content of the blood and the sedimentation or between cholesterol content and sedimentation rate could not be ascertained in clinical tuberculosis, under normal conditions or during slight phys. disturbances. Although a higher av. rate is found in active tuberculosis than under normal conditions, this increase is far from const. and it is not parallel with the extent and the progressiveness of the lesions. The prognostic value of the sedimentation is minimal, and, with the exception of extremely rare instances, this test is not apt to furnish information beyond that gained by clinical and bacteriologic observations. The clinical value of fibrin detns. in clinical tuberculosis is of the same order. HARRIET F. HOLMES

Electropathology. A review of the pathologic changes produced by electric currents. R. H. JAFFÉ. *Arch. Path. Lab. Med.* 5, 837-70(1928).—A general review. HARRIET F. HOLMES

The modification of scarlatinal toxin by formaldehyde. J. SMITH. *Brit. J. Exptl. Path.* 9, 49-54(1928).—Various expts. on the modification of scarlatinal toxin have shown that many weeks are required to produce the anatoxin unless formalin is present in great excess. Immunization by means of toxin modified by 2 or 1% formalin is impracticable because of the pain produced by the excess of formalin. The discomfort caused by inoculating with the toxoid modified by 0.5% formalin was, however, trifling, and none of the children developed the scarlatinoid syndrome following an injection of any of the toxoids. Although the percentage of individuals rendered immune to the Dick dose of toxin has not been high, the results suggest that further expts. should be carried out. HARRIET F. HOLMES

Pancreatic fat necrosis: a chemical study. FRED A. K. HERBERT. *Brit. J. Exptl. Path.* 9, 57-63(1928).—Histochem. observations confirm the accepted opinion that soap is formed in the necrotic areas in pancreatic fat necrosis. Possibly neutral fat, fatty acid and soaps are all present in cryst. form. There is certainly more than one type of crystal, but histochem. identification is unsatisfactory. By chem. analysis it has been shown that hydrolysis and sapon. of the fat do occur in pancreatic fat necrosis, but the hydrolysis is mainly an acid hydrolysis, and very little soap is formed. There is a marked rise in the Ca content of the omental tissue when the fat necrosis is extensive, but only a minute portion of this Ca exists as soap. H. F. H.

Blood phosphorus in health and disease. III. A. The alleged value of blood phosphorus determinations in suspected malignant disease. B. The phosphorus distribution in anemic, polycythemia and leucemia. F. B. BYROM AND H. D. KAY. *Brit. J. Exptl. Path.* 9, 72-81(1928); cf. C. A. 22, 1622.—In malignant disease unaccompanied by anemia there is no significant change, as compared with non-anemic non-

cancerous controls in the amt. of any of the following kinds of P compds. in the blood: free phosphate, phosphoric esters hydrolyzed by phosphatases, phosphoric esters not hydrolyzed by phosphatases, lipin P, total P. In malignant disease accompanied by anemia the changes which occur in the above blood constituents are entirely explicable on the basis of the anemia, and are in no way specific for cancer. The detn. of the "phosphorus quotient" as described by Gröbly (*C. A.* 16, 4270) is of no diagnostic value in this disease. In severe obstructive jaundice, such as that accompanying carcinoma of the pancreas, the lipin P of the blood is markedly increased. In polycythemia and simple secondary anemia, as in the anemia of carcinoma, the changes from the normal in the blood P distribution are the result merely of a change in the relative proportion of the red cells to plasma. This is not the case in the anemia of advanced chronic nephritis or in pernicious anemia, in both these diseases the qual. and quant. compn. of the cell with regard to P compds. appear to be changed. Leucocytes are relatively rich in P compds., a given vol. of leucocytes contg. 2 to 3 times the quantity of P as the same vol. of red cells. In leucemia, therefore, P detns. on the whole blood vary with the severity of the anemia and the leucocytosis in an irregular manner. H. F. H.

The structure of the *V. cholerae*, with reference to its immunizing properties. R. W. FAIRBROTHER. *Brit. J. Exptl. Path.* 9, 89-96(1928) --The substance of *V. cholerae*, which, on inoculation, gives rise to protection in animals, is intimately connected with the body protoplasm; it is also heat-stable (100° 1 hour). It is present only in small quantity in the supernatant fluid of a 24-hour bouillon culture after centrifugalization. HARRIET F. HOLMES

Differentiation of achylia by fractional removal of the stomach contents after the injection of histamine; and the determination of pepsin in the urine. HANS J. TESCHEN DORF. *Deut. Arch. klin. Med.* 155, 43-51(1927) --A rapid increase in the acidity of gastric juice was observed after the injection of 0.5 mg histamine. Before the ingestion of food no pepsin was found, after stimulation with alc. only traces; but after the injection of histamine pepsin was found in normal amts. In the urine in some cases normal amts of pepsin were found after the injection, but in other cases subnormal amts. P. Y. JACKSON

Disturbance of carbohydrate metabolism during diphtheria. ARTHUR ELKELES AND FRANZ HEIMANN. *Deut. Arch. klin. Med.* 155, 263 9(1927) --In moderate and severe cases of diphtheria cases were observed with normal, excessive, and subnormal concn. of glucose in the blood. The administration of 10-20 g glucose was followed, even after 2 hrs., by an increased concn. of blood glucose, but no glucosuria was observed. P. Y. JACKSON

The diagnostic importance of lipases in the blood serum. A. KÖRBYNER. *Deut. Arch. klin. Med.* 155, 353-9(1927) --In various diseases of the liver, pancreas, kidneys, lungs, blood and in other pathol. conditions, only normal lipases were found in the blood serum. P. Y. JACKSON

The effect of colloidal dyes upon the vitality of leucocytes. E. V. PHILIPSBORN. *Deut. Arch. klin. Med.* 155, 281-93(1927) --Leucocytes in the urine are rapidly affected by bacterial toxins so that they are readily stained. Variations of the temp. between 15° and 37°, or of the p_H (by the addn. of HCl or NaOH) between the limits found in fresh urine, or of illumination, did not affect the ability of the leucocytes to resist staining. When fresh leucocytes from the blood are kept at 37° in blood serum, in 0.9% NaCl, or in urine, it is found after 30 min. that only a few in each lot are readily stained by Seydewitz's soln., and only those in the urine are strongly stained. After 30 hrs. 0.75 of the serum leucocytes will stain; those in the other solns. are all stained, but only those in the urine are strongly colored and in good condition. The presence in the urine of many fresh leucocytes which resist staining is an indication of acute inflammation of the bladder, kidneys, or ureter. The death of the leucocytes is not sufficient to cause them to stain; the structure of the cell must be altered, as is shown by the fact that warming for 30 min. with quinine, a typical protoplasm-poison, is sufficient to cause practically all the leucocytes to stain. P. Y. JACKSON

The relation of high blood pressure to hyperglucemia. HANS VORGELIN. *Deut. Arch. klin. Med.* 156, 178-81(1927) --A soln. of 20 g. glucose in 100 cc. water, taken on an empty stomach, causes in normal individuals a rise in blood sugar of about 70%; the max. is found in 45-60 min., and after 90-120 min. normal or subnormal values are found. Patients with high blood pressure, including those with chronic nephritis, secondary and genuine shrunken kidney, and arteriosclerosis, were examd., and in all cases the curve for the concn. of blood sugar after the administration of glucose by mouth was found to be within the normal limits. P. Y. JACKSON

Sodium-chlorine regulation. Clinical investigation of the role of sodium and

chlorine ions in the regulation of acid-base equilibrium. LUDWIG HEILMEYER. *Deut. Arch. klin. Med.* 156, 200-25(1927).—Corresponding to 130 mille-equiv. of Na ion, there is found in the blood serum only 5 mille-equiv. each of K and Ca, and 2 mille-equiv. Mg. Of the anions, there is found for 100 mille-equiv. Cl, 2 of phosphate and 13 carbonate (or bicarbonate). More than 400 cases reported in the literature were studied to det. the greatest variations in these ratios occasioned by diseases of various kinds, by radiation with x-rays or with ultra-violet light, by injection of choline or adrenaline, by intravenous or per oral administration of NH_4Cl , CaCl_2 , NaHCO_3 , etc. The abs. variations were large only for Na ion and Cl ion; for Na, max. 222 mille-equiv.; min. 94.8; for Cl, max. 118, min. 48. The variations among the "smaller" ions were largely compensated; that is, an increase in K is frequently accompanied by a decrease in Ca; and further, especially in very severe nephritis, by an increase in phosphate. Of 290 cases there were 284 where the sum $\text{K} + \text{Ca}$ varied not more than 3.5 mille-equiv. from the av. 10.6. Still more nearly const. is the term $\text{K} + \text{Ca} - \text{P}$; its mean in 100 cases was 9.1 mille-equiv.; these included extreme cases of disturbances of the acid-base equil., a stomach tetany with an alk. reserve of 117.4 vol. % CO_2 , and a diabetic coma with an alk. reserve of only 4.4 vol. %. It follows that only the Na and Cl ions, together with proteins and org. acids, det. the amt. of the alk. reserve; and that pathological variations result only from foreign org. acids, decompn. products of proteins and changes in the concn. of Na or Cl ions. The Henderson equation becomes $(\text{H-ion}) = (\text{free } \text{CO}_2) / (\text{Na} + k - \text{Cl-anion deficit})$, where $k = \text{K} + \text{Ca} - \text{P}$. The respiration det. the numerator in this equation, so that the ratio is kept const. for any change in the denominator. The Na and Cl ion concns. det. the denominator; and their effect is noted in cases of diabetic, uremic, or cholamic coma, where excess acid has exhausted the alk. reserve. When the respiration is disturbed, as in pneumonia, the acidosis is compensated by the regulation of Na and Cl ions. P. Y. JACKSON

Further work on paroxysmal hemoglobinuria. T. KUMAGAI AND M. NAMBA. *Deut. Arch. klin. Med.* 156, 257-71(1927).—In Japan typical hemoglobinuria is more common than in European countries or in America, and is frequently found assoc. with syphilis. It is possible that a tendency to this condition is a racial trait. Persons with a strong autohemolytic reaction develop hemoglobinuria upon immersion of the feet in ice water; less pronounced autohemolysis responds with albuminuria to the same conditions. Autohemolytics are most frequently found in the fourth blood group. P. Y. JACKSON

Paroxysmal uroerythrinuria. MUTSUMI NAMBA. *Deut. Arch. klin. Med.* 156, 272-82(1927).—Uroerythrin, instead of the expected hemoglobin, was found in the urine of a no. of autohemolytic patients; and in paroxysmal hemoglobinuria, uroerythrin was detected along with urobilin. The uroerythrin was apparently a product of the hemoglobin. P. Y. JACKSON

The chemical constitution of the kidneys in disease, and its relation to anatomical and clinical observations. I. G. HOPPE-SEYLER. *Deut. Arch. klin. Med.* 156, 321-42(1927).—Tables are given to show the gross wt., dry wt., water, coagulable protein, total N, residue N, fat and ash for normal kidneys and for kidneys in various pathological conditions. II. *Ibid* 159, 31-5(1928).—Normal kidneys contained 81% water, 13.9% coagulable protein, 5% N, 2% fat and 8% ash. In disease of the liver the total wt. is increased, and usually the dry wt. also. In some pathological states the protein content is lower, as in older cases of diabetes, and especially in arteriosclerotic shrinking, where sometimes protein, fat and N are all far below normal. P. Y. J.

The ion content of the blood in diseases of the heart. WERNER BURGER. *Deut. Arch. klin. Med.* 159, 79-84(1928).—The av. concn. of Na, K and Ca in the blood of a patient suffering with heart disease was not abnormal. When a milk diet was employed there was a decrease in the concn. of Na and an increase in K and Ca; but the variations were too small to be considered of importance. P. Y. JACKSON

The lactic acid content of the blood following the injection of lactic acid in experimental derangement of the liver. K. BECKMANN AND T. MIRSALIS. *Deut. Arch. klin. Med.* 159, 129-46(1928); cf. *C. A.* 22, 625.—In normal dogs the intravenous or oral administration of Ca lactate was followed by no increase in the lactic acid content of the blood. After several 0.1 g. doses of P, given as an emulsion in oil, the injection of Ca lactate was followed by an immediate and large increase in blood lactic acid; the concn. did not revert to normal, but to a value somewhat greater than that detd. before the injection. Similar results were noted after the administration of Am and Et alcs. No special increase in concn. was observed in any case after the oral administration of lactic acid. The rate at which the excess lactic acid disappeared from the blood depended upon the extent to which the liver was deranged by the poison administered.

A decrease in the Ca content of the serum was noted in a case of severe derangement.

P. Y. JACKSON

A method for the determination of hexosephosphoric acids in the blood; and a study of their occurrence in normal and diabetic organisms. HEINZ LAWACZECK. *Deut. Arch. klin. Med.* 159, 223-34(1928).—The blood to be analyzed is twice treated with HgCl_2 to ppt. proteins, and the excess Hg removed with H_2S ; the hexosephosphoric acids are not combined with protein and none is lost by this process. The clear filtrate is made alk., and the hexosephosphoric acid pptd. with $\text{Ba}(\text{OH})_2$; washed with dil. $\text{Ba}(\text{OH})_2$ soln., dissolved in HCl, and freed from Ba by pptn. of the latter as BaSO_4 . The hexose sugars are then directly detd. in the neutralized mixt. by the micro-reduction method of Bang. The reducing sugar is calcd. as glucose; the error is small and const. In non-diabetics the blood contains about 1 mg. % of hexosephosphoric acid; or about 1% of the glucose is combined with about 1-3% of the total phosphoric acid in the blood. In diabetics the av. concn. of hexosephosphoric acid is slightly higher. No relation was found between the concn. of hexosephosphoric acid and the total concn. of blood sugar in diabetics.

P. Y. JACKSON

A typical diabetic coma. THEODOR WEISS. *Deut. Arch. klin. Med.* 159, 235-40 (1928).—A case is discussed in which diabetic coma was attended by only very slight ketonuria, but by a very high concn. of blood sugar (1245 mg. in 100 cc.). P. Y. J.

The administration of acid and base as a test of kidney function. FERDINAND LEBERMANN. *Deut. Arch. klin. Med.* 159, 241-5(1928).—The p_{H} of the urine of a person with sound heart and kidneys falls immediately after the administration of HCl, within 1.5 hrs. a dose of 10 cc. 10% HCl in 300 cc. H_2O , given on an empty stomach, depresses the p_{H} below 6. If after 2 hrs. 15 g. Na_2CO_3 , dissolved in 300 cc. H_2O , is swallowed, the p_{H} of the urine rapidly rises to approx. 8. In light cases of glomerulo-nephritis the behavior is almost the same as in normal persons; but in acute nephritis or cases of shrunken kidney, the p_{H} remains almost const. and on the acid side of neutrality. This detn. is of value in the diagnosis of pathol. conditions of the kidneys. P. Y. J.

The acidity of the duodenum and of the upper small intestine. ÉMIL GOTSCHLICK. *Deut. Arch. klin. Med.* 159, 288-305(1928).—In a majority of cases of healthy persons, or those convalescing from a disease which did not involve the digestive tract, the duodenal reaction was distinctly acid. In other cases a relatively strong alk. reaction was found. The reaction in the upper small intestine was normal in cases of subacidity, anacidity and achylia. The acidity of the duodenum and of the small intestine is increased only slightly and for only 10-15 min. by the administration of dilute HCl by mouth. After rather large doses of HCl the temporary acidity is followed by a temporary alkalinity in both duodenum and upper small intestine. The colorimetric method of detn. was employed.

P. Y. JACKSON

The antigenic properties of papain-digested bacterial antigens. HIDETAKI YAOI AND KAMEKICHI NAGASE. Govt. Inst. for Infectious Diseases, Tokyo. *Japan. Med. World* 8, 86-90(1928).—Expts. on dysentery and typhoid bacilli show that papain digests of bacteria act as excellent antigens to test for the presence in serum of agglutinin-producing substances, as well as for passive and active immunization. By using papain digests it is possible to obtain active antigens free from bacterial bodies.

N. KOPELOFF

The significance of lipoids in biology and medicine. LAJOS SURANYI. Univ. of Budapest. *Z. Immunitäts.* 53, 74-98(1927).—Daily feeding of cholesterol causes a lymphocytosis while lecithin produces a neutrophilia. Immunization combined with cholesterol feeding results in a higher titer of antibodies while lecithin causes a lower titer. Sensitized guinea pigs can be saved from fatal anaphylactic shock when the shock-producing dose is reinjected mixed with cholesterol. A single or several fatal doses of diphtheria toxin do not kill a guinea pig when injected with cholesterol. Cholesterol feeding lowers the complement titer. Such procedures as narcosis which cause a hypercholesterolemia also cause a leucocytosis, decrease of complement and hyperglucemia. Lecithin fed to and typhoid bacilli injected into rabbits lower the sedimentation speed of red cells. Cholesterol has this same action but to a less extent. Cholesterol fed for 3 months produces atheromatosis in rabbits. There is also a great increase in the general fat deposits.

J. H. LEWIS

The antigenic action of bacterial lipoids. M. FISLER AND S. EHRLICH. Staatlichen serotherapeutischen Inst., Wien. *Z. Immunitäts.* 53, 151-69(1927); cf. C. A. 21, 1674.—The intravenous injection of the 80% alc.-sol. ext. from dried typhoid bacilli or cholera vibrios, either with or without the residue, does not produce agglutinins, bacteriolysins or Forssman's antibody in rabbits. However the sera produced gives complement fixation reactions with the lipid exts. If the lipid is injected with guinea

pig serum the titer for the complement fixation reaction is increased. There was some specificity of the antibodies produced but was rather spread out. The antiserum had no influence on the native bacteria and bacteria immune serum gave no reaction with the lipid. Lipoid antisera gave flocculation reactions with alc. bacterial exts. but were entirely unsp.

JULIAN H. LEWIS

The antigenic function of bacterial lipoids. A. KLOPSTOCK AND E. WITKESKY. *Z. Immunitäts.* 53, 170-91(1927).—Rabbits injected with killed tubercle bacilli produced antisera which gave complement-fixation reactions with tubercle bacilli as well as with the lipoids from these organisms. This serum contained, besides the sp. antibodies for tubercle bacilli lipoids, also antibodies which reacted with a wide range of lipoids. *Proteus* X-19 bacilli formed antibodies which were active only against the native bacteria and not the alc. ext. Anti-lipoid bodies were obtained by injecting the lipid from tubercle and *Proteus* X-19 bacilli without mixing with a protein. Anti-tubercle bacillus lipid serum acts on native tubercle bacilli while antisera to defatted bacilli reacted only with native bacilli. The same is true for the *Proteus* X-19 bacilli. The antisera to the lipoids of these 2 organisms are very unsp. in their reactions with lipoids.

JULIAN H. LEWIS

Antibody formation among animals. L. HIRZFELD AND HALBER. Staatlichen Inst. f. Hyg., Warshaw. *Z. Immunitäts.* 53, 419-38(1927).—This is a further analysis (*Z. Immunitäts.* 48, 33(1926)) of the finding that the injection of rabbits with group A human blood produces sheep blood hemolysis, while only in a few cases does the injection of sheep blood produce an anti-A antiserum. The ability of an animal to form antibodies for a second substance after the injection of another substance, although the 2 substances have no demonstrable antigen in common, is a rather common phenomenon. A theory to explain this unsp. formation of antibodies is given which is based on the conception that natural antibodies occur at different stages of maturity and that they respond differently to stimuli.

JULIAN H. LEWIS

The extraction and fractionation of Wassermann positive sera. L. REINER AND M. TÖRÖK. Hyg. Inst., Elizabeth-Universität. *Z. Immunitäts.* 53, 532-40(1927).—Serum lipoids play no important role in the fixation of complement in the Wassermann reaction. Electrodialysis ppts. completely the Wassermann reacting substances, but they are not bound to euglobulin. The ppt. contains a small portion of the pseudoglobulin which gives the same Wassermann reaction of the original serum.

J. H. L.

The Wassermann reaction after immunizing with autogenous lipid. E. HERONIMUS AND W. AWRECH. Bakteriolog. Inst. der 2. Univ., Moskau. *Z. Immunitäts.* 53, 541-6(1927).—Sachs and coworkers believe that the antigen of the Wassermann reaction antibodies is the lipid of syphilitic disintegrated tissues combined with the protein of the spirochetes. Expts. to confirm this theory have previously been made with rabbits although this animal is very unsatisfactory since it responds to unsp. stimuli with the formation of a positive Wassermann reaction. Rats immunized with an alc. ext. of rat kidneys mixed with hog serum did not produce a positive reaction although they were able to form complement-fixation antibodies for the alc. ext. of horse kidney.

JULIAN H. LEWIS

The fermentative method of producing diphtheria toxin in vitro. V. M. SDRAVOS-MISSLOV AND N. E. KOSTROMIN. Bakteriolog. Inst., Perm. *Z. Immunitäts.* 54, 1-20 (1927).—It is believed that antibodies are none other than combinations of antigen and enzyme with a resulting "ungrouping." Trypsin mixed with diphtheria toxin under certain conditions produced an antiserum which had all the properties of that produced by animal immunization. In infection of the body there is a balance between the production of enzymes and the antienzyme action of the antigen which determines the outcome of the disease. The indication is given that enzyme administration might be helpful in the treatment of disease.

JULIAN H. LEWIS

The experimental basis of the protection afforded by toxoids. ST. BÄCHER. Serotherapeutischen Inst., Wien. *Z. Immunitäts.* 54, 21-40(1927).—A review of the recent work on toxoid, especially the anatoxin of Ramon.

JULIAN H. LEWIS

The relation of lipid antibodies in the fractionation of serum by acid precipitation. G. E. SELTER. Inst. für experimentelle Krebsforschung, Heidelberg. *Z. Immunitäts.* 54, 113-30(1927).—Antiserum produced by immunizing with lecithin or non-heterogeneous organ exts. and hog serum was fractionated with dil. HCl. The lecithin antibodies appeared in the globulin fraction and the hog serum antibodies appeared in the albumin fraction. However, heterogeneous lipid antibodies were found in the albumin fraction. To explain this difference the theory is given that the native lipid of the globulin fraction is liberated by the acid used for fractionation and reacts with the lipid antibodies. The reaction product is pptd. with the globulins. That no inhi-

bition of antibody reaction is observed is explained in that the combination is a very weak one and is readily broken up. The fact that in the fractionation of a mixt. of a heterogeneous lipid antiserum and a blood serum of a heterogeneous animal the heterogeneous as well as the other lipid antibodies appear in the globulin fraction is given as a fact to support the above theory. An exception to the rule is that of anti-brain serum whose antilipoid reacting bodies are pptd. in the globulin fraction.

JULIAN H. LEWIS

Isoagglutinins and group specific lipoids. I. WITEBSKY AND K. OKABE. Institut. für Krebsforschung, Heidelberg. *Z. Immunitäts.* **54**, 131-7(1927); cf. *C. A.* **22**, 2406.—Complement-fixation and pptn. expts. show no relation between antisera to group sp. red cells and the lipoids from these cells. However, such a relation can be shown by absorption expts. Agglutinin α can be absorbed from serum by the alc. ext. of red cells of group a, and agglutinin in β by the alc. ext. of group b red cells. From serum of group O either agglutinin α or β can be removed by the alc. ext. of the corresponding red cells.

JULIAN H. LEWIS

The relation of blood coagulation to anaphylactic shock. HANS LOEWENTHAL. Rudolf Virchow-Krankenhaus, Berlin. *Z. Immunitäts.* **54**, 138-43(1927).—Anaphylactic shock in sensitized guinea pigs whose blood is made uncoagulable with heparin differs in no way from the usual type of anaphylactic shock.

JULIAN H. LEWIS

Lysozyme of egg white. T. KIGASAWA. Inst. der deut. Univ., Prag. *Z. Immunitäts.* **54**, 155-80(1927).—Lysozyme, a substance which occurs widespread in the fluids and tissues of the body and of plants rapidly dissolves many forms of non-pathogenic bacteria. Egg white will completely dissolve a thick suspension of certain air bacteria in a short time at 37° or 42°. Not all air bacteria are sensitive to lysozyme and among those that are sensitive there is a great variation. The bacteria that are acted on are Gram positive. Lysozyme of egg white is more resistant to heat than is bacteriolysin of serum, but is nevertheless gradually destroyed by high temps. The bacteria vary in their soly. after heating. Some strains can be dissolved by lysozyme after boiling, while others lose their sensitivity after heating to much lower temps. A lysozyme that has dissolved bacteria once may do so a 2nd and a 3rd time, but there finally comes an exhaustion, the time of appearance of which depends on the species of bacteria. To a given amt. of lysozyme a large enough amt. of bacteria can be added that some remain undissolved. It is impossible to bind lysozyme to bacteria without at the same time producing some lysis. Free alkali within certain limits inhibits lysozyme, but does not make it, with the concns. tried, impossible to act. Free acid above a certain limit inhibits concd. as well as dil. lysozyme. A clear soln. of bacteria dissolved with lysozyme is made turbid with those concns. of acid which inhibit lysis. Suspensions in which lysis is inhibited by acid become immediately clear on over neutralization with alkali. This action of alkali is obtained with bacteria washed free of acid and lysozyme. Bacteria that are prevented from dissolving because they were heated are dissolved by alkali. Without knowing the nature of lysozyme it is a substance which makes bacteria sensitive to changes in Ph.

JULIAN H. LEWIS

The production of group specific antibodies for human red blood cells. I. WITEBSKY AND K. OKABE. Inst. für experimentelle Krebsforschung, Heidelberg. *Z. Immunitäts.* **54**, 181-8(1927).—The intraperitoneal injection of guinea pigs with human red blood cells of group A produces lipid antibodies which give complement fixation reactions with the alc. ext. of red cells of group A. Such antiserum does not react with the Forssman antigen in contrast to the antiserum produced in rabbits the same way. The antiserum for group A was sp. for this blood group although the antiserum for the other groups was not. The antisera against group B and O red cells reacted only with red cells and not their lipoids. The injection of alc. ext. of human red blood cells combined with hog serum produced no lipid antibodies.

JULIAN H. LEWIS

Experiments with lysozyme. L. K. WOLFF. Pharmako therapeutischen Inst. Universitäts Amsterdam. *Z. Immunitäts.* **54**, 188-98(1927); cf. *C. A.* **21**, 251.—Lysozyme injected into animals disappears because of its soly. in lipoids. It is very difficult to ext. lysozyme from lipoids with H₂O. Very lipid-rich substances as egg yolk and fish roe contain much lysozyme which cannot be extd. with H₂O. If the lysozyme is absorbed by lecithin it can be brought into an aq. soln. by drying the lecithin with anhyd. Na₂SO₄ and extg. with MeOH. The lysozyme remains with the salt. The substance was further purified so that the amt. from 1 cc. egg-white weighed 1 mg.

JULIAN H. LEWIS

The mechanism of sensitization. V. A. BASHENIN. Inst. für Infektionskrankheiten "Elias Metschnikoff," Moskau. *Z. Immunitäts.* **54**, 226-36(1928).—The instantaneous removal of the site of injection of antigen in the guinea pig does not interfere

with anaphylactic sensitization. The sensitization is also not affected if the arterial or venous circulation is restricted. From these facts the conclusion is drawn that sensitization is a reflex action of the vegetative nervous system. JULIAN H. LEWIS

The relation of β -lysin to lipid solvents. ALFRED PETTERSSON. Karolinischen Inst., Stockholm. *Z. Immunitäts.* 54, 292-302(1928).—The bacteriolytic substance in sera which is resistant to heat at 56° and diln. with or dialysis against H₂O, as complement is, is called β -lysin. This substance is not injured by extg. the native or dried serum with ether, petroleum ether or CHCl₃, which is another mark of distinction from complement. The ppt. formed by treating serum with acetone contains no β -lysin. JULIAN H. LEWIS

The cellular nature of anaphylactic shock with erythrocytes as antigen. I. L. KRITCHEVSKII AND K. I. FRIEDE. Mikrobiol Forschungsinst., Moskau. *Z. Immunitäts.* 54, 303-12(1928).—Frogs sensitized with red blood cells and whose circulating blood was entirely replaced with Ringer-Locke's soln. showed anaphylactic shock when red cells were re injected just as if the antigen were serum. This expt. eliminated hemolysis and hemagglutination as a cause of shock with red cells and pointed to a cellular reaction instead of a humoral one. J. H. L.

Formation of antibodies in the spinal cavity. C GRABOW AND E. PLAUT. Landesheilanstalt, Neustadt i Holstein. *Z. Immunitäts.* 54, 335-54(1928).—Intraspinal immunization is not adapted to studying the local formation of antibodies because of irritation of the meninges and the formation of a depot of antigen. To neutralize this action a group of rabbits was immunized intravenously with one antigen and at the height of immunization was divided into 2 groups, one of which was given the same antigen intraspinally and the other another unrelated antigen but with equal irritative action. Conclusion: Antibodies are formed in the spinal canal independent of those in the serum. Points in the antibody curve showed a similarity to the condition in lues in which there is a high titer of Wassermann reagin in the spinal fluid without any being present in the serum, indicating that the Wassermann reagin is probably a true antibody. JULIAN H. LEWIS

Comparative studies with the spirochetal extract of Klopstock. HUGO HECHT. *Z. Immunitäts.* 54, 365-7(1928).—The spirochetal ext (probably lipoidal) made by Klopstock was excellent as a Wassermann antigen, but should always be controlled with other exts. JULIAN H. LEWIS

Antibody formation in tissue cultures. KURT MEYER AND HANS LOEWENTHAL. Rudolf Virchow-Krankenhaus, Berlin. *Z. Immunitäts.* 54, 409-19(1928).—Cultures of the spleen, lymph glands, and "milk-spots" of the omentum of rabbits regularly formed agglutinins for typhoid bacilli when the tissues were taken from animals previously immunized with typhoid bacilli or injected with them immediately before the cultures were made. Agglutinin formation was detectable first after 48 hrs., was at its highest in 3 days, and at 5 days agglutinin formation was no longer found. This quick cessation of function was attributed to the changes that the reticulo-endothelial cells undergo. Since cultures of the milk spots in the omentum consist of fibroblasts and reticulo-endothelial cells exclusively these expts. show for the first time the importance of these cells in antibody formation. MgCl₂ in the cultures did not increase antibody formation. **Anaphylaxis in tissue cultures.** *Ibid* 420-38.—Spleen and lymph gland from guinea pigs sensitized to horse serum were grown in a medium consisting of guinea pig plasma, spleen ext and horse serum in various dilns. No inhibition of growth was observed. It made no difference if normal or sensitized guinea pig plasma was used. The out-budding blood vessel endothelium seen in cultures of subcutaneous tissue and pia mater also showed no inhibition of growth under the same conditions. The same tissues were passively sensitized by growing 24 hrs. in plasma from sensitized guinea pigs, and, like actively sensitized tissues, there seemed to be no effect from the antigen in the medium. Tissues from guinea pigs dead of anaphylactic shock grew just as well as did those from normal guinea pigs. Heterogenetic serum prepd. by immunizing rabbits with guinea pig kidney had no effect on the growth of tissues or the rhythm of surviving pieces of embryonal heart other than that of normal rabbit serum. Various normal sera as well as rabbit serum had some inhibiting effect which was independent of the content in hemolysis. From these expts. it is concluded that the reticulo-endothelial cells, the blood vessel endothelial cells and heart muscle either do not take part in the anaphylactic shock or are so slightly injured that their growth remains unaffected. JULIAN H. LEWIS

The influence of chloralose on the anaphylactic reaction of guinea pig intestines. ARTHUR ELKELES. Rudolf Virchow-Krankenhaus, Berlin. *Z. Immunitäts.* 54, 471-7(1928).—Chloralose (a compd. of chloral hydrate and glucose) inhibits the anaphy-

lactic reaction of surviving guinea pig intestine in the concn. of 1:1000. When the chloralose soln. is replaced with pure Ringer soln. a typical anaphylactic response is obtained. The contractions from acetylcholine and hypophysin are only slightly inhibited. These expts. show that a narcotic has a peripheral as well as a central one.

JULIAN H. LEWIS

Anaphylactic antibody and precipitin. R. OTTO AND K. IWANOFF. Inst. "Robert Koch," Berlin. *Z. Immunitäts.* 54, 496-506(1928).—O. was not able to confirm his earlier findings (*Z. Hyg.* 103, 426(1924)) that the anaphylactic antibody and precipitin could be quantitatively sepd. by fractionation of antiserum. Only in some instances could this be done. In others the anaphylactic antibody was divided between euglobulin and pseudoglobulin while precipitin was entirely in the pseudoglobulin. In many sera both antibodies were in the same fraction, or both antibodies were divided between the 2 globulin fractions. The results did not agree with those of Doerr and Haßauer (*Z. Immunitäts.* 51, 463(1927)) who found by using electro-dialysis or electrodialfiltration that the 2 antibodies were either in both fractions, often quantitatively divided or in the euglobulin alone.

JULIAN H. LEWIS

The antigenic properties of brain lipoids. BORIS ABADJEFF. Inst. "Robert Koch," Berlin. *Z. Immunitäts* 54, 507-17(1928).—In contrast to the gray substance the white substance of the brain gave alc. exts. which were poor antigens for complement fixation and pptn. reactions in syphilis. There is no difference in the alc. ext. of normal and syphilitic (paralytic) brains in the ability to serve as antigens. There is no species specificity of brain alc. exts. as those from rabbits and guinea pigs act equally well as those from human brains. All sera from syphilitic paralysis gave positive reactions with brain exts., and also about $\frac{1}{3}$ of those from other stages of syphilis, independent of the presence of softening of the brain from other causes than syphilis. Brain exts. are sp. for syphilis as in no case did a serum which was negative with the usual Wassermann antigens give a positive reaction.

JULIAN H. LEWIS

Diabetes insipidus. II. Diuretic substance. HELEN BOURQUIN. Univ. S. Dak. *Am. J. Physiol.* 83, 125-33(1927); cf. *C. A.* 21, 1303.—A diuretic substance which was not pptd. by phosphotungstic acid was extd. from sections of the brains of dogs cut so as to include only the mammillary bodies. The substance was more abundant in the brains of dogs suffering from exptl. diabetic insipidus than in normal brains. The same or a similar diuretic substance was obtained from the blood of dogs suffering from diabetes insipidus but not from normal dogs blood. It could not be found in the urine.

J. F. LYMAN

The role of toxins in parathyroid tetany. I. An attempt to control tetany by the oral administration of kaolin. E. LARSON AND LEO A. ELKOURIE. Univ. of Alabama. *Am. J. Physiol.* 83, 231-6(1927).—The oral administration of kaolin to thyroparathyroidectomized dogs had no effect on preventing or controlling tetany.

J. F. L.

Experimental cretinism. I. A rachitic-like disturbance in extreme hypothyroidism. M. M. KUNDE AND A. J. CARLSON. Univ. of Chicago. *Am. J. Physiol.* 82, 630-8(1927).—When rabbits were thyroidectomized between 2 and 3 weeks after birth they suffered marked thyroid deficiency as shown by the growth curve and a pathol. condition corresponding to rickets in man which developed. This condition was accompanied by a severe anemia. Blood Ca was normal or slightly below normal; while the acid-sol. P of the serum was low.

J. F. LYMAN

Experimental investigations on the serum-antigen reaction. MARIO CAPOACCIA AND GOFFREDO FROLA. *Boll. soc. ital. biol. sper.* 3, 178-82(1928).—The specificity and sensitiveness of the serum-antigen reaction were studied. Guinea pigs were injected with small doses of $HgCl_2$. The reaction was positive with kidney tissue antigen. Animals treated with phosphorated oil gave a positive reaction with liver antigen. Disintegration products of various organs when injected into animals and their blood tested with the various antigens always gave a positive reaction with the corresponding antigen. Many other organs used as antigens are cited.

PETER MASUCCI

Studies in blood volume with the dye method. LEONARD G. ROWNTREE. Mayo Foundation, Rochester, Minn. *Ann. Internal Med.* 1, 890-901(1928).—The use of the dye (Congo red or vital red) is sufficiently accurate for clinical purposes and free from danger.

JOHN T. MYERS

Clinical and pathological evidence of the influence of iodine in the therapy of primary hyperthyroidism. FRANK R. MENNE, THOMAS M. JOYCE AND JAMES D. STEWART. Univ. of Oregon, Portland. *Ann. Internal Med.* 1, 912-34(1928).—Intra-acinar colloid storage with a physico-chem. and mech. inhibition of secretory function and power is probably as important as explanation of the action of I as is the complete iodination of the hormone. The permanency of the efficacious use of I can only be

detd. by more exptl. studies of its real role in colloid storage and in maintaining metabolic constancy.

JOHN T. MYERS

Studies in intestinal obstruction. II. The absorption of histamine from the obstructed bowel. OWEN H. WANGENSTEEN AND MILE LOUCKS. Univ. of Minn. *Arch. Surg.* 16, 1089-1111(1928).—Absorption of histamine from the normal small intestine of the dog in simple obstruction of 2 days' standing cannot be detected. In strangulation, a great fall in arterial blood pressure follows the release of the strangulating mechanism. The autolysis of intestinal mucosa deprived of blood supply is rapid and accompanied by the liberation of a toxic substance with an effect like that of histamine. Absorption of histamine from a strangulated segment that is still viable does not appear great. **III. Simple obstruction: a study of the cause of death in mechanical obstruction of the upper part of the intestine.** OWEN H. WANGENSTEEN AND STANLEY S. CHUNN. *Ibid* 1242-55.—The rapid death of dogs with upper intestinal obstruction is due to rapid dehydration and loss of chlorides. Saline soln. in treatment merely replaces these substances, it does not detoxify. There is no evidence of the absorption of toxins. Interference with the continuity of the upper intestine causes an increase in blood non-protein N, and a decrease in chlorides. The urinary N increases. The administration of NaCl prevents the blood but not the urine changes.

JOHN T. MYERS

Investigations on complement. I. The influence of various salts on the action of complement. H. TOKUNAGA. Epidemiological Inst. Jamaguchi, Japan. *Centr. Bakt. Parasitenk., I. Abt. Orig.* 107, 283-8(1928).—The action of guinea-pig complement on sensitized goat erythrocytes can be changed by several hypertonic and isotonic salt solns. Ba salts, NaNO_3 and MgSO_4 have a marked inhibiting effect, which cannot be offset by an increase of amboceptor or complement. Cl , NO_3 and SO_4 and salts of Na or K have only a slight inhibiting action. Isotonic NaOAc or KOAc markedly enhance the action, the unit ranging from 0.006125 to 0.0125 cc. for guinea-pig serum which was almost inactive with isotonic NaCl. **II. The value of potassium acetate solutions in complement reactions.** *Ibid* 288-95.—The use of KOAc will offset the action of small quantities of anticomplementary salts. Guinea-pig serum inactivated with $(\text{NH}_4)_2\text{SO}_4$ can be reactivated with 0.0001 cc. of normal guinea-pig serum in the presence of isotonic KOAc. Apparently KOAc favors the action of the third component of complement. In the presence of isotonic KOAc, rabbit and human serum is strongly hemolytic for goat erythrocytes. The substitution of isotonic KOAc for NaCl renders the Wassermann reaction more sensitive.

JOHN T. MYERS

The non-specific Wassermann reaction in rabbits. Y. MANO. Kaiser Wilhelm Inst Biochem. Berlin. *Centr. Bakt. Parasitenk., I Abt. Orig.* 107, 306-8(1928).—The use of antisyphilitic medication as arsphenamine or Hg has no uniform effect. Parenteral injection of lipoids was without influence except that large amts. of lecithin cause a transitory disappearance of the positive reaction.

JOHN T. MYERS

The influence of thermochemical stimulation on the Arneth blood picture in the human and in normal animals. B. G. RUBINSTEIN. Odessa Therapeutic Inst. *Folia Hematol.* 36, 5-11(1928).

JOHN T. MYERS

The erythrocyte membrane as a colloidal system, and its changes. O. B. LEPRSHINSKII. Timirjaseff State Inst., Moscow. *Folia Hematol.* 36, 41-93(1928).—The processes of adsorption, swelling, coagulation and disintegration, on the part of frog erythrocytes under the influence of various chem. agents, were observed under the microscope. The cell membrane behaves like a colloidal protein, being insol. in water and sol. in acids and alkalis. It is probably fibrin. The observations on swelling, soln. and fibrin pptn. suggest that the fibrin of serum is a postmortem product of erythrocyte membranes, the amt. in living blood being small and dependent on physico-chem. conditions. Coagulation depends on similar changes, an increase in the degree of dispersion leading toward sol. formation, and a decrease toward coagulation. In many preps. it was possible to see the transformation of cell membrane and then cell nucleus into fine threads. The cell membrane is very sensitive to changes in p_H or salt content in the surrounding medium. This may explain poikilocytosis in the anemias. The application of AcOH produces basophilic granules resembling polychromatophilia. The vol. of the cells is least at the isoelec. point. The process of agglutination is due to swelling of the cell membrane and depends on mol. forces. Strychnine nitrate, 0.15:1000 Ringer's soln. contg. K mixed with blood and 1% tannin soln. produced a ppt. in the cells resembling granules. This did not occur with 5% tannin. JOHN T. MYERS

Hydatid fluid as an anaphylactic antigen. C. H. KELLAWAY. Walter and Eliza Hall Inst., Melbourne. *J. Path. Bact.* 31, 141-56(1928).—The presence of host serum protein in most samples of hydatid fluid is shown by the use of the isolated guinea-

pig uterus. This does not prove its presence *in vivo*, since it is almost impossible to remove fluid from a cyst without contact with the adventitia, and while mother and daughter cysts *in vitro* are permeable to dyes of low mol. wt., they are not readily permeable to oxyhemoglobin or to serum protein. In addn. to host serum proteins another anaphylactic antigen is present in hydatid fluid. This was demonstrated by using coned hydatid fluid of several species, by distn. *in vacuo* or by ultra-filtration. Bicarbonate Ringer solns. which are being oxygenated may be kept at a constant p_H with a const. partial pressure of CO_2 .

JOHN T. MYERS

A case of nervous cretinism with histological examination of the organs. ELIZABETH COWPER, EAVES AND MARGARET MARY CROLL. South Yorkshire Mental Hosp., Wadsley, Sheffield, England. *J. Path. Bact.* **31**, 163 72(1928) — Microchem. reactions for fat were pos. in the cells of most organs. It was in many instances a fatty pigment, but not all pigment was lipid. In the spleen there is a very intense microchem. reaction for Fe, but some of the pigment did not contain any. In the central nervous system, and in the walls of the vessels of the corpus striatum, Fe was found but not necessarily as a pigment. It is remarkable that Fe was absent in the pigment in the liver. Ca was deposited irregularly in the bone. There was more than a normal amt. in the central nervous system, which may have resulted from an increase in the thickened vessel walls where the purpurin reaction was positive. The myelinization of the brain tracts corresponded to that at birth. This arrest of myelinization may account for a low P content of the brain.

JOHN T. MYERS

Hypercholesterolemic splenomegaly. S. C. DYKE. Wolverhampton and Staffordshire Hosp., Wolverhampton, England. *J. Path. Bact.* **31**, 173 84(1928) — A case of splenomegaly associated with generalized xanthoma, hypercholesterolemia, and biliary cirrhosis is described. The hypercholesterolemia was due to chronic interstitial pancreatitis. The splenomegaly was due to hyperplasia of large mononuclear cells of reticulo-endothelial origin. Histological methods did not reveal cytoplasmic inclusions of fatty or lipid material in these cells.

JOHN T. MYERS

Experiments upon the relationship of complement fixation to precipitation. NEIL E. GOLDSWORTHY. Univ. of Cambridge. *J. Path. Bact.* **31**, 220 35(1928) — The process of pptn. may be divided into 3 phases, first clear, second opalescence and turbidity and third particulation or true pptn. Complement fixation occurs during the early phases. Both processes are dependent on proportions in which antigen and antibody are present and the potency of the antiserum. A mixt. of antigen and antiserum in optimal proportions for particulation quickly reaches the peak of its complement-binding capacity and is soon beyond that point, after which the amt. of complement fixed is practically nil. If either antigen or antibody is in relative excess, maximal complement-fixing power is attained more slowly. Mixts. with only a moderate excess of antigen retain opalescence and complement-binding power in a remarkable way. Complement fixation is a function of the size of the particle of the ppt. J. T. MYERS

The immunity index method of testing antigenic values. A. T. GLENNY AND HILDA WADDINGTON. Wellcome Lab., Breckenham, Kent. *J. Path. Bact.* **31**, 403 21(1928).—Guinea pigs may become Schick-negative after the eighth weekly injection of toxin. Immunization is more rapid when begun in summer or early fall, and if the health of the animal is good. Qual. differences exist between different batches of toxoid depending on the amt. of precipitable material, the type of broth, the amt. of HCHO and the absence of phenol. Toxoid pptd. at p_H 0.2 is still antigenic, as is also Na ricinoleate toxoid. The addn. of alum, turpentine, or toluene increases the antigenic efficiency of toxoid. The antigenic efficiency of toxin-antitoxin and of toxoid-antitoxin is increased by heating the floccules to 70° for 1 hr. The immunity response is increased by heating the floccules to 70° for 1 hr. The immunity response to one antigen may be lowered by simultaneous response to other antigens. Dye-blockaded pigs show little response. Diln. of toxin-antitoxin mixts. causes dissoen.

JOHN T. MYERS

The precipitation test in hydatid infestation. NEIL E. GOLDSWORTHY. Univ. of Cambridge. *J. Path. Bact.* **31**, 435 6(1928).—Particular attention must be paid to optimal proportions.

JOHN T. MYERS

Studies of an insulin-resistant diabetic. R. D. LAWRENCE. Kings College Hosp. Quart. *J. Med.* **21**, 359 69(1928).—A boy of 17 suddenly developed diabetes 3 years ago. It was controlled by 40 units of insulin per day and a diet of 35 g. carbohydrate, 38 g. protein, and 83 g. fat, the fall in blood sugar being normal. A year later he required 100 units on the same diet, and 6 months later he was excreting 5 to 10 g. sugar on a diet of 60 g. carbohydrate, 80 g. protein, and 150 g. fat, with 220 units of insulin per day, a glucose equiv. of 1 g. per 2 units. When insulin was omitted he went into coma; hence it has a mild action. None of the usual factors such as sepsis, which

make a patient insulin resistant, was present. Blood sugar studies showed features different from the ordinary severe diabetic. It was lowest after a night's rest, and when carbohydrate was given it rose in spite of insulin. This was not due to delayed insulin action or lack of absorption because insulin during fasting reduced the blood sugar at a normal rate, though to a less degree than in the ordinary diabetic. It seems that insulin in this case cannot deal with ingested carbohydrate in the usual way, by storing it as glycogen. When starved the blood sugar fell spontaneously instead of rising as in the usual diabetic, when insulin is withheld. It is suggested that insulin here failed to store glycogen normally, but did have its other action of checking the new formation of sugar and ketones from endogenous protein and fat. It seems probable that a factor other than insulin is lacking, perhaps some coenzyme which is necessary in the usual action of insulin in forming glycogen.

JOHN T. MYERS

Observations on the pulmonary ventilation and oxygen consumption in pulmonary tuberculosis, and on the effect of the respiratory quotient on the relation between pulmonary ventilation and oxygen consumption. RAYMOND WILLIAMSON. Hospital for Consumption and Diseases of the Chest, Brompton, England. *Quart. J. Med.* 21, 371-83(1928).—O consumption and pulmonary ventilation in patients with pulmonary tuberculosis when examd. over a considerable period under basal conditions vary together. Even under varying conditions, the relationship is approx. direct. In a normal subject there was a close relationship under basal, but not under varied conditions, being modified considerably by the respiratory quotient. For practical purposes the relationship between O consumption and pulmonary ventilation seems sufficiently close to permit the assumption that the measure of pulmonary ventilation indicates the rate of metabolism, and may be useful in following the progress of a case of pulmonary tuberculosis.

JOHN T. MYERS

Creatine and rigidity. MARION HIRST AND C. G. IMRIE. Univ. of Sheffield. *Quart. J. Med.* 21, 401-17(1928).—In subjects with marked Parkinsonian rigidity creatinurea occurs regularly. The amt. excreted expressed as a fraction of the body wt. appears to be related to the body rigidity. The rate of excretion is lowest at night when muscular activity is least. In these respects it resembles the output of uric acid, both in these cases and in the normal subject. After single doses of creatine (18 g.) rigid cases excrete less of the injected material than do normal persons. When 3 such doses are given on successive days, the output was greater after the second and third doses in both normal and rigid cases but the difference was greater in the latter. In some cases the creatine seemed to be broken down. Creatine in large doses increases the output of creatinine.

JOHN T. MYERS

Variations in the different forms of phosphorus under the influence of diabetes and the hypoglycemic drugs. G. FLORENCE, J. EISELME and TSEN ZOLA. *Bull. soc. chim. biol.* 10, 675-83(1928).—In the diabetic there is a diminution of saline P in the plasma but an increase in the org. P. The etherized P is increased 7 times and the remaining org. P is doubled. In the diabetic as in the normal animal, insulin and synthalin tend to restore the P of the blood to its normal value by increasing the saline P and diminishing the etherized and other org. P. There appears to be no action on the lipidic P. In the muscles insulin and synthalin, on the contrary, decrease the saline P and increase the org. P.

L. W. RIGGS

Comparative action of a precipitating serum upon the serums of the mother and fetus. L. NATTAN-LARRIER AND P. LÉPINÉ. *Compt. rend. soc. biol.* 98, 924-6(1928); cf. *C. A.* 22, 620.—In 40% of the subjects the serum of the fetus appeared less active and less sp. than the maternal serum. The results of this study tend to support the idea that proteins of the normal maternal serum do not traverse the placental tissue. Antimaternal precipitins in fetal blood and antifetal precipitins in maternal blood. *Ibid* 926-8.—In 12 cases the fetal serum gave no ppt. in the corresponding maternal serum, and in turn the maternal blood gave no ppt. in the serum of the fetal homolog.

L. W. RIGGS

Hemolysis and surface tension. AUGUSTE LUMIÈRE AND EDOUARD RÉTIF. *Compt. rend. soc. biol.* 98, 984-5(1928).—Blood of the guinea pig, withdrawn by cardiac puncture, was dild. to 1 in 50 with physiol. saline soln. and to this dild. was added just sufficient of the active substance to insure hemolysis. The surface tension of the mixt. was then detd. The most active hemolysins such as saponin and hexylresorcinol in 1/20,000 gave solns. with a surface tension of 65 and 59 dynes per cm., resp., while the com. products "Nokal A. E. M." and "Alborit" in concns. of 1 in 600 and 1 in 250, resp., caused the surface tension to drop to 40 and 49, resp. Accordingly there is no relation between lowering of the surface tension and hemolytic power.

L. W. RIGGS

Role of arsenic in tar cancer. SIMONS RAPOSO. *Compt. rend. soc. biol.* 98,

997-9(1928).—The application of Fowler's soln. or of As_2O_3 to surfaces previously painted with tar appeared to have little or no effect on the development of cancer. Thorough washing of the tar prevented the formation of cancer. Pseudo-electrolysis of tar (Kotzareff method) and the action of heat on cancer-forming tar. *Ibid* 999-1001; cf. Kotzareff, *C. A.* 21, 268.—Tar applied at 10° to 45 rabbits caused no cancer in 70 days. When applied at 55° 9 of the animals developed cancer. Results with pseudo-electrolyzed tar were like those with heated tar. There was no difference in the development of cancer following daily paintings and paintings twice a week. L. W. R.

Retention of residual nitrogen and of aromatic substances of the blood. Anatomic localization in experimental renal insufficiency. M. FRANK. *Compt. rend. soc. biol.* 98, 1053-7(1928).—In exptl. renal insufficiency in the dog, the raised level of residual N and of aromatic substances are symptoms of a grave renal condition involving an important lesion of the kidney, especially of the renal epithelium. L. W. RIGGS

Desensitizing action of rabbit serum after intraperitoneal injection of vital colors. J. MOLDOVAN AND M. ZOLOG. *Compt. rend. soc. biol.* 98, 1085-6(1928). Site of origin of the desensitizing substance after the injection of India ink in the sheep. J. MOLDOVAN AND T. TURCU. *Ibid* 1087-8. L. W. RIGGS

Nature of the desensitizing substance of the serum of animals blocked with India ink. J. MOLDOVAN, T. SLAVOACA AND M. ZOLOG. *Compt. rend. soc. biol.* 98, 1619-20(1928).—The substance in question is sol. in alc., is stable in acid soln., and resists the action of heat at 100° . L. W. RIGGS

The sensitizing principle of the aqueous or alcoholic extract of the node of Tawara (sheep and cattle). MARCELINÉ HOEBAERS. *Compt. rend. soc. biol.* 98, 1242-4(1928). L. W. RIGGS

Preparation of precipitating serums starting with proteins coagulated by heat. E. NICOLAS AND K. KATRANJEFF. *Compt. rend. soc. biol.* 98, 1310-1(1928).—Lab. details are given. Zoölogical and chemical specificity of precipitating serums obtained by means of raw proteins and of proteins coagulated by heat. *Ibid* 1312-4.—Cf. following abstr. L. W. RIGGS

Antigenic character of albumins modified by heat and their specific differentiation by precipitating serums. E. NICOLAS AND K. KATRANJEFF. *Centr. Bakt.* 98, 259(1926). L. W. RIGGS

Variations of urinary acidity in patients with pulmonary tuberculosis. R. GIEFFON AND R. BLASKO. *Compt. rend. soc. biol.* 98, 1393(1928); cf. *C. A.* 22, 2083.—The p_H , total acidity, org. acids and phosphates of 4 patients were detd. on 3 successive days. The variations in these constituents were large and cannot be explained by differences of diet, but probably are caused by crises of fatigue, dyspnea or tachycardia which accompany the disease. Loss in bases by urines of patients with pulmonary tuberculosis. *Ibid* 1394-5. L. W. RIGGS

Influence of aging on serums submitted to the Vernes reaction with resorcinol. A. BRETON. *Compt. rend. soc. biol.* 98, 1429-31(1928); cf. *C. A.* 22, 821.—The flocculating power of 44 serums on standing varied from day to day. These variations are indicated in general by a fall in the optic index in 90% of the samples. The variations are not proportional to the time of aging nor do they seem to follow any known law. L. W. R.

Acid-base equilibrium in spontaneous animal rickets. F. LIÉGEAIS. *Compt. rend. soc. biol.* 98, 1445-7(1928); cf. *C. A.* 21, 1485, 2031.—In the rachitic animals studied, regardless of species, there was a fall in the alk. reserve, a p_H at the inferior limit of normal values and a ratio $H_2CO_3/NaHCO_3$ above $1/10$. Spontaneous rickets in the dog, pig and colt, before any treatment, is a disturbance of the acid-base equil. in the sense of a generally compensated non-gaseous acidosis. Acid-base equilibrium and treatment of rickets. *Ibid* 1448-50.—Treatment of rickets in the dog by cod-liver oil was accompanied by a change in the blood p_H from 7.38 to 7.43, a rise of 10 to 15% in the total CO_2 and a corresponding rise in the $NaHCO_3$. The $H_2CO_3/NaHCO_3$ ratio changed from $1/10$ to $1/21.2$ and the Ca ions in mg. per l. fell from 33 to 27. The administration of "vigantol" (irradiated ergosterol Merck) to 2 normal dogs was without action on the mechanism of acid-base equil. L. W. RIGGS

Hyperglucemia in cardiac affections. I. GAVRILA AND E. CABA. *Compt. rend. soc. biol.* 98, 1466-8(1928).—In diseases attended with cardiac affections there are important disturbances of the gluco-regulating mechanism, which are more evident as the cardiac insufficiency is more pronounced. It is believed that insufficient liver functioning has an important influence in these cases. L. W. RIGGS

Cholesterolytic power of human serum in ocular affections. D. MICHAEL AND P. VANCEA. *Compt. rend. soc. biol.* 98, 1470-1(1928).—The conclusions of this study are not in agreement with those of Loeper *et al.* (cf. *C. A.* 22, 1374). L. W. RIGGS

Blood calcium and phosphorus after sympathectomy in hemiplegia. C. I. URECHIA AND G. POPOVICIU. *Compt. rend. soc. biol.* 98, 1486-8(1928).—In 6 cases of hemiplegia with contraction the Ca was greater on the side affected than on the normal side. The P varied within very narrow limits. In flaccid hemiplegia the Ca was diminished. In flaccid hemiplegia in which the sympathetic was paralyzed the Ca was diminished, but in the form with contractions in which the sympathetic was excited the Ca was increased. The state of the sympathetic appeared to have no influence on the P content. In 3 cases of sympathectomy Ca was diminished on the side of operation. The injection of ergotamine had no influence on the Ca content on the side already paralyzed. Tests with 2 sympathectomized dogs showed a diminution of Ca on the side of operation. The P was but slightly disturbed. L. W. RIGGS

The Widal agglutination reaction in healthy persons. A. N. BOSE AND S. K. GHOSH DASTIDAR. *Indian Med. Gaz.* 63, 320-1(1928).—Healthy persons of the middle class in Bihar do not as a rule show any agglutinins of the typho-coli group. The few individuals who do show their presence live under poor hygienic conditions. There is a remarkable absence of *B. dysenteriae* (Shiga and Flexner) agglutinins in all. The comparative immunity to the typho-coli organisms in persons living in tropical countries may be due to some protective factors in the serum other than agglutinins. L. W. R.

Practical suggestions regarding biochemical diagnostic methods. VICTOR C. MYERS. *J. Am. Med. Assoc.* 91, 167-73(1928).—The modern technics of testing body fluids are reviewed. The relations of the results of chem. analysis of body fluids in various pathol. conditions are discussed. L. W. RIGGS

Immune-body production of animals fed with lipoids. L. SURÁNYI. *Magyar Orvosi Arch.* 29, 222-30(1928); cf. *C. A.* 21, 2505.—Immunization expts. with typhoid, paratyphoid, dysentery, colon, bacilli and erythrocytes of sheep or rabbits fed cholesterol or lecithin showed that cholesterol-fed animals gave an immune serum with a very high titer, while the lecithin-fed animals gave a serum with a lower titer than that of controls. Animals which had been fed cholesterol for long periods received an acute fatal anaphylactic shock by the intravenous or intracardial application of heterogeneous protein such as typhoid bacilli or horse serum. The immune body is produced in the reticulo-endothelial cells. These processes are under the influence of the lipoids which modify the production of the immune body. L. W. RIGGS

Relation of complemental activity and of antibody production to the acid-base equilibrium. ISTVAN WEISS, ISTVAN SUMEGI AND Z. BENKOVICS. *Magyar Orvosi Arch.* 29, 239-43(1928).—The activity of the complement of guinea-pig serums is lowered either by changing the metabolism toward the acid or toward the alk. direction. The max. amt. of complement was formed when the p_H was normal. The hemolysin production of the acidified rabbits at the end of 7 days was about 2.5 times larger than in normal or alkalinized animals. The difference is smaller with the time and disappears during the third week. There is no significant difference between alkalinized and normal animals in hemolysin production. L. W. RIGGS

Influence of hemorrhage upon the adrenaline (Folin) content of the suprarenals of the rabbit. HIROSHI TACHI. *Tohoku J. Exptl. Med.* 10, 409-19(1928).—Bleeding causes a reduction in the adrenaline load, as detd. by the colorimetric test of Folin, Cannon and Denis, in the suprarenal glands of rabbits. Denervation of the glands prevents the depletion of the adrenaline content. L. W. RIGGS

Simplified apparatus and technic for the determination of the icterus index. RUSSELL C. PIGFORD. *J. Lab. Clin. Med.* 13, 658-9(1928).—An inexpensive equipment easily made in any lab. is described. Detn. are rapidly made on only 1 to 1.5 cc. of serum. Calcns. for diln. are seldom necessary. ETHEL W. WICKWIRE

The technic and interpretation of the van den Bergh test; its value in detecting latent jaundice. E. ELSWORTH STEEN. *Irish J. Med. Sci.* [6], 22, 625-33(1927).—In performing the "indirect" reaction the same technic is used as is followed in the "direct" reaction (cf. *C. A.* 21, 3921), except that 0.5 cc. of 95% EtOH is added to obtain the proper diln. in performing the quant. test. S. describes a positive "indirect" reaction as one which gives almost at once a pure violet color, unless "hepatic bilirubin" is present in the serum, when the color is first pink or red, growing to become more violet. The reaction will detect 1 pt. of bilirubin in 1,000,000 parts of serum. No substances found in serum interfere and lead to a false positive. Lutein obtained while on a certain diet gives an icteric appearance to the skin but not a positive van den Bergh reaction. "The great value of the test lies in the fact that it can demonstrate hyperbilirubinemia at a time when it cannot be detected by any other means." R. C. WILLSON

The calcium and phosphorus content of the blood in fractures. G. V. RUDD.

Med. J. Australia 2, 398-401(1927).—No significance is attached to the small irregular variations in the Ca and total P. R. suggests that the observed fall and subsequent rise in the inorg. P after fracture has occurred, may bear some relationship to the 2 phases of union, callus formation and active calcification. R. C. WILLSON

H—PHARMACOLOGY

A. N. RICHARDS

Influence of pituitrin on diuresis variously induced. F. P. KNOWLTON, A. N. CURTIS AND A. C. SILVERMAN. *Proc. Soc. Exptl. Biol. Med.* 24, 865-9(1927).—When diuresis is induced in anesthetized rabbits by the method of continuous intravenous injection, pituitrin acts to augment such diuresis. The effects are similar with various diuretics and with varying dosage and administration of the pituitrin. C. V. B.

Cardiac output as influenced by ephedrine, homocamfin, quinidine, quinine, chloral and chloroform. C. REYNOLDS AND S. N. BLACKBERG. *Proc. Soc. Exptl. Biol. Med.* 24, 870-1(1927).—Cardiac output, blood pressure, heart rate and O_2 consumption were detd. in dogs under the influence of these various drugs. C. V. B.

Action of narcotics on the ameba by means of microinjection and immersion. S. HILLER. *Proc. Soc. Exptl. Biol. Med.* 24, 938-9(1927).—The results of comparative studies on the influence of the narcotics ethyl alc., chlorotone, ether and $CHCl_3$ on the protoplasm of *Amoeba dubia* are described. C. V. B.

Action of ethyl alcohol on the intestine of mammals. E. MILANESI. *Arch. sci. biol. (Italy)* 11, 55-62(1928).—The effect of EtOH on the intestine (isolated) of dog was studied as the effects of reagents on this are known. A piece of intestine 5 cm long was immersed in Ringer-Locke soln. at 38° and EtOH added. Concns below 1:200 have no effect; increase to 1:1000 lowers the tone; and further increase reduces the involuntary movements. Addition of pilocarpine restores these movements even with concns. up to 1:200 of EtOH, while above this, $BaCl_2$ is necessary to restore the movements. Adrenaline further depresses the movements, stopping the involuntary entirely. The action of EtOH must be one of paralysis, since it is neutralized by pilocarpine, which is stimulating, and enhanced by adrenaline, which is depressing. A. W. C.

The protein sugar of blood. IV. Action of adrenaline and insulin on protein sugars of blood in normal dogs and with pancreas removed. G. QUAGLIARIELLO. *Boll. soc. ital. biol. sper.* 2, 890-2(1927); cf. *C. A.* 21, 3075.—Q has studied the effect of both insulin and adrenaline injections of normal dogs, and those with exptl diabetes by pancreas removal. Neither reagent affects the amount of protein sugars in the blood plasma noticeably, and while insulin does reduce the free sugars, it does not affect the protein sugars appreciably. A. W. CONTIERI

Camphor treatment of the late stages of pulmonary tuberculosis with hexetone. RICHARD MICHEL. *Beitr. klin. Tuberk.* 67, 577-81(1927).—Hexetone possessed the advantage over camphorated oil in being purer without danger of local irritation and of more rapid action. It is given in 1% soln. at daily, bi-daily and tri-daily intervals to a total of 50 injections. Beneficial results were obtained in severe bilateral conditions in pulmonary tuberculosis, especially with concomitant circulatory disturbances, such as diminished blood pressures or increased pulse frequency. H. J. CORPER

Insulin treatment in initial and stationary pulmonary tuberculosis. H. GROSSFELD. *Z. Tuberk.* 47, 389-93(1927).—Insulin fattening treatments are considered suitable for stationary, fibroid cases of tuberculosis. Focal reactions are not to be feared. Aside from the action upon the carbohydrate metabolism there are indications that the insulin can also favorably affect the tuberculosis. In the blood it causes a leucocytosis and counteracts increased pressure resulting from adrenaline. The tissue reaction is shifted to the alkaline side and chronic inflammation favorably affected. Increased carbohydrate combustion aids in detoxication of the tuberculosis products of disintegration. Insulin can be designated a histotropic hormone since it enables cells to utilize carbohydrates while in its absence the tissues lose their resistance to various infections. H. J. CORPER

Metal salt therapy. Sterilization of the infected organism (tetanus and tuberculosis). L. E. WALBUM. *Z. Tuberk.* 48, 193-216(1927); cf. *C. A.* 21, 963.—In various earlier reports it was pointed out that suitable minimal injections of metal salts protected rats against infection with virulent "Rattenbacillen" and guinea pigs against infection with mildly virulent tubercle bacilli. In the present report it is pointed out that a "Therapia sterilizans" toward virulent tetanus spores in mice can be attained by means of small quantities of Mn salts in an indirect manner. While mice with a latent tetanus spore infection can be activated by a subsequent staphylococcus inocu-

lation, the same animals remain healthy after treatment with suitable amts. of Mn. The organs of these mice planted on media after 1 injection revealed the spores still alive, but one injection would inhibit the development of tetanus following the injection of staphylococci. Like inhibitory results attained in guinea pigs infected with a mildly virulent strain of tubercle bacilli and treated with suitable doses of salts (usually the chloride) of W, Pt, Er, Ba, Al, La, Ce, Se, Cd, Mo and Ru. Like results attained in rabbits infected with a highly virulent strain of bovine tubercle bacilli (Bang) and treated with Cd, Mn, La and Ce. The organs were tested by guinea-pig inoculation. Large doses of metal salts are believed to depress the protective mechanism and cause a more rapid fatal outcome. The theoretic basis of chemotherapy according to Ehrlich (direct and sp. effect on the causative organism) so far as it concerns bacterial diseases is considered incorrect. Rather it should be aimed to stimulate the sterilizing energy of the organism.

H. J. CORPER

Acurogen therapy as a means of diminishing metabolism in pulmonary tuberculosis. G. PANEL. *Z. Tuberk.* **48**, 301-8(1927).—Reasoning that cases of pulmonary tuberculosis all have an increased metabolism, and in addn. diseases with increased basal metabolism exert an unfavorable influence upon the former, therapy should aim to oppose this by causing a diminution of metabolism. Jacobson's "Acurogen" prepd. from thymus, lymph gland tissues and heart tissues, combined with Fe, tannin, and allyl sulfide was used in 41 cases of pulmonary tuberculosis with the result that of 30 open cases 8 became free from bacilli and in 13 they were diminished in the sputum. Improvement resulted in 86% of the cases. The results are believed due to a diminished metabolism occasioned by the Acurogen therapy.

H. J. CORPER

The old and modern cinnamic acid treatment of pulmonary tuberculosis. T. STERNBERG. *Z. Tuberk.* **48**, 309-12(1927).—Landerer's favorable results in animal expts. were dependent on 2 properties of cinnamic acid, causing a generalized leucocytosis and provoking an aseptic inflammation at the tuberculous focus. The more favorable results in man are due to immunobiologic relations developed. Experiences with Elbon-Ciba (cinnamoyl-*p*-hydroxyphenylurea), which after resorption and addition of water, splits into cinnamic acid and hydroxyphenyl urea, are recorded. While Landerer aimed at a non-sp. irritation by massive administration, S. uses protracted administration resulting in continual benzoylizing of the blood and tissues. The sputum was favorably influenced qualitatively and quantitatively, the temp. dropped without perspiration or other concomitant symptoms indicating a lack of parallelism with the usual antipyretics, following this treatment. The diminution of bacilli with prolonged treatment is attributed to the favorable influence upon the secretions. Suited for this treatment are all cases with prolonged pyrexia, exclusive of septic temps. and outspoken exudative forms, as well as afebrile cases with profuse secretion and large amts. of bacilli. Initially 4 to 5 g. are given daily and brought to a max. of 8 g. After the disappearance of symptoms 2 g. as a daily dose are continued for 4 to 6 weeks.

H. J. CORPER

Metal salt therapy ad modum Walbum. Experiences with the manganese treatment of pulmonary tuberculosis. O. HELMS AND J. FREDERIKSEN. *Z. Tuberk.* **49**, 18-26(1927).

H. J. CORPER

The influence of chloroform narcosis on the blood lipase. F. KESSEL. *Zhurnal exptl. Biol. Med.* **1926**, 52-70; *Chem. Zentr.* **1926**, II, 3100.—In CHCl_3 narcosis, the lipase content of the blood increases until it reaches a max. after 8 hrs., and then becomes normal again after 21 hrs.

C. C. DAVIS

Influence of lobeline on the respiratory center paralyzed by certain poisons. A. TESIKOV. *Zhurnal exptl. Biol. Med.* **1926**, 159-68; *Chem. Zentr.* **1926**, II, 3101.—A discussion of the effect of lobeline on dogs whose respiration is impaired by morphine, heroine and CHCl_3 .

C. C. DAVIS

Pharmacological investigations on a mercury colloid. ERCOLE UGOLOTTI. *Arch. farmacol. sper.* **44**, 145-68(1928).—A colloidal prepn. of HgS , made by heating HgCl_2 with NaOH and egg albumin, was administered subcutaneously, intramuscularly, intraperitoneally and intravenously to guinea pigs, rabbits and dogs. With subcutaneous injection the portion contg. the finer and more stable micellae is absorbed, while the coarser and less stable micellae pass into the granular state and are deposited in the tissue near the site of injection. Within 3 or 4 days toxic symptoms develop, such as degeneration and necrosis of the renal and hepatic epithelia, accompanied by loss in body wt. and eventually resulting in death. This cannot be attributed to the ultimate absorption of the granular deposits which is extremely slow, but is due to the colloid initially absorbed. Intramuscular administration produces the same phenomena. When injected intraperitoneally, some of the unabsorbed granules appear in the lymph

phatic system, probably transported thither by the macrophages. Intravenously, the colloid is rapidly brought into the general circulation without forming a granular deposit either at the site of injection or elsewhere. The toxic effects on the system are the same as those produced by the ordinary mercurial preps. There is loss in wt., hepatic lesions with degeneration of the cells, acute nephritis and hyperplasia of the spleen. The antiseptic action associated with Hg ions is wanting. A. W. DOX

The reticulo-endothelial system and resistance to inorganic chemical poisons. G. VACCA. *Arch. farmacol. sper.* **44**, 177-92(1928).—A study of the increased resistance to Pb poisoning after injections of trypan red, trypan blue, pyrrole blue and collargol. A. W. DOX

Experimental investigations on the lack of habituation to morphine and synergized preparations of opium. VITTORIO SUSANNA. *Arch. farmacol. sper.* **45**, 33-43(1928); cf. *C. A.* **21**, 1679.—Dogs receiving repeated doses of morphine or opium preps. develop a tolerance to these narcotics. If, however, hyoscyamine or scopolamine is administered simultaneously with the morphine or opium, no tolerance is established. The narcosis produced by morphine is less intense than that produced by the opium preps., "pantopon," "narcopon," "pantergon," of which "pantergon" is the most potent. The toxicity of morphine and of opium preps. is increased more by hyoscyamine than by scopolamine. A. W. DOX

Action of adrenaline on the isolated heart. MARIO CHIO. *Arch. farmacol. sper.* **45**, 44-8(1928).—The frog heart was isolated and left *in situ* with a glass canula penetrating into the ventricle through the abdominal cavity, the veins being ligated in such a way as to avoid injury to the chest. Ringer soln. was perfused continuously at a diastolic pressure of about 5 cm. H₂O and systolic pressure of about 13 cm. H₂O. Under the influence of adrenaline in concns. of 1:100,000 to 1:10,000,000 the same variations in the work of the heart resulted as were obtained by very light circular compressions on the chest and on the auricles. A. W. DOX

Intoxication by hydrofluosilicic acid. J. DROST. *Pharm. Zentralhalle* **69**, 385 G (1928).—A fatal case of poisoning by drinking a soln. of com. hydrofluosilicic acid. W. O. E.

Action of guanidine on dehydrogenation in muscle. L. CALIFANO AND M. D'ALISE. *Riv. patol. sper.* **2**, 288-93(1927); *Physiol. Abstracts* **12**, 546.—Guanidine increases the oxidative activity of toad's muscle. H. G.

The chloride, base and nitrogen content of gastric juice after histamine stimulation. W. S. POLLAND, A. M. ROBERTS AND A. L. BLOOMFIELD. Stanford Univ. *J. Clin. Investigation* **5**, 611-37(1928).—The vol. of gastric secretion and the concn. of Cl⁻, base and N before and after histamine stimulation were detd. The titratable acid is increased by histamine. ARTHUR GROELMAN

Calcium therapy in diseases of children. PAUL LUTTINGER. *Arch. Pediatrics* **45**, 341-56(1928).—Review with full bibliography. Sections are devoted to Ca assimilation, dentition, rickets, tetany, tuberculosis, other therapeutic applications, administration of Ca salts, Ca synergists. JOSEPH S. HEPBURN

Review of the pathogenesis of ipecac and its alkaloids. T. H. MCGAVACK. *J. Am. Inst. Homeopathy* **21**, 300 G(1928).—Review of their pharmacol. action and therapeutic use with bibliography. JOSEPH S. HEPBURN

Pharmacology of the homeopathic drugs. L. J. BOYD. *J. Am. Inst. Homeopathy* **21**, 312-23(1928); cf. *C. A.* **22**, 988, 1398.—This paper is devoted to P, HgCl₂, gelsemium, hepar sulfur, hydrastis, ignatia, ipecac, iris, kalmia, ledum, lycopodium and podophyllum. JOSEPH S. HEPBURN

Influence of adrenaline on the excretion of acetone in different pathological conditions. SIGMUND HIRSCHHORN AND LEO POLLAK. *Z. klin. Med.* **105**, 371-402(1927).—Excretion of acetone bodies by a non-diabetic person, either spontaneously or as the result of withdrawal of carbohydrate, is markedly increased by subcutaneous injection of 1 mg. of adrenaline. The increase is apparent within the first hr. and usually does not last more than 4 hrs. It apparently extends to acetone, acetoacetic acid and β -hydroxybutyric acid. This effect of adrenaline is hindered by administration of carbohydrates. Adrenaline can produce an increase in ketonuria, in spite of the carbohydrate, only in cases which exhibit an especial tendency toward acetoneuria. Adrenaline gives rise to an especially marked increase in ketonuria in pregnancy, acute infectious processes, and some cases of bronchial asthma; in all of these states, the tendency toward ketonuria is increased by other conditions, e. g., withdrawal of carbohydrates. Likewise, in the acetoneuria of starvation, the chief factor is not the abs. glycogen-reserve of the liver, but the velocity with which the glycogen is used; for on this depends the velocity of the mobilization and utilization of the fat. In diabetic patients, adrena-

line causes only a very slight increase in the excretion of acetone when the blood sugar rises to very high values; however, the increase may occur later and last longer in such patients, than in non-diabetic individuals.

JOSEPH S. HEPBURN

Action of thyroid substance on the composition of the blood. FRITZ ROTHSCHILD AND MAX JACOBSON. *Z. klin. Med.* 105, 403-5(1927).—A thyreotoxic condition was produced by administration of thyroid substance (0.3-1.0 g. thyreophorin). The blood sugar exhibited a slight tendency to decrease but the av. of the expts. gave a normal value (120 mg.). The cholesterol increased in 9 expts., decreased in 1, and remained const. in 1 expt.; the max. increase was 20% of its initial value; the av. increase was from 209 (initial) to 233 (final) mg.; this was accompanied by a low-grade lipemia. The inorg. P_2O_5 showed a slight av. decrease from 6.8 to 6.6 mg., the org. P_2O_5 a decrease from 16.6 to 15.1 mg. The Ca frequently increased definitely; the K either decreased or remained const. The residual N was definitely decreased in 10 expts., the av. decrease being from 23.9 to 21.88 mg. per 100 cc. These changes were, on the whole, due to action on the sympathetic.

JOSEPH S. HEPBURN

Action of ergotamine (Stoll) on the composition of the blood in Basedow's disease and in animals. FRITZ ROTHSCHILD AND MAX JACOBSON. *Z. klin. Med.* 105, 406-9 (1927).—In 7 patients with characteristic symptoms of Basedow's disease, injection of 0.5 mg. of ergotamine tartrate had produced the following av. changes in the chem. compn. of the blood by the time the max. decrease in the pulse had been attained, usually 20 to 30 min. after the injection. Dextrose decreased from 170 to 142 mg. per 100 cc. Cholesterol decreased from 171.0 to 166.0; inorg. P_2O_5 decreased from 8.5 to 7.0; org. P_2O_5 decreased from 15.7 to 15.1; Ca decreased from 10.6 to 9.8; K increased from 17.5 to 19.1; residual N increased from 27.08 to 31.54. These changes were due chiefly to action on the vagus. In 6 expts. on animals, the av. changes produced were: Dextrose increased from 86 to 94; cholesterol decreased from 138 to 132; inorg. P_2O_5 increased from 8.8 to 9.3; org. P_2O_5 increased from 19.8 to 21.6; Ca increased from 10.9 to 11.1; K decreased from 21.78 to 21.59; residual N increased from 28.22 to 28.48. These changes were due chiefly to action on the sympathetic.

JOSEPH S. HEPBURN

Action of adrenaline on the composition of the blood. MAX JACOBSON AND FRITZ ROTHSCHILD. *Z. klin. Med.* 105, 410-3(1927).—Both patients and dogs were given 1 mg. of adrenaline subcutaneously, and blood was taken 30 min. later. The following changes (mg. per 100 cc.) occurred in the av. chem. compn. of the blood. Dextrose increased from 121 to 175; Ca increased from 9.0 to 10.7; K decreased from 19.2 to 18.4; cholesterol increased from 133.2 to 146.4; inorg. P_2O_5 decreased from 6.9 to 5.6; org. P_2O_5 decreased from 15.8 to 14.7.

JOSEPH S. HEPBURN

Action of atropine (bellafolin) on the composition of the blood. MAX JACOBSON AND FRITZ ROTHSCHILD. *Z. klin. Med.* 105, 414-6(1927).—Subcutaneous administration of an av. dose of 1 mg. of bellafolin caused the following changes (in mg. per 100 cc.) in the chem. compn. of the blood 30 min. later. Dextrose increased from 132 to 143; cholesterol decreased from 162 to 154; inorg. P_2O_5 increased from 4.83 to 5.8; org. P_2O_5 decreased from 15.03 to 13.6.

JOSEPH S. HEPBURN

Action of choline on the composition of the blood. MAX JACOBSON AND FRITZ ROTHSCHILD. *Z. klin. Med.* 105, 417-9(1927).—Choline chloride (10 cc. of 6% soln.) was injected intramuscularly into patients, and blood was taken 30 to 40 min. later. The action of choline on the vagus was shown by decreases in the dextrose (from 108 to 100 mg. on the av.), inorg. P, and cholesterol, and an increase in the org. P of the blood.

JOSEPH S. HEPBURN

The effect of methylene blue injections on the body temperature of the rat. A. D. STAMMERS. *Brit. J. Exptl. Path.* 7, 44-6(1926).

E. H.

The combined effect of phlorhizin and insulin upon water and carbohydrate metabolism. F. HIRSCH AND O. KLEIN. *Deut. Arch. klin. Med.* 155, 163-76(1927).—The simultaneous action of phlorhizin and insulin produces a larger diuresis than does phlorhizin alone; the effect is made still more pronounced by the ingestion of carbohydrates. Phlorhizin frequently increases the amt. of water and of NaCl in the blood, even though large quantities of water are not taken after the injection of the phlorhizin. The administration of large quantities of water after the injection of phlorhizin causes the blood glucose to fall rapidly to subnormal values, while the glucosuria is increased. If the water is accompanied by considerable carbohydrate, an initial rise in blood sugar is followed by a fall to subnormal values. Phlorhizin in company with insulin weakens the tendency of the latter to decrease the concn. of blood glucose; but in many cases more sugar was excreted than when phlorhizin was used alone.

P. Y. JACKSON

The utilization of salabrose in the animal organism. KARL BOYTINCK. *Deut. Arch. klin. Med.* 156, 72-9(1927).—Salabrose, a tetraglucosan, was administered by

mouth, and, as a 30% soln., intraperitoneally and subcutaneously, to dogs which for 5 days had been kept on a carbohydrate-free diet. After a total of 30-50 g. had been given by mouth, the urine and a hot-water ext. of the feces for 4 days were boiled with HCl and tested for glucose. No trace of glucose was found. When 50 g. salabrose had been given on 4 successive days, diarrhea set in, and glucose was found in the feces; none was found in the urine, however, during ten days. After the intraperitoneal or subcutaneous injection of 20 g. salabrose, no glucose could be detected in the urine. These results conflict with the observation of Deuel, Wadell and Mandell that salabrose is not absorbed by the organism. P. Y. JACKSON

The treatment of irregular heart action with quinidine. GOTTFRIED EISMAYER. *Deut. Arch. klin. Med.* **156**, 182-99(1927).—The use of quinidine is attended, in 10-20% of the cases studied, with dizziness, vomiting, or even with loss of consciousness and heart failure; and in cases of severe decompensation, with sudden death. On the other hand, regular heart rhythm was completely restored in 25% of the cases treated, and the regularity was found to persist sometimes for years; most of these patients were able to resume their usual work. A preliminary dose of 0.2 g. was given to test the ability of the patient to take the treatment, and then 0.4 g. 3 times daily. It is necessary when giving this treatment to keep the patient under observation for some time, as the undesirable complications may appear later. Should arrhythmia reappear the treatment may be repeated with good results. P. Y. JACKSON

Acid-base equilibrium and the osmotic resistance of the red corpuscles. ISTVAN WEISS AND ISTVAN SUMEGI. *Deut. Arch. klin. Med.* **159**, 147-51(1928).—There was introduced daily for 4 weeks into the stomach of 10 guinea pigs 6 cc. 0.2 N HCl, and into a sec. group 4 cc. 8% Na₂CO₃; a third control group was kept under the same external conditions as the first two. After 4 weeks the blood *p_H* values for the groups were, resp., 7.45, 7.58 and 7.70. The osmotic resistance of the red corpuscles to hypotonic NaCl soln. was detd. for each group, but the variations noted were all within the limits of exptl. error. The opinion is, therefore, not tenable that an increase in such osmotic resistance is due to erythrocytes newly formed by the acid stimulation of the marrow; or that variations in the acid-base equil. has an effect upon the osmotic resistance. P. Y. JACKSON

The treatment of acute and chronic rheumatic polyarthrits with pyramdone. RUDOLF BODENSTAB. *Deut. Arch. klin. Med.* **159**, 171-9(1928).—Clinical observations show the superiority of pyramdone over Na salicylate and aspirin. P. Y. JACKSON

The behavior toward adrenaline of the hexosephosphoric acids of the blood in the normal organism. HEINZ LAWACZECK. *Deut. Arch. klin. Med.* **159**, 257-66(1928).—The increase in the concn. of hexosephosphoric acids in debrinated blood *in vitro* is not influenced by the presence of adrenaline. The injection of adrenaline *in vivo* is followed by a marked decrease in the concn. of hexosephosphoric acids in normal and in various pathol. conditions. The decrease is followed by a secondary increase of about the same order of magnitude. The concn. of glucose increases after injection at such a rate that the max. concn. is reached at about the same time as the secondary max. for the hexosephosphoric acids. P. Y. JACKSON

The behavior toward insulin of the hexosephosphoric acids of the blood in the normal organism. HEINZ LAWACZECK. *Deut. Arch. klin. Med.* **159**, 267-74(1928).—The concn. of hexosephosphoric acids in the blood in normal or in various pathol. conditions is increased in 12-15 min. by the injection of 5-40 units of insulin from 11.3 to 16.9%. In a healthy dog the injection of 90 units of insulin produced in 15 min. an increase of 17.1%. The increase in concn. is followed by a secondary fall. Insulin *in vitro* was without effect upon the concn. of hexosephosphoric acids in the blood. P. Y. JACKSON

The effect of synthetic thyroxine upon persons with a normal thyroid. HANNS BAUR AND GUSTAV LOEWI. *Deut. Arch. klin. Med.* **159**, 275-87(1928).—Clinical observations upon non thyroid pathological conditions and upon normal persons show that synthetic thyroxine administered *per os* or subcutaneously has the same effect as a 100-fold dose of dried thyroid. An injection of 2 mg. thyroxine increases the basal metabolic rate 10-30%, and the effect continues for 24-48 hrs. Repetition of the injection for several days produces no proportionally larger increase; but larger doses have a toxic effect upon the nervous system and heart. P. Y. JACKSON

The sorrel-poisoning theory of lamb mortality. C. S. M. HOPKINS AND D. A. GILL. *New Zealand J. Agr.* **36**, 153-5(1928).—Expts. were carried out to det. the effect of oxalates and sorrel on rabbits and lambs in order to test the theory that the commonly occurring mortality among fat lambs is caused by sorrel poisoning. Rabbits were easily killed by stomach doses of 40 grains of Na₂C₂O₄ in soln., or repeated intravenous

injections of solns. Stomach doses and intravenous injections of $\text{Na}_2\text{C}_2\text{O}_4$ were also fatal to lambs. Postmortem examn. of the kidneys of the lambs revealed an inflamed condition and the presence of oxalate crystals. Continuous feeding of an almost exclusive diet of sorrel for 4 weeks was not fatal to lambs but a few crystals of oxalate could be detected in postmortem examn. of the kidneys. Conclusion: Mortality among lambs cannot be due to sorrel poisoning. K. D. JACOB

Treatment of malaria with plasmochin and plasmochinum compositum. P. H. OLIVER AND A. A. HÜLSHOFF. *Geneeskund. Tijdschr. Nederland. Indie* 67, 907-21 (1927).—Plasmochin (I) is well tolerated. Slight cyanosis occurred only in a few cases. With the exception of a few relapses the blood in tertian and quartan malaria was sterilized within 4.4 days. The gametes of tropical malaria are resistant to quinine, the rings to I. The gametes disappeared under I after 6 days. Plasmochinum compositum (II) is recommended for tropical malaria. The rings and gametes disappeared within 4.4 days. Only in a few cases gametes previously absent appeared in the blood after 2 days of II. Quinine and I act like II. In order to prevent relapses the treatment ought to be continued for 21 days with 3 tablets of I or II daily. I is well tolerated by blackwater-fever patients sensitive to quinine. MARY JACOBSEN

Malaria therapy. SURBECK. *Geneeskund. Tijdschr. Nederland. Indie* 67, CXXXVI-CXLI (1927).—Quinine is rapidly eliminated. Its concn. in the blood is, therefore, proportional to the body wt., and the dose ought to be proportional to the latter. The following doses of quinine-HCl are to be given daily during the fever period and at least 4 days after defervescence: 1-1.5 g. for less than 50 kg. wt., 1.5-2 g. for 50-75 kg., 2-3 g. for over 75 kg. Where the absorption *per os* is unsatisfactory half the dose should be given subcutaneously. The alternate use of quinine and Na cacodylate or nearsphenamine after defervescence is highly recommended. In children a 5% sirup of FeI gives excellent results. Adrenaline given orally is a good adjuvant. The adrenaline test is of good prognostic value in splenomegaly. I as a 5% tincture or as an iodotannin, or a weak Lugol soln. given intravenously is an excellent adjuvant. The Ag salts of arspenamine and nearsphenamine have a greater gametocidal effect and are more stable in the tropics than these preps alone. A combination of Ag arspenamine and Lugol soln. given intravenously was used with good results. M. J.

Insulin and synthalin in diabetes of childhood. A. TONO. *Pediatria Rivista* 35, 1125 (1927).—When properly used insulin gives better results. MARY JACOBSEN

Novum Sofos in tuberculous eye affections of children. F. DURANTE. *Pediatria Rivista* 35, 1139 (1927).—In 2 cases of keratitis and 6 of kerato-conjunctivitis 2 injections every 2nd day brought about recovery without relapse. MARY JACOBSEN

Effect of tuberculin therapy on Pirquet's reaction and blood sedimentation velocity. MICHELE MIRAGLIA. *Pediatria Rivista* 35, 1145-52 (1927).—Cut-reaction and general condition are favorably influenced by tuberculin therapy; the sp. lesions and the sedimentation velocity are hardly affected. The latter is accordingly a more reliable index of the patient's condition than the cuti-reaction. MARY JACOBSEN

Ureides of bromovaleric acid. II. Influence of the branching of the chain on the physiological properties. R. FOURNEAU AND G. FLORENCE. *Bull. soc. chim.* 43, 111-6 (1928); cf. *C. A.* 22, 1329.—A study of the hypnotic action of the ureides of α -bromovaleric, α -bromoisovaleric, α -bromomethylethylacetic and bromopivalic acids.

The hypnotic intensity increases with the branching of the chain, the ureide of bromopivalic acid being more effective than the other three. LOUISE KELLEY

Use of Lugol's solution in exophthalmic goiter. JOSEPH L. DECOURCY. *Ann. Surgery* 86, 871-6 (1927).—The beneficial influence of Lugol's soln. is due to a rapid formation of colloid material in the I-famished gland, resulting in back pressure on the secreting cells and the thin-walled veins surrounding the acini. Hence, passive edema follows and the cells, rendered temporarily inactive, fail to absorb the toxic substance; consequently the patient's clinical condition improves. New blood vessels are formed and the older ones accommodate themselves to the changed conditions, so that absorption is resumed and clinical condition again becomes worse. FRANCES KRASNOW

The action of quinine on animal cells. MARIE FEILER. *Arch. Protistenk.* 61, 119-31 (1928); cf. *C. A.* 22, 1804.—Diln. of quinine to $10^{-7.5}$ exerts a stimulating effect on paramecium, bringing about an increase in its size and rapidity of division. A stimulating effect is also produced if the animal is placed in a fatal concn. (1/30,000) for a few min. and then placed in quinine-free water. The toxicity of quinine is much greater in light than in the dark. If placed first in arsenic soln., the animals are then more resistant to quinine. FRANCES KRASNOW

The action of plasmochin on *Paramecium caudatum*. MARIE FEILER. *Arch. Protistenk.* 61, 133-43 (1928).—This drug, a synthetic alkaloid of the quinoline group,

shows properties similar to those of quinine. The fatal action occurs in solns. more concd. than that for quinine. Plasmochin is more effective in the dark than is quinine.

FRANCES KRASNOW

Notes on the therapy for tropic ulcers. F. M. PETER. *Arch. Schiffs-Tropen Hyg.* 31, 447-59(1927).—The pyrogallol-zinc-powder therapy does not meet with success in long-standing cases. In 2 cases "Pyrogallol plaster" was given previous to pyrogallol zinc powder with remarkably good results.

FRANCES KRASNOW

The mechanism of the action of germanin (Bayer 205) on trypanosomes. SCH. MOSCHKOWSKI. *Arch. Schiffs-Tropen Hyg.* 31, 541-2(1927).—Guinea pigs experimentally infected with *Trypanosoma brucei* and *s. aurum*, when under treatment with Bayer 205, permit no increase in the no. of parasites. Treatment of the parasites for $\frac{1}{2}$ to $1\frac{1}{2}$ hrs. with a 1:22,000 soln. has no effect on its virulence; $\frac{1}{2}$ hr. in a concn. of 1:1000 lengthens the incubation period and $3\frac{1}{2}$ hrs. in this concn. obliterates its virulence. The *in vivo* dose is the same.

FRANCES KRASNOW

Action of *Ixodes ricinus* (Ixodidae) on human skin. E. N. PAVLOVSKII AND A. K. STEIN. *Arch. Schiffs-Tropen Hyg.* 31, 574-86(1927).—The saliva of *I. ricinus* cause a popular reaction on human skin. It is toxic, thermolabile and specific. Emulsions of the various organs call forth non-specific reactions.

FRANCES KRASNOW

Efficacy of "iodine vermicide" pills for the treatment of ascarid and hookworm infestations in silver foxes. Critical experiments. W. L. CHANDLER. *J. Am. Vet. Med. Assoc.* 71, 218-20(1927).—The drug was found to be very efficient.

F. K.

The physiology of glands. LEON ASHER. CX. **Humoral regulation of the heart beat with cholate.** S. MATSUYAMA. *Z. Biol.* 86, 495-502(1927); cf. *C. A.* 21, 3663. Cholate in concns. of 1:4000 and 1:6000 strengthens the heart beat (rats). The effect produced is greater than that of adrenaline. CXI. **Influence of cholate on pharmacological intestinal remedies.** *Ibid* 516-22.—After inhibition of intestinal movement by atropine, cholate administration effects good movement. The stimulating action of pilocarpine is enhanced by cholate. Adrenaline does not produce inhibition of motion if cholate is administered previously.

FRANCES KRASNOW

The toxicity and trypanocidal action of antimony compounds with 3- and 5-valent antimony (according to investigations with Antimosan). GEORGE BOCK. ROBERT KOCH Inst. *Z. Hyg. Infektionskrankh.* 107, 396-406(1927). Antimosan is more toxic for white mice and rats when given subcutaneously than when given intraperitoneally. The addn. of colloids hindering absorption, such as gum arabic, gelatin and agar, on intraperitoneal injection, brings the toxicity up to that found for subcutaneous injection. Prevention of elimination by ligating the ureters in the rat does not lead to an increase in toxic action after subcutaneous injection, but greatly increases that after intraperitoneal injection. These results are probably explained on the basis of chem. changes in antimosan in the body. Expts. show that oxidation of antimosan to the 5-valent form detoxicates the compd. The oxidized, 5-valent antimosan is likewise much less trypanocidal.

E. R. LONG

Myrtillin. FREDERICK M. ALLEN. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 81, 462(1927).—Myrtillin is an ext. of green leaves prepd. by the method of R. I. Wagner. It is of unknown chem. nature. Its physiol. action is non-toxic, it reduces adrenalinic hyperglucemia, and accelerates O_2 consumption after carbohydrate ingestion in normal and diabetic subjects. It enables totally depancreatized dogs to heal wounds and to live 4 to 6 weeks. Myrtillin is not a substitute for insulin, but is probably an accessory substance which is widely distributed in nature and which plays a part in the carbohydrate metabolism of animals and plants.

J. P. LYMAN

Carbon dioxide as a narcotic agent. II. The effect of carbon dioxide upon the contraction of striated muscle of the frog. CHARLOTTE HAYWOOD. *Univ. of Penn. Am. J. Physiol.* 82, 241-9(1927); cf. *C. A.* 22, 463.—When small muscles of the frog were immersed in Ringer soln. satd. with CO_2 the contraction was reduced in 1 min. to 80% and in 5 min. to 25% of the original. The effects could not be imitated by lack of O_2 or by changing the acidity of the medium by adding a non-penetrating acid such as HCl. The addn. of $NaHCO_3$ did not abolish the typical effects of CO_2 but did diminish them. The narcotic action of CO_2 may be assocd. with its ability to produce intracellular acidity.

J. P. LYMAN

The physiological action of cholesterol. MARTIN F. CASHIN AND VLADIMIR MARAVSK. *Royal Victoria Hosp., Montreal. Am. J. Physiol.* 82, 204-8(1927).—The intravenous injection of emulsions of cholesterol in gelatin into rats proved to be toxic and to have a profound anesthetic action. The toxicity of cholesterol was modified and reduced by the simultaneous administration of lecithin. After the injection of cholesterol

the cholesterol content of the blood fell and there was an increase in the cholesterol of the lung tissue. J. F. LYMAN

The value of intravenous and intraperitoneal administration of oxygen. GEOFFREY BOURNE AND RALPH G. SMITH. Washington Univ., St. Louis. *Am. J. Physiol.* **82**, 328-34(1927).—The intravenous injection of O_2 , in amts. sufficient to supply the necessary O_2 , caused pulmonary embolism and heart failure. When pure O_2 was introduced intraperitoneally there was enough absorption in some cases to cause a diminution in an experimentally produced anoxemia. J. F. LYMAN

Histamine and salivary secretion. MARGARET E. MACKAY. Dalhousie Univ., Halifax, N. S. *Am. J. Physiol.* **82**, 546-56(1927).—Histamine seems to have a double action on the submaxillary gland: (1) a secretory effect, which is greatly increased by previous nerve stimulation, and (2) a mechanical effect due to pushing out saliva by action on the contractile elements in the gland. J. F. LYMAN

Insulin anhydremia. Importance of water reserve in a physiological crisis. DAVID L. DRABKIN AND H. SHILKRET. Yale Univ. *Am. J. Physiol.* **83**, 141-6(1927).—Dogs desiccated through water starvation when given large doses of insulin developed a more profound anhydremia than those which had water. Spastic convulsions were not observed in the desiccated animals although they appeared in those given fluids. The latter invariably recovered upon glucose administration, while those deprived of water for periods longer than 4 days did not survive. J. F. LYMAN

Absorption of insulin from the alimentary tract of depancreatized dogs, when protected by blood serum. JOHN R. MURLIN AND ESTELLE E. HAWLEY. Univ. of Rochester. *Am. J. Physiol.* **83**, 147-61(1927).—When insulin, mixed with blood serum (possessing antitryptic activity), was given by stomach tube to depancreatized dogs, insulin was absorbed into the blood and showed its usual physiol. effects such as increased respiratory quotient, disappearance of sugar from the urine and a fall in blood sugar. Four depancreatized dogs were kept alive for 41 to 125 days by the administration of insulin by stomach tube. J. F. LYMAN

The calorogenic action of adrenaline. S. SOSKIN. Univ. of Toronto. *Am. J. Physiol.* **83**, 162-70(1927).—Adrenaline caused a marked rise in O_2 consumption and an increase in the respiratory quotient of normal dogs. In liverless dogs adrenaline did not prevent the usual decline in O_2 intake, or show any significant influence on the respiratory quotient. In depancreatized dogs adrenaline caused a definite rise in the O_2 intake but no change in the respiratory quotient. The calorogenic action of adrenaline, therefore, is primarily on the liver, not on the direct stimulation of the tissue cells or on the pancreas. The high blood sugar, caused by adrenaline in the normal dog, is not the essential cause of the increased metabolism which follows its administration. J. F. LYMAN

Changes in the sedimentation rate of the erythrocytes and in the plasma proteins following prolonged chloroform administration to the dog. M. D. ROURKE AND E. D. PLASS. *Am. J. Physiol.* **84**, 42-7(1928).— $CHCl_3$ poisoning in dogs resulted in liver necrosis, a marked drop in plasma fibrinogen and a greatly reduced rate of cell sedimentation. The rate of sedimentation of the red blood cells is thought to depend upon the plasma fibrinogen. J. F. LYMAN

The distribution of arsenic in the tissues after serial administration of neoarsphenamine. F. P. UNDERHILL AND ALICE DIMICK. *Am. J. Physiol.* **84**, 56-60(1928).—After administering neoarsphenamine the distribution of As in the organs of dogs was in the following decreasing order: kidneys, spleen, liver, thyroids, adrenals, heart, muscle, reproductive organs and brains. J. F. LYMAN

The origin of the glucose in the hyperglucemia induced by pituitrin. G. A. CLARK. Sheffield Univ. *J. Physiol.* **64**, 324-30(1928).—The intravenous injection of pituitrin into decapitated, eviscerated cats increased the rate of disappearance of blood sugar. In cats under amylal anesthesia, with the liver out of the circulation, pituitrin did not produce hyperglucemia as in normal animals nor did it diminish the rate of fall of blood sugar. The source of glucose in pituitrin hyperglucemia, therefore, is the liver glycogen. J. F. LYMAN

The effect of atropine, ergotamine and pituitrin on phlorhizin glucosuria. A. B. ANDERSON AND M. D. ANDERSON. Cambridge. *J. Physiol.* **64**, 350-5(1928).—The administration of atropine and ergotamine had no effect on the glucose—nitrogen ratio in the urine of phlorhizinized rats. There is no evidence therefore, that phlorhizin produces glucosuria by acting on the sympathetic nerve endings of the kidney. Pituitrin had no demonstrable action on phlorhizin diabetes. J. F. LYMAN

The effect of the "heart tonics" and other drugs upon the heart tone and coronary circulation. RICHARD BODO. Univ. College, London. *J. Physiol.* **64**, 365-87(1928).—

When heart rate, venous inflow and arterial resistance are const. the tonic action of drugs was revealed in the heart-lung prepn. by a diminution in the diastolic and systolic vols. of the ventricles. Digitalis showed a delayed but lasting tonic effect; caffeine gave a rapid but evanescent tonic action; and after insulin a tonic effect could be noticeable only once in each prepn. Camphor, NaNO_2 , pituitrin and quinidine produced dilatation. Strychnine and amyl nitrite had no effect on heart tone. Digitalis, caffeine, camphor and nitrites increased the coronary flow; pituitrin, quinidine and insulin diminished it. J. F. LYMAN

The effects of subcutaneous and intraperitoneal injection of oxygen upon the oxygen saturation of the arterial blood. H. W. DAVIES AND M. RABINOVICH. *Proc. Physiol. Soc., J. Physiol.* **64**, xxxviii(1928).--The intraperitoneal or subcutaneous administration of O_2 to anoxemic dogs did not affect respiratory rate and caused little or no increase in O_2 satn. of the arterial blood J. F. LYMAN

The fixation of inorganic colloids in the organism by the application of local anesthetics. G. SPAGNOL. *Boll. soc. ital. biol. sper.* **2**, 768-9(1927); cf. *C. A.* **22**, 452. If an anesthetic is applied for 5-15 seconds on the skin of an animal and immediately afterwards an inorg. colloid is injected intravenously, the colloid becomes fixed in the cutaneous and subcutaneous tissues in the area where the anesthetic has acted. CHCl_3 , CCl_4 , $\text{C}_2\text{H}_5\text{Br}$ and Et_2O may be used as anesthetics although the latter is not as satisfactory as the others. Fixation is noticeable even with small doses of colloid: 0.01 g. of HgS or PbS per kg. rabbit. The same phenomenon is observed if FeSO_4 is injected. This becomes transformed by the organisms to $\text{Fe}(\text{OH})_3$ which is recognized by its rusty color. These results are not only of theoretical importance, but may have possible application in the therapeutics of skin diseases. PETER MASUCCI

The hyperglucemic action of certain protein disintegration products. CIACCIO AND TRIMARCHI. *Boll. soc. ital. biol. sper.* **2**, 780-3(1927). Witte's peptone was fractionated by each of the following methods: (1) addn. of 9 vols. abs. $\text{C}_2\text{H}_5\text{OH}$ to a coned peptone soln.; (2) extn. of the peptone with acid 60%, $\text{C}_2\text{H}_5\text{OH}$, addn. of NaOH to pH 5-6, filtration, concn. at reduced pressure at 30°, addn. of 9 vols. 96% $\text{C}_2\text{H}_5\text{OH}$, washing of the ppt. with $\text{C}_2\text{H}_5\text{OH}$ and ether and drying *in vacuo*; (3) treating the peptone according to the Doisy, Somogyi, Shaffer method. The ppt. from each of the three methods, the residue from the alc.-sol. portion, and the whole peptone itself were administered to starved rabbits in 0.5-10-mg. doses intraperitoneally and orally. A decided, const., lasting hyperglucemia was obtained from the ppts. of the 3 methods, 5-10-mg. doses raised the blood sugar 100%, 0.5-1.0 mg. doses raised it 30%. The alc.-sol. portion even in 10 mg. doses was inert. The oral administration of the ppt. from the second method in 1-3-mg. doses raised the blood sugar 70-100%. (4) The whole peptone administered in similar doses had no effect. PETER MASUCCI

The action of urotropine on the contraction of the uterus. C. VERCESI. *Boll. soc. ital. biol. sper.* **3**, 144-8(1928).--Clinical and exptl. results indicate that urotropine has a marked action on the contraction of the uterus. The intravenous injection of urotropine gives rise to contractions which occasionally expel the fetus, the action on the isolated uterus is variable but can be differentiated from that of the higher alkylamines. PETER MASUCCI

The action of indole on experimental teratoids. M. LAPIDARI. *Boll. soc. ital. biol. sper.* **3**, 214-5(1928).--Repeated injections of indole into white rats and chickens failed to produce any changes in the malignant tumors; neither did it influence the development and duration of these teratoids. PETER MASUCCI

Muscular contraction by certain alkaloids and phosphagen. G. MARTINO AND G. CARBONARO. *Boll. soc. ital. biol. sper.* **3**, 218-21(1928).--A few drops of a 1% caffeine and 1% quinine-HCl soln. were instilled into the isolated gastrocnemius and crural muscle of frogs. Inorg. phosphoric acid and phosphagen were detd. after 1-90 min. of exposure. The same detns. were made on the untreated homologous muscles. The results given in tabular form show a diminution in phosphagen and a corresponding increase in inorg. phosphoric acid. The variations in muscle phosphagen are similar to those obtained with heat, CHCl_3 and alc. PETER MASUCCI

Variations in the phosphagen content of striated muscles by the action of chloroform and certain alcohols. G. MARTINO. *Boll. soc. ital. biol. sper.* **3**, 225-9(1928).--Inorg. phosphoric acid and phosphagen were detd. in one of the gastrocnemius or crural muscles of the frog and the same detns. were made on the homologous muscles after exposure for various intervals to the vapors of CHCl_3 , MeOH , EtOH and AmOH . The tabulated results show that exposure to CHCl_3 vapors causes the complete disappearance of phosphagen and an increase of 54 to 112% inorg. phosphoric acid. With the alcs. the results were similar but not so marked; the

diminution in phosphagen was least with MeOH, more marked with EtOH and still more pronounced with AmOH.

PETER MASUCCI

The influence of diuretin on animals treated with corpus luteum extracts. G. RUGGERI. *Boll. soc. ital. biol. sper.* 3, 233-5(1928).—Diuretin was injected into female rabbits and the glucemic titer was detd. at one half hr. intervals up to 3 hrs. There was a decrease in blood sugar which became normal again after 3 hrs. The rabbits were then fed corpus luteum. Several days later diuretin was again injected and the blood sugar detd. There was an increase in blood sugar instead of a decrease as before.

PETER MASUCCI

The action of atropine and insulin on pilocarpine hyperglucemia. ANTONIETTA ORRU. *Boll. soc. ital. biol. sper.* 3, 242-7(1928).—The administration of pilocarpine to rabbits rendered hypoglucemic with small doses of insulin raises the blood sugar above the normal level; the increase is of short duration as hypoglucemia again follows. If large doses of insulin are given, pilocarpine in any amt. and administered at different periods fails to influence the hypoglucemia. Insulin convulsions are neither lessened nor relieved by pilocarpine.

PETER MASUCCI

The influence of soaps and certain anesthetics on the coagulation of the blood. PAOLA MAZZA. *Boll. soc. ital. biol. sper.* 3, 250-1(1928).—Ca oleate accelerates the coagulation of the blood and plasma. The addn. of anesthetics (1 drop) to 1 cc. salted plasma before diln. with H₂O hastens the coagulation of the dild. plasma. The order of coagulation is: CHCl₃, Et₂O, EtOH and CCl₃CHO.H₂O.

PETER MASUCCI

Studies on adrenaline-like substances. The influence of ephetonine on carbohydrate metabolism. L. CANNAVO. *Boll. soc. ital. biol. sper.* 3, 259-61(1928).—The action of ephetonine (phenylmethylaminopropanol hydrate) on carbohydrate metabolism is similar to that of adrenaline; its activity is less pronounced but it is effective orally and is less toxic than adrenaline.

PETER MASUCCI

The comparative pharmacological action of manganese chloride, carbonate and phosphate. I. SABBATANI. *Boll. soc. ital. biol. sper.* 3, 268-72(1928).—The lethal dose of MnCl₂, MnCO₃ and Mn₃(PO₄)₂ was detd by intravenous injection into rabbits. The M. L. D's were: MnCl₂ 0.00023-0.00039; MnCO₃ 0.00025-0.00039; Mn₃(PO₄)₂ 0.00030-0.00042 g.-mols per kg. wt.

PETER MASUCCI

The action of morphine on the pulmonary vessels. A. IUISADA. *Boll. soc. ital. biol. sper.* 3, 270-2(1928).—Small doses of morphine have no action on the pulmonary vessels. Large doses, 2 cg. per kg., increase the vol. of the lungs, caused a hypertension in the region of the pulmonary artery, in the venous part of the lung, and in the left auricle. The beneficial effect of morphine in pulmonary edema is due to some action outside the lungs.

PETER MASUCCI

The behavior of hepatic glycogen in rabbits treated with pilocarpine. ANTONIETTA ORRU. *Boll. soc. ital. biol. sper.* 3, 277-9(1928).—In the rabbit the injection of pilocarpine increases the velocity of transformation of hepatic glycogen into glucose which gives rise to hyperglucemia.

PETER MASUCCI

Modifications in the ureogenic function and protein metabolism following chloroform narcosis. G. MONTEMARTINI. *Boll. soc. ital. biol.* 3, 279-81(1928).—The total N and urea in the blood and urine, NH₃ N, amino acids, and uric acid in the urine of 16 patients under local anesthetic were detd. The azoturia coeff. decreased till the 5th day; Maillard's coeff. increased progressively and in proportion. The evidence shows the vulnerability of the liver under chloroform narcosis.

PETER MASUCCI

Studies on antagonism. Chloral and camphor. ALFONSO CHIODO. *Boll. soc. ital. biol. sper.* 3, 284-6(1928).—The combined action of chloral and camphor was studied on the heart of frog and toad. The antagonism between the 2 drugs was bilateral. For certain doses chloral exerted an antagonistic action to the neg. chronotropic and inotropic action of camphor. By varying the doses of chloral and camphor, the pharmacol. action also varied; in some cases there was antagonism, in some synergism, and in others simple addn.

PETER MASUCCI

Emetic action and the valence of antimony. SATULLO ROSARIO. *Boll. soc. ital. biol. sper.* 3, 287-9(1928).—The comparative emetic action of tartar emetic and oxidized Sb K tartrate was studied. Tartar emetic administered to dogs orally produces vomiting in doses of 0.05-0.10 g. With K Sb tartrate it is necessary to give 6 g. to produce vomiting. The addn. of an atom of O to tartar emetic, the oxidation of Sb⁺⁺⁺ to Sb⁺⁺⁺⁺ results in a product requiring a dose 100 times larger to obtain the same pharmacol. effect. The difference in the action of the 2 compds. is interpreted. The strong emetic action of tartar emetic is attributed to the formation in the stomach of SbOCl under the influence of HCl. The oxidized product does not give a ppt. of SbOCl with the same concn. of HCl.

PETER MASUCCI

Intermediate carbohydrate metabolism. V. Effect of amytal narcosis on the different types of reaction of the dog to prolonged intravenous injection of glucose. U. WIERZUCHOWSKI AND H. GADONESKA. *Biochem. Z.* **191**, 398-410(1927); cf. *C. A.* **22**, 1616.—Amytal narcosis itself has no effect on sugar metabolism, but it does seem to interfere seriously with the assimilation rate when glucose is being injected, this being reduced by 0.15 g. glucose per hr. and per kg. Insulin administered before the injection of glucose apparently has no effect. Although the amytal narcosis does reduce appreciably the rate of assimilation it has no influence on the special form of the sugar curve, so that the finer adjustments of the carbohydrate metabolism cannot be affected by the amytal narcosis, which leaves unaffected also the blood lactic acid. Amytal is very valuable for prolonged anesthesia but is contraindicated for bitches in late pregnancy.

S. MORCULIS

The effect of sympathetic and parasympathetic poisons on the content of creatine in the muscle. HIDEO AKATSUKA. *J. Biochem. (Japan)* **8**, 57-77(1927).—Formation of creatine from its mother substance is increased by the action of adrenaline and decreased by ergotoxine. Physostigmine accelerates the transformation of creatine into creatinine. The simultaneous action of adrenaline and cold stimulate the production of creatine from its mother substance, leading to a decrease of creatine after a certain time because of lack of mother substance. Curarized animals are not affected by these drugs, and the creatine-forming process diminishes with decreasing body temp. In homeothermic animals cooling to a tolerable degree causes oversecretion of adrenaline and is accompanied by an increased creatine content of muscle, the production of the latter being accelerated by the adrenaline. In poikilothermic animals, on the contrary, the cooling slows down the chem. processes in the organism and there is no appreciable influence of these drugs on the muscle creatine content.

S. MORCULIS

Experimental study of acquired resistance of the rabbit renal epithelium to uranyl nitrate. WARREN C. HUNTER. Univ. of Michigan. *Ann. Internal Med.* **1**, 747-89 (1928).— $\text{UO}_2(\text{NO}_3)_2$ produces in the rabbit a glomerulotubular nephritis which in the chronic stage resembles that seen in the human being, although the tubular changes are the more prominent. Repair begins early in the epithelium of the tufts and Bowman's membrane. Frequently the number of new cells is excessive, forming crescents or even obliteration of the capsular space, glomerular atrophy and hyaline degeneration. In some cases the capsular space is dilated and cystic with atrophy of the accompanying glomerulus. The regeneration of tubular epithelium is remarkable, particularly if the doses are so graduated that not all cells are killed at once. By gradually increasing the dose 54 to 96 times the amt. capable of producing demonstrable changes in the normal rabbit can be given without injury. The most probable explanation is that the regenerated cell is able to prevent the poison from uniting with the cell protein.

JOHN T. MYERS

A fatality following the intravenous use of ammonium α -iodoxybenzoate. BERNARD A. MANACE. Univ. of Michigan. *Ann. Internal Med.* **1**, 825-7(1928).—Death followed the administration of 100 cc. of 1% "Amidoxyl" apparently due to hypersusceptibility. The first dose to a patient should be small to rule out idiosyncrasy especially if there is known idiosyncrasy to salicylates, since the action of the two drugs seems similar. The subsequent doses should be increased with caution.

JOHN T. MYERS

The changes in serum bactericidins during narcosis and during surgical attack on animals. E. EICHHOFF AND W. PFANNENSTIEL. Univ. of Breslau. *Centr. Bakt. Parasitenk. I. Abt.* **106**, 31-41(1928).—Injections of morphine in rabbits strikingly increase the bactericidal action of the blood serum within 5 to 24 hrs. It is not a direct effect on the bacteria. Pure CHCl_3 anesthesia definitely increases the bactericidal power, but the effect of ether is less. Combined ether morphine anesthesia has no more effect than morphine alone. This mechanism may be concerned in post-operative complications.

JOHN T. MYERS

The influence of his profession on the erythropoietic function in the radiologist. J. W. MOLDAWSKY. Univ. of Berlin. *Folia Hematol.* **36**, 145-73(1928).—Röntgen rays and Ra first irritate the spleen, then cause hyperfunction, then fatigue followed by aplastic anemia. The mechanism is uncertain but may be the ozone or HNO_2 in the air.

JOHN T. MYERS

Blood changes occurring during the course of treatment of malignant disease by lead, with special reference to punctate basophils and the platelets. RONALD W. BROOKFIELD. Univ. of Liverpool. *J. Path. Bact.* **31**, 277-301(1928).—Intravenous injection of colloidal Pb for the treatment of malignant disease causes a considerable temporary anemia due to peripheral destruction of erythrocytes. The rapid return to normal is due to increased bone marrow activity. The stippled cells are closely re-

lated to reticulated cells and are probably young cells altered by a degenerative process. No change attributable to Pb was found in the white cells. Injections of a suspensoid of metallic Pb along with $\text{Pb}(\text{OH})_2$ and PbCO_3 caused an immediate rise in the number of circulating platelets, while a mixt. of colloidal Pb and Se caused an immediate fall. There is a long bibliography.

JOHN T. MYERS

The etiology of hepato-lenticular degeneration: experimental liver cirrhosis: poisoning with manganese, chloroform, phenylhydrazine, bile and guanidine. WESTON HURST AND PHYLLIS E. HURST. Miller General Hosp., London. *J. Path. Bact.* **31**, 303-42 (1928).— MnCl_2 given subcutaneously destroys the peripheral cells of the liver lobule and leads to extensive cirrhosis. Its effect is greatly enhanced by repeated intravenous injections of living *B. coli*. Phenylhydrazine affects the cells in the center of the lobule and does not itself cause cirrhosis, but augments the effect of Mn. The effect of CHCl_3 was inconclusive, but cirrhosis was produced in one case. Bile does not cause cirrhosis. None of these poisons produced degenerative changes in the central nervous system. Guanidine causes severe nerve cell degeneration and ameboid changes in neuroglia, but has no effect on liver. There is no evidence of connection between liver cirrhosis and cerebral changes which might throw light on hepato-lenticular degeneration.

JOHN T. MYERS

Drug action in galvanotropic responses. I. F. B. FRIES. Harvard Univ. *J. Gen. Physiol.* **11**, 507-13 (1928).—Strychnine produces reversal of the reciprocal inhibition of circular and longitudinal muscles of planarians (*Planaria maculata*, *P. velata* and *P. agilis*) and earthworms (*Allolobophora foetida*); in an elec. current the strychninized animals show reversed, i. e., anodal galvanotropic responses. Neither nicotine nor atropine induced reversed galvanotropic responses in planarians. Conclusion: Strychnine causes reversal of inhibition primarily through its action upon central synapses or homologous elements. *Asellus communis*, like other arthropods, is little affected by strychnine and even less so by caffeine and atropine. No reversal of galvanotropism occurs. Nicotine causes abnormal posture and movements which are perhaps reversed but no change of anodal galvanotropism.

C. H. RICHARDSON

Colloidal lead phosphate. A substitute for colloidal metallic lead in cancer therapy. FRITZ BISCHOFF AND N. R. BLATHERWICK. *J. Pharmacol.* **31**, 361-74 (1927).—To prep. colloidal lead phosphate, Na_3PO_4 is added drop by drop to a soln. of gelatin contg. Pb chloride at the b. p. The reaction is complete at p_H 7.4. The mixt. is centrifuged and filtered. The resulting colloidal soln. is sterilized by heating in vaccine bottles. The Pb content is 0.40%. For the prepn. of colloidal Pb oxide and carbonate, the procedure is the same, NaOH, and Na_2CO_3 being used. Colloidal metallic Pb added *in vitro* to blood satd. with oxygen was found to combine with all the dissolved oxygen at room temp., and with a small amt. of the oxygen combined with Hb at 37°. The degree of hemolysis was decreased. The Pb distributed itself between serum and cells. Colloidal Pb phosphate injected intravenously into rabbits caused no decided fall in Hb, and is, therefore, less toxic than the acetate, colloidal Pb, or colloidal Pb oxide. Ionic Pb (Pb acetate) mixed with serum or red blood cells contg. enough phosphate to react with the Pb was also non-toxic.

C. RIEGEL

Action of essential oils and of some of their constituents upon the formation of methemoglobin *in vitro*. EMMELINE DESSEMONTET. *J. Pharmacol.* **31**, 377-86 (1927).—The oils or constituents of the oils were added to defibrinated blood, either dild. with water or undild. at 37°. All the oils examd. caused the formation of methemoglobin from oxyhemoglobin (spectroscopic examn.). Of the constituents having an alc. group, those having an unsatd. side chain, like eugenol and safrol, form methemoglobin most quickly. Those with no unsatd. side chain react slowly or not at all (menthol, thymol). With terpenes, ketones and aldehydes, no relation was found between speed of formation of methemoglobin and unsatn. The amount of methemoglobin formed in blood at different oxygen tensions after the addn. of linalool, carvone and pinene was detd.; the greatest amount was formed at a definite oxygen tension specific for each of these constituents. No methemoglobin was found in the blood of white rats killed 6 weeks after injection of oil of clover, and oil of orange.

C. RIEGEL

The comparative effect of ethyl cyanide and ethyl isocyanide on biological oxidations. O. H. EMERSON AND J. WILLIAM BUCHANAN. *J. Pharmacol.* **31**, 387-92 (1927).—Ethyl cyanide, 0.0001 M and 0.0002 M, had no effect on the O consumption of *Planaria dorotocephala* or *Planaria maculata*. Ethyl isocyanide in the same concns. caused a depression in O consumption of about 8-14%.

C. RIEGEL

The adsorption of quinine by blood cells. O. S. GIBBS. Dalhousie Univ. *J. Pharmacol.* **33**, 185-90 (1928).—From 61 to 80% of quinine added to defibrinated blood

could be recovered, the quinine being distributed equally between serum and cells.

C. RIGGEL

Trials of pancreatic extracts in the course of experimental tuberculosis in the guinea pig. S. BONNAMOUR and P. DELORE. *Compt. rend. soc. biol.* **98**, No. 9 Séance, Feb. 20, Lyon, 598-9.—The subcutaneous injection of ext. of the pancreas of fowl had no favorable or unfavorable action on the evolution of exptl. tuberculosis in the guinea pig. The injection of insulin, repeated during several months, led in general to a prolongation of life, and appeared to cause an increase in the no. of endocrine pancreatic islets.

L. W. RIGGS

Action of adrenaline on the contractility of fatigued muscle in the rabbit deprived of suprarenals. FERREIRA DE MIRA and JOAQUIM FONTES. *Compt. rend. soc. biol.* **98**, 1011-3 (1928).—Adrenaline acts unfavorably on muscular contractility in the decapsulated rabbit. This action differs from that in the normal rabbit because the recuperation by rest is not reestablished. Muscles which have not been fatigued preserve their power of contraction. **New studies of the suprarenal capsules in their relation to muscular functions.** *Ibid* 1013-5. The substance produced by the suprarenals, which causes muscular debility in the decapsulated animal, acts on the muscle locally. Its precise mode of action was not detd.

L. W. RIGGS

Action in vitro of various alkaloids and chemotherapeutic products on trypanosomes. R. BRUYNOGHE and A. DE BOIS. *Compt. rend. soc. biol.* **98**, 1249-50 (1928).—Strychnine- HNO_3 , veratrine- AcOH , emetine- HCl , and quinine- HCl had a strong toxic action on trypanosomes *in vitro*; cocaine- HCl , atropine- H_2SO_4 , curare and eserine salicylate showed a moderate toxicity, while morphine- HCl and pilocarpine- HCl had no action. The concns. used varied from 1.0 to 0.01%, and the time of contact from 0.5 to 6.0 hrs. The results were somewhat irregular, depending on the nature of the blood, its degree of diln., and the no. of trypanosomes present.

L. W. RIGGS

Variations of chronaxie in the cataleptic state produced in the cat by the injection of bulbocapnine. GEORGES BOURGEOIS and H. DE JONG. *Compt. rend. soc. biol.* **99**, 55-7 (1928).—Action of bulbocapnine on the chronaxie in normal man. *Ibid* 57-9.

L. W. RIGGS

Effect of chronic strychnine poisoning on the number of erythrocytes. E. ANNAU and J. HERGLÖZ. *Monatsh. Chem. Arch.* **29**, 215-21 (1928).—Repeated injections of strychnine in rabbits caused a decrease in the no. of erythrocytes and a final death in tetanus. On the other hand if the spleen is removed the no. of erythrocytes is increased following the injection of strychnine, but this increase is transitory, and if the injections are continued the no. of erythrocytes is reduced.

L. W. RIGGS

The effect of caffeine upon the autolysis of the liver. AKIRA OHNISHI. *Sei i-Kwai Med. J.* **47**, No. 3, 1-1928. Both protease and peptase act under pH values ranging from 2.94 to 6.25. The optimum pH value for protease action is 3.24 and for peptase 7.20. Liver washed with saline soln. autolyzed more readily than liver contg. blood or caffeine. The latter in the amounts above indicated always inhibits the autolysis of the liver. **Mode of action by which caffeine inhibits the inhibitory action of decomposition products of protein on the proteolytic enzyme.** *Ibid* 2-3. Caffeine accelerates the activity of proteolytic enzymes because caffeine itself inhibits the inhibitory action of secondary albumose in the decomposition products of protein by forming a complex compd with the secondary albumose.

L. W. RIGGS

The influence of bolus suspension on drugs introduced into the blood vessels. NARANOSKE KÖNY. *Acta Schol. Med. Univ. Imp. Kyoto* **10**, 175-87 (1928).—The blood vessels of the legs of a frog were perfused with Ringer soln. contg. a certain quantity of a drug. When in this stage a colloidal soln. of bolus alba was added, the effect of the drugs causing contraction or dilation was varied, as seen by the change of the out-flow of the resp. soln. The expts. were performed at room temp., the drugs employed were adrenaline, NaNO_2 , cocaine, nicotine, morphine, caffeine, strophanthin, atropine, strychnine, digitonin and BaCl_2 . As to the first 7 drugs, bolus exerted an inhibitory action; while with the 4 latter, it increased their original medicinal effect. G. S.

The effect of insulin upon glycolysis and carbohydrate metabolism in the muscle. JUN HOMMA. *Japan J. Med. Sci. Sect. II*, **1**, 165-81 (1927).—In normal dogs the difference in the blood sugar between arteria and vena femoralis is 0.014%; in hyperglucemia produced by injection of adrenaline or glucose, it is 0.024%. In hyperglucemia caused by total pancreatectomy this difference is greatly diminished; on the av. it is 0.003%. This indicates that in diabetes, sugar consumption is decreased in the peripheral muscles. By giving insulin the difference in the blood sugar is brought back to normal. Expts. on normal rabbits show that insulin either injected or added *in vitro* has no effect on hemoglucolysis. In pancreatectomized dogs, the rate of glu-

colysis is greatly decreased, but is increased again by adding insulin to the blood or by a previous insulin injection. The lipid content of the blood has no influence upon the glucolysis. As to human beings, H. differentiates between mild diabetes with a normal glucolysis and almost normal difference in the blood sugar content between venous and arterial blood, and severe diabetes with a decreased rate of glucolysis and a greatly reduced difference of the blood sugar. In this type of diabetes nearly always a histological change in the pancreas can be detected. Insulin when given subcutaneously brings "blood sugar difference" and glucolysis back to the normal state; *in vitro*, it is of little influence. G. SCHWOCH

Serochemical studies on the parenteral administration of proteins foreign to the species. TAKU ASAKURA. *Japanese J. Med. Sci. Sect. II* 1, 183-220 (1927).—Parenteral injections of sterilized milk or sterilized casein soln. were given to rabbits and the serochemical changes observed. After one injection the non-protein nitrogen, amino acid N, fibrinogen, lecithinase, blood sugar, catalase and protease increased. Serum protein (albumin and globulin), ethylbutyrase and antitrypsin decreased; diastase remained unchanged. Complement and normal amboceptor did not change distinctly. After a second injection of casein, the non-protein N, amino acid N, blood sugar and ethylbutyrase showed an increase, while diastase remained unchanged. Catalase and protease increased but to a smaller extent than after the first injection. G. SCHWOCH

Permeability of the liver to some colloidal substances. DANIEL ALPERN. *Arch. ges. Physiol.* (Pflüger's) 218, 610-26 (1928).—When cholesterol is given to dogs by mouth a cholesterolemia of different degrees follows, the degree depending upon the rate at which the fat in which the cholesterol is incorporated is absorbed from the intestine. In dogs with a chronic pancreatic diabetes the blood cholesterol fluctuates within very wide limits, sometimes attaining a normal level. In both normal and diabetic dogs the hypercholesterolemia is not always accompanied by an increased excretion in the bile. After several injections of phlorhizin the cholesterol of the bile is diminished although there is a hypercholesterolemia. Removal of the pancreas increases the excretion through the bile almost 2 fold. Cholesterol emulsions injected intravenously (femoral vein) into normal dogs cause no increase in biliary excretion, and in diabetic dogs cause but a slight, transitory increase in the daily excretion. Emulsions injected directly into the liver through the hepatic vein result in complete retention of the cholesterol, but during pancreatic diabetes such an administration increases the excretion through the bile. The ratio between the blood sugar and that of the bile in diabetes depends upon the degree of cholesterol excretion by the bile. In pancreatic diabetes a more marked excretion of intravenously injected colloidal dyestuffs and colloidal Fe takes place than in the normal animal. Disturbances in the carbohydrate metabolism in pancreatic diabetes result in an increased permeability of the liver for cholesterol. G. H. S.

Adsorption and narcosis. FERD. HERCIK. Russian Zoological Lab., Villefranche sur Mer. *Protoplasma* 3, 417-25 (1928).—The young dark green assimilators of *Caulerpa prolifera* were ground, the sap was expressed and dild. 10 times with distd. H₂O. The surface tension of the sap was detd. by means of Du Nouy's tensimeter. The adsorption was measured on the differences of surface tension with equicapillary solus of alcs. The alcs were adsorbed in an indirect relation to their respective capillary activities against air. It was supposed that the unadsorbed remainder is a regulating device to remove the narcotizing substance from the more liquid phase of the cell interior. The validity of Traube's rule for narcosis as a biol. phenomenon can be understood on the basis of the fact that the strongly capillary active substances are adsorbed least and the poorly capillary active substances most. Thus their narcotizing effect is indirectly proportional to their respective adsorbility. M. H. SOULE

Use of histamine as a standard test for diminished resistance in suprarenalectomized rats. J. MARMORSTON-GOTTESMAN AND J. GOTTESMAN. *J. Exptl. Med.* 47, 503-14 (1928).—Of all the drugs thus far used in testing the resistance of suprarenalectomized rats, histamine has been found to be the most satisfactory. It is a readily obtainable and comparatively stable drug, producing characteristic symptoms. Its m. l. d. for a given strain of rats can be established within narrow limits and the difference between the m. l. d. for normal and suprarenalectomized rats is comparatively great (1:20). C. J. WEST

Studies of the action of sodium thiosulfate in metallic intoxications. I. The effect of sodium thiosulfate on arsenic elimination. A. G. YOUNG. *J. Lab. Clin. Med.* 13, 622-8 (1928).—The opinion is expressed by many that Na₂S₂O₃ is the "ideal" antidote for arsenical poisoning. This is shown not to be the case by expts.; in most instances the thiosulfate markedly diminishes the rate of arsenic excretion and has

never increased it even when there is pronounced diuresis. Exptl. work on rabbits indicates that the drug has some value in preventing kidney damage in chronic intoxication but that its value as an antidote when large amts. of As have been ingested is questionable. II. The effect of sodium thiosulfate upon the excretion of lead. A. C. CURTIS AND A. G. YOUNG. *Ibid* 628-32.— $\text{Na}_2\text{S}_2\text{O}_3$ given by mouth in doses of 0.5 g. per kg. body wt. to guinea pigs, rabbits and rats previously poisoned by Pb does not appreciably affect the excretion of Pb. Results obtained would indicate that any other alk. drug would give the same results as those obtained with $\text{Na}_2\text{S}_2\text{O}_3$. E. W. W.

The effect of sodium salicylate on the normal human electrocardiogram. ARTHUR M. MASTER. *Am. Heart J.* 3, 180-9(1927).—Twelve men and 1 woman who had no disease which affected the heart were studied. Electrocardiographic records were taken before and after the administration of Na salicylate. The salicylate was given by mouth and by rectum until signs of salicylism appeared. The electrocardiogram was not changed by sodium salicylate and there is no evidence that the drug has any effect on the normal heart muscle.

R. C. WILLSON

Studies of respiratory effects of anesthetics. I. A comparison of irritant and non-irritant types. M. S. DOOLEY AND CHAS. J. WELLS. *Anesthesia and Analgesia* 6, 278-84(1927).—Two cannulae were placed in the trachea of a rabbit under local anesthesia. Liquid anesthetics were administered in a gaseous form by admixt. with a current of air. The arrangement of the cannulae permitted application of the anesthetic to the upper or lower part of the trachea. Ethyl chloride and CO_2 mixed with ethyl and methyl chlorides and ethyl bromide and chloroform exerted local effects not unlike chloroform and ether. CO_2 in conns. required to anesthetic or even to counteract alcoholic or other narcotic intoxication exerted a local irritating effect. N_2O had no more local effect than air. A group of the ethylene type had very minor local effects but was otherwise similar to N_2O . The authors believe that the results reported support the Schmiedberg primary depression theory.

R. C. WILLSON

A preliminary report on the postoperative use of aromatic spirits of ammonia. OSCAR H. STOVER. *Anesthesia and Analgesia* 7, 77-9(1928). Rabbits and cats were anesthetized by injecting equal parts of ether and oil into the peritoneal cavity. Aromatic spirits of ammonia were administered by holding a satd. gauze before the nose for 30 sec., repeating after an interval of 4-5 min. if deemed necessary. Aromatic ammonia stimulates reflexly the respiration and circulation of animals under ether anesthesia. The reflex stimulation varies inversely with the depth of the anesthesia. The reflex arises mainly in the mucous membranes of the nose, as cocainizing the nose abolishes the reflex. Repeated administrations of the drug at intervals repeatedly increases the respirations. Administration of the drug to animals under deep anesthesia often causes them to cry out and give evidence of waking up. Since the effect appears quickly after administration, it may be due to direct cerebral stimulation. The drug administered by inhalation shortens the postanesthetic recovery time. It is a reflex respiratory and circulatory stimulant and may be used to advantage following many anesthetics. The use of the drug tends to decrease shock and vomiting in caudal and spinal anesthetics.

R. C. WILLSON

A study of sugar metabolism in animal cells with special reference to the effect of anesthetics. A. M. ESTES AND W. E. BURGE. *Anesthesia and Analgesia* 7, 79-81(1928).—*Paramoecium caudatum* was introduced into 0.1% sugar solns. and anesthetics in gaseous form were bubbled through the soln. Chloroform and ether decrease sugar metabolism, whereas N_2O and C_2H_4 do not unless they are used with a very limited supply of O. The limited supply of O alone decreased sugar metabolism so N_2O and C_2H_4 have no effect on sugar metabolism.

R. C. WILLSON

The chemical basis of the efficacy and toxicity of local anesthetics. JOHN S. LUNDY AND ARNOLD E. OSTERBERG. *Anesthesia and Analgesia* 7, 141-51(1928).—Practically all local anesthetics that are used extensively at present are alic : i. e., they contain at least 1 OH group. This may be either free or substituted and either an alic or phenolic type. Furthermore, most of them contain a free or substituted amino group. The anesthetic coefficient is generally increased by esterification of the alic OH. Benzoic acid or substituted benzoic acids are usually used for the esterification. After injection the first reaction is the liberation of the base from its salts by the body fluids and in this form it is lipid-sol. and exerts its effect on the nerve fibers. Nine general types of anesthetics are suggested based on certain similarities in structure. The groups: cocaine, tropacocaine, piperidine, procaine, apothesine, benzyl alc., ecaine, anesthesine and quinine.

R. C. WILLSON

The preparation of 4-chaulmoogrylamino benzene arsonic acid (DEWAR) 17. The

preparation of chaulmoogryl alcohol (DEWAR) 17. The synthesis of iododihydrochaulmoogric acid and its ethyl ester (DEAN, *et al.*) 17.

I—ZOÖLOGY

R. A. GORTNER

Digestive processes in protozoa. Study on *Paramecium caudatum*. HANS FORTNER. *Arch. Protistenk.* 61, 282-92(1928).

FRANCES KRASNOW

The action of carbon dioxide on water organisms. T. NIKITINSKII. *Centr. Bakt. Parasitenk., II Abt.* 73, 481-3(1928).—A satd. soln. of CO₂ (about 2%) at 15° killed diatoms, cyclops and daphnia in 10 to 40 sec.; the larvae of *Chironomus plumosus*, ceratopogen and *Corethra plumicornus* in 30 to 60 sec.; and nematodes, *Rotifera vulgaris* and *Chilton uncinatus* in 3 to 10 min. Death is not due to the H ion. The more saprophytic organisms are more resistant.

JOHN T. MYERS

Ability of certain marine invertebrates to live in diluted sea water. A. S. PEARSE. *Biol. Bull. Marine Biol. Lab.* 54, 405-8(1928).—*Limulus*, *Phascolosoma* and 18 marine annelids lived a week or two in a mixt. of $\frac{3}{4}$ sea water and $\frac{1}{4}$ fresh. Several species lived in $\frac{1}{2}$ sea water. *Limulus*, *Leoneice* and *Nereis* were active for 2 to 3 weeks in $\frac{1}{4}$ sea water, but died in weaker solns.

L. W. RIGGS

Variations in the content of amino acids of certain lepidoptera during nymphosis. (MLLE.) ANDRÉE COURTOIS. *Compt. rend.* 186, 1575-6(1928).—Chrysalides of *Saturina carpin*, *Attacus cyathia*, *A. Pernyi* and *Sphinx pinastri* were ground and extd. with cold water. The ext. was defecated with CCl₃CO₂H and the amino acids were detd. by the method of Sørensen. The content of amino acids remains at about 2.5 g. per kg. until the time of forming the tissues of the perfect insect when there is a rapid diminution of this figure notwithstanding a pronounced loss of wt. of the chrysalides.

L. W. RIGGS

Action of various gases on the egg of the fowl. Assimilation of carbon monoxide as an inert gas. (MLLE.) SUZANNE ANCEL. *Compt. rend.* 186, 1579-80(1928).—Eggs placed in jars contg. pure CO and sealed for 8 days were allowed contact with the atm. for 24 hrs. and were then incubated. CO behaved as an inert gas like N, H or O₂, in that the eggs developed normally. Eggs exposed to H₂S, NH₃, HCl, SO₂, Cl, C₂H₂, CO₂ or illuminating gas for varying periods of time developed abnormally or not at all.

I. W. RIGGS

Elimination of urea by batrachians. ALFRED SCHWARTZ. *Compt. rend. soc. biol.* 98, 1552-4(1928).—The urea excretion of *Rana temporaria* after retention for 15 to 17 hrs. was detd. in *a*, frogs totally immersed in water, *b*, the ventral portion only immersed and *c*, kept in air. In 7 frogs of series *a*, the urine for 24 hrs. ranged from 8.3 to 29.5 cc., concn. of urea per 1000 of urine 0.32 to 0.73, output of urea in mg. per 24 hrs. 4.4 to 21.5, concn. of urea per 1000 of blood 0.72 to 1.5. In 4 frogs of series *b*, the urine for 24 hrs. averaged about $\frac{1}{2}$ that of the series *a*, concn. of urea 0.66 to 0.87, output for 24 hrs. 4.9 to 8.6 mg. and the blood urea 0.72 to 1.6. Two frogs, *c*, kept in air gave 2.6 and 5.5 cc. of urine in 24 hrs. with a concn. of urea of 1.35 and 1.14 per 1000 of urine; the output of urea for 24 hrs. was 3.5 and 6.2 mg. and the concn. of urea in the blood was 1.6 per 1000.

L. W. RIGGS

Chemical regulation of the respiration in the sloth (*Bradypus tridactylus*). MIGUEL OZORIO DE ALMEIDA. *Compt. rend. soc. biol.* 98, 1576-8(1928).—The chem. regulation of respiration by CO₂ in the sloth follows the same laws as that in ordinary lab. mammals. Although this animal presents variations in many functions it appears normal concerning its respiration.

L. W. RIGGS

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Bacteria count limits and the transportation of milk. JAMES D. BREW AND RICHARD C. FISHER. Cornell Univ. Agr. Expt. Sta., *Bull.* 460, 1-37(1928).—A general discussion. Bacterial-count tolerance cannot be always complied with and the main purpose of such regulations is to compel better care in handling milk. A mass of inconclusive data is compiled in 28 tables.

C. R. FELLERS

The possibility of producing iodized milk. C. F. MONROE. Ohio Agr. Expt. Sta., *Bimonthly Bull.* 13, 153-6(1928).—The milk of the Expt. Sta. herd of cows has not contained a demonstrable amt. of I for a period of 2 yrs. The amt. present is believed

to be less than 10 parts per billion. Feeding tests with KI, CaI_2 , and dulce (a sea weed), when fed at the rate of 2 grains daily, showed I present in the milk in amts ranging from 10 to 100 parts per billion. C. R. FELLERS

The bacteriology of dried powdered milk preparations used in infant feeding G. F. AND G. H. DICK. *Am. J. Diseases Children* 34, 1040-1 (1927); *Expt. Sta. Record* 58, 594.—The presence of a variety of living bacteria, including streptococci, in preps of powd. milk indicates that the methods of manuf. do not destroy the bacteria in the milk and that the bacteria remain viable in the powder. The prepn. of powd milk feedings without boiling or pasteurization in order to avoid curdling allows the bacteria in the powder to persist in living form in the feeding. H. G

Investigations on the bacterial and enzyme content of condensed milk. GERTRUI GEHRI. *Mill. Lebensm. Hyg.* 19, 89-101 (1928).—Swiss condensed milk samples were good as to taste and smell, but none was sterile. The bacterial count varied between 10 and 9000, mostly harmless organisms. There is always a difference in bacteria count between sweetened and unsweetened milk, preponderance apparently changing with different methods of process. The Swiss condensed milk contains only exceptionally traces of oxidases and reductases. J. C. JERRJENS

The purification of skim milk solutions on a lath filter. M. LEVINE, G. W. BURKE AND C. S. LINTON. *Iowa Eng. Expt. Sta., Bull.* 81, 30 (1926); *Expt. Sta. Record* 58, 185.—Studies are reported which showed that a plant for the purification of creamery wastes must be capable of rapidly destroying milk sugar without developing detrimental acidities. Anaerobic methods such as septic or Imhoff tanks are not suitable, whereas aerobic devices such as trickling filters provide the conditions necessary for the rapid oxidation of milk sugar and org. acids. Results obtained by applying various dilns. of skim milk to a small lath filter at 2 rates are reported on the removal of solids, O-consuming constituents, org. N, on the O consumption, ammonification, nitrite and nitrate formation and on the stability of the effluents. The effluents were considerably more alk. than the applied wastes. Anaerobic storage of the raw wastes resulted in distinctly acid reactions. E. H

Lipins and sterols as sources of error in the estimation of fat in buttermilk by ether extraction methods. L. M. THURSTON AND W. E. PETERSEN. *J. Dairy Sci.* 11, 270-83 (1928).—The gravimetric method of fat detn., when applied to buttermilk, gives results which are higher than the true fat content by the amt. of non-saponifiable matter and lecithin present in the product tested. Inasmuch as the A. O. A. C. test or the Bu alc. test detcs. the % of lecithin and fat when both are present, it is inaccurate, and should be discontinued. The Babcock method was shown to be the most accurate for a product such as buttermilk contg. roughly as much lecithin as fat. With buttermilks below 0.3% fat the results are often considerably too low. The Gerber method also yields incorrect results, using Am alc. instead of Bu alc. and showing the same errors as the Babcock test. Results of expts. are extensively tabulated. J. C. JERRJENS

A study of the proteolytic action of specific organisms and groups of organisms in butter made from graded cream. GEORGE SPITZER, E. F. PAKFITT, V. C. MANHART AND WM. F. EPPLE. *Purdue Univ. Agr. Expt. Sta., Bull.* 319, 1-36 (1927); cf. *C. A.* 21, 1153.—Chem. methods of detg. protein hydrolysis together with bacterial methods and arbitrary butter scores were used on about 100 samples of butter to show the relation of the several predominating factors influencing the flavor and general quality of butter held in storage. The quality decreased in proportion to protein hydrolysis, and proteolytic hydrolysis progressed at a greater rate in the presence of proteolytic organisms such as *B. liquefaciens*, *B. butyricus* and *B. proteus vulgaris*. Salting of butter, contrary to popular belief, had no influence in retarding proteolysis though the growth of some microorganisms was retarded by salt. This retardation was insufficient to retard protein hydrolysis. The p_H value of butter when going into storage was one of the most important factors controlling its keeping value. An optimum p_H value of from 5 to 6 is suggested. C. R. FELLERS

The determination of butter fat in cooking fats containing butter. HEINRICH WILDI. *Mill. Lebensm. Hyg.* 19, 102-16 (1928).—The accuracy of the "A" and "B" nos., and butyric acid no. methods was tested on samples of fat- and oil-mixt. to which a known amt. of butter had been added. Mixt. with coconut oil causes the butyric acid no. to give too low butter values. It was proved theoretically and exptly. that this low value must be attributed to the variety of the butyric acid no. of the coconut and palm oils. The sapon. no. cannot compensate for this error. Satisfactory results can be obtained if only half the amt. is taken for analysis. The disadvantages of the detn. of the "A" and "B" nos. are large amt. of time and expense of reagents. The

modification of Kuhlman and Grossfeld and using half the amts. for analysis give accurate percents of butter fat. J. C. JURRIJENS

A contribution to the question concerning the influence of the amount of added salt upon the changes taking place in cheese. E. HAGLUND, A. SILFVERSPARRE AND E. SANDBERG. *Medd. Centralanstalt. forskväsendet jordbruks. Mejeriförsök 34; Bakteriöl. avdel. 46*, 3-21(1928).—An investigation of the effect on certain bacteriol. and chem. changes in cheese resulting from the method of salting employed. Half of the curd was salted as soon as the whey had been removed after which it was pressed. At the same time the other half of the curd was pressed for 2 days and then salted in a brine bath. The lactose and bacterial contents as well as the p_H of the cheese were detd. at different intervals. In the cheese which had been immediately salted the salt had a marked retarding effect on the bacterial growth, the bacterial count in no case reaching as high a value as in the cheese salted after 2 days. The difference in the 2 types of cheese became more noticeable with increase in the content of salt. Four % or more of salt in the moisture in the immediately salted cheese resulted in a hard, brittle and crumbly consistency, while the cheese salted after 2 days showed no appreciable effect on its consistency with a moisture contg. as high as 8% of salt. E. O. E.

A comparison of the volatile-solvent method with the vacuum-oven method for determining moisture content of cheese. GEORGE P. SANDERS. *J. Dairy Sci.* 11, 325-30(1928).—Toluene removes moisture rapidly without causing undue charring or decompn. and is recommended. Collodion-coated corks, correction for density of water, and using a paraffin or glycerol bath at 140° to 150° increase the efficiency of the method. The results are slightly higher than those obtained by the vacuum oven method. With the rate of boiling properly regulated, it is undesirable to boil longer than 1½ hrs. Closer checks are obtained on duplicate samples by the vacuum-drying method, but the distn. method is much more rapid and is very accurate for detns. on cheese. J. C. JURRIJENS

A new process of bread-making. GIULIA DROGOU. *Atti II congresso naz. chim. pura applicata 1926*, 376-80.—The Monti process, the principles of which and the application to wheat bread have already been described (cf. D., C. A. 17, 3726), is also suitable for the prepn. of whole-corn bread. New expts. are described in which the process was utilized for the prepn. of corn bread by several formulas. In this case the bran was treated with grape juice, which increased slightly the content of sol. proteins and increased notably the total sol. substances and the reducing sugars. C. C. DAVIS

New methods of bread-making. EUDO MONTI. *Atti II congresso naz. chim. pura applicata 1926*, 393-408.—A review of recent developments (cf. Drogoul, C. A. 17, 3726 and preceding abstr.) As representative applications of the Monti process, (1) the mixt.: wheat flour (75% yield) 90 parts, corn meal 6 parts, unfermented grape juice 4 parts, which yields 116 parts of bread contg. 28% moisture, which is white and keeps exceedingly well, and (2) the mixt.: wheat flour (75% yield) 75, bran (disintegrated with corn oil) 6, corn meal 7, unfermented white grape juice 4, neutral corn oil 10, which yields 110 parts of product contg. 10-12% moisture, are given to show the economy possible with the process. C. C. DAVIS

Flours suitable for bread-making and the control of the yield of bread. STEFANO CAMILLA. *Atti II congresso naz. chim. pura applicata 1926*, 381-92; cf. C. A. 20, 2549.—A crit. review and discussion of present knowledge and important problems of research, with references to past and present research at the Royal School at Turin. Under ordinary conditions, 12% is about the min. gluten content of a flour from which satisfactory bread can be made. Expts. show, however, that it is possible to prep. satisfactory bread from a flour contg. less than 12% gluten if this deficiency is compensated by the addn. of a suitable quantity of certain protein substances. For this purpose, skimmed milk powder gives particularly good results, and with this ingredient the bread stays fresh an unusually long time. C. C. DAVIS

Mass production of yeast for feeding purposes. H. CLAASSEN. *Chem. Ztg.* 52, 407(1928).—The cost estus. of yeast from various sources of supply have been made by Stich (C. A. 22, 3016). They are erroneous. German materials cannot compete with foreign ones. A. L. HENNE

Effects of the constituents of the yeast cell in the fermentation of dough. M. BARTSLÉ. *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 240-8(1928).—A brief review. A. PAPINEAU-COUTURE

Hungarian paprika (red pimento). ANON. *Ann. fals.* 21, 210-5(1928).—Text of the official Hungarian definition, description, methods of analysis and standard. A. P.-C.

The identification of foreign honey by bacteriological method. CH. SCHWEIZER.

Mitt. Lebensm. Hyg. 19, 117-25(1928).—Practically all Swiss honeys were found to be free from bacteria, as were also several of French origin. A large no. of Swiss honeys as well as several foreign brands were examd. bacteriologically and results are tabulated. It is concluded that a bacteriol. examn. does not show the origin of the honey.

J. C. JURRYENS

Carotin: a pigment of honey. H. A. SCHUETTE AND PHYLLIS A. BOTT. Univ. of Wisconsin. *J. Am. Chem. Soc.* 50, 1998-2000(1928).—At least 1 of the pigments of buckwheat honey can be isolated with petroleum ether in the presence of EtOH and CaSO_4 , a method applied by Palmer in the removal of pigments from blood serum, and this pigment is carotin.

C. J. WEST

The nutritive value of swedes, marrow stem kale, and sugar beet tops. T. B. WOOD. *J. Min. Agr.* 34, 697-705(1927); *Expt. Sta. Record* 58, 565.—A new formula was used in these calcs.: $R = M + GK$, in which R equals the av. ration per head per week in lbs. of starch equiv., M the av. maintenance requirement in lbs. of starch equiv., G the av. live wt. increase per head per week in lbs., and K the wt. in lbs. of starch equiv. required to make 1 lb. of live weight increase. This equation has been found to be justified if the animals are quiet and do not waste too much starch equiv. in movement. R can be calcd. from the ration and G from periodical weighings. M and K can be read from curves previously calcd. by the author (*J. Ministry Agr.* 34, 295-307(1927)). From these calcs. it was found that the starch equiv. per 100 lbs. of Norfolk swedes was 5.84 lbs., Fen swedes 5.15, marrow stem kale 7.14, and sugar-beet tops and crowns 8.8 lbs.

H. G.

Chemical injury to watermelons in transit. W. W. GILBERT AND F. C. MEIER. *Phytopathology* 16, 73(1926); *Expt. Sta. Record* 58, 552.—Expts. conducted to det. whether any chemicals carried as freight might damage melons indicated that after 5 days melons under pressure showed marked injury, such as discoloration, pitting, and softening, when in direct contact with acid phosphate, K muriate, common salt and NaNO_3 . Some damage resulted under the same conditions from $(\text{NH}_4)_2\text{SO}_4$ and K_2SO_4 . Neither hydrated lime nor air-slaked lime caused any injury.

H. G.

A relation between the concentration of oxygen and carbon dioxide in the atmosphere, rate of respiration and length of storage life in apples. F. KIDD AND C. WEST. *Dept. Sci. and Ind. Res., Food Invest. Bd. Rept.* 1925-1926, 41-2, *Expt. Sta. Record* 58, 540; cf. *C. A.* 20, 1283.—By comparing the rate of respiration, as measured by loss of weight, of apples stored in air and in gas (12% CO_2 and 9% O_2) it was found that respiration was approx. halved and the length of storage life approx. doubled in gas storage. The relations between O_2 concn. and the respiration rate as detd. by the amt. of CO_2 evolved were for 10 and 5% of O_2 0.86 and 0.78, resp., as compared with unity for normal air.

H. G.

Determination of malic and citric acids in fruit juices and jams by Muttelet's method. (Miss) CONCHA ESPESO. Lab. Municip. Paris. *Ann. fals.* 21, 201-3 (1928); cf. Muttelet, *C. A.* 16, 3142.—The sources of error in the technic described by Muttelet are: incomplete elimination of pectic matter because of addn. of insufficient alc., incomplete elimination of Ba malate from the mixed Ba salts, partial repptn. of Ba malate in the purification of Ba citrate by double pptn., Ba malate is not completely insol. in alc. of the strength recommended by Muttelet. To overcome these errors, the following technic is recommended. To 1 part of jam or juice soln. (corresponding to an acidity equiv. to 5.6 cc. N NaOH) add 2 vols. of 95% alc., let stand a few hrs., filter off the pectic matter, neutralize the filtrate with NaOH in presence of phenolphthalein, add 25-30 cc. of BaBr_2 in 80% alc., filter, wash with 80% alc., redissolve the ppt. in as small a quantity as possible of very dil. aq. HCl , dil. to 100 cc., neutralize with NaOH , make to 125 cc., gradually add 63 cc. of 95% alc. while stirring, let stand a few hrs., filter, wash with 33% alc., redissolve and reppt. as before, weigh the ppt. of Ba citrate and test it for the presence of Ba malate by Pinerua's reaction (heating with 0.2 g. β -naphthol dissolved in 1 cc. concd. H_2SO_4 gives a green fluorescence). Combine the filtrates from the 2 pptns., evap. to 25 cc., add 2 vols. of 95% alc., filter, wash with 80% alc., weigh, and test with Pinerua's reagent to make certain it is Ba malate. Pptn. of citric acid is never complete, 20-30 mg. remaining in soln., while some malate (when present) is always carried down with the citrate, so that the values found for citric acid are usually somewhat high. The error was found to be -7 to +20 mg. per 100 g. of jam or juice.

A. P.-C.

A relation between the sugar and nitrogen content of the apple at the time of gathering and the length of its subsequent life in storage. D. HAYNES AND H. K. ARCHBOLD. *Dept. Sci. and Ind. Res., Food Invest. Bd. Rept.* 1925-1926, 42-5; *Expt. Sta. Record* 58, 540; cf. *C. A.* 20, 1283.—The demand that an apple make on its stores

of respirable material is regulated almost entirely by its N content. Sugar intake is deemed to be largely dependent on seasonal conditions during the growing period. In storage at 34° the supply of sucrose is believed to be the limiting factor in the life of the apple. When the supply of sucrose in process of inversion gives out, acids are drawn upon but cannot entirely offset the deficiency, and internal breakdown results.

H. G.

Pectic changes in apples and pears. A. M. EMMETT. *Dept. Sci. and Ind. Res., Food Invest. Bd. Rept.* 1925-1926, 47-9; *Expt. Sta. Record* 58, 540.—The general chemical processes in stored pears were very similar to those in apples. In pears stored at 39° F. there was a steady decrease in total pectic content during the entire storage period. Low temp. (34°) tended to inhibit the development of sol. pectin in pears much more than in apples, a difference believed to explain the contrasting behavior of pears and apples in storage. In pears at 39° practically the whole of the cell wall losses were due to pectin losses, whereas in the apple, even at 34°, cell walls suffered other losses presumably by hydrolysis of the cellulose, suggesting differences in the nature of the pectin cellulose compds. in the cell walls of the pear and apple.

H. G.

The commercial production of sauerkraut. EDWIN LEFEVRE. U. S. Dept. Agr., *Circ.* 35(1928).—Sauerkraut is defined as the clean, sound product of characteristic acid flavor obtained by the full fermentation, chiefly lactic, of properly prep'd. and shredded cabbage in the presence of not less than 3% salt. It contains upon completion of the fermentation not less than 1.5% of acid expressed as lactic acid. Sauerkraut which has been rebrined in the process of repacking contains not less than 1% of acid expressed as lactic acid. The av. compn. of cabbage is H₂O 91.1, crude protein 1.5, fat 0.1, sugars as dextrose 4.2, crude fiber 1.1 and ash 0.8%. Vitamins A and B are probably retained uninjured in the finished kraut but C is largely destroyed by the fermentation process. The bacterial species largely responsible for sauerkraut fermentation is *Lactobacillus brassicus*. The use of pure cultures or starters in the manufg. process is not recommended. A preliminary heating of the kraut stock to 27-30°, the optimum fermentation temp., was found decidedly advantageous. The proper quantity of NaCl is 2.5% of the wt. of shredded cabbage. Pathogenic or toxicogenic bacteria are usually not associated with sauerkraut, which forms an unfavorable medium for their development. Swells in canned sauerkraut may be due either to gas-producing microorganisms which were not destroyed by the processing operation or to H caused by acid-metal action. Cool temps. are essential for storing canned sauerkraut.

C. R. FELLERS

Flavor of maple sirup. F. K. NELSON. Dept. Agr., Washington, D. C. *J. Am. Chem. Soc.* 50, 2009-12(1928).—The flavor of maple sirup depends to a great extent on an unstable phenolic substance which is associated with a cryst. aldehyde, m. 74-6°, and similar in odor and properties to vanillin. Maple sirup may contain minute quantities of other aldehydic substances which influence the flavor.

C. J. WEST

Can the use of aluminum cooking utensils be recommended from a hygienic standpoint? TH. VON FELLEBERG. *Mitt. Lebensm. Hyg.* 19, 137-47(1928).—Very little Al is taken up by food prep'd. in Al cooking utensils. It is recommended to clean Al pans, that have been unused for a long time, with acid and then to polish with sand. Acid fruit should not be boiled to sirupy consistency, and scale should always be removed from a kettle before cooking acid foods in them.

J. C. JURKJENS

The deterioration of the oils of feeding stuffs. W. L. DAVIES. *Fertilizer, Feeding Stuffs and Farm Supplies J.* 12, 389-91(1928).—The taints most frequently encountered in deteriorated feeding stuffs are abnormal acidity, rancidity and mustiness. The causes of these and their prevention are discussed. In general, feeds high in protein, or oil, deteriorate most rapidly when stored under humid conditions. In some cases rancidity in oils is due to contamination of the residual fat by minute traces of metals, such as Fe and Cu, particularly if solvent extn. methods are used.

K. D. JACOB

Iron-starvation (bush sickness) in stock. B. C. ASTON. *New Zealand J. Agr.* 36, 316-8(1928).—The results of practical experiences on the application of FeSO₄ to soils and of feeding of Fe citrate to stock as measures for prevention of iron starvation in stock in certain N. Zealand districts are summarized. Both methods give good results.

K. D. JACOB

The chemical composition and digestibility of different cuttings of alfalfa. E. NEDOCHETOVA AND N. GORJAINOVA. *Izvestiya Saratovsk. Gosud. Inst. Selsk. Khos. i. Melior.* 1927, 99-105; *Expt. Sta. Record* 58, 564-5.—Digestion trials with sheep were made to det. the value of 4 cuttings of alfalfa hay. The first cutting was made before blooming time at the end of May and at blooming time in early June, the second cutting before blooming at the end of June, the third when blooming began at the end of July,

and the fourth when blooming began at the end of August. The coeff. of digestibility of all the components was detd., and from these coeffs. the amt. of each component digested was calcd. and the figures were converted into starch values, 1 g. of crude fiber being used as equiv. to 0.58 g. of starch. The starch value of hay cut before blooming was higher than that of hay cut after blooming. The feeding value of the different cuttings varied but little, although there were differences in the chem. compn. First cutting hay was lower in albumin, fat and N-free ext. but higher in ash and cellulose than second cutting. The starch values of the third and fourth cuttings were approx equal. H. G.

Properties of cacao butter; the detection of foreign fats in chocolate (ALBERS) 27. Sugar in milk (TOCHER) 11F. Apparatus for humidifying bakers' ovens (U. S. pat. 1,676,763) 1.

BAILEY, EDGAR HENRY S., AND BAILEY, HERBERT S. **Food Products, their Source, Chemistry and Use.** 3rd ed., revised. Philadelphia: P. Blakiston's Son & Co. 563 pp.

BURR, ANTON. **Kurzer Grundriss der Chemie der Milch und Milcherzeugnisse.** Hildesheim: Molkerei Zeitg. 87 pp. M. 1.80

MARYAWAKI, ALSUSHI. **Condensed Milk.** New York: John Wiley & Sons, Inc.; London: Chapman & Hall. 228, 6 d., net.

MASQUET, V. J. **L'emploi des laits acides chez le nourisson.** Paris: Arnette. 88 pp. Paper, F. 9.

PELLERIN, GEORGES. **Guide pratique de l'expert chimiste en denrées alimentaires.** 3rd ed. Paris: Editions Médicales N. Maloine. Reviewed in *Ann. fals.* 21, 225 (1928).

RUPRECHT, KARL. **Die Fabrikation von Albumin und Eier-Konserven.** 3rd ed., revised. Vol. 88 of *Chemisch-technische Bibliothek.* Vienna: A. Hartleben. 156 pp.

SALA, A., AND BESANA, G. **L'acidità del latte e la sua determinazione.** Estr. dalla rivista latte e latticini. Lodi: tip. succ. Wilman. 16 pp.

SAVINI, ELIA. **Chimica ed analisi del latte e dei latticini.** Milan: U. Hoepli (U. Allegretti). 542 pp. L. 28.

TILLMANS, JOSEPH. **Lehrbuch der Lebens-Mittelchemie.** Munich: J. F. Bergmann. 387 pp.

TURNBOW, G. D., AND RAFFETTO, L. A. **Ice Cream Textbook for Student and Manufacturer.** New York: John Wiley & Sons, Inc.; London: Chapman & Hall, Ltd. 407 pp. 20s., net. Reviewed in *Industrial Chemist* 4, 253 (1928).

Food mixture. LOUIS SOKOLSKY (to ALBERT K. EPSTEIN). U. S. 1,676,166, July 3. Wet casein and liquefied coconut oil are mixed, chilled and comminuted and then solidified into a self-sustaining mass.

Food product. ALBERT K. EPSTEIN. U. S. 1,676,138, July 3. A mixt. suitable for preservation or shipment is formed from wet pressed casein 80, coconut oil 18.7, and edible hydrogenated cottonseed oil 1.3 parts, homogenized together.

Enzymic composition for use in bread-making. HENRY A. KOHMAN, ROY IRVIN and ERNEST S. STATELER (to the Fleischmann Co.). U. S. 1,676,446, July 10. *Aspergillus oryzae* is cultivated upon a moist mass of ground hominy contg. 1.4% of lactic acid.

Baking yeast. H. CLAASSEN. Brit. 280,861, Nov. 19, 1926. A "mother yeast" is grown in a soln. prepd. from malt and malt sprouts, contg. only org. N. From this mother yeast, 2 or more cultures are prepd. in molasses soln. with increasing addns. of inorg. N nutrients so that the yeast has a successively increasing proportion of albumin. The last yeast contains 55% or more albumin and may be used as "store yeast" without being compressed. The "store yeast" in semi-liquid state may be fermented in a molasses soln. to produce baking yeast, sepd. and pressed.

Baked food including "non-acidosis producing odd-carbon fatty acids." HATTIE L. HEFT, MAY B. VAN ARSDALE and DOROTHY E. SHANK (to Teachers College). U. S. 1,676,899, July 10. A food suitable for use in cases of diabetes comprises acids such as undecylic, tridecylic, pentadecylic, heptadecylic, or like acids which may be mixed with gluten flour, baking powder, egg white, skim milk, salt and water and flavoring substances such as cocoa or cheese and baked into crisp wafers which do not have the unpleasant taste of the odd C fatty acids themselves.

Cheese from pieces of curds. RICHARD VON DER HEIDE. U. S. 1,676,121, July 3.

In forming cheese by use of salts and the action of bacteria, a mixt. is employed comprising amino acids 50, NaCl 40, $MgCl_2$ 4, Ca phosphate 4, Fe salts 1 and Mn salts 1%.

Treating cereals. L. BARTMANN. Brit. 280,605, May 18, 1926. In steeping cereals in water to cause the endosperm to swell, CH_2O is added or rapid changes are made in the temp. or mech. or elec. shocks are utilized for the purpose of killing the embryos or germs of the cereals. Various details are given for treating rye and wheat. Cf. C. A. 22, 830.

Sausage casing. RALPH EITTLINGER. U. S. 1,676,082, July 3. Fabric suitable for sausage casings, such as muslin or cheesecloth, is coated on one side with a substance contg. gelatinized raw hogskins, which may be prepd. by boiling the skins with an aq. soln. of glycerol and salt, and is then subjected to the drying, setting and preservative action of wood smoke.

13- GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

The chemist and the industrial association. W. LEE LEWIS. *J. Chem. Education* 5, 846-50 (1928). E. H.

Achievements in industrial research. EDWARD R. WEIDLEIN. *Pittsburgh Record* 2, No. 4 (1928). E. J. C.

The development of large-scale chemical industry. A. THIEME. *Z. Ver. deut. Ing.* 72, 876-8 (1928).—An outline history of notable successes in chem. industry. W. C. EBAUGH

Basic nature of heavy chemical industry insures constant opportunity for engineering progress. J. J. HEALY, JR. *Chem. Met. Eng.* 35, 361-3 (1928).—Recent developments in contact and chamber H_2SO_4 mfg., NH_3 oxidation processes, HCl manuf., the continuous production of alum from bauxite and the development of the lacquer industry are evidences of the appreciation in which the chem. engineer is regarded. J. H. PERRY

The latest progress in centrifugation of liquids. R. SEVIN. *Science ind.* 12, 148-51 (1928). E. H.

Precautions to be observed in handling high-pressure oxygen. W. BUCHANAN GRAY. *J. S. African Chem. Inst.* 10, 51-2 (1927).—The usual precautions necessary in handling compressed O_2 are stressed. ALBERT THOMAS FELLOWS

Flow of heat through limestone and lime. R. T. HASLAM AND V. C. SMITH. Mass. Inst. of Technology. *Ind. Eng. Chem.* 20, 170-4 (1928).—An application of the work of Gurney and Lurie (C. A. 17, 3809) to a case where heat is generated or liberated by a reaction. Slabs of limestone were provided with thermocouples at known distances from the surface and the rate of heating was detd. below and above the decompn. temp. Expressions are developed for the rate of heating of flat slabs and spheres, with or without a consideration of radiation. The results cannot be given in an abstract. W. L. BADGER

The applications of filter devices for protection against gases in mines. MEUSS. *Z. ges. Schiess-Sprengstoffw.* 23, 206-9 (1928).—A discussion of the advantages and limitations of the canister type of gas mask as compared with the O helmet. J. S. REICHERT

Use of woolen fabrics for filtration. P. I. SOKOLOV AND V. P. DREVING. *J. Chem. Ind. (Moscow)* 4, 232-5 (1927).—An investigation was made by S. and D. of comparative resistance of various woolen cloths when used in filtering acid liquids at various temps. After use, the tearing strength of the cloths was tested by means of Schopper's app. The temp. at which the liquids are being filtered has a paramount influence on the extent of the damage suffered by the cloth. Some of the cloths suffered considerable loss of weight and of strength by the action of water alone above 50° . As a rule, at 45° a 10% H_2SO_4 soln. weakens a woolen cloth to the same extent as pure water does at 60° ; at 60° the 10% H_2SO_4 soln. effects a profound damage on the fabric, and at 80° it practically renders it unfit for use. Although all fabrics used were made of pure wool, some of them have shown a considerably better resistance than others. A soft cloth was weakened more than a hard one on being subjected to the action of acid liquids under the same conditions. HERNARD NELSON

Recent progress in the refrigeration industry. R. BILLARDON. *Tech. moderne* [20], 12, 409-17 (1928).—B. reviews the mech. and thermodynamical progress accomplished in the last few years (*Tech. moderne* [16], 17, 565 and [16], 18, 604), in the compressors used for refrigeration. P. THOMASSET

Injury of vegetation caused by factory fumes—methods of chemical analysis. G. VERPLANCKE. *Ann. Gembloux* 33, 333-62(1927); *Expt. Sta. Record* 58, 511.—The symptoms of toxication by industrial fumes and the relative sensitiveness of various plants are discussed at some length; analytical methods, based upon familiar procedures, are given for the detn. of SO_2 in air and of various substances likely to be present in plants as the result of exposure to toxic industrial fumes. H. G.

The diagnosis of lead poisoning. OTTO STRICKL. *Arch. Hyg.* 98, 43-58(1927).—Long-continued exposure of the employees of a Pb smelter to poisoning by Pb produced a variety of effects upon various organs, upon the central nervous system, and especially upon the blood cells. The no. and intensity of the symptoms depend to some extent upon the previous history of the subject. P. Y. JACKSON

A critical examination of the blood in lead poisoning, with special attention to the various methods of preparing the polychromatophiles and the basophilic erythrocytes. H. BRÜCKNER AND R. SPATZ. *Arch. Hyg.* 97, 277-98(1927).—The no. of polychromatophiles and basophilic erythrocytes found in the blood of a guinea pig or dog suffering from Pb poisoning is not only not const., but varies widely according to the method of staining. The technic of staining is discussed. P. Y. JACKSON

MARTIN, G.: **A Treatise on Chemical Engineering Applied to the Flow of Industrial Gases, Steam, Water, and Liquid Chemicals including the Pneumatic Transport of Powders and Granulated Materials.** London: Crosby, Lockwood & Son. £3 3s.

ROUSIERS, PAUL DE: **Les grandes industries modernes.** T. V. Les industries chimiques. Le régime légal des ententes. Paris: A Colin Paper, F 12.

STREUER, CARL: **Lehrbuch der Chemie für technische Anstalten.** 3rd revised ed. Kiel: R. Cordes. 141 pp. Cloth bound, M. 5 60.

Compositions for producing oxygen. DEUTSCHE GOLD- UND SILBER SCHEIDANSTALT VORM. ROESSLER. Brit 280,554, Nov. 10, 1926. O-evolving compns. suitable for use in respirators comprise Na peroxide or other alkali metal peroxide with a catalyst such as O compds. of Fe or Mn, hydrated while cooling and stirring with water in finely divided condition.

Gas-diffusing unit. ERNEST J. SWEETLAND. U. S. 1,677,502, July 17. A porous block which may be formed of wood has its pores treated with (but not obstructed by) a preservative material such as shellac, linseed oil or creosote and may be used for app. for sewage aeration, ore flotation, etc.

Dispersing noxious gases. WINFORD L. LEWIS. U. S. 1,675,940, July 3. SnCl_4 and an aq. NH_3 soln. which may also contain NH_4Cl are brought together in order to disseminate chloropicrin or other substances. An app. is described.

Reflux system and apparatus for fractional condensation of vapors from coal tar or other mixed vapors. LOUIS WEISBERG (to The Barrett Co.). U. S. 1,676,232, July 3.

Treating liquids with gases in a succession of reaction vessels. A. F. MEYERHOFER. Brit. 274,881, July 24, 1926. An app. is described for carrying out processes as described in Brit. 269,491. The liquids or the gases are passed successively through a series of vessels and the liquid and gas may pass in counter current.

Crystallizing paraffin or other substances from solution. ALBERT DELAS (to Soc. des condenseurs Delas). U. S. 1,677,551, July 17. A volatile substance, e. g., water, is intimately incorporated with a soln. such as oil contg. paraffin, and cooling of the soln. to effect crystn. is effected by vaporizing the volatile substance.

Emulsions. W. E. BILLINGHAM. Brit. 280,762, May 25, 1926. Emulsions of oils, fats or waxes in concd. form are prepd. by treating liquid rosin or the like with alkali to produce a soap contg. 39% rosin, agitating with the material to be emulsified and then mixing with casein or similar protein material.

Refrigerating system. PIERRE E. HAYNES. U. S. 1,765,455, July 3. An app. is described in which ether and CO_2 may be used as the refrigerating medium.

Refrigerating system. FRANK W. SCHWINN. U. S. 1,676,837, July 10.

Refrigerating apparatus of the absorption type. GAUDENZ BAYER. U. S. 1,676,068, July 3.

Refrigerating system of the absorption type. BALTZAR C. VON PLATEN and CARL G. MUNTZERS (to Electrolux Servel Corp.). U. S. 1,675,474, July 3.

Compression refrigerating apparatus. G. ZWICKY. Brit. 280,577, Nov. 15, 1926.

Gas scrubber for refrigerating apparatus. ALLAN C. THAYER (to Ubald R. Loranger). U. S. 1,677,804, July 17.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Chemical composition of the thermal waters of Barèges. R. MASSY AND P. CAZAUX. *J. pharm. chim.* 7, 340-5(1928).—Results obtained by M. and C. (12^e Congrès internat. d'Hydrol., de Climatol. et de Géologie médicales, Lyon, Oct. 1927) differ from those of Robine and Dejussieu (*C. A.* 22, 1816) notably in regard to total S. A joint study is proposed in order to establish, in the interest of reliable therapy, whether these waters have const. or variable characters.

The artesian wells at Gyömrő (Kom. Pest) [Hungary]. HEINRICH HORUSITZKY. *Földtani Közlöny* 56, 218-20(1927).—The various deposits crossed by the wells are enumerated, and an analysis of the water is given.

The water of the laguna of Puan. CARLOS A. GRAU. *Anales oficina quim. provincia (La Plata)* 1, 23-37(1927).—An examn. was made of the H₂O in the laguna of Puan because in the province of Buenos Aires the H₂O in a number of the lagunas has a medicinal value. The therapeutic action of the H₂O must be associated with the mineral content since the H₂O is only slightly radioactive. Several very complete tables of analyses are given.

Determination of the iodine content of drinking water. HERMANN SCHRÖDER, J. F. RIETH AND S. N. BLUMSTEIN. *Chem.-Ztg.* 52, 440(1928).—Drawe (*C. A.* 22, 1419) published a method for detg. the I content of water which has brought forth vigorous independent letters of protest from the above 3 scientists, all of whom point out that the method of D. is not sensitive enough to detect I⁻ in the low concns. which are likely to be present in drinking water.

Report on municipal sanitary engineering practice in Great Britain. H. W. STREETER. *U. S. Pub. Health Service, Pub. Health Bull.* No. 166, 1-56(1927).—Sanitary administration in Great Britain is compared and contrasted with that in the United States. In general, filtration processes in Great Britain occupy a place secondary to long-time storage for water treatment. Where filtration is used, the slow-sand method is followed to a large extent in preference to the rapid-sand method, the latter being depended upon mainly as a roughing treatment prior to slow-sand filtration. Chlorination of water is beginning to be utilized extensively, but chem. coagulation is practically unused in Great Britain. Other features of British practice in water supply discussed are: (a) the many types of pumps, (b) the increasing use of metal pipe lined with bitumen or concrete mortar by the "spinning" process, (c) the use of sodium silicate at Birmingham, as an anticorrosion treatment for stored water, and (d) the use of rapid-sand filters, without a coagulant, for the removal of microorganisms. Recent progress in the application of the activated-sludge process of sewage treatment is described, especially the successful developments in methods of aerating sewage directly from the atm., by means of mechanical agitation and surface contact. Other features are: (a) the use of large detritus tanks for the preliminary removal of coarser suspended matters, (b) the high efficiency of revolving and traveling distributors as used in connection with percolating sewage filters, (c) the use of partial activated sludge treatment at Birmingham as a measure for increasing the capacity of a large existing percolating filter installation, (d) the methods pursued in the sep. digestion of sludge, and (e) the effective measures taken to make sewage treatment works and their surroundings attractive in appearance. For refuse disposal, large-scale application is being made at Birmingham, Sheffield, and other cities, of the incineration method combined with that of sepn. Other interesting features of British practice in refuse disposal were: (a) the apparently universal custom of combining garbage and rubbish at the dwelling for collection and disposal, (b) the ingenious uses made of power generated by incinerating refuse, and (c) the increasing sentiment against the "tipping," or "dumping" of crude refuse on land. An appendix describes the bioaeration method of sewage treatment at Sheffield.

Additional water supply for Manila. P. I. PAUL W. MACK. *Eng. News-Rec.* 100, 841-2(1928).—The history of the water supply of Manila is reviewed and the present supply from the Montalban River is described. A new supply from the Angat River is being developed and a 40-million-gals.-per-day rapid sand filter plant is under construction. The av. consumption is 23 million gals. per day.

Raw-water chlorination at Sandusky. O. F. SCHROEPFLE. *Seventh Ann. Rept. Ohio Conference on Water Purification* 1927, 19-21.—Brief additional data (cf. *C. A.* 22, 471) are presented regarding prechlorination at Sandusky, O., as a means of producing a filter effluent conforming to the U. S. P. H. S. standard. The process is very

effective except during the period when the water temp. is around 0°. At such times the bactericidal efficiencies are lower because the amt. of Cl₂ which can be applied and still maintain absence of free Cl₂ in the filter influent is materially less. The presence of free Cl₂ in the filter influent during the winter period resulted in low efficiencies due to unloading. This does not occur when the temp. is higher. The av. *B. coli* index of the filtered water during the whole prechlorination period was 1.44 per 100 cc. By maintaining free Cl₂ in the influent throughout the year it is hoped to avoid unloading during the winter.

R. E. THOMPSON

Raw-water chlorination at Warren. PHILIP J. O'CONNOR. *Seventh Ann. Rept. Ohio Conference on Water Purification 1927*, 21-4.—Prechlorination has been experimented with as a means of coping with the increasing pollution of the Mahoning River water. The plant is of 8-million gals.-per-day capacity, the present consumption being 3 million gals. per day. The Cl₂ is applied before the water enters the mixing chambers. The bacterial content of the water entering the settling basins was much lower than that of the raw water, but a great increase occurred in the coagulation basins, the bacterial count of the filter influent being at times higher than that of the raw water. The *B. coli* content, however, was consistently reduced throughout the treatment, the filter effluent at all times conforming to the U. S. P. H. S. standard. Secondary Cl₂ treatment of the filter effluent rendered the water practically sterile. The treatment eliminated algae growths in the basins and increased the length of filter runs during the summer months.

R. E. THOMPSON

Raw-water chlorination at Akron. J. S. GETTRUST. *Seventh Ann. Rept. Ohio Conference on Water Purification 1927*, 24-7. Prechlorination was exptd. with at Akron during February and March, 1927, in an effort to eliminate the gas-forming organisms previously reported (cf. *C. A.* 21, 145; 22, 651). These organisms, which ferment lactose only after 24 hrs. incubation, occurred in 50% of the 10 cc. samples of chlorinated water examd. during 1925. Cl₂ in amts. up to 2.23 p. p. m. was applied to the water entering the mixing chambers and SO₂ was applied at the outlet of the coagulation basin to remove the residual Cl₂, which was as high as 1 p. p. m., the contact period thus provided being 5 hrs. The treatment effected a considerable reduction in the bacterial content of the filter influent and *B. coli* was removed entirely, but it was not effective in reducing the gas-forming organisms mentioned. The bacterial quality of the delivered water was not materially changed. No benefits were observed which would recommend chlorination of the raw water as a regular practice. In discussion, G. R. Patton reported that prechlorination was employed at Struthers for removal of taste due to algae. Treatment of the water with 0.6-0.8 p. p. m. Cl₂ in a preliminary sedimentation basin providing approx. 3 days detention has completely eliminated taste troubles.

R. E. THOMPSON

Report of the water-softening and purification works for 1927, Columbus, Ohio. CHARLES P. HOOVER. *The City Bull.*, Columbus, O. *Ann. Rept. 1927*, 27-35; cf. *C. A.* 22, 1816. The per capita consumption of water was 9.8 gals. per day. Hardness was reduced from 230 p. p. m. to 87. The cost of CaO, soda-lime and Cl per million gals. treated was \$14. Carbonation effectively reduced the phenol alkyl from 33 p. p. m. to 7. The only difficulty in operating the carbonation plant was due to the corrosive action of the gases on the valve seats of the air compressor used to force the washed gases through the diffusers. Full details are found in 12 tables.

CARL R. FELLERS

Mechanical control of wash-water application at Bellaire. *Seventh Ann. Rept. Ohio Conference on Water Purification 1927*, 27-9. An illustrated description of a device developed by E. J. Lewis for automatically controlling the application of wash water through a hydraulic valve at the Bellaire, O., filter plant. The device causes the valve to open and close slowly, preventing overturning of the filtering material, and controls the length of wash to any predetd. period.

R. E. THOMPSON

Description and operating results of the Barberton water-purification plant. H. T. CAMPION. *Seventh Ann. Rept. Ohio Conference on Water Purification 1927*, 47-50. The 4-million gals.-per-day filter plant put in service at Barberton in June, 1926, treating water from an impounding reservoir on Wolf Creek, consists of nozzle aerators, mechanical mixing basins, coagulation basins, 4 rapid sand filters and chlorinating equipment. Prechlorination has been found effective in increasing the length of filter runs during the summer months when algae are numerous. Mn, up to 1.25 p. p. m. derived from decaying vegetation in the new reservoir, has placed an additional burden on the filter plant. Total Mn was detd. by the persulfate method and Mn⁺⁺⁺ by its reaction with *o*-tolidine reagent. The proportion of Mn⁺⁺⁺ was extremely irregular. Oxidation continued in samples standing in the lab., being complete in 3-5 days, i. e.,

when p_H reached 8.0 in consequence of loss of CO_2 . Addn. of $CuSO_4$ prevented oxidation, presumably by killing the organisms effecting the change. Cl_2 in amts. up to 10 p. p. m failed to oxidize the Mn. H_2O_2 effected complete oxidation, the reaction being hastened by raising the p_H with lime. This method was employed in detg. total Mn with *o*-tolidine. Lime treatment followed by coagulation with alum or $FeSO_4$ will ppt the Mn. With sufficient lime to render the water caustic all the ppt. settles in the basins, but with lower amts. of lime some of the floc is carried on to the filters, and, with the accompanying growths of slime and Mn bacteria, cements the filter sand causing short runs. Raw-water chlorination will prevent these growths to a large extent, allowing longer runs. The Mn is very difficult to remove from the filters. A tremendous increase in the nitrite content occurs during filtration. The significance of this is not apparent.

R. E. THOMPSON

Description and operating results of the water purification and softening plant at Piqua. J. M. MONTGOMERY. *Seventh Ann. Rept. Ohio Conference on Water Purification 1927*, 38-46. The 5-million-gals-per-day purification and softening plant at Piqua, treating water from Swift Run Lake, consists of nozzle aerators, mechanical mixing tanks, a Dorr clarifier, settling basins, carbonation chambers, coke burner and scrubber, 4 rapid sand filters and chlorination equipment. Alum and lime are applied to the water entering the mixing chambers. Sludge removal by the Dorr clarifier has averaged 97%, 0.75% of the water entering the plant being wasted in removing the sludge. In softening as ordinarily practiced, the theoretical limit of 17 p. p. m. of carbonate hardness cannot be nearly attained, probably because of the formation of basic Mg salts. At Piqua it has been found that excess lime treatment can be effectively employed to increase softening efficiencies. Sufficient lime is added to produce a caustic alk. of 40 p. p. m., which ppts the Mg as $Mg(OH)_2$. After settlement, the water is recarbonated until the total alk. minus twice the phenolphthalein alk. equals approx. 5. After filtration the water has a total alk. of 20-25 p. p. m., consisting of 15-20 p. p. m. normal carbonates and 5 p. p. m. of bicarbonates. The total hardness is reduced from 260 to 50-55 p. p. m. without the use of Na_2CO_3 . With ordinary lime treatment the total hardness would be 80-85 p. p. m. This additional softening is effected at a cost of 2.5¢ per p. p. m. per million gals. compared with 4¢ for ordinary lime treatment. The cost of Na_2CO_3 treatment would be 12¢ per p. p. m. per million gals. The CO_2 used is approx. the same as in ordinary lime treatment, only a sufficient amt. being added to convert caustic alk. to normal carbonate alk., whereas the usual method is to convert caustic and carbonate alk. to bicarbonates.

R. E. THOMPSON

Discussion of operating results of the new Piqua water-softening works. CHAS. P. HOOVER. *Seventh Ann. Rept. Ohio Conference on Water Purification 1927*, 64-5.—The results with excess lime treatment at Piqua (cf. preceding abstract) are discussed and the history of recarbonation is reviewed briefly. At Columbus during times of flood, when an excess of lime is required, the water is toxic to goldfish. This has always been assumed to be due to the excess lime added, but recent observations and expts. have led to the conclusion that the trouble is due to residual alumina in the water at times when the excess lime is employed. It is proposed to carbonate the water after settlement to reduce the p_H to the point where complete pptn. of the alum will be assured. It is believed to be better practice in treatment of flood water to add alum first, and then follow with lime-soda treatment after the bulk of the pptd. alumina and entangled mud has settled out.

R. E. THOMPSON

The manganese removal problem at Barborton. R. D. SCOTT. *Seventh Ann. Rept. Ohio Conference on Water Purification 1927*, 66. Brief data are given regarding the Mn content of some of the raw-water supplies in Ohio, together with data on the total and Mn incrustation of filter sand at several plants. Zeolite filtration offers a possible means of Mn removal.

R. E. THOMPSON

Final report on double coagulation studies at Cincinnati. CLARENCE BAHLMAN AND E. B. EVANS. *Seventh Ann. Rept. Ohio Conference on Water Purification 1927*, 60-3; cf. C. A. 22, 470. Final report is made upon double coagulation at the Cincinnati filter plant over a period of 16 months. Use of alum as the primary coagulant has been found more satisfactory than $FeSO_4$ treatment of equal cost. The saving in secondary chemicals, $FeSO_4$ and lime, has not equaled the cost of the more expensive primary coagulant. The additional cost of double coagulation has averaged 86¢ per million gals. Filter runs have been increased an av. of 31%, and wash water reduced 18%. This effect was confined solely to the warm-weather period, during which time the increase in length of filter runs was 30-65% and the wash water reduction 25-40%. Double coagulation has materially improved the quality of the

filtered water, and has enabled the uniform production of a chlorinated water of standard quality, even with extreme raw-water pollution. The filter effluent is not of standard quality under normal operating conditions employing double coagulation, but if the lime dosage is increased to give 1-3 p. p. m. caustic alkali, a coli-free effluent results. This enabled chlorination to be discontinued during a period when phenol pollution was present, giving rise to taste with the Cl_2 .

R. E. THOMPSON

The effect of chlorine on the bacteria in water. M. DÜGGELE. *Mitt. Lebensm. Hyg.* 19, 126-37(1928).—Effects of amts. of Cl_2 of temp., of time of exposure, and of the addn. of small amts. of lactose peptone and algin substance, were studied. Water contg. a flocculent suspension of org. material must be filtered before chlorination. Water treated with amts. of Cl_2 up to 0.5 mg per l., showing a practical absence of bacteria, may develop on standing for a short time at room temp. a large amt. of molds exceeding in no. the original amt. of bacteria.

J. C. JURRJENS

Biological purification of water for brewing. M. STRELL. *Wochschr. Brau.* 44, 607-13(1928).—Microorganisms can be removed by filtration with a Berkefeld, or with larger volumes of water, with a sand filter. They can be destroyed by passing chlorine or ozonized air into the water or by electroosmosis. By the latter method 50-100 l. per hr. of water free from bacteria and salts can be obtained from water giving 400 g. of residue per cu. m. and having a hardness of 12.4° by means of a current of 30 kw.-hrs.

A. SCHULTZ

Experimental bacterial and chemical pollution of wells via ground water, and the factors involved. C. W. STILES, H. R. CROHURST and G. E. THOMSON. *U. S. Pub. Health Serv., Hyg. Lab. Bull.* 147, 168 pp.(1927); *Expt. Sta. Record* 58, 184—This is a progress report of these studies, including also a Report on the Geology and Ground Water Hydrology of the Experimental Area of the U. S. Public Health Service at Fort Caswell, N. C., by N. D. Stearns. In studies of the distance to which excretal pollution of soil will travel in sandy soil with slowly moving ground water, bacterial pollution with *Bacillus coli* was recovered from well water in 1213 samples taken under a most rigid technic at distances varying from 1 to 232 ft. away from the exptl. trench in which excretal pollution was placed. Chem. pollution was recovered from well water up to 450 ft. from the same trench. Both uranin and *B. coli* traveled in the direction of the ground water flow, and neither was found in other portions of the exptl. field. Wet weather, resulting in high ground water, was conducive to extension of the pollution, whereas dry weather, resulting in low ground water, was inhibitive of the extension and conducive to purification of the ground water. *B. coli* tends to localize in the upper blanket at or near the ground water table. When the ground water falls, *B. coli* tends to filter out into the capillary fringe or into the soil. If the soil remains dry sufficiently long *B. coli* dies. Uranin appeared to float out in a blanket at or parallel and close to the ground water table, and tended to filter out into the capillary fringe and soil. However, it did not seem always to rise with higher ground water. Experimental *B. coli* infection of the ground water had remained alive for 2 years and 8 months when last examined, while uranin remained visible in the ground water for 2 years and 7 months. The changes of the ground water elevations play an important part in the progression of the pollution, carrying the bacteria along to more distant points. As pollution traveled it did not appear to expand laterally but appeared to contract to narrower breadth. Under the circumstances it is considered obvious that circular cesspools have a mathematical advantage in this respect over square or oblong pits. A mathematical analysis of the spread of pollution, as indicated by these results, leads to the conclusion that distance from points of pollution represents the great factor of safety in water supplies.

H. G.

Spontaneous precipitation of salts in rivers receiving the residual liquids of the potash industry. EMMERLING. *Chem.-Ztg.* 52, 308-9(1928).—Considerable quantities of MgO are pptd. in the beds of certain rivers. This pptn. is due to residual liquids of the salt industry which contain a very fine suspension of clay and CaCO_3 . In the absence of the clay, the carbonate would not ppt. MgO . Humic acid present in these waters also plays an important role. The plants growing in the rivers, principally *Polamogelon pectinatus* and *Cladophora*, sep. an appreciable amt. of CaO and MgO .

A. L. HENNE

Industrial wastes affect plant water supply. D. C. CARMICHAEL. *Power Plant Engineering* 32, 711-4, 813-5(1928).—A study of a stream polluted with wastes from an iron mill. The effects on feed water for boilers and cooling water for condensers are noted. Treatment of plant water is outlined. Neutralization of acid wastes from iron mills with lime and recovery of FeSO_4 are suggested as methods to dispose of trouble.

S. D. POARCH

Sewage treatment at Groningen. H. BLUNK. *Gesundh. Ing.* 51, 380-2(1928).—Three possibilities exist for the disposal of the sewage of Groningen: (1) pumpage through a 28-km. pipe line to the Delfzijl, (2) pumpage into the heath at Drenthe, or (3) treatment near the city. In deciding which of the 3 is to be employed, consideration should be taken of the construction cost, operating cost, and the rights of the general public.

Water consumption and sewage discharge at Denver. S. T. WEILLER. *Eng. News-Rec.* 100, 556-60(1928).—The results are given of a detailed study of water consumption and sewage discharge at Denver. The data obtained indicate that the actual return of water used for strictly domestic and factory purposes to the river by way of the sanitary sewers is approx. 95%.

Change in p_H of fresh sewage solids. C. E. KEEFER. *Public Works* 59, 137 (1928).—Tests showed that the p_H of fresh Baltimore sewage, initially 6.8, dropped rapidly during the first 24 hrs. and reached 5.1 in 48 hrs. Conclusions are that fresh solids should be removed to digestion tanks as soon as possible and plans to provide one tank of the Baltimore plant with mechanical means for removal of fresh sludge are being prep'd.

Effect of chlorine treatment on the biochemical oxygen demand of sewage filter effluents. C. D. MCGUIRE. *The City Bull.*, Columbus, O. *Ann. Rept. Div. Sewage Disposal* 1927, 36-9.—Ten gal. samples were collected in earthenware pots. The immediate Cl demand was det'd. by the addn. of Cl water and titration of the sample directly with o-tolidine, with a spot-plate as an external indicator. Cl was added to the jar content in amt. equiv. to the immediate Cl demand in p. p. m. minus 0.2 p. p. m. The under-dosage was for the purpose of preventing sterilization of the sample. Biochem. O demand was det'd. daily for 5 days at 20°. For 45 detns. where the Cl demand was 2.32 p. p. m. the reduction in biochem. O demand at the end of 1, 2, 3 and 5 days was, resp., 65.5, 50.8, 42.1 and 41.5%.

Sewage treatment plant operation at Worcester. ROY S. LANPHEAR. *Water Works* 67, 69-72(1928).—Two years' operating results of this Imhoff tank-sprinkling filter plant having an av. flow of 22 m. g. d. are described. From 1.5 to 2.0 cu. ft. of screenings are removed per million gallons of sewage. Wire screens of 1-inch mesh are used across the Imhoff effluent channels to prevent clogging of the filter nozzles. Gas production in the Imhoff tanks was vigorous but gas is not utilized. Foaming has seldom occurred and never caused trouble. Because of trade-waste liquors the p_H of the sewage varies from 3.4 to 9.1.

Methods for computing the characteristics of sludge-digestion chambers. M. PRÜSS. *Gesundh. Ing.* 51, 401-6(1928).—The amount of the expected daily gas production *per capita* is dependent on two factors: (1) the amount of dry org. material *per capita* per day and (2) the time in which the sludge may digest. If all of the org. material could be gasified, the amount of gas obtained would be 30-35 l. *per capita* per day. However, the av. is only 20-24 l. The time of digestion and the per cent digestion are represented graphically in terms of other factors. A method by which the size of the digestion chamber can be est'd. from the water-content curve is described. The velocity of digestion increases rapidly with increasing temp., while the size of the sludge chamber decreases accordingly. The vol. of gas produced increases with increasing temp. Graphical plots of the calcd. results for a fresh sludge of 95% water content and for 6 temps. are given. From these, the size of the digestion chamber, daily gas production, etc., are estimated.

The economical importance of the utilization of gas from digesting sludge. M. PRÜSS. *Gesundh. Ing.* 51, 439-44(1928).—Several different types of mechanical construction for digestion chamber are considered and curves showing the daily gas production for artificially heated chambers are given. Artificial heating of the sludge to 25° without simultaneous mechanical mixing of the sludge in open chambers is possible only by the application of foreign external heat. Insulation of the chambers gives better results as less heat is lost in the winter months. Mechanical stirring also seems to give better results.

Sludge disposal at the Milwaukee activated-sludge plant. T. CHALKLEY HATTON. *Eng. News-Rec.* 100, 674(1928).—It is est'd. that the return from the sale of dried sludge in 1928 will be \$550,000 to \$600,000 and the operating expenses \$900,000, making the total cost of sewage disposal to the present metropolitan district 60-65¢ *per capita*. The production of dried sludge is approx. 100 tons per day, all of which is disposed of at a price exceeding the cost of production. A market has been built up which cannot possibly be met by the max. amt. produced.

Activated sludge plant for Wahiawa, Hawaii. F. M. VEATCH. *Eng. News-Rec.*

100, 478 80(1928) —A description of the activated sludge plant under construction at Wahiawa, a town of approx 3000 persons. As the flow of the stream into which the effluent will be discharged is very low, complete treatment is required. The plant was designed for treatment of an estd flow of 100 gals *per capita* per day from a population of 6000, and consists of 3 plain settling tanks, 6 aeration tanks, 2 final settling tanks equipped with Dorr clarifiers and a chlorination tank, the retention periods being 30 min., 6 hrs., 1.2 hrs. and 15 min., resp. The excess sludge will be digested in a tank with capacity equal to 2 cu ft *per capita*, and dried in glass covered beds ($\frac{2}{3}$ sq. ft. *per capita*) with forced ventilation. R. E. THOMPSON

Sludge heating and gas collection at Antigo, Wis. ANTHONY J. FISCHER AND FRANK K. QUIMBY. *Public Works* 59, 97-101, 135 7(1928). The Antigo plant was designed to treat 900,000 gallons of sewage per day from a population of 10,000 and includes a grit and screen chamber, a clarifying tank, a sep. sludge-digestion tank, sludge beds and filters. The digestion tank is equipped with a Dorr mechanism rotating at 1 1/2 r. p. m., a gas-collecting dome, hot water heating pipes and piping for circulating sludge or applying fresh sludge at the top or bottom. The gases evolved from the digesting sludge are utilized for heating the sludge. The gas collection and water-heating systems are automatic. The plant was put into operation in December without seeding. The sludge temp. was brought up to 66° F. during the first 2 weeks and no difficulty was experienced in maintaining that temp. Lime was added to adjust the p_H to 7.4 and it was necessary to circulate the sludge to prevent the accumulation of lime sludge. After the first 3 months the proper p_H was maintained in the digestion tank without liming and circulation was discontinued. Daily gas production is about 3500 cu. ft. or 0.64 cu. ft. *per capita*. A well-digested, ripe sludge is produced with an av. solids content of 8.9%, of which 57.5% is ash. C. C. RECHMORT

Mechanical aerator for activated sludge at Princeton, Ill. F. C. RORER. *Water Works* 59, 179-81(1928). The new Princeton plant with a capacity of 500,000 gal. per day includes grit and coarse screen chamber, a preliminary settling tank with 1-hr. detention period, 5 aeration units, using simplex mechanical aerators, having an 8-hr. detention period, a final settling tank and a pump house. An activated sludge was built up readily and increased to about 18% of the flow. The plant cost about \$51,000. C. C. RECHMORT

Sedimentation at separate sludge-digestion plants. ANTHONY J. FISCHER. *Public Works* 59, 176 9(1928). The results of 5 sedimentation plants of the same type are compared and showed uniformly high removal of solids that can be settled and considerable variation, from 52.3 to 78.2%, in removal of suspended solids. The av. flow of the plants was 86 gallons *per capita* and the suspended solids content of the raw sewage was 57.5 g. *per capita* per day. A reduction in the biochem. O demand of from 13 to 35% was obtained in these clarifiers. C. C. RECHMORT

Digestion of vegetable wastes and screenings in sewage treatment plants. WILHELM RUDOLFS AND H. HEIKELERIAN. *Water Works* 67, 113 6(1928). Expts. on the digestion of various mixts. of ripe sludge, fresh solids and vegetable wastes and of ripe sludge, fresh solids and screenings are described. Duplicates of each mixt. were set up and the reaction of the duplicates was adjusted to p_H 7.4 with lime. Liming increased the gas production in all mixts. with the exception of the screenings and ripe sludge mixt. Mixts. of screenings with ripe solids and with ripe and fresh solids digested very readily. The addn. of vegetable wastes to ripe and fresh solids hindered the digestion so that max. gas production was set back from 20 to 40 days. Mixts. of vegetable wastes and ripe solids did not digest satisfactorily, even with the addn. of considerable quantities of lime. C. C. RECHMORT

A study of factors affecting the efficiency and design of farm septic tanks. E. W. LEHMANN, R. C. KELLEHER AND A. M. BUSWELL, III. *Agr. Expt. Sta. Bull.* 304, 299 339(1928). Recommendations are made for the design, construction and operation of farm septic tanks, based on chem., bacterial and engineering exptl. studies. CARL R. FELLERS

Treatment of slaughterhouse waste in Holland. WILHELM RUDOLFS AND H. KESSENSE. *Public Works* 59, 151 4(1928). A small surface-aeration plant designed to treat 30,400 gallons of strong slaughterhouse waste daily is described. The aeration tank is equipped with submerged paddles rotating diagonally to the flow of the sewage at a speed of 3.75 r. p. m. to keep the sludge in suspension; and 4 nine foot long street-cleaning brushes submerged about 1/2 in. rotating 57 r. p. m. for aeration. Operating results indicate excellent purification. C. C. RECHMORT

Refuse disposal in Providence. DAVID L. BOUCHARD. *Public Works* 59, 127-30(1928).—Refuse and garbage are collected with trucks each equipped with two 1.25-

ton removable tanks, and are delivered to a Decarie two-unit incinerator, which is operated on two 9-hr. shifts each day.

C. C. RUCHHOFT

Effect of various chemicals on the spreading and penetration of oils in different mosquito breeding places. JOSEPH M. GINSBURG. N. J. Mosquito Exterm. Assocn., *Proc. 14th Ann. Meeting* 1927, 52-61.—The need for increasing the spreading power of oils and of increasing spread and toxicity of the cheaper fuel oils is emphasized. The mechanism of spread, as put forward by Harkins and by Langmuir, ascribes the spreading power to the presence of either active or polar groups such as OH, COOH, etc., or double bonds in the hydrocarbon chain. Such a double or triple bond acts similarly to a polar group (OH, etc.), and is attracted by H₂O and, hence, causes spreading. G. concludes that an oil contg. unsatd. hydrocarbons should spread more rapidly than an oil free from these hydrocarbons. Tests confirmed his theory. Varying percentages of 35 compds. were tested and greatest success was had with monohydric alcs., phenols, cresols, xlenols, pine oils and turpentine. Of these, the cresols proved best both as to spreading power and toxicity. With fuel oil as a testing medium, the most effective mixture was made by adding 1% cresylic acid. This spread 1½ times as much as plain fuel oil, penetrated among weeds and flottage, and killed larvae within 30 min. whereas pure kerosene took 12 hours. After kerosene, breeding was resumed in less than 3 days; after fuel oil with cresylic acid, no signs of breeding occurred after 3 days. The mixt. of 1% cresylic acid with fuel oil was tried with uniform success on pools, ditches, vegetation-covered ponds, cattail swamps, and salt marsh areas. It increased the cost of the oil less than 1 cent per gallon. The bibliography includes 17 references.

C. R. FELLERS

The removal of phenol wastes from gas plants (SHNIDMAN, BOWMAN) 21. The purification of skim milk solutions on a lath filter (LEVINE, *et al.*) 12. H-ion concentration—its determination and relation to the paper industry (KLEIN) 23. Laboratory tests on physical properties of water-bearing materials (STEARNS) 8. Gas-diffusing unit (for sewage aeration) (U. S. pat. 1,677,502) 13.

ADENEY, W. E.: **The Principles and Practice of the Dilution Method of Sewage Disposal.** Edited by G. S. Graham-Smith and J. E. Purvis. London: Cambridge Univ. Press. 161 pp. 12s. 6d.

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STEUER, CARL. **Erläuterungen der Kesselspeisewasseruntersuchung.** Kiel: R. Cordes. 32 pp. M. 1.

Apparatus for treating water with glauconite or other softening agents. ANDREW J. DOTTERWEICH. U. S. 1,676,532, July 10.

Filtering material for purifying water. RALPH H. MCKEE. U. S. 1,676,151, July 3. The untreated residue of oil shale distn. is used as a filtering medium for waste waters contg. oils, acids, etc.

Apparatus for filtering and softening water by treatment with zeolites. RALPH C. DUNKELBERG. U. S. 1,676,891, July 10.

Apparatus for softening water with zeolites. AUGUST NEUMANN (to the Permutit Co.). U. S. 1,675,860, July 3.

Septic tank. JOSEPH FRAPPY. U. S. 1,677,626, July 17.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Agricultural value of rainfall in the tropics. H. MARTIN LEAKE. *Proc. Roy. Soc. (London)*, B103, 82-96 (1928).—The effective rainfall is a daily measure of the soil moisture which originates in rain and is available for plant growth, and may also be used for the estn. of crop yields and of crop areas in a given tract. For agricultural plants, 2 curves may be drawn, giving the upper and lower limits of their water requirements at each stage of growth; the dual curve has a varietal significance. A bibliography is appended.

JOSEPH S. HEPBURN

Aqueous vapor pressure of soils. III. Soil structure as influenced by mechanical

treatments and soluble salts. M. D. THOMAS. Utah Agr. Expt. Sta. *Soil Science* 25, 409-18(1928); cf. C. A. 18, 2571.—Samples of Trenton clay were treated to simulate a thorough puddling and were also frozen, when the soil contained enough water to render it plastic, and the vapor pressure moisture relations of the materials were studied. Puddling the clay increased its water-absorbing power at vapor pressures above 85%. Freezing had the opposite effect. When the soil was dried further, these differences disappeared, but returned when the soil was moistened again. Calcd. by means of the thermodynamic capillary equation indicated that the smallest capillary spaces affected by these treatments had a size range from about 5 to 25 millimicrons radius. Addition of the chlorides of Na, Mg, Ca and Al modified the water-absorbing power of the soil by an amount which could be calcd. on the assumption that the salt was entirely in soln. and did not exert any influence on the soil. KCl appeared to be partially absorbed from the soil soln. but it may have reacted with the replaceable bases in the soil, giving a K silicate complex which has a lower water-absorbing power than the natural soil, thus indicating a reduction in the concn. of the soil soln. which did not occur. Sulfates and carbonates were pptd. by the soil and largely removed from the soil soln. There is some evidence of base replacement in these reactions. J. J. S.

Replaceable bases in some soils from arid and humid regions. M. D. THOMAS. Utah Agr. Expt. Sta. *Soil Science* 25, 379-92(1928).—Eight clays and a natural mineral colloid were treated to exchange their bases for a single base, and the process was followed by chem. analysis. When alkali soils were leached with water there was a nearly const. soly. of the Na on a high level of concn. as compared with the other bases, after the removal of sol. salts. The alkali soils contained appreciable amts. of sol. silicates which were not present in the humid soils. The arid soils showed a marked tendency to hydrolysis on washing out the sol. salt. The discrepancies between the amts. of bases dissolved and NH_4 absorbed by the Utah soils were accounted for. The arid soils had higher p_{H} values than the other soils. Drying at 110° changed the p_{H} values considerably. Chem. analyses of the colloid into which different bases had been introduced showed that the material is a hydrated Mg Al silicate in which about $1/3$ of the Mg is replaceable by other bases. This material has properties closely analogous to those of the soils. J. J. SKINNER

The relation of soil type to the exchangeable calcium and magnesium in some Illinois soils. M. P. CATHERWOOD AND E. E. DETURK. *J. Am. Soc. Agron.* 20, 657-78(1928).—This investigation was undertaken with a view to detg. the relation of the exchangeable Ca and Mg in soils to soil type differentiation. Four soil types were investigated. The types were described and the methods of analysis indicated. Part I presents data on the surface samples showing the relation between exchangeable Ca and Mg and soil type with respect to the following: (A) relation of exchangeable Ca and Mg to the apparent maturity of the soil, (B) total amts. of exchangeable and non-exchangeable Ca and Mg, (C) ratio of exchangeable Ca to exchangeable Mg, (D) the percentage of the total Ca and Mg which is exchangeable. Part II gives data and conclusions resulting from analysis of all the horizons of the same types with reference to these points. E. F. SNYDER

The relation of the concentration of calcium ion required by alfalfa to the amount present in soil solution. H. W. E. LARSON. Oregon Agr. Expt. Sta. *Soil Science* 25, 399-408(1928).—The min. concn. of Ca ion required by the alfalfa in water cultures to make growth appears to be about 16 p. p. m. The most economical growth was produced with about 32 p. p. m. Ca present in excessive concns. does not seem to be toxic to the plant; instead, increased growth may be produced. The presence of sufficient Ca ion in a soln. produces a strong, healthy plant with a stocky root system which when inoculated has a large number of nodules. In studies of the effect of season and treatment on water-sol. Ca content in soils, in field, and in pots it was found that the water-sol. Ca content of certain soils is found to be below the amt. necessary for a satisfactory growth of alfalfa in soln. culture. The application of ground limestone and S increases the water-sol. Ca content of the soils as used in this investigation. By the application of ground limestone, the water-sol. content of some soils can be increased and maintained throughout the season at a concn. which will eliminate Ca as the limiting factor in plant growth. The sol. Ca content of some soils seems to be lowest during the early part of the season, which is the time that the plant requires Ca in large amts. The amt. of replaceable Ca present on the ultra-clay complex varies during the season; also the application of limestone tends to increase the amount present. It is probable that Ca tends to conserve the base-absorbing capacity of the soil or prevent soil deterioration. J. J. SKINNER

Rapid colorimetric determination of phosphorus in soils and vegetation. IDA

LONSTEIN. *J. S. African Chem. Inst.* 10, 49-50(1927); cf. *C. A.* 21, 2161.—The unknown soln., neutralized with NH_4OH , is treated with 0.5 cc. of a soln. of 100 cc. 10% $(\text{NH}_4)_2\text{MoO}_4 + 300$ cc. 50% H_2SO_4 and dild. with H_2O to 19.8 cc. and 0.2 cc. of a soln. of 0.1 g. Sn in 2 cc. concd. HCl and one drop of dil. CuSO_4 , warmed and made up to 10 cc. The color of this soln. is compared after 5 min. with the color developed in a standard phosphate soln. $(\text{NaNH}_2\text{HPO}_4)$ equiv. to 0.1 mg. P_2O_5 . After transference to matching cylinders the amt. discarded from the darker to obtain the same tint in both is measured and the reading depth of the standard times 0.01 mg. divided by the reading depth of the unknown gives mg. of P_2O_5 in the aliquot. A. T. F.

The determination of nitrates in soil. R. P. BARTHOLOMEW. *Arkansas Agr. Expt. Sta. Soil Science* 25, 393-7(1928).—A study was made of the value of $\text{Al}_2(\text{SO}_4)_3$ and $\text{Ca}(\text{OH})_2$ as clarifying agents in the extn. of nitrite N from soils. Some observations were made of the rate of the transformation of nitrite to nitrate. $\text{Al}_2(\text{SO}_4)_3$ and $\text{Ca}(\text{OH})_2$ used in the soln. for the extn. of NO_2 from soil gave a clear ext. in a short time. All the N present in soils as NO_2 was extd. by this method. NO_2 was converted to NO , very rapidly in soil. The transformation is largely due to biol. reactions. J. J. S.

The action of neutral salts on acid soils with reference to aluminum and iron. SANTE MATTSO. *Bur. of Soils. Soil Science* 25, 345-50(1928).—Soil colloidal materials were given alternate treatments with 0.05 N HCl and 1.0 N neutral chloride solns. Al and Fe were dissolved in appreciable quantities only by the first few treatments with the acid soln., whereas with the chloride treatments considerable quantities of these elements were yielded continually each time the materials were rendered unsatd. by the preceding acid treatment. The reaction is due to the liberated acid, the activity of which was shown to be greatly increased by the high Cl-ion concn. of the salt. A mixt. of the acid and the salt solns. brought about a complete decompn. of the material. That the exchange acidity is independent of the presence of Al and Fe was shown in the case of specially treated soil colloidal materials. J. J. SKINNER

The effect of sulfur on soils and on crop yields. R. R. MCKIBBIN. *Md. Agr. Expt. Sta., Bull.* 296, 65-114(1928).—The amt. of H_2O -sol. S in a soil is no measure of the amt. of total S in that soil, and, conversely, a soil low in total S may be high in H_2O -sol. S. Soils low in total S readily oxidize elemental S to the SO_4 form. S behaves as a soil amendment rather than as a fertilizer. It helps to restore equil. in alk. soils by bringing the reaction of the soil soln. to neutrality just as lime helps to restore equil. in acid soils by bringing the reaction of the soil soln. to neutrality. The amount of H_2O -sol. P in a soil is governed by the reaction of the soil and not to any great extent by the total amt. of P present. S oxidation in most soils tends to make P less sol. rather than more sol. S and acid phosphate mixts. tend to lower yields of most crops grown in Maryland soils. S and pulverized raw rock phosphate mixts. tend to increase yields of most crops grown in Maryland soils. With Ca and with S there seems to be a very good balance maintained between total and water-sol. soil content. When there is a low total amt. there will be a relatively high H_2O -sol. content. This suggests that the soil soln. may be satd. with respect to the 2 constituents, Ca and sulfate-S, in the soils studied. S oxidation in these soils tends to make less H_2O -sol. Ca. The relatively low soly. of CaSO_4 may have something to do with this fact. Applications of elemental S greater than 100 lbs. per acre should not be made on Maryland soils. In light applications and for specific crops it is believed that increased yields may be obtained in many cases through the use of elemental S. Elemental S should not be used in acid phosphate mixts. Mixed with raw rock phosphate it increases the value of that material in most cases. C. R. FELLERS

The position of France in the production and the consumption of chemical fertilizers. LOUIS BRULÉ. *Sci. et ind.* 12, 90-3(1928). E. H.

Determination of the fertility of the soil. JULIUS STOKLASA. *Internat. Agr. Kultur-Wiss. Rundschau* 2, 627-37; *Chem. Zentr.* 1926, II, 2998; cf. *C. A.* 21, 1514.—The respiratory intensity of soils fertilized with inorg. and org. substances was investigated. The CO_2 evolved increased in all cases, especially when the soils were fertilized with lime. The greatest effect was obtained with stable manure. Without a fertilizer about 4 g. of CO_2 per sq. m. were evolved each 24 hrs., with NaNO_3 5.58 g., with urea 5.65 g., with lupine 5.03 g. and with stable manure (in all cases 80 kg. of N per hectare) 6.59 g. The increase in CO_2 production was attributed to the stimulated activity of autotrophic and heterotrophic processes. The importance of org. fertilizers is discussed. C. C. DAVIS

Dehydration due to the application of fertilizer. HERMANN KRANTZ, MEMMINGEN AND BADENHAUSEN. *Swabia. Centr. Bakt. Parasitenk. II Abt.* 73, 70-4(1928).—K. discusses the literature and gives a bibliography. JOHN T. MYERS

The chemical and physical behavior of certain synthetic fertilizer salts when mixed with limestone and dolomite. W. H. MACINTIRE AND K. B. SANDERS. *J. Am. Soc. Agron.* 20, 764-70(1928).—Air-dry mixts. of limestone and dolomite with each of 5 concd. synthetic ammoniates showed either no loss of NH_3 or the most meager quantities after standing for 36 days at room temp. When the same mixts were brought to a moisture content of 6% the NH_3 losses were nil in 2 cases and measurable in 3. The max. loss, however, was only $1/7$ of the analytical error permitted the fertilizer analyst. The absence of any material loss of NH_3 showed that no change in chem. soly. ensued when the limestone was added to the fertilizer salts. Natural dolomitic limestone was less reactive than limestone. The phys. condition of each concentrate was affected unfavorably by exposure to a circulating moist atm., and in 3 cases the salts were practically liquefied. This tendency was eliminated when the concentrates were mixed with either of the 2 limestones in the proportion of 1 of salt to 4 of limestone. In a greenhouse expt. a mixt. of 2 parts of nitrophoska and 1 of ground limestone remained for weeks in a granular and uncaeked condition. E. F. SNYDER.

The influence of large doses of lime on the root solubility of potash and phosphoric acid fertilizers in the soil. S. GERICKE. *Fortschr. d. Landwirtschaft* 1, 774-7(1926); *Chem. Zentr.* 1927, I, 790-1; cf. *C. A.* 22, 1175. A preliminary communication. The influence of fertilization with CaO and CaCO_3 on the absorption of P and K by the germinating plants according to Neubauer and Schneider was studied. The lime requirements of marsh land and high land are given. Twenty-five g. of soil were treated for 2 days with frequent shaking with satd. aq. Ca(OH)_2 and the absorption was detd. by analyzing the supernatant liquid. The p_n of the CaO series was 8.0-8.8; that of the CaCO_3 series was 7.0-7.5. The influence of this fertilization on the root soly. of P and K varies. On high land the K_2O absorption increased, whereas on marsh land it diminished. The P_2O_5 absorption increased in some cases, and in others it diminished. The poorer a soil was in root sol. P_2O_5 , the more favorable was fertilization with lime toward the absorption of P_2O_5 . C. C. DAVIS.

The content of root-soluble phosphoric acid in soils according to Neubauer, and the results of field fertilization experiments. D. MEYER AND K. WODARZ. *Z. Pflanzener. nähr. Dungung Abt. B* 5, 433-42; *Chem. Zentr.* 1926, II, 3001. The content of root sol. P_2O_5 was detd. by the method of Neubauer and Schneider, and results were compared with results on the same soils in field expts. with cereals and vegetables. Soils with low Neubauer nos. required fertilizers in the majority of cases, whereas those with high Neubauer nos. in no cases required such treatment. With medium values, the results of the field expts. varied. When the vegetables were treated with stable manure, the effect of P_2O_5 was no longer so evident. Limiting values could not, however, be established, because the effect of P_2O_5 depended upon the condition of the soil, the P requirements of the plants, the weather and the form of fertilizer. C. C. DAVIS.

Some effects of method of application of fertilizers on corn in soils. F. B. SMITH. Iowa Agr. Expt. Sta., Ames, Iowa. *Res. Bull.* 104, 67-104(1927). A fertilizer contg. 2% NH_3 , 12% P_2O_5 and 2% K_2O and one contg. 0% NH_3 , 12% P_2O_5 and 2% K_2O had a greater effect on the development of both primary and secondary roots of corn than did one contg. 12% P_2O_5 . Germination and root growth of corn were retarded when the fertilizer was applied in contact with the seed. The greatest development of primary and secondary roots was secured when the fertilizers were applied in the hill, and thoroughly mixed with the soil. A fertilizer contg. 2% NH_3 , 12% P_2O_5 , and 2% K_2O and one contg. 0% NH_3 , 12% P_2O_5 and 2% K_2O applied in the hill mixed with the soil decreased the production of NO_3 and lowered the nitrifying power of the soil for 2 weeks after the fertilizers were applied. The retardation in germination of corn was not due entirely to the osmotic pressure of the salt soln. The elongation of cells and the rate of cell division were retarded by certain fertilizers independently of the osmotic pressure. J. J. SKINNER.

Tests of American soil-inoculating materials. FR. ZUCKER. Univ. of Leipzig. *Centr. Bakt. Parasitenk. II Abt.* 73, 499-509(1928). The effect on the soil bacterial flora of 17 com. fertilizers was studied. The manufacturers' claims as to marked effects of microbiological activity were greatly exaggerated. Some of them had fertilizer value but the cost was too high. Many preps. of N-fixing bacteria are inert. Only those approved by competent scientists should be purchased by agriculturists.

JOHN T. MYERS.

The relation between the concentration of mineral elements in a culture medium and the absorption and utilization of those elements by plants. F. W. PARKER AND W. H. PIERCE. Alabama Polytechnic Inst. *Soil Science* 25, 337-43(1928).—An expt. is reported in which corn was grown in large vols. of culture soln., the P content

of which ranged from 0.05 p. p. m. to 0.50 p. p. m. PO_4 . The results indicate that corn will make max. growth at a concn. of 0.10 p. p. m. PO_4 if that concn. can be maintained throughout the growing period. In a second expt. corn and soy beans were grown in culture solns. which varied in K concn. from 0.5 p. p. m. to 25 p. p. m. K. The results obtained show that both crops will make max growth at a concn. of 2.0 p. p. m. K or possibly less. The bearing of these data on the question of the nutrition of plants growing in soils is discussed. The results are taken to indicate that in many soils the displaced soil soln. is adequate for the K nutrition of plants but that in many soils, root-soil contact is necessary for the P nutrition of plants. J. J. SKINNER

Effect of spraying with fungicides on the keeping quality of Florida citrus fruits. H. R. FULTON AND J. J. BOWMAN. *U. S. Dept. Agr. Circ.* 409, 1-13 (1927); *Phytol. Abstracts* 12, 659.—The results of trials extending over 6 seasons show that citrus fruit grown in Florida can be improved in keeping quality by spraying with 3-3-50 Bordeaux mixt. plus 1% of oil in the form of emulsion. H. G.

Tar-oil wash trials in the west midlands, 1926-7. S. G. JARY. *J. Ministry Agr.* 34, 1107-13 (1928); cf. *C. A.* 21, 793.—Since the no. of aphids and apple suckers were small on the control trees, the relative merits of the washes were difficult to det. Mortegg, Battle's Winter Wash and Tarolite all appear to control these insects quite effectively. None of the washes gave more than a partial control of winter moth caterpillars. Results obtained on the control of capsid bug may be very deceptive. The distribution of this insect, even over a small area, may be very irregular, and unless precautions are taken to allow for this, one may easily arrive at wrong conclusions as to the value of any particular wash. The covering power of dinitroresol washes was equal to that of any of the tar-distillate washes. Dinitroresol washes leave marked stains on the clothes and skin, but do not leave a residue which clogs the spraying machinery. The trees were in no way harmed by any wash, and the strengths used may be regarded as safe when applied on plums and damsons before the end of Jan. and on apples before the end of Feb. E. F. SNYDER

Studies on toxicity of fluorine compounds. S. MARCOVITCH. *Tenn. Agr. Expt. Sta., Bull.* 139, 1-48 (1928); cf. *C. A.* 22, 2025.—The fluosilicates appear to be the best available substitutes for the arsenicals as agents for the protection of plants against phytophagous insects. As the white rat is a standard for pharmacol. studies, so the mosquito may be employed for insect toxicology. For insects and lower organisms, Na_2SiF_6 is more toxic than Na_3AsO_3 . Since F seems to effect the pptn of essential Ca from the tissues, the meager Ca content of the lower organisms may account for their susceptibility to F compds. By the aid of the formula $K = (1/t)\log(1/\text{concn.})$, a numerical toxicity value of 34.5 was obtained for Na_2SiF_6 , 15.1 for Na_3AsO_3 , 4.8 for Na_3AsO_4 , and 4 for NaF. On the other hand, to man and the higher animals the arsenicals are at least 9 times more toxic than Na_2SiF_6 , and 30 times more toxic than NaF. Dry dusts of Na_2SiF_6 and S were found to be more effective than dusts in the presence of moisture against adult bean beetles. The F compds are protoplasmic poisons, and their systemic action seems to be produced by the withdrawal from the tissues of Ca, the element that is essential for proper permeability, and its pptn. as CaF_2 . F compds. do not seem to be repellent to insects, and usually are more effective than arsenicals, especially with the cutworm (*Pontia duces*). On the other hand, for higher animals, such as birds and mammals, F compds. are distasteful in poison baits. Plants tolerate sol. fluosilicates better than sol. arsenicals. Free moisture seems to be the principal agency responsible for foliage injury by fluosilicates. In the presence of moisture $\text{Ca}(\text{OH})_2$, when used as a carrier for Na_2SiF_6 , may be the cause of foliage injury. S or flour was found to be safer than lime as a carrier, when used at the rate of 2 parts to 1 of Na_2SiF_6 . In the presence of moisture, $\text{Ca}(\text{OH})_2$ alone is capable of causing foliage injury on cucumbers. For quant. toxicological tests mosquito larvae were found to be well suited. The insol. fluorides of Ca, Mg and Sr show a low order of toxicity. Of the org. acids, salicylic was the most toxic, followed by oxalic, formic, benzoic and acetic. Of the metals, Hg was the most toxic. Ba, Pb, Zn and Cu showed some toxicity, although it was small in comparison with that of F. The arsenicals and F compds. are much more effective under high temps., especially above 39° . The fluosilicates possess marked antiseptic properties, and are highly toxic to protozoa. A 1-10,000 soln. of Na_2SiF_6 is almost instantaneously fatal to *Paramecium caudatum*. NaF (1-1000) required 60 min. for a lethal effect, while the same strength of sodium arsenite was harmless. Against the earthworm (*Lumbricus terrestris*) a 1-10,000 soln. of Na_2SiF_6 was fatal within 25 min.; thymol, 55 min.; KCN 5 hrs. C. R. F.

Analysis of insecticides: naphthalene; naphthalene and camphor; strychnine-base blue powders; red wheat. MAURICE FRANÇOIS AND (MISS) LAURE SEGUIN. *Ann.*

fals. 21, 204-9; *J. pharm. chim.* 7, 331-40(1928); cf. *C. A.* 21, 2353.—Naphthalene, when mixed with inert substances to disguise its identity, is generally the only sublimable compd. in the mixt. It is first sepd. by sublimation and then subjected to the usual identifying tests (microscopical examn., forms with picric acid a yellow cryst. compd. m. 149°, m. p. 79°, b. p. 220°). In naphthalene-camphor mixts. if natural camphor is used it can be detd. polarimetrically. If inactive camphor is used, it can be sepd. by means of β -naphthol, as follows: triturate 10 g. of the dry powder in a mortar with 5 g. β -naphthol, let stand 1 hr. (not longer), transfer to a tared Gooch crucible, apply suction till all the liquid has been drained off, change the suction flask, wash the naphthalene with 50 cc. of 5% NaOH, then with water, dry at atm. temp. and weigh. To the camphor-naphthol mixt. add 50 cc. of NaOH soln. and then the washings from the naphthalene detn., filter on a tared Gooch crucible, wash with H_2O , dry at atm. temp. and weigh the camphor. Blue powders for the destruction of moles contain strychnine sulfate, together with a relatively large amt. of methylene blue which interferes with the strychnine detn. The dye can be eliminated by addn. of KI to form insol. tetramethylthionine hydriodide, as follows: slowly percolate 30 cc. H_2O through 10 g. of sample on a small filter, add 15 g. KI and agitate to accelerate soln., filter immediately; the last traces of methylene blue can be removed by adding a few silk threads and allowing to stand 24 hr., and strychnine is then detd. by known methods. Mice poisons generally consist of mixts of cereal grains and strychnine sulfate colored a deep red (generally with eosin). Though the alkaloid does not penetrate inside the grain, it cannot be removed by distd. H_2O , and is best extd. by treating the unground product with cold 1% H_2SO_4 for 24 hrs. It is then detd. in the soln. by known methods.

A. PAPINEAU-COUTURE

Surface tension of disinfecting solutions for American foulbrood. C. H. GILBERT. *Wyo. Agr. Expt. Sta. Bull.* 159, 119-31(1928).—The success of an immersion treatment of diseased combs lies in the ability of the soln. to penetrate into the cells and openings of the comb. CH_2O and EtOH mixts. have been widely used for this purpose, the former acting as a disinfecting agent and the latter as a penetrating agent. The surface tension of numerous soap solns., H_2O - CH_2O mixts. and gasoline was detd. by means of the *du Nouy tensiometer*. Pure soaps reduced greatly the surface tension of soft H_2O in very high dilns., i. e., 1 lb. soap flakes to 40 gals. of H_2O . Temp. had very little effect on the surface tension of the disinfecting soln. Soap solns. should be used alone, not mixed with CH_2O , because their penetrating is lost after a single 48 hr. immersion. The soap soln. dissolved from 3.7 to 10% of the wax in combs in 24 hr. while a 48 hr. treatment caused a wax loss of from 11 to 15%. C. R. F.

The use of calcium cyanide in the apiary. C. L. CORKINS. *Wyo. Agr. Expt. Sta. Bull.* 158, 109-16(1928).—For killing instantly all bees in foulbrood-infected hives, $Ca(CN)_2$ proved superior to CH_2O or S fumigation. The cyanide treatment does not poison the honey, which can be recovered. $Ca(CN)_2$ proved very effective in destroying ants in hills or mounds. $Ca(CN)_2$ was superior to CS_2 or p - Cl_2H_2Cl when used to fumigate hives or combs infected with wax moth. C. R. FELLERS

The danger to stock of poison baits for grasshoppers. H. R. SEDDON. *Agr. Gaz. N. S. Wales* 39, 64 6(1928).—Na arsenite and Paris green in doses of 20 grains were fatal to sheep but does of 6.6 grains had no ill effects. Sheep did not voluntarily eat Na arsenite baits but Paris green baits were eaten in some instances by starved animals. Results of the expts. indicated that poison grasshopper baits contg. Na arsenite or Paris green will not be toxic to sheep when broadcasted on pasture at the rate of 100 lbs. of bait per acre. The bait should not be spread in pellet or mass form, nor applied to bare soil, and stock should be kept off the baited areas for 1 to 2 days. Na arsenite appears to be much more toxic to sheep in hot weather than in moderate and cold weather. K. D. JACOB

Dipping of lambs. E. A. ELLIOTT. *Agr. Gaz. N. S. Wales* 39, 106(1928); cf. *C. A.* 21, 1865.—The growth of lambs was not checked by dipping in As and C_6H_5OH solns. of the type and concn. ordinarily used for control of ticks and lice. Examn. of the lambs 4 weeks after treatment showed that the wool of the dipped animals was somewhat brighter than that of the controls but the wool of those dipped in As solns. had a slightly creamy tip. The skin of all the lambs was quite healthy. K. D. J.

Determination of the injury to seed by corrosives. GUSTAV GASNER. *Pflanzenkrankh. Pflanzenschutz* 36, 25-42(1926); *Chem. Zentr.* 1927, 1, 2860.—Germination expts. with wheat grains proved that injury by corrosives depends greatly upon the temp. of germination. Grain treated with $HCHO$ was injured at low temps., but treated with Hg preps. injury occurred at high temps. As a result, toxic doses cannot in general be established for low temps. Data on *toxic doses of formalin, us-*

pulun and germisan are given. The chief injury did not appear immediately upon treatment, but only subsequently by the substance adhering to the grain. The influence of the temp. is discussed. A germinating temp. of 15° is recommended.

C. C. DAVIS

Nauru and Ocean Islands phosphate (ELLIS) 18. Certain factors influencing the staining properties [for soil bacteria of fluorescein derivatives] (CONN, HOLMES) 11C. Drying S recovered from manufactured gas (CUNDALL) 21.

PFISTER, AUGUST: *Die Bedeutung des Kalkes für Acker und Wiese*. Freising: F. P. Datterer & Cie. 17 pp. M. 40.

Method and apparatus for injecting air under pressure into soils to promote plant growth. CHARLES H. SPENCER. U. S. 1,677,153, July 17.

Apparatus for excavating acid phosphate from "dens" or the like. FRANK M. WEVER. U. S. 1,675,871, July 3.

Insecticide and fungicide. HEINRICH GÜNZLER and OSKAR NEUBERT (to Winthrop Chemical Co.). U. S. 1,677,823, July 17. A polyhydroxy compd. of the benzene series such as resorcinol or pyrogallol is caused to react with HgCl_2 or other suitable water-sol. Hg compd. to form a stable reaction product which is sol. in water and possesses a strong disinfecting action. It is suitable for treating seeds.

Destroying insects and fungi. G. T. GREEN. Brit. 280,695, Oct. 28, 1926. A compn. suitable for use on trees is prepd. by soaking quassia chips in a hydrocarbon such as "petrol," filtering and mixing the filtrate with linseed oil and varnish.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Fermentation in closed tanks. M. ROSIER. *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 229-36(1928).—A description of the process with a discussion of its merits and drawbacks.

A. PAPINEAU-COUTURE

Some top fermentation processes. P. PETIT. *Brasserie et malterie* 18, 17-21, 33-6, 49-53(1928).—Essentially a discussion and comparison of French and English practice at the present time, bringing out their relative merits and drawbacks.

A. PAPINEAU-COUTURE

Factors affecting the stability of beer. J. RAUX. *Brasserie et malterie* 18, 36-40, 53-8(1928).—An address discussing the chief constituents of beer and the manner in which they can favor the appearance of turbidity.

A. PAPINEAU-COUTURE

Filtration (in the brewery). P. PETIT. *Brasserie et malterie* 18, 65-9(1928).—From a discussion of the mechanism of filtration and the troubles encountered in filtering worts and beers, P. suggests that most of the troubles could be eliminated by adding an easily filterable substance with large surface area, filtering without pressure on a relatively coarse filtering medium, and then refiltering the filtrate.

A. P.-C.

p_H Measurements (in the brewing industry). P. PETIT. *Brasserie et malterie* 18, 82-6(1928).—As the variations in p_H encountered in the brewing industry are small, and as the constituents of worts are extremely sensitive to very small variations in p_H , in order to be of any real value p_H detns. should be accurate to 0.02-0.03, which can be obtained only electrometrically. The difficulties inherent to carrying out such detns. on brewery products are outlined.

A. PAPINEAU-COUTURE

Detection of sarcinae and saccharobacilli in the brewing industry. JULIEN NYS. *Bull. trimestr. assoc. élèves école sup. brasserie Louvain* 28, 21-37(1928).—The best culture media for sarcinae are horse urine and wort to which has been added autolyzed yeast; as solid medium, horse urine and gelatin are suitable. The optimum p_H is about 7.0; but by taking certain precautions it can stand as low as p_H as 4. SO_2 and mustard oil are of practically no value as antiseptics, and moreover could not be used because of their odor and taste. p_H has a much more marked influence on the development of saccharo-bacilli than on that of sarcinae. The best medium for isolating saccharobacilli is wort-gelatin-alc.; but pasteurized beer is preferable as a culture medium.

A. PAPINEAU-COUTURE

Alcohol content of carbon dioxide wash-water from closed fermentation vessels. E. LÜDDEK. *Z. Spiritusind* 51, 1-2, (1928).—In consequence of condensation in the upper part of the fermentation vessel, not more than about 0.4% of the total alc. pro-

duced is usually carried over. This amount varies with the vol. of liquid in the fermentation vessel as shown by a test in a 10,000-l. vessel. When 3000, 6000 and 9000 l. were used, 400 l. of wash-water contained 0.0, 0.8 and 1.5% of alc., respectively.

A. SCHULTZ

The differentiation of artificial and natural wines with the aid of the analytical quartz lamp. J. WERDER AND C. ZACH. *Mitt. Lebensm. Hyg.* 19, 147-52 (1928); cf. *C. A.* 22, 1823. Artificial wines show a blue luminescence in filtered ultra-violet light; natural wines do not. The wines must be decolorized by a good brand of decolorizing carbon before analysis. Judgment of the intensity of the luminescence is made by comparing with a scale worked out on glycerol. Nothing is known about the cause of the luminescence.

J. C. JURRGENS

The acid flavor of wines and their hydrogen-ion concentration. G. CHABOT. *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 205 (1928). The acid flavor of wines is essentially a function of negative acid ions and not of the H-ion concn. With equal H-ion concn., the acid flavor increases proportionally to their total acidity (detd. by ordinary titration). The neg. ions of strongly dissociated acids have less influence on the flavor than those of weakly dissociated acids. High mol. wt. acid radicals have the greatest effect on the gustative papillae. Under certain conditions, doubling the total acidity may render the wine undrinkable though it may not change the pH .

A. P.-C.

Clarification and precipitation phenomena in the course of the manufacture of beer. LUERS. *Der Brauerer Techniker*, Wien, No. 4, April, 1928; *Brasserie et malterie* 18, 99-106 (1928). A general discussion of their mechanism.

A. P.-C.

Conditions of the surface of yeast as a factor in fermentation. CLERK RANKEN AND JAMES BELL. *J. Inst. Brewing* 34, 265 (1928); *Brasserie et malterie* 18, 110-1 (1928); cf. *C. A.* 22, 300. It has been found that the phys. conditions of the various deposits mentioned in the preceding article are extremely sensitive to the action of numerous substances which may be present in beer, and consequently the effects of each deposit are not specific. Peptone tannin, for instance, retards fermentation, but in the presence of a trace of Fe it becomes spongy and less coherent, and fermentation is more active than in the absence of the deposit.

A. PAPINEAU-COUTURE

Results obtained with a wort filter. STRASSMANN. *Kaus* Nov. 23, 1927; *Brasserie et malterie* 18, 120-1 (1928). A discussion of its advantages and disadvantages.

A. PAPINEAU-COUTURE

Conservation of the food value of barley in its conversion into beer. COMRIE. *J. Inst. Brewing* 34, 284 (1928); *Brasserie et malterie* 18, 126-7 (1928). Figures are given showing that beer has a nutritive value equiv. to about 67% that of the barley used in its manufacture.

A. PAPINEAU-COUTURE

The acidity of malts. J. DE CIERCK. *Bull. trimest. assoc. élèves école sup. brasserie Louvain* 28, 1-16 (1928). From the analysis of 217 samples C. concludes: (1) There does not seem to be any relationship between the acidity (expressed as pH) and the other analytical data detd. (degree of fermentation, time of saccharification, color, sugars in ext., length of germination). (2) The nature of the barley has but little influence on the pH value of the malt, but the conditions of malting having a preponderating influence thereon. (3) The nature of the barley and the conditions of malting both have a large influence on the buffer no.

A. PAPINEAU-COUTURE

The analysis of malt. E. BEKAERT. *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 237-9 (1928). A brief discussion of the interpretation of malt analyses from the standpoint of the results to be expected in the brewery, with a plea for the unification of methods of analysis.

A. PAPINEAU-COUTURE

Manufacture of fermentation vinegar during the decade of 1830. HEINRICH KREIPE. *Deutsche Essigind.* 32, 299-11 (1928). An account of conditions prevailing at that period.

W. O. F.

Inactive tartaric acid in the tartaric acid industry. F. HECKELE. *Chem. Ztg.* 52, 405-7 (1928). It outlines the conditions favoring the formation of inactive tartaric acid during the treatment of the d -acid in the industry, and the simple technical precautions which are taken to reduce its amt. to a minimum.

A. L. HENNE

Biological purification of water for brewing (STRELL) 14.

PIGUB, R.: *Vinification et alcoolisation des fruits tropicaux et produits coloniaux*. Paris: Librairie Centrale des Sciences. Reviewed in *Ann. fids.* 21, 225 (1928).

SCHNEIDER, HANS: *Die biologische Betriebskontrolle des Brauereibetriebs*. Vol. 14 of "Enkes Bibliothek f. chemie u. Technik." Stuttgart: F. Enke. 430 pp. M. 20; cloth, M. 22.

ZELLNER, HEINRICH, AND WALTER, ERICH: *Leitfaden für die Untersuchung und Beurteilung der Weinbrennprodukte: Weindestillate, Weinbrände und Weinbrand-Verschritte.* Berlin: Verlag Chemie (Komm. H. Haessel Kommgesch, Leipzig.) 68 pp. M. 3.50.

Dehydrating alcohol. WARREN K. LEWIS (to Standard Oil Development Co.). U. S. 1,676,700, July 10. An aq. soln. contg. less than 95.6% alc. is distd. under an abs. pressure corresponding to not more than 6 in. Hg, a distillate is recovered contg. more than 95.6% alc. and the distillate is fractionated under a pressure of at least 100 lbs. per sq. in. to leave a substantially anhyd. residue and obtain a distillate contg. less than 95.6% alc.

Absolute alcohol. DONALD B. KEYES (to U. S. Industrial Alcohol Co.). U. S. 1,676,735, July 10. A mixt. of 3 liquids such as alc., water and C_6H_6 , which form a ternary min. const. b. p. mixt. which upon condensing settles into layers, is distd. to obtain one of the liquids such as alc. in substantially pure form as a residue, the const. b. p. mixt. evolved is condensed and allowed to sep. into layers; one of the layers is rectified to recover at least a portion of one of the liquids such as alc. which is returned to the mixt. being distd. and the other layer is treated to recover at least a portion of the third liquid in concd. form which is also returned to the mixt. being distd. An app. is described.

Yeast. ALFRED POLLAK. U. S. 1,677,529, July 17. Yeast is propagated in a nutrient soln., with aeration, and at the period of yeast development at which the reproduction has considerably slowed down there is added a second portion of culture yeast, the assimilative properties of which for nitrogenous compds. have been increased by subjecting the yeast to a treatment with a soln. contg. albumin-digesting enzymes and also enzymes capable of decomp. hemi-cellulose, and thereafter to a preliminary fermentation; spent-wash resulting from an alc. fermentation is added to the preliminary mash or wort.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Determination of arsenic in arsenobenzenes. A. KIRCHER AND F. VON RUPPERT. *Pharm. Zentralhalle* 69, 17-8(1928); cf. *C. A.* 18, 880.—Comparative expts. are described, using the authors' method along with that of Stollé and Fechtig, as also that of De Myttenaere (*C. A.* 17, 2471). The differences noted are negligible. The authors' method gave results slightly above those obtained by other methods. R. C. A.

Synthetic fixators for perfumery. W. A. POUCHER. *Am. Perfumer* 23, 236(1928).—The choice of fixator is detd. largely by the type of perfume blended. The heavy amber type will contain patchouli and vetivert which are in themselves excellent fixators, but the permanence of the perfume will be much improved by the judicious addn. of labdanum, benzoin and myrrh together with musk and ambergris. To a very large extent the problem is closely assoc. with that of the boiling points of the perfume constituents. Vetivert and sandalwood oils have a high boiling point and are accordingly excellent fixators. Whenever it becomes difficult to choose a combination of high-boiling odoriferous essential oils because of the particular odor note desired, recourse may often be advantageously had to synthetic chem. fixators possessing little or no odor and boiling well above 200°, as arosol, resorcinol diacetate, Et, Bu and Am phthalate, benzyl benzoate and tricresyl phosphate. These synthetics are particularly useful in the rose, jasmín, narcissus, lavender and cologne types. In soap perfumery, fixation is of equal importance. A very stringent test may be made in an endeavor to find a suitable fixator by taking 10 g. of cheap milling base and dissolving it in 30 cc. of EtOH subsequently made slightly alk. with NaOH. To this is added 10 cc. of a 1% alc. soln. of the compounded oils contg. 10% of synthetic fixator. Heat the flask 2 hrs. in a water bath under a reflux. If after cooling the contents are still fragrant, the fixator deserves a very extensive application. W. O. E.

Plant, leaf and flower drugs, their adulteration and substitution during the year 1927. C. HAHMANN. *Apoth. Ztg.* 43, 697-700(1928); cf. *C. A.* 22, 841.—A discussion of certain typical cases involving both common and obscure drugs. W. O. E.

Sulfur præcipitatum. ERNST PFAU. *Apoth. Ztg.* 43, 740-2(1928).—The Ger. Pharm. provides for 3 forms of S, sublimed, purified and pptd. These 3 preps. differ not only in form but also in size of particles. A microscopical study has been made of the 3 products and micrograms are presented. W. O. E.

Functions of fixatives. H. STANLEY REDGROVE. *Perfumery Essent. Oil Record* 19, 217-8(1928).—In addn. to endowing perfumes with the quality of permanence, fixatives seem, in certain cases at least, to perform the function of binding the constituent odors together and of making them into a harmonious whole. The action of fixatives may be physical (physico-chemical), chem. or physiological. Fixatives are materials of high b. p., i. e., with small or even negligible vapor tensions at ordinary temps. The effect of adding small quantities of such materials to volatile perfumes in which they are sol. is to decrease the vapor tension and hence to retard the evapn. of the perfume. They will act differently on the various ingredients in accordance with the mol. wt. and quantity present of each of these. Fixatives are as a rule materials of very complex structure and hence have high mol. wts. Perfumes, like wines, improve by maturing, and very many of the odorous substances used in perfumery are chemically unsatd. and susceptible of chem. combination with other substances, i. e., with the fixatives themselves or one or more of their individual components. The physiol. effect of the specific odor of the fixative itself in combination with the odors of the other constituents of a perfume is discussed. W. O. E.

Essential oil of Myoporum latum Forst (the Ngaio). F. H. McDOWALL. *Perfumery Essent. Oil Record* 19, 221-3(1928).—The essential oil obtained by distn. of the leaves with dry steam in a yield of 0.1 to 0.3% (dry leaves) had a reddish brown color, and a sweet, malt-like odor. It had the following characters. d_{20}^{20} 1.022-1.026, n_D^{20} 1.4790-1.480; $[\alpha]_D$ in CHCl_3 16.5°, sapon. no. 8-22; sol. in $1/2$ its vol. of 90% alc. and in 45 vols. of 70% alc. The main fraction b_{71} 183° proved to be a ketone having the compn. $\text{C}_{15}\text{H}_{22}\text{O}_2$, which gave a *p*-nitrophenylhydrazone, m. 103°, and a semicarbazone, m. 120-2° (decompn.). The oxime, thiosemicarbazone, phenylhydrazone, and *p*-bromophenylhydrazone were non-cryst. The ketone has been designated *ngaione*. It had a slight reducing action towards Fehling soln. and ammoniacal AgNO_3 , but would not react with aldehydic reagents and reacted only sluggishly with NH_4OH and thiosemicarbazide. Treatment with Na and abs. EtOH gave a secondary alc., *ngaioi*, $\text{C}_{15}\text{H}_{24}\text{O}_2$, a lemon-yellow oil with a faint sweet odor. It failed to revert to *ngaione* on treatment with CrO_3 in AcOH soln. No cryst. deriv. of *ngaioi* was obtained; a monoacetate was prepd. which distd. with decompn. at 29 mm. pressure. The K salt and Me ether of *ngaioi* were prepd. The conclusion that *ngaioi* is a diolefin is confirmed by the results of hydrogenation, both *ngaione* and *ngaioi* taking up 2 mol. proportions of H to form tetrahydrongaione and tetrahydrongaioi, which were then fully satd. Heated with Ac_2O and NaOAc, tetrahydrongaioi gave a monoacetate. When *ngaioi* in aq. alc. is treated with H and Skita's colloidal Pd, and the product distd. repeatedly *in vacuo*, a small amt. of glycol, $\text{C}_{15}\text{H}_{26}\text{O}(\text{OH})_2$, is obtained through opening of one of the oxide rings. With H and Pt black, *ngaioi* gave in AcOH soln. a different glycol, of the same ultimate compn., which decompd. with loss of H_2O on distn. in high vacuum. Both glycols formed diacetic esters. Treated with CSCl_2 in $\text{C}_2\text{H}_5\text{N}$, followed by alc. KOH, *ngaioi* gave *dehydrongaione dioxide*, $\text{C}_{15}\text{H}_{22}\text{O}_2$, a yellowish oil, unstable in the air, and presumably a triolefinic compd. Both rings of tetrahydrongaioi can be ruptured by means of HI in glacial AcOH, with resulting formation of a polyiodide acetate, probably $\text{C}_{15}\text{H}_{24}\text{I}_2\text{OCOCCH}_3$. While the absence of a carbocyclic ring in *ngaione* has been demonstrated, it is not yet possible to put forward even a tentative constitutional formula for this substance. The results so far obtained indicate the presence of a ketone group, 2 oxide rings and 2 double bonds, and absence of a carbocyclic ring. The stability of the oxide rings to H_2O , Ac_2O , dil. H_2SO_4 , and Na and alc. show fairly definitely that an ethylene oxide ring is absent (cases are, however, known of ethylene oxide rings which possess extraordinary stability, e. g., mannite anhydride). A furan ring may be present in the *ngaione* mol. W. O. E.

Estimation of eugenol. W. A. N. MARKWELL and L. J. WALKER. *Perfumery Essent. Oil Record* 19, 169(1928).—A modified technic is suggested, as follows: 2 cc. of the oils measured from graduated pipets are introduced into each of several Gerber milk tubes contg. 16 cc. of 5% KOH soln. Stopper and shake at 5 min. intervals during 30 min. at room temp. Now add another 4 cc. of 5% KOH soln. to each and centrifuge the tubes for 5 min. Read vol. (V) of the uncombined oil and calc. % of eugenol from: $\% = 100 - (V \times f \times 50)$, in which f = the factor required to convert divisions on the Gerber scale into cc. W. O. E.

Testing medicinal glassware. FISCHER and HOKKHEIMER. *Pharm. Ztg.* 73, 777-8(1928).—An amplification of the Ger. Pharm. method for testing the quality of medicinal glassware, notably the quadratric types, by titrimetric or colorimetric procedures, with bromothymol blue as indicator. W. O. E.

Stability of cod-liver oil and phosphorus emulsion. P. BOHRISCH. *Pharm. Ztg.* 73, 778-9(1928).—In general it is found that all emulsions of this character even when prepd. with the greatest care and addn. of some preservative show deterioration in a comparatively short time. After the lapse of 2 to 3 weeks the content of free P has measurably decreased, while after 4 to 6 weeks no free P is any longer detectable.

W. O. E.

Content of homeopathic iron triturations. ALFRED KUHN. *Pharm. Ztg.* 73, 827-8(1928).—It has been previously shown that the Fe content of the 1st potency is usually too low, while in the following potencies D₂ to D₄ the Fe values are almost invariably too high, thus indicating some error in the operation of trituration. An attempt is made to show exptly. how by too conscientious or protracted trituration the soft Fe is partially caught or lost in the pores of the mortar. The Fe in the various potencies examd. was detd. colorimetrically, by ashing the sample, soln. of the residue in aqua regia, addn. of K₄Fe(CN)₆, diln. to a standard vol. and comparison with known solns.

W. O. E.

Analyses of American peppermint oils. E. W. LAZELL. *Perfumery Essent. Oil Record* 19, 183-4(1928).—Tabulated results covering analyses of oils (84 samples) from peppermint grown in Oregon and Washington are presented for the 2 seasons of 1926 and 1927. All the samples gave the test for dimethyl sulfide and were sol. in 4 parts of 70% EtOH.

W. O. E.

Arsenobenzenes. Methods of analysis and chemical evaluation. ST. WEIL AND W. POPLAWSKI. École sup. du service de santé, Varsovie. *Rapport. IV Congrès Internat. Méd. Pharm. Milit.* 1927, 24 pp.—Arsenobenzene preps., of which neoarsphenamine or neoarsenobenzene is an example, are difficultly analyzable mixts. of variable compn. The identity of a product as an arsenobenzene deriv. and not a false product can be established by reactions given in pharmacopeias. The As content, normally 19-21%, or 17-21% in some countries, is detd. by the De Myttenaere method, slightly modified, which gives concordant results; this involves iodometry in alk. soln. Since a neoarsphenamine prepn. may contain impurities and decompn. products, which are toxic, its relative harmlessness must be detd. The index DM¹, representing the amount of As precipitable by H₂S, measured in cc. 0.01 N I soln., helps to establish the degree of toxicity and the origin of a given product. So also does the index SK², which, when multiplied by 0.00375, represents the amount of As contained in the filtrate after pptn. by H₂SO₄ of 0.1 g. of substance. But a more rapid and accurate method than either of these is needed. The initial index of refraction of a 10% aq. soln. of neoarsenobenzene, and the curve representing the change of this index with time, are of value in establishing the origin and the toxicity of a product.

MARGARET W. MCPHERSON

Ichthyolic medicinal preparations. G. L. STADNOKOV. *Papers Karpov Chem. Inst. Bach Memorial Vol.* 1927, 174-97.—To obtain ammonium ichthyolsulfonate the tar derived from bituminous shales is distd. and the ichthyl obtained is sulfonated; a viscous mass possessing the property of killing microorganisms is thus obtained. It has been shown by H. Scheibler that the best and most active germicidal fraction of ichthyl is that which boils between 160 and 190°, being the richest in homologs of thiophene. Many medicinal preps. contain but little of the active fraction and their efficacy is, therefore, very small. S. devised the following analytical method, which permits detn. of the amount of the thiophenic fraction contained in an ichthyolic prepn.: Treat 20-30 g. in a separatory funnel with 20% H₂SO₄, dissolve the tar which seps. in an excess of ether, remove the aq. layer and repeatedly treat the ethereal layer with normal alkali for extn. of sulfonic acids. Wash the ethereal layer with a small quantity of water, drive off the ether, ext. the residue with light benzine (b. up to 60°) to free it of Na salts of sulfonic acids, dry the benzine layer over fused CaCl₂, filter, and distil from a weighed flask on a water bath. Weigh the residue, which represents the neutral oils. In order to manuf. ammonium ichthyolsulfonate, ichthyl must first be deodorized, for which purpose Scheibler prescribes boiling it either with NaNH₂ or with metallic Na. This method being expensive, S. recommends replacing it by a treatment with formalin in presence of naphthasulfonic acids (Petrov's contact catalyzer). Ichthyl is heated to 70-80°, a mixt. consisting of formalin and Petrov's catalyzer is introduced gradually under stirring and the stirring is continued 4-6 hr. at the same temp. after which the oil is steam-distd. In this treatment mercaptans, thiophenols and some unsatd. hydrocarbons condense with formaldehyde under the influence of the catalyzer, and the remaining oil is odorless and enriched in thiophene.

BERNARD NELSON

Extractum fluidum Valerianae. CHR. SCHOUSEN. *Dansk. Tids. Farm.* 1, 500-8

(1927).—S. discusses several suggestions already made regarding the method of prepn. of extractum fluidum Valerianae to be recommended for the next revision of the Danish Pharm. He also had made a series of extns. by the percolation and the repercolation methods from drugs obtained from Thuringen, Hartz and Japan. The results were: (1) Greater yields were obtained than were given by the Danish Pharm. for '07. (2) Greater yields were obtained when an alc. soln. was used instead of H_2O . (3) There is not much difference in yields between the 2 methods. (4) The yield of exts. in the repercolation method was practically the same when the processes were continued for 48, 96 or 144 hrs. (5) The yields of exts. were the same when 1-3, 1-2 or 1-1 alc- H_2O mixts. were used for repercolation, but slightly less with the 2:1 mixt. (6) The fluidext. repercolated with 1-3 and 1-2 alc- H_2O mixts. gave a clear soln. in H_2O but the exts. from 1:1 and 2-1 mixts. were insol. in H_2O . S. recommends using the repercolation method with an alc- H_2O mixt., and continuing extn. for 2 days (48 hrs.).

O. A. NELSON

Repercolation of fluidextracts. J. SCHMELTZ. *Dansk. Tids. Farm.* **1**, 508-9 (1927).—S. points out that Extr. fluid. Valerian. obtained by repercolation with a mixt. of concd. alc. and distd. H_2O in the ratio of 1-4 as suggested by Bang (*C. A.* **21**, 300) cannot contain the amt. of alc. required by the Danish Pharm. The complete ext. obviously contains some of the drug in question and cannot therefore contain 1000 g. extr. mixt. per kg. ext., and therefore not 200 g. alc. which the Danish Pharm. requires. If one places the av. drug (dried material) content at 17%, then in 1 kg. there are 170 g. dry material, and 830 g. alc. aq. mixt. contg. 20% alc. or 166 g. A similar point can be made in regard to the addn. of glycerol to the extg. mixt. Bang suggested adding the same % glycerol as the percent desired in the finished ext. S. points out that this is not possible, if any dry material is extd., e. g., an ext. contg. 20% dry material will contain only 8% glycerol whence 10% was added to the extg. mixt. S. suggests the following formula for the prepn. of extg. mixt.: alc. concn. = 20 g.; distd. H_2O = $(100 - x) g.$, whence x is the concn. of dry material required in the ext. E. BANG. *Ibid.* 537. B. admits the correctness of Schmeltz's remarks, and points out that the main purpose of his own article was to call attention to a method of obtaining fluidexts. without any kind of heating and one whereby all the active principles of the respective drugs could be obtained, also to point out a method that could be used by the smallest drug houses (drug stores). B. also admits that Schmeltz's formula is more accurate than his.

O. A. NELSON

Contribution to our knowledge of the oxidation of spirits of turpentine. J. TERPOUGOFF. *Bull. inst. pin.* No. 48, 103-5 (May 15, 1928). A consignment of Portuguese spirits of turpentine was found to be turbid on reaching Antwerp. It filtered easily through paper, but the filtrate again became turbid after a few days. After standing several weeks, 70,000 kg. of the turpentine gave 80 kg. of air dried deposit, which consisted mainly (on the H_2O - and turpentine free basis) of Zn formate (with possibly also a small proportion of $Zn(OAc)_2$, together with some H_2O insol. Fe salts (probably of higher org. acids). The formation of the deposit is undoubtedly due to autoxidation of the spirits of turpentine, which was catalyzed by the galvanized Fe drums used, acid oxidation products of unknown constitution having attacked the metals. The first products of oxidation are acids of approx. the same mol. wt. as abietic acid, which form Zn and Fe salts which are sol. in spirits of turpentine, these under a secondary decompn. change into formic acid, giving insol. Zn formate.

A. P.-C.

Relationship between the solubility of geraniol in alcohol and its degree of purity. R. ERNEST MEYER. *Parfumerie moderne* **21**, 96-7 (1928). Pure geraniol is fairly easily sol. in 50% alc., but the impurities (sesquiterpenes) which accompany it in the com. products are very difficultly sol., so that the soly. is an indication of the purity of the product. As it varies considerably with temp., the best procedure is to mix 1 cc. of sample with 15 cc. of 50% alc. and note the temp. at which sepn. into 2 phases (indicated by turbidity) appears or disappears, which can easily be detd. with an accuracy of $1/3^\circ$. Results thus obtained with 22 samples having a geraniol content of 96.6-91.5% geraniol (detd. by cold formylation) are tabulated and plotted, the temps. varying from 8 to 32° .

A. PAPINEAU-COUTURE

Aromatic lichens: evernia and sticta. R. CERBELAUD. *Parfumerie moderne* **21**, 98-110 (1928). In French and English. A review of their chemistry with a no. of formulas for their use in perfumery.

A. PAPINEAU-COUTURE

Neroli. WALTER TREFF. *Parfumerie moderne* **21**, 123-5 (1928).—A brief review of its chemistry.

A. PAPINEAU-COUTURE

Iris. ÉTABLISSEMENTS ANTOINE CHIRIS. *Parfums de France* **6**, 123-40 (1928).—

In French and English.—A review of its cultivation, process of extn., chemistry and use in perfumery.

Oil of celery. ÉTABLISSEMENTS ANTOINE CHIRIS. *Parfums de France* 6, 163-70 (1928).—In French and English.—A review of the chemistry of oil of celery.

The occurrence of harmine in a South American liana (yagé). F. ELGER. *Helv. Chim. Acta* 11, 162-6 (1928).—Yagé is a plant of the Amazon region whose botanical nature is unknown. By the extn. of yagé a white, cryst. alkaloid, m. 263-264°, was obtained. From its chem. and phys. properties it was identified as harmine.

The synthesis of iododihydrochaulmoogric acid and its ethyl ester. ARTHUR L. DEAN, RICHARD WRENSHALL AND G. FUJIMOTO. *U. S. Pub. Health Service Pub. Health Bull.* No. 168, 28-30 (1927).—Iododihydrochaulmoogric acid (I) (12 g. from 50 g. chaulmoogric acid and I₂), white, m. 68-9°, $[\alpha]_D^{25.5}$ 6.24 (in 5% CHCl₃ soln.), acid value 139.8, sapon value 274.8, insol. in H₂O, sol. in org. solvents. If the chaulmoogric acid reacts as cyclopentene, I is either μ -(2- or 3-iodocyclopentyl)tridecoic acid. Ethyl ester (from I and Et₂SO₄) m. 35-6°. This latter is expected to be of clinical value in the treatment of leprosy. Chaulmoogric acid and I₂ gave a black tarry substance instead of diiodochaulmoogric acid.

The preparation of 4-chaulmoogrylaminobenzeneearsonic acid. MARGARET M. DEWAR. *U. S. Pub. Health Service Pub. Health Bull.* No. 168, 31-2 (1927).—4-Chaulmoogrylaminobenzeneearsonic acid, from chaulmoogryl chloride and arsanilic acid, decomposes 230°, sol. in hot EtOH, hot AcOH and aq. alkalies, insol. in H₂O, Et₂O, CHCl₃, EtOAc and C₆H₆. This insoly. makes the compd. unfit for being used in the treatment of leprosy.

The preparation of chaulmoogryl alcohol. MARGARET M. DEWAR. *U. S. Pub. Health Service Pub. Health Bull.* No. 168, 33-5 (1927).—Since the yield of chaulmoogryl alc. (I) prepd. according to Power and Gornall (*J. Chem. Soc.* 85, 851 (1904)) was small the method of Prins (*C. A.* 18, 1815) was used to reduce the ester of chaulmoogric acid (II) to the alc. Forty g. of I was obtained from 100 g. of II; m. 36°, $[\alpha]_D^{25}$ 58.5 (in 5% CHCl₃ soln.), I value 95.1.

Action of picric acid on silicotungstate of tropine (tropanol), the reaction permitting detection and tracing the hydrolysis of atropine. RENÉ HAZARD. *J. pharm. chim.* 7, 255-62 (1928).—In the sepn. of atropine (A) from tropanol (B) by means of Bertrand's reagent (C) (cf. *C. A.* 20, 1303), the optimum concn. for total pptn. of A and simultaneous non-pptn. of B is 2% HCl in a diln. of 1:1500 or 1:1600. At a lower concn. of HCl, B is also pptd. Upon adding to the clear filtrate 1 cc. of concd. picric acid, pptn. of B takes place at once; in more dil. solns. (e. g., 1:3100) after 20-60 min. The compn. of the ppt. was not detd.; upon heating it leaves much ash. This reaction enables one to observe the march of hydrolysis of A, since pure A after pptn. with C does not yield in the filtrate a ppt. with picric acid. Hence the use of the latter seems to render the reaction with C more sensitive, which probably holds good also in the detection of other alkaloids. A 10% soln. of C satd. with picric acid may reveal traces of alkaloid which C alone could not detect (cf. Guillaume, *C. A.* 21, 2048).

Cocaine and the Maclagan test. PIERRE BRETEAU. *J. pharm. chim.* 7, 329-31 (1928).—The various pharmacopeias differ as to the concn. of the soln. to be tested and the mode of inducing crystn. of cocaine. Adoption of the following procedure by the French Pharm. is recommended: Dissolve 0.1 g. of the HCl salt in 80 cc. H₂O, add 2 cc. of 1% NI₃ (d. 0.995) and mix with a glass rod tipped with rubber; after standing for 5 min. the liquid must be limpid. Then rub the walls of the vessel from time to time, not too vigorously, with a glass rod to end supersatn. A cryst. ppt. of cocaine must form at the bottom, and the supernatant liquid must be limpid to indicate absence of toxic isatropylcocaine (A). If this liquid is opalescent, and the opalescence of the liquid after decanting disappears upon adding HCl, the presence of A is indicated.

Léon Guignard, 1852-1928. ANON. *J. pharm. chim.* 7, 370-2 (1928).—An obituary.

Evolution of the chemistry of organic medicaments. CH. MOUREU. *J. pharm. chim.* 7, 377-80 (1928).—A brief historic review of modern org. remedies, from alkaloids to chemotherapy.

Synthalin, the name regrettably homonymous to that of an older preparation. R. WERTZ. *J. pharm. chim.* 7, 449-55 (1928).—Synthalin (cf. *C. A.* 22, 2031), the recently evolved intended substitute for insulin, is decamethylenediguandine (NH₂.C.(NH).NH.(CH₂)₁₀). In 1913, the same name had been given by Schering to a quinoline deriv.

used as an antirheumatic (cf. *C. A.* 9, 954). Fortunately the rights to the name and process have been ceded recently to the makers of the new synthalin. S. W.

Some adulterations or substitutions of medicaments. E. LÉGER. *J. pharm. chim.* 7, 455-6(1928).—Com. ZnO consisted of ZnCO_3 . Beer yeast contained a large quantity of CaCO_3 . Com. cherry laurel water had a faint odor although its HCN content was 0.1 per 100 (Codex). It was merely a soln. of HCN in H_2O ; BzH was absent, since NH_4OH added to the prepn. failed to produce opalescence caused in the genuine water by the formation of hydrobenzamide. This test should be added in the Codex to enable detection of the fraud described. S. WALDBOTT

Oil-free linseed meal. EMILÉ ANDRÉ. *J. pharm. chim.* 7, 481-6(1928).—The directions of the Codex Supplement (1926) for prepg. oil-free linseed cake (deprive powd. linseed partially or entirely of its oil by cold pressure or by a chem. solvent) do not prevail in manufg. practice. Here, a small quantity of H_2O is added before pressing (at 55-60°), to increase the yield of oil. This causes the mucilage to be set free, rendering the presscake unsightly and unfit for use in emollient cataplasms. The press cake will always retain 6-7% of oil; if no H_2O is added, 12%+. A. applied chem. solvents to the extn. of oil from crushed seeds, and from the cake after cold pressure without addn. of H_2O . The kernels become dust-like and are easily sepd. from the husks which alone carry the mucilage developed on addg. H_2O . The powd. defatted kernel is rich in P and N, and may be used as food for cattle. Some day it will be used as human food when linamarin, the HCN-bearing glucoside, has been eliminated from the plant by proper cultivation and selection. S. WALDBOTT

Silver-ion concentration studies of colloidal silver germicides. II. Changes in the silver-ion concentration of solutions on standing. RALPH B. SMITH. *J. Am. Pharm. Assoc.* 17, 453-4(1928); cf. *C. A.* 19, 3350.—The following method gave stable readings when attempting to detect small variations in Ag-ion concn. The electrode used was an 8-in. piece of No. 14 B and S gage pure Ag wire which was not cemented to the tube. It is placed in boiling 1% KCN soln. for 10-15 min. and rinsed without touching. It is then stored 15 hrs. in a soln. similar to the one to be tested. The solns. used were 1% for the strong type and 10% concn. for the others. The results are tabulated. The changes in Ag-ion concn. which take place in colloidal Ag compds. in the first month are negligible and those occurring in the first 4 months are not believed to be great enough to cause any change in germicidal power. If any of these solns. on aging produce irritation, it must be due to changes in soln. other than Ag-ion concn. L. E. WARREN

The physical and chemical properties of bismuth sodium citrate and bismuth sodium tartrate. W. F. VON OETTINGEN, T. SOLLMANN AND H. H. SCHWEID. *J. Am. Pharm. Assoc.* 17, 540-3(1928).—The salts studied were "dibismuthyl mono-Na citrate" (A) and "bismuthyl bismuthio-Na tartrate" (B) in 10% soln. A is practically neutral (p_H 7.2-7.4) while B is distinctly alk. (p_H 8.2-8.4). Changes in p_H from 7.0 to 7.9 do not ppt. A, while pptn. of B begins at p_H 7.6 and increases with acidity. A ppts. with CaCl_2 but this may be prevented by adding Na citrate. B is pptd. by a large no. of the alkali salts of strong mineral acids. A in 5% soln. is not pptd. by Locke's soln., whereas a 5% soln. of B is pptd. Neither soln. ppts. proteins. A may give a slight ppt. with the Ca of serum. B is pptd. by other mineral salts. The diffusibility of each is about the same. Solns. of A may be sterilized by boiling. B is pptd. by heat. Solns. of either may be rendered sterile by 0.4% tricresol. L. E. WARREN

The corolla of *Monarda fistulosa*. KARL H. RANG. *J. Am. Pharm. Assoc.* 17, 525-7(1928).—Florets were collected in 1924. Moisture detd. by the xylene method was 75, 78 and 78%; ash 8.11, 8.08 and 8.10%; H_2O -insol. ash, 2.46, 2.84 and 2.79%; volatile oil 3.1%; d_{25} 0.9740; phenols 36.3%. The regenerated phenols were reddish brown. Cavacrol was test positive. Monohydroxythymoquinone was present. L. E. WARREN

Some new and improved tests for morphine and related alkaloids. CHARLES C. FULTON. *J. Lab. Clin. Med.* 13, 750-62(1928).—There are given and described: (1) A new test for morphine, not given by codeine, which is a modification of the iodic-acid ammonia test and might be called the "iodic-acid peroxide test." (2) Methods for making 2 new reagents for the opium alkaloids and their reactions with these alkaloids. (3) An improved method for performing the well-known Pellagri test. (4) Prepn. of a new deriv. of morphine. Codeine and dionine give similar but distinct derivatives. The deriv. is formed by heating the alkaloid in concd. H_2SO_4 soln. to 40° or 50°, and is no doubt a dehydration product. The morphine deriv. is not apomorphine but it gives similar color reactions. (5) Two tests based on the formation of this deriv. The derivative-oxidation test is given by morphine, heroine, codeine and dionine, and

is a new test similar to Pellagri's. (6) Husemann's test is discussed, with particular attention to the difference in the reactions when the H_2SO_4 soln. is heated to 40° or 50° instead of to 100° .

ETHEL W. WICKWIRE

Further researches in the explosibility of anesthetics. A. P. HORNER AND CLYDE B. GARDENIER. *Anesthesia and Analgesia* 7, 69-72(1928).—The explosibility of ethylene mixtures and ether mixtures was tested in a standard Orsat explosion pipet. Downward propagation of the flame was used to distinguish explosion from combustion. The following limits of explosibility were detd. for the various mixts.: C_2H_4 4-14.5%, air 96-85.5%; C_2H_4 5-70%, O 95-30%; C_2H_4 5-35%, N_2O 95-65%; C_2H_4 5-47%, N_2O 85-43%, O 10% (fixed); C_2H_4 5-20%, N 85-70%, O 10% (fixed); C_2H_4 5-55%, O 95-40%, CO_2 5% (fixed); ether 5-14.5%, air 95-85.5%; ether 5-65%, O 95-35%; ether 5-30%, N_2O 85-60%, O 10% (fixed); ether 5-60%, O 90-35%, CO_2 5% (fixed). The dampening effects of CO_2 and N were greatest in mixtures with ethylene-oxygen. Thus, 5% CO_2 added to ether-oxygen did not materially affect the explosive range of the mixt., whereas it had a decided effect on ethylene-oxygen. The same was true of N.

R. C. WILLSON

Some useful matters contained in forest trees in Japan [alkaloids] (MIURA) 22. Hydroxycitronellal in the soap industry (COLA) 27. Normal aliphatic alcohols and aldehydes (DESCOLLONGES) 10.

GIOSIA, ALBERTO: *Lezioni di chimica farmaceutica e tossicologica*. Pt. II. *Chimica dei metalli*. 2nd ed., revised and enlarged. Padova. A. Milani. 481 pp. L. 56. Cf. C. A. 22, 2812.

KOFER, LUDWIG: *Die Saponine*. Vienna: J. Springer. 278 pp. M. 18 80, bound, M. 20.

New and Nonofficial Remedies, 1928. Chicago: Am. Med. Assoc. 489 pp. \$1.50. Reviewed in *J. Am. Med. Assoc.* 91, 194(1928).

Medicinal composition. ALDUS A. HOOPMAN. U. S. 1,676,554, July 10. A compn. suitable for treating wounds and for other purposes comprises I, PhOH , menthol, glycerol and alc., equal quantities.

Therapeutic organic arsenic compounds. G. NEWBERY and MAY & BAKER, LTD. Brit. 280,613, July 8, 1926. Aryl-1,4-isoxazine As compds. are made by reduction of an arylarsonic acid contg. nitro and oxyacetic acid groups in adjoining positions in the aryl nucleus. With mild reducing agents only ring formation occurs, but with other reductions the starting material may be reduced, with or without isolation of intermediate products, to the corresponding arsenious oxide, arsine halide or arseno compd. 2-Nitrophenoxyacetic acid-4-arsonic acid is reduced with alk. $\text{Fe}(\text{OH})_2$ to 3-hydroxy-1,4-benzisoxazine-6-arsonic acid and by further reduction of the latter with Na hyposulfite 6,6'-arseno-bis-(3-hydroxy-1,4-benzisoxazine) is formed. By similar treatment, 6-acetyl-amino-2-nitrophenoxyacetic acid-4-arsonic acid yields first 8-acetyl-amino-3-hydroxy-1,4-benzisoxazine-6-arsonic acid and then 6,6'-arseno-bis-(8-acetyl-amino-3-hydroxy-1,4-benzisoxazine). Glucose in an alk. medium and hypophosphorous acid also may be used as reducing agents. *o*-Nitroaryloxyacetic acid arsonic acids are made from phenolarsonic acids by treatment with an α -halogenated acetic acid and introducing the NO_2 group either before or after the treatment. An example is given of the prepn. of 6-acetyl-amino-2-nitro-phenoxyacetic acid-4-arsonic acid.

Water-soluble organic compounds of arsenic. MORRIS S. KHARASCH. U. S. 1,677,392, July 17. An arsenious compd. such as *p*-dimethylaminophenylarsenious oxide or other suitable As compd. in which at least one valence bond of the As is attached to an inorg. radical other than that of S, Se or Te and at least one bond of the As attached directly to a C atom of an org. radical is treated, in a solvent such as alc. or acetone with thiosalicylic acid or other similar suitable org. compd. contg. both an acid radical and a sulphydryl group and having the sulphydryl group attached directly to a C atom. The products are suitable for therapeutic use.

Esters of aromatic acids (local anesthetics). ROGER ADAMS and EARNEST H. VOLWILER (to Abbott Laboratories). U. S. 1,676,470, July 10. A γ -halogen propyl benzoate or a similar compd. with a substituted benzoyl radical is added to an excess of dialkylamine and heated for several hr. The product is made alc., excess amine is removed by steam distn. and the γ -dialkylaminopropyl ester of the aromatic acid is extd. with an org. solvent such as ether. The ether is then removed, leaving the free base. If an aminobenzoic acid deriv. is desired, a nitro γ -halogen propyl benzoate is used in-

initially and the base resulting is reduced, *e. g.*, with Sn or Fe and HCl or electrolytically. Details are given for the production of the γ -dibutylaminopropyl ester of *p*-aminobenzoic acid.

Cyclopentenylalkylacetic acid. ROGER ADAMS (to Abbott Laboratories).

U. S. 1,677,123, July 17. Compds. of the general formula
$$\begin{array}{c} \text{CH} = \text{CH} \\ | \\ \text{CH}_2 = \text{CH}_2 \end{array} \text{CH} = \text{CH(R)} -$$

COOZ, in which R stands for C_6H_{13} or other alkyl group contg. 5 or more C atoms and Z stands for H or a substituent such as a metal or alkyl, are described. They are *therapeutic agents* and may be used in the treatment of leprosy and tuberculosis.

Compounds of gall acids. ALPHONSE GAMS and PAUL SCHNEIDEGGER (to Soc. anon. pour l'ind. chim. à Bâle.). U. S. 1,677,554, July 17. Acylated aliphatic diamines such as oleyldiethylethylenediamine are caused to react with a gall acid, to form *therapeutic compds*. Several examples are given.

Ampoules for separate reactive ingredients for making unstable solutions. PHARMAGANS, PHARMACEUTISCHES INSTITUT, L. W. GANS A.-G. Brit. 280,838, July 22, 1926. Structural features.

Antitubercular serum. CONSTANTINE LEVENTIS. U. S. 1,676,997, July 10. A donkey or other suitable animal not normally responsive to tuberculosis is injected with tuberculosis antigen and with serum from man or other animal normally responsive to tuberculosis, and serum is subsequently withdrawn from the treated animal.

Antitoxins and serums. CONSTANTINE LEVENTIS. U. S. 1,676,995, July 10. An animal such as a donkey which is not normally responsive to a specific disease such as human pneumonia or tuberculosis is treated with an antigen, serum from the human or other different species to be protected is then injected into the treated animal and serum for use is subsequently withdrawn from the latter.

Antiseptic. JOHN H. WRIGHT (to Zonite Products Co.). U. S. 1,676,309, July 10. A stable prepn is formed from the Na salt of *o*-dichlorosulfonamide of benzoic acid, K stearate, free stearic acid, water, eucalyptol, bornyl acetate and menthol.

Cleansing and astringent cosmetic. DELLA BRANDON. U. S. 1,675,840, July 3. A mixt. of egg white 240, H_2O_2 soln. 228 and yeast 219 parts is specified.

Solution for use in curling or "permanent waving" of hair. FRANK J. MCKENNA (to Chemical Preparations, Inc.). U. S. 1,677,246, July 17. A 4% aq. soln. of hydrazine hydroxide is used.

Hydroxyethylamide of *o*-hydroxybenzoic acid, etc. WALTER KROPP (to Winthrop Chemical Co., Inc.). U. S. 1,675,500, July 3. This compd. is made by heating methyl salicylate at 180° with aminoethanol until all MeOH formed has been distd. It crystallizes from water and m 119° . Similarly, *m*-cresotinic acid methyl ester and aminoethanol yield a cryst. product m 88° . These compds are antirheumatics and antineuralgics. They are difficultly sol. in water.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Contact oxidation of ammonia to nitric acid. V. I. MALYAREVSKII. *J. Chem. Ind. (Moscow)* 4, 122 9(1927); cf *C. A.* 21, 3712.—The detn. of compn. of N oxides formed in the catalytic oxidation of NH_3 to HNO_3 shows that the opinion of Raschig (*Z. angew. Chem.* 18, 1281(1905); *C. A.* 1, 1896) and of Jolibois and Sanfourché (*C. A.* 13, 1055) that NO oxidizes in 2 phases is false. Immediately after contact and also in the whole space between contact app. and nitrite scrubber NO predominates in the gas mixt. The fundamental reaction is $4\text{NH}_3 + 5\text{O}_2 = 4\text{NO} + 6\text{H}_2\text{O}$. The presence in the nitrous gas of an excess of NO det. the character of the reaction in the nitrite scrubber. NaNO_2 is formed by the interaction of NaOH and the NO + NO_2 mixt. Absorption of the latter destroys the equil. and provokes further oxidation of NO. The speed and the degree of absorption of N oxides in the nitrite scrubber depend on the concns. of NO and NaOH, the velocity of the gas current and the intensity of contact of the liquid with the gas. The principal reaction in the absorption towers is $3\text{NO} + 3\text{NO}_2 + \text{H}_2\text{O} \rightleftharpoons 2\text{HNO}_3 + 4\text{NO}$. The formation of HNO_3 with sepn. of $\frac{1}{3}$ of the combined N in form of NO, the retardation of the speed of oxidation with decrease of concns. of NO and O towards the end of absorption, and the dependence of the const. *K* on $t^\circ [(Kt + 10)/Kt = 0.93]$ are the fundamental factors to be considered in the choice of a proper absorption system.

BERNARD NELSON

Synthetic nitric acid in Spain. The plants of the Sociedad Iberica del Nitrogeno. RAMÓN MIRAVALLS. *Quim. Ind.* 5, 4-7(1928) - The Flix plant employs a modification of the Franck-Caro process. NH_3 , made by the Claude process, and air are forced into a diffusion chamber from which the homogeneous mixt. contg. NH_3 passes with great velocity through the combustion chamber. The catalyst is Pt wire gauze, the temp. $800-50^\circ$. The mixt. of NO , N_2 , O_2 and some N_2O_3 passes water-cooled pipes and enters with a temp. of 50° 4 oxidation towers 10 m. high and 80 cm. in diam. filled with Raschig rings, where it streams counter-current against cold HNO_3 . The acid from the condensers, contg. 8-10% free and combined N oxides, is used for this purpose. The low temp. is essential, since it favors absorption and formation of NO_2 and obviates decomn. The mixt. of N_2O_4 and N_2O_3 enters 4 Raschig absorption towers 10 m. high and 1.5 m. in diam., irrigated with HNO_3 , the concn. of which is gradually lowered toward the bottom by injecting water. The gases circulate in these towers alternately upward and downward. The circulation of the gases is effected by an exhauster, that of liquids by a pump of acid resistant V₂A. The pipes are of Al. The waste gases which are expelled into the air contain 6-8 g. HNO_3 per cu. m. The concd. acid from the 1st tower is $36-40^\circ$ Bé and has a fairly high content of N oxides. It passes through a coil immersed in water at 40° and then enters a small tower where a current of air removes the N oxides and carries them to the 2nd absorption tower. The daily capacity of the plant is 7000 kg. HNO_3 or 1000 kg. NH_3 . M. J.

Separation and regeneration of caustic soda in the Harris process of lead refining. R. WINTER. *Eng. Mining J.* 125, 809-12(1928) - In the Harris process (cf. Brit. pat. 245,479 (C. A. 21, 304)) the As, Sn and Sb in the Pb bullion are converted into arsenate, stannate and antimonate by molten NaOH , NaCl and NaNO_3 . The molten spent reagent is drawn off and granulated. The aq. soln. thus produced is brought in contact with more spent reagent till the cold filtrate has a d. of 1.35 (70° Tw.). At this d. Na stannate and antimonate are insol. in the hot soln., while Na arsenate is sol. but ppts. when the soln. is cooled to 25° . The soln. of the spent reagent at d. 1.35 contains approx. 350 g. NaOH , and 85 g. NaCl per l. The treatment of the slurry can be varied to suit its compn. Details are given of the variations to suit two classes of impure Pb: (1) Ag-Pb contg. comparatively small quantities of As and Sb, and no Sn; (2) secondary and residual leads and alloys high in As, Sb and Sn. These variations are given in some detail, with diagrammatic flow sheets. The NaOH - NaCl soln., freed from As, Sb and Sn, is concd., and the recovered NaOH used again in the process. A subsequent article will describe various ways of treating the wet alk. filter cake contg. the cryst. oxy-salts of As and Sn. E. G. R. ARDAGH

The manufacture of barium and strontium nitrates. R. CHEMNITIUS. *Chem.-Ztg.* 52, 465-6(1928). - 98% BaCO_3 is used as raw material except where a very pure product is needed (as for optical purposes), and then BaSO_4 is employed. (a) 1000 kg. BaCO_3 and 1400 kg. HNO_3 (sp. gr. 36° Bé.) are mixed gradually in a 5 cu. m. enamelled kettle with wooden stirring app., heated near the end of the reaction. The soln. is drawn off into a pressure cylinder, filter-pressed, concd. in vacuum pans, centrifuged, washed, dried and sieved. (b) Into a 5 cu. m. wooden vat with stirring app. and heating coil are placed 1000 l. $\text{Ca}(\text{NO}_3)_2$ soln. (35° Bé.) contg. 45% of the salt, diluted with 750 l. condensed H_2O and 1000 kg. $\text{Ca}(\text{NO}_3)_2$ added. While warming 1250 kg. BaCO_3 are added and agitation is continued 4 or 5 hrs. Thus an excess of about 15% $\text{Ca}(\text{NO}_3)_2$ is employed, but is recovered and re-used. The sp. gr. of the $\text{Ba}(\text{NO}_3)_2$ soln. formed is only 10° Bé. at the end of the reaction. The hot soln. is then filter-pressed, the filtrate stirred while cooling in a Cu grainier, the crystals are washed with HNO_3 (1:10) in an earthenware vessel to remove CaCO_3 , centrifuged, washed, dried and sieved. The press cake is boiled with mother liquor from the $\text{Ba}(\text{NO}_3)_2$, and the soln. re-used. $\text{Sr}(\text{NO}_3)_2$ is made from $\text{Sr}(\text{OH})_2$ instead of SrCO_3 . 1400 kg. HNO_3 (sp. gr. 36° Bé.) are mixed with 1500 kg. $\text{Sr}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$ in an app. similar to that used for making the Ba salt, but the reaction vessel is smaller, since no evolution of CO_2 occurs. Double decomn. with $\text{Ca}(\text{NO}_3)_2$ is not employed. W. C. EBAUGH

Nauru and Ocean Islands phosphate: The industry and its future. A. F. ELLIS. *New Zealand J. Agr.* 36, 28-30(1928).—The entire production of phosphate rock, about 550,000 tons annually, from Nauru and Ocean Islands is exported to Australia and New Zealand. K. D. JACOB

A method for obtaining potassium ferrocyanide. K. R. LANGE. *Chem.-Ztg.* 52, 440-1(1928).—The method described by F. Chemnitz (Biochem. Z. 139, 394; 152, 122) has certain disadvantages which would make it seem hardly suitable for manufacturing ferrocyanide on the large scale from gas purification masses. For one thing it is not desirable to work with CS_2 as a solvent for S. Trichloroethylene and o-dichloro-

benzene are replacing CS₂ as solvents. S is very sol. in dichlorobenzene at 90°. Other objections are raised to the method of C. because of the expense involved. W. T. H.

Preparation of a vanadium-asbestos contact catalyzer. N. N. EFREMOV AND A. M. ROZENBERG. *J. Chem. Ind. (Moscow)* **4**, 129-34; *J. Russ. Phys.-Chem. Soc.* **59**, 701-14 (1927).—V-asbestos can be used as contact mass instead of the more expensive Pt-asbestos. Its action is based on the easy transformation of quadrivalent to quinquevalent V: $2V_2O_4 + O_2 \rightleftharpoons 2V_2O_5$. It is prepd. by fixing a V compd. on asbestos fibers as either a colloidal film or amorphous, finely divided particles; cryst. compds. would not be active. A soln. of 5 g. NH_4VO_3 in 100 cc. boiling H₂O is reduced either by a soln. of $(NH_4)_2SO_3$, $(NH_4)_2S_2O_4$ or H₂SO₃, e. g., $2NH_4VO_3 + NH_4HSO_3 = (NH_4)_2V_2O_5 + NH_4HSO_4$. On adding to the reduced soln. 2 to 3 g. 25% H₂SO₄ a blue, transparent soln. is obtained: $V_2O_4 + 2H_2SO_4 = V_2O_2(SO_4)_2 + 2H_2O$. Pure asbestos is immersed into the latter soln. in a porcelain dish, stirred up and boiled 10 to 15 min., then cooled to 40° to 50°. Ammonia of sp. gr. 0.92 is added to this warm liquid, without removing the asbestos, until strongly alk.: $V_2O_2(SO_4)_2 + 4NH_4OH = 2(NH_4)_2SO_4 + V_2O_2(OH)_4$. The $V_2O_2(OH)_4$ ppt. settles in the pores and on the surface of the fibers. The contents of the dish are evapd. almost to dryness, the asbestos being stirred constantly. Then the asbestos, which has become brown, is put in a thin layer over asbestos cardboard to dry. The asbestos thus obtained is calcined by placing it in a thin layer on an asbestos sheet and heating in a furnace with free access of air, the temp. being raised gradually to 500° to 600° and held there for about 30 min. This decomposes the NH_4 salts and all V compds. are oxidized to V_2O_5 . To avoid fusing the latter the temp. should not reach 700°. As the catalytic action of V-asbestos is the more energetic the greater the V_2O_5 content, asbestos impregnated as above is given a second impregnation. For this purpose a NH_4VO_3 soln. can be used without being first reduced. In both impregnations asbestos can absorb up to 52.5% of its weight of V_2O_5 . The final product is brittle and cannot be woven. It is therefore advisable to deposit V_2O_5 on asbestos nets or sieves.

BERNARD NELSON

The preparation and properties of the vegetable decolorizing carbons. I. MIURA. *J. Coll. Agr., Imp. Univ. Tokyo* **9**, 101-18 (1927); *Expt. Stu. Record* **58**, 203.—This paper presents a systematic study of the prepn. of decolorizing carbons from the sawdust of the Japanese cedar or sugi (*Cryptomeria japonica*), from the ground wood pulp and sulfite wood pulp of the Japanese spruce or yezomatsu (*Picea jezoensis*) and the Japanese fir or todomatsu (*Abies sachalinensis*), from the alga kajime (*Ecklonia cava*), from birch bark, and from camellia oil cake. Among the compds. added to the org. material before carbonization were Ca acetate, 1, 5, 10 or 20 parts per 100 of sawdust; slaked lime 10, 20, 50 or 100 parts per 100 of sawdust; CaCl₂ 10 or 50 parts; CaHSO₃ 50; crude MgCl₂ 10, 50 or 100; NaCl 50 or 100; K₂CO₃ 50; Na₂CO₃ 50; NaHCO₃ 50; CuSO₄ 50; alum 50; etc. The products were rated according to the percentage of color removed from a standard color soln. by a definite proportion of the C under fixed conditions. It was found that of all the substances added before carbonization, Ca compds. were most effective in improving the quality of the resulting C, slaked lime, or Ca bisulfite followed by slaked lime, giving the best products. Washing out of the ash with water, alkalies, or acids after carbonization was necessary for the highest effectiveness. The presence of alkali metal compds. during charring was found useless or even deleterious, causing fusion of the ash in the charring process. The decolorizing effect of an animal charcoal of best quality is about 3.6 times that of ordinary wood charcoal, and a C prepd. by submitting sugi sawdust mixed with slaked lime to dry distillation after treating it with Ca bisulfite has a decolorizing power about 13.5 times that of animal charcoal of best quality. A C of high efficiency generally passes the filter paper with difficulty; consequently it can easily be filtered off from the soln. A rather detailed discussion of the theory of decolorization by C is included.

H. G.

A new artificial wood. H. HERPER. *Kunststoffe* **18**, 127-8 (1928).—An artificial product which very closely resembles natural wood is made by exposing cellulosic material, such as chips and sawdust, to a steam pressure of about 58 kg. per sq. cm. for 4-5 sec., suddenly releasing the pressure to disintegrate the cellulosic stock into fibers, and subjecting the material mixed with phenol-formaldehyde condensation products to a pressure regulated according to the desired hardness of the finished product. Glue or other artificial binding agent is not necessary. The product is light, an excellent insulator, and has tensile strength 280-365 kg. per sq. cm. and d. close to that of precious woods. It possesses excellent acoustic properties. The phenol-formaldehyde condensation products incorporated in the material are capable of swelling under the action of H₃PO₄ or a mixt. of HCl and H₂SO₄.

BONTFANT HAMILTON

The preparation of HBr in the presence of charcoal (BOZHOVSKI, DANILCHENKO) 6. Absorption plant [for making HNO_3] (U. S. pat. 1,677,409) 1.

CRIVELLI, E.: *Solfato di Rame*. Milan: Ulrico Hoepli. 321 pp. L. 35. Reviewed in *Chem. Met. Eng.* 35, 431 (1928).

Arsenic acid. FRITZ ULLMANN and GERT TREWENDT (to J. Michael & Co.). U. S. 1,677,257, July 17. A soln. comprising As_2O_3 10, water 20 and KClO_4 3.8 parts is heated and a small quantity of HCl is added.

Hydrocyanic acid. PAUL L. MAGILL and PAUL J. CARLISLE (to Roessler & Hasslacher Chemical Co.). U. S. 1,675,366, July 3. Formamide vapor is passed in contact with brass at a temp. of about 300° .

Phosphoric acid. E. URBAIN. Brit. 280,763, Jan. 20, 1927. In making H_3PO_4 by heating together Ca triphosphate, silica and carbonaceous material, a portion of the silica is replaced by alumina or clay to obtain a fusible slag having the compn. of an alumina cement. The mixed P and CO formed are mixed with water vapor and a halogen acid and passed over porous amorphous carbonaceous material as described in Brit. 278,578 (C. A. 22, 2642) and H_3PO_4 and a gas of the compn. of water gas are obtained.

Carbon dioxide. FREDERICK H. KELLIHER. U. S. 1,675,497, July 3. Pulverized coal or other finely divided carbonaceous material is burned in a closed furnace in the presence of sufficient air to insure substantially complete combustion without producing CO and combustion products are withdrawn from the furnace by operation of a water piston suction pump and passed through a scrubber to a gas-receiving tank through a separator from which water is returned to the upper part of the scrubber. App. is described.

Sodium hydrosulfide. HENRY HOWARD (to Grasselli Chemical Co.). U. S. 1,675,491 July 3. An alk. earth metal sulfide such as Ba sulfide is dissolved in a soln. contg. Na hydrosulfide and the soln. is treated with NaHCO_3 .

Sodium phosphate. HENRY HOWARD (to Grasselli Chemical Co.). U. S. 1,676,556, July 10. A soln. of H_3PO_4 contg. also sulfate and fluosilicate is treated with a Na compd. such as Na_2CO_3 and subsequently with a Ba compd. such as BaCO_3 to ppt. the SO_4 ; the soln. may then be further treated with alkali to ppt. Fe and Al compds.

Soluble carbonates from fluorides. MAX RUCHNER (to Albert F. Meyerhofer). U. S. 1,675,786, July 3. A fluoride such as NaF is caused to react with CaCO_3 or other carbonate which in the reaction will form an insol. fluoride; the reaction is effected under superatm. pressure (suitably in the presence of CO_2).

Apparatus for cooling salt solutions for crystallization, etc. RUSSELL W. MUMFORD (to American Potash & Chemical Corp.). U. S. 1,676,277, July 10.

Sulfur composition. CARLETON ELLIS. U. S. 1,676,604, July 10. A compn. suitable for use as a constituent of moldable compns., etc., comprises S together with a S-miscible and S-contg. resinous material such as a phenol S resin.

Apparatus for making powdered oxides from lead lumps or balls. CLARENCE A. HALL. U. S. 1,675,345, July 3.

Producing granules from steatite or similar materials. WM. H. ALTON (to R. T. Vanderbilt Co., Inc.). U. S. 1,677,701, July 17. Pyrophyllite sericite or steatite or other soft non-vitreous rock having a fibrous or laminated structure is crushed, particles of granule size are sepd. and are subjected to a vitrifying treatment, e. g., by heating to 1200 – 1370° , to reduce the absorptive properties of the granules and render them suitable for roofing or other purposes.

Regenerating catalysts. SELDEN CO. Brit. 280,712, Nov. 26, 1926. Catalysts contg. V compds. or the like, and which may have deteriorated from use in the oxidation of C_2H_4 or similar catalytic oxidation processes, are regenerated by treatment with a suitable substance such as halogen, non-metallic halogen compd., non-metallic acid or its anhydride, ozone or H_2O_2 which is volatile at 550° or below and does not leave a residue which is non-volatile when heated with O. Numerous detailed examples are given in which Cl, air, ethylene chloride, steam, nitrosyl chloride, H_2O_2 , ozonized air, H halides, NH_3 halides, S chloride, sulfuryl chloride, thionyl chloride, phosgene and similar compds. may be used as regenerating agents.

Condensation product of urea with formaldehyde. ALPHONSE GAMS and GUSTAV WIDMER (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,676,543, July 10. Condensation is effected in the presence of active C, which is afterward eliminated, e. g., by filtration.

Condensation product of urea and formaldehyde. ALPHONSE GAMS and GUSTAV WIDMER (to Soc. anon. pour l'ind. chim. à Bâle). Can. 281,325, June 26, 1928. One mol. urea and 2 mols. neutral CH_2O are heated to 98° under a reflux condenser; a condensation product may be pptd. with H_2O and alc. in 17 hrs. When heating is conducted in a closed vessel, temp. and other conditions being equal, the same degree of condensation is reached after $3\frac{1}{2}$ hrs. The product is useful for lacquers and impregnating agents. Cf. C. A. 22, 2818.

Condensation products of urea and formaldehyde. ALPHONSE GAMS and GUSTAV WIDMER (to Soc. anon. pour l'ind. chim. à Bâle). Can. 281,326, June 26, 1928. Waste (splinters, shavings) of hardened condensation products of urea and formaldehyde are heated at 120° for 2-3 hrs. with CH_2O of 36.5% strength. Thick soln. obtained is dild. in H_2O and heated with urea for 16 hrs. The mass is evapd. to a sirup and worked as though it were fresh condensation product. Cf. C. A. 22, 2818.

Condensation product of urea and formaldehyde. ALPHONSE GAMS and GUSTAV WIDMER (to Soc. anon. pour l'ind. chim. à Bâle). Can. 281,327, June 26, 1928. To a water-sol. condensation product from 1 mol. urea and 2 mols. CH_2O before or after concn., a quantity of urea is added and also a small quantity of acid and the mixt. is converted into a solid, clear or opaque final product at room temp. or by heating. Cf. C. A. 22, 2818.

Molded articles formed of particles of wood bonded with congealed sulfur. HARRY A. NOYES (to Texas Gulf Sulphur Co.). U. S. 1,675,576, July 3. Wood flour or sawdust, etc., bonded with S is used for making receptacles or other rigid molded structures.

Adsorbent material. LURGI GES FÜR WARMETECHNIK. Brit. 280,505, Nov. 11, 1926. An adsorptive agent for sepg. gases, decolorizing liquids or for other uses comprises fine dust or the like which may be subjected to selective sepn. by baffles, wet sepn., "cyclonic" or centrifugal treatment or elec. pptn.

Brake lining. ISADOR J. NOVAK (to Raybestos Co.). U. S. 1,667,842, July 17. Asbestos fiber is incorporated with a solid residue obtained from the heat treatment of a mixt. of water gas tar and petroleum oil (which may be heated to about 230° to obtain this residue).

Paint remover. OTTO L. FLÜGEL. U. S. 1,676,642, July 10. See Can. 269,704 (C. A. 21, 2380).

Laminated sheets formed of cardboard or similar material. JOHN D. CARTER. U. S. 1,676,727, July 10. Water-resistant plies such as cardboard or veneer are united by reaction products of alk. Na silicate soln. and CaCO_3 .

Fiber board for making cans or other receptacles. DONALD G. MAGILL (to American Can Co.). U. S. 1,676,617, July 10. Fibrous stock is impregnated with a mixt. of paraffin 90-75 and Montan wax 10-25 parts, which has a m. p. above the theoretical mean m. p. of the components of the mixt.

Coloring photographs or other materials. OTTO S. MARCKWORTH. U. S. 1,676,730, July 10. A photograph or other material to be colored is preliminarily treated with a wax emulsion which serves to facilitate blending the colors by heating and artists' colors or other suitable coloring material is then applied.

Sensitized screen for stencil process work. GLEN I. KEEL. U. S. 1,675,561, July 3. A gelatin dichromate compn. or other sensitizing soln. is applied to the surface of silk or other suitable fabric and a design is printed on the surface thus prepd. through a negative on which the desired design has been opaqued; the sol. materials are washed off and a lacquer is applied to one side of the screen and then removed from about the design formed from the non-sol. material by applying a thinner and washing through the screen from the other side.

Fire-extinguishing substances. EXCELSIOR FEUERLOSCHIGERATE A.-G. and O. TREICHEL. Brit. 280,543, Nov. 15, 1926. CO_2 and CCl_4 are used together; the CO_2 as used solidifies to snow-like form in mixt. with the CCl_4 and the snow-like mixt. is projected on a fire to be extinguished. A "Daniell" cock may be used for effecting admixt. and projection.

Apparatus for extinguishing fires by use of a fire-extinguishing powder carried by cooled exhaust gases from an internal-combustion engine. CORNELIUS SZILVAY. U. S. 1,677,875, July 17.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Silica glass. HENRI GEORGE. *Bull. soc. encour. ind. nat.* 127, 373-408 (1928).—G. gives the history of silica glass, and its mechanical, optical, chem. and insulating properties. He discusses its manuf. and especially describes in detail a new process of manuf. which has considerably lowered the price of the product. L. B. MILLER

Beryllium glass. CHI FANG LAI AND ALEX. SILVERMAN. Univ. of Pittsburgh. *J. Am. Ceram. Soc.* 11, 535-41 (1928).—Over 80 different glasses were studied, in which BeO replaced the usual CaO or MgO. Be glasses are somewhat more refractory than Mg or Ca glasses. Annealing is apparently not difficult. Be glass shows lower d. than Ca or Mg glass. The hardness of Be glass is much greater than that of Ca glass and a little greater than that of Mg glass, lying between 6.2 and 6.7. The n is slightly above that of Mg glass but much lower than that of Ca glass. Transmission of ultra-violet light is good. Be glasses warrant further study. C. H. KERR

Window glass transmitting ultra-violet rays. ALFRED SALMONY. *Chem.-Ztg.* 52, 269-70 (1928).—Several special glasses and their uses in schools, greenhouses, etc., are discussed. Slight impurities may spoil the transmitting power of a glass for the shorter wave lengths of light. Some of these glasses may readily be blown into elec. bulbs for ultra-violet treatment. H. F. K.

A system of college education in ceramic technology. H. F. STALEY, K. TURK AND H. D. CUSHMAN. Comm. on Education, Enamel Union, Am. Ceram. Soc. *Bull. Am. Ceram. Soc.* 7, 190-202 (1928).—Curricula are discussed. C. H. K.

American Ceramic Society. Report of Committee on Standards. A. S. WATTS, et al. *J. Am. Ceram. Soc.* 11, 531-534 (1928).—A very comprehensive report, covering definitions, specifications, testing methods, descriptions of app., etc. C. H. KERR

Chemical control of feldspars. F. P. KNIGHT, JR. *J. Am. Ceram. Soc.* 11, 560-70 (1928). A discussion of the importance of control in mfg. processes. Some methods are given. C. H. KERR

The moisture of clay. TSURUJI OKASAWA. *Bull. Inst. Phys. Chem. Research (Tokyo)* 7, 199-236 (1928).—In contradistinction to the ideas generally accepted, O. thinks that moisture is really H_2O entering into certain chemical combinations besides the recognized constitution of clay. A. L. HENNE

The development of the German brick industry. O. WITTE. *Tonind. Ztg.* 52, 753-5 (1928). H. G. SCHURECHT

Manufacture of paving brick. H. AVENHAUS. *Tonind. Ztg.* 52, 629-31, 674-6, 713-5 (1928). H. G. SCHURECHT

Modern trend of design for pottery plants. H. S. JACOBY. *Bull. Am. Ceram. Soc.* 11, 184-90 (1928). C. H. KERR

The requisite consistency of a casting slip. W. L. SHEARER. Rutgers Univ. *J. Am. Ceram. Soc.* 11, 512-59 (1928). C. H. KERR

Raw yellow glazes for terra cotta, and development phenomena. L. R. SQUIER. *J. Am. Ceram. Soc.* 11, 584-6 (1928).— TiO_2 , $BaCrO_4$ and U_3O_8 were tried with (a) an Albany slip-Cornwall stone glaze, and (b) a Bristol glaze. CaO, MgO or an improper amt. of ZnO should not be used with U_3O_8 to obtain yellow. BaO and a certain % ZnO, dependent upon the amt. of U_3O_8 and the compn. of the glaze, are advocated to give intense yellows in modified Bristol glazes. CaO and MgO appear to act as catalysts for the reduction of yellow and orange U oxide to greens and grays, at high temps. CaO and ZnO affect TiO_2 in glazes in the same way that U_3O_8 is affected. C. H. KERR

The problem of printed tableware. MARION L. FOSDICK. *Bull. Am. Ceram. Soc.* 7, 171-3 (1928).—A description is given of decalcomania work. C. H. KERR

Metal-polishing properties of stones in connection with their chemical and mineralogical composition and structure. V. V. ARSHINOV, B. YA. MERENKOV AND F. ANOSOV. *Trans. Inst. Econ. Mineral. Met. (Moscow)* 1928, No. 38, 1-30.—Hard stones are not suitable for removal of the surface inequalities of metals, in particular of Cu, since they soon become covered with Cu and thus lose their polishing effect. A slight amount of clay in the stone contributes to fine polishing, but an excess of it decreases the polishing capacity. British and Russian polishing stones have been examd. "Fine Polishing Block" (Scotch) was dark brown, very compact, non-hygroscopic, and of moderate hardness; its principal ingredients were quartz and mica. "Bluestone-Fine" (Scotch)

was gray, slightly porous and water-absorbing; its principal constituents were quartz and mica. The Russian stones, which were mined in the environs of Krivoi-Rog, were in quality much like the Scotch species "Tam O'Shanter" and "Bluestone-Fine." One of them was a phillite; it was compact, dark gray and of fine texture. The principal mineralogical constituents of the latter were 61% mica (35% of which was of the muscovite variety) and 37% quartz; its chem. analysis was: SiO_2 64.32, TiO_2 0.64, Al_2O_3 21.37, Fe_2O_3 and FeO 2.52, MnO 0.34, MgO 1.56, CaO 0.60, Na_2O 1.42, K_2O 4.85, loss on ignition 3.09%. Another Krivoi-Rog polishing stone was a black and fairly compact slate which consisted of quartz 49.5, mica 44 (26% of which was muscovite), coal-like substance 5, other minerals 1.5%. Its chem. compn. was: SiO_2 67.06, TiO_2 1.02, Al_2O_3 15.84, Fe_2O_3 and FeO 0.72, MnO 0.00, MgO 0.48, CaO 0.59, Na_2O 0.59, K_2O 2.94, V_2O_5 0.04, Cr_2O_3 0.02, loss on ignition 11.26%. BERNARD NELSON

Slagging of refractory materials [fireclay]. H. SALMANG. *Stahl u. Eisen* 47, 1816-20 (1927).—The action of the various constituents of metallurgical slags on crucibles made of a high-grade fireclay contg. SiO_2 56.52, ($\text{Al}_2\text{O}_3 + \text{TiO}_2$) 40.79 and Fe_2O_3 2.42% has been examd. at temps. up to 1600° . Ferrous and manganous oxides and the fluid basic silicates derived from them are extremely corrosive towards fireclay above 1100° , while CaO and MgO have a rapid slagging action above 1500° . The rate of corrosion decreases with increasing acidity of the slag, and viscous slags are much less reactive than the more fluid slags; thus orthoclase feldspar has practically no action on the clay at 1600° . Ca phosphate dissolves fireclay almost as rapidly as CaO does at 1500° . B. C. A.

Reflection from glass (AMY) 2. The use of α -hydroxyquinoline for the chemical analysis of silicates (ROBITSCHKE) 7. Reversible regenerative open-hearth furnace [for manufacture of glass] (U. S. pat. 1,675,588) 9.

Apparatus for feeding charges of molten glass. BRITISH HARTFORD-FAIRMONT SYNDICATE, LTD. AND T. WARDLEY. Brit. 280,611, June 18, 1926.

Apparatus for feeding separate charges of molten glass. ENOCH T. FERNGREN (to Hartford Empire Co.). U. S. 1,677,436, July 17.

Apparatus for feeding mold charges of molten glass. KARL E. PELIER (to Hartford-Empire Co.). U. S. 1,675,819, July 3.

Apparatus for delivery of unit charges of molten glass. HARVEY H. DEULEY. U. S. 1,677,275, July 17.

Continuous tank furnace for melting glass. CHAUNCEY F. FRAZIER. U. S. 1,675,542, July 3.

Melting glass-forming materials in a shaft furnace with a flame adjacent the bottom of the shaft. KURT KUNZEL. U. S. 1,676,267, July 10. An app. is described.

Heat-resistant borosilicate glass. LUDWIG HOCHSTEIN (to E. T. Brown). U. S. 1,676,331, July 10. A glass having a coeff. of expansion of approx. 0.0000017 comprises SiO_2 80-90, B_2O_3 7-15, Al_2O_3 1.5 and ZrO_2 1.5%.

Sheet glass. GEORGE H. HARVEY (one-half to Edward A. Lawrence). U. S. 1,676,027, July 3. A film is formed on the surface of a body of molten glass by treating it with a spray of moisture and this film is then withdrawn from the bath in sheet formation; the sheets thus formed are of substantially uniform thickness.

Making sheet glass reinforced with wire. WALTER COX and ARNO SHUMAN (to Pennsylvania Wire Glass Co.). U. S. 1,676,772-3, July 10. Mech. features.

Plate-glass-rolling apparatus. LEE SHOWERS (to Pittsburgh Plate Glass Co.). U. S. 1,676,056, July 3.

Apparatus for forming plate or sheet glass. L. VON REIS (to Naamlooze Venootschap Mij tot Beheer en Exploit van Octrooien). Brit. 280,533, Nov. 10, 1926.

Apparatus for making sheet glass by rolling. SOC. ANON. DES MANUFACTURES DES GLACES ET PRODUITS CHIMIQUES DE SAINT-GOBAIN, CHAUNY, ET CIREY. Brit. 280,582, Nov. 15, 1926.

Apparatus for making fire-polished sheet glass. CHARLES J. JORDAN (one-fourth to Rudolph G. Schaub). U. S. 1,677,095, July 10.

Apparatus for applying a rotating flame to glass to be worked. GEORGE A. MILLAR (to Cooper Hewitt Electric Co.). U. S. 1,676,796, July 10.

Apparatus (with a set of movable gas jets) for working hollow glassware. ROY D. MAILEY and WILFORD J. WINNINGHOFF (to Cooper Hewitt Electric Co.). U. S. 1,676,795, July 10.

Apparatus for manufacture of bottles or other glass hollow ware. GUGLIELMO DI RENZIS. U. S. 1,676,981, July 10.

Apparatus for molding tumblers or similar glassware. VIRGIL O. CORNWELL (to The Federal Glass Co.). U. S. 1,675,971, July 3.

"Crackled" glassware. DAVID L. MIDDENDORF (to The Federal Glass Co.). U. S. 1,675,951, July 3. A fluid such as atomized water is projected against a glass blank under such regulated conditions as to produce a crackled effect in the finished article without altering the temp. sufficiently to interfere with proper shaping. U. S. 1,675,952 specifies projecting a fluid such as water on the exterior of a mold to maintain the interior of the mold at a temp. which will produce a crackled effect on the molded glass.

"Antique" surfaces. RAYMOND J. GREENE (to The Gem Clay Forming Co.). U. S. 1,677,716, July 17. In forming back walls of radiant gas heaters or other articles of clay mixed with Mg silicate or the like, a slip contg. an oxide such as Sb oxide is applied to the surface of the article and the latter is fired so that the oxide combines with the Mg silicate to eat into the surface of the clay article. Cr oxide may also be used as a coloring.

Kiln drying ceramic ware. THOMAS DOWNS. U. S. 1,677,818, July 17. Air is circulated upward about the sides and over the crown of the kiln, and control and regulation of the relative circulation about and through the kiln are effected so that "sulfuring" of the ware is avoided. Structural features are described.

Rack for supporting ceramic products during heating in kilns, etc. THEODORE C. PROUTY and WILLIS O. PROUTY (to American Encaustic Tiling Co., Ltd.). U. S. 1,676,799, July 10.

Baking refractory linings in crucibles. FRANZ STÖHR. U. S. 1,675,735, July 3. In baking linings which may be formed of magnesite within crucibles which are open at one end and have a tap hole at the other end, the open end is provided with a temporary closure and through an opening in this closure a jet of flame is projected; combustion products are vented through the tap hole of the crucible.

Rubber-bonded abrasive articles. PEIR JOHANSON and DUANE E. WEBSTER (to Norton Co.). U. S. 1,676,190, July 3. In forming grinding wheels or other abrasive articles, a rubber bond is used together with an admixt. of wax such as beeswax which serves as a modifying agent and decreases the hardness of the bonded article after vulcanization.

Sagger. JOSEPH A. JEFFERY (to Champion Porcelain Co.). U. S. 1,677,452, July 17. Sagers are formed of SiC covered by a refractory alumina-silica compn. such as andalusite which does not change materially in vol. from the green state in which the compn. is applied when fired to a high temp. The layer is of sufficient thickness that it would be injured by any disproportionate changes in vol. relative to the SiC.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Japanese cement industry. C. R. PLATZMANN. *Zement* 17, 222-3(1928).

H. F. K.

Crystal phases in technical portland cement clinker. II. A. GUTTMANN and F. GILLÉ. *Zement* 17, 296-9(1928); cf. C. A. 22, 2042.—Photomicrographs of thin sections of clinker show crystals with zones indicating the possibility of mixed cryst. structure for some of the hydraulic components of cement.

H. F. K.

Study of a method for testing concrete in the field. C. A. WIEPKING. *Proc. Am. Concrete Inst.* 24, 212-39(1928).—The prepn. of materials, proportioning, mixing, molding, curing, testing and computing the results are discussed.

J. C. WITT

A method for predicting concrete strengths with increased precision. HERBERT J. GILKEY. *Proc. Am. Concrete Inst.* 24, 149-78(1928).—The quality of concrete, regardless of what particular test may be used as its measure, is influenced by many factors that may be more or less arbitrarily classified as major and minor. The major factors are (a) the cement, (b) ratio of mixing water to the cement, (c) ratio of voids to the cement, (d) effective age, i. e., period of moist curing, (e) curing temp. The minor factors are (f) kind, quantity and grading of aggregates, (g) time of mixing, and (h) incidental factors and personal equation. These same factors may be classified, also, as systematic (b, c, d, e, g) and chance (a, f, h). The use of the method is recommended when it is desired to predict either the general quality or some specific property of concrete.

J. C. WITT

Influence of size of test pieces, their position in the original material, and the

different spans of pressure in the flexural strength of asbestos-cement slates. O. KALLAUNER. *Zement* 17, 275-6(1928).—Strips taken from various portions of the slates showed fairly uniform results. The size or the span had little effect on the flexural strength in kg./sq. cm. under the conditions maintained, whole slates being adaptable to the test. H. F. K.

Cement and concrete problems. V. BAHNER. *Zement* 17, 265-9(1928).—The relations of time to compression strengths of concrete and mortar mixes designed according to the water/cement ratio are shown graphically and discussed. H. F. K.

Weight per unit volume of portland cement. HAEGERMANN. *Zement* 17, 379-85 (1928).—The weight per vol. of finely powd. materials is affected by the size and shape of the container and by the method of filling it. For normal and early strength cements, resp., weights of 126.6 kg. and 120.2 kg. per 100 l. measure were obtained, the fineness of the latter cement reducing its wt. Detus with one vol. cannot be converted readily into wts. per other vols. App. for filling the measures is described. H. F. K.

Flow of concrete under sustained compressive stress. RAYMOND E. DAVIS. *Proc. Am. Concrete Inst.* 24, 303-35(1928).—Twenty-four $6 \times 24"$ concrete cylinders were loaded 640 lbs. per sq. in., and forty-five $4 \times 14"$ were loaded from 200 to 1200 lbs. per sq. in. Results indicate that the time-flow relation is affected by (a) cement ratio, (b) gradation of aggregate, (c) moisture conditions of storage, (d) age at time of loading and (e) magnitude of compressive stress. In a series of graphs, flows from 0 to 0.1% are shown. J. C. WITT

Measurement of the finest fractions in portland cement by use of the Wiegner sedimentary apparatus. HANS KÜHL AND JOSHIO TOKUNE. *Zement* 17, 256-61, 299-301(1928).—The app. used consists of a glass tube 1.57 m. long and 42 mm. diam. fitted with a side arm of small diam. extending from near the bottom of the tube to its top. This side arm is fitted with stopcocks at top and bottom. To the tube nearly filled with abs. alc. is added a definite weight of cement, usually 30 g. After carefully mixing the cement and alc. to obtain a uniform suspension the meniscus reading in the side arm is taken. During the settling of the suspended matter the fall of the meniscus is observed at definite intervals photographically. Applying Stokes' law for falling bodies the diam. of the particles remaining in suspension at any time may be calcd. The distribution of cements into particles of 60, 40, 25, 15 and 10 μ diam. are thus obtained from the graphically recorded sedimentation values. Reliable results are claimed for the method when temp. is controlled. H. F. K.

United States Government master specification for integral waterproof material (for use with portland cement mortar or concrete). Bureau of Standards, Circ. No. 360, 4 pp (1928). E. H.

Italian specifications for hydraulic cements and for structures of concrete and reinforced concrete. ANON. *Zement* 17, 337-41(1928). H. F. K.

Reinforced-concrete building regulations and specifications. report of Committee E-1 on reinforced concrete building design and specifications. F. R. McMILLAN, et al. *Proc. Am. Concrete Inst.* 24, 786-833(1928). J. C. WITT

Tentative amendment of standard specifications for concrete block and concrete building tile. report of Committee P-1 on standard concrete building units. C. L. BOURNE, et al. *Proc. Am. Concrete Inst.* 24, 834-51(1928). To this report is appended methods of tamping and feeding in manuf. of dry tamped concrete masonry units. J. C. WITT

Researches on concrete materials and on plain and reinforced concrete. report of Committee E-3 on research. H. F. GONNERMAN, et al. *Proc. Am. Concrete Inst.* 24, 745-76(1928).—The report is outlined as follows: researches on cement (constitution tests, vol. changes, effect of gypsum, humidity); researches on aggregates (mech. analysis, influence of iron content, soundness, moisture); researches on plain concrete (admixtures, curing, durability, mixing water, permeability, sea water, strength, temp., test methods, vol. changes, workability, yield); researches on reinforced concrete (arches, chimneys, culvert pipe, frames, slabs); suggested researches on concrete and related subjects (aggregates, plain concrete, reinforced concrete); references to papers and reports on researches published during 1927. J. C. WITT

Calculations of the raw [cement] powder using a mixture of different highly siliceous clays but keeping a constant silicate modulus. C. HELMHOLTZ. *Zement* 16, 1092 (1927). H. F. KRIEGER

Requirements of gravel as an aggregate for concrete.—report of Committee E-5 on aggregates. (Sub-committee on gravel.) R. W. CRUM, et al. *Proc. Am. Concrete Inst.* 24, 777-84(1928). J. C. WITT

Determination of the mechanical mixture of mortar and concrete. Ratio of ce-

ment to aggregate in the mix. V. RODR. *Zement* 17, 138-47(1928).—In a discussion of previous German methods of detg. the cement content of concrete it is claimed that an error is introduced by the liberation of sol. or colloidal SiO_2 from parts of the aggregate as well as from the cement. In sands this sol. SiO_2 is derived chiefly from the silt or loam. This effect may be reduced by dilg. the 1:3 HCl soln. to 1:9, whereby the sol. SiO_2 liberated is less than 0.1%. The procedure becomes: digest 10 g. finely ground sample with 100 cc. 1:9 HCl on the water bath, boil for 2 min., filter at once and wash the residue off into a beaker with 100 cc. 5% Na_2CO_3 soln. and boil for 2 min. Filter, combine the filtrates and det. the SiO_2 liberated by the usual methods. If the silt content is known to be small 1:3 HCl digestion may be employed. The found SiO_2 is calcd. to cement by using 22% as the SiO_2 content of cement. Since the water of hydration is about 20% of the set cement wt. this correction must be added if the % compn. of the concrete is to be stated in terms of the hydrated cement.

H. F. K.

Determination of mix of concrete. HEINRICH HART. *Zement* 17, 319-20(1928).—With reference to the preceding abstr. it is claimed that the method described is limited to quartz sand-gravel concrete whereas in practice the aggregates vary so greatly in compn. that the method will not apply generally.

H. F. K.

Workability symposium. *Proc. Am. Concrete Inst.* 24, 24-100(1928).—This symposium consists of the following papers on the workability of concrete: **A study of some methods of measuring workability of concrete.** GEORGE A. SMITH AND GEORGE CONAHEY. *Ibid* 24-42. **Cement as a factor in the workability of concrete.** P. H. BATES AND J. R. DWYER. *Ibid* 43-55. **Gradation and character of aggregates as a factor in workability.** A. T. GOLDBECK. *Ibid* 56-66. **Water as a factor in workability.** R. L. BERTIN. *Ibid* 67-9. **Workability means durability to the engineer.** R. W. ATWATER. *Ibid* 70-6. **What workability means to the contractor.** NELSON L. DOE. *Ibid* 77-82.

J. C. WITT

Better concrete. Do we mean it? NATHAN C. JOHNSON. *Proc. Am. Concrete Inst.* 24, 480-94(1928).—J. points out the possibility and need for improvement in present concrete practice. Both field research and lab. research demonstrate that better concrete and cheaper concrete are identical.

J. C. WITT

Concrete primer. F. R. McMILLAN. *Proc. Am. Concrete Inst.* 24, 495-535 (1928).—The primer is a series of 142 questions and answers which develop in simple terms the principles governing concrete mixts and show how a knowledge of these principles and of the properties of cement can be applied to the production of permanent structures in concrete. The divisions of the primer are cement, mortar and concrete; factors affecting the strength of concrete; problems of proportioning; production of durable concrete. An appendix gives 2 field methods for detg. the moisture in sand: (1) displacement with cylindrical container, and (2) drying to const. wt. with de-natured alc. In the second method, 500 g. of damp sand are placed in a pan and moistened with 100-200 cc. denatured alc. The alc. is ignited, and the sand is stirred to facilitate the escape of moisture.

J. C. WITT

Notes on the progress of some studies of the crazing of portland cement mortars. P. H. BATES AND C. H. JUMPER. *Proc. Am. Concrete Inst.* 24, 179-89(1928).

J. C. WITT

Crazing in concrete and the growth of hair cracks into structural cracks. ALFRED H. WHITE, VILHELM A. AAGAARD AND AXEL O. L. CHRISTENSEN. *Proc. Am. Concrete Inst.* 24, 190-201(1928).—Crazing is due mainly to the rather rapid evapn. of water from the surface of a rich cement mortar or concrete. It may be prevented by using lean mixts. and by keeping the moisture content of the concrete const.

J. C. WITT

Surface protection of concrete against corrosive waters. H. DUBIEL. *Zement* 17, 70-2(1928).—A general discussion of present methods.

H. F. K.

Water permeability of concrete. W. PETRY. *Zement* 17, 318-9(1928).—The report of a commission investigating some concrete structures subjected to H_2O under pressure includes the following factors governing water tightness: (a) Imperviousness is in direct relation to cement content. (b) Admixts. such as stone flour, lime, etc., do not alter the above relationship. (c) The d. of a concrete cannot be predicted from a statement of the content of mixing water without a knowledge of the particle size and the ratio of the quantities of sand and gravel. (d) Natural gravel and sand give a much denser concrete than do crushed materials. (e) Moist curing was better than air curing though the air-cured specimens sealed themselves quickly when exposed to water. (f) This sealing proved to be temporary as intermittent wet and dry treatment showed a return of the air-cured concrete to a pervious state between wettings. (g) The time of curing between 53 and 97 days had little effect. (h) When the self-sealing effect

is left out of account the permeability to water bears a simple relation to water pressure. (i) Surface treatment of pitch proved successful. (j) 2-3 cm. layers of 1:2 and 1:3 cement mortar were tight up to 10-15 m. H_2O . (k) Metal sprays made water-tight concrete up to 15 atm. pressure. H. F. K.

Chemical resistance of cement. CURT PRÜSSING. *Zement* 17, 385-7(1928).—The resistance of normal portland, slag and special cements to the attack of natural and artificial sulfate-contg. solns. is discussed. H. F. K.

Trend of portland and accelerated portland cement compositions. EDWIN C. ECKEL. *Eng. News-Rec.* 100, 617-8(1928).—It is shown by means of triaxial diagrams that trend in manuf. of cement is toward the production of tricalcium silicate. The early strengths of accelerated portland cement concrete, up to 6 months at least, are more than 25% in excess of portland cement concrete strengths. R. E. T.

The determination of the quantity of cement used in hydraulic concretes. DOMENICO MENEGHINI. *Ann. scuola ing. Padova* 2, 95-9(1926).—Finely pulverize a weighed sample (1-2 g. for cement; 10 g. for cement mixts.) and treat with 250-300 cc. of boiling water. Add 100 cc. of HCl (d. 1.05-1.06) and after the evolution of CO_2 has ceased heat the mixt. but do not allow to boil, wash by decantation with boiling H_2O and filter the washings through a Gooch crucible. Treat the residue with about 75 cc. of N $NaOH$ on the water bath at 80° . Decant this alk. liquor into the same filter previously used and wash the residue thoroughly with hot H_2O . The filtrate contains all the active silica derived from silicates that are attacked by this treatment. The silica is sepd. and weighed as SiO_2 and represents the so-called active silica. The method was controlled by detg. the active silica in fresh cement and in cement mixts. prepd. under various conditions and allowed to stand for various lengths of time. L. T. FAIRHALL

Influence of low temperatures and frost on the properties of quicksetting portland cement. A. GESSNER. *Zement* 17, 10-12(1928).—Quicksetting cements suffered relative reductions in compression and tensile strength much like normal portland cements. Because of their high early strength, they have a distinct advantage over normal cements in severely cold weather. H. F. K.

Rotary kiln and its development. N. C. KYRIACOU. *Zement* 17, 342-4(1928). H. F. K.

Influence of time and type of curing on the strength of asbestos cement slates. O. KALLAUNER. *Zement* 17, 99(1928).—The greatest increase in flexural strength comes in the early stages of curing. Combined moist and air curing conditions gave the highest strengths. Prolonged moist curing tended to produce "popouts." Very little gain in strength was found between 28 and 90 days. H. F. K.

Report of committee S-6 on concrete roads and pavements. W. M. ACHESON, et al. *Proc. Am. Concrete Inst.* 24, 852-3(1928). J. C. WITT

The hardening of silicated roads. M. R. FERRET. *Tech. sand. munic.* 23, No. 5, 111(1928).—Encouraging results were obtained by impregnating limestone with Na_2SiO_3 . The hardening effect is attributed to the pptn. under certain conditions of silica jelly which surrounds the stony particles with an insol. and resistant magma. The principal influence is probably absorption due to the finely divided solid particles. This action is favored by desiccation, dialysis and by CO_2 . C. R. FELLERS

Concrete paving-base control by bore tests. E. A. KEMMLER. *Eng. News-Rec.* 100, 660(1928).—The results of systematic concrete base control in Akron, O., are described. In the 5 yrs. during which the system has been developed the av. strength of the base has increased from less than 750 lbs. per sq. in. at 28 days to an excess of 2500 lbs. The av. cost per core, including lab. tests, is \$5.50. The strength curve demonstrates that the curing method employed, sprinkling with a hose, has not been successful, the peak strength occurring in October when conditions are most favorable for natural curing. The 1928 specifications provide for curing by ponding or covering with wet straw for 7-10 days. The 4-in. cores have not been found entirely satisfactory and 6-in. cores have been substituted. R. E. THOMPSON

Chemistry in road building. VON SKOPNIK. *Chem.-Ztg.* 52, 397-8(1928).—Outline of the control work done at the "Strassenbahnlaboratorium der Provinz Brandenburg." The method used for the analysis of mixts. of bitumen and tar by means of H_2SO_4 is summarized. The correction factor for the bitumen is about 4%. A. L. H.

Wall board patent history. JOSEPH ROSSMAN. *Paper Trade J.* 86, No. 22, 50-3(1928).—A review of U. S. patents, with brief abstracts. A. PAPINEAU-COUTURE

Use of petroleum and petroleum products for the preservation of wood. A. SAPOSHNIKOV AND B. KOPYTKOVSKI. *Neftyanoe Khozyaistvo* 11, 748-54(1926); *Chem. Zentr.* 1927, I, 2381.—Alkali salts of naphthenic acids (especially those of acids which be-

150–5°) kill the fungus, *Merulius lacrimans*, even when they are used in lower concn. than ZnCl_2 or NaF . Mold fungus, on the other hand, is killed only with higher concns. of naphthenic acid salts. A mixt. of NaF and naphthenic acid salts (equal wts.) is recommended for the preservation of wood. Another active preserving agent is prepd. by mixing creosote oil (from coal tar) with petroleum distillates, *e. g.*, with gas oil or light lubricating mazout (Engler mazout). For each 1 vol. of creosote oil, 3 vols. of petroleum product are used.

C. C. DAVIS

The mechanical and physical laboratories for testing lime and cement at the Polytechnic Institute at the University of Grenoble (DEJEAN) 2. Rubber sheet material with fibrous backing (U. S. pat. 1,677,284) 30. Producing granules from steatite or similar materials (U. S. pat. 1,677,701) 18.

BOLOMEY, J.: *Durcissement des mortiers et bétons*. Paris: Rouge et Cie. Paper, Swiss F. 2.

FORESTIER, V.: *Agenda Dunod 1928. Béton armé*. Coll. Agendas Dunod. Paris: Dunod. 356 pp. F. 17.

Cements high in alumina. ALEXANDER HASSELBACH (to G. Polysius). U. S. 1,677,182, July 17. A raw cement mixt. is introduced into a rotary kiln together with a small proportion of fluorspar and burning is effected at a temp. below the m. p. of similar mixts. not contg. fluorspar.

Cement mixtures, etc. H. E. DOUGHTY. Brit. 280,813, June 7, 1927. Mixts. of cement, plaster, gypsum, etc., with sand, coloring agents and the like are ground and the fine particles are drawn off by air flotation *in vacuo*. Ingredients such as Na silicate, alumina, silica or gypsum may be added during the process.

Mixture of cement and fiber for making slabs, etc. J. S. HANCOCK and W. H. MACMENIGALL. Brit. 280,456, May 30, 1927. An app. is described in which the dry material, after a preliminary mixing, is fed to a breaker with a stream of water and the wet mixt. is then delivered to a head box with more water obtained from the backwater of a forming machine to which the wet mixt. is supplied.

Concrete building blocks. HARMON S. PALMER. U. S. 1,676,153, July 3. Layers of sugar cane fiber are secured to the sides of concrete blocks and serve to retain the block in shape before setting and also serve as an insulation.

Internal curved baffle system for rotary kilns for cement making, etc. FRITZ LUTHER (to G. Polysius). U. S. 1,675,717, July 3.

Rotary kiln and cooler for cement manufacture. POVL T. LINDHARD (to F. L. Smidth & Co.). U. S. 1,675,416, July 3.

Road surfaces. R. H. KING. Brit. 280,819, June 16, 1927. Soil forming the road surface is burned *in situ* to harden it. A wearing surface may be formed by fusing the soft earth and mixing it with bitumen. Various details are given and an app. is described.

Street pavements. AUGUST E. SCHUTTE (to Warren Bros. Co.). U. S. 1,677,600, July 17. A foundation is covered with a thick layer of mineral aggregate and bitumen which is rolled, tamped and consolidated until cold and solid and incapable of being further distorted; the superficial portion of this layer is then melted and a thin wear-resisting layer is placed upon it, followed by further rolling.

Porous clinker for use in making building blocks, concrete, etc. E. I. LINDMAN. Brit. 280,567, Nov. 10, 1926. Clays, rocks or the like which expand on heating are heated by burning in air after crushing and mixing with fuel. Various details are specified.

Veneer sheets for covering walls, etc. J. BRÜNING & SOHN, A.-G. Brit. 280,785, Feb. 25, 1927. Embossed plywood veneer sheets of the thickness of paper are prepd. by first thickly coating the back with glue or paste contg. a hardening agent, *e. g.*, CH_3O , ZnO or waterglass, and then embossing. The back is moistened and pressed onto a wall to secure it to the latter.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Analysis of solid fuels. I. Sampling, proximate and ultimate analysis. A. A. POTTER AND H. L. SOLBERG. *Power* 67, 1094–6(1928).—The processes of sampling and of making a proximate analysis are described. II. Determination of heating

value. *Ibid* 68, 105-7.—A review of methods for estn. of ultimate compn. when proximate analysis, heating value and S content are known. D. B. DILL

The production of smokeless domestic fuel. JOHN ROBERTS. *Gas J.* 183, 42-3 (1928).—An historical review of process development. F. S. GRANGER

Purification of benzene for motor fuel. F. T. HATSWELL. *Gas World* 88, Coking Sect., 11-4 (1928).—Crude benzene, after washing with dil. acid, is treated, for 1 hr. at 50-60°, with an intimate mixt. of an active form of $\text{Fe}_2(\text{SO}_4)_3$ and an absorbent material. This transforms the objectionable impurities into products which are absorbed. It is then filtered, neutralized and distd. The losses are much smaller than with the usual acid washing, with which the costs compare favorably, and the product, though unable to pass the acid tests, is stable, free from gumming materials and S, and performs better in the engine than a normal high-grade benzene. F. S. GRANGER

Wood as a fuel. L. A. WANDERLEY. *Bol. soc. chim. S. Paulo* 1, 73-7 (1928).—The heat of combustion of 10 different kinds of *Eucalyptus* varied between 4744 and 4655 cal. or an av. of 4680 cal. Five other typical Brazilian trees gave practically the same results. The value of the wood as a fuel depends almost entirely on the water content and on the sp. wt. R. D. BUMBACHER

Drying wood refuse for fuel. E. V. AHARA AND R. C. WIREN. *Pulp Paper Mag. Can.* 26, 377-9 (1928).—A description of the Nordstrom drying tower installed at the Wisconsin Rapids mill of the Consolidated Water Power & Paper Co. and of its performance, which was found to agree with the constructor's guarantee within 5%. One of its outstanding features and merits is that it works at very nearly 100% efficiency with gases at as low a temp. as 193° F. A. PAPINEAU-COUTURE

Coals of the Cheremkhov district. G. I. STADNIKOV AND E. E. IVANOVSKII. *Papers Karpov Chem. Inst. Bach. Memorial Vol* 1927, 198-205.—Cheremkhov coal mines are 80 km. West of Irkutsk and form a part of the richest coal deposits, estd. at 150 billion tons of solid fuel. The characteristic feature of the former is that their S content increases from 0.2 to 6.0% the deeper the mine. Analyses of 5 samples of these coals are given. BERNARD NELSON

The bitumens in Hokkaido coals. KWAN TAWADA. *J. Fuel Soc. Japan* 7, 11-7 (English Section) (1928).—The bitumens of Hokkaido coals were studied with a view to finding a theoretical method for obtaining good coke. The bitumens were extd. with benzene and pyridine by Fischer's method. The benzene and pyridine exts. were sepd. into oily and solid bitumens by the methods of Wheeler and Bone and of Wheeler, resp. The benzene and the pyridine exts. are similar in quantity and character. The petr. ether-sol. fraction and the oily bitumen resemble each other and may be regarded as hydrocarbon; the ether-sol. and the alc. ether-sol. solid bitumens may be resinous substances; acetone-sol. bitumen and also the solid bitumens insol. in acetone, alc. and ether resemble humus substance. The caking and swelling properties of exts. were studied to det. which theory, Fischer or Bone, can be applied to Japanese coal. The Muck test shows that the caking and swelling properties of each fraction of solid bitumen are stronger than those of oily bitumen, alc. sol. and ether-sol. solid bitumen have the strongest caking power while alc.-insol. and ether-insol. solid bitumen is inferior to others in this respect. This conclusion appears to be well in accord with Bone's results. The results obtained in regard to the swelling property coincide perfectly with Fischer's; that is, oily bitumen does not swell, while solid bitumen almost always swells. The softening and decompn. temps. of the exts. were studied by the method of Audibert. Almost all constituents of coal soften and decompose between 350° and 400° at any rate of heating. The decompn. points of the benzene exts. are arranged in the order of extd. residue, solid bitumen, oily bitumen; those of the pyridine exts. are in the order α , γ , β compd. The softening points are almost in the same order as the decompn. points. Audibert's principle, that if T_s (the softening temp.) is lower than T_p (the decompn. temp.) the coal can be coked, and if $T_s > T_p$, it is difficult to obtain good coke, was confirmed. The problem of coal blending is discussed, but no scientific theory is proposed. FRANK I. NAKAMURA

Bituminous coal as water-gas generator fuel at Detroit. HENRY FINK. *Gas Age-Record* 61, 777-8 (1928).—The Tireman Ave. water-gas plant of the Detroit City Gas Co. has been operated on 100% bituminous coal since Nov. 1925. Only slight changes were necessary. Elkhorn coal is used with a 4 min. cycle making a 526° B. t. u. gas of 0.630 to 0.650 sp. gr. As compared to oven coke, 4 in. \times 6 in. coal has the following advantages: lower fuel requirement, higher oil efficiency, less screening loss, lower clinkering cost, lower cost of maintaining generator linings and less deterioration of back run pipes and valves. LESLIE B. BRAGO

Bituminous coal as water-gas generator fuel. GEORGE H. PARK. *Gas Age-*

Record 61, 849-50, 853-4(1928); cf. preceding abstr.—A method of utilization of 100% coal in water-gas generators with expense figures from the Charleston plant of the South Carolina Power Co. Straight water-gas plants, with some few exceptions, could profitably use 50 to 60% bituminous coal as generator fuel. **LESLIE B. BRAGG**

Coal liquefaction and its importance in world economy. H. BRUCKMANN. *Mining J.* 160, 69-70, 94, 116(1928).—B sketches Germany's oil needs and summarizes the products and yields of high- and low-temp distn. The early studies of Bergius are described and the general features of the process outlined. The products of hydrogenation of 1000 kg. of coal are 650-700 kg. of oil, 230 kg. of pitch residue and 120 kg. of gas and loss. The oil on distn. gives 31% motor fuel, 41% Diesel engine oil, 16% fuel oil and 12% lubricating oil. B. figures costs at 71 marks per 1000 kg. treated, from which the products at German prices conservatively yield 141 marks or a surplus of 70 marks per 1000 kg. of coal. A plant to produce 50,000 tons of coal oil annually costs about 10 million marks. This means a conservative profit of 25% on the capital cost of the plant. This would be increased for brown coal due to cheaper mining costs. B. suggests yearly construction of plants of 200,000 tons oil capacity. Thus up to 1932 construction will keep pace with the increase in demands, for a few years equl. will be established; after this importations will gradually decrease. To reach independence, Germany will require an investment of 500 million marks. **ALDEN H. EMERY**

Liquid fuel from coal. DAVID BROWNLIE. *Gas Age-Record* 61, 879-81, 884, 913 5(1928). The subject is carefully reviewed with particular emphasis being laid on low-temperature carbonization, 30 of the more important processes being discussed in particular. **LESLIE B. BRAGG**

The Bergius process for the liquefaction of coal. HENRY O. ASKEW. *New Zealand J. Sci. Tech.* 9, 321-31; 10, 1-16(1928). A summary of the developments of coal liquefaction published between 1924 and 1927 with a bibliography of the literature and patents consulted. Plant details, operation, costs and chem reactions occurring in the process are reviewed. **A. S. CARTER**

Blending of coals before extraction of gas. A. THAU. *Gas u. Wasserfach* 69, 970 1(1926), *Chem. Zentr.* 1927, 1, 825-6.—A review of recent developments by various investigators. **C. C. DAVIS**

Diesel engine performance on oils obtained from the low-temperature carbonization of coal. J. S. BROWN. *J. Roy. Tech. Coll. (Glasgow)* 1927, No. 4, 76-84.—The behavior of oils from the low temp. carbonization of coal has been compared with that of creosote oils (I) from coal and petroleum oil, (II) from shale, when used in a single-cylinder Mirreles Diesel engine, bore and stroke 12 X 18.25 in., at 200 r. p. m., compression 470 lb. per sq. in., water jacket temp. at 135° F. Three carbonization oils were tested: Maclaurin oil (III), from a vertical retort heated by partial combustion, L. and N. oil (IV) from a rotary inclined retort heated by inert gas, and Turner oil (V) from retorts directly heated internally with superheated steam. No operation records could be obtained on III because of its high viscosity which rendered fuel injection impossible under usual conditions. The thermal efficiency of the engine with I, II, IV and V was the same, av. 0.5 lb. fuel per b. h. p. hr. (18,500 B. t. u. basis). At low power output V did not preignite, IV did occasionally, but IV and V were both better than I though not quite as good as II. Starting tests showed that none of the oils had the qualities of II for starting with a cold jacket (62° F.). **A. S. CARTER**

Dvorkovitz system of low-temperature carbonization demonstrated. A. C. BLACKALL. *Combustion* 18, 180 1928.—A short discussion. **LESLIE B. BRAGG**

A new British low-temperature carbonization process. DAVID BROWNLIE. *Gas Age-Record* 62, 39-40, 48(1928); cf. *C. A.* 22, 1667.—The Winsor process is described. It consists essentially of a circular tunnel oven, very similar to the circular kiln used for pottery and ceramic ware. An installation with a throughput of 50-60 tons of coal per day is to be built at Erith, near London. It is to have an over-all outside diam. of 44 ft. 2 in., with the tunnel portion 11 ft. 5 in. wide, leaving a hollow center portion 28 ft. 4 in. diam. Ninety vertical, cast iron retorts, 5 ft. 6 in. high, 4 ft. 6 in. long and 8 in. wide are fixed on a traveling cast iron floor, driven by gearing and running on ball bearings. The tunnel is heated externally, the hot gases passing through about half of the total periphery counter-current to the retorts, which are mechanically charged and emptied. The charge is to be heated to a max. temp. of 500-600° and a cycle is to be about 6 hrs. **LESLIE B. BRAGG**

A British carbonization test on a rotary retort. W. HAMILTON GORDON. *Combustion* 10, 44, 46(1928).—A discussion of a "Fusion" rotary retort test carried out by the Brit. Fuel Research Board. **LESLIE B. BRAGG**

Dry distillation at low temperatures of the coals and the bogheads of the Moscow

district. A. P. SHAKIHO. *J. Chem. Ind. (Moscow)* 4, 324-6(1927).—The coals of the Moscow district are extremely rich in ash and S, are very hygroscopic and yield a coke which does not agglomerate and is easily alterable on keeping. S.'s investigation tends to show that the most rational utilization of these coals consists in distg. them at low temps. The semicoke obtained from the coals is a powder which is less hygroscopic than the coals and contains less S, but more ash; its high volatile matter content enables it to burn well, and its calorific capacity is higher than that of the coals from which it was derived. Primary coal tar is obtained in small quantities, has a high S content, a small paraffin content and a relatively high calorific capacity. Little of primary gas is obtained and the latter requires purification before it can be used as lighting gas. The bogheads are much more interesting than the coals, as they give, on dry distn. at low temps, 45% of a valuable primary tar. The semicoke obtained from the bogheads has little interest. The primary gas obtained from the bogheads had a high calorific capacity and is valuable.

BERNARD NELSON

The growing importance of coal as a raw product. THOMAS S. BAKER. *Combustion* 18, 191-3(1928).—A discussion.

LESLIE B. BRAGG

Pulverized coal—a short comparison of American and English practice. GEO. F. ALLIN. *Fuel Econ. Rev.* 7, 46-7(1928).—Differences in data showing results of using powdered coal are ascribed to (a) the greater H₂O content of dried English coal, (b) the greater absorptive power of the latter, (c) the greater av. humidity of the English atm., (d) the necessity for more thorough drying in Great Britain, and (e) the greater hardness of English coal, and therefore difficulty of pulverizing it. Even with these disadvantages the use of powdered coal is recommended.

W. C. EBAUGH

Some observations on coke quality in relation to the size, mixture and storage of the coal. HS. DERINGER. *Monats. Bull. Schweiz. Ver. Gas Wasserfach.* 8, 121-4(1928).—The investigation was carried out on a large scale under industrial conditions, on lower Silesian coal dust, pea and nut and Ostrau-Salm small coal. The coal was coked in a chamber oven in continual operation. Details are lacking. The results are expressed in terms of sieve tests in which 300 kg. samples of coke were passed through a series of screens and the percentages passing through each screen were plotted against the mesh. The coke is valued according to the predominance of larger sizes. On this basis, the coke from the dust coal was very superior to that from the nut or Ostrau coals, because of the fluxing action of the dust on coking. For the same reason, the predominance of larger pieces in the coke from mixts. of the coals increased with the proportion of dust coal. The dust and Ostrau coals mixed before coking yielded a coke showing a somewhat better sieve test than a corresponding mixt. of the cokes obtained from the same coals separately. After several months storage, these coals individually yielded definitely more broken-up cokes than the same coals fresh. But with a mixt. of the 2, the effect of storage was very slight.

F. S. GRANGER

Economic and engineering survey of the gas industry. WALTER C. BECKFORD. *Gas Age-Record* 61, 351-4, 393-6, 400(1928).—A discussion of the problems confronting the gas industry. Among these is the possible use of butane and propane, obtainable from natural gas casing head operations, for the enrichment of lean gases.

LESLIE B. BRAGG

The economics of carbonization at electric central stations. R. P. SOULE. *Combustion* 18, 237-43, 260(1928).—A discussion.

LESLIE B. BRAGG

Natural gas as an industrial fuel. FRED S. EDGREN. *Gas Age-Record* 61, 702-6(1928).—The utilization of natural gas as an industrial fuel is discussed. Nomographic charts, for detg. the cu. ft. of gas equiv. to 1 barrel of oil and the equiv. cost of gas and oil, and tables and curves, for use in combustion calcs., are given.

L. B. B

Mixing natural and manufactured gas. H. E. MERRILL. *Gas Age-Record* 61, 585-7(1928).—See C. A. 22, 678.

LESLIE B. BRAGG

The dehydration of gas. T. K. CLEVELAND AND W. H. FULWEILER. *Gas Age-Record* 61, 743-4, 749-50, 779-82(1928).—A review and general discussion of corrosion and the various methods of gas dehydration, with their advantages, disadvantages and probable costs.

LESLIE B. BRAGG

Gas dehydration. E. F. COFFMAN. *Gas Age-Record* 61, 507-9(1928).—Tests made on the distribution system of the Public Service Gas Co. of N. J. showed that the gas leaving the governor on a 50 lb. main line had a dew point of 31.5°. On passing through a water-sealed holder the dew point rose to 66° but with a layer of oil 1.7 in. deep on the water the dew point rose only 2.5°. Repairs to meter diaphragms alone cost 1.1 cents more per 1000 cu. ft. with wet gas than with partially dehydrated gas and it is estd. that dehydration will save from 1½ to 2½ cents per 1000 cu. ft.

LESLIE B. BRAGG

Calcium chloride for gas drying. CHARLES COOPER. *Gas Age-Record* 61, 477 (1928).—Polemical versus Sperr (C. A. 21, 1535) and Bragg (C. A. 22, 1670) with respect to the corrosion of equipment as a result of the use of CaCl_2 for gas drying. L. B. B.

Tables for determining specific gravity and heat value of gases. FRED M. REITER. *Gas Age-Record* 61, 469-71 (1928).—A set of tables is given by means of which the sp. gr. and heat value of a gas may be easily computed from the gas analysis. L. B. B.

Waste heat recovery. MAJOR W. GREGSON. *Gas Age-Record* 61, 397-400; *Engineering* 125, 241-3, 272-3 (1928).—A discussion with test data from waste-heat recovery plants on gas-retort settings. The normal gas works can meet the whole of its power and process requirements by means of waste-heat steam. L. B. B.

Gas analysis solutions. F. M. REITER. *Gas Age-Record* 62, 6, 8-9 (1928).—Directions are given for the making up of gas analysis solns for the absorption of CO_2 , O_2 , illuminants, CO , C_2H_6 , $(\text{CN})_2$, C_2H_4 , NH_3 , CS_2 , H_2S and other gases. L. B. B.

The removal of phenol wastes from gas plants. LOUIS SHNIDMAN AND LINN B. BOWMAN. *Gas Age-Record* 61, 626-8, 634 (1928).—A summary of a study of the action of phenol wastes upon sanitary sewage and upon sludge digestion in Imhoff tanks. NH_3 still waste can be added to sewage in the ratio of 1-2000 without ill effects on the operation of the Imhoff tanks. Only a small quantity of the phenols is destroyed in this manner but trickle filters or activated sludge apparently destroys the phenols.

The Cottrell electrical precipitation processes. N. W. SULTZER. *Gas Age-Record* 61, 505-6, 516 (1928).—A discussion of the use of elec. precipitators for detarring gas. Tar, oil fog and any condensed water vapor is removed with an efficiency of over 95%. There is considerable saving due to a longer life of the oxide, lower pressure resistance and little maintenance. LESLIE B. BRAGG

Experience with continuous vertical retorts. W. H. DREAPER. *Gas Age-Record* 61, 907-9 (1928).—The Vancouver plant of the British Columbia Elec. Power & Gas Co., Ltd., using Glover-West vertical retorts is described. Its operation is discussed, with performance data on the waste-heat boilers being given. LESLIE B. BRAGG

British tests on the Crozier retort. A. C. BLACKALL. *Combustion* 18, 370-1 (1928).—A discussion. LESLIE B. BRAGG

The thermal insulation of retort settings. A. J. DALE AND A. T. GREEN. *Gas J.* 183, 37-42 (1928); *Gas World* 88, 712-8 (1928).—A review and general discussion. F. S. GRANGER

The Rochester silica gel light oil treating plant. R. E. KRUGER. *Gas Age-Record* 61, 577-8, 587-8 (1928).—A description of the plant at the Rochester Gas & Electric Corp., Rochester, N. Y. A ratio of not less than 200 parts of oil per part of gel is being used, producing an oil of 19 to 25 Saybolt color range. A cost of 0.75 cents more than the acid process per gal. of crude light oil is offset by a 13% greater yield. L. B. B.

The treatment of water-gas plant waste. E. J. MURPHY. *Gas Age-Record* 61, 817-8 (1928).—An installation at the Brooklyn Union Gas Co. plant is described. The raw effluent (waste water) from the separators of the water-gas plant is treated in a mixing tank with 5 lb. of lime and 4 lb. of FeSO_4 per 1000 gal. of effluent. The suspended matter coagulates almost immediately and is then sepd. in a Dorr clarifier. The cost is 24 cents per 1000 gal. LESLIE B. BRAGG

The evolution of the water-gas machine. F. W. STEERE. *Gas Age-Record* 62, 3, 5, 9, 10 (1928).—An historical review. LESLIE B. BRAGG

Rational presentation of flue gas analysis computations. R. H. MCCARTHY. *J. Eng. Education* 18, 940-4 (1928).—The computation procedure is based directly upon fundamentals, each step retaining a phys. conception. Examples are given. DAVID GORDON

Long-distance gas transmission. L. A. KIRCH. *Gas Age-Record* 61, 391-2, 402 (1928).—A consideration of the expenses and savings of centralized production and long-distance gas transmission. K. predicts that this centralization has only started. LESLIE B. BRAGG

Long-distance transmission of gas. ELVERS. *Z. Ver. deut. Ing.* 72, 869-75 (1928).—A discussion of two memoirs on the production and distribution of natural and manufactured gas throughout Germany, showing present and prospective sources, pipe lines and markets for gas. (8 maps) W. C. EBAUGH

Compression and transmission of carburetted water gas. M. P. CLEGHORN. Iowa State College. *Gas Age-Record* 61, 809-10, 819-20 (1928).—A consideration of the mech. losses caused by the compression and transmission of gas, with test data. LESLIE B. BRAGG

The corrosion of iron return mains. O. A. HILL, JR. *Gas Age-Record* 61, 429-30

(1928).—The collecting of CO_2 in "dead ends" of return lines may reduce the life of the line to $\frac{1}{8}$ of its normal life under uniform corrosion. **LESLIE B. BRAGG**

Pipe corrosion and protection. **W. G. HAGAN.** *Gas Age-Record* **61**, 697-8(1928).—A discussion. **LESLIE B. BRAGG**

Solving the dust problem. **R. C. BOUGHTON.** *Gas Age-Record* **61**, 625, 634(1928).—A description of an app. used to remove iron rust dust, resulting from the passage of dry natural gas through lines which had handled wet mixed gas. The app. consisted of a section of 20-in. pipe, 6 ft. long, which contained a 6-in. cylindrical muslin screen. The gas entered the 20-in. pipe and passed through the screen into a 6-in. main, the dust collecting on the outside of the screen and eventually dropping to the bottom of the trap. **LESLIE B. BRAGG**

Gas-measuring devices. **T. H. KERR.** *Gas Age-Record* **61**, 699-700(1928).—A discussion, with particular reference to the measurement of natural gas at the well. **LESLIE B. BRAGG.**

A. B. C. grate operation at the Minneapolis Gas Light Co. **H. B. YOUNG.** *Gas Age-Record* **61**, 813-4(1928).—The results of tests, with data, when operating in U. G. I. carburetted water-gas machines. **LESLIE B. BRAGG**

Fundamental principles in the design of gas-burning equipment. **N. T. BRANCHE.** *Chem. Met. Eng.* **35**, 357-60(1928).—The combustion mixt. must be supplied under sufficient pressure at the burner nozzles to have a higher velocity than the rate of flame propagation, as otherwise a flash-back occurs which ignites all of the mixt. in the manifold. A detailed description of proportioners for gas and air to secure max. efficiency is given. **J. H. PERRY**

The role of catalysts in high-pressure synthesis from water gas. **PERK F. FROELICH.** *J. Soc. Chem. Ind.* **47**, 173-9T(1928).—The high-pressure synthesis of NH_3 and of "Synthol" is briefly discussed. The latter process is considered to be prohibitive from a commercial standpoint because of the complexity of the products obtained. These two applications of high-pressure technic have demonstrated the possibility of synthesizing the entire aliphatic range of compds. from the cheapest grade of coal, and have stressed the necessity of bringing the reactions under control so as to obtain (1) one compd., (2) a limited no. of single compds. or (3) a mixt. of related compds. The synthesis of any aliphatic compd. is possible by studying intensively temp., pressure and specific catalysts. The synthesis of alcs. by oxide catalysts is outlined, and it is shown that there is a very close relation between the decompn. and synthesis of CH_3OH . **J. H. PERRY**

The conditioning of ammonium sulfate in large plants. **ANON.** *J. Indust. Gas* **52**, 271-3(1928).—The article deals mainly with the Wilton process, the special feature of which is the replacement of the centrifuges by a slow-moving acidproof metal-cloth belt conveyor on which the draining of the acid salt is completed and a preliminary drying is accomplished after neutralization. The belt acts as a filter, passing over 2 suction boxes, just after the salt is sprinkled by a dil. NH_3 soln. The belt delivers the nearly dry crystals, intact and uncaked, to a finishing drier, consisting of a bundle of steam-heated tubes, and passes through a washing trough on the way back. The final product contains not more than 0.1% moisture. **F. S. GRANGER**

Looking into the future of by-product ammonia. **C. J. RAMSBURG.** *Koppers Co. Chem. Met. Eng.* **35**, 417-8(1928).—Production statistics are given. It is predicted that production of by-product NH_3 will slowly increase. **E. H.**

Drying sulfur recovered from manufactured gas. **K. N. CUNDALL.** *Chem. Met. Eng.* **35**, 407-11(1928).—S sludge, 55% H_2O , recovered from gas plants (cf. *C. A.* **21**, 1699) was reduced in H_2O content by steam digestion, rotary drying or tunnel drying. The product is particularly applicable for insecticide or for soil treatment. Particle size is below that of any com. brand of S. **G. B. TAYLOR**

Gas from lignite. **DAVID BROWNLIE.** *Gas Age-Record* **61**, 355-7, 358(1928).—Lignite briquets yield a high-grade fuel on low-temp. carbonization but it has been found almost impossible to carbonize raw lignite of 35-40% moisture in this manner. High-temp. carbonization of briquets yields 8000-11,300 cu. ft. of 375-400 B. t. u. gas but the results have not been very conclusive as yet. **LESLIE B. BRAGG**

Gasification of lignite. **J. H. HRUSKA.** *Fuels and Furnaces* **6**, 907-8(1928).—H. discusses the use of lignite in the gas producer, important in Central Europe because of the large lignite resources in the vicinity of their steel mills and a corresponding lack of better fuel. Western Czechoslovakian lignite of 10,000 B. t. u. was gasified in a Kerpely producer at a rate of 51,170 lb. per day. A 136 B. t. u. gas of the following compn. was obtained: CO_2 3.8, CO 28.3, O_2 0.4, H_2 11.3 and CH_4 0.7%. 0.4-0.7 lb. steam per lb. lignite is required. A table shows the relationship between the compn.

of 8 lignites and the gases produced from them in various plants—fuel values of lignites varied from 8400 to 10,400 B. t. u.; resulting gases were within the following limits: CO_2 3.8–5.7, CO 25.4–28.9, H_2 9.7–12.4 and CH_4 0.8–1.4. ALDEN H. EMERY

The chemical analysis of benzenes. G. BANDTE. *Erdöl u. Teer* 4, 107–9, 131–2 (1928).—Analyses were made on straight-run petroleum, low-temp. coal tar and cracked gasolines and synthetic mixts. of these with benzene, by the Riesenfeld and Bandte (*C. A.* 20, 3346, 3801; 21, 489, 645, 1538) and Kattwinkel (*C. A.* 22, 3039) methods, comparing changes in oil and acid vols., different standing times, etc. In general, the decrease in oil vol. was found more accurate than the increase in acid vol. Violent shaking was unnecessary; 3 hr. standing was sufficient in all cases and 1 hr. in most. The Kattwinkel $\text{P}_2\text{O}_5\text{--H}_2\text{SO}_4$ soln. gave accurate results for unsatd. and aromatic, but, with high aromatic content, only if the sample was dild. with "normal" gasoline, whereas with the R. and B. method dildn. was unnecessary. The Kattwinkel boric-sulfuric acid soln. gave, with high unsatd. content, low values attributed to polymerization, and, with high aromatic content, high values, for unsatd., because of action on the aromatics. F. S. GRANGER

Low-temperature tar. JOHN M. WEISS. *Combustion* 18, 182–3(1928).—A discussion. LESLIE B. BRAGG

Low-temperature carbonization. H. D. SAVAGE. *Combustion* 18, 297–301 (1928).—Polymetal versus Weiss (cf. preceding abstr.). LESLIE B. BRAGG

The cracking of low-temperature coal tars. A. E. DUNSTAN AND H. G. SHATWELL. *Ind. Chemist* 4, 109–14(1928).—Two types of tar were investigated: (1) from feebly coking South Yorkshire coal, and (2) from a blend of a steam coal and a strongly coking coal. Straight-run spirits were obtained from these tars by steam distn., followed by fractionation of the distillate; the spirits so obtained showed anti-knock properties equal to C_6H_6 . An attempt to crack the distn. residue from the fractionation of the steam distillate yielded little cracked spirit and large amts. of pitch. Cracking stock was then prepd. by steam distg. 2 and topping the distillate to 170° . A portion of this stock was cracked as is, and another portion was sepd. by NaOH treatment into hydrocarbons and phenols, which were separately cracked. The phenols yielded simpler tar acids, but no hydrocarbons; the unsepd. stock yielded results intermediate between the phenols and the hydrocarbons. Pressure distn. of tar distillates from either type tar yielded 6.2 to 7.7% hydrocarbons, as compared to 36.8% from Persian fuel oil. T. S. CARSWELL

Tar emulsions. E. D. CARSWELL. *Gas Age-Record* 61, 661, 668(1928).—As a result of trouble experienced with tar emulsions which would not sep. in the separator a dehydrator was built to dry the tar. This consisted of a tank in which the tar was agitated with compressed air and heated with steam coils until all of the water was driven off, which was indicated by a rapid rise in the temp. of the tar. L. B. B.

The Rütgers viscometer. HEINRICH MALLISON. *Teer u. Bitumen* 26, 317–8 (1928).—The Hutchinson viscometer is recommended for roads tar but is not adapted to thinner tars because of the shortness of the measured time interval. The Rütgers viscometer is applicable to tars of all viscosities. F. S. GRANGER

Coke preparation. L. E. KNOWLTON. *Gas Age-Record* 61, 811–2, 814(1928).—A discussion. LESLIE B. BRAGG

The future of coke as domestic fuel. HAROLD J. ROSE. *Gas Age-Record* 61, 631–3(1928).—An address. LESLIE B. BRAGG

The new coke plant of the Lothringen concern in Hiltrop. HEINRICH KAMM. *Stahl u. Eisen* 48, 753–61(1928).—The daily output of the new plant is 1000 tons. The coal is first dried in a waste gas heater, then in a revolving furnace. The coke as a rule is cooled dry, its heat being utilized by a current of air for the production of steam. For an exigency a wet quenching equipment is provided, with notable labor-saving devices, for the transportation of the coke. The gases are washed with water which is not cooled, thereby effecting a sepn. of the volatile and non-volatile NH_3 compds. The S is obtained from the crude C_6H_6 by washing with NaOH . The economic advantages and the effected savings are discussed; plans and photographs of the new plant are given. J. A. SZILARD

Some factors influencing reactivity of coke. I. Carbonizing temperature and heat treatment in nitrogen. Institution Gas Fellowship Report. J. A. SUTCLIFFE AND J. W. CONN. *Gas World* 88, 709–12(1928).—To det. the influence of carbonization temp. on reactivity, cokes prepared at 500–1100°, with and without addn. of inorg. substances, were tested for reactivity in steam. Coke carbonized at 800° had the max. reactivity in all cases. 500° gave distinctly lower results and 1000° lower still. Fe_2O_3 , CaCO_3 , Na_2CO_3 and K_2CO_3 all showed a marked catalytic effect. The reactivity of coke prepd.

at 500° was very little affected by heating 2.5 hr. at 1000° in N₂, but heating 800° coke for 50 hr. at 900° caused considerable diminution in reactivity. **II. The effect of heating a coke in various gases on its reactivity.** F. J. DENT. The activity in CO₂ was detd. after treatment of the coke with H₂, CO, CH₄ or C₂H₄ for 1 hr. at various temps. After treatment with H₂ or CO the cokes had somewhat lower reactivity than the untreated, but after gasification in CO₂ for 2 hr. the difference in reactivity had disappeared. CH₄ lowered the reactivity decidedly. The diminution was lessened somewhat after passage of CO₂ for 2 hr. C₂H₄ had a more marked effect than CH₄, its greater decompn. affecting the coke by deposition of C on it. F. S. GRANGER

Reflux system and apparatus for fractional condensation of vapors from coal tar (U. S. pat. 1,676,232) 13. Conduit and associated apparatus for measuring the quantity of powdered coal carried in suspension (U. S. pat. 1,677,691) 1. Absorption plant [for treating coke-oven gases] (U. S. pat. 1,677,409) 1.

FABER, ALFRED **Braunkohlengeneratorgas. Band 16. Kohle, Koks, Teer.** Halle (Saale): W. Knapp. 263 pp. M. 16; bound, M. 17.80.

Fuel blocks. F. L. SHARP. Brit. 280,696, Oct. 29, 1926. Layers of pitch, resin or other highly combustible material may be placed between pieces of flat wood and the layers secured together. Various structural features are described.

Motor fuel. DAVID COSTAGUTA. U. S. 1,677,273, July 17. A mixt. for addn. to gasoline in order to prevent C deposition in engines comprises trinitrophenol 2, Et₂O 3, naphtha 20, "petroleum ether" 60 and ligroin 15%. Cf. C. A. 21, 2551.

Destructive hydrogenation of coal, oil, etc. INTERNATIONALE BERGIN-COMPAGNIE VOOR OLIE- EN KOLENCHEMIE AND A DEBO. Brit. 280,734, Jan. 10, 1927. A high-pressure reaction vessel is connected through a multiple condensing system to an engine which utilizes the pressure of the uncondensed gases.

Distillation of coal. MILON J. TRIMBLE. U. S. 1,676,675, July 10. Coal in a closed retort is treated with superheated steam under a pressure of not less than 5 lb. The steam and volatile products are led off, and fractional condensates and gas are recovered. An app. is described. Cf. C. A. 22, 1672.

Distillation of coal and other carbonaceous materials. FELIX FRANK (to Wm. W. Kemp). U. S. 1,677,757, July 17. Lignite or other carbonaceous material to be distd. is treated in an air-tight retort, which may be of the revolving type, by the direct action of a flame produced by burning a previously formed mixt. of gases including O, in the presence of inorg. catalysts such as Fe, Cu, Ni, W, V or their oxides, peroxides or salts. A similar procedure may be applied to coal, lignite, shale, peat, wood, heavy hydrocarbon oils, tars, asphalt, etc. App. is described. U. S. 1,677,758 specifies similar distns. under reducing conditions, *e. g.*, in the presence of an excess of H.

Combustible gas. WM W. KEMP. U. S. 1,677,785, July 17. Material such as coal is charged into a gas generator from which air is excluded and heated to form gas by projecting into the generator the flame produced by the combustion of a thoroughly premixed gas and air mixt., the quantity of O in which is not more than just sufficient for combustion of the mixt. itself (but not of the gas-forming material supplied to the retort). A vertical generator construction is described.

Apparatus for dewatering peat, etc. STEN V. C. PLATE. U. S. 1,676,459, July 10. **Gas producer (fuel agitator construction).** CHARLES W. LUMMIS (to Morgan Construction Co.). U. S. 1,676,148, July 3.

Electric safety control for gas burners. GERHARDT F. SCHWARTZ. U. S. 1,676,671, July 10.

Safety device for gas burners. A. HOFMANN and E. CONRAD. Brit. 280,768, March 7, 1927.

Lessening exhaust of carbon monoxide from internal-combustion engines. EDWARD J. LACY. U. S. 1,675,611, July 3. A perforated pipe leading to the engine intake is placed in the exhaust pipe.

Apparatus for cooling incandescent coke employing inert gas in a heat exchange system. ARNOLD MORTTELI (to Dry Quenching Equipment Corp.). U. S. 1,677,196, July 17.

Apparatus for cooling coke and heating a boiler plant by circulating inert gases. FRANKFURTER GAS GES, F. P. TILMETZ and F. SCHUMACHER. Brit. 280,514, Nov. 11, 1926.

Coke-oven construction. JOSEPH BECKER (to The Koppers Co.). U. S. 1,675,687, July 3.

Coke-oven construction. THOMAS G. KUS (to Chicago Trust Co., Trustee). U. S. 1,676,736, July 10.

Synthetic coke briquets for metallurgical uses. BERTRAM E. CROCKER. U. S. 1,676,729, July 10. The C residue obtained in the manuf. of oil gas is incorporated with a gas-liberating substance such as CaCO_3 , the mixt. is formed into briquets and the latter are heated to effect liberation of gas.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

Determination of the composition of petroleum. B. TARASSOV. *Neftyanoe Khozaystvo* 11, 67-70(1926); *Chem. Zentr.* 1927, I, 830-1; cf. C. A. 21, 1179.—An application of the method of Egloff and Morrell (C. A. 20, 1509). Unsaturated hydrocarbons can be detd. by extn. with H_2SO_4 only when they are present in high proportions; otherwise the method is not sensitive. The content of unsaturated hydrocarbons can, however, be detd. in an approx. manner by detg. the crit. temp. of soln. with PhNH_2 (T_c) before and after treatment with 80% H_2SO_4 . When the H_2SO_4 is washed out of the treated petroleum with aq. alkali, naphthenic acids are also removed and T_c is increased. Detns. of synthetic mixts. of saturated benzene and naphthenic acid gave the following values of T_c , the data showing the vol.-% of naphthenic acids and T_c , resp.: 0, 72.2°; 1, 71.0°; 5, 66.2°; 15, 54.0°; 30, 36.6°; 50, 5.0°. The detn. of aromatic hydrocarbons by nitration yields satisfactory results, though no general coeff. is applicable for converting the nitro derivs. to hydrocarbons. For each fraction investigated a suitable formula is given, from which the conversion coeff. is obtained. The principle that all paraffins have the same T_c value, which is diminished to the same extent by naphthenes, is erroneous in both respects.

C. C. DAVIS

The molecular weight of petroleum products. B. KAMINER. *Neftyanoe Khozaystvo* 11, 219-23(1926); *Chem. Zentr.* 1927, I, 828.—The mol. wts. of various petroleum fractions were detd. cryoscopically in $\text{C}_2\text{H}_4\text{Br}_2$, C_6H_{12} , stearic acid and C_6H_6 and ebullioscopically in C_6H_6 . In stearic acid soln., the mol. wt. is independent of the concn., whereas in C_6H_6 and in C_6H_{12} it increases with increasing concn. For products isolated in the lab., the following mol. wts. were obtained in C_6H_6 : crude petroleum 250-63, gasoline (b. p. up to 190°) 119-22, kerosene (190-259°) 166-70, "gas oil" (259-64°) 227-31, solar oil (264-310°) 288-97, machine oil (310-320°) 411-20, cylinder oil (322-330°) 474-81, tar 711-32.

C. C. DAVIS

The oxidation of hydrocarbons as a technical problem. FELIX HEBLER. *Erdol u. Teer* 4, 333-4(1928)—A literature survey on the oxidation of petroleum and similar products.

F. S. GRANGER

The unsaturated hydrocarbons in the different products of petroleum. G. GANE AND (MMR.) M. ZILISTEANU-GHEORGHIU. *Bul. soc. chim. Române* 8, 3-10(1926).—The authors tabulate the density, flash pt., viscosity, gelling pt. and iodine no. (Wijs method) of samples of distd. and refined oils obtained from Roumanian refiners. Their results indicate that the iodine nos. are higher for the crude distd. oils and lower for the refined oils. The results confirm the view that the iodine no. increases with the density and b. p. of the product. Synthetic mixts. of C_6H_{12} , C_8H_{16} , mesitylene and benzene were analyzed by Tansz method with $\text{Hg}(\text{OAc})_2$ to give close agreement with the theoretical for unsatn. The method of Botcher and Kramer, using oleum, gave quant. results for the aromatic hydrocarbons present. A sample of light petroleum with a d. 0.730 gave an unsatn. of 12.5% by the Tansz method. Other fractions have not yet given satisfactory results.

D. H. POWERS

Manufacturing oil from oil shale and bituminous coal. G. W. WALLACE. *Combustion* 19, 23-8(1928).—The Dundas-Howes process is described and discussed with estd. plant and operating costs.

LESLIE B. BRAGG

Oxidation of mineral oils in presence of soluble catalyzers. G. S. PETROV, A. I. DANILOVICH AND A. YU. RABINOVICH. *Papers Karlov Chem. Inst. Bach. Memorial Vol.* 1927, 157-68; cf. C. A. 22, 2073.—To det. which catalyzers have the most potent effect in the oxidation of mineral oils, Cu, Zn, Pb and Mn salts of naphthenic acids were tried under identical conditions. The max. of activity was found to belong to Mn salts, $\text{Mn}(\text{C}_7\text{H}_{15}\text{O}_2)_2$, the min. to Zn salts. The oxidizing influence of Mn naphthen-

ates has been compared with that of Mn salts of sulfo acids of high mol. wt. and the former were found to be more energetic. The oxidizing effect of Zn naphthenates has been compared with that of Zn stearate and it was found that the former is greater, but only on account of the formation of more oxyacids. Oils refined with H_2SO_4 oxidize about to the same extent as non-refined oils, but in the case of the former the yield in sol. acids is greater, whereas in the latter case more oxyacids are obtained. Distd. oils very highly refined with fuming H_2SO_4 do not oxidize in absence of catalysts even when treated with air at 150° for 40 hrs., but they darken as a result of decompn. The oxidation deepens the color of a mineral oil. BERNARD NELSON

The composition of the volatile fractions of Kashperovsk shale oil. G. L. STADNIKOV AND A. E. WEIZMANN. *J. Russ. Phys.-Chem. Soc.* **59**, 859-66 (1927). - The shale contained 13.4% H_2O , 46.25% ash and 3.8% S. By distn. from a Fischer retort, 15% oil was obtained. The fraction volatile with steam was treated with 3% $HCHO$, and 3% naphtha sulfo acids to remove S. compds of acidic character. Redistd. with steam, the oil was washed with H_2SO_4 and Na_2CO_3 solns and fractionated. The various fractions were acetylated in the presence of $SnCl_4$ ($AlCl_3$ gives rise to side reactions). Analysis showed the presence of C_4H_8S derivs.; they were further purified by crystn. of the semicarbazones. Semicarbazones m. $192-3^\circ$ and $199-200^\circ$, having the compn. formula $C_7H_7ON_2S$, were those of AcC_4H_7SEt or $AcC_4H_7SMc_2$. Two semicarbazones, m. 177° and 166° , resulted from the isomers of AcC_4H_7SPr . These conclusions were checked by the prepn. and analysis of corresponding p - $O_2NC_6H_4NHNH_2$ derivs. BASIL C. SOYENKOFF

Standards for kerosene. A. SAKHANOV. *Neftyanoe Khozyaistvo* **11**, 233-7 (1926); *Chem. Zentr.* **1927**, I, 672. - Surface tension and d. measurements vary but little and are of no significance. Viscosity depends chiefly upon the compn. of the petroleum and is governed by the latter. The appearance of a turbidity on chilling depends upon the presence of dissolved paraffin and is avoided by the proper regulation of the compn. In general the compn. is the determinative factor. The kerosene distillate ($200-270^\circ$) of Grosnyi petroleum burns in a satisfactory manner in ordinary burners, and higher fractions may be added only if ligrom fractions are also added. Petroleum from natural oils rich in asphalt must contain more light fractions. It is sufficient to establish lower permissible limits to the flash point, for even petroleum with a flash point of 60° yields good illuminating oil. The color is of little practical significance, and the presence of traces of resins (0.002% of heavy resin of d. 1.06 or 0.027% of light resin of d. 1.03), which intensify the color several degrees, do not affect the flash point. The content of unsatd. and of aromatic hydrocarbons is small in Russian petroleum and can be disregarded in formulating standards. The S content of Russian petroleum is very low. Contamination with naphthenic acids can be detected by simple tests. Admxt. of H_2SO_4 seldom reaches the harmful point. C. C. D.

Preparation of contact substances from the solar oils of Grosnyi. M. D. TILICH'EV AND A. I. DUMSKII. *Neftyanoe Khozyaistvo* **11**, 748-43 (1926); *Chem. Zentr.* **1927**, I, 2380. - The acids formed by the action of fuming H_2SO_4 on solar and machine oil distillates are used industrially as catalysts in the sapon. of fats, in the condensation of phenols with $HCHO$, etc. (cf. Petrov, *Neftyanoe Khozyaistvo* **1922**, 279, cf. *C. A.* **20**, 2394). The previously dried distillate is shaken at $50-60^\circ$ with 5% oleum (contg. 27% SO_3), the next day the acid layer (with the resins) is run off, the residual oil is aerated and is extd. with 3% (by wt.) of 48% $EtOH$. The aq. alc. ext. which contained S acids and the oil obtained from the extn. were studied, with special attention to the effect of repeated extn. Petroleum distillates of d. 0.883-0.898, n_D^{20} 1.49-1.50, viscosity 1.47-1.95 (Engler at 50°), were used in the expts. The acid no. of the aq. alc. ext., which serves as a measure of the S acid content, since approx. the same quantity of H_2SO_4 is always present, first increases and then diminishes. At the beginning a decrease in the acid no. corresponds to a decrease in the resinous substances in the acid layer, the oleum first causing resinification and then sulfonation. When the substances capable of being sulfonated are consumed, the oleum no longer reacts (aside from insignificant reactions which are manifest by the evolution of SO_2). The properties of the residue are not altered by further treatment. This residue has a lower d., viscosity, n value and $[\alpha]$ value and a higher "aniline point" (crit. temp. of soln. of the system with aniline) than the original oil. It consists chiefly of naphthene hydrocarbons, for the aromatic hydrocarbons undergo sulfonation. That sulfonation changes chiefly the aromatic hydrocarbons is shown among other ways by the fact that the higher the d. of the original oil, the greater the yield of "contact substance" (13-22% of the original oil). With this yield, 38-45% oleum is consumed. C. C. DAVIS

Sulfate-reducing bacteria in California oil waters. RUDOLPH GAHL AND BELLE

ANDERSON. Univ. of California. *Centr. Bakt. Parasitenk., II Abt. 73*, 331-8(1928).—Out of 40 wells sampled, 17 gave cultures of sulfate-reducing bacteria. In no case were pos. cultures found in surface waters. The cultures were all salt tolerant. All the cultures were variations of the original *Sp. desulfuricans* of Beijerinck. These organisms may have a bearing on the presence of *S in oil*, making it inferior for practical purposes.

JOHN T. MYERS

Some useful matters contained in forest trees in Japan. I. MIURA. *J. Coll. Agr., Imp. Univ. Tokyo* 9, 85-100(1927); *Expt. Sta. Record* 58, 202-3.—The fatty oils of the seeds of various forest trees found in Japan, the percentages of crude fat extd. from the powd. seeds of 44 species by treatment with ether of mixts. of the powd. material with anhyd. CuSO_4 , sand and Na_2SO_4 are reported in the form of giving the genus and species, the Japanese name, and the English name, if any, for the same genus, as well as the percentages of crude fat in the whole dried, ground seed and in the endosperm. There is also given the yield secured by pressing at ordinary temps. from the seeds of the 8 species showing the highest total crude fat in the first series of expts., together with the sp. gr., acid value, sapon. value, Wijs I no. and ester value, n , and Reichert-Meißl value, acetyl value, and percentage of unsaponifiable matter. A study is made of the oil product of 4 species of tung oil trees (*Aleurites cordata*, the aburagiri or Japanese tung oil tree; *A. fordii*, the Shina-aburagiri or Chinese tung oil tree; *A. montana*, the Kwangtung-aburagiri or Kwangtung tung oil tree; and *A. moluccana*, the Kukuinoki or tropical tung oil tree) grown in Japan. In addn. to the data given for the oils, for the 4 types of tung oil, the percentage found in the whole seeds and in the endosperm and the time required for drying at 95° are given for the 4 types of oil. The tannins of a large no. of species are studied, with results on the total tannin as detd. by an exhaustive method and by colorimetric estn. in 101 samples of various parts of 78 species and varieties, together with the type of tannin found in each case, and also the tannin content as detd. by the hide-powder method, and by oxidation of nontannin ext., and the reducing sugar in the ext. of 11 materials from 10 species and varieties selected from those of table 4 as worthy of this special study. The methoxyl content of the wood of the principal forest trees of Japan, the crude fractions obtained in the dry distn. of some of these woods, the percentages of MeOH and of acetic acid recovered, and the results of adding catalysts in the dry distn. of the sawdust of a fir (*Abies sachalinensis*) are tabulated. $(\text{NH}_4)_2\text{CO}_3$, the most efficient catalyst, increased the MeOH to a little more than one and two-thirds times the yield obtained in a blank distn. of the wood alone. The cultivation of cinchona in Formosa is discussed and the percentages of total alkaloids found in the roots, trunks, branches and leaves of *C. ledgeriana*, *C. hybrida* and *C. succirubra* grown at 3000 ft. and at 2800 ft. above sea level are given. The yields, sp. gr. and rotatory power of the needle oils of 26 Japanese conifers are given including a considerable no. of analytical data with respect to the oils of the twigs and leaves of *A. sachalinensis*, *Picea ajanensis*, *P. glehnii* and *Podocarpus macrophylla*. H. G.

The chemical analysis of benzines (BANDTE) 21. Helium and the genesis of petroleum (FARR, ROGERS) 8. Filter for gasoline (U. S. pat. 1,676,024) 1. Destructive hydrogenation of oil (Brit. pat. 280,734) 21. Crystallizing paraffin from solution (U. S. pat. 1,677,551) 13.

GOTTWEIN, K.: *Kuhlen und Schmierer bei der Metallbearbeitung*. 2nd ed. Berlin: V. D. I. Verlag. 93 pp. Paper, R. M. G. Reviewed in *Mech. Eng.* 50, 577 (1928).

Cracking petroleum. LEE J. GARY (to Universal Oil Products Co.). U. S. 1,676,895, July 10. An app. is specified comprising heating coils, expansion chambers and dephlegmators between which and the expansion chambers pressure-reducing valves are placed which are connected with headers for equalizing the pressure on the different dephlegmators.

Cracking petroleum oils. FRANK A. HOWARD (to Standard Oil Development Co.). U. S. 1,676,894, July 10. A stream of oil heated to a cracking temp. is delivered into a "primary drum" in which the material remains at an elevated temp., above a cracking temp., but below the temp. of delivery into the drum; admixed conversion products are continuously removed from the drum and passed through a "secondary drum" of similar form maintained at a somewhat lower temp. and a portion of the material is recirculated from the secondary to the primary drum. An app. is described.

Cracking petroleum oils. GEORGE L. PRICHARD (to Gulf Refining Co.). U. S. 1,676,207, July 3. A body of the material is maintained in a still under cracking temp.

and pressure while withdrawing and condensing cracked products; the oil is agitated by a stirring device in the still operated by a shaft passing outside the still and which passes through a packing enclosed in a housing through which oil under pressure is circulated.

Cracking hydrogen oils. J. C. CLANCY. U. S. 1,658,116, Feb. 7. Crude petroleum or other oil under treatment is led together with H into contact with a molten body contg. NaCN, through a retort filling of Ni packing units maintained at a cracking temp.; the molten material is supplied to packing units and remaining unvaporized materials are withdrawn from them through liquid-sealed passages, and gases and vapors from the retort are recovered. An app. is described.

Cracking hydrocarbon oils. EDWARD W. ISOM and JOHN E. BELL (to Sinclair Refining Co.). U. S. 1,676,203, July 3. Oil is circulated to and from a bulk supply tank through a heater maintained at a cracking temp. and through a circulating pump having a drive shaft in loosely fitting bearings, while maintaining the oil under superatm. pressure; fresh oil also is fed to the still and a substantial portion of this fresh oil is forced through the pump bearings into the hot circulating oil.

Apparatus for cracking hydrocarbon oils in tubular pressure stills. EDWARD W. ISOM and ARNOLD C. VOBACH (to Sinclair Refining Co.). U. S. 1,676,204, July 3.

Cracking hydrocarbon oils. EDWARD W. ISOM and CHARLES L. PARMELEE (to Sinclair Refining Co.). U. S. 1,675,558, July 3. The oil is passed through a heating zone of restricted cross section such as a pipe coil in which it is heated to a cracking temp. and at an intermediate point in this heating zone there is added (before the oil becomes satd. with tar) an oil such as kerosene which is capable of acting as a solvent for tar which is formed during the process. An app. is described.

Cracking hydrocarbon oils. CHARLES L. PARMELEE and EDWARD W. ISOM (to Sinclair Refining Co.). U. S. 1,675,575, July 3. Oil is forced in a single pass through a cracking coil in which it is heated to a cracking temp. under high pressure, a solvent oil is introduced into the oil at an intermediate stage in its passage through the coil and the solvent oil is preheated by heat interchange with the cracked oil or its distillates. An app. is described. Cf. C. A. 21, 819.

Cracking hydrocarbon oils. EUGENE C. HERPHEL and THOMAS D. TIEFT (to Sinclair Refining Co.). U. S. 1,677,772, July 17. Oil to be cracked is forced in a single pass through a heating zone such as tubes in a furnace and thence into a primary vaporizing zone which may be in the form of a drum still and is maintained under superatm. pressure in both of these zones; unvaporized oil is passed from the primary vaporizing zone to an externally unheated secondary vaporizing zone which is maintained under a lower pressure than the primary vaporizing zone and vapors from the secondary vaporizing zone are taken off and condensed, oil condensed from these vapors is forced again through the heating zone, first in advance of fresh oil and then in admixt. with fresh oil, without returning to the heating zone unvaporized components of oil which have once passed through it, heating gases in the heating zone are passed first in heat exchange with the oil condensed from vapors from the secondary vaporizing zone and then in heat exchange with the mixt. of this oil with fresh oil; vapors from the primary vaporizing zone including those of desired oils of lower b. p. are taken off. App. is described. Cf. C. A. 21, 2556. U. S. 1,677,773 specifies a process in which vapors sep'd. from the oil withdrawn from pressure distn. are passed into a tower into the vapor space of which fresh oil is introduced so that it comes into direct and intimate contact with the vapors and effects their condensation; vapors from a pressure still are passed into a reflux tower and admixed condensate and unvaporized fresh oil are introduced from the first-mentioned tower into direct contact with the vapors; reflux is returned together with admixed unvaporized oil from the reflux tower to the pressure distn. App. is described. U. S. 1,677,774 specifies a pressure cracking process in which unvaporized oil is withdrawn from the pressure distn. and subjected to pressure reduction to effect further vaporization; vapors from the pressure distn. are taken off and condensed to produce pressure distillate and vapors sep'd. from the unvaporized oil withdrawn from the pressure distn. are fractionated and this fractionation is controlled by supplying a fraction, the constituents of which correspond to components of the desired distillate, to take off as vapors from the fractionation, a fraction the constituents of which correspond to the components of the pressure distillate; this fraction is condensed. App. is described. U. S. 1,677,775 specifies a process and app. somewhat similar to that of U. S. 1,677,772 as does also U. S. 1,677,776.

Distilling and cracking hydrocarbon oils. ROBERT T. POLLOCK (to Universal Oil Products Co.). U. S. 1,676,924, July 10. Oil which has been previously heated to a distg. temp. is passed in a restricted stream through a vaporizing zone such as a spiral pipe coil located outside the furnace where the initial heating of the oil has been

effected and in which no further rise in temp. occurs and vapors are released at different intervals during the travel of the oil through the latter. An app. is described.

Distilling hydrocarbon oils. ARMAN E. BECKER (to Standard Oil Development Co.). U. S. 1,676,724, July 10. A considerable body of oil is distd. in contact with steel wool and at a temp. not much in excess of the temp. of vaporization of the oil. The steel wool serves to equalize the heating. An app. is described.

Distilling hydrocarbon oils. ROGER D. HUNNEMAN (to Standard Oil Co. of Ind.). U. S. 1,676,609, July 10. Oil is passed in a stream through a heating device of restricted cross-section such as a heated pipe coil and into an enlarged sepg. chamber from which vapors and unvaporized liquid are separately removed. The unvaporized liquid is passed in counter-current to a current of steam and at least a part of the steam and vapors carried with it is faced into the stream of oil flowing through the heated zone. An app. is described. U. S. 1,676,610 ROBERT E. WILSON (to Standard Oil Co. of Ind.) relates to a somewhat similar process in which steam and assocd. vapors are forced into the stream of heated oil at an intermediate point in the heating zone; a sufficient head of liquid is maintained in the discharge line from the vaporizing chamber to prevent return of steam and vapors. App. is described. U. S. 1,676,611 ROGER D. HUNNEMAN (to Standard Oil Co. of Ind.) also specifies a process in which steam is supplied to the sepg. chamber at substantially the same temp. as the oil and in thermal equil. with it; the unvaporized oil is subjected to the action of live steam to remove lighter fractions and the latter are commingled with the vapors from the sepg. chamber and the latter are refluxed. App. is described.

Distilling and converting hydrocarbon oils. FRANK A. HOWARD (to Standard Oil Development Co.). U. S. 1,676,826, July 10. Residues such as topped petroleum are heated to effect partial conversion into products of lower b. p., under sufficient pressure to maintain the unchanged residue in the liquid phase; mixed conversion products are led into a chamber at lower pressure and fresh oil contg. constituents of low b. p. is passed in heat exchange relation with the conversion products at lower pressure removed from the chamber and subsequently in heat exchange relation with conversion products at higher pressure before they enter the chamber (without intermixt. of the fresh oil and other products); vapors evolved from the fresh oil are withdrawn and the residue is subjected to the other treatment described. An app. is described.

Apparatus for distilling hydrocarbon oils. C. W. STRATFORD. Brit. 280,727, Dec. 13, 1926. Oil is discharged by nozzles within a drum still against the heated surface of the still to keep the surface clean and effect rapid evapn. of the oil.

Refining petroleum oils. FRANK C. AXTELL (to Axtell Research Laboratories, Inc.). U. S. 1,677,425, July 17. Oils such as Calif. or other distillates are treated with H_2SO_4 solns. of persulfuric acid and Caro's acid, to remove S and other impurities.

Refining petroleum oils. WRIGHT W. GARY (one-half to Charles O. Middleton). U. S. 1,677,440, July 17. Dry gaseous SO_3 is passed through heated oils to remove impurities. An app. is described.

Recovering lead from sludge formed in petroleum refining. LLOYD B. SMITH and GEORGE W. JAMISON (to Atlantic Refining Co.). U. S. 1,676,294, July 10. The sludge which results from treatment of petroleum with Pb compds. such as an alk. soln. of Na plumbite is treated with a substance such as $CaCl_2$ soln. to break the emulsion of oil and water, the water which seps. is removed, and the remainder is ignited, leaving a residue of relatively high Pb content which may be smelted. An app. is described.

Converting hydrocarbon oils into lighter products. HENRY C. KIRK. U. S. 1,676,230, July 3. Upwardly directed streams of oil are injected into the lower portion of a body of oil maintained at a temp. and pressure which will effect conversion, to produce an upwardly moving current of oil; and a downwardly directed oil stream is injected into the upper portion of the body of oil to produce a downward current. The currents thus set up serve substantially to prevent deposition of C. An app. is described.

Separating from hydrocarbon mixtures constituents which precipitate at low temperature. NILS O. BACKLUND (to Bergedorfer Eisenwerk A.-G.). U. S. 1,676,069, July 3. Lubricating oil stock or similar mixt. of hydrocarbons is treated with a liquid such as C_2HCl_3 which has a sp. gr. higher than that of the heaviest of the hydrocarbon constituents which may be pptd. by cooling and which has a selective solvent action upon the fluid hydrocarbons present which are not so pptd., and the materials are then subjected to centrifugal sepn.

Apparatus for removing sediment and water from crude petroleum. JOSEPH C. UMBARGER. U. S. 1,675,775, July 3.

Removing wax from petroleum oils. L. D. JONES (to Sharples Specialty Co.).

Brit. 280,559, Nov. 9, 1926. Wax which cannot be removed by ordinary diluting, chilling and centrifuging is removed by first adding amorphous wax in such proportion that the wax pptd. on cooling is sufficiently heavy and amorphous, and then effecting the chilling and sepn. Centrifugal sepn. may be facilitated by the presence of some substances such as are ordinarily removed by acid or clay treatment of the oil.

Filter for gasoline, etc. CARL E. PEARSON (to Motor Requirements Corp.). U. S. 1,675,378, July 3.

Screen for filtering gasoline, etc. HENRY FORD. U. S. 1,677,118, July 10.

Apparatus for clarifying gasoline after use for cleaning. ARLIE C. BECK and ALVIE S. MORNINGSTAR. U. S. 1,667,324, July 17. The gasoline is filtered and treated with alkali.

Cylinder-oil mixture. RAYMOND T. HOWES (to Pan-American Petroleum Co.). U. S. 1,677,389, July 17. In order to reduce the surface tension of cylinder oil made from Calif. crude petroleum stock, for use in hydrostatic sight-feed lubricators, about 2.5% of Turkey red oil is added.

Automatic safety control for oil burners. HOMER S. ROGERS and RICHARD RADATZ (to Combustion Fuel Oil Burner Co.). U. S. 1,677,295, July 17.

Reclaiming naphthenic distillation residues. STEWART P. COLEMAN and WAYNE S. HUGHES (to Standard Oil Development Co.). U. S. 1,676,687, July 10. The hot residue such as that produced by distg. lubricating oil stock is discharged onto the surface of flowing water and stratification into layers is permitted, water and dissolved naphthenate are withdrawn from the bottom layer, the residual material is subjected to further stratification, oil is withdrawn from the top, and the water contg. metal naphthenates is withdrawn from the bottom layer. An app. is described.

Acid resins obtained from refining mineral oil derivatives. CARL SAUTERMEISTER and FRIEDRICH WILHELM. U. S. 1,677,731, July 17. In order to produce neutral bitumens from materials such as acid tars, the material is heated and agitated to sep. some of its assocd. H_2SO_4 , the H_2SO_4 which seps. is removed and the tar is heated to conc. the H_2SO_4 remaining; the temp. is raised to 130° and S is introduced to form H_2S and reduce the H_2SO_4 .

Lubricating oil mixture. JOHN H. MACKLE. U. S. 1,677,244, July 17. A mixt. suitable for use at high or low temps. comprises mineral lubricating oil 60, corn oil 20 and castor oil 20%.

Strainer for lubricating oil, etc. O. PETERSEN. Brit. 280,802, May 5, 1927.

Hand-operated tube and piston device for testing lubricating oils. ADOLPH A. SCHAEFER (to Frontier Mfg. Co.). U. S. 1,677,690, July 17.

Lubricating oil and asphalt from petroleum. ARTHUR E. PEW, JR. (to Sun Oil Co.). U. S. 1,675,462, July 3. The heaviest and less heavy constituents of heavy residual mineral oil are sepd. by subjecting a flowing shallow stream of the oil to a low abs. pressure and to a temp. above the vaporizing points of the less heavy constituents at the prevailing pressure and simultaneously passing through the stream a relatively light hydrocarbon material such as gas oil vapor which is substantially lighter than the less heavy constituents of the residual oil to assist vaporization of the latter. An app. is described.

Asphalt-mixing plant. FREDERICK H. CUMMER. U. S. 1,677,274, July 17.

Treating asphaltic compositions with copper sulfate. FRANCIS L. CARSON. U. S. 1,677,272, July 17. An aq. soln. of $CuSO_4$ is first mixed with a small quantity of bitumen to form a mixt. much richer in $CuSO_4$ than that finally desired, the water is allowed to evap. and the remaining mixt. is then mixed with a further quantity of hot bitumen.

Carbonizing wood or other materials. WM. W. KEMP. U. S. 1,677,784, July 17. A mixt. is formed including combustible material such as gas and just sufficient of a supporter of combustion such as air to effect combustion of the combustible material, this mixt. is burned in a retort from which air is excluded and material such as wood, lignite or peat is passed through the retort and subjected to the direct action of the flame from the burning combustible mixt. An app. is described.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Investigation of "resin precipitations." ARNOLD TYDEN. *Svensk Pappers-Tid.* 31, 265-7(1928).—"Resin pptns." in this paper refers to those sticky, viscous, resinous deposits of varied character that appear at various stages in the manuf. of pulp and

paper, usually in the wet parts of the machinery. They originate in the "resin content" of the wood and are composed of the same main constituents, which are resinous acids and fatty acids, oleic acid predominantly, together with indifferent substances of an unknown nature. They are probably formed by the coagulation and pptn. of the resin constituents which are at first suspended in water as a finely dispersed emulsion. The purified "resin content" of several samples was sepd. into resinous acids, fatty acids and indifferent substances. The acid constituents were sepd. from the indifferent substances by means of their soly. in alkali. The resinous acids were sepd. from the fatty acids by esterification; the former were left intact and were dissolved by alkali out of the ether soln. of the mixt. Resin taken from the mixt. of a sulfite chest contained approx. equal amts. of resinous acids, fatty acids and indifferent substances. Analysis of raw-material sulfite resin gave: fiber and mineral compds. 12.0, resinous acids 19.5, fatty acids 27.0, indifferent substances 21.0, ppt. insol. in ether 1.0, balance (water, etc.) 19.5, sum 100.0%. Analysis of resinous acids gave: acid no. 156, sapon. no. 177, I no. 77.5, C 73.84% and H 10.00%. Analysis of fatty acids gave: acid no. 154, sapon. no. 168.5, I no. 69.5, C 74.90% and H 8.82%. The close agreement of these 2 analyses makes further study of these fractions highly desirable. The investigation is to be carried out along these lines and will be extended to other characteristic "resin pptns" from different places in the pulp and paper mills.

WILHELM SEGERBLOM

Contribution to the chemistry of digesting sulfite cellulose. XI. The decomposition of pine and fir wood with sulfurous acid. ERIK HAGGLUND AND TORSTEN JOHNSON. *Scensk Pappers Tid.* 31, 263-5(1928). (In German.)—Expts. in pulping wood by digesting with H_2SO_3 , but without sulfite, various boiling temps. being used, are reported. With a relatively high acidity of liquor and a relatively low temp. the solid ligno-sulfonic acid of the residue changes to a dark color. This is probably due to resinification or condensation and retards the recovery of the lignin. A good pulp can probably not be obtained from the use of H_2SO_3 alone as the resinification probably cannot be obviated. Cf. C. A. 22, 1679.

WILHELM SEGERBLOM

The chemistry of wood cellulose. IV. Isolation, analysis and chemical properties of cellulose from red spruce (*Picea rubens*). E. C. JAHN AND I. E. WISE. *Paper Industry* 10, 244-52(1928); cf. C. A. 16, 1664; 17, 3098.—The isolation of crude cellulose from red spruce (*Picea rubens*) was effected by 5 different methods. The most homogeneous prepn. was apparently that obtained by bleaching sulfite pulp. The purest and most homogeneous α -cellulose prepn. was that obtained from Cross and Bevan cellulose. The methods of isolating "crude" and "alpha" cellulose were studied and described in detail. The source of the wood used was known and the material was chemically analyzed for α -, β - and γ -cellulose, pentosans, residual lignin, and, in a no. of cases, C and H. The latter was of relatively little value in judging the homogeneity of cellulose prepn.s. D'Ans and Jager's statement that cellulose is most sol. at 23° in 12% NaOH was not substantiated. The removal of pentosans from cellulose by alkali treatment was shown to increase with increasing strength of alkali. Upon retreatment with alkali the pentosan content of the cellulose reached an irreducible min. It was impossible to obtain any α -cellulose prepn. in such a form that it remained completely insol. in NaOH on retreatment with alkali. This confirms the findings of Tauss (*J. Soc. Chem. Ind.* 9, 883(1890)). The best methods of drying α -cellulose prepn.s. were studied. Drying at 100-5° was ordinarily satisfactory. Air-dried material could be completely dehydrated at 78° in *vacuo* over P_2O_5 . At lower temps., however, the cellulose absorbs H_2O in such an evacuated system.

A. PAPINEAU-COUTURE

The chemistry and technology of cellulose. R. E. MONTONNA. *Paper Trade J.* 86, No. 18, 61-7(1928); *Tech. Assoc. Papers* XI, 84 90(June, 1928).—A brief review of the more important publications covering the whole field, with about 500 references selected on the basis of their importance and of their probable availability. A. P.-C.

Study of our knowledge of the chemistry of lignin. G. DUPONT. *Chimie et Industrie* 19, 3-23, 407-16(1928).—A review of the chemistry and technology of lignin.

A. PAPINEAU-COUTURE

The chemistry of lignin bodies. KARL KURSCHNER. *Paper Trade J.* 86, No. 16, 62 71(1928); *Tech. Assoc. Papers* XI, 100-9(June, 1928).—A critical review with bibliography.

A. PAPINEAU-COUTURE

Structure of mercerized cellulose. I. The space lattice of mercerized ramie cellulose as developed from x-ray data. O. I. SPONSLER AND W. H. DORR. Univ. of Calif. *J. Am. Chem. Soc.* 50, 1940-50(1928); cf. C. A. 21, 3268.—X-ray diffraction data are given for ramie cellulose which has been subjected to mercerization processes with various strengths of NaOH solns. The evidence shows that there is a critical concn. of the alkali at about 13%, above which the fibers are mercerized, below which

they remain unmercerized. From the diffraction patterns of mercerized ramie cellulose a space lattice has been developed. When compared with the unmercerized lattice the c axis is seen to be unchanged, while the a and b axes have been changed from $a = 5.40$ in the unmercerized to $a = 4.53$ in the mercerized and from $b = 6.10$ to $b = 7.61$ A. U. The angle between axes a and b has been changed from 90 to 83° . As a result of mercerization the chains of glucose units have been shifted laterally in the wall of the fiber and have remained unbroken. Within the chain the original glucose unit has remained unchanged except for a shift of the HO of the 6th C atom. The x-ray diffraction patterns indicate that there has been a partial rotation of some of the glucose units about the long axis of the chain. A comparative study of the structures of mercerized and unmercerized cellulose has produced additional support to the view that the constituent units of cellulose are united in chains by primary valence linkages. C. J. W.

Lignin and cellulose. VI. **Methylcellulose.** KARL FREUDENBERG. Univ. Heidelberg. *Ann.* **461**, 130-1 (1928).—Comments on the work of Sponser and Dore (C. A. **21**, 3268). C. J. WEST

Behavior of cellulose on heating under pressure with water. E. BERL AND A. SCHMIDT. Tech. Hochschule, Darmstadt. *Ann.* **461**, 192-220 (1928).—Results are given of heating 10 g. cellulose (cotton linters) with 110 g. distd. H_2O at temps. from 150° to 350° in a Bergius high-pressure bomb. Practically no change is noticed at 150° ; at 175° the product suffers little change, but may be powdered between the fingers. Gas production begins to be pronounced at 225° , consisting principally of CO_2 at that temp. As the temp. increases the quantity of CO_2 formed gradually decreases and that of CH_4 increases, until at 350° the gas has the compn. CO_2 , 77.8; CO , 7.3; H_2 , 2.6; CH_4 , 8.0; C_nH_m , 3.2. The quantity of CO varies only from 6.4 to 8.6% in going from 225° to 350° . The vol. of gas formed increases from 350 cc. at 225° to 1600 cc. at 350° . The reduction no. (mg. Cu) appears to reach a max. at 225° (1778) and then gradually decreases to 800 at 350° . The H_2O -sol. portion contains HCO_2H and a brown, amorphous product, with an acid reaction and reducing capacity (NH_4OH - $AgNO_3$, Fehling soln.), which resembles humalic acid. The original should be consulted for the details of the analyses C. J. WEST

The action of strong caustic solutions on cellulose. PERCY WAENTIG. *Papier-Fabr.* Fest- und Auslands-Heft, **26**, 64-6 (1928).—Alkali-cellulose aged in a closed flask 40-50 days takes up about 1.3% O, but the decompn. product is not "oxycellulose," since the Cu no. is but slightly increased. There is a large decrease in α -cellulose. When the pulp is both mercerized and aged in a vacuum, there is an actual increase of about 1% in the α -cellulose value, and the viscose prepd. from such pulp is much more viscous. These observations may be of importance in the rayon industry; they indicate a serious source of error in the present α -cellulose detn. R. H. DOUGHTY

Manufacture of high- α -cellulose. JOSEPH ROSSMAN. *Paper Trade J.* **86**, No. 15, 59-63 (1928); *Tech. Assoc. Papers* **XI**, 187-91 (June, 1928).—A review of U. S. and foreign patents. A. PAPINEAU-COUTURE

The determination of α -, β -, and γ -cellulose. GUNNAR PORRVIK. *Papier-Fabr.* **26**, 81-5, 120-4, 133-9, 151-7, 179-83 (1928).—The sources and magnitude of the errors in this detn. have been studied in detail. The methods used were the usual Jentgen method (I) and a titration method (II) carried out as follows: 2.5 g. pulp is treated 30 min. with exactly 70 cc. of mercerizing soln., which is then filtered off without diln. Of the filtrate, 50 cc. is used for the detn. of β - and γ -, the remainder being added to the α -pulp, which is then dissolved in concd. H_2SO_4 . Cellulose is detd. in the solns. by oxidation with $K_2Cr_2O_7$ (cf. Bray and Andrews, C. A. **17**, 1714). On the assumption that the 50 cc. of soln. used for the detn. of β - and γ -values contains exactly $\frac{1}{2}$ of the hemicelluloses, the true α -, β -, and γ -values are calcd. Repeated extn. of the α -portion with mercerizing soln. shows that this assumption is correct within 0.1%. In both I and II β - and γ -values are detd. by titration. The degree of neutralization and heating used in sepp. the β -cellulose has a marked influence on the β - γ -ratio. In I, the first 1000 cc. of filtrate contain 97% of the hemicelluloses. The α -values from I are decreased 1% by changing the temp. of treatment from 20° to 0° ; by doubling the kneading time; or by changing the relative humidity at which the pulp is dried (at room temp.) from 100 to 0%. They are decreased 1.5% by doubling the vol. of mercerizing soln., or by changing the concn. of the soln. from 18 to 24% by weight. With a mercerizing soln. contg. 30% EtOH (to inhibit swelling) the α values are 4-5% higher than in aq. NaOH, and nearly independent of the soln. vol. With method II, the α values were found to be roughly in inverse ratio to the degree of swelling in NaOH solns. of varying concn. The lowest values were found in solns. of 12 g. per 100 cc. Diln. of a more concd. soln. than 12% before filtration (as in method I) gives α -cellulose values corresponding to a 12% soln..

while diln. of a more dil. soln. has no effect. Finally, though 6% and 22% solns. give nearly the same α -cellulose values, by II, the stronger soln. gives a purer cellulose, as shown by Cu no. and viscosity detns. Many exptl. data are discussed in detail, with the following conclusions: The soln. of hemi-celluloses is governed by 2 interdependent sets of factors, one related to swelling and mech. condition of the pulp, the other to temp. and time of treatment. γ -Cellulose is an end product, β -cellulose an intermediate product in the degradation of cellulose by concd. NaOH. The most serious error in the Jentgen method is caused by the diln. before filtration. Details are given of two new methods for α -cellulose detn., which are stated to give improved accuracy and reproducibility of results. Both use 2.5 g. pulp, 70 cc. of soln., and a mercerizing time of 30 min. In the *minimal method* (III) the soln. contains 12 g. NaOH per 100 cc. The pulp after filtration is washed with four 25-cc. portions of this soln., then with H₂O and acid in the usual way, dried and weighed. In the *alcohol method* (IV) the NaOH soln. contains 21.8 g. per 100 cc. The pulp is treated as in III except that the washing with mercerizing soln. is followed by a wash with four 25-cc. portions of 95% EtOH. Method III gives approx. the "true content of resistant cellulose," while IV shows how much will withstand the alkali treatment in the prepn. of viscose. Typical results given by methods I, II (with 21.8% by vol. NaOH), III and IV, resp. are: for cotton pulp, 96.7, 99.2, 94.5, 98.8; good viscose pulp, 88.2, 89.9, 83.6, 89.2; poor pulp, hardly suitable for viscose, 87.3, 88.6, 82.5, 86.9.

R. H. DOUGHTY

Benzylcellulose and its uses. CLEMENT AND RIVIERE. *Z. angew. Chem.* **40**, 1579 (1927).—Benzylcellulose can easily be obtained by acting with benzyl chloride at definite temps. on alkali celluloses. This benzylcellulose is sol. in acetone and in a mixt. of alc. and benzine, and in many org. products of high-boiling pts., such as plasticizers. It is useful in the manuf. of protective coatings and lacquers. B. H.

X-ray spectrographic investigations on celluloid. KOGAKUSHI HAJIME UEDA Kaiser Wilhelm Inst. f. Faserstoffchemie, Berlin-Dahlem. *Z. physik. Chem.* **133**, 350-6 (1928).—Nitrocellulose fibers, themselves giving a sharp crystal-fiber diffraction pattern, absorb camphor until the pattern is "amorphous." Extn. of the camphor regenerates the nitrocellulose with its original pattern unchanged, unless very large amts. of camphor are involved. Technical celluloid produces a diffraction pattern consisting of 2 intense and several weak Debye-Scherrer rings. This is a superposition effect of the diagrams of both components, the positions and intensities being functions of concns. The inner strongest interference ring approaches the camphor interference with increasing concn. of camphor. At high concns. (70%) the diagram shows crystn. of the camphor. The same thing happens at lower concns. when the celluloid is strongly stretched. The x-ray results indicate the existence of a solid soln. and not of stoichiometric compd. formation. When a film of nitrocellulose is stretched a fiber pattern is obtained.

G. L. CLARK

Chemistry and physics of artificial silk. R. O. HERZOG. *J. Textile Inst.* **19**, 138-46P (1928); cf. *C. A.* **20**, 2068, 2105.—Constitutional possibilities of the cellulose mol. based on x-ray diagrams and other phys. and chem. properties are discussed.

L. W. RIGGS

Cornstalks as chemical raw materials. S. D. KIRKPATRICK. *Chem. Met. Eng.* **35**, 401-3 (1928).—Utilization of the cellulose of cornstalks is discussed. Expts. on production of wall board, carried out at Iowa State College, and a plant at Tilton, Ill., for the manuf. of cellulose particularly adapted to producing parchment paper are briefly described.

E. H.

Studies of the chemistry of wood. II. The "Todomatsu" pine of Karafuto. YOSHISUKE UEDA AND GOICHI YAMADA. *J. Cellulose Inst. Tokyo* **2**, 25-6; *Chem. Zentr.* 1926, II, 3083.—The wood of this pine is used for the production of *sulfite cellulose*. The effect of the mannan present on the properties of the cellulose and on the utilization of the spent liquor through fermentation is discussed. C. C. DAVIS

The German requirements governing the determination of the moisture content in mechanical wood-pulp. ANON. *Svensk Pappers-Tid.* **31**, 355-6 (1928).—Specific directions are given for taking and handling samples of the main supply, for drying, weighing and calcn. of moisture content as established in Germany. W. S.

The chemical decomposition of wood. BROR HOLMBERG. *Svensk Pappers-Tid.* **31**, 256-8 (1928).—Investigations into the alcoholysis of wood by Holmberg and Rinius (cf. *C. A.* **20**, 774) were continued by treating the alc. with mercaptans such as benzylmercaptan or thioglycolic acid. The latter was especially suitable because of its power of making a soln. and because of the characteristics of the resulting lignin compds. These compds. consisted of esters which could be saponified into ligno-thioglycolic acid, the compn. of which was approx. $C_{40}H_{40}O_{13} \cdot 2HOCOCH_2SH$ and $C_{40}H_{40}O_{13}$.

4HOCOCH₂SH. From 10 g. of pine wood meal 2.7 g. of these acids were obtained.

WILHELM SEGERBLOM

Poplar as a raw material for paper making: micrographic study. L. VIDAL. *Paper* 31, 393-7(1928).—A discussion of the micrographic characteristics and pulping and paper making merits of poplar, particularly to meet conditions in France. Its advantages for groundwood manuf. are particularly stressed. A. PAPINEAU-COUTURE

Chemical wood pulp from poplar and from deciduous woods in general. M. BROU. *Paper* 31, 399-402(1928).—B. considers that poplar and similar species can give bleached sulfite, and particularly bleached soda, pulps which can be used to advantage, in admixt. with stronger pulps, in the manuf. of fine papers. Esparto and straw pulps, prep'd. either by the soda, Cl hydrate or neutral sulfite processes, are suitable as substitutes for chem. poplar pulp. In order to be economically successful poplar should be procurable at approx. $\frac{1}{3}$ the cost of spruce or fir (wt. for wt.). Proper alkali recovery is essential to the successful operation of the soda process. Poplar soda or sulfite pulp cannot be economically used for the manuf. of viscose rayon or for nitration purposes.

A. PAPINEAU-COUTURE

The pulping of hardwoods and mixtures of hardwoods and conifers by the sulfite process. W. H. MONSSON. *Paper Trade J.* 86, No. 17, 59-62(1928); *Pulp Paper Mag. Can.* 26, 705-9(1928); *Tech. Assocn. Papers* XI, 121-4(June, 1928).—A study of the sulfite pulping of hardwoods, both alone and in admixture with conifers, showed that: (1) Aspen, maple, birch and black gum are readily reduced by the sulfite process, giving high yields of bleachable pulp suitable for a no. of grades of paper and paper board. (2) Mixts. of the above hardwoods and spruce or hemlock are as readily pulped as the hardwoods themselves, giving good yields of bleachable pulp equal or superior in strength to pulps produced from the hardwoods alone. (3) A cooking acid of high free SO₂ and a long impregnation period are desirable to insure thorough penetration of the chips by acid and uniform cooking. (4) Cooking schedules previously found suitable for spruce are equally good with only slight modification for the hardwoods and mixts. (5) The advantage of good yields noted for hardwoods is enhanced by the greater wt. of such species per cord.

A. PAPINEAU-COUTURE

Cornstalks versus wood. J. E. JACKSON. *Pulp Paper Mag. Can.* 26, 713-4(1928); cf. *C. A.* 21, 4062.—A discussion of the advantages of the Dörner process of high α -cellulose pulp from cornstalks (the exact nature of which is not disclosed) and of the merits of the product thus obtained.

A. PAPINEAU-COUTURE

The evaluation of wood pulp. J. W. BERRIMAN. *Paper Maker & Brit. Paper Trade J.* 75, 255, 257(1928); *World's Paper Trade Rev.* 89, 788, 790(1928); *Paper Making* 47, 118 9(1928).—A plea for a standardized formula of the evaluation of wood pulp to be accepted by pulp makers and paper makers alike, discussing the various tests which should be applied in judging the value of groundwood, kraft, sulfite and soda pulps.

A. PAPINEAU-COUTURE

Mill control. J. P. KENNEDY. *Paper Mill* 51, No. 23, 9, 16(1928).—An outline of proper raw materials, process and finished product control in a modern paper mill, being essentially a picture of such control as carried out in the mills of the Am. Writing Paper Co.

A. PAPINEAU-COUTURE

Beating and washing of rags. LEO SCHLICK. *Paper Trade J.* 86, No. 22, 47-9(1928).—A discussion showing that these processes have made practically no advance in the last 100 yrs. and pointing out the lines along which progress should be made.

A. PAPINEAU-COUTURE

The coloring of container board. IVAR EKHOLM. *Pulp Paper Mag. Can.* 26, 476(1928); cf. *C. A.* 22, 1689.—Container board is generally colored with cheap basic dyes lacking fastness. Because of the fairly strong alkali of Na silicate, when this is used as an adhesive, the liner should have sufficient water-resisting properties to prevent the silicate from penetrating and affecting the dye. A no. of domestic dyes possessing suitable fastness in such cases are discussed.

A. PAPINEAU-COUTURE

Problems of sulfite pulp manufacture. ANON. *Wochbl. Papierfabr.* 59, 83-6(1928).—Needed research is indicated.

R. H. DOUGHTY

Cost and technical aids to management. G. N. COLLINS. *Paper Mill* 51, No. 20, 22(1928).—A discussion of the functions of the cost and technical departments in paper mill organization.

A. PAPINEAU-COUTURE

Quality control in the sulfite pulp industry. ALEKS LAMPÉN. *World's Paper Trade Rev.* 89, 1058-64, 1082-8, 1234-42, 1246-50(1928); *Paper Maker & Brit. Paper Trade J.* 75, 369-75, 388D-388H(1928); *Paper Mill* 51, No. 16, 20-6(1928); *Pulp Paper Mag. Can.* 26, 629-32(1928).—A discussion of the importance of standardized tests for controlling the quality of sulfite pulp, and of the chief factors involved in the detn.

of the strength of pulp, bringing out the merits of the Lampén steel ball mill for beating the pulp prior to making into test sheets.

A. PAPINEAU-COUTURE

The size and care of conical save-alls in recovery work. GOSTA M. JOHANSSON. *Svensk Pappers-Tid.* 31, 364-5(1928).—J. describes a conical save-all used in white-water recovery and compares the rate of flow of water at the top of the funnel, at the level where the slope changes, and at the apex.

WILHELM SEGERBLOM

Sulfite pulp manufacture in Brazil. JOHANNES TEICHER and MAX JERROLD. *Papier-Fabr.* 26, Fest- und Auslands-Heft, 44-6(1928).—A mill with a 75-cu. m. digester has been making bleached pulp from eucalyptus for over a year, in Sao Paulo. Some difficulties encountered are mentioned. Nine illustrations.

R. H. DOUGHTY

New suggestions for utilizing pulp waste-liquors. A. SCHROBE. *Papier-Fabr.* 26, 241-8(1928).—A review of patents issued during 1925-6-7. Cf. C. A. 19, 2564; 20, 988.

R. H. DOUGHTY

Some viewpoints on sulfite cooking. E. ÖMAN. *Svensk Pappers-Tid.* 31, 259-63(1928).—In the sulfite process the org. substances dissolved in the digesting liquor absorb increasing amts. of H_2SO_3 . Sulfite waste liquor when mixed with SO_2 -water absorbs large amts. of H_2SO_3 . This absorption is a time reaction; at ordinary temp. equil. is attained only after several days, while at 100° it takes only hrs. The reaction is reversible. When lime or some other base is present, more SO_2 is absorbed than when no base is present, the amt. of SO_2 increasing with the concn. of sulfite in the waste liquor. This accounts for the varying consumption of S in different sulfite mills. The temp. and pressure change with varying concn. of sulfite on account of the pressure of the liquid with consequent variation in the soly. of SO_2 and in equil. points. Circulation of the liquor produces a more even temp. and SO_2 concn.

W. S.

Regeneration of alkali from sulfate waste liquor, with simultaneous production of by-products. ADOLPH MATZNER. *Wochbl. Papierfabr.* 59, 119-21(1928).—A process is described by which the concd. liquor is treated with $NaHSO_4$ to ppt. the lignin, which is filter-pressed and subjected to destructive distn. The coke is heated in a reducing furnace to regenerate sulfide, and the Na_2SO_4 liquor from the filter is causticized with lime. No operating data are given.

R. H. DOUGHTY

Some experiments in processing pulp in the rod mill. G. H. CHIDESTER. *Tech. Assocn. Papers* XI, 127-40(June, 1928); *Paper Trade J.* 86, No. 25, 51-64(1928).—Investigation of the action of the rod mill showed that a less severe action is needed in developing strength qualities than in the disintegration of chips or fiber bundles and that the use of a higher consistency of stock and lighter rods is desirable. By proper selection and control of consistency and ratio of wt. to surface of the rods, a given strength property can be brought to a max. considerably higher than can otherwise be reached. The higher the consistency or the lighter the rods the less is the cutting effect as compared to the hydration. Power consumption required to develop a given degree of strength is lower in the rod mill than in the beater.

A. PAPINEAU-COUTURE

White water treatment. JAS. STRACHAN. *World's Paper Trade Rev.* 89, 704, 770, 772(1928); *Paper Maker & Brit. Paper Trade J.* 75, 339B(1928).—A discussion of the requirements of a proper white-water treating system, the 2 aims of which are recovery of stock and prevention of pollution by the paper mill effluent. S. shows that a closed white-water system is entirely feasible and practical and discusses its advantages.

A. PAPINEAU-COUTURE

The manufacture of bleached sulfite pulp on the Pacific Coast of British Columbia. W. L. KETCHEN. *Pulp Paper Mag. Can.* 26, 765-70(1928).—A detailed description of the sulfite process, from wood to finished products, with particular reference to conditions on the Western Coast of Canada.

A. PAPINEAU-COUTURE

Use of magnesia instead of lime in sulfite cooking. O. HILLER. *Papier* 31, 195-6(1928).—After reviewing previous work on the advantages of MgO -base sulfite liquors, H. gives the results of lab. expts. and of mill experience, from which he concludes that by replacing half of the CaO by MgO the cook can be carried out more rapidly and at a higher temp.

A. PAPINEAU-COUTURE

Consumption of coal and of chemicals in continuous alkaline cooking. RAYMOND FOURNIER. *Papeterie* 50, 358-65(1928).—After a discussion of the advantages of continuous alk. cooking of slightly lignified material at atm. pressure, with simultaneous mech. treatment to effect deligning, F. calcs. the cost of such treatment of straw, showing that semi-chem. straw pulp can be obtained at a cost of 39.70 francs (about \$1.60) per 100 kg. air-dry, by treatment with CaO and Na_2CO_3 .

A. PAPINEAU-COUTURE

The composition and utilization of "tallol." MAURICE DE KEGHEL. *Pulp Paper Mag. Can.* 26, 529-31, 546, 548(1928).—See C. A. 21, 1354.

A. P.-C.

Saturation of spruce wood (with sulfite liquor). C. G. SCHWALBE and WERNER

LANGE. *Papier-Fabr.* 26, 238-41(1928).—Heart-wood and sap-wood absorb practically the same amt. of NaHSO_3 soln. but the former absorbs considerably more $\text{Mg}(\text{HSO}_3)_2$ than the latter. Using cylinders of sap-wood 3 by 3 cm. in size, with solns. contg., resp., Na, Mg and Ca as base, and equal amts. (4.5%) of total SO_2 , the amt. absorbed varies in the order: bisulfite + free SO_2 > sulfite > bisulfite. The base used has little effect. Solns of SO_2 or NaOH are absorbed more than any soln. contg. both. Absorption is apparently complete in 32 hrs., at which time the inner part of the stick contains an excess of free SO_2 , and the outer part an excess of base, when Na salts are used. This sepn. of the base does not occur with Ca or Mg salts; the reason is obscure.

R. H. D.

New developments in (waste) liquor evaporation. J. HAUSEN. *Papier-Fabr.* 26, 173-9(1928).—Mechanical. Elec scale prevention, waste-steam conversion, and the burning of atomized sulfite waste liquor are considered.

R. H. DOUGHTY

Determination of heat transmission coefficients in the machine drying of sulfite pulp. ERIC ÖMAN. *Papier-Fabr.* 26, 349-51, 371-5, 396-400(1928); cf. *C. A.* 22, 1679.—The methods of measurement and calcn. used in detg. these coeffs. for the individual cylinders of a pulp dryer are given in detail. A serious error may be caused by uncontrollable variations in the intimacy of contact between pulp and dryer surface.

R. H. DOUGHTY

The Ruth (steam) accumulator and its influence on the production and profit of a mill. G. PLANCK AND R. HELLBORG. *Svensk Pappers-Tid.* 31, 271-6(1928).—Descriptive of the advantage of this equipment.

WILHELM SEGERBLOM

The rod-mill and its applications. W. SCHMID. *Papier-Fabr.* 26, Fest- und Auslands-Heft, 41-3(1928).—The app. and uses to which it has been put in the American pulp industry (cf. *Ruc. C. A.* 21, 494) are described. S. thinks that it offers most promise as a refiner for screenings.

R. H. DOUGHTY

A contribution to the history of paper making. BRUNO SCHULZE. *Papier-Fabr.* 26, 162-4; *Wochbl. Papierfabr.* 59, 257-60(1928).—The oldest paper known, a Chinese product of the third century A. D., was made mainly of hemp, with some cotton rags. Six photomicrographs are included.

R. H. DOUGHTY

An outstanding paper research laboratory. L. K. ARNOLD. *Paper Industry* 10, 446d-446f(1928).—A description of the pulp and paper board research lab. of the Iowa State College, Ames, Iowa.

A. PAPINEAU-COUTURE

Paper research literature. VII. C. J. WEST AND B. W. SCRIBNER. *Paper Trade J.* 86, No. 17, 51-2(1928); cf. *C. A.* 21, 2797.—A list of contributions by members of the U. S. Bur. of Standards, Dept. of Commerce, in 1927, with brief abstracts.

A. PAPINEAU-COUTURE

United States patents on paper making. C. J. WEST. *Paper Trade J.* 86, No. 18, 68(1928); cf. *C. A.* 21, 2187.—A list of patents issued during the 1st quarter of 1928.

A. PAPINEAU-COUTURE

Work of the U. S. Bureau of Standards. B. W. SCRIBNER. *Paper Trade J.* 86, No. 15, 57-8(1928). cf. *C. A.* 22, 1681.—A brief outline of the type of work being conducted by the paper section of the Bureau.

A. PAPINEAU-COUTURE

Results with testers for measuring tensile strength of paper. R. E. LOFTON AND L. W. SNYDER. *Paper Trade J.* 86, No. 24, 63-6(1928).—Results are tabulated and plotted for tensile strength of seven different papers detd. with six types of tensile strength testers at present on the market, one of which was found to be unsatisfactory for some cause which was not ascertained. The reliability of the results obtained with the various instruments is discussed.

A. PAPINEAU-COUTURE

Paper testing at the Government Printing Office. E. O. RERD. *Paper Trade J.* 86, No. 15, 42-8(1928).—A report of the work carried out in 1927 by the Division of Tests and Technical Control of the U. S. Govt. Printing Office.

A. P.-C.

Increasing the capacity of the Elmendorf tearing tester. F. T. CARSON AND L. W. SNYDER. *Paper Trade J.* 86, No. 13, 57-60(1928).—In order to increase the capacity of the tester by merely increasing the wt. of the pendulum in such a manner as to make the present scale graduations usable without complicated conversion formulas or tables, and so that the tester might be quickly convertible from the heavy-duty to the present form, or vice versa, an adequate fundamental calibration formula was derived, the scale was calibrated according to this formula, and from the formula and the calibration data a wt. was designed which could be inserted in the opening in the sector of the pendulum so as to double the capacity of the tester without necessitating any other modification of the original design. A no. of modifications in the design of the instrument are suggested to improve its performance.

A. PAPINEAU-COUTURE

The McLaurin gummed tape tester. ANON. *Paper Trade J.* 86, No. 14, 61

(1928).—The test is carried out as follows: the tester is leveled and adjusted to zero setting, the pointer is moved to a position in contact with the carrier attached to the pendulum shaft, 2 sheets of good grade kraft paper, cut to standard length, are inserted and held fast by 2 clamps, a moistened strip of gummed tape is attached to the kraft paper, a short time is allowed for partial setting of the glue, and the pendulum release lever is then tripped. The pendulum exerts a const. pull on the test piece, and the resistance value of the moistened glue at the critical period is indicated on the scale. The actual time to make the test is only about 15 sec. The merits of the instrument are briefly discussed.

A. PAPINEAU-COUTURE

A study of the Thwing impact tester. II. C. ECKHARDT AND L. W. SNYDER. *Paper Trade J.* 86, No. 15, 64-6(1928); *Tech. Assn. Papers* XI, 91-3(June, 1928).—The construction and principles of operation of the instrument are presented, together with a method of calibrating it. A study of this tester showed that it is apparently well adapted for testing boxboards, a purpose for which it was primarily designed. It is unsuited, however, for testing single plies of light wt. paper, because the resistance of such paper is insufficient to give an adequate scale reading. Consistent results were obtained with this instrument, which compared favorably with the results obtained by the hydraulic type of bursting strength tester. Just what the results mean, however, in terms of serviceability of the board can be detd. only through extensive experience. A. P.-C.

The use of corrosion-resisting steels in the paper industry. JOHN A. MATHEWS. *Paper Mill* 51, No. 22, 24-8(1928); *Paper Trade J.* 86, No. 24, 60-2(1928).—An address outlining recent progress in the production of corrosion-resisting alloys suitable for paper mill use.

A. PAPINEAU-COUTURE

British Guiana woods for paper making. II. ANON. *Bull. Imp. Inst.* 26, 4-17 (1928).—A report on the analysis and pulping tests of 11 samples of commonly occurring timbers of British Guiana, which are likely to furnish considerable quantities of waste wood when the forests are eventually worked. The pulping tests were made with 20% NaOH (at 4% concn) on the wt. of the wood, and cooking at 160°, the time being varied with the different samples so as to obtain proper disintegration. In 6 hr. *Greenheart* (*Ocotea Rodiei*, Schomb.) gave 41.0% of well-digested pulp which furnished a pale brown paper. It did not bleach readily and required about twice as much bleaching soln. as is necessary for poplar pulp, giving a 38% yield of bleached pulp which furnished a soft, rather bulky, cream-colored paper of moderate strength. In 5 hr. *Wallaba* (*Eperua falcata*, Aubl.) gave 35% of well-reduced pulp which felted well and furnished a soft grayish brown paper of good strength and quality. The pulp bleached readily to a pale cream color, yielding 32% of bleached pulp. In 5 hrs. *Kakaralli* (*Eschweilera laevisfolia*, Miers?) gave a 45% yield of well-reduced pulp, which furnished a soft brown paper of moderate strength, but which could not be bleached beyond a pale yellowish brown. Increasing the time of cooking to 6 hrs. reduced the yield to 35%, but did not improve the bleachability. In 5 hr. *Mora* (*Dimorphandra mora*, Benth. and Hook?) gave 48% of well-reduced pulp which furnished a strong pale brown paper, but which could not be readily bleached; increasing the cooking time to 6 hrs. reduced the yield to 41% of pulp which, after bleaching, yielded a strong white paper of good quality. In 6 hr. *Yaruru* (*Aspidosperma excelsum*, Benth?) gave 46% of well-reduced pulp which furnished a weak, soft, rather dark brown paper, and which could be bleached only to a yellowish brown. In 5 hr. *Itikibourballi* (*Leguminosae*, genus indeterminate) gave 42% of well-digested pulp, which furnished a soft, rather bulky pale brown paper of moderate strength, and which did not bleach readily, requiring a strong bleaching soln. to reduce it to a cream color. In 5 hr. *Trysil* (*Pentaclethra filamentosa*, Benth.) gave 37% of well-digested pulp, which furnished a strong grayish brown paper, and which could only be bleached to a pale cream color. In 6 hr. *Marishiballi* gave 40% of well-digested pulp free from undisintegrated material, which furnished a rather soft, pale brown paper of fair strength, and which was bleached to a cream color by a strong bleaching soln. In 6 hr. *Kautaballi* (*Licania venosa*, Rusby) gave 44% of well-digested pulp, which produced a pale brown, very soft, rather bulky paper of poor strength, and which could only be bleached to a cream color with a strong bleaching soln. In 5 hours *Morabukra* (*Leguminosae*, genus indeterminate) gave 45% of fairly well-digested pulp, which furnished a pale brown paper of good strength but contg. some undisintegrated material and which bleached fairly readily, giving a white paper of good strength and almost free from specks. In 6 hr. *Moraballi* (*Leguminosae-Caesalpiniae*, genus indeterminate) gave 40% of fairly well-reduced pulp, which yielded a pale brown paper of fairly good strength and contg. only a slight amt. of undisintegrated material, and which bleached fairly readily to a pale cream color, almost free from specks.

A. PAPINEAU-COUTURE

Hydrogen-ion concentration; its determination and relation to the paper industry.

ARTHUR ST. KLEIN. *Papier-Fabr.* 26, 145-51; *Wochbl. Papierfabr.* 59, 140-7(1928).—Following a general exposition of the subject, K. gives his experiences in boiler plant and water purification work, and a good review of articles bearing especially on pulp and paper manuif. R. H. DOUGHTY

Chemical pulps for paper making and for the manufacture of rayon. M. BROR. *Papier* 31, 291-301(1928).—An address briefly outlining the several pulping processes and discussing the properties of the products obtained from the standpoint of their transformation into various grades of paper or into rayon. A. PAPINEAU-COUTURE

The manufacture of durable paper and causes of its deterioration. L. ARNOULD. *Papier* 31, 431-6(1928).—A general discussion of the precautions necessary in the manuif. of paper which is to be preserved for a long time. A. PAPINEAU-COUTURE

Tracing paper. Some micro-phenomena. JAMES SCOTT. *Paper-Maker & Brk.* *Paper Trade J.* 75, 251-5(1928).—An illustrated description of the microscopical structure of tracing paper as such and after writing on it with soft lead, ordinary writing ink, and Indian ink. A. PAPINEAU-COUTURE

Paper for blue prints. FREDERICK GROVE-PALMER. *Paper Trade J.* 86, No. 18, 59-60(1928); *Paper Mill* 51, No. 21, 26, 28(1928).—A discussion of the properties required of paper for blue prints and of the precautions to be taken in mfg. such paper. The essential characteristics are high folding resistance and tensile strength, and durability. A. PAPINEAU-COUTURE

Determination of opacity and gloss of paper. ANON. *Pulp Paper Mag Can* 26, 425-6(1928).—A detailed description of the proposed official methods of the Tech. Asscn. of the Pulp and Paper Industry. A. PAPINEAU-COUTURE

Some experiences regarding the influence of fiber character and beating upon the strength properties of paper, particularly sulfate paper. GOSTA HALL. KORSNÅS Wood Pulp Mills, Gefle, Sweden. *Svensk Pappers-Tid.* 31, 321-5, 357 61, 393-7(1928).—Better qualities of both sulfite and sulfate paper have been demanded in recent years. The call for better qualities of sulfate pulp dates from the manuif. of kraft paper in the Mississippi district. The Mississippi kraft pulps have a weaker and more brittle fiber than the Scandinavian and Canadian pulps. Pulp and paper made from yellow pine has monopolized the less exacting market and forced Scandinavian kraft pulp to a higher level. The consumption of sulfate pulp in the U. S. is analyzed critically. Increasing interest in paper testing in the U. S. is a contributing factor in the demand for better pulp qualities. International testing methods are in general confusion. To create a testing method which will give uniform results of satisfactory interpretation it is necessary to agree on standards for: (1) the procedure used in converting pulp into paper (defibration, beating and sheet making), (2) the beating condition (degree of beating) of the fiber at which the paper shall be formed and the strength detd. and (3) the strength properties of the paper which shall be used to characterize the strength of the pulp. Some technical men contend that ball-mill beating is not consistent with mill practice. Detns. made by H. on sulfate pulps used in American mills show that the ball-mill tests ranked the various pulps exactly in accordance with the strength of papers made commercially from the pulps. Sweden is perfecting lab. machinery for paper making to be used in strength testing of wood pulp. Tensile strength, bursting strength and folding endurance increase considerably with continued beating, whereas the tearing strength usually decreases slowly. Several graphs bring out the details of their detn. In Europe the tensile strength and in the U. S. the bursting strength are considered a measure of the strength of a paper. These 2 properties usually run as parallel functions of the beating condition of the fiber, although the bursting strength is somewhat more sensitive to changes in beating condition and the brittleness of the fiber. H. analyzes the factors of fundamental importance to the strength of unbleached wood pulp and discusses the relation of α -cellulose content to the strength of pulp. WILHELM SEGERBLOM

Weighing paper pulp. ARNO JAATINEN. *Svensk Pappers-Tid.* 31, 400-2(1928).—To avoid financial losses the pulp plants of Finland have installed Toledo scales in place of the "push weight" scales long in use. The advantages in reduction of friction, greater speed of operation and elimination of errors are pointed out. WILHELM SEGERBLOM

Determination of the combustibility of cigaret paper. SIGURD KÖHLER. *Svensk Pappers-Tid.* 31, 268-71(1928).—By combustibility of cigaret paper is understood the capacity of the paper to burn without a flame, i. e., only by incandescence. The importance of maintaining const. combustibility in papers used in different brands of cigarets led to the development of a method of testing combustibility based upon ignition of the paper in a specially designed app. by means of an electrically heated igniter-rod and measurement of

the size of the hole burned. The igniter-rod consists of a porcelain tube of so-called "pytagorasmass" with an outside diam. of 2.0 mm., around which is wound in a close spiral a chrome-nickel wire. The total length of the wire is 1 m. and the diam. is 0.30 mm. The length of the spiral is 40 mm. The paper is stretched upon a suitable stand and raised against the igniter-rod. A const. elec. current through the spiral detns. the temp. of the rod and consequently the size of the hole burned. A current of 1 amp. for a tension drop of 17.1–17.2 v. between the terminal screws is suitable. The combustibility is gaged by the max. diam. of the hole burned. If the paper burns to the edge of the stand, the min. strength of current required to ignite the paper gages the combustibility. The moisture content within the customary indoor air-dry limits affects the results to only a minor degree. Cuts of the app. used and of the holes in paper of varying degree of combustibility, and a graph relating current strength to size of hole are shown.

WILHELM SEGERBLOM

The theory of rosin size analysis. A. C. DRESHFIELD. *Paper Trade J.* **86**, No. 21, 59–63 (1928).—From a series of tests made on rosin sizes in conjunction with theoretical consideration of the laws of chemistry, especially as applied to the hydrolysis of the salts of weak acids such as abietic acid, the following conclusions are reached: (1) Because of hydrolysis, free rosin extn. tests on size give misleading information. Results obtained by such tests give not only the true free abietic acid, but also the unsaponifiable matter and some rosin hydrolyzed from the combined rosin. These errors are greater with neutral size than with high free rosin size. (2) The results obtained by free rosin extn. tests vary considerably, depending on the exact procedure used, particularly diln. (3) Errors in the free rosin detn. affect the figures reported as combined, whether obtained by direct detn. or by calcn. from total and free rosin. (4) Free rosin by titration gives reliable results capable of being checked and is a measure of the grade of the size. It does not indicate in what conditions the size enters the reaction in the beaters. It has possibilities for development into a method for detg. the ultimate structure of size. (5) Total rosin detns. are unnecessary as sufficiently accurate values can be obtained by calcn. from total solids and Na_2O detns. (6) Na_2O can be detd. accurately. Variations in the Na_2O content of rosin size, even between neutral and high free rosin sizes, can have but little bearing on the practical alum requirements in the beater, because of far greater variations in stock and water conditions. (7) The total solids test indicates the relative strength of the paste. It is of primary importance to the users of rosin size. All the information necessary to the practical consumer in the paper mill can be obtained from simple calcns. based on total solids and Na_2O .

A. PAPINEAU-COUTURE

The importance of hydrogen-ion concentration in the sizing of paper. H. ROSCHIER. *Pulp Paper Mag. Can.* **26**, 639–40, 679–82, 715–7, 745–8 (1928).—See C. A. **22**, 1851.

A. PAPINEAU-COUTURE

Precipitants in rosin sizing. E. ÖMAN. *Paper Trade J.* **86**, No. 14, 56–60 (1928).—See C. A. **22**, 1684.

A. PAPINEAU-COUTURE

Latex sizing by the beater method. JOSEPH ROSSMAN. *Paper Trade J.* **86**, No. 22, 45–46 (1928).—A review of U. S. patents, with brief abstracts.

A. P.-C.

Talk on sizing. J. R. PETRIE. *Paper-Maker & Brit. Paper Trade J.* **75**, 261–3 (1928).—From a discussion of sizing in the light of 35 yrs.' experience, P. considers that in general mill-made size is preferable to purchased size, low-free-rosin size to high-free-rosin-size, and that the size and alum should be added in the refiner or in the beater chest rather than in the beater.

A. PAPINEAU-COUTURE

Lignin (FRIEDRICH) 10.

ARNOULD, E.: *Catéchisme du fabricant de papier. Traité classique d'enseignement de la fabrication du papier.* Fontainebleau: Cuénot Bourges. 327 pp. F. 75.

MILLER, RAYMOND N., SWANSON, W. H., BRAY, M. W., SODERQUIST, R., ANDREWS, T. M., AND MONSSON, W. H.: *Chemistry of the Sulphite Process.* GARDENVALE, Que.: Book Dept., Pulp and Paper Magazine. 166 pp. \$3. Reviewed in *Pulp and Paper Mag. Can.* **26**, 1003; *Chem. Met. Eng.* **35**, 430 (1928).

Papier-Fabrikant Fest- und Auslands Heft. Berlin: O. ELSNER. 283 pp. R. M. **2**.50.

Cellulose ester composition. RICHARD L. KRAMER (to E. I. duPont de Nemours & Co.). U. S. 1,676,612, July 10. A compn. suitable for making "artificial leather" comprises cellulose nitrate 1 and methylphenoxycethyl phthalate (or laurate) 0.75–2 parts which serves as a softener.

Plastic cellulose ester compositions. OTTO DROSSBACH and OTTO JORDAN (to I. G. Farbenind. A.-G.). U. S. 1,677,753, July 17. Material suitable for making films is formed of a cellulose ester or ether such as cellulose nitrate together with the mono-ethyl ester of maleic acid or other suitable ester of an ethylenecarboxylic acid and a non-aromatic alc. such as dimethyl maleate or a fumaric ester.

Decorating plastic material containing cellulose esters. JOHN H. CLEWELL (to E. I. duPont de Nemours & Co.). U. S. 1,675,642, July 3. A casting dope which may be formed mainly of cellulose nitrate is mixed with flake-like particles such as "pearl essence" and the compn. is cast into sheets, a stack is formed of sheets with intermediate sheets of crinkled plastic material which may be formed of similar compn. and the stack of sheets is welded into a block which may be used for imitation mother of pearl.

Saccharifying cellulosic material. JOHN PERL (to M. M. Cory). U. S. 1,677,406, July 17. Disintegrated wood or similar cellulose material is subjected to the action of a counter-current of HCl gas mixed with diluent cooled inert gas such as fine gases freed from O so that the cooled gas of highest acid content meets the cellulosic material of the highest acid concn. until it contacts with fresh cellulosic material when the gas mixt. is partially exhausted. An app. is described.

Apparatus for making cellulose acetate sheets, etc. ADOLPH ZIMMERLI (to Acetol Products, Inc.). U. S. 1,677,576, July 17.

Artificial silk. HARRY P. BASSETT. U. S. 1,676,003, July 3. Cellulose and Cu hydroxide are dissolved in NH_4OH and pptn. is effected with a bath of 40° Bé. caustic alkali, the material is washed in a caustic alkali soln. of $15-20^\circ$ Bé. and then washed in a caustic alkali soln. of lower strength. An app. is described.

Artificial silk. I. G. FARBENIND. A.-G. Brit. 280,628, Aug. 16, 1926. A coagulating bath maintained at a temp. of $20-30^\circ$ (or even below 20°) is used in making threads, bands or the like from ammoniacal Cu cellulose solns. which are prepd. from wood pulp, straw or grasses. Products of good luster and strength are obtained. Cf. C. A. 22, 3044.

Artificial silk. R. SAITZ and E. POTT (TRADING AS CHEMISCH FABRIK POTT & CO. AND F. POSTPICH). Brit. 280,608, June 17, 1926. A naphthalenesulfonic acid alkylated in the nucleus, such as the condensation products of naphthalenesulfonic acids with iso-Pr or secondary iso-Bu alc., is added to a viscose bath or coagulation bath or to both; salts of these compds. and their condensation products of oxidation also may be used.

Nozzles for producing artificial silk. LEONARD A. LEVY. U. S. 1,676,831, July 10. The diam. of nozzles is tested, during grinding with abrasive, by passing liquid under definite pressure through the nozzle and measuring the quantity passing in a definite time.

Charging and packing pulp digesters. PER A. FRESK. U. S. 1,676,691, July 10. A circulating air current is passed into and out of a digester and a charge of chips is introduced into the air current entering the digester. An app. is described.

Paper pulp. D. R. NANJI. Brit. 280,629, Aug. 17, 1926. Woolly or other cellulosic material is heated with a soln. contg. up to 4% of an alkali such as NaOH at high temp. and under pressure of about 10 atm. for about a half hr. Impure cellulose pulps, bagasse from sugar cane, grasses and the like may be similarly treated and may be preliminarily crushed and treated with a dil. H_2SO_4 under pressure.

"Beating engine" for paper pulp. LEO SHLICK. U. S. 1,675,385, July 3.

Paper making. ROY V. WELDON (to Great Northern Paper Co.). U. S. 1,676,305, July 10. Mech. features.

Centrifugal and other rotary screens for use in paper making. ISAAC L. LAIRD (to Bird Machine Co.). U. S. 1,675,612 and 1,675,613, July 3.

Oscillating suction box for paper-making apparatus. ALONZO ALDRICH (to Beloit Iron Works). U. S. 1,677,128, July 17.

Soaking machine for use in paper making. CHARLES T. CROCKER. U. S. 1,676,636, July 10.

Apparatus for drying webs of paper. R. MARX. Brit. 280,776, March 10, 1927.

Skimming and sedimentation apparatus for cleaning paper stock. CHARLES L. KELLER (to The Richardson Co.). U. S. 1,676,652, July 10.

"Engine" for refining paper stock. HARRY LIEBECK (to Scott Paper Co.). U. S. 1,676,653, July 10.

Paper-crinkling apparatus. WILLIAM A. LORENZ (to The Otaka Fabric Co.). U. S. 1,676,655, July 10.

Making stretchable paper provided with distributed folds. HOWARD G. WIDMER (to Arkell Safety Bag Co.). U. S. 1,676,759, July 10. Mech. features.

Fiber board. WM. M. SHOEMAKER, JR. (to National Vulcanized Fibre Co.). U. S. 1,675,666, July 3. Sheets of cellulosic material are impregnated with a material such as ZnCl_2 soln. and heated to $38-93^\circ$ and then are superposed and united into a composite fiber board. U. S. 1,675,667 relates to an app. for use in this or similar processes.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Recent investigations on the determination of the stability of smokeless powder. MICHAEL TARLÉ. Manchurian Arsenal, Mukden, China *Bull. Chem. Soc. Japan* 3, 123-7(1928).—A survey of the various methods commonly used. Variable results will be obtained as long as stability is detd. with heated samples. Moreover these detns. have not much meaning because the solvents and H_2O are evapd. at the high temp. used, and the decompn. cannot be compared with the decompn. occurring in storage. Methods analogous to the electrometric titration should be developed.

A. L. HENNE

Explosives and preventive measures. W. GRAULICH. *Chem.-Ztg.* 52, 428-9 (1928).—If the proper precautions are taken, accidents are not more numerous in the explosives industry than in any other industry. The accidents usually are caused by a breaking of the rules by untrained persons. Several examples are given. A. L. H.

Unexpected explosions. W. P. JORISSEN. *Chem. Weekblad* 25, 228-30(1928).—It follows from the work of Schlumberger and Piotrowski (*C. A.* 9, 862) and of White (*C. A.* 16, 4348) that NH_3 air mixts. are explosive between about 17 and 25 vol. % NH_3 , depending on direction of flame propagation, etc. Small amts of illuminating gas or other gases can widen these limits considerably. Recent explosions in Germany are evidence of this possibility. The limits for HCN are 12.75 and 27 vol. %, contrary to a widespread opinion of its innocence. Another occasionally explosive substance is $\text{C}_2\text{H}_2\text{Cl}_2$ (3.3 to 15.3%); C_2HCl_3 may lower the limit for other gases; CCl_4 tends to raise the limit and decreases hazard.

B. J. C. VAN DER HOEVEN

The value of inert gas as a preventive of dust explosions in grinding equipment. HYLTON R. BROWN. U. S. Dept. Agr. *Tech. Bull.* 74(1928).—Thirty explosions in a 20-yr. period resulted in the death of 60 persons and property damage of \$5,000,000. Exptl. work in industrial plants indicates that CO_2 under pressure possesses many advantages over other fire-fighting media because it does not injure metals, fabrics, or food products, does not freeze nor deteriorate and, since it is a non-conductor, can be used to extinguish fires in elec. equipment. CO_2 leaves no residue; this is a distinct advantage, since frequently the residue or damage caused by the extinguishing medium constitutes the greater part of the loss. Distributing pipes leading from compressed-gas storage tanks to likely sources of fire and equipped with quick-acting valves is an ideal installation for fire fighting and fire prevention in grinding plants, mills, etc.

C. R. FELLERS

Spontaneous ignition of varnish (TALANZEV) 26.

Toy torpedoes containing explosive materials. KOBV KOHN. U. S. 1,677,034-5, July 10.

Apparatus (with a bed of porous refractory material) for burning explosive gaseous mixtures. SIDNEY P. VAUGHN (to Surface Combustion Co.). U. S. 1,677,156, July 17.

Apparatus for heating cordite disks, etc. J. H. BARKER. Brit. 280,653, Aug. 25, 1926.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

The action of light on nitrated coloring matters. A. SEYEWETZ AND D. MOUNIER. *Bull. soc. chim.* 43, 648-54(1928).—See *C. A.* 22, 916. E. H.

The dyeing of rayon. P. SISLEY. *Rev. sci.* 66, 204-12(1928).—An address.

A. P.-C.

Utilization of badan for tanning and dyeing. S. N. IGNATIEV. *J. Chem. Ind. (Moscow)* **4**, 147-50(1927); cf. Sadikov and Yakimov, *C. A.* **22**, 2681.—200 g. of root of badan (*Saxifraga crassifolia*) contg. 7.8% moisture was pulverized, extd. 3 times with hot water to exhaustion of sol. ingredients, and the liquids were evapd. to dryness at 70°. 78.6 g. of reddish brown dry ext. were obtained and were used for expts. which consisted in detg. (1) the tanning capacity, (2) the dyeing properties and (3) the characters of dyestuffs which are extractible. The detn. of tanning capacity was made by the colorimetric method. The degree of tanning capacity of badan ext. is lower by 40-50% than that of pure tannins. To det. the dyeing properties the ext. was used in amts. of 2-3% of the weight of the fabric to be dyed. With cotton fabrics the following mordants were tried: $\text{Fe}_2(\text{SO}_4)_3$ soln., ferri ammonium alum soln.; Fe_2Cl_6 soln. followed by 0.5% NaOH soln. These mordants enabled I. to dye cotton in brown-black, beautiful greenish black, yellow-brown and dark brown colors. To dye wool, at first Fe_2Cl_6 soln. was used as mordant and the fabric was dyed in dark brown color; then, with PbCl_2 soln. as mordant, wool was dyed in light cream color. All the samples dyed with badan ext. by the aid of mineral mordants preserved their resp. colors well in spite of a 5 months' exposure to sunlight and periodic washings. To obtain S dyestuffs a mixt. of 9 g. badan ext., 6 g. flowers of S, 3 g. NaOH, 3 g. Na_2S (free from Fe) and 25-40 cc. water was placed in a porcelain beaker and heated in a sand bath first at 95° for 2 hrs. under stirring, then at 180° for 16 hrs. 13.3 g. of a melt was obtained which was sol. in water, MeOH, EtOH and ether, giving bronzed-brown solns. This melt dyed cotton, with the addn. of Na_2S , in gray and dark gray colors; it dyed wool, with the addn. of CH_3COOH , in beautiful bronzed-brown color. The difference in the colors obtained was due to the presence in the melt of several dyestuffs, the latter having been sepd. by dissolving 20 g. of the melt in water, acidifying the soln. with CH_3COOH and filtering hot. Six g. of black ppt. was thus obtained (first dyestuff), whereas the filtrate, on being evapd., gave 10.5 g. of a dark brown dyestuff (second S dyestuff). The first S dyestuff possessed the property of dyeing cotton in alk. medium in gray; the second dyestuff dyed, in acid medium, wool and silk (but not cotton) in bronzed-brown color. Preliminary expts. were made to obtain a nitrated product from the ext. of badan by introducing in small portions and under stirring 9 g. of the ext. into a mixt. cooled to 0° of 50 g. H_2SO_4 (sp. gr. 1.84) and 24 g. HNO_3 (sp. gr. 1.58). After 30 hrs. of nitration the mass was filtered through asbestos and the solid residue, without washing, was dried. The yellow-brown nitrated product exhibited under the microscope a cryst. structure and was sol. in water and in MeOH and EtOH giving yellow solns. It dyed wool and silk in yellow and yellow-brown, did not dye vegetable fibers. It seems that badan ext. can serve as a source of many new dyestuffs.

BERNARD NELSON

The textile industry. AYRTON NEIVA. *Chimica industria* **2**, 437-9(1927).—An address.

R. D. BUMBACHER

The properties of the new acetate silk (celanese, milanese, aceta, etc.). A. HERZOG. *Kunstseide* **9**, 7-11, 73-9(1927); *Expt. Sta. Record* **58**, 394.—Extensive studies on samples of cellulose-acetate rayon from Germany, England, Belgium and Switzerland showed the av. width of the dry-spun fiber to range between 26.4 and 40.3 μ and of the wet-spun fiber between 17.1 and 23.9 μ . The several sources had rather characteristic cross sections. The dry-spun samples varied between 3 and 5 deniers in fineness, and the sp. wt. averaged 1.33 g. The elec. cond. of this fiber was very slight. Acetone dissolved cellulose-acetate rayon, whereas chloroform caused it to swell, although other rayons are said to be not affected by these reagents. Water caused only a slight swelling. Cellulose-acetate rayon m. 200-300° into an amorphous mass which became brown on further heating. The av. refraction of light by cellulose-acetate rayon was 1.473, the lowest of rayons and other textile fibers, and this rayon was birefringent. Other behavior in relation to light is also described.

H. G.

Methods of finishing cottons. PAUL F. HADDOCK. *Textile World* **73**, 3909-71 (1928).—An address, describing present procedures and pointing out the need of chem. research.

RUBY K. WORNER

Removal of non-cellulose constituents of cotton in scouring and bleaching of fabric. M. FREIBERGER. *Textile World* **73**, 3971-3(1928); *J. Textile Inst.* **19**, 134-7P(1928).—A review of recent discoveries in the chemistry involved and a discussion of related technical questions. The most important substances to be removed from cotton cellulose are starches, fats, pectins, proteins, pigments and mineral matters, each of which is discussed individually.

RUBY K. WORNER

X-ray investigation of woolen samples. T. D. THREADGOLD. *J. Textile Inst.* **19**, 233-6T(1928).—The exptl. details of app. and tests are given. There was no evidence

for assuming a cryst. structure in the wools and yarns examd. If such structure exists it must be in the form of extremely minute crystallites which are individually too small to give a characteristic x-ray diffraction pattern, or else the lattice spacing const. d. is less than 0.77 A. U. It is highly improbable that wool is truly amorphous. It would appear that the wool fiber consists of an aggregate of extremely small cryst. particles, i. e., is colloidal, for the likelihood of the lattice const. being less than the least value which could have been detected in this investigation is remote. L. W. RIGGS

Soap in its relation to the degumming of silk. II. Factors controlling the process. PROCTER & GAMBLE. *Silk Degumming*, Bull. No. 3, 1928, 20 pp.; cf. C. A. 22, 1857.—The conditions under which silk is degummed are, in general, in need of standardization and strict operating control. From this study the following recommendations for the degumming of silk are made: (1) The water should be absolutely soft, preferably zeolite-treated under accurate control; otherwise softened with soap soln. (2) The soap should closely approach sodium oleate in compn. In dry flake form 20 to 25% soap (corresponding to 28 to 35% fresh bar soap) is an effective and economical range within which to work, (3) Alkali addns. for cutting cost and time are dangerous from the standpoint of weakening and chafing the silk, because of lack of suitable control methods. (4) The temp. should range between 93° and 98° and preferably be controlled by thermostatic regulation. (5) The time of degumming is largely dependent on temp. and soap concn., both of which should be regulated to effect a max. of economy. In practice 20% soap gives satisfactory degumming in 2 hr. (6) Agitation during degumming is a source of chafing and should be kept at a min. (7) Thorough rinsing is an absolute necessity, especially for tin weighting. Several baths of soft, hot water and the use of a low-titer soap provide the most efficient conditions for rinsing. L. W. RIGGS

The Mackey test (HERBIG) 27. Starch sizing (U. S. pat. 1,677,615) 28. Sizing from starch (U. S. pat. 1,677,614) 28. *p*-Cymene studies. X. *p*-Cymylene-2,5-diamine and certain new dyes (WHEELER, BOST) 10.

FAUST, O.: *Kunstseide*. 2nd and 3rd enlarged eds. Dresden and Leipzig: T. Steinkopff. 196 pp. Paper, R. M. 7.50; bound, R. M. 9.

RUGGLI, PAUL: *Die Geschichte der Färberei*. BASEL: F. Birkhäuser & Cie. Pp. 261-304. M. 2. Bd. 38. Verhandlungen der Naturforschenden Gesellschaft in Basel.

SCHÖBER, JOSEF: *Seide und Seidenwaren*. Seidenzucht, Seidengarne und -zwirne, Kunstseide, Seidenwaren, Seidenbänder, Strick- und Wirkwaren. Leipzig: M. Jänecke. 304 pp. M. 12; bound, M. 13.50.

SCHULZ, WALTER: *Die Textilwaren und ihre Garne*. Berlin-Zehlendorf Sieben-Stäbe-Verl. und Druckerei-Ges. n. b. H. M. 2.10.

WAGNER, HANS: *Die Körperfarben*. STUTTGART: Wissenschaftl. Verlagsgesellschaft. Chemie in Einzeldarstellgn. Bd. 13. 506 pp. M. 33; cloth bound, M. 36.

Dyes. BRITISH DYESTUFFS CORPORATION, LTD., A. SHEPHERDSON and S. THORNEY. Brit. 280,652, Aug. 24, 1926. Bluish gray to black vat dyes are made by successive treatment with hydroxylamine and subjection to alkali fusion of sulfonic acids of benzanthrone or substituted benzanthrone such as those obtained by synthesis from anthraquinone sulfonic acids or by direct sulfonation as described in Brit. 276,766 (C. A. 22, 2470). The sulfonation and treatment with hydroxylamine may be effected in the same H₂SO₄. Examples are given.

Dyes. BRITISH DYESTUFF CORPORATION, LTD., AND A. J. HAILWOOD. Brit. 280,647, Aug. 19, 1926. The vat dye obtained according to example 1 of Brit. 26,690 of 1913 by alkali fusion of naphthalimide is converted into a product that can readily be dispersed in water and easily vatted, by treatment with oleum or a halosulfonic acid at moderate temp. (suitably about 50°) and then pouring on to ice or water. The product may be used for dyeing cotton from a hyposulfite vat at 50-60°.

Dyes. I. G. FARBENIND. A.-G. Brit. 280,637, Aug. 17, 1926. Dyes which give clear greenish blue and reddish blue shades on wool are produced by the interaction of alkyl or aralkylamine, e. g., butylamine or benzylamine, upon 1-amino-4-halo-2-anthraquinonesulfonic acids in the presence of a catalyst such as Cu or a Cu compd., e. g., CuSO₄.

Dyes. I. G. FARBENIND. A.-G. Brit. 280,846, Nov. 18, 1926. The diazo compd. from the aminobenanthrone made by reducing the nitrobenanthrone described in example 2 of Brit. 12,518 of 1906 is treated with alkali xanthates or S compds. of similar

action and the product then further treated with alkali, *e. g.*, by fusion with KOH and alc. A dye is produced which gives fast black on cotton from the vat.

Dyes. I. G. FARBENIND. A.-G. Brit. 280,492, Nov. 15, 1926. Orange dyes of the anthraquinone series are made by treating a 1-acylamino-4-hydroxyanthraquinone with esters such as the halogen hydride or arylsulfonic acid esters of polyhydric alcs. in the presence of acid-fixing substances, *e. g.*, 1-benzoylamino-4-hydroxyanthraquinone may be boiled with *p*-toluenesulfonic acid chloroethyl ester in the presence of calcined soda and trichlorobenzene. The resulting dye can be sepd. by crystn. from PhNO_2 into 2 products. Other examples also are given.

Dye intermediates. FRITZ BALLAUF, FRIEDRICH MUTH and ALBERT SCHMELZER (to Grasselli Dyestuff Corp.). U. S. 1,675,478, July 3. By condensing carbazole-carboxylic acids with dimethylamine, *p*-toluidine or 2-aminocarbazole, etc., and testing the resulting amides with nitrosophenols, indophenols are produced which are reddish blue to blue powders reduced in alk. soln. with hyposulfite and Na_2S to the corresponding leuco compds. and suitable for use as intermediates for producing sulfide vat dyes.

Solid diazo salt. FERDINAND KELLER and KARL SCHNITZSPAHN (to Grasselli Dyestuff Corp.). U. S. 1,677,610, July 17. A compd. of the formula $\text{NO}_2\cdot\text{C}_6\text{H}_4\cdot\text{N}_2\cdot\text{SO}_2\cdot\text{C}_6\text{H}_4\cdot\text{Cl}$ is formed by reaction of diazotized *p*-nitroaniline with *p*-chlorobenzene-sulfonic acid. It is an almost colorless sol. powder suitable for use in dyeing and printing. Nitroaniline and other similar compds. also may be used.

***o*-Hydroxyazo dyes.** OSKAR KALTWASSER, HANS OEHREN and HERMANN KIRCHHOFF (to Grasselli Dyestuff Corp.). U. S. 1,676,697, July 10. Dyes are obtained by coupling with a 1-aryl 3-methyl 5-pyrazolone, *e. g.*, the 1-phenyl compd., the 4-toluenesulfonic ester of 7-hydroxynaphthalene-1,2-diazo-oxide-4-sulfonic acid; these dyes form dark powders sol. in water, but insol. in ether and C_6H_6 , and dye wool orange to brown tints which become red to bluish red when chromed.

Monoazo dyes. WILHELM NEELMEIER (to Grasselli Dyestuff Corp.). U. S. 1,676,107, July 10. By diazotization and coupling of compds. such as aniline and *o*-anisidine and 1,8-(or 1,6)-dihydroxynaphthalene-3,6-(or 3)-sulfonate and treatment with *p*-toluenesulfonylchloride, dyes are obtained with red powders, dyeing wool level red shades fast to light and milling.

Monoazo dyes. WILHELM NEELMEIER (to Grasselli Dyestuff Corp.). U. S. 1,676,458, July 10. By diazotization and coupling of aniline and K 1,6-dihydroxynaphthalene-3-sulfonate and heating with *p*-toluenesulfonylchloride, a dye is produced which is an orange-red powder, dyeing wool from an acid bath orange-red shades fast to light and milling.

Trisazo dyes. OSKAR KNECHT and HANS BRUTSCH (to Chemische Fabrik vorm. Sandoz). U. S. 1,676,562, July 10. A diazotized deriv. of the benzene or naphthalene series is coupled with a diazotizable component; the intermediate is diazotized and combined with the same or another diazotizable component, and, then, after further diazotization, is coupled with a 1-arylammonaphthalenesulfonic acid. Dyes thus formed are extremely fast to light and resistant to washing. Various examples are given of dyes producing gray to black shades on cotton.

Sulfur dye. LINCOLN M. SHAFER (to Tower Mfg. Co., Inc.). U. S. 1,675,430, July 3. A dye is prepd. by the reaction of S on *m*- and *p*-diamines such as *m*-toluenediamine and *p*-phenylenediamine and dehydrothiotoluidine which dyes unmordanted cotton in a sulfide bath tan to greenish bronze shades.

Sulfur dye. ERWIN KRAMER (to Grasselli Dyestuff Corp.). U. S. 1,675,498, July 3. Dyes producing orange-brown shades on cotton from baths contg. Na sulfides are formed by heating 2-nitro- or 2-amino-4-acetyltoluidine with S and about 2-8 mols. of benzidine. U. S. 1,675,499 relates to similar dyes produced by heating 3-nitro- or 3-amino-4-acetyltoluidine with S and benzidine.

Sulfuretted dyes. SOC. ANON. POUR L'IND. CHIM. A BALE. Brit. 280,595, Nov. 13, 1926. In producing dyes as described in Brit. 270,348 (C. A. 22, 1692), the aromatic base is omitted and, together with urea, there are used other compds. contg. N which facilitate the sulfurizing process, *e. g.*, semicarbazide, guanidine and its salts, dicyanodiamide, thiourea, NH_4CNS and acetamide. The dyes produced dye vegetable fibers fast indigo blue tints.

1-Methyl-2,5,6-trichloro-3-aminobenzene-4-sulfonic acid. HERMANN WAGNER and BARTHOLOMAUS VOSSEN (to Grasselli Dyestuff Corp.). U. S. 1,677,536, July 17. This compd. is a whitish powder, very sparingly sol. in water, insol. in alc. and ether, sol. in concd. H_2SO_4 and repptd. on diln. with water. It is made, by nitration and reduction, from 1-methyl-2,5,6-trichlorobenzene-4-sulfonic acid and may be used in the manuf. of dyes.

Metal compounds of azo dyes. FRITZ STRAUB, HERMANN SCHNEIDER and JOSEPH SPIELER (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,677,534, July 17. 1-Hydroxynaphthalene-5-sulfonamide or other hydroxynaphthalenemonosulfonamides (other than the 1,8-hydroxynaphthalenesulfonamide) are coupled with *o*-hydroxydiazocompds. such as that of 1-amino-2-hydroxynaphthalene-4-sulfonic acid and the products are converted into metal derivs., e. g., by treatment with Cu or Cr compds. These metal derivs. dye wool in an acid bath fast red-violet to blue and dark green tints.

Chromium compounds of dyes. FRITZ STRAUB, GUILLAUME DE MONTMOLLIN and MAX SCHMID (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,676,581, July 10. Azo dyes obtained by uniting *o*-hydroxydiazocompds. with 3-methyl-5-pyrazolone are treated with Cr fluoride, formate, acetate, freshly pptd. hydroxide or an alkali chromite or the like, producing compds. which dye wool fast orange or red tints and also suitable for coloring lacquers. Several examples are given. Cf. C. A. 21, 2069, 3133.

Dyeing cellulose esters and ethers. BRITISH CELANESE, LTD., and G. H. ELLIS. Brit. 280,698, Oct. 30, 1926. Cellulose acetate or similar material is mordanted with thiocyanate solns. in which the concn. of the thiocyanate radical is in excess of the theoretical equiv. of the mordant metal. The solns. may be formed by the addn. of thiocyanates of non-mordanting metals such as Na, K or NH_4 to a soln. of thiocyanate of Fe, Al or Cr. Mordanting is expedited so that the fabrics may be treated in a continuous method. After treatment with the mordanting bath, the material is washed with water or treated with a soln. of Na_2CO_3 or the like to hydrolyze the thiocyanate.

Dyeing fibers. ALEXANDER WINOGRADOFF (to Inecto, Inc.). U. S. 1,677,508, July 17. Fibers such as hair, fur or feathers are treated with a soln. of an inorg. iodide such as CdI_2 or LiI where the color is developed by the oxidation of a leuco compd., e. g. *p*-phenylenediamine. The iodide serves to accelerate the dyeing reaction.

Jigger for dyeing fabrics. HENRY GRASSEY. U. S. 1,676,261, July 10.

Apparatus for dyeing hanks with heated circulating dye liquor. P. F. HÖLTZING (TRADING AS HÖLTZING & Co.). Brit. 280,844, Nov. 19, 1926.

Apparatus for treating felt hats, etc., with dyeing, cleaning, mordanting or other liquids. SOC. DES CONDENSEURS DELAS. Brit. 280,489, Nov. 10, 1926.

Phosphate reducer for bottom chrome dyeing. NEIL NEVILLE (to Federal Phosphorus Co.). U. S. 1,675,450, July 3. Na acid pyrophosphate or other suitable pyrophosphate is added to a dichromate mordanting bath to assist the action of the bath.

Identifying label for use on goods to be dyed. OSWALD GUNNELL. U. S. 1,677,475, July 17. Labels are formed of fabric tape of "Celanese" and cotton yarn with the surface mainly composed of "Celanese."

Bleaching and setting colors. EDGEcombe M. JONES. U. S. 1,677,283, July 17. In simultaneously bleaching white goods and incidentally setting any colors present in the goods, the material is subjected to a single boiling treatment in an Fe kier by the action of a soln. formed from Na silicate, oxalic acid, Na bihydrate and Na perborate.

Modifying the dyeing properties of textile materials. CHEMISCHE FABRIK VORM. SANDOZ. Brit. 280,493, Nov. 13, 1926. The dyeing properties of loose cotton or other vegetable textile fibers are modified (so as to destroy their affinity for substantive dyes and render them suitable for use in "effect threads") by treatment with a mixt. of Ac_2O , HOAc and a catalyst such as is used for the prepn. of cellulose triacetate while only allowing the reaction to proceed as far as the mono- or di-acetate stage. Various examples and details are given.

Textile fabrics. F. HOPKINSON and A. B. HENSHILWOOD. Brit. 280,705, Nov. 11, 1926. In making woven or knitted fabrics as described in Brit. 269,980, synthetic fibers of nitrogenous character are used (instead of vegetable fibers as previously used) such as may be obtained from dissolved skins, hoofs, horns or other animal matter and these are spun with animal fibers such as wool, mohair, silk or the like and are cut into lengths similar to the natural fiber with which the artificial fiber is assocd. The artificial fiber may be dissolved out from the composite fabric (e. g., by use of boiling water) leaving a fabric of extremely fine texture.

Washing and purifying artificial threads wound on perforated bobbins. SPINN-STOFFWERK GLAUCHAU A.-G. and H. VOSS. Brit. 280,519, Nov. 12, 1926. The material is freed from adherent particles or decomn. products by use of air or other gas or vapor under pressure or suction; NH_3 or other neutralizing gas may be used and vapors which condense to liquids may be substituted for washing liquids.

Waterproofing fabrics. LEROY SHELLELL and GEORGE B. JACK, JR. (to Jatón Mfg. Corp.). U. S. 1,676,362, July 10. Silk, canvas or other fabric is treated with a solvent for cellulose esters and then impregnated with a dil. soln. contg. cellulose

nitrate or acetate or other ether-sol. cellulose ester of sufficiently low viscosity to coat and impregnate the individual fibers of the fabric without forming a thick surface layer. An app. is described.

Apparatus for impregnating fabrics with pyroxylin, etc. LEROY SEIDELL and GEORGE B. JACK, JR. (to Jaton Mfg. Corp.). U. S. 1,676,363, July 10.

Textile fibers from animal hair and bristles. WILHELM H. SCHWEITZER (to American Lanil Corp.). U. S. 1,677,149, July 17. Material such as "cross bred cardings" is oxidized, *e. g.*, by an acidified $\text{Ca}(\text{OCl})_2$ soln., and then treated with a 0.1–0.15% NaOH soln., washed and dried.

Textile lubricant. JOSEPH J. SCHAEFER, JR. U. S. 1,677,852, July 17. An alkali metal lactate such as Na lactate is used for treating wool in making woolen or worsted fabric.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

The story of paint and varnish. F. C. HOLTON. Sherwin-Williams Co. *J. Chem. Education* **5**, 682–96, 836–45 (1928); cf. *C. A.* **22**, 2669. R. H.

Large-scale titanium pigment production based on old laboratory process. BRUCE K. BOWEN. *Chem. Met. Eng.* **37**, 427–8 (1928).—The manuf. of TiO_2 from ilmenite, with copperas as a by product, is described. E. H.

Whiting from zinc containing cadmium. I. E. ADADUROV. *J. Chem. Ind. (Moscow)* **4**, 326–7 (1927).—In the manuf. of white pigments from Zn of American origin trouble was experienced on account of yellow coloration of the product obtained. This coloration is entirely due to formation of CdO because of the presence of Cd in the Zn. Analyses of American Zn show in one case the presence of 0.37% and in another case of 0.84% Cd, whereas German Zn contains no trace of Cd. On calcining the pigment obtained from American Zn, yellow coloration is apt to disappear on account of formation of CdCO_3 , which is white. Pure CdO, on being calcined at 600° in a current of CO_2 , does not whiten, in presence of ZnO, however, whitening takes place with formation of CdCO_3 , which is attributed to the catalytic action of ZnO. If the calcination is effected above 800 – 900° , CdCO_3 dissociates with formation of CdO and consequent reappearance of yellow coloration, which cannot be eliminated by further calcination. The best way of treating this overcalcined whiting is to mix it with small quantities of chalk in an atm. of CO_2 at 800 – 1000° , under these conditions CaCO_3 partly decomposes and CdO becomes carbonated and white. BERNARD NELSON

Influence of the iodine number on the quality of linseed-oil varnish. Z. TALANZEV. *Oil and Fat Ind. (Russia)* **1928**, 17–8; *Chem. Zentr.* **1927**, I, 819.—Various cases (hemp, poppy, sunflower and cedar oils) are cited to show that, like linseed oil, many vegetable oils with low I nos. give more quickly drying varnishes than do those with high I nos. Sunflower and cedar oils in general give varnishes which do not dry completely but which remain sticky for a long time. By maintaining oils at -25° and subsequently filtering, varnishes prepd. from them dry much more rapidly. Thus oil chilled in this way dried in about 3 hrs., compared with 9–10 hrs. for the corresponding unchilled oils. Though such chilling and filtering increase the rate of drying of semi-drying oils (sunflower and cedar oils) and make the drying more nearly complete, they do not dry completely even after this treatment. C. C. DAVIS

Spontaneous ignition of varnish. Z. TALANZEV. *Oil and Fat Ind. (Russia)* **1926**, No. 7–8, 62–4; *Chem. Zentr.* **1927**, I, 1384.—Two instances of the spontaneous ignition of varnish and of linseed oil are described. In the 1st case, a bale of oakum satd. with varnish spontaneously ignited; in the 2nd case clothing which was satd. with linseed oil and which dried in proximity to a steam boiler also ignited spontaneously. On the other hand it is maintained that straw impregnated with linseed oil or with varnish will not ignite spontaneously. There should be no hesitation, therefore, in shipping linseed oil and varnish in wooden casks covered with straw for protection. Far more dangerous than linseed oil or varnish is linseed meal, which in large bulk easily ignites spontaneously. Even flaxseed itself readily ignites spontaneously when piled in heaps, and to prevent spontaneous heating it must be frequently turned. The same is true of extd. seed, whereas oil cake is not dangerous when it is not piled flat. C. C. D.

New rust-preventing varnish. M. B. *Apparalebau* **40**, 140 (1928).—"Enamit" protects containers from C_6H_6 , benzine, alcohols, oils, etc. J. H. MOORE

Finishing modern aircraft. R. C. MARTIN. *Chem. Met. Eng.* **35**, 404–5 (1928).—

The application of cellulose-ester dopes to airplanes and to dirigible balloons is discussed.

E. H.

A compilation of patent literature on the manufacture of synthetic resins. ALADIN. *Kunststoffe* 17, 278-83 (1927); cf. C. A. 22, 142.—Patents referring to the manuf. of synthetic resins up to the end of 1926 with the exception of the phenol condensation products are classified in the following manner: (1) from hydrocarbons, (a) coumarone resins, (b) vinyl resins, (c) other resins; (2) from hydrocarbons and aldehydes; (3) from Cl compds. by splitting off HCl; (4) from naphthalene and benzyl chloride; (5) from naphthalene and oxalic acid.

BONIFANT HAMILTON

Fusing and dissolving the "infusible" and "insoluble" resinoids. CHARLES W. RIVISE. *Plastics* 4, 309-10 (1928).—A review of patents on treatment of phenol-aldehyde resins for reworking.

G. B. TAYLOR

Mechanical properties of resinoid plastics. Colloid chemical aspects of condensation products. O. MANFRED AND J. OBRIST. *Plastics* 4, 318-21 (1928).—See C. A. 21, 2991.

G. B. TAYLOR

Synthetic resins. A. A. DRUMMOND. *Elec. Rev.* (London) 102, 59-60; (1928); *Science Abstracts* 31B, 189.—The resins are prepd. from formaldehyde, phenolic resins, acrolein resins, glycerol and phthalic anhydride resins, and hydrocarbon resins. Methods of classification by the raw materials used by the heat-resisting properties and by soly. in certain org. compds. are described. The chief uses are in the manuf. of molded compns. of an inert material with the resin as a binder, and for laminated products made from textile fabrics coated or impregnated with the resin. The elec. strength varies from 450 to 1000 v. per mil. The most commonly used resins are those derived from formaldehyde (bakelite type) and those derived from phthalic anhydride (glyptal type), the latter being used instead of shellac for building up mica sheets. Synthetic resins in general are superior to rubber, where exceptional resistance to heat and chem. influence are required, and also give a better appearance and lasting stability.

H. G.

The chief constituents of the rosin light oil. II. SATOYASU IYMORI AND TADAO ISONO. *Bull. Inst. Phys. Chem. Research* (Tokyo) 7, 89-97 (1928).—The chief constituent of the rosin light oil obtained by destructive distn. of rosin with Japanese acid earth is methylpentamethylene. By means of a H_2SO_4 treatment, 2 satd hydrocarbons have been isolated therefrom, one of which, b. 140-5°, d_4^{20} 0.7844, n_D^{20} 1.4332, is hexahydropseudocumene, while the other one, b. 131-2°, d_4^{20} 0.7822, n_D^{20} 1.4233, is considered an isomeric form of the first one and could not be identified. A. L. HENNE

Some useful matters contained in forest trees in Japan [tung oil] (Miura) 22. Benzylcellulose and its uses [for lacquers] (CLEMENT, RIVIERE) 23.

AABYE, J. S., AND NEERGAARD, A. N.: **Hvide Farvestoffer til udvendig Oliemaling.** Copenhagen: Teknologisk Institut. 30 pp.

Composition containing oil and nitrocellulose. WALTER D. BALDSIEFEN AND THOMAS H. ROGERS (to E. I. duPont de Nemours & Co.). U. S. 1,675,631, July 3. A compn. suitable for use as a coating contains nitrocellulose, a vegetable oil such as castor oil and an aromatic amine, e. g., diphenylamine, which serves to prevent rancidity.

Conditioning printing ink. LESLIE W. CLAYBOURN. U. S. 1,675,695, July 3. A drier such as japan drier or Pb acetate is stirred with previously made printing ink just before the ink is used.

Hood and draft conduit for controlling fumes from varnish kettles or similar apparatus. VERN K. BOYNTON (to Perry & Webster, Inc.). U. S. 1,675,403, July 3.

Resinous composition. VICTOR H. TURKINGTON (to Bakelite Corp.). U. S. 1,677,417, July 17. A resinous compn. which may be used for varnish, impregnating, etc., comprises a phenol-fatty oil-methylene reaction product such as that formed from phenol, tung oil, CH_2O and $(CH_2)_3N_4$ together with a sufficient proportion of colophony or other non-phenolic resin to serve as a blending agent and prevent sepn. of insol. reaction products.

Solvent oil from resinous material. SATOYASU IYMORI AND KOJI SUZUKI (to Zaidan Hojin Rikagaku Kenkyujo). U. S. 1,675,977, July 3. In prepg. a solvent oil suitable for use in fuels, etc., from colophony or similar resinous material present in coniferous wood, the material is mixed with an "acid earth" or the like and heated to about 500° until decompn. is effected.

Synthetic reins. H. L. BENDER (to Bakelite Corp.). Brit. 280,520, Nov. 10, 1926. PhOH or other suitable phenol is caused to react with more than 1 mol. proportion of CH_2O and at least part of the excess CH_2O is then combined with a non-phenolic substance such as urea also capable of forming resinous products; in the second stage of this process, the mass may be rendered acid by lactic, boric, phosphoric or other suitable acid. Thiourea or toluene-*p*-sulfonamide may be used instead of urea, and the product may be dissolved in alc. or other suitable solvent to form a varnish or may be further heated to render it insol. and infusible and may be used in molding mixts., etc. Brit. 280,521 specifies the manuf. of synthetic resins by condensing a phenol with anhydroformaldehyde aniline (or the corresponding deriv. of another cyclic amine) or with reagents such as CH_2O and aniline (or other suitable cyclic amine). Examples are given in which $(\text{CH}_2)_6\text{N}_4$, a filler such as wood flour and other reagents and addns. may be used.

27—FATS, FATTY OILS, WAXES AND SOAPS

R. SCHERUBEL

Analysis of fats by the iodine method. EUGENIO LINDENBERG. *Bol. soc. chim. S. Paulo* 1, 92(1928).—The Margosches method is described (cf. *C. A.* 18, 2436). To dissolve certain fats not easily sol. L. recommends an addn. of 1–2% of HCl to the alc.; solid fats are first heated with alc. and after cooling to 25°, treated with the 0.2 N I soln.; 0.5 to 1 cc. of CHCl_3 may be added with advantage to the fat or to the alc.

R. D. BUMBACHER

Tests for the incipient rancidity of fats. W. L. DAVIES. *J. Soc. Chem. Ind.* 47, 185–7T(1928).—A survey is given of the more important tests for following the course of autocatalytic oxidation of fats. The Kreis test is not an indication of the degree of rancidity but of the amt. of 3-membered C chain compds. capable of coupling 2 mols. of phloroglucinol to form a flavonium salt. A test which can forecast the keeping qualities of a fat is as follows: 1 g. of fat and 1 cc. of 0.25% methylene blue are emulsified in 10 cc. of 50% dild. sepd. milk, and the blue color is allowed to be bleached by the reductose of the milk by incubating at 37° to 40°. After bleaching the contents of the tube are well shaken and the depth of blue color is noted. The test was carried out on a large no. of fats of known history and keeping properties and the depth of the blue formed corresponded accurately with the ease of oxidation of the fats. The test is useful in detecting metallic contamination of fats and was used in compounding the catalytic action of Cu and Fe in the oxidation of butter fat. Further, as a test for the state of oxidation in individual fats, this method was found more suitable than the Kreis test and less cumbersome than detg. the oxidizability values of the steam vol. and H_2O -sol. constituents.

R. SCHERUBEL

Maritime fats and their production in the northern part of the Soviet Republic. I. SHENDEROVICH. *Oil and Fat Ind.* (Russia) 1926, No. 6, 18–22, No 7–8, 17–21; *Chem. Zentr.* 1927, I, 2868.—Maritime fats, especially seal oil, are obtained and are worked up in the most primitive way in Russia, and because of the poor quality of the final products, the latter are used exclusively for oiling leather and in the shoe industry. Detailed instructions are given for obtaining fats and for purifying, decolorizing and deodorizing the fats. By the process described, which is based on modern European methods, a product suitable for the production of margarine or other food product can be obtained.

C. C. DAVIS

Some extraction experiments in the laboratory. A. W. Seifensieder-Ztg. 55, 119 (1928).—Lab. results are diagrammed for the extn. of earthen, press cakes and seeds, by shaking 50 g. of the material with 50 cc. solvent 3–5 times and then extg. to exhaustion. The following materials were tested: bleaching carbon, soy earth, oil earth, hardened fat earth, castor bean cake, palm kernels, sunflower seed, soy beans and cacao cake.

P. ESCHER

The Mackey test [for inflammability of textile oleins]. W. HERBIG. *Seifensieder-Ztg.* 55, 118–9(1928); cf. *C. A.* 21, 499. —Polemical.

P. ESCHER

Some results in the hydrogenation of fats during the last three years. Y. SORENSEN. *Oil and Fat Ind.* (Russia) 1926, No. 4–5, 54–7; *Chem. Zentr.* 1927, I, 2868.—Ni catalyst used in the hardening of fats can be used repeatedly without regeneration. To accomplish this, the catalyst which settles before filtering the hydrogenated fat is pulverized and is mixed with an equal quantity of fresh catalyst for the new reaction. This mixt. is just as active as the freshly prepd. catalyst. The catalyst remaining on

the filter press is not usable, since it is rendered inactive by slimy and protein impurities in the fat.

C. C. DAVIS

Acid salts of fatty acids. I. STENZENKO. *Oil and Fat Ind.* (Russia) 1926, No. 7-8, 27-38; *Chem. Zentr.* 1927, I, 1426.—The problem of the existence and constitution of acid alkali salts of fatty acids was investigated. The prepn of the acid K salts by hydrolysis of the corresponding neutral salts is inconvenient on account of the great diln. necessary. Partial neutralization of the fatty acids in EtOH with alc. KOH was, therefore, chosen as a method of prepn. The acid salts were readily crystd. from their alc. solns. and after filtration and drying at 10-5° were practically pure. The combined acid in excess of that represented by the formula KR (R is the fatty acid residue) was detd. by titration of the alc. soln. with KOH (phenolphthalein). The following compds. were isolated, the data giving the m. p. and the no. of cc. of 95% EtOH to dissolve 1 g. of acid salt, resp.: *K disearate*, 153°, 880; *K dipalmitate*, 138°, 198; *K dimyristate*, 153°, 76; *K dilaurate*, 160°, 36; *K dioleate*, 95°, not detd. The method of prepn. always gave salts of the type HR.KR. Expts. aimed at the prepn. of mixed acid salts of the type HR₁KR₂ were unsuccessful. Instead, the reaction $2HR_1 + 2KR_2 \rightarrow HR_1KR_1 + HR_2KR_2$, led to the formation of the simple acid salts, and since the soly. diminishes with increase of the mol. wt. of the acid, the salt of the acid with the higher mol. wt. always crystd., leaving the other acid salt in soln. Water hydrolyzes the acid salts, and the greater the mol. wt. the greater this tendency to hydrolyze. Whereas K dioleate hydrolyzes appreciably at room temp. hydrolysis of the other acid salts begins only at 40-50° and with the dilaurate is hardly noticeable even at 100°. Extd. in a Soxhlet app. for 70 hrs., the acid salts give up nearly all their fatty acid constituent, leaving as residue the neutral salt.

C. C. DAVIS

The decolorization of coconut oil. P. HONIG. *Allgem. Öl Fett Ztg.* 23, 571-3 (1926); *Chem. Zentr.* 1927, I, 1384.—To det. the color, an empirical scale was used, No. 1 of which was the color of 0.001 N K₂Cr₂O₇ and No. 100 the color of 0.1 N K₂Cr₂O₇. Tables are given for comparison of K₂Cr₂O₇ values with the same colors of the Lovibond tintometer. It is shown by means of diagrams and tables that pure coconut oil treated with highly activated C (e. g., Norit) mixed with 20% activated fuller's earth is the economical means of obtaining a clear, white, stable oil. Traces of fuller's earth in the refined oil increased its content of free acid during 72 summer days from 0.03% to 0.42%. Extn. from the earth-C mixt. is conveniently carried out with benzine. If a subsequent extn. with acetone is made, Norit with 80% of its original decolorizing power is obtained.

C. C. DAVIS

Properties of cacao butter; the detection of foreign fats in chocolate. D. ALBERS. *Chem. Weekblad* 25, 235-9 (1928).—The critical point of sepn. of aniline-cacao butter mixts. was found for pure cacao butter at 80° aniline from 42.7° to 43.2°; for the possible adulterants "illipé" fat 33.3°, Borneo tallow 19.6° (90% aniline), cacao-shell butter (acidity 34.6°) 35.0°. The sepn. point for shell butter depends greatly on its acidity, being 41.1° for acidity zero and 35.0° for acidity 34.6. Likewise cacao butter mixts. show about 0.18° drop in sepn. point per degree increase of acidity. Linear interpolation for sepn. points of mixts. of cacao butter with foreign fats is allowable as shown from expts. Three distinct melting points of cacao butter were observed. Fat melted in a U-tube and then solidified under tap water m. 23.8°; a second m. p. is found by the Polenske method after 24 hrs. (29.0°); a third after 6 to 10 days' standing (33.6°). The last one can be accelerated by inoculating 5 g. molten fat at 30° with 5 mg. solid powdered fat of normal m. p. and 24 hrs.' standing in the icebox. For pure cacao butter both m. ps. are clearly visible in the same sample after it is left overnight at 22° and then heated up according to Polenske, 2° per 5 min. In mixts. the double m. p. disappeared. The refraction of cacao butter at 40° is around 1.4570, the I no. (Winkler) between 34° and 36°, the I no. of its fatty acids 36° to 38°, the m. p. of these 48° to 49°. From chocolate the fat was sepd. by boiling with HCl and after filtration, washing and drying, extn. with C₂HCl₃. After neutralization of the fat if necessary the values of 16 samples for the consts. were found to lie within the limits found for pure cacao butter. Of several samples with abnormal values the probable adulteration is discussed; sepn. point, refraction and m. p. are the most reliable criteria.

B. J. C. VAN DER HOEVEN

The mechanical treatment of oil palm fruit. A. STIELTJES. *Mem. rapports mal. grasses Inst. Colonial Marseille* 3, 255-67 (1928).—The fruits are first cooked in H₂O, then put through a machine for removing the pulp after which the kernels are pressed either in hydraulic presses, Anderson expellers, or the crushed mass is centrifuged. Extn. can also be used.

E. SCHERUBEL

The presence of free fatty acids in palm oil. A. C. BARNES. *Mem. rapports mal.*

grasses Inst. Colonial Marseille 3, 269-87 (1928).—The ripe oil-palm fruit can be kept in a cool, dry, well-ventilated place for 7 to 9 days without any great increase in free acid. The free acid increases more rapidly in the picked fruit than in that which ripens and falls. This is more marked in unripe fruit than in ripe. The enzymes secreted by mold formation are able to hydrolyze the oil in the pulp. During the period of storage in casks hydrolysis continues if active enzymes are present. If the particles of vegetable matter are removed from the oil, hydrolysis diminishes. Hydrolysis is completely prevented if the oil is heated to 110° and filtered. The action of the enzyme in the pulp from the nut is completely checked if the fruit is heated for 10 min. in H₂O at 55°. Certain chem. products such as NaCl and tannic acid modify the activity of the enzymes in palm nuts.

E. SCHERUBEL

Behavior of oils under ultra-violet light. R. MARCILLE. *Ann. fals.* 21, 189-97 (1928).—Fresh virgin olive oil when examd. under ultra-violet light through a Wood screen has a light yellow color, sometimes highly opalescent; under the same conditions second-pressing oil has more of an orange color, which can even be brick red with very low-grade oils. On aging of the oil the color becomes either grayish white or lilac, while aged low-grade oils exhibit a more or less marked violet-blue fluorescence, which at times may equal that of seed oils. A study of the causes of these phenomena showed that the violet fluorescence of olive oils is accidental and is due to oxidation or to the action of heat, and that it is particularly marked in refined oils obtained either by pressing or by extn. With seed oils the violet fluorescence is natural in some cases, but in most cases results from the treatments they have undergone in the course of extn. or refining. This property cannot therefore be considered as an abs. characteristic of either group of oils. In practice, the use of ultra-violet light can furnish valuable indications for the preliminary examn. of olive oils; but even those having a normal reaction cannot be absolutely considered as pure, nor does an abnormal reaction positively prove adulteration. In the latter case, if chem. analysis gives normal consts and shows the absence of adulterants, if the acidity is high (over 3%) the oil is probably pure but of low grade, while if the acidity is low the oil is probably a pure refined olive oil. But the latter can also have been mixed with oils of high acidity, so that the interpretation of the results then becomes extremely difficult.

A. PAPINEAU-COUTURE

The decolorization of oils with fuller's earth. J. DAVIDSOHN. *Oil and Fat Ind.* (Russia) 1926, No. 7-8, 10-7; *Chem. Zentr.* 1927, I, 1537.—Following a brief survey of the production of fuller's earth, a comparative classification of earths based on their decolorizing power is given. The decolorizing power was detd. by the method of Eckart and Wirtzmüller (*Die Bleicherden*, 1926). The decolorizing factor varied from 1.18 (American fuller's earth) to 7.78 (Silhydrol) and 8.03 (Isarit), other earths lying between these extremes. The measurements were made on products of 1924 and with soy-bean oil. For oil satn. values, reference is made to data already published (*Seifensieder-Ztg.* 50, 665). Expts. on the fixation of acids by fuller's earth indicated a slight alk. reaction of the earths. An increase of the acid no. of oil during decolorization with fuller's earth does not therefore occur. Regeneration of fuller's earth by heating is possible only after completely extg. the oil, and in the purification the earth loses approx. 1/3 of its decolorizing power. Removal of oil is usually carried out through the agency of hot water or superheated steam, but this method does not thoroughly remove oil from the earth. It is recommended that the oil be sapond. with aq. NaOH (30° B_e), the soaps which contain fuller's earth then being mixed with other soap. C. C. D.

Adsorptive capacity of various decolorizing agents. A. M. MONOSON. *Papers Karpov Chem. Inst. Bach. Memorial Vol.* 1927, 169-73.—In the manuf. of ceresin the resins which are formed by treatment of ozocerite with H₂SO₄ are responsible for the appearance of a dark coloration and have to be removed by various decolorizing agents, such as floridin, fuller's earth, clays, silicas, charcoals, etc. To find the most suitable agent a study of the resin-adsorptive capacity of different agents under different conditions has been undertaken. Russian clays are apparently as effective as those of foreign origin and they can be used to advantage not only to discolor ceresin but also in the industry of animal and vegetable *fats and oils*. Preliminary pulverization of the adsorbers strongly increases their adsorptive power, and so does sometimes their treatment with acids. The most favorable temp. for drying adsorbers is 350-400°. Calcining adsorbers at high temp. does not improve them, whereas drying them at 105° even has a deteriorating effect.

BERNARD NELSON

Some sterols of the vegetable kingdom. KURT BONSTEDT. *Z. physiol. Chem.* 176, 269-81 (1928).—The crude phytosterol from soy-bean oil was brominated according to the method of Windaus and Hauth to effect a sepn. of stigmasterol and sitosterol. The stigmasterol content amounted to 25%, and the sitosterol obtained by reduction

of the readily sol. bromide appeared to be identical in all its properties with the sitosterol from wheat germs. Attempts were then made to prep. derivs. which would not be isomeric but identical with the corresponding cholesterol derivs. Heating 8 hr. in a sealed tube at 220° with Ni catalyst converted it into sitostanone which on oxidation yielded the same dicarboxylic acid as that prepd. from sitosterol. Addn. of HCl to sitostene in CHCl₃ soln. yielded *sitostene-HCl*, m. 132-3°, and this by boiling with alc. KOAc was converted into a *pseudositostene*, C₂₇H₄₆, m. 69°. Sitosterol forms a cryst. addn. product with HCl, which m. 155° with decompn. The analysis of this deriv. was not quite in agreement with the calcd. values, suggesting the presence of the dihydro-sitosterol obtained by Anderson (*C. A.* 18, 2134) from the endosperm of maize. By repeated recrystns. the m. p. of sitosterol remained practically const. but the *l*-rotation diminished very noticeably. From 50 g. crude sitosterol 0.4 g. dihydro-sitosterol, m. 144°, [α]_D 28°, was actually isolated. Repeated fractionation of the acetylated mother liquors gave an acetate, m. 143°, [α]_D -46.8°, which on sapon. yielded a sterol, m. 142°, [α]_D 44.8°. This differed considerably from Anderson's γ -sitosterol in m. p. and rotation, but had the same m. p. as the sterol obtained by Windaus and Welsch from beet oil, although a 10° difference in rotation. B. prepd. this beet-oil sitosterol and by numerous recrystns. lowered the rotation 5° without changing the m. p. Fractionation of the acetate, on the other hand, raised the m. p. 8° with very little change in rotation. Other derivs. prepd. from the γ -sitosterol of soy-bean oil were *sitostanol*, m. 143-4°, [α]_D¹⁶ 20.8°; by hydrogenation with Pd black; *sitostanol acetate*, m. 144-5°; *sitostanone* m. 163°, [α]_D¹⁵ 38°, by oxidation of sitostanol; *sitostane*, m. 87°, [α]_D¹⁵ 20.2°, by Clemmensen reduction of the ketone; *sitosteryl chloride*, m. 115-6; *sitostene*, m. 73°, [α]_D¹⁹ -59.2°, by reduction of the latter with Na and AmOH. Sitosterol is evidently an almost inseparable mixt. of several sterols which form mixed crystals. A. W. DOX

The use of sodium hydroxide in the preparation of catalyst for hydrogenation. E. MASHKILLEISSON. *Oil and Fat Ind.* (Russia) 1926, No. 4-5, 53; *Chem. Zentr.* 1927, I, 2868.—When on account of lack of Na₂CO₃, Ni catalyst for the hardening of fats must be pptd. with NaOH, the catalyst is less active than that prepd. with Na₂CO₃. This is attributed to the greater difficulty of washing out NaOH from the pptd. Ni(OH)₂, so that in the subsequent heating of the Ni(OH)₂ for the purpose of reduction, Na silicate forms and partially envelops the Ni. Furthermore the catalyst prepd. from NiCO₃ has a greater surface area, because of the swelling effect during the escape of the CO₂. The use of NaOH instead of Na₂CO₃ in the prepn. of Ni catalyst is therefore to be avoided.

C. C. DAVIS

Hydroxycitronellal in the soap industry. FELIX COLA. *Riechstoffindustrie* 1926, 201-22; *Chem. Zentr.* 1927, I, 822.—Hydroxycitronellal is an excellent ingredient for lilac, lily-of-the-valley, jasmine and other flower compns. and is used extensively in the perfumery industry. Though so well adapted to the latter industry, it is unsuitable in the soap industry, for like its derivs. it decomp. rapidly in soap, forming a rancid oily odor. According to expts. of C., this decompn. in soap paste can in many cases be prevented by combining hydroxycitronellal or its derivs. with the same quantity of methylanthranilate. Under these conditions an odor between sweet pea and furze is obtained. The application of such mixts. is illustrated by a formula. C. C. D.

The washing quality of soap. B. RAVICH. *Oil and Fat Ind.* (Russia) 1926, No. 6, 28-31; *Chem. Zentr.* 1927, I, 2868.—A survey is made of theories of washing, and recent views on the compn. of soap having a max. washing power are discussed. Such a soap must be as neutral as possible and should contain the highest practicable proportion of fatty acids of high mol. wts. Unsats. acids give soaps with less washing power than do satd. acids.

C. C. DAVIS

The influence of fat constants in a soap charge upon the hardness and solubility of the soaps. E. L. LEDERER. *Seifensieder-Ztg.* 55, 85-7 (1928).—Webb's method of calcg. the hardness and soly. of a soap from the difference of the sapon. no. and I no. (*I N S* factor, cf. *C. A.* 22, 879) holds true for such types as W. selected for illustration, but fails entirely for Marseilles curd soaps, which contain no non-drying fats; 14 examples of such fat charges are given and while the calcd. hardness approx. agrees in a few cases with actual figures, the calcd. soly. does not agree. A knowledge of the dependence of the *permanation coeff.* (cf. *C. A.* 20, 3829) upon the chem. constitution of the fats might lead to more dependable data.

P. ESCHER

Discoloring soap. A. RIZZINI. *Chimica Industria* 2, 420-2 (1927).—A general description is given of the methods used in discoloring soap. R. D. BUMBACHER

Washing powder. W. SHADIN. *Oil and Fat Ind.* (Russia) 1926, 10-23; *Chem. Zentr.* 1927, I, 822.—A survey of washing agents and soap powders now used in Russia

shows that in general they are of poor quality and are for the most part mixts. of Na_2CO_3 and worthless ingredients. Thus "Ukrainka" contains 99.1% Na_2CO_3 ; "Chosjaska" 26.8% Na_2CO_3 , 39.4% NaCl and 33.0% water; "Gloria" 11.8% Na_2CO_3 , 41.8% Na_2SO_4 and 46.6% water, and "Stirol Inosit" 1.4% fatty acids, 52% Na_2CO_3 , 6% water-glass and 40.6% water. Na perborate is not manufactured in Russia, and pure soap powder is available in insufficient quantities. In conclusion the most commonly used machines for producing soap powder are described. C. C. DAVIS

Experience and observations on apparatus for saponification under pressure. C. H. KRUTGEN *Chem. App.* 15, 133-6 (1928).—A rather detailed description of app. and method of operating in an English soap factory. J. H. MOORE

Soap in its relation to the degumming of silk. II. Factors controlling the process (Procter & Gamble) 25. Some useful matters contained in forest trees in Japan [fatty oils] (MIURA) 22. The manufacture of corn starch and obtaining the residue and the corn oil (KRIZKOVSKY) 28. Synthetic fixators for perfumery (POUCHER) 17.

DAVIDSOHN, J.: *Lehrbuch der Seifenfabrikation*. Berlin: Gebrüder Borntraeger. 731 pp. R. M. 36.

Detergent. THOMAS MOSS. U. S. 1,677,044, July 10. A mixt. of equal quantities of soap and $\text{Na}_2\text{S}_2\text{O}_4$ is used for laundry purposes, etc.

28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

Modifications of sucrose. E. O. VON LIPPMANN. *Chem.-Ztg.* 51, 873 (1927).—Previous indications that sucrose may exist in several modifications are confirmed by the recent work of Helderman (*C. A.* 22, 705), showing that sucrose pptd. by MeOH has sp. gr. 1.5713, while that pptd. by EtOH has sp. gr. 1.5860. The heats of soln are -813 and -1095 cal., resp. The 2nd modification is more stable at moderate temp. (30°). All phys. consts. of sucrose published so far apply to undefined mixts. of its 2 or more modifications. F. W. ZERBAN

Detection and estimation of sucrose by the ammonium molybdate method. NORRIS W. MATTHEWS. *Maryland Acad. Sci. Bull.* 7, No. 3, 35-7 (1928).—To detect and det. sucrose in very dil. solns. such as condenser water in sugar factories, 5 cc. of the liquid to be tested is placed in a clean test tube, 3 drops of concd. HCl and 3 cc. of a 4% NH_4 molybdate soln. are added, and the tube is placed in a boiling water bath for exactly 6 min. If sugar is present a blue color develops, which is, however, not permanent. For quant. work standards are prepd. by dilg. a soln. contg. 1 g. pure sucrose per l. to convenient concns, and treating these solns. exactly as described for the test. Permanent standards may be made by dilg. blue-black ink to match the freshly prepd. primary standards. For concns. below 0.0125% of sucrose, dil. felding soln. must be used instead of ink to get a perfect color match. These secondary standards keep for 6 months. The conditions of the test must be strictly adhered to in quant. work, because even slight variations in detail may cause large errors. F. W. ZERBAN

The new baryta process in the manufacture of beet sugar. PAUL RIMAILHO. *J. fabricants de sucre* 1926, 15/5; *Chem. Zentr.* 1927, I, 195.—The new process overcomes the difficulties encountered in the decompn. of BaCO_3 , by means of a simple app. ("Paul Baud" process). BaCO_3 is heated in a rotary furnace not above 1150° with a mixt. of oxides, especially Fe_2O_3 . A kind of ferrite in the form of black pellets of the size of beans is obtained, which with water disintegrate with evolution of heat. The product is filtered and washed, a soln. of pure Ba(OH)_2 thereby being obtained. The filtration proceeds smoothly and the filter cake can be used again. C. C. DAVIS

The losses of sugar in the storage of sugar beets. I. I. DOKHLENKO. *Zapiski* 4, 77-86 (1926); *Expt. Sta. Record* 58, 432-3.—The investigation dealt with the control of the losses of sugar in sugar beets in storage, the loss in weight, the change in compn. of N compds., and other aspects of the storage problem. The results led to recommendations that areas infested with disease should be isolated and infected beets be destroyed to control the disease. A clean cut at the crown perpendicular to the axis will permit examn. for diseases. Infested fields should be plowed and seeded to some grain crop, and all litter in connection with the storage should be burned. It appeared advisable to det. the maturity of the beets before digging and to keep unripe beets separate.

Sprinkling the pits with Fe sulfate before storage of beets and maintaining a const. storage temp. are also suggested. H. G.

Acids of maple sugar "sand." E. K. NELSON. U. S. Dept. Agr. *J. Am. Chem. Soc.* 50, 2028-31 (1928).—Maple sugar "sand" is the deposit of the Ca salts of org. acids, chiefly Ca malate, which forms in the evap. kettle during the concn. of maple sap. The acids identified were: *l*-malic, formic, acetic, fumaric, succinic and citric; there was evidence of the presence of *d*-tartaric and tricarballic acids. A small quantity of an unknown acid, represented by a hydrazide, m. 173-5°, was found. C. J. W.

Acids of maple sirup. E. K. NELSON. U. S. Dept. Agr. *J. Am. Chem. Soc.* 50, 2006-8 (1928).—The approx. quantities of acids found in a sample of maple sirup from Vt. and Mich. in g. per l. are: formic, 0.134, 0.121; acetic, 0.150, 0.085; *l*-malic, 1.04, 0.81; citric, 0.095, 0.11; fumaric, 0.0056, 0.0063; a small quantity of succinic acid was found in the Mich. sample. There was evidence of the presence of a small quantity of an unidentified acid having a high m. p. Neither *d*-tartaric nor tricarballic acid could be found. C. J. WEST

Influence of humidity on the elastic properties of starch film. FREDERICK T. PEIRCE. *J. Textile Inst.* 19, 237-52T (1928).—The effects of humidity on torsional rigidity, flexural rigidity, dimensions, sp. vol. and tensile properties were detd. by special app. and the results were illustrated by curves. The treatment of the subject was largely mathematical. L. W. RIGGS

Adhesiveness of rice, corn and wheat starches in comparison with potato starch. E. PAROW, A. STIVNUS AND W. EKHAARD. *Z. Spiritusind.* 51, 23-4 (1928).—Rice starch prepd. by the alkali process and slightly alkaline showed decreasing Saare values with longer periods of heating. Neutralized rice starch gave values 3-4 times as great, which increased with the heating period. Rice starch prepd. without alkali gave intermediate values which did not change with heating. The values for corn starch were generally higher and increased with the heating period. Wheat starch values were between those of corn and rice. Potato starch values averaged lower than the cereal starches and tended to decrease as the heating period was prolonged. A. S.

The manufacture of corn starch, utilization of the residue and recovery of corn oil. I. O. K. A. KRIZKOVSKY. *Chem.-Ztg.* 52, 425-8 (1928).—Each state of the manufacture is described as it is carried out in Germany. A. L. HENNE

The vegetable gums—valuation of the commercial products. S. R. TROTMAN. *Chem. Trade J.* 82, 500-1, 525-7, 601-2 (1928).—True gums are classed as: (1) those consisting principally of arabin such as gum acacia, gum arabic, gum senegal and Indian gum; (2) those contg. cerasin and arabin such as the gum from the cherry, plum, almond or peach tree; and (3) gums consisting largely of bassorin such as gum tragacanth. Characteristics of arabin, cerasin and bassorin are noted and specific tests are described for the purity and the valuation for adhesive purposes of gum arabic. Other vegetable products giving colloidal solns. but not contg. arabin, cerasin or bassorin are often designated as gums. Examples are: Irish moss, Iceland moss, agar, algin and pectins. Means of prepn. and tests are given for gum tragacanth. The sources and properties of agar-agar and means of sepg. it from fruit products are noted, and Irish moss, Iceland moss and algin and alginic products, are briefly discussed. Four distinct forms of pectin exist, viz., protopectin, pectin, pectinic acid and pectic acid. Jellifying properties of pectin, extn. from raw materials and various analytical methods are discussed. W. H. BOYNTON

JAGT, H. A. C. VAN DER. **Tabellen ten gebruike in het scheikundig laboratorium van suikerscholen, beetwortelen, rietsuikerfabrieken.** 2nd ed., revised and enlarged. Dordrecht: G van Herwynen. 77 pp. Fl. 1.90.

McNAIR, JAMES B.. **Sugar and Sugar-making.** Chicago: Field Mus. 34 pp. Paper, 50 cents.

Sugar Manual. London: Cifra, Ltd. 2s. 6d., net.

Cold-swelling starch. JULIUS KANTOROWICZ (to William H. Fain). U. S. 1,677,348, July 17. In order to prevent formation of lumps when cold-swelling starch is added to water, the latter is added to a mixt. of the starch with a substance such as Na₃PO₄, alum, borax or MgSO₄ which retards the swelling.

Cold-swelling starch. EUGENE WULKAN (to Harberland Mfg. Co.). U. S. 1,677,314, July 17. A mass of starch is heated to a temp. (suitably about 100-110°) at which cold-swelling starch would be formed in the presence of water, and a reacting liquid such as water is introduced in small individual drops or particles, into the starch

mass, so that individual paste balls are formed, and the latter are then dried. A jacketed kettle provided with an agitator is suitable for the process.

Starch sizing. AUGUSTE BODIN and JEAN EFFRONT. U. S. 1,677,615, July 17. A neutral starch is subjected to the action of starch-liquefying enzymes such as described in U. S. 1,227,525 (C. A. 11, 2263) and the moisture content of the materials during this treatment is controlled so that the product will contain no more moisture than an air-dried product.

Sizing from starch. AUGUSTE BODIN and JEAN EFFRONT. U. S. 1,677,614, July 17. In prep. a sizing for textile material, starch material is directly subjected to the action of a starch-liquefying bacterial enzyme such as that described in U. S. pat. 1,227,525 (C. A. 11, 2263) until at least part of the starch has been liquefied and the action is then stopped, e. g., by heat or acid.

29—LEATHER AND GLUE

ALLEN ROGERS

Leather industry challenges chemical engineering. HAROLD J. PAYNE. Am. Leather Producers, Inc. *Chem. Met. Eng.* 35, 425-7 (1928).—Some of the chemical problems of leather manuf. are briefly presented. E. H.

Application of science to beamhouse operation. GEO. D. McLAUGHLIN. Cincinnati Univ. *J. Am. Leather Chem. Assoc.* 23, 336-44 (1928).—An address. H. B. M.

Further studies on the chemistry of liming. GEO. D. McLAUGHLIN, JOHN H. HIGHBERGER and E. KENNETH MOORE. Cincinnati Univ. *J. Am. Leather Chem. Assoc.* 23, 318-36 (1928); cf. C. A. 21, 3139.—It is shown that amines are formed in skin during curing, during soaking and to a slight extent during liming. Amines accumulate in lime liquors, being carried in from the soaks. Amine formation increases rapidly with temp. above 20°. Nine typical lime liquors contained from 0.0013 to 0.0024% volatile amine as CH_3NH_2 , $\text{C}_2\text{H}_5\text{NH}_2$, and other diamines have more marked unhairing properties than have monamines. Increasing temp. decreases the unhairing action of amines. Pretreatment of skin with satd. $\text{Ca}(\text{OH})_2$ alone decreased the subsequent effect of the amine. When skin is placed in a soln. contg. CH_3NH_2 (1 part skin to 4 parts soln.), the concn. of amine decreases to about 80% of its initial value in 24 hr. and is thereafter const. The combination of skin with $\text{Ca}(\text{OH})_2$ is accelerated by the presence of amine. It is suggested that this is due to activation of the carboxyl groups of the protein. H. B. MERRILL.

Re-use of salt in the curing of animal skins. GEO. D. McLAUGHLIN, IRVIN H. BLANK and GEO. E. ROCKWELL. Cincinnati Univ. *J. Am. Leather Chem. Assoc.* 23, 300-18 (1928).—NaCl once used for curing skins is heavily contaminated with bacteria, blood and other impurities. The re-use of salt increases the initial bacterial count of fresh steer hide by only 1-3%, but the bacteria introduced have a higher salt tolerance, and show proteolytic activity at higher NaCl concns. than do bacteria normally present in skin or present on fresh salt. The bacterial count of steer hide cured with old NaCl decreases slower than that of hide cured with fresh salt. H. B. M.

Hide damage and its prevention. A. GANSSEK. *Gerber* 54, 97-9 et seq. (1928); cf. C. A. 21, 1205.—The principal types of mech. damage are enumerated and illustrated, and methods for their prevention are discussed. H. B. MERRILL.

Synthetic tannins. M. HORI and H. KOMORI. *Repts. Imp. Ind. Research Inst. Osaka (Japan)* 8, No. 3, 1-38 (1927).—Synthetic tannins were prepd. by condensing sulfonic acids of $\text{MeC}_6\text{H}_4\text{OH}$, PhOH , C_{10}H_7 , $\text{C}_{10}\text{H}_7\text{OH}$ or $\text{C}_6\text{H}_4(\text{OH})\text{CO}_2\text{H}$ with HCHO , AcH , paraldehyde or BzH . Various factors in the synthesis and the efficiency of the products in tanning hide were studied. NAO UVEI.

The leaf of *Grewia polygama* and its tannin content. ALICE M. COVERLID. *Proc. Roy. Soc. Vict.* 39, 149-53 (1927), *Australian Sci. Abstracts* 7, 2. H. G.

Chrome tanning. VI. Properties and behavior of chromium sulfate solutions after different pretreatments. E. STIASNY and O. GRIMM. *Collegium* 1928, 49-71; cf. C. A. 22, 696.—A study similar to that on CrCl_3 solns. was made of the combined effect of aging, heat and acid on basic Cr sulfate solns. The changes in p_{H} which were found can be explained by hydrolysis, formation or breaking up of ol. compds., neutral salt effect or change of acid radicals into or out of the chromium complex. The sulfate differs from the chloride in that oxygen bridges do not form, the neutral salt effect is appreciable and the sulfate tends to enter complexes. The pptn. no. was influenced both by the p_{H} and the size of the chrome-complex mols. **VII. Sulfato-chromic sulfate, its behavior on hydrolysis and its tanning action.** E. STIASNY

AND D. BALANYI. *Ibid* 72-97.—Sulfate in the Cr complex (*i. e.*, SO_4 not existing as SO_4^{--} ion) and p_H were detd. in normal and basic $\text{Cr}_2(\text{SO}_4)_3$ solns. after various periods of aging. Ionized SO_4 was detd. by a modification of the benzidine method and SO_4 in the complex by the pyridine method of Gustavson. Sulfato-chromic sulfate is less hydrolyzed and therefore less acid than the hexaquoichromic sulfate (I). On boiling a soln. of I the soln. becomes more acid because a basic sulfato salt contg. ol compds. is formed. On aging the reverse process occurs, but if the boiled soln. is made basic at once the reversal is hindered. On aging or making I basic, SO_4 radicals enter the Cr complex. The Cr complex absorbed by hide powder was richer in SO_4 than the liquor, showing that the compds. richer in SO_4 have greater tanning action. Tanning requires the simultaneous presence of OH groups in the ol form and not in the ol form.

I. D. CLARKE

The fat absorption capacity of chrome leather as concerns sulfonated and unsulfonated fats. E. MEZEY. *Collegium* 1928, 209-13.—The absorption by chrome leather of sulfonated neatsfoot and train oils mixed with the unsulfonated oil or with mineral oil was studied. The greater the proportion of unsulfonated fat the greater was the absorption unless too little sulfonated oil was present to emulsify the unsulfonated oil. In the latter case little fat was taken up.

I. D. CLARKE

The variation in complex bound sulfate in chrome alum liquors. WILHELM SCHINDLER AND KARL KLANFER. *Collegium* 1928, 97-107.—Ionized SO_4^{--} was pptd. cold with BaCl_2 , filtered off and discarded. Then SO_4 held in the complex was detd. as BaSO_4 after boiling the filtrate with HCl. SO_4 held in the complex slowly decreased on aging boiled green Cr alum solns., it was decreased but not entirely replaced by addition of soda, it was entirely removed by $\text{K}_2\text{C}_2\text{O}_4$, and it is decreased greatly during tanning.

I. D. CLARKE

Artificial leather. HEINRICH WIESENTHAL. *Kunststoffe* 18, 128(1928).—There is described an artificial leather and a process of prepg. it. The base is nitro-cellulose or celluloid. The pure celluloid soln. is placed in an upright or horizontal, closed, 1000-2000-l. kettle adapted for stirring. There is then added as solvent 95% alc. with an admixture of small quantities of MeOH, Me_2CO , formic acid esters, amyl acetate, etc. There is usually prepd. a 20% soln., the celluloid and solvent being intermittently introduced into the kettle. The soln. is filtered through a fine brass sieve into a vacuum app.; it is then allowed to stand and ripen for some time. Mineral colors and castor oil are rubbed in. The resulting compn. contains about 25 parts celluloid, 35 parts castor oil and 40 parts mineral color. The objectionable odor is removed by the addition of oil of birch or other perfume. The machines for forming the product are described. The surface of the material is lacquered, or decorated with colors, the decorating being done in such a way that only the deepest colors are retained. Acetylcellulose and artificial resin may be used for the coloring. Processes have been devised whereby the volatile materials may be recovered.

B. H.

Glue testing. Report of the committee on glue testing of the German association for testing technical products. OTTO GERNGROSS. *Collegium* 1928, 130-43.—The results of tests of 10 glues by 4 labs. are given. The agreement was not always good and the various tests did not always give the same quality rating. A "chrome" glue having a high jelly strength was the poorest by the viscosity and adhesion tests. Further work is planned on chrome glues, on H_2O detn. by dissolving the glue to a gel and drying thin layers, on viscosity at different concns. and on adhesion strength of different glues at the same viscosity.

I. D. C.

Utilization of badan for tanning (IGNATIEV) 25. Some useful matters contained in forest trees in Japan [tannins] (MIURA) 22. Physiologic role of the pyrocatechol tannins (MICHEL-DURAND) 11D. Cellulose ester composition [artificial leather] (U. S. pat. 1,676,612) 23.

KOSTIN, N.: Die physikalisch-chemischen Grundlagen der Lederfabrikation in elementarer Darstellung. Vom Verf. bis zur Neuzeit erg. deutsche Ausg. Übers. von Leonid Keigueloukis u. Rudolf Schunck. Leipzig: Paul Schulze Verl. 128 pp. M. 8.

Drying leather. V. G. WALSH. *Brit.* 280,770, March 7, 1927. Leather is dried from the flesh side only while the grain side is covered to prevent evapn. The grain side may be preliminarily treated with a gelatin soln. to ppt. any excess of tanning reagent and the leather then may be stacked with alternate layers of anhyd. Na_2SO_4 spread on the flesh side. Sand may be mixed with the Na_2SO_4 .

Waterproofing leather. HENRY V. DUNHAM (to Van Tassel Co.). U. S. 1,677,435, July 17. Molten paraffin at a temp. of about 150° has incorporated with it about 5-50% of rubber to form a uniform smooth mixt. which if cooled to room temp. is a firm waxy solid. Leather is impregnated with this mixt. while hot, without use of volatile solvents.

Tanning compositions. RÖHM & HAAS, A.-G. Brit. 280,509, Nov. 13, 1926. Emulsions for use in tanning are made by treating oils and fats with freshly pptd. metal hydroxides such as $\text{Al}(\text{OH})_3$ and water. Urea also may be added and assists in dyeing.

Celluloid sheets superficially coated with embedded particles of granulated leather. MILTON H. COOK (to H. N. Cook Belting Co.). U. S. 1,677,125, July 17. A material is specified which is suitable for coating belt pulleys.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Seasonal variations in the composition of the latex of *Hevea brasiliensis*. NORMAN RAE. *Analyst* 53, 330-4 (1928).—Monthly analyses show that the N, K and P_2O_5 contents reach a max. in Feb., decrease slowly till May, increase to July and then decrease to August. Since the leaf fall coincides with the decrease in March and the maturing of the seeds with the drop in July, it seems possible that latex is a food reserve to be used when the leaf and seed growths are most active. W. T. H.

Comments on a thesis (structure of rubber). J. DUGUÉ. *Rev. gén. caoutchouc* 1928, No. 41, 7-11, cf. *C. A.* 22, 2682.—Only when the properties of rubber are explained in terms of subatomic phenomena, the application of which is illustrated, will it be possible to obtain knowledge of rubber which can be applied systematically to the solution of technical problems. C. C. DAVIS

Plasticity determinations in crude rubber. V. Influence of different factors on the changes in plasticity when keeping the rubber. OTTO DE VRIES. Rubberproefstation Nederlandsch Indië. *Arch. Rubbercultuur* 12, 243-56 (1928) (In English 257-67); cf. *C. A.* 20, 124. A study of the varying compn. of latex and the different methods used in prepg. rubber failed to show that variations in the plasticity of the com. product can be explained by these factors (cf. *C. A.* 22, 2077). The plasticity of raw rubber therefore changes when the latter is kept, so a study was made of the influence of individual factors on these progressive changes in plasticity. The latter plasticity values were detd. when the rubber was new and after 1-2 yrs. When rubber contains below the normal proportion of serum substances, its plasticity increases more on keeping than does that of rubber with a normal quantity of serum substances. The greater the diln. of the latex when coagulated, the greater is the increase in plasticity of the resulting rubber on keeping. This may be a result of the extrn. of serum substances by the water. Since rubber which contains all the serum substances becomes harder when kept, and that which contains a deficiency of serum substances becomes softer, there must be an intermediate proportion of serum substances where the plasticity remains practically unchanged while the rubber is kept. This proportion of serum substances is within the range of that normally present in com. plantation rubber (cf. *C. A.* 22, 2077). The changes in plasticity on keeping are little influenced by the age of the trees from which the rubber was obtained, not even rubber from very young trees changing in any noteworthy manner. Neither does the nature nor the proportion of acid used for coagulation influence these changes in plasticity. Likewise mech. treatment (rolling, milling, sheeting, etc., under different conditions), heating during the drying operation and smoking fail to influence the plasticity in any definite way. On the other hand when a large dose of AcONa is added to the latex, the rubber becomes very weak on keeping, and finely cut, unwashed matured coagulum also becomes very weak in contrast to crepe from matured coagulum which becomes harder to about the same extent as does ordinary crepe. No definite influence on the plasticity on keeping could be attributed to coagulation by heating, whereas coagulation by EtOH tends to cause the rubber to become gradually softer. The plasticity of crepe from ammoniated latex changes in about the same way as that of crepe prepd. under the same conditions from fresh latex. Likewise films from ammoniated latex evapd. in the air become very hard on keeping, in the same way as films from fresh evapd. latex.

C. C. DAVIS

Cooling rubber mills. FRED. GROVE-PALMER. *Rubber Age* (London) 9, 141 (1928).

C. C. DAVIS

Rubber vulcanization accelerators in ultra-violet light from the Hanau analytical quartz lamp. RUDOLF DITMAR AND WILHELM DIETSCH. *Chem.-Ztg.* **52**, 388-9 (1928); cf. *C. A.* **22**, 2291; Kirchhof, *C. A.* **22**, 2291.—Exposure of various accelerators to filtered ultra-violet light showed that most of them are readily distinguishable by their characteristic fluorescence. When they are mixed in pale crepe without any other ingredient, the fluorescent colors of the mixts. are characteristic enough in some cases to distinguish the accelerators. Even when other ingredients, such as S, ZnO, MgO, PbO, etc., are present, it is possible in some cases to distinguish a characteristic fluorescence, though with several ingredients present, the fluorescent effect varies with the different combinations, and only by knowing the compn. of the mixt. does the particular fluorescence have any significance. C. C. DAVIS

Reclaimed rubber compounding. A review of progress made along lines of correct vulcanizing, aging and reinforcement in reclaimed rubber compounds. D. F. CRANOR. *India Rubber & Tire Rev.* **27**, No. 11, 30, 33-4 (1927); cf. *C. A.* **22**, 185 —A crit. review of recent scientific and technical research. Emphasis is laid on the fact that reclaimed rubber may be of inferior quality *per se*, and yet may give disproportionately good results when used as a component in rubber mixts (cf. Winkelmann, *C. A.* **21**, 511). The discussion deals particularly with papers by Vogt (*C. A.* **22**, 1058) and Bierer and Davis (*C. A.* **20**, 2092). C. C. DAVIS

Effect of various carbons in rubber. ELLWOOD B. SPEAR AND ROBERT L. MOORE. *Rubber Age* (London) **9**, 123-5 (1928); cf. *C. A.* **20**, 2095 —C blacks may for convenience be grouped in 4 classes, according to the properties imparted to rubber, the effects being relative only: (1) those which impart great stiffness, high tensile strength and moderate ultimate elongation (channel or gas blacks), (2) those which impart great stiffness, moderate tensile strength and low ultimate elongation (lamp blacks); (3) those which impart little stiffness, moderate tensile strength and moderate ultimate elongation (e. g., thermatomic C), and (4) those which impart little stiffness, high tensile strength and very high ultimate elongation (these blacks are in an exptl. stage, cf. *C. A.* **20**, 2095). Data are presented to illustrate the properties of cured mixts. contg. the different types of C blacks. The radical differences between blacks of classes (1) and (2) on the one hand and of (3) and (4) on the other are especially emphasized. Some C blacks retard the rate of vulcanization, whereas others (class (4)) have a pronounced accelerating action. These effects vary in turn with the type of rubber and with the particular accelerator. C blacks of class (4) are unique in that with certain accelerators, notably diphenylguanidine, and in certain proportions, e. g., 14 parts of C black per 100 parts of rubber by vol., they give mixts. with an ultimate elongation as great as, or even greater than, the basal mixts. contg. no C black. This lends support to the plastic film theory of Wilson applied by Spear to rubber-C black mixts. (cf. *C. A.* **18**, 1064). The ability to add high proportions of C blacks of classes (3) and (4) to rubber renders them particularly serviceable in formulating rubber mixts. resistant to heating. C. C. DAVIS

HAUSER, E. A.: **The Colloid Chemistry of the Rubber Industry.** London: Oxford Univ. Press, Humphrey Milford. 53 pp. 4s. 6d.

Coagulating latex. R. KOEPP & Co. Brit. 280,639, Aug. 18, 1926. A soln. of Na biformate is used as a coagulant, with or without other coagulants.

Compositions comprising rubber and fibrous material. WILLIAM G. O'BRIEN (to Goodyear Tire & Rubber Co.). U. S. 1,676,798, July 10. Rubber is pptd. on fibrous material and liquid from a suspension of the coated fibers is passed through a screen of sufficiently small mesh to retain the fibers and the latter are then treated with a rubber precipitating agent such as alc. which is passed through the screen.

Belt or rubber and rubberized fabric reinforced with twisted cords. AUSTIN A. TRISHER (to Goodyear Tire & Rubber Co.). U. S. 1,676,845, July 10.

Sheet material containing rubber and fiber. REED P. ROSE (to General Rubber Co.). U. S. 1,675,959, July 3. A material suitable for various purposes is formed by mixing a suspension of beaten fibers and an aq. dispersion comprising rubber and protective agent having a negative charge, in an alk. medium, such as a Na resinate soln. and then acidifying the mixt. to reverse the charge on the protective agent and effect deposition of the rubber on the fiber, and forming the material into sheets.

Rubber sheet material with fibrous backing. TON J. MELL (to B. F. Goodrich Co.). U. S. 1,677,284, July 17. Material suitable for use as a floor covering is formed of a rubber sheet with a backing comprising wool felt or other suitable fibrous material

consolidated with bituminous material or other binder which will absorb a rubber solvent such as gasoline without swelling.

Sheet rubber reinforced with wire netting. BERNARD A. RUHLING. U. S. 1,677,372, July 17. Sheets are described which are suitable for use in making automobile bodies, etc.

Apparatus and method for making rubber tubes. JOHN A. FLEISCHLI (to Cupples Co.). U. S. 1,676,776, July 10.

Coating metal with rubber. ALLAN B. MERRILL (to B. F. Goodrich Co.). U. S. 1,677,360, July 17. In making composite sheets, the metal is coated with a tough heat-plastic isomer of rubber such as that formed by heating rubber with phenolsulfonic acid, and a S-contg. rubber compn. is superposed on the coated metal with an intervening layer of material such as a rubber compn. or balata or gutta percha which will inhibit migration of S to the metal, the assembled material is subjected to vulcanization.

Rubber composition for golf-ball centers. PAUL S. SHOAFF (to Goodyear Tire & Rubber Co.). U. S. 1,676,841, July 10. A mixt. of balata resin and scrap vulcanized rubber is heated to reduce it to a gel-like consistency, PbO or other weighting material and S are added, and the product is vulcanized.

Apparatus for vulcanizing rubber articles. CLIFFORD H. OAKLEY. U. S. 1,677,200, July 17.

Apparatus for continuous vulcanizing of rubber heels, etc., under pressure. CLIFFORD H. OAKLEY. U. S. 1,677,201, July 17.

Vulcanizing rubber. ALBERT C. BURRAGE, JR. U. S. 1,677,169, July 17. Di-phenyl-*o*-tolylguanidine or other tri-substituted guanidine contg. phenyl and tolyl substitution radicals is used as an accelerator. Cf. C. A. 22, 2856.

Vulcanizing rubber. RALPH V. HEUSER. U. S. 1,677,235, July 17. *o*-Tolyl-di-*p*-tolylguanidine or other suitable substituted guanidine contg. an aryl group in each of the amino positions and a *p*-substituted aryl group in the imino position is used as an accelerator.

Vulcanizing rubber. BRITISH DYESTUFFS CORPORATION, LTD., C. J. T. CRONSHAW and W. J. S. NAUNTON. Brit. 280,661, Sept. 3, 1926. Rubber is given good aging properties by use of a condensation product of equal proportions of α - and β -naphthylamine with AcH formed in the presence of an acid such as HCl. About 15% of this condensation product may be added to rubber compns. before vulcanizing.

Vulcanizing rubber. LORIN B. SEBRELL (to Goodyear Tire & Rubber Co.). U. S. 1,676,838, July 10. The product of crotonaldehyde, acetaldehyde and aniline or other suitable reaction product of an unsatd. aldehyde, a satd. aldehyde and an amine is used as an accelerator.

CHEMICAL ABSTRACTS

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No. 18

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Apparatus in the chemical industry. M. ARGANT. *Science ind.* 12, 43-89(1928).—An illustrated review of chem. app. and plant equipment. R. D. B.

A new watch glass. C. E. IRON. *Chemist-Analyst* 17, No. 3, 18-20(1928).—Four projections are made on the under surface of an ordinary watch glass so that the greater part of the lower surface does not touch the beaker when the watch glass is placed upon it. In this way, it is not necessary to use a glass triangle or glass hooks to raise the watch glass from the beaker when it is desired to accomplish the evapn. of liquid in the beaker. W. T. H.

Hand spectroscope. F. LOWE. *Rev. chim. ind.* 37, 194-6(1928).—The app. described permits the use of test tubes and can also be used to obtain photographs of spectra. P. THOMASSET

Distance thermometer. SCHULZE-MANITIUS. *Warme & Kälte Tech.* 28, 190(1923).—In thermometers in which the reading is carried to a distance by a Hg thread, errors due to expansion of the thread are avoided by providing another similar parallel thread, arranged to act on the dial in the opposite direction. ERNEST W. THIELE

A micro-Saybolt-type viscometer. STUART M. ROGERS AND LINDEN R. ADKINS. Vacuum Oil Co. *Ind. Eng. Chem.* 20, 742(1928).—The app. is an all-metal viscometer, with proportions similar to those of the Saybolt. It operates with as little as 8.5-cc. sample. T. S. CARSWELL

Carbon-resistor furnaces for laboratory use. H. C. KREMERS AND L. F. YNTEMA. Illinois Univ. *Ind. Eng. Chem.* 20, 770-1(1928).—A C-resistor furnace is made by mounting 2 aluminum tubes concentrically on a graphite bar. The space between the tubes is packed with granular C. An Fe collar, the pressure on which is variable, makes contact with the C. A temp. of 1200° may be reached. T. S. CARSWELL

Maintaining the efficiency of evaporators, cooling and condensation coils. S. SCHUTZ. *Wochschr. Brauw.* 45, 244-8(1928).—The common theories of the rusting of iron and its prevention by the use of different protective coatings are discussed. A paint contg. Cr has been found to be very effective against rusting. A. SCHULTZ

Number of plates in fractionating columns. W. L. McCABE. *Ind. Eng. Chem.* 20, 873(1928).—The method of Keyes, Soukup and Nichols (*C. A.* 22, 1875) for calcg. the no. of plates in a fractionating column may cause an error when a low reflux ratio is used, because as the reflux ratio is increased, the vol. of vapor per unit product and the necessary column cross section increase, although the height of the column decreases. T. S. CARSWELL

Number of plates in fractionating columns. D. B. KEYES. *Ind. Eng. Chem.* 20, 873.—Reply to McCabe (preceding abstract) stating that the difference is not great from a practical standpoint. T. S. CARSWELL

An improvised photomicrographic apparatus. CHAS. N. SHAW. *Chemist-Analyst* 17, No. 3, 16-7(1928).—In order to do some photomicrographic work without any of the standard app. available, an outfit was prepd. by mounting an ordinary Kodak camera directly over the eye-piece of the microscope. A complete description of this improvised outfit is given, a picture of the same and a photomicrograph of CuSO₄ crystals magnified about 200 times. W. T. H.

Apparatus for the micro-determination of dissolved oxygen. THOMAS G. THOMPSON AND ROBERT C. MILLER. Univ. of Washington. *Ind. Eng. Chem.* 20, 774(1928).—An all-glass-app. is described in detail, which requires as a sample from 5 to 10 cc. T. S. CARSWELL

Simple apparatus for use in colorimetric titration. EDWIN B. POWERS. University Tennessee. *Ecology* 9, 364(1928).—The app. consists of a 250-cc. Erlenmeyer flask, to the neck of which is sealed a test tube, and to the bottom of which is sealed a neck adapted to take a no. 10 stopper. The liquid being titrated is compared with color

standards while in the test tube portion of the app., and titrations may be carried out under gas pressure. T. S. C.

A continuous extractor. DOUGLAS HENVILLE. *Analyst* 53, 380-2(1928).—The app. was designed for the rapid extn. of as much as 50 g. of material. It is somewhat similar to the Soxhlet extractor but has the following advantages: Neither thimbles nor filter paper packets are necessary; the substance is always immersed in solvent; the "pressure" is directly on the solvent which is directly in contact with the material and the extg. liquid is always in motion; there is a continuous and rapid flow of solvent; if the app. is allowed to stand overnight, the substance remains constantly immersed and the extractor is started again as soon as a little condensate drops down; as soon as the solvent is circulating easily only very little excess solvent is necessary; the contents of the extractor are always visible. W. T. H.

New apparatus for extraction at high temperature. ST. REINER. *Chem.-Ztg.* 52, 529(1928).—This app. is suitable for Soxhlet extns. using inflammable solvents. The only novel feature is the replacement of a multiple place water bath by an elec. heating table capable of accommodating several extn. app. at one time. A. L. H.

Evils of the common cocks for liquid fuels. BRUNO MÜLLER. *Apparatebau* 40, 161(1928).—The Werner cock is recommended. J. H. MOORE

A valve for use in flowing gases. E. BLECHSCHMIDT. *Physik. Z.* 29, 441(1928).—This valve is built of glass very much like a glass stopcock, with no bore but with an opening along the side which gradually closes as the stopcock handle is turned. MALCOLM DOLE

An improved gas generator. V. T. JACKSON. *Florida Univ. Ind. Eng. Chem.* 20, 771(1928).—The app., constructed of bottles, acts much upon the principle of the Kipp generator. T. S. CARSWELL

Insertion of tight-fitting glass tubing into rubber stoppers. T. J. COCHRANE. *Chemist-Analyst* 17, No. 3, 20(1928).—After boring the stopper to the desired size, insert the next larger cork borer into the hole and then shove the glass tubing through the cork borer. Now on removing the borer the glass tube will be in place. W. T. H.

The behavior of rubber-plated apparatus toward organic solvents. A. BRESSER. *Kunststoffe* 18, 125-7, 160-2(1928); cf. *C. A.* 22, 335, 545.—Rubber-plated metals were tested by exposing them to the action of various org. solvents, including isobutyl alc., propyl alc., AcOBu, butyl alc., AcOMe, Me Et ketone, acetone, dichlorohydrin, triacetin, Et₂CO₃, etc. In most instances the coating on the samples became soft and useless. BONIFANT HAMILTON

The development of pipe-line construction. ANON. *Apparatebau* 40, 157-9(1928).—A special flange for high-pressure lines, and a special form of expansion bend are described. J. H. MOORE

Benzine and alcohol recovery equipment. R. W. MÜLLER. *Kautschuk* 1928, 136-7.—An illustrated description of the Sulzer process. C. C. DAVIS

Lead and articles manufactured from it (BRENTHEL) 9.

Filters. JEAN É. A. THILL. *Fr.* 633,092, Apr. 22, 1927. A filter of large capacity is described in which the liquid to be filtered passes through holes in the floor of a tank and is directed by tongues on to inclined filter cloths or gratings arranged as an endless band by passing under and over rollers at the bottom and top of a tank arranged underneath.

Air filter. EDWARD R. HEWITT and ALFRED F. MASURY (to International Motor Co.). U. S. 1,678,044, July 24.

Filter for liquids. VICTOR R. HEFTLER. *Fr.* 632,323, Apr. 7, 1927. A filter for liquids, specially for motor fuels, comprises a series of narrow disks with holes to form canals parallel to the axis of the pile, some of the disks having their peripheries cut away to form a communication between the canals and the exterior of the pile.

Rotary filter for treating coal fines or other materials. ILLINGWORTH CARBONIZATION CO., LTD., and S. R. ILLINGWORTH. *Brit.* 281,390, Sept. 1, 1926.

Filter for lubricating oils, etc. AC SPARK PLUG CO. *Brit.* 281,124, Jan. 24, 1927.

Filter (for edge filtration) for treating lubricating oil, etc. FREDERICK D. HERBERT, WALDO L. KRAEMER and JOSEPH E. GARABRANT (to Metal Edge Filter Corporation). U. S. 1,677,892, July 24.

Apparatus for separating dust from gases. NAAMLOOZE VENNOOTSCHAP MACHINE-RIJEN-APPARATEN FABRIEKEN. *Fr.* 633,268, Apr. 23, 1927. In a dust separator for

gases of the type in which V-shaped channels are placed in the path of the gas with the apex opposed to the current of gas, the angle between the walls of the channels is between 50° and 70° , while the width of the walls is less than 10 mm. and the distance between the channels is one row less than 5 mm.

Centrifugal device for separating dust from air, etc. E. DODSON. Brit. 281,088, Nov. 23, 1926.

Centrifugal apparatus for removing suspended solids from gases. J. THOMPSON (DUDLEY), LTD., AND R. D. WEST. Brit. 281,033, Sept. 10, 1926.

Distilling apparatus. ELIE LIANDIER. Fr. 632,904, Apr. 15, 1927. An app. is described for the distn. of fruit or other solid or pasty substances, in which the perforated plates of the distg. column are in two parts capable of being dropped automatically or by hand into a vertical plane.

Distilling apparatus. SEMET-SOLVAY COMPANY. Fr. 633,201, Apr. 6, 1927. A distg. app. is described which can be used in any distn. system but is particularly for distg. the light oils from the oil used for washing the gas from the destructive distn. of coal.

Distilling columns. ALFRED M. J. SORREL. Fr. 632,450, Apr. 8, 1927. The distg. columns are inclined and arranged so that the bubbling zone on one plate is not beneath the bubbling zone on the plate above.

Improvements in heating-baths. SOC. ANON. ANCIENS ÉTABLISSEMENTS FARGE. Fr. 632,859, Apr. 15, 1927.

Thermometer for indicating the temperature of oil circulating in automobile engines, etc. ARTHUR HOLMES (to Holmes Automobile Co.). U. S. 1,678,389, July 24, 1927.

Pyrometer. VICTORIN C. LOMBARD and JOANNY LOMBARD. Fr. 632,162, Apr. 5, 1927. Colored-glass screens of different thicknesses or prisms are movably mounted between an objective and an eyepiece. The objective is turned toward the source of heat to be measured and the screens are moved till complete extinction of light is obtained, the temp. being deduced from the position reached.

Ultramicroscopes. CHARLES SPIERER. Fr. 632,996, Apr. 20, 1927. An app. is described for illuminating objects for their ultramicroscopic observation by which the light rays reach the object from two different sides.

Apparatus for sublimation suitable for use in analytical work. FRANK A. PEARL. U. S. 1,678,442, July 24.

Air or gas purifier. PIERRE AMET. Fr. 632,551, July 29, 1926. An app. for filtering air or gas specially for engines is described.

Gas and air control and heating system, etc., for regenerative gas-fired furnaces of the reversible open-hearth type. W. SCHUCANY. Brit. 281,002, Aug. 23, 1926.

Apparatus for drying solids and gases. BAECHLER, KISER ET CIE. Brit. 281,664, Dec. 4, 1926. An app. is specified comprising a series of superposed truncated cones and fixed or rotating plates within a vertical cylinder through which the materials treated pass.

Treatment (involving vaporization of magnesium) for obtaining a high vacuum in vacuum tubes. S. LOEWI. Brit. 280,908, Nov. 16, 1926.

Valve for controlling the flow of gas through purifiers, condensers, etc. R. DEMPSTER & SONS, LTD., AND H. LUMB. Brit. 281,001, Aug. 23, 1926. Structural features.

Apparatus for storing radioactive liquids or other liquids containing gases. E. LEVOUX. Brit. 281,228, Nov. 29, 1926.

Vacuum tubes. JEAN B. J. M. ABADIE. Fr. 633,439, Aug. 26, 1926. To maintain a const. pressure in a vacuum tube through which a current is passing a salt is decomposed at the cathode in a manner just necessary to re-feed the tube.

X-ray tubes. N. V. PHILIPS' GLOBILAMPENFABRIEKEN. Fr. 633,598, Apr. 29, 1927.

Electrical treatments for degasifying radio tubes. FREDERICK S. MCCULLOUGH. U. S. 1,677,900, July 24.

Röntgen shield. RUDOLF MANNL. Fr. 633,597, Apr. 29, 1927. The protecting partitions of a Röntgen shield, directed radially toward a common center, are divided into sep. small plates.

Solutions for use in light-transmitting heat screens. C. S. MCNAIR. Brit. 281,066, Oct. 28, 1926. A soln. of alum and a Cu salt, to which Fe or Co salts and dyes also may be added, is used for filling glazed cells for use with optical projection app. or the like. Various structural features are described.

Apparatus for drying industrial products. SOC. IND. BRIQUETTERIE ET CERAMIQUE. Fr. 632,557, Jul. 30, 1926.

Device for delivering measured quantities of dyes or other materials in granular

form. I. G. FARBENIND. A.-G. Brit. 281,645, Dec. 1, 1926. A funnel is provided with spring blades and a slide which serve as measuring devices.

Centrifugal chargers. GABRIEL CLERMONT and ANDRÉ H. NARBONNE. Fr. 632,431, Mar. 14, 1927. The blades on the rotating wheel of centrifugal chargers, for instance, for charging a furnace with coal, are at different angles to the surface of the wheel to cause the coal to spread.

Apparatus for the automatic control of a reduced pressure in a vessel. EZECHIEL WEINTRAUB ET SOC. ALSACIENNE CONSTRUCTIONS MÉCANIQUES. Fr. 633,402, Aug. 17, 1926.

Mill for grinding paints, etc. R. J. DOREY. Brit. 281,062, Oct. 23, 1926.

Colloid mill (with rollers rotating in opposite directions). W. H. WHATMOUGH. Brit. 280,973, May 29, 1926.

Electric system for preventing corrosion of boilers, water heaters, etc. A. GOMEZ. Brit. 281,244, Nov. 26, 1926.

Cleaning textile-material boilers or other high-pressure boiling apparatus. GUSTAV ULLMANN. U. S. 1,678,089, July 24. At the same time that the boiler is blown off a cool liquid diluent such as water is introduced for diluting and cooling the soln. and sludge which are blown off from the boiler. App. is described.

Apparatus for cleaning or scouring tin plates. H. S. THOMAS and W. R. DAVIES. Brit. 281,007, May 24, 1927.

Apparatus for cleaning, scouring and polishing tin plates with bran, etc. R. THOMAS & CO., LTD., and R. A. JONES. Brit. 281,063, Oct. 25, 1926.

Apparatus for testing abrasion resistance of various materials. FRANK A. FAHRENWALD. U. S. 1,678,110, July 24.

Apparatus for regulating the outflow or output of liquids in accord with pressure or temperature conditions, etc. SOC. ANON. SOLEX. Brit. 280,879, Nov. 20, 1926.

Agitator (of the injector type) for mixing oil with purifying chemicals. JOHN W. KINCADE. U. S. 1,678,225, July 24.

Heat-exchange apparatus for cooling oil or other liquids. JAMES MOORE (to Buhmah Oil Co., Ltd.). U. S. 1,678,070, July 24.

Resistance viscometer with associated devices for actuating indicating or concentration-regulating apparatus. ZEILSTOLFFABRIK WALTHER and R. HAAS. Brit. 280,876, Nov. 20, 1926.

Viscometer. GEORGES L. WILLAINE. Fr. 632,339, Apr. 7, 1927. A viscometer is described which depends on the correlation between the viscosity of a liquid and the coeff. of transmission of heat to the liquid. A vessel dipping into the liquid is heated and the difference in temp. of the vessel and the liquid gives the viscosity.

Apparatus for extracting volatile products. AM. HYDROCARBON COMPANY, INC. Fr. 632,716, Apr. 13, 1927. An app. for extg. volatile products from solids comprises an annular vessel, the walls of which rotate and carry blades, the interior wall being cylindrical and the exterior a truncated cone.

Rubber tip for hydrometer syringes. MELVIN S. LOWER (to Sun Rubber Co.). U. S. 1,678,600, July 24. Structural features.

Perforating glass. G. GANZ & CO. (to B. Erber). Brit. 281,648, Dec. 1, 1926. A brass wire which may be first coated with graphite and then electroplated with Cu is sealed into glass and afterward withdrawn to leave a perforation.

Photomechanical screens. F. HAUSLEITER. Brit. 281,137, Feb. 15, 1927. A glass screen is provided with a metal frame around its edge which is applied directly to the glass, e. g., by metal spraying or galvanic plating.

Apparatus for testing tensile strength of various materials. FRANK A. VALENTINE and DAVID C. SCOTT (to Henry L. Scott Co.). U. S. 1,678,369, July 24.

Pulp forming and molding apparatus. ORANGE J. SALISBURY. U. S. 1,677,905, July 24.

Electric condensers. DUBILIER CONDENSER CO. (1925), LTD. Fr. 632,529, Apr. 9, 1927. The insulating bands of elec. condensers are made of rubberized fabric not vulcanized till after the completion of the condenser.

Cathode for thermionic valves. M.-O. VALVE CO., LTD., and M. THOMPSON. Brit. 281,060, Oct. 15, 1926. Cathodes such as those of Pt or W are heated in the vapor of an alk. earth metal such as Ba to form a deposit of the latter on the filament.

Thermionic cathodes for vacuum tubes. RADIOTECHNIQUE. Brit. 281,262, Nov. 26, 1926. Cathodes are formed with a core of W or other suitable refractory metal and an adherent sheath of insulating material such as MgO, BaO, SrO or CaO on which is mounted a helical wire or other suitable form of an electron-emitting material such as thoriated W. The sheath may be formed by heating a wire in MgO; its

m. p. should be between that of the core and the electron-emission temp. of the surrounding helix or the like.

Thermostat. JOHN A. SPENCER (to Spencer Thermostat Co.). U. S. 1,678,407, July 24.

Thermostats. FREDERICK W. MILLER. Fr. 632,938, Apr. 16, 1927. Bi-metal plates for thermostats are made by covering a plate of the metal of higher m. p. with a flux contg. the other metal finely divided, and heating to the m. p. of the second metal.

Thermostatic control system for heating apparatus of buildings. CHARLES L. FORTIER (to Johnson Service Co.). U. S. 1,678,213, July 24.

Electric-recording or thermostatic alarm or temperature-indicating apparatus. REPUBLIC FLOW METERS CO. (to Electroflo Meters Co., Ltd.). Brit. 281,341, Nov. 29, 1926.

Thermostatic electric switch. NICHOLAS J. LUTTRELL. U. S. 1,678,401, July 24.

Thermostatic cut-out for gas valves. RICHARD H. SHADRICK (to Andrew E. Carlsen). U. S. 1,678,169, July 24.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

The Institute of Chemistry and the American Chemical Society. S. W. PARR. Univ. of Ill. *Ind. Eng. Chem., News Ed.* 6, No 15, 1-2(1928).—Address delivered on the occasion of the opening of the A. C. S. Institute at Evanston, Ill., July 23, 1928.

Influence of chemistry on civilization. JAMES C. IRVINE. Univ. of St. Andrews Scotland. *Ind. Eng. Chem.* 20, 884-8(1928).
E. J. C.

Mongolian distillation apparatus. E. HUBER. *Chem. App.* 15, 145-7(1928).—Historical.
E. H.

Ernst Beckmann (1853-1923). G. LOCKEMANN. *Ber.* 61A, 87-130(1928).—Biography with portrait and bibliography.
J. H. MOORE

Ignác Mościcki, President of the Polish Republic, as technologist. JAROSLAV MILBAUER. *Chem. obzor.* 3, 1-3(1928).—A biography, with portrait, and a short description of his work.
E. H.

Count Rumford—scientist and philanthropist. LYMAN C. NEWELL. *Science* 68, 67-73(1928).
JAR. KUCERA

Color. E. W. PIERCE. *Proc. Am. Assocn. Textile Chem. Colorists* 1928, 200-2; *Am. Dyestuff Rept.* 17, 472-4.—The phenomena of color are discussed from the physicists point of view.
L. W. RIGGS

The atomic weight of cesium. THEODORE W. RICHARDS AND MARCEL FRANÇON. Harvard Univ. *J. Am. Chem. Soc.* 50, 2162-6(1928).—An analysis of CsCl, prepd. by the recrystn. of Cs alums, by comparison with Ag confirmed the at. wt. of Cs to be 132.81.
G. L. CLARK

The structure of atoms as a periodic property and its relation to valence and ion formation. A. A. NOYES AND A. O. BECKMAN. *Chem. Reviews* 5, 85-107(1928); cf. *C. A.* 22, 536-7.—This article presents a compilation of values, derived from recent spectroscopic studies, of the energies attending the removal of the sep. electrons from the atoms and ions of the first thirty elements. With the aid of these values and data as to quantum states, a periodic chart has been prepd. showing graphically the number, the quantum states, and the energies of removal of the electrons in the outer shells of these atoms and ions. These at. structures are discussed in relation to the periods and groups of the periodic system of the elements. The structures are also discussed in detail in relation to the formation of ions in crystals or solns. by the sep. elements, and in relation to the best defined valences which they exhibit. The first eight elements of the third period exhibit max. positive valences that correspond to a reactivity of the electrons outside of the completed $3s$ or $3p$ subshells. All of them beyond Sc form bivalent compounds, which indicates that the $3d$ subshell is an exceptionally stable configuration. The other irregular valences exhibited by these elements are not related in any apparent way to the structure of their atoms.
G. L. CLARK

The helix chemica. B. K. EMERSON. *Chem. Reviews* 5, 215-29(1928).—The original helix chemica of 1911 is a helical arrangement of the elements, the coils increasing in size and number according to the simple geometrical series, $2^{-\infty}$, 2^{-1} , 2^0 , 2^1 , etc., the interspaces increasing by the arithmetical series 1, 2, 3, 4, etc. This paper

is to show that the addn. of two small coils at the origin of the helix as originally published perfects it and that the full development of the series of the powers of 2 demands this addn. It requires one addnl. element, coronium, before hydrogen but this addn. completes the symmetry of the elemental series. The same symmetry suggests the existence of two new elements, between hydrogen and helium as well as the two, coronium and proto-hydrogen, preceding hydrogen. A novel interpretation is given to the occurrence and arrangement of the elements, as shown by charts, as well as criticisms of the at. and Mosely numbers and of the at. structure by Mosely, Langmuir and Lande. The similarity and differences of the helix chemica as compared with Rydberg's arrangement are thoroughly discussed.

Molecular diameters in gas reactions. RICHARD C. TOLMAN, DON M. YOST, AND ROSCOE G. DICKINSON. *Science* 67, 241(1928). Attention is called to a numerical error in a previous paper (*C. A.* 21, 2207), which, however, does not greatly alter the main conclusions.

The allotropic modifications and solid solutions of phosphorus. I. V. NICOLAEV. *Compt. rend.* 186, 1621-4(1928).—The 4 modifications of P (viz., white, purple, red-violet and black), announced by N. and Ipatieff, have now been sepd. mechanically by the laborious process of picking out, under a binocular microscope, individual crystals of the same color and appearance. The d., ignition temp., and vapor tension at 21° were measured for each modification. The results are correlated in a series of graphs for each of which ds. (from 1.8 to 2.7) are taken as abscissas. N. states the following conclusions: (1) The existence of 4 allotropic modifications of P, forming among themselves a continuous series of solid solus., has been demonstrated. (2) The vague idea of red P is replaced by that of 2 species, viz., purple P and ruby P (ruby by transmitted and slightly violet by reflected light). (3) The violet forms are solid solus. of the black and ruby. (4) The white and purple form a eutectic.

The vapor density and some other properties of formic acid. ALBERT S. COOLIDGE. Harvard Univ. *J. Am. Chem. Soc.* 50, 2166-78(1928).—Formic acid probably 99.99% pure was prepd. by vacuum sublimation. The f. p. was 8.26° and the d. 1.2456 at 0° and 1.2206 at 20°. The vapor d. was measured by the method of transferring known quantities of acid to containers of known vol. and observing the pressure developed at a series of temps., between 10° and 156°. A correction for wall adsorption was detd. and applied. The results can be satisfactorily interpreted upon the assumption that the vapor is an ideal mixt. of 2 gases, having single and double mols., resp., each of which deviates from the perfect gas laws in the same way as would a unimol. vapor of similar mol. wt.

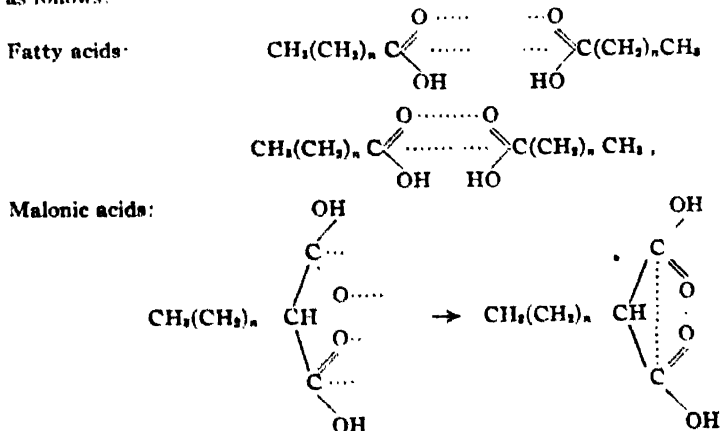
Molecular and atomic volumes. XVIII. The volume of ammonia in crystallized ammonium salts. WILHELM BILTZ AND GUNTHER BALZ. *Z. anorg. allgem. Chem.* 170, 327-41(1928).—The mol. vol. of NH₃ is detd. by measuring the vol. increase produced in monobasic acids when NH₄ salts are formed. In iodic, sulfamic, *p*-aminobenzoic, *β*-naphthalenesulfonic and *p*-aminobenzenesulfonic acids, the mol. vol. obtained for NH₃ is between 19 and 21, but with 1,4-naphthylaminesulfonic acid the mol. vol. of NH₃ in the salt is 28. In the NH₄ salts of the monobasic fatty acids, mol. vols. of 18, 18 and 19 are obtained for NH₃ in the formate, acetate and propionate, but in the butyrate, valerate and capronate, the mol. vol. of NH₃ is 28. In the case of dibasic acids, the introduction of the first NH₂ group results in a normal increase of vol. of about 18, but in the introduction of the 2nd NH₂ group a much smaller increase in vol. occurs, corresponding to a mol. vol. for NH₃ of only 11 in the case of (NH₄)₂SO₄ and 14 in the case of (NH₄)₂SeO₄. In the dicarboxylic acids, the mol. vol. of NH₃ varies around 17, for both the 1st and 2nd NH₂ group, until the higher acids are reached, when it increases, the mol. vol. of the 2nd NH₂ group being 21 in the salt contg. 9 C atoms and 28 in the salt contg. 10 C atoms. In the case of (COOH)₂, the mol. vol. of the 1st NH₃ is 21 and the 2nd 9.8. Density is given for various NH₄ salts of monobasic, dibasic and dicarboxylic acids.

Molecular and atomic volumes. XIX. The densities of uranium, tungsten, and molybdenum chlorides. WILHELM BILTZ AND CURT FENDLUS. *Z. anorg. allgem. Chem.* 172, 385-94(1928); cf. preceding abstract.—The difficulties in the prepn. of each of the chlorides are noted. In some cases the amt. of impurity was detd. and the d. extrapolated. The pycnometer detns. were accurate to several tenths of a percent. The following ds. were found at 25°: UCl₄ 4.854; UCl₃ 5.440; WCl₆ 3.520; WCl₅ 3.875; WCl₄ 4.624; WCl₃ 5.436; MoCl₅ 2.928; MoCl₄ 3.579; MoCl₃ 3.714. For compds. with more than 3 Cl. the at. vol. of Cl varies from 16.0 to 16.5, agreeing with that of free Cl, at. vol. 16.5. For lower chlorides the at. vol. is greater than 16.5, agreeing with the data for In and Ta halides. For the chlorides of W and Mo of mean compn.

the at. vol. is at a min., much the same as in homologous org. series, ammoniates, etc. Compds. in which the halogen at. vol. is the same as the free halogen at. vol. have ionic lattices, those in which the at. vol. is greater have mol. lattices. **XX. Density measurements of iodine chloride.** ERWIN BIRK. *Ibid* 395-402.—The measurements were carried out by an air displacement method, the app. being checked with KCl and *o*-nitrophenol. Values were about 1% low, probably because of gas absorption. Densities found are the following: d_0 β -ICl 3.66, mol. vol. 44.3; d_0 α -ICl 3.85, mol. vol. 42.1; d_2 , liquid ICl 3.10, mol. vol. 52.3. The labile form of ICl changes to the stable with contraction in vol. agreeing with observations on other substances. The mol. vol. of the α -form = $0.81 \times$ mol. vol. of the liquid near the m. p., agreeing with factor for AlI_3 . The d. of ICl_3 was detd. in a pycnometer with liquid chlorine as the fluid. The advantages are that ICl_3 is insol. in dry liquid Cl and that the compd. may be made from its components in the pycnometer; d_{-40° is 3.203, mol. vol. 72.84, corrected to zero point vol. 70.7. The mol. vol. calcd. by addn. is 73.8, hence a contraction occurs in the formation of ICl_3 .

ARTHUR FLEISCHER

An x-ray examination of saturated dicarboxylic acids and of amides of the fatty acid series. EDWARD HENDERSON Univ. of Edinburgh. *Proc. Roy. Soc. Edinburgh* 48, 20(1927-8).—In addn. to the C_6 , C_{10} , C_{12} , C_{14} and C_{16} normal satd. dicarboxylic acids previously investigated with x-rays (*C. A.* 21, 390, 2101), results are now reported for the C_2 to C_8 acids, inclusive. The lower members exhibit a considerable departure from the regularity of structure found for higher homologs. The d. spacing of the odd acids is nearer that of the next lower even acid than the next higher even acid until C_{12} and C_{14} show almost identical values (13.25 and 13.3 A U.). The d_1 and d_2 spacings of the higher odd acids are different from those of the even members, being higher and indicating a longitudinal contraction and lateral expansion. Next, a series of monoalkylmalonic acids were investigated with the following results for the principal spacing d_1 : C_2H_5 .CH(COOH) $_2$ 7.36 A. U.; C_3H_7 .CH(COOH) $_2$ 8.70; C_4H_9 .CH(COOH) $_2$ 9.83; C_7H_{15} .CH(COOH) $_2$ 12.78; $C_{11}H_{23}$.CH(COOH) $_2$ 25.50. The increase per CH_2 group indicates that there is only one mol. between successive reflecting planes. The explanation in terms of partial free valencies of the difference in this respect between the fatty acid series (2 mols. per layer) and the malonic acid series is graphically shown as follows.



The dialkylmalonic acids give similar results. The d_1 spacing of dioctadecylmalonic acid is the same as that of the mono-octadecyl deriv. In lower members, however, the spacing differs. Thus the diethyl is 1.34 A. U. shorter than the monoethyl; the dipropyl 0.80 and the dibutyl 0.63 A. U. shorter than the monoalkyl acids. Results on d_1 for amides are as follows: $CH_3(CH_2)_2$.CONH $_2$ 14.76, $CH_3(CH_2)_3$.CONH $_2$ 19.56, $CH_3(CH_2)_4$.CONH $_2$ 29.56, $CH_3(CH_2)_5$.CONH $_2$ 33.40. These values are similar to those of the acids, again indicating that bimol. layers in the crystals are due to the presence of incompletely satd. terminal groups in the mol. An interesting crit. discussion on the constancy of the increment $\partial d_1 / \partial n$ is given.

G. L. CLARK

Density of fused mixtures of cadmium chloride and potassium chloride. RICHARD LORENZ AND HANS ADLER. *Z. anorg. allgem. Chem.* 172, 372-4(1928).—D. is detd. by using a quartz sinker, weighted with Fe, and attached to a balance pan placed

about 1 m. above the oven contg. the fusion and protected from radiant heat. A linear relation is found between d. and temp. A mixt. comprised of 20 mol. % CdCl_2 and 80 mol. % KCl has a d. of 1.877 at 702° , 1.885 at 685° , 1.903 at 649° , 1.953 at 636° . With 40% CdCl_2 and 60% KCl , d. is 2.308 at 598° , 2.270 at 651° and 2.216 at 720° . With 60% CdCl_2 and 40% KCl , d. is 2.677 at 609° , 2.636 at 651° , 2.593 at 700° and with an 80-20 mixt., d. is 3.17 at 600° , 2.979 at 650° and 2.907 at 700° .

H. STOERTZ

Systematic relationships. XLVI. Measurement of the alternation of chemical relationship in crystallized dicarboxylic acids. WILHELM BILTZ and GÜNTHER BALZ. *Z. anorg. allgem. Chem.* 170, 342-6(1928).—An alternating variation in NH_4 dissoen. pressure with increase in C atoms in dicarboxylic acids is shown. This pressure is higher in the salts with an uneven no. of C atoms than in the salts with an even no. of C atoms on each side. Thus with glutaric acid P_{NH_4} in mm. for the acid NH_4 salt is 37, with adipic acid it is 0, with pimelic acid it is 182, with suberic acid it is 18, with azelaic acid it is 210 and with sebacic acid it is 25. Similar alternation in electrolytic dissoen. between even and uneven C atoms likewise is observed in the dissolved acids. In the NH_4 salts this alternation is observed in the increase in mol. vol. as NH_4 is substituted for H to produce the acid salt, but when the 2nd NH_4 is introduced no alternation in mol. vol. increase occurs. Alternation is also shown in the heat of combustion of dicarboxylic acids.

H. STOERTZ

The crystal form of ψ -yohimbine. T. ITO. *Z. Krist.* 65, 303-5(1927).—Crystals of ψ -yohimbine are holohedral orthorhombic, with axial ratio 1.042:1:1.690. The indices for Na light are α 1.571, β 1.642 and γ 1.655.

B. C. A.

The crystal form of methyl tetrathionoxalate. H. HIMMEL. *Z. Krist.* 65, 496-9(1927).—The *cis*-form is holohedral monoclinic, with $a:b:c = 0.8356:1:1.1684$, $\beta = 124^\circ 32'$; m p. 71.5. The *trans*-form is also monoclinic, with $a:b:c = 0.7919:1:0.6059$, $\beta = 99^\circ 48'$; m p. 101.5.

B. C. A.

The equation of state of a gas. KAMEKICHI SHIBA. *Proc. Phys. Mat. Soc. Japan.* 9, 157-62(1927).—Assuming that the mols. of a gas are similar, perfectly elastic, smooth spheres with cohesion which depends only upon their mutual distance, the following modification of van der Waals' equation has been found: $p + (a/v^2) + c(ab/v^3) = (RT/v)[1 + (b/v) + (5/8)(b^2/v^2)](1)$, in which c is a numerical coeff. detd. by the relation $a'/a = cb$, where a and b are the van der Waals' corrections due to cohesion and to mol. vol., resp. Letting the mass and the diam. of a mol. equal m and σ : $a = (2\pi/3m^2) \int_0^\infty r^2 f(r) e^{-2h \int_r^\infty f(x) dx} dr$ [$h = (N/RT)$]; and $b = 2\pi\sigma^3/3m$. Equation (1) may be reduced to: $p + (a/v^2) + c(ab/v^3) = (RT/v)[1 + (b/v)]$, which may be written as: $(p + \phi(T)/v - (c/2)b)(v - b) = RT$, which is very like Clausius' equation of state. Data calcd. with S.'s equation of state agree approx. with the results of Debye's theory.

J. H. PERRY

The validity of gas equations (of state). IV. W. HERZ. *Z. Elektrochem.* 34, 68-9(1928); cf. *C. A.* 21, 2206.—Tables contg. the satn. pressure and the d. of the satd. vapor for a no. of org. and inorg. compds. are compared. Ratios of the pressure and the d. with different fractions of the abs. crit. temp. (T_c) are given and it is indicated that the ratios are the smallest at the crit. temp.; at $2/3 T_c$ the ratio is equal to 2 to 2.5 and at $1/3 T_c$ the ratio remains about the same. The ratios increase with the crit. temp., at first very rapidly, then more slowly, pass through a max. and again decrease.

J. H. PERRY

The relation of liquid properties to orthobaric densities. W. HERZ. *Z. anorg. allgem. Chem.* 172, 414-6(1928); cf. *C. A.* 21, 1399, 2084, 3505.—From H.'s previous work and MacLeod's equation for the relation of surface tension to d., H. deduces 2 equations for the relation of heat of vaporization and for viscosity to the orthobaric d. of a liquid. The equation is shown to hold for nonassociated liquids. A. FLEISCHER

The theory of the liquid state of aggregation. E. N. GAPON. *J. Russ. Phys.-Chem. Soc.* 60, 249-64(1928).—Assuming that internal pressure $P = C\gamma(1 + fT)$ (1), where γ is surface tension and f its temp. coeff., G. substitutes from the b. p. equations $fT_s = 1.40$ and $P_s/\gamma_s = 75.3$ and finds $C = 31$. Equation (1) is now rewritten: $P = 3/\gamma(1 + 2.2\theta)$ (2), where θ denotes reduced temp. P calcd. from (2) for PhCl and PhNMe_2 shows a continuous decrease with the rise in temp. while $P(Mv)^{1/3}$ remains const. Also, for these two liquids $P = 114T_s/(Mv)^{1/3}$ (3), T_s being b. p. in $^\circ\text{K}$. Equation (3) combined with that of Herz (*Chem. Ztg.* 41, 183(1917)) gives $aP(Mv)^{1/3} = 50.0$, which can be extended to consider liquids under external pressure: $\alpha_p (P + p)V_p^{2/3} = \alpha_{p1} (P + p_1)V_p^{2/3} \dots = 50.0$. The relationship holds within 10% for CS_2 and Et_2O . If p is negligible, $P = p/(\alpha_1/\alpha_p - 1)$. Stefan's formulas lead to too

large values of P for associated liquids because exptl. λ is the sum of the heats of evapn. and dissociation. The connection between γ and P explains the variations of the Eötvös-Ramsay-Shields const., high values corresponding to P of 200–500 atm. Equation (3) is transformed into $\beta T_i/(\alpha(Mv)^{1/2}) = \text{const.} (= 1.28 \text{ at } 20^\circ)$. The av. exptl. value for 65 liquids is 1.20; the equation was applied to associated liquids by substituting xM for M , and x was calcd. for 13 org. liquids. G. observes that among alcohols and acids the higher homologs are less associated; addnl. OH groups and side chains also decrease x . For Hg, $x = 2.5$ at room temp. The equation $\gamma\beta(2.2 + T_k/T) = 10.6 \times 10^{-3}$ (T_k being crit. temp.) holds within 10% for 24 liquids, the exptl. value of the const. being 9.0×10^{-3} . The equation $\beta = 0.41 f/\gamma$, agrees with the behavior of 11 org. compds.

BASIL C. SOYENKOFF

The internal pressure of pure and mixed liquids. W. WESTWATER, H. W. FRANTZ AND J. H. HILDEBRAND. Univ. of Calif. *Phys. Rev.* 31, 135–44(1928).—Internal pressures were measured on the principle of a const.-vol. thermometer for 8 pure liquids and 12 mixts. of 50 mol. % compn. Values for the former are given at 15° , 20° , 25° and 35° and for the latter at 20° , 25° and 35° . The values of γ in atm. per degree at 20° are as follows: (1) heptane, 8.66; (2) acetone, 11.22; (3) CCl_4 , 11.47; (4) benzene, 12.58; (5) CS_2 , 12.67; (6) $(\text{CH}_2\text{Cl})_2$, 14.17; (7) $(\text{CH}_2\text{Br})_2$, 15.20; (8) CHBr_3 , 15.32. The values of γ for the mixts. at 20° are, designating the components by the foregoing nos. 1–2, 9.27; 1–3, 9.68; 1–4, 9.86; 1–5, 9.84; 1–7, 10.66; 1–8, 10.86; 3–4, 12.19; 4–5, 12.32; 4–6, 12.92; 4–8, 14.05; 2–5, 11.77; 5–7, 13.98. It was found further (1) that γ is a function of the sp. or molal vol. only; (2) that for each pure liquid $v_2 T \gamma$ is a const., a , v being the molal vol. and T the temp. at which the pressure is 1 atm. (a function of molal vol.); (3) that the values for the mixts. are less than additive, less than those calcd. from the equation of Biron, $\gamma = \gamma_1 \gamma_2 / (\gamma_1 N_1 + \gamma_2 N_2)$ where N_1 and N_2 are the mol. fractions of the components, here 0.5; (4) that they are given within 1 or 2% by the relation $a = (a_1 a_2)^{1/2}$ except in some of the mixts. of CS_2 , acetone and $(\text{CH}_2\text{Cl})_2$ —the first of these is in other respects irregular and the last two are polar; and (5) that a still better agreement is given by considering that γv is additive. The compressibility, β , can be calcd. by combining γ with the coeff. of expansion, $\alpha = \beta \gamma$. In most instances, the agreement with the directly detd. values is satisfactory.

BERNARD LEWIS

The determination of the vapor pressures of odoriferous substances. G. TAMMANN AND W. OELSEN. *Z. anorg. allgem. Chem.* 172, 407–13(1928).—The method consists in satg. air with the substance whose v. p. is being detd. and then dilg. the satd. air till the odor can just be detected. At the same time the threshold value is detd. for the persons used to detect the odor. The temp. at which a substance could be detected by odor was also detd. For a given person the variation was 1.7° , for seven persons the deviation from the mean temp. was 1.2° . For camphor at -40° and -18.5° the vapor pressures found were $0.842 \pm 0.133 \times 10^{-3}$ and $7.30 \pm 0.36 \times 10^{-3}$ mm., resp. These values agree with the values found by other methods. The threshold values for 7 persons varied from 6 to 13×10^{-9} g./cc. For butyric acid the v. p. at -78° and -22° were $1.13 \pm 0.20 \times 10^{-6}$ and $3.74 \pm 0.37 \times 10^{-3}$ mm., resp. The threshold values varied from 0.9 to 1.2×10^{-10} .

ARTHUR FLEISCHER

Unimolecular films. SHEPPARD AND KEENAN. *Nature* 121, 982(1928).—The thicknesses of unimol. films are measured as follows: A drop of a soln. of the compd. studied is allowed to spread upon a mercury surface, the film area being developed with talc powder and its area measured with a planimeter. From the area and the concn. of the compd. in the solvent the thickness is calcd. By plotting film thickness against concn. a point is reached where the thickness value becomes independent of concn. These values in A. U. for a few of the compds. studied are as follows: cellulose nitrate, 3 to 5; stearic acid 22 to 24; oleic acid 11.2; elaidic acid 12.2; *n*-caproic acid 13.6. The data are interpreted to agree with the present theories of polymerization and with atom-group orientation theory of colloid micelle formation. G. L. C.

Method for the measurement of interfacial tension of liquid-liquid systems. F. E. BARTELL AND F. L. MILLER. Univ. Michigan. *J. Am. Chem. Soc.* 50, 1961–7(1928).—A method based upon the capillary-tube principle was developed for the detn. of the interfacial tension of liquid-liquid systems, designed especially for systems where one of the liquids was colored. Two somewhat different types of app. were designed. The method is rapid; the app. can be cleaned easily; non-transparent liquids can be used, likewise liquids of any d. The app. can be placed in a H_2O thermostat and kept at a const. temp. while readings are being made. It is not essential that the diam. of the capillary be strictly uniform throughout. Calibration of capillary radius is necessary only for a given point on the capillary tube; also for work of ordinary

accuracy no capillary corrections for meniscus height readings are necessary. Results which have been obtained show a close agreement with what are believed to be the most accurate interfacial-tension data available in the literature. C. J. WESR

Phenomena occurring in the condensation of molecular streams on surfaces. J. D. COCKCROFT. *Proc. Roy. Soc. (London)* A119, 293-312(1928).—The rates of condensation of streams of Cd and Ag vapors at low pressure are studied (1) when the d. of the stream is approx. const. and the condensing surface has a known temp. gradient, (2) when the d. of the stream varies from point to point on a condensing surface of const. temp. and (3) when different materials are used for the condensing surface. A new app for measuring the phenomena under conditions (2) and (3) is described. At densities below a certain crit. value, no deposit is formed. The crit. d. for Cd on Cu varies with temp. in the range -150° to -90° according to the relation $\nu = 4.7 \times 10^{22} e^{-2840/T}$. This is of the form required by Frenkel's theory of adsorption (cf. C. A. 18, 3302). Numerical values for the energy required to remove one member of an at. "doublet" from the surface and for the mean life of the doublets are calcd. The theory also gives the correct relation between the time of appearance of a visible deposit and the stream d. If the latter is at least 4 times as great as ν , the proportion of atoms which re-evap. can be neglected. The value of ν is found to be the same within 1 or 2% for condensing surfaces of Cu and Ag (-137° and -170°), and a similar result is obtained with Cu and glass. When a fresh Ag surface is deposited immediately before condensation of Cd, and when other precautions are taken to remove contamination from the condensing surface, the d. required to form a deposit decreases by a factor of 10. This shows that the true surface forces were probably masked by adsorbed gases. The surface motion of condensed metal atoms required by the F. theory is verified by a photomicrographic method, and by observation of the optical properties of the condensed film. A magnetic field of 10,000 gauss has no effect on the condensation phenomena. F. A. JENKINS

The sorption phenomena and chemical processes. IV. Heterogeneous chemical reactions. S. LIPATOV. *J. Russ. Phys.-Chem. Soc.* 59, 969-80(1927); cf. C. A. 22, 1264.—The chem. reaction between nitroalizarin and $\text{Cu}(\text{OAc})_2$ bears an external resemblance to an adsorption process. Two samples of nitroalizarin were studied with a view to reproducing phenomena considered peculiar to adsorption. The time curve is much flatter in the case of coarse powder. The c_1/c_2 curve is convex toward the c_1 axis due to free AcOH formed, the effect becoming more pronounced on the addn. of more acid. The addn. of 0.5 N Na_2SO_4 straightens out the curve, and so does 0.5 N NaCl in dil. solns.; the extent of adsorption is decreased. The amt. of $\text{Cu}(\text{OAc})_2$ withdrawn is proportional to that of the solid phase. The colloid particles of nitroalizarin being aggregates of minute crystals, the solute probably diffuses among them until it reaches unaggregated units, whereupon chem. reaction begins. The compd. formed slides off the crystal, thus exposing a fresh surface. Although nitroalizarin is more sol. than BaSO_4 , the reaction with $\text{Cu}(\text{OAc})_2$ does not take place in the liquid phase only, since the equil. is not detd. by the final concns. of the reagents in soln. BASIL C. SOYENKOFF

The influence of structure, configuration and the degree of saturation of organic acids on the extent of their adsorption from solutions on charcoal. E. V. ALEKSEEVSKIĬ. *J. Russ. Phys.-Chem. Soc.* 59, 1033-42(1927).—An activated sample of Merck's animal charcoal was shaken with an acid soln. for 10 min., allowed to stand for a day and filtered, aliquot portions being titrated. $\text{MeCH}:\text{CHCOOH}$ is adsorbed more than PrCOOH , possibly because of the greater soly. of the latter (de Tzaguirre). $\text{Me}_2\text{CHCO}_2\text{H}$ is less adsorbed than PrCO_2H although it is also much less sol. in H_2O . A. therefore concludes that a straight-chain acid occupies less surface in an adsorbed layer. Fumaric acid is adsorbed from H_2O and MeOH to a greater extent than maleic, again possibly because of the difference in soly. In EtOH , however, the more sol. maleic acid is the one better adsorbed. The less sol. $(\text{CH}_3\text{CO}_2\text{H})_2$ is adsorbed from H_2O to a greater extent than maleic acid; the latter is preferentially adsorbed from EtOH , although it is also the more sol. one. A. concludes that a double bond decreases the adsorbability from H_2O and increases that from EtOH . BASIL C. SOYENKOFF

Adsorption phenomena in solutions. X. The relation between adsorption and the p_H value of solutions. SOPHIE PEVSNER. *Z. physik. Chem.* 133, 122-8(1928).—The effect of variable p_H values of buffer solns. on the adsorption of weak electrolytes or nonelectrolytes has been studied: (1) (with phosphate buffer) glucose, HCHO , arsenic acid, $\text{C}_6\text{H}_5\text{OH}$, $(\text{CH}_3)_2\text{CO}$, HCN and H_3BO_3 and (2) (with acetate buffer), $\text{CO}(\text{NH}_2)_2$ and $\text{C}_6\text{H}_5\text{NH}_2$. Graphs of p_H (abscissa) vs. amts. adsorbed (ordinate) show either 2 min. or 2 max. at p_H values lying between 5 and 7. J. H. PERRY

Adsorption phenomena in solutions. XIII. Adsorption from mixed electrolytes. MICHAEL DUBININ. *Z. physik. Chem.* 135, 24–35 (1928).—Adsorption from solns. of mixed electrolytes and non-electrolytes by wood and sugar charcoals was measured. The electrolyte pairs were $\text{HCl} + \text{HNO}_3$; $\text{HCl} + \text{H}_2\text{C}_2\text{O}_4$; $\text{HBr} + \text{HNO}_3$; $\text{HCl} + (\text{CH}_3)_2\text{CO}$; $\text{CH}_3\text{COOH} + (\text{CH}_3)_2\text{CO}$; $\text{NaCl} + \text{NaNO}_3$; $\text{NaCl} + \text{NaNO}_2$; $\text{NaCl} + \text{Ba}(\text{NO}_3)_2$; $\text{BaCl}_2 + \text{NaNO}_3$; $\text{BaCl}_2 + \text{Ba}(\text{NO}_3)_2$. The ratio $(b - y)/x$, where b = the amt. of one constituent adsorbed, from a soln. of that constituent only, y = the amt. of the same constituent adsorbed in the presence of a second constituent and x the amt. of second constituent alone adsorbed, was found to be const. over a range of 5-fold variation in concn. of one of the constituents. From this equation there can be calcd. a value representing the ability of one component to displace another from the adsorbent.

R. L. DODGE

The dehydrogenation theory of Wieland. K. TANAKA Dairen Hospital. *J. Oriental Med.* 4, 4 (1925); *Chem. Zentr.* 1927, I, 225.—In the reaction of methylene blue, EtOH and Pd, the H does not come from the EtOH as assumed by W., but is previously adsorbed on the Pd. Pd first treated with O is inactive. HCN arrests the oxidation by O but not the reduction of methylene blue. The dehydrogenation theory is not sufficient to explain the facts.

C. C. DAVIS

The primary action of chromic acid on animal fiber. M. A. IL'INSKIĬ AND D. I. KODNER. *J. Russ. Phys.-Chem. Soc.* 60, 193–207 (1928).—Samples of wool were placed in 0.05 N H_2SO_4 contg. 0.09–0.49 g. $\text{K}_2\text{Cr}_2\text{O}_7$ at 17–19° for 0.25–6 hrs. and solns. titrated for CrO_3 . After 30 min. 50% of $\text{H}_2\text{Cr}_2\text{O}_7$ is absorbed, and equil. is reached before 6 hrs. The amt. absorbed is greater in the presence of H_2SO_4 than without it, both approaching the limit of 10.8% with increasing concn. Further increase is very slow and probably due to the hydrolyzing and oxidizing action of $\text{K}_2\text{Cr}_2\text{O}_7$. Temp. rise does not affect the absorption of $\text{K}_2\text{Cr}_2\text{O}_7$ but accelerates the oxidation of wool as a secondary reaction. For a given concn. of $\text{H}_2\text{Cr}_2\text{O}_7$ absorption increases with the amt. of H_2SO_4 toward a sp. limit beyond which the addn. of H_2SO_4 does not influence the reaction between $\text{H}_2\text{Cr}_2\text{O}_7$ and wool. $\text{H}_2\text{Cr}_2\text{O}_7$ displaces quant. H_2SO_4 and HCl from wool except after long interaction between the latter and H_2SO_4 , in which case the amts. liberated are slightly below the theoretical. The difference probably remains in combination with the weaker NH_2 groups. The chromates formed in silk and wool are very slowly and slightly washed out with water. Wool probably forms a compd. $[\text{R}(\text{CO}_2\text{H})\text{NH}_2]_2\text{H}_2\text{Cr}_2\text{O}_7$. Treatment of woollen fabrics with $\text{K}_2\text{Cr}_2\text{O}_7$ in the cold followed by dyeing, instead of the reverse, results in heat economy. The Cr-wool complexes remain stable and insol. after reduction with NaHSO_3 preliminary to the use of easily oxidizable dyes.

BASIL C. SOYENKOFF

Chemical fogs. H. O. ASKEW. *Trans. Proc. New Zealand Inst.* 59, 165–207 (1928); cf. *C. A.* 21, 2829.—Clouds produced by phys. means have been studied in connection with the condensation of H_2O vapor on ions formed from Ra or by thermal or elec. methods. The chief chem. fogs studied have been those formed by O_3 and reducing agents; NH_3 and HCl; org. bases and HCl; H_2SO_4 , HCl and HNO_3 with H_2O ; Ra and ultra-violet light; during electrolysis; "smoke fogs," etc. The ease with which suspended matter may be removed from a gas varies greatly according to the substance in suspension; thus certain materials are removed by concd. H_2SO_4 when not by H_2O . With SO_3 clouds formed by rapid cooling are more difficult to remove than those formed by slower cooling, probably because of the smaller size of the former. In chem. warfare it has been found that there is a min. efficiency for a filter at a certain crit. size of particle. With COCl_2 led through alcoholic NaOH, fogs occurred only when hydrolysis had split off HCl. Similarly, with POCl_3 and HCl fogs were formed only when free HCl occurred in the gas and when free alkali was present. If EtOH, Me_2CO , Et₂O, AmOH were present also, the fogs are much more dense. Expts. with COCl_2 , HCl and HBr were conducted, the purification, concn., partial pressure, etc., of the gas being carefully regulated, and the sizes of the orifices and their depths of immersion in various liquids, sizes of the bubbles, rate of flow, intensity of the fog, its absorptive qualities, the quantity of alkali present, the influence of gelatin, gum arabic, iso-AmOH, saponin, $\text{C}_6\text{H}_5(\text{OH})_3$, sucrose, safranin, methylene blue, Congo red, suspensions like kaolin, aquadag and clay, and of alc., pyridine, etc., studied. By the Stokes-Cunningham equation radii of fog particles were calcd. from their rates of fall, giving values near 9×10^{-4} cm. for fogs from aq., 7.6% and 35% alc., pyridine and HBr solns., the radius remaining const. at all stages of the neutralization, but increasing during the time of settling. With fogs from solns. of dyestuffs, colloids, suspensions, etc., the radii were smaller (approx. 0.7 to 2.6×10^{-4} cm.). It appeared that the original size of the particles is of the same order as for fogs from other reactions

viz., 5×10^{-5} cm., but these are unstable and increase rapidly to perhaps 2×10^{-4} cm. Apparently an equil. state is reached by the particles, since vapor pressure and concn. of acid in the droplets remain const. and independent of the conditions of formation, no matter whether HCl or HBr is used. Electroscopic examn. for charges on the particles gave no deviations of more than 2 or 3% from the "natural value;" the amt. of charge is, therefore, zero or too small to be measured by this means. Quant. data on concns. show that there is a logarithmic relation between alkali concn. and fog formation in aq. solns.; with small quantities of colloids and suspensions this is also true. If the alkali concn. is kept const. and the concn. of added substance is varied, each substance has its own specific effect. That surface tension is not the controlling factor so far as fog formation is concerned is shown by the fact that, although AmOH causes a great reduction in the surface tension, it is not very active as regards fog formation. If a gas contg. HCl vapor be passed through aq. NH_3 , fogs are formed in all cases, because even in very dil. solns. NH_3 has an appreciable partial pressure. If the vapor from even concd. NH_3 be passed through fairly strong HCl solns., no fog is formed until the partial pressure of the chlorides rises above the infinitesimally small value in more dil. solns., *i. e.*, only above about 18% acid, and even here the partial pressure of the acid vapor is merely a fraction of a mm. For any pair of jets studied the ratios of the radii and times of contact are practically the same; hence the amts. of fogs obtained in simple alkali solns. do not vary a great deal, a result in harmony with the two-film theory of gas absorption. All considerations lead to the conclusion that the alkali film is the cause of the decrease in the absorption of an acid by the solvent. The alk. film, with its adsorbed material, appears to act as a membrane which is more permeable to water vapor than to other gases or ions. Much more work is necessary before condensation and the stability of particles can be explained satisfactorily.

W. C. EBAUGH

The adsorption of excess ions by positive and negative silver halide, and thiocyanate silver sols. A. LOTTERMOSER AND W. PETERSEN. *Z. physik. Chem.* 133, 69-121 (1928).—The amt. of adsorption increases with decreasing soly. of the salt. The adsorption of Br^- and I^- ions by negative AgBr and AgI sols is greater than the adsorption of Ag^+ ions on the corresponding positive sols. The negative AgCNS sol has a much smaller adsorption for CNS^- ions than the negative AgBr sol possesses for Br^- ions, although they are only slightly more sol.

J. H. PERRY

Preparation of gold sol. N. KEULEMANS. *Pharm. Weekblad* 65, 647 (1928).—In a 1-l. flask which has been thoroughly cleansed with aqua regia and freshly distd. H_2O , dissolve 0.05 g. AuCl_3 in 500 cc. freshly distd. H_2O , add 0.12 g. K_2CO_3 and heat to boiling. Remove the flame, add 0.125 g. glucose and shake vigorously until a bright purple-red color develops. The colloidal soln. is preserved in amber bottles that have been thoroughly cleansed. Au sol has been prescribed for internal treatment of certain skin diseases.

A. W. DOX

Colloidal gold solution. The preparation of gold solutions and their titration with permanent hydrogen-ion concentration standards. VINCENT CHRISTINA AND CLARA S. GREEN. *J. Lab. Clin. Med.* 13, 678-81 (1928).—A slight modification of Zsigmondy's method of prepn. of colloidal Au is described, wherein cond. water, instead of triply distd. water, is used, in addn. to an increased amt. of alkali. The titration of the soln. is accomplished with phenol red as an indicator, and the p_{H} is detd. with permanent inorg. standards.

ETHEL W. WICKWIRE

Gelatin as an emulsifying agent. I. I. ZHUKOV AND I. N. BUSHMAKIN. *J. Russ. Phys.-Chem. Soc.* 59, 1061-9 (1927).—Gelatin of isoelec. pt. 5.27 was used. The surface tension of solns., measured with a Donnan pipet, is a function of p_{H} . It reaches a min. at the isoelec. pt. When 2 parts of C_6H_6 by vol. are shaken with 1 part gelatin soln. an unstable emulsion of the soln. in C_6H_6 results; the phases are reversed when 2 parts of the soln. are shaken with 1 part of C_6H_6 . A stable emulsion of C_6H_6 in gelatin soln. results from equal vols.; its viscosity increases on addn. of C_6H_6 until a virtual solid is obtained contg. 95 parts C_6H_6 . The reversal of phases does not take place. The max. stability of C_6H_6 emulsions in gelatin solns. coincides with the isoelec. pt., *i. e.*, min. surface tension and viscosity. Two min. points on the stability curve correspond to viscosity max. at p_{H} 2.5 and 9.5. Non-hydrated and undissocd. gelatin mols. thus serve best as emulsifying agents.

BASIL C. SOYENKOFF

The science of colloids and its applications. HENRI BRAIDY. *Ind. chimique* 15, 294-6 (1928).—The first article of a review on colloids. This article deals with the meaning of the word colloid and also with their structure.

P. THOMASSET

Combined water of colloids. JULES AMAR. *Compt. rend.* 186, 1147-9 (1928).—The H_2O of ovalbumin consists in 2 parts, an indifferent part and a combined part.

For 3 cc. of dry ovalbumin there are 8 cc. combined H_2O and 9 cc. indifferent H_2O . Likewise it has been found that gelatin, cellulose and kaolin also contain a small amt. of H_2O seemingly united.

E. G. VANDENBOSCHE

Coagulation through agitation and vibration. TADEUSZ KUCZYNSKI. *Przemysł Chemiczny* 9, 84-93(1925); *Chem. Zentr.* 1926, II, 2883-4.—The effect of vibration on the settling of fine Berlin blue ppts. was investigated. Under the influence of vibration, Berlin blue ppts. settle much more rapidly than when allowed to stand undisturbed, a difference which is attributed to a more rapid coagulation of the sols. Likewise the clarification and crystn. of a Ca ferricyanide soln. is accelerated by vibration. A high-speed motor mounted on an elastic support was used to obtain the necessary vibration. As a further explanation of the influence of vibration on coagulation, the behavior of dialyzed Fe hydroxide, colloidal Au, etc., was studied. The expts. show that vibration alone does not bring about coagulation, the latter occurring rather at the point of contact with other media.

C. C. DAVIS

Hysteresis in the coagulation and sedimentation of suspensions, emulsions and colloidal solutions. B. II'IN. *Inst. Physics Biophysics, Moscow. Zhurnal expl. biol. med.* 1926, 1-28; *Chem. Zentr.* 1926, II, 3090; cf. C. A. 20, 3606.—By sedimentation or coagulation hysteresis is meant the varying rate of sedimentation, which can be quant. measured, which is observed when suspensions or colloidal sols. treated with a sedimentation agent are allowed to settle after different intervals of time following the addn. of the agent. The phenomenon can be explained by adsorption or other reactions.

C. C. DAVIS

The distribution of hydrogen ions between gelatin and water. I. SHUKOV, S. SICHUKAREV AND I. BUSHMAKIN. *Univ. of Petrograd. J. Russ. Phys.-Chem. Soc.* 58, 639-58(1926); *Chem. Zentr.* 1927, I, 408-9.—A part of the work has already been published (C. A. 19, 1518). The p_H values of gelatin sols. in the presence of H_2SO_4 + Na_2SO_4 , $AcOH$ and HCl were detd. potentiometrically at 30° . At the isoelec. pt. p_H was 5.25. The discrepancies in the data of various investigators probably depend upon the variations in com. gelatins.

C. C. DAVIS

Effect of previous history on the viscosity of gelatin solutions. CLARKE E. DAVIS AND HENRY M. SALISBURY. *Ind. Eng. Chem.* 20, 829-31(1928)—Viscosity measurements over a p_H range from 1 to 9 were made at 40° with 1% sols. of pig-skin and ossein gelatin prepd. by both acid and alkali cooking. Below p_H 4.7, the p_H -viscosity curves of all the samples were similar but the shape of the alk. side of the curve depended on the previous history of the gelatin.

J. J. McNALLY

The cataphoretic migration velocity of large particles in sols and gels. II. H. FREUNDLICH AND H. A. ABRAMSON. *Z. physik. Chem.* 133, 51-68(1928); cf. C. A. 21, 3517.—The cataphoretic migration velocity of large particles is independent of their form, from a study of quartz particles in pure H_2O , in H_2O -sols. of sugar and $NaCl$, and in serum, as well as for glass and kaolin particles in H_2O . Proteins like gelatin, albumin and hemoglobin in very dil. suspensions (10^{-7} g. per l.) decrease the migration of quartz particles in H_2O , while other hydrophyllic colloids (starch, Na oleate) do not do this. At higher protein concns., 10^{-4} g./l. of egg albumin, 10^{-3} g./l. of gelatin, the migration velocity of the quartz particles is independent of the protein concn. The particles then behave exactly as if they are covered completely with proteins, i. e., like protein particles. It is therefore possible that the cataphoresis of proteins is a function of the p_H of the soln. Not all solid surfaces behave like particles of quartz, ZnO , and air bubbles; for example, erythrocytes in serum have about twice the cataphoretic migration velocity of quartz particles, the velocity of which is as large as that of the leucocytes in spite of the large concn. of Fe in the serum. In mixts. of serum with gelatin, which contain so little gelatin that the whole is a soft gel, the erythrocytes migrate twice as rapidly as quartz particles and leucocytes. Particles may migrate through a gel, without any change in the velocity due to the gel structure.

J. H. PERRY

The speed of absorption of sulfur dioxide by magnesium hydroxide. PAUL RIOU AND A. P. BEWARD. *Compt. rend.* 186, 1465-7(1928).— SO_2 is absorbed almost as readily by H_2O as by a soln. of $Mg(OH)_2$; the greater the amt. of solid $Mg(OH)_2$ present the greater the speed of soln.; the speed is decreased with rise in temp. Increasing the amt. of solid $MgSO_4$ present in a soln. of $MgSO_4$ decreases the speed of soln.

E. G. VANDENBOSCHE

What is osmosis? ORTON K. STARK. *Science* 67, 556-7(1928).—The inexact nature of the terms employed in describing osmosis is discussed. "Osmosis, then, can be defined briefly and accurately as diffusion through a membrane, the direction of the major movement being from a region of high concn. to a region of low concn."

of the thing diffusing. Such a definition will apply to all cases of the phenomenon, no matter how complicated."

L. W. RIGGS

Determination of the specific gravity of van't Hoff equilibrium solutions at 83°. F. SEROWY. *Mitt. Kali-Forschungsanstalt* 1921, 53-69; *Chem. Zentr.* 1927, I, 491-2.—Two precisely detd. values of the sp. gr. in the range of the van't Hoff equil. point are used to interpolate and extrapolate and thus obtain the desired sp. gravity. This is possible because the latter is a continuous function of the mol. differences of the analyzed and of the original prepd. solns. (The solns. were prepd. according to the van't Hoff directions and were analyzed after 24 hrs. at 83°.) Almost all of the analyses are in terms of % by wt., mols. per 1000 mols. of water, mol.-% and g. per l.

C. C. DAVIS

Determination of the specific gravity of saturated magnesium chloride solutions between 20° and 100°. QUEISNER. *Mitt. Kali-Forschungsanstalt* 1921, 75-8; *Chem. Zentr.* 1927, I, 558.—From detns. of the d. of satd. $MgCl_2$ solns. at 20, 30, 60 and 80° a continuous curve was constructed. The values for 40, 50, 70, 90 and 100°, which lay slightly above or below the curve, varied from the exptl. values only in the 4th place of decimals or at the most by 1 unit in the 3rd place of decimals. Similarly by plotting the mols. of $MgCl_2$ per 100 mols. of water, calcd. from the analyses, a curve was obtained which conformed to that of the mean satn. nos. of van't Hoff, and which approached the values of Dawson for low temps., but which was at all temps. considerably different from the data of Classen

C. C. DAVIS

The solubility of gases and the coefficient of dilatation by absorption. I. JURO HORIUCHI. *Bull. Inst. Phys. Chem. Research (Tokyo)* 7, 119 72(1928); [English Ed. 1, 11-7].—The following data refer to gases dissolved in CCl_4 ; the solute, the temp., the soly. (γ), the crit. temp. of the solute and $\ln \gamma P_k$ (P_k = crit. pressure) are given successively: H, 25°, 0.085, 33.2, 0.037; air, 25°, 0.198, 132.5, 0.867; CO_2 , 25°, 2.668, 304.1, 2.289; N_2O , 25°, 4.285, 309.6, 2.487; SO_2 , 25°, 18.51, 430.2, 3.158; SO_2 , 40°, 12.49, 430.2, —. The following data are first the temp., then the soly. of N_2O in C_6H_6 , $ClPh$, CCl_4 , $MeOAc$ and Me_2CO : 1.41° , —, —, —, 9.30; 10°, 4.453, 3.891, 5.26, 8.035, 7.64; 15°, —, 3.636, 4.89, —, —; 20°, —, 3.382, 4.57, —, —; 25°, 3.686, 3.174, 4.285, 6.27, 5.95; 30°, —, 2.981, 4.005, —, —; 35°, —, 2.801, 3.775, —, —; 40°, 3.123, 2.650, 3.565, 4.05, 4.73; 45°, —, 2.520, —, —, —; 50°, —, 2.400, —, —, —; 55°, —, 2.279, —, —, —. The next figures indicate: the solute, the temp., the coeff. of dilatation by absorption, the calcd. soly. and the observed soly.; soly. in Me_2CO : N_2O , 0°, 0.00180, 8.48, 9.08; N_2O , 10°, 0.00189, 5.85, 7.64; N_2O , 25°, 0.00202, 3.75, 5.95; N_2O , 40°, 0.00211, 3.08, 4.73; CO_2 , 10°, 0.00190, 10.3, 9.0; CO_2 , 25°, 0.00199, 6.17, 6.295. Soly. in CCl_4 : N_2O , 10°, 0.002022, 5.28, 5.26; N_2O , 25°, 0.02130, 4.12, 4.57; N_2O , 40°, 0.002176, 3.81, 3.56; CO_2 , 25°, 0.00229, 3.04, 5.668; soly. in C_6H_6 : N_2O , 10°, 0.00206, 3.90, 4.453; N_2O , 25°, 0.00219, 3.07, 3.69; N_2O , 40°, 0.00223, 2.54, 3.12; CO_2 , 0°, 0.00200, 7.84, —; CO_2 , 25°, 0.00219, 3.50, 2.425; H_2 , 0°, 0.00170, 0.0166, 0.048. The following figures indicate the solvent, the solute, the temp., the coeff. of dilatation on absorption, the calcd. and the observed solubilities: $MeOAc$, N_2O , 25°, 0.00202, 4.80, 6.27; $MeOAc$, CO_2 , 25°, 0.00199, 7.31, 6.494; $ClPh$, N_2O , 25°, 0.00203, 3.19, 3.17; $ClPh$, CO_2 , 25°, 0.00201, 5.55, 2.265; $CHCl_3$, CO_2 , 0°, 0.00188, 7.75, 5.0; Et_2O , CO_2 , 0°, 0.00200, 8.94, 7.330; Et_2O , N_2 , 0°, 0.00184, 0.024, 0.1115.

A. L. HENNE

The solubility of chromic anhydride in aqueous sulfuric acid. A. V. RAKOVSKII AND D. N. TARASENKOV. *J. Russ. Phys.-Chem. Soc.* 60, 7-12(1928).— CrO_3 interferes with the detn. of H_2SO_4 as $BaSO_4$; titration with $Ba(OH)_2$ also gives results in error by 7.7%. The acid mixt. is made alk. with $NaOH$ and the excess titrated back in the presence of Congo red. CrO_3 was detd. by the I method. The error rarely reached 0.5%. The soly. of CrO_3 in H_2O was 61.94% at 0°, 60.54% at 100°. The system $CrO_3-H_2SO_4-H_2O$ was studied at 0, 20, 40 and 100°. The soly. curves are continuous, proving the existence of a single solid phase confirmed by Schreinemaker's method of residue. Brownish yellow crystals sep. from satd. soln. of CrO_3 in 90% H_2SO_4 whose compn. is best represented by $CrO_3 \cdot SO_3$, CrO_3 is split off in contact with air of 1.7% relative humidity at room temp.

BASIL C. SOYENKOFF

Solutions of salts in pure acetic acid. I. Preliminary paper. ARTHUR W. DAVIDSON. Univ. of Kansas. *J. Am. Chem. Soc.* 50, 1890-5(1928).—A qual. study is made on the soly. of salts of inorg. bases in $AcOH$ (I). The halides and nitrates were generally more sol. and the sulfates much less so. Double decompn. reactions readily occurred as detd. by the soly. of the salts formed. Na_2CO_3 was the only salt noticeably solvolyzed by I liberating CO_2 ; $CaCO_3$ was not affected. The soly. of $Zn(OAc)_2$ in I was markedly increased by the addn. of 5 mol. percent of $NaOAc$ and the soly. of $Cu(OAc)_2$ was improved by NH_4OAc .

D. H. POWERS

The solubility of potassium bromide in acetone as related to the inter-ionic attraction theory. A. L. ROBINSON. *J. Phys. Chem.* 32, 1089-93 (1928).—An attempt is made to verify the factor $(DT)^{1.5}$ of the Debye and Hückel equation for the activity coefficient of an ion: $\log f_i = -\frac{e^2 N^2 (\pi/R)^{0.5} z_i^2 (\sum c_i z_i^2)^{0.5}}{R(DT)^{1.5}}$ by measuring the soly. of KBr

in acetone and acetone plus other solvents giving both heterionic and homoionic solvents. A plot of $\log S/S_0$ against the square root of the ionic strength is given and explained, along with the exptl. method. The Debye and Hückel theory is closely checked, the failure to check exactly being attributed to traces of water in the acetone.

G. L. CLARK

The formal and real concentration of solutions. M. LEVAT-EZERSKII. *J. Russ. Phys.-Chem. Soc.* 59, 1019-28 (1927).—A review of L.'s previous papers on the osmotic and vapor pressures of solns. An attempt is made to det. the phys. meaning of factor $i = (\Delta t \text{ observed} / \Delta t \text{ calcd.})$, the salts NaNO_3 , AgNO_3 and KNO_3 being chosen because they are presumably not hydrated in soln. Arrhenius' i is calcd. from the data of Kohlrausch (iI) and L.'s $i = N(p/p_1 - 1)/n$, denoted by iII , from the b. p. and f. p. data. These values obtained at different temps. are comparable because p/p_1 changes appreciably with temp. only for more concd. solns. than 3 M. In the case of NaNO_3 , iI decreases and iII increases with the increasing concn.; the only explanation lies in the hydration of undissocd. mols. The iI for AgNO_3 is slightly larger than iII , probably as a result of mol. compd. formation (double etc., mols. of AgNO_3). iI and iII for KNO_3 solns. differ negligibly over the range of 5-28%. L. concludes that neither hydration nor compd. formation takes place. BASIL C. SOYENKOFF

Hydrogen-ion concentration and p_H —an explanation. A. LEE CALDWELL. *J. Am. Pharm. Assoc.* 17, 136-8, 529-34 (1928).—An attempt to explain the relationship between H-ion concn. and p_H . Some of the applications of p_H values to pharmacy are mentioned. Directions for the prepn. of buffer solns and indicator solns. are given. The technic of making the p_H detn. is described. L. E. WARREN

A simple, cheap and rapid method for measuring hydrogen-ion concentration. LEOPOLD POLLAK. *Gerber* 54, 99-100 (1928).—The "Folienkolorimeter" is described. The indicator is adsorbed by a membrane permeable to water. The p_H value of a soln. is estd. from the color assumed by the membrane after immersion for 1 min. The app. is especially adapted to turbid solns. H. B. MERRILL

A prevalent error in the derivation of the freezing-point and boiling-point laws for dilute solutions. A. W. DAVIDSON. *J. Phys. Chem.* 32, 1080-5 (1928).—The prevalent error in the derivation of the freezing- and boiling-point laws, according to the reversible cycle of van't Hoff, of the failure to take into consideration the heat equiv. of the osmotic work is pointed out. No changes occur in either of the final equations, however. The derivations are corrected and a new derivation is presented, following the same scheme, for the approximate form of the freezing-point equation for ideal solns.

G. L. CLARK

The dissociation constants of diphenyl- and di-*o*-tolylguanidine. LUDWIG METZ. *Z. Elektrochem.* 34, 292-4 (1928).—The dissocn. consts. calcd. from cond. measurements of dil. solns. at 18° are 6.09×10^{-5} for diphenyl- and 4.72×10^{-5} for di-*o*-tolylguanidine. J. G. McNALLY

The hydration of ions and molecules. II. Hydration and ionic mobility. E. N. GAPON. *J. Russ. Phys.-Chem. Soc.* 60, 237-48 (1928); cf. *C. A.* 22, 526, 1082.—The following empirical equation holds for 100 org. ions within about 10%: $u\sqrt{n}$, where u is ionic mobility and n the no. of atoms composing the ion. Similarly, for 14 complex ions contg. 1 metallic atom $u\sqrt{n} = 154$ (1). The no. of H_2O mols. in the inner coordination sphere, $m = (n - 1)/3$, obtained from u for Li-Cs, Cl-I, Tl and Ag agrees with the generally accepted values. From (1) it follows that diffusion coeff. of a binary electrolyte $D = 6.907 [1 + 0.0034(t - 18)]/(\sqrt{n_+} + \sqrt{n_-})$. The diffusion equation (cf. *Ukr. Chem. J.* 2, 459, 1926) is used in considering the addn. of a chem. inert component to the soln.; the following deductions agree with the expt. The effect of such addn. on diffusion velocity is independent of the amt. of diffusate, being sp. for the solvent. If the diffusate reacts with the new component, the diffusion is accelerated thereby. Since the velocity of soln. $K = D/\delta_0$, it similarly follows that the change in K on the introduction of a chem. inert component depends not on the nature of the dissolving substance but on that of the solvent. The no. of solvated mols. of the component is expressed in terms of the initial and final K and properties of the solvent and the new component. (K_2/K_0) depends on the change in viscosity resulting from the addn. of a new substance as well as the extent of its solvation. K_1 and D_1 are max.

when 2 components are present in their combining proportions; min. K_1 and D_1 correspond to max. disson.

BASIL C. SOYENKOFF

The influence of the so-called higher terms in the Debye-Hückel theory of solutions of strong electrolytes. T. H. GRONWALL, VICTOR K. LA MER AND KARL SANDVED. *Physik. Z.* 29, 358-93(1928).—The fundamental equation of the Debye-Hückel theory (C. A. 17, 2665) is

$$\frac{1}{r^2} \frac{d}{dr} \left(r^2 \frac{d\psi_i}{dr} \right) = - \frac{4\pi e}{D} \sum_{i=1}^s \frac{N n_i z_i}{V} e^{-\frac{ze\psi_i}{kT}}$$

and with the limiting conditions of $\psi_i = 0$ when $r = \infty$, $\frac{d\psi_i}{dr} = -\frac{ez_i}{D} \frac{1}{a_i^2}$, when $r = a_i$ det. the electrostatic potential ψ_i of an ion of the i th kind. The symbols denote: V = the vol. of soln. which contains n_0 mols. of solvent and n_i mols. of ions of the i th sort ($i = 1, 2, \dots, s$) of valence z_i and apparent diameter a_i cm., D = the dielec. const. of the soln. which may depend on the abs. temp. T and also on the mol. fractions, N = Avogadro's no., k = the Boltzmann const., e = the electronic charge in electrostatic units. For elec. neutrality $\sum_{i=1}^s n_i z_i = 0$. Development of the exponential function according to powers of ψ_i leads to the equation

$$\frac{d}{dr} \left(r^2 \frac{d\psi_i}{dr} \right) - \kappa^2 r^2 \psi_i = \kappa^2 r^2 \Phi(\psi_i) = \kappa^2 r^2 \sum_{\nu=2}^{\infty} \frac{(-1)^{\nu-1}}{\nu} \left(\frac{e}{kT} \right)^{\nu-1} q_\nu \psi_i^\nu$$

where $\kappa^2 = (4\pi N e^2 / kTD) \sum_{i=1}^s (n_i z_i^2 / V)$ and $q_\nu = \sum_{i=1}^s n_i z_i^{\nu+1} / \sum_{i=1}^s n_i z_i^2$. In order to calc. ψ_i Debye and Hückel neglect the higher powers of ψ_i and use the equation $(d/dr)[r^2(d\psi_i/dr)] - \kappa^2 r^2 \psi_i = 0$, from which they obtain $\psi_i = [ez_i/D(1 + \kappa a_i)] / [\epsilon(\kappa a_i - r/r)]$. In this paper an integration method is developed for the calc. of ψ_i from the unabridged fundamental equation. In the case of very small concns. asymptotic expressions are found which result in the conclusion that the limiting law of Debye is not merely the basis of the Debye approximation but is entirely general. Expressions for free energy and activity coeff. are obtained in the form of infinite series in powers of $1/D$. For the case of electrolytes whose positive and negative ions have the same valence the numerical values of the functions occurring in the series up to terms in $1/D^5$ inclusive are given in tabular form. Comparison of the derived formulas with exptl. data shows excellent agreement even in cases of small ionic diam. where the Debye approximation fails to work. Assumptions supplementary to the Debye-Hückel theory, such as the association hypothesis of Bjerrum (C. A. 22, 1263), are superfluous.

EDGAR R. SMITH

Velocity of reaction between two liquid phases. W. FRAENKEL, E. WENGEL AND L. CAHN. Univ. Frankfurt A. M. *Z. anorg. allgem. Chem.* 171, 82-97(1928); cf. C. A. 18, 1774.—F. and W. have studied the reactions occurring when various acid solus. are in contact with many amalgams of Ca, Sr, Ba, Li, Na, K, Be, Mg, Al, Cs, Rb and Zn. Reproducibility of the results was difficult to obtain, since many variable factors were involved. Potential measurements of the reactions were made against a N calomel electrode and were found to be capable of duplication if platinized Pt was used as the other electrode; smooth Pt gave varying results. This work gave indications that the overvoltages of the metals were intimately related to their behaviors. Constancy of the reaction velocity rates is well ascertained in the data given. The rates parallel the potentials of the various metals and are dependent upon the H-ion concn., rate of stirring, vol. and surface area of the amalgams; a linear relationship exists in many cases. F. and C. have examd. the rate of reaction between a bromoform soln. of diazoacetic ester and aq. HNO_3 solns., the N_2 produced by hydrolysis affording a method of measurement. Variation of the concn. of ester over the exptl. range had no effect. Decrease in the concn. of the catalyzing acid lowers the reaction rate while decrease in the speed of stirring has the same effect. Many tables are given. W. E. V.

The reactivity of solid substances. E. KORDS. *Zement* 17, 94-8(1928).—The mobility of atoms and mols. of cryst. solids is shown by metathetical reaction, diffusion, m. p. lowering of mixts. and recrystn. On the abs. scale the temps. of these reactions bear the following relation to the melting temps.—metals = 0.33-0.40, inorg. salts = 0.57 and mol. compds. = 0.9. The more complex the compds., the nearer the m. p. before activity begins. M. p. lowering is greater for high-temp. reactions than lower

ones. Thus CaSiO_3 (m. $1785^\circ\text{K}.$) lowers the m. p. of CaF_2 ($1651^\circ\text{K}.$) about 250° but that of CaCl_2 ($1045^\circ\text{K}.$) only 6° . Many silicate reactions are governed by this reactivity. Quartz plus BaCO_3 reacts, at 700° to 800° , while quartz plus BaCO_3 plus Na_2CO_3 begins to react at 400 – 450° . The speed of reaction of solids only is slower than in the presence of a flux. H. F. K.

The kinetics of chemical reactions, between a solid and a gaseous component, which form complex compounds. A. PREDVODITELEV AND A. WITT. *Z. physik. Chem.* 132, 47–54 (1928).—A microbalance is described by means of which the reaction kinetics of solid CuSO_4 and gaseous NH_3 ($\text{CuSO}_4 + 5\text{NH}_3 = \text{CuSO}_4 \cdot 5\text{NH}_3$) have been measured. This reaction takes place according to the equation: $dc/dt = qp(B - C)/(C_0 - C)$. Where C is the concn. of the ammoniate, p is the pressure, and q , B and C_0 are constns. J. H. PERRY

Carbon dioxide cleavage from acetonedicarboxylic acid. E. O. WING. *J. Phys. Chem.* 32, 961–81 (1928).—This paper is an interpretation of exptl. facts to explain the mechanism of decompn. of acetonedicarboxylic acid. The exptl. evidence may be briefly summarized as follows. The decompn. of acetonedicarboxylic acid is a first-order reaction, the reaction rate being practically independent of the nature of the walls of the reaction flask. Acetone, a product of decompn., has practically no effect on the velocity of decompn. The effect of catalysts dissolved in water, aniline and alcs. on the rate of reaction has been detd., after the reaction rate had been detd. in each of the pure solvents. Observations were made on the effect of HCl salts and colloids on the rate of decompn. in water. The temp. coeffs. for the various alcs., for water and for the various catalysts in alcs. and in water have been calcd. Measurements of the completeness of decompn. in various solvents, with and without catalysts have been made at temps. varying from 0° to 60° . A complete discussion is given of the results and a mechanism has been proposed, postulating the formation of an unstable intermediate compd. of the formula: CH_3COOH

CO Catalyst

CH_3COOH

G. L. CLARK

The velocity of formation of an insoluble anhydride. P. P. BUDNIKOV. *J. Russ. Phys.-Chem. Soc.* 59, 881–9 (1927).—The influence of time and temp. on the formation of insol. CaSO_4 was studied. A sample (0.6 g.) of finely powd. $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ was heated to 140 – 200° for 2–40 hrs. and quickly introduced into a cond. cell contg. 200 cc. H_2O . Cond. measurements at 20° with rapid stirring gave the concn. of sol. CaSO_4 . Insol. CaSO_4 first appears when the hydrate is heated at 140° for over 17 hrs., while after 40 hrs., 16.7% is formed. When the hydrate is heated at 160° , the insol. gypsum appears after 5 hrs. and its content reaches 20.7% after 40 hrs. At 200° the insol. CaSO_4 appears immediately, its content at the end of 40 hrs. being only 15.7% (possibly due to a difference in particle size). At 220° the amt. of the insol. anhydride reaches 22.6% after 40 hrs. Protracted heating is, therefore, detrimental to the mech. properties of gypsum plaster. BASIL C. SOYENKOFF

The velocity of oxidation of alcohols, ethers and esters by potassium permanganate and chromic anhydride under various conditions. B. V. TRONOV AND A. A. LUKANIN. *J. Russ. Phys.-Chem. Soc.* 59, 1157–72 (1927).—To a H_2O soln. of the oxidizing agent (KMnO_4 , $\text{KMnO}_4 + \text{KOH}$, $\text{KMnO}_4 + \text{H}_2\text{SO}_4$, CrO_3 , $\text{CrO}_3 + \text{H}_2\text{SO}_4$) in a thermostat was added an equiv. or a large excess of the alc. or ester. The reactions being assumed to be bimol., the constns. were calcd. The oxidation of EtOH , PrOH and EtCHO by CrO_3 is represented satisfactorily by a second-order equation; Me_2CHOH less so. Consistent values of k were obtained with $\text{CrO}_3 - \text{H}_2\text{SO}_4$ and Me_2CHOH , EtOH and Et_2O . The latter is scarcely oxidized in the absence of H_2SO_4 , while esters are apparently hydrolyzed by CrO_3 soln. Expts. with KMnO_4 gave good values for k except in the case of Me_2CHOH . PrOH reacts more rapidly with CrO_3 , Me_2CHOH with KMnO_4 . KMnO_4 acts about 100 times faster in alk. than in neutral media. The oxidizing capacity of CrO_3 increases in presence of H_2SO_4 in a similar ratio; the reaction goes to completion in acid media, while in neutral soln. only 30% of the available O is utilized. Esters and ethers are oxidized by CrO_3 much more slowly than the corresponding alcohols, the difference being less marked in the case of acid and neutral KMnO_4 , while alk. KMnO_4 acts about equally well. Apparently only alk. KMnO_4 attacks the alkyl radical. BASIL C. SOYENKOFF

The velocity of oxidation of alcohols by chromic anhydride and nitric acid in aqueous solutions. B. V. TRONOV, V. F. UDODOV AND M. I. CHIZHOVA. *J. Russ. Phys.-Chem. Soc.* 59, 1149–56 (1927).—Equiv. amts. of aq. CrO_3 were added to the alcohols at room

temp., the resulting concns. being 0.3 *M*. Samples were titrated at intervals with $\text{Na}_2\text{S}_2\text{O}_3$. In the expts. with HNO_3 , 67 or 39% acid was added to an equiv. of alcohol; samples were titrated with NaOH . Me_3COH is not acted on, EtOH is oxidized more readily than MeOH , esp. by HNO_3 ; susceptibility of the primary alcohols to oxidation increases with the length of chain. The Ph or the $\text{CH}_2\text{:CH}$ group favors oxidation. PhCH_2OH reacts more readily than $\text{CH}_2\text{:CHCH}_2\text{OH}$. Secondary alcohols are more active towards HNO_3 and Br_2 , less active towards CrO_3 , than the primary. B. C. S.

The velocity of oxidation of alcohols by potassium permanganate. B. V. TRQNOV, A. A. LUKANIN AND I. I. PAVLINOV. *J. Russ. Phys.-Chem. Soc.* 59, 1173-97 (1927).—The initial concns. of the alc. and KMnO_4 were 0.03 *M*. Each expt. was carried out at 16, 18, 21 and $24 \pm 0.05^\circ$. Difficultly sol. alcohols (iso-AmOH , $\text{C}_7\text{H}_{15}\text{OH}$, PhCH_2OH , $\text{Me}(\text{CH}_2)_{11}\text{CH}_2\text{OH}$) were shaken before and during the reaction. The oxidation of primary alcs. follows the second-order equation until large amts. of reaction product accumulate. $\text{Me}(\text{CH}_2)_{11}\text{CH}_2\text{OH}$ shows increasing values of the const., probably because its oxidation products are more sol. than the alc. itself. With the secondary alcs., *k* is not a const. $(\text{CH}_3\text{OH})_2$ gives consistent values, $\text{MeCH}(\text{OH})\text{CH}_2\text{OH}$ less so. With glycerol *k* increases as the reaction progresses. Monohydric alcs., except $\text{CH}_2\text{:CHCH}_2\text{OH}$, decrease the valence of Mn ion from 7 to 4, while polyhydric alcs. carry the reduction farther. The following results were obtained in alk. media. The oxidation *k* of MeOH was fairly const. until 10% of the available O was utilized, whereupon it decreased twice, *k* of PrOH decreased to a const. value at 10% O; *k* of $\text{Me}_2\text{CHCH}_2\text{OH}$ decreased to 20% O; Me_2CHOH gave consistent values of *k*. Following are the av. values of *k* in neutral soln. at 21° : MeOH $3.0438, 3.0280 \times 10^{-5}$; EtOH , $3.2261, 3.3371 \times 10^{-5}$; PrOH $2.9213, 3.1867 \times 10^{-5}$; BuOH $4.0975, 4.1332 \times 10^{-5}$; $\text{Me}_2\text{CHCH}_2\text{OH}$ $3.8261, 4.1567 \times 10^{-5}$; iso-AmOH $5.1977, 5.3821 \times 10^{-5}$; $\text{C}_7\text{H}_{15}\text{OH}$ $4.0937, 3.2620 \times 10^{-5}$; $\text{Me}(\text{CH}_2)_{11}\text{CH}_2\text{OH}$ $10.5360, > 3.0000 \times 10^{-5}$; $\text{CH}_2\text{:CHCH}_2\text{OH}$ 5×10^{-5} ; PhCH_2OH $1.7483, 1.5202 \times 10^{-5}$; Me_2CHOH 5.0616×10^{-5} ; MeEtCHOH 8.0430×10^{-5} ; $\text{C}_6\text{H}_5\text{OH}$ $10.66488, 9.3454 \times 10^{-5}$; Me_2COH 0; Me_2EtCOH 9.2759×10^{-5} ; pinacol 2.8912×10^{-5} ; $(\text{CH}_3\text{OH})_2$ $5.3789, 6.1826 \times 10^{-5}$; $\text{MeCH}(\text{OH})\text{CH}_2\text{OH}$ $11.3817, 8.0146 \times 10^{-5}$; glycerol 9.4638×10^{-5} ; erythritol $> 36.3850 \times 10^{-5}$; adonitol $> 4.8585 \times 10^{-5}$; mannitol $> 4.5387 \times 10^{-5}$. In alk. media, (before 5% O) MeOH 2.4×10^{-4} ; PrOH 9.2×10^{-4} ; $\text{Me}_2\text{CHCH}_2\text{OH}$ 1.2×10^{-3} ; Me_2CHOH 1.1×10^{-3} ; Me_2COH 2.5×10^{-3} . Secondary alcs. are oxidized more rapidly than the primary. Lengthening the chain, the introduction of Ph or a double linkage increases the reaction velocity. An OH group in glycols and glycerol is not oxidized faster than in monatomic alcs. BASIL C. SOYENKOFF

The mechanism of the hydrolysis of saccharin and *o*-sulfaminobenzoic acid. KURT TAUFEL, CARL WAGNER AND WILHELM PREISS. *Z. Elektrochem.* 34, 281-91 (1928); cf. C. A. 21, 78.—Saccharin is stable in boiling water but hydrolyzes to *o*-sulfaminobenzoic acid in the presence of acid or alkali. The alk. hydrolysis is bimol., the rate being proportional to the concn. of saccharin and OH ions. The velocity const. at 100° is 0.020 (time in min.). The reaction proceeds no further in neutral or alk. solns., but in acid solns., the *o*-sulfaminobenzoic acid is hydrolyzed to acid NH_4 *o*-sulfohenzoate. The rate of this reaction is independent of the concn. of the catalyst (perchloric acid) and the monomol. const. at 100° is 0.045. The dissoen. consts. of saccharin were found to be 9.86, 8.32, 5.76 and 4.53×10^{-3} at mol. vols. of 100, 200, 400 and 800 l., resp. The second dissoen. const. (NH_2 group) of *o*-sulfaminobenzoic acid is given as 2.1×10^{-2} at room temp. and the second const. of *o*-sulfohenzoic acid as 1.9×10^{-3} . The ionic equilibria of the system are given in a chart. J. G. MCN.

The kinetics of the hydrolysis of diketopiperazine. ARNE ÖLANDER AND HANS V. EKLUND. *Z. physik. Chem.* 134, 381-6 (1928).—The basic dissoen. const. of diketopiperazine in 0.01 *N* NaOH was so small that it could not be measured electrometrically. The acid dissoen. consts. at 20° were measured by the kinetic method. They were $K_1 = 7 \times 10^{-3}$ and $K_2 = 2 \times 10^{-14}$. Measurements of the rate of hydrolysis in alk. solns. of various OH^- concns. between 0.042 *N* and 0.476 *N* gave for the reaction velocity const. data that could be represented by the formula $k = (rg) / \{ [K_2' / (K_1 K_2 \text{OH}^{-2})] + [K_2' (K_2 \text{OH}^{-2})] + 1 \}$ where $(rg) = 0.249$. R. L. DODGE

Double decomposition between saline vapors; fumes formed from gaseous salts. A. TIAN. *Compt. rend.* 186, 1840-2 (1928); cf. C. A. 21, 3301.—Study is continued of the analogy between the reaction of salts in the vapor phase and in soln. The law corresponding to Berthollet's law is: The mixt. of 2 saline vapors can give a fixed salt by the exchange of their constituents and a decrease in volatility tends to det. the pptn. of the salt in fumes. By neglecting the actual vaporization of the salt occurring before the apparent vaporization, a simple law develops. The mixt. of 2 saline vapors

which gives by double decompn. a salt of a strong acid and base, tends to det. the pptn. of this salt in fumes. This conclusion was checked with the C_6H_5N , NH_3 , C_6H_5NH and Me_2NH salts of $HOAc$, $ClCH_2CO_2H$, HCO_2H and HCl . D. H. POWERS

The action of carbon dioxide on glass at high pressures. O. K. BOTVINKIN. *J. Russ. Phys.-Chem. Soc.* 60, 221-8 (1928).—One g. of powd. glass contg. 50.84% SiO_2 , 27.94% PbO and 15.19% Na_2O besides Al , K , Ca , Mg and Fe was covered with 10 cc. H_2O , subjected to 0-15 atm. of CO_2 for 1-24 hrs., filtered, and the filtrate titrated with HCl . Amts. of alkali plotted against time for 0, 5, 10 and 15 atm. gave almost parallel curves rising steeply at the origin and asymptotic to the time axis. The Na_2O -pressure curves are practically parallel to the axis of pressures. The action of H_2O and Na_2SiO_3 is accelerated by temp.; the amt. of alkali liberated after a given time interval is proportional to the temp. The total surface of the powder has a large influence on the velocity of hydrolysis. The CO_2 reaction const. decreases with time, probably because of diffusion through the carbonate formed followed by rhythmic pptn. The max. amt. of alkali dissolved was 10% of the total alkali. BASIL C. SOYENKOFF

Cryoscopic determination of the molecular equilibria of resorcinol and pyrocatechol in aqueous solution. F. BOURLON AND CH. TUTTLE. *Compt. rend* 186, 1124-6 (1928).—The equil. const for the change $nC_6H_6O_2 \rightleftharpoons (C_6H_6O_2)_n$ was studied. For resorcinol, from 0.75 to 3 M , and for pyrocatechol, from 0.375 to 1.25 M , $K = 3.5$ at 0° . This shows that there is equil. between single and triple mols. in each case ($n = 3$), just as at 100° $n = 2$ at low concn. and $n = 3$ at higher concn. The heat of assocn. is calcd. to be +600 cal./g. for resorcinol and -2400 cal./g. for pyrocatechol. Also in *J. chim phys.* 25, 485-96, 1928). E. G. VANDENBOSCHE

Equilibrium between metals and salts in fusion. VIII. Tin, lead, tin chloride, lead chloride. RICHARD LORENZ AND GEORG SCHULZ. *Z. anorg. allgem. Chem.* 170, 320-3 (1928); cf. *C. A.* 22, 2308.—The equil. is studied over the entire range of concn. at 500° and 600° , results being shown graphically. From calcns. based upon Lorenz' law of mass action, the following values of L and L' are obtained: at 500° $L = 0.0735$, $L' = 0.0949$; at 600° $L = 0.7732$, $L' = 0.3431$. The av. value obtained for the new const. are for 1, $k = 0.241$ and for 2, $k = 0.474$. IX. Zinc, cadmium, zinc chloride, cadmium chloride. *Ibid* 324-6.—This equil. is studied at 600° . The hygroscopic nature of both $ZnCl_2$ and $CdCl_2$ made the quantitative work difficult. From the results obtained and Lorenz' law of mass action, $L = -5.5938$ and $L' = -0.4421$. X. Establishment of equilibrium in fusions with aluminum as one component. *Ibid* 171, 258-60.— Al and the double chloride of Mg and K are heated at 700° but no reaction occurs, as is also the case with Al and $CaCl_2 \cdot 2NaCl$ at 800° . The reaction, $4Al + 3(Na_2SiF_6) + 6NaF = 4Na_3AlF_6 + 3Si$, is studied at 950° to 1000° , and proceeds quantitatively to the right. Sufficient Al was present to take up all the sepd. Si as the 10% eutectic, but this was not accomplished because some of the Na_2SiF_6 is always decomposed into NaF and SiF_4 , part of which is lost by vaporization. The failure to obtain equil. is attributed to the large difference in the heat of formation between $MgCl_2$ and $AlCl_3$ (21.4 cal.), $CaCl_2$ and $AlCl_3$ (41.5 cal.) and AlF_3 and SiF_4 (23.1 cal.). XI. Tin, cadmium, stannous chloride, cadmium chloride. RICHARD LORENZ, W. FRÄNKEL AND PAUL WOLFF. *Ibid* 355-63.—The effect of the addn. of Bi and alkali chlorides to the equil. $Sn + CdCl_2 \rightleftharpoons Cd + SnCl_2$ is studied. In the

equil. with addition of Bi , the relation $\frac{Bi}{Sn + Cd}$ in g.-atoms is taken as the measure of Bi , and 3 series are studied in which this relation is 6, 2 and 1. The equil. curve in which mol. % $CdCl_2$ is plotted as ordinate against atomic % Cd as abscissae, is displaced to the right with increasing addition of Bi . Addn. of an equimol. mixt. of $NaCl$ and KCl is studied at 650° . The equil. is displaced in the opposite direction to that produced by Bi , the max. displacement being obtained with the relation $\frac{NaCl + KCl}{SnCl_2 + CdCl_2} = 2$. With $LiCl$ the max. displacement is obtained with

$\frac{LiCl}{SnCl_2 + CdCl_2} = 1$ and is in the same direction as with $NaCl + KCl$. H. STOERTZ

Solid solution and compound formation. ALEXANDER LEHRMAN. *Chem. News* 136, 401-3 (1928).—In many cases, it is not realized that the compn. of a solid phase in equil. with solns. of varying compn., varies also, because ordinary analytical methods are not nice enough to make the distinction. The argument is presented from the point of view of the phase rule and is accompanied by diagrams. Numerous references are given, criticized and explained in the light of the failure to det. the min. soly. of a liquid phase in a solid phase. G. L. CLARK

The activation of hydrogen by the catalytic action of metals. M. V. TOLYAKOV. *J. Russ. Phys.-Chem. Soc.* 59, 847-9(1927); cf. *C. A.* 22, 1522.—"Catalysis at a distance" takes place when H_2 at 3 mm. is passed over hot Pd, Fe or Ni. On meeting a stream of air from a capillary a violet luminescence develops and heat is evolved, or H_2 flame appears in an excess of O_2 . The effect is most marked in the case of Pd. A very faint luminescence may appear in the absence of the metal. B. C. S.

Catalytic activity of titania in the reduction of nitro compounds. G. ETZEL. *J. Phys. Chem.* 32, 852-60(1928).—The reduction of $C_6H_5NO_2$ with titania as a catalyst has been thoroughly studied. The catalyst was prepd. by pptg. Ti hydroxide at the b. p. with NH_4OH from a soln. contg. 150 cc. of a 15% soln. of $TiCl_3$ dild. to 1000 cc. It was then reduced by H_2 at 302° . The rate of flow of H_2 was 14 l. per hour for a half-hour period. Reduction products formed were $C_6H_5NH_2$; $C_6H_5N.NC_6H_5$; $C_6H_5NHNHC_6H_5$; NH_3 and cyclo compds., $(C_6H_5)_2NH$, etc. Higher yields were obtained with 14 g. than with 6.8 g. of catalyst. The max. yield of $C_6H_5NH_2$ (94.4%) was obtained at about 282° with a non-ignited catalyst reduced at 302° . The optimum temp. of ignition of $Ti(OH)_3$ for production of $C_6H_5NH_2$ (from $C_6H_5NO_2$) was 100° . Catalysts ignited previously at 415° formed traces of $C_6H_5N.NC_6H_5$ and $C_6H_5NHNHC_6H_5$ from reduction of $C_6H_5NO_2$ at 245° and 266° . With the non-ignited catalyst none of these latter products was formed and less of NH_3 and cyclo compds. The best yield of $C_6H_5NH_2$ resulted with a flow rate of H_2 at 14 l. per hour with 14 g. of catalyst. A gradual drop occurred as the vol. of H_2 increased and a more sudden drop when it decreased. The optimum flow rate of $C_6H_5NO_2$ was 4.05 g. per hour (over 14 g. of catalyst). Continuous or intermittent flow of $C_6H_5NO_2$ made no difference in yield of $C_6H_5NH_2$. Activity of the catalyst increased by passing H_2 over it for 1 hour at 410° . The color of $C_6H_5NH_2$ varied from yellow to cherry-red as temps. increased from 260° upward. The asbestos support caused no change in the activity of the catalyst. Mn (5%) added to the catalyst did not increase the yield but improved the color of $C_6H_5NH_2$. A. J. CURRIER

Catalytic action of neutral salts. Effect of normal alkali sulfates on alkali acid sulfates in the ketonic splitting of ethyl acetoacetate. E. A. GOODHUE AND H. I. DUNLAP. Univ. of Missouri. *J. Am. Chem. Soc.* 50, 1916-22(1928).—An app. is described for accurately measuring the velocity of reactions at higher temps. and over a long period of time with substances evolving a gas. The effects of K_2SO_4 and Na_2SO_4 on their corresponding acid sulfates in the hydrolysis of $AcCH_2CO_2Et$ have been studied at 80° , 90° and 95° . The effect of the neutral salt on the rate of hydrolysis may be shown by calcg. the ratio of the time required with the acid sulfate plus the neutral salt for producing 75 and 150 cc. of CO_2 to the time required with the acid salt alone for producing the same quantity of CO_2 . For 0.2 N $KHSO_4$ and N KSO_4 , the av. ratio is 0.487 (75 cc.) and 0.483 (150 cc.); for 0.4 N $KHSO_4$, the av. values are 0.477 and 0.499. C. J. WEST

Catalysts for the formation of alcohols from carbon monoxide and hydrogen. Decomposition of methanol by catalysts composed of copper and zinc. PER K. FROLICH, M. R. FENSKE AND D. QUIGGLE. *Ind Eng Chem.* 20, 694-8(1928). A study of the catalytic decompn. of CH_3OH at 360° and 1 atm. with mixts. of ZnO and CuO in varying proportions indicates that the max. decompn. and formation of CO occur when the ZnO is present in excess. At 40-50 mol. % ZnO, the mols. CO formed per mol. CH_3OH increase about 350%. The addn. of a small amt. of ZnO to CuO very markedly increases the decompn. of CH_3OH . A catalyst consisting of 3 mols. % ZnO and 97% CuO decomposes 26% of the CH_3OH , while pure Cu decomposes only 9% under similar exptl. conditions. A mixt. containing 98.6 mols. % ZnO and 1.4 mols. % CuO decomposes 41% of the CH_3OH , whereas pure ZnO decomposes 33% under similar exptl. conditions. Cu promoted with ZnO favors formation of $HCOOCH_3$; and CO formation is favored by ZnO promoted with Cu. J. H. PERRY

Acid and salt effects in catalyzed reactions. XII. Water catenary ($H^+ - H_2O - OH^-$) in the ionization of acetone. HARRY M. DAWSON AND ARTHUR KEY. *J. Chem. Soc.* 1928, 543-51; cf. *C. A.* 22, 716. — The rate of reaction of acetone with I in isohydric buffer solns. has been detd. with an acetone concn. of 20 cc./l., I concn. initially of 0.001 M, and H-ion concns. between 18.5×10^{-5} and 0.065×10^{-5} . The velocities due to the different catalytic constituents of H_2O have been calcd. by means of the equation: $V_0 = k_1(H^+) + k_{OH}(OH^-) + k_w(H_2O)$. H_2O mols. accelerate the reaction rate although k_w is small. The ratio k_{OH}/k_w is approx. 5×10^{10} . The velocity due to the combined effect of H^+ and OH^- agrees with the values calcd. from the formula $r = \cosh \log n$, where r = reduced ionic velocity and n = reduced H^+ concn. XIII.

Inert salt effects in the catalytic action of acids. HARRY M. DAWSON AND ARTHUR KEY. *Ibid* 1239-48.—Measurements are reported on the velocity of the acetone-iodine reaction when catalyzed by HCl, dichloroacetic, monochloroacetic and acetic acids in solns. of NaCl of 0-4 molar. The character of the influence of the NaCl (inert catalytically) depends upon the strength of the acid. By assuming that the increase of the rate of reaction caused by adding inert salts to a strong acid is due to a change in the catalytic activity of the H^+ ion, it is shown that the ionization const. of a weak acid is first increased and then decreased with progressively higher salt concns. The study of the catalytic properties of mixts. of weak acids and their corresponding salts is not affected by such inert salts as the alkali chlorides. XIV. **Influence of inert salts on the catalytic catenary for acetic acid-acetate mixtures.** *Ibid* 1248-57.—The influence of catalytically inert salts on the velocity of the acetone-I reaction has been studied in the presence of a weak acid and in the presence and absence of the corresponding salt. The relations in the NaCl solns. from 0.1 to 4.0 *M*, are very similar to those obtained with pure aq. solns. The coeffs. detg. the catalytic activity of the AcOH mol. and the AcO^- ion are only slightly affected by the presence of NaCl. But the catalytic activity of the H^+ ion and the degree of ionization of the AcOH vary considerably with the salt concn. The velocity- p_H curves are all catenaries for, although the isocatalytic activities vary with the salt concns., the variations are small. J. H. PERRY

The catalytic decomposition of oleic acid. B. M. MARKS AND H. C. HOWARD, JR. *J. Phys. Chem.* 32, 1040-8 (1928).—As a preliminary in the study of the hydrogenation of sunflower-seed oil which consists of glycerides of oleic and related acids, the catalytic activity of Ni toward oleic acid was studied through a temp. range of 200° to 490°. The decarboxylating catalysis of Ni has been demonstrated for oleic acid, the products of catalytic decompn. being, mainly, CO, water and hydrocarbons. Analytical data are given for the products of reaction as well as an explanation of the observed data. G. L. CLARK

The electrodynamics of surface catalysis. A. K. BREWER. *J. Phys. Chem.* 32, 1006-17 (1928).—This paper is a summary and conclusions drawn from exptl. material previously published. Certain observed facts, namely, the emission of ions during various surface-catalyzed chem. reactions following an equation of the Richardson type, and the concn of the ions increasing as the inverse cube of the distance upon approaching the surface, have been made the basis for the proposed mechanism of surface catalysis. The mechanism of catalysis as brought out is briefly that the image and intrinsic surface forces combined with kinetic energy of agitation dissociate the gas mols. on the surface into ions; the ions thus formed are driven from the surface by kinetic agitation with a probability distribution of velocities; and that chem. action results from a rearranged combination of the ions whose velocity components perpendicular to the surface are sufficient to carry them out to a region of weak surface forces—the chemically active region. Thus it is possible to treat chemical action as a special case of thermionic emission. The equation for the rate of the forward reaction developed from the thermodynamic point of view is: $dC'/dt = A'T^{3/2} e^{-b'/T}$, where A is the combination factor and b is the complete chemical work function. Equilibrium is expressed by: $K = (A'/A'')T^{(n''-n')/2} e^{-(q-b')/T}$. G. L. CLARK

Further remarks on the method proposed by Swietosławski for the correction of the older thermochemical data. P. E. VERKADE AND J. COOPS, JR. *Rec. trav. chim.* 47, 701-8 (1928).—The authors criticize the methods proposed by S. for correcting the thermochem. data of the older investigators (Zubow, Swarts, Richards, Berthelot and Matignon) using correction coeffs., on the ground that only one comparison substance is used. S. gives a correction coeff. for all of Zubow's data (Zub. = 0.9903) derived thus: heat of combustion of naphthalene, 9706 cal. per g. (air) (Zubow) and 9612 15°-cal. per g. (Swi.) 9612/9706 = 0.9903. S. corrects all of Zubow's data by this one coeff. The authors maintain that if the data of an investigator are to be reduced to the international standard, the comparison substances chosen should be well distributed over the entire work of the investigator. A. J. CURRIER

The ratio of the heats of combustion of benzoic acid and salicylic acid. P. E. VERKADE AND J. COOPS, JR. *Rec. trav. chim.* 47, 709-14 (1928).—The heat of combustion of salicylic acid (previously detd. by the authors), viz., 5241.9 15°-cal. per g. (air) has been redetd. The new value is 5241.3 15°-cal. per g. (air). The ratio of 6324/5241.0 = 1.2064 (air) for the old value is stated, using 6324 cal. as the heat of combustion of benzoic acid (international standard). The lower value obtained by Berner, 5237.3 15°-cal. was thought to be due to a small systematic error and confirmed by the authors by data obtained from naphthalene and from two substances previously investigated by Berner, the heats of combustion for which were found to be too low. A. J. CURRIER

The true temperature scale of carbon. C. H. PRISCOTT, JR., AND W. B. HINCKE. Calif. Inst. Tech. *Phys. Rev.* 31, 130-4(1928).—The spectral emissive power of Acheson graphite for the wave length 0.660μ has been detd. for the temp. range from 1250° K. to 2700° K. The observations were made on a small tabular graphite resistance furnace with a hole in the wall and are best summarized by the relation: $\epsilon = 0.984 - 5.8 \times 10^{-6}T$. Measurements of the temp. distribution along the furnace afford detns. of the ratio of resistivity to thermal cond. at 3 temps. BERNARD LEWIS

The thermal and electrical conductivity of fused quartz as a function of temperature. HERMAN E. SEEMANN. Cornell Univ. *Phys. Rev.* 31, 119-29(1928).—The thermal cond. as a function of the temp. has been detd. for clear fused quartz by a radial flow method from 235° K. to 1225° K. The specimen was in the form of a hollow cylinder closed hemispherically at one end. Energy to maintain a steady temp. gradient was supplied by means of an electrically heated filament mounted axially inside the specimen. Thermal contact with the specimen was made with Hg inside and outside at the lower temps. and with the Sn-Pb eutectic at higher temps. Inside and outside temps. were obtained with thermocouples. A guard-ring scheme was used to prevent heat loss or gain at the open end of the cylinder and correction was made for the heat flow through the hemispherical end cap. The results may be represented by the linear equation: $K = 3.83 \times 10^{-6}T + 0.00163$. An abrupt change in the thermal cond. was noted in the vicinity of 1140° K. which is attributed to heat treatment *i. e.*, annealing or partial crystn. An attempt was made to measure the sp. elec. resistance as a function of the temp. by the same method at the same time. The results were not conclusive because of the small no. of data taken but there is every reason to believe that the method would be entirely successful for the detn. of both quantities. The sp. resistance was measured for a small piece of the original specimen. The modified Königsberger formula was verified, *i. e.*, $\rho = A\epsilon(Q/RT + aT)\rho = A\epsilon(Q/RT + aT)$. The results indicate the presence of both electrolytic and dielec. polarization. Certain peculiarities in the polarization were noted at about 1140° K. as well as a general change in the resistance-temp. curve due to heat treatment. The interpolated results are:

Temp. °K.	550	750	950	1150
Sp. resistance	4.46×10^9	2.09×10^7	1.35×10^6	2.89×10^5

BERNARD LEWIS

A new method for the measurement of the temperature of gases. MARCEL CHOPIN. *Compt. rend.* 186, 1830-2(1928).—To avoid errors in temp. measurement of gases the flow of gas through an orifice at two temps. is used to det. the temp. accurately. The formula $Q = SK\sqrt{p/T}$ is used where Q is wt. of gas passing through the orifice, S is the cross section of the orifice and K is a coeff. dependent on the given gas. A gas is first passed through an orifice at a given temp. and is then passed through an orifice in the region where the temp. is desired. With an equal wt. of gas passing through both orifices: $SK\sqrt{p/T} = S_1K_1\sqrt{p/T_1}$. After heating these values become $SK\sqrt{p_1/T_2} = S_1(1 + at)^2K_1\sqrt{p_1/T_2}$ and $T_2 = pT_1/p_1T$. $p_1/p_2(1 + at)^2T_2$. The term pT_1/p_1T is const. and $(1 + at)^2$ is very close to unity. D. H. POWERS

The latent heat of fusion of naphthalene from new solubility data. A. A. SUNIER AND C. ROSENBLUM. *J. Phys. Chem.* 32, 1049-55(1928).—The soly. of naphthalene has been detd. in $(\text{CH}_2\text{Cl})_2$, $(\text{CH}_2\text{Br})_2$, MeCHCl_2 and MeCHBr_2 and the slopes of the upper portion of log N vs $1/T$ curves have been calcd. These indicate that the molal heat of fusion of naphthalene is 4440 cal. G. L. CLARK

A critical study of the experimental investigations on the heat of formation of liquid water and of carbon dioxide. MORRIS W. TRAVERS. *J. Inst. Fuel* 1, 279-87(1928).—The available data are critically reviewed. The heat of formation of liquid water is concluded to be 68,485 15° -calories at 0° and 68,345 15° -calories at 18° . The heat of combustion of carbon in coke is taken to be 94,750. LESLIE B. BRAGG

Contribution to the theory of the melting process and of the specific heat of liquid metals. A. MAGNUS. Univ. Frankfurt a/M. *Z. anorg. allgem. Chem.* 171, 73-81 (1928).—M. discusses several theories advanced to elucidate the melting of solids, such as the kinetic interpretation of Lindeman (*C. A.* 4, 2593) and the quantum expositions of the phenomenon. A question arises as to whether the lattice is completely disrupted at the m. p., or whether "fragments of the lattice" remain, this debris disappearing upon further rise of temp. of the melt. M. applies quantum considerations to the change of internal energy with temp. by use of the formula for the energy of N atoms (or oscillators) with 3 degrees of freedom, $U = 3N[h\nu/(e^{h\nu/kT} - 1)] + U_0$. Tests of the theoretical material with the data for Hg (liquid) reveal a fair

agreement. The discrepancies may be attributed to the incomplete destruction of the lattice at the m. p., more than the theoretical amt. of energy being required for C_p of the liquid since addnl. energy for the disruption of the lattice fragments must be supplied. Theoretical corrections, applied on the basis of this assumption, are in accord with expt.

WILLIAM E. VAUGHAN

Measurement of the true specific heat of nickel by a direct electrical method. (MME.) CH. LAPP. *Compt. rend.* 186, 1104-6 (1928).—A pure Ni wire, 2 mm. in diam. was placed in an oven at uniform temp. and then heated for a short time; from the energy furnished the wire and its rise in temp. the sp. heat is easily calcd. The sp. heat at 175° is 0.0550 and this rises to 0.1557 at 353.3°, corresponding to the Curie magnetic point; then there is a sudden drop to 0.1252 at 360.5° and rise again to 0.1288 at 460°, the latter rise in the paramagnetic region.

E. G. VANDENBOSCHE

Attempt of a quantum theory for gases and solutions. N. BARBULESCU. Univ. of Cluj. *Bul. soc. stiinte Cluj* 4, 62-74 (1928).—The difficulty in establishing a quantum basis for the theory of liquids and gases has existed in the idea that the energy of translation of the mols., as opposed to that of vibration and rotation, is continuous as required by the principle of equipartition. For actual matter, however, B. shows that there exists a force of cohesion which tends to hold the mol. in the position which it occupies at the time of the arrival of the energy wave. The intensity of the field of cohesion varies with the state of aggregation. For liquids and gases the movement of translation of the mols. represents a vibratory movement of an extremely small frequency. On the basis of this idea, assuming as a first approximation that the vibrations are monochromatic, an equation of state for gases is derived. The active mass of a gas is shown to be the product of the concn. into a term involving the vibrational frequency. A new formula for sp. heat is also derived. By applying the same ideas to solns., equations which have a greater validity are derived for osmotic pressure, etc. The idea of Longinescu and Chaborski (*C. A.* 21, 3004), that mol. assocn. is due to the accumulation of mols. into a given vol., is supported.

H. F. JOHNSTONE

Calculation of the energy of dissociation of diatomic molecules. A. CARRELLI. *Nuovo cimento* [N. S.] 5, 9-13 (1928).—A math. discussion of the sign of the terminal corrective in the formula for the energy of dissociation of a diat. mol.

L. T. F.

The theory of Born-Landé lattice forces. ALBRECHT UNSÖLD. *Naturwissenschaften* 15, 681-2 (1927).—A short review is given of the author's work (*C. A.* 21, 2096, 22, 536) on the detn. from quantum mechanics of the Born-Landé b/r^n repulsive force between atoms at short distances. The potential of this force (energy of perturbation) in its general form is found to be $(e^2Z/a)c^{-r}[(8/r) + 6 + 2r + (r^2/2)]$ for r = nuclear distance times Z_{eff} /hydrogen radius a . As appears from the derivation the repulsive force has no directional effect. This approx. equation represents the exptl. data on the Born factors n satisfactorily; it makes them rise with increasing ratio of ion radius to ion distance.

B. J. C. VAN DER HORVEN

The internal pressure and thermal oscillations of solids. E. N. GAPON. *J. Russ. Phys.-Chem. Soc.* 59, 933-49 (1927).—By assuming that only $1/3$ of the heat energy is used in overcoming internal pressure, the Richards formula is made to read $P = C_p(dT/dV)/3$ (1). Since $(dV/dT) = \alpha V$, the equation of Traube $(\alpha V/\Phi) = 1/3n$ is obtained if $C_p = 6$. According to Grüneisen, $\alpha = \text{const.} \times C_p$. By neglecting the difference $C_p - C_v$ from (1): $[d(PV)/dT] = 0$. Another equation of Grüneisen leads to $P = 588.7\lambda_0/v$ (2). P being in atm. per sq. cm., $PV^{1/3}$ is termed mol. internal pressure. G. points out that $PV^{2/3} = 600T_0$ (3) (where T_0 m. p. in °K.) quite closely for the metals, P being obtained from (2). P increases with the at. wt. in Ga-Tl, Fe-Os, Co-Ir, V-Ta; declines with the increasing at. wt. in Be-Ba, Zn-Hg, B-La, C and Si, Ti-Th. Other groups show min. or max. From $P\Phi = RT$, where Φ is the covol. ($v - b$), and (1) the following relationship is obtained: $(\alpha V/\Phi) = (14.13 C_v/RT)$. Or, the coeff. of expansion of Φ is proportional to at. heat. If $P\beta = \text{const.}$ (4), $(\beta T_0/v^{1/3}) = \text{const.}$, where β is the compressibility. The value of the const. for metals actually varies between 0.00021-0.00030, the mean being at 0.000265. If a mol. contains n atoms, equation (3) becomes $P = 600T_0/(nV^{1/3})$. Combining it with (2), G. has $n = 1.029[T_0V^{1/3}/(M\lambda)]^{3/2}$, from which n is computed for the alkali metals (Li 10.5, Na 2.3 etc.). Equation (3) is modified to apply to binary salts: $P = n^{1/2}T_0/v^{1/3}$. P of the alkali halides declines in the series Cl-I and Na-Cs. The covols. of salts follow roughly the additive law. The following relationship holds within 5%: $\sigma_K \times \sigma_A \times P_{KA} = 8.6 \times 10^4$ where σ is ionic diam. From (1) and (4) results $[\alpha V/(\beta C)] = 90.6$ (5), which has been obtained by Mie from different premises. α of complex compds. deviates little from the mean of 0.0038. Ice is a complex of the formula $(H_2O \dots H)_xO$. From the expression of Lindemann for ν , and Guldberg's

$\lambda_g = [E/(40d)]$, G. deduces $\nu = 5 \times 10^{11} \sqrt{E/M}$ besides the following empirical relationships: $\nu = 10.5 \times 10^{12} (C_p/M) \sqrt{d(C_p - C_v)} = 6.24 \times 10^{15} / (DM^{1/2})$. E denotes the modulus of elasticity, D diffusion coeff. of the metal into Hg at room temp., M at. wt., ν frequency of at. vibration. From (5) and $C_p = C_v + TV\alpha^2/\beta$ follows $C_p = C_v(1 + 2\alpha T)$, or C_p/C_v is a linear function of temp. G. obtains $\lambda_g = 0.074 \sqrt{\beta/n}$ where λ_g is wave length in the ultra-violet; the equation holds for Na, K, NaCl and KCl within 5%. For binary compds. $P = 1.05 \times 10^{-6} \times V^{1/2} (C_{11} + C_{12} + C_{44}) / (Z_1 Z_2)$ where Z_1 and Z_2 are the mol. fractions.

A generalization of the third principle of thermodynamics. N. A. KOLOSOVSKIĬ
J. Russ. Phys.-Chem. Soc. 59, 741-53 (1927).—See *C. A.* 22, 1069, 1267, 2090.

B. C. SOYENKOFF

The second law of thermodynamics in chemistry. R. C. CANTELO. *J. Phys. Chem.* 32, 982-9 (1928).—A clear, concise statement is given of the second law of thermodynamics. The concepts and the mathematical expressions are developed from the point of view of classical thermodynamics; then their application to chemistry is simply and thoroughly presented and discussed.

G. L. CLARK

Thermodynamics of air separation. BARNETT F. DODGE AND CHEVOWETH HOU. *Trans. Am. Inst. Chem. Eng.* 19, 117-51 (1927).—The theoretical work necessary for the sepn. of air into O_2 and N_2 by a reversible liquefaction process is equal to 2.60 h. p. hrs. per 1000 cu. ft. O_2 . It is shown by thermodynamic analysis that the present low energy efficiency (10%) of liquefaction processes is due to the multiplication of a no. of high and moderate efficiency terms and that any great increase in the overall efficiency is not to be expected over perhaps to 13-15% efficiency. This apparently small increase, however, should reduce the cost of O_2 very materially.

J. H. P.

The study of the specific resistance of bismuth crystals and its change in strong magnetic fields and some allied problems. I. The growth of crystal rods with a definite orientation of the crystal planes and the specific resistance of bismuth crystals. P. KAPITZA. *Proc. Roy. Soc. (London)* A119, 358-86 (1928).—During the growth of Bi crystals, a small strain in the material influences greatly the orientation of the trigonal axis of the crystal lattice. According to the character of the strain, the perfect cleavage plane is changed from one of the pseudo-octahedral planes to one of the 3 remaining planes of the same pseudo-octahedron. In order to obtain crystal rods with the perfect cleavage plane having any desired orientation relative to the axis of the rod, no strain must be set up in Bi during crystn., and a method is described by which this is effected. During growth, cracks and imperfections are developed in the lattice, which account for the variations in the sp. resistance of Bi previously observed. For a perfect crystal, the sp. resistance along the trigonal axis is $1.38 \times 10^{-4} \pm 1\%$, and perpendicular to the axis $1.07 \times 10^{-4} \pm 1\%$ at 16° . The cracks are produced during cooling at a temp. very near the solidification point, and their character depends chiefly on the temp. gradient at the point where the Bi is crystallized. A perfect Bi crystal at room temp. probably has no well-defined cleavage plane and is very flexible. To explain the origin of the cracks, it is proposed that Bi exists in 2 modifications. The one now unknown (probably cubic) changes to the ordinary rhombohedral form at a temp. slightly below the melting point. The transition involves a change in shape which produces the cracks. This hypothesis, together with the observed phenomena, leads to an explanation of several physical properties of Bi. **II. The method and apparatus for observing the change of resistance of bismuth in strong magnetic fields.** *Ibid.* 387-401.—A method is described for measuring the change of resistance of a conductor when placed in a magnetic field which exists for $1/100$ sec. For such a short time, larger c. ds. can be used without heating and specially sensitive app. is not required. The measurements can be made with an oscillograph. The design of a special switch is given, which permits the current to be sent through the conductor for the short interval during which the field is applied, the time adjustment being very accurate. The exptl. arrangements for studying the change of resistance of Bi crystals in a magnetic field at different temps. are described, and the elimination of errors due to heating by induction discussed. **III. The change of resistance of bismuth and the time lag in magnetic fields.** *Ibid.* 401-43.—Exptl. results are given for the change of the resistance of Bi crystals at 290° , 193° and 91° K. when the current is perpendicular to the magnetic field, for different orientations of the crystal axis relative to the field. Impurities and imperfections in the lattice have a large effect on the change of resistance, particularly with low temps. and strong fields. In an ideal perfect crystal, the change of resistance in weak fields follows a square law, and in strong fields a linear law. The latter is almost independent of the orientation of the crystal axis. The

change of resistance when the current is parallel to the magnetic field, with different orientations of the crystal, is also measured, and a "satn effect" is found. In this case, the resistance change is small and depends only slightly on temp., but is strongly affected by imperfections in the crystal. The observed resistance change may be due entirely to imperfections and lack of complete alignment of the current and magnetic lines of force. An unsuccessful attempt to make perfect Bi crystals by condensation of the vapor in vacuum is described. By studying the change of resistance in strong magnetic fields of the deposits obtained, certain phenomena previously observed in thin Bi layers are explained. The residual e. m. f. which occurs in Bi in a magnetic field when a current is passing, and which accounts for the time lag, is roughly detd. The ratio of this e. m. f. to the resistance is independent of the strength of the field, but depends greatly on the orientation and perfection of the crystal. A general discussion is given of the failure of the present theory of metallic conduction to account for the phenomenon of the change of resistance in a magnetic field, and various suggestions are made in this connection.

F. A. JENKINS

The decomposition of carbon dioxide at low pressures under the action of an electric current. PIERRE JOLIBOIS, HENRI LEFEBVRE and PIERRE MONTAGNE. *Compt. rend.* 186, 1119-21 (1928); cf. *C. A.* 21, 1914.—With currents up to 0.002 amps. the disson. of CO_2 at 3.4-mm. initial pressure is 42% and independent of the current, though equil. is reached more readily with a high current. The initial pressure affects the disson. (54% at 0.8 mm. and 31% at 8 mm., around 2300°). The efficiency of the d. c. is much less than that of the discharge from a condenser.

E. G. VANDENBOSCHE

Temperature variation of the electrical conductivity of crystals. N. USSATAJA and B. HOCHBERG. *Z. Physik* 46, 88-92 (1927); *Science Abstracts* 31A, 293.—For NaNO_3 , CaI_2 and NaCl the elec. cond. decreases regularly with increasing temp., and the consts. are practically equal. For mica the cond. diminishes much more slowly.

H. G.

Salt-like hydrides. IV. I. KAZARNOVSKII. *Z. anorg. allgem. Chem.* 170, 311-9 (1928). The normal potential of the negative H ion (O^{H}) in hydrides such as LiH is calcd. from the heat of formation, soly and free energy of the ions, and is found to be 2.38 v. It is thus the weakest of the metalloids. The hydration energy is given by the expression $W_{\text{H}^-} = (\text{O}^{\text{H}} - \text{O}^{\text{Na}})23 + S'_{\text{Na}} + I'_{\text{Na}} + D'_{\text{H}_2\text{O}} - E'_{\text{H}} - W_{\text{Na}^+}$, in which D'_{H} is the free energy of H disson. = 47 kg.-cal., E'_{H} is the electron affinity of H and = 0, O^{Na} is the normal potential of Na = -2.712 v., S'_{Na} is the free energy of sublimation of Na = 19 kg.-cal., W_{Na^+} is the energy of hydration of Na = 99 kg.-cal., I'_{Na} is the energy of ionization of Na = 117 kg.-cal. The value obtained for W_{H^-} = 91.5 kg.-cal. The hydrides are completely hydrolyzed by H_2O : $\text{NaH} + \text{H}_2\text{O} = \text{NaOH} + \text{H}_2$. Calcn. of the heat of formation of the hypothetical hydride NH_2H gives 196 kg.-cal., while that of MgH_2 is found to be about 0. The lattice energy in kg.-cal. is given for LiH —calcd. 234, observed 234, for NaH —calcd. 211, observed 210; for RbH —calcd. 169, observed 178; for BaH_2 —calcd. 551, observed 526.

H. STOERTZ

The limiting potential of solutions of glucose. RENE WURMER and JEAN GELOSO. *Compt. rend.* 186, 1842-4 (1928); cf. *C. A.* 21, 1467. In studying the potentials of glucose (I) solns. with various dyes it was found that these dyes have a catalytic effect on the speed of establishing the potential, and if the measurements are sufficiently prolonged the final potential reaches the same limit in a soln. of I with or without the dye. A limiting potential of p_{H} 7 was obtained after 30 days at 40° , 9 hrs. at 75° or 2 hrs. at 90° . The temp. coeff. of p_{H} of I with a phosphate buffer is $(500/T) - 8.8 \pm 0.5$. The curves indicate that the dye has no effect on the final potential. The leuco form of Janus green and phenosafranine whose potentials are more neg. than I are reoxidized by it, as if I yielded a true reversible form.

D. H. POWERS

The oxygen electrode as a quasi-quantitative instrument. W. T. RICHARDS. *J. Phys. Chem.* 32, 990-1005 (1928).—The methods of prepn. of an O-Pt electrode capable of giving reproducible results is discussed along with the types of solns. in which it works best. The operation and construction of a convenient cell chain having a flowing junction and requiring only small vols. of liquid is described. Although far below the thermodynamic value for the O-H chain, it has been demonstrated that, under suitable conditions, O electrode potential const. to a millivolt for many days may be obtained. The potential of the O electrode has been shown to vary quant., but not thermodynamically, with the partial pressure of O gas between 0 and 1 atm. A method is described for measuring *OH-ion activities* with the O electrode which is capable of some accuracy. It is hoped that this method will prove useful in biochem. work. In order to explain the results it is necessary to attribute electromotive activity

to O gas, and to consider the measured potential of the electrode a compromise between this and the oxidic potential.

G. L. CLARK

The preparation of the hydrogen electrode and the removal of a common source of trouble in connection with its use. S. POPOFF, A. H. KUNZ AND R. D. SNOW. *J. Phys. Chem.* **32**, 1056-60(1928); cf. *C. A.* **21**, 3807.—The following technic in the prepn. and use of the H electrode is established as good practice: (1) Equil. is attained more quickly in a Bovie titration cell than in an open beaker. (2) A preliminary plating of gold on the electrodes does not affect the time required for the attainment of equil. but causes a more adherent coating of Pt black to be deposited which is more easily removed in cleaning. (3) A thinly coated electrode is more desirable than a heavily coated one, and should be deposited from a soln. of 0.5 cc. of 0.1 N Pb acetate soln. in 100 cc. of 3% H_2PtCl_6 soln. (4) Poisoning due to HgCl_2 can be removed by treatment with HNO_3 or dichromate cleaning mixt. Directions are also given for plating the electrodes

G. L. CLARK

The electrochemical behavior of silicate glasses. V. J. B. FERGUSON, M. J. MULLIGAN AND J. W. REBBECK. *J. Phys. Chem.* **32**, 1018-30(1928).—When a glass sample is electrolyzed at moderate temps. with a difficultly sol. anode material like Hg, the current decreases as the electrolysis proceeds. This decrease is caused by the setting up of counter e. m. fs. and by an increase in the true resistance of the glass sample. At low voltages the counter e. m. f. tends to assume a const. value. The min. voltage which is required to give this nearly const. value increases as the electrolysis proceeds. The true resistance of a Hg-containing anode glass layer has been found to be many times that of the original glass and to change with temp. in accordance with the rule of Rasch and Hinrichsen. The smaller counter e. m. fs. const. values which are noted when glass samples are electrolyzed with a sol. anode and a mercury cathode have been attributed to chem. origin. The manner in which the elec. measurements are affected by current reversal has been indicated for glass samples having Hg-contg. anode glass layers. Hopkinson's expt. on residual charge was repeated under different conditions.

G. L. CLARK

A new method of measurement of the dielectric constants of liquids. P. V. GOLUBKOV. *Ber. Saratower Naturforscherges.* (Russia) **1**, No. 4, 37-51(1925); *Chem. Zentr.* **1927**, I, 144.—The method is based on the resonance principle, but instead of detg. the max. amplitude of the galvanometer in its resonance cycle, the throw of the galvanometer ϕ is detd. when the condenser is filled with air ϕ_0 , with a liquid of reference ϕ_1 , and with the liquid to be tested ϕ_2 . From these values the dielec. const. ϵ_2 can be calcd. from the relation: $\epsilon_2 = (\epsilon_1 - 1)[(\phi_2 - \phi_0)/(\phi_1 - \phi_0)] + 1$, where ϵ_1 is the dielec. const. of the liquid of reference. This is in the range where the throws of the galvanometer are directly proportional to the capacity of the condenser. C_6H_6 was chosen as the liquid of reference. The values for CS_2 were 2.6606, 2.6608 at 11° and 2.6587 at 12°. For the mixt. CS_2 20 + C_6H_6 80 (by wt.) it was 2.3713; for CS_2 40 + C_6H_6 60 it was 2.4396, for CS_2 60 + C_6H_6 40 it was 2.5041, for CS_2 80 + C_6H_6 20 it was 2.5950; and for pure CS_2 it was 2.6739 (at 11°).

C. C. DAVIS

Thermomagnetic study of the sesquioxide of iron attractable by a magnet. J. HUGGETT AND G. CHAUDRON. *Compt. rend.* **186**, 1617-9(1928).—The method of prepn. has great influence on the properties of the magnetic form of Fe_2O_3 originally discovered by Malaguti. Details of prepn. are given for 2 specimens which were subjected to thermomagnetic analysis. In one the magnetism reached a max. at approx. 350° and then fell to practically zero at about 600°. The process was accompanied by a liberation of heat between 350° and 450°. Since on cooling the magnetism is not recovered, this is interpreted as a transformation of the Malaguti form into the ordinary Fe_2O_3 . The other specimen showed a more or less steady rise in magnetism up to approx. 450°, then a more rapid increase to a max. a little below 550°, followed by a rapid drop to zero at about 620°. On cooling the magnetism increases rapidly to about 500° and then more slowly, the final value at room temp. being approx. $2\frac{1}{2}$ times the initial. If heated to 700° this form is transformed, with evolution of heat, into ordinary Fe_2O_3 . The variations in behavior of the two specimens are ascribed to impurities. Cf. *C. A.* **22**, 1934.

W. W. STIFLER

A study of the nightly fluctuations of atmospheric ozone. DANIEL CHALONGE. *Compt. rend.* **186**, 1856-8(1928).—Detns. of the ozone content of the atmosphere were made spectroscopically by photographing the moon, using the spectral region 3100-3250 Å. U. The results indicate that the upper atmosphere never contains less ozone at night than in the day time. The concn. at night shows no marked seasonal variation over the period studied, from October, 1927 to April, 1928. Creation and fluctuation of ozone at a high altitude must then be explained by other causes than solar ultra-violet radiation.

D. H. POWERS

Valency and refraction equivalents. K. v. AUWERS. *Ber.* 61B, 1041-9(1928).—The following new exptl. detns. are used as a basis to discuss the influence of the N valency on the refraction exhaltation.

	M_a	M_D	$M_D - M_a$
PhCH:NMe	43.83	43.41	2.25
$\begin{array}{c} \text{O} \\ \parallel \\ \text{PhCH:NMe} \end{array}$	39.19	39.57	1.35
	+3.64	+3.84	+0.90
PhCH:NPh	64.26	65.28	3.97
$\begin{array}{c} \text{O} \\ \parallel \\ \text{PhCH:N. Ph} \end{array}$	61.70	62.57	3.24
	+2.56	+2.71	+0.73
C ₆ H ₄ Cl.CH.NPh	68.57	69.55	4.23
$\begin{array}{c} \text{O} \\ \parallel \\ \text{C}_6\text{H}_4\text{ClCH.N. Ph} \end{array}$	65.94	66.86	3.46
	+2.63	+2.69	+0.77
PhCH:N.OMe	44.83	45.33	1.74
$\begin{array}{c} \text{O} \\ \parallel \\ \text{PhCH:N.OMe} (\alpha) \end{array}$	41.65	42.08	1.56
	+3.18	+3.25	+0.18
PhCH:N.OMe	41.83	45.33	1.74
$\begin{array}{c} \text{O} \\ \parallel \\ \text{PhCH:N- OMe} (\beta) \end{array}$	41.42	41.84	1.50
	+3.41	+3.49	+0.24
MeC ——— CMe	27.35	27.54	0.70
$\begin{array}{c} \parallel \qquad \parallel \\ \text{N} \text{---} \text{O} \text{---} \text{N} = \text{O} \\ \parallel \qquad \parallel \\ \text{MeC} \text{---} \text{CMe} \end{array}$	23.87	23.99	0.42
	+3.48	+3.55	+0.28
PhCNO	33.03	33.36	1.14
PhCN	31.34	31.62	0.96
	+1.60	+1.74	+0.18
PhN=NPh	62.64	63.66	
$\begin{array}{c} \text{O} \\ \parallel \\ \text{PhN} = \text{NPh} \end{array}$	62.07	63.05	
	+0.57	+0.61	
<i>o,o'</i> -MeC ₆ H ₄ N=NC ₆ H ₄ Me	79.93		
$\begin{array}{c} \text{O} \\ \parallel \\ \text{o,o'}\text{-MeC}_6\text{H}_4\text{N} = \text{NC}_6\text{H}_4\text{Me} \end{array}$	72.12		
	-1.19		
<i>m,m'</i> -MeC ₆ H ₄ N=NC ₆ H ₄ Me	72.82	73.93	
$\begin{array}{c} \text{O} \\ \parallel \\ \text{m,m'}\text{-MeC}_6\text{H}_4\text{N} = \text{NC}_6\text{H}_4\text{Me} \end{array}$	72.37	73.83	
	+0.45	+0.10	

$p\text{-HOC}_6\text{H}_4\text{N}=\text{NPh}$	66.21 67.23	67.88 69.39		
	-1.02	-1.43		
$p\text{-EtOC}_6\text{H}_4\text{N}=\text{NPh}$	70.65	78.13		
$p\text{-EtOC}_6\text{H}_4\text{N}=\text{NPh}$	76.58	78.49		
	+0.07	-0.36		
	M_α	M_D	$M_\beta - M_\alpha$	$M_\gamma - M_\alpha$
MeNCO	13.31	13.39	0.24	0.38
MeNC	11.76	11.83	0.23	0.36
	+1.55	+1.56	+0.01	+0.02
EtNCO	18.10	18.26	0.31	0.49
EtNC	16.42	16.50	0.29	0.46
	+1.74	+1.76	+0.02	+0.03
PhNCO	33.64	33.94	1.03	
PhNC	32.02	32.32	1.00	
	+1.62	+1.62	+0.03	
MeNCS	20.80	20.98	0.61	
MeNC	11.76	11.83	0.23	
	+9.09	+9.15	+0.38	
EtNCS	26.02	26.22	0.72	
EtNC	16.42	16.50	0.29	
	+9.60	+9.72	+0.43	
PhNCS	43.08	43.60	1.88	
PhNC	32.02	32.32	1.00	
	+11.06	+11.28	+0.88	

ALBERT L. HENNE

Osmium (FRITZMANN, *et al.*) 6. Solidification of amorphous matter (ENGLISH) 19. Color standardization and testing (KLEIN, *et al.*) 26. Liquid NH_3 as a solvent (FERNELIUS, JOHNSON) 6. The periodic system and the system of analytical chemistry (GILLIS) 7. Induction of the reaction between chromic acid and manganous salt by As_2O_3 (LANG, ZWERINA) 6. Synthetic gems (HOFFMANN) 6.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

Secondary variations in cosmic radiation. AXEL CORLIN *Naturwissenschaften* 16, 512(1928); cf. *C. A.* 21, 2218. —Irregular variations in cosmic radiation are discussed; they are of an amplitude occasionally double that of the variations with stellar time.

B. J. C. VAN DER HOEVEN

The quantum postulate and atomic theory. F. J. SELBY. *Nature* 121, 828(1928). — A discussion of Bohr's paper (cf. *C. A.* 22, 2313), in which it is emphasized that the duality of observed phenomenon and observing mechanism is connected with a third factor, the conscious mind of the observer. It is shown that the origin of the quantum can be explained in these terms.

F. A. JENKINS

Temperatures of melting and of boiling of homopolar compounds considered as a function of the distribution of electrons in the molecule. A. DUBROVA. *Ukrainskii Khim. Zhurnal* 3, No. 1, Sci. Pt. 1-38 — On the basis of the ideas of N. Bohr on the structure of atoms and on the ideas of Remy on the structure of mols. of homopolar compds., D. affirms that the properties of homopolar compds. can be represented in the form of the function $q = f(N_m, N_a, N, K)$, where q is the magnitude of the property, N_m the no. of electrons in the system of mol. union, N_a the no. of electrons remaining unaffected by the chem. process at the at. nuclei, N the no. of charges of at. nuclei, and K a magnitude wholly dependent on external conditions. To prove this assertion D. takes the temps. of melting and boiling of homopolar compds., preferably of homologous series, and establishes for them formulas which have the following general appearance: M (or b). p. = $f(N, P)(N_a/\sqrt{N_m})$, where P stands for pressure. It thus becomes evident that the temps. of m . p. and b . p. of homopolar compds. are really functions of distribution of electrons in the mol. between the system of mol. union and the systems of at. centers. When $P > 0$ and $P = \text{const.}$, $f(N, P)$ is in homologous series a linear function which, though not exactly always equal, differs but little for various compds. In absence of association of mols. the magnitude $f(N, P)$ is below 40 for the b . p. and below 30 for the m . p., P being not above 760 mm. When $P = 0$, the m . p. and b . p. of homopolar compds. are only directly proportional to the multiplication factor of repartition (distribution) of electrons in the mol., $N_a/\sqrt{N_m}$, since in that case $f(N, P) = \text{const.}$ For the b . p. it is approx. equal to 20. When P is variable $f(N, P)$ has, for the b . p., rather the appearance $f(N, P) = a[(b - N)\sqrt{P} + d]$, where a , b and d are consts. characteristic of the homologous series given, $a \cdot d = \text{const.} = \text{about } 20$. The nos., N_m and N_a were detd. not only on the basis of the theory of valency, but also by taking into consideration the properties of elements and their compds.

BERNARD NELSON

The production and measurement of molecular beams. THOMAS H. JOHNSON. Yale Univ. *Phys. Rev.* 31, 103-14(1928); cf. *C. A.* 21, 2422. — A new method for studying mol. beams has been developed in which the beam is detected and its intensity measured by the increase in pressure which is produced in an ionization gage when the gage is moved to allow the beam to enter it through a narrow slit. This method has the advantage over other methods in use in that it is applicable to beams of mols. of non-condensable and chemically inactive gases. Many details of the construction of the new beam detector have been described and the characteristics of its operation have been studied both experimentally and theoretically. Simple kinetic theory fails to explain the observed pressure changes unless adsorption on the inner walls of the gage is taken into account. A satisfactory hypothesis for interpreting the observations is that gas is adsorbed by the walls at a rate which is proportional to the mol. d. in the vol. of the gage and liberated at a rate proportional to the no. of adsorbed mols. A value of 10^{-4} per collision is found for the probability of adsorption of a Hg mol. on glass. The sensitivity of the gage method of detecting a beam, although seriously impaired by adsorption still compares favorably with that of other methods in use.

A study of the relation between the beam intensity and the pressure in the source chamber has been made in which the ionization-gage method has been used for the measurements.

BERNARD LEWIS

Some experiments on the separation of the isotopes of chlorine by chemical methods. TSUNEKICHI NISHIMURA AND TORINOSUKE TOYAMA. *Bull. Inst. Phys. Chem. Research (Tokyo)* 7, 98-108(1928); *Abstracts* 1, 6-8.—N. and T. tried to sep. the isotopic forms of Cl by taking advantage of the soly. of HCl in aq. FeCl_3 solns. and also by forming solid salts of Mg oxychloride and carnallite. No success was obtained.

A. L. HENNE

Some experiments attempting to separate the isotopes of magnesium by chemical methods. TSUNEKICHI NISHIMURA, TAKEMARO YAMAMOTO AND MASAE ARAI. *Bull. Inst. Phys. Chem. Research (Tokyo)* 7, 237-56(1928); *Abstracts* 1, 19-22.—The sepn. of the Mg isotopes was tried with the following compds.: (a) $\text{MgCl}_2 \cdot 3\text{Mg}(\text{OH})_2 \cdot n\text{H}_2\text{O}$, (b) MgHCO_3 and (c) carnallite, $\text{MgCl}_2 \cdot \text{KCl} \cdot 6\text{H}_2\text{O}$. In case (a) no difference was detected in the at. wt. of Mg of the various fractions; (b) gave a 0.11 difference; (c) gave 0.15. The detn. of the at. wt. offered a probable error of 0.12.

A. L. H.

The spectrum of "nebulium." A criticism. ADOLFO T. WILLIAMS. *Contrib. estudio de las ciencias fis. y mat., La Plata* 4, 45-51(1926); *Chem. Zentr.* 1927, 1, 21.—It is shown that the conclusions reached by Lemon (*Nature* 113, 764(1924); *Phys. Rev.* [2], 23, 766(1924)) on a basis of purely empirical graphical representation are erroneous. According to W., the lines of nebulium correspond to definite states of ionization of known elements (cf. Rosseland, *C. A.* 19, 774), e. g., highly ionized He in a medium of low d.

C. C. DAVIS

The photographic plate in the service of the spectral analysis of the nucleus of the atom. F. KOHLRAUSCH. *Phot. Korr.* 62, 113-9(1926).—A simple explanation of the detn. of the frequency of γ -rays by means of the energy of the electrons they liberate from various substances. This energy is detd. from the so-called "magnetic spectra" of the electrons, which are recorded on a photographic plate by the impact of the electrons. γ -Rays necessarily have their origin in the nucleus of the atom.

M. W. S.

Extraction and recovery of radium, vanadium and uranium from carnotite. H. A. DOERNER. *Bur. of Mines, Rept. of Investigations*, No. 2873, 12 pp (1928).—A modification of the HNO_3 extraction process of the U. S. Bur. of Mines is proposed. The ore is first roasted. After grinding in a pebble mill and Na_2CO_3 leach the usual HNO_3 leach is given in counter-current equipment. A high recovery of all 3 elements is made.

L. D. ROBERTS

Recovery of radium from old luminous paints. I. YA. BASHILOV. *J. Chem. Ind. (Moscow)* 4, 425-7(1927); cf. *C. A.* 21, 2436.—Luminous paints consisting of ZnS which has been calcined at 1000-1300° for its transformation into a cryst. modification and of a very slight addn. (50-250 mg. per kg.) of Ra salt lose their luminosity in the course of time, but their Ra content remains practically unchanged and can be recovered. A method for the recovery of Ra from these paints has been given by A. Francis (cf. *C. A.* 16, 3030), but it is rather complicated and laborious. B. proposes a simple method which is based on the circumstance that the radioactive ingredient is disposed on the surface of ZnS and can be extd. by comparatively weak agents, which hardly affect the other elements. The scraped-off paint in powder-form is first calcined at low temp. to destroy the gum and then treated with dilute HCl. Ra dissolves, the soln. is concd. by evapn., a few mg. of BaCl_2 and a few vols. of concd. HCl are added and the ppt. of BaCl_2 is allowed to settle for several hrs., after which it is pressed out, washed with concd. HCl and dried to absence of HCl odor. An aq. soln. of this BaCl_2 ppt. which contains most of the Ra, can be used for activation of fresh ZnS . On account of the slight soly. of BaCl_2 in concd. HCl, part of this salt remains in soln. together with some Ra. The amt. of the latter which remains dissolved may reach up to 25%; it can be recovered after pptn. of BaCl_2 by evapn. the filtrate to dryness to remove HCl, dissolving in water and using the soln. for activation of ZnS . By this method B. easily extd. 73.5% of Ra contained in old luminous paints scraped off from dials used in aviation. The new Ra paint thus obtained possessed a high degree of luminosity.

BERNARD NELSON

The chemical composition of the uraninite of Karelien and its lead-uranium ratio. K. NENADKEVICH. *Acad. Sciences Leningrad. Bull. Acad. St. Petersburg* 1926, 767-74; *Chem. Zentr.* 1926, II, 3029.—Four samples of uraninite, which contains, besides U and Pb oxides, rare earths, Th oxide, Si, Ca and Cl, were analyzed to det. their Pb/U ratio. This ratio is evidently influenced by secondary chem. changes in the mineral; it was max. in one sample contg. 63.4% UO_2 but no UO_3 . In the best preserved sample the ratio was about 0.3, which indicates about 2×10^9

ys. for the age of this mineral. It was proved by at. wt. detns. (206.06) that the Pb originated by transformation of the U. The Pb was weighed partly as sulfate and partly as nitrate, a method to which attention is particularly called. C. C. DAVIS

The age of uranium minerals in pegmatite veins. A. FERSMAN. Acad. Sciences Leningrad. *Bull. Acad. St. Petersburg* 1926, 775-80; *Chem. Zentr.* 1926, II, 3029; cf. preceding abstr.—The detn. of the age of minerals by the Pb/U ratio can lead to erroneous conclusions, if the mineral has during its formation absorbed Pb salts from the magma, or if U compds. or Pb compds. are dissolved to different extents.

C. C. DAVIS

The yield on β recoil of thorium B. K. DONAT AND K. PHILIPP. *Naturwissenschaften* 16, 513(1928).—Recently (C. A. 22, 538) a recoil yield of 2 to 6.5% of the theoretical value was found for Th B on β emission. The explanatory assumption then made of evapn. of the recoil atoms from the receiving plate *in vacuo* was now tested by cooling the plate by liquid air. The yield was found to increase to 9 to 11% at -90° , to 33% at -170° . Contamination of the plate by active material was negligible. Apparently many atoms can during β emission overcome the surface forces holding them.

B. J. C. VAN DER HOEVEN

The visibility of β -scintillations. HANS PETTERSON AND GERHARD KIRSCH. *Naturwissenschaften* 16, 463(1928).—To the note of Bothe and Franz (cf. C. A. 22, 1902) on the results of scintillation count the authors reply that the effect of β scintillation on a ZnS screen is very small. Several reasons are advanced to support P.'s contentions.

B. J. C. VAN DER HOEVEN

The radioactivity of the water of Cluj and its origin. G. ATHANASIU. *Bull. sect. sci. acad. roumaine* 10, No. 6, 1-2; *Chem. Zentr.* 1927, I, 3182; cf. C. A. 22, 725.—The radioactivity of Cluj water is 1.11 millimicrocuries ($\pm 5\%$), and in all the tests the variation was not over 10%. The radioactivity is not confined to the Cluj springs, but is prevalent in the springs of the entire region. The springs of Magura-Marisel show the highest radioactivity of any yet measured in Roumania. The granite of the region is weakly radioactive and is probably the source of the radioactivity of the springs.

C. C. DAVIS

The radioactivity of the sediment of springs. G. NUSSBERGER. *Erweiterter Jahresber. Nahr. Ges. Graubündens Feier ihres 100-jähr. Bestehens, Neue Folge* 64, 1926; *Chem. Zentr.* 1927, I, 1813.—The sediments of the springs of Val Sinestra, Andeer, Val and Mauritius (St. Moritz) were examd. for their radioactivity. In the Grison schist region, the mineral springs are more radioactive than the fresh-water springs of the region.

C. C. DAVIS

Investigations of the radioactivity of some mineral waters and of the drinking water of the Somes and Cris valleys (Roumania). G. A. DIMA. *Bull. sect. sci. acad. roumaine* 10, No. 6, 21-9; *Chem. Zentr.* 1927, I, 3182.—Various springs were examd. with a view to detg. whether the radioactivity varies with the rate of flow at different times of the yr. It was found that the greater the flow the smaller was the radioactivity. The radioactivities varied between 0.1 and 12.85 millimicrocuries per l.

C. C. DAVIS

A possible explanation of the double sign of Hall's coefficient. VITO GIAMBALVO. *Nuovo cimento* [N. S.], 5, 41-52(1928).—G. has stated and tested the hypothesis that the concn. of free electrons in metals depends upon the magnetic field. The field produced by the primary current engenders a difference of potential that is in excess of that demanded by the usual electronic theory. The two differences of potential have opposite signs so that the double sign of the Hall effect should explain the prevalence of one or the other of two partial effects.

L. T. FAIRHALL

Observed relative intensities of the Stark components of $H\alpha$. J. STUART FOSTER AND M. LAURA CHALK. McGill Univ. *Nature* 121, 830-1(1928); cf. C. A. 21, 359.—New photographs of the Stark components of $H\alpha$ have been taken by the Lo Surdo method. A microphotometric record, which is reproduced, shows that the relative intensities agree with those calcd. by Schrödinger by the wave mechanics. They are not in agreement with the theoretical predictions of Kramers (correspondence principle) and Epstein (wave mechanics), or with the exptl. results of Stark by the canal-ray method.

F. A. JENKINS

Statistical experiments on the motion of electrons in gases. R. D'E. ATKINSON. *Proc. Roy. Soc. (London)* A119, 335-48(1928).—The interpretations given by Townsend for the results of his recent expts. on the cond. of gases are criticized, and an attempt is made to reconcile these results with the quantum theory. The low values obtained by T. for the ionization potential of He are due to the fact that metastable 2^1S He atoms ionize the mols. of impurity gases by collisions of the second kind. The

resulting ionization current would be independent of the amt. if impurities present over a considerable range. This explanation could be verified by positive-ray analysis of the ions produced. With Ne, ionization of the impurity mols. by the absorption of Ne radiation probably plays a large part. The exponential increase of the current at potentials above 60 volts may be accounted for partly by direct collisions of electrons with mols. of the impurities, but principally by the diffusion of the metastable atoms between the time of their formation and the collision of the second kind. The distance of this diffusion may be sufficient to bring the metastable atom to a point in the field at which the energy of the electron produced on collision may differ considerably from that of the original exciting electron. The quantum theory is not easily applied to such statistical high-pressure expts., but A. is able to show by an approx. calcn. that the results of T. are at least not in disagreement with the theory. No reliable estimate of the ionization potentials can be obtained from these expts. In discussing certain objections raised by T. to the results of direct electron impact expts., it is emphasized that the elastic collisions which occur in these expts. below the first crit. potential do not take place without loss of energy, but involve the definite, though small, loss required for conservation of momentum.

F. A. JENKINS

Theory of normal cathode fall in glow discharges. K. T. COMPTON AND P. M. MORSE. Princeton Univ. *Phys. Rev.* 30, 305-17(1927).—From the principle of min. energy dissipation it is shown that the actual potential distribution in the fall space must be that one which is most favorable to ionization, subject to limitations imposed by Poisson's equation. With the aid of this principle, taking as known quantities of the N cathode fall V_n and Townsend's ionization const. N and V_0 , expressions are derived for the potential distribution the thickness of the fall space d_n , the distribution of ionization n_z and the c. d. j_n , which agree with exptl. values. The most important results are given by the equations: $pd_n = 0.85 (V_n/NV_0)[1 + (V_0/0.97V_n) + \dots]$ and $j_n/p_2 = 1.85 (10)^{-4} (L/M)^{1/2} [(kN)^{1/2} V_n^{3/2}/(1 - (n_0/n_d))]$ in which L , M and p are the mol. mean free path, mol. wt. of positive ions and gas pressure. It appears that the N cathode fall is found when the potential is distributed in the manner most favorable to ionization, without restriction by space-charge considerations. When the c. d. exceeds the N value, space-charge considerations require a less favorable potential distribution and hence a larger cathode fall, which is the abnormal case.

BERNARD LEWIS

The interaction between radiation and electrons. ARTHUR H. COMPTON. Univ. of Chicago. *Phys. Rev.* 31, 59-65(1928).—The production of recoil electrons is an example of the action of radiation on free electrons, whereas the photoelec. effect with x-rays is an example of the action of radiation on a pair of positive and negative charges. In both effects expt indicates that the whole momentum absorbed from the radiation is imparted to the electron that is set in motion by the radiation, showing that the duration of the radiation is short compared with the natural period of the electron in the atom. It is assumed that the action is instantaneous. In contrast with the prediction of Lorentz's force equation, which would predict an impulse imparted to an isolated electron almost in the direction of the elec. vector, the expts. show that the preferred direction of motion of the recoil electrons is perpendicular to the elec. vector. An impulse on a free electron in the direction of the elec. vector would not be consistent with the conservation of momentum. The photoelectrons on the other hand have the elec. vector of the incident wave as their preferred direction of motion (neglecting radiation pressure), though the expts. show that the impulse imparted to the electron by the radiation may make a considerable angle with the elec. vector. In this case the conservation of linear momentum permits motion in any direction, since equal and opposite impulses are applied to the positive and negative parts of the atom by the elec. vector; but the conservation of the angular momentum of the system requires that the impulse shall be imparted in a direction detd. by the instantaneous position of the electron in the atom. Expts. are consistent with this requirement, but indicate that Lorentz's force equation is only statistically valid in defining the direction of the action of the elec. vector on the photoelectron.

BERNARD LEWIS

The free electron in the homogeneous magnetic field according to Dirac's theory. I. I. RABI. *Z. Physik* 49, 507-11(1928).—Highly mathematical. W. W. STIFLER

The electronic theory of metals. A. SOMMERFELD. *Naturwissenschaften* 16, 374-81(1928); cf. *C. A.* 22, 1538.—A review is given on the basis of the new quantum and electron theories of the present status of the metallic conduction theory. Contrary to classical statistical mechanics and due to a typical condition of the electron gas at ordinary temps. (Pauli restriction) the Fermi Dirac distribution law gives an av. electron velocity independent of temp.; it is related to the electron energy by $E_e = mv^2/2$

and is practically equal to the zero point energy. The electron waves are in the range of soft x-rays (λ of 10^{-8} cm.). The exit work of electrons from a metal W_e is due to electrostatic effects of the surrounding charges; it is usually higher, sometimes lower than W_i , the internal energy of the electron gas. By powerful elec. field the latter case can be realized. The Volta potential between 2 metals can be expressed by $eV_{12} (W_{e1} - W_{i1}) - (W_{e2} - W_{i2})$ on the basis of the assumption that thermal equil. is established between electrons in a narrow "Hohlraum" between the 2 metals. Actual soldered contacts need a different treatment. The "Hohlraum" disappears. Only the internal work functions det. the thermo-elec. effect. Cond. has been brought to a basis of dispersion of electron waves by the field of atoms and their mutual interference. From the free path analog of an electron is then found that $l = \text{const}$

$\frac{A^2 \theta v^2}{dII(c)\phi(x)}$, with $II(c) = \int_0^1 \frac{u^2 du}{(u+c)^2}$, $\phi(x) = \frac{1}{x^3} \int_0^x \frac{\xi d\xi}{(\xi^2 - 1)}$ for $c = \left(\frac{\lambda}{4\pi b}\right)^2$, $x = \frac{\theta}{T}$ in which A is the at. wt. of the metal ion, θ the Debye temp. for the lattice vibrations, v the electron speed, b the parameter detg. the decrease in d. of the electron atm. of the ions. The const. is equal to $\frac{k}{24\pi e^4 L^2}$. For multivalent ions z^2 has to be added in the

denominator. The temp. dependence of ρ , the sp. resistance, follows from $\phi(x)$; for $x < 1$ (high temp.) ρ is proportional to T , a significant result. For very low temps ρ appears to decrease proportionally to T^2/θ^3 in good agreement with exptl. data on Au (Grüneisen). Calcns. of the pressure influence on ρ also give results in agreement as far as the order of magnitude (10^{-17}) with expts.; likewise anisotropic conduction effects.

B. J. C. VAN DER HOEVEN

Theory of the electrical conductivity of metals. II. ST. PROCOPIU. *Bull. sect. sci. acad. roumaine* 10, 93-5(1926); *Chem. Zentr.* 1927, I, 859; cf. *C. A.* 21, 1746.--Objections to the theoretical basis of the Grüneisen equation ($\rho = KCT$) are discussed. It is concluded that as yet it has not been established on a sound theoretical basis.

C. C. DAVIS

The Saha theory and the conductivity of flames containing alkali metal vapors. H. A. WILSON. *Proc. Roy. Soc. (London)* A119, 1-11(1928).—A derivation of an equation for calcg. the equil. const. of the reaction $M = M_+ + e$ is given in which a certain fraction of the salt introduced into the flames is reduced to the metallic state and only a fraction of the carriers of the negative electricity consists of free electrons. Results show that at high temps. these fractions are near unity and are nearly const. at 2000° K. They are also nearly independent of concn. of the metal in the flame. Relative condns. from various sources agree well with Saha's theory.

R. H. L.

Gas absorption as influenced by the electric discharge; clean up and related phenomena. ERICH PIETSCH. *Ergebnisse der exakten Naturwissenschaften* 5, 54 pp. (1926); *Chem. Zentr.* 1927, I, 16-7.—P. gives a comprehensive crit. review of clean-up expts. in Geissler tubes, incandescent cathode tubes and incandescent lamps. In the case of Geissler tubes the question of absorption is discussed in its relation to cathode disintegration, cathode fall, cathode material and the glass wall; in x-ray tubes the phenomena of so-called high vacuum is discussed. In incandescent cathode tubes, the work of Campbell and his collaborators shows that absorption is associated with the lower limit of glow-potential. Glow-potential diminishes with increasing mol. wt. of the gas (investigated in the case of H_2 , CO, N_2 , P). The double role of Hg vapor is discussed at length. According to the mol.-wt. rule, Hg lowers the glow potential and thereby favors absorption, on the other hand with Hg. discharge is accompanied by the evolution of gas from the glass walls (counter-effect). The part played by the walls of the vessel in absorption remains in dispute. The present work does not point conclusively to a polarity between the walls of the vessel and the gas. Clean-up in incandescent cathode tubes is investigated, particularly in the case of the noble gases, O, N, H and CO. N and H show clean-up of their atomic modifications. According to Schwab and Pietsch, in the presence of small quantities of O (oxide cathode) water is formed, and this is then absorbed by PbO_2 , WO_3 , SiO_2 , Cr_2O_3 , I_2O_5 , P_2O_5 , H_2SO_4 and $FeCl_3$ to various extents. Increasing the water-vapor const. in the reaction chamber lowers this clean-up. The possibility of an absorption of atomic H is excluded by the inertness of the gas toward WO_3 , oleic acid and indigo- H_2SO_4 . Clean-up in incandescent lamps is of great technical interest as a means of rapid and effectual evacuation. P. strongly aids absorption, but the nature of this phenomenon is not clear. Certain salts (given in the original) show a similar effect. The reactions, investigated by Langmuir, occurring in incandescent lamps at low pressures and those reactions resulting in a decrease of pressure within the system are treated briefly. Typical reactions in,

clude the reaction between the charged gas and an incandescent wire (W and O_2 or Cl, and also C and O_2), the reaction between the gas and the vapor given off by the wire (W and N_2 or CO_2 , also Mo and N_2 , Pt and O_2), the reaction between an incandescent wire and the gas which has been changed because of the discharge, catalytic reactions. The meaning of these phenomena, which are not explainable through chem. reactions, is to be reached through a comprehensive theory of absorption when the problem is more systematically investigated and when the phenomena of absorption are distinguished from associated phenomena. C. C. DAVIS

Influence of anode heating on the ignition of metal arcs. H. ALTERTHUM AND H. EWEST. *Z. tech. Physik* 9, 221-3(1928).—By measurements on arc formation between two heated W spirals it was found that in 10^{-3} mm Hg vacuum the c. d.-voltage characteristics are independent of the anode temp. However, in 760 mm. N_2 the ignition potential for hot anode (1670°) was 120 v., for cold anode more than 220 v., in A + 20% N_2 at 50 and 141 v., resp. The influence is attributed to longer free paths of the electrons. Lower pressure reduces the potential from 90 v. at 760 mm. to 35 v. at 360 mm. The results, also including the influence of electrode distance, are represented in several graphs B. J. C. VAN DER HOEVEN

The ignition potential of a glow discharge. H. ALTHERTHUM, M. REGER AND R. SEELIGER. *Z. tech. Physik* 9, 161-72(1928).—A review. The elec "respiration" of vacuum tubes (diodes, 10^{-2} to 10^{-4} mm Hg), i. e., the appearance of anodic glow at 440 v, 10 milliamps. and subsequent disappearance, is due to small amts. of impurities in the hydrogen filling, particularly org. vapors (stopcock grease, etc.). For measurements of actual ignition potentials (point where potential begins to decrease with rising c. d.) the lamps were carefully heated at 350° in *vacuo* and the W filament degasified with 8 amps., the exptl. current being 6 amps. Characteristic *i*-V curves for several gases are shown, also curves of ignition potential as a function of pressure (up to 10 mm.) and of gas compn. (H_2 , A, Ne, N_2). With increasing pressure it has a min. between 0.1 and 1.0 mm. Hg below 100 v.; the same holds for H_2 - N_2 , H_2 -A and N_2 -A mixts. The min. is explained by competition between increasing no. of collisions and decreasing ion yield of the collisions; the magnitude of the potential is related to the mass of the positive ions; particularly at low pressures the potential increases with lower wt. Several other theoretical points are discussed B. J. C. VAN DER HOEVEN

Direction of photoelectron emission. DONALD H. LOUGHRIDGE. Calif. Inst. Tech. *Phys. Rev.* 30, 488-93(1927).—Photographs of the photoelectron tracks in a Wilson expansion chamber through which a narrow beam of monochromatic $M_{K\alpha}$ x-rays were passed were taken with a stereoscopic camera. The direction of the paths with respect to the x-ray beam was detd. from measurements made with a *pecially designed stereoscopic comparator*. 445 tracks were studied of which 231 were in A, 123 in air and 91 in H_2 . Curves showing the frequency of occurrence of different angles of ejection have a fairly sharp max. for angles of about 70° with the forward direction of the x-ray beam. The curves are similar for the 3 gases studied except that the max. in the case of H_2 is somewhat sharper than for the other 2 gases. B. L.

Demonstration of a new photoelectric effect. F. M. PENNING. *Physica* 8, 137-40 (1928).—Details are given of expts. on the effect recently described (cf. C. A. 22, 1536) of increase of the spark potential of a Ne-A tube (20 mm. Ne, 0.001 % A) on intensive radiation with light from another Ne tube. The theory of the effect is based on ionization by metastable atoms B. J. C. VAN DER HOEVEN

Safety standards of protection against x-ray dangers. A. MUTSCHELLER. *Radiology* 10, 468-74(1928).—Tolerance doses for radiation proposed by different investigators are correlated, and a safety tolerance dose of 0.01 of a skin erythema dose per month is recommended. The total thickness of Pb required for this degree of protection is not less than 2 mm. for radiography and fluoroscopy, not less than 3.25 for superficial therapy and not less than 5.6 for deep therapy. E. H. QUIMBY

Sources of error in precision wave-length measurements of x-rays and contribution to the determination of normal lines. H. IWATA. *Z. Physik* 49, 217-27(1927).—There is an important need of standard reference lines in x-ray spectroscopy to avoid the necessity of abs. measurements in each case. The Cu $K_{\alpha 1}$ line may be taken as a primary standard. It is possible to eliminate errors by working both with the Seemann wedge method and with the Bragg rotating-crystal method, since the sources of error in each of these methods is lacking in the other. The wedge method is unsuitable for rays of large glancing angle, and unevenness in the plate is a source of error. In the rotation method the sources of error are the divisions of the goniometer circles and imperfections of the crystal face. Comparison of the results obtained by the

two methods, therefore, yield accurate values. The W $L_{\alpha 1}$, W $L_{\beta 1}$, W $L_{\beta 2}$, Pb $L_{\alpha 1}$ and Mo $K_{\alpha 1}$ lines were detd. by both of these methods with the following results, the figure (in X-units) obtained by the wedge method being given first in each case: 1473.354, 1473.354; 1279.29, 1279.24; 1242.15, 1242.155; 1172.79, 1172.77; 708.05, 707.96. The W $L_{\alpha 1}$ and Mo $K_{\alpha 1}$ lines are proposed as secondary standards with the values 1473.35 and 708.05. The other precision detns. of these lines are recorded and a note calls attention to Siegbahn's latest detn. of the Cu $K_{\alpha 1}$ line (cf. *Physik. Ber.* 8, 2101 (1927)). The above figures are based on the older value, 1537.30. A. W. KENNEY

X-rays of long wave length from a ruled grating. FRANKLIN L. HUNT. Bur. of Standards. *Phys. Rev.* 30, 227-31(1927).—By the use of a grating ruled on glass (200 lines per mm.) at grazing incidence (20° to 40°) in vacuum, the following lines have been obtained: M_{α} of Pt (6 A. U.); K_{α} of Al (8.3 A. U.); L_{α} of Cu (13.3 A. U.); L_{α} of Fe (17.7 A. U.); L_{α} of Cr (21.5 A. U.); K_{α} of C (45.8 A. U.). A water-cooled metal x-ray tube with hot lime-coated Pt cathode was used. This was connected directly to the spectrometer with no absorbing film between the anticathode and the photographic plate. Wave lengths were detd. with reference to L_{α} of Cu and also directly by calcg. from the constns. of the spectrometer. BERNARD LEWIS

A new method of spectroscopy for faint x-radiations. P. A. ROSS. *J. Optical Soc. Am.* 16, 433-8(1928).—The difficulty of analysis of extremely faint x-rays by the crystal reflection method has led to the development of an analysis depending on absorption. Two foils of chemically pure Ag and Cd were stretched on small rectangular frames with adjustments for rotating the foils about a vertical axis so that the exact thickness to the x ray beam could be changed and so mounted that either or both foils could be placed in the beam. An ordinary ionization spectrometer was used to det. the transmission curves. After the foils had been adjusted to give the same absorption for a series of wave lengths, the crystal was removed and the ionization chamber swung into direct line with the slits, which were opened to several mm. Ionization current readings were then taken with the foils alternating in the path of the beam and their differences recorded as representing the intensity of the band of radiation between their K limits. In the case of Cd and Ag the width of this band was about 0.022 A. U. and for Pb-Bi about 0.0037 A. U. with mean values of 0.474 A. U. and 0.1383 A. U. The intensity was nearly uniform across the band and its purity was independent of the width of the slits over a wide range. Other elements can be used as foils, and it is possible to use screens in which salts are the absorbing media. It is calcd. that, allowing for the wider slits which may be used in this method without decrease of resolving power, the advantage in efficiency over the crystal reflection method may be over 1000-fold. A. W. KENNEY

Thermoluminescence excited by x-rays. Further experiments upon synthetically prepared materials. FRANCES G. WICK AND MABEL K. SLATTERY. *J. Optical Soc. Am.* 16, 398-408(1928); cf. *C. A.* 22, 1103.—The thermoluminescence excited by x-rays in the sulfates of Cd, Na and Zn contg. slight amts. of Mn is the object of this study. The sulfates were prepd. by adding to the metal sulfates $MnCl_2$ soln. with a small amt. of H_2SO_4 , using about 1 mol. Mn to 250 mols. of the salts except that in the case of Cd the ratio was 1 to 900 of Cd. Samples were evapd. to dryness, ignited to drive off fumes, sifted and exposed for 1 hr. to x-rays from a Mo tube running on 50 kv. and 3 milliamp. at 11 cm. from the tube. Immediately after exposure the material was put into long glass tubes immersed in liquid air. The thermoluminescence was excited by heating the specimens on a Cu plate fastened to a small elec. stove, the temp. of the plate being measured by a thermocouple. Photometric detns. of the thermoluminescence were then made. At liquid air temp., the thermoluminescent property is apparently preserved indefinitely, and there is no phosphorescence, although all samples were phosphorescent at room temp. after exposure to x-rays. In every case it was found that the specimen exhibited two maxima of thermoluminescence. One is produced very soon after the heating is commenced and lasts but a short time; the other comes up much less quickly and persists longer. In some specimens the 2 emissions were of different colors. If the material stands at room temp. after exposure to x-rays, the first effect lasts only a few hrs. while the second may last for months or even yrs. At liquid-air temp. both effects are preserved. The decay curves were plotted to show the effect of the temp. on thermoluminescence, which is to heighten the max. intensity and shorten the time. The effect of higher temp. of exposure to x-rays is to decrease the intensity of the max. and lengthen the decay. The effect of an increased voltage on the x-ray tube is to heighten the max. intensity and shorten the life. The thermoluminescence of all the specimens can be quenched by exposing them to sunlight or particularly to ultra-violet light. In all cases also the color of

light which exactly matches the thermoluminescence is effective in quenching. In some cases the samples after exposure to x-rays fluoresce in ultra-violet when they did not previously.

A. W. KENNEY

Regularities in physical and chemical action of x-rays. R. GLOCKER. *Z. tech. Physik* 9, 201-7(1928).—A review with 35 references dealing with ionizational effect, photographic action, fluorescence excitation, action on Se cells and photochem. actions of x-rays.

B. J. C. VAN DER HORVEN

Application of x-ray crystal analysis to the problems of chemistry. G. SHEARER. *J. Oil Colour Chem. Assoc.* 11, 75-89(1928).—The way in which x-ray crystal analysis has been applied to some chem. problems is outlined. Its possible application to the paint-varnish industry is discussed.

R. J. M.

Three notes on the quantum theory of aperiodic effects. J. R. OPPENHEIMER. Harvard Univ. *Phys. Rev.* 31, 66-81(1928).—In section 1 it is shown that the normalization of the characteristic functions corresponding to a continuous spectrum, which has been introduced by Hellinger and Weyl, satisfies the requirements of the δ -normalization of the Dirac-Jordan transformation theory. It is further shown that this normalization makes the flux to and from infinity of systems for which an integral of motion β lies in the little range $\Delta\beta'$ equal to $(\partial E/\partial\beta')\Delta\beta'$. In section 2 the condition for the validity of classical mechanics in the form $\text{grad } \lambda \ll 1$, where λ is the instantaneous wave length $\lambda = (h/2\pi)[2M(E - U)]^{-1/2}$, is applied to establish Rutherford's formula for the scattering of α -particles. In section 3 a method is developed for computing the transition probabilities between states of the same energy which are represented by almost orthogonal "eigenfunctions." The theory is applied to the ionization of H atoms in a const. elec. field. The period of ionization in a field of 1 v per cm. is 10^{10} sec. The bearing of such transitions on the problem of metallic conduction is discussed.

BERNARD LEWIS

The application of the irregular doublet law to complex spectra. K. MAJUMDAR AND G. R. TOSHNIWAL. Univ. of Allahabad. *Nature* 121, 828-9(1928).—Several terms are identified in the K^+ and Ca^{++} spectra by the use of the irregular doublet law. The application of the law to the isoelectronic systems (I) A, K^+ , Ca^{++} , Sc^{+++} (II) K, Ca^+ , Sc^{++} , T^{+++} is illustrated by a table. The ionization potential of Ca^{++} is approx. 52 v. The high excitation energy of certain Ca^{++} lines is against the view that they appear in the solar corona.

F. A. JENKINS

Possible meaning of the additional potential of 1.4 volts in the mercury atom. ADOLFO T. WILLIAMS AND RAMÓN G. LOYARTE. *Contrib. estudio de las ciencias fis. y mat., La Plata* 4, 35-44(1926); *Chem. Zentr.* 1927, I, 232.—The potentials measured by Franck and Einsporn (cf. *C. A.* 14, 3360) and by Loyarte (*Contrib. estudio de las ciencias fis. y mat. La Plata* 4, 7(1926); cf. *C. A.* 21, 1501), which correspond to no known lines or end series of the Hg atom, can be explained by assuming an abnormal arc spectrum for Hg with a potential of 21.59 v. The ratio of this potential to that of the normal spectrum (10.39 v.) would be 2.07, which is identical with the corresponding ratio of the known spectra of Tl.

C. C. DAVIS

The addition spectral series of Hicks. ADOLFO T. WILLIAMS. *Contrib. estudio de las ciencias fis. y mat., La Plata* 3, 451-87; *Chem. Zentr.* 1926, II, 3018.—The wave lengths of the inverse series for the spectra of various metals were calcd. and compared with exptl. data. It is concluded that no phys. significance can be attached to the inverse series, and that the case is one of coincidence of numerical values.

C. C. D.

The mechanism of the emission of addition spectral series. ADOLFO T. WILLIAMS. *Contrib. estudio ciencias fis. y mat., La Plata* 1927, 115-24; *Chem. Zentr.* 1927, II, 15.—The new hypothesis of Hicks (*C. A.* 20, 2948) according to which the emission of addn. series is caused by the simultaneous neutralization of doubly ionized atoms appears to W. to be untenable. It is doubted whether these series can be realized experimentally.

C. C. DAVIS

Spectroscopic study of the after-glow of nitrogen. GERHARD HERZBERG. *Z. Physik* 49, 512-33(1928); cf. *C. A.* 22, 1911.—Characteristics of the type of discharge which brings out the after-glow of N are: (1) the excitation of the red and infra-red arc lines; (2) the appearance with considerable intensity of the second positive group of bands (and eventually the fourth positive group); (3) the enhancement in these bands of members with large values of n' . The existence of N atoms is thus necessary for the appearance of the after-glow. Its spectrum consists of bands which have been identified with the first positive group of N. At the temp. of liquid air the intensity max. in the green, yellow and red after-glow bands is displaced toward the violet; but with increasing pressure of the gas in the discharge tube, and with increasing time

between the instants of excitation and observation, the intensity max. shifts toward the red. In addn. to these, the CN bands at 4216 and 3883 Å. U. appear faintly but with modified appearance in the after-glow. Their behavior is regarded as a resonance fluorescence similar to that observed by Wood for I. It is pointed out that the majority of observed facts of the after-glow support Sponer's theory of its production (*C. A.* 20, 1355).

C. C. KIESS

The inverse Stark effect of the second and third members of the principal series of sodium. W. GROTRIAN. *Z. Physik* 49, 541-5(1928).—The Stark effects for the Na doublets at 3303 Å. U. and 2853 Å. U. were measured in the second order of a concave grating for fields of various strengths. The observed displacements were toward the violet and were proportional to the square of the field. For fields of 100,000 v./cm. the shifts amounted to 0.02 Å. U. and 0.21 Å. U. resp. for the second and third series members, being a little greater in each case for the shorter component of each doublet.

C. C. KIESS

Active nitrogen. P. K. KICHLU AND D. P. ACHARYA. *Nature* 121, 982-3(1928); cf. *C. A.* 21, 1588. A new band system in the spectrum of active nitrogen, extending from 5500 Å. U. to 8900 Å. U., has been photographed after an exposure of 42 hrs. These bands originate from the N₂ mol.; which conclusion does not support Sponer's theory that active nitrogen is a single mol. of N. The agreement of the cause of these bands with the opinions of other authorities is pointed out. The recent conclusions of McLennan, Ruedy and Anderson ascribing the activity of nitrogen to chemiluminescence does not seem to be justified.

G. L. CLARK

Activation of hydrogen by electric discharge. G. A. ELLIOTT. *Nature* 121, 985 (1928). cf. *C. A.* 21, 1221.—Recent experimenters have been unable to activate hydrogen in an elec. discharge by the methods usually described. E. J. B. Willey is the only recent experimenter who has been able to obtain active hydrogen in a discharge tube. More details of Willey's procedure will be appreciated.

G. L. CLARK

Investigation of the negative band spectrum of nitrogen. L. S. ORNSTEIN AND W. R. VAN WIJK. *Z. Physik* 49, 315-22(1928).—Intensity measurements of the negative bands of N₂ at 3014 Å. U., 4278 Å. U., 3884 Å. U., and 4237 Å. U. shows that the statistical wt. of the terms with odd rotational quantum nos. is double that of terms with even quantum nos. The total energies of the bands were found to be in the ratios 52.12 : 2.7 : 1 in the order named.

C. C. KIESS

The bands of the third positive group of nitrogen. R. SCHMID. *Z. Physik* 49, 428-62(1928). The work of Guillery (*C. A.* 21, 1931) on the classification of the bands of the third positive group of N is here extended to include the bands (0,0) at 2260 Å. U., (0,1) at 2368 Å. U., (1,0) at 2154 Å. U., (1,1) at 2244 Å. U., (2,3) at 2316 Å. U., and (3,4) at 2289 Å. U. The new wave length data on which the investigation is based were obtained with a large quartz spectrograph. The details of the study are fully tabulated including calc'd. values for the moments of inertia and the inter-nuclear distances of the mol. in the various energy states.

C. C. KIESS

Infra-red absorption by the S-H bond. JOSEPH W. ELLIS. *J. Am. Chem. Soc.* 50, 2113-8(1928). The absorption spectra of ethyl, *n*-propyl, *n*-butyl, isoamyl, phenyl and benzyl mercaptans were exam'd. for bands which are characteristic of the S-H linkage. Assuming that the band at 3.8-3.9 μ represents a fundamental frequency of the S-H atom pair, search was made for harmonics of this band. A band at 1.99-2.00 μ was found to be a distinguishing feature in the spectra of the mercaptans and is regarded as the first harmonic of the fundamental. A table contains a list of the bands characteristic of mercaptans and sulfides.

C. C. KIESS

The absorption spectrum of thallium vapor between 7000 and 1850 Å. U. RAMÓN G. LOYARTE AND ADOLFO T. WILLIAMS. *J. phys. radium* 9, 121-6(1928).—Quartz-prism spectrographs were used to exam the absorption of Tl vapor in quartz tubes and bulbs which were maintained at temps. of 700° and 900°. The lines absorbed were those of the series $2^2P - m^2S$ and $2^2P - m^2D$. In the region 3225 to 3246 Å. U. four band heads, already noted by others and attributed to Tl₂, were observed.

C. C. KIESS

Investigations of the hydrogen lines in the electric arc. (Mlle.) M. HANOT. *Compt. rend.* 186, 1716-7(1928).—The arc between Cu electrodes in an atm. of H₂ is of very short duration, being first rectilinear, then bending and spreading in the direction of the magnetic field (used to separate the electrodes) before going out. The H lines observed in the rectilinear phase of the arc are very broad, H β being reversed, the width of the lines increasing with the current. Observed in the deviated phase of the arc, however, the lines are narrow, which is attributed to the fact that the current is

distributed over a wider area than in the rectilinear phase, with consequent diminution of the inter-mol. field.

Continuous and band spectra of zinc vapor. H. VOLKRINGER. *Compt. rend.* **186**, 1717-9(1928).—A heated quartz tube contg. Zn vapor was excited by means of the oscillatory electrodeless discharge. At low vapor densities the light emitted is continuous but of varying intensity, and extends from a point between 4000 and 4600 Å. U. into the ultra-violet near 2000 Å. U. Superposed on the continuous spectrum appear faintly the lines of the arc and spark spectra which fade away with increasing vapor density. For high vapor densities a complex band spectrum appears, extending from 4800 to 2975 Å. U. followed by a continuous band with max. at 2570 Å. U. The low-density phenomenon is attributed to the fall of free electrons with all initial velocities into various atomic orbits; the high-density phenomenon to the energy changes occurring among the various associations of atoms.

C. C. KIESS

The structure of the yellow sodium lines (5890, 5896). H. SCHÜLLER. *Naturwissenschaften* **16**, 512-3(1928).—S. succeeded in constructing a novel hollow cathode (cf. *C. A.* **20**, 2121; **22**, 912) for observation of the luminescence of metal vapors at low temps. The discharge is carried by 2 mm. A vapor. The tube is made of metal and cooled in liquid air. By reason of the considerable decrease in Doppler effect of the spectral lines great improvement in sharpness is obtained. Study of the 5890 and 5896 Na lines showed both of these to consist of at least 2 components: 5890 with $\Delta\lambda = 0.02$ Å. U., intensity ratio 1.25; 5896 with $\Delta\lambda = 0.023$ Å. U., ratio 1:2.0; in both cases the weaker component was on the violet side. The analysis was done by a Perot Fabry étalon of 8.3-mm. plate distance. Photographs of the lines in emission and absorption are shown. Increase in discharge current makes the components unite; further increase gives self-reversal followed by absorption. No explanation can as yet be given; nucleus action in analogy to the Li^+ fine structure (5485) is suggested.

C. C. KIESS

B. J. C. VAN DER HOEVEN

Absorption by quartz and by air and the components up to 1810 Å. U. ADOLFO T. WILLIAMS. *Contrib. estudio ciencias fis. y mat., La Plata* **1927**, 95-112; *Chem. Zentr.* **1927**, II, 138.—It is shown that with quartz spectrographs, photographs can be made up to 1838.30 Å. U. in air, and up to 1808.40 Å. U. (perhaps further to 1760 Å. U.) in N. By using fluorite, these limits can probably be extended.

C. C. DAVIS

Phosphorescence as related to electrical effects. R. W. POIN. *Naturwissenschaften* **16**, 477-84(1928).—A lecture on luminescence. The theory of luminescence as due to liberation of photoelectrons from the "phosphor" body and subsequent re-union with the remnants of the latter is exposed and many elec. expts. are described to substantiate it. The photoelec. cond. of insulating crystals follows for weak fields (non-satn.) Ohm's law with a resistance about proportional to T . From optical examn. of transparent phosphors, e. g., KCl or NaCl with traces of TiCl or PbCl₂ (strongly refractive addns.), it appeared that the absorption spectrum was substantially the same as that of extremely thin films (10^{-5} mm.) pressed between quartz of the pure admixt., TiCl or PbCl₂. This absorption is the active agent in electron liberation. A phosphor is defined as a mixed crystal with extremely small amts. of the one strongly absorbing component.

B. J. C. VAN DER HOEVEN

Resonance fluorescence of cyanogen. GERHARD HEKZBERG. *Naturwissenschaften* **16**, 464-5(1928).—During the after-glow of N₂ the violet CN bands usually appear with peculiar intensity distribution. In electrodeless ring discharges the distribution is quite different (only lines from 0-1 and 0-0 bands). It is assumed that this phenomenon is a resonance fluorescence similar to that of I and is excited by ultra-violet bands which are probably present in the after-glow of N₂. It would indicate that the final condition of the violet CN bands is not the ground level.

B. J. C. VAN DER HOEVEN

Photochemical cleavage of an iron carbonyl compound; the photochemical equivalence law. OTTO WARBURG AND ERWIN NEGELEIN. *Naturwissenschaften* **16**, 387(1928).—From irradiation expts. in 6 spectral ranges of complex iron (ferrocysteine)-CO compds. the photochem. equivalence law was confirmed, i. e., 4 mols. CO per quantum light. The photochem. effect W in thin layers was found proportional to $\alpha i \lambda$ (α abs. coeff., $i \lambda$ quantum intensity). From W and i measured for different λ values the absorption spectrum can thus be detd. A curve is given of $\alpha/\lambda_{\text{abs}}$ as a function of λ for the compds. examd.

B. J. C. VAN DER HOEVEN

The luminescence of formation of iodine. V. KONDRATEV AND A. LIPINSKII. *Naturwissenschaften* **16**, 463-4(1928).—The yellow luminescence of I₂ on heating at 600° to 700° appears in air or in a closed evacuated vessel. Its character (absorption by I₂ vapor) indicates its origin from the I₂ mol. The bands are sharp in yellow and

red. The green bands are diffuse. At shorter λ no bands are distinguishable. The presence of light $< \lambda 4995$ (convergence) seems to show that it is caused by a $I_{\text{res.}} + I = I_2 + h\nu$ reformation after heat dissoen.

B. J. C. VAN DER HOEVEN

The structure of atoms as a periodic property and its relation to valence and ion formation (NOYES, BECKMAN) 2. Intensity of radiation in the vicinity of filtered radon implants (QUIMBY) 11A. Radiation risks of the röntgenologist (BARCLAY, COX) 11A. Apparatus for storing radioactive liquids (Brit. pat. 281,228) 1.

BRICOUT, PIERRE: La résonance atomique. Absolute measurement of the energy of a spectral ray excited by electronic shock. Chartres: Durand. 71 pp.

MOLL, W. J. H.: Meting van straling. Groningen: P. Noordhoff. 24 pp. Fl. -.60.

4—ELECTROCHEMISTRY

COLIN G. FINK

The chemist in the electrical industry. G. S. PARLOUR AND C. H. CROWE. Can. Gen. Elec. Co. *Can. Chem. Met.* 12, 224-6(1928). E. H.

High-power electric furnaces for the manufacture of calcium carbide and of ferro alloys. (The Miguet furnace.) P. BERGEON. *Rev. Gen. Elec.* 22, 797-802(1927); *Science Abstracts* 31B, 68; cf. C. A. 20, 3392; 22, 916-7.—B., after describing the advantages which are offered by highpower elec. furnaces, both from the economic standpoint as well as from that of their regularity of function, passes on to describe the monophase furnaces of this type designed by Miguet. The special feature of the Miguet furnaces, which have been constructed up to a size of 6000 kw. is that they possess one single electrode which is fixed vertically, while the sole or hearth electrode is movable. This design has enabled Miguet to overcome many of the structural difficulties that arise when many electrodes are employed, in order to obtain a furnace consuming such large amts. of power, and it has also solved the complications offered by the current conductors. The problem of charging these large furnaces has only been solved after close study of all the conditions, and the soln. has been found in a system of mechanically controlled hoppers which discharge their contents in a few seconds into the furnace as and when required. In order to enable these monophase furnaces to operate with three-phase current, the system of distribution suggested by Scott for use with two furnaces on a three-phase system is recommended, and the installations are described of the Miguet furnace at the works of the Soc. Électrométallurgique de Montricher and at the works at St. Julien-de-Maurienne, the former for 6000 kw. and the latter for 5000 kw. The article is illustrated. H. G.

The hardness of electrodeposited nickel. D. J. MACNAUGHTAN AND A. W. HOTHERSALL. *Trans. Faraday Soc.* 24, 387-400(1927).—An attempt was made to develop practical methods of detg. hardness and stress in deposits and to ascertain the value of such tests for the control of conditions of deposition for the production of deposits for specific purposes. Exptl. data are given on the production of Ni deposits under carefully controlled conditions of bath compn., temp., purity of anodes, etc., and subsequent testing of deposits. Scratch, Brinell and scleroscope tests were made and stress was measured by depositing the Ni on one side only of a hardened and tempered steel strip and noting the bend. Details are given on the influence of temp., the prepn. of NiSO_4 , and of Ni anodes of high purities, compn. of electrolytes and the deposition expts. The effects of addns. of NaF , Na_2SO_4 , $(\text{NH}_4)_2\text{SO}_4$, the prevention of pptn. of basic salts in the deposit, and the production of hard deposits are discussed. Brinell hardness tests were made with 1-mm. balls and 10-kg. load, and an approx. method for rapidly ascertaining relative stresses is described. The presence of fluorides in the soln. results in low anode and cathode efficiencies, and the solns. contg. large amts. of Na_2SO_4 yield highly stressed deposits. Much harder deposits were obtained in baths contg. $(\text{NH}_4)_2\text{SO}_4$ than those contg. H_2BO_3 . W. H. BOYNTON

The mechanism of the action in galvanic baths. J. HAUSEN. *Metallborse* 18, 257-8, 314-5, 483-4(1928).—The modern views regarding throwing power are discussed. Expts. on Cu, Ni, Zn and Cr solns. show the effect of various factors on the throwing power of the respective soln. J. BALOZIAN

Electrodeposition of chromium. J. G. ROBERTS. *Roy. Tech. Coll. Met. Club J.* 1927-8, No. 6, 19-22.—The history of the development and some details of com. Cr plating are briefly outlined. DOWNS SCHAFF

Influence of the cathode on the electrodeposition of chromium. HIRAM S. LUKENS. *Metal Ind.* (N. Y.) 26, 354-5(1928).—See C. A. 22, 1283. E. H.

The effect of colloids in the electrodeposition of silver from silver nitrate solutions. S. WIERNICK. *Trans. Faraday Soc.* 24, 361-6(1928).—Detns. of "silver numbers" of numerous colloids (after the order of "gold numbers") used to reduce grain-size show that, with the exception of dextrin, there appears to be a rough relationship between the reciprocal Ag no. and the no. of crystals per sq. cm. Dextrin is much more effective in reducing the grain-size than would be expected from its Ag no. It appears to improve its protective capacity on standing. β -Naphthol and dextrose, possessing no protective action on the Ag colloid, show a corresponding inability to reduce the crystal size. The Ag nos. were detd. by the pptn. method of Zsigniondy. AgNO_3 cannot be used as a precipitant for all colloids but other precipitants were found that had approx. the same effect. A min. strength of precipitant is necessary to effect pptn. The relationship of Ag no. to grain-size is not marked, but enables the differentiation of "good" colloids from "bad." Calcd. Ag nos. for 13 protective colloids and reports of appearance of deposit and no. of crystals per sq. cm. are tabulated. W. H. B.

Removal of salts from water by electroösmosis. KURT ILLIG. Siemens-Halske, Berlin. *Siemens Z.* 8, 349-58(1921), cf. C. A. 21, 208.—By means of a three-compartment electrolytic cell a method has been devised for removing salts from water by taking advantage of the differential migration of ions under the influence of the elec. current. The ions will migrate to their respective electrodes from the middle compartment, producing in this section of the cell water of as good a grade as distd. water. The time required depends on Coulomb's law and the current density used. The best anodes are of magnetite with Fe, Zn or Sn cathodes. The activity of the diaphragm depends on the no. and size of the pores and its elec. resistance. Diaphragms of different materials are required to sep. the anolyte and the catholyte, resp., from the middle compartment. The catholyte will probably become predominately alk. and the anolyte acid in reaction as the electrolysis proceeds. Animal and vegetable membranes are best. A battery of several cells (three compartments each) in series is required for the best results, because the diaphragms do not have uniform values for solns. of all concns. of salts. The water is siphoned from the middle section of one cell to the middle section of the next as the salt concn. changes. The first 4 cells require 25 v.; then 3 vol. cells at 35 v.; 2 at 55 volts and 1 at 110 v. These make an efficient battery of 10 cells from the last of which the purest water is drawn. Power costs show this method to be from $\frac{1}{4}$ to $\frac{1}{5}$ of the cost by other purification methods. However, the method can scarcely compare economically with waste-steam methods, but should be very good for small-scale work where only a few liters an hour are required. C. J. BROCKMAN

Solid cells, in particular thermoelements of solid electrolytes. HERMANN REINHOLD. *Z. anorg. allgem. Chem.* 171, 181-230(1928).—Thermal e. m. f. is considered as a complex quantity which can be resolved into a homogeneous (Thomson) and a heterogeneous (Peltier) thermoelectric effect. The e. m. f. of the following solid cells was measured in the temp. range of 150° to 500° : (1) *Solid electrolytic thermoelec. elements*, $\text{Ag} | \text{AgI} | \text{Ag}$; $\text{Ag} | \text{AgCl} | \text{Ag}$; $\text{Ag} | \text{AgBr} | \text{Ag}$; $\text{Pb} | \text{PbCl}_2 | \text{Pb}$; $\text{Cl}_2 | \text{AgCl} | \text{Cl}_2$; $\text{Br}_2 | \text{AgBr} | \text{Br}_2$; $\text{Cl}_2 | \text{PbCl}_2 | \text{Cl}_2$. (2) *Solid isothermal galvanic cells*, $\text{Ag} | \text{AgCl} | \text{Cl}_2$; $\text{Ag} | \text{AgBr} | \text{Br}_2$; $\text{Pb} | \text{PbCl}_2 | \text{Cl}_2$; $\text{Pb} | \text{PbCl}_2 | \text{AgCl} | \text{Ag}$. The temp. coeff. of e. m. f. of cells of the type $\text{M} | \text{MX} | \text{X}_2$ can be calcd. from the thermoelec. e. m. f. of the cells $\text{M} | \text{MX} | \text{M}$ and $\text{X}_2 | \text{MX} | \text{X}_2$. The e. m. f. of the cell $\text{Pb} | \text{PbCl}_2 | \text{AgCl} | \text{Ag}$ can be calcd. from the measured e. m. f. of the cells $\text{Ag} | \text{AgCl} | \text{Cl}_2$ and $\text{Pb} | \text{PbCl}_2 | \text{Cl}_2$. The Nernst heat theorem is shown to be valid for these systems. Numerous exptl. results are tabulated. EDGAR R. SMITH

Importance of the work of Prof. Dr. F. Hanaman for the development of the incandescent lamp. F. BAUMANN. *Arch. hem. farm.* 2, 109-15(1928). (In German and Croatian.) JAR. KUČERA

Franjo Hanaman (1878-1928). V. NJEGOVAN. *Arch. hem. farm.* 2, 105-9(1928).—A biographical sketch, with portrait. JAR. KUČERA

Influence of anode heating on the ignition of metal arcs (ALTKRTHUM, EWE-ST) 3. Producing or modifying oils (Fr. pat. 632,293) 21. Rendering porous bodies impervious to liquids [electrodes] (U. S. pat. 1,678,405) 18. Drying wood [for storage-battery separators] (U. S. pat. 1,677,963) 20. Furnaces (Fr. pat. 632,343) 21.

MICHEL, F.: **Metallniederschläge und Metallfärbungen.** Berlin: Julius Springer. 179 pp. Unbound M. 6.90.

Electric batteries. EUGEN AUMÜLLER. Fr. 633,523, Apr. 28, 1927. An arrangement to prevent batteries discharging too far is described.

Electric batteries. RONALD M. BURLISON and WILLIAM DEREHAM. Fr. 633,328, Apr. 26, 1927. Constructional details.

Dry-cell electric battery. EDWIN E. MEISEKOTHE (to French Battery Co.). U. S. 1,678,601, July 24. Structural features.

Improvements in dry batteries. JACQUES COURTECUISSÉ and VICTOR COURTECUISSÉ. Fr. 632,358, July 21, 1926.

Storage battery. A. LEWIS. Brit. 281,018, Aug. 26, 1926. The cell walls may be molded *in situ* around the bipolar plates. Various structural features are described.

Storage battery with lead partitions between sets of plates. ANTHONY KASTELIC. U. S. 1,678,224, July 24. Structural features.

Storage-battery electrodes. J. VAUGHAN-SHERRIN. Brit. 281,130, Feb. 3, 1927.

Electrolytic cell for producing caustic soda, chlorine, hydrogen, etc. JESSUP & MOORE PAPER CO. Brit. 281,184, June 2, 1926. Structural features.

Electrolytic refining of aluminum. ALUMINIUM-INDUSTRIE A.-G. Brit. 280,881, Nov. 22, 1926. The electrolyte comprises halide salts of Al and alkali or alk. earth metals which are molten at the working temp. at which the electrodes remain solid. Fe, Mn, Pb, Cd and Ni or their salts or oxides 0.1-0.5% may be added, as may also NH_4Cl . Cf. C. A. 22, 1737.

Active oxygen compounds. I. G. FARBENIND. A.-G. Fr. 633,360, Apr. 26, 1927. In the electrolytic prepn. of compds. contg. active O, the two electrodes are used simultaneously for this purpose; thus, if a soln. of $(\text{NH}_4)_2\text{SO}_4$ with H_2SO_4 is placed in the anode chamber, and 0.5% H_2SO_4 in the cathode chamber, $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and H_2O_2 are obtained.

Beryllium. KEMET LABS. CO., INC. Fr. 633,491, Apr. 27, 1927. Be is prepd. by electrolysis of its anhydrous chloride in a bath of fused NaCl or halogen salts of other metals more electropositive than Be.

Diaphragms. THE GRAMOPHONE COMPANY, LTD. Fr. 632,679, Apr. 12, 1927. Metallic diaphragms, specially for gramophones, are formed by electrodeposition of Cu or Ni on a Ni cathode which has been dipped in $\text{K}_2\text{Cr}_2\text{O}_7$. A Mg salt may be added to the electrolytic bath.

Accumulators. CHARLES J. V. FÉRY. Fr. 633,179, Aug. 12, 1926. Accumulators are provided with a cover which allows the escape of gas, but excludes air.

Electric accumulators. COMPAGNIE GÉNÉRALE D'ÉLECTRICITÉ. Fr. 633,211, Apr. 14, 1927. IHCN or one of its salts is added to the alk. electrolyte of an accumulator contg. as the active mass, oxygenated compds. of Ni, to counteract the lowering of the capacity of the positive electrode.

Electric accumulators. PARISINO PETTINELLI. Fr. 633,006, Apr. 20, 1927. The plates of an accumulator are made of undulating strips of lead on which is a paste of active matter such as minium and an absorbent powder such as vegetable charcoal and an agglomerant.

Electric furnace. LE NICKEL. Fr. 632,366, July 21, 1926. An elec. furnace in which the tension reaches 200 v. per arc has a lining of chromite bricks. When used for metals a thick coating of slag is maintained at the bottom of the furnace to absorb a part of the voltage.

Electric induction furnace operating in a vacuum. N. R. DAVIS and METROPOLITAN-VICKERS ELECTRICAL CO., LTD. Brit. 281,379, Aug. 31, 1926. A furnace is described which is suitable for melting Pt, Cu, Cr, Pb, Sn, Zn, Ni, Fe and other metals or alloys. The furnace also may be adapted for use in distn.

Electric heating apparatus with means for automatically regulating the temperature. ANDRÉ BERGÉS. Fr. 632,301, Apr. 6, 1927.

Precipitation of dust from smoke. COMPAGNIE DES MINES D'OSTRICOURT. Fr. 632,185, Apr. 4, 1927. In an app. for the elec. deposition of dust from smoke the ionizers and precipitators are combined to form compd. electrodes.

Electric lamps. SOCIÉTÉ DU FILM EN COULEURS KELLER DORIAN and GEORGES CABET. Fr. 632,234, July 15, 1926. A lamp is described contg. gas under pressure which gives an intensive light for photographic, etc., purposes.

Electric lighting tubes. DEUTSCHE LEUCHTRÖHREN-GESELLSCHAFT. M.B.H. Fr. 632,704, Apr. 13, 1927. Elec. lighting tubes contg. rare gas and mercury vapors have 60 to 75% of Ne and 40-25% of Ar.

Electrical resistances. NAAMLOOZE VENNOOTSCHAP MACHINERIEËN EN APPARATEN FABRIEKEN. Fr. 633,579, April 29, 1927. See Brit. 270,677 (C. A. 22, 1549).

5—PHOTOGRAPHY

C. R. K. MEES

Preservation of photographic materials. Report of Committee. *Phot. J.* **67**, 498-9; *Nature* **120**, 891; *Brit. J. Phot.* **74**, 668-9 (1927).—To preserve negatives and positives as much as possible it is recommended that those on glass be hardened in chrome alum, fixed, washed and lacquered after drying. Film negatives should be copied upon glass because of the tendency of either nitrate or acetate bases to decay. Prints should be S-toned and varnished with a soln. of gum dammar in benzene. The article points out that the Pt process is not referred to in spite of its well known permanency.

G. E. MATTHEWS

Photographic density. J. C. VAN SELMS. *Dissertation, Utrecht, 1927*.—The extinction of a photographic plate is in general independent of the wave length for ordinary development. With plates strongly exposed and developed for a very short time, the extinction increases with decreasing wave length. A method is described for measuring in an abs. manner the intensity of light scattered at all angles by a photographic d. Measurements with blue and with red light showed that the intensity of light scattered at different angles is independent of the wave length. The intensity of scattered light was small at big angles, and very high at small angles, but no relation could be deduced between intensity and angle. A curve is given showing the intensity of the scattered light at different angles as a function of the plate extinction. The intensity of light scattered at a given angle is in certain cases independent of the extinction of the plate. The surface of the plate plays only a small part in detg. the scatter. The effect of diffraction round the silver grains was examd. on the basis of Rayleigh's law, but the exptl. results did not agree with the theoretical. The theory of Mie would probably be more applicable. The intensity of the scattered light could be explained if the variation of the n of the gelatin in the neighborhood of the silver grain were known.

B. C. A.

Mechanism of formation of the latent photographic image. F. C. TOY. *Nature* **121**, 865 (1928).—Recent exptl. work supports the prediction that the sensitivity—wave length and photo conductivity—wave length curves for pure AgBr emulsions will coincide when the thickness of the emulsion is of the order of 1.5μ . Results on an emulsion of 20μ thickness show that in all probability the phenomena of the primary stage of the formation of the latent image are closely related to those which cause the changes of cond. on illumination.

G. E. CHAMBERS

Image destruction by desensitizers. LUPO CRAMER. *Z. wiss. Phot.* **25**, 282-7 (1928).—Investigations on the influence of different kinds of red light used in dark rooms on highly sensitive plates treated with the following desensitizers: phenosafranine, pinakryptol green and pinakryptol yellow, especially in relation to the Herschel effect.

A. P. H. TRIVELLI

Aging phenomena of sensitized material. A. FUNGER. *Phot. Ind.* **25**, 1203-4 (1927).—The deterioration of plates and films, especially plates, on long keeping before use, takes the form principally of edge fog, general fog, and spots caused by bacterial action. F. states Homolka's explanation of edge fog as a consequence of a migration of traces of free sol. bromide from the edges towards the center of the plate during the earlier stages of the drying of the emulsion. The general (central) fog appears later. The danger of bacterial spots, although it can be minimized by suitable conditions of storage, is inseparable from the use of gelatin.

E. R. BULLOCK

Chemical sensitization of silver iodide gelatin plates. H. PRIESER. *Phot. Ind.* **25**, 520-1 (1927).—Using a pure iodide gelatin emulsion, prepd. with NH_3 and excess of sol. iodide and which had been allowed to set on glass plates before being washed and dried, F. treats strips with soln. of several inorg. and org. substances, and tabulates the effect on sensitivity for chem. and physical development and for printing out. A remarkable diminution of sensitivity is produced by hydrazine and thiocarbamide.

E. R. BULLOCK

Hypersensitizing plates. E. J. WALL. *Am. Annual Phot.* **42**, 163-6 (1928).—Instructions are given for hypersensitizing with NH_4OH , either plain or in combination with alc. or color-sensitizing baths. It has been claimed that ordinary plates treated with an alc.- H_2O NH_4OH soln. do not increase in speed. W. has, however, obtained increased densities in the "toe" of the H. and D. curve but the fog is also increased. Details of permissible dark room illumination and hints on quick drying are given. Ninck's hypersensitizing formula of ammoniacal Ag compn. is given as well as a modification which has a lower concn. Color sensitizing may be done at the same time as

the hypersensitizing or conducted separately. Plates to be hypersensitized may be color-sensitized in acid dye solns. The plates are not color-sensitive until after the NH_4OH treatment. Fog on hypersensitized film is reduced by bathing before development in the following soln.: Basic scarlet N, 0.02 g.; KBr, 5 g.; H_2O , 1 l. Other desensitizers may be used in the same manner.

L. MUEHLER

Covering power of photographic silver deposits. I. S. F. SHEPPARD AND A. BALLARD. *J. Frank. Inst.* 205, 659-89(1928).—A method is given for the rapid and accurate estn. of minute amts. of Ag (0.005-0.40 mg.) on photographic deposits. Small pieces of film (less than 1 sq. cm.) are accurately punched from the various densities on sensitometric strips. The punchings are given a preliminary treatment to solubilize the Ag, and the resulting Ag soln. is treated with dil. Na_2S soln. The yellow Ag_2S color is then compared in a micro-colorimeter with a standard Ag_2S color. For the 2 emulsions studied, Eastman Commercial film and Eastman Process film using P. A. P. developer, the covering power decreases with time of development. The values of covering power plotted against $\log E$ show a distinct tendency to give straight lines, which come nearer together as development proceeds. The covering power tends to decrease with increasing exposure. The mass of Ag has also been plotted as a function of time of development and of $\log E$. A table is given showing the covering power of development fog for various times of development. From the results obtained, there appears a more pronounced tendency for the D : $\log E$ curves to give a common point of convergence of the straight-line portions than for the mass of Ag: $\log E$ curves.

A. BALLARD

More about the Herschel effect. I. ÜPPO-CRAMER. *Phot. Rund.* 65, 209-11 (1928); cf. *C. A.* 21, 2852.—The destruction of the latent image, generally called the Herschel effect, on gaslight papers, is caused by red and by yellow light on many of the papers; and on some, by blue light. Consequently latent images on gaslight papers cannot be exposed too long to red or orange light in the printing process without partial destruction of the latent image.

E. R. BULLOCK

Schwarzschild effect as a regression phenomenon. LUPPO-CRAMER. *Phot. Ind.* 25, 495-8(1927).—L.-C. finds that with an iodo-bromide gelatin emulsion showing solarization readily, prep'd. according to a particular method, no appreciable difference is seen in the results on development when the time of exposure is increased, at const. H , from 1 min. to 144 min. If, however, a preliminary uniform exposure corresponding to max. density (but not further specified in the article) has been given, reversal becomes more extended on increasing the time of the subsequent const. H exposure. With a pure iodide gelatin emulsion and const. H exposure, the Schwarzschild effect, that is diminution of effective exposure when I is increased, is very pronounced. With pure bromide collodion emulsion that has been dried without addition of any preservative, the effect is only of the same order of magnitude as with fine-grained gelatin plates and not greater, as would be expected if the Schwarzschild effect were really a regression phenomenon.

E. R. BULLOCK

Dyes; photographic developers (Fr. pat. 632,273) 25.

Photographic diazotype process. KALLE & Co., A.-G. Brit. 280,593, Nov. 12, 1926. Neutral brown to black tints are obtained in a sensitive layer comprising a diazo comp'd. such as diazonaphtholsulfonic acid, an azo coupling component such as resorcinol and a metallic salt, by using as the metallic salt a salt of Ti such as Ti K oxalate. The tones may be modified by an after-treatment with a salt of a metal other than Ti, e. g., CuSO_4 .

Photographic films. TECHNICAL MOTION PICTURE CORP. Fr. 633,306, Apr. 25, 1927. Gelatin surfaces, particularly on celluloid films, are hardened by heating the surface in the presence of hardening agents, e. g., $\text{K}_2\text{Cr}_2\text{O}_7$ and a few drops of AcOH . After drying the film it is heated for a long time to 32-43°. The surface is then washed and dried.

Photographic films, etc. LUIKE KLAVER. Fr. 632,972, Apr. 19, 1927. See Brit. 269,912 (*C. A.* 22, 1289).

Combined phonographic and cinematographic films. C. A. HOXIE (to British Thomson-Houston Co.). Brit. 281,615, Dec. 2, 1926. Negatives of the pictorial and sound records are first produced on sep. films and these records are then combined on a single positive film. For the picture negative, a rapid emulsion is used and for the sound record a relatively fine-grain sensitive material is used in order to avoid "ground noises."

Cinematographic films. RODOLPHE BERTHON. Fr. 632,352, July, 20, 1926. On one face of the support a layer of celluloid or other plastic matter contg. in relief microscopic refractive particles for the selection of colors is applied and on the other side a layer of substance, permeable to gas, charged with azo compds. or azo compds. and phenols.

Cinematographic films. JOHN E. THORNTON. Fr. 632,334, Apr. 7, 1927. The method described in Brit. 214,934 (C. A. 18, 3011) is improved. Films of the kind comprising a transparent waterproof support carrying a ready-colored sensitive colloid layer upon which is a temporary reinforcing layer of paper are manufactured in two parts which are cemented together to produce the finished material. The back of the support may be coated with an anti-curling hardened gelatin layer.

Photographic prints. FRANZ VAN DER GRINTEN. Fr. 633,319, Apr. 15, 1927. In making prints contg. diazo compds. which become pale on exposure to light, reducing agents such as aldehydes or amino compds. are added to the sensitive film to prevent yellowing. The sensitive film may contain a compd. not having the power to couple but which is transformed into an azo compd. during development of the image with an alkali.

Developing photographic papers. EUGÈNE GAY. Fr. 632,452, Apr. 8, 1927. In the development of photographic papers by means of alk. vapors, a porous body projecting above the level of the liquid is placed in the ammoniacal tray to increase evapn.

Color photography. TECHNICOLOR MOTION PICTURE CORP. Fr. 633,305, Apr. 25, 1927. The dye compns or solns. used in the imbibition process are such as will be adsorbed on the negative in accordance with the development of the negative and will have the power to penetrate into the gelatin film. The dye may have a viscosity agent added, and it may be first treated with a colloid afterwards coagulated, *e. g.*, by boiling, and removed with assocd. impurities. A second dye having relatively low penetrability and high definition with respect to the film to be printed may be added. Two dye compns. for red and green, resp., are given.

Photographic sensitive material. F. VAN DER GRINTEN (TRADING AS CHEMI-CHE FABRIK L. VAN DER GRINTEN). Brit. 281,604, Dec. 11, 1926. A sensitive layer comprises an aromatic diazo compd. such as the diazotized deriv. of *p*-aminodimethylaniline-HCl or of *p*-aminodiethylaniline-HCl or 1-diisomylamino-2,6-dimethylbenzene-4-diazonium chloride or other diazo compd. having a tertiary N atom in the *p*-position to the diazo group and free from any substituent such as might form an anhydride with the diazo group. If the layer contains only the diazo compd. it is developed after exposure with a mixt. of alkali and an azo coupling component and if an azo coupling component is already present in the layer development is effected with alkali only, *e. g.*, with NH_3 gas. A salt such as BaCl_2 may be used in the layer to prevent bleeding of the developed azo dye and a non-volatile acid such as citric or tartaric acid may be added to prevent premature coupling if the azo coupling component is included in the layer.

Photographic emulsions. I. G. FARBERNIN. A.-G. Fr. 633,638, Apr. 30, 1927. In making photographic emulsions of Ag salts, imidazole or one of its derivs., such as nitrobenzimidazole or a complex protein product such as imidazolealanine, is added at any stage of the process.

Mono- and di-N-oxyethyl derivatives of *p*-aminophenol. I. G. FARBERNIN. A.-G. Brit. 280,873, Nov. 19, 1926. These compds., which may be used as photographic developers, are made by reaction of ethylene chlorohydrin, in either 1 or 2 mol. proportions, upon $p\text{-H}_2\text{NC}_6\text{H}_4\text{OH}$ by heating in the presence of KOH and alc. or of Na_2CO_3 .

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Osmium. III. E. FRITZMAN. Leningrad Univ. and Platinum Inst. of Acad. Sciences, Leningrad. *Z. anorg. allgem. Chem.* 172, 213-33 (1928).—A comprehensive review of the work of L. Chugaev on Os from 1916 to 1925 appearing mainly in inaccessible Russian journals. 1. Complex derivatives of osmium tetroxide. L. CHUGAEV AND I. CHERNYAEV. *Ibid* 216; cf. C. A. 20, 155. 2. The salt-forming properties of osmium tetroxide. L. CHUGAEV. *Ibid* 217; *J. Russ. Phys.-Chem. Soc.* 50, 294 (1918); *Mitteil. der Republ. II*, 124 (1920); cf. C. A. 12, 2504; KRAUSS AND WILKEN (C. A. 19, 2609).—Two g. OsO_4 , 1.5 g. KOH, 0.6 g. H_2O gave 2.4 g. of black $\text{OsO}_4 \cdot 2\text{KOH}$. Analyses

were carried out by titrating the base in the presence of Me orange and Os with $\text{Na}_2\text{S}_2\text{O}_8$ according to Klobie. $\text{OsO}_4 \cdot \text{RbOH}$, orange plates; $\text{OsO}_4 \cdot 2\text{RbOH}$ (?), red; $\text{OsO}_4 \cdot \text{CsOH}$, brown; $2\text{OsO}_4 \cdot \text{CsOH}$, orange plates; $2\text{OsO}_4 \cdot (\text{RhPy}_4\text{Cl}_4)\text{OH}$, yellow. In H_2O these salts form brownish yellow solns. and are largely hydrolyzed. 3. The distribution of osmium tetroxide between carbon tetrachloride and alkali. L. CHUGAEV AND A. I. LUKASHUK. *Ibid* 223; cf. Wartenburg (*C. A.* 19, 942); Yost and White (*C. A.* 22, 1290).—The soly. of OsO_4 in g. per 100 cc. of H_2O is 6.60 (25°), 5.30 (0°). The distribution coeff. of OsO_4 between CCl_4 and H_2O was found to be 14.3; between CCl_4 and 0.25 *N* NaOH only 0.90–3.635. 4. The velocity of distillation of osmium tetroxide from aqueous solutions. L. CHUGAEV AND M. BORODULIN. *Ibid* 227.—The distn. of OsO_4 from aq. solns. of K_2OsCl_6 is faster in the presence of HNO_3 and of acid KMnO_4 than in a stream of Cl_2 . 5. The catalytic decomposition of hydrogen peroxide by osmium tetroxide in the presence of alkali. L. CHUGAEV AND I. BIKERMAN. *Ibid* 229.— OsO_4 is one of the most active inorg. catalysts for the decompn. of H_2O_2 . 0.000001 *M* alkaline soln. accelerates this reaction. Above 0.001 *M* the rate of reaction is independent of the OsO_4 concn. The rate is max. in concns. of alkali from 0.005 to 0.01 *N*. 6. A new complex base of osmium. L. CHUGAEV. *Ibid* 231; cf. *C. A.* 13, 543; 20, 155. 7. Transformations in the series of osmiamic acid derivatives. L. CHUGAEV AND F. BOTKEVICH. *Ibid* 231; *J. Russ. Phys.-Chem. Soc.* 52, 424(1920).—Three g. $\text{K}_2(\text{Cl}_3\text{Os}=\text{N})$ reduced with SnCl_2 and HCl at 60° gave 0.6 g. $\text{K}_2(\text{Cl}_3\text{OsNH}_2)$. 1.5 g. $\text{K}_2(\text{Cl}_3\text{Os}=\text{N})$, 4.5 g. KOH , 4.5 g. H_2O treated with O_3 gave 0.55 g. $\text{K}(\text{O}_3\text{Os}=\text{N})$. Part of the product was pptd. as the difficultly sol. $\text{Cs}(\text{O}_3\text{Os}=\text{N})$. DAVID DAVIDSON

Rotatory dispersion of optically active coordination compounds. C. E. WOOD AND S. D. NICHOLAS. Univ. Birmingham. *J. Chem. Soc.* 1928, 1727–38.—Optically active coordination compds., in addn. to true anomaly, exhibit an anomaly that consists in the crossing of the zero axis from the neg. to the pos. region of rotation by the curve of rotation vs. wave length; this latter anomaly indicates the relative configuration. The configuration as deduced from dispersion data is in agreement with Werner's law. The algebraic sign of the hemihedral form of the coordination compd. considered indicates the relative configuration, but no generalization can be made at present.

C. J. WEST

Preparation and properties of a boride of cerium. L. ANDRIEUX. *Compt. rend.* 186, 1736 8(1928); cf. *C. A.* 22, 3100.—The electrolysis of CeO_2 dissolved in fused B_2O_3 is difficult, for the metaborate formed has a high m. p., and is not miscible with B_2O_3 in excess. Electrolysis of the mixt. $\frac{1}{2}\text{CeO}_2 + \text{B}_2\text{O}_3 + \frac{1}{2}\text{CeF}_3$ at 1000° by a current of 20 amp. gave blue-violet crystals of CeB_4 (I). The use of this bath has certain disadvantages. During the fusion and electrolysis, BF_3 is evolved; after the electrolysis, it is difficult to sep. the crystals of I; the quantities of CeO_2 and CeF_3 required are too large. Expts. with 10 different baths showed that the best one for the prepn. of I has the compn. (in g.-mols.): $\frac{1}{10}\text{CeO}_2 + 2\text{B}_2\text{O}_3 + \text{Li}_2\text{O}(\text{Li}_2\text{CO}_3) + \text{LiF}$. By using this bath, 10.83 g. of I was obtained from 15 g. CeO_2 after 2.5 hrs. of electrolysis. It is hard and will easily scratch quartz and topaz $d_s = 4.6$. It is not attacked by HCl , H_2F_2 or dil. H_2SO_4 . It is attacked by hot concd. H_2SO_4 , dil. HNO_3 and concd. HNO_3 . It is not attacked by alk. solns., but is decompd. at red heat by fused NaOH and KOH , by carbonates, nitrates and alk. bisulfates. It burns with difficulty in the air, but reacts violently when heated with PbO_2 or Na_2O_2 . LOUISE KELLEY

The constitution of silicates. WILHELM EITEL. *Naturwissenschaften* 16, 421–3 (1928).—A short review

B. J. C. VAN DER HOEVEN

Synthetic gems. M. K. HOFFMANN. *XI Ber. d. Freiburger Geol. Ges.* 1927, 11 pp.; *Chem. Zentr.* 1927, II, 156.—The synthesis of gems is carried out by 3 general methods (1) The individual components are mixed and fused with a flux, which yields only small crystals. (2) The gems form through chem. double decompn. in which case LiCl , salts of vanadic acid, of molybdic acid or tungstic acid, Fe, etc., are often used as flux. (3) The components are fused together without a flux. This method yields beautiful crystals. During the synthesis, the pressure must be so chosen that at the f. p. or just below it, the suspended gas bubbles occupy only the vol. which they occupy at ordinary temp. without pressure. The history of synthetic gems is outlined.

C. C. DAVIS

The reaction between chromic acid and manganous salt. RUDOLF LANG. *Z. anorg. allgem. Chem.* 170, 387–8(1928).—The reaction between $\text{Cr}_2\text{O}_7^{2-}$ and Mn^{2+} in acid soln. does not proceed unless an alkali fluoride or metaphosphoric acid is added. In the latter case addn. of 1:1 HCl will send the reaction in the reverse direction, Mn^{2+} being reduced to Mn^{3+} again. Fresh addn. of metaphosphoric acid will again reverse the direction. H. STOERTZ

Induction of the reaction between chromic acid and manganous salt by arsenious acid. RUDOLF LANG AND JOSEF ZWERINA. *Z. anorg. allgem. Chem.* 170, 389-96 (1928).—In the presence of As_2O_3 , Cr^{VI} is reduced to Cr^{III} and Mn^{II} oxidized to Mn^{III} . As^{III} is also oxidized to As^{V} . The amt. of Mn^{III} produced is detd. by treatment with AgNO_3 after adding HCl and measurement of the equiv. quantity of Cl liberated. The chromic acid remaining is detd. by titration with $0.1N$ FeSO_4 . The relation of Mn^{II} oxidized to As^{III} oxidized is known as the *induction factor*, and this is given for a series of expts. in which the quantity of MnSO_4 is varied. Regardless of the amt. of MnSO_4 , the induction factor is found to be about 0.5 at the beginning of the reaction, but becomes less as the reaction proceeds, for as the chromate concn. falls, Mn^{II} is reduced by As^{III} to an increasing extent. The presence of only a trace of KIO_3 produces great irregularity in the induction factor and lowers its initial value to about 0.25. The following equations are given for the induced reaction (1) $\text{Cr}^{\text{VI}} + \text{As}^{\text{III}} = \text{Cr}^{\text{IV}} + \text{As}^{\text{V}}$, (2) $\text{Cr}^{\text{IV}} + \text{Mn}^{\text{II}} = \text{Cr}^{\text{III}} + \text{Mn}^{\text{III}}$. H. STOERTZ

The constitution of silver subfluoride. J. BRODY AND TH. MILLNER. Vereinigten Glühlampen- und Elektrizitäts-A. G., Ujpest bei Budapest. *Z. anorg. allgem. Chem.* 172, 84-6 (1928); cf. *C. A.* 22, 1924 —Reply to Hettich (*C. A.* 22, 2118).

DAVID DAVIDSON

The constitution of silver subfluoride. CARLOS DEL FRESNO. Oviedo Univ., Spain. *Z. anorg. allgem. Chem.* 172, 256-64 (1928).—By analogy with H_2O and NH_3 , the energy of insertion of Ag atoms is >40 cal. and the calcd. heat of formation of Ag_2F considered as an insertion compd. of Ag into the AgF lattice is >15.5 cal. The formation of a F insertion compd. is not possible. These results are contrary to the calcs. of Brody and Millner (*C. A.* 22, 1924).

DAVID DAVIDSON

Ferrous hydroxide. E. DEISS AND G. SCHIKORR. State Material Testing Office, Berlin-Dahlem. *Z. anorg. allgem. Chem.* 172, 32-42 (1928).— $\text{Fe}(\text{OH})_2$ (I) sol. prep'd by repeated centrifugalizing and resuspending a ppt. of I, is positively charged as shown by semi-quant. pptn. expts. with electrolytes (Na_2SO_4 , NaCl , MgSO_4). I reacts with $\text{Fe}(\text{OH})_3$ to form a green intermediate product (II) and finally black Fe_3O_4 . II contains ferrous and ferric iron in the ratio of 1:1 and is formulated by D. and S. as $\text{H}_2\text{O} \cdot \text{Fe}_2\text{O} \cdot \text{Fe}(\text{OH})_2$. I is slowly oxidized by NH_4NO_3 , quickly by H_2O_2 . D. D.

Magnesium peroxide, $\text{MgO} \cdot 2\text{H}_2\text{O}$. H. KŘEPELKA AND J. ČERVINKA. *Časopis Československého Lékařnictva* 6, 153-8, 169-77 (1926).—The action of H_2O_2 on dry $\text{Mg}(\text{OH})_2$ yielded products difficult to define. By evap'g a mixt. of $\text{Mg}(\text{OH})_2$ and a concd. soln. of H_2O_2 in ether, a mixt. of $\text{MgO}_2 \cdot \text{H}_2\text{O}$ and $\text{MgO}_2 \cdot 2\text{H}_2\text{O}$ was obtained. $\text{MgO}_2 \cdot 2\text{H}_2\text{O}$ was isolated. The monohydrate took up H_2O until it reached the compn. of the dihydrate, and then began to decompose into compds. of the type $\text{MgO}_2 \cdot \text{MgO} \cdot \text{H}_2\text{O}$; in one case the mixt. corresponded to $4(\text{MgO}_2 \cdot 2\text{H}_2\text{O}) + \text{MgO}$. In absence of sufficient H_2O to reach the dihydrate stage, there was decompn. into O_2 and products difficult to define. H_2O_2 did not form addn. compds. with $\text{Mg}(\text{OH})_2$ or with the peroxides of Mg.

WILLIAM J. HUSA

Acetates of iron, nickel and other metals and a very basic crystalline ferric acetate. R. WEINLAND AND HERMANN HOLTMEIER. *Z. anorg. allgem. Chem.* 173, 49-62 (1928).—If to a soln. of FeCl_3 and the sulfate of Ni, Co or Mn" in H_2O , a soln. of CH_3COONa in H_2O is added, compds. of the type $[\text{Fe} \cdot \text{Ac}_3(\text{OH})_3]_x + 6\text{H}_2\text{O}$ are formed. They are sol. in H_2O to a deep red color, insol. in alc., sol. in pyridine, from which they can easily be crystd. If a CH_3COONa soln. is added to a soln. contg. $\text{Fe}(\text{NO}_3)_3$ and the nitrate of Zn, Cd or Mg, compds. of the type $[\text{Fe} \cdot \text{Ac}_3(\text{OH})_3]\text{Cd} + 7\text{H}_2\text{O}$ are formed, pale red in color, finely cryst., sol. in H_2O with a red color, sol. in AcOH , pyridine, slightly sol. in alc., decompd. by CH_3OH with formation of the golden green *dimethoxy-ferric acetate*, $\text{Fe}(\text{OCH}_3)_2 \cdot \text{CH}_3\text{COO}$. When strong CH_3COONa is added to a mixed soln. of $\text{Fe}(\text{NO}_3)_3$ and the nitrate of Ni, Co or Zn, compds. of the type $[\text{Fe} \cdot \text{Ac}_3(\text{OH})_3]\text{Ni}_4 + 23\text{H}_2\text{O}$ (A) are formed, bright brown in color, cryst., sol. in H_2O , dil. or concd. AcOH , pyridine and alc., but decompd. by MeOH . If A is dissolved in pyridine, warmed and crystd., the compd. $[\text{Fe}_4\text{Ac}_9\text{O}_3(\text{OH})]\text{Ni}_4 + 12\text{C}_4\text{H}_9\text{N}$ separates. It is bright olive-green, sol. in H_2O , alc. and pyridine. Analogous salts of Co and Mg are formed, as well as salts in which the acetate group is replaced by benzoate. If to a soln. of 5 g. of $[\text{Fe}_4\text{Ac}_9(\text{OH})_3]\text{Mg} + 10\text{H}_2\text{O}$ in 20 cc. H_2O , a soln. of 15.6 g. $\text{NaClO}_4 + \text{H}_2\text{O}$ in 20 cc. H_2O are added and the soln. is allowed to crystallize slowly, an ochre colored, *cryst. powder* separates, sol. in H_2O and slightly sol. in alc., and having the formula $[\text{Fe}_4\text{Ac}_9\text{O}(\text{OH})_3] + 7\text{H}_2\text{O}$. This may be dehydrated by drying over H_2SO_4 in a vacuum, and is decompd. by MeOH and $\text{C}_4\text{H}_9\text{N}$.

H. STOERTZ

The samarium subhalides. WILHELM PRANDTL AND HANS KÖGL. Bayer. Akad. der Wissenschaften, München. *Z. anorg. allgem. Chem.* 172, 265-72 (1928).— SmCl_3

pptd. as the hexahydrate with HCl is dehydrated in a stream of HCl which is then replaced by N_2 or by H_2 in the cold. Reduction is effected by carefully purified H_2 which is passed over a preliminary sample of $SmCl_3$. The temp. is raised from 450° to 600° after 15 hrs. and finally to 850° at the end of 70–80 hrs. Vessels of Au are superior to porcelain or Pt. The product is dark brownish red, dissolves in H_2O leaving some $SmOCl$. $SmCl_3$ heated to 1000° gives a sublimate of $SmCl_3$, while the Au vessel alloys with Sm. The ratio of Sm:Cl in the residue remains 1:2. Hg exts. Sm from $SmCl_3$ at 400° . N_2 does not react at 1350° . $SmBr_3$ is darker in color and exhibits the same behavior. The authors conclude that $SmCl_3$ is either a soln. of Sm in $SmCl_3$ or a compd. of these two (cf. Jantsch, Ruping and Kunze, C. A. 21, 2229). DAVID DAVIDSON

Preparation of sodium phosphomolybdate. A. SHACHOV. *Trans. Inst. Pure Chem. Reagents* (Russ.) 4, 74 9, *Chem. Zentr.* 1927, II, 37.—Directions are given for the prepn. of Na phosphomolybdate from NH_4 molybdate and Na phosphate. C. C. DAVIS

The classification of silica hydrates by means of the ammonia extraction procedure. WILHELM BILTZ and ERICH RAHLFS. *Z. anorg. allgem. Chem.* 172, 273–91(1928); cf. W. Biltz, C. A. 22, 704.—The findings of R. Schwarz on metasilicic and disilicic acids as true chem. compds. were confirmed, while "garnet" and trisilicic acids were found to be mixts. Liquid NH_3 is an ideal dehydrating agent for this type of hydrates since the influence of curved surfaces on vapor pressure is absent and it is very hygroscopic. Metasilicic acid hydrate prepd. from synthetic cryst. Na_2SiO_3 is powdery, settles well in water, is not cryst. to the eye. The acetone dried prepn. shows only traces of an x-ray diagram. Extn. with NH_3 yielded a hydrate $6SiO_2 \cdot 2H_2O$, which formed compds. with 1 to 4 mols. NH_3 . The decompn. curve was stepwise. Vapor dehydration of metasilicic hydrate yields H_2SiO_3 , the same formula as disilicic hydrate, but not behaving as the latter, but as a metasilicic deriv. Disilicic hydrate was prepd. from cryst. $Na_2Si_2O_5$. It settled easily in water and had a macroscopic leafy cryst. structure. The acetone-dried material had a significant x-ray figure. NH_3 does not remove any hydrate water. The hydrate combines with $3NH_3$ zeolithically, the loss being continuous. Vapor dehydration gives 2 hydrates, $6SiO_2 \cdot 2H_2O$ and $6SiO_2 \cdot H_2O$. The hydrate obtained depends on the original starting material and isomers are possible. It was not possible to prepare orthosilicic hydrate in the pure form. The ammo compd. indicates that it might be isolated by rapid manipulation from Li_4SiO_4 . The silica hydrates from the glassy forms of sodium metasilicate and sodium disilicate differ from the corresponding hydrates from the cryst. forms only in the state of subdivision. Metasilicic hydrate from glass does not lose its ammonia stepwise. Silica gels were prepd. from aq. solns. of sodium metasilicate, sodium disilicate, tech. sodium silicate and from $SiCl_4$. The ammonia decompn. curves resembled adsorption curves, no stoichiometric relations were observed, and aging decreased the absorptive capacity. The behavior of the hydrates from cryst. silicates was independent of age. The hydrate obtained from a sample of heulandite behaved in ammonia extn. and vapor pressure exactly as a disilicic hydrate. The formula of heulandite used is expressed as $(6SiO_2 \cdot 0.995Al_2O_3) \cdot 0.833CaO \cdot 0.088Na_2O \cdot 5.45H_2O$. The hydrate is obtained by the soln. of the mol. outside the bracket and then the substitution of water for the Al_2O_3 . A. F.

The classification of alumina hydrates by the ammonia extraction procedure. WILHELM BILTZ, GUSTAV A. LEHRER AND KARL MEISEL. *Z. anorg. allgem. Chem.* 172, 292–309(1928).—Willstätter's metahydroxide, hydroxides A, B, C_α , C_β , C_γ , Bornsdorff's hydrargillite, "Indian" alumina, aluminum hydroxide as in analytical work, Kohlschütter's topochem. gel and Böhm's artificial bauxite were prepd. and treated by the acetone and ammonia extn. procedures. Of these, Willstätter's compds., hydrargillite, Kohlschütter's gel, and bauxite were found to be definite chem. compds. and to give diffraction diagrams. Hydrargillite and bauxite are one type of compd. whose lattice is too stable to permit the formation of hydrates and ammoniates. Willstätter's metahydroxide is considered as a reactive bauxite of formula $(Al_2O_3 \cdot H_2O)$. A and B are bauxite hydrates $(Al_2O_3 \cdot H_2O) \cdot 0.5H_2O$ and $(Al_2O_3 \cdot H_2O) \cdot H_2O$. C_α is a bauxite dihydrate, unstable and changing in time to C_β , which in turn changes under water to C_γ , a hydrate resembling hydrargillite. ARTHUR FLEISCHER

The composition of the precipitate which forms from the action of potassium ferrocyanide upon calcium salts in the presence of acetic acid. IV. TANANAEV. *Z. anorg. allgem. Chem.* 172, 403–6(1928).—The ppt. was obtained by using either an excess of dil. Ca salt or by using an excess of ferrocyanide. To det. Fe and Ca the ppt. (dried) was carefully heated to burn off C, the residue dissolved, $Fe(OH)_3$ and then CaC_2O_4 pptd. K was detd. after removing ferrocyanide as Ag ferrocyanide. The compn. of the ppt. was found to be $K_2CaFeCaNa$. ARTHUR FLEISCHER

Liquid ammonia as a solvent and the ammonia system of compounds. II. In-

organic ammonia compounds. W. CONARD FERNELIUS AND WARREN C. JOHNSON. *J. Chem. Education* 5, 828-35(1928).—A further explanation of the ammonia system of compds of Franklin, Kraus *et al.* (cf. C. A. 22, 3082). Whereas ordinary acids, bases and salts may be considered as derived from H_2O by replacing H with acid groups, metals or both acid groups and metals, just so NH_3 can have its H replaced by acid groups (as in $CINH_2$ and $N \equiv N = NH$), metals (as in KNH_2), and both acid groups and metals (as in $CaNCN$). The analogies of hydrolysis and ammonolysis, of amphoteric hydroxides and amides, of ordinary basic salts and of ammonobasic salts, etc., are explained in terms of Franklin's theories. Similarly S, halogens and other substances may be taken as the basis of systems of compds. comparable to the ordinary substances derived from H_2O theoretically. W. C. EBAUGH

Complex formation in stannous chloride and stannous bromide solutions. MILDA PRYTZ. Kgl. tierärztlichen u. landw. Hochschule, Kopenhagen. *Z. anorg. allgem. Chem.* 172, 147-66(1928).—Using the equation $E = E_0 - 0.02955 \log a_{Sn} - E_0 - 0.02955 \log C_{Sn} - 0.02955 \log f$, where E = the measured potential referred to the normal H_2 electrode and corrected for diffusion potential according to Henderson, E_0 = the normal potential, and f = the activity coeff. of Sn calcd. from the formula of Debye and Huckel, the normal potential of Sn^{2+}/Sn (in perchlorate soln.) was found to be 0.1359 v. (The potential of the 3.5 M calomel electrode was taken as 0.2505 v.) The potential of Sn^{2+}/Sn in 0.01 M $SnCl_2$ and $SnBr_2$ indicates a marked decrease in the stannous ion with increasing activity of the halide ion. The following consts. were calcd.: $C_{SnCl_2}/(a_{Sn^{2+}} \cdot C_{Cl^-}) = 32$; $C_{SnCl_2}/(C_{SnCl_2} \cdot C_{Cl^-} f^2) = 5.5$; $C_{SnCl_2}/(C_{SnCl_2} \cdot C_{Cl^-} f^2) = 0.6$; $C_{SnCl_2} f^2/(C_{SnCl_2} \cdot C_{Cl^-} f^2) = 0.3$; $C_{SnBr_2}/(a_{Sn^{2+}} \cdot C_{Br^-}) = 13$; $C_{SnBr_2}/(C_{SnBr_2} \cdot C_{Br^-} f^2) = 5$; $C_{SnBr_2}/(C_{SnBr_2} \cdot C_{Br^-} f^2) = 0.44$ (C = concn; a = activity; f = activity coeff. of the halide ion; f' = activity coeff. of the stannous ion). Within certain limits the consts. of the complex ions $SnCl_4$ and $SnBr_4$ are approx proportional to the halide-ion concn. DAVID DAVIDSON

Complex anions of meconic and quinic acids with heavy metals. R. WEINLAND AND HEINRICH FRIEDE. Univ. Würzburg, *Arch. Pharm.* 266, 353-66(1928).—The following compds. were prepd and characterized: *trisodium dimeconatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]Na_3$; *triguanidine dimeconatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]H_3 \cdot 3(CN_3H_3) + 6H_2O$; *tribipyridine dimeconatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]H_3 \cdot 3(C_5H_5N) + 5H_2O$; *monocyanurium dimeconatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]H_3 \cdot NH_3 + 5H_2O$; *monopyridine dimeconatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]H_3 \cdot C_5H_5N + 5H_2O$; *monoguanidine dimeconatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]H_3 \cdot CN_3H_3 + 5H_2O$; *monoguanoline dimeconatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]H_3 \cdot C_5H_5N + 6H_2O$; *dimeconatoferrate with 1.75 Na*, $[Fe(OC_6H_3(COO)_2)_2]H_{1.75}Na_{1.75} + 20H_2O$; *dimeconatoferrate with 1.75 C_5H_5N* , $[Fe(OC_6H_3(COO)_2)_2]H_{1.75}(C_5H_5N)_{1.75} + 20H_2O$; *pyridine chlorodimeconatochromate*, $[Cr(OC_6H_3(COO)_2)_2Cl]H_4 + C_5H_5N + 7H_2O$; *copper ammonia meconate*, $Cu_3(OC_6H_3(COO)_2)_2 + 6NH_3 + 8H_2O$; *copper pyridine meconate*, $Cu_3(OC_6H_3(COO)_2)_2 + 4C_5H_5N + 8H_2O$; *zinc ammonia meconate*, $Zn_3(OC_6H_3(COO)_2)_2 + 4NH_3 + 8H_2O$; *tripotassium triquinatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]K_3 + 12H_2O$; *tribipyridine triquinatoferrate*, $[Fe(OC_6H_3(COO)_2)_2]Rb_3 + 12H_2O$. W. O. E.

Complex salts of cobalt having univalent ions. F. M. JAEGER AND P. KOETS. *Z. anorg. allgem. Chem.* 170, 347-69(1928).—If a soln. of triamino triethylamine, $N(CH_2CH_2NH_2)_3$, (A), acts upon praseo-diethylenediamine-dichlorocobaltichloride or upon diethylenediamine chloraquaacobaltic sulfate, a compd. contg. the complex

Co ion, $\left\{ \begin{array}{c} (En)_3 \\ (Triam)_3 \end{array} \right\} IX$, is formed. In the formula used (En) represents ethylene

diamine and (Triam) represents triaminotriethylamine. The presence of an uneven no. of C atoms led to the belief that stereoisomeric compds. contg. this complex might exist, so many of its derivatives were prepd. A is prepd. by passing NH_3 for 10 hrs. at $140-150^\circ$ into fused β -bromoethyl phthalimide. The product is extracted 3 times with 97% alc., and the residue recrystd. from boiling glacial AcOH. The triphthalyl-triaminotriethylamine thus formed is treated with strong HCl at 150° for 2 hrs., the mass dild. with H_2O , and then treated with alc. + Et_2O , which ppts. the hydrochloride of the base A, spin-ile like, colorless bipyramids or somewhat thicker hexagonal tablets.

To prepare a salt of the complex nonavalent Co ion, the compd. $\left\{ \begin{array}{c} (En)_3 \\ CoCl \\ H_2O \end{array} \right\} Cl_3$, (B), is treated with a dil. soln. of A in H_2O and heated for 4 hrs. on the H_2O bath.

The compd., $\left\{ \begin{matrix} (\text{En})_6 \\ \text{Co}_3 \\ (\text{Triam})_2 \end{matrix} \right\} \text{Cl}_3 + 6\text{H}_2\text{O}$, is formed. The H_2O -free iodide is prepd. from this by treatment with a concd. soln. of NaI , and is crystd. in the form of thick, dark colored, gleaming crystals, or in the form of blood-red needles or somewhat thicker pillars. The following salts of this type are prepd., and their cryst. form is studied in detail: $\left\{ \begin{matrix} (\text{En})_6 \\ \text{Co}_3 \\ (\text{Triam})_2 \end{matrix} \right\} (\text{SO}_4)_3 + 8\text{H}_2\text{O}$; $\left\{ \begin{matrix} (\text{En})_6 \\ \text{Co}_3 \\ (\text{Triam})_2 \end{matrix} \right\} (\text{NO}_3)_3 + 4\text{H}_2\text{O}$; $\left\{ \begin{matrix} (\text{En})_6 \\ \text{Co}_3 \\ (\text{Triam})_2 \end{matrix} \right\} (\text{ClO}_4)_3 + 6\text{H}_2\text{O}$; $\left\{ \begin{matrix} (\text{En})_6 \\ \text{Co}_3 \\ (\text{Triam})_2 \end{matrix} \right\} (\text{S}_2\text{O}_8)_3 + 18\text{H}_2\text{O}$. In all these salts no indication of stereoisomerism is given. To test this further an iodo-*d*-tartaric acid derivative is prepd. - $\left\{ \begin{matrix} (\text{En})_6 \\ \text{Co}_3 \\ (\text{Triam})_2 \end{matrix} \right\} \text{I}_3 + 3\text{H}_2\text{O}$. The only optical activity obtained was that derived from the tartaric acid, as the iodide prepd. from the iodo-tartrate is identical with the iodide prepd. from the chloride. The authors conclude that the complex Co ion is represented by the formula $\left\{ \begin{matrix} (\text{Triam}) \\ [\text{Co}(\text{En})_2]_3 \\ (\text{Triam}) \end{matrix} \right\} \text{IX}$.

H. STOERTZ

Cyanogen compounds of the platinum metals. II. Cyanogen compounds of ruthenium. F. KRAUSS AND G. SCHRADER. *Z. anorg. allgem. Chem.* 173, 63-72 (1928); cf. *C.* 1, 21, 3846. To a soln. of $\text{K}_4[\text{Ru}(\text{CN})_6] \cdot 3\text{H}_2\text{O}$ in H_2O an equal vol. of 4 *N* H_2SO_4 is added, and the mixt. is boiled until a flocculent, deep blue ppt. is formed, which is filtered, washed with NH_4Cl soln., H_2SO_4 and hot H_2O and dried in a vacuum at 150° . The compd. thus prepd. is $\text{Ru}(\text{CN})_6 \cdot \text{H}_2\text{O}$ (A); it is strongly hygroscopic, stable in acids and alkalis, and sol. in concd. NH_4OH . If A is dissolved in NH_4OH and NH_3 conducted into the soln. while it is boiled down to a small vol., the soln. being finally evapd. to dryness in a vacuum desiccator over KOH , the compd., $\text{NH}_4[\text{Ru}_2(\text{CN})_{12} \cdot 4\text{NH}_3]$ (B), is formed, blue, sol. in H_2O to a golden brown soln., from which heavy metal ions ppt. compds. such as $\text{Ni}[\text{Ru}(\text{CN})_6 \cdot 4\text{NH}_3]_2 \cdot 7\text{H}_2\text{O}$. This is prepd. by adding a soln. of B in H_2O to a boiling dil. NiSO_4 soln. The bright green ppt. is filtered, washed with hot H_2O and dried. It is practically insol. in H_2O , sol. in NH_4OH , decomposed by acids to form A. The Cu compd., $\text{Cu}[\text{Ru}(\text{CN})_6 \cdot 4\text{NH}_3]_2 \cdot 5\text{H}_2\text{O}$ (C), is prepd. in an analogous manner and is a chocolate brown, crust. powder, unstable in acids. On dissolving C in concd. NH_4OH the compd., $\text{Cu}[\text{Ru}_2(\text{CN})_{12} \cdot 4\text{NH}_3] \cdot 4\text{NH}_3$, is formed, bright brown, crust., sol. in dil. NH_4OH , sol. in H_2O with difficulty, fairly stable in acids. If Cl is conducted into a neutral soln. of $\text{K}_4[\text{Ru}(\text{CN})_6] \cdot 3\text{H}_2\text{O}$, the soln. finally becomes reddish brown. An equal vol. of 3 *N* H_2SO_4 is added and on warming a dark green ppt. is formed, which on filtering and drying over CaCl_2 in a vacuum at room temp. shows the compn., $\text{Ru}(\text{CN})_6 \cdot 5\text{H}_2\text{O}$ (D). Drying at 200° forms the monohydrate. If D is dissolved in hot NH_4OH and NH_3 gas is passed into the soln., the compd., $[\text{Ru}(\text{CN})_6 \cdot \text{H}_2\text{O} \cdot 2\text{NH}_3]_3$, is formed, insol. in H_2O , decomposed by alkalis. The free acid, $\text{H}_4[\text{Ru}(\text{CN})_6]$, forms compds. with organic bases of high mol. wt., which are cryst. and difficultly sol. in H_2O . The brucine compd. has the formula $[\text{C}_{27}\text{H}_{25}(\text{O} \cdot \text{CH}_3)_5 \cdot \text{O}_2 \cdot \text{N}_2\text{H}_2] [\text{H}_2\text{Ru}(\text{CN})_6]$ and the strychnine compd. the formula $[\text{C}_{21}\text{H}_{22}(\text{O} \cdot \text{N}_2\text{H}_2)_2] [\text{H}_2\text{Ru}(\text{CN})_6]$. H. STOERTZ

Oxysiloxenes. H. KAUSKY AND H. THIELE. *Z. anorg. allgem. Chem.* 173, 115-24 (1928). - *Monooxysiloxene* is prepd. by hydrolysis of $\text{Si}_2\text{O}_5\text{H}_2\text{Br}$ with alc. contg. about 20% H_2O and acidified with a few drops HCl : $\text{Si}_2\text{O}_5\text{H}_2\text{Br} + \text{H}_2\text{O} = \text{Si}_2\text{O}_5\text{H}_4\text{OH} + \text{HBr}$. In a similar way the di-, tri-, tetra- and hexaoxysiloxenes are prepd. from the respective halides, the colors running from yellow through red and violet to black. They are very unstable and possess strong fluorescence and chemiluminescence. Since the hydrolysis of the halogen compds. of siloxen is reversible, the oxysiloxenes produced behave like weak bases, and the OH groups can be replaced by acid residues such as sulfate, phosphate, halogenide, formate, acetate, etc. The oxysiloxenes can also be prepd. by action of SO_2 on siloxen or any SiH compd., H_2S being left in soln. A soln. of SO_2 in acetone is more advantageous, as no S separates. The explosive nature of these compds. is due to the occurrence of SiOH groups and Si-Si linkage, as well as the grouping Si-acyl .

H. STOERTZ

7—ANALYTICAL CHEMISTRY

W. T. HALL

Methods of analysis used in the metallurgical industry. L. PERSOZ. *Rev. chim. ind.* 37, 190-3(1928); cf. *C. A.* 22, 2895.—Details are given for the analysis of dolomite, lime, phosphorus slag, ferromanganese, spiegeleisen and ferrosilicon and for the detn. of Mn, Si, S, P, As, Cu and C in cast iron. P. THOMASSET

The periodic system and the system of analytical chemistry. J. GILLIS. *Natuurw. Tijdschrift* 10, 47-52(1928).—A review. B. J. C. VAN DER HOEVEN

Spectral analytical measurements. J. VERHAEGHE. *Natuurw. Tijdschrift* 10, 10-7, 53-7(1928).—A review. B. J. C. VAN DER HOEVEN

Indicator for oxidizing agents. D. S. DAVIS. *Chemist-Analyst* 17, No. 3, 4 (1928).—To det. whether any free Br_2 , Cl_2 , HClO or HNO_3 remains in a boiling aq. soln., add a little methyl orange, which will be decolorized if any of these oxidizers are present. W. T. H.

Simplified method of differential potentiometric titration. NORRIS F. HALL, MARK A. JENSEN and SVEN A. BAECKSTROM. Harvard Univ. *J. Am. Chem. Soc.* 50, 2217(1928).—The method of Mac-Innes and Jones for differential electrometric titration can be simplified by leading one of the electrode wires into a medicine dropper around which the other electrode is wound. The liquid in the dropper is stagnant and therefore at a different concn. than the soln. outside the dropper which has been partly titrated. W. T. H.

New method of potentiometric volumetric analysis. BOGDAN KAMIENSKI. *Bull. intern. acad. Polonaise* 1928, 33-60.—Recently several papers have appeared, obviously written without knowledge of the other work, in which an improved method of differential titration is proposed depending upon the use of 2 electrodes, one of them immersed directly in the stirred and titrated soln. while the other is in a narrow tube surrounded by soln.; the soln. diffuses very slowly into the main body of liquid so that an e. m. f. results between the 2 electrodes and reaches a max. when the titration is finished. This paper is the most pretentious of all these recent publications and is an exptl. study based on mathematical studies. The oxidations of Fe^{++} to Fe^{+++} , of $[\text{Fe}(\text{CN})_6]^{4-}$ to $[\text{Fe}(\text{CN})_6]^{3-}$, Cr^{+} to Cr^{++} and Sn^{+} to Sn^{++} were studied. All the exptl. details are described explicitly as well as the app. used. A method for prepg. Cr^{++} solns. also is given. W. T. H.

Rapid volumetric determination of calcium oxide and magnesium oxide in mixtures. N. M. MILOSLAVSKI and E. A. BILENKO. Ukrainian Institute of Applied Chemistry. *Ukrainskii Khim. Zhurnal* 3, No. 1, tech. pt., 37-41.—The method of Willstatter and Waldschmidt-Leitz (published in *Berichte* 19, 1223), with insignificant modifications, has been thoroughly tested by M. and B. and has been found by them applicable to factory labs. Not more than 1-1½ hrs. is required for a determination of Ca and Mg by this method. BERNARD NELSON

Quantitative precipitations at extreme dilutions. V. NJEGOVAN and V. MARJANOVIĆ. *Z. anal. Chem.* 74, 191(1928); cf. *C. A.* 22, 1927.—A correction. One cc of satd. BaCl_2 ppt. about 0.125 g. of SO_4 . In the method 3 cc of soln. should be used where 1 cc. was specified. W. T. H.

Use of constant-weight filters in quantitative analysis. B. ORMONT. Kiev Polytechnicum. *Ukrainskii Khim. Zhurnal* 3, No. 1, sci. pt., 47-58.—Gooch crucibles are not satisfactory for use in alk. soln. Expts. with filter papers show that it is extremely difficult to dry them to const. wt. in the old-fashioned way. B. N.

Gallium. III. Quantitative separation of iron from gallium by means of α -nitroso- β -naphthol. JACOB PAPISH and L. E. HOAG. Cornell Univ. *J. Am. Chem. Soc.* 50, 2118-21(1928); cf. *C. A.* 22, 929.—From a soln. of $p_H < 7$, a 2% soln. of α -nitroso- β -naphthol in 50% AcOH will ppt. Fe^{+++} and no Ga^{+++} . In the filtrate, after evap. to dryness to remove the AcOH , the Ga can be pptd. as hydroxide and the ignited Ga_2O_3 contains no appreciable Fe. W. T. H.

Colorimetric method of determining reducing substances. S. S. FROLOV and K. O. SVETLYAKOV. Ivanovo-Voznesensk Polytechnicum. *J. Chem. Ind. (Moscow)* 4, 545-7(1927).—In employing Fehling soln. for detn. of reducing substances (such as sugar, starch, cellulose derivs.), the amt. of reagent required is usually detd. either from the wt. of the Cu_2O ppt. or by titration of the remaining soln. Instead of this, a colorimetric detn. of Cu remaining in soln. is recommended. The optical consts. of Fehling soln. in various concns. were detd. with the Bock-Benedict colorimeter and

very rapid and exact results were obtained in test analyses, provided not less than 0.088 mg. of Cu per cc. remained in soln. BERNARD NELSON

New method for the colorimetric determination of small quantities of antimony and their separation from tin. S. G. CLARKE. *Analyst* 53, 373-9(1928).—A method is described for the detn. of small amts. of Sb in high-grade Sn based on the pptn. of Sb from chloride solns., by the Reinsch reaction and the colorimetric detn. of Sb, after stripping the deposited film with Na_2O_2 soln., on the basis of the golden-yellow color formed by the reaction of Sb soln. with pyridine and an iodide. W. T. H.

The detection and the colorimetric determination of carbon monoxide. K. SCHULTZE. *Glückauf* 62, 1496-7(1926); *Chem. Zentr.* 1927, I, 632; cf. Kast and Selle, *C. A.* 21, 2630.—The utility of PdCl_2 paper is impaired by keeping. Uniformity of color cannot be obtained, which leads to uncertainty. During the War, test tubes with Thiele NH_3 -Ag solns. were only occasionally unsatisfactory. It proved advantageous to make the upper pointed end of the ampoules finer as well as to replace it by a thick-walled capillary. C. C. DAVIS

A simple method of determination of arsenic in small quantities of organic substances. O. WINTERSTEINER AND H. HANNEL. *Univ. Graz. Mikrochemie* 4, 155-67; *Chem. Zentr.* 1926, II, 3065.—The method depends upon the fact that during the destruction of the org. substance, As is oxidized to arsenate; this liberates I from KI, which can be titrated with $\text{Na}_2\text{S}_2\text{O}_4$. *Procedure.*—Boil 7-12 mg. of substance with 1 cc. of 30% H_2SO_4 and a few drops of concd. HNO_3 , add more HNO_3 and boil longer, evap. several times with addn. of a few drops of perhydrol, dissolve in 1 cc. of water, evap. until SO_3 is evolved, repeat this process, add 1 cc. of water, boil out of contact of air, add fresh concd. HCl and 2 cc. of 4% KI soln. (free of iodates), let stand closed for 10 min. and titrate the I with 0.01 N $\text{Na}_2\text{S}_2\text{O}_4$. If the soln. is only pale yellow, make it up to 20 cc., add 5 drops of 1% starch soln., and titrate to the appearance of a characteristic pale reddish end point. When halogens are present in the org. substance, special precautionary measures are necessary to obtain correct results. The method gives reliable results and is particularly serviceable in elementary org. analysis. C. C. DAVIS

The determination of carbon on the basis of the fracture structure. MATSUJIRO HAMASUMI. *Arch. Eisenhüttenwesen* 1, 157-60(1927).—In studying the effect of C on the fracture of steels with 0.1-0.9% C, expts. show that the bending angle, hardness and microscopic structure are influenced more by C when it is present in amts. less than 0.3% than when present in greater amts. An Fe-Mn-C diagram is plotted to show the effect of Mn on the structure of the fracture. From this it appears that increase of Mn displaces the eutectic point toward the Fe-Mn side, causing a decrease in the eutectoid temp. Similarly the weak appearance of acid steels can be explained from the raising of the transition point by the addn. of Si to C-poor steels. J. B.

Rapid method of determination of carbon in iron and steel. N. M. MILOSLAVSKII AND V. P. VEPRITZKII. *Ukrainskii Khim. Zhurnal* 3, No. 1, tech. pt., 31-5(1928).—De Nolly's method (cf. *C. A.* 5, 1888) has been thoroughly examined and has been found correct only in the case when C content is not over 1%. BERNARD NELSON

A new method for determining copper in iron and steel. EMIL ZINDEL. *Chem.-Ztg.* 52, 537-8(1928).—Treat 5 g. of sample with 40-50 cc. of 6 N HCl , filter as soon as the sample is all decomposed and dil. with 400 cc. of hot water. Heat to boiling and add 100 cc. of 10% $\text{Na}_2\text{S}_2\text{O}_3$ soln. Filter, wash with 500 cc. of water, ignite the ppt and weigh as CuO . W. T. H.

Rapid method for determining copper. G. SPACU AND J. DICK. *Bul. soc. stiinta Cluj* 4, 23-7(1928).—The method depends upon the pptn. of $[\text{CuPy}_2](\text{SCN})_2$, which contains 18.87% of Cu. Only alkali, alk. earth and Mg ions can be present. To 75-100 cc. of Cu soln. add 8-20 drops of pyridine, or enough to impart an azure blue color, and 0.5 g. of NH_4CNS . Stir well and filter into a filtering crucible. Wash with a water contg. 3 g. NH_4CNS and 3 cc. of pyridine per l., then with an alc. wash prepared by adding 8 cc. of pyridine and 0.5 g. of NH_4CNS to one l. of 75% alc. Finally wash with ether and dry in a vacuum of an oven heated to 40-45°. W. T. H.

A new, rapid method for determining manganese. G. SPACU AND J. DICK. *Z. anal. Chem.* 74, 188-91(1928).—If an alk. soln. of Mn^{++} is treated with alkali thiocyanate and an excess of pyridine, the Mn is completely pptd. as $(\text{MnPy}_4)(\text{SCN})_2$. The ppt. can be weighed after suitable washing and drying. Some 20 expts. with pure Mn^{++} solns. show that the method is accurate and rapid. Since the Mn compd. is not pptd. when only little thiocyanate and pyridine are present, it is hoped that a method can be worked out for sepg. Mn^{++} from Co^{++} , Ni^{++} etc., which cations give more insol. pyridine complexes. W. T. H.

Volumetric determination of mercury. LOUIS MARICQ. Brussels Univ. *Bull. soc. chim. Belg.* 37, 241-51(1928).—The electrotitration of the Hg salts with KI is the only correct procedure in the case of 0.1-0.001 N Hg solns. The presence of HNO_3 , H_2SO_4 , chlorides, phosphates or acetates does not influence the titration. The KI soln. may be titrated with a blank or by electrotitration with AgNO_3 ; in this case, a correction coeff. 0.994 is to be used; it is independent of the diln. A. L. HENNE

Determination of small quantities of phosphorus by the method of Denigès. V. V. CIUREA. *Bul. soc. chim. Romania* 9, 869(1928).—For detg. small quantities of P (1-5 mg. of P_2O_5) Denigès treated the phosphate soln. with sulfo-molybdate reagent and detd. the P content colorimetrically, Mo blue being formed. Unfortunately the color is not directly proportional to the P content and different observers do not always agree with respect to the depth of color. To overcome this difficulty, it is now recommended to add standard Cl_2 water until the blue is bleached. Place 1-5 cc. of the soln. in a conical flask, add water enough to make the vol. 5 cc. and then add 4 drops of Denigès sulfo-molybdate soln. Shake and add 4 drops of freshly prepd. SnCl_2 soln. Do the same thing with solns. contg. known quantities of P. After 10 min., add 10-15 cc. of water and from a microburet, drops of Cl_2 aq. until the soln. is just decolorized. W. T. H.

A rapid gas-volumetric determination of potassium. GERHART JANDER AND HERMANN FABER. *Z. anorg. allgem. Chem.* 173, 225-32(1928).—By pptg. $\text{NaK}_2\text{Co}(\text{NO}_2)_6$ from a nearly satd. NaCl soln. the ppt. is of const. compn. By treatment of the ppt. with acid and FeSO_4 soln. all of the nitrite radical is converted into NO gas, which can be measured. In this way a rapid and accurate detn. of K can be accomplished. Alk. earths are preferably removed by treatment with Na_2CO_3 . NH_4 salts must be present. To det. K in a commercial salt proceed as follows. Dissolve 3 g. of salt in a little hot water, add 1-2 cc. of 4% Na_2CO_3 soln., filter and wash. Make the filtrate acid to methyl orange with HCl, dil. to exactly 100 cc., mix and take 2.5 cc. of the soln. for the further analysis. Ppt. the K with 1.5 g. of $\text{Na}_3\text{Co}(\text{NO}_2)_6$ dissolved in 30 cc. of satd. NaCl soln. The reagent must be freshly prepd. Stir with a mechanical stirrer for 3 min. and wash with satd. NaCl soln., using 30 cc. in all. Transfer the ppt. to an evolution flask, connect with the gas buret, through a reflux condenser, expel all air from the app. by a rapid stream of CO_2 and add a concd. soln. of FeSO_4 in 2 N H_2SO_4 . All the NO can be removed by heating the flask and eventually forcing CO_2 through the liquid, using KOH to dissolve this gas at the buret. The entire procedure requires less than an hour and the results are surprisingly good. W. T. H.

Estimation of zinc by the iodate method. GORDON EASTWOOD AND A. M. MUNRO. *Chem. Eng. Mining Rev.* 20, 322(1928).—To the barely acid soln. add 20 cc. of reagent prepd. by dissolving 27 g. of HgCl_2 and 39 g. of KCNS separately and finally dilg. the mixed solns. to one liter. 10 cc. of this reagent will ppt. 0.09 g. of Zn as $\text{ZnHg}(\text{SCN})_4$. Stir 5 min. and allow to stand for at least 1 hr. Filter and wash with water contg. 1% of the thiocyanate reagent. Dissolve the ppt. in a cold mixt. of 35 cc. concd. HCl, 10 cc. of water and 5 cc. of CHCl_3 or CCl_4 . Titrate carefully with standard KIO_3 soln. Cu, Mn, Co, Bi, Cd and mercurous Hg interfere as they give insol. thiocyanates. W. T. H.

The determination of vanadium in high-speed steels and its waste in producing these steels. A. FOLSNER. *Stahl u. Eisen* 47, 28-30; *Chem. Zentr.* 1927, I, 1504.---A method of Svensson for detg. V in steel (cf. *Stahl u. Eisen* 28, 853(1908)) gives results which are far too low. The following method is proposed. Dissolve 2-4 g. of steel in 50 cc. of concd. HCl, evaporate with a few cc. of HNO_3 , dissolve in 20 cc. of concd. HCl, dil., neutralize, pour in hot aq. NaOH (30 g. in 100 cc.), dil. to 500 cc., filter off 250 cc., acidify with HCl, boil, add 20 g. of NH_4Cl , make weakly ammoniacal, ppt. with 30 cc. aq. MnCl_2 (1:10), add 20 cc. of NH_4OH (d. 0.91), again boil a short time, let stand 3 hrs., filter, dissolve the ppt. in 50 cc. of hot HCl (1:1), add 30 cc. of concd. H_2SO_4 , evaporate, cool, reduce with 25 cc. of HCl (2:1), evaporate again, cool, make up with water (free of O) to 200 cc. and titrate at 80-85° with aq. KMnO_4 according to the method of Treadwell. C. C. DAVIS

Analysis of stainless steel. WM. KUEBLER, WM. SHANEMAN, J. GALLAGHER AND B. INGRAM. *Chemist-Analyst* 17, No. 3, 6-8(1928).—The analysis of stainless steels, irons, heat-resisting alloys, etc., is often difficult because of the insol. of these materials. They often do not respond well at all to the conventional methods of dissolving steel. In this paper the chemical analyses of 14 materials of this nature are given and directions for dissolving them for the detns. of C, Mn, P, Si, Ni, W, Cr, Cu and Mo. W. T. H.

Studies of the determination of sulfur in inorganic compounds. H. TER MEULEN. *Diss. Delft* 1925, 86 pages; *Chem. Zentr.* 1927, I, 325.—A method is recommended

which is based on the conversion of Na to Na_2S by fusion with Na_2CO_3 and C. The Na_2S is decompd. with dil. acid and the H_2S detd. iodometrically. Another method is recommended in which sulfates are calcined with H_3BO_3 in a current of H, which reduces the SO_3 evolved to H_2S (Pt-asbestos being used as catalyst). In a third process, which is particularly suitable for such S compds. as sulfides (ores), the S is burned in a current of air, and the addn. of H_3BO_3 prevents any S remaining in the residue. The gases of the combustion are conducted over C at $250\text{--}300^\circ$ to convert any escaping SO_3 to SO_2 , and the SO_2 is absorbed in titrated alkali soln. The structural formula of ammonium dithiodioxymolybdate is $(\text{NH}_4\text{O})_2\text{Mo}(:\text{S})_2\text{S}$. C. C. DAVIS

The detection of sulfur and sulfurous acid. AUGUST NOLL. *Papier-Fabr.* 26, Fest- und Auslands-Heft, 59-61 (1928).—The following qual. tests are described: S in any form—heat the powd. substance to redness with S-free Fe in a hard-glass tube, dissolve in HCl, and recognize H_2S by odor, $\text{Pb}(\text{OAc})_2$ test, or (after making alk.) Na nitroprusside test. Sulfite ion in paper or pulp.—Digest sample with distd. H_2O , acidify ext. and test as above. Or, treat the ext. with Zn dust to reduce sulfite to hyposulfite and test the filtrate with indanthrene yellow G, methylene blue, or (after making alk.) Na anthraquinone *n*-sulfonate. With hyposulfite these give the color changes, yellow-blue, blue-colorless, colorless-red, resp. Other reducing substances may interfere in the color tests, and the anthraquinone salt may contain impurities which will give a red color with alkali alone. R. H. DOUGHTY

Accurate method for the determination of iodine in mineral mixtures. M. D. KNAPHEIDE AND ALVIN R. LAMB. *J. Am. Chem. Soc.* 50, 2121-30 (1928).—The addn. of KI or CaI_2 to mineral mixts. to be fed to farm animals has made it necessary for the chemist to know how to det. I in such mixts. Because of adsorption by the charcoal which is usually present, it is impossible to remove the iodide by simple extn. and over 600 analyses were necessary to develop the following method: Melt together 20 g. of NaOH and 10 g. of KNO_3 in a 100-cc. Ni crucible. Cool, add 10 g. of the mineral mixt. and moisten with 5 cc. of satd. NaOH soln. and 10 cc. of 80% alc. Place on a cold, 3-heat hot plate and gradually raise the temp. until finally the contents of the crucible are exposed to the full heat of the plate for about 2 hrs. Then carefully fuse. Extract the melt with water and det. the I content by Kendall's method, eventually titrating free I_2 with $\text{Na}_2\text{S}_2\text{O}_3$. W. T. H.

Iodometric determination of ozone and chlorine. A. JULIARD AND S. SILBERSCHATZ. Brussels Univ. *Bull. soc. chim. Belg.* 37, 205-24 (1928).—A p_H about 7 is required to titrate O_3 exactly by means of KI. The buffer may be boric acid + borax, or NaH_2PO_4 + Na_2HPO_4 . The titration of Cl is not affected by the buffer. Cl and O_3 may be titrated together. A. L. HENNE

Determination of ammonia in sulfonated oils. GEO. LANG. St. Louis College of Pharmacy. *Ind. Eng. Chem.* 20, 693 (1928).—To the emulsion produced in a distg. flask by adding 10-15 g. oil to 50 cc. H_2O , add with shaking 100 cc. 4% NaOH soln. With shaking add 100 cc. 8% CaCl_2 soln. A gummy Ca soap is pptd., and the NH_3 can be distd. into standard acid without foaming. T. S. CARSWELL

Testing brine for presence of ammonia. C. E. ANDERSON. *Power Plant Eng.* 32, 731-2 (1928).—A method is given for sepg. NH_3 from brine, and the use of Nessler's reagent for detg. the presence of NH_3 is described. S. D. POARCH

Methods for estimating hydrogen peroxide. PHILLIP A. BERRY. *Chem. Eng. Mining Rev.* 20, 320-1 (1928); cf. C. A. 22, 2808.—The gasometric method is claimed to be unsatisfactory although no reason is given. The KVO_4 method gives good results under the following conditions. Dil. 20 cc. of peroxide to 200 cc. Of this, dil. 20 cc. to 300 cc., add 25 cc. of 7 N H_2SO_4 and titrate until the excess of KMnO_4 is shown by the color. Sometimes the preservative added to the peroxide causes a fugitive end point. In this case the Kingzett iodometric method is preferable, which otherwise gives results of about the same accuracy as the KMnO_4 method. Take 20 cc. of the diluted peroxide soln., 20 cc. of 3.6 N H_2SO_4 and 2 g. of KI. Shake till the solid has all dissolved, allow to stand 15 min. and titrate with thiosulfate. W. T. H.

Titration of ammonium hydrosulfide with potassium ferricyanide. ANTS LAUR. *Acta Commentationes Univ. Turkuensis [Dorpatensis]* 12A, No. 5, 50; *Chem. Zentr.* 1927, II, 140-1.—Iimori (cf. C. A. 17, 1605) showed that K_2S in alk. soln. could be titrated with $\text{K}_3\text{Fe}(\text{CN})_6$ but the results are lower in dil. soln. A repetition of I.'s expts. shows this to be true but the diln. error is due to the oxidation of S by dissolved O_2 rather than to lack of sensitiveness of the nitroprusside indicator. High results are caused also by too much OH^- , due to its decomposing effect on ferricyanide. Satisfactory results in the analysis of NH_4HS solns. can be obtained if a small vol. of the sulfide soln. is added to sufficient NaOH soln. to make the final soln. 0.075-0.15 N

in NaOH and the total vol. 10-20 cc. Then add 1 drop of 10% NaNOFe(CN)_6 indicator and titrate promptly with 0.1 N $\text{K}_2\text{Fe(CN)}_6$. The titration succeeds in the presence of thiosulfate, polysulfide and small quantities of sulfite. A detailed survey is given of the literature on the detection and detn. of sulfides, hydrosulfides, polysulfides, sulfites, thiosulfates and sulfates in the presence of one another. W. T. H.

Determination of nitrites in nitrocellulose. A. KOHILER AND M. MARQUEYROL. *Mém. des poudres* [1], 23, 19-28(1928).—In a 50-cc. flask, place 4 g. of nitrocellulose and 40 cc. of cold water and digest 24 hrs. at room temp. or 4-5 hrs. at 50°. Make up the vol. to 50 cc., filter and treat 5-cc. portions with the β -naphthylamine-sulfanilic acid Griess reagent. Tables are given showing the relation between the % of nitrites and heat tests at 65° and 110°.

Notes on the analysis of phosphates. A. SANFOURCHE AND FR. BLÉ. *Bull. soc. chim.* 43, 680-3(1928).—The sources of error in the detn. of P_2O_5 in phosphate ores by the citrate method are discussed; although each individual error does not seem serious it is clear that by an accumulation of errors the results may become as much as 1% out of the way. In the official directions it is not specified that sol SiO_2 must be removed. If this is not done the results are likely to be too high, although the error can be reduced by using 50% more of NH_4 citrate than called for in the official directions. Moreover the amt. of citrate added should be increased in the case of rich phosphates. With respect to the concn of NH_4OH in the soln. from which MgNH_4PO_4 is pptd considerable variations are found in procedures followed by different labs. but this does not have much effect on the results. The results are likely to be low if the soln is not properly cooled after adding the Mg reagent and the dil NH_4OH used for washing should be at 18°. The no. of washings does not seem to have much effect if the wash liquid is cold. A slight darkening of the ppt. does not seriously affect the results and the practice of whitening by adding HNO_3 is inadvisable. It is also noted that some labs. are using factors for converting the wt. of P_2O_5 which are based on antiquated at wts.

Acetophenetide as a stabilizer of cupferron solution. FREDERICK G. GERMUTH. *Chemist-Analyst*, 17, No. 3, pp. 3 and 15(1928).—The addn. of 0.05 g. of acetophenetide to 100 cc. of cupferron reagent tends to prevent decompn. of the latter. At the end of 1 month there is only a slight decompn. of the soln.

The antimony-antimony trioxide electrode and its use as a measure of acidity. E. J. ROBERTS AND F. FENWICK. Yale Univ. *J. Am. Chem. Soc.* 50, 2125-47(1928).—The e. m. f. of the $\text{Sb/Sb}_2\text{O}_3$ electrode is shown to depend on (1) the crust character of the oxide used, (2) the presence or absence of air in the electrolyte and (3) the direction by which the state of equilibrium is approached. The best results are obtained with the cubic rather than the orthorhombic oxide. The transition point of these 2 oxides lies at about 570°, the cubic form being the more stable below this temp. Com. Sb_2O_3 is likely to contain enough sulfide to make it necessary to subject it to a drastic purification. In measuring the e. m. f. the electrolyte should be air-free and should be pretreated with a soln. which is more alk. than the one being studied. Under these conditions the e. m. f. is a linear function, with theoretical slope, of the pH of the soln. The difference between it and a H_2 electrode in a soln. of the same acidity is 0.1445 v. at 25°. Equal accuracy can be obtained without excluding air, if the electrode is standardized against 2 solns. of known acidity. Such an electrode is superior to the H_2 electrode as it requires but little attention when once set up. HCl should not be present in concn. greater than 0.16 M, H_3PO_4 greater than 0.15 M and H_2SO_4 in concn. greater than 1 M. Because the behavior of the $\text{Sb/Sb}_2\text{O}_3$ electrode indicated that previously detd. temp. coeffs. applied to the Clark and Lubs buffers were somewhat in error, the pH of certain of these solns. were measured at 25° with the H_2 electrode. In the course of the work it was established that Sb_2O_3 obtained by the hydrolysis of SbCl_3 solns. consists chiefly of orthorhombic crystals. The free energy of formation of cubic Sb_2O_3 at 25° is -150,000 cal and the free energy of transformation of orthorhombic into cubic Sb_2O_3 is -1800 cal. The e. m. f. of the 0.1 N Hg_2Cl_2 electrode was derived in 2 different ways and found to be -0.3341 v.

Gravimetric determination of the thallium radical as thallos iodide. STEPHEN SOULE. *Chemist-Analyst* 17, No. 3, 4(1928).—Believing that more than 1% of KI in excess of the amt. required to form TII is injurious, S. recommends taking a special sample and detg. how much KI can be added before the soln. will give a test with FeCl_3 and CHCl_3 . This procedure, it is claimed, is especially desirable when the Tl content is low. Wash the TII ppt. with 25 cc. of hot water, then with 50 cc. of water satd. with TII, 3 times with alc. and 3 times with ether before drying at 100°.

Two qualitative tests for zinc ions in the presence of manganese, nickel and cobalt

ions. R. RIPAN. *Bul. soc. stiinte Cluj* 4, 80-3(1928).—The 2 tests described depend on the formation of either ZnPy_2I_2 or ZnPy_2Br_2 by adding alkali halide and pyridine in excess. Both are very insol. ppts. and suffice to detect 0.01 mg. of Zn present at a concn. of 5 mg. per 100 cc. of soln. It is proposed to develop a method for the detn. of Zn in the presence of Mn, Ni and Co by means of these reactions. W. T. H.

The use of metallic cyanates as a basis for a new method of separating the members of the third analytical group of cations. (MILE.) R. RIPAN. *Bul. soc. stiinte Cluj* 4, 104-9(1928); cf. C. A. 22, 3104.—Treat the ppt. produced by NH_4OH and $(\text{NH}_4)_2\text{S}$ with a little 10% HCl and some H_2O_2 . Boil gently and filter off residual S. To the soln. add Na_2CO_3 until it is barely acid in reaction, add 1-2 g. of NH_4NO_3 , heat to boiling and ppt. $\text{Fe}(\text{OH})_3$, $\text{Cr}(\text{OH})_3$ and $\text{Al}(\text{OH})_3$ by adding small portions of 2% KCNO soln. Boil a few min. and filter. After washing once, treat the ppt. with 10-12 cc. of boiling N NaOH soln. to dissolve the Na as NaAlO_2 . Make the soln. neutral to litmus and add a few drops of 2 N HCl . Add a little KCNO reagent, and continue boiling. The formation of a ppt. by this treatment indicates the presence of Al. After the removal of the Al from the first ppt., treat the residual $\text{Fe}(\text{OH})_3$ and $\text{Cr}(\text{OH})_3$ with a hot N soln., of NaOH to which 4-6 cc. of Br_2 -aq. has been added. This converts the Cr to yellow chromate anions. In the remainder of the original ppt. $\text{Fe}(\text{OH})_3$ is recognized by its color or by dissolving in dil. HCl and applying the thiocyanate test. In the filtrate from the original pptn. with KCNO detect Mn by treatment with NH_4OH and Br_2 -aq. Filter and test the filtrate for Zn by treatment with KI and pyridine, forming ZnPr_2I_2 . Filter off the Zn ppt. and next test for Co by evap. to dryness, dissolving in 1-2 cc. of water, adding 5-8 cc. of acetone and a few drops of concd. KCNO soln. The formation of a coloration due to $\text{K}_2[\text{Co}(\text{CN})_4]$ is evidence that Co is present. In the same soln., or in another portion of that serving for the Co test, try the dimethylglyoxime test for Ni. W. T. H.

Studies of hydrogen-ion concentration measurements. I. Methods of measurement. CLARKE E. DAVIS AND GLENN M. DAVIDSON. *J. Am. Chem. Soc.* 50, 2053-65 (1928).—Reans and Oakes in 1920 detd. p_{H} values without a potentiometer, using a high-grade condenser, standard cell and ballistic galvanometer. Carhart and Potter have described more recently a similar procedure. This method can be applied to all concn. cells but is especially advantageous for the measurement of the e. m. f. of cells having such a high internal resistance as to render them impossible of measurement by the potentiometer method. It was thought desirable to study carefully the errors of the condenser method. These errors are due to the accumulation of errors on the plates of the condenser, the throw of the galvanometer, humidity and the formula used for the calcn. of the unknown e. m. f. In this paper, the important errors are calcd. and graphs drawn to show the significance of such errors in the titration of H_2SO_4 and of H_3PO_4 with 0.1 N NaOH . In the former case the end point agrees closely with that obtained with the potentiometer but in the latter case the first and second end points are not nearly as clear as with the potentiometer. The accumulative error in the condenser method may amt. to 30-40 mv. in either direction. The results, therefore, seem to indicate that the condenser system of e. m. f. measurements cannot be used where precise work is required, such as in the titration of solns. or in the detn. of equil. consts. W. T. H.

Toxicology of lead and its compounds. IV. Electrolytic detection of lead. P. W. DANCKWORT AND E. JÜRGENS. *Hannover. Arch. Pharm.* 266, 367-74(1928).—An exptl. study shows that Pb can be detected electrolytically in very minute traces even admixed with other metals. In case the cathodic Pb tree formation is masked by other metals, the addn. of HNO_3 causes the anodic sepn. as PbO_2 . The detection of Pb can be effected in the HNO_3 soln. after destruction of org. substance. The growth of Pb crystals is observed under the microscope, the anodic sepn. being carried out in a glass vessel. When a brown coloration of the anode is not directly observable, electrolysis is continued 2 hrs., the Pt wire laid on filter paper and dabbed with Arnold's reagent. V. Quantitative nephelometric determination of lead. *Ibid* 374-82.—It is possible to det. Pb nephelometrically in amts. as small as 0.006 mg. A turbidity standard produced by 0.05 mg. Pb in an AcOH soln. of $\text{K}_2\text{Cr}_2\text{O}_7$ can be used over a period of an hr. without appreciable change in particles or danger of pptn. A series of turbidities is prepd. for purposes of comparison and exclusion. NaOAc and Cu are without influence on the turbidity. Large amts. of Fe, however, make the readings somewhat inconstant. W. O. R.

Determination of organic matter in mixed acid and of carbon in nitrocellulose. CARRIERE AND GUIBERT. *Mém. des poudres* [1], 23, 29-32(1928).—In the flask of a Soxhlet extractor, heat 10 g. of CrO_3 and 120 g. of mixed acid. For C, heat 0.35 g.

of nitrocellulose, 80 g. of 66° Bé H_2SO_4 and 36 g. of 40° Bé nitric acid in the Soxhlet flask. Wash the evolved gas through a pumice-sulfuric acid tube, a permanganate-sulfuric acid tube and collect in a Liebig KOH bulb.

A. J. PHILLIPS

Technical analysis of carbazole. E. SCHWENK AND L. WANKA. *Z. anal. Chem.* **74**, 168-87 (1928).—By a modification of the Kjeldahl method, using CrO_3 and AcOH instead of H_2SO_4 as oxidizer, it is possible to est. the carbazole content with a fair degree of accuracy. Take 0.5-10 g. of material according to whether 50-5% of carbazole is present. To this add 450 cc. of AcOH, heat to boiling and while boiling add 50 cc. of soln. contg. 37 g. CrO_3 , 25 cc. of water and 25 cc. of glacial AcOH. Digest for 0.1 hr. under a reflux condenser and then distil off 400 cc. of coned. AcOH. Dil. with 1 l. of water, add 15 g. of Zn, 300 cc. of 30% NaOH and distil off NH_3 as in the Kjeldahl method.

W. T. H.

Analytical notes concerning vanillin and vanillin sugar. J. PRITZER AND ROB. JUNGKUNZ. *Chem.-Ztg.* **52**, 537 (1928).—The following reagent is most suitable for the detection of vanillin. Dissolve 4.4 g. of KNO_2 or 3.6 g. of NaNO_2 in 100 cc. of cold, satd. HgCl_2 soln. (about 7% HgCl_2) and add 1 cc. of 10% Na_2CO_3 soln. Filter, mix with an equal vol. of the vanillin prepn. and heat 5 min. For the gravimetric detn., treatment with nitrobenzohydrazide is recommended. For the volumetric detn., titration with 0.1 N NaOH, using thymolphthalein as indicator, gives values agreeing closely with the gravimetric method.

W. T. H.

Preparation of polymerization acid. W. H. HAMMOND. *Chemist-Analyst* **17**, No. 3, 14 (1928).—Polymerization acid, contg. 82.39% of SO_3 is used in the analysis of wood and coal-tar distn. products in the presence of hydrocarbons and in testing the purity of turpentine and carbolinum. Weigh a 1-l. reagent bottle. Pour into this bottle the entire contents of a 1-lb. bottle of fuming sulfuric acid. Stopper the bottle and wait until the fumes subside. Then remove a sample to a weighing pipet and transfer the weighed sample to a beaker of water. Det. the acidity and also the acidity of coned. H_2SO_4 . Compute how much of the latter is necessary to bring the fuming acid to the required SO_3 concn. Add about 80% of this quantity of coned. H_2SO_4 , take another sample and check the work before adding the last of the coned. H_2SO_4 .

W. T. H.

A new reaction for the identification of urotropine and of formaldehyde. Rapid method for the analytical differentiation of these two substances in a mixture. MIRCEA V. IONESCU. *Bull. soc. chim.* **43**, 677-80 (1928).—Both urotropine and formaldehyde react with a 5-10% aq. soln. of dimethyldihydroresorcinol to form an insol. cryst. ppt. of methylenebisdimethyldihydroresorcinol. By this reaction 1 g. of urotropine can be detected when dissolved in 50 l. of water. With formaldehyde the reaction is the same as with urotropine except that no NH_3 is liberated. The reaction with HCHO takes place quickly in the cold, whereas the reaction with urotropine is much slower. It is possible, therefore, to test for formaldehyde and urotropine separately, even when both are present. To the cold aq. soln., add an excess of the reagent. If formaldehyde is present the reaction will be complete in about 10 min. After 15 min. filter off the ppt. and heat the filtrate to boiling. Then, if urotropine is present some more of the same ppt. will be formed.

W. T. H.

Action of polyalcohols on periodic acid. Analytical application. I. MALAPRADE. *Bull. soc. chim.* **43**, 683-96 (1928).— $\text{K}_2\text{I}_2\text{O}_8$ in dil. H_2SO_4 soln. reacts with glycol to form KIO_3 and HCHO. One mol. of HIO_4 oxidizes 1 mol. of glycol to 2HCHO. With glycerol and other polyalcohols HCHO and HCO_2H are formed. With 1 mol. of glycerol, 2 mols. of HIO_4 are reduced, 1 mol. of acid and 2 mols. of HCHO are formed. With 1 mol. of erythritol, 3 mols. of HIO_4 are reduced, 2 mols. of acid and 2 of HCHO are formed. With adonitol, 4 mols. of HIO_4 are reduced and with mannitol 5 mols. These reactions can be utilized for the detn. of HIO_4 when mixed with HIO_3 and for the detn. of polyalcohols in pure aq. solns. *Detn. of periodate in the presence of iodate.*—To the acid soln. add KI and titrate the liberated I_2 with thiosulfate. 3I_2 is obtained from iodate and 4I_2 from periodate. In another similar sample, add an excess of mannitol to the acid soln. and after 0.5 hr. add KI and titrate as before. Less thiosulfate will be required because the mannitol has reduced the periodate to iodate. From these 2 titrations both IO_3^- and IO_4^- can be computed. *Detn. of polyalcohol in aq. soln.*—First det. the amt. of thiosulfate required to titrate a portion of periodate after adding KI to the acid soln. Then add the same vol. of acid periodate soln. to a definite vol. of polyalcohol. Wait 2-3 hrs. for the reaction between the alc. and the periodate to complete itself. Then add KI and titrate the liberated I_2 .

W. T. H.

CARNEVALE, P.: *Elementi di analisi chimica ad uso degli istituti tecnici, industriali commerciali e delle scuole agrarie medie.* Turin: Paravia. 222 pp. L. 17.

FICHTER, FRIEDRICH: *Übungen in quantitativer chemischer Analyse*. 2nd ed. Basel: E. Birkhäuser & Cie. 156 pp. F. 6.80.

SCHMIDT, ERNST: *Anleitung zur qualitativen Analyse*. 10th ed. Edited and revised by Johannes Gadamer. Berlin: J. Springer. 114 pp. M. 5.60.

Analysis of gases. SOC. ANON. CHARBONS ACTIFS ÉDOUARD URBAIN. Fr. 632,396, July 24, 1926. Changes in the compn. of a mixt. of gases or vapors are detected by the automatic recording of the absorption spectrum of light after passing through the gas.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Some minerals of the Kuban metalliferous region, Caucasus. P. I. LEBEDEV. *Bull. acad. sci. union rep. soviet. serial*. 1927, No. 12-14, 953-66 — Dolomite, barite and sphalerite occur in veins. Two samples of each were analyzed with the resp. results: SiO_2 0.22, 0.50, CaCO_3 57.71, 53.39, MgCO_3 35.59, 42.29, FeCO_3 6.28, 3.85%; sp. gr. 3.077, 2.861. BaSO_4 97.96, 97.17, CaSO_4 1.02, 0.0, SrSO_4 0.33, 2.06, MgSO_4 0.50, 0.0, loss on ignition 0.30, 0.0%. ZnS 86.66, 83.78, FeS 11.69, 15.82, CdS 1.39, 0.06, PbS 0.26, 0.34%; sp. gr. 4.107, 4.075.

BERNARD NELSON

Reniphorite, a new mineral from the Yunosawa mine, Province of Mutsu, Japan. KEIKICHI KAWAI. *Jap. J. Geol.* 3, No. 3-4; *Chem. Zentr.* 1926, II, 3028 — The mineral, which occurs with barite, has d. 6.451 and the compn. $5\text{PbS} \cdot \text{As}_2\text{S}_3$. It is thus an analog of geonorite, $5\text{PbS} \cdot \text{Sb}_2\text{S}_3$.

C. C. DAVIS

Iozite, an important mineral of the lava of young volcanoes. ALB. BRUN. *Schweiz. mineral. petrog. Mitt.* 4, 355-6(1924); *Chem. Zentr.* 1926, II, 3031. — Iozite (FeO) occurs frequently in lavas rich in Fe. It seps. with feldspars, forming rectangular opaque granules ($< 10\mu$ in size), and comprises 0-50% of the Fe content of the lava.

C. C. DAVIS

Preliminary communication on a study of the structural change of the solid solution of moonstone (Japan). SH. KOZU AND KENICHI WADA. *J. Geol. Soc. Tokyo* 30, 342-56(1923); *Chem. Zentr.* 1926, II, 3030. — X-ray photographs of Ceylon moonstone showed that at 400° it consists of 2 solid phases, one of which is rich in K, the other in Na. At 500° these 2 phases blend, at 700° there is a sudden pronounced structural change; and at 1650° the 2 phases form a homogeneous solid soln. With the structural change the optical axial angle increases. In moonstone from Korea, blending of the 2 phases is complete at 650° . The shimmer of Ceylon moonstone disappeared at 1100° , that of Korea moonstone at 700° .

C. C. DAVIS

The pyroxenes of Campiglia Marittima, Tuscany. P. ALOISI. *Mem. accad. Lincei* [6], 2, 2-15(1926); *Chem. Zentr.* 1926, I, 256. — There are 3 types: (1) dark green or brown, with long thick fibers; (2) light gray-green to brown-yellow, with fine fibers and (3) reddish, in granular or foliated masses. They gave, resp.: H_2O —, 0.22, 0.24, —; $\text{H}_2\text{O} +$, 0.46, 0.28, —; SiO_2 , 47.16, 49.28, 51.84; Al_2O_3 , 0.72, 0.82, 0.75; Fe_2O_3 , 6.10, 0.19, 0.45; FeO , 19.50, 1.25, 1.21; MnO , 3.75, 27.60, 33.85; CaO , 22.16, 20.32, 9.33; MgO , 0.66, 0.72, 1.37. Type 1 is of the compn. of hedenbergite contg. Mn, and has the usual optical properties of such pyroxenes, often with twin formation as in augite. It is accompanied by granules of quartz, magnetite, calcite, and perhaps also zoisite and clinozoisite. The optical properties of type (2), a *bustamite*, approach those of hedenbergite. This type is accompanied by quartz. The compn. of type (3) resembles a *rhodonite* contg. Ca. This type has optical monoclinic or pseudomonoclinic symmetry, and is accompanied by quartz and calcite. Transition forms between types (2) and (3) exist. The optical properties of the *bustamite* and *rhodonite* are notably different from those of other pyroxenes of similar compn. There is no evident relation between the optical properties and chem. compn. of pyroxenes contg. Mn.

C. C. DAVIS

Crystallographic study of some crystals of Brazilian euclase. MARIA PIAZZA. Univ. Rome. *Mem. accad. Lincei* [6], 2, 18-29(1926); *Chem. Zentr.* 1927, I, 51. — In pale yellow, greenish yellow or blue-green crystals of Brazilian euclase were frequently observed inclusions (apparently mica or chlorite) and natural etch figures, prevailing in the direction of the vertical axis. Their arrangement confirmed the classification of the mineral as monoclinic prismatic. The crystallographic data are recorded in detail.

C. C. DAVIS

A microchemical method applied to stellerite. SR. J. THUGUTT. *Arch. lab. min.*

Soc. des Sciences de Varsovie 1, 34-6(1925); *Chem. Zentr.* 1927, I, 1047.—After dehydration at 140°, stellerite becomes yellow-red with AgNO_3 and K_2CrO_4 , whereas stilbite similarly treated remains colorless. C. C. DAVIS

Wolchonskoite. L. V. PUSTOVALOV. *Trans. Inst. Econ. Mineral. Met. (Moscow)* 1928, No. 36, 1-57; cf. *C. A.* 8, 41.—It has hitherto been thought that wolchonskoite is a rare mineral, but P. finds that it is, on the contrary, very widely distributed in north-eastern European Russia. The samples hitherto described do not represent the unaltered original material, but only an air-dried modification. Freshly mined wolchonskoite, which is always moist, does not disintegrate in water into small pieces like the mineral which has become dry; it possesses different structure and properties. The genesis of wolchonskoite and its chem. nature remain as yet but little known. BERNARD NELSON

The problem of the chemical formula of apatite. H. HAUSEN. *Finska Kemist-samfundets Medd.* 35, 9-18; *Chem. Zentr.* 1927, I, 1811.—A preliminary communication. The chem. compn. of apatite can be expressed in a composite formula, which contains, besides the double salt $3\text{Ca}_3(\text{PO}_4)_2 \cdot \text{Ca}(\text{F}, \text{Cl})_2$, the isomorphous compd. $3\text{Ca}_3(\text{PO}_4)_2 \cdot \text{Na}(\text{F}, \text{Cl})$ in variable proportions. In formulating its compn. it is essential to know the relation between the F deficiency on the one hand and the alkali content on the other. C. C. DAVIS

The nature of the lead in vanadinite of the Tjuja Muyun radium mine, Ferghana. K. NENADKEVICH. *Compt. rend. acad. sci. U. R. S. S.* 1926, 56-8; *Chem. Zentr.* 1927, I, 1811-2; cf. *Bull. acad. Leningrad* [6], 1926, 767.—The Pb in the vanadinite has d, 11.349, and its at. wt. is 207.16, which indicates that it is ordinary Pb, not formed from U. C. C. DAVIS

Zoning of mineral deposits in British Columbia. GEORGE HANSON. *Trans. Roy. Soc. Can.* 21, IV, 119-26(1928).—A review of the mineralogical maps of B. C. indicates that different metals and ore minerals occur at different distances from their common igneous source. The minerals in an area of 400 sq. miles in the Zymoetz River area east of Prince Rupert have a distinctly zonal arrangement. High-temp. minerals such as scheelite, molybdenite and Au-quartz veins lie in the tongue of the batholith, while low-temp. minerals are found in the outer zone. The minerals found in the area are scheelite, molybdenite, Au, chalcopyrite, pyrite, bornite, sphalerite, galena, tetrahedrite and some Ag minerals. Across the zones a gradation is evident from Au through Cu to Ag-Pb-Zn deposits. The metals probably arose from a source directly below the deposits and the apparent zoning is due to the dip of the source rock. From a study of the relationship of mineral deposits to possible sources of origin, H. concludes that ore deposits have their origin in an irregular tabular zone not much more than 1000 feet thick in the uppermost part of the parent magma. The lack of mineralization in certain areas is attributed to the absence of metals in the source and the nature of the country rock. The location of the zone of origin of ore deposits should be the guide in searching for new ones. Metal zoning is to be preferred to mineral zoning. J. W. SHIPLEY

U. S. S. R. resources in mineral raw materials, their geographical distribution and exploitation in chemical industry. A. G. FERSMAN. First All-Russian Conference on Problems of Chem. Industry. *J. Chem. Ind. (Moscow)* 4, 277-82(1927).—Estimates of the total Russian supplies in mineral chem. raw materials are as follows: *Very considerable:* salt, lime, chalk, quartz, Glauber salt, gypsum; *considerable:* P, pyrite, S, kaolin, refractory clays, magnesite, K salts, Mg salts, fluorite, SrSO_4 , BaSO_4 , Cr compds., Be compds., Se; *moderate:* bauxite, feldspar, mineral dyestuffs, dolomite, Ti compds. (ilmenite and titanomagnetite), Br and I salts, As, Ra; *small:* soda, alunite, Th, Zr, Bi, V; *poor or lacking:* saltpeter, B. Many of these resources are almost untapped. The *White Sea-Leningrad region* is rich in bauxite, feldspar, quartz materials, barite, mineral dyestuffs, celestite, apatite, dolomite, gypsum, refractory clays. Hydroenergy and peat being abundant in this region the following chem. industries are coned. there: manuf. of ceramics, of refractory products, of Al, of alundum, of mineral dyestuffs, of P and of fine chemicals. The *Central-Industrial and Volga region* contains clays, gypsum, dolomite, salt, phosphorites, brown coal. The presence of big consumption centers and of competent workers led to the development in this region of a no. of chem. industries, particularly glass and ceramics. The *Donetz-Ural region* is rich in coal, kaolin, lime, salt, chalk, quartz materials, feldspar, phosphorite, mineral dyestuffs, etc. This region would be well adapted to a development of a powerful chem. industry, if it were not for the lack of H_2SO_4 . The *Black Sea-Caspian Sea region* contains salt, mineral oil, Glauber salt, S, Br, I, Mg. *Caucasian-Transcaucasian region:* mineral oils, barite, pyrite, alunite, As, salt, Glauber salt, S, acid-resisting materials, lime, Mn, Co, Cr, Zn, Cd. This region undoubtedly has an enormous future. *Kama-Ural*

region: pyrite, K salts, phosphorites, salt, kaolin, lime, quartz, feldspar, mineral dyestuffs, talc, magnesite, As, dolomite, nephelite, Se, Ti, Cr, Ba, Li, Zn. An important chem. industry should be developed in this region. **Mid-Asiatic region:** mineral oils, ozocerite, salt, Glauber salt, S, barite, celestite, fluorite, V, U, Ra, Sb, Hg. **Kirghiz-Alai region:** salt, Glauber salt, barite, pyrite, refractories, Zn, Mo, Pb, Cu. **Kuznetsk-Minusinsk region:** coal, salt, pyrite, barite, fluorite, feldspar. **Transbaikal region:** Glauber salt, soda, fluorite, As, W, Bi, Sn, Mo, Zn, Pb, rare earths, Be, Li. Chem. development is just beginning.

BERNARD NELSON

Natural productive strength of Russia. S. LICHAREVA. **Strontianite and celestite**, No. 30a; **Useful fossil materials**, 4; **Copper**, No. 7, 1-183; **Silver, lead, zinc, gold**, No. 8, 1-118, 68 pp.; *Chem. Zentr.* 1927, I, 1144.—The catalog of the strontianite and celestite deposits of Russia includes analytical data on these minerals of the most varied origin and formation. Strontianite always contains more or less CaO and BaO, and celestite always CaO and SrO.

C. C. DAVIS

Rare-metal deposits in Brazil. HENRIQUE G. THUT. *Chimica industria* 1, 349-54 (1926); 2, 383-4, 403-4 (1927).—**Monazite sands.**—The monazite deposits of Brazil are the largest in the world; they extend from the state of Bahia to the state of Rio de Janeiro. Compn.: Ce 62%, Th 1.5-15%, Y 1-3%, La 2.5%, Fe 2.5%, Al 3%. The sands are coned on Wilfleys and on Humboldt magnetic separators. Th is extd. as sulfate from monazite and thorite by decompn. with H_2SO_4 . Ce is found assoc. with La, Y and Th in samarskite, euxenite and monazite. The powd. mineral is digested with hot H_2SO_4 and pptd. as double sulfate with K_2SO_4 , the metals of the Y group remaining in soln. Y combined in gadolinite, xenotime and in monazite sand; La in monazite sands, cerite, allanite and lanthanite. La oxide is easily reduced by Na or K, or by electrolysis of the double Na chloride. Ta and Nb combined in samarskite (40% Ch_2O_6 , 14% Ta_2O_5), tantalite and columbite, at Ramalhetes, Peconha (Minas). Nb is obtained from the oxide by a reduction with Al; Ta from the fluoride by K. V is found in many places as vanadinite; it is extd. from a $NaOH-Na_2CO_3$ fusion with H_2SO_4 . Er is found combined in xenotime near Diamantina and Tripuhi (Ouro Preto). The mineral is decomposed by HF and the insol. Er is sepd. by filtration. Notes on history, properties, compds. and uses are given for each metal.

R. D. BUMBACHER

Gold and silver deposits in the Omui gold mine. CHOZO IWASAKI. *Japan. J. Geol.* 52, No. 3-4, 13-8 (1924). *Chem. Zentr.* 1927, I, 1143-4.—1. holds that during a liparite eruption, colloidal solns. of Au and Ag sulfides and SiO_2 penetrated the rock veins and remained there. Then began a concn. of the noble metals in the colloids which, like breccia, were sealed by the remaining crystd. silicates. Chlorination followed, with formation of cerargyrite and argentite and finally disintegration. In the last 2 yrs., 2500 tons of ore with 0.0024% Au and 0.036% Ag were obtained from one vein alone.

C. C. DAVIS

Mines of gold, silver and copper ore at Matrabanya [Hungary]. A. VITÁLIS. *Földtani Kozlony* 56, 172-83 (1927).—A geological description. Analyses of a few ores are given.

A. L. HENNE

Magnetic nickel pyrite deposits of the southern Black Forest in the St. Blasien district. K. SAUER. *Ber. Freiburger Geol.* 8, 78-85 (1920). *Chem. Zentr.* 1927, I, 1144.—A description of the deposits, which contain an av. of 0.25% Ni + Co and 0.3% Cu.

C. C. DAVIS

Note on the existence of a bauxite bed in Shan-Tung, China. KYUKICHI WATANABE. *Japan J. Geol.* 3, No. 3-4, 87-90; *Chem. Zentr.* 1927, I, 1144.—In the coal fields of Shantung there is a deposit, extending over 100 km., and varying from white to almost black, which by microscopic examn. appears to be homogeneous with only a few crystal formations. Analysis showed 55% Al, a high content of combined H_2O and a little SiO_2 . In the darker parts the Al content is lower than in the lighter parts.

C. C. DAVIS

Base exchange and the formation of coal. E. MCKENZIE TAYLOR. *Nature* 121, 789-90 (1928); cf. *C. A.* 22, 371.—An examn. of the roofs of bituminous coal seams of the Jurassic, Cretaceous and Tertiary ages proved that these roofs like those of the Carboniferous age have undergone base exchange and hydrolysis. The final stage in coal formation appears to have been the bacterial decompn. of accumulated plant material under alk. anaerobic conditions. An expt. was arranged by placing a mixt. of sand and fat at the bottom of a beaker and inoculating this layer with soil suspension. A roof contg. hydrolyzing Na clay was deposited on the sand-fat layer and the whole was covered with water and was incubated at 30°. The fat was hydrolyzed, the resulting glycerol being converted to CH_4 and the aliphatic acid being reduced to the corresponding paraffin. These results have a bearing on the formation of petroleum as well as coal.

L. W. RIGGS

Tables for the calculation of rock analyses. D. J. MAHONY. *Bull. Geol. Survey Vict.* 1927, 51; *Australian Sci. Abstracts* 7, 5.—Three sets of tables are given, based on accurate at. wts. The first 2 tables are for mol. proportions and percentage wts. of mol. proportions of normative minerals. These tables are set out in a new form which greatly shortens them, does away with interpolation and gives accurate results to the second decimal place. The third set of tables enables practically all the common rock-forming minerals to be calcd. directly from analysis and may be used for taking out both norm and mode. H. G.

Minerals of the Soogoor mountain range. E. A. KUZNETZOV. *Trans. Inst. Econ. Mineral. Met. (Moscow)* 1928, No. 37, 1-53.—The Soogoor range, which is a prolongation of Mount Karabash, is composed of serpentines and pyroxenites intersected with bands of porphyrite tuffs and tuff schists. Chem. and mineralogical analyses are given of the *serpentines*, *pyroxenites* and rocks derived from them by partial metamorphism and erosion. BERNARD NELSON

Metamorphized gabbrodiorite of Klokocna. J. KRATOCHVIL and V. VISELY. *Rozpravy. Ces. Akad.* 31, Kl. II, No. 27, 1922; *Chem. Zentr.* 1926, II, 3027 + C. C. DAVIS

Petrographic study of the dark sands of the north shore of the Sea of Azov. P. CHIRVINSKII. *Verh. Russ. Miner. Ges.* 54, 159-72 (1925); *Chem. Zentr.* 1927, I, 1568.—The sand between Novonikolaevskaya and the Mins-Limans shore consists, as indicated by a representative analysis of quartz 48.97, magnetite 25.19, staurolite 13.40, orthite 3.83, garnet 3.00, sillimanite 1.25, cyanite 0.62% and other minerals. The minerals of this Quarternary sand must originate from granite, gneiss and cryst. schist of south Russia. C. C. DAVIS

Nature of clay and its significance in the weathering cycle. G. W. ROBINSON. *Nature* 121, 903-4 (1928).—The primary residual product of the chem. weathering of silicates is a mixt. of kaolinite and notronite or of hydrated silicates having the same silica-sesquioxide ratio, namely, 2. Variations from this ratio may occur as a result of the differentiation consequent on soil profile development, leading in humid temperate climates to the production of a more siliceous (a) horizon and a less siliceous (b) horizon, and in humid tropical climates to the formation of laterite. Enrichment of the clay complex in silica takes place in estuarine and other littoral sediments in consequence of the concomitant pptn. of the silicic acid present in river waters. J. W. RIGGS

Chemical action in the desert. G. STEINMANN. *Sitz-Ber. Niederrhein. Ges. Natur.-u. Heilkunde Bonn* 1924, 8-12; *Chem. Zentr.* 1927, I, 257.—In the desert regions of Atacama, the occurrence of abundant quantities of halides of the heavy metals is worthy of note. The origin of borates is doubtless volcanic, and probably Chili salt-peter originated in a similar way. The halides accompanying the ore veins contain large quantities of I, Br and Cl compds., enriched with Ag, Cu and Pb. The transformation of the S ores to halides as well as the oxidation of the halides and of the NH_3 are to be regarded as special effects resulting from chem. reactions characteristic of the desert climate. C. C. DAVIS

Chemical weathering in the Egyptian desert. E. BLANCK, S. PASSARGE, A. RIESER and F. HEIDE. *Hamburg, Univ. Abh. Gebiet Auslandskunde* 17, Reihe C, *Naturwissenschaften* 6, 110 pp. (1925); *Chem. Zentr.* 1927, I, 257.—The Egyptian deserts are regions of active chem. disintegration. Everywhere that rock is covered with a black-brown protective crust, a diluvial surface may be present. The formation of a desert crust is the most important chem. transformation. The weathering of the individual rocks is considerably greater than has been heretofore assumed. C. C. DAVIS

A few observations on the Island of Vulcano. A. ROCCATI. *Boll. soc. geol. ital.* 44, II, 135-9 (1925); *Chem. Zentr.* 1927, I, 1569.—Up to the present time NH_4Cl and B_2O_3 have been considered normal products of the fumaroles of the Island of Vulcano. This idea is however erroneous, for the most frequent efflorescent products of the soil are $\text{Fe}_2(\text{SO}_4)_3$ and $\text{Al}_2(\text{SO}_4)_3$. The eruption of a S fumarole was observed. The temp. of the S which emanated was 98° , that of the steam 104° . The activity lasted about one month, and 10 tons of S were given off. Another fumarole yielded in the same length of time 30 tons of S at 106° . In this fumarole a sudden rise of temp. was accompanied by the escape of HF. Because of the water also discharged, SiF_4 was formed, and gelatinous SiO_2 at cracks and fissures. C. C. DAVIS

Dossor mineral oil (TUCHININ, PAVLOVA) 22. Synthetic gems (HOFFMANN) 6.

BUTTENBACH, H.: Les minéraux et les roches. 5th ed. revised. Practical

study of crystallography, petrography and mineralogy. Paris: Dunod; Liege: Vaillant-Carmanne. 757 pp. Reviewed in *Mineralogical Abstracts* 3, 462(1928).

DAMMER, BRUNO AND TRETZE, OSKAR: *Die nutzbaren Mineralien mit Ausnahme der Erze und Kohlen. Bd. II.* 2nd ed. Revised by Bruno Dammer. Stuttgart: F. Enke. 785 pp. M. 47.; cloth, M. 50.

SCHORNSTEIN, W.: *Die rolle kolloider Vorgänge bei der Erz- und Mineralbildung.* Insbesondere auf den Lagerstätten der hydrosilikatischen Nickelerze. Halle a. S.: Knapp. 87 pp.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, R. H. ABORN

Beryllium: a survey. A. C. VIVIAN. *Mining Mag.* 38, 220-2(1928). A. B.

Lead and articles manufactured from it. BRENTHEL. *Chem.-Ztg.* 52, 169-70, 190 2, 250 2(1928).—A lecture outlining the metallurgy, properties and uses of Pb and its alloys. Lead sheet, pipe, valves, pumps, cable covering and app. for use in the chem. industry are given special consideration. W. C. EBAUGH

Gold, silver, copper, lead and zinc in Idaho and Washington in 1926. C. N. GERRY. *Bur. Mines, Mineral Resources U. S.* 1926, Pt 1, 415-70 (preprint No. 20, published June 23, 1928). E. H.

Flotation practice at the Sullivan mill. C. T. OUGHTRED. *Can. Mining Met. Bull.* No 194, 804 16(1928).—A detailed description, with data and flow sheets. A. BUTTS

Milling Baboquivari ore. EDMUND S. LEAVER AND JESSE A. WOLF. *Bur. Mines, Repts. of Investigations* No 2874, 2 pp(1928).—An analysis of this ore shows SiO_2 90.10, Fe_2O_3 5.30, Al_2O_3 1.64, CaO 0.20, MnO 1.20, S 0.04%, Ag 4.23 oz. per ton and Au 0.275. A flotation mill does not conc. precious metals satisfactorily. In lab. grinding to 65 mesh and floating with xanthate or standard flotation oils + Na_2S and polysulfide gave concn. of 32% of the Ag and 80% of the Au. This about equals plant practice. Flotation does not conc. oxidized forms of Mn satisfactorily. Plain cyanide on original ore exts. practically all Au but only $\frac{1}{3}$ of the Ag. A preliminary deoxidizing roast, with producer gas or powdered coal, gives a calcine from which cyanide dissolves about 90% of the Au and 75% of the Ag. This is the Clevenger-Caron process described in *C. A.* 19, 2624. Preliminary treatment with SO_2 by burning pyrite or S and passing this gas into the pulp until all Mn is dissolved or changed in form best prepares the ore for cyanidation. Neither Au nor Ag is dissolved by this acid treatment. The washed residue gives max. cyanide solution of Au and Ag with min. loss of cyanide. H. C. PARISH

Cyanidation test on high-grade gold ore from the Columbia mine. H. D. WILSON. *Black Hills Eng.* 16, 205-13(1928).—The best recovery with extra-fine grinding followed by amalgamation and cyanidation was 74%. Roasting at 500-600° till sweet resulted in over 90% recovery. Photomicrographs are reproduced. E. G. R. A.

Microscopic study of an ore as an aid in copper leaching. R. E. HEAD. *Eng. Mining J.* 126, 13-5(1928).—Ore from the Castle Dome ore body of the Pinto Valley Mining Co., near Miami, Ariz., was studied chemically and microscopically. In addn. to showing the nature of the metal-bearing and gang minerals present, the microscopic examn. indicated that the extent and nature of the fracturing, together with the compn. and mode of occurrence of the Cu-sulfides in the ore (chalcocite, covellite and chalcopyrite), are important considerations in conducting leaching operations and emphasized the value of microscopic study in procuring data not obtainable by chem. means. W. C. EBAUGH

Observations on the Inspiration leaching plant. E. H. ROBIE. *Eng. Mining J.* 125, 971-4(1928).—A discussion of metallurgical operations at Miami Copper Co. and Inspiration Consolidate Copper Co. plants, with photographs. H. C. PARISH

Bromocyanide treatment of telluride concentrate at Wright-Hargreaves. J. T. WILLEY. *Eng. Mining J.* 126, 16-7(1928).—Detailed directions are given for treating a part of the mill concentrates with "Dow's mining salts" (a mixt. of NaBr and NaBrO_3), "Cassel's cyanide" and H_2SO_4 . To make 1 lb. of bromocyanide, 521 g. Dow's salts per 1500 cc. water, 207 g. Cassel's cyanide per 1500 cc. water and 484 g. H_2SO_4 (66° Bé.) per 4500 cc. water, are mixed. A 20-lb. lot of bromocyanide mixt. is prepd. at once by running the 2 salt solns. into the acid. [Danger from HCN.—Abstr.] The soln. is then discharged into an agitator contg. 15 tons slime and 15 tons soln. Subsequent similar additions of 20- and 10-lb. portions of bromocyanide are made, thus

reducing the Au to a dollar in the tailings. Approx. 70 lbs. of bromocyanide are needed per charge, and about 6 hrs' treatment is sufficient. The entire charge of concentrate and soln. in the tank is then added to the secondary thickeners of the mill circuit. Extns. of 98% Au are claimed.

W. C. EBAUGH

Some constituents of basic open-hearth slag. J. M. FERGUSON. *Roy. Tech. Coll. Met. Club J.* 1927-8, No. 6, 9-18.—Tricalcic silicate, tricalcic ferrite and a magnetic constituent analyzing 8% SiO₂, 4.79% Al₂O₃, 32.04% Fe₂O₃, 4.86% FeO, 13.65% MnO, 32.20% CaO and 5% MgO, were isolated from basic open-hearth steel finishing slags, chemically analyzed, examd. in reflected and oblique light, and observations made of their optical behavior in thin sections by means of polarized light. Some aspects of the occurrence of these constituents in working slags are considered. Thirteen references are included.

DOWNES SCHAAF

Mining, milling and smelting at Superior, Arizona. E. H. ROBBE. *Eng. Mining J.* 125, 932-5(1928).—A short description is given of the mine, mill and smelter of the Magma Copper Company as well as the Belmont plant located at Superior, Wis. Analyses of mill feed and products of the Magma Company are given as follows:

	Cu	Ag	Au	Fe	CaO	Al ₂ O ₃	SiO ₂	'S
Mill feed	5.38	2.73	0.026	13.3	1.0	8.0	52.5	12.7
Table concentrate	13.60	8.51	0.086	31.7	0.7	2.2	10.4	13.0
Flotation feed	3.60	1.87	0.01	8.9	1.0	8.2	62.1	8.4
Flotation concentrate	16.15	8.29	0.085	25.6	0.8	3.4	17.9	28.7
Final tailings	0.168	0.12	Trace	5.5	1.3	10.6	73.6	2.2

A. W. HOFFMAN

Details of mill practice and manufacture as they affect rail quality. COMM. REPT. *Am. Ry. Eng. Assor. Proc.* 29, 560 2(1928).

R. C. BARDWELL

Smelting secondary aluminum and aluminum alloys. VIII. Blending methods in secondary smelting. ROBERT J. ANDERSON. *Metal Ind.* (N. Y.) 26, 347 9(1928); cf. *C. A.* 22, 747-8.

E. H.

The function of oxygen in the solution of metals and minerals by cyanide solutions. R. HAY. *Roy. Tech. Coll. Met. Club J.* 1927-8, No. 6, 23 8.—From exptl. test results it would appear that (1) O has a less tendency to combine with KCN in dil. solns. than in more concd. ones; (2) O plays a direct part in the soln. of Au in KCN solns. and does not act through the formation of oxidation compds.; (3) more concd. solns. of KCN dissolve Au faster, although the consumption of KCN is greater due to the excessive action of the air acting as a cyanide; and (4) when metals are dissolved in a cyanide soln., H is liberated and the O acts as a depolarizer, allowing the soln. of the metal to continue.

DOWNES SCHAAF

The question of drying the air-blast. G. KROUPA. *Montan Rundschau* 20, 328(1928).—This is a review and discussion of Lewis' method of drying by means of a 6-unit silica-gel absorber the air for an iron blast furnace (cf. *C. A.* 21, 3868).

W. W. HODGE

Special gas-fired furnace built to heat-treat manganese steel castings. O. W. ANDERSEN. *Foundry* 56, 662-5(1928).

E. H.

Pulverized coal in metallurgy. G. E. K. BLYTHE. *Mining Mag.* 38, 276-82 (1928).—A description and explanation of the Buell burner with special reference to its use in reverberatory smelting furnaces.

A. BUTTS

Coal and ash handling for steel plants. H. S. FORD. *Blast Furnace & Steel Plant* 16, 1070-1, 1075(1928).

E. H.

The cost of the heating of iron works. HERMANN JORDAN AND ARTHUR SCHULZ. *Arch. Eisenhüttenwesen* 1, 699 706(1927 8); *Stahl u. Eisen* 48, 858-60(1928).—

J. A. SZILARD

The first iron works in America - 1645. HOWARD CORNING. *Blast Furnace & Steel Plant* 16, 1034-61, 1090(1928).

E. H.

Refractoriness of molding sand. J. F. McMAHON. *Investigations in Ceramics and Road Materials, Dept. of Mines, Can.*, No. 690, 9-24(1928).—Conditions which prevail at the point of contact of sand molds with molten metals and which affect refractoriness are: (1) Atm.—highly reducing, (2) slag action—slight, (3) heat application—sudden, (4) imposed load—lbs to ton per sq ft, (5) temp.—up to 1670°. Some factors affecting the refractoriness of molding sand are: (1) Mineral and chem. constituents of the sand: (a) the granular material, and (b) the bonding clay; and (2) fineness of grain. Reactions that may take place upon heating a molding sand are: (1) Removal of mechanically held and chemically combined water, (2) decomposition of carbonates, (3) shrinkage of bond, (4) vitrification of bond, (5) corrosion of accessory

materials and (6) corrosion of sand grains. Tests for molding sand are: (1) softening point detn., (2) draw-trial test—crushing strength of fired molds, and (3) Saeger's test. In Saeger's test a sample of molding sand in the shape of a bar is heated locally by an elec. heated Pt ribbon and the temp. noted at which the sand sinters and adheres to the ribbon. L. B. MILLER

Brass in engineering: Failures and remedies. W. N. JONES. *Eng. News-Record* 101, 161-4(1928).—A detailed description and discussion of failures of brass and bronze strainer plates and bolts in the Minneapolis, Minn., rapid sand filters, together with an outline of similar experiences at other plants. The studies carried out indicated that the failures were due to internal stress set up by cold working of the metal and subsequent corrosion by external agencies, such as CO₂. Annealing the metal was found to be an effective remedy, 1300° F. being the critical temp. Monel metal was found satisfactory. R. E. THOMPSON

Rail failure statistics for 1926. W. C. BARNES. *Am. Ry. Eng. Assoc. Proc.* 29, 562-72(1928).

Transverse fissure statistics. W. C. BARNES. *Am. Ry. Eng. Assoc. Proc.* 29, 573-9(1928).

Malleable iron. F. H. HURREN. *Iron and Steel of Canada* 11, 196-9(1928).—The time of annealing and the effect of different concn. of Si, C, S, P, Mn, Ni and Cr in whiteheart malleable iron castings are briefly considered. Methods are suggested for overcoming or minimizing the troubles due to distortion, hard spots and cracks. D. S.

Carbon-silicon ratio determines physical qualities of malleable. L. E. GILMORE. *Foundry* 56, 529-31(1928).—The relative proportion of Si and C in white-iron castings, is the most important factor in controlling the amt. of combined C in them. The combination of greatest tensile strength and ductility in malleable castings is obtained with low C and high Si. In works practice, a low C of 2.20-2.40% and a correspondingly high Si of 0.90-1.00% have given very good results over a period of two years. To insure heats being tapped with the desired Si and C, preliminary chem. analyses should be made before tapping, or in lieu of lab. control, test bars should be cast and cooled under standardized conditions so that their fracture when broken will indicate the condition of the heat. DOWNS SCHAAF

A comparison of whiteheart and blackheart malleable cast irons. A. E. PEACE. *Proc. Inst. Brit. Foundrymen* 20, 327-49(1926-7).—The essential differences in method of manuf., chem. compn., melting, casting, annealing, structure, properties and applications of whiteheart and blackheart malleable castings are described. D. S.

The heat-treatment and growth of cast iron. J. W. DONALDSON. *Proc. Inst. Brit. Foundrymen* 20, 513-43(1926-7).—Heat-treatment tests were carried out on an ordinary general engineering iron, a cylinder iron and two irons made by the Perlit process. The tests were divided into two groups, one dealing with carbide decompn., strength and hardness, and the other with carbide decompn. alone, and the min. temp. required to produce it. The combined C content, tensile strength and Brinell hardness figure were detd. after each 40 hrs. heating, the temp. of the heat-treatments ranging from 200° to 550°. The results of the various tests are set forth in tables, graphs, and photomicrographs, and the following conclusions are made: (1) Carbide decompn. accompanied by graphite deposition takes place in gray cast iron when subjected to low-temp. heat-treatment. (2) Stability of the carbide is influenced by the Si content, and also by the initial combined C content. (3) Stability is also influenced by the temp. and the duration of heat-treatment; over 200° the rate of change varies with the temp. and the nature of the iron. (4) Carbide decompn. also affects the mech. properties of gray cast iron according to the condition and duration of heat-treatment. (5) Growth and vol. changes are in some ways related to carbide decompn., but not wholly explained by it. DOWNS SCHAAF

The strength of cast iron. J. E. FLETCHER. *Proc. Inst. Brit. Foundrymen* 20, 188-232(1926-7).—The mean results of many tests made on groups of iron castings, indicate that the tensile and transverse strengths of cast iron are distinctly related to the sum of the total C and Si contents. The influence of total C, Si, Mn and P, have been correlated with Brinell hardness figures, and again the sum of the total C and Si contents prove to be of great value. The importance of the relationship between the tensile and transverse strength values is stressed, since this factor is related to the deflection, to the sum of the total C and Si contents and to the proportion of C to Si in that sum. DOWNS SCHAAF

The effect of nickel and chromium on the strength properties of gray cast iron. E. PIWOWARSKY. *Proc. Inst. Brit. Foundrymen* 20, 166-87(1926-7).—Very high mech. strengths were obtained by causing cast Fe having a gray to mottled charge

to solidify at first white to mottled by accelerated cooling, and graphitizing it only by subsequent annealing. A still further increase of tensile properties of from 10 to 30% was obtained by the addn. of Ni or of Ni and Cr. Small castings with a wall thickness of 35 mm. were completely graphitized in 10 minutes by immersing them in a salt bath at a temp. of 925° to 950°.

DOWNES SCHAAP

The critical points and martensitic quenching of cast iron containing nickel with and without chromium. LEON GUILLET, GALIBOURG AND BALLAY. *Compt. rend.* 187, 14-7 (1928).—Martensitic quenching is defined as rapid cooling through the crit. point, resulting in a structure of martensite. Twenty samples of cast Fe contg. 3.2 to 3.4% C, 0.9% P, 0.21 to 0.63% Mn, 0.74 to 2.11% Si, 0 to 4% Ni and 0 to 0.7% Cr were prepd. and heat-treated carefully in similar ways. Some specimens were cooled slowly in the furnace at 8° to 10° per min. from 950° to 450°; others were cooled in a current of air at 250° per min. The transformation temp. is tabulated for each sample under different conditions of heat treatment and also the hardness change as compared to the as-cast condition. Si raised the transformation temp. and the crit. rate of martensitic quenching. Mn lowered the transformation temp. slightly and the crit. rate of quenching distinctly, and also increased the hardness after quenching. Ni lowered the transformation temp. and the crit. rate of quenching, facilitating martensitic quenching as well as graphitization. Cr lowered the crit. rate of quenching and increased the depth of martensite formation. Industrially useful cast Fe contg. Ni or Ni and Cr may be either machinable as cast and capable of hardening by heat-treatment around 900°, or self-hardening as cast but machinable after brief annealing at 650°.

GLO. F. COMSTOCK

The influence of sulfur in cast iron. J. E. HURST. *Proc. Inst. Brit. Foundrymen* 20, 497-512 (1926-7).—The theoretical reasoning for the modern view of the influence of S on cast iron is given at some length. It includes that in the presence of sufficient Mn, at least in the ratio of 3:1 in low-silicon iron, the S is converted to MnS, in which form it is harmless up to appreciable amts., and even in the absence of sufficient Mn the presence of a rather high concn. of FeS will not have any serious effect with higher Si and total C contents, particularly when the rate of cooling is comparatively slow.

DOWNES SCHAAP

Nitrogen in technical iron. V. N. SVETCHNIKOFF. *Rev. métal.* 25, 212-21, 289-97 (1928).—The investigation, the results of which are given in detail, showed that N is liable to segregation in steel, segregation being greatest in mild steel and the increase in N content in the segregation zones reaching at times an increase of 100% over the N content in zones which do not exhibit segregation. The character of the N segregation is similar to that of P segregation. The following are the factors affecting the N content of Bessemer steel: Si and Mn contents of the Fe, temp. of the metal, time of blowing and pressure of the blast. Increase in the pressure of the blast is one of the factors favoring most the increase in N content of the metal.

A. P.-C

Effect of mass on heat treatment of nickel steel. W. ROSENTHAIN, R. G. BATSON AND N. P. TUCKER. *J. Iron and Steel Inst.* 116, 385-417, 418-53; *Science Abstracts* 31B, 184-5.—This investigation was undertaken to ascertain the relationship between mech. properties and microstructure and the size of the heat-treated pieces. The exptl. work was carried out on bars 2, 4, 7 and 10 in diam. Conclusion: Properties that can be obtained by hardening and tempering small specimens cannot be obtained by similar treatment of large masses.

H. G.

Heat-resisting steels. ROBERT HADFIELD AND R. J. SARJANT. *Fuel Econ. Rev.* 7, 72-80 (1928).—Heat resisting steels consist of solid solns. of the austenitic type and of simple grain; they produce a very small film of scale, adherent, dense and refractory, when heated. These steels run 10-30% Cr, 7-40% Ni, 50-70% Fe, usually with small addns. of Si, W or Mo. The normal tensile strength test is inadequate for heat-resisting steels. "Limiting creep stresses" are far better criteria, especially at high temps. Ordinary steel is practically valueless for supporting loads above 500°, besides scaling badly. Heat-resisting steel has a strength 10 times that of cast iron, resists the action of sulphurous gases, and is superior as regards resistance to scaling and creep stress at the highest practical temps. It is also machined easily, both in castings and forgings and welds readily by the oxyacetylene or electric processes. Their superiority in ultimate cost is indicated by bottle molds; when made of cast iron they can be used perhaps 50,000 times, but if heat-resisting steel is used, several million operations can be carried out.

W. C. EBAUGH

Deterioration of steels in the synthesis of ammonia. J. S. VANICK, W. W. DE SVESNIKOFF AND J. G. THOMPSON. U. S. Bur. Standards, *Tech. Paper No.* 361, 22, 199-233 (1927); cf. C. A. 21, 3875.

E. H.

Alloys affect properties. EDMUND R. THEWS. *Foundry* 56, 532-5(1928).—The effects have been studied of addns. of Zn, Pb, Ni, Co, Mn, P, Al, Fe and Si to bronze on such properties as shrinkage, expansion and segregation. **DOWNES SCHAAP**

Contraction in alloy castings. H. C. DEWS. *Proc. Inst. Brit. Foundrymen* 20, 395-426(1926-7).—Theoretical ideas are developed to account for the vol. and location of contraction cavities in alloy castings. The vol. of contraction cavities can be considerably reduced by (a) a low thermal capacity of the mold; (b) a high thermal capacity of the metal; (c) a low coeff. of expansion in the liquid and solid metal; (d) an algebraically low contraction on freezing; and (e) a low casting temp. Because of the diversity of shape of castings each design must be given individual attention so that the principle of directional cooling and feeding may be applied. In alloys which freeze through a range of temp. the molding practice should be manipulated so that the temp. gradient slopes evenly from the remotest points of the mold to the feeding point, in order to obtain sound castings. **DOWNES SCHAAP**

X-ray analysis and the crystalline structure of metal alloys. G. NATTA. Reale Politecnico di Milano. *Ann. chim. applicata* 18, 135-88(1928).—A crit. review and discussion of the literature of alloys and the methods of examn. (many references to which are included) shows the importance of Cd-Mg alloys, particularly from a theoretical point of view. Therefore a systematic x-ray examn. by the powder and by the Laue methods was made of Cd-Mg alloys of various compns. and under different conditions. In alloys rapidly solidified and immediately tempered, which represent modifications stable at high temps., the powder method shows 2 types of crystals, solid solns. of Mg in Cd and of Cd in the Mg lattice. Solid soln. crystals of Mg in Cd predominate in alloys contg. 100-50% Cd, whereas crystals of Cd in Mg predominate in the remaining range, the proportions being approx. equal in 50% alloys. In the solidification of 50% alloys, solid solns. of Cd in Mg contg. more Mg than the integral alloy first sep., followed by sepn. from the fusion mixt. rich in Cd of solid solns. of Mg in Cd. The segregation of the initial solid soln. of const. compn. explains the arrest observed in the cooling curve obtained by thermal analysis. The powder method excludes the existence of the compd. Mg-Cd stable at high temps. and with a cryst. structure different from its constituents. The cond. curve at high temp. can be interpreted on the supposition that the 2 branches of the curve correspond to the 2 solid solns., viz., Cd in Mg and Mg in Cd. The variations of the lattice consts. do not follow the Vegard law, the Cd cell increasing from 2.98 to 3.01 A. U. and the axial ratio decreasing from 1.89 to 1.875 for 0 to 40% Mg. The intensity of the Cd lines is changed by large proportions of Mg, indicating the regular distribution of Mg atoms in the Cd lattice. Likewise in solid solns. of Cd in Mg the cell dimensions decrease greatly with small proportions of Cd, the cell diminishing from 3.22 to 3.155 A. U. from 0 to 15% Cd. The Laue method indicates that in alloys contg. 30-60% Cd the atoms are regularly distributed. Cooled normally, alloys contg. under 30% Cd segregate in large crystals in regular orientation and with $c/a = 1.628$. From 200° to 150° these crystals are transformed into minute aggregates of new crystals which retain the form of the earlier crystals, and furnish a striking example of paramorphosis. With 60% Mg the elementary cell has dimensions which are multiples of those of Mg, probably $a = 18.9$ A. U. and $c/a = 0.1813$ (216 atoms). Solid solns. from alloys contg. initially less than 70% Mg are not ideal solns., the Cd atoms being arranged regularly in the Mg lattice. Alloys heated for a long time show by the powder method the lines of solid solns. in Cd, the lines of solid solns. in Mg disappearing except with high proportions of Mg. The abnormal phys. properties of heated 50% alloys are explained by the presence of solid solns. regularly distributed, the effect of atoms fixed stationary in the lattice of the solvent being the same as that of a compd. The relation between these results and those obtained by thermal analysis are discussed. **C. C. DAVIS**

Copper and brass. O. BAUER, FRIHR. V. GÖLER AND G. SACHS. *Z. Metallkunde* 20, 202-8(1928).—The metal and alloys examd. are E-Cu (99.93% Cu), Ms 98 (98.12% Cu - 1.63% Zn), Ms 90 (90% Cu - 10% Zn), Ms 85 (85% Cu - 15% Zn), Ms 72 (72% Cu - 28% Zn), Ms 63 (64% Cu - 36% Zn), Ms 60 (60% Cu - 40% Zn). The effect of the angle at which the sample is cut with respect to the rolling direction is detd. with respect to tensile strength. With E-Cu and Ms 98 there is no effect, but as % Zn increases, the tensile strength increases as the angle increases up to 90°. With Ms 85, tensile strength is about 68 kg./sq. mm. at an angle of 0° to the rolling direction and about 82.5 at 90°. X-ray photographs show practically no difference between Cu and brass in the form of rolled plate, but on annealing at 500° for $1/2$ hr., a progressive difference is obtained between Cu and 60-40 brass. Notch-test strength rises as annealing temp. is increased up to about 600°, after which there is only a slight decrease

in E-Cu and Ms 60, but a very large decrease in Ms 72, 85, 90. Tensile strength and elongation attain max. values with about 70% Cu on specimens taken perpendicular to the direction of rolling. Max. hardness is attained with Ms 60 by quenching from a temp. just at the point where α -crystals are converted into β -crystals (about 750°).

H. STOERTZ

Structure of aluminum-rich silver-aluminum alloys. M. HANSEN. *Z. Metallkunde* 20, 217-22(1928).—The alloys are prepd. from refined Ag and Al contg. 0.10% Si, 0.16% Fe. The equil. diagram is detd. from 0 to 60% Ag, and the soly. of Ag in Al is detd. microscopically from 200° to the eutectic temp. of 558°. The soly. is given as follows: at 200°—0.75%, at 250°—1.75%, 300°—3.25%, 350°—6.5%, 400°—12.0%, 450°—21.0%, 500°—33.0%, 558°—48.0%. The satn. limit at room temp. is about 0.45% Ag. Microscopic examn. indicates the existence of the compd. $AlAg_2$, which separates in the form of very small crystals when the alloy has been annealed at 200° to 300°. Quenched from higher temps., $AlAg_2$ separates in the form of variously oriented needles.

H. STOERTZ

Study of the structure of electrolytic copper by means of x-rays. JEAN J. TRILLAT. *Rev. métal.* 25, 286-8(1928).—Detn. of the size of the elementary cell of the crystal lattice, by means of the rotating-crystal method, in electrolytic Cu deposited from $CuSO_4$ soln. both contg. gelatin and without it by Marie's technic (*C. R.* 21, 3806) showed that in both cases electrolytic Cu belongs to the face-centered cubical system, and that the size of the cell is nearly the same in both cases (3.68 Å. U. without gelatin, 3.70 Å. U. with gelatin), and near that of ordinary Cu (3.60 Å. U. according to Bragg) Spectrograms obtained by the Debye-Scherrer method gave perfectly clear, fine and regular rings with Cu deposited in presence of gelatin, while Cu deposited without gelatin gave rings with a granular structure, which were really composed of a large no. of Laue spots practically side by side. In neither case was there any indication of a fiber structure or of orientation in a direction perpendicular to that of the x-rays, i. e., parallel to the plane of the cathode.

A. PAPINEAU-COUTURE

Significance of the casting structure on the properties of copper. O. BAUER AND G. SACHS. *Metall u. Erz.* 24, 154-64(1927); *J. Inst. Metals* 38, 464.—The paper contains a large no. of photographs of failures in Cu castings before and after working, of characteristic structures of overpoled and underpoled Cu and of the effect of Cu_2O and of reducing gases on the structure of the cast metal, together with an account of the value of x-rays and of the detn. of the sp. gr. in ascertaining the soundness of Cu castings. A table is also given showing the variation in the tensile properties of rolled Cu in different directions and after various mechanical treatments.

H. G.

Significance of the casting structure on the properties of copper. P. SIEBE. *Metall u. Erz.* 24, 288-9(1927); *J. Inst. Metals* 38, 464.—The long, fibrous, coarsely cryst. structure of some Cu castings is due to the presence of impurities, as little as 0.03% of Pb or 0.003% of Bi causing this structure if no Cu_2O is present, i. e., if the metal is overpoled. In "tough-pitch" Cu, which contains 0.05-0.08% of O, this quantity of impurities exists as oxide, which is not nearly so deleterious to the properties of the metal as is metallic Pb or Bi.

H. G.

Uses of nickel deposits in engineering. C. H. FARIS. *Trans. Inst. Eng. and Shipbuilders* 71, 209-42, 242-4(1927); *Science Abstracts* 31B, 185.—The requirements of heavy electrodeposited Ni are perfect adhesion, resistance to wear and immunity from corrosion, and the advantages claimed are the absence of the necessity of heat treatment, possibility of local application of treatment and wide range of metals possible of treatment. The results of tests are given which illustrate the perfect adhesion obtained, the resistance to wear of the deposited metal and its immunity from corrosion. Examples are given of the application of heavy Ni deposits to a variety of engineering parts.

H. G.

Stresses in non-ferrous castings. CECIL H. DESCH. *Proc. Inst. Brit. Foundrymen* 20, 106-24(1926-7).—Non-ferrous metals are liable to internal stresses due to the condition of solidification when cast into shapes which allow of the cooling of different parts at unequal rates. The stresses in some metals and alloys are accentuated by the cryst. nature of the material. Metals which crystallize in the cubic system contract the same in all directions, while others such as Zn, Bi, Sb and Cd, which crystallize in less simple form, contract more in one direction than another. Stresses are easily set up in an alloy composed of two constituents of very different phys. properties. Local heating subsequent to casting, such as burning in at defective places in castings, is likely to set up stresses. It seems very probable that rupture of alloys by chem. means does not occur unless a state of stress exists in the region to which the reagent penetrates.

DOWNES SCHAAF

Scientific views on the oxygen-cutting process. S. I. LAVROV. *Zentr. Hütten- u. Walzwerke*, 31, 169-72; *Chem. Zentr.* 1927, 1, 2773.—With gas contg. 78% O, the temp. of the section cut is the same as the kindling point of Fe, and therefore this O content should represent the theoretical limit of applicability of the O-cutting process. If the O is superheated or the metal prewarmed, it is possible to cut with 75% O. The use of pure O greatly diminishes the consumption of gas and the loss of time. A decrease in the O content leads to an increase of space over which the cutting takes place. During the cutting, there is carbonization on the surface, the C originating from the metal. With less than 0.35% C, this phenomenon is not evident. C. C. DAVIS

Instruments for testing the stamping qualities and tensile strength of sheet metals. R. GUILLERY. *Rev. métal.* 25, 148-50 (1928).—G.'s instrument for testing the stamping qualities of sheet metals has been perfected by means of an attachment which enables it to be used for detg. tensile strength. A. PAPINEAU-COUTURE

The influence of cold-working on specific heat. W. GEISS AND J. A. M. VAN LIEMPT. *Z. anorg. allgem. Chem.* 171, 317-22 (1928).—The equation $C_c - C_r = C_0 (R_c/R_r)\beta/\alpha$ is derived for the difference between the sp. heats of cold-worked and recrystd. metal. C_c , C_r and C_0 represent, resp., the sp. heat of the cold-worked metal, of the recrystd. metal at a temp. of t° and of the recrystd. metal at 0° . R_c and R_r are the sp. resistances and α and β are the coeffs. in the equations $R_c = R_r(1 + \alpha t)$ and $C_r = C_0(1 + \beta t)$. For W and Ni the calcd. difference is less than 0.5% and the measured difference is also less than this amt., in agreement with the theory. The sp. heats of pure W and Ni were detd. to be $0.0323 \pm 0.5\%$ and $0.1035 \pm 0.5\%$, resp. EDGAR R. SMITH

Study and commercial control of annealing and cold-hardening by means of the hardness test using a ball of small diameter under a small load. P. NICOLAU. *Rev. métal.* 25, 155-68 (1928).—The hardness test using a small-diameter ball under a small load constitutes an extremely rapid, simple and accurate method for studying and controlling cold-hardening and annealing after cold-hardening, either on test pieces or on small-sized finished articles, and can be applied as easily in the shop as in the lab. This method can be advantageously substituted for micrographic examn. in the field of application where its sensitiveness is greatest, namely, in the zone of low cold-hardening on the one hand, and, after annealing in the germination zone and at the beginning of the zone of complete annealing, on the other. For Cu and α brass, N. recommends a 1.58-mm. ball and 10-kg. load, which permits carrying out the tests on articles not less than 0.3 mm thick. The diameters of the marks should be detd. to less than 0.001 mm with a microscope (preferably under vertical illumination) having a magnification of 100 and provided with a micrometric ocular. The results of a systematic investigation of the influence of the degree of initial cold-hardening on the trend of the variation in hardness of Cu as a function of annealing temp. are given graphically, confirming and supplementing various results obtained by Charpy and by Grard, both for Cu and for brass. As a result of the extreme sensitiveness and accuracy of the method as described, N. discovered an anomaly in the annealing of Cu and α -brasses, which seems to be general and which is revealed by a max. in the hardness-annealing temp. curve. This anomaly is more pronounced with Cu and its sharpness increases the greater the initial cold-hardening. A. P.-C.

Slip interference theory of hardening. M. G. CORSON. *Mining & Met.* 9, 304-6 (1928).—Jeffries' theory is discussed and many instances of its applicability are given. The author divides alloys into six groups each one characterized by a certain velocity of pptn. of the hardening component and a certain velocity of growth of the grains pptd. A brief discussion of hardening and annealing of the alloys in the several groups is given. It is suggested that season cracking, loss of ductility when heated for a long time at 450° and other phenomena characteristic of the alpha alloys of Cu may be due to a pptn. of a secondary component. WILLIAM F. EHRET

Brinell hardness, static bending and shearing. R. GUILLERY. *Rev. métal.* 25, 151-4 (1928).—G.'s hardness tester has been adapted for carrying out bending and shearing tests also. The method of carrying out these 2 tests is described. A. PAPINEAU-COUTURE

Homogeneous lead coating. A. KUFFERATH. *Apparatebau* 40, 164-6 (1928).—A brief review of processes. J. H. MOORE

Blading metals in modern steam turbines (corrosion). ALBERT BODMER. *World Power* 10, 41-7 (1928).—Inoxidizable steels alloyed with high percentages of Ni and Cr, and not dependent on surface polish or heat treatment for their corrosion-resisting properties are recommended for blades of the modern turbine. C. G. F.

Relative corrodibilities of ferrous and non-ferrous metals and alloys. I. Results

of four years' exposure in the Bristol Channel. J. NEWTON FRIEND. *Engineering* 126, 115-8(1928).—See C. A. 22, 2540. E. H.

Paints on Jirotko-processed light metals (KUTSCHER) 26. The rust-prevention problem (WOLFF) 26. Extraction and recovery of Ra, V and U from carnotite (DOERNER) 3. Maintaining the efficiency of evaporators, cooling and condensation coils [corrosion] (SCHUTZ) 1. Determination of V in high-speed steels and its waste in producing these steels (FÖLSNER) 7. The hardness of electrodeposited nickel (MACNAUGHTAN, HOTHERSALL) 4. Oxidizing hydrocarbons [flotation agents] (U. S. pat. 1,678,403) 22. Phosphates (Fr. pat. 632,341) 18.

FREMONT, C. *Essai de corrosion des fers et des aciers*. Paris, 25, rue du Simplon: The Author. 179 pp.

MIRANDA, EUSTAQUIO F. *Preparación mecánica de las menas. Concentración de minerales por flotación*. Madrid: Escuela Especial de Ingenieros de Minas. 61 pp. Ptas. 15.

REINBOTH, FRANZ: *Metallüberzüge, Metallfärbung und Metallanstriche*. 2nd ed. Berlin: Mactzig & Co. vorm. C. Pataky. Bd. 3. Pataky's Bucherei f. prakt. Metallbearbeitung 121 pp. Half linen, M. 3.

RICHTER, HERMANN: *Die Azetylen-Schweißung im Handwerk und Kunstgewerbe*. Hamburg: Hansische Verlagsanstalt. 111 pp. M. 3.80.

Ore flotation. GAIL L. ADAMS (to Standard Oil Development Co.). U. S. 1,678,311, July 24. A finely divided ore such as Cu ore is agitated with water and a small proportion of a mixt. contg. pressure-still tar 80, residuum from hydrolysis of sulfated olefins 19 and a water-sol. Na sulfonate of petroleum hydrocarbons 1%, and aerated to form a froth. U. S. 1,678,312 specifies a similar flotation mixt.

Flotation apparatus for treating ore pulps. EDWARD H. SHACKELFORD, JR. (to Hebbard Mfg. Co.) U. S. 1,678,087, July 24.

Ore concentration. CORNELIUS H. KELLER (to Minerals Sepn. North America Corp.). Can. 282,358, Aug. 7, 1928. Complex Ag-Pb-Zn ore is ground with Na₂S and the pulp is agitated with H₂O with addition of soda ash, K₂Fe(CN)₆, Na xanthate, Barrett No. 634 oil and cresylic acid, to produce a Pb froth rougher concentrate. To the remaining pulp are added CuSO₄, Na xanthate, Barrett No. 634 oil, and steam-distd. pine oil and the pulp is agitated to produce a Zn froth rougher concentrate. The Pb concentrate was reagitated with additional cresylic acid to form a finished Pb concentrate and a Pb middling. The Zn concentrate was reagitated with additional reagents to form a finished Zn concentrate and a Zn middling.

Ore concentration. TUDOR R. SIMPSON (to Minerals Sepn. North America Corp.). Can. 282,357, Aug. 7, 1928. Ores carrying a substantial amt. of normally floatable insol. silicate gang are concd. by agitating a pulp of the ore with a mineral frothing agent and a xanthate to yield a mineral-bearing froth carrying a relatively large proportion of a mineral of the ore accompanied by a large proportion of said silicate, sepg. the froth, agitating a pulp of the froth concentrate with a further addition of starch so as to yield a froth concentrate relatively rich in said mineral and relatively free from said silicate, and sepg. the froth concentrate. Cf. C. A. 21, 2454.

Concentration of ores. MINERALS SEPARATION LIMITED. Fr. 633,679, Sept. 3, 1926. Substances contg. a complex radical, e. g., ferricyanides, are added to the frothing agent, which may be an org. compd. contg. S such as a xanthate.

Concentrating table for treating ores. ALBERT H. STEBBINS. U. S. 1,678,364, July 24.

Concentrating mixed sulfide ores. HAROLD S. MARTIN. U. S. 1,678,259, July 24. In effecting selective froth flotation of Cu sulfides from ores contg. Fe sulfides, the ore pulp is rendered alk. and a substance such as NH₄HSO₄ is added which is capable of "liberating the SO₂ radical" and H ions during the flotation.

Treatment of slags. ÉMILE BOHON. Fr. 633,448, Aug. 27, 1926. Slags from old hand forges and from the refining of pig iron are made into briquets with a flux such as alkali carbonates and CaF₂ intimately mixed, powdered charcoal and pitch. The briquets are treated in the usual way.

Reducing iron ores. I. G. FARRINGTON. A.-G. Brit. 280,970, June 19, 1926. In a modification of the process described in Brit. 278,167 (C. A. 22, 2544) the gas used for reduction is prepd. from natural gas, coke-oven gas or gases resulting from

cracking processes, or similar gases, and O or air rich in O. Gases resulting from the reduction process may be used for other purposes, such as in hydrogenations.

Zinc from ore or oxide. H. R. COLLEY. Brit. 281,129, Feb. 2, 1927. Preheated ore or oxide is further heated to a reducing temp. by passing it as a thin stream through a heated zone and, at points of suitable reducing temp., is supplied with a hydrocarbon reducing agent which is introduced through cooled pipes or conveyers so that it is decomposed only after contact with the material to be reduced. An app. is described.

Reducing zinciferous materials. JAMES A. SINGMASTER, FRANK G. BREYER and EARL H. BUNCE (to New Jersey Zinc Co.). U. S. 1,678,607, July 24. See Brit. 269,324 (C. A. 22, 1319).

Extracting minerals. MAX C. HELSON. Fr. 632,596, Apr. 11, 1927. Minerals are sepd. from gang, by a flotation process in which oil or gasoline is added, the flotation being hastened by passing through it water satd. with CO_2 under pressure, the flotation vessel being open to the atm.

Combined mill, converter, drier and classifier for treating ores. WALTER DUSENBERG and JOHN H. MACARTNEY. U. S. 1,678,002, July 24.

Rotary furnace for two-stage ore reductions, calcining and sintering operations, etc. F. L. DUFFIELD. Brit. 281,338, Nov. 29, 1926. Two rotary furnaces are used alternately for each stage of the treatment in reducing Fe ore or other processes. Various structural features are described.

Furnace for heat-treatment of metal sheets and plates. JOHN W. PERRY. U. S. 1,678,300, July 24.

Apparatus for recovering precious metals by amalgamation. JAMES F. HOPKINS. U. S. 1,678,142, July 24.

Ingot molds, ladles and converters. G. DURVILLE. Brit. 280,963, Nov. 19, 1926. Structural features.

Centrifugal apparatus for casting metals. A. PORTEVIN (to Soc. d'expansion technique). Brit. 280,929, Nov. 17, 1926.

Apparatus for casting pipe, etc., centrifugally. J. H. UHRIG (to International De Lavaud Mfg. Corp., Ltd.). Brit. 281,251, Nov. 23, 1926.

Tumbling apparatus for cleaning foundry castings. FREDERICK W. NEVILLE (to J. W. Jackman & Co., Ltd.). U. S. 1,678,072, July 24.

Ferrous castings with chromium-alloy surfaces. WALTER M. MITCHELL (to Electro Metallurgical Co.). U. S. 1,677,979, July 24. The surface of the mold used for casting is coated with a mixt. of Cr and a binder such as Na silicate and the base metal is poured under a ferriostatic head of 20-30 in. to prevent running of the alloy coating on the casting. An app. is described.

Malleable cast iron. SOC. ANON. FORGES ACIÉRIES DE FIRMINY. Fr. 632,399, July 26, 1926. Ni or Cu from 0.5 to 10%, is added to cast iron or materials from which it is obtained to reduce the thermal operations necessary to bring it to the malleable state.

Pickling and other treatments of metal sheets. W. E. WATKINS. Brit. 281,575, June 16, 1926. An app. is described. Brit. 281,577 specifies an app. for coating metal plates with oil or other substance before annealing and for giving them a fine-grained surface by action of rollers.

Treating metal sheets for pickling, washing, etc. W. E. WATKINS. Brit. 281,349, June 16, 1926. Mech. features.

Apparatus for pickling or cleaning metal articles. UNITED WIRE WORKS (Birmingham), LTD., AND H. LOWNDES. Brit. 281,125, Jan. 29, 1927. The articles are carried by conveyers through vats which may contain acid or other pickling or cleaning solns. A soln. of H K tartrate may be used.

Elongating metals. W. C. CORYELL. Brit. 281,364, Aug. 26, 1926. By simultaneous application of tension and rolling pressure, a high degree of elongation may be effected with re-annealing.

Refining and separating metals. SOC. MINIÈRE MÉTALLURGIQUE DE PENARROYA. Fr. 632,921, Apr. 16, 1927. An oxy salt of Sn is sepd. from oxy salts of As and Sb by treating the mixt. with a cold NaOH soln. of such a concn. that it dissolves only the oxy salt of Sn.

Refining and separating metals. SOC. MINIÈRE MÉTALLURGIQUE DE PENARROYA. Fr. 632,920, Apr. 16, 1927. Small quantities of Sb and Pb contained in alk. liquors from refining processes in which NaOH is used are sepd. by treating the soln. with reducing agents such as Sn or SnCl_2 .

Metallurgical carbon. GEORGES DE KORFF and GASPARD JAKOVA-MERTURI. Fr. 632,023, Apr. 11, 1927. Carbon for use in steel and iron making is prepd. by car-

bonizing charcoal without distn or using a charcoal incompletely decomposed by the weather, such as lignite and mixing it with or allowing it to absorb a finely ground nitrate, particularly NaNO_3 or an alkali borate or both.

Aluminum. RUDOLF JACOBSSON. Fr. 632,205, Apr. 5, 1927. Minerals contg. Al are attacked by H_2SO_4 or acid sulfates under pressure at a temp. of 185° or more, the addition of the H_2SO_4 being gradual and the mineral being made into a sludge with wash water from a previous operation. The product is filtered while still hot.

Steel. H. MEYER. Brit. 281,621, Dec. 6, 1926. Ingot steel such as may be used for boilers, reservoirs, tubes or construction work is subjected to a cold straining by rolling or drawing and is then annealed by heating to $700-950^\circ$ and air-cooling.

Steel. GRANULAR IRON COMPANY. Fr. 632,888, Apr. 15, 1927. In making steel from minerals contg. such substances as TiO_2 the mineral is reduced so as to leave the TiO_2 as oxide by allowing the mineral to remain solid. The TiO_2 is removed in the gang formed.

Special steels. THOMPSON PRODUCTS INCORPORATED. Fr. 633,213, Apr. 16, 1927. Alloys known as special steels used for such purposes as engine valves are made from Cr, Ni, Si, C and Fe within the following limits, Cr 5 to 20%, Ni 0 to 14%, Si 1.5 to 5%, C 0.1 to 0.75% and the rest of Fe, the amount of Cr and Ni together being between 13 and 21.5%. The heat treatment consists in submitting the alloy normally in the austenite form to a high temp. (870°) kept substantially constant for over 4 hrs. then cooling it slowly at a speed not exceeding 40° per hr. for over 3 hrs.

Permanent-magnet steel. PORTER H. BRACE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,678,001, July 24. A magnet steel comprises Co 1-10 and Cr or other metal of the Cr group 1-10%, the remainder being mainly Fe and minor impurities.

Aluminum alloys. SOC. TH. GOLDSCHMIDT A-G. Fr. 632,942, Apr. 16, 1927. Al alloys used as elec. conductors are submitted after annealing, tempering and mechanical cold treatment to a rest period of some days at ordinary temp. followed by reheating to 200° for some days.

Alloys of copper and aluminum. METALLBANK UND METALLURGISCHE GES. A. G. Fr. 632,713, Jan. 13, 1927. A relatively large proportion of Mg is added to Cu and Al alloys (Al bronzes) to counteract the effect of Ni and Fe therein. An example of an alloy is Cu 83%, Al 9%, Mg 3%, Ni 2%, Fe 3%. Fr. 632,714 describes similar alloys to which Sn is also added, for instance Cu 84%, Fe 1.5%, Mg 5%, Al 9%, Sn 0.5%. Cf. C. A. 22, 1321.

Lead alloy. SYDNEY BECKINSALE and HERBERT WATERHOUSE. Fr. 632,220, Apr. 6, 1927. See Brit. 272,320 (C. A. 22, 1755).

Cast iron alloys. INTERNATIONAL NICKEL CO. Brit. 281,051, Oct. 4, 1926. Cast Fe alloys contain about 2-4% C contain also Ni 5-35 and Cr 2-15% (the Ni always being in excess of the Cr). Small proportions of Cu, Al, Si and Mn also may be present.

Gray iron alloys. PAUL D. MERICA, JAMES S. VANICK and THOMAS H. WICKENDEN (to the International Nickel Co.). Can. 281,987, July 24, 1928. A gray-Fe casting contains C 2-4%, Si 0.5-1.5%, Ni 1-5%, Cr up to 2%, S, P and Mn within the usual ranges found in cast iron, the Ni content being greater than the Cr content.

Silver alloys. SOC. FRANÇAISE MONNAYAGE. Fr. 632,368, July 22, 1926. Alloys of Ag contg. Ag, Ni, Cu and Zn or Cd suitable for money or silver articles are described. One example gives Ag 35, Ni 12, Cu 38, Zn 15%. Two intermediate alloys may be formed, one contg. Cu and Ni, the other Ag and Zn, the second alloy being formed by heating the two metals slowly from the point of fusion of Zn to that of the alloy sought.

Steel alloy. WALTER DORTMUND. Can. 282,241, Aug. 7, 1928. A structural steel contains 0.5-1.5% Si and 0.1-0.5% Cu.

Alloy for pistons of glass surgical syringes. F. KRUPP AKT.-GES. Brit. 281,625, Dec. 6, 1926. In order to avoid breaking the glass by unequal expansion during sterilization, pistons are used which are formed of Ni steel preferably contg. 36% Ni, which has a low coeff. of thermal expansion.

Prevention of rust. PARKER RUST-PROOF COMPANY. Fr. 632,891, Apr. 15, 1927. See Can. 281,317 (C. A. 22, 2917).

Protecting the surface of metals. JULES DUBOIS. Fr. 632,510, Apr. 9, 1927. To protect the surface of metals, especially under heat treatment, they are covered with a layer consisting of a powdered mixt. of sand, feldspar, borax and Na which may be applied by mixing with water.

Coating iron or steel with phosphates. PARKER RUST-PROOF CO. Fr. 632,342, Apr. 7, 1927. Iron or steel is coated with phosphates of Fe and Mn, the content of Mn in the coating being at least half the content of Fe and the relation of metal to P

being 6 atoms of the former to 5 of the latter. The iron objects to be coated are placed in a dilute soln. of phosphoric acid and the phosphates. Cf. *C. A.* 22, 2917.

Coating iron with zinc or tin. T. LIBAN. Brit. 281,357, July 20, 1926. Before dipping iron articles into molten Zn or Sn (which may contain a small proportion of Al) the articles are dipped into a molten bath or soln. of a mixt. of F compds. and ZnCl_2 or Zn NH_4 chloride, e. g., a mixt. formed of KF 0.5-6, NH_4Cl 10-20 and ZnCl_2 74-89.5%. For Sn coating, tallow, resin or palm oil may be added. The metal-coating bath may carry the preliminary treating bath on its surface.

Metal plating. EZECHIEL WEINTRAUB and SOC. ALSACIENNE DE CONSTRUCTIONS MÉCANIQUES. Fr. 632,407, July 27, 1926. To increase the adherence of a coating of Ni, Co, or Cr on a metallic surface, the object with one layer of one of these metals is heated in a vacuum or under reduced pressure to a temp. sufficient to cause the coating metal to attack the metal underneath.

Treating the surfaces of articles made from chromium-iron alloys. LOUIS SCHULTE (to Allegheny Steel Co.). U. S. 1,678,359, July 24. The surfaces of articles such as those contg. Cr 8-60% are cleaned after heating, by frictional treatment with pebbles or hard alloy or other suitable scouring material, in the presence of HNO_3 soln. which serves to produce a finish resembling Ag.

Hardening and toughening screw-cutting taps. R. F. KNIGHT and F. LYNCH. Brit. 281,384, Sept. 1, 1926. A hole is drilled longitudinally through the tap and is filled with clay or like material and the tap is then hardened by heating. Afterward, the clay is removed and the tap is further toughened by heating it with an elec. resistance wire or by hot air or molten metal passed through the hole.

Preventing corrosion in boilers, oil stills, pipe lines, etc. J. CALDER. Brit. 280,991, July 28, 1926. A finely divided compn. formed of Fe, graphite and Zn, with or without Al, is fed into the liquid. An app. is described.

Recovering oil from tin plates after tinning. THOMAS O'BRIEN and RUFUS E. ZIMMERMAN (to American Sheet and Tin Plate Co.). U. S. 1,678,297, July 24. Both sides of the plates are scrubbed with a non-inflammable liquid such as an aq. soap or soda soln. from which the oil may be readily recovered and the plates are further squeezed and rubbed to remove adhering liquid and are then passed through a body of bran or other suitable cereal material to remove remaining oil and moisture. An app. is described.

Annealing box for metal articles. WILLIAM E. TROUTMAN (to Duquesne Steel Foundry Co.). U. S. 1,678,452, July 24. Structural features.

Apparatus for annealing metal sheets and cooling them in a non-oxidizing atmosphere. W. E. WATKINS. Brit. 281,578-9, June 16, 1926.

Apparatus for annealing metals. SIEMENS ELEKTROWARNE-GES. Fr. 633,657, May 2, 1927.

10—ORGANIC CHEMISTRY

CHAS. A. ROULLER and CLARENCE J. WEST

The manufacture of vanillin. ALFRED WAGNER. *Chem.-Ztg.* 52, 525-6, 542-3 (1928).—Descriptive. A. L. HENNE

X-ray examination of a cellobiose anhydride. MAX BERGMANN, R. O. HERZOG AND W. JANCKE. *Naturwissenschaften* 16, 464(1928).—X-ray diagrams of the cellobiose anhydride described by B. and Knehe (*C. A.* 20, 381) are identical with those of hydrated cellulose. The diagram of the hexaacetate was identical with that of cellulose triacetate. B. J. C. VAN DER HORVEN

Nierenstein reaction. M. NIERENSTEIN. *Nature* 121, 940-1(1928).—Reply to Bradley and Robinson (*C. A.* 22, 3150). DAVID DAVIDSON

Transformation of hexadecene under the influence of active hydrogen. H. I. WATERMAN AND J. N. J. PERGUIN. *Ann. scuola ing. Padova* 3, 383-5(1927).—When hexadecene was exposed to active H several hrs., it assumed a slightly yellow color, although remaining liquid. The Br no. was reduced $\frac{1}{3}$, but the refractivity was markedly increased, suggesting polymerization. Oleic acid under similar treatment has already been proved to produce a small amount of stearic acid. The O content of the H used precluded an oxidation reaction. Compn. before, C 85.8, H 14.4; after, C 85.4, H 14.6%. A. W. CONTIERI

The activity of halogen in certain compounds of the propane series. V. V. TRONOV AND A. T. GERSHEVICH. *J. Russ. Phys.-Chem. Soc.* 59, 727-39(1927).—The introduction of an electronegative atom into a hydrocarbon causes the electronic shells of

the neighboring C atoms to contract and expand alternately, resulting in induced polarity. Another halogen in the β -position will have a cumulative, in the α an opposite effect. Assuming the polarity of a double linkage according to Lowry, C:C would induce ionization in the β - and C:O in the α -position. The activities of 18 halides of C_6H_5 and propene towards C_6H_5N and MeONa were compared, the first reaction only being of the ionic type. Equimol. quantities of the compd. and C_6H_5N or 1 N MeONa in MeOH were sealed and left at room temp. C_6H_5NHX was dissolved in H_2O , washed with $CHCl_3$, warmed to 80-90° to drive $CHCl_3$ off and titrated according to Volhard. The excess of MeONa was titrated with HCl. The reactivity of the halides towards MeONa varies much less than towards C_6H_5N . A second α -halogen decreases the activity towards C_6H_5N , while one in the β -position increases it. With MeONa activity increases on the introduction of another halogen, especially in the α -position. The primary halides react with C_6H_5N 6-40 times, with MeONa 2-8 times faster than the secondary. An α -double linkage increases the activity of PrCl towards C_6H_5N 162, of PrBr 300 and of PrI 385 times. The increase in activity towards MeONa is, resp., 44, 72 and 78. $ClCH_2CHCH_2Cl$ is 60 times more active towards C_6H_5N and twice towards MeONa than $(ClCH_2)_2CH_2$. A OH behaves like an additional halogen.

BASIL C. SOYENKOFF

β, β' -Dicyanodiethyl sulfide. V. V. NEKRASOV. *J. Russ. Phys.-Chem. Soc.* **59**, 921-4 (1927).—To 70 g. $CH_2(OH)CH_2CN$ (obtained from $CH_2(OH)CH_2Cl$ and KCN) in 80 cc. $CHCl_3$ was slowly added 130 g. $SOCl_2$ at 0-5°. After standing overnight 55-60 g. of $ClCH_2CH_2CN$ was distd. *in vacuo* and refracted at atm. pressure (b. 170-2°, yield 40-50 g.). To 24 g. of the Cl compd. and 11 g. anhyd. Na-S in abs. Et₂O is added an equal vol. of MeOH. The reaction is controlled by cooling, the mixt. being finally refluxed for 4 hrs., filtered and evapd. The resultant oil is dissolved in 120 cc. hot H_2O ; $S(CH_2CH_2CN)_2$ seps., on cooling and concn., in needles, m. 24.5°, yield, 14 g. The dibasic acid $C_6H_{10}O_4S$ results on boiling the nitrile with concd. HCl for 2 hrs.

BASIL C. SOYENKOFF

Preparation of mercury dimethyl. KARL FUCHS. *Univ. Vienna. J. prakt. Chem.* **119**, 209-10 (1928).—Shaking 55 g. acid-free Me_2SO_4 and 10 g. $AcOMe$ with 2 kg. 0.5% freshly prepd. Na-Hg, until the reaction mixt., which reaches 60-70°, is cool, then adding 200 cc. H_2O and distg. with steam, gives 32 g. pure $HgMe_2$, b₇₆₀ 91.5-2.5° (60-5% yields). Et_2SO_4 also gives $HgEt_2$ but the yields are no better than with $EtBr$.

C. J. WEST

The chemical nature of hydroxycitronellal. ALMONS M. BURGER. *Richtstoff-industrie* **1927**, 23 5. *Chem. Zentr.* **1927**, I, 1756 7.—The prepn. of hydroxycitral and hydroxycitronellal is described in detail. According to the general reaction of ethylene bonds with salts of SO_3 , the residue contg. S (which in the decompn. furnishes the OH group) adds to the C atom farthest from the group already contg. O. There are 2 possible formulas for hydroxycitronellal: $Me(HOCH_2)CHCH_2CH_2CHMeCH_2CHO$ and $Me_2C(OH)CH_2CH_2CHMeCH_2CHO$. It b₁₅ 116-7°, d₁₅ 0.923-0.925, n_D²⁰ 1.45, is sol. in 6.5 vols. of 30% EtOH, and is miscible in all proportions with 50% EtOH.

C. C. DAVIS

Quantitative study of the oxidation of methyl oleate and elaidate by hydrogen peroxide in presence of acetic acid. THOMAS P. HEDITCH AND COLIN H. LEA. *Univ. of Liverpool. J. Chem. Soc.* **1928**, 1576 83.—In a study of the oxidation of Me oleate and elaidate by H_2O_2 in AcOH, there is no indication of the formation of oxido compds. (cf. Bocseken, *C. A.* **22**, 2877), whether carried out at the ordinary temp. or at 95°, but there is definite evidence of the concurrent formation of 3 types of oxidation product varying in quantity according to the temp. of oxidation. Simple dihydroxystearic esters are produced in appreciable quantities, especially at the lower temps. They sepd. from the oxidation mixt. as a cryst. deposit and were isolated by crystn. from Me_2CO at 0°; the yields obtained represented min. values. Acetylated dihydroxystearic esters are produced to the extent of only about 50% of the total product at room temp., but in much larger quantity as the temp. is increased. The % of AcOH combined in the original oxidized ester was detd., and hence was calcd. the total quantity of mono-acetylated esters present. An oily product is also formed, like the di-HO ester, in greater quantity at lower temps. It has all the properties of an unsatd. fatty oil or ester which has been exposed to atm. oxidation and is largely made up of a compd. in which mol. O is held very loosely in direct combination with the unsatd. system. It instantly liberates I from acidified KI soln. and on heating to about 100° under reduced pressure froths violently and evolves small quantities of acrid vapors with an acid reaction. After hydrolysis of the original product, followed by removal of as much dihydroxystearic acid as possible, the oily substance shows no reaction to acid

KI and has an apparent sapon. equiv. of the order of 220–45°; ultimate analysis gave figures in agreement with the addn. of 2 atoms of O per ethylenic linkage, $C_{17}H_{30}(O_2)-CO_2H$. C. J. WEST

Properties of conjugated compounds. V. The hydrogenation of certain extended heterogeneous systems. JOHN T. EVANS AND ERNEST H. FARMER. Imperial College Science Tech., London. *J. Chem. Soc.* 1928, 1644–50; cf. *C. A.* 22, 1948.—Previous results with strongly acid or alk. reducing media showed that muconic acid, its esters and its α,α' -dihalogenated (substituted) derivs. are converted into Δ^8 -dihydro compds. To these methods is now added reduction in neutral soln. with Al-Hg. Et muconate in moist Et_2O and Al-Hg for 16 hrs. give pure Et Δ^8 -dihydromuconate. Hydrogenation of MeCH:CHCH:CHAc gave about 80% of a compd. derived from 2 mols. of the ketone, doubtless a cyclized form of the diketone MeCH:CHCH(CH₂Ac)CH(MeCH:CH)CH₂Ac, b_n 169–78°, it absorbs 4 atoms H when catalytically reduced, giving 5-acetyl-1-methyl-3,4-dipropenylcyclopentan-1-ol; with CrO_3 this gives $(CH_2CO_2H)_2$. Reduction of sorbic acid with Al-Hg or Na-Hg in AcOH gives a mixt of Δ^6 - and Δ^7 -dihydrosorbic acids. C. J. WEST

Alkali compounds of polyhydric alcohols and carbohydrates. LEOPOLD SCHMID, ALFRED WASCHKAU AND ERNST LUDWIG. Univ. Vienna. *Monatsh.* 49, 107–10 (1928).—Glycol, glycerol, glucose, fructose, glycogen and chitin readily dissolve in a soln. of Na in liquid NH_3 to yield a mono-Na compd. That there is no other change than a replacement of H by Na is shown by the fact that the inulin recovered by treatment of the Na compd. with H_2O , is unchanged in rotation. Near the b. p. of NH_3 , glycogen reacts with more than 1 Na atom, but the reaction is apparently complex and proceeds very slowly. C. J. WEST

New convenient preparation of 1,4-dihydroxybutane(tetramethylene glycol) and 1,4-dibromobutane. ADOLF MÜLLER. Univ. Vienna. *Monatsh.* 49, 27–30 (1928).—Reduction of $(CH_3CO_2Et)_2$ with Na and EtOH gives 54.4% of $(CH_2CH_2OH)_2$, b_{10} 120°. Passing HBr into the glycol at 80° gives 70% of $(CH_2CH_2Br)_2$. C. J. WEST

Nitration process in general and nitration of glycerol in particular. A. N. MASHKIN. Shostka Technicum. *Ukrainskii Khim. Zhurnal* 3, No. 1, sci. pt., 59–113 (1928).—The speed of nitration, the quality of nitroglycerin obtained and the quant. yield depend on the compn. of the nitrating mixt. Nathan and Rintoul (cf. *C. A.* 2, 1619) studied the action on glycerol of various nitrating mixts. and gave curves expressing the change in the products obtained as a function of varying proportions of HNO_3 and H_2SO_4 used; Pascal (cf. *C. A.* 20, 667) supplemented these curves by a diagram. These graphic representations, however, tell us nothing of the mol. structure of the nitrating mixts. and it is difficult to utilize them for practical purposes as well as for understanding the course of the nitration process. The reason is that the nitrating mixts. do not merely consist of a phys. mixt. of mols. of HNO_3 , of H_2SO_4 and of H_2O , but form various hydrates which react with each other as well as with glycerol and with nitroglycerin in a manner totally different from each other and peculiar to each particular hydrate. Aside from the monohydrates HNO_3 and H_2SO_4 , the following hydrates exist in the nitrating mixts.: mesonitric acid, H_3NO_4 ; orthonitric acid, $N(OH)_3$; and $H_2SO_4 \cdot H_2O$, $H_2SO_4 \cdot 2H_2O$, $H_2SO_4 \cdot 3H_2O$, $H_2SO_4 \cdot 4H_2O$ and $H_2SO_4 \cdot 5H_2O$. In all processes of nitration the formation of hydrates and their equil. in the nitrating mixt. have a very great importance. If instead of merely representing nitrating mixts. in % of HNO_3 and H_2SO_4 taken we translate them into mol. formulas of acid hydrates existing in the mixt. we shall find that the exptl. data and curves given by Nathan and Rintoul can very well be interpreted and understood and that it is easy to calc. in advance the best proportions of acids to use for nitration purposes. All the windings and bendings of the curves given by Nathan and Rintoul are satisfactorily explained by M. in detail on the basis of the properties of the various acid hydrates formed. HNO_3 effects nitration and soln. of nitroglycerin formed, strong sulfuric acids decomp. it, H_3NO_4 and the lower hydrates of HNO_3 cause oxidation. The min. of absorption of nitroglycerin takes place with mixts. of the compn. $2HNO_3 + 5(H_2SO_4 \cdot H_2O)$, and this should be the compn. of the nitrating mixt. at the end of the process. A simple calcn. shows that, in order to obtain the best results, the nitrating mixt. should be compounded of 43.4% pure HNO_3 and 56.6% pure H_2SO_4 (aq. HNO_3 can be used to obtain this compn., but in that case a certain proportion of oleum should be used instead of H_2SO_4) and that 520.8 parts of this mixt. should be made to react with 92 parts of glycerol; in that case 385.8 parts of used-up acid mixt. will be found at the end of the reaction and these will hold in soln. 9.7 parts of glycerol, whereas the amount of nitroglycerin obtained will be 217.3 parts, i. e., a yield of 236.2%. Exptl. data obtained by Soddy (*C. A.* 5, 1841; 6, 1226), Göpner (*C. A.* 6, 1228), Hof-

wimmer (*C. A.* 6, 1804; 7, 1100), Naum (in his book "Nitroglycerin und Nitroglycerinsprengstoffe") are also satisfactorily explained on the basis of M.'s theory of the role of hydrates in the nitration process. BERNARD NELSON

The C₄-saccharinic acids. IV. Further studies in the preparation of 2,3-dihydroxybutyric acid. GLADYS LEAVELL. *Abstracts of Theses, Univ. Chicago, Science Series* 4, 99-104(1925-6) (publ. May, 1928).—A process for the large-scale prepn. of the γ -lactone of 2,3-dihydroxybutyric acid (I), yielding about 54%, is described. The starting material was glycerol, the intermediate products were CH₂(OH)CH(OH)CH₂Cl (II) (710 g. from 1000 g. glycerol, 1350 cc. concd. HCl and 48 cc. AcOH at 120°) and CH₂(OH)CH(OH)CH₂CN (III) (from II and KCN in dil. EtOH). III was hydrolyzed to I by means of Ba(OH)₂. The m. p. of the phenylhydrazide of I is 109° instead of 100-1°, as reported by Glattfeld and Miller (*C. A.* 15, 532). Reduction of I with Na and abs. EtOH gave a liquid, b₁₈ 188°; probably it is 1,2,4-trihydroxybutane. The γ -lactone of 3-hydroxy-1,2-crotonic acid (IV) is a by-product of the hydrolysis of III. With PhNHNH₂, IV gave yellow needles, m. 183°; this substance is not the regular phenylhydrazide. G. SCHWOCH

The mechanism of the transformation of ricinoleic acid. P. S. PANYUTIN. *J. Russ. Phys.-Chem. Soc.* 60, 1-6(1928).—The crude oil was saponified, thrice salted out and Pb(OAc)₂ added. The Pb salt was extd. with Et₂O contg. 10% PhH and decompd. with H₂SO₄. The free acid was extd. with PhH, and the soln. allowed to stand for a week over CaCl₂; yield, 72-5%. The Me ester distd. at 150 mm. over NaBO₃ and pumice gave 90-2% of Me(CH₂)₈CHO and 60-87% Me(CH₂)₈CO₂Me; when the pressure was lowered to 8-10 mm. the ester distd. unchanged and no isomer could be found in the residue. Distn. at 80-100 mm. does not change α_D of the ester although decompn. begins at that pressure. At 320° and atm. pressure polymerization takes place; the unchanged ester distils over when the pressure is lowered. No isomers were detected after sudden cooling of the reaction mixt. No evidence was thus obtained for the shifting of the double bond preliminary to its rupture. The directing action of the OH group on the double bond is more probable. BASIL C. SOVENKOFF

Interaction between hydrazine and α -oxides and α -monochlorohydrins. A. K. PRISOV. Kharkov Inst. of Popular Education. *Ukrainskii Khim. Zhurnal* 3, No. 1, sci. pt., 125-31(1928).—Continuing the researches of Knorr (*Ber.* 35, 4474(1902)) and of Krasuskii (*C. A.* 2, 2226, 2548); *J. Russ. Phys.-Chem. Soc.* 39, 16(1907)) P. obtained 3 hydrazino alcs. and their derivs. To obtain hydrazino alc. contg. 2 mols of ethylene oxide per 1 mol. of hydrazine a mixt. of 2.5 or 3 mols. of ethylene oxide and 1 mol. of a 50% aq. N₂H₄·H₂O was, on strong cooling, sealed in a tube and left standing at room temp. The reaction was at first very violent. After 24 hrs. the tube was heated 1 hr. on a water bath and opened. Water and unchanged oxide having been driven off from the reaction mixt. by heating to 110°, the remaining thick oily liquid, b₂₅ 189°, represented [CH₂(OH)CH₂]₂NNH₂ (yield, 60%), non-crystallizing substance with an amine odor, decomps. on heating and on long keeping, reacts with aldehydes and ketones, a circumstance which proves its non-symmetric structure, reduces cold Ag₂O and Fehling soln. To obtain hydrazino alc. composed of 1 mol hydrazine and 1 mol. ethylene oxide, 50% aq. soln. of ethylene oxide (1 mol.) and N₂H₄·H₂O (4 mols.) were mixed with cooling and, on being sealed in a tube, were left standing at room temp. for 24 hrs. after which the tube was opened, the water and excess of N₂H₄ were distd. off and the residue was distd. under reduced pressure. The fraction b₂₅ 140-53° was redistd. and this time it b₂₅ 146-53°. The CH₂(OH)CH₂NNH₂ obtained possessed a strongly alk. reaction, had a bitter taste, and reduced cold Ag₂O and Fehling soln.; its alc. soln., on being satd. with HCl, gives white long needles of CH₂(OH)CH₂NNH₂·2HCl. The fraction b. 178-90°, which was equal in wt. to the above-described lower-boiling fraction, consisted of [CH₂(OH)CH₂]₂NNH₂. To obtain the hydrazino alc. contg. 1 mol hydrazine per 2 mols. trimethylene oxide a mixt. of 2 mols. of trimethylene oxide and 1 mol. N₂H₄·H₂O (the latter in 50% aq. soln.) was sealed in a tube and heated on a water bath 4-5 hrs. The tube was opened, the water and unchanged ingredients were driven off by heating at 110-5° and the residue was distd. at 44 mm [Me₂C(OH)CHMe]₂NNH₂ b. 185-90°. It is a thick liquid with an onion odor, bitter to the taste, non-volatile with water vapor, sol. in water, alc. and ether, crystg. on long keeping in white oblong crystals. It reacts with cold Ag₂O and Fehling soln. By satg. its alc. soln. with HCl is obtained [Me₂C(OH)CHMe]₂NNH₂·2HCl which crysts. in long hygroscopic needles sol. in water, poorly sol. in alc., insol. in ether, decomp. on heating and even on keeping; the HCl salt reduces cold Ag₂O and Fehling soln. To obtain the Bz deriv., [Me₂C(OH)CHMe]₂NNBz₂, a mixt. 4 g. of [Me₂C(OH)CHMe]₂NNH₂ in Et₂O with 12 g. K₂CO₃ and 12 g. BzCl was heated

on a water bath 4 hrs. The residue after evapn. of the ether was freed of admixts. and crystd. from alc. Small white needles insol. in water and ether, poorly sol. in alc. and ligroin. It reduces Fehling soln. after prolonged boiling. $[\text{Me}_2\text{C}(\text{OH})\text{CHMe}]_2\text{-NNH}_2$ was also obtained among the products of the reaction of an excess of N_2H_4 with $\text{Me}_2\text{C}(\text{OH})\text{CHMeCl}$ by operating in a sealed tube heated in an elec. furnace 5-6 hrs. at $120-30^\circ$; trimethylethylene oxide, $\text{Me}_2\text{C}(\text{CHMe})_2\text{O}$, is also found among the

products of reaction, whereas in the reaction between N_2H_4 and $\text{CH}_2\text{ClCH}_2\text{OH}$ ethylene oxide is obtained. Krasuskii's statement that the formation of α -oxamines from α -monochlorohydrins goes on through the intermediate formation of an α -oxide is confirmed by P.

BERNARD NELSON

Action of certain dibromotetracarboxylic esters on the sodium derivatives of ethyl malonate, ethyl ethanetetracarboxylate and analogous substances. JOHN J. LENNON AND WM. H. PERKIN, JR. Dyson Perrins Lab., Oxford. *J. Chem. Soc.* 1928, 1513-28.— $\text{Br}_2\text{C}(\text{CO}_2\text{Et})_2$ and $(\text{EtO}_2\text{C})_2\text{CNaCNa}(\text{CO}_2\text{Et})_2$ give about 60% of $[\text{C}(\text{CO}_2\text{Et})_2]_2$ (I);

$\text{CH}_2[\text{CBr}(\text{CO}_2\text{Et})_2]_2$ and $\text{CHNa}(\text{CO}_2\text{Et})_2$ give $\text{CH}_2\begin{matrix} \diagup \text{C}(\text{CO}_2\text{Et})_2 \\ \diagdown \text{C}(\text{CO}_2\text{Et})_2 \end{matrix}$ (II) and $[\text{CH}(\text{CO}_2\text{Et})_2]_2$

(III). With $[\text{CNa}(\text{CO}_2\text{Et})_2]_2$ $\text{CH}_2[\text{CBr}(\text{CO}_2\text{Et})_2]_2$ gives II and I. $[\text{CH}_2\text{CBr}(\text{CO}_2\text{Et})_2]_2$ and $\text{CHNa}(\text{CO}_2\text{Et})_2$ give $(\text{EtO}_2\text{C})_2\text{CH}(\text{CH}_2\text{CH}_2\text{CH}(\text{CO}_2\text{Et}))_2$ (IV) and III, while with

$[\text{CNa}(\text{CO}_2\text{Et})_2]_2$ $[\text{CH}_2\text{CBr}(\text{CO}_2\text{Et})_2]_2$ gives IV and I and with $[\text{CH}_2\text{CNa}(\text{CO}_2\text{Et})_2]_2$ there results only IV. The probable mechanism of these reactions is discussed. They can be correlated by the assumption of rapid bromination of substituted sodiomalonic esters by substituted bromomalonic esters, followed by slower double decompn. of the normal type with alkylvaln of malonic esters. In order to bring further evidence of the oxidizing action of Bresters contg. the α -bromo- α,α -dicarboxylic group, the action of $\text{CH}_2[\text{CBr}(\text{CO}_2\text{Et})_2]_2$ and of $[\text{CH}_2\text{CBr}(\text{CO}_2\text{Et})_2]_2$ on PhOH was investigated. In the 1st reaction, the PhOH was brominated and the product on hydrolysis gave *propane- α,α,γ -tricarboxylic acid*, m. 125° and loses CO_2 at $128-35^\circ$, giving glutaric acid; the latter gives adipic acid and brominated phenols. $\text{CH}_2[\text{CBr}(\text{CO}_2\text{Et})_2]_2$ and $\text{C}_{10}\text{H}_7\text{OH}$ in the presence of EtONa give II. $(\text{EtO}_2\text{C})_2\text{C}[\text{CH}_2\text{CNa}(\text{CO}_2\text{Et})_2]_2$ and $\text{BrCH}_2\text{CHBrCO}_2\text{Et}$ give *trans*-cyclopentane-1,2,4-tricarboxylic acid, the intermediate product being the 1,2,3,4,4-penta-carboxylate.

C. J. WEST

New method for the preparation of diphenyl oxalate and the dicresyl oxalates. JOSIP MIKŠIĆ AND ZVONIMIR PINTEROVIĆ. Univ. Zagreb. *J. prakt. Chem.* 119, 231-4 (1928).—PhOH (37 g.) in 200 cc. Et_2O , treated, with cooling, with 25 g. $(\text{COCl})_2$, in 50 cc. Et_2O and then with 9 g. Na wire and allowed to stand overnight, gives 10 g. $(\text{CO}_2\text{Ph})_2$, m. 134° ; similarly were prepd. the *o*-cresyl ester, m. $90-1^\circ$; the *m*-cresyl ester, m. 105° and the *p*-cresyl ester, m. 148° . Metallic K reacts in the same way, but the yields are better with Na.

C. J. WEST

Condensation of pyrrocemic acid with paraformaldehyde in the presence of sulfuric acid. V. FEOPILAKTOV. *J. Russ. Phys.-Chem. Soc.* 58, 759-66 (1926); *Chem. Zentr.* 1927, I, 418.—A continuation of previous work (cf. *C. A.* 21, 896). It was shown by Jankowa that "Kaltwasser's acid" yields a cryst. Ac deriv., a cryst. oxidation product with PbO_2 in AcOH and $(\text{CO}_2\text{H})_2$ with 1% KMnO_4 . In freezing AcOH the lactone has a mol. wt. of about 130, corresponding to $\text{C}_8\text{H}_6\text{O}_4$, in boiling AcMe the mol. wt. is 258-269, corresponding to $\text{C}_{11}\text{H}_{12}\text{O}_5$. From water it forms monoclinic crystals which lose water at about 90° . The *Ag salt* also readily loses 1 mol. of water. The "oxime" and the "di-Ac deriv." cannot be normal derivs. of the lactone because they contain about 2 and 1 mol. of water, resp., too few.

C. C. DAVIS

Synthesis of rutecarpine. III. Y. ASAHINA AND T. OHTA. *J. Pharm. Soc. Japan* 48, 313-7 (1928); cf. *C. A.* 21, 2134, 3054, 3622.—Previously A. and O. tried without success to obtain rutecarpine (I) by reduction of *N*-*o*-nitrobenzoyl-3-keto-3,4,5,6-tetrahydro-4-carboline (II) with SnCl_2 and HCl. Now they succeeded in obtaining I by treating II with glacial AcOH and Zn dust. Yield, 80%. It is to be noted that 3- β -aminoethylindole-2-carboxylic acid, the precursor of II, was previously obtained from I, but now has been obtained by treating 3-keto-3,4,5,6-tetrahydro-4-carboline (Manske and Robinson. *C. A.* 21, 1263) with EtOH-KOH. NAO UYRI

Anomalous rotatory dispersion from the standpoint of the Drude equation. CHAS. E. WOOD AND SYDNEY D. NICHOLAS. *J. Chem. Soc.* 1928, 1671-96.—Values for d. and rotations for many wave lengths are given for the following esters: Et tartrate, acetyl tartrate, diacetyl tartrate, benzoyl tartrate, dibenzoyl tartrate, thionyl tartrate, dichlorosuccinate, Me tartrate, acetyl tartrate, diacetyl tartrate, benzoyl tartrate and

dibenzoyltartrate. Examn. of the rotatory-dispersion curves for these compds. shows that both inflection and max. are confined to the positive region of rotation and crossing of the axis occurs in only 1 way, viz., as the wave length decreases so the rotation decreases, $da/d\lambda$ being always positive. The occurrence of anomalous rotatory dispersion is an indication of the relative configuration. The explanation of anomaly by consideration of ultra-violet terms only is incomplete. A view has been put forward postulating an infra-red term in the Drude equation. The term is negative for a compd. of relative configuration "d." This term, though its contribution may be small compared with rotation of electronic origin, is necessary, for it controls the assocn. of the high-frequency const. with the positive ultra-violet term and the final course of the path to the infra-red band in the positive region. The consideration of anomaly involves both the superposition rule (Lowry) and also Wood's interpretation of Drude's view of spurious anomaly; for the dispersion occurs between 2 bands, the low-frequency band in the ultra-violet and the infra-red band, and not merely outside the ultra-violet bands (longer wave length side), the infra-red band being neglected. Quartz is taken as an illustration of the importance of the infra-red term. By an extension of Thomson's view, a single asym. center can give rise to anomaly. Different classes of anomalous rotatory dispersion are discussed. C. J. WEST

Rotatory dispersion: Intersection of dispersion curves and of temperature-rotation curves. CHAS. E. WOOD AND SYDNEY D. NICHOLAS. Univ. of Birmingham. *J. Chem. Soc.* 1928, 1696-712.—The manner of intersection of dispersion curves is discussed. An envelope of max dispersion develops in certain tartrates and lactates, with increase of temp., in the direction red \rightarrow blue, which indicates movement of max. in temp-rotation curves. Movement of max of positive rotation (temp-rotation diagram) is in 1 direction only, provided the crossing of the axis, da/dT , is positive. A definite movement is of value in deciding configuration. It is necessary to know, in absence of anomaly, the direction of crossing the axis and the possibility of intersection of the temp-rotation curves in the positive region. Two methods throw light on these points—effect of solvents and extrapolation by means of a characteristic diagram. The presence and movement of negative min is assumed to be a temp relationship for enantiomorphs, and is of rarer occurrence than max of negative rotation. Utilization for configuration purposes depends upon a consideration of the following points: movement of minima; the sign of da/dT on crossing the axis; no intersection of temp-rotation curves in the negative region; effect of solvents. The possibility of 8 types of max. and min. having temp-rotation curves convex towards the axis is considered. Intersection of temp-rotation curves takes place in a definite order and gives rise to an enveloping curve of max. temp. rotation. C. J. WEST

Study of the anomalous rotatory dispersion of configuratively related compounds. CHARLES E. WOOD AND SYDNEY D. NICHOLAS. Univ. of Birmingham. *J. Chem. Soc.* 1928, 1712-27.—Anomalous rotatory dispersion is a trustworthy criterion for detg. relative configuration. The configuration of *l*-lactic, *l*-malic, *d*-hexahydro-mandelic and *d*-tartaric acids, as shown by their anomalies, are *d*, *l*, *l* and *d*, resp., which is in agreement with the configuration assigned to these acids by other workers. The non-empirical nature of this criterion is illustrated by *l*-alanine, *l*-tyrosine and *l*-aspartic acid, which are configuratively related to *l*-tartaric acid and certain series of alcs. The distinction between *d*- and *l*-alcs. contg. normal straight chains depends only on their relative lengths, since all other factors are eliminated. Movement of max. and min. for a particular wave length in a homologous series of configuratively related compds. is discussed. Series of alcs. have been considered with respect to: configuration; rotation changes with temp. for each individual member, particularly with regard to the region of approach of temp. rotation curves to the 0 axis and to a 0 rotation-temp-wave length plane; movements of max. and min. as the series is ascended. A series, none of the members (or derivs.) of which exhibits anomaly, is then considered with respect to temp-rotation curves and movement of max. and min., as the series is ascended. From analogy, conclusions are drawn as to configuration relationship. The configurations of nicotine and its salts are considered. C. J. WEST

Some acyl derivatives of hydrazine. F. J. WILSON, W. BAIRD, A. C. BROWN, E. C. PICKERING. *J. Roy. Tech. Coll. Glasgow*, No. 4, 60-2(1927).—Various aldehydic and ketonic derivs. of $\text{CO}(\text{NHNH}_2)_2$ were prepd. and their thermal decomps. studied. The following carbonylhydrazones of the type $\text{CO}(\text{NHN}:\text{CRR}')_2$ were prepd. from $\text{CO}(\text{NHNH}_2)_2$ and the resp. ketone: diacetone, di(methyl ethyl ketone), diacetophenone (I). Also some δ -aminosemicarbazones of the type $\text{NH}_2\text{NHCONHN}:\text{CRR}'$ were obtained (from $\text{CO}(\text{NHNH}_2)_2$ and the resp. aldehyde or ketone): benzaldehyde (II), acetophenone,

benzil and diacetyl. Ph_2CO and $\text{CO}(\text{NHNH})_2$ in boiling alc. gave *benzophenone δ -aminosemicarbazone*, which by prolonged boiling with excess of the ketone was partly transformed to $\text{CO}(\text{NHN}:\text{CPh})_2$ (cf. *Ber.* 37, 3177(1904)). A compd. of the mixed type is represented by the *benzaldehyde acetophenone carbohydrazone*, CH_3Ac_2 and $\text{CO}(\text{NHNH})_2$ gave 3,5-dimethylpyrazole, $\text{CO}(\text{NHIN}:\text{CHPh})_2$ (III) (cf. *J. prakt. Chem.* 52, 471(1895)) is decompd. in the following manner: boiling in abs. alc. gives dibenzaldehyde hydrazidicarbohydrazone (IV) and benzyldene azine (V); $2 \text{ III} = (\text{NH}:\text{CONHN}:\text{CHPh})_2$ (IV) + $(\text{PhCH}:\text{N})_2$ (V). IV and V were also obtained when III was heated at its m. p., but IV was further decompd. to 4-aminourazole, $\text{CO}:\text{NH}:\text{NH}:\text{CO}:\text{NNH}_2$ (VI), and V. Decompn. of I in boiling alc.: $2 \text{ I} = (\text{NH}:\text{CONHN}:\text{CMe}_2)_2 + (\text{PhMeC}:\text{N})_2$ (VII); without solvent. $2 \text{ I} = \text{VI} + 2 \text{ VII}$. Decompn. of II in boiling toluene: $\text{II} = (\text{NHCONHNH})_2 + \text{V}$; without solvent: $2 \text{ II} = \text{VI} + \text{NH}_2\text{NH}_2 + \text{V}$. Heating of $\text{CO}(\text{NHN}:\text{CMe}_2)_2$ with diphenylcarbohydrazone gave acetone phenylcarbohydrazone, VI, and $(\text{Me}_2\text{C}:\text{N})_2$, thus proving the interpretation of the thermal decompn. of some δ -anilinosemicarbazones (cf. *J. Roy. Tech. Coll. Glasgow*, No. 3, 89(1926)) to be correct. No intermediate products were obtained in the thermal decompn. of acetone, pinacolin and benzyldene δ -anilinosemicarbazone, while in the case of $\text{Me}_2\text{C}:\text{NNHCONHNHPh}_2$, some $\text{CO}(\text{NHNHPh})_2$ could be isolated. The reaction of PhNHNH_2 with acetone, acetophenone or dibenzyl ketone thiosemicarbazone, resp., gave thiosemicarbazide and the resp. ketonic phenylhydrazone instead of the expected δ -anilinothiosemicarbazone: $\text{CRR}':\text{NNHCSNH}_2 + \text{NH}_2\text{NHPh} = \text{CRR}':\text{NNHPh} + \text{NH}_2\text{NHCSNH}_2$. G. SCHWACH

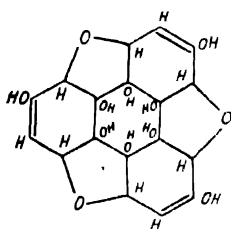
Chemistry of the three-carbon system. XVII. Cyclohexylideneacetone and cyclohexylenemethyl ethyl ketone. ALFRED H. DICKENS, WILFRED E. HUGH AND GEORGE A. R. KON. Imperial College Science Tech., London. *J. Chem. Soc.* 1928, 1630-8; cf. *C. A.* 22, 393.—The equil. mixt. of cyclohexylenemethyl Et ketone (I) and Δ^1 -cyclohexenylmethyl Et ketone (II) with an excess of EtONa contains 31% I; with insufficient EtONa, starting with I, the % of I was as follows: 3 hrs., 81; 8 hrs., 66; 16 hrs., 52.5; 24 hrs., 45; 48 hrs., 37; starting with II, the % of I was: 3 hrs., 10; 6 hrs., 20; 16 hrs., 30.5; 24 hrs., 31. With 10 cc. $\text{N}^2\text{H}_2\text{SO}_4$, after 16 hrs., I underwent about 75% conversion; II was unchanged, with piperidine, I was about 8.5% changed, II was again unchanged. In the direct condensation of cyclohexanone and MeCOEt, 84.5% II was formed. Condensation of II with $\text{CHNa}(\text{CO}_2\text{Et})_2$ gave the dihydroresorcinol ester as a viscous liquid, hydrolyzed with $\text{Ba}(\text{OH})_2$ to *cyclohexane-spiro-4-methylcyclohexane-3,5-dione*, m. 170°. Cyclohexylideneacetone (III) and Δ^1 -cyclohexenylacetone (IV), with excess of EtONa, give an equil. mixt. contg. 29% III; with insufficient EtONa, starting with III, the % of III decreased from 89% after 1 hr. to 34% after 46 hrs.; starting with II, the % of III increased from 12% after 3 hrs. to 26.5% after 24 hrs. With NaOH in EtOH, starting with III, the % of III decreases from 80.5 after 3 hrs. to 52.5% after 12 hrs.; starting with IV, the % of III after 6 hrs., 15; after 12 hrs., 22.5. C. J. WEST

Mechanism of tautomeric interchange and the effect of structure on mobility and equilibrium. II. Ring-chain tautomerism in its relation to the mutarotation of the sugars. JOHN WM. BAKER. Univ. of Leeds. *J. Chem. Soc.* 1928, 1583-93.—This paper contains a study of structural effects on ring-chain tautomerism in its application to the mutarotation of sugars. Tetraacetylglucose shows arrest of mutarotation in AcOEt for 23 hrs., and the mutarotation is not complete in 171 hrs.; tetramethylglucose shows a similar arrest in AcOEt and in Me_2CO for 6 and 3 hrs, resp. *Tetraacetylglucose anilide*, m. 98°; *p-toluide*, m. 147°; *p-aniside*, m. 129°; *p-bromoanilide*, m. 160°; *p-chloroanilide*, m. 147°; *N-methylanilide*, m. 102°. Details are given of the mutarotation of tetraacetylglucose in 90% EtOH and of the relative velocities of the anilides in AcOEt with acid catalysts at 24°. C. J. WEST

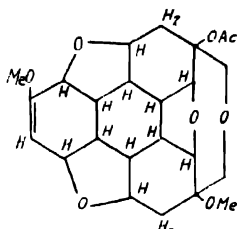
Methylation experiments on starch. LEOPOLD SCHMID AND MARGOT ZENTNER. Univ. Vienna. *Monatsh.* 49, 111-7(1928).—Methylation of starch with CH_3N_2 gives a product with about 21% MeO; hydrolysis with 1% MeOH-HCl by heating 46 hrs. at 100° and 12 hrs. at 170° gave a product, sepd. into 3 fractions with MeO 35.3, 25.23 and 20.01%. Further hydrolysis of the 1st fraction with aq. HCl gave a dimethylglucose, α_D 83.85°. Oxidation with HNO_3 gives a mono- CO_2H acid, whose Me ester contains 3 MeO groups. Hydrolysis of the fraction contg. 25.23% MeO gave a sugar with about 24% MeO. C. J. WEST

The status of lignin research. K. G. JONAS. *Papier-Fabr.* 26, 221-9(1928); cf. *C. A.* 15, 3063; 16, 2315; 19, 3015.—An address. The work of Klason, Fischer, and others, who ascribe an aromatic origin to lignin, is discussed and criticized. J.

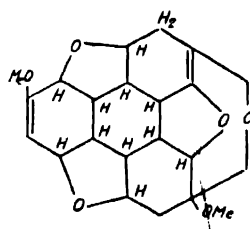
believes it to be a furan deriv. formed by polymerization and condensation of 3 mols. of 2,5-anhydrohexose, giving the compd. (I), $C_{15}H_{18}O_8$. Reduction of the OH groups in the inner ring may give rise to different lignins. I differs from Schrauth's formula (C. A. 17, 2111) in the position of the enolic OH groups. Native lignin is assigned the



I



II



III

structure II, $C_{20}H_{22}O_8$, and Willstätter lignin III, $C_{20}H_{22}O_8$. Condensed anhydro-sugars resembling III, but without the McO group, have been prepd. From the practical standpoint, such a lignin would be much more difficult to utilize commercially than if it were aromatic in nature.

R. H. DOUGHTY

Cryoscopic determination of the molecular weight of glycogen in liquid ammonia. LEOPOLD SCHMID, ERNST LUDWIG and KATHE PIETSCH. Univ. Wien. *Monatsh.* 49, 118-21 (1928).—A sample of Schuchardt's "Glykogen puriss," with 0.48% ash and α 175.3°, was almost completely sol. in liquid NH_3 ; a 2nd sample, with α 163° and 2.68% ash, was only partially sol., the recovered part having α 177°; a sample prepd. from human liver likewise was only partly sol., the recovered part having α 186°. The mol. wt. of the NH_3 -sol glycogens in liquid NH_3 was about 180 (range of values, 131-197).

C. J. WEST

Mobile hydrogen tautomerism analogous to the Wagner-Meerwein rearrangement. II. The tautomerism of 1 (or 5)-hydroxy-2,2,3,3-tetramethylcyclopentan-5(or 1)-one and its derivatives. CHARLES WM. SHOPPÉE. Univ of Leeds. *J Chem Soc.* 1928, 1662-70; cf. C. A. 22, 1952.—Reduction of bromoacetoxyphorone with Zn and AcOH gives mainly the Ac deriv., b_{10} 120.1°, of 1(or 5)-hydroxy-2,2,3,3-tetramethylcyclopentan-5(or 1)-one (I), m. 142°. It is but slowly oxidized with alk. $KMnO_4$ but reduces Fehling soln. readily; $EtOH-FeCl_3$ gives no color; *p*-nitrophenylhydrazone, golden yellow, m. 223-4° (decompn.); *p*-nitrobenzoate, m. 85°. Reduction of I gives a mixt of 2,2,3,3- and 3,3,4,4-tetramethylcyclopentanones, sep'd as the semicarbazones. $BzCl$ in C_6H_5N gives a mixt. of 2 Bz derivs, sep'd. by crystn. from dil. MeOH, 1-benzoyloxy-2,2,3,3-tetramethylcyclopentan-5-one, m. 105°, which reduces Fehling soln. and is hydrolyzed to I by NaOH; the oxime, m. 115°, gives no color with $FeCl_3$, reduces Fehling soln. on boiling, yields a Bz deriv., m. 135° and on reduction gives 3,3,4,4-tetramethylcyclopentylamine, m. 100°. 5-Benzoyloxy-2,2,3,3-tetramethylcyclopentan-1-one, m. 60°, hydrolysis gives I; the oxime is oily and gives a Bz deriv., b_{16} 200-15°; reduction of the oxime gives 2,2,3,3-tetramethylcyclopentylamine. The oximes of I form an oil which on reduction gives the 2 amines obtained from the Bz deriv. I with Me_2SO_4 gives a Me deriv., b_{16} 88-90°, n_D^{20} 1.4574; the oxime is oily.

C. J. WEST

Condensation of ketones with ethyl acetoacetate. LEONARD G. JUPP, GEORGE A. R. KON and EDWARD H. LOCKTON. Imperial College Science Tech., London. *J. Chem. Soc.* 1928, 1638-44.—Condensation of cyclohexanone with $AcCHNaCO_2Et$ by heating for 24 hrs. gives cyclohexenylacetone, cyclohexenylcyclohexanone and a very small quantity of the ester $C_6H_5CH(COMe)CO_2Et$, b_{16} 135°, giving an intense red-violet color with $FeCl_3$; semicarbazone, m. 141°; there also is formed cyclohexenylacetoacetic acid, m. 121°; semicarbazone, m. 196°; oxidation of this acid gives $(CO_2H)_2$ and adipic acid; heating splits off CO_2 and gives a mixt. of cyclohexylideneacetone and cyclohexenylacetone. The acid cannot be esterified. Other efforts to prep. the desired ester failed. Di-Et Δ^1 -cyclohexenylacetylmalonate, b_{16} 181°; semicarbazone, m. 178°; EtONa gives AcOEt and di-Et cyclohexenylmalonate. Condensation of cyclopentanone with $AcCHNaCO_2Et$ gives cyclopentylideneacetoacetic acid, m. 137° (decompn.). Et isopropylideneacetoacetate gives a semicarbazone, m. 247°; attempts to methylate the ester failed. Δ^1 -Pulegenylacetone (I) forms a semicarbazone, m. 187°; Na and MeI give the α -Me deriv., b_{16} 150°, d_4^{21} 1.49694, n_D^{21} 1.49347; semicarbazone, m. 191°. I and $AcCHNaCO_2Et$ give a dihydroresorcinol deriv., $C_{10}H_{12}O_3$, m. 130°;

FeCl_3 gives a reddish violet color. Piperitone gives a *ketone*, b_{20} 155 d_{20}^{21} 0.95821, n_D^{21} 1.49610; *semicarbazone*, $\text{C}_{14}\text{H}_{22}\text{ON}_3$, m. 217° C. J. WEST

Action of bromine water on certain olefinic hydrocarbons and ethers. JOHN READ AND WM. G. REID. Univ. of St. Andrews *J. Chem. Soc.* 1928, 1487-93.— PhCH:CH_2 and 7% Br in 10% KBr at 90° give 96.7% of β -hydroxy- β -phenylethyl bromide (I), b_2 109-10°, d_4^{20} 1.4994, n_D^{17} 1.5800; at ordinary temps., the yield drops to 78%, some dibromide being formed. I and concd. NH_4OH , shaken 10 hrs., give $\text{HOCHPhCH}_2\text{NH}_2$. Attempts to prep. I from the dibromide by digestion with CaCO_3 in aq. EtOH or Me_2CO were unsuccessful. The yields of bromohydrin from $\text{MeCH:CHC}_6\text{H}_4\text{OMe}$ at room temp. and 90° were 47.9 and 76.1%, resp. With concd. NH_4OH this gives β -hydroxy- β -*p*-methoxyphenylisopropylamine (II), m. 84° (*HCl* salt, m. 182°; *Bz* deriv., m. 159°; benzylidene deriv., viscid sirup). Crystn from abs. EtOH gives the *d*-II *d*-camphorsulfonate, m. 194-5°, $[\alpha]_D$ 20.5°; the *d*-II, m. 80-1°, $[\alpha]_D$ 4.6° (H_2O , c 1.0), 13.9° (MeOH , c 1.0), 18.4° (EtOH, c 0.6), 22.9° (C_6H_6 , c 1.2), 21.7° (Me_2CO , c 0.6). *HCl* salt, m. 171-2°, $[\alpha]_D$ 14.7° (H_2O , c 0.9); *Bz* deriv., m. 153-4°; a 0.5 EtOH soln. was inactive. The yields of bromohydrin from safrole at room temp. and 90° are 65.2 and 69.2%; from isosafrole, 67 and 72.8%; eugenol and isoeugenol give indefinite tarry products. β -Amino- α -hydroxydihydroisosafrrole, viscid oil; *HCl* salt, m. 154°. Amylene (chiefly $\text{Me}_2\text{C:CHMe}$) gives 50% of $\text{Me}_2\text{C(OH)CHBrMe}$, b_{15} 45-6°; concd. NH_4OH gives γ -amino- β -hydroxy- β -methylbutane, pale yellow, b_{15} 60-2°; chloroplatinate, orange, m. 186° (decompn.); *Bz* deriv., oily; *p*-nitrobenzoyl deriv., m. about 65°; *d*- α -bromocamphorsulfonate, m. 170°; *d*-camphorsulfonate, m. 144°; no optical resolution was noted on crystn. of these salts. With KOH the bromohydrin gives trimethylene oxide, while on heating with H_2O at 100° or with PbO_2 and PbCl_2 , Me_2CHAc results, *dl*- Δ^3 -Menthene and Br in H_2O give a mixt. of $\text{C}_{10}\text{H}_{17}\text{OBr}$ and $\text{C}_{11}\text{H}_{17}\text{Br}_2$, amber-colored liquid, which decomp. on distn, n_D 1.5111. C. J. W.

The halogenation of aromatics in aqueous solutions. D. V. TISHCHENKO. *J. Russ. Phys.-Chem. Soc.* 60, 153-62(1928).—A concd. soln. of Na_2CO_3 and 1 equiv. Br_2 give NaHCO_3 , NaBr , Br_2 , NaBr and NaBrO_3 . In dil. solns. contg. excess Na_2CO_3 , NaOBr is found. Into 0.1 mol. org. substance dissolved or suspended in 50 cc. H_2O are allowed to drop 0.1 mol. of Br_2 and Na_2CO_3 in 100 cc. H_2O ; 0.05 equiv. of HCl or H_2SO_4 are added after the mixt. is colorless. Evolution of Br_2 and CO_2 follows, and bromination stops. PhH , PhMe and xylenes are unchanged, C_{10}H_8 gives 80% very pure α - $\text{BrC}_6\text{H}_4\text{H}$; which is not colored on standing. PhOH yields over 70% *p*- $\text{BrC}_6\text{H}_4\text{OH}$; 20 g. Br_2 , 36 g. Na_2CO_3 and 4 g. PhOH give $\text{Br}_2\text{C}_6\text{H}_3\text{OH}$ quant. *m*-($\text{HO})_2\text{C}_6\text{H}_4$ is partly oxidized, 15% $\text{Br}_2\text{C}_6\text{H}_3(\text{OH})_2$ m. 111° (*Monatsh* 9, 296, 1888) being obtained. β - $\text{C}_{10}\text{H}_7\text{OH}$ forms tar which settles on careful addn. of acid; 1.2- $\text{C}_{10}\text{H}_7\text{BrOH}$ in the soln. is recrystd., yield, 60%. *o*- and *p*- $\text{C}_6\text{H}_4(\text{OH})_2$ are almost wholly resinified. The *m*- and *o*-cresols yield 84 and 70%, resp., of 6-*Br* deriv.; *p*-cresol gives 60% of $\text{Br(OH)C}_6\text{H}_4\text{Me}$ b_{15} 110-4°. Alizarin and anthraquinone are not acted on; indigo is oxidized to indoxyl. BrONa and $\text{C}_6\text{H}_4(\text{CO}_2\text{Na})_2$ are not brominated. *o*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{Na}$ after bromination was converted into the *Ca* salt and crystd. The middle fraction (70% of the total) gave 4.2- $\text{Br(HO)C}_6\text{H}_3\text{CO}_2\text{H}$. PhOH forms *p*- and $\text{MeC}_6\text{H}_4\text{OH}$, *o*-derivs. in solns. of the same acidity. On the other hand, the brominating agent must be Br_2 in acid and HOBr in alk. solns. since almost quant. bromination of *m*- $\text{C}_6\text{H}_4(\text{OH})_2$ occurs in the former and oxidation in the latter. Analogous expts. were made with Cl_2 instead of Br_2 . PhOH gives equal quantities of *o*- and *p*- $\text{ClC}_6\text{H}_4\text{OH}$, the total yield being 75%. *o*-Cresol yields 80% of *m*- and *o*- Cl derivs., *m*-cresol gives chiefly 2,3- $\text{ClMeC}_6\text{H}_3\text{OH}$ besides the *p*- Cl deriv. Thymol yields 80% of a 4- Cl deriv., m. 59-60° and b. 259-43°. *m*- $\text{C}_6\text{H}_4(\text{OH})_2$ is strongly oxidized; β - $\text{C}_{10}\text{H}_7\text{OH}$ gives 20% of what is probably 2,8- $\text{C}_{10}\text{H}_6(\text{OH})\text{Cl}$, m. 101°, and 30% of β , β - $\text{C}_{10}\text{H}_6(\text{OH})_2$, besides a tarry residue. PhNH_2 is transformed into $\text{H}_2\text{NC}_6\text{H}_4\text{NO}_2$. PhNMe_2 yields about 100% of the *o*- and *p*- Cl derivs. in equal quantities. AcNHPh , acetotoluides acetonaphthalides, Ph_2NH and α -aminoanthraquinone are not changed. $\text{H}_2\text{NC}_6\text{H}_4\text{SO}_3\text{Na}$ is converted into yellow ($\text{NC}_6\text{H}_4\text{SO}_3\text{Na})_2$, which yields $\text{H}_2\text{NC}_6\text{H}_4\text{SO}_3\text{H}$ with Sn in HCl . The salts of the CO_2H and SO_3H which do not contain OH , NH_2 , etc., groups are not chlorinated. The chlorination products of *o*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{Na}$ were a mixt. of *p*- and *o*-derivs. *p*- $\text{HOC}_6\text{H}_4\text{CO}_2\text{Na}$ gives the *m*- Cl deriv. quant. Alk. solns. of Cl_2 thus have a stronger oxidizing action than those of Br_2 due to the greater content of hypohalite.

BASIL C. SOYENKOFF

The influence of impurities on the reaction velocity of organic halides with amines. B. V. TRONOV AND A. I. GERSHEVICH. *J. Russ. Phys.-Chem. Soc.* 60, 171-80(1928).—Equimol. quantities of PhCH_2Cl , $\text{C}_6\text{H}_5\text{N}$ and a hydrocarbon or alc., etc., were allowed

to react at 18°, extd. with H_2O , and the halogen ion titrated. Hydrocarbons and Et_2O hindered the reaction between PhCH_2Cl and $\text{C}_6\text{H}_5\text{N}$. Aldehydes, ketones, esters and PhNO_2 had little influence. $\text{CH}_2(\text{NO}_2)_2$ accelerated the reaction 1.5-2.2 times, alcs. 1.5-2.8 times, MeCN 1.79 times and $\text{MeCH}(\text{OH})\text{CN}$ and HCONH_2 about 5 times. Similar results were obtained with PhCH_2Br and CCl_4NO_2 . Substances which cause $\text{C}_6\text{H}_5\text{N}\cdot\text{HCl}$ to sep. hinder the reaction, possibly because $\text{C}_6\text{H}_5\text{N}$ is carried down with the salt. However, the immiscible substances are also chem. inert while those in which $\text{C}_6\text{H}_5\text{N}\cdot\text{HCl}$ is sol. form complexes. HCONH_2 , although immiscible, accelerates the reaction, probably by forming a complex with $\text{C}_6\text{H}_5\text{N}$.

BASIL C. SOYENKOFF

The preparation of *p*-nitrobenzyl bromide. I. V. HOPPER. *J. Roy. Tech. Coll. Glasgow*, No. 4, 58-9 (1927).—Improved methods are given for the prepn. of *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{CH}_2\text{Br}$ (I). By heating 5 g. of *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{Me}$ with 2 cc. Br at 128-32° in a sealed tube for 160 min., 70% of I was obtained. Addn. of a crystal of I raised the yield to 80%. Heating of 10 g. *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{Me}$ with 12.7 g. Br and an I crystal in CCl_4 under reflux and while exposed to the rays of a mercury-vapor lamp, gives 80% of I.

G. SCHWOCH

The action of magnesium on *p*- and *m*-dibromobenzene. Y. S. ZALKIND AND P. V. RAGOVINA. *J. Russ. Phys. Chem. Soc.* 59, 1013-8 (1927).—On the basis of electronic structure of the dibromobenzenes (according to Berkenheim) the introduction of Mg would strengthen the C-Br linkage in the *p* position and weaken it when in the *m*-position. The reactivities of *m*- and *p*- $\text{Br}_2\text{C}_6\text{H}_4$ were detd. by adding them to 2 equivs. Mg in abs. Et_2O . After 9 hrs. boiling the Mg compd. was decompd. with ice H_2O and uncombined Mg dissolved in dil. H_2SO_4 . The vols. of H_2 were measured and the aqueous layers titrated for Br. The *m*-deriv. reacted with 83.0, 87.0, 87.1% Mg, the *p*-deriv. with 88.4, 86.6, 88.0%. The figures obtained by Br titration are higher because the Fittig condensation also takes place. Among the reaction products of *m*- $\text{Br}_2\text{C}_6\text{H}_4$ were PhH (yield 30.8%) and PhBr (22.6%) besides a small amt. of Ph $_2$ and tar contg. 11.2% Br. An expt. with Mg, activated with 50% I_2 , and *p*- $\text{Br}_2\text{C}_6\text{H}_4$ showed that 83% of Mg entered the reaction. A 23% yield of PhH was obtained besides 24% PhBr, some (*p*- BrC_6H_4) $_2$ and tar. The *m*- and *p*-derivs. thus react equally readily with the second Mg, any resulting Mg_2 compds. being transformed into tar.

BASIL C. SOYENKOFF

Nitration of benzene to mononitrobenzene. V. I. MALYAREVSKII AND I. P. KALINCHENKO. *J. Chem. Ind. (Moscow)* 4, 399-500 (1927).—A series of expts. with nitrating mixts. consisting of 38.5% HNO_3 , 48.7-54.37% H_2SO_4 , 12.8-7.13% H_2O , as well as with those having the following compos.: HNO_3 34.1%, H_2SO_4 52.6%, H_2O 13.74%; HNO_3 28.69%, H_2SO_4 56.45%, H_2O 14.86%; HNO_3 23.05%, H_2SO_4 60.90%, H_2O 16.05%, the temps. of nitration being 40°, 50°, 60°, 70°, 80°, show that the compn. of the nitrating mixt. within the limits studied, and particularly the temp. of the reaction, have but an insignificant influence on the quality of the PhNO_2 obtained, the formation of $\text{C}_6\text{H}_4(\text{NO}_2)_2$ as impurity varying only between 0.03 and 0.20%. While only an insignificant amount of $\text{C}_6\text{H}_4(\text{NO}_2)_2$ is formed as long as an excess of benzene is present in the mixt., the formation of larger quantities of $\text{C}_6\text{H}_4(\text{NO}_2)_2$ and their increase with the rise of the temp. are principally due to a partial overnitration which takes place at the end of the operation when very little benzene is left. Another factor which may bring about the formation of $\text{C}_6\text{H}_4(\text{NO}_2)_2$ is the insufficient stirring of the reaction mixt. It is advisable to operate with energetic stirring of the mixt., or with a nitrating app. of such construction that the nitrating liquid, at the moment of entering the app. does not immediately come in contact with the benzene. Since the temp. of nitration can be raised to 80°, and probably higher, without lowering the quality of the product obtained, it is advisable to operate at this high temp., thus increasing the speed of the reaction. The higher the temp. the more completely HNO_3 is utilized, and thus smaller amounts of it could be taken, which in turn would permit operation with smaller amounts of H_2SO_4 .

BERNARD NELSON

Catalytic oxidation of nitro and halogen derivatives of toluene by means of air. EDWARD B. MAXTED AND ARTHUR N. DUNSBY. *J. Chem. Soc.* 1928, 1439-42; cf. C. A. 22, 2376.—Oxidation of *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{Me}$ to *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ by air in the presence of Sn vanadate begins at 260° (8.4% yield); at 270-300° the yield is fairly const. at 14-16%; the air rate was 10 l. per hr., about 0.3 g. *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{Me}$ passing the 10 cc. of catalyst during that time. *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{Me}$ gave little or no acid, the product decompd. at catalyst temps. sufficient to cause oxidation. *o*- $\text{BrC}_6\text{H}_4\text{Me}$ gives 7.4% acid at 255°, 12.1% at 265°, 13.7% at 275°, 21% at 285°, 24.3% at 290°, 14% at 295° and 6.3% at 305°. *o*- $\text{ClC}_6\text{H}_4\text{Me}$ gives 4.9% acid at 260°, 7.4% at 275°, 13% at 285°, 13.8% at 287° and 12.6% at 293°.

C. J. Waser

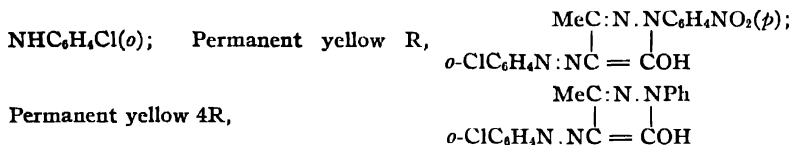
α , γ -Diamino- β -phenylpropane and related compounds of pharmacological interest. JOSEPH G. JACKSON AND JAMES KENNER. Univ. of Sheffield. *J. Chem. Soc.* 1928, 1657-62.—*Di-Et β -phenylglutarate* b_{14} 180-4°; *β -phenylglutardihydrazide* m. 177°; the corresponding urethan m. 73-4°; with boiling HBr (6 hrs.) this gives α , γ -diamino- β -phenylpropane-HBr (I), m. 252° decomps. 272°; the free base, b_{15} 150°, is rapidly converted into the carbonate, m. 172° (decompn.), in the air; *picrate*, yellow, m. 247° (decompn.); *di-Ac deriv.*, m. 153-4°; *di-Bz deriv.*, m. 179°; *di-p,p'-toluenesulfonyl deriv.*, m. 91° (Me₂SO₄ gives a *di-Me deriv.*, m. 60°, whose acid hydrolysis gives *N,N'*-dimethyl- α , γ -diamino- β -phenylpropane-HCl, m. 249°). The filtrate of I gives γ -amino- β -phenylbutyric acid-HBr, m. 114°, which, treated with cold 10% KOH, gives 4-phenyl-2-pyrrolidone, m. 60° (*Ac deriv.*, m. 63°; *Bz deriv.*, m. 145°). The di-Ac deriv. of I and P₂O₅ in PhMe gives 4-aminomethyl-1-methyl-3,4-dihydroisoquinoline (II), m. 182° (*HCl salt*, m. 222°); the di-Bz deriv., similarly treated, gives the *Bz deriv.*, m. 114°, of 4-aminomethyl-1-phenyl-3,4-dihydroisoquinoline (III), m. 169° (*di-HCl salt*, m. 291°). CH₂(CO₂Et)₂ and *p*-MeC₆H₄CH₂CHCO₂Et with EtONa give tri-Et *p*-methoxyphenylpropane- α , α , γ -tricarboxylate, b_{12} 225-40°; hydrolysis and heating the resulting acid at 130° gives β -*p*-methoxyphenylglutaric acid, m. 165°; *anhydride*, m. 152°; *di-Me ester*, m. 42°, b_{20} 205-10°; *di-Et ester*, b_{14} 206-10°; *dihydrazide*, m. 190°; *diurethan*, m. 99-100°; hydrolysis with HBr gives α , γ -diamino- β -*p*-hydroxyphenylpropane-di-HBr (IV), m. 316°, which gives a violet color with FeCl₃; *tri-Bz deriv.*, m. 206-7°. Heating veratraldehyde, CH₂(CO₂H)₂ and 4 *N* EtOH-NH₂ at 100° for 6 hrs. gives 3,4-dimethoxybenzylidenemalonic acid, light yellow, m. 208° (decompn.). Tri-Et β , β ,4-dimethoxyphenylpropane- α , α , γ -tricarboxylate, b_{14} 245-8°; 3,3'-dimethoxydiphenylglutaric acid, crystg. with 1 H₂O, m. 125-30°; *anhyd.*, m. 184°; *anhydride*, m. 124°; *di-Me ester*, m. 73°; *di-Et ester*, b_{15} 226-9°; *dihydrazide*, m. 182°; the sirupy urethan, on hydrolysis with HBr, gives α , γ -diamino- β ,3,4-dihydroxyphenylpropane-di-HBr (V), crystg. with 1 H₂O, m. (anhyd.) 294°; *tetra-Bz deriv.*, m. 217°. I and its di-Me deriv. produce no appreciable effect upon the blood pressure of a cat; IV and V are devoid of all but a trace of a sympathomimetic action. II and III cause a definite depression of the blood pressure of a cat.

C. J. WEST

Identification of the reduction products of azo dyes. II. Classification and identification of compounds belonging to group A. SHIGEO UENO. *Bull. Inst. Phys. Chem. Research (Tokyo)* 7, 49-88 (1928); English Ed. 1, 3-5.—In the first paper, U. had classified the reduction products of azo dyes into 2 groups. Group A: Those which show a color reaction with difficulty through oxidation by air. when a filter paper is moistened with their NH₄OH soln.; Group B: Those giving a color reaction. Some 80 compds. belonging to group A have been classified as follows: *Class I*.—Easily distd. by steam: aniline, *o*- and *p*-toluidines, *m*- and *p*-xylydines, γ -cumidine, *o*- and *p*-anisidines, *p*-phenetidine, 2,4-Cl₂C₆H₃NH₂, 3,4-H₂N(MeO)C₆H₃Me. *Class II*.—Distd. by steam rather poorly, but easily identifiable: *m*- and *p*-C₆H₄(NH₂)₂, *m*-tolylenediamine, α - and β -C₁₀H₇NH₂.—*Class III*.—Bases difficultly sol. in water: benzidine, *o*- and *m*-tolidines, dianisidines, 3-ethoxybenzidine, 3,3'-dichlorobenzidine, *p*-H₂NC₆H₄NHPh, (*p*-H₂NC₆H₄)₂NH, thioaniline, (*p*-H₂NC₆H₄NH)₂CO, (*p*-H₂NC₆H₄NH)₂CS, dehydrothio-*p*-toluidine, dehydrothio-*m*-xylydine, 1,4-C₁₀H₆(NH₂)₂NHPh. *Class IVa*.—Bases moderately sol. in water: 3,4-H₂N(PhCH₂O)C₆H₃Me, 1,3,4,5-C₆H₂Me₂(NH₂)₂, 2-aminobenzidine, 1,2-C₁₀H₆(NH₂)₂. *Class IVb*.—Bases easily sol. in water: 3,4-(H₂N)₂-C₆H₃Me, *m*-H₂NC₆H₄NMe₂Cl, *p*-H₂NC₆H₄CH₂NMe₂, *p*-H₂NC₆H₄CH₂NH₂. *Class V*.—Free acids difficultly sol. in water, sepp. out on addn. of dil. HCl to aq. solns. of their alk. salts: 2,5,4-Cl(H₂N)(HO₂S)C₆H₃Me; benzidine-2,2'- and 3,3'-disulfonic acids; diaminostilbenedisulfonic acid; diaminodiphenylureadisulfonic acid; 4,4'-diaminodiphenylamino-2-sulfonic acid; dehydrothio-*p*-toluidinesulfonic acid; 1,4- and 1,5-C₁₀H₆(NH₂)₂SO₃H, 2,1-, 2,5-, 2,6- and 2,8-C₁₀H₆(NH₂)₂SO₃H, 1,5,3,7-C₁₀H₄(NH₂)₂(SO₃H)₂, 2,5,7-C₁₀H₄(NH₂)₂(OH)(SO₃H). *Class VIa*.—Free acids or their acid Na salts slightly sol. in water: metanilic acid; sulfanilic acid; 4,2- and 4,3-H₂N(HO₂S)C₆H₃Me; 4-amino-*m*-xylene-5- and 6-sulfonic acids; 2,4-H₂N(HO₂S)C₆H₃OH, 1,2,3,4,6-C₆H₃(NH₂)₂(SO₃H)₂, 1,4,7-, 1,4,8-, 2,1,6- and 2,3,6-C₁₀H₆(NH₂)₂(SO₃H)₂, 8,3,6-C₁₀H₄(OH)(SO₃H)₂. *Class VIb*.—Free acids or their acid Na salts easily soluble in water (more than 2% at ordinary temp., acidic Na salts diminishing their soly. very greatly on addn. of NaCl to the solvent): 2,5-H₂N(HO₂S)C₆H₃Me, 2,4- and 2,5-(HO₂S)₂C₆H₃NH₂; 1,3,6-, 1,4,6-, 2,6,8-C₁₀H₆(NH₂)₂(SO₃H)₂. *Class VII*.—Difficultly sol. in water, sol. in dil. AcOH, sepp. out on addn. of NaHCO₃ to the aq. soln. of their chlorides, easily sol. in alk. carbonates: *p*-aminophenol; 5,2- and 3,4-H₂N(OH)C₆H₃Me. *Class VIIa*.—Free acids slightly or difficultly sol. in water, aq. soln. of their HCl salts sepp. out as free acids on addn. of AcONa: *o*-, *m*-, and *p*-H₂NC₆H₄CO₂H, 3,2- and 5,2-

$\text{H}_2\text{N}(\text{HO})\text{C}_6\text{H}_4\text{CO}_2\text{H}$. *Class VIIIb*.—Slightly or difficultly sol. in water, their HCl salts sepg. mostly as free acid even without adding AcONa : 3,5,2- and 4,5,2- $\text{Me}(\text{H}_2\text{N})(\text{HO})\text{C}_6\text{H}_3\text{CO}_2\text{H}$. A. L. HENNE

Constitution of Hansa yellow 3G, 5G and log (M. L. B.) and of permanent yellow R and 4R (A. G. F. A.). A. H. BURR AND F. M. ROWE. *J. Soc. Dyers Colourists* **44**, 205-7(1928).—Analytical and synthetical reactions indicated the following constitutions: Hansa yellow 3G, 4,2- $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{N}:\text{NCHAcCONHPh}$; Hansa yellow 5G, $\alpha\text{-O}_2\text{NC}_6\text{H}_4\text{N}:\text{NCHAcCONHPh}$; Hansa yellow 10G, 4,2- $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{N}:\text{NCHAcCO}$ -



L. W. RIDGS

The transformation of diaminodiphenylarsinic acid into the diphenylarsinic acid. V. V. NEKRASOV. *J. Russ. Phys.-Chem. Soc.* **59**, 877-80(1927).—($p\text{-H}_2\text{NC}_6\text{H}_4$)₂AsO(OH) (I) is a by-product in the prepn. of arspenamine. $\text{Ph}_2\text{AsO}(\text{OH})$ can be obtained from it and used in the AsPh_2Cl synthesis. The crude I is extd. from the residues and charcoal thrice with the same portion of H_2O which is cooled and filtered each time. A soln. of 29 g. of the acid in 45 cc. HCl (d. 1.14) and 100 cc. H_2O is diazotized with 14 g. NaNO_2 in 70 cc. H_2O at 0-2°. The reaction mixt. is added to a cooled soln. of 106 g. $\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$ in 112 cc. HCl (d. 1.14) and 180 cc. H_2O to which 2-3 cc. 10% CuSO_4 has been added. The mixt. is left overnight, neutralized, boiled with charcoal and filtered. The residue is extd. as above. $\text{Ph}_2\text{AsO}(\text{OH})$, m 173-4°, seps. on cooling. Yield 15-16 g. BASIL C. SOYENKOFF

Arylsulfonyl chlorides. II. ERICH GEBAUER-FULNEGG, EUGEN RIESZ AND SIEGFRIED ILSE. *Univ. Wien Monatsch.* **49**, 41-6(1928); cf. *C. A.* **21**, 573.—The action of NaI upon $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{Cl}$ gives $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{Na}$, identified as the free acid, ($p\text{-MeC}_6\text{H}_4\text{SO}_2$)₂, m. 212°, and $p\text{-MeC}_6\text{H}_4\text{SO}_2\text{SC}_6\text{H}_4\text{Me}(p)$, m. 78°. $\text{PhC}_6\text{H}_4\text{SO}_2\text{Cl}$ and NaI give $\text{PhC}_6\text{H}_4\text{SO}_2\text{Na}$ (the free acid m. 71°) and *dibiphenyldisulfone*, m. 214-6°. C. J. WEST

Course of the oxidation of arylsulfurarylides. ERICH GEBAUER-FULNEGG AND EUGEN RIESZ. *Univ. Wien. Monatsch.* **49**, 31-40(1928), cf. *C. A.* **22**, 1148.—Five g. each of 4,2- $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{SOCl}$ and $o\text{-H}_2\text{NC}_6\text{H}_4\text{OH}$ in Et_2O give 6.5 g. of 4-chloro-2-nitrophenylsulfur-2'-hydroxyanilide, reddish brown, m. 143°; oxidation with $\text{Na}_2\text{Cr}_2\text{O}_7$ in AcOH gives an amorphous product, m. 134-5°; H_2O_2 gives 4-chloro-2-nitrophenyl-o-quinone sulfur imine, $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{SN}:\text{C}_6\text{H}_4:\text{O}$. $p\text{-C}_6\text{H}_4(\text{NH}_2)_2$ gives sym-bis-[4'-chloro-2'-nitrobenzenesulfenyl]-1,4-diaminobenzene, m. 212°, all oxidizing agents, as well as long boiling with AcOH or Me_2CO , give a high-melting, very difficultly sol., red product; 1 amorphous product m. 264-70°; continued boiling with AcOH gives a violet product, m. 212°; chlorination of the high-melting product gives NH_4Cl and $\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{SOCl}$. $o\text{-C}_6\text{H}_4(\text{NH}_2)_2$ gives the corresponding 1,2-diaminobenzene, red, m. 181°; also, a 2,3-diaminophenazine, yellow, decomps. above 340°. Oxidation of the former gives a dark violet product, m. 187-93°; long boiling with AcOH gives a reddish brown ppt. $p\text{-Me}_2\text{NC}_6\text{H}_4\text{NH}_2$ gives 1-dimethylamino-4-[4'-chloro-2'-nitrobenzenesulfenyl]aminobenzene, brownish red, m. 152°. Oxidation with HNO_3 gives the compd. $\text{C}_{14}\text{H}_{13}\text{O}_2\text{N}_3\text{SCl}$, red, m. 102°; the free base, $\text{C}_{14}\text{H}_{14}\text{O}_2\text{N}_3\text{S}$, m. 186° ($\text{Cl}(\text{O}_2\text{N})\text{C}_6\text{H}_3\text{SN}:\text{C}_6\text{H}_4:\text{NMMe}_2\text{OH}$). C. J. WEST

Direct introduction of substituents into aromatic mercaptans. Complementary note. TH. VAN HOVE. *Ghent Univ. Bull. soc. chim. Belg.* **37**, 240(1928).—A correction to the bibliography of *C. A.* **22**, 62. A. L. HENNE

Oxidation of sulfides by benzoylhydroperoxide. II. I. N. LEWIN. Nametkin's Lab., Moscow. *J. prakt. Chem.* **119**, 211-4(1928); cf. *C. A.* **22**, 1950.—(ClCH_2CH_2)₂S (2.52 g.) in 50 cc. CHCl_3 , cooled to -10° and treated with the theoretical quantity of BzO_2H in CHCl_3 , also at -10°, gives quant. the sulfoxide, m. 108.5-10.5°; Ph_2S is likewise quant. oxidized to the sulfoxide, m. 70-1.8°; (PhCH_2)₂S gives the sulfoxide, m. 133-4.6°. With an excess of BzO_2H , the corresponding sulfones are formed, quant. in the 1st 2 cases, 80% in the case of (PhCH_2)₂SO. C. J. WEST

Organoselenic compound. M. TAKAMATSU. Tokyo Imp. Univ. *J. Pharm. Soc. Japan* **48**, 450-3(1928).—Heating of 2 mols. PhOH and 1 mol. H_2SeO_4 gave a reddish brown compd., $\text{Se}(\text{C}_6\text{H}_4\text{OH})_2$, sol. in EtOH , Me_2CO and alkali hydroxides, sparingly sol. in Et_2O and insol. in CHCl_3 , C_6H_6 and NH_4OH . It is probably identical with the seleno-

phenol of Michaelis and Kuncell (*Ber.* 30, 2823). In like manner, $\text{PhOCH}_2\text{CO}_2\text{H}$ and H_2SeO_3 gave *diphenoxyacetic acid-selenoxide*, bright yellow, decomp. 210° . The above 2 reactions are represented by the following equations: $2\text{PhOH} + \text{H}_2\text{SeO}_3 = \text{Se}(\text{C}_6\text{H}_4\text{OH})_2 + 2\text{H}_2\text{O} + \text{O}$. $2\text{PhOCH}_2\text{CO}_2\text{H} + \text{H}_2\text{SeO}_3 = \text{SeO}(\text{C}_6\text{H}_4\text{OCH}_2\text{CO}_2\text{H})_2 + 2\text{H}_2\text{O}$.

NAO UYER

Organic derivatives of silicon. XXXVI. Highly complex condensation product of diphenyl- and di-*p*-tolylsilicanediol. Fission of the Si-Ph link. FREDERICK S. KIPPING AND ARTHUR G. MURRAY. Univ. College, Nottingham. *J. Chem. Soc.* 1928, 1427-31; cf. *C. A.* 22, 776.—When 10 g. Ph_2SiCl_2 is dissolved in 200 cc. 10% aq. KOH and the clear liquid concd. on the H_2O bath to about 75 cc., there sep. insol. products; repeated washing with H_2O and extn. with Me_2CO and C_6H_6 finally gives an insol. product A, SiPh_2O , amorphous, decomp. much above 360° , sparingly sol. in molten camphor but freely sol. in boiling PhNH_2 , from which it seps. after 2 hrs., boiling as an amorphous product; in the presence of a little H_2O it is completely hydrolyzed; it is not appreciably changed by boiling with 5% KOH in aq. Me_2CO for several hrs., but when heated with concd. alkali at 150° it is slowly decompd., giving C_6H_6 and a silicate. From the C_6H_6 ext. obtained in purifying A, there seps. B (SiPh_2O), an amorphous product, which begins to sinter at 300° and gradually liquefies at a considerably higher temp.; it is very slowly hydrolyzed by KOH in Me_2CO . (*p*- MeC_6H_4) $_2\text{SiCl}_2$ behaves similarly, the insol. amorphous product, $\text{Si}(\text{C}_7\text{H}_7)_2\text{O}$, shows signs of sintering at 270° but does not completely m. 360° ; it is not appreciably changed by boiling with 5% KOH in Me_2CO ; the C_6H_6 ext. gives a gelatinous solid, $\text{Si}(\text{C}_7\text{H}_7)_2\text{O}$, which sinters at 260° but does not completely m. 360° ; it is only slowly hydrolyzed by KOH- Me_2CO . Ph_2SiO , heated with 20% KOH at 100° under reduced pressure, gives after 3 hrs. 1% C_6H_6 . **XXXVII.** Production of tetrabenzylsilicane, tribenzylsilyl oxide and other products by the action of sodium on dibenzylsilicon dichloride. ALFRED R. STEELE AND F. S. KIPPING. *Ibid* 1431-9.—The action of 2.25 atoms of Na upon 50 g. $(\text{PhCH}_2)_2\text{SiCl}_2$ in 500 cc. PhMe in an atm. of N for 20 hrs., followed by 1-2 g. K for 5 hrs., gives 1 g. of an insol. product, contg. 28-34% Si; this is a gray powder, insol. in all common solvents and does not give H when heated with KOH in EtOH or Me_2CO ; 1 g. $[(\text{PhCH}_2)_2\text{Si}]_2\text{O}$; 4-5 g. $(\text{PhCH}_2)_4\text{Si}$; and, as the principal product, thick oils, which gradually harden to transparent or translucent, brittle masses, consisting of $[(\text{PhCH}_2)_2\text{Si}]_n\text{O}$; the O probably results from Na_2O present in the Na. In some cases the PhMe soln. has a mahogany color at the end of the reaction; this is assumed to be due to the conversion of the $[(\text{PhCH}_2)_2\text{Si}]_n\text{O}$ into Na or K derivs., from which other oxides are subsequently formed. Examples are given of the fission of the SiCH_2Ph linkage.

C. J. WEST

The action of nitric acid on phenol in dilute aqueous solutions. A. V. KARTASHEV. *J. Russ. Phys.-Chem. Soc.* 59, 819-32 (1927).— PhOH heated to $94-6^\circ$ for 4 hrs. with 5 equivs. of 9% HNO_3 yields chiefly 2,4-(O_2N) $_2\text{C}_6\text{H}_3\text{OH}$, besides picric acid and a tarry residue. No reaction occurs on heating with 1 equiv. of 2.8% HNO_3 , while oxidation takes place if the latter is present in excess. Heating to $96-8^\circ$ with an equiv. of 2.8-8 13% HNO_3 yields tar; nitration takes place at $40-50^\circ$ or excess HNO_3 . The temp. at which the reaction starts depends on the concn. of HNO_3 and on the oxidation products of PhOH which act as catalysts. The addn. of HCHO , BzH , or $\text{C}_6\text{H}_{12}\text{O}_6$ similarly lowers the reaction temp. and favors the oxidation of PhOH . K. concludes, the main reaction is oxidation.

BASIL C. SOYENKOFF

The nitration of phenol. A. V. KARTASHEV. *J. Russ. Phys.-Chem. Soc.* 59, 833-45 (1927).—The nitration of PhOH is preceded by oxidation (cf. preceding abstr.). The HNO_2 formed gives nitrosophenols with PhOH which are further oxidized to nitro derivs. Liebermann's test was positive (dark blue to green). The addn. of HNO_2 to a cold mixt. does not lower the temp. of the reaction, and no nitrosophenols are formed; when the mixt. is at 80° , HNO_2 starts the reaction accompanied by the evolution of heat (in the control expt. at 92°). Or the formation of nitrosophenols takes place within certain temp. limits. The addn. of nitrosophenols to the cold PhOH-HNO_2 mixt. lowers the initial reaction temp. by $5-10^\circ$. Nitrosophenols are readily transformed by cold dil. HNO_3 into the mononitro compds. Dinitro derivs. result upon continued heating. Very dil. hot HNO_3 acts as a strong oxidizer, *o*- $\text{O}_2\text{NC}_6\text{H}_4\text{OH}$ is not oxidized by heating on the water bath with 5.5% HNO_3 , 2,4-(O_2N) $_2\text{C}_6\text{H}_3\text{OH}$ being formed instead. The action of HNO_3 on PhOH is oxidation paralleled by the formation of NO compds.

BASIL C. SOYENKOFF

Bromophenols. XXX. Halogenated *o*-anisidines. MORITZ KOHN AND REGINE KRAMER. Wiener Handelsakademie. *Monatsh.* 49, 146-59 (1928); cf. *C. A.* 22, 233.—*p*- $\text{ClC}_6\text{H}_4\text{OH}$ with Me_2SO and 20% KOH gives *p*- $\text{ClC}_6\text{H}_4\text{OMe}$, b. $193-7^\circ$; nitration

gives 4,2-Cl(O₂N)C₆H₃OMe, m. 96°, which is reduced to 4,2-Cl(H₂N)C₆H₃OMe, m. 82°; in AcOH 2 mols. Br give 3,5-dibromo-4-chloro-2-aminoanisole, pale lilac, m. 113°; the constitution was established by the removal of the NH₂ group, giving 4,3,5-ClBr₂C₆H₂OMe, b₇₄₀ 296°, m. 79°, which, on heating with HBr in AcOH, gives 4,3,5-ClBr₂C₆H₂OH, m. 118°, whose Bz deriv., m. 132°. Nitration of 4,3,5-ClBr₂C₆H₂OMe gives the 2,6-di-NO₂ deriv., demethylated by C₆H₅N to the phenol deriv., m. 146-7°. *p*-ClC₆H₄OMe is nitrated to the 2,6-di-NO₂ deriv., m. 64°, which is demethylated by C₆H₅N; the phenol m. 79°. Heating 4,3,5,2-ClBr₂(H₂N)C₆HOMe with Ac₂O and then nitrating gives 4-chloro-3,5-dibromo-2-acetamido-6-nitroanisole, carbonizes at 215°; concd. H₂SO₄ at 100° for 15-20 min. gives the amino compd., S-yellow, m. 82°. 2,4-Cl₂C₆H₃OH with Me₂SO₄ and 20% KOH gives 2,4-Cl₂C₆H₃OMe, b. 222-7°; nitration gives the 6-NO₂ deriv., m. 42°, which gives 2,4,6-Cl₂(O₂N)C₆H₂OH, m. 124°, with HBr in AcOH. Reduction gives the 6-NH₂ deriv., whose Ac deriv., m. 72°. Nitration gives 1-methoxy-2,4-dichloro-3,5-dinitro-6-acetamidobenzene, m. 219°; the amino compd., deep yellow, m. 135°. 2,4,6-Cl₃(H₂N)C₆H₂OMe with 2 mols. HBr gives the 3,5-di-Br deriv., m. 83°. XXXI. 3,4,5-Trichlorophenol. *Ibid* 161-8—4,2-Cl(H₂N)C₆H₃OMe with 4 mols. Cl gives a colored 3,4,5-Cl₃ deriv., which was not analyzed but transformed, through the diazo reaction, into 3,4,5-trichloroanisole, b. 256-61°, m. 63°. HBr in AcOH gives 3,4,5-trichlorophenol, b₇₄₆ 271-7°, m. 91°; Bz deriv., m. 120°; 2,6-di-Br deriv., m. 180°, d 2.554; crystallographic data are given for this and for the 3,5-Cl₂, 3-Cl and 4-Cl derivs. HNO₃ gives 2,6-dibromo-3,5-dichloroquinone, yellow, undecompd. at 240°. 2,6-Dinitro-3,4,5-trichloroanisole, m. 95-6°. XXXII. Preparation of 2,6-dibromo-*m*-xyloquinone from symmetrical xylenol. M. KOHN AND M. K. FELDMANN. *Ibid* 169-72.—2,4,6,3,5-Br₂Me₂C₆OH, whose Me ether, m. 116°, is oxidized by fuming HNO₃ to 2,6-dibromo-*m*-xyloquinone, yellow, m. 176° (crystallographic data are given); it is unstable in the air; SO₂ reduces it to 1,3-dimethyl-4,6-dibromo-2,5-dihydroxybenzene, m. 180°; Bz deriv., m. 253°; di-Me ether, b₇₄₀ 309-11°, m. 116°. XXXIII. Chloro- and bromopyrogallol ethers. M. KOHN AND ELISABETH GUREWITSCH. *Ibid* 173-86.—1,2,3,5-(MeO)₂C₆H₃NO₂ (5 g.) and 28 cc. Br give the 4,6-di-Br deriv., m. 112-4° (crystallographic data are given), thus confirming the structure assigned by Kohn and Grün (C. A. 20, 1609). Heating 1 mol 1,3,5-C₆H₃(OMe)₃ with 1 mol PCl₅ gives the 4-Cl deriv., b₇₄₈ 252-6°; nitration gives the 5,6-di-NO₂ deriv. (I), m. 116-8°; the 5,6-di-Br deriv., m. 57-8°. 1,2,3,5-(MeO)₂C₆H₃NO₂ and about 6 mols. Cl give the 4-Cl deriv., m. 77-8°. Nitration of 1,2,3,4,5-(MeO)₂ClC₆HNO₂ gives I. Chlorination of 1,2,3,5-(MeO)₂C₆H₃NO₂ gives the 4,6-di-Cl deriv., m. 103-4°. 1,3,2-(MeO)₂C₆H₃OH and 1 mol. SO₂Cl₂ give the 4-Cl deriv., b₁₈ 175°, b₇₅₄ 270.5°; Me₂SO₄ gives 1,2,3-trimethoxy-4-chlorobenzene, b₇₁₉ 250.60°; which is nitrated with fuming HNO₃ to I. With somewhat more than 3 mols. Cl, 1,3,2-(MeO)₂C₆H₃OH yields the 4,5-di-Cl deriv., m. 103-4° (Bz deriv., m. 122-3°); the 6-Br deriv., m. 117-8°. Oxidation of the tribromo- or trichloropyrogallol di-Me ether with CrO₃ gives the 2,6-dimethoxy 3,5-dibromo- or dichloroquinone, m. 175° and 159°, resp.

C. J. WEST
Ketones of carvacrol. K. W. ROSENMUND AND CHIENCHI WHA. *Arch. Pharm.* 266, 407-11 (1928).—The following ketones and derivs. were prepd. and characterized. *carvacrol* Me ketone, C₁₂H₁₄O₂ (1-Me, 2-OH, 4-Pr, 5-Ac), m. 120° (Me ether, C₁₃H₁₆O₂, b₁₈ 164°); Et ketone, m. 110°, b₁₅ 201° (ketoxime, m. 145°); Pr ketone, m. 90°, b₁₆ 200° (ketoxime, m. 120°); carvacrol Et and Pr ketones gave on reduction with HCl and Zn wool treated with 5% HgCl₂ the corresponding propylcarvacrol, C₁₃H₂₀O, b_{14.5} 150°, and butylcarvacrol, b₁₂ 158°; condensation product of the Me ketone with BzH, C₁₉H₂₂O₃, m. 158°; condensation product of the ketonic Me ether with BzH, C₂₀H₂₄O₃, m. 72°; with diethyl ketomalonate, K salt, C₁₆H₁₈O₇K₂; free acid, m. 96° (Et ester, b_{6.5} 190°); Et ω -methoxy- γ -keto- α -hydroxybutyrate, C₁₇H₂₄O₆, b_{6.36} 180-4°. W. O. E.

Action of oxalyl chloride upon resorcinol. JOSIP MIKŠIĆ. *Univ. Zagreb J. prakt. Chem.* 119, 218-30 (1928).—*m*-C₆H₄(OH)₂ (50 g.) in 250 cc. moist Et₂O, treated with cooling with 7 g. Na wire and 20 g. (COCl)₂, heated several hrs. on the H₂O bath, again treated with 20 g. (COCl)₂, boiled 2 days and again treated with 20 g. (COCl)₂

$$\begin{array}{c} \text{HOC}_6\text{H}_3 \\ \diagup \quad \diagdown \\ \text{O} \quad \text{CHCH}(\text{OH})\text{C}_6\text{H}_3(\text{OH})_2 \quad (2,4), \text{ yellow, m. } 155-60^\circ \\ \diagdown \quad \diagup \\ \text{HOC}_6\text{H}_3 \end{array}$$

(decompn.); the alk. solns. have a pale green fluorescence; concd. H₂SO₄ gives a deep blue soln.; from MeOH it crystallizes with 1 mol. of solvent; melting with solid KOH gives β -resorcylic acid; distn. with Zn gives xanthone and *m*-C₆H₄(OH)₂; penta-Ac deriv., m. 197°. The formation of this compd. is explained by the intermediate formation of OHCCOCl, which reacts to form a ketone, which in turn is reduced by the Na.

When 33 g. $m\text{-C}_6\text{H}_4(\text{OH})_2$ is treated, without cooling, with 20 g. $(\text{COCl})_2$ and then with 12 g. K and the mixt. warmed 2 days, the Et_2O removed and the product taken up in Me_2CO , H_2O ppts. 20 g. *resjankin* (I), $\text{C}_{14}\text{H}_{18}\text{O}_{10}$, pale rose, sol. in H_2O (green fluorescence), from which it is pptd. by KCl; KOH gives a violet color; dil. solns. change to an intense red. The alk. soln. quickly decolorizes KMnO_4 . The K salt forms long, violet needles. Melting with NaOH gives β -resorcylic acid and $m\text{-C}_6\text{H}_4(\text{OH})_2$; distn. with Zn dust gives xanthone and $m\text{-C}_6\text{H}_4(\text{OH})_2$. *Tetra-Ac deriv.*, m. $170\text{--}2^\circ$. The aq. mother liquor from I slowly deposits *resperin* (II), $\text{C}_{22}\text{H}_{28}\text{O}_{11}$, whose *Ac deriv.* m. $159\text{--}9.5^\circ$. The NaOH melt gives dihydroxyxanthone and β -resorcylic acid. The absorption spectra of I and II are given

C. J. WEST

Glycol from methylethylacetaldehyde and benzaldehyde. ADOLF FRANKE AND ROSA STERN Univ. Wien. *Monatsh.* 49, 21–6(1928)— MeEtCHCHO and BzH , condensed by a slight excess of alk. KOH, give *1-phenyl-2-methyl-2-ethylpropane-1,3-diol* (I), b_{17} $188\text{--}90^\circ$, does not solidify at -19° ; *diacetate*, b_{20} $189\text{--}91^\circ$, in 2 expts., there resulted, not I, but its benzal deriv., $\text{C}_{19}\text{H}_{22}\text{O}_2$, b_{18} $214\text{--}5^\circ$, m. $80\text{--}1^\circ$, which also results from I and BzH with concd. HCl. Oxidation of I with KMnO_4 gives MeEtCHBz . Distn. of I with 14% H_2SO_4 gives the *hydrocarbon*, $\text{C}_{10}\text{H}_{14}$, b. $205\text{--}6^\circ$; this is probably PhCH.CMeEt , whose *di-Br addn. compd.* m. 57° ; the 2nd product is the *compd.*, $\text{C}_{13}\text{H}_{18}\text{O}_2$, b_{13} $156.5\text{--}7^\circ$, which is also obtained from I, HCHO and HCl; the pure *compd.* b_{12} 150° ; it is therefore a *formal* of I.

C. J. WEST

Benzal formation in glycols. ADOLF FRANKE AND JEMMERICH GIGERL. Univ. Vienna. *Monatsh.* 49, 8–20(1928)— $\text{Me}_2\text{C}(\text{CH}_2\text{OH})_2$ and a little more than 1 mol. BzH , treated with cooling with dry HCl for about 1 hr., give 68% of the benzal of *2,2-dimethylpropane-1,3-diol*, b_{10} $123\text{--}4^\circ$, m. 35° , this also results by heating the components with 5 parts 1% EtOH-HCl 1 hr. (65% yield). *Butane-1,3-diol* gives 55.5% of a benzal, b_9 117.5° . *1-Phenyl-2,2-dimethylpropane 1,3-diol* gives 50% of the benzal, m. 98° . *2-Methylpentane-2,4-diol* yields a benzal, b_9 124° . *2,4-Dimethylpentane-2,4-diol* gives 20% of a benzal, b_{16} $127\text{--}8^\circ$, m. 42° . Definite products could not be obtained from pentane-1,4-diol, camphor glycol or decane-1,10-diol, the glycol being obtained unchanged in the case of the last *compd.*

C. J. WEST

Mobile anion tautomerism. II. A complementary study of the mechanism of anionotropic change, with special reference to the fate of the mobile anion. HAROLD BURTON Univ. of Leeds. *J. Chem. Soc.* 1928, 1650–7; cf. *C. A.* 22, 2556.—The study of the mechanism of anionotropic change divides itself into 2 portions: The behavior of the electrons in the electromeric cation under different conditions of structure (see part I) and the behavior of the eliminated anion under different conditions of catalysis, it is now shown that the mobile group undergoes ionic disson. promoted by some mol. property of the solvent closely related to its dielec. const. It is suggested that the anion combines electrostatically with the catalyst by means of the preëxisting, plus the induced, dipolar field of the latter. $\text{CH}_2\text{:CHCH}(\text{OCOC}_6\text{H}_4\text{NO}_2)\text{Ph}$ was converted into $\text{PhCH:CHCH}_2\text{OCOC}_6\text{H}_4\text{NO}_2$ by boiling with Ac_2O for 6 hrs., by heating in PhCN at 140° for 6 hrs. and by heating in PhCl or $p\text{-C}_6\text{H}_4\text{Me}_2$ for 72 hrs., but not in chloral. Boiling a mixt. of $\text{CH}_2\text{:CHCH}(\text{OH})\text{Ph}$ with $p\text{-O}_2\text{NC}_6\text{H}_4\text{COCl}$, AcONa and Ac_2O gives a mixt. of $\text{PhCH:CHCH}_2\text{OCOC}_6\text{H}_4\text{NO}_2$ and $\text{PhCH:CHCH}_2\text{OAc}$. The latter is unchanged by boiling with $p\text{-O}_2\text{NC}_6\text{H}_4\text{COCl}$ and AcONa . The acetate also results from $\text{PhCH:CHCH}(\text{OCOC}_6\text{H}_4\text{NO}_2)\text{Ph}$ by heating with Ac_2O and Me_4NOAc for 6 hrs. $\alpha\text{-}p\text{-Chlorophenylallyl alc.}$, b_{10} $122\text{--}3^\circ$, from $p\text{-ClC}_6\text{H}_4\text{MgI}$ and $\text{CH}_2\text{:CHCHO}$; $p\text{-nitrobenzoate}$, m. 170° ; boiling the alc. with Ac_2O for 6 hrs. and hydrolysis gives $p\text{-chlorocinnamyl alc.}$, m. $57\text{--}8^\circ$; $p\text{-nitrobenzoate}$, m. $130\text{--}1^\circ$. Either alc. with HBr gives $p\text{-chlorocinnamyl bromide}$, m. $62\text{--}3^\circ$. $\alpha\text{-}m\text{-Tolylallyl alc.}$, b_{11} $115\text{--}7^\circ$; $p\text{-nitrobenzoate}$, m. 53° ; AcO and hydrolysis give $\alpha\text{-3-methylcinnamyl alc.}$, b_{11} $137\text{--}40^\circ$; $p\text{-nitrobenzoate}$, m. $63\text{--}4^\circ$; the bromide is a straw-colored oil, b_{11} $138\text{--}40^\circ$, which slowly decomps. into a black, viscous mass.

C. J. WEST

Laws of aromatic substitution. VIII. BERNHARD FLÜRSCHHEIM AND ERIC L. HOLMES. *J. Chem. Soc.* 1928, 1607–16; cf. *C. A.* 22, 1962.—*Tri-Et phenylmethanetricarboxylate*, b_{14} $154\text{--}5^\circ$, results from $\text{CPhNa}(\text{CO}_2\text{Et})_2$ and ClCO_2Et ; $\alpha\text{-NO}_2$ deriv., m. $83\text{--}4^\circ$. *Di-Et phenylchloromalonate*, b_2 $143\text{--}4^\circ$. On nitration, the following % of *m*-isomer are obtained: PhCH_2Cl , 11.6; $\text{PhCH}_2\text{CO}_2\text{Et}$, 12.1; PhCHCl_2 , 33; $\text{PhCH:ClCO}_2\text{Et}$, 14.2; $\text{PhCH}(\text{CO}_2\text{Et})_2$, 25.4; PhCCl_3 , 48.4; $\text{PhCCl}_2\text{CO}_2\text{Et}$, 32.7; $\text{PhCCl}(\text{CO}_2\text{Et})_2$, 52.9; $\text{PhC}(\text{CO}_2\text{Et})_3$, 56.5; PhCH_2Br , 6.6; $\text{PhCBr}(\text{CO}_2\text{Et})_2$, 39.4. The results with $\text{PhC}(\text{CO}_2\text{Et})_3$ constitute the first case of preponderating *m*-nitration in the exclusive presence, at the $\alpha\text{-C}$ atom, of such substituents as would be *m*-directing if directly attached to the nucleus. Where the quant. factor is not very pronounced—*e. g.*, at an $\alpha\text{-C}$ atom which neither forms part of an ethylenic or acetylenic group nor is

linked to substituents possessing a much higher or lower affinity demand than H— and where at the same time the polar factor is very pronounced—e. g., in the case of an α -C atom directly linked to an atom charged through electrolytic dissoen. or to several substituents of distinct and similar polarity—there the quant. factor may be overborne by the polar effect. But even in such extreme cases the quant. factor can be distinctly traced. The electrolytic dissoen. const. of aromatic acids and bases, substituted in the *m*- or *p*-positions by Cl on the one hand, by CO_2Et on the other, show that the polar effect transmitted from these positions is greater with CO_2Et than with Cl. The *m*-directive effect, however, as evidenced by the above results, is less for CO_2Et than for Cl.

Phenylstearic acid. CLARA MARIE DE MILT. *Abstracts of Theses, Univ. Chicago, Science Series* 4, 123-8(1925-6) (publ. May, 1928).—A phenylstearic acid, which is probably 10-phenylstearic acid (about 40% from 200 g. oleic acid and 400 g. PhH , with 100 g. AlCl_3 as a catalyzer) is a viscous, pale yellow, almost odorless liquid, b_d 250°, n_D^{25} 1.4905. The *K* and *Na* salts are soaps. *Pb* salt, m. about 86°, creamy-white, waxy, sol. in Et_2O , CHCl_3 and ligroin. *Ag* salt, white. *Me ester*, pale yellow oil, b_d 228°, n_D^{25} 1.4840. The *amide* is liquid. *Anilide*, faintly yellow liquid, b_d 282°. Phenylstearic acid was easily nitrated, but no definite product of reaction could be isolated. G. J. WEST

Isomeric 2-amino- α -arylcinnamic acids. JOHN M. GULLAND AND CYRIL J. VIRDEN. Dyson Perrins Lab., Oxford. *J. Chem. Soc.* 1928, 1478-86.—2,5-(MeO) $_2$ $\text{C}_6\text{H}_3\text{CHO}$, $\text{BzNHCH}_2\text{CO}_2\text{H}$, AcONa and Ac_2O give 75% of 5-*keto*-2-phenyl-4-[2',5'-dimethoxybenzylidene]-4,5-dihydrooxazole, orange, m. 170-2°; boiling a short time with EtOH - HCl gives α -benzylamino-2,5-dimethoxycinnamic acid, m. 195-6°; hydrolysis with 10% NaOH gives 76% of 2,5-dimethoxyphenylpyruvic acid, cream-colored, m. 166-70° (decompn.); with o - $\text{C}_6\text{H}_4(\text{NH}_2)_2$ this gives 3-hydroxy-2',5'-dimethoxy-2-benzylquin-oxaline, m. 179-80°, which crystallizes with 0.5 EtOH . Oxidation gives 2,5-(MeO) $_2$ - $\text{C}_6\text{H}_3\text{CH}_2\text{CO}_2\text{H}$, which condenses with 2-nitroveratraldehyde to give *trans*-2-nitro-3,4,2',5'-tetramethoxy- α -phenylcinnamic acid (I), bright yellow, m. 204-5°, and a small quantity of 2,3,4- $\text{O}_2\text{N}(\text{MeO})_2\text{C}_6\text{H}_3\text{CH}(\text{CHCO}_2\text{H})$, m. 229°; the quantity of the latter increases rapidly with rise in temp. Reduction of I with NH_4OH and FeSO_4 gives a mixt. of the *trans*-2-amino acids, A (II) and B (III); II, colorless, m. 219°, crystallizes with 0.5 H_2O from EtOH ; III, from the EtOH mother liquor, yellow, m. 167°; III is unimol. in camphor while II is bimol.; in $(\text{PhN})_2$, both were associated, but at comparable concns., the values for the mol. wt. of II were approx. twice those of III; in AcOH both appear to be unimol. but the values for II were consistently low. III in EtOH , exposed to ultra-violet light for several days, or heated with Ac_2O - H_2SO_4 for 30 min., gives 7,8,2',5'-tetramethoxy-3-phenylcarbostyryl (IV), m. 189°. IV also results from II and Ac_2O - H_2SO_4 . III is transformed into II in $(\text{PhN})_2$, as shown by the change in f. p. The addn. of AcONa or AcOH to an acid or alk. soln. of II ppts. III; the addn. of AcOH to the NH_4OH soln. of III ppts. II. The action of ultra-violet light on the Na salt of I gives a small yield of the *cis*-acid, pale yellow, m. 186°; alk. reduction gives the *cis*- NH_2 acid, which passes into IV on acidification. The diazo soln. from II or III, heated at 60°, gives 3,4,5,8-tetramethoxyphenanthrene 9-carboxylic acid, m. 190-8°; heating at 240° for 40 hrs. gives 3,4,5,8-tetramethoxyphenanthrene, light brown, m. 118-20° (*picrate*, dark chocolate, m. 158°). From the data now available it is not possible to decide whether the H_2O of crystn. of II is essential for the production of the bimol. form, or whether II is composed intrinsically of 2 mols. of the III type.

C. J. WEST

Action of phosphorus pentachloride on homophthalic acid. WM. DAVIES AND HARRY G. POOLE. Univ. of Melbourne. *J. Chem. Soc.* 1928, 1616-20.—Homophthalic anhydride in dil. EtOH , treated with 0.1 *N* KOH , the cold yellow soln. made faintly acid with dil. H_2SO_4 and FeCl_3 added, gives a bluish violet color, which lasts for a considerable time, showing the existence of the enolic form of the anhydride. With PCl_5 in POCl_3 a tarry mass results, but when 20 g. of the acid is heated with 50 g. PCl_5 in 50 g. POCl_3 3 hrs. at 140-50° there results 5 g. 3-chloroisocoumarin, lachrymatory, b_d 150°, m. 98.5-9°, shows a strong blue fluorescence in org. solvents and is stable toward neutral or acid hydrolytic agents; it reacts slowly with NH_3 in C_6H_6 , giving a small quantity of o - $\text{HO}_2\text{CC}_6\text{H}_4\text{CH}_2\text{CN}$, m. 126°; aq. NaOH gives the original acid; PhNH_2 in C_6H_6 gives homophthalanilide, m. 231.5°. Heating 54 g. acid with 250 g. PCl_5 in 100 g. POCl_3 8 hrs. at 140-50°, gives 12 g. 3,3,4,4-tetrachloro-3,4-dihydroisocoumarin, m. 122°; PhNH_2 in C_6H_6 gives an *anilide*, m. 225°. Further action of PCl_5 at high temps. gives an oily mixt., whose hydrolysis product is phthalonic acid, identified by conversion into a *compd.*, m. 239°, with p - $\text{O}_2\text{NC}_6\text{H}_4\text{NHNH}_2$.

C. J. WEST

The basicity of nitrophenoxymalonic acids. I. S. TELESTOV AND N. N. ANDRONI-

KOVA. *J. Russ. Phys.-Chem. Soc.* 59, 1199–204 (1927).—Titration with NaOH and cond. measurements of the salts show *o*-, *m*- and *p*-C(OC₆H₄NO₂)₂(CO₂H)₂ to be dibasic. (*p*-O₂NC₆H₄O)₂C(CO₂Na)₂ prep'd. both by sapon. of the Me ester and by neutralization of the acid m. 110° and showed the same cond. in H₂O. *p*-O₂NC₆H₄OCH(CO₂H)₂ is a weaker dibasic acid than the disubstituted ones since the cond. of its Na salt changes less on diln.

BASIL C. SOYENKOFF

Constituents of *Zanthoxylum setosum* Hemsl. T. ARAKI and Y. MIYASHITA. Central Expt. Sta. (Formosa). *J. Pharm. Soc. Japan* 48, 437–46 (1928).—From an alc. ext. of the leaves of *Zanthoxylum setosum*, an oil with a characteristic odor and 2 cryst. substances were isolated. One of the latter had the compn. C₁₄H₁₄O₆ and m. 104°, while the other (I) had the compn. C₁₁H₁₀O₄. I, m. 147–8°, shows bluish violet fluorescence in alc. It has 2 MeO groups and by catalytic reduction, with Pt black, it gives an aromatic substance C₁₁H₁₀O₄. It forms an oxonium salt with concd. H₂SO₄ or HCl. The above facts and also the color reactions with acids show a close resemblance between I and the limettin (5,7-dimethoxycoumarin) (II) of Tilden and Beck (*J. Chem. Soc.* 57, 323 (1890)). II and Br in either C₆H₆ or AcOH gave C₁₁H₉O₄Br₂, bright yellow, m. 257°, while I and Br in AcOH gave C₁₁H₁₀O₄Br₂, white, m. 235°. I and Br in C₆H₆, on the other hand, gave C₁₁H₉O₄Br, m. 176°. From this fact, it appears that I is probably an isomer of II. Boiling of I with 30% KOH for 8 hrs. gave dimethoxy-*o*-coumaric acid (III), C₁₁H₁₂O₆, yellow, m. 197–8°. Ac deriv., m. 210–11°. Heating of III with POCl₃ for 8 hrs., resulted in a ring closure and gave a yellow compd., m. 145–6°, which was found to be identical with I.

NAO UYEI

A new synthesis of 3,4,5-trimethoxy-*o*-phthalic acid. K. FEIST and G. L. DSCHU. Univ. Göttingen. *Festschrift A. Tschirch* 1926, 23–9; *Chem. Zentr.* 1927, II, 58.—3,4,5-Trimethoxy-*o*-phthalic acid (I) was prep'd. from 3,4,5-trimethoxygallic acid (II) in 2 different ways. (1) Gallic acid, Me₂SO, and NaOH form 3,4,5-(MeO)₃C₆H₂CO₂H and the latter and CCl₃CHO·H₂O form 3,4,5-trimethoxytrichlorophthalide, m. 71–2°. The latter refluxed in MeOH with NaOH, dild. with water, the MeOH expelled, supersatd. with HCl, extd. with Et₂O and evapd. yields 3,4,5-trimethoxyphthalidecarboxylic acid (III), m. 147–8°. The residue from the Et₂O extn. on treatment with CH₃N₃ (IV) yields the Me ester of III, m. 121°. III heated in *vacuo* yields 3,4,5-trimethoxyphthalide, m. 134–5°. The latter dissolved in hot NaOH, cooled and treated with KMnO₄, filtered, treated with SO₂, evapd., acidified with HCl, and extd. with Et₂O, yields I, m. 163°. 3,4,5-Trimethoxyphthalic anhydride, m. 143°. Di-Me ester of I, m. 64–5°. (2) II in CHCl₃ heated with Br in CHCl₃ in presence of powd. Fe until HBr is no longer evolved, the CHCl₃ distd. off, dild. with water, boiled and filtered hot, yields bromo-trimethoxygallic acid (V), m. 148°. From the mother liquor is obtained an addn. compd. of V and II. IV added to alc. V yields the Me ester of V, m. 33°. This ester boiled with Mg chips in presence of I forms 1-mono-Me 3,4,5-trimethoxy-*o*-phthalate, m. 138–41°. Treatment with IV forms its di-Me ester.

C. C. DAVIS

Separation of α - and β -santalol. T. TSUKAMOTO and E. ICHIBASHI. Tokyo Imp. Univ. *J. Pharm. Soc. Japan* 48, 416–22.—A mixt. of the oil of sandalwood in Et₂O and aq. Hg(OAc)₂ was boiled for several days. The Hg compd. of β -santalol was recovered from the Et₂O or aq. layer by addn. of Na₂CO₃ or NaCl, purified and decompd. with H₂S to obtain β -santalol (I). From the Et₂O layer, after removal of I, α -santalol was recovered by decompn. of its Hg compd. by H₂S.

NAO UYEI

Menthol. I. R. SPINNER. Univ. of Berlin. *Riechstoffindustrie* 1926, 160–2; *Chem. Zentr.* 1926, II, 3081.—Methods for the prepn. of menthol and its properties are described.

C. C. DAVIS

Optical activity and the polarity of substituent groups. IX. Menthyl esters of methoxynaphthoic and of diphenyl-2-carboxylic acids. EGON BRETSCHER, H. GORDON RULE and JOHN SPENCE. Univ. of Edinburgh. *J. Chem. Soc.* 1928, 1493–504; cf. C. A. 22, 3157.—The influence of the typically *o*,*p*-directive MeO group on the rotatory powers of the menthyl naphthoates has been examd. and found similar to that exerted in the case of menthyl benzoate. In any position adjacent to the carboxylic complex the substituent depresses the rotatory powers of the 1- and 2-naphthoates. In menthyl 2-methoxy-1-naphthoate the combined effect of the 2 *o*,*p*-directive groups in the 2- and 6-positions actually reverses the sign of rotation, giving a *d*-rotatory ester. In the 4-MeO deriv. the *p*-substituent raises the rotation but in the 5-position it has little or no effect. A MeO group in the *peri*-position also produces a marked diminution in rotatory power, thus indicating that the peculiar *o*-influence is transmitted through space and not through the chain of atoms. A Ph group in the 2-position in menthyl benzoate leads to the diminished rotation characteristic of *o*,*p*-directive substituents. A 2-MeOC₆H₄ group in this position raises the rotation. The relative magnitudes of

the rotatory powers of optically active esters of BzOH , $1\text{-C}_{10}\text{H}_7\text{CO}_2\text{H}$ and $2\text{-C}_{10}\text{H}_7\text{CO}_2\text{H}$ may be correlated with the known influence of *o*-, *m*- and *p*-substituents on the benzoic esters. *Menthyl 2-methoxy-1-naphthoate*, from the acid chloride, menthol and $\text{C}_6\text{H}_5\text{N}$ in C_6H_6 , m. $122\text{--}3^\circ$. *4-MeO deriv.*, m. $114\text{--}5^\circ$. *8-MeO deriv.*, m. $98\text{--}6.5^\circ$ (from the acid, m. $162\text{--}3^\circ$, whose *Me ester*, m. $51\text{--}2^\circ$). *5-MeO deriv.*, m. $90\text{--}3^\circ$. *Menthyl diphenyl-2-carboxylate*, b_{10} 175° ; *2'-MeO deriv.*, b_{10} $171\text{--}3^\circ$. Values are given for the rotation of these compds. in various solvents for the wave lengths 6708, 5893, 5461 and 4358. C. J. WEST

Constituents of camphorol. M. ISHIDATE. Tokyo Imp. Univ. *J. Pharm. Soc. Japan* 48, 410-5 (1928).—Recently Asahina and I. (*C. A.* 22, 2161) showed that the *d*-camphorol (I) of Schmiedeberg and Meyer is a mixt. of 3-hydroxycamphor (II) and 5-hydroxycamphor (III). This conclusion was reached from the study of their oxidation products. By repeated fractional crystn. from ligroin (IV), I has now been sepd. into II and III. II is easily sol. in IV and m. $193\text{--}5^\circ$. *Semicarbazone*, m. $183\text{--}4^\circ$, $[\alpha]_D^{25}$ 15.2° . By CrO_3 oxidation, it gave camphorquinone quant., and with Na-Hg it gave *d*-camphor. It is identical with the α -hydroxycamphor of Bredt and Ahrens (*C. A.* 20, 2157). III gave a *mono-Ac deriv.*, b_{27} $159\text{--}60^\circ$, and *semicarbazone*, m. $233\text{--}5^\circ$. III, $\text{K}_2\text{Cr}_2\text{O}_7$ and AcOH gave *p*-diketocamphane, while with Na-Hg it gave *d*-camphor and *p*-dihydroxycamphane. NAO UYET

The camphor series. X. Anomalous changes of the boiling point of isobornyl acetate. YASUJI FUJITA. *Bull. Inst. Phys. Chem. Research (Tokyo)* 7, 1-48 (1928); (English Ed.) 1, 1-3.—F. observed that isobornyl acetate prepd. from camphene by the Bertram-Walbaum method b_{11} $134\text{--}64^\circ$ during the 1st distn., b_{18} $80\text{--}100^\circ$ during the 2nd distillation, b_{20} $110\text{--}20^\circ$ the 3rd time and b_{18} $165\text{--}6^\circ$ the 4th time. The 5th and following runs gave b_{20} $113\text{--}4^\circ$, which is also observed with samples prepd. with any other than the B.-W. method. Despite the inconsistency of the b. p., the other phys. properties never vary. When O_2 is passed through a neutral Me_2CO soln. of a sample, b_{20} $113\text{--}4^\circ$, the b. p. is raised to b_{10} 154° ; the reverse action is observed by treating the latter with alc. By drastic drying, the b. p. can be lowered from b_{18} $106\text{--}7^\circ$ to b_{18} 104° . Other consts. of this dry form are: $[\alpha]_D^{21}$ 1.7° , d_4^{30} 0.9739, d_4^{20} 0.9991, n_D^{30} 1.4538, MR_D 55.00. F. believes that the variations are due to a change in the mol. state of the liquid isobornyl acetate. The vapor pressure and the latent heat of vaporization prove that the sample b_{18} 104° is "abnormal" according to Trouton's rule and Nernst's formula. The mol. complexity of this acetate is less than 1, with every method of measurement. The sample b_{18} $165\text{--}6^\circ$ gives a "normal" value by Longinescu's method. F. discussed the anomalous changes of the b. p. and, in analogy with the azeotropic mixts., he conceives that an ordinary liquid consists of a mixt. of mols. having different degrees of assocn., so that the change in the b. p. takes place according to the change in the proportion of these ingredients. He further discusses the general phenomena of chem. substances which show always a const. b. p., the relation between the proportion of the different ingredients to the b. p. and then the true cause of the changes in the b. p. XI. The separation and identification of borneol and isoborneol. TETSUSAKU IKEDA AND YASUJI FUJITA. *Ibid* 257-68.—Pure borneol can be isolated as follows: treat with $\text{C}_6\text{H}_4(\text{CO})_2\text{O}$; ext. with petroleum ether in which the phthalic acid ester is insol.; dissolve the insol. part in NaOH; steam distil. This method is suitable to sep. borneol from isoborneol and is better than the ZnCl_2 or any other method. For identification borneol or isoborneol are usually treated with HNO_3 (d. 1.4), the former yielding camphor and the latter a liquid substance. If the acid contains NO_2 camphor will be obtained from isoborneol also. The optimum exptl. conditions are recorded for each reaction. XII. Anomalous phenomena observed in the acetylation of borneol. TETSUSAKU IKEDA. *Ibid* 269-97.—When bornyl acetate is prepd. with glacial AcOH and H_2SO_4 and distd., the b. p. changes for each redistn., arriving finally at a stable state, seemingly after passing through 2 intermediary states. The other phys. properties do not vary. Bornyl acetate prepd. by any other method shows a constant b. p. The b. p. change is not due to an isomerization. The mol. complexity of the acetate is far less than 1. A. L. HENNE

Camphor group. VIII. Y. MURAYAMA, K. OHTSUKA AND S. TANAKA. *J. Pharm. Soc. Japan* 48, 429-31 (1928); cf. *C. A.* 22, 955.—Contrary to the statement of Minguin, Bredt, Wieland and others, the authors found that isoborneol ester can best be converted into *p*-ketoborneol ester (II) through its trichloroacetic ester (I) by oxidation with $\text{CrO}_3\text{-AcOH}$. Thus, 100 g. of I, 375 g. AcOH and 210 g. CrO_3 gave about 73 g. crude trichloroacetate of II, which on sapon. gave II (m. $240\text{--}2^\circ$), identical with the product obtained from borneol. IX. A new oxidation product of menthol. Y. MURAYAMA AND

S. TANAKA. Tokyo Imp. Hyg. Lab. *Ibid* 432-7.—Oxidation of menthyl acetate with CrO_3 in AcOH gave an oil, probably with a group OC , whose semicarbazone (I), m. $189-90^\circ$ and has the compn. $\text{C}_{13}\text{H}_{21}\text{N}_3\text{O}_3$. Warming of I with EtOH-KOH resulted in the sapon. of the Ac group and gave a compd. (II), $\text{C}_{10}\text{H}_{15}\text{N}_3\text{O}_3$, m. 190° . Heating of II with 30% HCl liberated semicarbazide and gave an oil (III) with a PhCH:CHCHO -like odor. As judged from the analysis of II, it probably has the structure $\text{AcCH}_2\text{CH}(\text{OH})\text{C}(\text{CH}_3)\text{CHMe}_2$. In like manner, the oxidation of menthyl chloride or benzoate with CrO_3 gave the product whose semicarbazones m. $204-5^\circ$ and 212° , resp. These probably have structures similar to III. NAO UYER

Preparation and constitution of some fluorene thioureas. LUIS GUGLIAMELLI, ARMANDO NOVELLI, CELESTINO RUIZ and CAMILO ANASIASI. *Anales asoc. quim. Argentina* 15, 337-62 (1927).—Thioureas of 1,2- and 2,7-fluorenediamines are of interest because they explain a new configuration of the mol. similar to some Ph_2 derivs. Some fluorene derivs. can be better adapted to this isomerism than by applying the Kauler theory (C. A. 1, 2691), which Cain assumed for Ph_2 . Elimination of free rotation of the C_6H_5 nucleus is singular and not encountered in any other compd. of C chemistry. Buttler and Adams (C. A. 19, 3267) studied this. Thioureas of 1,2- and 2,7-nitroamino- and diaminofluorenes, hitherto unobtained, were prepd. by the original Rathke method (Ber. 5, 799), since not even traces were obtained by the previous CS_2 method. Reasoning from analogies it is assumed that both 1,2- and 2,7-diaminofluorene react in the same way in the presence of *o*-quinone, aldehydes (glyoxal), HCO_2H and AcOH acids, dibenzyl, etc., forming the resp. quinoxalines and imidazoles. E. M. SYMMES

Constitution of phenolphthalein. I. Preparation of some compounds of the phthalein type. HAKON LUND. Univ. of Copenhagen. *J. Chem. Soc.* 1928, 1569-75.—1,3,5- $\text{C}_6\text{H}_3(\text{OMe})_3$ (I) and *p*- $\text{HO}_2\text{CC}_6\text{H}_4\text{CHO}$ with HCl in abs. EtOH give 80% of 2',4',6',2'',4'',6''-hexamethoxytriphenylmethane-4-carboxylic acid, m. $258-60^\circ$; oxidation in AcOH with Ph(OAc) gives 4-carboxy-2',4',6',2'',4'',6''-hexamethoxytriphenylcarbinyl acetate, violet-black powder with bronze luster, giving a very intense violet color in all solvents but Et_2O ; the colorless Et_2O soln. becomes colored when shaken with H_2O ; perchlorate, violet leaflets with an intense metallic luster, decomps. violently when heated. I and *o*- $\text{HO}_2\text{CC}_6\text{H}_4\text{CHO}$ give 2',4',6'-trimethoxyphenylphthalide, m. 200° . I and *o*- $\text{C}_6\text{H}_4(\text{COCl})_2$ with ZnCl_2 give phloroglucinolphthalein hexa-Me ether, m. $175-8^\circ$; HCl gives a violet soln. With concd. HCl , followed by hydrolysis with aq. KOH , it gives 2',4',6'-trimethoxybenzoyl-*o*-benzoic acid, m. $184-5^\circ$. 2',4'-Dimethoxybenzoyl-*o*-benzoic acid and *m*- $\text{C}_6\text{H}_4(\text{OMe})_2$ with concd. H_2SO_4 in Et_2O give resorcinolphthalein tetra-Me ether, m. 153° ; 20% HCl gives a reddish violet color; the 2',4'-di-Me ether, m. 220° . Phloroglucinolphthalein 2',4',6'-tri-Me ether, m. 200° . All m. ps. are cor. C. J. W.

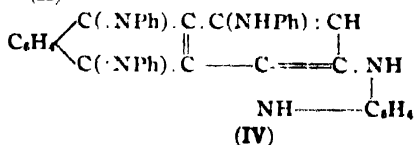
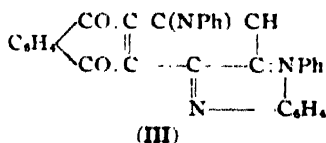
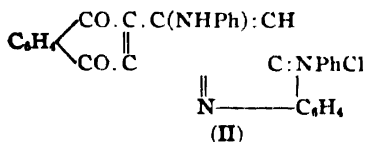
Semipinacolic transformations of trisubstituted glycols. S. KANAO and T. YAGUCHI. *J. Pharm. Soc. Japan* 48, 358-66 (1928).—*l*-Leucine Et ester and PhMgBr gave *l*-isobutyldiphenylethyleneglycol (I), iso-BuCH(OH)CPh₂OH, m. 143.4° , $[\alpha]_D^{20} -135.8^\circ$ (yield 72%). I and cold H_2SO_4 gave optically inactive iso-Bu benzohydril ketone (II), iso-Bu COCHPh₂, b. $183-4^\circ$, m. $32-3^\circ$ (yield, 80%). Semicarbazone, m. 168° . Heating of I with $\text{C}_6\text{H}_5(\text{CO})_2\text{O}$, citric acid or $(\text{CO}_2\text{H})_2$ gave an oil ($b_D^{18} 185^\circ$, $d_4^{20} 1.0269$, $n_D^{20} 1.553$) from which the semicarbazone of II (m. 168°) and that (m. $147-8^\circ$) of isobutyldiphenylacetalddehyde (V) were isolated. V is identical with the compd. prepd. by Tiffeneau and Orekhoff (C. A. 18, 70), who obtained it by heating *dl*-isobutyldihydrobenzoin (IX) with $(\text{CO}_2\text{H})_2$. Lagrave (*Ann. chim.* [10], 8, 400) obtained a mixt. of II and V by distn. of isobutyldiphenylethylene oxide (VI) ($b_D^{17} 196-7^\circ$, $d_4^{20} 1.035$, $n_D^{18} 1.5555$) which was prepd. by the action of BzO_2H on $\text{Me}_2\text{CHCH}_2\text{CH: CPh}_2$ (III). It is remarkable that the oil obtained by heating I with poly- CO_2H acids and L.'s product (VI) have the same phys. properties. For this reason, it was suspected that the heating of I with poly- CO_2H acids converts I into VI which on account of its instability splits into II and V. To make this point clearer, *l*-diphenylmethylaminopentanol (VIII), $\text{Me}_2\text{CHCH}_2\text{CH}(\text{NH}_2)\text{CPh}_2\text{OH}$, was methylated to obtain the quaternary base (VII), iso-BuCH(NMe₃)OH)CPh₂OH, and upon subsequent Hofmann decomposition, isobutyldiphenylethylene oxide (IV), $b_D^{17} 174-5^\circ$, $d_4^{20} 1.0479$, $n_D^{20} 1.5636$, $[\alpha]_D^{20} 10^\circ$, was obtained. From IV, 2 semicarbazones, one m. 168° and the other m. $147-8^\circ$, were isolated. The above facts show that compds. of the type represented by IV or VI are very unstable. Besides the compds. given above, the following new compds. are described: *l*-isobutyldiethylethyleneglycol (XI), $b_D^{18} 111-3^\circ$, m. about $48-52^\circ$, $[\alpha]_D^{18} -27.7^\circ$ (CHCl_3), from *l*-leucine Et ester and EtMgBr ; diphenylurethan, m. 122° . 3-Ethyl-6-methylheptan-4-one, b. $188-92^\circ$, from

XI and concd. H_2SO_4 . *l*-Isobutylidimethylethyleneglycol (**XII**), b_m 111–2°, $[\alpha]_D^{18}$ 22.98° (CHCl_3), from *l*-leucine Et ester and MeMgBr ; *diphenylurethan*, m. 186°. *2,5-Dimethylhexan-3-one*, b. 148°, from **XII** and concd. H_2SO_4 . NAO UYRI

Condensation of aldehydes with phenols. II. *m*-Nitrobenzaldehyde- β -naphthol. OTTO DISCHENDORFER. Tech. Hochschule, Graz. *Monatsh.* 49, 133–45 (1928); cf. *C. A.* 22, 72.—The m. p. curve of β - $\text{C}_{10}\text{H}_7\text{OH}$ and *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$ shows a eutectic at 47.5° (17.5% β - $\text{C}_{10}\text{H}_7\text{OH}$) and a 2nd at 61.5° (47% β - $\text{C}_{10}\text{H}_7\text{OH}$). On mixing 0.302 g. *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$ and 0.288 g. β - $\text{C}_{10}\text{H}_7\text{OH}$ in ligroin, the compd., m. 61.5°, crystallizes out as yellow needles; the same compd. results on melting equimol. amts. of the 2 components at 70°. *m*-Nitrobenzaldehyde- β -naphthol (**I**) results in 80% yield by treating 9 g. *m*- $\text{O}_2\text{NC}_6\text{H}_4\text{CHO}$ and 16.8 g. β - $\text{C}_{10}\text{H}_7\text{OH}$ in 180 cc. AcOH with 18 cc. concd. HCl; soln. in 6% NaOH or KOH gives the resp. salts; *dibenzoate*, m. 193–4°; *di-Me ether*, pale yellow, m. 216°. **I** (5 g.) in 75 cc. EtOH and 75 cc. 10% NaOH, treated with $\text{Br-H}_2\text{O}$ as long as a ppt. formed, gives 76% of the *dehydro deriv.*, orange, m. 221–2°; *oxime*, m. 216–7° (decompn.). Heating 10 g. **I** in 400 cc. AcOH with 80 cc. concd. H_2SO_4 and 80 cc. AcOH 1 hr. at 100° or using the components in the same way, gives *ms*-[3-nitrophenyl]dinaphthopyran (**II**), pale yellow, m. 223–4°. With H_2SO_4 or better with FeCl_3 , there results from **II** *ms*-[3-nitrophenyl]dinaphthopyranol (**III**), m. 286–7° (decompn.); the *chloride ferrichloride*, red with a metallic luster, m. 204°; *chloride-HCl*, red with a greenish metallic luster, darkens 255°, m. 281° (decompn.); *chloride mercurichloride*, bright red, m. 286° (decompn.); *perbromide*, red, m. 225° (decompn.); *perchlorate*, red, m. 307° (decompn.). The HCl salt of **III** and abs. EtOH give the *Et ether*, m. 266–7°; *Me ether*, m. 256–7°. **II**, boiled with Zn and AcOH for 8 hrs, gives the *3-acetamido deriv.*, crystg. with 0.5 AcOH, m. 140–50°, and then 246–7°; the *3-amino deriv.*, m. 242–3°.

Melting point of 2-chloroanthraquinone. MAX PHILLIPS. Bur. of Chemistry. *Ind. Eng. Chem.* 20, 874 (1928).—The m. p. of 2-chloroanthraquinone was incorrectly reported as 204° (cf. *C. A.* 19, 2335). It is 212.4°. T. S. CARSWELL

Anthraquinone dichlorodiimine and its compounds with the amines. A. A. SANIN. *J. Russ. Phys.-Chem. Soc.* 59, 867–75 (1927).—A suspension of 1,4-(H_2N) $_2\text{C}_{14}\text{H}_6\text{O}_2$ in an excess of HCl is allowed to stand for 1 hr. with excess $\text{Ca}(\text{OCl})_2$. (NCl) $_2\text{C}_{14}\text{H}_6\text{O}_2$ (**I**), seps. and is recrystd. from CCl_4 in orange prisms, m. 155–6°. It is easily sol. in PhNO_2 and $\text{C}_6\text{H}_5\text{N}$ with a red-violet color, brown-yellow in EtOH and AcOH, turns violet on heating as a result of the formation of the amine, sol. in concd. H_2SO_4 , ppts. on addn. of H_2O . **I** dissolves in alkalis and is reduced to the amine by NaHSO_3 , or by Sn and HCl. The corresponding chlorimines were also prepd. from 1,4,5,8-(H_2N) $_4\text{C}_{14}\text{H}_6\text{O}_2$, 1,5,4,8-(H_2N) $_2(\text{HO})_2\text{C}_{14}\text{H}_6\text{O}_2$ and 1,4- $\text{H}_2\text{N}(\text{HO})\text{C}_{14}\text{H}_6\text{O}_2$. **I** reacts readily with phenols and amines; 15 g. PhNH_2 boiled for 5 hrs. with 1 g. of **I** in the presence of anhyd. AcONa and $\text{Cu}(\text{OAc})_2$ yields 1,4-(H_2N) $_2\text{C}_{14}\text{H}_6\text{O}_2$ and 1.6 g. of residue insol. in aq. HCl. Recrystd. from EtOH, it m. 280° and lost Cl on treatment with NH_3 giving a base, m. 204–6°. The compds. are insol. in H_2O , sol. in org. solvents and concd. H_2SO_4 . The formulas **II** and **III** have been assigned to this quinazonium compd. and its base. The portion of the residue insol. in EtOH (0.18 g.) did not contain Cl; it crystd. from a $\text{C}_6\text{H}_5\text{N}$ -EtOH mixt. in brwn-black needles, m. 234–5°. The compn. corresponds to formula IV.



BASIL C. SOYENKOFF

Active constituent of the true coto bark. Constitution of cotoin. ERNEST SPÄTH and FRITZ WESSELY. *Univ. Wien. Monatsh.* 49, 229–40 (1928).—The methylation of cotoin with CH_3N_3 gives only 1 Me deriv., m. 97–8°; MeCHN_3 likewise gives only 1 Et deriv., m. 91–2°. That the free HO is adjacent to the CO group is shown by the

formation of 3,5-dimethoxy-2-phenylcoumarone; the Et ether with $\text{BrCH}_2\text{CO}_2\text{Et}$ gives a coumarone deriv., $\text{C}_{17}\text{H}_{16}\text{O}_3$, m. 108–9.5°. The di-Et ether of cotoin, $b_{10}\text{m}$ 160–70°, m. 82–3°; reduction with Zn dust and alc. KOH gives the alc. 2,6,4-diethoxymethoxy-phenylphenylcarbinol (I), m. 104–5°. The methylation of the Et ether and the ethylation of the Me ether give the same product, methylethylcotoin, m. 103–4°; the corresponding alc. (II), m. 80–1°. Oxidation of I with CrO_3 gives 2,6-diethoxyquinone, m. 127–8°, while II gives 2-methoxy-6-ethoxyquinone, m. 134–5°, also obtained by the oxidation of phloroglucinol Me Et ether, m. 50–1°. These facts support the formula 2,6,4-(HO)- $\text{C}_6\text{(MeO)}_2\text{C}_6\text{H}_2\text{Bz}$ for cotoin.

C. J. WEST

Condensation of furfural with acid amides. KARL BEAUCOURT, Hochschule Bodenkultur, Wien. *Monatsh.* 49, 1–7(1928).— HCONH_2 and furfural (I), heated in a CO_2 stream, give a dark resin. AcNH_2 and I give 40% of *furfurylidenediacetamide*, m. 197° (decompn.); with dil. HCl as the condensing agent, 25% yields are obtained; a Ag salt could not be prepd., the compd. being oxidized and metallic Ag being liberated. The *dipropionamide*, m. 195° (decompn.), results in 35% yields; the *dibutyramide*, m. 181° (decompn.), is formed in 35–40% yields; the *dibenzamide*, decomp. 185°, results in 30–35% yields.

C. J. WEST

Synthesis of tetrahydrofurylpropylamine. R. TAKAMOTO AND T. HIROHASHI, Tokio Imp. Univ. *J. Pharm. Soc. Japan* 48, 446–50(1928).—Condensation of $\text{C}_4\text{H}_8\text{OCHO}$ and MeCHO in 20% NaOH gave 71–2% *furylacrolein* (I), m. 51.5°. I and NH_2OH gave 98% of the oxime, (II), m. 110–1°. The reduction of II in EtOH-AcOH with Na-Hg (Goldschmidt, *Ber.* 20, 728) gave 93% *furylpropylamine* (III), $b_{14}\text{m}$ 172.5–3.0°, b_{20} 34–5°; *chloroplatinate*, yellow, m. 179–80°; *picrate*, bright yellow, m. 165–6°; *picrolonate*, yellowish brown, m. 231–2°. The reduction of II or III in EtOH-AcOH with H_2 and PtO_2 using FeCl_3 as a promoter gave 88–9% *tetrahydrofurylpropylamine*, $b_{14}\text{m}$ 186–7°, b_{20} 46–7°. *Chloroplatinate*, yellow, m. 171–2°; *picrate*, yellow, m. 136–7°; *picrolonate*, yellowish brown, m. 176–7°.

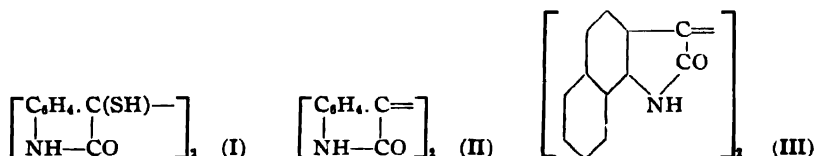
NAO UYEI

The isomerism of heterocyclic nitrogen compounds. N. POTOKHIN, *J. Russ. Phys.-Chem. Soc.* 59, 761–817(1927).—Alkaloids can be regarded as decompn. products of protein; the $\text{C}_8\text{H}_8\text{N}$ and $\text{C}_8\text{H}_7\text{N}$ groups probably result from HCHO and the fission products of proteins (Pictet). A detailed review of the literature is followed by expts. on the condensation of HCHO with hydrogenated N heterocyclics. The action of HCO_2Et on *indolemagnesium iodide*.—To 1.2 g. Mg activated with a little I_2 in 10 cc. abs. PhH are added 1 cc. abs. Et_2O and 8.5 g. EtI . The mixt. is kept at 70° for 2–3 hrs., cooled in snow, and 3 g. indole in 8 cc. PhH are introduced with shaking and cooling (about 600 cc. C_2H_4 are liberated) followed by 10 cc. HCO_2Et . The mixt. is acidified with AcOH , H_2O and Et_2O added. The Et_2O layer is shaken with Na_2CO_3 soln. and Et_2O distd. off. $\text{C}_8\text{H}_7\text{N}$ is removed by treatment with picric acid in PhH. *N-Formylindole*, HCNCC_8H_6 , b_{15} 125–6°, b_{18} 136–7°, m. 52°, $n_D^{18.5}$ 1.6200, $d_4^{18.5}$ 1.750, remains (yield 90%). When HCO_2Et is added without cooling and the mixt. heated to 80–90°, 1–2 g. of the β -aldehyde, $\beta\text{-OHCC}_8\text{H}_6\text{N}$, m. 194°, results. The action of HCO_2Et on $\alpha\text{-MeC}_8\text{H}_6\text{NMeGI}$.— $\alpha\text{-MeC}_8\text{H}_6\text{NMeGI}$, similarly prepd., is a viscous liquid, b_{15} 155°, n_D^{16} 1.6170, d_4^{16} 1.1353. When HCO_2Et is added at 70–75°, $\alpha,\beta\text{-C}_8\text{H}_6\text{NMeCHO}$, m. 198°, is obtained in small quantities. The action of HCO_2Et on *pyrrolemagnesium iodide*.—To 30 g. EtI , 30 cc. abs. PhH and 2 cc. abs. Et_2O are added 5.6 g. Mg and a little I_2 . Upon the soln. of Mg, 13 g. $\text{C}_4\text{H}_7\text{N}$ and 8 cc. PhH are introduced with cooling; 40 cc. HCO_2Et is added drop by drop and the mixt. warmed on the water bath for 10–15 min., decompd. with ice and neutralized with AcOH . The dry Et_2O ext. is fractionated *in vacuo*. A 33–5% yield of $\alpha\text{-OHCC}_8\text{H}_6\text{N}$ is obtained, b_{15} 114°, n_D^{16} 1.5939, solidifies on standing. The oxime, m. 163°. The action of AcOEt on $\text{IMgC}_8\text{H}_7\text{N}$.— AcOEt is added at 85° and heating continued for 30 min. The mixt. is extd. with Et_2O as usual, the Et_2O distd. off and the residue treated with picric acid in PhH to remove $\text{C}_8\text{H}_7\text{N}$ and $\beta\text{-AcC}_8\text{H}_6\text{N}$, leaving $\text{N-AcC}_8\text{H}_6\text{N}$ (2.8 g. from 3 g. $\text{C}_8\text{H}_7\text{N}$), b_{10} 144–5°. The picrate is decompd. with Na_2CO_3 and washed with PhH, the insol. $\beta\text{-AcC}_8\text{H}_6\text{N}$ being recrystd. from hot PhH (m. 189°). The decompn. of *N-OHC- and N-AcC}_8\text{H}_6\text{N}* at high temps.— $\text{N-OHC}_8\text{H}_6\text{N}$ (2 g.) in a sealed tube at 300° yields after 6 hrs. 250 cc. CO_2 , 1.8 g. $\text{C}_8\text{H}_7\text{N}$ and a few crystals solid at 300°. $\text{N-AcC}_8\text{H}_6\text{N}$ (2.6 g.) after 12 hrs. at 300–50° gave CO_2 and 0.15–0.2 g. quinoline besides the unchanged compd. The condensation of $\text{C}_8\text{H}_7\text{N}$ with HCHO .—Equimol. quantities of the amine and (HCHO) $_4$ were heated in a sealed tube to 140–50° for 6 hrs. $\text{N-MeOC}_8\text{H}_6\text{N}$, b_{10} 55–6° and ($\text{N-C}_8\text{H}_6\text{N})_2\text{CH}_2$, b_{10} 94–5°, were obtained upon drying and fractionation. The residue was dry-distd., free $\text{C}_8\text{H}_7\text{N}$ and probably, $\alpha\text{-MeOC}_8\text{H}_6\text{N}$ being isolated from the distillate. The condensation of $\text{C}_8\text{H}_{11}\text{N}$ with HCHO .—Equiv. quantities were heated in a

sealed tube to 150° for 6 hrs. CO₂ and a small quantity of water-sol. liquid sepd. The oil layer contained MeC₃H₁₀N, b₃₅ 33-5° (probably a mixt. of α - and *N*-compds.) and (N-C₃H₁₀N)₂CH₂, b₁₋₁ 120-5°, d₄²⁰ 0.9371, d₄¹⁵ 0.9335, n_D¹⁵ 1.4883. The condensation of (CH₃)₂NH with HCHO.—After 5 hrs. in a sealed tube at 120°, equimol. quantities of (CH₃)₂NH, b. 65-70°, and HCHO gave CO₂ and C₆H₁₄N₂, b. 185°, d₄¹⁰ 0.9110, n_D¹⁰ 1.4685.

BASIL C. SOYENKOFF

A new reaction of the disulfisatides. A. WAHL AND LOBECK. *Compt. rend.* 186, 1303-5(1928); cf. C. A. 21, 2472.—A direct transformation of a disulfisatide (I) into an isoindigotin (II) can be realized by heating with CuCl in AcOH on the water bath. The yield is 50-60%. The reaction has a general character. When the indigotin is little sol. in org. solvents, CuS cannot be removed by filtration; oxidation in wet air or treatment with hot concd. HCl must be used. Naphthodisulfisatide, which is insol. in org. solvents and thus cannot be completely freed of S, yields α -dinaphthoisoindigotin (III).



A. L. HENNE

Thiazole derivatives. HERBERT WM. STEPHEN AND FORSYTH JAMES WILSON. Royal Tech. College, Glasgow. *J. Chem. Soc.* 1928, 1415-22; cf. C. A. 21, 245.—CS(NHN:CMPh)₂ and MeCHBrCO₂Et with EtONa give 90% of 3-phenylmethylmethyleneamino-2,4-diketotetrazole-5-methyltetrahydrothiazole-2-phenylmethylmethylenehydrazone, PhCMe:NN:C.N(N:CPhMe).CO.CHMe.S, m. 150°; the 5-Et deriv.,

m. 110° (90% yield from EtCHBrCO₂Et); the 5-Ph deriv., m. 165° (80% yield from PhCHBrCO₂Et); these could not be satisfactorily hydrolyzed by dil. or concd. HCl. H₂NN:C(SH)NHNH₂ and ClCH₂CO₂Et with EtONa give an impure 3-amino-2,4-diketotetrazole-2-hydrazone, H₂NN:C.N(NH₂).CO.CH₂.S, m. 119-20°, whose

dibenzylidene deriv., m. 138°, has been previously described; MeCHBrCO₂Et gives the 5-Me deriv., m. 100-1°, whose dibenzylidene deriv., m. 114°; the 5-Et deriv., m. 92-3°, could not be obtained pure (dibenzylidene deriv., m. 106°). o-Phenyleneithiocarbamide, MeCHBrCO₂Et and EtONa give 90% of Et benziminazolyl-2- α -thiolpropionate (I), m. 100°; the butyrate, m. 108-9°; the free acid, m. 176° (decompn.). Attempted ring closure with I, by using Na wire in C₆H₆, gave the free acid, m. 179° (decompn.). Benzimidazole-2-thioglycolic acid, m. 215°. Trimethylenethiocarbamide and ClCH₂CO₂Et in C₆H₅N give Et 1,4,5,6-tetrahydropyrimidine-2-thioglycolate, m. 256°. Benzoylenethiocarbamide, ClCH₂CO₂Et and EtONa give a complex mixt., from which was isolated a small quantity of Et 4-keto-3,4-dihydroquinazoline-2-thioglycolate, m. 149°. H₂NCSNHNHCSNH₂ and ClCH₂CO₂Et are considered to give 2,4-diketotetrazolethiazole-2-ketazine (cf. Frerichs, C. A. 4, 2294; 7, 3476). H₂NCSNHNHCONH₂ and ClCH₂CO₂H give 2,4-diketotetrazolethiazole-2-semicarbazone, m. 221-2° (decompn.). Acetophenone 8-phenylthiosemicarbazone, pale yellow, m. 195° (95% yield). C. J. WEST

Rhodanines and related compounds. RUDOLF ANDREASCH. Tech. Hochschule, Graz. *Monatsh* 49, 122-32(1928).—In the reduction of benzalphenylrhodanine with Zn and HCl, the S of the thioketo group is replaced by H₂, giving 4-keto-3-phenyl-5-benzaltetrahydrothiazole, m. 206°. Similarly were prepd. 4-keto-3-phenyltetrahydrothiazole, m. 115° and the 3-p-tolyl deriv., m. 143°. The reduction product of rhodanine is apparently hydrolyzed during the concn. of the reaction product, HSCH₂CO₂H being isolated. Diphenylthiohydantoin and BzH in AcOH give 85% of benzaldiphenylthiohydantoin, m. 206°; attempted reduction led only to the splitting off of PhNH₂. Condensation of PhNHCS₂NH₂ and HO₂CCH₂CHBrPh gives 2-thioketo-3,6-diphenyl-4-ketotetrahydrothiazine, m. 122°. PhNCS and HO₂CCH(SH)CH₂Ph gives benzal- γ -phenylrhodanine, m. 118-9°. Heating PhNHCOCH₂SH with COCl₂ gives a dark colored resin; BzH gives benzaldithioglycolic anilide, m. 178°. Rhodanine and Me₂CHCHO give isobutylidenerhodanine, m. 128°; isovalerylene deriv., m. 83-5°. Isopropylthiohydantoin, m. 229°. o-Chlorobenzal- γ -phenylrhodanine (I), yellow, m. 140-1°; o-chlorobenzalrhodanine, m. 169°; α -sulphydryl-o-chlorocinnamic acid, m. 119-20°, by

hydrolysis of I. A table is given of the thioglycolic acid reaction, the compds. being classified according as to whether they give a red, green or blue color with Fe.

C. J. WEST

Chemistry of the 1,2,3-triazoles. I. Reactions in the heating of aryl azides in sodium alcoholate solutions in primary alcohols. ALFRED BERTHO AND FRITZ HÖLDER. Univ. Heidelberg. *J. prakt. Chem.* 119, 173-88(1928).—*p*-Xylyl azide (14.7 g.) and 6.9 g. Na in 111 g. PrOH, heated 65 hrs. at 108°, give 1100 cc. N and 10% of 1-*p*-xylyl-4-methyl-1,2,3-triazole, *b*₁₆ 165-70°, m. 57.5°; iso-AmOH gives 2.5% of the 4-*iso*-Pr deriv., m. 118°; PhCH₂OH gives 26% of the 4-Ph deriv., m. 129°; EtOH or BuOH did not give a triazole. Attempts are reported to det. the constitution of the compd., m. 282° (decompn.), which is formed in the reaction with PhN₃; the mol wt., 128.9, does not correspond to the analysis; since this does not result in the above reactions, the matter is dropped. II. Decomposition of 1-*p*-xylyl-1,2,3-triazole-4,5-dicarboxylic acid according to Curtius. *Ibid* 189-98.—*Di-Me* 1-*p*-xylyl-1,2,3-triazole-4,5-dicarboxylate, m. 86°, results in 82% yield from 5 g. (:CCO₂Me)₂ and 5 g. *p*-MeC₆H₄N₃ at 90°; the free acid, m. 151° (evolution of CO₂), results quant. on heating 4 hrs. with KOH in 70% EtOH. The ester and N₂H₄·H₂O in EtOH give 80% of the dihydrazide, m. 133.5° (diacetonil deriv., m. 207°; dibenzal deriv., m. 186°), and a sec. hydrazide, C₁₂H₁₄N₁₀O₄, which crysts. with 1 AcOH and m. 286° (decompn.). HNO₃ with the dihydrazide gives 92% of the 4-azide 5-isocyanate, decomp. 150°; cooking with EtOH gives a resin, while MeOH gives a sym. urea, C₁₂H₂₀N₁₄O₄, m. 164° (decompn.) and a large quantity of resin, from which nothing could be isolated.

C. J. WEST

Constitution of the anthochlor of the yellow dahlia. LEOPOLD SCHMID AND ALFRED WASCHKAU. Univ. Vienna. *Monatsh.* 49, 83-91(1928).—The dyestuff of the yellow dahlia is *apigenin*; details are given for its isolation; it crysts. with 0.5 H₂O, m. 347-8° (color.); the *Ac* deriv., m. 181-2°; the *di-Me* ether, m. 170-1°. Alk. degradation gives *p*-HOC₆H₄Ac and 1,3,5-C₆H₃(OH)₃. The KOH melt gives *p*-HOC₆H₄CO₂H.

C. J. WEST

Neocyanine. FRANCES M. HAMER. Ilford, Ltd. *J. Chem. Soc.* 1928, 1472-8; cf. Dundon, Schoen and Briggs, *C. A.* 20, 1764.—Lepidine-EtI (5 g.), 5.5 g HC(OEt)₂ and 20 g. C₆H₅N, boiled 3 hrs. and the product (0.89 g.) recrystd. from 1000 cc. EtOH, give 0.72 g. (17%) of neocyanine-EtI (I), which probably has the formula C₂₃H₁₇N₃I₂, dull-green powder, m. 284° (decompn.). The C₆H₅N mother liquor yields 42% of 1,1'-diethyl-4,4'-carbocyanine iodide (II). From *p*-MeC₆H₄SO₃Et, there results 26% I and 7% II. If the reaction product is decompd. with NaBr soln., there results 37% of neocyanine-EtBr, green and gold crystals, m. 291° (decompn.), and 5% of the bromide of II. Lepidine-MeI and HC(OEt)₂ gave no neocyanine. Neocyanine-MeBr, bright Cu color, m. 288° (decompn.) (41% yield). From condensations carried out with lepidine-*p*-MeC₆H₄SO₃Et, it appears that in the presence of much C₆H₅N there is a tendency to the formation of cryptocyanine rather than of neocyanine, but that with a small quantity of C₆H₅N the reverse is the case. All 3 neocyanines show a very similar sensitizing action.

C. J. WEST

Synthesis of anthocyanins. IV. Constitution of *o*-benzoylphloroglucinaldehyde. ALEXANDER ROBERTSON, ROBERT ROBINSON AND ADA MARGARET STRUTHERS. Univ. of Manchester. *J. Chem. Soc.* 1928, 1455-9; cf. *C. A.* 21, 3195.—The structure of *O*-benzoylphloroglucinaldehyde (I) as 4,6-dihydroxy-2-benzoyloxybenzaldehyde is confirmed by its synthesis from *O*-benzoylphloroglucinol (II), HCN and HCl; although the yield was poor, no isomers could be isolated; MeI and K₂CO₃ give the 4,6-*di-MeO* deriv., m. 148°. Similarly, II, anisoylacetaldehyde and HCl give 7-hydroxy-5-benzoyloxy-4'-methoxyflavylium chloride, previously obtained from I. *m*-Xylorcyllaldehyde, *p*-AcC₆H₄OMe and HCl in HCO₂H give 5-hydroxy-4'-methoxy-6,8-dimethylflavylium chloride, reddish violet needles, which appear red by transmitted light, crystg. with 3H₂O; the dehydrated product is redder in color; the color base gives a blue soln. in C₆H₆. V. Synthesis of 3,β-glucosidylpelargonidin chloride, which is believed to be identical with callistephin chloride. A. ROBERTSON AND R. ROBINSON. *Ibid* 1460-72.—*p*-HOC₆H₄COCH₂OH and ClCO₂Me in H₂O give *ω*-hydroxy-4-methylcarbonatoacetophenone, m. 84°; 4-*Ac* deriv. (III), m. 95-6°; 4-*Bz* deriv. (IV), m. 140-1°; the *di-Bz* deriv., m. 180-2°. IV (4.5 g.) and 12 g. *O*-tetraacetyl-α-glucosidyl bromide (V) in 80 cc. C₆H₆, treated with 10 g. Ag₂CO₃ at 35°, give 5 g. *ω*-*O*-tetraacetyl-β-glucosidory-4-benzoyloxyacetophenone, m. 147°; attempts to condense this with I were not successful. III and V similarly give the 4-*Ac* deriv. (VI), m. 132°. *ω*-*O*-Tetraacetyl-β-glucosidory-4-methoxyacetophenone, m. 133°, from V and anisoylcarbinol. VI (1 g.) and 1.5 g. I in 30 cc. CHCl₃ and 100 cc. Et₂O, satd. with HCl at room temp., give 0.4 g. pure and 0.6 g. impure 3-*O*-tetraacetyl-β-glucosidory-7-hydroxy-5-benzoyloxy-4'-acetoxyflavylium chloride,

red plates with brilliant green reflex; the orange-red EtOH soln. shows a green fluorescence; NaOH or concd. aq. Na_2CO_3 gives a purple-violet color. With 8% NaOH at 10° for 3 hrs., followed by acidification with 7% HCl until the concn. of the HCl was 2%, purification through the Pb salt and addn. of cold satd. aq. picric acid, there results 3- β -glucosidylpelargonidin picrate, bright red plates with a brilliant golden reflex; with 5% MeOH-HCl this gives the chloride, which crysts. with $2\text{H}_2\text{O}$ and in every respect appears to be identical with the callistephin chloride of Willstätter and Burdick. If this be true, then pelargonin, peonin and cyanin are 5- or 7-saccharides, the weight of evidence favoring the 5-saccharide configuration. C. J. WEST

Synthesis of pyrylium salts of anthocyanidin type. XV. The synthesis of cyanidin chloride by means of *O*-benzoylphloroglucinaldehyde. ALEXANDER ROBERTSON AND ROBERT ROBINSON. Univ. Manchester. *J. Chem. Soc.* 1928, 1526-32; cf. *C. A.* 22, 90.— ω ,3,4-Triacetoxycetophenone, m. 95° , from the 3,4-(HO) $_2\text{C}_6\text{H}_3\text{COCH}_2\text{Cl}$, Ac_2O and AcOK; 3.5 g. of the ketone, 2.5 g. *O*-benzoylphloroglucinaldehyde (I), 50 cc. AcOEt and 20 cc. EtOH, cooled and satd. with HCl, give 5 g. 5-*O*-benzoylcyanidin chloride, red, crystg. with $1.5\text{H}_2\text{O}$; the EtOH soln. is bluish red and becomes KMnO_4 -colored on diln; addn. of H_2O gives a pink color, rapidly decolorized on heating. FeCl_3 in EtOH gives an intense deep blue color, becoming reddish violet on diln. with H_2O . The chloride (5 g.), added to 65 cc. cold 8% aq.-EtOH NaOH in an atm. of N, allowed to stand 3 hrs., then treated with 100 cc. concd. HCl and heated at 60° , gives 3 g. cyanidin chloride, identical with the natural chloride. There are appended remarks on the paper of Malkin and Nierenstein (*C. A.* 22, 2358), regarding the constitution of cyanin chloride.

XVI. Synthesis of pelargonidin chloride by means of *O*-benzoylphloroglucinaldehyde. A. ROBERTSON, R. ROBINSON AND JIRO SUGIURA. *Ibid* 1533-7.—I (7.7 g.) and 7 g. 4-AcOC $_6\text{H}_4\text{COCH}_2\text{OAc}$ in 150 cc. AcOEt, satd. with HCl, gives, after 3 days, 9.5 g. 5-*O*-benzoylpelargonidin chloride, crystg. with $1.5\text{H}_2\text{O}$, plates having a maroon color in mass and deep blue luster; EtOH gives a violet soln.; the pseudo base is formed in very dil. EtOH solns. or on the addn. of H_2O ; Na_2CO_3 gives a bright violet soln. but the color, even in 50% EtOH, is pure blue. Hydrolysis gives pelargonidin chloride. $\text{MeOCH}_2\text{COCH}(\text{OMe})\text{CO}_2\text{Et}$ (22.8 g.), added to 2.8 g. in 150 cc. Et_2O and the soln. treated with 24.1 g. 3,5-(MeO) $_2\text{C}_6\text{H}_3\text{COCl}$, gives 6.7 g. ω ,3,5-trimethoxyacetophenone (II), b $_p$ $127-37^\circ$, m. 42° ; semicarbazone, m. $149-9.5^\circ$. I (2.3 g.) and 2 g. II in 500 cc. Et_2O , satd. with HCl, give 0.84 g. 7-hydroxy-5-benzoyloxy-3,3',5'-trimethoxyflavylium chloride, brownish crimson, crystg. with $2\text{H}_2\text{O}$; hydrolysis with 10% aq. NaOH, or the condensation of II and *O*-triacytlyphloroglucinaldehyde in HCO_2H with HCl gives 5,7-dihydroxy-3,3',5'-trimethoxyflavylium chloride, crystg. with $0.5\text{H}_2\text{O}$, dark violet-brown prisms, which are reddish brown by transmitted light and exhibit a Cu glance. Attempts to demethylate this compd. and to obtain the pure penta-HO deriv. were unsuccessful.

XVII. Synthesis of peonidin chloride by means of *O*-benzoylphloroglucinaldehyde. SHINZO MURAKAMI AND R. ROBINSON. *Ibid* 1537-41.—I (2.94 g.), 2.58 g. 4,3-AcO(MeO) $\text{C}_6\text{H}_3\text{COCH}_2\text{OAc}$ and 75 g. AcOEt, satd. with HCl, give 3.55 g. 5-*O*-benzoylpeonidin chloride, crystg. with $0.5\text{H}_2\text{O}$, scarlet; solus. in MeOH and EtOH are crimson, becoming violet on diln. with alc. and colorless on great diln. and warming. The salt is very sparingly sol. in boiling H_2O and hot 0.5% HCl. The soln. in aq. Na_2CO_3 is pure blue, greenish blue in thin layers and purplish blue in thick layers. The red crystals, dissolved in MeOH and warm 15% HCl added, changed to beetle-green prisms, yellowish brown by transmitted light, and gave a violet-red smear on paper; they contain $3\text{H}_2\text{O}$. Hydrolysis (acid or alk.) gives peonidin chloride, which was compared with a natural sample.

XVIII. Synthesis of malvidin chloride. WM. BRADLEY AND R. ROBINSON. *Ibid* 1541-69.— Bz_2O in C_6H_6 added to $\text{BzCHNaCO}_2\text{Et}$ in Et_2O at 0° gives *Et* benzoylbenzoyloxyacetate, m. 61° ; in EtOH it gives no color with FeCl_3 and no Cu deriv. could be isolated; on heating with H_2O at 200° for 2 hrs., there results $\text{PhCOCH}_2\text{OBz}$, m. $114-5^\circ$; with dil. H_2SO_4 this gives an unsatisfactory yield of BzCH_2OH . 3,4,5-(MeO) $_3\text{C}_6\text{H}_2\text{COCH}_2\text{CO}_2\text{Et}$ (for which a modified method of prepn. is given), transformed into the K salt in C_6H_6 and treated with Bz_2O , gives *Et* 3,4,5-trimethoxybenzoylbenzoyloxyacetate, m. 107° ; on heating with H_2O at 200° for 14 hrs., there results ω -benzoyloxy-3,4,5-trimethoxyacetophenone, m. $98-100^\circ$; this compd. exhibits little tendency to condense with I to give a flavylium salt. *Et* trimethoxybenzoyloxyacetate, m. 88° ; hydrolysis by boiling 10% H_2SO_4 for 3 hrs. gives ω -hydroxy-3,4,5-trimethoxyacetophenone, m. $87-8^\circ$ (diphenylhydrazone of 3,4,5-trimethoxyphenylglyoxal, yellow, m. $137-8^\circ$). With I and HCl in Et_2O , there results 3,5,7-trihydroxy-3',4',5'-trimethoxyflavylium chloride, crimson needles, crystg. with 1 mol. H_2O . HBr in AcOH gives a mixt. of malvidin and delphinidin or, more probably, delphinidin 3'-Me ether and therefore a synthesis of a more precise nature was undertaken. *O*-Acetylsyringoyl

chloride, m. 126°, (from the acid and PCl_5 in AcCl); with $\text{AcCHNaCO}_2\text{Et}$ gives *Et O-acetylsyringoylacetate*, m. 112–4°; hydrolysis gives *Et syringoylacetate*, m. 92°; FeCl_3 in EtOH gives a bright emerald-green color; $\text{Cu}(\text{OAc})_2$ gives an insol. brown Cu salt. These esters could not be transformed into acyloxy derivs. *Me O-benzylsyringate*, m. 71°, results from Me syringate and PhCH_2Cl and KOH in MeOH . This could not be condensed with AcOEt . *O-Benzylsyringic acid*, m. 157°, from syringic acid and BzCl in 10% aq. NaOH ; the chloride, m. 45°; the amide, m. 152°. *Et O-benzylsyringoylacetate*, m. 97–102°; FeCl_3 in EtOH gives a crimson color. Hydrolysis with NH_3 gives *Et O-benzylsyringoylacetate* (II), m. 67°; FeCl_3 gives a crimson color; the Cu salt is pale green, m. 212°. With Bz_2O_3 this gives ω -benzyloxy-4-benzyl-3,5-dimethoxyacetophenone, m. 105°; this appears to condense with I, although in a sluggish fashion and its behavior is somewhat anomalous. $\text{Pb}(\text{OAc})_4$ and II in AcOH give *Et di-[O-benzylsyringoyl]succinate*, m. 173–6°, a better yield is obtained with the K salt of II. Benzylsyringoyl chloride and CH_3N_2 give ω -diazo-4-benzoyl-3,5-dimethylacetophenone, bright lemon-yellow, m. 122–3° (decompn.); heated with AcOH at 60–70° it gives ω -acetoxy-4-benzoyloxy-3,5-dimethoxyacetophenone, m. 60.5–1°. With I and HCl , this gives 5-benzoylmalvidin chloride, crystg. with 2.5 H_2O , olive-green in mass and exhibits a strong golden luster; the alc. solns. are violet-red, and are readily decolorized on keeping or standing; aq. Na_2CO_3 gives a pure deep-blue soln., which becomes greenish on diln. in H_2O and in EtOH even the addn. of NaOAc gives a pure blue color. Hydrolysis gives malvidin chloride, which is compared with the natural product. Hydrolysis of II by heating with H_2O at 175–80° for 10 hrs. gives 4-benzoyloxy-3,5-dimethoxyacetophenone (III), m. 60–1° (semicarbazone, m. 166°; 2,4-dinitrophenylhydrazones, scarlet, m. 192–3°); HBr in AcOH gives 4-hydroxy-3,5-dimethoxyacetophenone, m. 117°. III and iso- AmNO , in EtONa give the isonitroso deriv., canary-yellow, m. 107–8° (oxime, m. 141–2°). III and I, condensed in AcOEt with HCl , give 5,7,4'-trihydroxy-3',5'-dimethoxyflavylium chloride, crystg. with 1 mol. H_2O , reddish brown, exhibiting a greenish yellow luster when rubbed; the hot aq. soln. is a deep brownish red; the brownish red MeOH soln. is not changed by heating or diln. The reddish violet NaOH soln. changes through deep red to orange and yellow. 4-Hydroxy- ω -3,5-trimethoxyacetophenone, m. 90°, results from $\text{MeOCH}_2\text{COCNa}(\text{OMe})\text{CO}_2\text{Et}$ and acetylsyringoyl chloride; with I it gives the 5-Bz deriv. of 5,7,4'-trihydroxy-3',5'-trimethoxyflavylium chloride (malvidin chloride 3-Me ether), crystg. with 2 H_2O , deep red by transmitted, olive-green by reflected light and possessing a bright yellow luster. Conc'd HCl in MeOH removes the Bz group, giving the malvidin chloride 3-Me ether, dark violet powder with a bright yellow reflex; the cold aq. soln. is blood-red and, if sufficiently dil., decolorizes on standing; the cold sat'd. soln. in 3% HCl is blood-red; the ease of pseudo-base formation in EtOH is greater than with malvidin and the color is immediately and fully restored on acidification.

C. J. WEST

The oxidation of quinoline-8-sulfonic acid. EDWARD SUCHARDA. Lemberg Polytechnic. *Kosmos* 1920–21, 18 pp.; *Chem. Zentr.* 1927, I, 3005–6.—The oxidation of quinoline-8-sulfonic acid with alc. KMnO_4 gives rise to 2 products: (1) a K salt of an addn. compd. (I) prepd. by Zürcher (*Ber.* 21, 180), and (2) the K salt of 7-sulfoisatin (II). I, m. 248°, is decompd. by strong acids; its aq. solns. are fluorescent. Decompd. with conc'd. HCl , I forms 2-amino-3-sulfobenzoic acid (III), m. 263°; its dil. aq. solns. are fluorescent. It is not identical with the compd. prepd. by Limpricht and Ulsar, which they regarded as 3,5- $\text{HO}_2\text{S}(\text{H}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$. With KNO_3 its soln. in conc'd. H_2SO_4 form the internal anhydride of 2-diazo-3-sulfobenzoic acid, $\text{C}_7\text{H}_4\text{O}_5\text{N}_2\text{S}$, m. 150°. Warmed with 20% HCl , this forms 2-hydroxy-3-sulfobenzoic acid, $\text{C}_7\text{H}_4\text{O}_5\text{S} \cdot 2\text{H}_2\text{O}$, m. 213°. Ba salt, $\text{C}_7\text{H}_4\text{O}_5\text{SBa} \cdot \text{H}_2\text{O}$. Na salt, with 2.5 H_2O . With formamide, III forms 4-hydroxy-8-sulfoquinazoline carbonizes without fusing when heated. From II was formed the Ba salt, $(\text{C}_8\text{H}_4\text{O}_4\text{NS})_2\text{Ba}$, and from this in turn 7-sulfoisatin, $\text{C}_8\text{H}_4\text{O}_4\text{NS} \cdot 4\text{H}_2\text{O}$ (II), orange-red, m. 80°, loses its H_2O of crystn. at 197°. It is not identical with the thioisatin prepd. by G. and A. Schlieper (*Ann.* 120, 1), for their Ba salt was different crystallographically and contained H_2O of crystn.

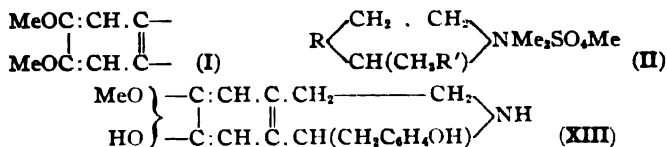
C. C. D.

Amino acid anhydrides. I. Molecular compounds of diketopiperazine with copper halides. TEI-ICHI ASAHINA AND TSURUMATSU DONO. Tokyo Univ. *Bull. Chem. Soc. Japan* 3, 151–6 (1928).—Mol. addn. compds. of diketopiperazine (glycine anhydride) and CuCl_2 or CuBr_2 have been prepd. in 80 or 90% yield, resp. Glycine anhydride-copper chloride crystals, $\text{C}_8\text{H}_{10}\text{O}_4\text{N}_2 \cdot \text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ (I), are light blue rhombic needles; they are partly decompd. in H_2O and alc. In hot solvents, the decompn. proceeds rapidly. I is insol. in, and scarcely decompd. by Me_2CO , C_6H_6 , Me_2O and CHCl_3 . The water of crystn. is expelled at 110° and the compd. turns reddish brown; on further heating it decomp. without melting. It can be recrystd. only from a warm

concd. CuCl_2 soln. by cooling. Glycine anhydride-copper bromide (II), exhibits the same general properties; the crystals are bright green monoclinic prisms, with $2\text{H}_2\text{O}$ of crystn. It was ascertained that similar compds. are formed in H_2O , but their formulas are different than in the solid state. The meaning of these mol. compds. for the chemistry of the proteins is discussed.

A. L. HENNE

Alkaloids of Sinomenium and Coccus. XX. Constitution of coclaurine. III. H. KONDO AND T. KONDO. *J. Pharm. Soc. Japan* **48**, 324-37 (1928).—In paper II, (*J. Pharm. Soc. Japan* No. 538, 1029) the approx. constitution of coclaurine was proposed, but the positions of the OH and MeO groups on the tetrahydroisoquinoline ring still remained uncertain. This paper reports the results of further work on the detn. of the positions of these groups. A complete purification of tetramethylcoclaurine-methin B (III) which was obtained by Hofmann's decompn. of tetramethylcoclaurine methosulfate (II) ($\text{R} = \text{I}$, $\text{R}' = p\text{-C}_6\text{H}_4\text{OMe}$) gave colorless crystals, m. 86° . *HCl* salt, m. $228.5-9.0^\circ$. Since it has lost its optical activity, it should have the constitution $\text{R}(\text{CH}:\text{CHR}')\text{CH}_2\text{CH}_2\text{NMe}_2$ (IIIa) rather than $\text{R}[\text{CH}(\text{CH}_2\text{R}')\text{NMe}_2]\text{CH}:\text{CH}_2$ (IIIb). The oxidation of III in MeOH with KMnO_4 gave 4-MeOC₆H₄CO₂H and an amino acid, $\text{R}(\text{CO}_2\text{H})\text{CH}_2\text{CH}_2\text{NMe}_2$ (IV). Hofmann's decompn. of the methosulfate (V) of IV gave



Me_3N and dimethoxyvinylbenzoic acid (VI), m. 184° . VI, Pd-C and H_2 gave 3,4-dimethoxy-6-ethylbenzoic acid, m. $142-3^\circ$, which was identical with Shinoda's synthetic product (*C. A.* **22**, 772). The above results show that the 2 MeO groups are in the 3,4-positions. In order further to prove that the structure of III as represented by IIIa is correct, the synthesis of III was accomplished. 3,4-(MeO)₂C₆H₃CHO and MeNO_2 gave 3,4-dimethoxy- β -nitrostyrene (VII), m. 142° . The electrolytic reduction of VII gave homoveratrylamine (VIII), whose chloroplatinate m. 196° . 4-MeOC₆H₄CH₂COCl and VIII gave 4'-methoxybenzylhomoveratrylamine (IX), m. 123.5° . IX and POCl_3 gave 1-[4'-methoxybenzyl]-6,7-dimethoxydihydroisoquinoline (X), m. $190-1^\circ$. Picrate, m. 177° . Methiodide, m. 224° . *HCl* salt of X, Pd-C and H_2 gave 1-[4'-methoxybenzyl]-6,7-dimethoxytetrahydroisoquinoline (XI); *HCl* salt, m. 175° . XI and Me_2SO_4 gave *N*-methyl-1-[4'-methoxybenzyl]-6,7-dimethoxytetrahydroisoquinolinemethylmethosulfate (II), m. 175° . Chloroplatinate of the methochloride, m. 174° . Hofmann's decompn. of XII with 30% KOH gave the free amine whose *HCl* salt m. $228.5-9.0^\circ$ and was identical with the *HCl* salt of III. The above results show the structure of coclaurine to be represented by XIII.

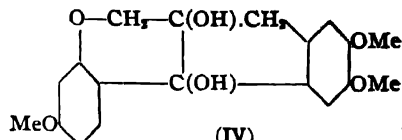
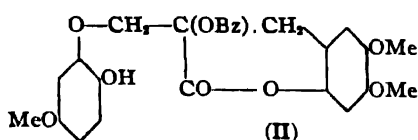
NAO UYRI

The significance of tri-, di- and sesquiterpenes in the chemistry of phytosterols and resins. K. ALB VESTERBERG. Univ. Stockholm *Tschirch-Festschrift* 1926, 4 pp.; *Chem. Zentr.* 1927, I, 894; cf. *C. A.* **21**, 4059.—Triterpene derivs. are probably present fairly often in various resins. Since abietic acid and *d*-pimaric acid yield phenanthrene derivs. when dehydrogenated with S, and since certain resin acids, C₃₀H₅₀O₂, can in all probability be regarded as diterpene derivs., there may be diterpenes which bear the same relation to phenanthrene that certain sesquiterpenes do to C₁₅H₈. A subfossil resin, probably originating from one of the Dipterocarpaceae, gave on distn. with powd. Ni a sesquiterpene, C₁₅H₂₄, b_p $90-2^\circ$, d_4^{20} 0.9153, n_D^{20} 1.5120, M_N 60.75, $[\alpha]_D^{25}$ 1.52° , which was converted by S to a C₁₆H₂ homolog similar to cadalene. In a similar manner sesquiterpenes were obtained from dammar resin and from Kauri copal resin. A sesquiterpene can be isolated from birch tar oil, which can be dehydrogenated to a naphthalene hydrocarbon, C₁₅H₁₄, b. 248° , and it is, therefore, probable that betulol would give a sesquiterpene on dry distn.

C. C. DAVIS

Synthesis of brazilin and hematoxylin and their derivatives. III. WM. HENRY PERKIN, JR., JNANENDRA NATH RAY AND ROBERT ROBINSON. Univ. of Oxford and Manchester. *J. Chem. Soc.* 1928, 1504-13; cf. *C. A.* **22**, 88.—The conversion of deoxytrimethylbrazilone (I) into *o*-trimethylbrazilin has proved a puzzling problem, chiefly because of the remarkable properties of I, which is prone to undergo oxidation; when I is merely shaken with C₆H₅N and aq. NaOH a considerable proportion of the material becomes alkali-sol. in a short time and in the presence of acids there is a strong tendency to form the isobrazilin salt. A stream of dry HCl passed through I in cold CHCl_3 gives chiefly isobrazilin-HCl tri-Me ether; other attempts to add the elements

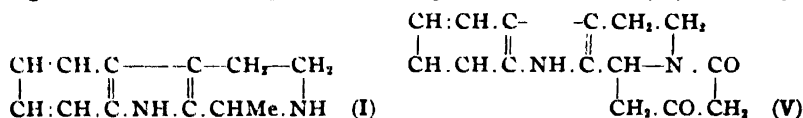
of H_2O or of an acid to I were unsuccessful. The reduction of trimethylbrazilone with $PhNHNH_2$ in EtOH does not proceed satisfactorily but in AcOH, 8 g. gives 4–4.5 g. I and as a by-product, the bright yellow compd., $C_{25}H_{32}O_4N_2$, m. 245° . The action of BzO_2H on I in $CHCl_3$ gives the compd. $C_{25}H_{32}O_8$, to which formula II is ascribed, largely



by analogy with the products derived from brazilin derivs. with H_2O_2 . I in AcOH adds Br, forming a dibromide, dark crimson, which loses Br in vacuum, giving an isobrazilin salt; with an excess of Br, a perbromide, $C_{15}H_{18}O_4Br_6$, is pptd. Zn in AcOH reduces the dibromide to I. Catalytic reduction of I in AcOEt gives the dihydro deriv. (O-trimethylbrazilane), m. 109° , which is oxidized by CrO_3 in AcOH to trimethylbrazilone (III). Reduction of III with Al-Hg in AcOEt gives the compd. $C_{15}H_{20}O_4 \cdot 0.5H_2O$, m. 129° (decompn.); Ac_2O gives a deriv., m. 116° . III and Zn in AcOH give trimethyl-dihydrobrazilone (hydroxy-O-trimethylbrazilin) (IV), m. $167-8^\circ$; with H_2SO_4 it gives isobrazilin tri-Me ether; the most characteristic salt is the anhydro sulfate, deep red needles; the anhydro HCl salt is also crimson but is more sol. than the sulfate. O-Triacetylbrazilone, m. 187° (decompn.); the tri-Bz deriv., m. 205° (decompn.).

C. J. WEST

Synthesis of carboline derivatives. G. TATSUI. Tokyo Imp. Univ. *J. Pharm. Soc. Japan* 48, 453–9 (1928).— β -(β' -Indolyl)ethylamine (Majima and Hoshino, *C. A.* 20, 758) and paraldehyde gave tetrahydroharman (I), $C_{17}H_{18}N_2$, light yellow, m. $179-80^\circ$. HCl salt, decomp. 265° . Chloroplatinate, red, decomp. 257° . It resisted most reducing reactions and by the Schotten-Baumann reaction it gave benzoyltetrahydroharman, m. $168-9^\circ$. I and MeI in a closed tube gave tetrahydro-N-methylharman-HI (II), light yellow, m. $199-200^\circ$. II and AgOH gave the methohydroxide, which was easily and quant. dehydrated in vacuum at 80° to give N-methyltetrahydroharman (III), $C_{18}H_{18}N_2$. III and MeI gave the methiodide. The condensation of I with $CH_2(CO_2Et)_2$ in presence of NaOEt gave di-Et tetrahydroharmanmalonate (IV), $C_{17}H_{18}N_2O_4$,



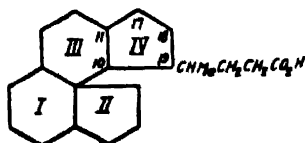
bright yellow, m. $134-5^\circ$, and the free acid, (decomps. 155°) as a by-product, which on heating liberates CO_2 and gives the Ac deriv. of I. IV and NaOEt gave a compd. (decomps. 175°) which gave a positive diazo reaction and probably has the structure represented by V.

NAO UYRE

Dehydration experiments with sitosterol. LEOPOLD SCHMID and MARGOT ZENTNER. Univ. Vienna. *Monatsh* 49, 92–7 (1928); cf. *C. A.* 21f, 3201.—From the mother liquors of the hydrocarbon, m. $324-6^\circ$, obtained in the dehydration of sitosterol, there is isolated a 2nd hydrocarbon, sublimes at 11 mm. and $170-90^\circ$, and m. $246-8^\circ$; this is not identical with chrysene, m. $246-8.5^\circ$, obtained from cholesterol, since a mixt. of the 2 compds. begins to soften at 235° and is clear at 245° ; the tetra- NO_2 deriv., $C_{18}H_8N_4O_8$, light yellow, decomp. under 200° , while tetranitrochrysene, m. above 300° . A crystallographic comparison of chrysene and the new hydrocarbon also shows that they are not identical. Various other products were isolated and m. p. given, but no indication of compn. is offered.

C. J. WEST

The bile acids. XXVIII. The nature of the fourth ring. HEINRICH WIELAND and FRITZ VOCKE. *Z. physiol. Chem.* 177, 68–85 (1928).—The basal structure of the bile acids, disregarding substituent groupings, consists of 4 rings and a side chain, which may be tentatively arranged as follows



Rings I, II and III have already been definitely established. Ring IV is now believed to be pentacyclic, since the etiobilanic acid remaining after oxidative destruction of the side chain and rupture of the ring to which it is attached is a di-CO₂H acid which readily forms an anhydride. The exact location of the side chain (C₁₉ or C₁₈) and the placement of 3 additional carbons (3Me, Me + Et or Me₂CH) remain to be detd. There is reason to believe that the C to which the side chain is attached has no other substituent and that the adjacent C carries 2H. Further studies on the 4th ring now center upon the monocyclic tetra-CO₂H acid, C₁₆H₂₄O₈, remaining after oxidative destruction of rings I, II and III. Oxidation of this yields a tri-CO₂H acid, C₁₃H₂₀O₆, by destruction of the side chain at C₁₀. Attempts, however, to break the linkage between C₁₀ and C₁₁ were unsuccessful, although by this treatment 2 more C were removed. The formation of MeAc by oxidation of the C₁₆H₂₄O₈ acid with H₂O₂ was thought at first to indicate an Me₂CH group on Ring IV, but other compds. with sec. Me groupings, *e. g.*, β -methyladipic and α -methylglutaric acids, were found to react in the same way. Among the oxidation products of desoxycholic acid, an acid, C₇H₁₀O₆, was obtained, which had the m. p. 134° of *cis*- α -methyltricarballic acid but was not identical with it and split off CO₂ with formation of α -methylglutaric acid. The identity of the acid with methyl- β -carboxyethylmalonic acid was established by synthesis of the latter from MeCH-(CO₂Et)₂ and ICH₂CH₂CO₂Et. The Me group of this acid is best reconciled with the presence of a Me on C₁₁ of the bile acid skeleton. On account of the poor yields obtained in the conversion of the C₁₆H₂₄O₈ acid into its pyro acid (ketodicarboxylic acid, C₁₃H₂₀O₆), the acid esters were used in this reaction. The tri-Me ester, m. 100°, was prepd. by treatment of the acid with MeOH-HCl. The 4th CO₂H cannot be esterified in the usual way, this behavior suggesting the presence of 3 more C-linkages on the C carrying the CO₂H. This fact also supports the assumption of a Me on C₁₁. The tri-Et ester, m. 108°. Partial esterification of the free acid yields a di-Me ester, m. 167°. Sapon. of the tetra-Me ester prepd. by the use of CH₂N₂ yields a mono-Me ester, m. 163°, whereas sapon. of the tri-Me ester yields the free acid. When the tetra-Me ester is treated with N₂H₄·H₂O only 3 ester groups react, yielding a Me ester trihydrazide, m. 145° (decompn.). HNO₂ converts this into the azide, which on evapn. yields a urethan, and this in turn is sapond. to the tri-NH₂ acid HCl salt, m. 250° (decompn.). Attempts to remove the NH₂ groups by means of HOCl or HOBr were unsuccessful, the halogen substituting on the NH₂. The tri-CO₂H acid, C₁₃H₂₀O₆, obtained by further decompn. of the pyro acid from C₁₆H₂₄O₈ readily forms a tri-Me ester, but only 2 of these ester groups react with N₂H₄·H₂O. The product was converted *via* the azide and urethan into a diaminocarboxylic acid di-HCl salt, C₁₁H₂₂O₂N₂·2HCl, which decomp. 280°, but subsequent removal of the NH₂ groups was unsuccessful. In the prepn. of pyrodesoxybilanic acid by thermal decompn. of desoxybilanic acid an isomeric desoxybilanic acid, m. 221-2°, was obtained as a by-product. When heated to 250-60° this yielded the same pyro acid as the ordinary desoxybilanic acid.

A. W. Dox

The vapor density and some other properties of formic acid (COOLIDGE) 2. An x-ray examination of saturated dicarboxylic acids and of amides of the fatty series (HENDERSON) 2. Carbon dioxide cleavage from acetonedicarboxylic acid (WIGG) 2. Velocity of oxidation of alcohols by potassium permanganate (TRONOV, *et al.*) 2. Velocity of oxidation of alcohols by chromic anhydride and nitric acid in aqueous solutions (TRONOV, *et al.*) 2. Velocity of oxidation of the alcohols, ethers and esters by potassium permanganate and chromic anhydride under various conditions (TRONOV, LUKANIN) 2. Valency and refraction equivalents (AUWERS) 2.

Organic phosphorous compounds. H. T. BÖHME A.-G. Brit. 281,232, Nov. 25, 1926. Fats and oils are treated with P₂O₅ or acetylphosphoric acid or with mixts. of Ac₂O or AcCl and H₃PO₄ to obtain products for use in the textile, leather or pharmaceutical industries as *wetting agents* or *solvents* or *pharmaceutical agents*. Examples are given of the treatment of oleic and ricinoleic acid.

Organometallic compounds. MAY and BAKER. Fr. 632,834, Dec. 3, 1926. Basic Bi salts of arylarsonic acids are prepd. by treating a soln. of a Bi salt, especially of a hydroxypolybasic acid such as tartaric acid, with a soln. of an excess of arylarsonic acid. Examples are given of the prepn. of the basic Bi salts of *N*-phenylglycinamide-*p*-arsonic acid, *p*-aminobenzenearsonic acid, 3-acetyl-amino-4-hydroxybenzenearsonic acid, and 2-hydroxy-5-acetylaminobenzenearsonic acid.

Cyclic hydrocarbons. I. G. FARBERMID. A.-G. Brit. 281,298, Nov. 24, 1926. Hydrocarbons such as C₆H₆ and its homologs, C₁₀H₈, phenanthrene and C₁₁H₁₀ are

produced by treating aliphatic or hydroaromatic hydrocarbons with an excess of H or of a gas contg. H under pressure at temps. above 500° in a cyclic process, preferably with use of catalysts, and removing the gaseous hydrocarbons such as CH₄ to prevent accumulation of undesired products. Numerous details and examples are given.

Polymerization of olefins. FRITZ HOFMANN and MICHAEL OTTO. Fr. 632,768, Apr. 14, 1927. Hydrocarbons of the olefin series are polymerized by the action of BF₃ under pressure with or without finely divided metals.

Tetrazoles. GEORG SCHENING and BRUNO WALACH (to C. C. Boehringer Sohn). Can. 282,292, Aug. 7, 1928. Compds. contg. the group —C(:N—)OAc (acylated enolic form of a mono-substituted acid amide) such as those obtained from compds. of an oximic character by an intramolecular rearrangement (Beckmann), or by the enolization of mono-substituted acid amides, are allowed to act upon compds. contg. the N₃ radical, including hydrazoic acid.

Diazo compounds. SOC. ANON. POUR L'IND. CHIM. A BALE. Brit. 280,945, Nov. 18, 1926. The process described in Brit. 238,704 (C. A. 20, 1996), suitable for the manuf. of diazo preps. from naphthalenetrisulfonic acid, is used also for the production of diazo compds. in general, other than those derived from aminoazo compds. The diazo solns. may be evapd. with a neutral naphthalenetrisulfonate, with or without addition of a diluent or fixing agent such as NaCl, Na₂SO₄ or Al₂(SO₄)₃. The dried products dissolve in water with an acid reaction and may be mixed with an acid-binding agent such as a bicarbonate, borax or CaCO₃. Several examples are given.

Alkyl derivatives. ALBERT VERLEY. Fr. 632,124, Mar. 31, 1927. See Can. 279,590 (C. A. 22, 2754).

Separation of amines. SILESIA VEREIN CHEMISCHER FABRIKEN. Brit. 280,877, Nov. 19, 1926. A mixt. of mono- and dimethylaniline is dissolved in C₆H₆, phthalic anhydride is added and the mixt. shaken; the phthalamic acid is sepd. by use of dil. NaOH and is split into phthalic acid and monomethylaniline, dimethylaniline remaining in the C₆H₆. A similar procedure may be applied to the sepn. of other mono- and dialkylated aromatic amines.

Arsonic acid. ELMER B. VLIET and ERNEST H. VOLWILER (to The Abbott Laboratories). Can. 282,284, Aug. 7, 1928. A 3-amino-4- ω -hydroxyalkylaminobenzene-arsonic acid or deriv. is made by nitrating an ω -haloalkyl(*p*-arsonophenyl)carbamate, isolating the product of the reaction, converting the isolated product into 3-nitro-4- ω -hydroxyalkylaminobenzene-arsonic acid by treatment with an alkali, reducing the product to 3-amino-4- ω -hydroxyalkylaminobenzene-arsonic acid and then converting said acid to a salt by treatment with a basic substance.

Arylthioglycolic acids. I. G. FARBERIND. A.-G. Brit. 281,290, Nov. 24, 1926. Haloalkylbenzenes are treated with chlorosulfonic acid at temps. below 100° to produce *p*-halosulfonyl chlorides. These products may then be reduced to the corresponding mercaptans, which by condensation with chloroacetic acid yield thioglycolic acids. Examples are given of the production of the following, in which X = SO₂Cl, SH and SCH₂CO₂H: 2,4-MeClC₆H₃X from *m*-ClC₆H₄Me, 2,4,5-Cl₂MeC₆H₃X from 2,4-Cl₂C₆H₃Me, 2,4,3-Cl₂MeC₆H₃X from 2,6-Cl₂C₆H₃Me and 2,5,4-Me₃ClC₆H₃X from 1,4,2-Me₃ClC₆H₃. Zn dust and H₂SO₄ may be used for the reduction of the sulfonyl chlorides, and the thioglycolic acids subsequently produced by condensation may be isolated as such or as their Na or Ca salts.

Benzoic acid. DONALD L. TABERN (to the Abbott Laboratories). Can. 282,283, Aug. 7, 1928. *o*-O₂IC₆H₄CO₂H is prepd. by passing a halogen into an aq. soln. of a salt of *o*-IC₆H₄CO₂H, at a suitable temp., sufficient alkali being added to prevent the pptn. of the intermediate products, followed by pptn. of the O₂IC₆H₄CO₂H with a mineral acid.

Butyric acid. SOC. BREVETS ÉTRANGERS LEFRANC ET CIE. Fr. 633,446, Aug. 27, 1926. See Brit. 276,617 (C. A. 22, 2378).

Hydroxybenzoylbenzoic acid. I. GUBELMANN, H. J. WEILAND and O. STALLMANN (to Newport Co.). Brit. 281,227, Nov. 29, 1926. See U. S. 1,654,289 (C. A. 22, 788).

Lactic acid. W. KLAPPROTH. Brit. 280,969, Nov. 22, 1926. Lactic acid is purified by extn. with a solvent such as ether or a higher alc. in the presence of H₂SO₄ and Na₂SO₄ or other strong acid and a salt of the acid. The ext. is washed with a concd. soln. of a neutral or acid lactate such as that of Na, Ca or Ba and the lactic acid ext. is then freed from the ether which is reused. In some instances, further purification may be effected by heating with a small proportion of H₂SO₄ to 80–100°.

Sulfonic acids. I. G. FARBERIND. A.-G. Fr. 632,155, Apr. 5, 1927. See Brit. 272,967 (C. A. 22, 1848).

Acetic anhydride. H. DREYFUS. Brit. 280,972, May 26, 1926. HOAc vapor in

heated in the presence of H_2PO_4 , $\text{H}_4\text{P}_2\text{O}_7$ or HPO_3 or a mixt. of these, with or without pumice or kieselguhr at temps. of 100–400° and the reaction products are passed through fractionating columns to sep. Ac_2O . The crude product also may be distd. over dry NaOAc .

Hydroxycarboxylic acid chlorides. BRITISH SYNTHETICS, LTD., AND ERIC B. HIGGINS. Fr. 632,767, Apr. 14, 1927. *o*-Hydroxycarboxylic acid chlorides are prepd. by reaction of SOCl_2 on an inorg. salt of the acid in question; thus 2,3-hydroxynaphthoic acid chloride is produced from the Na hydroxynaphthoate.

Methanol. COMPAGNIE DE BÉTHUNE. Fr. 632,259, July 17, 1926. See Brit. 274,492 (C. A. 22, 2171).

Synthetic methanol. COMPAGNIE DE BÉTHUNE. Fr. 633,139, Aug. 6, 1926. See Brit. 275,600 (C. A. 22, 2171).

Pentaerythritol. HENRY A. AARONSON. U. S. 1,678,623, July 24. Acetaldehyde 44 parts and CH_2O about 150 parts are mixed with water not over 1000 parts, lime is gradually added with stirring until a temp. of 60° is attained, the addition of lime is further continued to maintain this temp. until about 33 parts are added, stirring at a temp. of 60–65° is continued for 2 hrs., the mixt. is cooled, the lime is pptd. with H_2SO_4 , the CaSO_4 is filtered out, remaining lime is removed with oxalic acid, the soln. is evapd. *in vacuo*, and the residue is washed, dried and pulverized.

Thymol and chlorothymol. F. RASCHIG. Fr. 633,067, Apr. 22, 1927. See Brit. 270,283 (C. A. 22, 1366).

Chloropyridine. DEUTSCHE GOLD- UND SILBER-SCHNEIDANSTALT VORM. ROESLER. Brit. 281,650, Dec. 3, 1926. 2-Chloropyridine is made by reaction of phosgene on *N*-alkyl-2-pyridones at an elevated temp.

Vanillin. JOSEPH TCHERNIAC. Fr. 632,640, April 11, 1927. See Brit. 268,158 (C. A. 22, 1164).

Catalytic hydrogenation of naphthostyryl, etc. I. G. FARBERIND. A.-G. Brit. 281,257, Nov. 25, 1926. Tetrahydronaphthostyryl or its homologs and substitution products are made by catalytic hydrogenation under pressure of naphthostyryl or a homolog or substitution product. Only the ring contg. the CO group is hydrogenated. Ni may be used as a catalyst.

Treating light paraffin hydrocarbons to obtain olefins, etc. ALEXANDER S. RAMAGE (to Bostaph Engineering Co.). U. S. 1,678,078, July 24. Material such as natural gas is heated to a temp. not substantially above 550° (suitably about 550°) with a reducible metal oxide such as Fe_2O_3 in order to form olefins which may be converted into alcs.

Calcium formaldehydesulfoxylate. I. G. FARBERIND. A.-G. Brit. 281,134, Feb. 14, 1927. A difficultly sol. Ca formaldehydesulfoxylate having 4 atoms of S to 3 atoms of Ca in the mol. is pptd. from an aq. soln. of Na formaldehydesulfoxylate by a mixt. of a sol. Ca salt such as CaCl_2 and Ca(OH)_2 or CaCO_3 .

Hydrogenating phenol-ketone condensation products. SCHERING-KAHLBAUM A.-G. (formerly Chem. Fabrik. auf Aktien vorm. E. Schering). Brit. 280,924, Nov. 16, 1926. The process as described in Brit. 276,010 (C. A. 22, 2379) is carried out at temps. substantially higher than usual hydrogenation temps., *e. g.*, the condensation product of *m*-cresol and acetone may be treated with H under pressure in the presence of a Ni catalyst at a temp. of 280° to form thymol and then stereoisomeric menthols (according to the duration of the treatment), or, the condensation product of *p*-cresol and acetone may be hydrogenated to form 4-methyl-6-isopropylphenol and then a mixt. of the stereoisomeric 4-methyl-6-isopropylcyclohexanols.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

The enzymic cleavage of α - and β -glycerolphosphoric acids. P. KARRER AND R. FREULER. Univ. Zurich. *Festschrift A. Tschirch* 1926, 421–4; *Chem. Zentr.* 1927, I, 3064.—The behavior of α - and of β -glycerolphosphoric acid toward enzymes was compared. Glycerolphosphatase from the hepatopancreas juice of the vineyard snail was chosen for the enzyme, and the Na salts of synthetic racemic α - and β -glycerolphosphoric acid for the substratum. The best effect was in strongly acid soln., and both acids were hydrolyzed at the same rate by the enzyme. With sufficiently slow

action, the decompn. reaches 96%. When the results are recorded graphically, a similar course of the hydrolysis of each glycerolphosphoric acid is evident. An increase of the quantity of enzyme causes a relatively great cleavage in the early stages of the decompn. compared with that in the later stages.

C. C. DAVIS

Further results of research on pectin. H. ECKART AND A. V. GYALÖKAY. *Johs. Eckart Konservenfabr. Konserven-Ind.* 14, 2-3, 13-5, 37-40; *Chem. Zentr.* 1927, I, 1900-1.—The max. limit of gelation was at p_H 3.04-3.10 and the optimum p_H was 2.3. For 1% pectin, the lower limit of gelation was with a 50% addn. of sugar, the upper limit with 75% addn. and the optimum with 60% addn. The Ca pectate value is unsatisfactory as a criterion of the gelation effect.

C. C. DAVIS

The violet bands of blood serum. MORIKUNI SAITO. Kaiserlich. Univ., Kioto, Japan. *Acta Schol. Med. Univ., Kioto* 9, 303-6(1927).—Absorption bands were found in 20 samples of human serum in the violet at about 4100 Å. U. which were presumably not caused by hemoglobin since the violet bands were 16 times stronger than those in the yellow-green area. It is suggested that they may be caused by the colloidal condition of the serum.

H. J. DEUEL, JR.

The specificity of animal proteases. XII. The specificity of pancreatic trypsin and intestinal erepsin. ERNST WALDSCHMIDT-LEITZ, ANTON SCHAFFNER, HANS SCHLATTER AND WILLIBALD KLEIN. *Bayer Acad., Munich. Ber.* 61B, 299-306(1928); cf. *C. A.* 21, 1466, 3061; 22, 246.—The specificity of intestinal erepsin (I) and trypsin kinase (II) is influenced not only by the length of the peptide chain but by the constituent amino acids. Thus it was found the glycylglycine (1), leucylglycine (2), leucylleucine (3), glycylserine (4), alanylserine (5), leucinemethylisoserine (6), glycylcystine (7), dileucylcystine (8), leucylglutamic acid (9), [phenylalanyl]glutamic acid (10), glycyltyrosine (11), alanyltyrosine (12), diargininetritrate (13), alanyl [α -aminocaproic acid] (14), alanyl [β -aminobutyric acid] (15), leucyl [β -aminobutyric acid] (16), glycyl [α -aminocaproic acid] (17), and leucyl [ϵ -aminocaproic acid] (18) were hydrolyzed by intestinal erepsin (except 13) and not by trypsin-kinase (no expts. on 6, 14, 15, 16, 17, 18). Diarginine trinitrate is probably an anhydride since it does not hydrolyze with acid, which would explain the negative effect of the enzyme on it. The enzymes were able to hydrolyze the unnatural as well as the naturally occurring dipeptides. However, both I and II were inactive in causing a hydrolysis with a number of anhydrides (glycine anhydride, glycylalanine anhydride, alanine[phenylalanine] anhydride, glycylserine anhydride, and phenyldiketopiperazine). The lengthening of the C chain was without effect on changing the susceptibility to the individual enzyme. Thus leucyltriglycylleucine, leucylheptaglycine, leucylnonaglycine, and leucyltriglycylleucyltriglycylleucylnonaglycine were hydrolyzed by I but not by II while [α -bromoisocaproyl]nonaglycine and [α -bromoisocaproyl]triglycylleucylnonaglycine were not acted on by either enzyme. Leucylglycyltyrosine (19), glycylalanyltyrosine (20), glycyltyrosylglycine (21), glycylalanylglycyltyrosine (22) and leucyltriglycyltyrosine were hydrolyzed by II but only 19, 21 and 22 by I (no test on 20), β -naphthalenesulfonylglycyltyrosine was hydrolyzed by II and also by trypsin alone but at a slower rate. The splitting of a large no. of acylated peptides confirms the assumption of Euler and Josephson that for the union of a substrate to erepsin, the presence of a free NH_2 group is necessary while the change in the carboxyl group (by esterification or making an amide) is without effect on ereptic hydrolysis. The addn. of erepsin to the free NH_2 group probably is caused by a free aldehyde or ketone group of the enzyme. For the action of trypsin a free NH_2 group is unnecessary since the latter is active on β -naphthalenesulfonylglycyltyrosine. The attack of trypsin presumably is on the carboxyl group.

H. J. DEUEL, JR.

The isomerism of hemin and allo-hemin. RICHARD KUHN AND CARL SBYFFERT. Eidgenöss. Tech. Hochschule, Zurich. *Ber.* 61B, 307-14(1928).—A new isomer, allo-hemin, was prepd. from hemin by allowing acetic anhydride to act on acetic acid hemin in pyridine- $CHCl_3$ soln. at room temp. Its chief differences are in soly., being sol. in $CHCl_3$ and acetone and wholly insol. in 2 N NaOH at room temp. Both carboxyl groups of hemin are present in the allo isomer. On heating with soda soln. complete soln. of the allo-hemin occurs. Absorption bands of allo-hemin and hemin agree in dry and moist pyridine. By crystn. of allo-hemin from hot $CHCl_3$, or hot acetone, a compd. is obtained which is insol. in cold $CHCl_3$ and easily sol. in 2 N NaOH. Hemin \rightarrow Allo-hemin \rightleftharpoons hemin. Allo-hemin when dried at 110° in vacuum and pulverized is easily sol. in $CHCl_3$ after 6 months. Acetic anhydride plays the important role in the change of hemin to allo-hemin, the pyridine and $CHCl_3$ acting only as solvents.

H. J. DEUEL, JR.

Remarks on the work of E. Waldschmidt-Leitz and W. Klein—on the specificity

and method of action of erepsin, trypsin and trypsin-kinase—as well as that of E. Waldeschmidt-Leitz and Gertrud Rauchsches—on the specificity of peptidases. II. Comparison of the peptide-sugar combination with the method of action of erepsin. KARL JOSEPHSON. Univ. Stockholm. *Ber.* 61B, 1276-9(1928).—Cf. C. A. 21, 2381. Polemical. H. J. DEUHL, JR.

The action of the pepsin of herbivora and carnivora on vegetable and animal proteins. H. W. VAHLTEICH. *Z. physiol. Chem.* 176, 222-30(1928).—Pepsin was prepd. from horse stomach and from dog stomach by the same method and the action of each prepn. on the vegetable proteins, edestin, gliadin and glutenin, and on the animal protein, myosin, detd. by the Willstätter and the Van Slyke methods. The 2 pepsins were apparently identical, the extent of digestion of a given protein being approx. the same in both cases. The Willstätter method gave in all cases higher values for amino N than the Van Slyke method. A. W. DOX

Bacterial catalase. ARAO ITANO AND SATIYO ARAKAWA. *Ber. Ohara Inst. landw. Forsch.* 3, 505-28(1928); cf. C. A. 22, 2382.—The catalase was obtained from *Clostridium thermocellum* and a thermophilic cellulose-fermenting bacterium isolated by Itano. The catalase action was influenced by the H-ion concn., a $p_H < 7$ having a stronger depressive action than $p_H > 7$. The action in glucose broth was not influenced appreciably by the quality or quantity of glucose used. Cultures 72 hrs. old gave max. catalase action; older cultures showed lowered activity. The velocity of the action decreased upon standing. Such chemicals as $MgSO_4$, $CuSO_4$, HCl , $HgCl_2$ and KCN depressed the action of catalase, KCN being the strongest depressor. Many tables and curves are given. RUSSELL C. ERB

Proteins. VI. Influence of salt on the point of optimum flocculation of rice glutelin. KINSUKE KONDO, TUNETOMO HAYASHI AND TAKASK MATSUSHITA. *Min. Coll. Agr. Kyoto Imp. Univ.* 1926, 71-81. VII. Refractive indices of protein solution. KINSUKE KONDO AND TUNETOMO HAYASHI. *Ibid* 83-94.—See C. A. 21, 2284. E. H.

Chemical and enzymic processes in the light of stereochemical research. CARL NEUBERG AND MARIA KOBEL. *Naturwissenschaften* 16, 392-6(1928).—A review with 19 references. B. J. C. VAN DER HOEVEN

The character of the action of enzymes on proteins and polypeptides. EMIL ABDERHALDEN. *Naturwissenschaften* 16, 396-9(1928).—A review. B. J. C. v. d. H.

Acid binding and swelling of fibrin. I. ERWIN VOIT. *Z. Biol.* 87, 270-8(1928).—Sol. albumin hydrolyzes slightly in acid but undergoes strong electrolytic dissocn. Fibrin, however, shows relatively great hydrolysis and little dissocn. There is greater association between acid and native fibrin than between acid and denatured fibrin. II. Swelling of native fibrin in dilute hydrochloric acid. FRITZ SCHULDENZUCKER. *Ibid* 279-91.—Fibrin can bind acid and then undergo marked hydrolysis. This is associated with marked swelling (9 times more than neutral fibrin). III. Water and acid binding of fibrin coagulated by boiling water. FRIEDRICH LOCHMÜLLER. *Ibid* 292-306.—When fibrin is purified with hot water, alc. and ether, it loses its fat and practically all its ash. Boiling with water causes the soln. of an albumin substance (the loss = 16.05% N). For horse fibrin the figure is 12% and for ox 7%. Denatured fibrin does not lose its acid-binding power but the acid-binding power increases less slowly with increase in acid concn. As in the case of native fibrin, there is slight soln. after treatment with acid; for native fibrin this dissocn. is 6.7%, for denatured 3%. FRANCES KRASNOW

Dehydration of malic acid. I. AMANDUS HAHN AND W. HAARMANN. *Z. Biol.* 87, 465-71(1928).—Frog muscle contains a large amt., of malic acid dehydrase, which seemed to be more active in the spring months than in the winter months. When this enzyme acts on malic acid large quantities of CO_2 are liberated. FRANCES KRASNOW

The photodynamic action of hematoporphyrin. ETHELBERTA N. ROCK AND W. H. HOWELL. Johns Hopkins. *Am. J. Physiol.* 84, 363-77(1928).—The fatal effects of light on animals that had received injections of hematoporphyrin were generally the same in all species tested; cutaneous irritation with great motor excitation, erythema and edema of the skin and hyperpnea, followed by cutaneous cyanosis, loss of sensibility, stupor and death. The toxic action is localized and toxic substances are not carried in the blood. Blood pressure, after some fluctuations, slowly sank to a lethal level, due probably to paralysis of the cutaneous circulation. Possibly the hematoporphyrin combines slowly with a substance or substances in the tissues. Light acting on this compd. gives rise to the injurious effects. J. F. LYMAN

Changes in permeability associated with the absolute minimum vital temperature. NELLIE M. PAYNE. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 81, 504(1927).—In insects at the lowest temp. at which they can live changes in cell permeability occurred,

the cell wall becoming permeable to protein. This change was followed by rapid oxidation. J. F. LYMAN

The effect of changes of hydrogen-ion concentration on the cardiac action current. JANE SANDS AND WILLIAM AMBERSON. Woman's Med. Coll. of Penn. and Univ. Penn. *Am. J. Physiol.* **84**, 533-44(1928).—Pulse rate, conduction rate and action currents varied according to the acidity of the soln. bathing the heart. J. F. LYMAN

Penetration of ultra-violet rays through clothing materials. CARRIE C. DOZIER AND HARRIET MORGAN. Utah Agr. Expt. Sta. *Am. J. Physiol.* **84**, 603-9(1928).—Ultra-violet did not penetrate baby flannel, pongee and crepe de chine sufficiently appreciably to activate cottonseed oil in respect to vitamin D. Artificial silk and meadow lane materials transmitted the rays. J. F. LYMAN

Phosphagen. PHILIP EGGLETON AND GRACE PALMER EGGLETON. Univ. Coll., London. *J. Physiol.* **65**, 15-24(1928); cf. *C. A.* **22**, 454.—Phosphagen (an ester of H_2PO_4 and creatine) occurs in resting voluntary muscles of all vertebrates. It is readily hydrolyzed in acid medium and hence must be extd. rapidly. It does not give the diacetyl color reaction for creatine. Muscles capable of rapid energy output are, in the resting condition, richer in phosphagen than those intended for lower rates of energy expenditure. Under anaerobic conditions and in resting muscle the disappearance of phosphagen was not correlated with lactic acid production. The breakdown of phosphagen always resulted in the liberation of a proportional amt. of creatine. Resynthesis of phosphagen in a fatigued muscle was very rapid if the surrounding atm. was rich in O_2 . When phosphagen broke down in resting muscles under anaerobic conditions the P remained entirely as inorganic phosphate; phosphagen destroyed as a result of activity produced inorganic phosphate and organic phosphate esters; phosphagen destroyed during incubation with NaF in a soln. buffered with $NaHCO_3$ was accounted for entirely by the phosphate esters formed. The phosphate ester produced in fatigue is identical with Embden's lactacidogen. J. F. LYMAN

The enzymic processes in mammalian skeletal muscle. MYRA K. BEATTIE, J. BELL AND T. H. MILROY. Queens Coll., Belfast. *J. Physiol.* **65**, 109-45(1928).—Muscle juice, obtained by pressing minced muscle, or exts. of muscle prepared by Myerhoff's method, incubated at 22° to 45° gave an approx. equimol. production of H_2PO_4 and lactic acid from the breakdown of the hexose diphosphate present. When glycogen alone was added esterification and lactic acid production occurred in approx. equimol. proportions at 22°, while the inorganic phosphate decreased. At 37° both esterification and lactic acid production were diminished, but the equimol. proportions were maintained. At 45° esterification ceased but diastatic action and the breakdown of pre-existing hexose diphosphate continued. When both glycogen and phosphate were added esterification became the dominant process at 22°. At 37° esterification was less and lactic acid production was greater than at the lower temp. At 45° there was some esterification along with lactic acid production; while at 50° both processes were inhibited although diastatic action was evident. In the presence of NaF esterification alone occurred and always to a greater extent than in its absence. Esterification of itself, owing to the formation of esters with higher dissociation consts. than H_2PO_4 , resulted in a fall of buffering capacity in the neighborhood of the neutral point and a rise in the more acid zone of p_H 6.5 to 5.5. J. F. LYMAN

The action of substances containing the alcoholic hydroxyl groups on pancreatic lipase. A DI FRISCO. *Boll. soc. ital. biol. sper.* **3**, 299-303(1928).—The hypothesis is advanced that the protective action of glycerol and glucose on pancreatic lipase is due to the presence of OH groups which combine with the metallic catalyzer in the enzyme and prevent its flocculation. Expts. were made to det. whether Na K tartrate and Na citrate have a similar protective action. Fresh and heat-inactivated pancreatic juice were added to samples of oil of sweet almond contg. (a) glycerol, (b) tartrate and (c) citrate. Pancreatic juice + glycerol, pancreatic juice + tartrate, and pancreatic juice + citrate were inactivated by heat and each was added to sweet almond oil. The addn. of glycerol, tartrate and citrate to inactivated juice restored partly the hydrolytic action. Juice in the presence of tartrate, citrate and glycerol resisted heat inactivation. Glycerol and tartrate increased somewhat the hydrolytic action of fresh juice; citrate inhibited it slightly. Tartrate and citrate have, therefore, a protective action on pancreatic lipase similar to that of glycerol. PETER MASUCCI

The radiation risks of the röntgenologist. A. E. BARCLAY AND SYDNEY COX. *Am. J. Roentgenology and Radium Therapy* **19**, 551-61(1928).—Measurements were made of the amts. of radiation received by various workers in the course of routine x-ray therapy, fluoroscopy, and radiography. On the basis of these measurements, a daily exposure of 0.00028 of a unit skin dose is recommended as the safe limit. De-

tails as to the amt. of protection necessary for different types of x-ray work are given.

E. H. QUIMBY

A note on the viscosity changes produced in egg albumin by x-rays. J. A. V. FAIRBROTHER. *Brit. J. Radiology*, [N. S.] 1, 121-5(1928).—The viscosity of egg albumin is decreased to a min. value, sometimes as much as 40%, by an x-ray dose of about 211,500 e, from a beam of Mo K radiation. This decrease is permanent and no appreciable subsequent coagulation occurs. When irradiated egg albumin is brought to the coagulation temp., 61°, setting is delayed.

E. H. QUIMBY

The intensity of radiation in the vicinity of filtered radon implants. EDITH H. QUIMBY. Memorial Hosp., N. Y. City. *Radiology* 10, 365-76(1928).—The distribution of the intensity of radiation about a tube of radon inserted in organic material has been investigated by the production of 3 phenomena, tissue necrosis, bleaching of butter, erythema of human skin. The actual intensities necessary to produce these were quite different, but the relative intensities for different distances from the tube were the same. A curve was derived representing the variation of intensity or quantity of radiation with distance from the buried source. Possible applications of this information to Ra therapy are discussed.

E. H. QUIMBY

The transport numbers of fibrin in solutions of dilute acids and alkalis. DAVID M. GREENBERG. Univ. of Calif. *J. Biol. Chem.* 78, 265-80(1928).—The transport no. of fibrin was detd. in soln. in NaOH, KOH, LiOH and in HCl, HBr and HNO₃. The same value was obtained in all solns. The sum of the transport nos. of anion and cation was approx. unity. The mobility of the fibrin as cation was calcd. to be 78, and as anion 44. In solns. in weak acids the values for the transport nos. were higher than would be expected if independent migration were taking place. This indicates formation of complex ions.

C. RIEGEL

The alleged conversion of fat to carbohydrate. I. The metabolism of acetic acid. HARRY J. DEUEL, JR. AND ADOLPH T. MILHORAT. Cornell Univ. *J. Biol. Chem.* 78, 299-309(1928).—Na acetate administered to phlorrhizinated dogs caused no significant change in D:N ratio. This indicates acetic acid is not a glucogenic substance. Only a small amt. of acetate was excreted, suggesting practically complete oxidation in the animal.

C. RIEGEL

Distribution in the organism of oil injected into the arterial system. Proof of pulmonary lipopexia. LÉON BINET AND RENÉ FAHRE. *Compt. rend. soc. biol.* 99, 190-2(1928).—Emulsified olive oil rendered fluorescent by the addn. of diphenylanthracene was injected into the arterial system and the fat extd. from different organs was examd. by the Wood radiations. The fat-fixing power of the lung was particularly marked, that of the muscle, liver and kidney following in order.

L. W. RIGGS

Physico-chemistry of the vitreous body. Relation of p_H to its swelling. F. REDSLOB AND P. REISS. *Compt. rend. soc. biol.* 99, 219-22(1928).—A special app. designed for this study is illustrated and described. The curve of swelling of the vitreous body shows a characteristic course as a function of the p_H . The p_H of freshly enucleated vitreous body 1 hr. after death was 7.7. By injections of isotonic solns. the zone of p_H ranging from 7.8 to 8.8 was explored and max. of swelling were observed, at 8.1 and 8.7, and a min. at 8.25. The relatively high p_H is explained by the spontaneous *post-mortem* evolution of the vitreous body toward alkali.

L. W. RIGGS

Ultra-violet irradiation and elaboration of the heterohemolysins. A. BESSEMAN AND P. NELIS. *Compt. rend. soc. biol.* 99, 329-31(1928).—The results generally indicated that the irradiation employed had little or no influence on the titer of natural heterohemolysins, or on the elaboration of artificial heterohemolysins in the rabbit.

L. W. RIGGS

The phosphorus of serum. M. MACHEBOEUR. *Ann. Inst. Pasteur* 41, 1036-44; cf. *C. A.* 21, 2005, 3642.—The results obtained confirm those of Greenwald in his isolation of a diphosphoglyceric acid from pig blood. In addn., it is claimed that a stable phosphoric ester is present in serum and also that one part of the H₃PO₄ is bound with glyceric acid forming a stable compd. which is rather resistant to acid hydrolysis.

ETHEL W. WICKWIRE

Starch-converting enzymes used in the textile industry (WALTON) 25. The bile acids (WIELAND, VOCKER) 10. Safety standards of protection against x-ray dangers (MUTSCHALLER) 3.

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ielle Chemie der Enzyme. Teil 2. Die hydrolysierenden Enzyme der Nucleinsäuren, Amide, Peptide und Proteine. Munich: Bergmann, pp. 613-24. M. 24.

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

A method for the biological assay of cod-liver oil. GEORGIAN ADAMS AND E. V. MCCOLLUM. Johns Hopkins Univ. *J. Biol. Chem.* 78, 495-524 (1928).—An attempt to obtain standardized procedure for this assay. The diet used for the test was the McCollum diet 3143 although the McCollum diet 4338 or Steenbock's diet 2965 were satisfactory while the McCollum diet 4025 did not produce rickets. Rats weighing 50-60 g. were used and were kept in a darkened room to prevent the complication of ultra-violet radiation. Control animals were killed before the cod-liver oil was given in a dose of 0.125 or 0.25% for 8 days; then the rachitic rats and a second set of control animals were killed. The serum Ca remains at the normal level of 10-11 mg. but P falls after the rachitic diet from 8.5 mg. to lower levels (4.5, 1.54, 2.01 mg.) in various groups after 21 days. The $[Ca^{++}] \times [PO_4^{--}]$ product is always below 8.0×10^{-23} in active rickets while it increases above this value in healing. The results of the analyses of the ash of the femurs after different lengths on the rickets-producing diet usually showed a decrease but showed great variation. However, when rats of a single sex (male) were used there was a more nearly graded falling off in the ash (29.17% at 21 days, 28.32% at 28 days, 29.60% at 29 days, 25.92% at 37 days and 24.64% at 40 days) using the average of 3 to 7 rats. However, the individual variations were considerable. There is also no particular relationship between the strength of the line test and the ash content. Similar deviations were found in the Ca and P values in the bones. The right and left femora of the same animal showed considerable deviations in Ca content although the P was fairly uniform. This agrees with the observation that the line test may vary in the two bones. The requirements set forth for the test are (1) a basal diet which allows fairly rapid growth of animals, (2) having a condition of florid rickets in 18-21 days and (3) allowing a healing in 8 days when cod-liver oil is given in a dose of 0.125 g. or higher. Antirachitic potency cannot be detd. by changes in bone compn. Blood analyses giving the $[Ca^{++}].[PO_4^{--}]$ values indicate whether the animal has active or healing rickets and can be correlated with the line test when averages of 10 to 15 animals are used. Variations in the vitamin D content of cod-liver oils were found.

H. J. DEUEL, JR.

Determination of urea in blood. F. W. Fox. *Biochem. J.* 22, 545-7 (1928).—The method is based on a procedure described by Kennaway (cf. *C. A.* 14, 3432). For macro-extn., the method is as follows: measure 5 cc. blood into 175 cc. conical flask, followed by 5 cc. 0.75 N H_2SO_4 and 5 cc. of 10% Na tungstate. Add 35 cc. water, shake and filter into a 50 cc. measuring cylinder. Place 30 cc. filtrate into another 175 cc. conical flask and wash out the cylinder with 10 cc. water. Add 3 drops 0.2% methyl red or chlorophenol red, boil and cool under tap. (Run blank with each batch of estns. Place 40 cc. water in a similar flask with equal quantity of indicator. Adjust to reddish yellow color with 0.01 N acid or alkali.) Now neutralize the test, first approx. with 0.1 N alkali and finally match with the blank with 0.01 N alkali. Add 5 cc. enzyme ext. (made by shaking 1 g. powd. soy bean with 50 cc. 0.85% saline and filtering after 20 min.) to both blank and test. Incubate for 1 hr. at 50°. Add 0.01 N acid until soln. is acid. (Most samples require about 10 cc.) The blank receives 10 cc. Boil, cool under tap and titrate with 0.01 N alkali, matching the test against the blank. The difference between vol. of alkali used for the test and that used for the blank when multiplied by 10 gives percentage urea in blood. A micro-estn. is also described. B. H.

What is the value of the cholesterol determination in the case of lead poisoning? ERNST KÜHN. *Zentr. Gewerbehyg. Unfallverhüt* 14, 117-29; *Chem. Zentr.* 1927, 11, 602.—The cholesterol content of the blood is generally taken as a measure of the ability of the organism to protect itself. In the case of lead poisoning the cholesterol content of the whole blood is frequently higher than the cholesterol content of the serum. Under normal circumstances the reverse is true. This phenomenon cannot yet be considered as specific of Pb poisoning. A. L. HENNE

The nature of the van den Bergh reaction. W. M. ROBERTS. *Brit. J. Exptl. Path.* 9, 107-12(1928).—The pigment of hemolytic serums gives a direct reaction if extd. by CHCl_3 and dissolved in an alk. buffered soln. This is in opposition to the hypothesis of Davies and Dodd (cf. *C. A.* 22, 605) that the pigment of hemolytic serums is present as an oxidation product of bilirubin. It is probable that bilirubin in such serums is present largely in the free colloidal condition. The suggestion of Collinson and Fowweather (cf. *C. A.* 22, 2403) that in those serums giving the direct reaction the bilirubin is present as the NH_4 salt is shown to be untenable. It appears that the bilirubin is in combination with some substance, the nature of which is as yet undetd., this combination being destroyed by the addn. of alc., leaving the bilirubin as a salt—probably the Na salt. HARRIET F. HOLMES

Bilirubin and the van den Bergh reaction. C. E. NEWMAN. *Brit. J. Exptl. Path.* 9, 112-9(1928).—The different van den Bergh reactions probably are due to an underlying chem. difference between the bilirubins. The behavior of azobilirubin as a dichromic indicator and the many differences between the bilirubins from different sources all point to its being, as pure bilirubin, an org. acid contg. 2 COOH groups and capable of forming 2 series of salts. The differences between pure bilirubin, the acid, and the delayed reaction pigment seem to indicate that the latter is a substance closely allied to the former, but considerably more stable. Pure bilirubin could not circulate as such in the blood, since it is changed on soln. in serum to the prompt reaction type of pigment. Prompt-reaction bilirubin is probably Na H bilirubinate. The disodium salt exists only in extreme alk., and does not concern physiology or pathology. The delayed reaction pigment cannot be biliverdin, because this substance is green, insol. in CHCl_3 , and only gives the van den Bergh reaction in 12-24 hrs.—all points of distinction from the delayed-reaction pigment. HARRIET F. HOLMES

The auto-inhalation method of anesthesia in canine surgery. JOHN C. HARDEN-BERGH AND FRANK C. MANN. *J. Am. Vet. Med. Assoc.* 71, 493-501(1927).—A cabinet inhalation method is described. It is very advantageous. An even anesthesia may be maintained over a long period, and hence furnishes a feasible one-man method that can be employed in emergencies by the practitioner. FRANCES KRASNOW

Iron metabolism. IV. WOLFGANG LINTZEL. *Z. Biol.* 87, 157-66(1928); cf. *C. A.* 22, 3435.—The Neumann-Hanslian method is not applicable to Fe detn. in urine. With the method of Lach and Friedenthal no Fe is found in normal urine. A new colorimeter technic for the detn. of Fe is described. Fe is sepd. as ferriphosphate and ferrosulfite from other salts obtained in urine ash and measured as the thiocyanate. Normal urine is free from Fe. FRANCES KRASNOW

Delay of blood in passing through the lungs as an obstacle to the determination of the carbon dioxide tension of the mixed venous blood. W. F. HAMILTON, J. W. MOORE AND J. M. KINSMAN. Univ. Louisville, Ky. *Am. J. Physiol.* 82, 656-64(1927).—The difference between CO_2 tension of alveolar air and rebreathed air increased significantly as the rebreathing time increased. This is thought to arise from the fact that at the beginning of rebreathing the lungs are full of arterIALIZED blood and as this blood leaves the lungs and venous blood enters, the tension of the rebreathed air gradually rises as the mean tension of the blood in the lungs rises. The accuracy of detg. circulation rate from the difference of CO_2 in alveolar and in rebreathed air is questioned. J. F. LYMAN

The efficiency of bicarbonate and phosphate buffers for experimentation with excised organs. TORALD SOLLMANN, W. F. VON OETTINGEN AND Y. ISHIKAWA. Western Reserve Univ. *Am. J. Physiol.* 85, 118-28(1928).—If a definite p_H is essential in physiol. expts. where the buffer soln. is being aerated it is recommended to maintain it by the periodic addn. of bicarbonate (or HCl) under colorimetric control. J. F. L.

Precipitins obtained by means of proteins coagulated by alcohol and their specificity. E. NICOLAS AND K. KATRANJIEFF. *Compt. rend. soc. biol.* 99, 184-6(1928).—Antiserums obtained by means of proteins of blood serum coagulated by alc. may be used for zoölogic differentiation of proteins. This may be applied in food exams. in *distinguishing beef and pork*. L. W. ROOS

Purification of pepsin. I. A quantitative method for the determination of pepsin.

II. Purification of pepsin by adsorption and the composition of purified pepsin. THOMAS LEROY McMEEKIN. *Abstracts of Theses, Univ. Chicago, Science Series* 4, 391-6 (1925-6) (publ. May, 1928).—For estg. its digestive activity, 1:4000 U. S. P. pepsin in a concn. of 0.1 to 10.0 mg. were allowed to act for 2 hrs. and at a temp. of 40° on 4-g. coagulated egg white suspended in 100 cc. 0.3% HCl. The egg white has to be prepd. by a special process. Then the soln. was filtered, the total N detd. by the method of Koch and McMeekin (cf. *C. A.* 18, 3335), and in another portion, the refractive index was taken. Both procedures furnished corresponding values of the rate of hydrolysis, yet the latter method is to be preferred. In studying the adsorption of pepsin on egg white, the H-ion concn. was found to have a great influence on the amt. of pepsin adsorbed. Adsorption occurs at any p_{H} between 1 and 7, but the adsorption is greatest at a p_{H} of 3.0. In 100 cc. soln. of p_{H} 3.0, and contg. 1000 mg. pepsin, 90% of the latter were adsorbed by 4-g. egg white. The pepsin adsorbed can be removed by $NaHCO_3$ or Na_2HPO_4 solns. With $NaHCO_3$, the max. release of 66% was obtained at a p_{H} of 3.0, while Na_2HPO_4 was most efficient (96%) at p_{H} 6.1 to 6.2. Based on these findings, a method of purification of com. pepsin is devised. Pepsin thus prepd. had a high activity (1:52-000) it gave the biuret, xantho-proteic and diazo reactions. The N content was 12.8 to 13.8%. It contained small amts. of P and reducing substances. G. SCHWOCH

Turbidimetric methods for sugar in blood and urine. ANTON R. ROSE. *J. Lab. Clin. Med.* 13, 382 (1928).—Clarify by shaking the sample with a modified Lloyd's reagent, add 3 cc. of ferricyanide reagent to 1 cc. of the filtrate; digest for 15 min. in boiling H_2O , dil. with H_2O to the 20-cc mark, mix; to 1 cc. of this dil. mixt. add 13 cc. of NH_4 soln. and treat with 1 cc. M $ZnSO_4$ soln.; measure the resulting turbidity in the Euton Junior (or wedge) Scopometer. This method is credited with the advantage of working over both normal and pathologic ranges of sugar in urine. On application of this method to blood the results have been more like Folin's Cu method than Benedict's picric acid method. ETHEL W. WICKWIRE

Lamotte-Wuth bromide comparator. W. A. TAYLOR. *J. Lab. Clin. Med.* 13, 495 (1928).—A method is given for the detn. of the bromide content of blood serum. ETHEL W. WICKWIRE

C BACTERIOLOGY

CHARLES B. MORREY

The mechanism of the degradation of fatty acids by mold fungi. II. PHILIP D. COPPOCK, VIRA SUBRAMANIAM AND THOMAS K. WALKER. *Univ. Manchester. J. Chem. Soc.* 1928, 1422-7; cf. *C. A.* 21, 2394.—*Aspergillus niger* grew satisfactorily on Ca butyrate, producing the following changes: Ca butyrate \rightarrow butyric acid \rightarrow β -hydroxybutyric acid \rightarrow acetoacetic acid \rightarrow acetone. No crotonic acid was formed and it was proved that *A. niger* would not grow on the salts of this acid as the sole source of C. On a medium contg. Ca valerate as the sole source of C, *A. niger* grew satisfactorily, giving a mixt. of β -hydroxy valeric acid and $\begin{matrix} CH_3 \\ C_2H_5 \end{matrix} \rangle CO$ but which

of these was formed first was not detd. On isovaleric acid*acetone was formed after 6 days by *A. niger* by the loss of a methyl group and the production of CH_3COCH_2COOH . H. J. DEUEL, JR.

Raising fermentative activity of *B. venturellii*. AMBROGIO DE TOMASI. *Boll. ist. sieroter. Milan* 5, 216-8 (1926). *Biol. Abstracts* 1, 677.—*Bacillus venturellii* in milk was accustomed to acetone and Am alc. by adding increasing amts. of these substances. The organisms so treated when cultivated on potato mash produced increased yields of distillable substances, about 50% more than organisms not so "exalted" in fermentative power. H. G.

The conditions of growth of the Bordet-Gengou bacillus. T. HAKAYAWA AND S. INAMORI. *J. Orient. Med.* 7, 105-26 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 579.—Shiga's glycerol-potato-broth agar with horse serum (7.3) is the most favorable medium for culture and isolation from the sputum. Fresh potato promotes growth; fresh blood is not indispensable. The optimal p_{H} is 6.8-8.0 for the *Bacillus Gengou*, 6.6-8.0 for the *Bacillus influenzae*. The limits of viability are: 3.6-9 and 4.4-9, resp. A sepn. with the aid of the p_{H} was, therefore, impossible. MARY JACOBSEN

A simplified method for detecting indole formation by bacteria. NIKOLAUS KOVACS. *Staatlichen Serotherapeutischen Institut. Z. Immunitäts.* 55, 311-5 (1928).—The soln. used was p -dimethylaminobenzaldehyde 5 g., amyl alc. 75 cc., concd. HCl 25 cc. The principle of the test is that when the culture in bouillon is shaken with the

soln. indole is extd by the amyl alc. and reacts in a medium where the color is not changed by the color of the bouillon.

JULIAN H. LEWIS

Lactic acid production by scarlet fever streptococci and the common pyogenic streptococci. A. KAPPUS. Univ. Berlin. *Z. Hyg. u. Infektionskrankh.* 107, 697-701 (1927).—There is no difference in the character of the lactic acid produced by the true streptococci of scarlet fever, the ordinary streptococci from the mouths of scarlet fever patients, and the common pyogenic streptococci. Formation of *d*-lactic acid is the rule. Racemic lactic acid and *l*-lactic acid are usually produced, but only in small amount. The quantity formed seems to depend primarily upon the time of incubation. That formed in the early stages seems to be destroyed in more prolonged incubation. The quantity formed is of no differential diagnostic value for distinguishing the various types of streptococci here considered.

E. R. LONG

Adsorption and disinfection. I. Investigation with mercury and silver salts. GEORG LOCKEMANN AND HERMANN PILCHER. Robert Koch Inst., Berlin. *Z. Hyg. Infektionskrankh.* 108, 125-45 (1928).—The nature of the material in which bacteria are present is of the first importance in disinfection. Wool absorbs Hg solns. most strongly. Silk, cotton and linen are less absorbing. Absorption of Ag salts is similar except that in the presence of dil. solns. (0.17%) silk at first surpasses wool, 24 hrs. being required to equalize the effect. In the presence of wool the disinfecting power of solns of HgCl₂ and AgNO₃ for paratyphoid B and colon bacilli and *Staphylococcus aureus* is low. In the presence of silk the disinfecting power is somewhat higher. Cotton and linen interfere still less with disinfection.

E. R. LONG

Observations on the formation of diphtheria toxin. A. GALLINCK. Univ. Berlin. *Z. Hyg. Infektionskrankh.* 108, 522-9 (1928).—The addn. of 0.2% sugar to the medium of growth of diphtheria bacilli leads to marked acid production and inhibits diphtheria toxin production. Aeration of such a culture does not increase the toxin production. Correction of the H-ion concn. during growth is without influence on toxin formation. In an irregular manner, varying with the strain of bacillus used, the addn. of cystine leads to higher and more rapid production of toxin, and even to toxin formation by strains not ordinarily forming toxin.

E. R. LONG

Special synthetic media for the cultivation of bacteriophage. S. RACCHISA. *Boll. soc. ital. biol. sper.* 3, 257-8 (1928).—Two formulas are given for making synthetic media suitable for the cultivation of bacteriophage. (1) asparagine 3 g., NaCl 4.50 g., MgSO₄ 2 g., K₂HPO₄ 2 g., H₂O, 1000 cc. (2) glycine 1 g., MgSO₄ 2 g., NaCl 2 g., K₂HPO₄ 2 g., NH₄ lactate 3 g., H₂O, 1000 cc. Dissolve the substance in H₂O, boil, neutralize and autoclave. Filter, place in tubes and sterilize in autoclave.

P. M.

Direct microscopic observations on the growth of the colon bacillus. The periodicity of bacteriophage action. K. A. JENSEN. State Serum Inst., Copenhagen. *Centr. Bakt. Parasitenk. I Abt.* 107, 1-34 (1928).—At certain stages of growth the bacilli have little protoplasmic material and are resistant to lysis.

JOHN T. MYERS

Food utilization by the colon bacillus. H. BRAUN, H. LISCH, H. HENKEL AND P. GINTSCHOFF. Univ. Frankfurt. *Centr. Bakt. Parasitenk. I Abt.* 107, 35-48 (1928). The colon bacillus can utilize only a few org. acids of the aliphatic series. It can use lactic, succinic and malic acids, and many carbohydrates. The intestinal disturbances due to eating unripe fruit may be due to fermentation of malic acid and carbohydrates. Shiga-Kruse dysentery bacilli have a narrower food range than does *B. coli*.

J. T. M.

A contribution to the knowledge of antagonism of the typhoid and the colon bacillus, and the use of enriching media for the typhoid bacillus. J. VIGNATI. Univ. Brun. *Centr. Bakt. Parasitenk. I Abt.* 107, 54-69 (1928). By nephelometric observation it was possible to note that some substances had a stronger effect on the protoplasm of the colon bacillus than of the typhoid bacillus. Victoria blue showed the most marked distinctions, but they were too slight to be of practical value, since the proteins are so similar. Cultures of the colon bacillus produce a filterable substance which hinders the multiplication of the typhoid bacillus. Adsorbents like bolus alba will remove this substance, but its presence in the medium will not prevent over growth by *B. coli*. Apparently the inhibitory agent has a greater affinity for the typhoid bacillus than for the adsorbent. Cultures in bile plus lactic acid did not overcome the inhibitory agent. NH₄OH in bile favored the typhoid bacillus and Na₂CO₃ was better still. This is not a direct chem. inhibition of *B. coli* but a change in biol. relationships between *B. coli* and *B. typhosus*. Na₂CO₃ bile (14 cc. of 1% Na₂CO₃ plus 100 cc. of bile) is a practical enriching medium for typhoid in feces. Further work is in progress.

J. T. M.

A fatal case of meningitis caused by a capsulated bacillus. H. KLEWEL. Univ. Heidelberg. *Centr. Bakt. Parasitenk. I Abt.* 107, 100-4 (1928).—The organism differed

from Friedländer and other capsulated bacilli in its ability to liquefy gelatin and the formation of an amber pigment.

JOHN T. MYERS

Effects of dyes in bacteria. I. FR SARTORIUS Westphal Kaiser Wilhelm Univ., Munster. *Centr. Bakt. Parasitenk. I. Abt.* 107, 134-56(1928); cf. *C. A.* 21, 113.—The effect of many dyes in the presence of many salts on the members of the colon-typhoid group of bacteria was studied. Methylene yellow H favors the paratyphoid bacilli and inhibits coli and typhosus. Resorcinol black was the most favorable dye found as a selective agent for *B. typhosus*, young cultures being more resistant than old ones. Dahlia favors the pathogens at the expense of the colon group if the p_H is between 8.0 and 8.5. Work is in progress as to any relationship between dye resistance and virulence. Here is a good bibliography. II. **The action of dyes of different constitution at different p_H values.** *Ibid.* 398-427.—The action of the azine dyes on the colon group seems directly proportional to the no. of amino groups, which give them their basic character. It may be modified by the type of substitution in the amino groups. The introduction of alkyl radicals increases germicidal activity. Substitution of alkyl radicals in the benzene ring weakens activity. A change which decreases soly will decrease germicidal activity. The majority of dyes in this group are more active at a p_H of 6.5 than at 7.5 or 8.5. Many individual effects of p_H and substitutions in the oxazine, di- and triphenylmethane, xanthone, acridine, quinoline, thioflavine, thiazine, nitro, azo and alizarin dyes were noted, but no definite generalizations were drawn. J. T. M.

The staining of lepra bacilli. (TTO RUEDEL *Centr. Bakt. Parasitenk. I. Abt.* 107, 357-8(1928). The following technic will differentiate between tubercle and lepra bacilli. Apply carbolfuchsin (basic fuchsin, 1 g.; alc., 10 cc., phenol, 5 g. and water up to 100 cc.) and heat till steam rises. Wash several times with 5% H_2SO_4 . Wash with water. Apply Joeffler's methylene blue for 30 to 60 sec. Wash with water. Wash 2 to 5 sec. with 70% alc. and then 1 to 3 sec. with abs. alc. Mount in toluene balsam.

JOHN T. MYERS

The influence of metallic salts on the development of bacteria. I. Silver salts. H. A. ANDRESEN *Centr. Bakt. Parasitenk. I. Abt.* 105, 444-55(1928).—Ag salts react with peptone and there is no equal established between bound Ag and the Ag ion. Bound Ag is slowly freed by Na₂S. In a protein and peptone free medium, the Ag-ion concn. can be kept quite constant, and concns. of $0.16 \cdot 10^{-11}$ to $0.10 \cdot 10^{-11}$ inhibit bacterial growth. Only Ag as ion has inhibiting power. The effect increases with the alkyl of the medium.

JOHN T. MYERS

The protamine bacteria. I. E. DEN DOOREN DE JONGE. *Centr. Bakt. Parasitenk. II. Abt.* 71, 193-232(1927). The term protamine bacteria is applied to that group of organisms which are Gram negative, non-spore bearing rods which can split one or more of the lower alkylamines. Of a large no. of oxidizing bacteria studied, only a few species met these requirements. The action of many bacteria was studied on a large list of org. compds. including acids, alcs., amino acids, amides, ureides, guanidine and purine derivs.

JOHN T. MYERS

Spore formation and colloid changes. GYULA DARÁNYI *Centr. Bakt. Parasitenk. II. Abt.* 71, 353-7(1927).—Sporulation in bacteria does not depend on such factors as O tension, p_H , salt concn. or temp.; but on colloidal dispersion. Hence dehydration will induce spore formation in very young cells.

JOHN T. MYERS

The influence of sugars on the metabolism of yeasts. A. OSTERWALD. *Centr. Bakt. Parasitenk. II. Abt.* 71, 357-72(1927).—In pure yeast cultures, the type of sugar in the medium influences the rate of growth and the kind and amt. of metabolic products. The effect does not depend on content of acid, alc. or N compds. Most sugars favor the growth of yeasts.

JOHN T. MYERS

Studies on amylase formation by several strains of Aspergillus. H. KNAPP. *Centr. Bakt. Parasitenk. II. Abt.* 71, 372-98(1927).—Amylase is formed faster and in larger amts. at the optimum growth temp. and with optimum type of medium. Enzyme formation and growth are proportional. Sporulation begins when diastase formation stops. Acid inhibits diastase production. Diastase is not used by the organism.

JOHN T. MYERS

Biochemical differential characteristics of the lactic acid bacteria. I. **Methods of investigation.** I. A. MAKRIKOV. *Centr. Bakt. Parasitenk. II. Abt.* 71, 399-407(1927).—It is essential to use a simple medium and the following was selected. K_2HPO_4 , 0.05 g.; $MgSO_4$, 0.05 g.; NH_4MgPO_4 , 1.5 g.; peptone, 0.2 g.; "manganpepton," 0.1 g.; lactose, 0.3 g.; $CaCO_3$, 0.2 g.; and cond. water 100 cc. All lactic acid bacteria belong to a single physiol. group.

JOHN T. MYERS

Milk as a culture medium for the lactic acid bacteria. SÖNCKE KNUDSEN AND A.

SÖRENSEN. *Centr. Bakt. Parasitenk. II Abt.* **71**, 500-7(1927).—The addn. of yeast autolysate frequently increased the yield of lactic acid. JOHN T. MYERS

The proteolytic action of certain lactic acid bacteria. W. H. PETERSON, L. M. PRUESS AND E. B. FRED. *J. Bact.* **15**, 165-78(1928).—Of 22 strains of lactic acid bacteria, 13 were mannitol fermenters and 9 were not. Three different media varying in N content from 105 to 326 mg. per 100 cc. were used. Formation of non-protein N, amino N, and of NH_3 was taken as a measure of proteolysis. Non-protein N was the most abundant form of N produced, there being an increase in most cases and a decrease in only a few. The max. increase occurred in a nitrose yeast-water medium contg. 326 mg. of N per 100 cc. where 89 mg. per 100 cc. were produced, making about 51% of the total N present after incubation. In a few cases more amino N was consumed than was formed, the variations ranging from a decrease of 24.8 mg. to an increase of 33.2 mg. per 100 cc. of culture. NH_3 production was small in all cases and sometimes did not equal its consumption. Proteolysis continued long after the destruction of sugar ceased. There is a long bibliography. JOHN T. MYERS

Description of an organism found in solutions of sodium caseinate. RUDOLPH GAHL. Univ. of Calif. *J. Bact.* **17**, 35-42(1928).—The name *chromobacter caseinum* is applied to the organism. JOHN T. MYERS

The bactericidal destruction of acetyl methyl carbinol. O. B. WILLIAMS AND MARIE B. MORROW. Univ. of Texas. *J. Bact.* **17**, 43-8(1928).—Acetylmethylcarbinol is destroyed by certain strains of the colon-aerogenes group of bacteria, chiefly *Aerobacter aerogenes*; by the green fluorescent bacteria; and by all of the aerobic spore formers tested. It is not destroyed by the representatives tested of the *Salmonella*, *Eberthella*, *Proteus* or *Serratia* groups. It is probable that the compd. serves as a source of C. JOHN T. MYERS

Studies on the proteolytic bacteria of milk. I. A medium for the direct isolation of caseolytic milk bacteria. WILLIAM C. FRAZIER AND PHILIP RUFF. U. S. Dept. of Agr. *J. Bact.* **17**, 57-63(1928).—The following casein agar has been adopted. Soak 3.5 g. of casein in 150 cc. of distd. water for 15 min. and add 72 cc. of satd. lime water. Shake until the casein is almost dissolved, add 0.35 g. of K citrate and shake until soln. is complete. Add 10 cc. of double-strength beef infusion and make up to 300 cc. Add 100 cc. of 0.15% CaCl_2 soln. and 100 cc. of a soln. which contains 0.105% of $\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$ and 0.035% of KH_2PO_4 . Divide the soln. into 50-cc. portions in 200 cc. flasks and autoclave 15 min. at 20-lbs. pressure. The p_{H} value should be 7.0. Sterilize likewise 50-cc. portions of 3% washed agar. One flask of each is heated in a steamer and mixed hot for use. II. Action of proteolytic bacteria of milk on milk. *Ibid.* 65-78.—Data are given to show the change in amino N, titratable acidity, H-ion concn., and NH_3 in milk by 229 cultures of proteolytic milk organisms. Tests were made for tryptophan in cultures in both autoclaved and steamed milk held for 10 days at 30°. The cocci were found to be mostly acidoproteolytic and to produce only a moderate amt. of amino N in milk. The Gram-negative rods varied from weakly to actively proteolytic. The Gram-positive rods fell into 3 groups: (1) high acid, low amino N, (2) low acid, low amino N and (3) low acid, high amino N. JOHN T. MYERS

Decomposition of nitrates by bacteria. M. P. KORSAKOVA. *Bull. acad. sci. union republ. soviet socialist* **1927**, No 15 7, 1221-50. In the reduction of nitrates by bacteria under anaerobic conditions the oxidation of an org. substance present is the source of energy necessary for the reaction. If this reaction takes place in presence of glucose the concn. of H ions of the soln. remains unchanged, but in case citric acid plays the role of the org. substance to be oxidized, the soln. gradually becomes alk., and the quantity of CO_2 sepd. per unit of free N is twice the amount of CO_2 sepd. in presence of glucose. The reduction of nitrates takes place in 3 phases: (1) $2\text{HNO}_3 \rightarrow 2\text{HNO}_2 + \text{O}_2$; (2) $2\text{HNO}_2 \rightarrow \text{intermediate} + \text{O}_2$; (3) $\text{intermediate} \rightarrow \text{N}_2 + \text{H}_2\text{O} + \text{O}$. The nature of the intermediate has not been established. In the course of reduction of nitrates, glucose which is contained in soln. is entirely oxidized to CO_2 . The relationship which has been established between the amount of oxidized glucose and that of reduced nitrate as well as that of CO_2 and N formed points to the following reactions: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 = 6\text{CO}_2 + 6\text{H}_2\text{O}$, $5\text{C}_6\text{H}_{12}\text{O}_6 + 24\text{KNO}_3 = 24\text{KHC}_2\text{O}_4 + 6\text{CO}_2 + 12\text{N}_2 + 18\text{H}_2\text{O}$. BERNARD NELSON

The rate of reduction of methylene blue by *Bacillus coli*. G. S. EADIE. *J. Gen. Physiol.* **11**, 459-68(1928).—The relation between substrate concn. and velocity of reduction of methylene blue and other oxidation-reduction indicators of Clark by *B. coli* in the presence of succinic acid and glucose was studied. The rate of reduction is expressed by the equation, $v = a + b \log c$, in which a and b are consts. and c is the concn. With the concns. used, increasing the p_{H} of the soln. increased the rate of the reduction

of methylene blue. Compared with the system, barley amylase and starch, this system shows the same relation between substrate concn. and velocity but the effects produced by altering p_H and the temp. on this relation are quite different in the two cases. The relation between velocity and substrate concn. does not appear to be governed by the mass law; the indications are that adsorption plays an essential part in the process.

C. H. RICHARDSON

The oxygen consumption of luminous bacteria. E. N. HARVEY. *J. Gen. Physiol.* 11, 469-75(1928).—The O_2 consumption of luminous bacteria detd. by the Thunberg micro respirometer and by the time elapsed before the luminescence of an emulsion of luminous bacteria in sea water begins to dim when more than 99% of the dissolved O_2 has been consumed, agree exactly. At 21.5° the consumption is 4.26×10^{-11} mg. O_2 per bacterium, or 2.5×10^1 mg. per kg., and 5.6 mg. per sq. m. of surface of the organism. Expts. show that O_2 must diffuse into the bacterium much more slowly than through gelatin or connective tissue but not as slowly as through chitin. Comparison of the O_2 consumption of organisms or tissues should be in terms of O_2 used per unit wt. with sufficient O_2 tension so that the consumption is independent of the tension.

C. H. RICHARDSON

The stability of carbohydrate media. LUCY D. HENRY AND M. S. MARSHALL. *J. Lab. Clin. Med.* 12, 474-7(1927).—Twenty % unheated filtered solns. of dextrose, lactose, maltose, sucrose, mannitol and levulose stored at 5° appear to retain their sp. properties with regard to biologic fermentation for a period of at least 20 months; xylose similarly prepd. is stable for at least 12 months. The addn. of such solns. to culture medium aseptically, to avoid heating, specifically a beef ext. sugar-free semi-solid agar, furnishes an excellent means of checking fermentation characteristics of bacteria, but the storage of the medium after the addn. of the carbohydrate for more than a few days renders the fermentation reactions nonspecific. Variation in the fermentation of some carbohydrates by some bacterial strains may under unknown circumstances occur, but every possible means of demonstrating that such variation does not occur should be exhausted before accepting such a conclusion. Fermentation reactions should be read, for example, at 4, 6, 8, 24 and 48 hrs. from the time of inoculation, for it is essential that one view fermentation as a progressive process with several possibilities rather than as a static definitely positive or negative matter. E. W. W.

Spontaneous heating of hay (HILDEBRANDT) 12. The struggle between yeast and wild organisms in fresh malt (HUMMER) 16. Pharmaceutical preparations containing lactic acid organisms (PLACRES) 17. Food requirements of soil amoebae with special reference to their inter relation with soil bacteria and fungi (SEVERTSOVA) 15. Cacao. I. Investigation of the musty odor of cacao beans (CIFERRI) 12.

VANDELVELDE, ALB. J. J.: *Vade-Mecum du chimiste-bactériologiste des denrées alimentaires.* Paris and Liege: Librairie Polytechnique Ch. Béranger. 36 pp. F. 8.

D - BOTANY

THOMAS G. PHILLIPS

The presence of certain xanthine substances and their derivatives in the potato. G. G. SCHWEIZER. *Arb. Biol. Reichs. Land-Forstw.* 15, 1-18(1926); *Chem. Zentr.* 1927, I, 908.—To explain the "mosaic disease" of the potato, the contents of purine bases in the tuber, in the germ and leaves were detd. Xanthine, guanine and hypoxanthine were isolated and in the germ adenine was identified. The purine content of germinated tubers is essentially higher than that of tubers which have not germinated, while the purine content of the germs is between these 2 values. The older the germ, the higher its xanthine content. The xanthine content of the tubers can, without analyzing, be estd. colorimetrically with $KClO_3$ and concd. HCl . From the tubers was isolated an enzyme which converts colorless solns. of adenine, guanine, hypoxanthine and xanthine into yellow solns., probably alloxan. It is concluded that xanthine has some causal relation to the yellow mosaic disease. There is also a discussion of the influence of sunlight.

C. C. DAVIS

The influence of various factors on the accumulation of alkaloids in the leaves of *Datura stramonium* L. var. *inermis*. WITOLD PŁOSKI. Krakau. *Roczniki Nauk Rolniczych I Lesnych* 16, 186-216; *Chem. Zentr.* 1927, II, 291.—The alkaloid content of the leaves of *Datura stramonium* is independent of N and K fertilization. It increases with the size and with the age of the leaves and is greater at the end of the night than in the evening.

C. C. DAVIS

Photosynthesis of cultivated plants, its relation to yield and its dependence on

climate and soil. H. LUNDEGÅRDH. *Medd. Centralanstalt. försöksväsendet jordbruks. Avdeln. lantbruksbotan.* 43, 3-97(1928).—A summary of a series of investigations on the assimilation of CO_2 by plants, carried out from an ecological point of view over a period of several years. New methods and app. for detn. of the assimilation under varying conditions and also of the controlling factors of light intensity, concn. of CO_2 , and temp. were developed. The importance of CO_2 as a growth factor is shown in expts. with beans, cucumbers, tomatoes and sugar beets. The CO_2 pressure in the air around growing plants (the CO_2 factor) and its dependence on soil respiration and climatic factors is considered. Some of the conclusions are as follows: (1) The absolute rate of assimilation per unit leaf-surface at 18° to 20° is practically the same in different plants, being about 8.42 to 9.78 mg of CO_2 per hr. per 50 sq. cm. (2) The increase by a certain % in one factor results in an increase in the assimilation rate which is relatively greater, the more the factor in question is in min. (3) The temp. optimum of the assimilation is changed with the light factor and the CO_2 factor so that an increase in each of these factors gives rise to a higher temp. optimum, and a decrease results in a lower temp. optimum. If V_0 = a given intensity and V_1 = a higher intensity of a certain factor, and if F = a biol function (e. g., assimilation of CO_2) then the quotient $F_1/V_1 \cdot F_0/V_0$ shows how much F increases or decreases when the factor is increased. The quotient is a measure of the relative effect of the factor upon assimilation. (4) The activity of soil respiration controls the CO_2 content of the air up to 5 m. above the soil surface. (5) A certain relationship exists between the cloudiness of the sky and the CO_2 factor, which is due to the influence of light upon the assimilation. (Much cloudiness = low light-intensity = weak assimilation = low CO_2 consumption = high CO_2 factor.) (6) Economically satisfactory results may be obtained by the application of CO_2 to greenhouse cucumber plants. (7) The effect of CO_2 fertilization increases with the temp. and the light intensity. (8) In certain expts. with oats, 50% of the total fertilization effect was due to the action of CO_2 . E. O. ELLINGSON.

Changes in hydrogen-ion concentration induced by carbon dioxide in relation to the germination of spores of *Ustilago levis*. M. F. HOWE. *Phytopathology* 16, 69-70 (1926); *Expt. Sta. Record* 58, 544.—In attempting to det. the effect of fragments of living plant tissue on the increased germination of the spores of *U. levis*, the influence of CO_2 given off by the tissue on the H-ion concn. was studied. Spore suspensions made by placing spores in tap water in suitable dishes showed that the highest percentages of germination occurred at p_{H} 4.9. A continuous flow of CO_2 caused the p_{H} to vary from 6.7 to 4.9, a similar variation having been observed where the source of CO_2 was fragments of living plant tissue. Spore suspensions confined in an atm. consisting of different percentages of CO_2 failed to produce the optimum of p_{H} 4.9, but by a continuous flow of CO_2 into the spore suspensions this optimum was obtained, as well as a high percentage of germination comparable to that noted in cultures where fragments of plant tissues were present. H. G.

Chemical composition of vegetable seed fats in relation to the natural orders of plants. THOMAS P. HILDITCH. Univ. of Liverpool. *Proc. Roy. Soc. (London)* B103, 111-7(1928).—In certain plant orders, a marked tendency exists toward the production of specific fatty acids. Thus, lauric, myristic, erucic and petroselinic (Δ^8 -octadecenoic) acids, in their nature and proportion, characterize the orders, Palmae, Myristaceae, Cruciferae and Umbelliferae (with the very closely related Araliaceae), resp. Fair to considerable amts. of oleic and linoleic acids and minor amts. of palmitic, arachidic, lignoceric and other acids may also be present. JOSEPH S. HEPBURN.

Feeding fungi with cobaltamine complex salts. KONO KONOSHITA. *Acta Phytchim.* 3, 31-49(1927).—*Aspergillus niger* (I), *A. oryzae* (II) and *Penicillium glaucum* (III) were grown for periods of 35 days on a culture medium contg. KH_2PO_4 , MgSO_4 , and sugar, with the following 19 compds. as sources of N: (1) NaNH_2 , (2) KNO_3 , (3) NH_4NO_3 , (4) $[\text{Co}(\text{NH}_3)_2\text{Cl}]_2$, (5) $[\text{Co}(\text{NH}_3)_2\text{Cl}]_2\text{Cl}_2$, (6) $[\text{Co}(\text{NH}_3)_2\text{Cl}]_2\text{C}_2\text{O}_4$, (7) $[\text{Co}(\text{NH}_3)_2\text{Cl}]_2(\text{HSO}_4)_2\text{SO}_4$, (8) $[\text{Co}(\text{NH}_3)_2\text{H}_2\text{O}]_2(\text{C}_2\text{O}_4)_2 \cdot 4\text{H}_2\text{O}$, (9) $[\text{Co}(\text{NH}_3)_2\text{H}_2\text{O}]_2\text{Cl}_2$, (10) $[\text{Co}(\text{NH}_3)_2\text{NO}_2]_2\text{Cl}_2$, (11) $[\text{Co}(\text{NH}_3)_2\text{ONO}]_2\text{Cl}_2$, (12) $[\text{Co}(\text{NH}_3)_2\text{SCN}]_2\text{Cl}_2$, (13) $[\text{Co}(\text{NH}_3)_2(\text{NO}_2)_2]_2\text{Cl}(\text{Croce})$, (14) $[\text{Co}(\text{NH}_3)_2(\text{NO}_2)_2]_2\text{Cl}(\text{Flavo})$, (15) $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})_2]_2\text{SO}_4 \cdot 3\text{H}_2\text{O}$, (16) $[\text{Co}(\text{NH}_3)_2\text{CO}]_2\text{SO}_4 \cdot 3\text{H}_2\text{O}$, (17) $[\text{Co}(\text{NH}_3)_2(\text{H}_2\text{O})\text{Cl}]_2\text{Cl}_2$, (18) $[\text{Co}(\text{NH}_3)_2(\text{NO}_2)_2]_2$, (19) $[\text{Co}(\text{NH}_3)_2(\text{NO}_3)_2]$. I showed the best growth with 3, 2, 13, 18, 15, resp. and none with 1, 16, 17; II grew best with 2, 18, 14, 13, 5, none at all with 7, 15, 16, 17; with III the best growth occurred with 2, 3, 4, 7, 6 and no growth resulted with 5, 10-13, 15-19. The cobaltamine-fed organisms averaged 2.18% ash, contg. 14.71% Co. Where a lack of N was apparent, especially with II, a known γ -pyronehydroxymonobasic acid, kojic acid, was formed and isolated. This sometimes amounted to 33% of the sugar used. *Aspergillus niger*, grown with cobaltamines, also produces an

unusual amt. of org. acids. Citric, malic, succinic, tartaric and oxalic acids were detected.

G. ALBERT HILL

Constituents of *Typha angustata* Bory et Chaub. MASAO FUKUDA. *Tohoku Imp. Univ. Sci. Repts* 17, 711-7(1928).—See *C. A.* 22, 1993.

E. H.

Red root tips. HANS MOLISCH. *Ber. deut. botan. Ges.* 46, 311-7(1928).—Anthocyan is found in the vegetative point of the roots of many plants belonging to the Crassulaceae, Saxifragaceae, Balsaminaceae, Melastomaceae and Compositae. The occurrence of this pigment in this area may often be an indication of plant relationship. L. P. M.

The influence of *Ustilago tritici* on the physiological functions of wheat. A. L. KOURSSANOW. *Univ. of Moscow. Rev. gén. botan.* 40, 277-302, 343-71(1928).—Respiration is more rapid in infected plants than in healthy plants, the difference increasing with age until it reaches 40% at the time of heading. The respiratory quotient remains unchanged. Transpiration is increased by 20-30% in infected plants. Diseased plants show stronger CO₂ assimilation, varying from 4 to 30% over healthy plants. For the first 20-25 days the infected plants grow more rapidly, after which there is a slowing down so that at efflorescence diseased plants have a dry wt. 60-64% of healthy plants. The % of total carbohydrates is about the same, but diseased plants have a higher content of sol. sugars. Total N and albuminoid N are not affected.

LAWRENCE P. MILLER

Interior medium of different organs of the potato during the growth of the plant. J. CHAUSSIN. *Compt. rend.* 186, 1649-51(1928); cf. *C. A.* 19, 843.—Analyses were made of the seed piece (*mere*) and leaves on May 22 and of these and new potatoes on June 10. On June 24 and July 10 the analyses were made of the leaves and new potatoes. From the results it is emphasized that the ratio of the ash to the ext. in the bouillon of the leaves is const. during growth. The results are closely parallel to those obtained in a previous study with wheat leaves. This suggests the existence of a *veritable physiologic ratio*, which is discussed at length.

L. W. RIGGS

Proximate principles of seeds of two species of *Combretum*. V. HASENFRATZ AND R. SUTRA. *Compt. rend.* 186, 1860-2(1928).—The seeds of *Combretum bernierianum* and of *C. subumbellatum* contain about 10% of fat material consisting principally of palmitin and olein, also a min. of 4% of sucrose which is easily isolated in pure form from the seeds. A glucoside is probably present.

L. W. RIGGS

Phenomena preparatory to germination. JEAN DUFRENOY. *Compt. rend. soc. biol.* 98, 1497-8(1928).—Beans sterilized with CaOCl₂ were divided in 2 series (a) with the outer coatings removed and (b) with the outer coatings not removed. These were placed in tubes with moist cotton and were kept at 27° in the thermostat. Seeds of series (a) germinated in 2 days, series (b) in 8 days. At 21° the germination was also 2 and 8 days. At 15° there was no germination in either series of seeds. (Cf. Morinaga, *C. A.* 21, 943.)

L. W. RIGGS

Contribution to the chemical study of Malvaceae. J. PIERAERTS AND F. DE WINTER. *Mut. grasses* 20, 8224-7(1928); cf. *C. A.* 22, 2283.—The oil obtained from *Honckenya ficifolia* Wild resembles cottonseed oil. The fibers of this plant are used by the natives for making very strong ropes. Phys. and chem. properties of *Berria ammanilla* Roxb and *Corchorus olitorius* also are given.

P. T.

Investigation of the hypothetical combined pentose and the so-called free pentose with inferences on the composition of pectin. RONALD B. MCKINNIS. State College, Washington. *J. Am. Chem. Soc.* 50, 1911-5(1928).—Apples and apple pectin contain no pentose, either free or combined. The furfural comes from arabinose, which in turn is derived from galacturonic acid. Arabinose is only an intermediate product in the formation of furfural from galacturonic acid. With weak acids some arabinose can be obtained before it is decomp'd. The digalacturonic acid is probably the nucleus unit of the pectin mol.

C. J. WEST

Acids of figs. E. K. NELSON. U. S. Dept. Agr. *J. Am. Chem. Soc.* 50, 2012-3(1928).—Acetic and citric acids were found in Adriatic figs and acetic, citric and a small quantity of malic acids were identified in Calimyrna figs. Adriatic black neck figs contained more than 10 times as much free AcOH as the normal Adriatic figs. Less citric acid was found than in normal figs. Normal Calimyrna contained 0.26 g. per kg. of free AcOH and 3.5 g. of citric acid, besides a small quantity of malic acid. In Calimyrna figs affected with internal rot the free AcOH amounted to 0.56 g. per kg. and the citric amounted to 3.3 g. per kg.

C. J. WEST

Vital oxidation of plant cells with cobaltamine complex salts. ATSUSHI WATANABE. *Japan J. Botany* 4, 37-70(1928).

C. J. WEST

Effect of renewal of nutrient solutions upon the growth of culture plants and its relation to aeration. TSUNG-L& LOO. *Japan J. Botany* 4, 71-98(1928).—Renewal of

culture soln. every 24 hrs. had no effect on the direction of the reaction change; the change of the reaction in the soln. was generally retarded to some extent by the renewal and consequently this treatment produced better results in the growth of the culture plants. In the solns. where no remarkable retardation of reaction change was produced by renewal, such as the NH_4Cl and $(\text{NH}_4)_2\text{SO}_4$ cultures, the increase in the yield was not as large as in the cultures whose reaction was kept almost const. by the treatment. The effect of renewal of soln. on the growth of paddy rice seedlings was found to be different from that on the growth of wheat. In the case of NH_4HCO_3 cultures, no beneficial effect was observed on renewal of the soln. Aeration of nutrient soln. has no influence on the growth of the seedlings. The O supply may not be a predominant factor in the beneficial effects of the renewal of the soln. C. J. WEST

Plant sterols. LEOPOLD SCHMID AND GERHARD BILOWITZKI. Univ. Vienna. *Monatsh.* 49, 98-106 (1928); cf. C. A. 21, 1271.—The sterol mixt. obtained from *Radix bardanae*, *Ulmus campestris* and *Ficus carica* has, in each case, been sepd. into stigmasterol and sitosterol by means of the insoly. of the tetrabromoacetate of the former. In each case the sterol was identified by a no. of derivs. C. J. WEST

Tannin content of Alaskan mountain hemlock (DAVIDSON, SHERRARD) 29. Nutritive value of grasses, as pasture, hay and aftermath (FAGAN 12. Wyoming forage plants and their chemical composition (McCREARY) 12. Constitution of the anthochlorin of the yellow dahlia (SCHMID, WASCHKAT) 10.

ROSENTHALER, LEOPOLD. *Grundzüge der chemischen Pflanzenuntersuchung*. 3rd ed., revised and enlarged. Berlin: Julius Springer. 160 pp. M. 9.

E - NUTRITION

PHILIP B. HAWK

Relative food values of brown (from "entire" wheat grain) and white (from endosperm of grain) wheaten flour, and their comparative potency for prevention of xerophthalmia in guinea pigs. E. J. SHEEHY. *Proc. Roy. Irish Acad.* 37, 415-25 (1927).—Guinea pigs fed on mangels (20 g.), white flour *ad lib.*, and 0.4 g. hydrogenated soybean oil decline in wt. and contract xerophthalmia in 3-7 weeks. The xerophthalmia, but not the decline in wt., is cured when cod-liver oil is substituted for hydrogenated oil. When brown flour made from the entire wheat grain is substituted for white flour, xerophthalmia occurs much more rarely, although the animals decline in wt. If the diet is restricted, brown flour appears to be preferable as a food to white flour. B. C. A.

Reaction of irradiated ergosterol (vitamin D). A. STEIGMANN. Heidelberg. *Kolloid-Z.* 45, 165-6 (1928).—With fuchsin H_2SO_4 reagent, irradiated ergosterol gives a violet color, whereas ergosterol or cholesterol which has not been radiated gives no color. This color reaction is particularly delicate if the reagent contains a little H_2SO_4 , and when the ergosterol has been irradiated in an atm. of CO_2 . Ammoniacal AgNO_3 is reduced to a stable colloidal Ag sol by irradiated ergosterol but not by the unrayed compd. These reactions suggest that vitamin D is an aldehyde or unsatd. ketone.

F. A. CAIORI

The effect of the quantity of calcium carbonate (fed) and of age on the calcium and phosphorus metabolism of Yorkshire swine. ISTVAN WEISER AND A. ZAITSCHEK. Royal Hungarian Animal Physiol. Expt. Sta., Budapest. *Fortschritte Landw.* 3, 451-5 (1928).—In 4 expts., shoats fed normal quantities of CaCO_3 absorbed an av. of 80.5% of the Ca, 91.3% of the P_2O_5 and 79.3% of the N fed; with double the normal quantities of CaCO_3 , the averages were 23.64, 16.57 and 83.1%, resp., indicating an unfavorable effect on the absorption of Ca and P_2O_5 and slight effect on the digestion of N-contg. feed. Likewise the higher dose of CaCO_3 led to retention of 13.25 g. of CaO and 4.93 g. of P_2O_5 per 100 kg. of live wt., as compared with 31.0 g. and 24.8 g., resp., with a normal dose of CaCO_3 . This highly diminished Ca and P_2O_5 assimilation expressed itself in a highly rachitic condition of the exptl. animal. Comparative metabolism expts. with shoats ranging in age from 16 to 28 weeks showed that the quantities of Ca and P_2O_5 assimilated steadily decreased with increasing age, indicating slower development of the skeleton in the older animals. The N assimilated, however, steadily increased to an age of 30 weeks and was independent of the quantity and quality of the protein feed.

P. R. DAWSON

The plural nature of vitamin B. ALBERT G. HOGAN AND JESSE E. HUNTER. Univ. Mo. *J. Biol. Chem.* 78, 433-44 (1928).—Expts. were made on rats, chicks and pigeons fed with a synthetic diet and yeast concentrate as a source of vitamin B. When the vitamin B preps. were exposed to ultra-violet light for 10 hrs. the growth-promoting power was lost

but the antineuretic power was retained. On the other hand after autoclaving the yeast and the yeast concentrate for 2 hrs. at 120°, the antineuretic property was destroyed but the growth-promoting power was retained. However, a mixt. of the two in all cases provided a potent source of vitamin B, the results in all cases being as satisfactory as with untreated yeast. These results are brought forward as proof that vitamin B is a mixt. of at least 2 distinct vitamins. It is proposed to retain the designation of vitamin B for the antineuritic factor and to designate the growth-promoting factor as vitamin F.

H. J. DEUEL, JR.

Studies in nutrition. I. Growth, reproduction, and lactation on diets with different proportions of cereals and vegetables. MARY SWARTZ ROSE AND ELLA L. MCCOLLUM. Columbia Univ. *J. Biol. Chem.* 78, 535-47 (1928).—A study of the efficacy of diets of children for prolonged nutrition in the rat. The diets were as follows: *H*, cereal (flour) 50% of calories, vegetables 10%; *M*, cereal 37.5% and vegetables 15%; and *L*, cereal 25% and vegetables 20%. The diets also contained dextrin, butter substitute, meat residue and NaCl. There was uniform food consumption on all the diets for 4 generations with growth curves exceeding those of Donaldson. There were more infertile matings on diet *L* but the age of the mothers at first reproduction showed no significant differences with the different diets. Reproduction was better in the second and third generations than in the first but lactation was poorer in the later generations as detd. by the no. of young successfully reared. Diets satisfactory for growth and reproduction were thus unsatisfactory for lactation. **II. The effect of adding egg to a diet already adequate.** *Ibid* 549-55.—When an egg was added to diet *M* (see above) making up about 3% of the wt. of the diet, there was a better growth of the young fed on this diet from the 28th to the 56th days of life and an earlier maturity of the females as detd. by the age of the mother when the first litter was born. Likewise a larger no. of females bore young and the capacity for lactation was improved. The hemoglobin content of the blood which had previously been shown to increase after addn. of egg to a similar basal diet in children was unchanged in the rats. The importance of milk and eggs as staple foods is emphasized.

H. J. DEUEL, JR.

Lipoid and fat metabolism during fattening. HANS KNAUER. *Z. physiol. Chem.* 176, 151-72 (1928).—The lipoid values of the blood are relatively low in the hog. In the course of fattening a distinct decrease is noted in the several fractions (phosphatides, cholesterol, free fatty acids), but this is not due to a diln. of the blood. The changes are most pronounced in the serum, while the lipoids of the erythrocytes vary only within narrow limits. The rate of sedimentation of the blood corpuscles also diminishes with increasing fattening. A comparison of serum with oxalate or citrate plasma shows that the values are consistently lower in the plasma, in consequence of the addn. of the chem. agent. In geese also the normal fattening with increasing body wt. is accompanied by a slow but const. decrease in the several lipoid fractions. With forced fattening the lipoid values remain low or even diminish as long as the organism takes care of the alimentary fat, but when a const. wt. is attained the lipoid values increase considerably. A lactemia then occurs and the birds in this condition present a sickly appearance. Fattening is not possible on a ration of noodles, potato flour, sugar and protein, the birds becoming acutely sick, perhaps for lack of vitamins. In the final stage there is lactemia which, however, might be attributed to a migration of depot fat. The organs of geese fattened in various ways show distinct differences in wt., especially of the liver and kidneys.

A. W. DOX

Sugar beet by-products for fattening livestock. E. J. MAYNARD AND B. W. FAIRBANKS. Colo. Agr. Coll., *Bull* 269A, 1-19 (1928).—Sugar beet tops, wet beet pulp, pressed beet pulp, beet molasses and dried molasses beet pulp were used to advantage in rations for fattening steers and lambs.

C. R. FELLERS

The relation of maternal diet to hemorrhage in the new-born. C. U. MOORE AND J. L. BRODIE. *Am. J. Diseases Children* 34, 53-61 (1927); *Physiol. Abstracts* 12, 559.—Expts. with rats show that a maternal diet deficient in vitamin B causes either abortion or death of the young at birth or during the nursing period; in these cases symptoms of advanced beri-beri are present and a hemorrhagic condition of many organs is found at autopsy. A human case is reported in which the mother's prenatal diet was very deficient in vitamin B; profuse hemorrhage occurred during delivery, and the baby died after a few days; there were no external abnormalities, but symptoms of hematuria, jaundice and diarrhea were present, and hemorrhages were found in most of the organs, together with a myelin degeneration of certain nerves similar to that of beri-beri. The authors suggest that vitamin deficiency may be a cause of otherwise unexplained hemorrhage of the new-born.

H. G.

The influence of the administration of cod-liver oil to the mother on the develop-

ment of rickets in the infant. A. A. WESSCH. *Bull. Johns Hopkins Hosp.* 40, 244-58 (1927); *Expt. Sta. Record* 58, 90-1.—The subjects of this study were colored babies from Johns Hopkins Hospital. The mothers of 3 out of every 4 were given 1 teaspoonful of cod-liver oil three times a day from the birth of the babies and were instructed to continue taking the oil until the babies were weaned. No oil was given any of the babies. At the end of 6 months Röntgenograms and blood analyses were obtained from all of the babies whose mothers had continued the treatment. Of 260 patients originally enrolled, only 47 were available at the end of the time, the mothers of 9 of whom had had no cod-liver oil. Although there were individual cases showing wide variation in the extent of rickets regardless of the cod-liver oil, the av. extent of rickets as judged both by x-ray and the Ca-P product varied inversely with the amt. of cod-liver oil taken by the mothers. Of the entire no. of cases, only 6 were examd. in May, when a seasonal reduction in rickets might have taken place. The author concludes that "when cod-liver oil is given to a mother a certain amt. of the antirachitic vitamin does pass into her milk, and that even though in individual cases the amount so transmitted to the infant may be insufficient to prevent manifestations of the disease, nevertheless when the average degree of rickets existing in a group of such infants is considered, the transfer has been sufficient to raise considerably the Ca-inorg. P product of the blood serum and to lessen the Röntgenographic evidences of disease." H. G.

The nature of the structural changes in nerve endings in starvation and in beriberi. H. H. WOOLLARD. *J. Anat. [London]* 61, 283-97(1927); *Expt. Sta. Record* 58, 297.—The results are reported of the histological examn. of the nerve tissues of the exptl. rats in the previously noted investigation of Drummond and Marrian (*C. A.* 20, 1667). A striking similarity was noted between the tissues of the rats deprived of vitamin B and of all food, although the lesions were less marked in the latter case. The only changes noted were in the intermuscular medullated motor and sensory nerves and their endings, these changes rapidly subsiding at a little distance from the muscles. The sympathetic and central nervous systems showed no abnormal anatomical changes. These findings confirm the opinion of Drummond that beriberi, as it occurs in rats under exptl. conditions, is really starvation arising from inability to assimilate food in the absence of vitamin B. H. G.

The complex nature of vitamin B as found in wheat and corn. C. H. HUNT. Ohio Agr. Expt. Station. *J. Biol. Chem.* 78, 83-90(1928).—Rats on a vitamin-B-free diet, supplemented with autoclaved yeast, died with polycneuritis or emaciation. Expts. with wheat or corn with and without the addn. of autoclaved yeasts indicate that in the former the limiting factor for growth is vitamin G. This vitamin is supplied by autoclaved yeast and when present in sufficient amt permits growth with a diet contg. 15% wheat. ARTHUR GROLLMAN

The influence of a diet, high in butter fat, on growth, blood formation and blood destruction. G. L. MULLER. Boston City Hosp. *J. Clin. Investigation* 5, 521-9 (1928).—The effect of a diet contg. 86.5% of its caloric intake in the form of butter fat was studied on growing and adult rats with reference to growth, maintenance, blood formation and blood destruction. Young rats grew to adult size and adults added to their wt. No evidence of injury to the *hematopoietic* system was observed. Necropsy findings were normal except for an increase in abdominal fat, fatty infiltration of the liver and a slight increase in the fat cells of the bone marrow. ARTHUR GROLLMAN

The digestibility of white of egg. I. G. MACDONALD and E. GORDON YOUNG. Dalhousie Univ., Halifax, N. S. *Proc. Trans. Nova Scotian Inst. Sci.* 16, 197(1928).—Uniform samples of egg white were coagulated at 100° for periods of time varying from 2 to 30 min. and their digestibility determined *in vitro*. No differences existed in the rate of peptic digestion, whether the period of coagulation was long or short. A. L. H.

Recent advances in science: Nutrition. LESLIE J. HARRIS. Univ. Cambridge. *Science Progress* 23, 68-74(1928).—Review of recent work on the mode of action of vitamin D with especial reference to the question of its regulation of gut acidity. JOSEPH S. HEPBURN

The relation of the specific-dynamic action in man to the type of food ingested. DIETRICH JAHN and EDGAR STRÖSSENREUTHER. *Deut. Arch. klin. Med.* 159, 152-63(1928).—The specific-dynamic action can be varied both quant. and qual. by changing the amt. of protein contained in test meals; quant. also by the previous ingestion of protein, but with no great regularity. The greater the amt. of protein previously ingested, the more marked was the effect observed during the first hr. after the test meal. P. Y. JACKSON

The specific-dynamic action of food, and the laws of gas-exchange. DIETRICH JAHN. *Deut. Arch. klin. Med.* 159, 335-61(1928).—Test meals were given accompanied

by acid drinks or by Na_2CO_3 (1 g. 4 times daily). The sp.-dynamic action, as measured by O_2 consumption, was 31.7% greater after the acid meal than after the alk. A similar test, carried out after the subcutaneous injection of 1 mg. suprarenine, showed a difference of 40%. In a severe case of Basedow's disease a much greater rate of O_2 consumption was noted; there were two distinct phases, the first max. being reached in 1-3 hrs., and the second in 4-6 hrs. A decided decrease in intensity of the first phase was brought about by the injection of 40 units of insulin; the opposite effect was noted upon the injection of 0.6 mg. histamine. An increased excretion of CO_2 was accompanied by a decreased consumption of O_2 , and by an alk. urine; this rule holds even when the sp. dynamic effect is changed by the injection of various hormones. The respiratory quotient is, therefore, no index of the nature of the oxidation processes taking place in the tissues. Intravenous injection of acid salts, such as 20 cc. $\text{N NaH}_2\text{PO}_4$, was followed by a decrease in the rate of excretion of CO_2 , the min. rate being reached after 30 min.; then by a sharp rise; a second fall was followed by a second max., the entire series of changes requiring about 3.5 hrs. In each part of the experiment a max. rate of excretion of CO_2 was accompanied by a min. in the curve for O_2 consumption. A soln. made up to contain the salts found in 150 g. beef caused upon injection a rapid rise in CO_2 excretion, the max. being attained in 1 hr.; the subsequent fall was accompanied by a rise in the consumption of O_2 . Since the rate of O_2 consumption decreases after the administration of certain hormones, the effect of the hormone is equiv. to a decrease in acidity in the organism. The reaction of the acid salt with bicarbonate accounts for the greater rate of elimination of CO_2 and for the alk. of the urine.

P. Y. JACKSON

Experimental rickets. P. M. HOLST. *Norsk. Magaz. Ingervidenskaben* 88, 1011-24 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 529.—A diet of polished rice, oat groats or of rice, oat or wheat flour always leads to rickets, while rice or wheat starch and water cause only osteoporosis. The addn. of wheat or oat groats to a pure starch diet causes rickets. Rickets is, therefore, produced not by avitaminosis but by a toxic substance. The latter may be extd. from oat flour by prolonged boiling with 0.5% HCl . It is probably an org. compd. dialyzable and insol. in alc., since neither the ash nor the non-dialyzable portion of oat flour causes rickets, while the dialyzate and the alc. ppt. do. Rats kept in the dark on a diet free from vitamin A and D with a sufficient Ca supplement did not get rickets. Addn. of Ca lactate prevented rickets in rats kept in the light on a corn-wheat or oats-wheat diet. H. agrees with Mellanby that $\text{Ca:P} < 1$ is pathologically significant.

MARY JACOBSEN

The influence of quantity of food on growth. H. VON HOESSLIN. *Z. Biol.* 85, 175-94 (1926).—An expt. is made which extends over 400 days on 2 pure-bred puppies of equal initial weight on a mixed diet. One dog received $\frac{1}{3}$ the amt. of food given to the other. The increase in weight of the former was only 26% that shown by the latter.

F. K.

Iron metabolism. II. Iron and hemoglobin formation. WOLFGANG LINTZEL. *Z. Biol.* 87, 97-106 (1928).—An "Fe-free" diet of egg white, lard, sucrose, rice and vitamins, with and without FeCl_3 , or ox-blood was fed to young rats. It was found that the inorg. Fe was utilized both in the formation of hemoglobin, and also in the increase of total body Fe. Fe from ox-hemoglobin had no effect. **III. Observations with animals kept in rarefied air.** *Ibid* 137-44.—Rats, kept for 1 to 5 weeks in rarefied air of 280 mm. (corresponding to a height of 8000 m.) and on a mixed diet, showed a decrease in body weight, an increase in hemoglobin to 100%, an increase in total Fe and wt. of the heart. No further increase in Fe content took place after 3 weeks at this low pressure. Acclimatization was complete.

FRANCES KRASNOW

The influence of nicotine and caffeine on the growth of chickens. CHARLES E. CHASE. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 81, 469 (1927).—Caffeine fed to chicks retarded their growth. Nicotine in large doses at first stimulated growth and later retarded it.

J. F. LYMAN

Determination of the vitamin B requirement of the pigeon and its bearing on the theory of vitamin B function. GEORGE R. COWGILL AND B. H. KLOTZ. *Proc. Am. Physiol. Soc., Am. J. Physiol.* 81, 470 (1927).—Vitamin B requirement of the pigeon is in linear relationship to the $\frac{1}{3}$ power of its body wt. $\text{Vitamin} = K W^{\frac{1}{3}}$. This formula holds for the rat and dog also. K is a const. characteristic for the species.

J. F. LYMAN

Some effects upon the young of inadequate maternal diets. I. Polyneuritis and hemorrhages. C. ULYSSES MOORE, JESSIE L. BRODIE AND ROBERT B. HOPE. *Univ. Oregon. Am. J. Physiol.* 82, 350-7 (1927).—On a diet of casein 18, salt mixt. 4, crisco 3, cod-liver oil 2, dextrin 71 and yeast 2%, normal growth and reproduction of rats

occurred but 73% of the young were lost during the nursing period. Some of the symptoms noted were: cerebral and visceral hemorrhages in young dying within the first week; myelin degeneration of the sciatics, vagi and other myelinated nerves and visceral and intra-cranial hemorrhages in young dying during the third week of life. The addition of lemon juice to the mothers diet had no effect; but an increase in the yeast content from 2 to 7% decreased the mortality of the offspring to 9.3%, practically eliminated the paralysis and greatly lessened the hemorrhagic condition. J. F. L.

The determination of the surface area of women and its use in expressing basal metabolic rate. HANNAH S. BRADFIELD. Univ. Mo. *Am. J. Physiol.* **82**, 570-6 (1927); Univ. Mo. Agr. Expt. Sta. *Research Bull.* **109**, 5-31.—The surface area of 47 women subjects was measured by means of the Elting surface integrator. The results obtained averaged the same as those obtained by the Worner linear formula; they were 6% below those obtained by the Du Bois linear formula, and nearly 2% below those obtained by the Du Bois height-wt. formula. Basal metabolism detns. on 16 of the subjects indicated that the Krogh modification of the Anb-Du Bois standards should be used for the prediction of basal metabolism of women. J. F. LYMAN

The protein intake of medical students. HOWARD H. BEARD. Western Reserve Univ. *Am. J. Physiol.* **82**, 577-9 (1927).—Male medical students (av. of 400) excreted 11.16 g. urinary N per 24 hrs., corresponding to 76.7 g. protein per 70 kg. body wt., after adding 10% protein lost in the feces. J. F. LYMAN

The digestion of cellulose in the wild rat. R. S. ALLEN AND J. J. CARLSON. Univ. Chicago. *Am. J. Physiol.* **82**, 583-90 (1927).—Ground Celotex (insulating lumber made from the residual material of sugar cane) was fed to wild rats, either without other food or mixed with food to the extent of 50 or 67%. In all cases the animals receiving Celotex died of starvation or enteritis. Enzyme prepns. from the animal digestive tract had no digesting effect on Celotex *in vitro*. Celotex has no food value, on the contrary it is harmful if ingested in large amts. J. F. LYMAN

A study of the laxative action of wheat bran. GEORGE ALBERT WILLIAMS. Yale and Jefferson Medical College. *Am. J. Physiol.* **83**, 1-14 (1927).—Wheat bran from which the water-sol. portion had been removed was laxative when added to the rations of dogs. The min. effective daily dose was 2% of the food intake. Crude fiber prep'd from bran was much more laxative, gram for gram, than was the washed bran. Crude fiber of bran, therefore, is an important contributory factor to the laxative effect of the bran. J. F. LYMAN

Blood regeneration in severe anemia. X. Assimilation and conservation of bile pigment, blood hemoglobin and muscle hemoglobin. G. H. WHIPPLE AND F. S. ROUSCHERT-ROBBINS. Univ. Rochester. *Am. J. Physiol.* **83**, 60-75 (1927); cf. *C. A.* **21**, 2494.—Dogs with exptlv. induced secondary anemia utilized for new red cell formation 80 to 90% of the blood hemoglobin introduced intraperitoneally or intravenously, while only 5 to 20% of that ingested by mouth was so utilized. When a pancreatic digest of dogs red blood cells was given intravenously 40% of the original hemoglobin was rebuilt into new hemoglobin. The results with muscle hemoglobin were not definite because of its poor toleration and low renal threshold. It is probably utilized. There was no evidence that bile pigment can be utilized in the anemic animal to form new red cell hemoglobin. **XI. Iron effect separated for organ effect in diet.** F. S. ROUSCHERT-ROBBINS AND G. H. WHIPPLE. *Ibid.* 76-83.—The addition of Fe salts to the diet of a dog in which anemia had been exptlv. produced sometimes did and sometimes did not result in an increased hemoglobin production and red cell output. This probably depended on an actual Fe shortage which might be present or absent. Addition of pig kidney or liver to a ration rich in Fe salts caused the expected increase due to kidney or liver and this increase was superimposed on the level of the Fe diet. J. F. L.

The anemia of rice disease. The effects produced by the addition of betaine hydrochloride, lactose, vitamins A and C, magnesium sulfate or mineral oil to the polished rice diet of pigeons. O. S. BARLOW. Western Reserve Univ. and Univ. Chicago. *Am. J. Physiol.* **83**, 237-44 (1927).—The administration of loosely bound HCl (betaine HCl) or butter or orange juice did not prevent the depressing effects of rice disease on body wt., respiration, temp. and red corpuscle counts. Lactose, mineral oil or MgSO₄ seemed to prevent the anemia without affecting the other effects. The beneficial action may be on the intestinal flora and consequent diminution of bacteremia. J. F. LYMAN

Experimental cretinism. II. The influence of the thyroid gland on the production and control of experimental rickets. M. M. KUNDE AND L. A. WILLIAMS. Univ. of Chicago. *Am. J. Physiol.* **83**, 245-9 (1927); cf. *C. A.* **22**, 3216.—No amt. of cod-liver oil added to a rickets-producing diet was adequate to prevent the development of rickets in cretin rats. J. F. LYMAN

Nature of the foodstuffs oxidized to provide energy in muscular exercise. I. In the normal animal. DAVID RAPPORT AND ELAINE P. RALLI. Western Reserve Univ. *Am. J. Physiol.* **83**, 450-65(1928).—Dogs on normal, high carbohydrate and high fat diets worked on a horizontal tread mill while records of their gaseous exchanges were made. It is concluded that even in mild exercise of short duration fat is utilized to supply energy for muscular work by its oxidation. J. F. LYMAN

A dietary deficiency canine disease—further experiments on the diseased condition in dogs described as pellagra-like by Chittenden and Underhill and possibly related to so-called black tongue. FRANK P. UNDERHILL AND LAFAYETTE B. MENDEL. Yale. *Am. J. Physiol.* **83**, 589-633(1928).—Fresh butter fat was effective in curing the disease in dogs described by Chittenden and Underhill (*C. A.* **12**, 286) and having a resemblance to pellagra in man. Egg yolk, boiled unpeeled carrots, lard, ext. of carrots and cryst. carotin were all potent in curing the disease. Cod-liver oil was ineffective; and yeast did not protect against the disease. It is suggested that naturally occurring pigmentary substances in foodstuffs play a role in nutritive processes. J. F. LYMAN

The influence of a vitamin-B-free diet on the growth of the Jensen sarcoma in rats. BRUNO HEYMANN AND ALFRED GALLINEK. Univ. Berlin *Centr. Bakt. Parasitenk. J. Abt.* **106**, 73-87(1928).—Young male rats subcutaneously inoculated with the Jensen sarcoma gave 80% of takes on a normal diet, and 56% on a vitamin-B-free diet. Of the tumors produced, 9% reached 10% of the body wt. within 30 days on the avitamin B diet, and 77% on a normal diet. The av. wt. of a tumor became 3.8 times greater on a normal than on an avitamin B diet. JOHN T. MYERS

Pellagra-like lesions associated with deficiency of vitamin B₂ in the rat. G. MARSHALL FINDLAY. Imperial Cancer Research Lab., London. *J. Path. Bact.* **31**, 353-64(1928).—Vitamin B consists of 2 parts: B₁ which is thermolabile and B₂ which is thermostable. Rats on a diet lacking B₁ behave like those which lack B; there is failure of growth, loss of appetite, decreased body temp., polyneuritis and death in about 5 weeks. The histological changes are those of inanition. Rats on a diet lacking B₂ show failure of growth, and as a terminal feature, loss of appetite and fall in temp. but no polyneuritic symptoms. After 8 to 10 weeks pellagra-like lesions appear on skin and buccal mucous membrane, followed by death 2 or 3 weeks later. The cardiac end of the stomach is papillomatous. The histological changes are those of inanition. There is hypertrophy of the adrenals with a deficiency of either B₁ or B₂ with a histological picture of slight toxemia or of the effects of cold. JOHN T. MYERS

Utilization of activated foods in animal pathology and in zoötechny. L. AUGER. *Compt. rend. soc. biol.* **98**, 972-3(1928).—Rations of the common grains, farina and powdered meat were subjected to the rays of the Hg vapor lamp and then fed to dogs with rickets, swine with osseous cachexia, horses with osteitis and to healthy fowls. Recovery was more rapid in dogs and swine than in controls receiving the same food non-irradiated. With horses the recovery was slow but definite. The fowls receiving the irradiated ration laid 128 eggs compared with 63 by the control flock. L. W. R.

Basal metabolism in adenoid patients. AL. POP AND N. POPOLITZA. *Compt. rend. soc. biol.* **98**, 1081-2(1928).—The development of adenoids in 20 cases was accompanied by a fall in the basal metabolism in 45%, a rise in 20% and in 30% the basal metabolism remained normal. After removal of the adenoids the basal metabolism became normal in all cases. L. W. RIGGS

Metabolism of sugars in the normal state and during starvation. G. MOURIGUAND AND A. LÉVILLIER. *Compt. rend. soc. biol.* **98**, 1110-3(1928).—The glycogen content of the liver ranged from 0.14 to 12.86% in the normal guinea pig and from 0.15 to 1.34% in the starved animal. In the muscles the ranges were 0.07 to 1.52% and 0.097 to 0.48% in the normal and starved animals, resp. The glucemia of the normal animals was fairly const. while that of the starved animals ranged from 0.85 to 1.38 parts per 1000. L. W. RIGGS

Summit metabolism during gestation and lactation. X. CHAHOVITCH AND (MLLB) M. VICHNITCH. *Compt. rend. soc. biol.* **98**, 1152-3(1928).—The results of a study of the energy metabolism of rats showed that the summit metabolism is notably diminished during gestation. After delivery the summit metabolism returns to the normal figure during lactation. The basal metabolism sometimes shows a slight diminution during gestation, followed by a gradual increase which is strongly increased during lactation. L. W. RIGGS

Physiologic action of vitamin B. Circulatory and respiratory phenomena. MARIE SKARZYNSKA-GUTOWSKA. *Compt. rend. soc. biol.* **98**, 1375-6(1928).—A study with dogs indicated that the exts. of vitamin B probably act by virtue of the choline, histamine and K salts which they contain. L. W. RIGGS

Irradiated sterols. RENÉ FABRE AND HENRI SIMONNET. *Compt. rend. soc. biol.* 99, 193-5(1928).—Curves are shown representing ultra-violet absorption of an alc. soln. of ergosterol, 1 to 10,000, before and after irradiation for 10, 20 and 30 min. The irradiated sterol had an activity of the order of 0.01 mg. per rat per day. After a certain amt. of irradiation the degree of antirachitic activity does not increase although the optical density gradually diminishes. L. W. RIGGS

Basal metabolism of inhabitants of Salta Province. P. MAZZOCCO. *Compt. rend. soc. biol.* 99, 237-8(1928).—Although the province of Salta (Argentina) is in a tropical latitude, its climate is temperate. The basal metabolism of its inhabitants is equal to that of persons living in cooler regions. L. W. RIGGS

The ketogenic diet. M. G. PETERMAN. *J. Am. Med. Assoc.* 90, 1427-9(1928); cf. *C. A.* 19, 1294.—The ketogenic diet as a means of treatment of epilepsy has been on trial for over 3 years. A period of fasting until convulsions have ceased, if practicable, is followed by the immediate diet prescription. This consists daily of not more than 15 to 20 g. of carbohydrate and 1 g. of protein per kg. of body wt. and the remaining caloric requirement is made up with fat. After 3 months' freedom from seizures the daily carbohydrate is increased 10 g. each month. From 6 to 9 months later the carbohydrate increases are alternated with 10 g. increases of protein. Twelve months after the seizures have been under control, the reduction of fat may be started. Slight variations are allowed according to the body wt. response. L. W. RIGGS

The vitamin B requirement of the calf. S. I. BRECHDEL. *Penn. Agr. Expt. Sta., Bull.* 213, 16-7(1927).—The effect of a vitamin-A-deficient ration upon the uterine development of calves is being studied. There is evidence to show, through blood studies, that the inability of the heifers to lactate on the ration deficient in vitamin B was probably due to an insufficient amt. of alkali-carrying roughages in the ration. Investigations will be made to det. whether this acidosis condition bore a direct relation to the ration used and was the sole cause of inability of the heifers to lactate upon the ration. E. A. SNYDER

Beriberi columbarum. R. McCARRISON. *Indian Med. Research Memoirs* No 10 (1928).—A condition—*beriberi columbarum*—having all the pathological characters of human beriberi has been produced under exptl. conditions in pigeons by means of diets of similar composition to those in use by human sufferers from the disease. This condition differs from *polyneuritis columbarum* in certain regards of which hypertrophy of the heart is the chief. The basal factor in the production of *beriberi columbarum* is insufficiency, but not complete want, of vitamin B (or of the antineuritic fraction of this vitamin). There is an optimum degree of insufficiency of vitamin B at which *beriberi columbarum* is most likely to arise; this optimum is provided by diets of which the vitamin B value is 20-50% below the min. required for the maintenance of normal metabolism. The ultimate cause of the disease is not the negative factor of vitamin-insufficiency but a positive and toxic agent produced in the course of a disordered metabolism arising out of insufficiency of vitamin B in the food. The clinical and pathological manifestations of beriberi are due in whole or in part to this specific agent. The existence of this agent has been demonstrated on pathological grounds and by statistical examn. of the exptl. data. *Beriberi columbarum* and *beriberi hominum* are preventable by the same means. Since *beriberi columbarum* can be produced by diets of similar composition to those in use by the subjects of *beriberi hominum*, since the pathological features of the two states are to all appearances the same, and since both are preventable by the same means, it is inferred that the etiology of the two conditions is the same. Expts. on animals suggest that beriberi-like maladies may be of different kinds: some due to infectious causes; some due to dietetic causes; and some due to a combination of both. The variety of "beriberi" dealt with here is due to dietetic causes; it is believed to be the variety which is endemic in certain parts of the Madras Presidency. The results of this investigation confirm the generally accepted view that endemic or true tropical beriberi is due to insufficiency of vitamin B (or the antineuritic fraction of this vitamin) and not to toxic substances produced in rice by bacterial action. They do not preclude the possibility that other maladies included under the generic term "beriberi" may have a different etiology. H. G. WELLS

Mineral nutrition of the living cell and vitamins—mineral nutrition and natural resistance of vegetables and animals to infectious diseases. M. P. MAZUR. *Ann. inst. Pasteur* 41, 948-81(1927).—A review of the author's work in this field, together with a summary and his conclusions; included is a review of the work of others. E. W. W.

Observations on calcium deficiency as a cause of certain diseases of animals and man. C. E. CORLETT. *Med. J. Australia* 1, 198-213(1928).—Ca or P deficiency or both can cause nervous disorder closely resembling that produced by deficiency of

vitamin B. It is, or may be, implicated in many morbid conditions of man and animals in which nervous symptoms often occur. Among these are polyphagia, earth-eating (and "sand disease"), bone-chewing, coprophagia, "ergotism," "lathyrism," scrapie or trotting disease of sheep, epizootic stringhalt, laminitis, rickets, osteomalacia, spasticity, paraplegia, tetany, milk fever and lactational dyspepsia of cattle and other animals, and the *stijfziekte* and *lamziekte* of South African cattle, and conditions answering to the same elsewhere. To these may be added some cases of supposed forage poisoning.

R. C. WILLSON

Cereal foods: their advantages and dangers. WM. WESTON. *Southern Medical J.* 20, 765-9 (1927).—When wheat, oats, yellow corn and rice are evaluated on a basis of fat, carbohydrate, protein, mineral and vitamin content, it is found that each has certain advantages and disadvantages, but that if used in combination as whole grains the result will show such a compensation that comparison with a single whole grain cereal is decidedly to the disadvantage of the single cereal, although it may have been grown under ideal conditions. A mixture of 35% wheat, 25% oats, 15% yellow corn and 25% brown rice was prepd., each cereal being selected from the section where conditions were such as to produce the highest mineral values, with the precaution that each of the mineral elements should be represented as well as an abundance of the amino acids, tyrosine, tryptophan and lysine. Feeding this mixt. resulted in prompt stimulation of appetite, prompt and progressive increase in weight, increase in 4 days of transitional cells and platelets, increase in 7 days of polymorphonuclear neutrophils and corresponding decrease in lymphocytes and in 10-12 days a progressive increase in hemoglobin. Lactating animals, both human and lower, were fed with the single whole grain cereals and with the mixt. of the 4 whole grain cereals. There was a much quicker and more permanent effect in increase of quantity and improvement of quality of the milk as reflected in the growth and development of the young. I and lysine were furnished by using a brown rice that had been grown near the sea. R. C. WILLSON

Cod-liver oil (BAILEY, *et al.*) 27.

F—PHYSIOLOGY

F. K. MARSHALL, JR.

New investigations on the glycolysis in blood in vitro. G. B. TAFURI. *Arch. sci. biol.* (Italy) 11, 71-6 (1928).—Sterile dog blood was defibrinated and then suspended in equal vols. of (1) isotonic NaCl soln., (2) equal vols. of blood serum and (3) equal vols. of phosphates (p_H 7.4); and the power of these solns. to reduce sugars was measured. The % sugar reduced in the 3 cases are 7.0, 8.8 and 18.9, *i. e.*, phosphates are most effective. In another series the defibrinated blood was hemolyzed with distd. H_2O . In this case isotonic NaCl soln. added did not give the mixt. power to reduce sugar; however, phosphate and $NaHCO_3$ (both at p_H 7.7) did cause sugar reduction. Therefore, the proteins of the plasma are not necessary in glycolysis but only the presence of certain electrolytes, *i. e.*, phosphates and bicarbonates in suitable concn., which assist the special enzymes contained in the blood corpuscles.

A. W. CONTIERI

Hyperglycemia by blood-letting. II. Relation between pressure and glucemia in bleeding. A. AGGAZZOTTI. *Boll. soc. ital. biol. sper.* 2, 863-9 (1927).—Three cases were studied: bleeding alone, bleeding after cutting the vagus and after injection of Witte peptone in physiol. soln. In each case, the viscosity of the blood drops regularly, while that of the serum is almost const. or drops slightly. The blood pressure remains fairly high and only drops rapidly at the last stages of bleeding, even when the blood pressure has been lowered at the start by use of the peptone. In all cases the sugar in the blood and serum increases; *i. e.*, 346% in the first case, 200% in the second case and 250% after injecting Witte peptone. It appears, therefore, that the increase in sugar content is not directly proportional to the drop in blood pressure; in fact, the blood pressure remains quite high right to the end, showing that there must be a copious secretion of adrenaline which tends to maintain the pressure. It is more probable that the increase in sugar is proportional to the blood lost, the big rise coming in the first case when blood to the extent of 2.2% of body wt. was lost, in the second when 3.8% was lost and in the third when 4.2% of body wt. of blood was lost. **III. Adrenaline and glycogen. Content in the liver and muscles before and after bleeding.** *Ibid* 870-5.—The glycogen content in the liver and muscle of a guinea pig was detd.; then the animal was bled to death and glycogen detd. again. There is a marked decrease in the amt. in the liver, with a corresponding increase in the muscles, showing that in bleeding adrenaline is liberated which causes a more intense change of glycogen into glucose. **IV. Influence of the suprarenal capsule on the splanchnic nerve.** *Ibid* 875-81. **V. Topography**

of hyperglucemia by blood-letting. *Ibid* 881-3.—The amt. of sugar in blood from various parts of the body has been detd. in a no. of dogs before and after bleeding. Though the av. sugar content is 1.16% of the total amt. of blood, the sugar found after bleeding at the carotids was 2.59%, cava superior at liver 4.95%, cava inferior at liver 2.42%, portal cavity 2.57%, renal vein 2.08%, iliac vein 2.12%, left ventricle 2.82%, right ventricle 2.85%. It is evident that the liver is the source of the sugar, although, particularly when food is present, the intestines are a secondary source of supply. A. W. C.

Studies on blood of overworked animals. I. Variation of the electrolytes. OSCAR M. BERMARDI. *Boll. soc. ital. biol. sper.* **2**, 895-7 (1927)—A dog under influence of narcotics which have been found not to affect the ionic equil. of blood was connected with an elec. current so as to stimulate the muscles on one side and samples of blood were taken after several hours stimulus. The blood was then analyzed. Na and Mg were found to diminish, while K, Ca, Cl and inorg. P increased. These same elements were detd. on the dry residue of samples of blood as well. In the latter case, Cl, Na and Mg decrease P (inorg.) increases, and Ca and K fluctuate so as to appear meaningless. Decrease in Cl agrees with observations of Aggazzotti who noted Cl decrease in a man after long marches on high mountains, while increase in inorg. P is logical from what is known of the metabolism of this element. A. W. CONTIERI

Effect of ligature of pancreatic ducts on the regulation of the glycogen titer. S. CACCURI. *Boll. soc. ital. biol. sper.* **2**, 918-22 (1927)—The pancreatic ducts of 4 dogs were ligated and every 15 days dextrose soln. was injected by way of the jugular vein and the free and combined sugar was detd. Two dogs died, but in the remaining after 75 to 90 days it was found that after injection of sugar the combined sugar increased while free sugar diminished, i. e., similar results as would result from insulin injection. Apparently, a tolerance for sugar is gradually acquired. The pancreas was found atrophied and changed almost wholly to connective tissue. A. W. CONTIERI

Influence of the spleen on the regulation of the glycogen titer. A. FRANCAVIGLIA. *Boll. soc. ital. biol. sper.* **2**, 922-4 (1927)—The free and combined sugar of the blood of 12 rabbits was detd. before and after splenectomy. Changes in sugar appear soon after removal and persist for 8-10 days before returning to normal. Injection of glucose soln. after splenectomy leads to a lowering in free sugar and an increase in the combined sugar. A. W. CONTIERI

The elimination of cholesterol in the urine. LUIGI COSTORELLI. *Chim. med. gen. e semeiotica Napoli. Polidimico sez. prat.* **33**, 179-98, *Chem. Zentr.* **1927**, 1, 1181—The work of Gardner and Gainsborough (*C. J.* **19**, 3526) is investigated, these authors not having considered sufficiently the difficult hydrolysis of cholesterol oleate. The latter must be boiled for a time with EtONa to bring about complete decomposition. The existence of esters of cholesterol sulfuric acid is not proved conclusively by G. and G. Expts. by C. indicate that the quantity of cholesterol in urine is related in some way to the blood cholesterol: blood fatty acid ratio. C. C. DAVIS

The nitrogen excretion of camels. HOMER W. SWIFT AND H. SILVERSTEIN. Univ. Virginia. *J. Biol. Chem.* **78**, 409-11 (1928)—The distribution of the N partition products in the urine of the Bactrian camel (*Camelus bactrianus*), the dromedary (*Camelus dromedarius*), the llama (*Lachenia huanacas*), and the alpaca (*Lachenia vicugna*) was the same as with other herbivora. Like results were found with a pregnant camel. Urea was in amts. of 55.69%, uric acid 0.3-1.8%, NH_3 1.7-4.5% (except in 2 cases), amino acid 0.2-2.1%, creatinine N 4.6-14.4%, creatine N 0.7-6.9%, and undetd. N 12.7-28.3%. These results are in contradiction to those of Read (*cf.* *C. J.* **19**, 3129). H. J. DEUEL, JR.

Observations of the rennin coagulation of milk. Effect of hirudin, of heparin, of cephalin and of fat removal. J. B. STONE AND C. L. ALSBERG. Stanford Univ. *J. Biol. Chem.* **78**, 557-72 (1928)—Hirudin and cephalin were both without influence on the rate of milk coagulation by rennin. Some preps. of heparin strongly inhibited the coagulation of milk while others were inactive. There is, therefore, no evidence that the inhibition of blood coagulation is related to the inhibition of milk coagulation. The active heparin preps. acted on the rennin rather than on the milk. The extn. of fat and lipid from the rennin soln. and allowing it to stand satd. with ether did not affect the coagulating power. Et₂O, EtOH and CHCl_3 inhibit the rennin coagulation of milk when present in the milk in sufficient quantity while benzene and petroleum ether are less effective. The effect is not due to a lowering of surface tension since saponin which does this is without influence on the coagulation. Neutralized soap soln. delays the coagulation, probably because of the removal of Ca since addn. of CaCl_2 prevents the effect. Milk skimmed by a separator coagulates less rapidly than gravity-skimmed milk. H. J. DEUEL, JR.

The rate of lactic acid formation in muscle contraction. G. EMBDEN AND E. LEHNARTZ. *Z. physiol. Chem.* **176**, 231-48(1928); cf. *C. A.* **21**, 2138.—The objections raised by Meyerhof (*Klin. Wochschr.* **6**, 1219) and by Meyerhof and Schultz (*C. A.* **22**, 108) that the high ratio of increase in lactic acid of frog muscle during stimulation in N to the lactic acid consumed during stimulation in O, as reported in the author's previous paper, are met by further expts. The contention that the semimembranous muscle is unsuitable for such expts., because its thickness does not allow rapid diffusion of O to the interior, is invalidated by similar results now reported with the sartorius muscle. The ratio is much higher than Meyerhof's oxidation quotient. The conclusions drawn in the author's previous paper are fully upheld. A. W. DOX

The action of extracts of mesenteric lymph glands on leucocytes. R. H. MOLE. *J. Path. Bact.* **29**, 107(1926); *Physiol. Abstracts* **13**, 17.—A saline ext. was prepd. from the mesenteric lymph glands of splenectomized rabbits. It produced a polymorphonuclear leucocytosis on injection into splenectomized rabbits, but no effect on normal rabbits. H. G.

Studies of the chemical mechanism of hydrochloric acid secretion. I. Electrolyte variations in human gastric juice. H. A. BULGER, C. M. STROUD AND M. L. HEIDEMAN. Washington Univ. *J. Clin. Investigation* **5**, 547-60(1928).—Relatively little change in the concn. of Cl in human gastric fluid attends acid secretion, but the total base falls proportionally to the increase in acid. The concn. of PO_4^{---} in gastric contents is usually greater than in serum, even when stimulation results in no HCl secretion. When much acid is produced, the concn. of PO_4^{---} falls. II. Observations on the blood passing through the stomach of dogs. H. A. BULGER, D. ALLEN AND L. B. HARRISON. *Ibid.* 561-71(1928).—As blood flows through a secreting portion of a dog's stomach, the total base increases while the Cl⁻ undergoes little change in concn. In gastric secretion, therefore, Cl⁻ leaves the blood with H_2O with retention of base which is neutralized in turn by HCO_3^- and organic salts. ARTHUR GROLLMAN

Role of oxidation in maintaining the dynamic equilibrium of the muscle cell. A. V. HILL. Univ. of London. *Proc. Roy. Soc. (London)* **B103**, 138-62(1928).—The resting heat rate of the sartorius muscle of the frog in O_2 agrees with the consumption of O_2 ; it is decreased by survival in O_2 , and by stimulation followed by recovery in O_2 . In the absence of O_2 , the min. resting heat rate is attained within 0.5 hr. in N_2 and is explained by production of lactic acid; it is increased immediately by stimulation (including electrocution or excessive elec. stimulation); and this increase may persist for many hrs. and may reach a high value with advanced fatigue. The increase is not due simply or mainly to increased formation of lactic acid, or to increased acidity of the tissues; other anaerobic catabolic changes occur. These effects of anaerobic stimulation are partially or completely reversed by recovery in O_2 . J. S. H.

Absolute value of the isometric heat coefficient T_1/H in a muscle twitch, and the effect of stimulation and fatigue. A. V. HILL. Univ. of London. *Proc. Roy. Soc. (London)* **B103**, 163-70(1928).—The isometric heat coeff. T_1/H has a mean value 6.16. The decompn. of phosphagen, a labile compd. of creatine and phosphate, and the accompanying production of heat apparently occur in a different manner *in vitro* and *in vivo*. JOSEPH S. HEPBURN

Absence of delayed anaerobic heat in a series of muscle twitches. A. V. HILL. Univ. of London. *Proc. Roy. Soc. (London)* **B103**, 171-82(1928).—In the absence of O_2 , the initial and the total heat production of a muscle twitch are very nearly equal. Therefore, little or no delayed anaerobic heat production and lactic acid formation occur. Lactic acid is produced entirely during contraction and relaxation. J. S. H.

Recovery heat production in oxygen after a series of muscle twitches. A. V. HILL. Univ. of London. *Proc. Roy. Soc. (London)* **B103**, 183-91(1928).—Measurement was made of the total heat set free as the result of a series of muscle twitches in O_2 and of a similar series in N_2 . The ratio of the heat in O_2 to the heat in N_2 had a mean value of 2.07. The oxidative quotient for lactic acid was found to be 4.81. The isometric heat coeff. of a muscle twitch was the same in O_2 and in N_2 ; therefore, the initial heat is entirely non-oxidative in nature. JOSEPH S. HEPBURN

The osmotic pressure of the contents of the vagina. F. WITTENBERG. *Arch. Gynakol.* **133**, 193-210(1928).—The osmotic pressure of the contents of the vagina varied between 4.27 and 18.46 atm. while that of the blood averages 7.72. The vaginal contents occasionally were isotonic with the blood, usually hypertonic but quite often hypotonic. HARRIET F. HOLMES

The state of calcium in the serum during the period of gestation. O. BOKELMANN AND A. BOCK. *Arch. Gynakol.* **133**, 308-30(1928).—In pregnancy there is a slight decrease in the total Ca content of the blood serum. At the onset of delivery the Ca

concn. in the serum is relatively high, but at the close of delivery returns to the low level of the last half of pregnancy and then slowly rises during the puerperium without reaching its former level. The diffusible Ca shows a fairly uniform relative increase during pregnancy. An abs. increase of concn. occurs only at the end of pregnancy and onset of delivery. At the close of delivery low values are found which gradually increase during the puerperium.

HARRIET F. HOLMES

The colloid structure of the plasma during gestation. I. The colloid stability of the plasma during the normal period of gestation. H. EUFINGER. *Arch. Gynäkol.* 133, 452-64(1928); cf. *C. A.* 22, 2612.—By the use of the Gerloczy reaction for stability it was shown that the colloid stability of the plasma decreases as pregnancy advances and reaches its lowest point during the puerperium. The increased lability of the colloids of the plasma during normal pregnancy indicates a measure of defense of the organism at this much threatened period as with increase in lability the power of the colloids to act as protective colloids is increased. II. The protein blood picture in pregnancy. H. EUFINGER AND R. SPIEGLER. *Ibid* 133, 465-74.—The total protein content of the blood serum is decreased in the last months of pregnancy and in the puerperium. There is a shifting of the proteins in the direction of the phases of coarse dispersion. There is a change in the albumin-globulin quotient, the globulins increasing at the expense of the albumins and euglobulin particularly showing a marked increase. The occurrence of an albuminuria in pregnancy and particularly *sub partu* is not an expression of an injury to the kidney but the indication of the elimination through the healthy kidney of non-utilizable protein material. III. The anchoring of cholesterol during the period of gestation. H. EUFINGER. *Ibid* 475-89.—In spite of a marked increase in total cholesterol during pregnancy, the cholesterol that can be removed directly from the serum by shaking with ether decreases as pregnancy progresses. Cholesterol, therefore, during pregnancy must be firmly anchored so only a relatively small part remains labile and easily removable. This changed anchoring of cholesterol depends on the colloidal changes in the serum in pregnancy. The amount of anchored cholesterol is dependent on the euglobulin present as protective colloid in the serum, so with high euglobulin content little cholesterol can be shaken out. The H₂O and salt content affect the labile cholesterol indirectly through their effect upon the proteins, particularly the euglobulin. IV. The biological significance for normal pregnancy of colloid alterations. H. EUFINGER. *Ibid* 490-503.—The changes in the colloidal structure of the plasma during pregnancy have an effect on the surface tension of the cells and tend to increase the permeability of the cell membranes which is responsible for the changed tonus of the blood vessels and the altered reaction of the blood vessels to vasoconstrictor substances such as adrenaline. The firmer anchoring of cholesterol in the serum is an important cause for the increased retention and altered excretion of cholesterol noted in normal pregnancy. Diuretic tests indicate that the pregnant organism is able to hold back the necessary mineral substances and thereby increase the ecucolloids of the blood. V. Colloid structure and the course of serological reactions. H. EUFINGER. *Ibid* 504-9.—In the toxicoses of pregnancy a direct v. d. Bergh reaction seems not dependent on the quant. correlation of the various proteins of the blood. However, there is a marked relation between a direct v. d. Bergh reaction and increased lability of the colloids and relative decrease of cholesterol of the blood. The delayed storing up of a dye like Congo red injected intravenously also seems dependent on the increased lability of the colloids acting as protective colloids. VI. The clinical symptoms of "Ödneklose" in their dependence on colloidal structure. H. EUFINGER AND R. SPIEGLER. *Ibid* 510-32.—The term "Ödneklose" was coined by I. Seitz to indicate the symptom complex of edema, nephrosis and eclampsia. The underlying basis for this condition is a general disturbance in the make-up of the colloids of the body and in many ways it seems related to the lipid nephrosis, unconnected with pregnancy. There is an excessive shifting of the colloids to the gel state, lipoiduria, edema and injury to the liver and kidney. The injury to the liver and kidney is secondary as there is not only an alteration of the cell colloids of these organs, but they are also the organs that receive and eliminate toxic products. One form of eclampsia, "lability eclampsia," is to be differentiated from "Ödneklose." "Lability eclampsia" is sudden in onset, edema is slight, lipoiduria is absent, there is seldom a direct v. d. Bergh reaction and colloid stability is high without shifting to the phase of coarse dispersion, a condition quite the reverse of "Ödneklose" but also probably dependent on alterations in the colloids of the body.

HARRIET F. HOLMES

The condition of the calcium of the serum in pregnancy. II. The relation between the mother and fetus. O. BOKELMANN AND A. BOCK. *Arch. Gynäkol.* 133, 739-46(1928).—The total Ca content and also the abs. concn. of dialyzable Ca are always

higher in blood from the umbilical cord than in the blood of the mother. The relative value of the dialyzable portion, however, is somewhat lower in the blood from the umbilical cord. The total Ca and the diffusible Ca are always higher in the blood from the Vena umbilicalis than in the blood from the Arteriae umbilicalis. The abs. Ca and the abs. concn. of diffusible Ca are higher in the Vena umbilicalis than in the venous blood of the mother. The passage of Ca from mother to fetus is not a case of simple diffusion through the placenta but probably involves active metabolic processes as well.

HARRIET F. HOLMES

Chemical and bacteriologic studies of the vaginal secretion in women at the menopause. R. KESSLER AND F. LEHMANN. *Arch. Gynäkol.* 133, 791-804(1928).—On the cessation of ovarian function the mucous membrane of the vagina does not show at once a diminished storage of glycogen, with a diminished acidity of the vaginal secretion and alteration in the vaginal flora, but the change to the atrophic vagina poor in glycogen is very gradual.

HARRIET F. HOLMES

Clinical studies of water and salt metabolism of pregnant women. J. BATISWEILER. *Arch. Gynäkol.* 134, 62-72(1928).—In the second half of pregnancy there is a distinct disturbance of H₂O metabolism as shown by the response to the H₂O test in which 1000 g. H₂O is ingested. The concn. of the urine is distinctly lowered for the first 12 hours. The ability of the kidney to concentrate the urine is retained and the lessened concn. is extrarenal in nature and is the result of the tendency to edema of the tissues in the latter half of pregnancy. The excretion of H₂O is normal or sometimes delayed. Administration of NaCl leads to a marked diuresis and to the excretion of the superfluous NaCl.

HARRIET F. HOLMES

The transportation and elimination of organic dyes by the animal organism. MILDRED R. ZIEGLER AND LAFAYETTE B. MENDEL. Yale Univ. *Am. J. Physiol.* 82, 299-317(1927).—Thirty-one dyes were injected intravenously into dogs, rats and rabbits; 24 were eliminated in the urine; 3 fat-sol. dyes, yellow AB, yellow OB and oil yellow, were conjugated and made water sol.; dinitroresorcinol and carmine, fat- and H₂O-insol. dyes, were the only ones not found in the bile. Amaranth, Martius yellow and methyl violet appeared in the pancreatic juice; none of the dyes was found in the saliva, even when the salivary glands were actively stimulated. Naphthol yellow S, crystal violet, methyl violet and ethyl violet stained the mucosa of the stomach and intestine; the cerebrospinal fluid was always free of dyes and leuco bases; the dyes were always found in the thoracic lymph; but never in the humors of the eye, unless the fluid had been previously withdrawn and allowed to reaccumulate, in which 5 of 7 tested stained the newly formed fluid.

J. F. LYMAN

Nerve metabolism. II. Respiration in oxygen and nitrogen. R. W. GERARD. Kaiser Wilhelm, Inst. of Biology, Berlin-Dahlem. *Am. J. Physiol.* 82, 381-404(1927); cf. C. A. 22, 454.—The O₂ consumption of resting frogs sciatic nerve continued const. for over 20 hrs. at 11 to 21 cm. O₂ per hr. per g. of nerve, av. 16 (winter *esculenta*) and 17 to 27, av. 23 (winter *temporaria*). Nerves from frogs taken in the spring gave higher values, 21 for *esculenta* and 28 for *temporaria*. Smaller nerves had a higher O₂ consumption than larger ones. Cutting or crushing a nerve or killing with CHCl₃ produced a temporary increase in O₂ consumption. Glucose and sodium lactate in small amts. had no effect; in larger amts. they inhibited respiration. KCN diminished but did not entirely abolish O₂ consumption. The temp. coeff., between 15° and 25°, was 2.2; the respiratory quotient for winter frogs was 0.77. A nerve stimulated continually practically doubled its resting metabolism. Intermittent stimulation, 22 secs. every 4 min., resulted in 3 times as much extra O₂ consumed as when stimulation was continuous. The respiratory quotient of the excess metabolism of activity was 0.97. The excess O₂ consumption did not appear and ceased sharply with stimulation but showed a lag of about 15 min., both to appear and disappear. A nerve kept in N₂ developed an O₂ debt. During 20 hrs. in N₂ a nerve produced about 10% as much CO₂ as during the same time in O₂. There seems to be present in nerves an oxidizing reserve which does not involve a lactic acid mechanism.

J. F. LYMAN

The regulation of respiration. XI. Effects of changes in alveolar oxygen pressure on tissue acidity and blood acidity. ROBERT GESELL AND ALRIK B. HERTZMAN. Univ. Mich. *Am. J. Physiol.* 82, 591-607(1927).—O₂ mixts. in N₂ were administered from rebreathing tanks by normal ventilation and by artificial ventilation. Changes in ventilation and O₂ consumption were recorded along with changes in acidity of the circulating venous and arterial blood, one MnO₂ electrode being placed in the external jugular vein and the other in the carotid artery. The results support the theory that augmented ventilation elicited by low alveolar O₂ is associated with increased intracellular acidity; that subsequent depression of ventilation from the administration

of room air is associated with a decreased intracellular acidity. **XII. The vagal reflex control of the respiratory movements of the isolated head. Peripheral mechanical and peripheral chemical factors.** ALRICK B. HERTZMAN AND ROBERT GESELL. *Ibid* 82, 608-20 (1927).—All connections between the head and trunk of an animal, except the vagi nerves, were severed; the head was kept alive, independent of the trunk, by connecting it in the circulation of a second animal. The severed trunk was kept alive by artificial respiration. The activity of the respiratory center of the isolated head was recorded through movements of the cricothyroid muscle which contracts with each movement of the lungs in the intact animal. The results support the significance of mechanical influences in eliciting reflex vagal effects on the respiratory center. The administration of CO_2 , of air low in O_2 and of NaCN to the isolated trunk produced inconstant and delayed reflex stimulation of the respiratory muscles of the isolated head. Similar administrations to the isolated head *via* the donor elicited prompt and constant stimulation of the respiratory movements in both the isolated head and the donor. J. F. LYMAN

The regulation of respiration. XIII. Effects of change in oxygen content of artificially administered gaseous mixtures on expired carbon dioxide and oxygen as studied with continuous electrometric methods. ROBERT GESELL AND DANIEL A. MCGINTY. Univ. Mich. *Am. J. Physiol.* 83, 323-34 (1927).—The results were in agreement with the theory of an acid mechanism of respiratory control. **XIV. The effects of hemorrhage and reinjection on expired carbon dioxide and expired oxygen as studied with continuous electrometric methods.** DANIEL A. MCGINTY AND ROBERT GESELL. *Ibid* 335-44.—Hemorrhage was found to give a prompt decrease in expired CO_2 and in retained O_2 . Reinjection momentarily increased CO_2 elimination, followed by a return to the prehemorrhage level. The period of CO_2 overshooting was accompanied by a corresponding over- O_2 retention which showed similar recovery to normal values. **XV. Effects of intravenous injection of sodium bicarbonate and sodium carbonate on expired carbon dioxide and expired oxygen as studied with continuous electrometric methods.** ROBERT GESELL AND DANIEL A. MCGINTY. *Ibid* 345-57. Na_2CO_3 intravenously administered caused decreased elimination of CO_2 and increased retention of O_2 , followed by gradual recovery. NaHCO_3 caused an increased elimination of CO_2 and increased retention of O_2 followed by gradual recovery. NaHCO_3 is thought to have a direct salt effect on the carbonate buffer system tending to drive CO_2 from the blood into the tissues and into the alveolar air. Na_2CO_3 increased the alkali of the cells. NaHCO_3 may temporarily increase the acidity. On that basis the respiratory movements associated with the administration of the salts may be explained by an acid mechanism. **XVI. The effect of intravenous injection of sodium cyanide on gaseous exchange and acid metabolism.** DANIEL A. MCGINTY AND ROBERT GESELL. *Ibid* 358-72.—The effects of NaCN on CO_2 elimination and O_2 retention varied somewhat. In general they appear to agree with an acid mechanism of respiratory control. J. F. L.

The regulation of respiration. XVII. Effects of intravenous injection of sodium cyanide on the acidity of the arterial and venous blood. ROBERT GESELL AND ALRICK B. HERTZMAN. Univ. Mich. *Am. J. Physiol.* 83, 421-34 (1928).—During normally controlled breathing the injection of 0.01 N NaCN was followed by an initial increased blood alkali, followed by progressively increasing acidity above the preinjection level. The final increased acidity varied from 0.04 to 0.4 μH . With constant artificial ventilation the initial alkali was missing and was replaced by increased acidity of the blood. The initial increased alkali was due probably to over ventilation of the lungs; the final increased acidity was due probably to a disproportionate increase in anaerobic metabolism over aerobic metabolism. The probability of increased cellular acidity resulting from disturbed oxidations and impaired acid transport support the view of the significance of intracellular acidity as a factor in control of ventilation. **XVIII. The effects of low and high alveolar oxygen and of sodium cyanide on the carotid and femoral flow of blood as studied with the continuous electrometric method.** THEODORE G. BERNTHAL, DETLEV W. BRONK, NARCISO CORDERO AND ROBERT GESELL. Univ. Mich. *Ibid* 83, 435-44 (1928).—The possibility of a central and peripheral acid mechanism of vol. flow control of the blood, modified by the paralytic action of reduced oxidation, is proposed. The results are not in disagreement with the view that metabolism of the vasomotor center may play a part in the control of vol. flow of the blood. J. F. L.

The effect of anoxemia on the size of the heart as studied by the x-ray. E. J. VAN LIERE. Univ. of Chicago. *Am. J. Physiol.* 82, 727-32 (1927).—Animals were placed in a steel respiratory chamber from which the air was partially exhausted (O_2 reduced to 2.5 to 8.7%), allowed to remain 3 to 4 min., immediately after which x-ray photographs of the heart were made. **Conclusion.**—Dogs, cats, rabbits and guinea pigs, subjected to anoxemia (2.5 to 8.7%), showed acute cardiac dilatation. J. F. L.

The total energy requirement of the albino rat for growth and activity. F. A. HITCHCOCK. Ohio State Univ. *Am. J. Physiol.* **83**, 28-36(1927).—The total food consumed by both mother and young during the first 30 days of life was 11.5 cal. per g. of gain for the control rats and 10.6 cal. for meat-fed rats (fed fresh meat once daily; otherwise fed like the controls). The control rats consumed 4271 cal. and the meat-fed rats 4197 cal. in doubling their birth rates. During the period from 30 to 90 days of age the caloric cost of one g. of gain was inversely proportional to the square root of the % increase in wt. The increase in food consumption due to physical activity was directly proportional to the cube root of the activity expressed in meters. J. F. L.

The metabolism of resting muscle. I. The respiratory quotient of resting muscle. HAROLD E. HIMWICH AND WILLIAM B. CASTLE. Harvard Univ. *Am. J. Physiol.* **83**, 92-114(1927).—The respiratory quotient of dogs muscle was detd. from the O_2 and CO_2 contents and capacities of arterial and venous blood. The av. corrected result for isolated muscles was 0.71 ± 0.10 ; for non-isolated muscles 0.77 ± 0.08 and for the expired air 0.80 ± 0.04 and 0.77 ± 0.03 , respectively, for the 2 groups. Resting muscle *in situ* oxidized, besides carbohydrates, either fat or protein or both, probably in the same proportions as does the rest of the body. The av. O_2 consumption of muscle per g. per hour in dogs weighing about 22 kg. was 0.36 cc. The O_2 consumption per g. of resting muscle is only 66% of that calcd. per g. of the entire animal. J. F. L.

Retention of intravenously injected fluid in fasting anhydremia and phlorhizin hydreemia. HENRY B. BARBOUR AND RAYMOND W. FRANKMANN. Univ. Louisville, Ky. *Am. J. Physiol.* **83**, 171-8(1927).—Dogs were fasted several days, inducing anhydremia, and fasted with phlorhizin, producing hydreemia. Glucose-free Locke's soln. was then introduced intravenously and its retention in the blood detd. through the sp. gr. of the blood. The introduced fluids were retained in the blood longer than in normally fed animals. **Conclusion**—The tissues of fasted animals, with or without phlorhizin, are less avid of intravenously injected fluid than during normal feeding. J. F. LYMAN

Activity. III. The influence of phosphate feeding on activity; the relation of blood sugar to activity. MARY SHIRLEY. Univ. of Minn. *Am. J. Physiol.* **83**, 377-83 (1928).—Phosphate feeding acted as a mild stimulant to spontaneous activity in the white rat. Correlation between blood sugar and activity seemed slightly negative. J. F. LYMAN

The respiratory response to carbon dioxide. PAUL PADGETT. Johns Hopkins. *Am. J. Physiol.* **83**, 384-94(1928).—When air containing an increased amt. of CO_2 was breathed, the max. increase in respiration occurred only after the mixt. had been breathed some time. There was no delay in raising the CO_2 content of the arterial blood. The lag in response of the respiration center to CO_2 is thought to be due to the time required to sat. the tissues (especially the respiratory center) to the new CO_2 tension. J. F. LYMAN

Phosphoric acid changes in worked mammalian muscle. LAURENCE IRVING. Stanford Univ. *Am. J. Physiol.* **83**, 395-405(1928).—Acid-sol. inorganic phosphates, organic phosphates, glycogen and lactic acid in muscles were detd. under various conditions. The agreement between lactacidogen, lactic acid and glycogen was excellent when the lactacidogen reduction of the worked muscle was distinct. In normal muscle there was no sign of agreement. J. F. LYMAN

The relationship of glycogen formation in the muscles to the pancreas and to adrenaline. YOUNG O. CHOI. Univ. Toronto. *Am. J. Physiol.* **83**, 406-14(1928).—When glucose was injected intravenously into eviscerated cats no change in the glycogen content of the leg muscles occurred. If insulin were injected simultaneously, or if the animals were not eviscerated, the injection of glucose was followed by an increase of glycogen in the muscles. The pancreas, therefore, is essential for the conversion of glucose to glycogen and for the storage of the latter in the muscles. Adrenaline did not stimulate the breakdown of muscle glycogen nor did it give rise to hyperglucemia in eviscerated cats. J. F. LYMAN

Calcium and ultra-violet irradiation. A. The effect of ultra-violet radiation upon serum calcium. B. Calcium utilization on a calcium-poor diet with ultra-violet radiation. LAWRENCE T. FAIRHALL. Harvard Univ. *Am. J. Physiol.* **84**, 378-85(1928).—Ultra-violet irradiation resulted in an increased Ca content of the blood serum both in dogs and rats. In rats on a low Ca diet ultra-violet irradiation increased the rate of growth to normal, but animals were produced which contained only about 50% as much Ca as normal animals. J. F. LYMAN

Muscular exercise under low barometric pressure. III. The output of carbon oxide. EDWARD C. SCHNEIDER AND ROBERT W. CLARKE. School Aviation Med.,

Mitchell Field, L. I., and Wesleyan Univ. *Am. J. Physiol.* **85**, 65-77(1928).—The vol. of CO_2 eliminated during phys. exercise was not changed by a reduction of barometric pressure; but the consumption of O_2 was decidedly lowered. This was probably caused by the "blowing off" of performed CO_2 when work is done at low barometric pressure.

J. F. LYMAN

Studies on the physiology of the hunger activity of the intestinal tract. V. Hunger contractions of the stomach in experimental hypothyroidism. A. G. KRATINOV AND F. N. KRATINOVA. *Zhurnal ekspl. biol. Med.* **8**, 561-8(1928).—Gastric activity is increased following thyroidectomy in dogs, and there is also evidence of strong bulimia. The gastric mucosa is edematous and there is an intensive mucus secretion.

S. M.

Minimum pressure of oxygen compatible with life. BEHAGUE, GARSIAUX AND CH. RICHEL FILS. *Compt. rend.* **186**, 1573-5(1928); cf. *C. A.* **21**, 2311.—Expts. with rabbits proved that there is a mean critical pressure for each percentage of O in the air breathed and that this pressure rises and falls with the percentage of O ; thus if the proportion of O ranged between 18 and 21% the fatal pressure was about 29 mm of Hg while if the percentage of O ranged between 61 and 89% the critical pressure was about 52 mm. of Hg. Under pressures below the critical the animal dies.

L. W. RIGGS

Simultaneous excitation of the external and internal secretions of the pancreas. E. GLEY AND R. HAZARD. *Compt. rend. soc. biol.* **99**, 16-8(1928); cf. Freud and Saadi-Nazim, *C. A.* **22**, 458.—Under the influence of pancreatic excitation due to secretin which is produced by the action of HCl on the duodenojejunal mucus, there is in general a secretion of insulin.

L. W. RIGGS

Buffer power of the saliva. A. D. MARENZI AND J. J. ROSSINGNOLI. *Compt. rend. soc. biol.* **99**, 176-8(1928).—Saliva has a slight buffer power as compared to that of the blood. The p_{H} variations of saliva are greater than those of blood.

L. W. RIGGS

Adrenaline content of the suprarenal capsules in total inanition. G. MOURIQUAND AND A. LEULIER. *Compt. rend. soc. biol.* **99**, 280-1(1928).—Guinea pigs receiving only water showed a reduction in their adrenaline output.

L. W. RIGGS

Wave-like variation of the contraction height of the skeletal muscle on introducing short periods of rest in its contraction series. KIYOSHI IWAKI. *Tohoku J. Exptl. Med.* **10**, 591-622(1928).—Expts. with frog gastrocnemius muscle exposed to air or immersed in Ringer soln. showed 22° to 26° as the most favorable temp. for the appearance of the wave-like oscillation. Conditions which act to hasten fatigue also act to hasten both onset and cessation of the waves of the summit line and vice versa.

L. W. R.

Some observations on pigment metabolism in the newborn. M. HINES ROBERTS. *J. Med. Assoc. Georgia* **17**, 143-8(1928).—The spinal fluid and blood serum of newborn negro infants were studied for pigment content. The van den Bergh test gave a positive "indirect" reaction in all serums and many of the deeper spinal fluids. The pigment content of the spinal fluid as measured by the icterus index varies directly with that of the blood serum and is approx. $1/140$ as great. The concn. of pigment in both serum and spinal fluid shows a gradual rise to the 4th day, then a gradual decline to normal by the 8th day. Clinical jaundice was not seen with icterus indices below 40. In intracranial hemorrhage the pigment concn. in the serum was only 30 times as great as in the spinal fluid.

R. C. WILLSON

BARCROFT, JOSEPH: *The Respiratory Function of the Blood. II. Haemoglobin.* London: Mills 12s. 6d., net.

GRADWOHL, RUTHERFORD B. H., AND GRADWOHL, IDA E.: *Blood and Urine Chemistry.* St. Louis, Mo.: C. V. Mosby. 542 pp. Cloth, \$10.

G—PATHOLOGY

H GIDEON WELLS

The lipid phosphorus-cholesterol ratio before and after feeding radiated eggs to tuberculosis patients. DUNCAN P. MCRAE AND THORSTEN INGVALDSEN. *Am. Rev. Tuberculosis* **17**, 520-1(1928).—No changes were found in the ratio of lipid phosphorus and cholesterol detd. in the patient's plasma by Bloor's method before and after feeding eggs radiated in thin layers for one-half hr. at a distance of 16 in. from a Hg quartz lamp. The findings were within the normal limits given by V. Meyer in a table of normal blood constituents. The clinical improvement noted could, therefore, not be attributed to a shift in circulating lipoids.

H. J. CORPER

Intense albuminuria exceeding greatly the protein content of the blood. W. STREPP AND F. PETERS. Univ. of Jena. *Deut. Arch. klin. Med.* **153**, 53-64(1926); *Chem. Zentr.* **1927**, I, 1034.—A case of congested kidneys with a fatal ending. The quantity of urine, which, with symptoms of severe heart insufficiency, at first increased by digitalis

suddenly diminished and acquired the consistency of a thick, almost clear, dark brown sirup of sp. gr. 1.112.2. The f.-p. depression of only 1.951° indicated a substance of high mol. wt. or colloidal. In a boiling test the whole mass coagulated. By pptn. with EtOH, coagulation by heat and addn. of $\text{Cl}_3\text{CCO}_2\text{H}$, 30.6, 26.4 and 28.7%, resp., of protein was obtained, the protein concn. thus exceeding that of the blood 3-4 fold. Salting out with Na_2SO_4 indicated 83.2% for the albumin fraction and 16.8% for globulin. The isoelec. point of the albumin fraction after 4 days' dialysis was at p_{H} 5.3 (by the Michaelis method). There was little inorg. material
C. C. DAVIS

The antigenic properties of lipoids. G. SOBERNHEIM. *Festschrift A. Tschirch* 1926, 431-4; *Chem. Zentr.* 1927, I, 2919-20.—Lipoids are capable of bringing about the formation of antibodies when small quantities of protein (hog serum) are added to lipid solns. obtained by extrn. with EtOH, C_6H_6 or other solvent. The antilipoid sera are completely non-sp., and act on the exts. of every substance contg. a lipid. The bacterial lipoids show a different behavior from the exts. of animal cells and organs.
C. C. DAVIS

Seasonal variation in the calcium content of infants' serum. H. BAKWIN and R. M. BAKWIN. *Am. J. Diseases Children* 34, 994-9(1927); *Expt. Sta. Record* 58, 493.—Detns. of the blood Ca of a large no. of sick and healthy babies from 3 to 24 months of age at monthly intervals from January, 1926, to March, 1927, inclusive, with the exception of July, August and September, showed a definite seasonal variation, the drop beginning during the late autumn, reaching the lowest point during the early spring months, and rising with the approach of summer. The values were consistently higher during the first three months of 1927 than of 1926, and the rise began earlier in 1927. Meteorological records showed more favorable weather conditions during February and March in 1927 than in 1926 in New York City, where the observations were made. The no. of infections during this period was also less.
H. G.

Study of the circulation in the normal and pathological kidney with Röntgenographic visualization of the arterial tree including the glomeruli. RALPH S. GRAHAM. *Am. J. Pathol.* 4, 17-31(1928); *Bull. Ayer Clinical Lab. Penn. Hosp.* 11, 58-73(1928).—Study was made of 48 human kidneys, removed at necropsy, injected with a radiopaque suspension contg. 17% BiOCl and 10% acacia in water, and subjected to Röntgenographic examn. Terminal values for urea N and creatinine were made on the blood taken at necropsy. The results failed to show a direct relationship between moderate arteriosclerosis and impaired renal function
JOSEPH S. HEPBURN

The bactericidal power of the blood of women during pregnancy and the puerperium. F. C. GELLER. *Arch. Gynakol.* 134, 141-4(1928).—The bactericidal power of the blood is markedly increased in the first 24 hrs. *post partum* and then slowly falls to normal. The bactericidal power of the blood, which is an unspecific resistance, was tested with hemolytic staphylococci according to Wright's method. It is probable that the increase in unspecific resistance after childbirth as well as at the close of menstruation is due at least in part to a resorption of cell or protein-split products from the wound surface of the puerperal or menstrual uterus
HARRIET F. HOLMES

Hypophysis and eclampsia. H. KÖSTNER. *Arch. Gynakol.* 133, 331-44(1928).—In eclampsia there is an increase in the activity of the hypophysis and an increased excretion of the hormone of the posterior lobe into the blood, which is toxic to the organism and brings about the symptoms typical of eclampsia, rise of blood pressure, kidney distribution, convulsions.
HARRIET F. HOLMES

The function of the liver in pregnancy. I. Storage of dyes in pregnancy. H. EUFINGER and C. W. BADER. *Arch. Gynakol.* 133, 720-32(1928).—In 100 cases of normal pregnancy and 33 cases of pathologic pregnancy 12-14 cc. of a 1% soln. of Congo red was injected intravenously and the concn. of the dye in the blood detd. 4 min. and 1 hr. after the injection. In normal pregnancy the storage capacity for Congo red is retarded, the retardation being particularly marked in the second half of pregnancy and *sub partu*. In the toxicoses of pregnancy retardation was especially great in cases of hyperemesis and icterus while in cases of nephropathy and eclampsia the results were not clear. The elimination of the dye depends not only on the condition of the reticulo-endothelial system but also on the chemico-physical structure of the blood. A delayed elimination of the blood was usually accompanied by an increase in colloid lability and a relatively low cholesterol content. The aldehyde reaction of Ehrlich is positive in both normal and pathologic pregnancies. A positive reaction is not specific for the presence of urobilinogen but indicates colloidal alteration of the blood in pregnancy. The almost regular presence of urobilin in the serum and urine during pregnancy, the increase of bilirubin in the blood and frequent occurrence of urobilinogen in the urine are an indication that in pregnancy the liver function deviates from the normal. H. F. H.

Effect of hyperthyroidism upon diabetes mellitus. FREDERICK A. COLLIER AND C. B. HUGGINS. *Ann. Surgery* **86**, 877-84(1927).—Great improvement of carbohydrate function follows thyroidectomy. The latter does not benefit carbohydrate tolerance in non-toxic thyroid states. Glucosuria in hyperthyroidism is an indication for the study of carbohydrate metabolism. FRANCES KRASNOW

Serodiagnosis of pregnancy with the Sdrodovskii modified Abderhalden test. M. LURIE, N. KOSAREV AND A. ROSENBLATT. *Bakteriol. Staatsinst., Baku. Z. Immunitäts.* **54**, 355-64(1928).—The Abderhalden test for pregnancy was made in the usual way except that the amt. of ninhydrin-reacting substances was quant. estd. The method was found to be sp. for the diagnosis of pregnancy. JULIAN H. LEWIS

The theory and method of the Wassermann reaction. MARGARETE STERN AND TONI FRANK. *Dermatologischen Universitätsklinik, Breslau Z. Immunitäts* **55**, 1-18(1928).—A study of a new method of complement titration for the Wassermann reaction. JULIAN H. LEWIS

Can guinea pigs produce a positive serum reaction and anaphylactic lipid antibodies from injections of homologous lipid and hog serum? LYDIA HENNING. *Univ. Hautklinik, Breslau Z. Immunitäts.* **55**, 19-33(1928).—Guinea pigs injected with alc exts. of guinea-pig kidney combined with hog serum were more sensitive to serum than were animals injected with serum alone. Thus the same results were obtained with homologous lipids as Klopstock obtained with foreign lipids. Occasionally the animals were sensitized with lipid alone. The guinea pigs injected with the lipid-serum mixt. did not give a positive reaction for syphilis (Wassermann, Sachs-Georgi, Meinicke). JULIAN H. LEWIS

The reproductive agent which changes the isoagglutination of red blood cells. V. FREIDENREICH. *Universitätsinst für allgem. Pathol., Kopenhagen. Z. Immunitäts* **55**, 84-101(1928).—The new and reproducing agglutinin that has been shown to develop in human blood on standing (*Z. Immunitäts* **52**, 87-107(1927)) is found to be nothing more than the effect of the growth of bacteria, 2 different organisms having been isolated that have this property. JULIAN H. LEWIS

Allergic reactions in hypersensitiveness to scabies. I. VON HÁNSZKY AND W. KREMER. *Pharmako-therapeut. Inst der Universität, Leiden. Z. Immunitäts* **55**, 102-6(1928).—Negative results in the passive transfer of local hypersensitiveness is no basis for placing asthma in a special class of allergic diseases, because, as is shown for asthma due to scabies and pediculosis, the passive transfer may be positive or negative depending on the stage of the disease. JULIAN H. LEWIS

The influence of the reticulo-endothelial system on the prophylactic effect of stovarsolan in spirochetal infections. P. I. RUBINSTEIN. *Mikrobiol. Forschungsinst des Volksunterrichtskommissariats R. S. F. S. R., Moskau. Z. Immunitäts* **55**, 107-17(1928).—The prophylactic effect and therapeutic action of arsenicals in spirochetal infections are entirely dependent on the functional efficiency of the reticulo-endothelial system. A dose of stovarsolan that is effective in 92% of normal animals is ineffective in 100% of animals after eliminating the reticulo-endothelial system either by blockade or splenectomy. If blockade is made during recurrent infection there is no sterilization in 42.5% and 12.7% die. "The action of the reticulo-endothelial system is to activate the chem. substances and is an independent function of the defense mechanism. JULIAN H. LEWIS

Chemospecific antigens. A. KLOPSTOCK AND G. E. SELTER. *Inst. für experimentelle Krebsforschung, Heidelberg. Z. Immunitäts* **55**, 118-41(1928).—The expts. of Landsteiner with chemically modified proteins were repeated and modified. By diazotization the original specificity is destroyed and antisera to this diazotized serum react with diazotized sera in general and independently of the source of the serum even if it be the immunized animal (rabbit). However, the antiserum reacts most strongly with the diazotized serum used for immunization. Serum combined with diazotized atoxyl and metanilic acid also produce sp. antisera which react little or not at all with the original serum. Bacterial protein combined with diazotized atoxyl forms a complex antigen. Rabbits immunized with it produce an antiserum that reacts in general with protein-atoxyl combinations although it also reacts with the native bacterial protein, showing that the atoxyl compd. retains its specie specificity. On the basis of the expts. made the ideas of Landsteiner on the nature of chemo-sp. antigens are questioned. An attempt is made to harmonize the facts with the results obtained with lipid-protein combinations. JULIAN H. LEWIS

Bacterial and antitoxin precipitins. E. HOEN, L. CHERTKOV AND V. ZIPP. *Staatlichen Bakteriolog. Inst., Odessa. Z. Immunitäts.* **55**, 149-50(1928).—Cultures of diph-

theria and cholera bacilli contain 2 different precipitinogens, the bacterial protein and the toxin.

JULIAN H. LEWIS

Further experiments on the action of serum on isolated vessel preparations. P. INTROZZI. *Forschungsinst. für Hyg. und Immunitätslehre, Berlin-Dahlem. Z. Immunitäts.* 55, 167-84(1928).—The action of normal serum from rabbits, cats, carp, guinea pigs, rats and eels on the blood vessels of rabbits, rats and guinea pigs was studied. The vaso-constricting substance was confined to the insol. albumin fraction of the sera. Ultra-violet light either weakened or destroyed the toxic action. There was no relation to temp. of the absorption of eel serum toxin by organ cells. The active substance in vaso-constricting sera was apparently not a complement-like thermolabile body. Serum taken at the height of digestion had the same activity as when taken during fasting. Serum from severe cases of human tuberculosis constricted, but not regularly, the blood vessels of tuberculous guinea pigs.

JULIAN H. LEWIS

Further experiments with anaphylaxis, especially passive anaphylaxis, studied with blood vessel preparations. E. FRIEDBERGER AND P. INTROZZI. *Forschungsinst. für Hyg. und Immunitätslehre, Berlin-Dahlem. Z. Immunitäts.* 55, 226-36(1928).—By means of the blood vessel perfusion method it is shown that an anaphylactogen loses its activity when heated 30 min to 100°. Radiation of a serum-eosin mixt with ultra-violet light destroys the sensitizing action of the serum without affecting its intoxicating properties. For guinea pigs sensitized with whole sheep serum the sol. albumin and euglobulin fractions are more active for intoxicating than the pseudoglobulin and insol albumin fractions. The perfusion method can be used for demonstrating passive as well as active anaphylaxis in guinea pigs and rats.

J. H. L.

Obtaining precipitating sera of high titer. W. GAEBTGENS. *Hyg. Staatsinst., Hamburg. Z. Immunitäts.* 55, 258-80(1928).—The intravenous injection of India ink in some instances increases the formation of precipitins. Sp. pptn. in an antigen-antiserum mixt. is increased and hastened in the presence of a lipid. Injections of lipoids can increase the production of precipitins but in about 1/2 of the sera unsp. antibodies render them useless for practical purposes. To find if this was due to the presence of 2 lipoids, that which was added and that already in the serum, a mixt. of heterologous lipid and serum extd. with ether was used for immunizing. However, the resulting antiserum was not any the less unsp. Immunization with mixts. of lipid and the sp. ppt. from antigen-antiserum mixts. produced an antiserum with increased species specificity. Dried serum free from lipid by extg. with alc. gave just as useful antisera as did native sera. The addition of homologous lipid to serum produced nonsp. antisera as often as when heterologous lipid was added.

JULIAN H. LEWIS

The concurrence of lipid antigens. A. KLOPSTOCK. *Inst. für exptl. Krebsforschung, Heidelberg. Z. Immunitäts.* 55, 304-11(1928).—Just as the body will not respond to a mixt. of 2 proteins as well as it will to them given separately, a phenomenon known as concurrence of antigens, so also will 2 lipoids show the same action. A concurrent action of Forssman heterogeneous antigen toward general organ lipoids could not only be demonstrated when the immunization was made with a mixt. of horse and rabbit kidney ext. and hog serum but when the horse kidney ext. and serum are injected at one place and the rabbit kidney ext. and hog serum at another place shortly afterward.

JULIAN H. LEWIS

The experimental basis of a preventive vaccination against cholera with toxoid. R. KRAUS AND N. NOVACS. *Staatl. Serotherapeut. Inst., Wien. Z. Immunitäts.* 55, 316-23(1928).—Expts. with guinea pigs indicate that the method should be tried with the human.

JULIAN H. LEWIS

Serological relation of tape-worm lipoids. H. SACHS AND A. KLOPSTOCK. *Inst. für experimentelle Krebsforschung, Heidelberg. Z. Immunitäts.* 55, 341-57(1928).—Rabbits injected with an aq. ext. of sheep tape-worms form lipid antibodies. Alc. exts. of the tape-worm have no antigen value when given alone but when mixed with hog serum are very active. The antiserum formed from the injection of the alc. ext. and hog serum reacts with the aq. ext. Complement fixation with antiserum and aq. ext. is inhibited at 0°, while with the alc. ext. the reaction is obtained at that temp. Antiserum to the alc. ext. and hog serum reacts with other organ exts. but not with lecithin, although an anti-lecithin serum shows that lecithin is present in the tape-worm alc. ext. The tape-worm substance contains not only sp. but undifferentiated lipoids whose activity is inhibited through the principle of concurrence of antigen.

JULIAN H. LEWIS

The influence of carcinomatous human serum on fermentation. G. LANDEGGER AND H. PIRKER. *Staatl. Serotherapeut. Inst., Wien. Z. Immunitäts.* 55, 358-63(1928).—In the serum of carcinoma patients, of pregnant women, and most healthy men there

is a substance that stimulates the fermentation of sugar by yeast. Normal leucocytes either inhibit this stimulating action or the fermenting properties of normal leucocytes is inhibited in the presence of carcinoma serum. The opinion is expressed that the stimulating action of serum on glucolysis is a condition for the development of carcinoma.

JULIAN H. LEWIS

Anaphylaxis with isolated blood vessel preparations using egg white as antigen. P. INTROZZI. *Forschungsinst. für Hyg. und Immunitätslehre, Berlin-Dahlem. Z. Immunitäts.* 55, 439-42(1928).—It has been claimed that the constriction of sensitized blood vessels perfused with sera is not anaphylactic in origin but is due to the primary toxicity of the sera and that no constriction is obtained in such preparations sensitized with egg white because egg white is not toxic to normal tissues (cf. Goldberger, *J. Exptl. Biol. Med.* (Russian) 1926, No. 4, 12). I find also that egg white causes no constriction of blood vessels in normal tissues but in tissues from sensitized animals a reaction appears as early as 48 hrs. after sensitization.

JULIAN H. LEWIS

The serological relation of the protein of a tissue fragment grown in a medium composed of plasma of another species. R. KIMURA. *Kaiser-Wilhelm-Inst. für Biol., Berlin-Dahlem. Z. Immunitäts.* 55, 443-4(1928).—Evidence is given, using immunological methods, that a tissue fragment grown a long time (18-55 days) in plasma of another species loses its species specificity and assumes that of the medium, although it is admitted that complete evidence fails because the large no. of controls required is not possible with the small amt. of material which tissue cultures afford.

J. H. L.

Chemospecific antigenic function in simple mixtures. II. A. KLOPSTOCK AND G. E. SELTER. *Inst. für experimentelle Krebsforschung, Heidelberg. Z. Immunitäts.* 55, 451-71(1928).—Simple mixts. of diazotized atoxyl and serum possess the chemospecific properties of the combination of diazotized atoxyl and serum as made by the complicated process of Landsteiner. A soln. of diazotized atoxyl undergoes changes on standing which renders it unable to combine with serum, but this changed soln. is yet able to bind antibodies for the combined serum-diazotized atoxyl. The change in chemospecificity of serum mixed with diazotized atoxyl does not take place immediately and the rate of change varies with unknown factors. Serum previously treated with alkalis, acids and alc. undergoes changes in the diazotized atoxyl mixts. better than native serum. The strongly sp. character of the change produced in these simple mixts. of serum and diazotized atoxyl was shown by comparison with similar mixts. made with diazotized Na metanilate. The loss of species specificity in atoxyl serum combinations as prepared by Landsteiner is attributed to the severe treatment of the serum of producing the compd. In simple mixts. species specificity is not lost. Such mixts. act as chemospecific antigens *in vivo* in rabbits as well as *in vitro*, but the serum used in the mixt. must be a foreign serum although the resulting rabbit antiserum will react with a rabbit-diazotized atoxyl mixt. Such an antiserum usually contains only chemospecific antibodies, but sometimes antibodies specific for the foreign serum are also present, and occasionally only the latter are found. This variable relation is attributed to concurrence of antigen. When the 2 types of antibodies are present they can be sep'd by selective absorption.

J. H. L.

The action of rabbit immune serum on cells *in vitro*. R. KIMURA. *Kaiser-Wilhelm-Inst. für Biol., Berlin-Dahlem. Z. Immunitäts.* 55, 501-11(1928). The serum of a rabbit injected repeatedly with a suspension of chicken embryos inhibits the growth of different embryonal cells *in vitro*, this action being on chicken as well as duck embryonal cells. The serum is injurious for cells already grown *in vitro*. Complement is not necessary for this toxic action. Heat and long standing weaken its activity. There is some species specificity of the cytotoxic serum in that it does not act on mouse or rabbit cells. The injection of embryo juice, chicken plasma, duck plasma or chicken leucocytes into rabbits does not produce an antiserum with the same cytotoxic action although it may have the same or higher precipitin titer as compared with the antiserum to embryo cells. Injections of embryo brains into rabbits produce an antiserum which is sp. for brain tissue of chicken or duck embryo cells. By injecting a cytotoxic serum into a rabbit an anti-cytotoxic serum can be produced.

JULIAN H. LEWIS

Viscosity of the blood in histamine shock. RUSSELL A. WARD. *Univ. of Chicago and Univ. of Western Ontario. Am. J. Physiol.* 84, 563-5(1928); cf. *C. A.* 21, 1301, 2502.—The fall in blood pressure in histamine shock was accompanied by a reduction in the viscosity of the blood.

J. F. LYMAN

Treatment of parathyroidectomized dogs with cod-liver oil. JOHN C. BROUGHNER. *Univ. of Oregon. Am. J. Physiol.* 84, 583-6(1928).—Feeding cod-liver oil to dogs whose parathyroids had been removed was very beneficial. It delayed the fall of blood Ca to the tetanic level, lessened the severity of tetany when it did occur and

finally resulted in a return of blood Ca to the normal level after 30 to 40 days' treatment.

J. F. LYMAN

The glucemia titer and its variations in eclampsia. O. M. BERNARDI. *Boll. soc. ital. biol. sper.* 3, 317-9(1928).—The av. blood sugar of 9 normal non-pregnant women was 0.080%; that of 5 normal pregnant women was 0.96%. The blood sugar of 4 pregnant women with eclampsia was also detd. from time to time. There was not a const. hyperglucemia. If the increased density of the blood is taken into account, B. found a lowering of blood sugar in some cases.

PETER MASUCCI

The elimination of oxalic acid in phlorhizin diabetes. P. DE LUCIA AND M. NAPOLI. *Boll. soc. ital. biol. sper.* 3, 324-6(1928).—The expts. were made on a young dog kept on a const. diet (350 g. bread per day). The urine was collected for a few days and oxalic acid detd. by the Salkowski method. After the av. daily elimination was established, diabetes was induced by means of phlorhizin, 10 cg. subcutaneously administered in oily suspension. The urine was tested for oxalic acid and glucose until the latter disappeared. The conclusions are that in phlorhizin diabetes there is an increase in oxalic acid elimination.

PETER MASUCCI

The influence of sensitization with lens protein on the formation of traumatic cataract in dogs. WILLY BENDER. Univ. of Leipzig. *Centr. Bakt. Parasitenk. I Abt.* 106, 7, 10(1928).—Injection of the lens of the eye with NaCl by the method of Solenkowsky (cf. Solenkowsky, *Klin. Monatsbl. Augenheilk.* 75) produced cataract in dogs, the extent of which varied directly with the concn. of the NaCl soln. Dogs which had previously received intraperitoneal or subcutaneous injections of exlens protein responded much more markedly.

JOHN T. MYERS

Specific cell stimulation. G. BESSAU AND C. DETERING. Univ. Leipzig. *Centr. Bakt. Parasitenk. I Abt.* 106, 11, 20(1928).—By sensitizing animals with small doses of serum (0.1 cc. intracutaneously) cell changes occur as manifested by local anaphylaxis without any type of free humeral antibodies. With larger doses cell sensitization can be demonstrated plus the slow formation of humeral antibodies. Apparently the primary action of an antigen is cell stimulation, the production of free antibodies coming later.

JOHN T. MYERS

Dyes as hemagglutinins. MARTIN GUTMANN. Univ. Breslau. *Centr. Bakt. Parasitenk. I Abt.* 106, 68, 73(1928). Washed human erythrocytes were agglutinated by all the basic dyes tried except fuchsin. Acid dyes had no effect. There was parallel serum flocculation. This may be due to the neutralization of the neg. charge on the erythrocytes by the acid dye. Expts. with acids and alkalies were unsatisfactory because they quickly destroyed the erythrocytes. Alc. inhibited dye agglutination. Aq. erythrocyte exts. gave no ppt. with the dyes. There are individual differences in cell agglutinability but no relation to Jansky blood groups.

JOHN T. MYERS

The Pfeiffer endotoxin concept and pathology. P. HUEBSCHMANN. *Centr. Bakt. Parasitenk. I Abt.* 106, 87, 99(1928).—The concept is very useful in explaining the mechanism of constitutional manifestations in many infections.

JOHN T. MYERS

The nature of "percutaneous immunization" against staphylococcus infections in rabbits. WERNER KOLLATH AND HEINRICH HERFARTH. Univ. Breslau. *Centr. Bakt. Parasitenk. I Abt.* 106, 120, 33(1928). A strain of staphylococcus was used which produced a phlegmon in rabbits. Its virulence was raised to a max. by 6 passages through the vitreous humor of the eyes of rabbits. The local application of Besredka filtrates, ordinary bouillon, peptone water, meat infusion, tryptophan, l-leucine, l-cystine, l-tyrosine and l-alanine had a protective effect against intracutaneous injections. Dry and moist heat was without influence. It is possible that the inhibiting effect of peptone is due to the local formation of histimine or histidine. Casein, uric acid and allantoin had no effect. The local resistance is non-specific and not due to true immune reactions.

JOHN T. MYERS

Bactericidal and growth inhibiting action of blood on tubercle bacilli. GERTRUD MEISSNER. Univ. Breslau. *Centr. Bakt. Parasitenk. I Abt.* 106, 210-36(1928).—The blood of tuberculous guinea pigs and rabbits contains a more strongly inhibiting substance against the tubercle bacillus than does that of normal animals, while that of scorbutic animals contains less than the av.

JOHN T. MYERS

The relationship between the amount of thermostable and thermolabile agglutinin in the blood of typhoid patients and the clinical course of typhoid fever. LEO OLITZKI. Hadassah Med. Organization, Safed, Palestine. *Centr. Bakt. Parasitenk. I Abt.* 106, 247-59(1928).—The typhoid bacillus has two agglutinins, a thermolabile (H) antigen from the ectoplasm, and a thermostable (O) antigen coming from the endoplasm. There is no relationship between the clinical course and the H agglutinin curve. In severe cases of typhoid the O agglutinins are absent or the titer is very low. In mild cases there

is usually a large amt. of O from the beginning; if absent the case is apt to become severe later.

JOHN T. MYERS

The influence of complement on agglutination, precipitation and bacteriophage action. LEO OLITZKI. Univ. Breslau. *Centr. Bakt. Parasitenk. I Abt.* **106**, 259-67 (1928).—Complement enhances the action of O (thermostable) agglutinins. Inactivation favors bacteriophage action.

JOHN T. MYERS

The formalin resistance of agglutinins. LEO OLITZKI. Hadassah Medical Organization, Safed, Palestine. *Centr. Bakt. Parasitenk. I Abt.* **106**, 267-78 (1928).—The group of HCHO-resistant agglutinins contains all of the H (thermolabile) agglutinins of the typhoid, paratyphoid and proteus groups of bacteria, and the normal H agglutinins of ox serum. The HCHO-non-resistant group of agglutinins contains the O (thermostable) agglutinins of the above bacteria, all normal O agglutinins, those of all non-motile bacteria, and the X19 proteus agglutinin, of typhus patients (Weil-Felix reaction). The X19 agglutinins are very labile, being destroyed after a few days exposure to HCHO. This will distinguish between X19 and specific proteus agglutinins. Formalin destroys the agglutinophore and leaves the haptophore group unchanged.

J. T. M.

The properties and action of anthrax immune serum. ALFRED PATTERSON. Carolinian Inst. Stockholm. *Centr. Bakt. Parasitenk. I Abt.* **106**, 295-300 (1928). Anthrax immune serum contains agglutinins, precipitins and complement binding bodies; but not lysins or opsonins. The exudate about the lesions of infected animals contains a neg. chemotactic substance for anthrax bacilli. Immune serum contains substances which enhance the action of this substance, which are the only immune substances of protective value.

JOHN T. MYERS

The further development of the knowledge of endotoxins. WOLFGANG WEICHARDT. *Centr. Bakt. Parasitenk. I Abt.* **106**, 342-8 (1928).—Buere neg. exts. of typhoid bacilli were prepd. by the method of Abderhalden (Cf. Abderhalden, *Handbuch der biol. Arbeitsmethoden*. Abt. XIII Teil II). When hemolytic streptococci were grown in Tyrode soln., with Na asparaginate as a source of N and glycerol as a source of C, the addn. of 0.1% of such ext. stimulated growth definitely. Under similar conditions the growth of diphtheria bacilli was markedly increased. The contraction of perfused fatigued heart muscle was definitely stimulated. Further similar work may throw light on the mechanism of infectious processes.

JOHN T. MYERS

Low-temperature hemagglutinins (frigid agglutinins). I. YU. Medical High-school, Keijo, Seoul. *Centr. Bakt. Parasitenk. I Abt.* **106**, 388-96 (1928).—The hemagglutinins which react only at 0° are different substances from those which react at body temp.

JOHN T. MYERS

The acid agglutination of influenza, pertussis and Koch-Weeks bacilli. BERNARD FISCHER. Univ. Breslau. *Centr. Bakt. Parasitenk. I Abt.* **106**, 417-25 (1928).—All of these organisms are acid agglutinable, the optimum being between pH 3.5 and 5.5. There is a marked variation among various strains. Virulence is directly proportional to agglutinability. Acid agglutination will not distinguish between different species, Bact. Cohen and Bact. canis being as readily agglutinable as true Pfeiffer bacilli. Acid-agglutinated organisms washed with isotonic NaCl soln. are still agglutinable by immune serum.

JOHN T. MYERS

A new tuberculosis antigen. R. ZDRAŽIL. Agr. School, Olmutz. *Centr. Bakt. Parasitenk. I Abt.* **107**, 95 (1928). One kg. of ground tuberculous human lung is mixed with 1 l. of water and allowed to stand 3 days, being brought to boil several times. The filtrate is evapd. to dryness on a water bath. Each 30 g. of dry residue is extd. with acetone for 6 to 7 days, filtered, the residue dried at 37°, extd. with 50 cc. of MeOH for 10 to 12 days, filtered, and the filtrate stored in rubber-stoppered flasks in 5 to 10 cc. ams. It gives a ppt. with ether serum or plasma. Lues occasionally reacts but not arteriosclerosis.

JOHN T. MYERS

Studies on the mechanism of Trichinella infestation. II. The influence of glycogen on muscle invasion. JULIAN H. LEWIS. Univ. Bâle. *Centr. Bakt. Parasitenk. I Abt.* **107**, 114-26 (1928).—In *Trichinella* invasions in guinea pigs, the masseter muscles and the diaphragm are attacked by preference. These have much less glycogen than those which are nearly exempt, i. e., the muscles of the extremities. Repeated *Trichinella* feeding at short intervals (2-5 days) leads to a continued migration into the same muscles until an overwhelming no. of fibers contain parasites. A marked previously existing infestation in a given muscle, with its accompanying disturbance of metabolism and function, and loss of glycogen, will not protect the intact fibers from further invasion from the blood stream. Large ams. of glucose by mouth hinder the passage of the parasites from the blood to muscle. Insulin has the opposite effect.

JOHN T. MYERS

Lipoid antibodies. II. Lipoid antibody formation after parenteral injection of

milk and milk products. FELIX KLOPSTOCK. Kaiser Wilhelm Inst. Biochem., Berlin-Dahlem. *Centr. Bakt. Parasitenk.*, I Abt. 107, 127-32(1928); cf. C. A. 22, 1390.—Casein called forth no lipid antibodies. Lactalbumin and alc. milk ext. gave a slight response. Whole milk gave a very active, and butter an extremely active, response. None of these substances was biologically pure. Calf tallow, lard and olive oil were somewhat antigenic. **III. Lipoid antibodies following parenteral injections of amino acids and polypeptides.** *Ibid* 129-32.—Injections of glycine, alanine and leucine produced lipid antibodies, but tyrosine did not. The dipeptides, glycylserine and leucylglycine, the tripeptide, diglycylglycine and the tetrapeptide, alanyldiglycylglycine called forth lipid antibodies. These substances probably unit with body cell or fluid constituents, causing changes which give the serum an affinity for lipoids. This may give rise to colloidal changes which make possible a colloidal reaction with lipoids as antigen.

JOHN T. MYERS

The relationship of "floccular" and "granular" types of agglutination to each other and to specificity. K. AOKI. Univ. of Sendai. *Centr. Bakt. Parasitenk.* I Abt. 107, 428-31 (1928).—In many instances the sp. agglutinins produce large floccules and the non-sp. ones, small granules, but the opposite occasionally holds. With *B. cholerae suis*, both sp. and non-sp. agglutinins produce floccules. After flagellated bacteria are heated, they produce floccular instead of granular agglutinins. The specificity of agglutinins must depend on the physico-chem. constitution of the homologous organism, and is not related to the flagella or to the ectoplasmic layers.

JOHN T. MYERS

Serological studies of schistosomiasis japonica. S. MIYAJI AND B. IMAI. Med. School, Niigata, Japan. *Centr. Bakt. Parasitenk.* II Abt. 73, 237-46(1928).—With emulsions of adult worms, complement-binding and precipitating substances can be detected in the blood of exptl. animals. The emulsions are not heterogenetic antigens. An isotonic NaCl ext. is much more strongly antigenic than an alc. ext. The latter often gives a pos. reaction with a syphilitic serum, while the former does not. In endemic regions the antibodies are often present in apparently normal individuals.

J. T. M.

Contribution to the study of isohemoagglutinins from the medico-legal standpoint. KAN-ITIVOSIDA. *Ann. méd. légale (criminol. police sci.* 8, 249-54(1928).—A study of the phenomena of isohemoagglutination led to the following conclusions. (1) most serous liquids, and also those secreted by the human body, have specific isohemoagglutinins of the same type as those of the blood serum; (2) all the cells of the human body possess the power of attracting and hold specific isohemoagglutinins of the same type as the blood serum; (3) all serous and secreted liquids and all exts. of internal human organs contain a substance which represses the agglutinating power of isohemoagglutinins towards agglutinogens.

A. PAPINEAU-COUTURE

Hemotoxin of the venom of *Synanceja horrida*. J. V. DUHIG AND GWEN JONES. *Australian J. Exptl. Biol. Med. Sci.* 5, 173-9(1928).—The venom of *Synanceja horrida* (stone fish) by itself produces lysis of guinea pig, sheep and human red cells, without the assistance of lecithin or alexin. Fresh unheated serum, when added to cells of the same species, inhibits hemolysis of guinea pig, sheep and human red cells by this venom. In the case of guinea-pig serum, a very high diln. is sufficient to protect against a min. hemolytic dose. Human serum, besides protecting against lysis of cells of its own species, also protects sheep cells. Guinea-pig serum heated to 55° for 20 min. inhibits hemolysis, but the same serum heated to 60° for 30 min. does not completely inhibit hemolysis. Lecithin can reactivate venom, the cytolytic power of which has been inhibited by fresh serum.

L. W. RIGGS

Non-colloidal substances with cryptotoxic properties. H. VINCENT. *Compt. rend.* 186, 1175-7(1928); cf. C. A. 19, 2701; 20, 3187.—Antipyrine, pyramidone and Na salts of acids of the benzenic or hydroxybenzenic series when forming colloidal solns. have the power of neutralizing tetanus toxin when added to a prepn. of the latter. Na salicylate has a remarkable power of neutralizing tetanus toxin as shown by tests with guinea pigs. Rabbits show pronounced resistance to repeated inoculations of the complex toxin-salicylate. Non-colloidal substances such as Na salts of benzoic, hippuric, butyric, pyruvic and mucic acids have a slight neutralizing power on tetanus toxin as compared with colloidal Na salicylate. These findings furnish a partial explanation of the beneficial action of Na salicylate in the treatment of toxo-infectious maladies.

L. W. RIGGS

Application of the acetone method to the study of the distribution of the antibodies in agglutinating serums in the course of immunization. MAURICE PIETRE and ANDRÉ CHRÉTIEN. *Compt. rend.* 186, 1240-2(1928); cf. C. A. 22, 810, 1393, 1610.—The agglutinating power appears to be attached to the serum globulin during the first phases of agglutination and in the later phases to the serum albumin. An

increase in the total ext. obtained by acetone and especially of the serum albumin corresponds to an increase in the agglutinating power L. W. RIGGS

Ultrafiltration of diphtheria toxins. F. PRZESMYCKI, L. LIPOWSKI AND ST. SIERAKOWSKI. *Compt. rend. soc. biol.* **98**, 1231-2(1928).—By the method of Beckhold-König, the ultrafiltration of diphtheria toxins proved that certain filters allowed all of the toxin to pass, others allowed none. Advantage of these facts was taken to purify and concentrate diphtheria toxins to some extent L. W. RIGGS

Natural antibodies and placental permeability. L. NATTAN-LARRIER, G. RAMON AND P. LÉPINE. *Compt. rend. soc. biol.* **98**, 1279-81(1928).—Pseudo-globulin is the principal if not the only carrier of the anti-trypanosomic substance of the human serum, while euglobulin is the carrier of antishoop hemolysins of human blood. Both the anti-trypanosomic and hemolytic substances are incapable of traversing the placenta. On the other hand the placenta is permeable to artificial antibodies, diphtheria toxin and tetanus toxin. L. W. RIGGS

Content of glutathione in the testicles of thyroidectomized guinea pigs. ANSELMO CRUZ. *Compt. rend. soc. biol.* **98**, 1588-90(1928).—The glutathione content in the testicles of 17 normal animals ranged from 134 to 194 mg. per 100 g. of tissue. In 13 thyroidectomized animals the range was from 115 to 199 mg., and the time between thyroidectomy and the detn. of glutathione ranged from 1 to 35 days. L. W. RIGGS

Alkaline reserve in the blood of the tuberculous guinea pig. LOPO DE CARVALHO AND FERREIRA DE MIRA FILS. *Compt. rend. soc. biol.* **98**, 1596-8(1928).—During the early stages of the disease the alk. reserve does not differ from normal. In the last phases and as death approaches there is a fall in the alk. reserve. **Alkaline reserve of the blood in pulmonary tuberculous patients.** *Ibid.* 1598-600. In patients with tuberculosis the alk. reserve of the blood tends to diminish and this diminution becomes more pronounced with the advance of the disease. This is explained by the changed metabolism of proteins and incomplete oxidation of org. acids produced in the course of disassimilation. This results in an excess of ammoniacal N and the presence of ketonic substances in the urine, indicating a state of acidosis. The alk. reserve varies with the amelioration or aggravation of the disease. L. W. RIGGS

Reducing power of the tissues of the tuberculous guinea pig. FERREIRA DE MIRA FILS. *Compt. rend. soc. biol.* **98**, 1611-2(1928).—The reducing power of the tissues during the period characterized by infiltration in the node of inoculation remains about normal. When the animal was in the state of general infection the reducing power fell from 10 to 23% in the 18 animals tested. L. W. RIGGS

Urobilinemia in the dog after hepatectomy. E. CORNEJO SARAVIA AND M. ROYER. *Compt. rend. soc. biol.* **99**, 171-2(1928).—The contradictory results of expts. with 4 dog are discussed. L. W. RIGGS

Muscular lactic acid in rats derived of suprarenals. P. MAZZOCCO. *Compt. rend. soc. biol.* **99**, 174-6(1928), cf. *C. A.* **22**, 630. The av. muscular lactic acid after tetanization for 1 min. was greater in rats deprived of suprarenals than in controls, but the differences were less than those obtained in a previous study. L. W. RIGGS

Chemical tests of the blood. Indications and interpretation. REED ROCKWOOD. *J. Am. Med. Assoc.* **91**, 157-66(1928).—To avoid unnecessary chem. detns. with expense to the patient or hospital, the following suggestions to the physician are made: (1) Never ask for both non-protein N and urea tests in the same patient. (2) Except in emergency, never ask for a non-protein N detn. when the excretion of phenolsulfonephthalein is normal. Det. the output of phenolsulfonephthalein first. (3) Never ask for the creatinine value of the blood unless the non-protein N content is above 60 mg. per 100 cc. Then det. the creatinine as a matter of routine. (4) Det. uric acid only in cases of gout or suspected gout. (5) Det. blood sugar in cases only of diabetes, suspected diabetes or hypoglycemia. (6) Test the CO₂-combining power of the plasma in (a) diabetic patients with diacetic acid in the urine; (b) uremic patients with N retention and dyspnea; (c) patients showing toxic symptoms who are receiving large doses of alkali; (d) patients with conditions assocd. with disturbed motility of the gastrointestinal tract with marked toxemia; (e) all types of tetany. (7) Chloride, non-protein N and CO₂-combining power detns. should be made in all cases of disturbance of gastrointestinal motility with marked toxemia. (8) Ask for serum bilirubin or icterus index tests in cases of jaundice, but do not pay too much attention to borderline values. (9) Ask for blood Ca detns. in cases only of tetany of unknown origin. (10) Inorg. P tests, if practicable, are necessary in cases only of rickets and infantile tetany. L. W. RIGGS

Microchemistry of nuclear inclusions in virus diseases. F. V. COWDRY. *Science* **68**, 40-1(1928).—This paper reports the reactions of nuclear inclusions to the Bensley-

Macallum test for masked Fe, also the Feulgen reaction and a few of the solys. of these inclusions. The test for Fe was neg. with inclusions of chicken-pox, herpes, Virus III disease of rabbits and the salivary gland disease of guinea pigs. The Feulgen reaction (cf. C. A. 21, 2138) was described and its application to the inclusions above named gave negative results except with the inclusions of the submaxillary glands of the adult guinea pig toward which the reaction was doubtful. The evidence indicates that positive results with the Feulgen reaction are given only by substances contg. thymonucleic acid. It appears that the reaction is sp. and elective for a distinctive nuclear component of some kind.

L. W. RIGGS

Precipitins produced by treatment with aqueous extract of fowl sarcoma. HARUJIRO YOSHIKAWA. *Sei-ikwa Med. J.* 47, No. 3, 3-4 (1928).—Antiserum was obtained by means of repeated intravenous injections with the aq. ext. of minced fowl sarcoma tissue in a rabbit. The mixt. of antisera thus obtained and an aq. ext. of fowl sarcoma gives a marked precipitin reaction. Normal serum gave no precipitin reaction with the aq. ext. of fowl sarcoma. The mixt. of antisera and the ext. of skeletal muscles of an untreated normal fowl produces no ppt. Accordingly blood serum of rabbits immunized with aq. ext. of fowl sarcoma gives sp. ppts when mixed with aq. ext. of fowl sarcoma.

L. W. RIGGS

Gastric lipase in various stomach diseases. KUNIO ANDO. *Nagaya J. Med. Sci.* 2, 103-6 (1927).—The influence of the acidity on the gastric lipase content of the gastric juice was studied. The gastric juice was collected in the morning 1 hr. after a test meal of 80 g. white bread and 200 cc. water. The p_H was estd. according to Michaelis' indicator method, while the activity of the lipase was detd. by Ogawa's modification of the tributyrin method of Michaelis and Rona. One-cc. phosphate buffer of p_H 5.7, which is the optimal acidity for the gastric lipase, was mixed with 8-cc. tributyrin soln. and 1-cc. gastric juice diluted with 19-cc. water, and the decomposition of the tributyrin observed. The lipase was not decreased in hyperacidity (p_H 1.1-1.5) and gastric ulcer (p_H 1.2), while in anacidity, gastric cancer and other diseases with a p_H above normal, it was considerably lowered.

G. SCHWOCH

The plasma proteins in leprosy. M. H. NEILL AND MARGARET M. DEWAR. *U. S. Pub. Health Service Pub. Health Bull.* 168, 1-20 (1927).—A quant. study on the plasma proteins of patients suffering from leprosy as compared with those of healthy persons. The plasma proteins were detd. by Wu's method. The controls showed an av. of 0.33% fibrin, 5.23% albumin, 2.29% globulin, the value of the total proteins thus being 7.52%, and the ratio albumin:globulin being 2.4. The total proteins stayed about the same in the leprosy cases, while fibrin was increased and the albumin:globulin ratio was lowered. In the cases with few or no leprosy bacilli and with patients in poor condition, the av. values were: fibrin 0.40; albumin 4.15; globulin 3.35; total proteins 7.50; albumin:globulin ratio 1.2. In cases with numerous leprosy bacilli and with patients in poor condition, fibrin was 0.44; albumin 3.94; globulin 3.55; total proteins 7.49; albumin:globulin ratio 1.1. Improved cases showed the values of fibrin and globulin returning to normal. In acute leprosy fever, a fibrin value of 0.60 and an albumin:globulin ratio of 0.9 was found. In some cases of advanced active pulmonary tuberculosis compared with others in an improved state of the same disease, fibrin values of 0.49 and 0.31, resp., and albumin:globulin ratios of 0.9 and 1.0, resp., were found. The total proteins were low in both stages (6.73 and 6.57, resp.); also in patients with acute broncho-pneumonia, the total proteins were low (6.00), fibrin was high (0.56) and the albumin:globulin ratio low (0.8). Numerous references are given.

G. SCHWOCH

The amount of lipase in the blood serum of lepers. M. H. NEILL AND MARGARET M. DEWAR. *U. S. Pub. Health Service Pub. Health Bull.* 168, 21-7 (1927).—The investigations were carried out to check Rogers' statement that untreated cases of leprosy showed a greatly reduced lipase content of the blood serum (*Lancet* I, 1207 (1924); C. A. 17, 3707). The technique employed was very similar to the one described by Rogers, the liberation of butyric acid from ethyl butyrate serving as indicator of the quantity of lipase present in the blood serum. The butyric acid was titrated with 0.02 N NaOH. It was found that, in general, the leprosy cases, whether improving or not improving, showed a normal content of blood lipase. Chaulmoogra ester injections did not increase the blood lipase. Low amts. were found only in some acute exacerbations of leprosy, besides this, in some cases of advanced pulmonary tuberculosis and liver diseases.

G. SCHWOCH

The effect of venous stasis on the proteins of blood plasma and on the rate of sedimentation of the red blood corpuscles. E. D. PLASS AND M. D. ROURKE. *J. Lab. Clin. Med.* 12, 735-41 (1927).—Prolonged venous stasis leads to blood dehydration and to an increase of plasma proteins. The fibrin, globulin and albumin are each increased

and to a greater extent than can possibly be accounted for by concn. of the plasma alone. The increase in the separate proteins is not equal to each other, nor is any one consistently higher or lower than the others. These authors believe that certain catabolic products formed in the tissues by the anoxemia imposed by the venous stasis act upon the cell membranes of both capillaries and tissue cells, increasing their permeability to protein. It is suggested that the lymph fluid has increased in protein content by diffusion of protein from the cytoplasm of the tissues which it surrounds, and that this lymph fluid, having become higher in protein than normal plasma, subsequently loses protein to the plasma, thereby increasing the total plasma proteins. The marked increase in fibrin during venous stasis points to reserve fibrin in the tissues. The sedimentation rate is increased by prolonged venous stasis and it is suggested that the increase is probably due chiefly to increased fibrin. Care should, therefore, be exercised in the use of the tourniquet or other constriction during the taking of blood upon which the sedimentation rate or plasma proteins are to be detd. E. W. W.

Methods for making a stable emulsified syphilitic antigen. FREDERICK PROESSCHER, ALBERT ARKUSH AND ALBERT KRUEGER. *J. Lab. Clin. Med.* 12, 908-11(1927).—Prepn. of "chloroform antigen I" and "chloroform antigen II" is described. These antigens were neither anticomplementary nor hemolytic in doses of 1 cc. of the undiluted antigen, and possess great stability of their antigenic properties. No expts. were encountered which would not keep for at least one year. ETHEL W. WICKWIRE

The origin and nature of the Wassermann antigen. L. G. HADJIOPOULOS AND REGINALD BURBANK. *J. Lab. Clin. Med.* 12, 973-8(1927).—Antigens cannot be considered as homogeneous material, but are composed of: (a) the "immunogenic," i. e., immunity-exciting or antibody-producing fraction, a property residing in the protein mol., and (b) the "immunophilic," i. e., the antibody-fixing property residing in the lipin mol. This theory applied to the heart muscle tissue proved correct by artificially inducing the Wassermann reagin in exptl. animals by the parenteral introduction of the immunogenic fraction and the subsequent fixation of the latter by the immunophilic lipin fraction. **The duality of the antigenic nature of erythrocytes.** *Ibid.* 979-82.—The same principle was applied in the case of sheep's erythrocytes and found strictly correct, thus demonstrating the dual nature of similar antigens. E. W. W.

"Acetone body" formation and the chemical affinity of oxygen for carbohydrate and fatty acid. DWIGHT M. ERVIN. *J. Lab. Clin. Med.* 12, 1059-65(1927).—The explanation offered for the chemistry of the "acetone bodies" is independent of the theory of the oxidation of glucose (lactic acid) and is applicable to all pathol. states where the quantity of fatty acid to be oxidized rises above a given ratio of 0 per mol. of fatty acid. ETHEL W. WICKWIRE

The relative diagnostic value of the Levinson test and the glucose content in cerebrospinal fluid. ALFRED S. GIORDANO AND MARJORIE ABILSON. *J. Lab. Clin. Med.* 13, 489-95(1928).—Low glucose values are not diagnostic of tuberculous meningitis, even in the absence of pyogenic organisms, and the percentage of false reactions in the Levinson test is too high to be of positive diagnostic aid. The glucose content of the cerebrospinal fluid yields valuable diagnostic information when correlated with all possible available clinical data. The chloride content in tuberculous meningitis is less than 700 mg. and not const. in other conditions. ETHEL W. WICKWIRE

A method of differentiating different types of cooked meat by the precipitin reaction (ROSENBERG) 12.

H—PHARMACOLOGY

A. N. RICHARDS

A home-made preparation of iodized oil for opaque injections of tuberculous sinuses. CLARKE BLANCE AND HARVEY R. LIVESAY. *Am. Rev. Tuberculosis* 17, 481-8(1928).—The details are given for the prepn. of iodized oil from mazola oil (corn oil). This new prepn. of iodine will penetrate into very small sinuses where Ia or Bi will not go if thick enough to cast a shadow in the x-ray. The prepn. also drains out of sinuses readily, and does not cause burrowing in other directions. It is non irritating and cheap to prepare. H. J. CORPER

Studies of the action of antipyrine. I. Viscometric investigations of the action of antipyrine in promoting the coagulation of the protein substances of blood serum. PIERO TESTONI. Univ. Sassari. *Arch. fisiol.* 24, 192-200; *Chem. Zentr.* 1927, I, 1184.—The degree to which the viscosity is increased by antipyrine depends upon its concn. and the concn. of the protein in the serum. The action of antipyrine in pro-

moting coagulation depends upon its pH group, and its local hemostatic action is related to this coagulation of the protein. C. C. DAVIS

An experimental study of narcosis, which is at the same time a contribution to the pathological physiology of narcosis. I. Narcosis from the standpoint of acid-base equilibrium. II. Acid-base economy and factors which are operative during narcosis. IMMO WYMER. *Deut. Z. Chr.* 195, 353-98, 399-425; *Chem. Zentr.* 1927, 1, 1183.—In ether narcosis, the alkali reserve diminishes, but later excess compensation occurs. The CO_2 content of the arterial blood diminishes and later increases above the normal value. Differences in the rabbit, dog and man were only of minor importance, *e. g.*, compensation occurred latest in dogs. There was an increase of H ions in the urine. After narcosis, the blood sugar is abnormally high. Glucosuria appears only seldom and acetoneuria never. Essentially the same phenomena were observed in $CHCl_3$ narcosis. The effects of shock, loss of blood and nutrition on the factors governing acid-base economy were investigated. C. C. DAVIS

Influence of hydrochloric acid and sodium bicarbonate on the tension of the abductor muscle of valves of anodon. M. DU BUISSON. Univ. Ghent. *Arch. intern. physiol.* 29, 11-8(1927); *Physiol. Abstracts* 13, 21.—HCl hinders while $NaHCO_3$ brings about relaxation of the abductor muscles of valves of anodon when nervous stimuli are abolished. H. J. DEUEL, JR.

The influence of adrenaline and ergotamine on chronaxie of muscle. J. BEERENS AND I. VAN DEN BERGHE. Univ. Ghent. *Arch. intern. physiol.* 29, 25-30(1927); *Physiol. Abstracts* 13, 21. H. J. DEUEL, JR.

Physiological action and stability of halogens in compounds. K. KINDLER. *Arch. Pharm.* 266, 394-406(1928).—An address. W. O. F.

Chemical composition and therapeutic action. EMANUELE OLIVERI-MANDALÀ. *Atti congresso naz. chim. pura applicata* 2, 903-7(1926).—A review. L. T. F.

Chemotherapy of epizootic lymphangitis by mercuric biiodide. G. JEAUME. *Maroc. Medical* 1928, 15; *Rev. Hyg. Med. Prev.* 50, 554(1928).—Favorable results from HgI_2 in the treatment of lymphangitis in mules were obtained. The intravenous injection of aq. HgI_2 , 2 parts per 1000, for 3 weeks was carried out. Each animal received a total of 2 g. of HgI_2 in 15 injections. All the mules completely recovered. C. R. F.

The influence of toxic substances on the nitrogenous and purine metabolism by dogs. Y. OKURA. *Tseng. Japan J. Med. Sci. Pharm.* 1, 49-74(1926); *Physiol. Abstracts* 13, 46.—Thyroid feeding accelerated purine metabolism more strikingly than it accelerated general N metabolism. Injection of certain bacterial products had, with small doses, a similar effect, but with large doses increased general N metabolism more than metabolism of purine bodies. H. G.

Acid therapy with neutral salts. F. MAINZER. *Klin. Wochschr.* 6, 1689-91(1927); *Physiol. Abstracts* 6, 1689-91.—A lecture on the uses of neutral salts in promoting acidity of the urine, lowered blood pH , and diminished alkali reserve. Special attention is devoted to the use of NH_4Cl , and data showing the extent of its effects are given. The delay in the excretion of Cl ion compared with NH_3 is attributed to a water retention in the tissues which follows the initial diuresis. The water passing into the tissues takes chloride with it. H. G.

Action of synthetic thyroxine. F. HAFNER. *Klin. Wochschr.* 6, 1932-5(1927); *Physiol. Abstracts* 13, 44.—The expts. were carried out with thyroxine synthesized by Schoeller and K. Schmidt. It was found that the prepn. accelerated the metamorphosis of tadpoles and axolotls. In mice a subcutaneous injection of 0.003 mg. per g. increased the resistance to acetonitrile to the same extent as 0.5 mg. per g. of dried thyroid gland. The O consumption of rats was markedly increased and a diuresis was produced in rabbits. Cyanide does not inhibit the accelerating influence of thyroxine on metamorphosis in tadpoles or axolotls. Because of this the author suggests that thyroxine acts on anaerobic oxidation processes. H. G.

Homeopathic indications of iodine in the light of present day research. PAUL S. WYNE. *J. Am. Inst. Homeopathy* 21, 549-61(1928).—A review of the physiol. action and therapeutic use of I and its compds. with bibliography. JOSEPH S. HEPBURN

The effects of ether anesthesia on the composition of the blood and the relation to thyroid function. H. E. MAGEE, W. ANDERSON AND A. E. GLENNIE. *Brit. J. Exptl. Path.* 9, 119-27(1928).—The blood of rabbits was examd. before and during ether anesthesia in normal, thyroid-fed and thyroidectomized animals. The inorg. P was lowest in March and April and highest in June and July. Ether anesthesia in normal animals lowered the Ca but increased the inorg. P, sugar and pH , the latter tending to return to normal after a time. Increasing doses of thyroid first raised and then lowered the sugar. Thyroid feeding progressively, and thyroidectomy slightly,

diminished the hyperglucemic response to ether. Large doses of thyroid increased the p_H and inorg. P which were still further raised by ether anesthesia. The effects of thyroidectomy alone and of thyroidectomy and ether on the p_H and inorg. P were variable. Thyroid feeding raised and thyroidectomy lowered the I. This was unaffected by ether anesthesia in normal and thyroid-fed and probably also in thyroidectomized animals.

HARRIET F. HOLMES

Yatrene therapy. JOSEF HAVLÍK. *Casopis Československého Lékárnictva* 6, 17-8 (1926).—A report of the phys. and chem. properties and therapeutic action of the German synthetic "Yatrene" (iodoxyquinolinesulfonic acid).

WILLIAM J. HUSA

The effect of insulin upon polyuria in diabetes insipidus; the combined effect of insulin and pituitrin upon water metabolism. O. KLEIN AND H. HOLZER. *Deut. Arch. klin. Med.* 156, 111-21 (1927).—The attempt has been made to employ for differential diagnosis the effect of insulin upon the diuresis of diabetes insipidus; but there is not sufficient justification, since the hypo- and hyperchloremic forms are not so easily distinguished by their reaction to insulin alone. In those cases where insulin alone was observed to be without diuretic effect, the effect became manifest when pituitrin was injected with the insulin. The antidiuretic effect of insulin is then an intensification of the effect of the pituitrin. In a case of syphilis where the hypophysis was seriously affected the antidiuretic effect was entirely lacking when insulin alone was administered; in similar cases which did not involve the hypophysis the effect was definite. In a case of lesion of the hypophysis the diuretic effect was observed only when insulin and pituitrin were injected together. The results were influenced quantitatively by the size of the dose, and by the amounts of water and of carbohydrate consumed during the expt. The use of insulin produces perfectly regular results where carbohydrate metabolism and the water-binding ability of the organism are seriously disturbed. The effect of the insulin is upon the carbohydrate metabolism, and only indirectly upon the diuresis.

P. V. JACKSON

Hypoglycemia with adrenaline. H. ROSSELLI AND E. RODRIGUEZ. *An Fac Med. Montevideo*, April, 1926; *Rev. sud-americana endocrinol. immunol. quimol. terap.* 10, 584-5 (1927).—Hypoglycemia was produced by adrenaline injections in some cases of severe tuberculosis. It was sometimes accompanied by hypoglycemic symptoms which disappeared on ingestion of hydrocarbons.

MARY JACOBSEN

The question of rat "bartonellas." E. LAUDA AND F. MARCUS. *Univ. Vienna Centr. Bakt. Parasitenk. I. Abt.* 107, 104-14 (1928).—"Bartonellas" or erythrocyte inclusion bodies appear in rats poisoned with tolylenediamine, pyridine or phenylhydrazine. Hemolysis due to the injection of distill. water, or the administration of saponin did not cause them. The inclusions are always accompanied by either anemia or erythrocyte degeneration. Apparently they are not parasitic in nature.

The influence of temperature on the biologic action of x-rays. A. DOCKNON. *Arch. Phys. Therapy, X-Ray, Radium* 9, 55-9 (1928).—Using *Ascaris* eggs as test material there was found to be little variation in the percentage of embryos injured within a temp. range of 5-20°. From 20° to 47° the number injured increased rapidly with the temp. D. explains the phenomena by considering that the biol. reaction consists of 2 parts, a photochem. reaction which does not vary with temp., and an ordinary chem. reaction which varies rapidly with temp. The second precedes and makes possible the first.

E. H. QUIMBY

The rate of action of drugs and ions on frog heart. PREMANKUR DE. *Univ. of Edinburgh. J. Pharmacol.* 33, 115-28 (1928).—Strips of frog ventricle were subjected to perfusion with Ringer soln. and certain modifications of Ringer soln. The response of the ventricle to induction shocks under different conditions was noted. With Ca-free Ringer or with Ringer soln. contg. 0.09% K, there occurred a 50% reduction in beat in 3 seconds. Recovery in normal Ringer was more rapid. With high frequency of stimulation the action with K is even more rapid, while differences in frequency of stimulation does not affect the response to Ca-free Ringer. With Ringer soln. at p_H 6.0 several minutes were required to reduce the rate $1/2$. Recovery was frequently incomplete. With greater frequency of stimulation the action was more rapid. Similar results were obtained by the addition of NaCN to the Ringer soln.

C. RIEGEL

Comparative antiedemic efficiency of adrenaline and related amines and pituitary in experimental edemas. M. I. TANTER. *Stanford Univ. J. Pharmacol.* 33, 129-46 (1928).—Injections of epinephrine prevented or benefitted the edema produced in cats and in rabbits by *p*-phenylenediamine, prevented or greatly diminished dionine chemosis in cats, mustard oil chemosis and mustard oil dermatitis in rabbits. Phenylethanolamine caused a delay in onset of *p*-phenylenediamine edema, and a decrease in dionine chemosis, but was ineffective in mustard chemosis or dermatitis. Pituitrin had no

antiedemic effect on edema of paraphenylenediamine, but prevented dionine and mustard-oil chemosis, and mustard dermatitis. Tyramine and ephedrine were not beneficial in any of the 4 types of edema. C. RIEGEL

The sequence of events in the excitation of the respiratory center by caffeine and some other stimulants. RALPH G. SMITH. Washington Univ. *J. Pharmacol.* **33**, 147-65(1928).—S. was able to study the effect of drugs on unanesthetized dogs, samples of alveolar air being collected by a specially devised method at the same time the rate, rhythm and minute volume of respiration were recorded. Caffeine caused an increase in ventilation which usually began 1 min. after injection, and lasted 2 to 10 min. Alveolar CO_2 tension was reduced, the max. depression occurring after the respiratory ventilation had returned to normal, and lasting sometimes as long as 2 to 3 hrs. α -Lobeline given intravenously caused a great increase in respiration beginning 30 sec. after the injection and lasting 2 to 3 min. Alveolar CO_2 tension was decreased and returned to normal in 10 min. With subcutaneous injections the effects were slower to develop and were more lasting. Cardiazole caused an increase in ventilation with a simultaneous decrease in alveolar CO_2 tension. C. RIEGEL

Tolerance and cross-tolerance in the human subject to the diuretic effect of caffeine, theobromine and theophylline. NATHAN B. EDDY AND ARDREY DOWNS. Univ. of Alberta. *J. Pharmacol.* **33**, 167-74(1928).—Caffeine, theobromine and theophylline were given by mouth to three normal individuals accustomed to drinking coffee. The urinary output was measured and the minimal effective diuretic dose detd. The same individuals abstained from coffee for one month, and were then subjected to a similar expt. The results indicated an increased tolerance to the three drugs was produced by the habitual use of coffee. The reaction time was shortened in individuals tolerant to the diuretic action of the drugs, while in those not tolerant the reaction time was lengthened. C. RIEGEL

A comparison of the pharmacological action of diacetone alcohol and acetone. D. C. WALTON, F. F. KEHR AND A. S. LOVENHART. Univ. of Wisc. *J. Pharmacol.* **33**, 175-83(1928).—Rats were injected intravenously with acetone and with diacetone alcohol (dimethylacetonylcarbinol). The max. tolerated dose of the alcohol was 3 cc. per kg., as compared with 5 cc. of acetone, while the m. l. d. was 3.25 cc. per kg., as compared with 6-8 cc. of acetone. Rats receiving alcohol showed less irritation and more immediate soporific effect than those receiving acetone. In rabbits and dogs the alcohol had a depressant action on respiration and produced narcosis, the extent of the latter depending on the dose and mode of administration. Both acetone and alcohol produce a fall in blood pressure in anesthetized dogs and rabbits, the extent of the decrease varying with dosage, speed of injection and strength of soln. C. RIEGEL

Biochemical study of thiourea. E. NICOLAS AND J. LEBDUSKA. *Compt. rend.* **186**, 1441-3(1928).—Thiourea, according to its concn, retards or prevents the coagulation of the blood *in vitro*. At a concn. of 3% thiourea the blood remains fluid, while urea up to 3.5% does not modify the time of coagulation, and at 4.5% simply retards the phenomenon. Thiourea is but slightly toxic. Introduced into the duodenum of the dog in doses of 1 g. per kg. of body wt. it does not modify the blood pressure or respiration. It has a moderate diuretic action and increases the output of bile if injected into the duodenum but not if intravenously injected. L. W. RIGGS

Differential vasodilator action of cobalt and nickel chlorides. J. M. LE GOFF. *Compt. rend.* **186**, 1656-7(1928); cf. *C. A.* **22**, 1403.—Intramuscular injections of NiCl_2 failed to produce vasodilatation in rabbits or man. Although Co and Ni are about equally toxic, their physiol. action on the vessels was very different. L. W. RIGGS

Influence of the blockage of Kupffer cells on the resistance of the liver with reference to an hepatotoxic substance. MAURICE PANISSET. *Compt. rend. soc. biol.* **98**, 1520-1(1928).—The blockage of the reticulo-endothelial system of the dog by 2 injections 24 hrs. apart of 0.3 to 0.5 cc. per kg. of India ink prevented a fatal action of 0.08 g. per kg. of novarsenobenzene injected 48 hrs. later. When the test by the elimination of rose bengale shows no defect in the chromogog function, the dog withstands without incident a dose which would be fatal in the animal with an impaired chromogog function. L. W. RIGGS

Action of magnesium chloride on guinea pigs with scorbutic deficiency. PIERRE DELBET AND PALIOS. *Compt. rend. soc. biol.* **98**, 1534-5(1928).—Animals on the Randoïn scorbutic diet were given daily injections of 5 cc. of 1.21% MgCl_2 for 8 days, then 50 cc. daily of the same soln. mixed with the food. Five animals thus treated lived 9, 13, 14, 21 and 25 days, resp., while of 6 controls 2 lived 4 days, 2 lived 8, one 12 and one 18. The explanation offered is that MgCl_2 permits or regulates certain syntheses which the absence of the antiscorbutic vitamin prevents or modifies. Since the controls

were not entirely deprived of Mg it is proposed that the usual Mg content of foods should be supplemented by addnl. Mg salts as is the case with NaCl. L. W. RIGGS

Action of sugars on muscular rigidity produced by monobromoacetic acid. THALES MARTINS. *Compt. rend. soc. biol.* **98**, 1558-60(1928).—Sugars promote the condition of rigidity caused by $\text{CH}_2\text{BrCO}_2\text{H}$. Sucrose is most and lactose least efficient in this action. L. W. RIGGS

Action of antipyretics on glucemia. ALBERTO DE CARVALHO. *Compt. rend. soc. biol.* **98**, 1583-6(1928).—Quinine, pyrimidone and antipyrine administered intravenously reduce the blood sugar of healthy subjects and of diabetics sometimes as much as 50%. This effect is most pronounced about 2 hrs. after the injection and it persists for several hrs. L. W. RIGGS

Action of glukhormont upon adrenaline glucemia. CARLOS TRINCAO. *Compt. rend. soc. biol.* **98**, 1602-4(1928).—Three fasting diabetics were treated as follows. The glucemia was detd. before and each 30 min. after the injection of 1 mg. of adrenaline. Three hrs. later 1 mg. of adrenaline and 3 glukhormont tablets were administered simultaneously and the glucemia detd. as before, when nearly every detn. showed that the glucemia was less than that following adrenaline alone. After 4 days of treatment with 4 tablets daily of glukhormont, 1 mg. of adrenaline was administered and the glucemia detd. at each 30 min. following when it was found to be from 3 to over 20% less than after adrenaline alone. L. W. RIGGS

Action of some substances of the camphor group on *Ascaris lumbricoides* of swine. S. F. GOMES DA COSTA. *Compt. rend. soc. biol.* **98**, 1604-6(1928); cf. *C. A.* **21**, 2332. —The introduction of the imide function into the radical of camphoric acid increases the toxicity of the latter. Camphocarbonic acid appears always inactive toward *Ascaris*. The introduction of CO_2H into the camphor mol. renders this compd. inactive toward *Ascaris*. Campholene nitrile prepd. as a fine emulsion and in concns of 0.005 M was slightly active toward worms. L. W. RIGGS

Action of ergotamine on the gastric secretion. EDUARDO COELHO and J. CANDIDO DE OLIVEIRA. *Compt. rend. soc. biol.* **98**, 1608-11(1928).—Fasting persons were subjected to stomach lavage before commencing the expts. The total gastric acidity at the end of each of 5 consecutive 15-min. periods after a test meal was equiv. to 15, 25, 30, 34 and 34 cc. of 0.1 N NaOH, resp. After the same test meal and an injection of 1 cc. (0.0005 g.) of ergotamine the corresponding figures were 27, 55, 70, 72 and 60. The total HCl without ergotamine was 10, 16, 20, 22 and 20 cc.; with ergotamine the figures were 19, 42, 50, 54 and 50 cc. L. W. RIGGS

Blood modifications following intravenous injections of India ink. T. TURCU. *Compt. rend. soc. biol.* **98**, 1620-2(1928).—Injections of India ink immediately increased the time of coagulability of the blood, decreased the complement titer and increased the velocity of sedimentation of the red corpuscles. These variations persisted from 24 to 48 hrs. and were followed by a return to normal. L. W. RIGGS

Increased action of insulin in experimental renal impermeability. M. LOEPER, A. LEMAIRE and J. TONNET. *Compt. rend. soc. biol.* **99**, 19-20(1928).—Expts. with rabbits in which one or both kidneys were ligated showed a progressive increase in the hypoglycemic power of insulin. **Action of insulin in renal impermeability in man.** M. LOEPER, RAVIER and TONNET. *Ibid.* 20-1.—By the administration of 5 to 10 units of insulin the av. lowering of the glucemia in 7 normal subjects was about 20%; in 6 patients with cardio-renal insufficiency the lowering was 42% and in 7 cases of renal impermeability the lowering was 45%. Insulin should be administered with caution to patients with defective renal permeability. L. W. RIGGS

Is there an antagonism between the water-soluble extract of the anterior lobe of the hypophysis and folliculine? L. BROUHA. *Compt. rend. soc. biol.* **98**, 43-4(1928).—The precocious puberal state brought about by the injection of folliculine is not prevented in rats by the simultaneous injection of the water-sol. ext. of the anterior lobe of the hypophysis. L. W. RIGGS

Action of nicotine on the excitability of motor nerves. H. L. MAZOUÉ. *Compt. rend. soc. biol.* **99**, 50-2(1928). L. W. RIGGS

Quantitative study of the action of histamine on the excitability of the cardiac inhibitory fibers of the vago-sympathetic nerve. A. B. CHAUCHARD and P. SARADINCHVILL. *Compt. rend. soc. biol.* **99**, 53-5(1928).—Expts. with dogs showed that the injection of histamine gradually increased the chronaxie which gradually returned to its normal value. L. W. RIGGS

Insulin and its relation to ovulation. C. COTTE and (MLLE.) G. PALLOT. *Compt. rend. soc. biol.* **99**, 74-5(1928).—Expts. with rats indicate that insulin retarded the appearance of the estrus and prolonged the period of genital inactivity. L. W. RIGGS

Hypotensive action of adrenaline in tabetics. A. DUMAS, ROGER FROMENT AND (MILÉ) MERCIER. *Compt. rend. soc. biol.* 99, 76-8(1928).—In the 3 cases studied the subcutaneous injection of 1 mg. of adrenaline was followed by a fall of 7.5 cm. of Hg in the blood pressure. The pulse was only slightly altered.

L. W. RIGGS

Effect of liquid petrolatum given by mouth on digestion and absorption of food. ALFRED B. OLSEN. *J. Am. Med. Assoc.* 91, 143-7(1928).—The results of expts. with dogs and men indicated that liquid petrolatum by mouth in therapeutic doses did not interfere with the digestion and absorption of protein and carbohydrate food.

L. W. RIGGS

Growth-producing effects of extracts of tobacco on mice. FERDINAND C. HELWIG. *J. Am. Med. Assoc.* 91, 150-1(1928).—Tobacco tar obtained at temps. produced by smoking pipes did not appear to contain any carcinogenic factor capable of producing limitless growth of epithelium in mice. The tar causes ulceration which heals promptly on removal of the irritant. Combustion products obtained at 400° to 500° act similarly to those formed in pipe smoking. Tobacco tar mixed with olive oil appeared to cause epithelial proliferation, but the growth was limited and disappeared by spontaneous involution.

L. W. RIGGS

Hypoglucemia-producing material from plants and microorganisms. YOSHIO SHIKINAMI. *Tôhoku J. Exptl. Med.* 10, 560-79(1928); *C. A.* 22, 1604.—From *Aspergillus ozyzac*, baker's yeast, beer yeast, bark and leaves of *Taxus cuspidata* and leaves of *Pinus densiflora* exts. were prepd. which, in rabbits, caused a gradual lowering of the blood sugar followed by a gradual return to normal in about 48 hrs. In 8 of the 34 animals tested there were hypoglucemic convulsions when there was a notable disappearance of glycogen from the liver and skeletal and heart muscles. There was also a moderate diminution of liver fat but not of the skeletal muscle fat. Histologic changes were evident in the liver but not in the suprarenals or pancreas. The passage of the hypoglucemic principle from one animal to another was not proved. Hypoglucemia-producing exts. were obtained from various bacteria and cocci. Exts. of sugar-splitting bacteria caused the blood sugar to diminish. Exts. of other bacteria were without action.

L. W. RIGGS

Relation between chemical constitution and pharmacological action of phenanthrene alkaloids. ITARO KIKUCHI and TOYOKICHI TAKASE. *Tôhoku J. Exptl. Med.* 10, 580-5(1928).—Chemically inactive atomic groups increase the convulsant action of the phenanthrene alkaloids, whereas the chemically active groups increase the narcotic action. The active and inactive groups interfere with each other so as to decrease their properties. The alkaloids studied were morphine, apomorphine, codeine, dihydrocodeine, oxycodone, hydroxycodone, sinomenine, bulbocapnine, thebaine and domesticine methyl ether.

L. W. RIGGS

Paralyzing action of magnesium salts on the Auerbach plexus. ITARO KIKUCHI. *Tôhoku J. Exptl. Med.* 10, 586-9(1928); cf. To, *C. A.* 15, 2501.—Expts. with rabbits proved that $MgCl_2$ exerts no irritating action on the sympathetic endings of the uterus and probably not of the stomach.

L. W. RIGGS

The effect of ceanothyn upon the kidney and liver of the dog. THEODORE KOPANYI. *J. Am. Pharm. Assoc.* 17, 528-9(1928).—Ceanothyn, administered orally to dogs in doses 30-40 times the daily human dose, over a period of 17 days produced no detectable impairment of the kidneys and liver in the dog as shown by functional test and morphological studies.

L. E. WARREN

The toxicity of an impurity of official cinchophen. ROBERT A. HATCHER. *J. Am. Pharm. Assoc.* 17, 557-63(1928).—Cinchophen may contain as much as 3% of γ -anilino- γ -phenylbutyric acid. Various pharmacologic tests on the cat and the dog demonstrated that the substance is only slightly toxic.

L. E. WARREN

The effect of drugs on the number of circulating white blood cells. WALTER J. R. CAMP. *J. Lab. Clin. Med.* 13, 206-14(1928).—The blood is considered as a tissue and as such, its function and activity must be under nervous control. The distribution of leucocytes in the peripheral blood is believed under the control of the autonomic system because: (1) The same blood picture is produced by such chemically different substances as pilocarpine, tartrates, eserine, arecoline, guanidine and adrenaline after a sensitizing dose of eserine. (2) The same differential blood picture is effected by substances stimulating the sympathetic nervous system, as adrenaline and by such substances as decrease the activity of the parasympathetic nerves, as atropine and calcium. (3) The pilocarpine action on the blood is promptly and completely checked by atropine just as pilocarpine action on any other organ is stopped by this same drug, and further, pilocarpine is ineffective after atropine has been given. The partition of leucocytes in the peripheral circulating blood is believed an index of

autonomic balance, the lymphocytes running parallel to parasympathetic tone and the neutrophils to sympathetic tone. The spleen plays no part in the production of a drug leucocytosis. It is possible and probable that this influence of the autonomic system is mediated through the medium of inorg. ions, such as Ca. ETHEL W. WICKWIRE

JENTZER, ALBERT: *Traitement biologique (biothérapie) des infections par les huiles essentielles, les résines (oléorésinothérapie) et par les essences déterpénées, les lipides (oléolipiothérapie)*. Paris: Masson et Cie. 424 pp.

TODD, A. T.: *Chemotherapeutic Researches on Cancer*. London: Arrow-smith. 2s. 6d., net

I—ZOOLOGY

R. A. GORTNER

Autolysis of fish muscle. III. Formation of ammonia. TAKEO OYA AND KI-ITSU SUMI. *J. Imp. Fish Inst. (Tokyo)* **22**, 21-4 (1926). (In Japanese, English résumé 16-7); *Biol. Abstracts* **1**, 452.—The authors earlier reported NH_3 formation in autolyzing mackerel muscle, most rapidly at p_{H} 6. They now report studies on NH_3 formation in autolyzing muscles of *Scomber japonicus*, *Paralichthys olivaceus*, *Pagrosomus mayor*, *Euthynnus vagans*, and *Tetrapturus mitsukuri*, the amt. formed in the 1st and 4th being greatest. The muscles of the 1st, 4th and 5th contain guanase, the remaining 2 none or at most a little. H. G.

The phosphate content or renal capsular fluid in necturus. FRANCIS O. SCHMITT AND H. L. WHITE. Washington Univ. *Am. J. Physiol.* **84**, 401-6 (1928).—The glomerular fluid from the kidney of *Necturus* contained only 25% as much inorg. P as did the blood. J. F. LYMAN

The effect of insulin on the blood sugar of fishes. IRVING E. GRAY. Univ. of Wisc. *Am. J. Physiol.* **84**, 566-73 (1928).—Injections of insulin produced convulsions and reduction of blood sugar to about 33% normal in trout, menhaden and scup. Convulsions were not produced in the puffer. Possibly sluggish fish with low blood sugar have a different kind of carbohydrate metabolism than do the more active fish. J. F. LYMAN

Temperature characteristics for pulsation frequency in *Gonionemus*. E. WOLF. Lab. Gen. Physiol. Harvard Univ. *J. Gen. Physiol.* **11**, 547-62 (1928).—Physiological. C. H. RICHARDSON

Experimentally induced metamorphosis in echinus. JULIAN S. HUXLEY. *Am. Nat.* **62**, 363-75 (1928).—Treatment of advanced larvae of *Echinus miliaris* with very dil. solns. of HgCl_2 (about molar (2×10^6)) rapidly causes precocious metamorphosis, a young echinus in one case surviving 8 days even in the absence of food. This appears to be caused through the differential susceptibility of larval tissues and echinus rudiment. The former are more affected by the poison and undergo histolysis, and are then reabsorbed by the echinus rudiment. When the echinus rudiment is small, metamorphosis is less rapid and may be incomplete, both larval and echinus tissues undergoing histolysis. Even when metamorphosis in such cases is complete, it is often abnormal, the young echinus possessing small or no tube feet or spines. Parallel abnormalities are found in thyroid-induced metamorphosis in anuran tadpoles. I. W. RIGGS

Functioning of the pancreas in amphibian larvae. MAX ARON. *Compt. rend. soc. biol.* **99**, 213-5 (1928); cf. Needham, *C. A.* **21**, 2939, 3000. **Functional correlation between the thyroid gland and the endocrine pancreas in amphibian larvae.** *Ibid.* 215-7. L. W. RIGGS

12—FOODS

F. C. BLANCK AND H. A. LEPPER

The interpretation of the analyses of foods. A. BEYTHIEN, C. HARTWICH AND M. KLIMMER. *Anales oficina quim. provincia (La Plata)* **1**, 91-100 (1927).—A review of the constituents of meat exts. and various other food products. M. H. SOULE

Food preservatives. The present position. H. R. JENSEN. *Food. Manuf.* **1**, 47-9 (1927). E. J. C.

The relations between the ash content as well as the degree of milling of a flour and the specific conductance of its aqueous extract. R. STRONECKER. *Z. ges. Mühlenwesen* **4**, 27-9; *Chem. Zentr.* **1927**, **11**, 341-2; cf. *C. A.* **18**, 2048.—In freshly milled wheat and rye flours, the p_{H} values of which are little different, the ash content can be estd.

fairly precisely by the cond. if the cond. curve for the particular grain has once been established. This is not possible, however, with grains of unknown origin. Bleaching with NO_2 increases the cond. in a similar way to the action of Cl . C. C. DAVIS

The specific conductance of aqueous wheat flour extract. E. BERLINER AND R. RÜTER. Univ. Frankfurt. *Z. ges. Mühlenwesen* 4, 29-32; *Chem. Zentr.* 1927, 11, 342.—Large variations in the ratio: ash content/cond. were found, even with flours of the same type (cf. Strohecker, preceding abstr.). In Sweden cultivated wheats showed remarkably low cond. The merit of cond. detns compared with the detns. of the ash lies in the rapidity of the former. C. C. DAVIS

The influence of cereal flours on the reaction of the liquid in which they are suspended. S. KOEHLER. *Bull. intern. acad. Polonoise* 1927B, 951-63 (publ. 1928).—Barley flours suspended in weak acids or bases affects the p_{H} value of the solvent. In this study, 4 g. of freshly milled rye, wheat, barley and oat flours were shaken with 80 cc. of HCl , NaOH or distd. water that had not been boiled. The flours were allowed to settle 40-60 min., and the p_{H} of the solvent was detd. During the first 15 min. of shaking, the p_{H} of the solvent changed rapidly, the acids increasing and the bases decreasing in p_{H} value. After this initial change, there was a slow definite decrease in p_{H} in all solvents, the rate varying with the kind of flours. A study of the data indicated that the p_{H} of a solvent that would not undergo the initial p_{H} change varied from 6.2 to 6.94. Since only one sample of each grain was studied, this variation may not be due to a difference in species. When barley flour that had been milled 3.5 years was added to an NaOH soln., the p_{H} decreased from 6.2 to 5.5 almost immediately, and then rapidly increased to a const. value of 5.9 after 3 hrs. The first change was probably due to certain decompn. products in the flour. AMY LE VESCONTE

Factors influencing the baking properties of flour. T. H. FAIRBROTHER. *Food Manuf.* 2, 285-6; 3, 369-70, 397-8 (1928).—The factors influencing the baking properties of flour may be summarized as chem., biochem., phys., and manipulative. The chem. factors involve the understanding of the protein content and the chem. changes which influence this content, the chem. actions which will oxidize the pigments and produce flour of standard whiteness, and those which induce the gluten to function correctly. The biochem. factors involve the life and action of yeast, the function of certain enzymes which influence the diastatic activity and provide yeast foods. The phys. factors involve a knowledge of the viscosity and colloidal properties of gluten, the size of particle, the effect of humidity during milling and storage; and finally the manipulative factors are concerned with clean milling and the handling of the flour and dough in the baking processes. A complete understanding of all these factors will lead ultimately to the real standard bread. J. A. KENNEDY

Detection of rice flour in other flours and in spices. ANON. *Pharm. Weekblad* 65, (680) 2 (1928).—The detection of rice flour particles by staining with fuchsin which reveals a characteristic network of protein (Wagenaar, C. A. 22, 1811) is difficult in the presence of ground pepper perisperm which takes the stain in much the same way. The difficulty is obviated by using a stain prepd. from 0.5 g. carmine, 25 cc. glycerol and 25 cc. 4 N NH_4OH . This gives a violet pattern with the rice granules but no color with pepper perisperm. A. W. DOX

The valuation of milk. J. GERUM. *Z. Untersuch. Lebensm.* 55, 274-83 (1928).—A discussion, emphasizing the importance of refractive index and f. p. depression in the valuation of milk. The use of *alocs* as a medicine causes a lowering of the fat content of milk. WILLIAM J. HUSA

New method for the volumetric determination of protein in milk. AL. IONESCO-MATIU AND C. V. BORDEIANU. *Bul. soc. chim. România* 9, 76-85 (1928).—For this detn. a glass-stoppered test tube is used which has a uniform bore of 1 cm., is calibrated in 0.1 cc. from 2 to 5 cm. and has marks above this showing 7.5 cc. and 10 cc. To det. the protein content in milk, fill the dry tube exactly to the 7.5-cc. mark with a soln. prepd. by dissolving 5 g. of HgCl_2 in 100 cc. of pure acetone. Not more than 250 cc. of this reagent should be prepd. at a time, as it does not keep very well. On top of the acetone soln. in the tube, add exactly 2.5 cc. of milk dropwise. Stopper the tube and shake 120 times. After 15 min. shake 30 times. Open the tube and let it stand 3-4 min. Close and allow to stand in an upright position for 24 hrs. at 18°. Read the vol. of the ppt. and multiply by 1.02 to get the wt. of protein contained in 100 cc. of milk. From the relations between fat content, d., and protein content, it is easy to tell whether a sample of milk has been watered, skimmed or both watered and skimmed. W. T. H.

Milk investigation with the aid of cryoscopy, the cryolac number and the chlorine-lactose number. J. FIEBIGER AND W. KORDATZKI. Prussian Hyg. Inst. Landsberg.

Z. Untersuch. Lebensm. **55**, 251-62(1928).—Detns. were made on the milk of cows inoculated with various diseases for serum production. The f. p. depression varied from 0.537° to 0.576°, the av. being 0.552°. The cryolac no. ranged from 393 to 435, the av. being 413. The Cl-lactose no. varied between 1.63 and 6.63. WILLIAM J. HUSA

Milk fat determination in fatty mixtures containing coconut oil. J. GROSSFELD. *Kazell* 1927, 5 pp. separate; *Chem. Zentr.* 1927, II, 184.—A general discussion together with the outlines of a method of detn. based on the butyric acid number. The details are substantially the same as given before (cf. *C. A.* **22**, 1863). A. L. HENNE

I. The effect of heat upon certain constituents of milk. II. Adult utilization from heated milk. KATE DAUM. *Abstracts of Theses, Univ. Chicago, Science Series* **4**, 423-30(1925-6) (Publ. May, 1928).—The changes of the Ca, Mg, P, CO₂ and citric acid content and of the *p_H* of cow milk brought about by heating were studied. The detns of Ca, Mg and P were made on raw milk, milk heated for 6 min. in a CaCl₂ bath, the temp. of which was 106-10°, and milk heated for 30 min. in H₂O bath which had the temp. of 100°. The samples of the heated milk were analyzed at once and after standing without agitation for 24 hrs. Heating decreased the Ca, Mg and P content, the decrease being greater in the milk heated for 30 min. Standing lowered the values still more. Citric acid and *p_H* did not change upon heating, while CO₂ was much decreased, the loss being greater for the milk heated for 30 min. Investigations on the Ca balance of 2 women whose Ca intake was mainly covered by milk showed that the balance was negative with both raw and with heated milk, though the losses on the heated-milk diet were somewhat larger. G. SCHWOCH

The effect of metals on milk. W. E. WARNER. *Food Manuf.* **3**, 398(1928)

J. A. KENNEDY

The composition of milk of western Hungary. ST. SZANYI. *Z. Untersuch. Lebensm.* **55**, 207-8(1928).—Analytical data are given. WILLIAM J. HUSA

Studies on starters. B. W. HAMMER AND M. P. BAKER. *Id. Agr. Expt. Sta. Research. Bull.* **106**, 135-56(1928).—The results obtained when starters were made from milk pasteurized with different exposures showed that milk heated to 145° F. for 30 min. developed acid and coagulated more slowly than milk heated to considerably higher temps. Essentially the same rate of growth of the starter organisms occurred after heating to 160° F. for 30 min. as when a higher temp. was used for this period. With a heating time of 30 min. the influence of the heat seemed to be gradual and spread over a considerable temp. range, instead of occurring completely at a definite temp. The explanation of the variations noted in the rate of coagulation following different pasteurization exposures undoubtedly lies in the effect of the heat on the germicidal property of milk. The data obtained suggest that, if uniform conditions for the growth of starter organisms are to be provided from day to day, the pasteurization exposure used must be taken into account. C. R. FELLERS

A colorimetric method for the determination of coloring substances in butter (butyrolcolorimeter). JANUSZ KRÓLIKOWSKI. *Landwirtschaftl. Hochschule Warsau Roczniki Nauk Rolniczych i Lesnych* **16**, 21-6; *Chem. Zentr.* 1927, II, 345. The color of melted and filtered butter is compared with the color of an aq. indicator soln. of tartrazine to which sulfanilic acid and β -naphthol have been added. The app. is described. C. C. DAVIS

Preliminary investigations into the factors that affect the keeping qualities of acidified butter. E. HAGLUND AND E. WALLER. *Medd. Centralanstalt. forskningsenhet. jordbruks No.* **321**, Mejeriförsök No. **33**, 3-21(1927).—The object of the investigation by H. and W. was to det. how butter was affected by the acidity of the cream, salt and bacteria introduced. Approx. 50 dairies cooperated. The acidity was expressed in Soxhlet-Hemkel degrees. One cc. of a 0.6% HgCl₂ per 100 cc. cream was added as a preservative during transportation from dairy to main lab. Three observations were made in 1 yr.: March 20, Aug. 2 and Nov. 6 (periods 1, 2 and 3, resp.). The results indicate a relation between the acidity and the quality of the butter. The butter made from cream of high acidity was of better quality at the end of 10 days but deteriorated faster than that made from cream of lower acidity. The acidity was highest during the 2nd period. The acidity of the moisture in the butter decreased with age while that of the butter fat increased. No definite data on the effect of salt on the keeping quality of butter were obtained. A discussion regarding the types of bacteria present is given but no conclusion drawn on the possible effects of these on the quality of the butter. O. A. NELSON

Alimentary egg pastes. GIOVANNI ISSOGLIO. *Atti congresso naz. chim. pura applicata* **2**, 1023-4(1926).—I. recommends the analytical detn. of the lecithin P₂O₅ as an index of the degree of admixture of grain flour in egg pastes. L. T. F.

Scientific control in the cocoa and chocolate industries. H. W. BYWATERS. *Food Manuf.* 1, 37-40(1927); cf. *C. A.* 22, 3000. E. J. C.

Cacao tannin and its determination. H. R. JENSEN. *Analyst* 53, 365-72(1928).—The results indicate that the water-sol. tannin content of full roasted cacao nibs ranges from 5.2 to 6.5%, corresponding to 13.8% in the fat-free and dry cacao. Compared with the tannin contents of tea and coffee it is surprising that the taste of the cacao is not more astringent. Fine, mild, Ceylon cacao beans contained as much tannin as the stronger Accra and Trinidad beans. W. T. H.

Determination of the color-producing constituents of the cacao bean. WILLIAM B. ADAM. *Analyst* 53, 369-72(1928).—By using a suitable sequence of solvents, it has been found that the unfermented cacao bean contains (a) a substance belonging to the catechin series; (b) a catechu tannin; and (c) a compd. of cacao tannin and caffeine. The red and brown coloring matters are complex alteration products of the catechin and tannin originally present in the bean. Methods previously proposed for detg. the catechin-like substance and the cacao tannin were studied and modified until fairly consistent results were obtained in the classes of cacao under examn. From the analytical results it is apparent that cacao catechin undergoes alteration during the process of fermentation and in the completely fermented bean no catechin is present. The alteration of the tannin appears to be less drastic. W. T. H.

The sanitary valuation of meat. L. M. HOROWITZ-WLASSOWA. *Bact. Med. Inst. Ekaterinoslaw (Ukraine). Z. Untersuch. Lebensm.* 55, 239-46(1928).—The alk. or acidity of aq. meat ext., the p_H , the refractive index, the biuret reaction, the total N, the N of the tannin and phosphotungstic acid ppts., the oxidizability, and the I absorption value give no indication as to the freshness of meat. Eber's reaction frequently gives negative results in samples showing incipient decompn. The test for NH_3 with litmus paper, the meat being heated with NaOH or MgO, is of no practical value, since NH_3 is split off during the test. The heating of meat ext. (ground meat in NH_3 -free H_2O) for 5 min. with the addn. of MgO at 50° liberates NH_3 from NH_4 salts but does not split it off from amino acids. With litmus paper, this test is sensitive to 0.02% NH_3 . Fresh meat does not give a positive test. The titration of amino acids by Sorensen's method gives useful indications as to the freshness of meat but it is not as simple as the above test since it requires the prepn. of aq. exts. W. J. H.

The aseptic autolysis of frozen meat. C. COLELLA. *Boll. soc. ital. biol. sper.* 3, 320 1(1928).—The aim of the investigation was to ascertain whether frozen beef from America under the conditions which the consumer finds it on the market is more susceptible to autolysis than fresh meat bought likewise. Fourteen samples were tested, 7 of each. There are no substantial differences in the intensity of autolysis between fresh and frozen beef; in both, 30 days after aseptic autolysis at 38° there was about 20% of the total N in soln. The curve of autolysis is the same for both kinds of beef. PETER MASUCCI

A method of differentiating different types of cooked meat by the precipitin reaction. RAHEL ROSENBERG. Charkow-Ukraine. *Centr. Bakt. Parasitenk. I Abt.* 107, 448-59(1928).—The precipitins from unheated meat are different from those produced by heated meat. Hence rabbits must be injected with exts. of cooked meat to detect the latter. JOHN T. MYERS

Absorption of iodine by fresh and by tainted meats. K. KATRANJIEFF. *Compt. rend. soc. biol.* 99, 112-5(1928).—**Biochemical factors in the absorption of iodine by tainted meats.** *Ibid.* 115-8. The essential factors which intervene to increase the absorption of I by filtrates of aq. macerations of tainted meats are (a) the proteins of which the quantity increases with the alteration of the meat, (b) proteolytic products of putrefactive organisms such as amino acids, NH_3 and H_2S , (c) the bacteria themselves and products of their sol. secretions. L. W. RIGGS

Mecklenburg canned sausage. ERNST VOLLHASE AND SIEGFRIED-OTTO SCHMECHEL. *Pharm. Zentralhalle* 69, 417-26, 434-7(1928).—From the examn. of a large no. of samples prepd. and handled in Mecklenburg it appears that the excess water content detd. via Feder after a storage period of 4 months reached a max. of 30%, although the av. run was under 28%. An excess water content of 30% (stipulated amt. for Mecklenburg is 20%) clearly indicates a "stretching" of the sausage mass. The sausage liquor invariably contained protein, in amt. relatively small when compared with the liquid itself, but of sufficient importance when considered in connection with the ratio of brine to sausage. Since the protein of this canning liquor has its source in the sausage mass, the amt. of original fat-free material would be diminished by the amt. of dissolved protein, a fact which would render the excess water content too high and hence require appropriate correction. The corrected excess water content represents the apparent

value detd. *via* Feder when curtailed by five times the amt. protein dissolved out of 100 g. of sausage. The processes underlying the interchange of inorg. substances between the sausage mass and its surrounding liquor are by no means uniform, consequently the original content of inorg. constituents in the sausage mass cannot be detd. In the authors' expts. losses of such constituents in the sausage mass were estd. as high as 40%. Of unquestioned influence in this connection is the degree of permeability of the sausage casing as affected by the manner of curing. W. O. E.

The influence of onions and garlic on the growth of bacteria in sausage. E. DANIELSEN. Univ. Rostock. *Z. Untersuch. Lebensm.* 55, 291-4(1928).—The addn. of garlic or onions to sausage in any practically endurable amt. does not influence the growth of putrefactive or disease-producing bacteria. WILLIAM J. HUSA

The relation between the digestibility of fish cooked by different methods and its water content. B. GLASSMANN. *Z. Untersuch. Lebensm.* 55, 231-5(1928).—Fish cooked by the "dry heat" process contained more H₂O and was more digestible in artificial gastric juice than that cooked by the "boiling oil" method. The presence of fat lowers the rate of digestion in a mechanical way by decreasing the contact between the substrate and the aq. enzyme soln. WILLIAM J. HUSA

The alimentary value of rice and of the principal foods. L. BORASIO. *Giornale risicoltura* 18, 67-70(1928); cf. *C. A.* 22, 1633, 2187.—Analyses, giving H₂O, fats, crude cellulose, ash, carbohydrates, crude protein, calorific values and stomachic digestibilities, are tabulated for 5 types of uncooked rice, boiled rice, bolted wheat, gluten and corn flours, whole wheat, corn and rye breads, powdered sugar, cauliflower, lettuce, cooked asparagus, potato, spinach, kidney beans and peas, apples, cherries, roast beef, beef steak, roast chicken and duck, boiled milk, salmon and chicken eggs. A. R. M.

Vitamin B found in all three parts of rice kernel. HILDA M. CROLL. Illinois Agr. Expt. Sta., *Rept.* 1927, 263-4.—Whole unpolished, or "brown" rice, and both the endosperm and embryo ends of the unpolished rice kernel have been found to contain vitamin B. The embryo end seemed to be richer in vitamin B than the endosperm end of the rice kernel. Not all of the vitamin B was contained in the germ of the rice kernel, as has been found to be true of the corn kernel. Since the outer bran coats are retained in the unpolished rice kernel, the presence of vitamin B in the endosperm end may possibly be due to its presence in bran, rather than in the endosperm itself. E. F. S.

The prolamine of wheat. R. HERZNER. Chem. Lab., Hochschule Bodenkultur Wien. *Z. Untersuch. Lebensm.* 55, 262-74(1928).—By use of different alc.-H₂O mixts., H. extd. proteins from wheat which were sepd. into two main distinct groups. Further differentiation has not yet been accurately accomplished. WILLIAM J. HUSA

Apple by-products and cull utilization. CARL R. FELLERS. *Fruit Products J. and Am. Vinegar Ind.* 7, No. 11, 8-9(1928).—"An insight on a number of apple products that can be made successfully in cider mills—blending apples for a desirable quality of cider." J. A. KENNEDY

Changes produced in apples by the use of cleaning and oil-coating processes. J. R. NELLER. *J. Agr. Res.* 36, 429-36(1928).—Storage tests were made of Winesap and Delicious apples grown under irrigated conditions. Both varieties were tested in an untreated condition, dry-brushed and oil-coated, and dipped in HCl. Oil coating was the most beneficial means of improving the keeping qualities. After 4 months' storage the untreated Winesap apples respired CO₂ at a rate about 40% faster than the dry-brushed oil-coated fruit, and after 8 months storage the respiration was 17% faster. Untreated Delicious apples respired 46% faster than oil-treated ones after 4 months' storage, and 43% faster after 8 months. When exposed to room conditions the uncoiled apples lost weight at a moderately faster rate than the oiled ones. Oiling also tends to reduce the rate of shriveling and softening. An oil film of the character used caused no significant difference in the dessert quality of the fruit. Dipping in 2% HCl for 10 min. had little effect on the subsequent respiration of CO₂; 2% NaOH slightly increased respiration and rate of loss of wt. Brushing the fruit caused a more rapid respiration and loss of wt. M. S. ANDERSON

Jelly strength measurement of fruit jellies by the Bloom gelometer. CARL R. FELLERS and FRANCIS P. GRIFFITHS. *Ind. Eng. Chem.* 20, 857-9(1928).—The modifications and the conditions under which pectin and fruit jellies are best measured by a modified Bloom gelometer are described. Jellies of good consistency tested between 60 and 100 g. Jelly strength ranged from very weak (30 g.) to very tough (200 to 280 g.). The jelly strength decreased rather uniformly with increase of temp. between 10° and 30° and increased with length of storage, the max. change occurring very soon after making. The probable error of any series was within 3 g. The av. deviation between top and bottom readings for 22 series was approx. 5%. C. H. BADGER

Pectin and conserves. GIOVANNI ISSOGLIO. *Atti congresso naz. chim. pura applicata* 2, 1025-9(1926).—A discussion of the application of commercial pectin in the manuf. of jellies. Analyses of various fruits show some to have abundant pectin while others are deficient in this respect. Some commercial preps. of pectin are decidedly deficient in pectin substance. The method of analysis consists in pptg. the pectin with an excess of 96% EtOH, washing with the latter and weighing. From this weight the ash and also the protein must be subtracted in order to obtain a correct figure. L. T. F.

The determination of hydrocyanic acid in lima beans with particular attention to the p_H most favorable for the hydrolysis of the glucoside. S. KÜHNEL HAGEN. *Z. Untersuch. Lebensm.* 55, 284-91(1928).—Treat 50 g. of the finely ground beans for 3 hrs. in a closed 2-l. flask with 400 cc. of a citrate-NaOH buffer of p_H 5.92, prepd. according to Sørensen. Then add 50 cc. of a 30% tartaric acid soln. and steam-distil with the outlet of the condenser dipping into a mixt. of 50 cc. H_2O and 1-2 cc. 2 N NaOH. Collect 250 cc of distillate, add 1 g KI and titrate with 0.05 N $AgNO_3$ soln. The detn. is accurate to 0.1 mg. HCN.

The determination of the ash constituents of honey. E. ELSER. *Swiss Dairy and Bact. Inst., Liebefeld. Z. Untersuch. Lebensm.* 55, 246-51(1928).—Details are given for the detn. of the ash constituents of honey by the following methods. H_3PO_4 is pptd. by a reagent contg. strychnine and molybdic acid, and compared with a standard soln. in a nephelometer. Fe and Mn are detd. colorimetrically, Fe as thiocyanate and Mn as permanganate. Ca is pptd. as oxalate, the ppt. dissolved in H_2SO_4 and titrated with $KMnO_4$. To detn. Cl, 2 to 3 g. of honey is treated with concd. HNO_3 , 0.01 N $AgNO_3$ is added, the mixt. warmed with perhydrol, dild with H_2O , and the excess Ag titrated with NH_4CNS . K is pptd. by Na cobaltinitrite reagent and titrated with $KMnO_4$.

WILLIAM J. HUSA

The role of viscosity in heat penetration—heat penetration in sugar solutions. M. A. JOSLYN. *Fruit Products J. and Am. Vinegar Ind.* 7, No. 9, 16-9; No. 10, 22-4; No. 11, 13-5; 18(1928).—It is possible to make a quant. correlation between viscosity and the rate of heat penetration as measured both by the apparent diffusivity and, in certain cases, by the slope of the semi-log plot. *Acidified sirups.*—Acid reduces the retardation of heat penetration. This is probably due to the reduction in viscosity caused by inversion of the sugar. The decreasing rate of heat penetration is in the direction of increasing viscosity. *Fruit juices and sirups.*—The heat penetration in the fruit juices did not differ noticeably from that of H_2O or from each other. In the fruit sirups studied it was not markedly different from H_2O , although it was slower than in a simple sirup of the same concn. In the viscous lemon concentrate (7 pts. lemon juice concd. to 1 pt. *in vacuo*) it was very markedly different from that of H_2O . With the instrument used it was too plastic for its viscosity to be detd. at 20°. *Effect of various sirups.*—Various sirups had no marked effect on the heat penetration. The retardation is not in the order of increasing concn. The effect of pectins and gums enter here. These colloids increase the viscosity of the sirup. *Effect of pectin.*—Pectin is a reversible colloid and even in solns. of $1/2$ and 1% noticeably retards penetration. Acid, here also, reduces somewhat this retarding effect. The retardation is in the order of increasing viscosity. The viscosity of the pectin solns. used was lower than that found by Wendelmuth. *Effect of pectin and sugar.*—The greater the concn. of pectin, the greater was the retardation. Acid when it did not cause jellying reduced this retarding effect. Once the soln. jellyed, the heat penetration was not influenced markedly by change in pectin content. *Effect of gum tragacanth and sugar.*—Addn. of gum tragacanth to H_2O and sirup markedly retards heat penetration. High concn. of gum tragacanth did not retard heat penetration in sirups as much as did high concns. of pectin. It is evident that the rate of heat penetration decreases with increase in viscosity of the soln. Apparent diffusivity decreases with increasing viscosity.

J. A. KENNEDY

The occurrence of starch in oil-bearing edible nuts. C. GRIEBEL. *Z. Untersuch. Lebensm.* 55, 236-9(1928); cf. *C. A.* 22, 2013.—G. demonstrated the presence of starch in sapucaja, pecan and Swiss pine nuts.

WILLIAM J. HUSA

The preservation of chestnuts in a fresh condition. E. BOTTINI. *Atti congresso naz. chim. pura applicata* 2, 1033-7(1926).—Although chestnuts preserved in an atm. of CO_2 show no change externally nor formation of mold, there is a sensible change in protein content and a loss of about 50% of sugar. Chestnuts treated with hexamethylenetetraamine have a compn. close to that of the fresh product. Part of the sugars are transformed to reducing sugars. Chestnuts held without treatment show a water content and acidity distinctly lower than the fresh product. The optimum condition of preservation consists in treatment with hexamethylenetetraamine. L. T. F.

Wyoming forage plants and their chemical composition. OTTO MCCREARY. Wyoming Agr. Expt. Sta., *Bull.* 157, 91-106(1927).—N in the total solids of the grasses and clover studied is present in largest quantity when the plants are in the stage of growth termed pasture, after which it gradually decreases until the plant is wholly dead. The same is true, in a lesser degree, of the fat and ash. After death of the grasses in the fall the dead plant may remain standing all winter without much change in chem. compn. The feeding value of these dead grasses appears to be little better than oat straw, this value showing little difference in the different species of grasses. At the higher altitudes growth of the grasses starts later, but is more rapid. "Alpine plants appear to bloom and seed almost in a day." On this account the pasture stage is hardly passed when the plants bloom and the chem. compn. of the plants of higher altitude will be nearer the pasture compn. than plants of the lower altitudes at the blooming stage. This would indicate the reason that plants of the higher altitudes contain more N than those of the lower altitudes when collected at the same stage of growth. The shading of the plants causes the prolongation of the pasture stage as indicated by the content of N, fat and ash. The fiber increases with the age of the plant whether shaded or not. The forage of the Red Desert has a very high feeding value; the leaves of the sage brush after drying have the compn. of a concentrate and the leaves of the salt sages have a nutritive value as high as the best alfalfa hay, while the dead grasses serve as roughage. E. F. SNYDER

The nutritive value of grasses, as pasture, hay and aftermath, as shown by their chemical composition. T. W. FAGAN. Univ. College Wales, Aberystwyth *Agr. Dept. Advisory Bull.* 2, 23 pp (1927).—Individual grasses show considerable variation in the % compn. of their pasture cuts, this being almost as great as the seasonal variation. Their yield and chem. compn. are to a large extent influenced by their ability to resist the cutting treatment (grazing) and by the leafiness of the growth. The oftener the grasses are cut (or the harder they are grazed) the more leafy they become and consequently the better the produce from the point of view of chem. compn. Where grazing is hard, the yield of dry matter to the animal is not so great as where the grazing is lenient, but the compn. of that dry matter is superior and does not vary to the same extent as when the interval is longer. The time at which hay is cut is a factor of the highest importance and it is better to err on the side of early rather than late cutting; an interval of a week with some grasses having a very pronounced effect on their chem. compn. Aftermaths are characterized by their leafiness, which has a considerable effect on their nutritive value. Results show that the longer the grazing of the aftermath is delayed, the heavier its yield but the poorer its quality, and that this is especially the case with the leaf portion. E. F. SNYDER

The spontaneous heating of hay. FRITZ HILDEBRANDT. *Centr. Bakt. Parasitenk. II Abt.* 71, 440-90(1927), cf. *C. A.* 21, 3240.—Fungi play a definite role in the heating of hay. It is essential to exclude as much O_2 as possible from fresh hay. J. T. M.

Precipitins obtained by means of proteins coagulated by alcohol and their specificity [distinguishing beef and pork] (NICOLAS, KATRANJEFF) 11B. Rennin coagulation of milk. Effect of hirudin, of heparin, of cephalin and of fat removal (STONE, ALSBERG) 11F. Acids of figs (NELSON) 11D. Volumetric analyses of oil cakes for their oil content and moisture (LAPTEV) 27. Obtaining average samples of oil cake (GOGOLEV) 27. Proteolytic bacteria of milk. I. A medium for the direct isolation of caseolytic milk bacteria (FRAZIER, RUPP) 11C.

COLEMAN, D. A., COLLATZ, F. A., FELLOWS, H. C., MIZE, M. D., AND MORISON, C. B.: **Methods for the Analysis of Cereals and Cereal Products.** Kansas City, Mo.: Am. Assoc. of Cereal Chemists. 176 pp. Price to members, \$3; to non-members, \$3.50. Reviewed in *Ind. Eng. Chem.* 20, 874(1928).

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Food. PAO N. WOO. *Fr.* 632,800, Apr. 14, 1927. See *Brit.* 269,576 (*C. A.* 22, 1415).

Agglomerated cream. CHARLES E. NORTH (to The Milk Oil Corp.). U. S. 1,678,476, July 24. Natural cream is washed to remove substantially all non-fatty solids and the washed cream is whipped without substantially increasing its volume.

The resulting stiff pasty product is thicker than ordinary whipped cream. U. S. 1,678,477-8 also relate to whipping cream and obtaining butter fat and describe app.

"Delactating" cream, etc. WILLIAM J. McLAUGHLIN. U. S. 1,677,976, July 24. A gas-forming material such as NaHCO_3 is mixed with water in a closed vessel and steam is introduced into the bottom of the vessel to produce a gas; heated air is also introduced to cleanse the air and the gaseous mixt. thus formed is heated to $60-90^\circ$ and used for deodorizing cream or the like. An app. is described.

Cheese. SANFORD K. ROBINSON (to Kraft-Phenix Cheese Co.). U. S. 1,678,167, July 24. Cheese of a normally solid variety is comminuted, heated and stirred and during the process there is added a small proportion of Na K double tartrate.

Treating cereals. TREUHAND-GES. M. B. H. HARTMANN & Co. Fr. 633,641, Apr. 30, 1927. See Brit. 270,706 (C. A. 22, 1650).

Waste products from cereals. RENÉ A. LEGENDRE. Fr. 632,126, Apr. 2, 1927. Bran and all kinds of waste products from cereals are made alk. by treatment with basic salts or free bases to prevent fermentation.

Curing meat. SALADINE E. COLGIN. U. S. 1,678,056, July 24. A compn. for curing meat is prepd. by mixing NaCl 10 lb., sugar 2 lb., KNO_3 8 oz., black pepper 4 oz. and red pepper 2 oz. and spraying and agitating the mixt. with pyroligneous acid 16 oz. and heating until dry.

Apparatus for regulating the temperature of chocolate. NATIONAL EQUIPMENT Co. Fr. 633,625, Apr. 30, 1927.

Fruit flour. CARTEL COLONIAL. Fr. 632,227, July 9, 1926. The pulp of bananas and other tropical fruits is dried under a high vacuum in very thin layers.

Fruit sirup. ROBERT T. NORTHCUTT. Fr. 632,839, Jan. 16, 1927. A fruit sirup contains a pectin, a carbohydrate such as sugar and an acid such as malic acid, the proportions being such that the pectin does not enter into soln. with the other matters to form a gel but can form a soln. when water or more sugar is added.

Maturing fruits. DYER B. HOLMES. U. S. 1,678,046, July 24. Fruits such as dates are cut when the first of the clusters are approx. ripe and ripening is completed in a closed chamber in which the fruit may be supplied with nutrient soln. and artificial light.

Apparatus for preserving fruit or other foods by heating and treating with circulating sugar solution or other liquids. R. V. JELlicoe. Brit. 281,380, Aug. 31, 1926.

Apparatus for grinding and pressing fruits and vegetables. ÉMILE L. ASSELIN. Fr. 633,430, Aug. 23, 1926.

Pectin. SCHWARTAUER HONIGWERKE UND ZUCKERRAFFINERIE A.-G. Brit. 281,513, Feb. 1, 1927. Apples or other suitable pectin-bearing material is alternately stirred in cold weakly acidulated water and pressed to remove sol. coloring substances and sand and other associated impurities. The pectin is then obtained by repeated hot extrns. with tartaric, citric, lactic or similar acids and the solns. are purified and concd. The p_H of the concd. soln. may be adjusted to facilitate jellification.

Cooking with steam. ALFRED F. BARTLESON (to Fruit Belt Preserving Co.). U. S. 1,677,912, July 24. An app. is provided with agitators which lift the middle portion of the mass of material and expose it to steam from jets in the upper portion of the app.

Cattle food. CHRISTIAN N. KJAERGAARD. Can. 281,904, July 24, 1928. Waste org. residues from industrial plants contg. less than 16% H_2O are compressed with a binder at a pressure of 350 atm. and temp. of 50° .

Food for animals. SOC. DES SUCRERIES TERNYNCK. Fr. 633,463, Sept. 1, 1926. Pulp from sugar factories or other industries is dried and mixed with a binder such as molasses and pressed to briquets which will disintegrate on adding H_2O .

Food for animals. U. S. FARM FEED CORPORATION. Fr. 632,191, April 5, 1927. See Brit. 278,818 (C. A. 22, 2800).

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

The chemical and allied industries. I. A general introduction to a series of articles. REX FURNESS. *Chemistry & Industry* 47, 765-7 (1928); cf. C. A. 22, 1417. E. H.

Patents and the chemist. A. B. MOULTON. *Catalyst* 13, 8 (June-July, 1928); *Ind. Eng. Chem., News Ed.* 6, No. 15, 7 (1928).—A discussion from the chem. viewpoint of the basic law which specifies the requirements of a patentable invention. E. J. C.

The influence of oil-containing incrustations in the steam chambers of evaporators on the heat transmission and the capacity of the evaporators. W. A. SPOELSTRA. *Arch. Suikerind.* 36, 429-47 (1928).—Expts. were made to find out the difference in heat transmission in clean pipes and pipes of the same material, but with an oil-contg. incrustation on the steam-side. The results showed that the usual way to clean the steam-sides of the evaporators with gasoline is not sufficient, when the incrustations contain 15-30% oil, and after cleaning with gasoline the surface of the pipe remains rough. A calcn. is given to show that the incrustation on the steam-side of the 1st body of an evaporator will cause only a small difference in capacity of the whole plant. Cleaning of the pipes of the other bodies will be necessary also. P. R. PEKELHARING

Gas distribution in liquids by means of a rotating sieve. ED. PSEHNICKA. *Z. Zuckerind. techoslav. Rep.* 52, 227-8 (1928).—When a gaseous medium is to react in a liquid it is necessary to introduce the gas in fine streams that quickly break up into small bubbles. The smaller their vol. the greater is the active contact surface, the more intimate is the contact between gas and liquid and the greater is the spread of reaction resulting in better utilization of the gas. P. achieves this by conducting the gas into the liquid through a turbine-like body, under or above which are placed rotating arms which serve to throw the gas toward a horizontal sieve which is perforated in such a manner as to force the gas through the holes on a tangent. The outflowing gas sets the entire app into rotation. A large float helps to reduce the friction caused by the wt. of the app. When rotation ceases, then the sieve, acting as a standing turbine, continues to give the liquid a rotary motion. With this gas distributor in the first carbonation tanks, P. succeeded in greatly increasing the slicing capacity for beets without having to increase CO₂ production or increasing size of carbonation station. F. R. BACHLER

Alkali, etc., works in Scotland. Report for the year 1927. J. W. YOUNG. *Annual Rept. Alkali Works* 1928, 36-41.—No serious complaints of emission of noxious gases have been made during the year. The results of inspection of alkali works, H₂SO₄, chem. manure, sulfate and chloride of NH₄ and gas liquor, tar and Zn works are outlined. Elimination of discharge of Zn vapors at Zn works seems impossible with present methods. W. H. BOYNTON

Arsenic in wall paper and window shades. K. SCHERINGA. *Pharm. Weekblad* 65, 677-9 (1928).—As is seldom found nowadays in wall paper and window shades in excess of the permissible limit of 5 mg. per sq. m. A peculiar case is reported where the odor of alkylarsines was noticed, but examn. of the outer wall paper gave a negative test for As. The older paper beneath gave, however, a strong test, the As being almost completely sol. in H₂O. It appears that the paperhanger some 15 years previously had mixed rat poison with the paste in order to prevent mice from gnawing the paper. Repapering from time to time had evidently furnished nutrient material for the fungi which converted the As into volatile compds. A. W. DOX

Classification and designation of chemical warfare agents. JULIUS MEYER. *Z. ges. Schiess- Sprengstoffw.* 23, 241-4 (1928).—About 25 chem. warfare agents were used effectively in the World War, 45 others were used exptly. or temporarily in the field, and 50 more were studied in the lab. They have been classified according to (a) chem. structure, (b) physiol. action, (c) tactical uses and (d) state of aggregation. German, French, English and American classifications according to (b) are given. The importance of ease of detection, persistence, immediate or delayed action, and time of disability, as factors in chem. warfare tactics, is discussed. J. S. REICHERT

Limiting uses for gas masks with chemical filters. WILHELM HAASE-LAMPE. *Montan. Rundschau* 20, 405-6 (1928).—See C. A. 22, 1637. W. C. EBAUGH

Operating experience with high-pressure and high-temperature steam (ORROK) 21. Measurement of steam flow in works practice (ARMSTRONG, NORDENSON) 21. Operating experiences with 1300-pound steam pressure (ANDERSON) 21.

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MÜLLER, WOLF JOHANNES: Unterrichtsprobleme in Chemie und chemischer Technologie im Hinblick auf die Anforderungen der Industrie. Berlin: Julius Springer. 17 pp. R. M. 1.

Emulsions. G. BAUME, P. CHAMBIGE and D. BOUYIER. *Brit.* 280,930, Nov. 17, 1926. In prepg. emulsions as described in *Brit.* 255,074 (C. A. 21, 2750) and *Brit.*

256,633 (C. A. 21, 2978) the soap employed may be replaced by ingredients which react together to form soaps or by other substances having soap-like properties, *e. g.*, caustic alkali, carbonates, sulfites, alk. borates or "sulfite leaches." In prepg. emulsions such as those of bituminous materials for use on roads, inert ingredients also may be added such as kieselsguhr, asbestos, clay, wood waste or residues from fermentation processes, bone powder, slags from foundries or blast furnaces or residues from the calcination of offal.

Emulsions. I. G. FARBENINDUSTRIE A.-G. Fr. 633,661, May 2, 1927. To render anhydrous org. compds. or solns. emulsifiable in water, they are added to a compd. sol. in water such as alc. or acetone, along with salts of sulfonated mineral oils.

Separating solids. GEORGE RAW. Fr. 633,524, April 28, 1927. Solid materials are sepd. according to their sp. gr. by static air pressure. To effect this the static pressure which supports the layer of material is approx. equal to the wt. of the layer, and the layer must offer sufficient resistance to the passage of air.

Separating objects according to weight. SOC. ANON ANCIENS ÉTABLISSEMENTS BERNARD, VERRERIE DE BAGNEAUX. Fr. 633,452. Aug. 27, 1926. The objects to be sepd. are put on floats which sink more or less according to the wt. of the object. The object is thus brought opposite one of a series of compartments down which it is caused to slide.

Utilization of liquids for transmitting energy or matter. IMPERIAL CHEM. INDUSTRIES, LTD. Fr. 633,570, April 29, 1927. Turbulence in liquids, produced by causing a liquid distributed on the exterior of a tube to descend under gravity, is used for the exchange of heat or transfer of matter from or to the film or between the film and surrounding space or matter. The method can be applied to the evapn. and distn. of liquids and absorption of gases.

Gases acting on solids. I. G. FARBENIND. A.-G. Fr. 632,528, April 9, 1927. To obtain material in small pieces of uniform size for reaction with gases, drops of water or solns. are caused to fall on a layer of the powdered material and the spherical masses which are formed are sepd. by sifting and dried.

Purification of gases. DEUTSCHE GASGLÜHLICHT-ÄTHER-GESELLSCHAFT M.B.H. Fr. 632,178, Apr. 4, 1927. To indicate that gas filters are nearing exhaustion, substances which are easily perceptible and which behave toward the filter in the same way as the impurity to be removed are added to the gas, or substances which will react with the impurity to form an easily perceptible compd. are placed behind the filter.

Purifying gases. MARCEL C. E. MULO. Fr. 633,499, April 27, 1927. In app. for purifying gases in which the gas is submitted to whirling, the whirling is produced by an Archimedean screw.

Treating gases. RICHARDSONS WESTGARTH AND COMPANY, LIMITED, AND FRANCIS G. INGLIS. Fr. 633,595, Apr. 29, 1927. An app. for cooling, purifying or otherwise treating gases with liquids contains several pairs of perforated disks, one of the disks of each pair being fixed while the other turns. The gas passes through the perforations and is intercepted by a current of liquid passing radially between the disks.

Breaking or deforming a vein of liquid. ÉTABLISSEMENTS GAIFFE-GALLOT ET PILON. Fr. 633,417, Aug. 20, 1926. A vein of liquid carrying an elec. current is broken or deformed by allowing a magnetic field to act on it. The invention is applied to the starting of mercury app. without rocking, and agitating baths or liquids without mechanical means.

Drying meat, hides, wood, paper or other materials in a closed receptacle. JOSEPH P. DEVINE. U. S. 1,678,559, July 24. The material is heated under sustained reduced pressure during the entire drying operation in the presence of vapor of relatively high humidity for an extended period of time and the vapor is removed from the drying receptacle during the process. An app. is described.

Refrigerating apparatus. HELMUTH W. TOHTZ and KIRKE L. BONNELL. U. S. 1,678,171-2, July 24.

Absorption refrigerating apparatus. JENS O. BOVING. U. S. 1,678,242, July 24.

Gas adsorption for refrigerating, separating and drying gases. STUDIENGES. FÜR GASINDUSTRIE. Brit. 281,305, Nov. 23, 1926. Silica gel is produced by introducing CO₂ into a soln. of waterglass, and the gel is cooled to the b. p. of the gas to be adsorbed (the cooling being effected by evapn. of liquefied gases). In obtaining O from liquefied air, the N is used for reactivating the gel.

Refrigerating system of the adsorption type employing alcohol vapor and activated carbon. IVAR AMUNDSEN (to A/S Amundsen Refrigerator Co.). U. S. reissue 17,045, July 24. Original pat. 1,647,208 was issued Nov. 1, 1927.

Refrigerating system of the absorption type. BALTZAR C. VON PLATEN and CARL G. MUNTERS (to Electrolux Servel Corp.). U. S. 1,678,277, July 24.

Refrigerating system of the reversing absorption or adsorption type. I. AMUNDSEN (to A/S Amundsen Refrigerator Co.). Brit. 280,880, Nov. 22, 1926.

Refrigerating system employing air-vapor mixtures. W. H. CARRIER and CARRIER ENGINEERING CORPORATION. Brit. 281,356, July 20, 1926. Mech. features.

Refrigerating system for liquefaction of air or other gases. JOSEPH L. SCHLITT and WILCOTT DENNIS (to Air Reduction Co.). U. S. 1,678,485, July 24.

Compression refrigerating system. R. W. DAVENPORT (to Chicago Pneumatic Tool Co.). Brit. 281,622, Nov. 30, 1926.

Compressor for ammonia for refrigerators. LUIS DE IZAGUIRRE. Fr. 633,662, May, 2, 1927.

Electric insulators. J. E. G. LAHOUSSE. Fr. 633,171, Aug. 12, 1926. See Brit. 275,958 (C. A. 22, 2421).

Insulating cables for high-tension electric currents. BRITISH INSULATED CABLES, LTD., G. H. NISBETT and F. J. BRISLEE. Brit. 281,397, Sept. 3, 1926. Insulation such as paper is dried and the contg. vessel is subjected to as high a vacuum as practicable; the vacuum is then broken by introducing a gas sol. in the impregnating material which is to be subsequently used, e. g., CO_2 when transformer oil, refined cylinder oil or petroleum jelly is to be used; the vessel is again subjected to a vacuum and flooded with the impregnating material which has been degasified. In some cases, resin or "insulating wax" may be added.

Heat-insulation. C. O. GOSSLER. Brit. 281,490, Jan. 4, 1927. Layers of spun glass are arranged with the filaments of each layer parallel with each other but those of different layers at an angle. Some or all the layers may be impregnated with rubber, waterglass, gelatin or other materials. The insulation is suitable for use on pipes and may be wrapped with fabric.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Water supplies of the Mississippi coast. W. A. KRAMER and M. P. HATCHER. *J. Am. Water Works Assoc.* 20, 54-60(1928).—As a general thing these waters are quite soft and of a type to produce foaming troubles and embrittlement rather than scale.

D. K. FRENCH

Red water at Southern Pines, North Carolina. C. O. BUTLER. *J. Am. Water Works Assoc.* 20, 64-77(1928).—Trouble began with the use of a new earthen impounding reservoir. As the raw water could only be coagulated at pH 5.2 to 5.4, the filtered water was very corrosive. Na_2CO_3 and later lime were used and the pH was held near 7.0, and later to 8.8 and 9.0 with improved results. The discussion indicates that the use of Na silicate and CaCl_2 would give good results.

D. K. FRENCH

The water supply of Lourenço Marques, Portuguese, East Africa. R. H. FOX. *Water and Water Eng.* 36, 255-62(1928).—A detailed description of this plant.

J. A. KENNEDY

Torquay corporation water works. REGINALD V. TOMS. *Water and Water Eng.* 30, 247-54(1928).—A detailed description of this plant.

J. A. KENNEDY

Filtration improvements and economics with pre-chlorination. J. S. WHITENER. *J. Am. Water Works Assoc.* 20, 61-3(1928).—Pre-chlorination did not kill *Cyclops* in raw water. In coagulated water it reduced the turbidity, eliminated gas formers, increased filter runs over 3 times, and eliminated cracks in the filter.

D. K. FRENCH

California water chlorination survey shows steady growth. C. G. GILLESPIE. *Eng. News-Record* 100, 847(1928).—Chlorination was first practised in Calif. in 1915 at 7 plants supplying a total of 41 million gals. per day. On January 1, 1928, 68 water works, supplying 107 communities with aggregate population of 3,185,000, employed chlorination, the total vol. treated being 470 million gals. per day. The total no. of water works in the state is 662, supplying 4,340,000 people.

R. E. THOMPSON

Iron removal plant for water supply of Albuquerque, N. M. N. T. VEATCH, JR. *Eng. News-Record* 100, 845-6(1928).—The water supply of Albuquerque is derived from wells intercepting the underflow of the Rio Grande River, the composite water having the following approx. characteristics. CO_2 6 p. p. m.; Fe 0.5 p. p. m.; temporary and permanent hardness 200 and 100 p. p. m., resp. The consumption averages 1.8 million gals. per day, with max. rate of 2.7 million gals. A 5-million gal. per day Fe-removal plant is being constructed which consists of a lime-mixing tank, settling basin, alum-mixing tank and 2 filters. The mixing tanks are circular, with tangential inlets and hopper bottoms, detention period being 10 min. Mixing is effected by the motion of the water

through the tank. The settling tank is 15 feet deep and has a capacity equiv. to $1\frac{1}{2}$ hrs. flow. The filters will be operated at twice the normal rate, functioning principally as roughing filters. The effluent will be chlorinated. R. E. THOMPSON

Experimental water-filtration plant for Chicago. LORAN D. GAYTON. *Eng. News-Record* 100, 861-3(1928).—The elaborate exptl. filter plant recently constructed at Chicago at a cost of \$150,000 is described. The plant, which includes chem. soln. tanks and mixing basins of different types, coagulation and settling basins, and 12 mechanical filters of total capacity of 0.75 million gals. per day, was built to det. the most efficient and economical method of purifying the entire water supply of Chicago, now drawn from Lake Michigan at the rate of 875 million gals. per day and treated by chlorination only. R. E. THOMPSON

Municipal water-softening at St. Louis. AUGUST V. GRAF. *Ind. Eng. Chem.* 20, 758-9(1928).—Details are given on the use of lime, Al sulfate and Fe sulfate at this plant. J. A. KENNEDY

Double coagulation at Cincinnati. CLARENCE BAHLMAN AND E. B. EVANS. *J. Am. Water Works Assoc.* 20, 30-46(1928); cf. *C. A.* 22, 470, 3247. D. K. F.

Remodeling a small water purification plant. JAMES L. BARRON. *Eng. News-Record* 100, 867-8(1928).—The water supply of Burlingame, Kans., derived from an impounding reservoir on Dagoon Creek, has been treated since 1916 in a plant consisting of an alum soln. tank, coagulation basin and rapids and filter. The plant has been recently remodeled and improved by addn. of a cascade aerator, mixing flume, basin stiffing baffle and machines for applying alum, lime and Cl_2 . R. E. THOMPSON

Starting washed filters. AUGUST V. GRAF. *Eng. News-Record* 100, 867(1928).—Newly washed filters at the St. Louis plant are put in service at rate of 0.5 million gals. per day and allowed to run for 1 hr. before the rate is increased to that of the other filters. A great no. of tests have shown that the turbidity of the effluent is lower with this method than when the filter is started at normal rate. When the rate is increased to normal an increase in turbidity occurs, but the max. is less than $\frac{1}{2}$ of that when the filter is placed immediately in service at full rate. At the new Howard Bend plant being constructed on the Missouri River a new device will be employed which will slowly increase the rate of filtration from zero to the desired rate in any period of time up to 1 hr. R. E. THOMPSON

Device for collecting deep water samples. EDWARD S. HOPKINS. *Eng. News-Record* 100, 870(1928).—A brief illustrated description of a sampling app. for water at depths of 10-60 ft., which can be operated from a height of 20-80 ft. above water level. R. E. THOMPSON

Further notes on the colorimetric method for field determinations of the carbon dioxide tension of natural waters. E. B. POWERS AND J. D. BOND. *Univ. of Tennessee. Ecology* 9, 364-6(1928); cf. *C. A.* 22, 471.—An equation is mathematically developed, by means of which the CO_2 tension of a natural H_2O may be calcd. after making 3 pH detns. T. S. CARSWELL

The Gersbach indole method for judging the condition of water. W. BLUMENBERG. *Univ. of Bonn. Centr. Bakt. Parasitenk. I Abt.* 107, 386-92(1928).—Indole production, is not a consistent characteristic of the colon bacillus; hence as a test for fecal contamination it may give false negatives. Other water bacteria, especially *B. cloucae*, may produce indole and give false positives. JOHN T. MYERS

Operating problems of pneumatic alum conveyor system. J. ARTHUR JENSEN. *Eng. News-Record* 100, 931(1928).—When the pneumatic filter alum conveyor was installed at the new Fridley filtration plant in Minneapolis it was equipped with rotary locks for delivery of the alum from the receivers to atm. pressure. These have been found unsatisfactory in that alum dust enters the drum bearings and causes friction. "Stop" or gate locks have been substituted and found satisfactory. An intensely hard scale accumulated at the bends in the iron conveyor line, reducing the capacity of the plant. This difficulty has been eliminated by substituting flanged rubber hose at the bends. R. E. THOMPSON

Use of exchange-silicate (zeolite) water softeners in railroad practice. GEORGE L. BAXTER. *Ind. Eng. Chem.* 20, 755-8(1928).—Exchange-silicate (zeolite) treatment at certain points on the Southern Pacific Lines has been found less expensive than treatment with lime and soda ash and has resulted in more satisfactory operation of stationary and locomotive boilers. J. A. KENNEDY

Deconcentrating treatment of boiler water. H. L. GRIFFIN. *Power Plant Eng.* 32, 869-70(1928).—Continuous blow-down is made economical by utilizing heat of blow-down water to heat fresh feed-water. Regulators make it impossible for blow-down water to leave the deconcentrator before its temp. has reached 65°F. S. D. POARCH

Illinois Central cleans well screens with acids. C. R. KNOWLES. *Railway Engineering and Maintenance* 24, 202-4(1928).—The Ill. Central R. R. recently cleaned the screen in a 16-inch well 258 ft. deep at Pesotum, Ill., with com. HCl, using 800 gal. acid to form 30% soln. The acid was allowed to stand in the well 24 hrs. before the pump was started and the well thoroughly flushed. The yield was increased from 42 to 140 gal. per min.

R. C. BARDWELL

The value of boiler water treatment to the mechanical department. J. F. RAPS. *Proc. Am. Ry. Eng. Assn.* 29, 1022-4(1928).—Review of improvements effected on the Ill. Central R. R., by water treatment.

R. C. BARDWELL

Circulating system in the Coffin Feedwater heater. ANON. *Railway Age* 84, No. 24A, 1420-40(1928).—Diagram and method are shown for installing and operating a feed-water heater on a locomotive.

R. C. BARDWELL

New water supply facilities effect economies on the Southern. ANON. *Railway Age* 84, 1329-32(1928).—The Southern Ry. recently completed extensive improvements to the Yadkin River plant at their Spencer, N. C., terminal. A 2,500,000-gallon sedimentation basin is provided with facilities for alum and dry sodium aluminate treatment. Present consumption averages 1.3 m. g. d. Automatic elec. control is provided for raw water and transfer pumps.

R. C. BARDWELL

The treatment of water for locomotives from the standpoint of chemical engineers. WM. BARR. *Proc. Am. Ry. Eng. Assn.* 29, 1025-31(1928); cf. C. A. 22, 834.—General discussion of railway water treatment problems including compds., lime-soda and zeolite methods.

R. C. BARDWELL

Boiler-feed water treatment from a manufacturer's viewpoint. J. B. ROMER. *Proc. Am. Ry. Eng. Assn.* 29, 1032-7(1928).—A general review of boiler-feed water impurities and their effect.

R. C. BARDWELL

Pretreatment of boiler-feed water. C. R. KNOWLES. *Proc. Am. Ry. Eng. Assn.* 29, 1045-51(1928).—Review of lime-soda and lime-soda-zeolite methods.

R. C. B.

Foaming of locomotive boilers with special reference to the influence of suspended matter on foaming and cost of blow-down. COMM. REPT. *Proc. Am. Ry. Eng. Assn.* 29, 143-52(1928).—General review with charts and tables indicates that foaming in locomotive boilers will vary with type, character and amount of suspended solids, and also with the type of work being handled by the locomotive.

R. C. BARDWELL

Cost of blow-down of locomotive boilers. R. A. TANNER. *Proc. Am. Ry. Eng. Assn.* 29, 152-5(1928).—Foaming point must be detd. for individual district and conditions after which amount of blow-down and cost can be calcd. Formula and chart are included.

R. C. BARDWELL

Carbonate and sulfate waters. Their relative influence on the operation and maintenance of boilers and their comparative costs of purification. COMM. REPT. *Proc. Am. Ry. Eng. Assn.* 29, 156-7(1928).—Cost per lb. for treatment varies from 0.44 c. for CaCO_3 to 1.66 c. for MgSO_4 . Cost in blow-down water for Na_2SO_4 averages 4 c. per lb. and soft sludge and suspended matter about 1 c. per lb. unless blown out by necessity for reducing alk. concn.

R. C. BARDWELL

Drinking water conditions on railroads during the Mississippi flood. COMM. REPT. *Proc. Am. Ry. Eng. Assn.* 29, 126-30(1928).—Emergency liquid-chlorine treatment was installed in larger towns by State Health Departments. Railroads issued bulletins recommending treatment of small supplies with $\text{Ca}(\text{OCl})_2$ on the basis of 1 ounce per 1000 gal. Boiling water was not found reliable. Experienced supervision was provided where possible.

R. C. BARDWELL

Causes of boiler pitting and means of prevention in neutral and alkaline waters. C. H. KOVL. *Proc. Am. Ry. Eng. Assn.* 29, 131-3(1928).—General review.

R. C. BARDWELL

The prevention of boiler pitting in neutral and alkaline waters by the exclusion of dissolved oxygen from the feed-water. C. H. KOVL. *Proc. Am. Ry. Eng. Assn.* 29, 133-5(1928).—Operation of locomotives equipped with an open feed-water heater in the alkali water district on the C. M. & St. P. Ry., during the past 3 years has shown good results in reduction of pitting and corrosion compared with similar engines in similar service not so equipped. The av. removal of dissolved O was 60%. Inaction of the remaining O is accounted for by the surge of water in locomotive boiler. Details and regularity of operation are important.

R. C. BARDWELL

Feedwater heaters reduce pitting. C. H. KOVL. *Railway Age* 84, 629-30(1928).—Weekly examn., over a period of 30 months, of flues in locomotive boiler equipped with open-type feed-water heater operating between Sioux City, Ia., and Mitchell, S. D., on the C. M. & St. P. Ry., developed a practical absence of pitting while similar locomotives not so equipped pitted badly. The test indicates that elimination of O by open-

type locomotive feed-water heater will greatly retard boiler corrosion in water high in alkali salts, which otherwise pit, although NaOH is present. In addition, the fuel saving averaged \$1000 per year.

R. C. BARDWELL

Prevention of pitting and corrosion by electrochemical polarization. L. O. GUNDERSON. *Proc. Am. Ry. Eng. Assn.* 29, 135-9(1928).—Three years' test on the Chicago and Alton R. R., with an electrochem. polarization system installed in locomotive boilers using weak arsenic soln. and e. m. f. of 2 v. and c. d. of 0.001 to 0.002 amp. per sq. ft. protected surface, has shown good results in relieving pitting and corrosion conditions.

R. C. BARDWELL

Sodium aluminate as an aid to water softening. COMM. REPT. *Proc. Am. Ry. Eng. Assn.* 29, 138-9(1928).—Sodium aluminate used in the lime-soda process of water softening hastens reaction time, improves coagulation and sedimentation, and reduces trouble from after-precipitation. Expts. are being conducted with dry Na aluminate.

R. C. BARDWELL

Use of sodium aluminate on the Rock Island Lines. PAUL M. LABACH. *Proc. Am. Ry. Eng. Assn.* 29, 139-42(1928).—Advantages gained by use of sodium aluminate are: (1) Increased plant capacity; (2) less residual hardness in treated water with smaller lime-soda overtreatment; (3) less alkali salts in treated water with reduction in foaming; (4) reduction in after-precipitation and improvement in pipe-line conditions. At 25 plants, Na aluminate is used without addn. of lime or soda ash.

R. C. BARDWELL

Embrittlement of steel. ALEXANDER G. CHRISTIE, et al. *Proc. Am. Ry. Eng. Assn.* 29, 1062-74(1928).—A general review of controversy on the effect of various mineral constituents in boiler-feed water on the embrittlement of boiler metal indicates a need for further study and research.

R. C. BARDWELL

Waste-water distributing devices. A. BATTIGE. *Apparatebau* 40, 162-3(1928).—Description of revolving sprays and trough distributors.

J. H. MOORE

Treatment of waste waters. T. J. LAFRENIÈRE. *Can. Chem. Met.* 12, 196-7(1928). (In French).—An address dealing with the disposal of industrial waste waters and particularly of sewage, and outlining the general policy adopted in the Province of Quebec in this respect.

A. PAPINEAU-COUTURE

The effect of sea water on the development of hookworm ova and larvae (*Necator americanus*). F. C. CALDWELL AND E. L. CALDWELL. *J. Parasitol.* 13, 270-82(1927).—Under conditions of satn., sea water has a marked lethal effect on the development of hookworm ova to the infective larval stage, 600 times that of fresh water under like conditions. Under optimum cultural conditions, the lethal action of sea water was demonstrated by an av. larval yield of 0.1% in contrast with 67.6% from cultures moistened with tap water. From feces contg. viable hookworm ova submerged under sea water for more than one day and transferred to favorable conditions of temp., soil and moisture, the larval yield was consistently low, averaging 0.75% from all cultures. Study of the process in detail showed that sea water does not prevent the development of hookworm ova to the embryo stage, but does retard the hatching of the embryos, and kills the newly hatched larvae.

C. R. FELLERS

Disposal of sludge at water-softening plants. COMM. REPT. *Proc. Am. Ry. Eng. Assn.* 29, 187-93(1928).—Where low land or flowing stream is not available, accumulation in pits with periodic cleaning and removal or direct removal in specially designed sludge cars is necessary. Plans and diagrams of typical installations are shown.

R. C. BARDWELL

Volatile acids in digesting sewage sludge. H. HEUKELEKIAN. *Ind. Eng. Chem.* 20, 752-5(1928).—Various methods for the detn. of volatile acids in digesting sewage solids have been studied. One detn. gives an accurate picture of the course and completion of digestion. When digestion is completed as indicated by solids and ash figures, the volatile acids have practically disappeared. The volatile acids in unseeded and unlimed material reach a high peak shortly after the digestion has started and persists for the whole digestion of 8 to 9 months. About half of the acids are free and can be distd. without acidifying the sample to free them. In the limed unseeded material there are no free volatile acids, but the total volatile acids reach a high peak early in the digestion period and then drop very rapidly to a low level, so that within 100 days when digestion is completed the volatile acids are at a low level. In properly seeded fresh solid mixts. there are no accumulated free volatile acids. The magnitude of the "total" volatile acids is lower than in unseeded limed material and a low point is attained earlier in the limed unseeded material. There is an intimate relation between volatile acids and gas production. Completion of digestion or the ripeness of a sludge can be detd. by measurement of volatile acids in conjunction with the other well-known tests.

J. A. KENNEDY

Partial aeration of strong sewage with activated sludge. WILLIAM D. HATFIELD. *Ind. Eng. Chem.* 20, 832-5(1928).—The sewage treatment plant at Decatur, Ill., consisting of Imhoff tanks, sprinkling filters and appurtenances, became heavily overloaded because of the rather phenomenal growth, after the war, of a corn-products manufg. company. The sewage became about 5 times as strong as normal city sewage. An expt. station to study partial aeration as a method of increasing the capacity of the existing plant and to reduce the odor hazard was operated for 15 months. Complete operating and chem. data are given which indicate that the process could be used to triple the capacity of the filters. A new addn. to the sewage plant has now been completed on the basis of the data presented and is in operation. This method, which has been termed pre-aeration, seems particularly adapted to increasing the capacity of sprinkling filters, but should also prove valuable as a method of partial treatment where complete treatment is not advisable until later. C. R. FELLERS

Accuracy of stream-flow measurements. KENDALL K. HOYT. *Eng. News-Record* 101, 167-8(1928).—Data are given which show that the Price current meter, when employed by experienced personnel, gives consistent results under different channel conditions, and that it checks with the much-praised Gibson method. R. E. T.

A stream-flow sewage treatment process. HARRY N. JENKS AND MAX LEVINE. Iowa State College. *Eng. News-Record* 100, 808-13(1928).—A distinctly new means of aeration, designated as stream-flow aeration, has been originated and studied. When embodied in a sewage works of special design, the functional action simulates, more closely than any existing method, the basic phenomena responsible for natural self-purification of streams. The structural features of a stream flow plant, with the exception of the aeration units, conform in essential particulars to the general design employed in activated-sludge plants. The aeration units consist essentially of a biochem. oxidation zone contained in a tank or basin through which the main body of sewage passes, and a sep. re-aeration or O₂-absorbing zone, embodied in a paved surface adjacent to or above the tank, over which an independent and concomitant recirculation of the org. wastes is maintained in a layer $\frac{1}{2}$ to 1 in. in depth. The sewage is with drawn from the oxidation zone, discharged on to the re-aeration surface and allowed to flow down the slope on this surface (in which is placed transverse cleats to induce riffing), thence returning to the oxidation zone within the aeration tank. It is estd. that a strong domestic sewage having a biochem. O demand of 350 p. p. m. should be successfully treated by 6 hrs. stream flow aeration of 50 times the vol. of flow, on which basis the energy required should not exceed 12 h. p. per million gal. treated. Expts. indicated that the re-aeration surfaces should be from 6 to 10 ft. in length, providing 3-5 sec. exposure of the sewage film to the atm. each time the sewage flows over the pavement. The results obtained in the treatment of milk wastes in a lab. exptl. plant and packing wastes in a field exptl. plant are given. Expts. were made also on the division of the treatment process into 2 or more stages, by developing and maintaining means when treating 2^d milk wastes in stream-flow aeration units. Previous expts. had shown that it was impossible to produce nitrates in single stage treatment of these wastes by the activated-sludge process. An important observation made was the great advantage of removing as quickly as possible all excess sludge with its high O₂-demanding characteristics. R. E. THOMPSON

Automatic hydro-electric control at Baltimore sewage works. C. E. KEEFER. *Eng. News-Record* 100, 926-7(1928).—When the Baltimore sewage works were constructed the flow line of the final settling tanks was put 20.5 ft. above the Black River, into which the effluent is discharged, to provide sufficient head for intermittent sand filters to be installed later if required. The filters were found unnecessary and the head has been employed for power generation. Installation of automatic control equipment at the power plant has reduced the operating personnel from 7 to 1 and the cost of power from 3.7 to 1.21¢ per kw-hr. The sewage flow is 50-60 million gals. per day. R. E. THOMPSON

Sewage-works construction at Cleveland, Ohio. A. A. BURGER. *Eng. News-Record* 101, 53-8(1928).—The southerly sewage works, the last of 3 constructed by the city, consists of an overflow chamber, screen building, 4 grit chambers with mechanical grit-removal equipment, a battery of 24 Imhoff tanks, 3 twin dosing tanks and 6 acres of trickling filters, and 3 humus tanks with continuous sludge removal equipment. Glass-covered sludge-drying beds, 94,000 sq. ft. in area, are to be constructed. The works will treat the sewage of 400,000 people, and is designed for future extension. R. E. THOMPSON

Sewage agitation and chlorination tests at Havre, Mont. EMIL SANDQUIST AND H. B. FOOTB. *Eng. News-Record* 100, 1001-2(1928).—The sewage flow of Havre,

0.587 million gal. per day, is discharged untreated into the Milk River at 3 points. The river flow is equal to or in excess of 7 sec.-ft. per 1000 population for 75% of the year. Expts. have been carried out on treatment by agitation to break up the solids and chlorination. Agitation was effected with a propeller driven at 500 r. p. m., and Cl_2 dosage was varied to maintain residual of 0.5–1.0 p. p. m. after 10 min. contact. The dosage ranged from 10 to 21 p. p. m., varying with flow and H_2S content. The bacterial count was reduced to 100–1200 per cc and *B. coli* tests on 10-cc. portions were negative. Hydrogen sulfide was reduced 26.5% by agitation alone, and 63% by agitation and chlorination. The cost of such treatment for the 4 months of low stream flow would total \$1320 per year.

R. E. THOMPSON

The sewer and clarification plant of the Rath rolling mills of the Mannemann tube works in Düsseldorf. OTTO MOHR. *Warme & Kälte Tech.* 28, 188 9(1926).—All water is used in a closed circuit, on account of the distance from the supply. Water from sanitary equipment is settled and aerated; that from industrial equipment is settled and skimmed.

ERNEST W. THIELE

The hygienic importance of the permeability of window glass to ultra-violet light. K. B. EISENBERG. *Gesundh. Ing.* 51, 465–7(1928).—Ultra-violet light is capable of activating org. substances. A table is given showing the per cent permeability for light of various wave lengths (320μ to 290μ) of various kinds of glass. All glass shows a rapid decrease in the per cent permeability with decreasing wave length but ordinary window glass is the poorest of all. At 320μ its permeability is about 1% and at 290μ the permeability has dropped to a negligible value. Only the direct light rays contain ultra-violet light; reflected rays have lost most of the shorter light rays. Also the amt. of ultra-violet light varies with the hour of day, time of year and the relative position of the house. In order to get much ultra-violet light into a house, it is necessary to use one of the several special glasses made for this purpose, such as silica glass, ultra-violet glass, etc.

WAYNE L. DENMAN

Impurities in the atmosphere. A. J. H. KAM. *Chem. Weekblad* 25, 298–301(1928).—The stack gases have been examd. in various types of factories. Among the more poisonous substances, the analysis detected H_2S , F, SO_2 , SO_3 , HCl, As and AsH_3 .

A. L. HENNE

Chemical examination of irrigation waters and alkali soils (HIBBARD) 15. Fumigation with $\text{Ca}(\text{CN})_2$ dust (QUAYLE) 15. Apparatus for the micro-determination of dissolved oxygen (THOMPSON, MILLER) 1. Brass in engineering (JONES) 9. Some combustion problems in their relation to public health (PARR) 21. Radioactivity of some mineral waters and of the drinking water of the Somes and Cris valleys (DIMA) 3.

GARTNER, AUGUST: *Die Wasserversorgung und Abwasserbeseitigung im rheinisch-westfälischen Industriegebiet*. München: R. Oldenbourg. 23 pp. M. 3.60.

Apparatus for softening water with base-exchange materials. UNITED WATER SOFTENERS, LTD., AND E. B. HIGGINS. Brit. 281,416, Sept. 15, 1926.

Apparatus for softening water with zeolites. WALTER H. GREEN (to General Zeolite Co.). U. S. 1,677,891, July 24.

Preventing incrustation in boilers. SOC. ANON. SUBOX. Brit. 281,598, Dec. 4, 1926. Resin "in the hydrated state" such as is obtained by treating colophony in the presence of a solvent with an alk. substance and then with an acid substance is used, with or without other substances such as a gum, tannin or dextrin.

Preventing and removing incrustation in boilers. J. BILLWILLER. Brit. 281,361, Aug. 25, 1926. See Can. 281,216 (C. A. 22, 3010).

Cleaning boilers. WILHELM BAUMANN and HEINRICH BAUMANN. Fr. 632,695, April 12, 1927. A small quantity of org. compds. such as quinaldine or acridine is added to the acid solns. used for cleaning boilers, etc.

System for heating, deaerating and evaporating water. GEORGE H. GIBSON (to Cochrane Corp.). U. S. 1,677,890, July 24. App. is described suitable for use in prep. boiler-feed water from condenser condensate and raw make-up water with steam at high and low pressures.

Sewage digestion tank and sludge circulating pump and pipe system connected with or within the tank. M. PRÜSS. Brit. 281,541, May 23, 1927.

Utilizing domestic refuse, etc. MUSAG GES. FÜR DEN BAU VON MULL-UND SCHLACKEN-VERTUNGSANLAGEN A.-G. AND A. GROTE. Brit. 280,902, Nov. 20, 1926. Domestic

or industrial refuse of "gutter refuse" is passed through an inclined rotary furnace in the first portion of which combustible constituents are burnt out and in the remaining part of which the residue is fused and formed into a slag in granular or lump condition.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

The hot fermentation of stable manure according to H. Krantz. HANS GLATHE *Landw. Vers. Sta.* 107, 65-129(1927).—The hot fermentation of stable manure makes possible, in addn. to an essential limiting of the losses during storage, a better utilization of the nutritive materials of the manure, especially the N. Hitherto a nearly complete preservation and utilization of the nutritive materials contained in stable manure was attained only by the preservation of the manure in deep stalls. In comparison herewith the hot fermentation process shows different advantages especially of a hygienic nature: (1) the slight possibility of the transfer of diseases, especially mastitis-producers in the stall itself; (2) the far-reaching destruction of the producers of the foot and mouth disease, as well as all non-spore-forming pathogenic bacteria by the action of temps. between 50° and 60° for several days. E. F. SNYDER

Investigations on the form and structure of soil particles. G. I. POKROVSKII *Kolloid Z.* 158-61(1928).—The important phases of the method used are described. The investigated soils were built up of particles of 2 sizes. The particles of these 2 sizes correspond to both maxima on the curve given. The interval between these maxima is on the other hand filled with conglomerates of small particles. These complicated forms are on account of their structure opalescent, which the positive value β signifies. E. F. SNYDER

Colloidal soil material. P. L. GILE. *Soil Science* 25, 359-64(1928).—The colloidal soil material might be simply and logically defined as "that material in the soil which has an appreciable capacity for adsorption or for evolution of heat on wetting." Such a definition is inadequate for distinguishing between colloid and non-colloid in a mixt. of these 2 classes of material, since soil materials cannot be sepd. according to their adsorptive or heat of wetting capacities. The colloidal soil material has also been defined as including: all soil org. matter, inorg. material dispersible into particles less than 1μ in diam. by a treatment that does not disintegrate distinctively mineral particles, and any undispersed material which microscopical observation shows is made up of particles less than 1μ in diam. A definition of this kind is practicable, since methods are available for sepg. or distinguishing soil constituents according to the characteristics specified; namely, chem. compn. of the material and size and structure of particles. It is somewhat questionable whether fibrous org. matter and Fe concretions should be classed as colloid and whether the upper limit for the size of colloidal soil particles should be placed as 1μ or higher. E. F. SNYDER

Variations of the colloidal material in typical areas of Leonardtown silt loam soil. R. S. HOLMES. *J. Agr. Res.* 36, 459-70(1928).—The constancy of the chem. compn. and certain phys. properties of the colloid of Leonardtown silt loam soil was studied. The samples investigated were typical of the Leonardtown series, taken from different localities. The colloid was found to vary little in SiO_2 , Al_2O_3 , Fe_2O_3 , K_2O , MgO and combined H_2O . Other constituents (MnO , CaO , Na_2O , P_2O_5 and SO_3) varied more widely. The p_H , adsorptive capacity for water vapor, for NH_3 and for Ba from BaCl_2 soln. were all fairly const. Leonardtown soil may be regarded as characterized by its adsorptive properties and by those inorg. constituents which are present in appreciable quantities. The probable error of sampling indicates that 8 to 10 samples of a soil should be sufficient to show with considerable accuracy the kind of colloidal material characteristic of the type. The hardness of the B_2 horizon of the Leonardtown soil type is not primarily dependent upon the kind or quantity of colloidal material present. M. S. ANDERSON

The clayey colloids and soil solutions. A. DEMOLON, H. BURGEVIN and G. BARBIER. *Compt. rend.* 186, 1646-9(1928); cf. *C. A.* 22, 3081.—The results verify the theoretical conclusions deduced from the Freundlich formula. They show the importance there is in maintaining clayey soils satd. with Ca, from the point of view of the mobility of the cations energetically fixed by the clay. The present study also shows that one cannot in these soils consider the total exchangeable K as capable of always contributing the same efficacy to plant nutrition. The necessity of considering in this regard the content of the absorption complex explains in particular the inefficacy often

noted in a similar case with small amts. of K fertilizer when the large amts. give positive results. The same conclusions apply wholly to NH_4 if nitrification does not permit the rapid renewal of the quantities passing in soln. When nitrification is retarded there results, in clayey soils and for small amts. of ammoniacal fertilizers, an amt. of N in the soil solns. insufficient for obtaining max. yields. There also results a decrease of ammoniacal N with respect to the essentially mobile HNO_3 . E. F. SNYDER

Investigation of the properties of colloidal material in Missouri soils. R. BRADFIELD. Missouri Agr. Expt. Sta., *Bull.* 256, 94-6(1927).—It has been found that with the non-calcareous, non-saline soils studied the electrodialyzable bases were identical with the exchangeable bases detd. by the neutral salt extn. methods. Electrodialysis had several advantages over the neutral salt extn. method. By the use of colloidal clay purified by electrodialysis it has been possible to demonstrate the colloidal acid theory of soil acidity previously developed. Investigations of the satn. capacity of soils, of the effect of the p_H value and of the nature of the exchangeable bases upon the retention of PO_4 by electrodialyzed colloidal clay and on the size distribution of particles in colloidal clay have been made. E. F. SNYDER

The hydrometer method for studying soils. GEORGE J. BOUYOUCOS. *Soil Science* 25, 365-9(1928); cf. *C. A.* 22, 292.—Exptl. refutation of disputed points regarding the hydrometer method. E. F. SNYDER

The crop-producing power of limited quantities of "essential" plant nutrient. CHARLES HARTMAN AND WILBUR L. POWERS. *Soil Science* 25, 371-7(1928).—The results seem to indicate the optimum concn. needed during the earlier stages of growth and also the crop-producing power of each mg of so-called "essential" element, for the conditions of the expt. NO_3^- effected by far the highest yield of dry matter per mg. while the formation of dry matter per mg. Mg^{++} was comparatively low. In another report the concns. needed in the soil soln. for optimum growth are indicated to be at least as high as here suggested in the case of SO_4^{--} and Ca^{++} . E. F. SNYDER

Method for the determination of phosphoric acid in samples of soil. Z. KOEHLER, H. SOWINSKA AND P. TERESZCZENKO. Univ. Krakau *Roczniki Nauk Rolniczych I Lesnych* 15, 424-6; *Chem. Zentr.* 1927, II, 486.—In analyses of the HCl ext. of soils poor in P_2O_5 , the method of Lorentz for the detn. of P_2O_5 (cf. Neubauer and Lucker, *C. A.* 6, 1264) gives far better results than the ordinary Mo method. It was tested with the crude ext. and with $\text{Mg}_3(\text{PO}_4)_2$ and MgNH_4PO_4 . C. C. DAVIS

A brief method for chemical examination of irrigation waters and alkali soils. P. L. HIRSHARD. *Soil Science* 25, 351-5(1928).—A procedure for the detn. of the ions, Ca^{++} , Mg^{++} , SO_4^{--} , CO_3^{++} , HCO_3^- , Cl^- and Na^+ , in ordinary H_2O is described. The H_2O ext. of a soil was analyzed as described for ordinary water and the p_H value, CaCO_3 , NO_3 and PO_4 were also detd. E. F. SNYDER

Manganese as an active base in the soil. C. J. SCHOLLENBERGER. *Soil Science* 25, 357-8(1928).—As a result of previous work from which it was assumed that there might be some connection between the development of active Mn and the change in reaction, several mixtures of soil and calcite were prepd. The only significant change produced by the treatment was a very large increase in exchangeable Mn, together with a decrease in the acid reaction. The data indicate that the increase in percentage of total base-absorbent capacity satisfied by the neutral salt-forming bases is the factor causing the change in reaction. E. F. SNYDER

Soil acidity studies. C. R. RUNK. Delaware Agr. Expt. Sta., *Bull.* 152, 6-7 (1927).—(1) *Acidity of the soils of the State.*—Taken as a whole the soils of the State have a wide range of acidity from neutral to strongly acid. The latter soils are mostly from areas not well suited to crop production, due to drainage and other factors. (2) *Buffer qualities of soils.*—(a) Lab. tests. Some soil types of the State possess strong buffer qualities and large amts. of lime or fertilizer materials may be added without disturbing the physiol. balance of the soil soln. to such an extent as to retard the crop. Other types are very easily thrown out of balance and these soils must be handled carefully. (b) Field tests. Work has been started to learn how the buffer capacity of the soil under field treatments compares with the lab. results. (3) *Reaction and crop growth in the field.*—Very poor stand and growth of alfalfa have been secured on the plots of p_H 6, 8, 7, 3 and 7.8. The best growth and stand of alfalfa have been on the plots between p_H 5.4 and 6.5. (4) *Lime requirement methods.*—One hundred and sixty-five soils have been tested with the Truog, KCNS and Ca acetate methods. The H-ion concn. was also detd. and titration curves were made for buffer capacity. No agreement was found among the methods used. (5) *Effect of continued fertilizer treatments upon reaction.*—Tests in progress. (6) *Chlorosis of soy beans.*—Quite marked results were obtained in the greenhouse in preventing the development of chlorosis by appli-

cation of K salts at planting time and also by side dressings for untreated plants which had begun to develop considerable chlorosis. The side dressed plants developed normally after treatment. The treatments used in this series are being used in the field.

E. F. SNYDER

Notes on the determination of the hydrogen-ion concentration of soils. FELIX G. GUSTAFSON. *Ecology* 9, 360-3 (1928).—Results indicate that it is not a safe practice to filter a soil soln. to free it from suspended particles. Centrifuging clears the soil soln. much better and does not change the p_H of the soln. The H_2O used must not have too much dissolved material in it, and it is always best to use distd. H_2O . For these reasons it is best to make the detns. in the lab. rather than in the field. It is safe to make the detn. of the p_H value of a soil in the lab. some time after the soil has been brought in because the p_H of the soil does not change during a few weeks of storage in the lab.

E. F. SNYDER

Concentration of hydrogen ions in the soil and plant formation in "Dolina Chocholowska" (Tatra). JAN WLODEK and KAZIMIERZ STRZEMIENSKI. Univ. Krakau. *Roczniki Nauk Rolniczych I Lesnych* 15, 321-38, *Chem. Zentr.* 1927, II, 484. - Investigations of the diffusion of plant associations in the Chocholowska Valley showed that this diffusion is far more dependent upon the geologic and ecological conditions than upon the p_H value. On the other hand the diffusion of wild plants, especially horse-tongue and perhaps mycorrhiza as well, depends to a great extent upon the soil reaction.

C. C. DAVIS

Soil microbiology. III. Fixative power of soil. S. WINOGRADSKY and (MME.) J. ZIEMIECKA. *Ann. inst. Pastur* 42, 36-62 (1928); cf. *C. A.* 21, 976. The N fixing power of organisms in the soil can be detd. by (1) the growth obtained from 1 g. of the soil on a plate of selective silica gel medium and (2) the total growth obtained spontaneously in a sample of the soil. The limestone and P_2O_5 requirements are indicated from the samples collected for these tests.

E. W. W.

Food requirements of soil amebae with special reference to their inter-relation with soil bacteria and fungi. L. B. SEVERTZOVA. *Centr. Bakt. Parasitenk., I Abt.* 73, 162-79 (1928).—Some species of bacteria, yeasts and molds are more acceptable as a food for soil amebae; hence they will be chosen first from a mixt. JOHN T. MYERS.

The abo-abo soil of Occidental negros. M. M. ALICANTE. *Philippine J. Sci.* 35, 391-401 (1928). Because of the peculiar phys. characteristic of the surface soil, the rate of evapn. and percolation became high, thus greatly reducing the available H_2O supply in the surface soil for the use of the plant. During the period of low pptn. and high evapn. the available H_2O supply in the surface soil is limited, because of the unusual formation of the lower strata—sandy subsoil and gravel substratum which prevents the capillary transmission of H_2O from below to the surface soil. The porosity of the abo-abo soil is primarily due to the absence of a sufficient amt. of colloidal materials. The different soil organisms concerned in the formation of available plant foods are rendered inactive by the unfavorable reaction of the soil soln. present in abo-abo soil. The limited H_2O supply in the surface soil and the unfavorable soil reaction are the factors responsible for rendering any com. fertilizer application in abo-abo soil ineffective.

E. F. SNYDER

The effect of cyanamide in different soil reactions. BRONISLAW CHROSTOWSKI. Landwirtschaftl. Hochschule, Warschau. *Roczniki Nauk Rolniczych I Lesnych* 15, 481-93 (1926); *Chem. Zentr.* 1927, II, 484. The effect of fertilization with $CaCN_2$ on the N content and on the growth of oats is almost independent of the soil reaction, though in strongly alk. soils ($p_H > 8$) the effect is deleterious.

C. C. DAVIS

Experiments on the fertilization of meadows. E. TRUNINGER. *Landwirtsch. Jahrbch. Schweiz* 40, 783-862; *Chem. Zentr.* 1927, I, 3127. About two thirds of the soils tested proved to be poor in P_2O_5 , and about one-half were poor in K_2O . Fertilization with P_2O_5 alone or with K_2O alone was of advantage only on soils very rich in nutrients and over a period of some yrs., while fertilization with both P_2O_5 and K_2O had a positive result in 80% of the cases. In no case did fertilization with $CaCO_3$ and P_2O_5 - K_2O increase the yield, though it did have a favorable influence on the health of the crops and was a protective against washing away. Fertilization with N should be abandoned because of its expense and its uncertain action. The effect of liquid manure was unsatisfactory, and it must be assisted by P_2O_5 and by CaO on acid soils. The use of artificial fertilizers on meadows must be greatly increased.

C. C. D.

Itano process of composting. I. General description, nature of fermentation and sanitary significance. ARAO ITANO and SATIYO ARAKAWA. *Ber. Ohara Inst. landw. Forsch.* 3, 497-504 (1928).—The Itano process of composting is based upon rapid aerobic fermentation at high temp., a supply of a certain amt. of nitrogenous material in pro-

portion to the cellulose, and the introduction of certain bacteria. The bacteria are thermophilic and must be capable of decomp. cellulose. To encourage oxidation in the process, a special zymotic chamber constructed so as to furnish a max. air supply is used during the fermentation. The temp. rises rapidly the first week. The contents are removed after the temp. drops, the time usually being 3 weeks. Since temps. as high as 75 to 80 are reached, the germicidal action has a marked sanitary significance for the Japanese farmer. The loss of org. matter and volatile N compds. is comparatively low. Any kind of org. waste material may be used. The chem. compn. of composts made from rice straw, barley straw, rice husks and weeds averages: total N 2.00 + K 1.44 and phosphates 0.85%. RUSSELL C. ERB

Fermentation of straw and artificial manure. G. RUSCHMANN. *Z. Spiritusind.* 51, 187(1928).—A method of fermenting straw by addition of "Adco" is discussed. The process has not been completely developed. C. N. FREY

An observed case of "spontaneous" ignition in stable manure. L. H. JAMES, G. L. BIDWELL AND R. S. MCKINNEY. *J. Agr. Research* 36, 481-5(1928).—Temp. observations taken in connection with a case of spontaneous ignition of stable manure are given. When exposed to the air charred straw glowed a fiery red. O aeration of a small section of the heating material produced an increase of 26.5° in 30 min. M. S. ANDERSON

Chemical stimulants and germination of seeds. F. KOTOWSKI. *Proc. Am. Soc. Hort. Sci.* 23, 173 6(1926); *Expt. Sta. Record* 58, 535.—Working at the Univ. of Calif., K found that soaking the seeds of peppers, spinach and parsnips in certain solns. apparently increased the percentage of germination but had no influence on the rapidity of germination. E. g., pepper seeds soaked for 48 hrs. in a 1.5% soln. of $MgCl_2$, $NaNO_3$ and $MnSO_4$ gave in 20 days at a const temp. of 25° 81, 84 and 80% of germination as compared with 78% for seeds soaked in distd. water. The treatment of spinach seeds gave even more striking results. H. G.

Better methods of canning crops production. C. B. SAYRE. N. Y. Agr. Expt. Sta., *Bull.* 553, 1-30(1928).— $(NH_4)_2SO_4$ at a rate of 72 lb. per acre increased tomato yields 2 tons per acre, followed closely by $NaNO_3$. $Ca(NO_3)_2$ barely paid the cost of application; and urea did not produce sufficient increase to return a profit. The soil was of alk. reaction. Early plantings of peas gave much higher yields than later plantings. In general, mercurial seed disinfectants slightly increased the yield of peas but had no appreciable effect on sweet corn. With stringless beans and cabbage, P is an important factor in increasing yields. C. R. FELLERS

The effect of potassium salts on the availability of nitrogen in ammonium sulfate. W. B. MACK AND D. E. HALEY. *Soil Science* 25, 333-6(1928).—Neither Cl nor K compds. consistently inhibited the process of nitrification. In fact, in soils treated with $(NH_4)_2SO_4$ the rate of nitrification was greater at the end of the test for all addns. of either Cl or K compds. Very rapid nitrification during the first 3 weeks was generally followed by a loss of NO_3 during the following 2 weeks. Mixing the soil at the end of 7 weeks resulted on the whole in increasing the rate of nitrification. Interchange of ions, $NaCl + KNO_3$ and $NH_4Cl + K_2SO_4$ instead of $NaNO_3 + KCl$ and $(NH_4)_2SO_4 + KCl$, resp., decreased the rate of nitrification. The difference for the NO_3 interchange was practically the same as for the SO_4 interchange. All fertilizers increased the rate of nitrification during the last 3 weeks, as compared to the unfertilized check. In the same period, K_2CO_3 caused a higher rate of nitrification than either KCl or SO_4 . K_2CO_3 was associated with the largest quantity of NO_3 present for any combination, both at the end of 3 weeks and at the close of the expt. Mono-calcium phosphate, during the last 3 weeks, tended to decrease the rate of nitrification for combinations contg. $NaNO_3$, but increased the rate of combinations with $(NH_4)_2SO_4$. E. F. S.

Comparative nutritive values of different salts of ammonia. ELEUTERIO PALISOC. *Philippine Agr.* 17, 37-43(1928).—In culture solns. contg. all of the principal nutrient radicals in various proportions, rice seedlings made relative growths of 128, 105 and 100 when the NH_3 was derived from NH_4NO_3 , $NH_4H_2PO_4$ and $(NH_4)_2SO_4$, resp. Throughout the series contg. $NH_4H_2PO_4$ the plants were well developed and of a normal color, but the leaf tips were dried out. The best culture soln. for rice is claimed to contain 1 part KH_2PO_4 , 4 parts NH_4NO_3 , 2 parts $Ca(NO_3)_2$ and 4 parts $MgSO_4$ with a total concn. of 0.00275 mol. per l. A. L. MEHRING

Agricultural sprays. VITTORIO CASABURI. *Atti congresso naz. chim. pura applicata* 2, 1045-52(1926).—The prepn. and uses of $NaOH$, $NaOH \cdot (NH_4)_2SO_4$, colloidal Cu, colloidal S and colloidal As and Pb sprays in agriculture are discussed. L. T. F.

Copper in combating blight. H. HOLLUNG. *Kühn-Archiv* 9, 79-96; *Chem. Zentr.* 1927, I, 1730.—In the choice of Cu salts to combat blight, care must be taken

that the germinating power of the crops is not injured. For this reason the sulfate, K cyanide and salicylate should not be used, whereas treatment for 0.5 hr. with 0.1% solns. of chloride, K chloride, nitrate, NH_4 sulfate, acetate, lactate or thiophenylate does no harm to the crops. With reference to the behavior toward blight spores, it was proved that some Cu salts do not, at the concn. above, kill the spores, but only change them to a dormant state, which in a suitable medium can be terminated. In all expts. 0.1% ammoniacal CuSO_4 soln. gave the best results. C. C. DAVIS

Petroleum oil as a carrier for insecticides and as a plant stimulant. F. R. DE ONG. *Ind. Eng. Chem.* 20, 826-7 (1928); cf. C. A. 21, 4009.—Petroleum oil as a carrier for insecticides has many attributes lacking in H_2O . The refining process usually applied to oils for foliage spraying removes much of the original insecticidal value necessitating the incorporation of more active chemicals. Expts. with the Brown apricot scale (*Leucanium corni*) using 2% emulsions of oils alone and with nicotine showed an av. mortality of 79.5% for kerosene alone and 92.4% for kerosene contg. 0.01% of free nicotine. The use of oil on foliage, either alone or in combination, must always be studied with reference to compatibility with the plant. E. F. SNYDER

Miscible carbon disulfide. WALTER E. FLEMING AND REINHOLD WAGNER. *Ind. Eng. Chem.* 20, 849-51 (1928).—A miscible CS_2 recently perfected is equally effective as emulsions of this compd. for destroying the soil-infesting stages of the Japanese beetle (*Popillia japonica*). Miscible CS_2 is a mixt. of CS_2 with castor oil, KOH, denatured alc. and H_2O . As high-grade chemicals are needed in the prepn. the qualities are specified. The method of prepn. of miscible CS_2 and the method of analysis of the finished product are described. E. F. SNYDER

Fumigation with calcium cyanide dust. H. J. QUAYLE. *Hilgardia* 3, 207-32 (1928); cf. C. A. 21, 3251.—The recent production of $\text{Ca}(\text{CN})_2$, a less stable compd. than the NaCN or KCN heretofore used for fumigation purposes, has made it possible to employ a different method of fumigation which consists of simply blowing the material or putting it down in thin layers in finely divided form into an enclosure. The atm. moisture acting on the small dust particles produces a sufficiently rapid generation of gas to make the method applicable even to citrus fumigation, where the fumigation period does not exceed 1 hr. Calcium cyanide, "A" in powd. form, first used in 1922, is largely used for citrus fumigation and for rabbits in Australia, for greenhouse and other fumigation generally, as well as for dusting in the open (without covers) for several insect pests. Because of injury the use of the "A" compd. was discontinued and grade "C" was substituted with much better results. Comparisons of dosage between grade "C," $\text{Ca}(\text{CN})_2$, and liquid HCN are given; the detns. are based on the effects on insects and on the actual gas concn. under the tent at different intervals. Less HCN is required in the $\text{Ca}(\text{CN})_2$ dust than in liquid HCN to effect the same mean concn. of gas under a canvas cover. In the case of a gas-tight fumigatorium the same amt. of HCN must be carried in the dust as in the liquid to give the same mean concn. within. There is less escape from gas through canvas covers where the source of the gas is the dust than where the source of gas is the liquid HCN. About 25% less gas is required in the dust than in the liquid. The data indicate that $1\frac{1}{4}$ oz. of "C" grade $\text{Ca}(\text{CN})_2$ dust is equiv. to 20 cc. of liquid HCN and there is approx. 25% less HCN in this amt. of the dust than there is in 20 cc. of HCN. The evolution of gas from "C" grade $\text{Ca}(\text{CN})_2$ was not greatly retarded when the relative humidity was as low as 20 to 22%, but this humidity did markedly retard the evolution of gas from "A" grade $\text{Ca}(\text{CN})_2$. The evolution of gas from both cyanides seemed to be independent of temp. within ordinary fumigation limits, that is, between 5° and 27°. C. R. FELLERS

Sodium and potassium bisulfates. Their use in agriculture (WAGUET) 18. Fat in the residual material remaining after the unwinding of the silk cocoon (JELAKOV) 27. Nature of clay and its significance in the weathering cycle (ROBINSON) 8.

BRENCHLEY, W. E.: *Inorganic Plant Poisons and Stimulants*. 2nd ed., revised and enlarged. New York: Macmillan Co. \$3.50.

GUSTAFSON, AXEL FERDINAND: *Handbook of Fertilizers; Their Sources, Makeup, Effects and Use*. New York: Orange Judd Pub. Co. 122 pp.

HASELHOFF, EMIL, AND BLANCK, EDWIN: *Lehrbuch der Agrikulturchemie. III. Bodenlehre*. Berlin: Gebrüder Borntraeger. 208 pp. M. 12.75; subscription price, M. 11.40. Cf. C. A. 22, 2434.

PINGRIFF, G. N.: *A Course of Experiments on Plant Growth and the Soil in Relation to Foodstuffs*. London: Black. 64 pp. 1s. 6d.

Phosphatic fertilizers. MONTAN- UND INDUSTRIALWERKE, formerly Joh. Dav. Starck. Fr. 632,310, April 6, 1927. To obtain normal phosphates, substances forming stable compds. with F are added to the crude phosphate before or during the addition of acid. Such compds. are oxides or hydroxides of Si, Fe, Al, Ti, oxides of Mn, Cr, Mo or easily decomposable salts of these oxides.

Superphosphate. ANTONIO GAILLARD. Fr. 632,867, April 15, 1927. An app. is described for drying superphosphate in such a way as to increase its richness. Fr. 632,868 describes a similar app. in which the percentage of moisture is a little higher. Cf. C. A. 22, 2804.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Chemistry as applied to the brewing industry. OTTO P. RINDLEHARDT. Carling's Brewery, London, Ont. *Can. Chem. Met.* 12, 217-9(1928). E. H.

The effect of hydrogen ions in the brewing process. IV. Hydrogen-ion concentration and fermentation. G. HAGUES. *J. Inst. Brewing* 34, 362-76(1928); cf. C. A. 22, 1648.—Analyses and electrometric titrations were made on a series of lab. and brewery worts of varying original p_H values. From the figures obtained electrometric titration curves are given. This is the only correct way of demonstrating the buffering of beer or wort. During the first 12 hrs. of fermentation the total acidity remained const. while the p_H fell rapidly; the initial fall in p_H is attributed to the utilization by the yeast of assimilable substances and particularly the phosphates. After 12 hrs. the total acidity increased with little change in p_H . Most of the decrease in p_H value took place within 40 hrs. under the condition of the lab. expts. Mashies made with varying amounts of gypsum indicated that the buffering in the worts is not altered very much by the presence of gypsum, although total acidity is affected with a max. upon the addition of 20 grains per gallon to the mash water. Measurements of yeast reproduction in worts of varying p_H value gave two maxima, one at p_H 4.0 and the other at p_H 8.0 to 8.5; the first is the optimum p_H for pepsin, whereas the latter value is optimum for creptase.

PETER J. F. WEBER

Fermentation carbon dioxide. F. STOCKHAUSEN AND F. WINDISCH. *Wochschr. Brau.* 45, 277-81, 289-98, 305-11, 317-24, 329-33(1928).—The effect of CO_2 on ale fermentation was studied under different concns. of CO_2 from 70-mm. water pressure up to 1 atm. at temps from 2° to 20°. Bottom fermentation Race U was used. The rate of fermentation and growth was less with the yeast under pressure but the latter showed a much greater fermentation strength in a sugar soln. These high concns. of CO_2 produced a large healthy cell. The solid content of the pressure yeast was higher but the fat was about half that of the normal grown yeast. Since almost identical results were obtained with these greatly varying amts. of CO_2 the authors conclude that the action of CO_2 is not a chem. but an anaerobic one effecting the life processes of the cell. A. SCHULTZ

The fermentation of toddy and an account of the microorganisms producing it. M. DAMODARAN. *J. Indian Inst. Sci.* 11A, 63-74(1928).—Bacteria and yeasts found in toddy were isolated and described. Date and coconut toddy, regardless of locality contain the same types of microorganisms. Alcohol and acetic acid are formed. In addn. glycerol, lactic acid, succinic and tartaric acids are found present. Acetaldehyde was also found. Acetic acid is the chief volatile acid; butyric and propionic acids were not found. Bacteria, not yeast, are responsible for the unpleasant odors, scum formation and turbidity, and may possibly be eliminated by the difference in thermal death point of yeasts and bacteria. Exposing the wort for long periods for the production of vinegar is an inefficient method. C. N. FREY

Methanol in various alcoholic drinks. W. SEIFERT. *Oesterr. Chem.-Ztg.* 31, 65-8 74-7(1928).—Various European and American wines were examd. for their MeOH content. White wines from European grapes contain, as a rule, 7 cm. MeOH per 1000 cc. alc. and white wines from America of the "Noah" type contained higher percentages. The amt. of MeOH which is toxic varies with the individual. It may be well to make the detn. of the amount present a procedure, used also as an aid in detecting adulterations of European wines. C. N. FREY

The extraction of alcohol and of tartaric acid salts from wine residues. G. MEZZADROLI AND I. MUTTI. *Atti congresso naz. chim. pura applicata* 2, 1053-62(1926).—A discussion of various processes of sepn. of the important constituents of wine residues. With a national production of 45,000,000 hectoliters of wine providing 6,000,000 quin-

tals of residue there is a possible production of 200,000 hectoliters of alcohol and 150,000 quintals of cream of tartar. L. T. F.

Manufacture of alcohol from carobs and utilization of the by-products. GUIDO RIMINI. *Atti congresso naz. chim. pura applicata* 2, 995-1014 (1926).—A quintal of carobs yields 23 l. of alc., 10 kg. of CO₂ and 3 kg. of gum. The actual cost of material including transport is about 62 lire, while the value of the three products is 150 lire. L. T. F.

The spectrochemical detection of fruit wine in grape wine. O. F. KALBERER. Swiss Expt. Sta., Wädenswil. *Z. Untersuch. Lebensm.* 55, 214-30 (1928); cf. C. A. 21, 3419.—The addn. of SO₂ to wine has no great influence on the absorption spectra. Opalescence increases the absorption. In dark brown wines the color interferes with the delicacy of the test. WILLIAM J. HUSA

The composition of Marsala wines. P. SEGRE. *Atti congresso naz. chim. pura applicata* 2, 1038-44 (1926).—Summary of analyses of 37 wines. L. T. F.

Vinegar making about the year 1800. CURT LUCKOW. *Deut. Essigind.* 32, 227-30 (1928).—Historical. W. O. E.

The determination of antiseptic power, with special reference to hops. T. K. WALKER. *J. Inst. Brewing* 34, 61-4 (1928); cf. C. A. 22, 1432. Adrian Brown in 1913 isolated a bacterium from a sour beer which when added to varying concns. of hop decoction gave a measure of the antiseptic properties of the hops. Previously the hard resin and soft resin content were the measure of the hops value. Brown's method of biologically testing hops was improved by A. C. Chapman in 1925. By the biol. methods the effects of the α - and β -resins and the hops were detd. and found to be in the ratio of 3 to 1, and chemically the α -resin plus $\frac{1}{3}$ β -resin is a measure of the antiseptic value of the hops. Grading of a large series of hop samples by the biol. methods and by chemically detg. the α - and β -resin content gave results in close agreement with each other. PETER J. F. WEBER

Sulfites. HAROLD HERON. *J. Inst. Brewing* 34, 377-87 (1928).—"The limitation of the amount of SO₂ and the prohibition of the use of any other preservative in beer by the Public Health Preservatives in Food Regulations, made by the Ministry of Health, has given rise to questions bearing on the amount of sulfite which can be safely used without fear of exceeding the maximum." Two methods for detg. SO₂ are in use, each requiring distn. of the beer in a current of CO₂ after the addn. of acid. The first method condenses and collects the distillate in Br water. In the second method the SO₂ is introduced in the gaseous state into H₂O₂ and the resulting H₂SO₄ detd. by titration with standard alkali (cf. C. A. 21, 2510, 2742). H. used the first method. Malt contributes 3 to 8 p. p. m. SO₂ to the wort, sugars used as adjuncts, practically none. Malt ext. had 25-50 p. p. m. Hops varied considerably, contributing from 1 to 10 p. p. m. to the wort. Because sulfites combine with certain of the wort constituents to form stable compds. a considerable amt. of the SO₂ survives the kettle boiling process even when sulfites are added to the mash. Tests on adding sulfites to beer at the rate of 57 p. p. m. SO₂ and using K₂S₂O₈, a Na and K sulfite, a Na, K and Mg sulfite, together with a CaSO₃, showed that in order to secure the max. preservative effect all the available SO₂ should become sol. immediately. After 28 days the loss of SO₂ was approx. 25% in the test beers. PETER J. F. WEBER

Dextrin not saccharified by wine yeast in distillery potato mash. ADOLF JOSZT AND JOZEF TROJAN. *Przemysł Chemiczny* 11, 317-31; *Chem. Zentr.* 1927, II, 649.—From a distillery potato mash fermented with wine yeast was obtained with a diastase, a not completely fermentable mixt of dextrins, which by means of EtOH was sepd. into 4 fractions. These fractions were readily distinguishable by their reducing power, by their optical rotation, by their tendency to decomp. and by their fermentation with diastase, which varied from 25 to 75%. The action of diastase increased with the soly. of the fractions in EtOH. By the simultaneous action of diastase and distillery or wine yeast, the dextrins were fermented to a great extent, the fraction most sol. in EtOH almost completely. C. C. DAVIS

Autolysis of bottom beer yeast. W. WINDISCH, P. KOLBACH AND R. FR. ROTHENBACH. *Wochschr. Brau.* 45, 251-6, 261-5, 281-5, 298-302 (1928).—In fresh yeast kept at low temps. a gradual autolysis accompanied by self-fermentation takes place. This natural course is greatly changed by drying or the addn. of antiseptics to the yeast. The optimum p_H for the proteolytic enzymes in a fresh untreated bottom beer yeast is 5; for a CHCl₃-plasmolyzed yeast 5.7 to 6.2. The opt. temp. at p_H 5 for a 3-hr. autolysis is 55° and for one of 6-hrs. 52°. During these intervals 79 and 89%, resp., of the total albumin N present is hydrolyzed. A larger yield of hydrolysis products

is obtained in the same period of time by changing the p_H from 5 to 6.25 when most of the albumin has been converted to peptones than by keeping a const. p_H of 5.

A. SCHULTZ

The struggle between yeast and wild organisms in fresh malt. OTTO HUMMER. *Centr. Bakt. Parasitenk. II Abt.* 71, 407-16(1927).—A study of the changes in fermentation induced by various wild yeasts and bacteria. Closure with a H_2SO_4 valve is better than cotton.

JOHN T. MYERS

The possibility of using fruit sugar for the manufacture of compressed yeast with particular reference to the utilization of carob sugar. G. MEZZADROLI AND S. SCHIAVI. *Alli congresso naz. chim. pura applicata* 2, 1015-8(1926).—A quintal of carobs under optimum conditions for alc. production yields about 20 l. of alc.; when used for yeast manuf. it yields about 12 l. of alcohol and 12-14 kg. of yeast. Yeast obtained from the fermentation of molasses or of grain differs from and is inferior to that obtained from the fermentation of fruit sugar. The author stresses the economic advantages of the utilization of carob sugar for this purpose.

L. T. F.

The growing of yeast with organic and inorganic nitrogen. H. CLAASSEN. *Chem.-Ztg.* 52, 497(1928).—C. states that Wohl (C. A. 22, 2807) confused org. sol. N with effective N. Only 40% of total N of beet molasses is assimilable by yeast according to W. but 50% is assimilable according to results given by the Garungs Institute. In the presence of more than optimum amt. of NH_3 the yeast fails to utilize org. N to any great extent. The curve I representing yield falls sharply when high amts. of N are given and more than 10% N is ammonia N. The curve representing N content of yeast continues to rise with increasing amts. of inorg. N. The curves II and III by Wohl representing optimum N concns. do not hold for higher concns., therefore W. has committed an error.

C. N. FREY

The growing of yeast with media containing organic nitrogen and ammonium salts by the aeration method. II. A. WOHL. *Chem.-Ztg.* 52, 498(1928); cf. preceding abstract. The old procedure did not involve utilization of organic N from malt. The old ideas do not apply but the subject which is pertinent pertained to the utilization of inorganic N in presence of org. N or when it is partly replaced with org. N. The coeff. 0.4 for org. N of molasses was formulated by Wendl. W. states that he does attempt to maintain that the curves representing max. growth with minimum concn. of N would hold for higher concns. The relative amt. of org. to inorg. N in the patent specification need not be strictly adhered to according to a recent court decision. Reply. H. CLAASSEN. *Chem.-Ztg.* 52, 498-9(1928).—W. admits that the investigations and curves on which his articles and patents were based were in error regarding sol. N as distinguished from assimilable N. W. has cited various investigations stating that org. N is replaceable by inorg. N and the latter is said to be of equiv. nutritive value. This relation was shown by C. not to hold for higher N concns.

C. N. F.

The role of phosphorus in the life of yeast in alcoholic fermentation. E. ELION. *Hochschr. Brauw.* 45, 178-82, 192-5(1928).—See C. A. 22, 1174.

A. SCHULTZ

Yeast. ARTHUR P. HARRISON (to The Fleischmann Co.). U. S. 1,676,437, July 10. Yeast is propagated, with aeration, in a yeast nutrient soln. until the soln. has attained a substantially const. Balling; a portion of the yeast-contg. liquid is then withdrawn, and yeast-nutrient materials are added to restore approx. the initial conditions of vol. and density, and the yeast-propagation is repeated, with aeration. Cf. C. A. 21, 3420; 22, 3017.

Cellulose fermentation. HERBERT LANGWELL and ELOI RICARD. Can. 282,038, July 31, 1928. Fatty acids are produced by fermenting a mash of cellulosic material by the action of thermophilic bacteria with high yields, controlling the acidity of the mash so that the H-ion concn. is maintained within the limits 10^{-9} and 10^{-5} measured in the bulk of the mash, and supplying the nutrient for the bacteria in part by waste liquor.

Cellulose fermentation. HERBERT LANGWELL and WILLIAM A. BURTON. Can. 282,039, July 31, 1928. A mash formed in part of distillery wastes is subjected to fermentation by thermophilic bacteria, the acidity of the mash being controlled so that the H-ion concn. is within the limits 10^{-9} and 10^{-5} measured in the bulk of the mash, by a method selected from the following, a compound of an alk. metal of which the phosphate is substantially sol. in H_2O or a compd. of an alk. earth metal of which the phosphate is substantially insol. in H_2O , in which case there is added to the mash a substance to cause the formation of an insol. alk. earth compd.

Fermentation vats. MAURICE G. APPERT. Fr. 632,131, April 4, 1927. A fermentation or defecation vat is provided with a coil for coil water, etc., and a manhole

cistern at the side to collect the coagulant by overflow or skimming, and maintain the wort at a const. height.

Alcohol. KISAKU MORIKANA (to Samuel C. Prescott). Can. 282,383, Aug. 7, 1928. A sterilized sugar-bearing mash including a protein nutrient of the fermenting bacillus is prepd. and has added thereto a culture of bacteria, derivable from fermented rice or koji, sufficiently resistant to heat to withstand 80° for about 5 min. and capable of producing butyl alc. and isopropyl alc. by fermentation, in the pressure of air, of a sterilized koji mash, and maintaining the same at a suitable fermenting temp.

Solid alcohol composition. H. OHLE and J. OTHMAR-NEUSCHLEER. Brit. 281,662, Nov. 30, 1926. A solidified gel is obtained by adding to EtOH a small proportion (suitably about 1-2%) of an alkali or alk. earth metal salt of the sulfuric acid half esters of acetone derivs of sugars and multivalent alcs. such as diacetoneglucose, diacetonegalactose, α - and β -diacetonefructose and acetoneglycerol. The K salt of α -diacetonefructosesulfuric acid is especially suitable for the purpose. The gel formed is non-toxic and suitable for making beverages, foods, medicinal and "technical" preps.

Glycerol. SOCIÉTÉ DES ÉTABLISSEMENTS BARBET. Fr. 632,260, July 19, 1926. See Brit. 274,519 (C. A. 22, 2235).

Glycerol by fermentation. JAMES W. LAWRIE (to E. I. duPont de Nemours & Co.). U. S. 1,678,150, July 24. In producing alc. and glycerol, a molasses mash is fermented with yeast and during the fermentation there is added a mixt. of substantially the same compn. as the incinerated ash of a fermented molasses ash, which serves to increase the yield of glycerol.

Yeast. HERMANN BUCHER. Fr. 632,848, Mar. 21, 1927. Examples are given of nutrient materials which are sol. in water and do not give rise to excessive acidity during the growth of the yeast, such as urca ammonium phosphate and ammonium nitrate. The same nutritive soln. is used several times after removal of the yeast formed and after sterilization. An app. is described.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Some non-alkaloid components of the *ipecacuanha*. O. KELLER. *Festschrift A. Tschirch* 1926, 85-98; *Chem. Zentr.* 1927, I, 2916, cf. C. A. 11, 3093. An alkaloid-free, alc. ext. of the roots of *Uragoga ipecacuanha* was analyzed. The substance called in the literature "ipecacuanhic acid" was found to be a *glucotannoid* or a mixt. of several *glucoside tannins* of weakly acid character, of which glucose and phlobaphene were cleavage or transformation products. The chief quantity was not in the Pb acetate ppt. but was in the filtrate. Neutral Pb acetate did not ppt. the compd. A brown color was formed in all cases with ferric salts. An acid *saponin*, malic acid, citric acid, and small quantities of fat and resins were also found. C. C. DAVIS

The tubers of the *Pinellia tuberifera*. C. MANNICH and SZE. YIH. Univ. Frankfurt. *Festschrift A. Tschirch* 1926, 158-61; *Chem. Zentr.* 1927, I, 2754. The origin, production, nature and use of the tubers of the Chinese and Japanese *Pinellia tuberifera* (Araceae) are described. Data found in an old Chinese book have been extended by Brandt. The morphology and anatomy of rhizome tubers are similar to those of *Arum maculatum*. Pulverized tubers showed the following % compn.: water 12.3, ash 2.1, Et₂O-ext. 3.0, crude fiber 2.3, N 0.74, N substances 4.6, starch 69.3. A small quantity of a hemolysin was found. The drug produced a strong irritation of the pharynx and esophagus. Pharmacol. expts. by Lautenschlager on animals showed that there is no poison in the tubers. C. C. DAVIS

A method for the determination of ethereal oils in drugs. J. STAMM. Univ. Dorpat. *Festschrift A. Tschirch* 1926, 283-7; *Chem. Zentr.* 1927, I, 2759-60. The method described has been used by S. for several yrs. The ethereal oil is isolated from small quantities of drug by distg. with water and collecting the distillate in a measuring vessel which has previously been filled to a definite mark with CCl₄. The vessel is shaken until the oil is dissolved, the mixt. is then centrifuged and the quantity of oil detd. by the increase in vol. The app. and the procedure are described, with diagrams of the app. CCl₄ was chosen on account of its low soly. in water (0.08:100) and its high d. The measuring vessel, termed an "*oleometer*," is made by "Verkaufsvereinigung Göttinger Werkstätten." In all expts. a loss of 0.01 cc. (1 graduation mark) must be added as a correction factor. C. C. DAVIS

Greek licorice and its juice. EM. EMMANUEL. Univ. Athens. *Festschrift A.*

Tschirch 1926, 288-90; *Chem. Zentr.* 1927, I, 2753.—A survey of the occurrence, gathering, prepn. and use of Greek glycyrrhiza. The following data give the % compn. of *Glycyrrhiza glabra* L. from Peloponnesus and from Asia Minor, resp.: dry glycyrrhiza: glycyrrhizin 7.316, 5.895; d-glucose 1.516, 1.398; sucrose 2.385, 2.678; dry ext. 31.167, 30.018; ash 4.085, 5.816; water 8.117, 8.891; juice: glycyrrhizin 18.812, 12.990; glucose 3.956, 4.875; sucrose 4.878, 5.618; starch + gums 20.761, 22.702; water 10.695, 13.412; ash 8.011, 7.510; water-insol. 5.207, 8.900. C. C. DAVIS

The saponin of Primula root. II. L. KOFLER AND M. BRAUNER. *Festschrift A. Tschirch* 1926, 351-6; *Chem. Zentr.* 1927, I, 3009; cf. K., C. A. 18, 3449.—When the method used for obtaining saponin from *Primula veris* was applied to the obtaining of saponin from *Primula elatior*, the elatior saponin was a gelatinous ppt. which could not be crystd. This saponin is sol. in NaOH, KOH, alk. carbonates, EtOH and MeOH. The hemolytic index is about 50% higher than that of primulic acid. At 218° elatior saponin becomes yellow-brown, and it m. 224-5°. Its toxicity is 0.5 as great as that of primulic acid. Heated in water with NaOH or Na₂CO₃, elatior saponin ppts. a white cryst. compd., which is also formed directly from *Primula elatior* by boiling its alc. ext. with aq. NaOH or Na₂CO₃. When boiled with aq. NaOH, primulic acid gives no ppt. The elatior-Na compd. is insol. in 96% EtOH and the veris-Na compd. is difficultly sol. The elatior Na compd. can be salted out of its aq. soln. by NaCl, whereas the veris-Na compd. cannot be. By electrodialysis, primulic acid is obtained from the veris-Na compd. and unchanged elatior-saponin from the elatior-Na compd. The veris-Na compd. cannot be obtained from crystd. primulic acid, but only directly from the drug. C. C. DAVIS

The chemistry of iodocatgut. STORP AND ABEL. *Veröffentl. Gebiete Heeres-Sanitätswesens* 1926, No. 80, 48 pp.; *Chem. Zentr.* 1927, I, 3110.—The methods of prepn. of iodocatgut through soaking of raw, degreased catgut in a KI soln. of I were investigated, and the quantity of I absorbed was detd. I is present as free I, HI and protein compds., and in insufficiently purified raw catgut as alkali iodide as well. On long standing, the free I disappears completely and the total I content decreases. The I and the acid have an unfavorable effect on the catgut and it is therefore recommended to remove excess I and acids with NaOAc-Na₂S₂O₃ soln. and to sterilize the material at 100.5°. For use it may be kept a short time in a flask with water and I to impregnate with free I. C. C. DAVIS

Loosely bound sulfur in pituitary extracts. M. X. SULLIVAN AND M. I. SMITH. *Hyg. Lab. U. S. Pub. Health Service Pub. Health Repts.* 43, 1334-42(1928).—A study of pituitary exts. to det. if the S content varies with the physiol. activity as is the case with glutathione and insulin. The physiol. activity was detd. by the ability to raise the blood pressure of anesthetized dogs. In 21 exts. of posterior lobe and 12 of the anterior portion it was found that the physiol. activity was roughly proportional to the loosely bound S. Inactive exts. did not give the test for this form of S. However, a destruction of the physiol. activity of a posterior lobe ext. by boiling for 30 min. with 0.5% HCl did not abolish the loosely bound S. H. J. DEUEL JR.

Preparation of liver extract. N. KETLEMANS AND P. VAN DER WIELEN. *Pharm. Weekblad* 65, 709-11(1928).—The use of glycerol simplifies the process of purification, serves as a preservative and disguises the unpleasant liver taste. Grind up 1 kg. of fresh beef or pork liver and mix with 1100 g. 90% EtOH and 5.3 cc. 4 N H₂SO₄. Let stand 24 hrs. in a cool place, strain and press. Mix the press cake with 200 g. 60% EtOH, strain and press as before. Filter the combined exts., evap. the EtOH *in vacuo* until the liquid begins to foam, filter and evap. further. To the residue add 25 g. glycerol of sp. gr. 1.25 and evap. below 80° to a thin sirup, then add glycerol to make 100 g. Ten g. of this ext. corresponds to 100 g. liver. Preserve in a well-stoppered bottle. The following recipe is given for a "Mistura extracti hepatis"—glycerol ext. as above 20 parts, glycerol 10, cinnamon water 30, water, q. s., 90. A. W. DOX

Pharmacy in British East Africa. GEORGE CECIL. *Apoth. Ztg.* 43, 781-2(1928).—Description of conditions prevailing in this British colony. W. O. E.

Testing emetine hydrochloride. S. KROEL. *Apoth. Ztg.* 43, 791(1928).—The evaluation of this compd. as prescribed by the D. A.-B. VI. is discussed. W. O. E.

Chinese drug store. ALBAN VOIGT. *Pharm. Ztg.* 73, 833-4(1928).—A description of a typical Chinese apothecary and its activities. W. O. E.

Chemical characterization of drugs. L. ROSENTHALER. *Pharm. Ztg.* 73, 837-9(1928); cf. C. A. 22, 1212.—Peru balsam, tolu balsam and styrax are discussed. A study has been made of some 21 samples of Peru balsam (genuine, artificial or imitation, or otherwise questionable) with respect to I no., cinnamein content, behavior toward petr. ether, Et₂O and NH₃. The cinnamein content varied from 53.4 to 74, the I no.

from 1.6 to 64.1. The I no. of tolu balsam ranged from 95 to 121, that of styrax from 70 to 91. W. O. E.

Alcohol determination in essential oils. I. G. OBERHARD AND N. A. KUBASSOW. *Pharm. Ztg.* 73, 839-41(1928).—In estg. the alc. of essential oils, recourse is had to a detn. of the ester no. and the acetyl no., these values being thereupon applied to the formulas: $e = (M/20) (b/n)$ and $m = (M/20) (a/s - 0.021a)$, in which e = content of esterified alc., M = mol. wt. of that alc., n = wt. of sample taken, and b = no. of cc. 0.5 N alc. KOH soln. necessary to saponify the esters in n g. of the oil; m = content of free alcohol, s = wt. of acetylated oil, a = no. of cc. 0.5 N alc. KOH soln. necessary to saponify the esters in s g. of acetylated oil, e and m are in percentages. By working on controls made up of paraffin oil as vehicle and menthol, borneol and thymol, resp., the free and combined alcs. were detd. in 3 series of expts., and the results tabulated. The time required properly to acetylate menthol-contg. oils was found to be 75 min., for thymol and 105 min. for borneol. The results calcd. from the formulas came regularly somewhat high, notably in the absence of determinable amts. of ester. W. O. E.

Titrimetric estimation of santonin in pharmaceutical preparations. A. LANGER. *Apoth. Ztg.* 43, 815(1928).—Since santonin tablets and confections frequently contain phenolphthalein, the santonin is 1st extd. with C_6H_6 in the heat, or if fats (cocoa butter, etc.) are present, they are successfully removed by treating the crude santonin with petr. ether satd. with santonin (0.05 g. per 100 cc.). Working with com. santonin, dissolve 0.2 to 0.3 g. in 20 cc. EtOH contained in an Erlenmeyer flask, add 5 drops phenolphthalein soln. and about 20 cc. of 0.05 N alc. KOH soln., digest by immersion in a boiling water bath $\frac{3}{4}$ of an hr. after suitable connection with a reflux, then titrate with 0.05 N HCl. Toward the end of the titration a pure bright yellow color finally develops in the santonin soln. The transition is sharply defined. For the EtOH itself some 0.35 to 0.4 cc. 0.05 N KOH are required, for which a suitable correction is made. The values obtained with pure santonin afford the necessary data to develop the santonin factor for unknowns. In the case of confections, an amt. of the sample is taken involving 0.2 to 0.3 g. santonin. Rub up the kernels with washed sand, dry at 80° to remove any volatile esters, then shake the cooled powder with petr. ether (satd. with santonin), decant and ext. with 2 like portions of petr. ether before filtration. Press the filtered residue between filter paper, then ext. with C_6H_6 (50 g. for 7 g. of kernels). After repeated shaking, allow to stand 14 hrs., pass through a pledget of cotton, evap. a weighed aliquot (contg. about 0.15 to 0.16 g. santonin) of the filtrate to dryness at 80° and weigh the residue (crude santonin). Wash with petr. ether satd. with santonin, then titrate as above. W. O. E.

Detection of isopropyl alcohol in spirits and tinctures. G. REIF. *Arch. Pharm.* 266, 382-94(1928).—Isopropyl alc. is detected in spirits and tinctures of the Ger. Pharm. by a procedure involving the production of a red color through the presence of piperonal. Substances contained in such products and calcd. to interfere can be removed by prior treatment with animal charcoal. This applies also to denaturants. The piperonal procedure applies as well to the detection of isobutyl alc. in spirits and tinctures. W. O. E.

Estimation of arsenic in drugs. E. SCHULEK AND P. V. VILLECZ. *Arch. Pharm.* 266, 411-5(1928).—Two rapid methods are described: *I. Macroprocedure.*—Introduce the finely powdered substance (equiv. to 5-100 mg. As) or 1-2 cc. of the evapd. liquid into a 100-cc. flask, add 3-5 cc. 30% H_2O_2 , rotate, then pour 10 cc. concd. H_2SO_4 down the sides and again rotate. Should the resulting liquid not be clear add more H_2O_2 . Heat to boiling and on appearance of any brownish cast remove with H_2O_2 . Continue boiling until SO_3 fumes develop, cool and add 10-20 cc. Cl-free $(NH_4)_2SO_4$ through a long funnel tube, being careful that none of this reagent touches the side of the flask. Boil 10 min. longer to expel SO_2 , cool and carefully add 20 cc. of H_2O , 10 cc. KBr, then titrate with 0.1 N $KBrO_3$ to a permanent yellow. *II. Microprocedure.*—Weigh into a flask (Jena or Pyrex) the sample equiv. to 0.1-5 mg. As, mineralizing with 1-2 cc. H_2O_2 and 3 cc. concd. H_2SO_4 . Reduce with 8-5 cc. $(NH_4)_2SO_4$, boil 10 min., cool the liquid with 10 cc. H_2O , or 20% H_2PO_4 , transfer quant. to a 40-cc. test tube (with ground glass stopper), add 3-5 cc. KBr, 1 cc. CCl_4 and 2 drops satd. aq. KI, then titrate with 0.01 N $KBrO_3$ with vigorous shaking till the liquid becomes colorless. A control titration should be made with 2 cc. pure concd. H_2SO_4 , 10 cc. H_2O (or 20% H_2PO_4), 3-5 cc. KBr and 2 drops satd. aq. KI. W. O. E.

Dextrin as a cosmetic raw material. SAMUEL ABRAMSON. *Am. Perfumer* 23, 295-6(1928).—A discussion of a product (corn, potato and tapioca dextrin) whose use in cosmetics is steadily growing. W. O. E.

Pharmacognostic investigations during the year 1927. RICH. WASICKY. *Arch. Pharm.* 266, 416-30(1928).—A résumé of work accomplished during this period.

W. O. E.

Drug activities during the year 1927. J. HERZOG. *Arch. Pharm.* 266, 430-45 (1928); cf. C. A. 22, 2809.—An address.

W. O. E.

Color reaction of mannitol. LAD. EKKERT. *Pharm. Zentralhalle* 69, 433(1928).—On oxidizing 0.2 g. mannitol in 15-20 cc. H_2O with 3% $Br-H_2O$ 15 to 20 min. in the heat, and expelling the Br excess by boiling till the liquid is reduced to 5 cc., a drop of this product admixed with 0.01 g. of the following substances with subsequent addn. of 1 cc. concd. H_2SO_4 gives in the cold and on warming, in the case of phenacetin: rose-red, wine to ruby-red; resorcinol: golden-yellow, saffron to deep blood-red; α -naphthol: brownish onion-red, brown; codeine: violet-rose to rose-violet; morphine: yellowish red, rose, peach-blossom, wine, ruby to garnet-red.

W. O. E.

Terpene-free essential oils. PIETRO LEONE. *Atti congresso naz. chim. pura applicata* 2, 839-69(1926).—L. recommends distn. at reduced pressure until 80% of the material has distd. over, or until that fraction is reached which is inactive to polarized light. From this point on the optimum yield of de-terpenated oil is obtained. Fractionation of this material yields partly terpenated and completely deterpenated oils. The fractionation of natural oil of lemon is illustrated in detail. L. T. FAIRHALL

De-terpenated essences of the acid fruits. GIOVANNI ROMEO. *Atti congresso naz. chim. pura applicata* 2, 870-99(1926).—R. describes in detail the manuf., physical and chem. properties and methods of analysis of de-terpenated essence of lemon, sweet and bitter oranges, mandarin and bergamot. The sophistication of these essences with artificial esters is discussed and expts. undertaken with a view of detecting such adulteration are described.

L. T. FAIRHALL

Denicotinized tobacco. E. M. BAILEY, O. L. NOLAN AND W. T. MATHIS. Conn. Agr. Expt. Sta., *Bull.* 295, 338-51(1928).—Tobacco is usually denicotinized by a re-sweating process accomplished by treatment with superheated steam by exposure in vacuum chambers. Solvents have been used but with indifferent success. Seventeen samples of denicotinized tobaccos were compared with ordinary tobaccos with reference to total nicotine, free nicotine and N distribution. The "denicotinized" products varied considerably in nicotine content as do ordinary tobaccos. As a group, they were found to contain somewhat less nicotine than tobacco not specially processed, the comparison being based upon abs. for each of the 2 classes. Some denicotinized products contained as much nicotine as is likely to be found in ordinary tobaccos; a few contained substantially less. The lowest nicotine content found in any sample was about 0.75%. The lowest value for ordinary tobacco, quoted from analyses made elsewhere, is about 1.50% but this is probably unusual; however, certain types of tobacco, Havana, Porto Rican and Turkish, for example, may contain normally as little as 1% of nicotine. None of the "denicotinized" tobaccos included in this investigation are sufficiently low in nicotine to warrant unrestricted indulgence on the part of consumers who suffer ill effects from this alkaloid. It may be found to be com. possible to make the removal of alkaloid from tobacco practically complete as has been done in the case of coffee for example; but whether the finished product will retain any of the qualities for which tobacco is prized for smoking purposes is an obvious question. No attempt has been made in this study to det. whether reduction in nicotine has been accomplished entirely, or in part, by the use of fillers. Free nicotine appears to be due to the dissociation of the nicotine salts of the org. acids in the tobacco leaf. The harsh and irritating effects experienced when smoking certain tobaccos are attributed to this form of nicotine. Denicotinized tobaccos do not differ in any conspicuous degree from ordinary tobaccos in this respect. N in the form of nitrates and of NH_3 are practically identical in both classes of tobaccos. The amt. of nitrate found does not indicate that tobaccos are nitrated to improve burning capacity.

C. R. FELLERS

Note on the test for purity of sodium benzoate and caffeine sodio-benzoate of the Austrian Pharmacopeia VIII. OTTO PROCKE. Charles Univ. Prague. *Casopis Československého Lékárnictva* 6, 1-2(1926).—The test for Cl in $BzONa$ of the Austrian Pharm. VIII is considered inadequate. P. proceeds as follows: To det. chlorides, dissolve 1 g. $BzONa$ in 10 cc. H_2O , add 1 cc. concd. HNO_3 and several cc. of ether and titrate with 0.02 N $AgNO_3$ and 0.02 N NH_4CNS . To det. total Cl , incinerate the sample in a Pt crucible before proceeding as above. Of 3 samples of $BzONa$ tested, 1 sample contained all the Cl as chloride, while in the other samples, $1/4$ and $1/10$, resp., of the total Cl was present as chloride.

WILLIAM J. HUSA

Oxidation of arsenite in solution arsenicalis Fowleri of the Austrian Pharmacopeia VIII, and determination of arsenic. OTTO PROCKE. *Casopis Československého Lékař-*

nictus 6, 53-6(1926).—P. combined the method of Mohr for detn. of As^{III} with Rosenthaler's method for detn. of As^{V} and applied the combined method to the study of the oxidation by atm. O_2 of the arsenite in "solutio arsenicalis Fowleri" of the Austrian Pharm. VIII. The samples were stored in diffused light at 15-20°. One sample out of 8 stored for 3.5 years showed 35% oxidation, the other 7 less than 2%. In 2 samples kept for 17 months, the % oxidation was 0.6 and 12.3, resp. The excessive oxidation in two cases is attributed to faulty prepn. or improper storage. The combined method of analysis is as follows: To 10.00 g. of Fowler's soln. in a glass-stoppered flask add 1 g. NaHCO_3 and det. As^{III} by titration with 0.1 N I. Then add 2 g. NaHCO_3 and 25 cc. of 38% HCl, and if the amt. of 0.1 N I consumed was less than 19 cc., add also 0.5 g. KI. After 8-10 min. titrate the mixt. with 0.1 N $\text{Na}_2\text{S}_2\text{O}_3$. The amt. of As^{V} originally present is calcd from the difference in the titrations. WILLIAM J. HUSA.

The detection of isopropyl alcohol in spirits by means of piperonal. G. REIF. Imperial Board of Health. *Z. Untersuch. Lebensm.* 55, 204-14(1928).—To detect iso-PrOH in spirits, liniments, tinctures, etc., dil. 1 cc. of the alc. distd. from 10 cc. of the sample with 2 cc. H_2O ; treat 0.3 cc. of the mixt. with 2 cc. H_2O and 0.04 g. medicinal charcoal (D. A. B. 6) and filter through a dry filter; add 5 cc. of a 0.5% soln. of piperonal in alc., then 20 cc. of concd. H_2SO_4 and shake the mixt.; heat 5 cc. of this mixt. on a H_2O bath for 4 or 5 min. If iso-PrOH is present a red to red-brown color appears.

WILLIAM J. HUSA.

Further observations on the accuracy of the cat method for the assay of digitalis. CHAS. C. HASKELL. Medical College of Va. *J. Pharmacol.* 33, 207-17(1928).—From a large number of expts. it is concluded that the cat method of assay of digitalis preps is only an approx. accurate measurement of toxicity. C. RIEGEL.

Pharmaceutical preparations containing lactic acid organisms. JACINTO PLACERES. *Anales oficina quim provincia (Lu Plata)* 1, 71-89(1927).—Sixty different products contg. lactic acid organisms for therapeutic use were examd. A 3% lactose milk medium was found to be most suitable for the growth of the germs. One cc. of a fluid or 0.5 g. of a solid prep. was placed in 100 cc. of the sterile medium. Incubation was carried out at 37° for 48 hrs. During the incubation period the flasks were agitated several times to break up the masses of casein. Several glass beads were usually placed in each flask to aid in the comminution of the curd. Ten cc. samples of culture were removed and titrated with NaOH, phenolphthalein being used as indicator. The liquid preps. produced the largest amts. of lactic acid, from 11.70 to 20.61 g. per l. The objectionable by-products such as formic, acetic and butyric acids, aldehydes and acetone were also estimated. Only the first two were found to be present. The quantity of formic acid produced varied from 0.014 to 0.081%, acetic acid from 0.123 to 0.945%. An attempt was also made to det. the amt. of proteolysis. M. H. SOULE.

A method for the quantitative estimation of sulfur combined as sulfides in potassa sulfurata (liver of sulfur). CHARLES H. ROGERS. *J. Am. Pharm. Assoc.* 17, 658-61(1928).—The U. S. P. X requires that a given wt. of liver of S shall ppt. all the Cu in a weighed amt. of Cu salt. If the product be substandard Cu will be found in the filtrate but no method is provided for detg. the degree of the fault. R. detcs. the Cu in the filtrate by pptg. as CuS and igniting to CuO . The amt. of Cu salt consumed is obtained by difference. Sample 1, 15.19 91%; sample 2, 14.11-44% S. L. E. W.

A source of error in the assay of belladonna plaster. JOSEPH L. MAYER. Brooklyn Coll. of Pharmacy. *J. Am. Pharm. Assoc.* 17, 661-3(1928).—In the general directions for the assay of alkaloids the U. S. P. X. directs that the extn. of the drug extd. with acid must be continued until the addn. to the acid soln. of $(\text{KI})_2\text{HgI}_2$ or I soln. fails to give a cloudiness. M. finds that in belladonna plaster the acid ext. contains considerable EtOH and does not give ppts. with either reagent. Precaution must be taken to evap. the EtOH before applying the test. L. E. WARREN.

Neutral glass for vials (GIORDANI) 19. Influence of various factors on the accumulation of alkaloids in the leaves of *Datura stramonium* L. var. *inermis* (FLOSKI) 11d. H-ion concentration and pH —an explanation (CALDWELL) 2. Active constituent of the true coto bark (SPATH, WESSLEY) 10. Application of x-ray crystal analysis to the problems of chemistry (SHEARER) 3. Organic phosphorus compounds (Brit. pat. 281,232) 10.

FAURHOLT, CARL: Om farmakopænsuorganiske Stoffer og om Kvantitativ analyse til Brug for apoteksdisciplen. Copenhagen: Farmaceutisk Læreanstalt. 40 pp.

MALMY: *Essai sur une méthode pratique de diagnose des médicaments chimiques*. Mayenne: Floch. 96 pp.

MARTINDALE, W. H., AND WESTCOTT, W. W.: *The Extra Pharmacopoeia*, Vol. I. 19th ed., revised by W. H. Martindale. London: H. K. Lewis & Co., Ltd. 1207 pp 27s. 6d. Reviewed in *Chemistry and Industry* 47, 752 (1928).

WASER, ERNST: *Synthese der organischen Arzneimittel*. Stuttgart: F. Enke. 227 pp. M. 16; bound, M. 18.

Apparatus for therapeutic application of chlorine by inhalation. CHARLES F. WALLACE and JOHN C. BAKER (to Wallace & Tiernan Products, Inc.). U. S. 1,678,625, July 24.

Alkaloids. WELLCOME FOUNDATION, LTD., T. A. HENRY and T. M. SHARP Brit. 281,582, Aug. 16, 1927. Three alkaloids ("A", "B" and "C") are obtained from the seeds of *Picralima klataneana*, Pierre. The ground seeds are freed from fat and extd. with EtOH; the ext. is dried and further extd. with dil HCl, clarified with charcoal and filtered. The alkaloids may be pptd. with Na_2CO_3 to render the filtrate alk. or may be first carefully dild. with H_2O , which ppts. a portion of "A" and a further ppt. then may be obtained by rendering the soln. alk. This ppt. may be sepd. into ether-sol. and ether-insol. portions and from the former alc. dissolves "B" and leaves "C," the ether-insol. portion is "A."

Sedatives and hypnotics. J. D. RIEDEL A-G. Brit. 281,365, Aug. 27, 1926. Isopropylallylactic acid is treated with thionyl chloride and the acetyl chloride thus formed is heated with urea to form isopropylallylacetyleurea or the latter may be obtained by treating the isopropylallylacetylechloride with NH_3 to form the acetamide and heating this with cyanic acid for some time. Di-Et *sec*-butylmalonate is transformed into its Na compd. and this is heated with allyl bromide and the product saponified; the *sec*-butylallylmalonic acid thus formed is converted into the corresponding acetic acid and the latter is treated with thionyl chloride and then with urea to obtain *sec*-butylallylacetyleureide.

Antirachitic principles of cod-liver oil. THEODORE F. ZUCKER (to University Patents, Inc.). U. S. 1,678,454, July 24. Cod-liver oil is treated with alc., the fatty acids in the alc. ext. are saponified, the Ca salts of the soaps thus formed are pptd. and the antirachitic principles are extd. from the pptd. soaps, *e. g.*, by extn. with acetone.

Organic gold compounds. ALPHONSE GAMS and PAUL SCHEIDEGGER (to Soc. anon. l'ind. chim. à Bâle.) U. S. 1,678,429, July 24. Stable complex Au compds. which may be used as therapeutic agents are formed by reaction of a Au compd. such as Au chloride upon a water-sol. nucleate such as that of Na.

Ammonium 3-acetylmino-4-hydroxybenzene arsonate. ERNEST FOURNEAU (to Les établissements Poulenc Frères). U. S. 1,677,964, July 24. See Brit. 264,797 (C. A. 22, 304).

Easily soluble local anesthetics of the *m*-aminobenzoic acid ester series. OTTO BILLETER, ERNST ROTILIN and JULIUS PEYER (to Chemische Fabrik vorm. Sandoz). U. S. 1,678,317, July 24. See Can. 274,214 (C. A. 21, 4028).

Cyclopentenyl-substituted aliphatic acids. ROGER ADAMS, CARL R. NOLLER and JAMES A. ARVIN (to Abbott Laboratories). U. S. 1,678,175, July 24. Cyclopentenylethyl bromide is made from cyclopentenylethanol by treating while cold with PBr₃ in toluene, then allowing the temp. to rise. It b_{16} 71-2° (uncor.). Its dry ether soln. is converted into cyclopentenylethylmagnesium bromide and this product further dild. with dry ether and condensed with methyl 8-aldehyde-octanoate and the resulting product decomposed with H_2O to obtain methyl 9-hydroxy-*dl*-hydnoicarpate, which is an oil b_4 177-9° (uncor.). Sapon. of this ester with alc. KOH yields 9-hydroxy-*dl*-hydnoicarpic acid, which, after recrystn. from acetone, m. 62.0-62.8° (cor.). By reaction of cyclopentenylethyl bromide on Et sodiomalonate, by refluxing in abs. alc., Et cyclopentenylethylmalonate is produced. It b_4 147-8°. By sapon. of this ester with aq. NaOH and recrystn. from C_6H_6 , cyclopentenylethylmalonic acid is obtained as colorless crystals, m. 107-107.5° (cor.). By heating this acid to about 150-155° under a reflux condenser until most of the CO_2 has been expelled and further heating for a half hr. at 165-170° cyclopentenylbutyric acid b_4 125-6° (cor.) is obtained. These products may be used in the treatment of diseases such as those produced by *B. leprae* and *B. tuberculosis*.

Face cream. JACQUES RISLER. Fr. 632,356, July 21, 1926. Phosphorescent ZnS is added to cream to protect the skin from harmful rays.

"Toilet creams." J. C. and J. FIELD, LTD., AND E. POLAN. Brit. 281,425, Sept. 24, 1926. NH_3 is used with stearic acid and olive oil or other suitable fatty acids and

fats or fatty oils, glycerol and water, to form a cream which is alk. to phenolphthalein.
Disinfecting compositions. A. ABRAHAM. Brit. 281,530, April 19, 1927. Polymerized CH_2O is dissolved in molten thymol and may be mixed with kieselguhr or other fillers.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

The separation of vanadic acid and its salts from vanadium wastes. N. N. EFREMOV AND A. M. ROZENBERG. *J. Russ. Phys.-Chem. Soc.* 59, 689-99 (1927).—The dry residue from the extrn. of Ra from the Fergan ore contains V_2O_5 32.48, V_2O_4 29.63, U_3O_8 5.74, Al 14.01, Pb 8.69 and smaller amts. of Cu, As, Fe, Ni, Si and Ca. The residue is dissolved in HNO_3 (d. 1.24) and concd. on a water bath until samples on cooling show a ppt. of PbCl_2 . V_2O_5 is filtered off while hot and washed with warm H_2O . The filtrate is evapd. and heated to volatilize excess HNO_3 , dissolved in hot H_2O and filtered. The combined residues contg. 93-6% V_2O_5 dissolve in a slight excess of 25% NaOH on heating. After filtering, the soln. is neutralized and boiled with Na_2CO_3 to ppt. $\text{Al}(\text{OH})_3$ and $\text{Pb}_3(\text{VO}_4)_2$. The filtrate is acidified, boiled and an excess of NH_4OH added to remove traces of $\text{Al}(\text{OH})_3$. The final filtrate is boiled and NH_4Cl added, whereupon NH_4VO_3 ppts. The soln. is concd. until on cooling a sample NH_4Cl seps. A little H_2O is added and the concentrate allowed to stand for 24 hrs. The crystals, filtered off, washed with an NH_4Cl soln. and cold H_2O , contain 99.5% NH_4VO_3 and 0.48% SiO_2 . The second acid filtrate contg. U_3O_8 is combined with the ppts. from the NaOH and Na_2CO_3 treatment and boiled with NaOH. The filtrate is discarded, the residue dissolved in HNO_3 and Pb pptd. with H_2SO_4 . The soln. is neutralized and added to boiling Na_2CO_3 to remove Fe, Cu, Ni and Ca. NaOH ppts. $\text{Na}_2\text{U}_2\text{O}_7$ from the filtrate. NaVO_3 remains in soln. and is purified as above; yield 90%. A practically quant. sepn. of V_2O_5 is thus possible on a factory scale without costly app. or reagents.

BASIL C. SOYENKOFF

The synthesis of ammonia with the aid of extreme pressures. GEORGES CLAUDE. *Mon. produits chim.* 9, No. 91, 9-12; No. 92, 6-11 (1926); *Chem. Zentr.* 1927, 1, 641.—Following a crit. historical survey of the work of Ostwald, Haber, Bosch and their collaborators, C. describes his own exptl. work on the synthesis of NH_3 at extremely high pressures and its application on a com. scale. The theoretical principles involved in pressure equil., rate of reaction and work performed in compression are then discussed and the objections to the high pressures used (over 1000 atm.) are pointed out. Expts. in this range of pressures and the yields of NH_3 obtainable under different conditions, which make possible the com. production of liquid NH_3 , are described. The rapid removal of the heat of the reaction is particularly stressed, and the methods developed for solving this problem are described. The construction of the furnaces, the circulation of gases and the production of H_2 by fractional distn. of H_2O and coke-oven gases are discussed. A list of the plants now using the Claude process is appended.

C. C. DAVIS

Synthetic ammonia. P. FIRMIN. *Industrie chimique* 15, 297-302 (1928); cf. C. A. 22, 1017.—A review comparing the different processes in use. P. THOMASSET. *Chem. Met. Eng.* 35, 342-4 (1925).—A general description of an NH_3 oxidation unit for Pb-chamber plants operating with a 9-11% NH_3 , 91-89% air mixt., a Pt gauze catalyst and an Al or Ni heat exchanger. The converter is of the Parsons type using a cylindrical catalyst of 3 or 4 layers of 80-mesh Pt gauze, of 0.003-in. wire, closed at the bottom by a silica disk and suspended at the top from a Ni holder. A 100-ton chamber plant operating on a 3% niter rate uses 1250 lbs. of niter per day which would, by the use of NH_3 oxidation, save from \$2900 to \$4400 per year. This, plus the saving of 60° Bé H_2SO_4 required to generate N oxides from niter, gives a total saving of \$5000-6500 per year. The oxidation unit described can be purchased and installed for \$6500.

J. H. PERRY

Attempts to prepare calcium hydrosilicates. FRITZ KLASSE. *Zement* 17, 2-9, 49-56 (1928).—Using $x\text{Na}_2\text{O} \cdot y\text{SiO}_2$ compds. of the ratios 2:1, 1:1 and 1:2 it was attempted to produce the corresponding Ca silicates in the wet way according to the reaction $\text{Na}_2\text{SiO}_3 + \text{Ca}(\text{NO}_3)_2 \rightarrow \text{CaSiO}_3 + 2\text{NaNO}_3$. Specially prepd. CO_2 -free reagents were used. After mixing under reduced pressure the reaction was brought to equil. by shaking for a week or two. The ppt. formed was sepd. on a Pukall filter, washed with alc. and both ppt. and filtrate were analyzed. The mol. ratio of the $\text{CaO}:\text{SiO}_2$ in the flocculent ppt.

did not vary greatly from 1:1.05 when the true Na_2SiO_3 compn. was used, even though the proportions of Na_2SiO_3 added to $\text{Ca}(\text{NO}_3)_2$ varied widely. The slightly below theoretical content of Ca in the ppt. is attributed to the following hydrolytic reaction: $2\text{CaSiO}_3 + 2\text{H}_2\text{O} \rightleftharpoons \text{Ca}(\text{HSiO}_3)_2 + \text{Ca}(\text{OH})_2$. The acid silicate, if formed, must have a low soly. under the conditions observed. When a Na_2SiO_3 soln. was used which had the compn. $1\text{Na}_2\text{O}:1.7\text{SiO}_2$ the resulting Ca silicate showed an av. mol. ratio of 1:1.73. The alky. of the remaining soln. increased with increasing ppt. Upon ignition the ppts. became insol. and had to be fused in K_2CO_3 for analysis. When Na_2SiO_3 was used the ppt. did not settle out well from the alc. wash. The compn. varied between 1:1.78 and 1:1.93. With Na_2SiO_3 the compn. of the resulting ppt. did not reach $2\text{CaO}:\text{SiO}_2$ but remained near $1.65\text{CaO}:\text{SiO}_2$. The addn. of $\text{Ca}(\text{OH})_2$ to an aq. suspension of freshly pptd. $\text{CaO}:\text{SiO}_2$ enriched the ppt. in CaO until a ratio of 1.2:1 was attained after agitation for 1 week, showing that a strong hydrolyzing tendency exists in all these Ca hydrosilicates. The failure to get higher than 1.5 to 1.76 CaO per SiO_2 mol. in these expts. is explained by the hydrolysis of the dimol. salt under the imposed conditions. H. F. K.

Use of dolomite in the manufacture of sodium chromate. N. F. YUSHKEVICH AND A. L. URAZOV. Institute of Applied Mineralogy and Metallurgy. *J. Chem. Ind. (Moscow)* 4, 387-94 (1927); cf. *C. A.* 21, 2761.—The usual com. process of manuf. of Na_2CrO_4 consists in calcining a mixt. of natural chromite with Na_2CO_3 and CaO at high temp. in an oxidizing atm.: $4\text{FeO} \cdot \text{Cr}_2\text{O}_3 + 8\text{Na}_2\text{CO}_3 + 7\text{O}_2 = 2\text{Fe}_2\text{O}_3 + 8\text{Na}_2\text{CrO}_4 + 8\text{CO}_2$. The purpose of the CaO is to prevent the mixt. from becoming semifluid, which would prevent it from being oxidized by air. The disadvantage of using CaO is that it reacts with chromite to form CaCrO_4 in amts. which may reach up to 10% of the total chromates obtained. CaCrO_4 being but slightly sol. in H_2O , part of it escapes extn. with H_2O , causing a loss of Cr. Having been informed that in the manuf. of chromate in a large German factory CaO is replaced by dolomite, Y. and U. made lab. expts with a natural chromite contg. Cr_2O_3 44.61, Fe_2O_3 24.28, Al_2O_3 9.86, SiO_2 4.04, CaO trace, MgO not detd., H_2O 0.09% and a dolomitic lime contg. CaO 65.04, MgO 29.69, SiO_2 4.19 and $\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$ 1.03%. The calcined Na_2CO_3 used was 99.85% pure. They used the same proportions as in their expts. on the old process, only replacing lime by dolomitic lime, i. e., chromite 37.85, calcined dolomite 37.85, calcined Na_2CO_3 24.20, all finely pulverized and mixed. At 1050° and at 1160° the speed of oxidation of Cr_2O_3 to CrO_3 is only slightly greater when using dolomitic lime than in the case of CaO, but at 830° , and particularly at 930° , the speed of oxidation is considerably less with dolomitic lime than with CaO. As far as acceleration of the reaction is concerned there is no advantage in replacing CaO by dolomitic lime, but from the point of view of ease of extn. of the chromates obtained the use of dolomitic lime has a considerable advantage over CaO. An investigation of the comparative stability of CaCrO_4 and of MgCrO_4 at high temps. has shown that the former, in the absence of CaO, begins to decompose very slowly at about 930° , whereas in presence of CaO it decomposes rapidly even at 830° . With increase of temp. to 1160° more than half of the total amt. of CaCrO_4 decomposes in 2 hrs., whether CaO is present or not: $4\text{CaCrO}_4 = 4\text{CaO} + 2\text{Cr}_2\text{O}_3 + 3\text{O}_2$. The decompn. of MgCrO_4 , conforming to an analogous equation, is noticeable even at 503° and becomes appreciable in the temp. interval 580 - 650° . Calcination of MgCrO_4 at 650° for 2 hrs., alone or mixed with MgO, decomposes 97.75 to 99.31% of it. Since the pressure of the gases in the factory furnace is 0.1 atm. the decompn. of MgCrO_4 should take place under these conditions at even lower temps. This explains the advantage of using dolomitic lime. The comparatively low CaO content in the dolomitic lime results in the formation of a smaller amt. of CaCrO_4 , and MgCrO_4 is not obtained at all, since it is not stable at the temp. of calcination. It might seem that replacing CaO by MgO instead of by dolomitic lime would be even more advantageous, but expts. show that in this case the Na_2CrO_4 obtained reacts with MgO, forming MgCrO_4 , which decomposes by heat into MgO, Cr_2O_3 and O_2 , and a sort of an equil. is reached when only 73 to 75% of Na_2CrO_4 is formed. It is thus necessary to use either lime or dolomitic lime, and the formation of some CaCrO_4 is unavoidable. Since the soly. of the latter increases considerably with the rise of temp., it is best to extract the chromates from the product of the reaction by boiling H_2O , and even in an autoclave, to increase the % of extd. Cr. BERNARD NELSON

Preparation of sodium formaldehyde-sulfoxylate. N. A. BACH-NIKOLAEVA. *Papers Karpov Chem. Inst. Bach. Memorial Papers* 1927, 92-100.—Under the com. name of Rongalite C $\text{NaHSO}_3 \cdot \text{CH}_2\text{O}$ is widely used in the industry as a reducing agent. The best method of prepn., based on reduction of $\text{NHSO}_3 \cdot \text{CH}_2\text{O} \cdot \text{H}_2\text{O}$ by Zn dust (German patents 165,280, 165,807, 202,242, 222, 195; K. Jellineck "Das Hydrosulfit" 1912;

p. 105), gives unsatisfactory results. The method given in German patent 276,984 (1914) is, on the contrary, very convenient if the following details are observed: A bisulfite soln. contg. 38.8-39.4% NaHSO_3 and 1.1-0.25% Na_2SO_3 and also impurities, chiefly colloidal Fe_2O_3 , is transformed into a soln. contg. 50-65 g. $\text{NaHSO}_3 \cdot \text{CH}_2\text{O}$ per 100 cc. by boiling for a few min. with CH_2O . The latter should be in excess to ppt. Fe_2O_3 , which is removed by filtration. The filtrate is then reduced by Zn sponge: $\text{NaHSO}_3 \cdot \text{CH}_2\text{O} + \text{Zn} + \text{H}_2\text{O} = \text{NaHSO}_2 \cdot \text{CH}_2\text{O} + \text{Zn}(\text{OH})_2$. Zn sponge is prepd. by electrolysis from an alk. bath using a brass sieve as cathode and a sol. Zn anode contained in an asbestos bag serving as a diaphragm. To effect the reduction an excess of sponge is put into the formalite-bisulfite soln. contained in a flask having a reflux condenser, and the mixt. is vigorously stirred and boiled for about 2 to 3 hr. The presence of Fe in the sponge lowers considerably the reducing capacity of Zn sponge, but Cu appears to increase it. Portions of the liquid are removed occasionally to test the progress of the reaction by the iodometric method. Rongalite is titrated in acid soln.: $\text{NaHSO}_2 \cdot \text{CH}_2\text{O} + 4\text{I} + 2\text{H}_2\text{O} = \text{NaHSO}_4 + \text{CH}_2\text{O} + 4\text{HI}$. When the titration is ended the titrated liquid is neutralized by NaHCO_3 and the amt. of non-reacted formalite-bisulfite is titrated, with vigorous stirring: $\text{NaHSO}_2 \cdot \text{CH}_2\text{O} + 2\text{I} + \text{H}_2\text{O} = \text{NaHSO}_4 + \text{CH}_2\text{O} + 4\text{I}$. When the reduction of formalite bisulfite is ended the remaining Zn sponge and $\text{Zn}(\text{OH})_2$ are filtered off by suction and can be used again for the prepn. of Zn sponge. The filtrate contains pure rongalite, which can be obtained as crystals by evapn. *in vacuo*. These crystals, after air drying, contain 95-7% $\text{NaHSO}_2 \cdot \text{CH}_2\text{O} \cdot 0.2\text{H}_2\text{O}$. By recrystg. from H_2O and drying *in vacuo* a 99% product is obtained.

BERNARD NELSON

Observations of the phenomena met in obtaining sodium nitrate from caliche. A. PEEFENBERGER AND G. LEIMBACH *Caliche* 9, 485 512(1928).—An examination of prior reports, expressed in various terms, of the soly. and phase relations of the most common components met in extracting caliche, replete with extensible tables and triangular isotherms with varied solid phases. Particular attention is given to the development of insol. Darapskite, $\text{NaNO}_3 \cdot \text{Na}_2\text{SO}_4 \cdot \text{H}_2\text{O}$, in leaching below 68.5°. The quaternary system, NaNO_3 , NaCl , Na_2SO_4 , H_2O , velocity of soln. and of crvstn. of NaNO_3 , NaCl and Na_2SO_4 , velocity of soln. of Darapskite in solns. satd. with Na_2SO_4 and NaCl and cooling of designated solns. are considered in detail. J. H. F.

Preparation of crystallized sodium-chromium alum. E. I. ORLOV, Kharkov Technological Institute. *Ukrainskii Khim. Zhurnal* 3, 115 7(1928).—To obtain Na-Cr alum in cryst. form, hitherto thought to be very difficult, O. phase xylene as reducing agent of $\text{Na}_2\text{Cr}_2\text{O}_7$. 100 g. of xylene were added, in small portions and while stirring, to a sealed flask contg. 300 g. H_2SO_4 , sp. gr. 1.84. The xylene dissolved, forming sulfacids; 295 g. of H_2SO_4 , sp. gr. 1.84, were added, the mixt. was poured into a large porcelain dish contg. 1 l. of H_2O and 375 g. of finely powdered $\text{Na}_2\text{Cr}_2\text{O}_7$ were added in small portions. The reaction takes place at first in the cold and is ended by heating over a free flame, the liquid turning green. The soln. is evapd. to 1339 g. The product, contg. Cr_2O_3 12.97 and SO_3 28.37, is poured into flat porcelain dishes, covered, and left to crystallize at room temp. The crystals obtained are very small, appearing under the microscope as a conglomerate of green, violet and colorless grains. The Na-Cr alum can be recrystd. from H_2O by slow evapn. of satd. solns. It could be used in the tanning industry to replace the more expensive K-Cr alum. B. N.

Sodium and potassium bisulfates. Their use in agriculture. P. WAGUET. *Rev. prod. chim.* 31, 401-3(1928).—The manuf., properties, industrial uses and use in agriculture of these two products are discussed. P. A. THOMASSET

An installation for handling potassium salts. LEVI. *Science ind.* 12, 16-23 (1928).—The total storing capacity of the plant is 200,000 tons; loading is done at the rate of 700 tons, with equipment for simultaneous unloading of 200 tons per hour. Salt in bags is handled by means of special cranes on movable bridges. R. D. RUMBACHER

Making pure tungstic oxide involves many unusual plant problems. W. B. GERO AND C. V. IREDELL. *Chem. Met. Eng.* 35, 412-7(1928).—Description of plant equipment for the manuf. of pure WO_3 from wolframite. The process involves digestion in NaOH soln., pptn. as CaWO_4 , treatment with HCl to form H_2WO_4 , neutralization with NH_3 , and ignition of $(\text{NH}_4)_2\text{WO}_4$ to WO_3 . G. B. TAYLOR

Transformation of zinc slag into pure zinc chloride. N. N. EPREMOV AND A. M. ROZENBERG. *J. Chem. Ind. (Moscow)* 4, 422-4(1927).—Zinc slag is often insol. in HCl on account of contg. up to 20% of Pb, which is apt to form a protective coating on the surface of Zn grains. To transform this waste product into ZnCl_2 , the Pb film is destroyed by an oxidizing calcination at 300-500°. A higher temp. would cause the loss of some Zn as volatile oxide. It is then dissolved in cold HCl (d. 1.12), 1500 cc. per kg. of cal-

cined slag being used. Sand, clay and other earthy materials are allowed to settle for 24 hrs. and the soln. is sepd. by decantation and treated with granular Zn to ppt. Pb, Cu, Sb, etc.

BERNARD NELSON

Chemical treatment of Solikamsk carnallite. N. N. EFREMOV AND A. A. VESKLOVSKI. *Northern Chem. Trust. J. Chem. Ind. (Moscow)* 4, 489-95 (1927).—The av. compn. of Solikamsk carnallite is: MgCl_2 25.88, KCl 23.55, H_2O (combined) 28.03, NaCl 20.60, MgSO_4 none, CaSO_4 1.46, hygroscopic H_2O none. The main difference between Solikamsk and Stassfurth carnallites, which simplifies the treatment of the former, is the absence of MgSO_4 . In the case of Stassfurth carnallite, to sep. MgCl_2 and KCl by crystn. treatment with H_2O at $120-135^\circ$ under pressure is necessary. Solikamsk carnallite gives very good results with cold H_2O treatments. This investigation is still in a preliminary stage.

BERNARD NELSON

Chemical treatment of Solikamsk sylvite. F. F. VOLF AND V. S. YATLOV. *Northern Chem. Trust. J. Chem. Ind. (Moscow)* 4, 485-9 (1927).—Solikamsk sylvite has the following compn.: sylvite (KCl) 18.45-44.14, carnallite ($\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$) none, MgCl_2 0.0-0.28, kieserite ($\text{MgSO}_4 \cdot \text{H}_2\text{O}$) none, anhydrite (CaSO_4) 0.92-3.70, halite (NaCl) 53.1-78.23, H_2O -insol. 0.27-2.16. The H_2O -insol. contains SiO_2 25.29, Fe_2O_3 3.27, Al_2O_3 3.86, Cu_2O 25.10, MgO 2.18, SO_3 24.65, undetd. 9.74, loss on ignition 5.91. It has been proposed to use Solikamsk sylvite for the manuf. of fertilizers. A high-grade fertilizing salt contg. 82% KCl can be obtained from a sylvite contg. 18.45% KCl by a single soln. followed by decantation and crystn. It is more profitable to use it for the manuf. of pure KCl as Stassfurth sylvite is used in Germany. For this Solikamsk sylvite has the advantage over Stassfurth sylvite in contg. no kieserite, the latter hindering crystn. of pure KCl . If Solikamsk sylvite is crystd. with stirring, and the crystals are drained on a vacuum filter without washing, a high quality salt contg. 99.20% KCl and 0.72% NaCl is obtained.

BERNARD NELSON

Catalytic refining of bromine. P. T. DANILCHENKO AND M. I. RAVICH. *J. Russ. Phys. Chem. Soc.* 59, 953-68 (1927).—Crude Br_2 was passed at 115° over 6.5 g charcoal contg. 9.16% Fe_2O_3 , prepd. by impregnating with $\text{Fe}(\text{NO}_3)_3$ and heating to redness in the absence of air for 2 hrs. The purified product contained 0.05% Cl_2 . The catalyst did not lose its activity after 700 g. of Br_2 had passed through. Al_2O_3 on charcoal is equally effective at 165° ; charcoal alone is much less so. The % of Cl_2 in the purified Br_2 does not depend upon its original amt. nor upon org. substances. The org. impurities are partly removed, although the catalyst does not show a commensurate gain in wt. Among the possible reactions are the hydrolysis of Cl_2 to HCl and O_2 , the action of Cl_2 on HBr , CBr_4 and CHCl_3 . The purified product contained about 0.62% HCl , a gain of 0.52%, which accounted for the disappearance of 57% Cl_2 , the remainder being used to displace Br_2 from the org. compds., which thus facilitate the removal of Cl_2 .

BASIL C. SOYENKOFF

Extraction of bromine from aqueous salt solutions. O. YU. MAGIDSON AND R. A. KONOVALA. *J. Chem. Ind. (Moscow)* 4, 153-4 (1927).—Cf. K. I. Sheidt, *C. A.* 22, 3022. To sep. Br from tribromophenol Sheidt boiled the latter with dil. HNO_3 , then distd. the Br; pure picric acid was obtained at a 90% yield whereas almost 98% Br was generated. M. and K. found that dil. or strong HNO_3 gave neither picric acid nor Br in large amts. To recover all the Br the tribromophenol would have to be fused with an alkali and thus completely destroyed. This expensive operation would make the sepn. of Br from aq. solns. as tribromophenol uneconomical.

BERNARD NELSON

The volumetric relations in the manufacture of hydrogen from carbon monoxide and water. ROBERT NITZSCHMANN. *Chem. App.* 15, 159-61 (1928).—Mathematical.

J. H. MOORE

A world view of nitrogen economics. JULIUS BUEB. *Chem. Met. Eng.* 35, 348-9 (1928).—An abbreviated form of B.'s paper written for the International Nitrogen Conference on the S. S. Lützow's Adriatic cruise. The assistance of governments should include cheap freight rates on all raw materials, abolition of all tariff duties, and support of suitable credit institutions. Vital statistics of the N industry since 1924 are included.

J. H. PERRY

The nitrogen problem in Brazil. JEAN P. LEHALLEUR. *Chimica industria* 1, 340-6 (1926).—An address. Brazil possesses no commercially exploitable nitrate deposits. The requirements of agriculture and national defense would best be met by synthetic NH_4NO_3 . The various processes are reviewed.

R. D. BUMBACHER

The "denitrification" of mother liquor. B. DIAZ OSSO. *Calcice* 9, 529 (1928).—This term, used by Donnan in his 1919 report, means such recovery of the residual, dissolved NaNO_3 that the mother liquor need not be reused for leaching. O. points out that the use of fresh H_2O increases the NaNO_3 extraction but gives difficulties in so

treating the mother liquor. Air agitation and evapn. in open tanks require careful control. Boiling at 110° removes sulfate and chloride by pptn., but using double effect evaporators has not proved economical. Removal of NaNO_3 from a Shanks process mother liquor by cooling tends to ppt. also Darapskite, $\text{NaNO}_3 \cdot \text{Na}_2\text{SO}_4 \cdot \text{H}_2\text{O}$. Guggenheim Brothers (Chilean patent 4594) cool to 2° a liquor satd. at 35° . It also has been suggested to mix 2 salt solns. to obtain a metastable condition of one salt, to be pptd. by seeding. Complete evapn. of the Shanks process mother liquor at atm. temp. yields 630 kg. of sol. salts per cu. m. contg. 69% nitrate. J. HOWARD FLINT

Chemical engineering may revive sublimation of sulfur. E. F. WHITE; *Chem. Met. Eng.* **35**, 355-6 (1928).—Flowers of S are preferred to the ground crude material in many industries such as rubber vulcanization, insecticides, and soil revivification. The app. developed consists of a retort and melting pan fired by a furnace contg. an air preheater. The S from the melting pan flows through a liquid seal into the retort where a const. level is maintained during the S vaporization. Flue gas from the burner heats the retort, the melting pan and the air. Three cu. ft. of the inert gas is required per lb. S, and this circulating atm. is handled by a small blower at $1\frac{1}{4}$ in. H_2O pressure. The inert gas is injected into the retort at 5 in. H_2O pressure and into the neck connecting retort and chamber. The gas leaving the chamber passes through a dust collector, through a H_2O -removal app. and back to the blower. The chamber temp. is 105°F and a volume of 10 cu. ft. per lb. S per hr. was found to be ample. The S flowers produced averaged over 97% through 200 mesh. Maintenance and depreciation are smaller; the hazard is less than in grinding, and the power costs are less. J. H. PERRY

The rotary kiln in the lime industry. T. KLEBE; *Forind-Ztg.* **51**, 1002-4 (1927). The use of rotary kilns in the lime industry is comparatively new but appears promising. H. G. SCHRECHT

Deterioration of steels in the synthesis of ammonia (Vander, *et al.* 9. Alkali, etc., works in Scotland (Young) 13.

KAUSCH, OSKAR. Die aktive Kohle, ihre Herstellung und Verwendung. Halle (Saale): W. Knapp. Monograph of the "Chemisch-technische Filtrationsmethode," vol. 42. 342 pp. M. 21.50; bound, M. 23.50.

Nitric acid. NORSK HYDRO-ELEKTRISK KVAELSTOFARBEIDNING. Brit. 281,642, Dec. 6, 1926. An app. is described in which continuous concn. of HNO_3 by boiling and rectification is carried out under reduced pressure. Dil. HNO_3 is introduced through a sealing tube into the upper part of a rectification column connected to condensers and a source of vacuum. Acid from the bottom of the column passes through a series of boilers and is withdrawn when it becomes sufficiently concd.

Sulfuric acid. H. PETERSEN. Brit. 281,551, June 7, 1927. In the use of tower-packed with small grains of quartzite, denitration is effected by cold sulfurous gases in one of the towers. The gases from the roasting oven are cooled by use in an app. for concg. H_2SO_4 and may be passed through cooling or condensing app. to a p. acid contg. water before use in the denitrating tower.

Sulfuric acid. SOC. GENERALE METALLURGIQUE DE HOBOKEN. Brit. 281,510, Feb. 19, 1927. Reaction chambers packed with small pieces of acid-resisting material (in chambers of not more than 50 sq. m. cross section) are used in producing H_2SO_4 as described in Brit. 249,914 (*C. A.* **21**, 991).

Recovering carbon dioxide. I. G. FARBENFABR. A. G. Pat. 622,664, April 12, 1927. See Brit. 271,852 (*C. A.* **22**, 1637).

Alkali compounds. ALBERT F. MEYERHOFFER. Fr. 632,890, April 14, 1927. Alkali compds. are formed from alkali salts and alk. earth compds., the reaction being carried out in a very short time and the lyes being sep'd. as soon as the reaction slackens.

Alkali metal compounds from silicates. THOMAS A. EDISON (to Thomas A. Edison, Inc.). U. S. 1,678,246, July 24. Finely divided silicate material such as feldspar or spodumene is treated with water and an alk. earth hydroxide such as $\text{Ca}(\text{OH})_2$ and heated to free the alkali metal from the silicate; the resultant mass is subjected to a head of liquid sufficient to displace the water and sol. salts. An app. is described.

Alkali metal cyanides. ROBERT W. POINDEXTER, JR., and PAUL T. DOLLEY (to Calif. Cyanide Co.). U. S. 1,677,986, July 24. An app. is specified comprising a converter for holding a fused alkali metal carbonate mixt. and a Cu tube for introducing HCN ; this tube has a protecting sheath of material such as Fe which is not attacked by fused alkali metal cyanide and is provided with a protecting tip composed of material

such as C which neither decomposes HCN nor is substantially attacked by fused alkali metal cyanide. Other structural features are described. Cf. *C. A.* **21**, 1873.

Cyanamides. N. CARO and A. R. FRANK. Brit. 281,610, Dec. 2, 1926. In prep. Ca or Mg cyanamides as described in Brit. 279,811 (*C. A.* **22**, 3024), NH_3 gas is passed over the heated carbonate at increased velocity and lower temps. may be used.

Cyanamides. STICKSTOFFWERKE GES. (to N. Caro and A. R. Frank). Brit. 281,611, Dec. 2, 1926. Cyanamides of Mg or other alk. earth metals are prepd. by treating oxides or compds. such as formates or carbonates which form oxides on heating with gaseous mixts. such as NH_3 and CO which tend to form HCN. The treatment is effected at $400\text{--}850^\circ$ and at either ordinary or increased pressure. Presence of H_2O increases formation of cyanamide. Presence of Fe is avoided and the app. used may be formed of ceramic material or Zn, and Fe carbonyl is eliminated from the gases. H_2S or CS_2 may be added to the gases or Ca sulfide or CaSO_4 to the solid materials as the S apparently serves to prevent decomp. of the product by metals present.

Anhydrous chlorides. I. G. FARBENIND. A. G. Fr. 632,503, Apr. 8, 1927. Anhydrous chlorides of Mg, Ca, Zn, Li or Ce are formed by causing the corresponding oxides as a suspension in the melted chloride or in melted mixts. of other chlorides to flow down a tower, up which a chlorinating gas such as HCl or phosgene is ascending. Carbon may be added to the oxide and the tower may contain coke.

Metallic chlorides. I. G. FARBENIND. A. G. Brit. 281,191, Jan. 7, 1927. A mixt. of gases contg. H, CO and Cl_2 , e. g., a mixt. of water gas and Cl_2 , is used for treating kaolin, chrom. Fe ore or other oxide contg. substances (suitably in a continuous manner in a rotary furnace) to form metal chlorides such as those of Al or Fe, which may be sepd. from associated HCl by dec. pptn. or partly by water-cooled condensers and further by dec. pptn. The HCl may be washed with coned. HCl to free it from metal chlorides and then absorbed in water. (*C. A.* **22**, 2444)

Alumina. T. R. K. HAGLUND. Can. 282,063, July 31, 1928. Al_2O_3 is manufd. by forming, on refining Al_2O_3 contg. raw material, a melt contg. both fused Al_2O_3 and Al_2S_3 , decomp. the sulfide by subjecting the melt to such incomplete oxidation that at least a part of the S is sepd. out as free S and carrying on the oxidation at such temp. that Al_2O_3 formed does not lose its ability to absorb H_2O but still high enough to enable free S to distil off, thereupon treating the oxidized melt with H_2O and sepg. the fused Al_2O_3 out of the treated melt.

Refining alumina. T. R. K. HAGLUND. Can. 282,064, July 31, 1928. Raw materials contg. Al_2O_3 are refined by first forming a slag contg. both Al_2S_3 and fused Al_2O_3 , decomp. Al_2S_3 with H_2O and sepg. out the fused Al_2O_3 and decomp. impurities of Fe sulfides by treating the residue with a gaseous Cl combination as HCl gas in presence of H_2O vapor and removing formed chloride combinations.

Ammonium chloride crystals. JOSEPH WILLIAM MOORE and WILFRED GUSTAV FORACK (to Imperial Chemical Industries, Ltd.). Can. 281,984, July 24, 1928. Gaseous NH_3 is allowed to react with gaseous HCl under such thermal conditions (with regard to velocity or thermal insulation) that a solid is deposited at 300° and produces a mass of tough fibrous crystals practically chemically pure.

Apparatus for producing ammonium sulfate crystals from ammonia and sulfuric acid or for similar processes. E. M. WEYMAN and R. P. WALLIS (representing G. Weyman). Brit. 281,165, Nov. 18, 1926.

Barium hydroxide. SOC. FRANÇAISE SUCRATERIES (Brevets et procédés Deguide). Fr. 633,368, Apr. 26. $\text{Ba}(\text{OH})_2$ is formed by attacking at about 1500° natural BaSO_4 with silica and grinding the product in the presence of H_2O . As by-products HCl and caustic alkalies and carbonates are prepd.

Borax. THOMAS M. CRYMER (to Pacific Coast Borax Co.). U. S. 1,678,381, July 24. In producing commercial borax from natural $\text{Na}_2\text{O} \cdot 2\text{B}_2\text{O}_3 \cdot 4\text{H}_2\text{O}$ the material is heated to about 115° to render it less resistant to soln. in water and is then dissolved and crystd.

Chromyl chloride. PERMUTIT. A. G. Fr. 633,517, April 28, 1927. See Brit. 270,711 (*C. A.* **22**, 1597).

Hexamethylenetetramine and ammonium chloride. SOC. S. KARPEN & BROS. Fr. 633,262, Apr. 23, 1927. To sep. $(\text{CH}_2)_6\text{N}_4$ from NH_4Cl formed in the reaction between CH_2Cl_2 and NH_3 , e. g., as described in Fr. 584,972, use is made of the fact that $(\text{CH}_2)_6\text{N}_4$ is less sol. in H_2O surcharged with NH_3 gas, whereas the soly. of NH_4Cl is slightly increased.

Hydrogen and carbon monoxide. MARIA CASALE-SACCHI. Fr. 632,660, April 12, 1927. In a process for prep. a mixt. of H and CO free from CH_4 from hydrocarbons or gaseous mixts. contg. hydrocarbons, oxygen and water, the reaction is carried out at a temp. above 1000° , with excess of H_2O , and at a reduced pressure.

Iron phosphates. PARKER RUST-PROOF CO. Fr. 632,340, April 7, 1927. Strongly acid orthophosphates of iron are made by projecting a concd. soln. of H_3PO_4 in a divided state on to particles of iron heated to 100° and in a gas at the same temp. They are used specially for preventing the rusting of iron.

Phosphates. PARKER RUST-PROOF CO. Fr. 632,341, April 7, 1927. A mixt. of dihydrogen phosphates of Fe and Mn is made by dissolving Fe and Mn in excess of phosphoric acid, crystallizing and drying the crystals under oxidizing conditions. It is used for preventing the rusting of iron.

Silicates. FERDINAND RICARD. Fr. 632,509, April 9, 1927. Na_2SiO_3 is formed by adding a powdered SiO_2 mineral to NaOH, which is treated with CO_2 to satn., giving a ppt. of SiO_2 , or the soln. of Na_2SiO_3 is treated with slaked lime to give $CaSiO_3$, the soln. in each step being used again in the process.

Sodium hypochlorite. MALCOLM P. APPLEBEY and CHARLES CARTER. Fr. 632,187, Apr. 4, 1927. A solid, drv and stable prepn. of NaOCl is obtained by admixture of a strong soln. or the melted crystals with wholly or partially dehydrated Na_2PO_4 or salts forming Na_2PO_4 .

Sodium sulfide. ALFRED H. WHITE (to John E. Alexander and Edward G. Goodell, Trustees for Falls Mfg. Co.). Can. 282,189, July 31, 1928. Na_2S is formed from material contg. Na_2SO_4 by heating a mixt. of such material, CaO and C to about 700° to form Na_2S and $CaCO_3$.

Zinc white. JOSEPH-MARCEL-HENRI CORNILLAT. Fr. 632,235, July 15, 1926. An app. for producing zinc white is described in which a slab of zinc is put into a furnace heated to about 1200° .

Gypsum. ARTHUR ANKER. Fr. 633,310, April 25, 1927. An app. is described for drying and reheating gypsum or the like, in which the material descends mechanically on plates in an annular space having a cylinder inside and an annular space outside for a heating fluid.

Sulfates and sulfur. CHARLES HARNIST. Fr. 633,105, April 25, 1925. Sulfates and S are obtained by heating under pressure the salts formed by the action of SO_2 in the presence of H_2O and H_2S on alkali metal, or ammonium compds. such as hydrates, carbonates or sulfides. Thus, the salts obtained when a gas contg. NH_3 and H_2S , such as the gas from coke furnaces, is led through a water saturator through which SO_2 is also passed, are so treated.

Purifying sulfur. W. BLYTHE & CO., LTD., W. H. BENTLEY and B. CATLOW. Brit. 281,133, Feb. 12, 1927. S. contg. bituminous impurities is distd. in the presence of non-volatile solid adsorbents or materials such as $CaSO_4$, bone ash, Na_2SO_4 , fine sand, kieselguhr, silica gel, pptd. silica, powdered charcoal and active C. The distn. may be carried out in a continuous manner.

Hydrogen from methane. I. G. FARBENIND. A.-G. Fr. 632,861, April 15, 1927. See Brit. 267,535 (C. A. 22, 1219).

Lithium. METALLBANK UND METALLURGISCHE GESELLSCHAFT AKTIENGESELLSCHAFT. Fr. 632,225, April 6, 1927. Li is obtained from its minerals by heating them with alkali salts to a temp. of $800-950^\circ$ in a tubular revolving furnace.

Recovering phosphorus from gases. I. G. FARBENIND. A.-G. Fr. 632,656, April 12, 1927. See Brit. 279,710 (C. A. 22, 3025).

Aldehyde condensation product. GEORGE S. SHAW (to The Can. Electro Products Co., Ltd.). Can. 281,951, July 24, 1928. An AcH condensation product is made by treating the aldehyde at 10° to 15° with 2.2 g. of alk. condensing agent per kg. of finished product, the condensing agent being in soln. of 10% concn., and then treating the resulting mass at 20° to 45° , with approx. double the amt. of the same condensing agent in soln. of approx. 20% concn.

Condensation products. PAUL HALLER and HANS KAPPELER. Can. 282,036, July 31, 1928. Aromatic amines reacting in the presence of strong mineral acids (HCl) with H_2CO form solid jellies which on treatment with inorg. or org. bases or basic, neutral or acid salts or weak acids on drying form valuable artificial masses of wood-like, bony or horny appearance.

Condensation products of phenols and aldehydes. LEONHARD DEUTSCH and ISAK THORN (to Selden Co.). U. S. 1,678,107, July 24. Light colored and color-fast, hard, infusible and insol. condensation products are formed from phenols and aldehydes such as PhOH and CH_2O by effecting condensation with an alkali and adding H_3BO_3 to the reaction product. U. S. 1,678,108 specifies molding and hardening fusible condensation products of phenols and aldehydes in an open-bottomed mold while supported on a molten alloy of low m. p. or other suitable material of higher sp. gr. than the condensation product.

Condensation product of urea, formaldehyde and a phenol. CHARLES O. TERWILLIGER (to Fritz v. Briesen). U. S. 1,678,024, July 24. In the reaction mixt. used, the ratio of 40% CH_2O soln. to urea is less than 2.5:1. Condensation is effected by heating and the product is highly resistant to water.

Hydrogenating phenol-ketone condensation products. SCHERING-KAHLBAUM A.-G. (formerly Chem. Fabrik auf Aktien vorm. E. Schering). Brit. 280,956, Nov. 22, 1926. Thymol, its isomers or homologs and their hexahydro compds. are made by hydrogenating etheric condensation products such as those from *m*-cresol and acetone or *p*-cresol and acetone.

"Artificial horn." A. JAGER and HEROLD A.-G. Brit. 281,537, May 17, 1927. PhOH 1, together with a 30% aq. CH_2O soln. 2–3.0 parts and an alkali salt of a fatty acid such as Na stearate in a quantity corresponding to at least 0.035 part of NaOH, are heated to about 70° for about 90 min. and the product is dehydrated *in vacuo* until the temp., after first falling, has again risen to about 65°. Salicylic acid 1.8 mols. for each mol. of alkali in the mixt. is then added and the mixt. is further dehydrated and then hardened by heating in open molds. Substances such as castor oil or glycerol also may be added.

Horn-like substances. DEUTSCHE KUNSTHORN G.M.B.H. Fr. 632,471, Oct. 27, 1926. Addn. to 611,342. In the prepn. of horn-like substances from albuminoids, the plastic mass is allowed to stand for some time after molding before the usual drying.

Substitute for horn, ebonite, etc. HEINO LIPPMANN. Fr. 633,591, April 29, 1927. A substitute for horn, ebonite, celluloid, etc., is made from scraps of paper or cloth mixed with a binder such as gum, resin or glue. It can be molded under pressure and heat. Other substances may be added according to the particular application of the substitute.

Treating bauxites with sulfuric acid. FRANCOIS TRAWINSKI. Fr. 633,199, April 4, 1927. In treating bauxites the bauxite in H_2O is added to concd. H_2SO_4 , thus using the heat of hydration, the heat of neutralization and of soln. of the $\text{Al}_2(\text{SO}_4)_3$.

Plastic compositions. O. MANFRED. Brit. 281,223, Nov. 26, 1926. Before or during plastification, casein, albumin or similar materials are admixed with substances which increase plasticity and release aldehydes, e. g., with aldehyde-ammonia combinations, formaldehyde-aniline or toluidine, mono- or dianhydro formaldehyde, phenylenediamine, ethyldecaniline, furfuramide, aldehyde-amino polymerization products or reaction products of aldehydes with aldehyde-amino compds. or thio compds. of similar nature, formates or methylamines or the like together with an oxidizing agent. Rubber or compds. such as isoprene, erythrene and amino acids preferably also are added and latex stabilized with a protective colloid may be sprayed into the mass.

Plastic compositions. SLUR TECHN. & CHEM. PRODUKTE GES. M.B.H. and ISAK THORN. Fr. 632,526, Apr. 9, 1927. A plastic compn. is made by mixing flour or pure starch with urea or the S. derivs. of carbonic acid or condensation products of urea and CH_2O or substances yielding CH_2O .

Plastic material. CHARLES CACHON. Fr. 633,626, April 30, 1927. A plastic material suitable for the manuf. of fancy goods is made by uniting one or several thicknesses of cloth, preferably artificial silk, between two sheets of plastic material such as celluloid or cellulose acetate, by means of an appropriate solvent which will superficially dissolve the sheets and as much as possible of the cloth.

Molding aluminous compositions. FELIX HOMBERG (to American Nuplax Corp.). U. S. 1,678,117, July 24. Cr-lined metal molds are used.

Adhesives for catching insects. V. SCHOLZ and B. EIBES. Brit. 281,068, Nov. 1, 1926. Material such as acetylcellulose, nitrocellulose or celluloid waste or decamphorated celluloid is dissolved in a solvent such as acetone or EtOAc together with a large proportion of oil such as castor oil, oxidized castor oil, oxidized linseed oil or other similar oil, with or without various other substances.

Nascent gases. SOC. INTERN. PROCÉDÉS PRUDHOMME. Fr. 632,379, July 23, 1926. To render gases such as H highly reactive, they are passed through metals or metallic oxides capable of transforming them from the mol. to the atomic state. The H may be used to ext. a metal from its compds., for the synthesis of NH_3 and for the regeneration of purifiers.

Rare gases. JEAN B. J. M. ABADIE. Fr. 633,394, Aug. 14, 1926. Rare gases are purified by alkali or alk. earth metals such as Ca which forms one or both electrodes in a tube, the metal being heated so as to have different temp. zones.

Drying gases. I. G. FARBENIND. A.-G. Fr. 632,311, April 6, 1927. Phosphoric acid contg. P_2O_5 in soln. is used as a drying agent for gases.

Separating acetylene from other gases. I. G. FARBENIND. A.-G. Brit. 280,885,

Nov. 16, 1926. The gas is washed with water or an aq. soln. under high pressure, *e. g.*, 5-25 atm., to effect selective soln. of C_2H_2 and sepn. from other gases such as CH_4 and H_2 . Na_2CO_3 , $NaCl$, $NaNO_3$ or Na_2SO_4 may be added to lessen the soly. of other gases. Separation of hydrogen from mixtures of gases. HENRI M. R. BARTOT. Fr. 632,337, April 7, 1927. See Brit. 251,988 (*C. A.* 21, 1526).

Nitrogen-hydrogen mixture. FRANS G. LILJENROTH. U. S. 1,678,518, July 24. In producing a definitely proportioned mixt. of H and N suitable for NH_3 synthesis, water is electrolytically decomposed and the O obtained is used together with steam and atm. air for continuously operating a water-gas generator; the CO of the water gas generated is converted by means of steam into CO_2 while setting H free, the CO_2 is removed and the remaining gas is mixed with the H obtained in the electrolysis.

Catalysts. I. G. FARBERMIND. A.-G. Brit. 281,218, Nov. 27, 1926. Hydrogenation-promoting metals such as Ni, Cu and Co are sepd. in finely divided form from aq. solns. of their salts by the use of Fe, Zn and Al (which may be effected in the presence of a non-metallic carrier such as kieselguhr, silica gel or charcoal) and the catalysts thus prepd. may be used in the hydrogenation of aromatic hydrocarbons or their derivs. such as toluene or phenol, in the hydrogenation of unsatd. compds. such as cinnamic acid or fats in the production of alcs. from aldehydes and ketones, conversion of quinones to hydroquinones, and in reduction of nitriles, nitro, azoxy, azo and hydrazo compds. to the corresponding amines (these reactions may be effected in the liquid phase and at comparatively low temps.). If the soln. from which the catalyst is prepd. is alk. the oxide of the more electropositive element is deposited and serves as an activator. The catalyst may be dried *in vacuo* or in a current of H before use.

Revivifying catalysts. ALPHONS O. JAEGER (to The Selden Co.). U. S. 1,678,626, July 24. In reviving catalysts such as V catalysts used for oxidizing aromatic hydrocarbons which are not injured by oxidizing agents, an inorg. peroxide such as H_2O_2 is used for treating the catalyst. U. S. 1,678,627 specifies treating catalysts such as those contg. V compds. with SO_3 or other "acidogen" which is volatile at a temp. below redness and does not leave a residue non-volatile upon treatment with O-contg. gases at elevated temps. Steam also may be used.

Catalytic gels. E. B. MILLER and G. C. CONNOLLY (to Silica Gel Corporation). Brit. 280,939, Nov. 19, 1926. A hydrogel such as that of silica or oxides of W, Sn or Al is treated with a soln. of a catalyst-yielding salt such as a salt of Cu, Fe, Al, Mn, Ni, Ag or Pt, water is removed from the hydrogel and the material is heated to decompose the impregnating salt.

Catalytic oxidation and dehydrogenation of organic compounds. A. O. JAEGER (to Selden Co.). Brit. 281,307, Nov. 26, 1926. Catalysts are used which contain 2-component zeolites obtained by reaction of a silicate with one or more "metallates" (tungstates, chromates, uranates, cerates, etc.) or one or more metal salts. An extremely large number of catalytic materials and processes in which they may possibly be employed are mentioned.

Agglomerants. RENÉ A. L. VOLET. Fr. 633,537, Apr. 28, 1927. Synthetic resins such as "bakelite" or "thiolite" are used as binding agents in making articles such as bushes or linings or dynamo brushes from substances such as graphite.

Agglomerant for powdered material. PAUL GONTIHR. Fr. 633,425, Aug. 23, 1926. Substances such as sand, SiO_2 , Al_2O_3 , clay, etc., are agglomerated by a mixt. of an acid and a chloride or a silicate, *e. g.*, phosphoric acid with $MgCl_2$ or $ZnCl_2$ or K silicate, or silicic acid with $AlCl_3$.

Hydrogenation of liquids or semi-liquids. GEORGES R. SCHUELER. Fr. 633,486, April 27, 1927. The hydrogenation catalysts are built up of a number of perforated disks, or plate-like units of interlaced wire or rods, preferably of Ni, and they may be combined on a central perforated tube. They may be corrugated or have indentations to keep them sep. The units are reactivated electrolytically, being suspended in a bath alternately with cathode plates.

Colloids. BOUTEILLE. Fr. 632,357, July 21, 1926. Colloid emulsions, particularly those to be used as conductors of heat or electricity, are stabilized by introducing one or several secondary emulsions not combining with the principal emulsion. A colloidal emulsion of C is obtained by the decompn. of org. matter by H_2SO_4 , H_3PO_4 or electrolysis.

Medium for mounting microscopic preparations. MARC-EMMANUEL-VALENTIN RONDEAU DU NOYER and HENRI BARRAL. Fr. 632,519, Apr. 9, 1927. A medium which is not affected by dampness and does not decolor the preps. is obtained by dissolving a resin in alc. and distg. in the presence of benzene or other liquid preferably at 100° .

Corrosion retarder. WALTER T. SCHREIBER (to U. S. Industrial Alc. Co.). Can. 282,175, July 31, 1928. Corrosion is inhibited on the metallic containers used to store or transport alcs. of the paraffin series that are sol. in H_2O by incorporating soaps sol. in the alc., preferably sol. alk. soaps formed from the higher fatty acids in the proportions of 2 lbs. soap to 100 gals. of the liquid.

Coating pipes or other articles with asphalt or similar rust-preventive material. E. HIMSTEDT and E. DRESCHER (to Vereinigte Stahlwerke A.-G.). Brit. 281,626, Nov. 30, 1926. Mech. features.

Gun-cleaning compound. JOSEF WAGNER. Can. 282,110, July 21, 1928. A gun-cleaning compd. contains 81.5 g. mineral oil, 15 g. alc. oleic acid alkali and 3.5 g. ethyl lactate.

Furniture polish. WILLIAM RICHTER and CARL BOUMBERGER. Can. 281,883, July 24, 1928. Furniture polish contains $18\frac{1}{2}$ oz. light separator oil, $18\frac{1}{2}$ oz. turpentine, $18\frac{1}{2}$ oz. white wine vinegar, 8 oz. beef gall, $2\frac{3}{4}$ oz. copper soln., 4 oz. butter of antimony and $57\frac{1}{4}$ oz. distd. water.

Adsorbent for water vapor. E. B. MILLER and G. C. CONNOLLY (to Silica Gel Corporation). Brit. 280,934, Nov. 19, 1926. A solid porous gel (preferably silica but possibly also oxide of W, Ti, Sn or Al) capable of absorbing at least 10% by wt. of water vapor at 30° and 22 mm. Hg partial pressure (and suitable for use in refrigerating app.) is impregnated with a dehydrating substance, e. g., H_2SO_4 , HPO_3 , $CuSO_4$, $Al_2(SO_4)_3$ or $MgSO_4$.

Rendering porous bodies impervious to liquids. RENÉ OPPENHEIM (to Soc. anon. le carbone). U. S. 1,678,405, July 24. Porous bodies, such as those formed of charcoal, which may be used as electrodes of batteries, electrolyzers or accumulators are provided with a strongly adhering sheath of air or other gas prior to use, e. g., by heating with H_2O and treating with an air current while hot.

Leak-stopping composition. GEORGE I. RAY (to The Radiator Specialty Co.). Can. 282,365, Aug. 7, 1928. A leak-stopping compn. contains a mixt. of Al, flaxseed meal, S and soap. Cf. C. A. 22, 485.

Revivifying spent decolorizing material. OSCAR L. BARNEBEY. U. S. 1,677,947, July 24. Paper pulp or other cellulose fiber is mixed with decolorizing material such as C which may have been used for treating sugar solns. and the mixt. is charred and activated with steam at 700 – 1100° .

Impregnated sheet material. GEORGE L. PREBLE (to Preble Box Toe Co.). U. S. 1,678,021, July 24. A material suitable for making box toes, etc., is prepd. by treating fibrous material such as woven fabric with a soln. of celluloid or similar substance and with a comminuted absorptive substance such as plaster of Paris and then partially drying, compacting and further drying the material in sheet form.

Free-flowing salt fused into globules and special package for dispensing. CARL E. MENSING and ROY E. WILEY. U. S. 1,678,154, July 24.

Preparing steel printing surfaces by carbonizing and etching. HELENA S. SADTLER. U. S. 1,678,231, July 24.

Portable vertical lime kiln with superposed detachable sections. T. DAND. Brit. 281,460, Nov. 10, 1926.

Removing scale from iron sulfate reservoirs. ABEL GASQUET and ARMAND BACQUÉ. Fr. 632,753, Apr. 13, 1927. To remove scale from cylindrical reservoirs used for iron sulfate liquors it is reduced to powder by the ends of branches of chain on a central rotating axle.

Photo-mechanical printing surfaces. T. E. RICHARDS. Brit. 280,958, Nov. 22, 1926. A litho stone or plate, preferably a grained metal plate, is rinsed with HNO_3 , washed and sensitized with a dichromated fish glue compn. contg. also ferric NH_4 citrate and NH_4 . The plate is exposed through a halftone negative or positive, the exposed colloid is dissolved off and the plate is coated with a compn. formed from asphaltum 1 lb., turpentine 1 gal., a soln. of transfer ink 0.5 lb. in turpentine 1 qt., elbagreen oil 1 dram and oleic acid 1 dram. The coated plate is immersed in water, the coating over the exposed dichromated glue is brushed away and the glue itself is removed with H_3PO_4 ; the plate is then washed, cleaned, heated to about 120° and after cooling is treated with gum arabic soln.

Wadding for use on metals. HENRI É. KELLER. Fr. 333,174, Aug. 12, 1926. Wadding is soaked in "Kidur" made by mixing white spirit with oleic acid and adding finely powdered silica, then liquid NH_3 and more white spirit and finally $AmOAc$.

Carbonization of algae. GEORGES J. B. CHAMAGNE. Fr. 633,167, Aug. 11, 1926. A furnace is described for the carbonization of marine algae with a view to recovering K salts, I and Br. Fr. 633,168 describes further improvements.

Insect-proof composition. SYDNEY W. KENDALL. Can. 282,081, July 31, 1928. A compn. comprising a rare element as a base radical (*viz.*, Th, Ti, Ce, La, Di, Yt, Ti, Zr and U), and as an acid radical a higher org. acid (fatty, oleic, linoleic, linolenic, clupanodonic, abietic, cocceric, ricinoleic, dihydroxystearic, jpanic, chaulmoogric, resin or gum acid series) and a varnish for use in protecting cellulosic, animal and other substances against insects, animals, vegetation and organisms. Cf. C. A. 21, 656.

Low-temperature charge for fire extinguisher. CHARLES A. THOMAS and CARROLL A. HOCHWALT. Can. 282,204, Aug. 7, 1928. A charge for fire extinguishers comprises 3 normally sepd. portions, a compd. contg. a sulfonic acid radical or halogenated sulfonic acid (as $\text{CH}_2\text{SO}_2(\text{OH})\text{COOH}$, $\text{C}_6\text{H}_5\text{SO}_2\text{OH}$, FSO_2OH), the second contg. a carbonate (as NaHCO_3) and a third a water soln. of CaCl_2 .

Fire extinguisher. CHARLES A. THOMAS and CARROLL A. HOCHWALT. Can. 282,205, Aug. 7, 1928. An anti-freeze charge for fire extinguishers comprises two normally sepd. portions, one a compd. contg. a sulfonic acid radical, and the other a soln. of a carbonate, admixed with ethylene glycol to lower the freezing point.

Fire extinguisher. ÉMILE BÉCHARD. Fr. 633,400, Aug. 14, 1926. CCl_4 or other halohydrocarbon is mixed with a mineral, animal or vegetable oil or several such substances are mixed.

Fire extinguisher. AMDYCO CORP. Fr. 632,731, April 13, 1927. Inert materials such as kaolin, talc, starch or flour are added to the ingredients which produce foam. Sulfate of Al contg. not more than 14 mols. of water of crystn. is used as one of the reagents, and the size of the particles is reduced.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

The transparency of glasses for ultra-violet radiations. B. LONG. *Science and Tech.* 12, 13-15(1928).—Glasses of a thickness of 2 mm. can be divided into: (1) Those which absorb all or the greater part of the ultra-violet spectrum. (They contain iron oxide, Ti, Cr, Ce, etc., and are mostly used for eye protection) (2) Those whose permeability is less than 10% for radiations below λ 3100 Å U. (To this class belong the dense flint and barium glasses) (3) Those which transmit rays with λ below 2900 Å U., and of small iron and titanium oxide content. Leaves of 2 mm. thickness were used in windows. Curves are included.

The light absorption of opal glass. G. GEHLHOFF and M. THOMAS. *Z. tech. Physik* 9, 172-5(1928).—For the av. absorption by opal glass bulbs was found 14 to 15% (0.8 mm. glass), the opacity being caused by fluorides. This absorption cannot be explained from the longer path of the light in the glass due to repeated reflections and absorption by the (Fe Mn) gray matter. Expts. on thick clear glass showed that this path was approx. only 3.9 times longer in opal glass. By complete removal of all Fe during the manuf. the absorption could be cut down to 11.6%, an insignificant decrease. Apparently the absorption is due to the opaque particles themselves (cf. Ryde and Yates, C. A. 21, 2365) and not to the impurities in between. B. J. C. v. d. H.

Solubility of glass ingredients. WALTER MEYER. *Chem.-Ztg.* 52, 151(1928).— Et_2O - EtOH after standing in a bottle 2 yrs. contained 0.001% of Se as H_2SeO_4 . Et_2O , MeOH , AmOH and AmOAc showed traces in 3 months and 0.001-0.002% at 0 months. Glass decolorized with Se may, therefore, contaminate neutral and non-aq. solns.

FOSTER DEE SNELL

Cause and removal of certain heterogeneities in glass. L. W. TILTON, A. N. FINN and A. Q. TOOL. Bur. of Standards, *Sci. Paper* 572, 713-36(1928).—Six Ba flint lens blanks from the same melt showed index of refraction deviations as great as 37×10^{-6} from the mean. The index tolerance of $\pm 7 \times 10^{-6}$ within a given blank was exceeded because of optical heterogeneities. Reannealing reduced the max. deviation of index to 12×10^{-6} , each blank showing a marked reduction and in some cases a reversal of sign. Further reduction to 3×10^{-6} without material change in the av. index was produced by prolonged careful reannealing under conditions of nearly constant temp. and symmetrically placed heat conducting material to decrease the temp. gradient of the furnace. Optical density variations which may occur in practically strain-free glass due to heat history differences may be removed by reannealing if the furnace temp. gradients are sufficiently low. In carefully selected glass the max. index deviations due to solely its chem. compn. should be almost negligible. H. F. KIRSON

Neutral glass for vials. MARIO GIORDANI. *Alli congresso naz. chim. pura applicata* 2, 818-29(1926).—As the result of his study of the effect of the heavy metals in glass and devitrification, G. concludes that the appearance of glass heated with water in an autoclave (etching) is not to be confused with devitrification. The ZnO content of the glass is without influence in producing either of these phenomena. The test for alkali, involving the use of HgCl_2 is not very sensitive. Heavy metals need not be prescribed for their presence confers many notable advantages upon the glass, such as greater resistance. Furthermore it has not been demonstrated that they cause devitrification. The max. sterilizing temp. for vials is 120° . L. T. F.

The solidification of amorphous matter. S. ENGLISH. *Roy. Tech. Coll. Met. Club J.* 1927-8, No. 6, 3 6(1928).—Two methods were specially developed for detg. the viscosity of glass with very great accuracy, one for use from a temp. of 1400° down to a temp. 200° above the annealing point of the glass, and the other for the range of 150° to 200° above the annealing point of the glass, the annealing point being defined as the lowest temp. at which internal strains may be removed by free movement of the glass mols. Viscosity curves for Na silicate glasses are approx. hyperbolas. Curves are also given of the mobilities of Na_2O -CaO glasses, showing that the replacement of Na_2O by CaO causes the viscosity at any given temp. to be progressively increased in proportion to the amt of Na_2O substituted. DOWNS SCHAAP

Contribution to the explanation of plasticity. W. MIEHR H. IMMKE AND J. KRATZERT. *Tonind. Ztg* 51, 1381-4(1927).—Plasticity of clays was explained by means of capillary physics. The moldability of clay may be explained by the mol. properties of the clay. H. G. SCHURECHT

Determining the compressive strength. GROOTHOFF. *Tonind.-Ztg* 51, 1418-20 (1927).—Attention is called to the fact that the compressive strength of clay products is influenced by the method of preparing specimens, moisture content, drying temp., speed of drying and construction of the testing machine used. H. G. SCHURECHT

Clay and clinker. HANS HIRSCH. *Tonind.-Ztg* 51, 1315-8(1927).—The effects of various fluxes on clinker were studied. Clinker is a vitrified brick used in Germany for building purposes as well as for paving. The addition of feldspar to brick mixts. was found to be more effective in reducing the absorption of clinker than chalk, magnesite or dolomite. MnO_2 was found to be a more effective flux than Fe_2O_3 . The effects of these fluxes on the strengths of clinker were also studied. H. G. SCHURECHT

The scientific study of the structure of brick. J. E. KIRCHNER. *Tonind.-Ztg* 51, 1475-7(1927).—The effect of the construction of the mouth pieces of auger machines on the production of laminations in brick was studied. Secondary clays are more apt to laminate than primary clays. The laminations may be broken up by putting a perforated plate in the mouthpiece of the auger. H. G. SCHURECHT

Building and paving brick. A. HIRLSCHER. *Tonind.-Ztg* 51, 1566-7, 1601-2 (1927).—The compressive strength of paving brick is 3000-4000 kg. per sq. cm., while that of granite is about 2000 kg. per sq. cm. and that of basalt is about 3000 kg. per sq. cm. H. G. SCHURECHT

Preventing scumming in the manufacture of brick. H. HIRSCH. *Tonind.-Ztg* 51, 1044-6(1928).—The addition of BaCO_3 reduces the SO_2 content of the clay by pptn. During firing the SO_2 increases to a max. at $300-400^\circ$ and becomes reduced to a min. at 1200° . High CaO clays absorb more SO_2 gases during firing than low CaO clays. Firing brick under reducing conditions tends to decompose the scum. F. G. S.

Methods of using barium carbonate for scum prevention in stiff-mud brick. L. P. COLLINS. *Investigations in Ceramics and Road Materials, Dept. of Mines, Can.*, No. 690, 5-7(1928).—Because of the increased popularity and use of rough-textured brick manufd. by the stiff-mud process, the problem of scumming or efflorescence is becoming of increased importance. In several brick plants efflorescence is prevented by the addn. of from 1 to 3 lbs. of BaCO_3 per ton of clay. The factor of primary importance is to obtain a thorough mixing of the Na_2CO_3 and clay. There is no definite evidence as to the superiority of the wet or dry method for addn. of the BaCO_3 . L. B. MILLER

The tunnel kiln in the brick and refractory industry. W. MORITZ. *Tonind.-Ztg* 51, 1634-6(1927).—The tunnel kiln is probably more efficient than the other types of continuous kilns. In comparing the fuel saved by using continuous kilns in the place of periodic kilns it is claimed that the coupled kiln system saves about 30% fuel. The chamber continuous kilns save about 30-70% fuel, while the tunnel kilns save about 57-75% fuel. H. G. SCHURECHT

Control of an old brick ring continuous kiln. P. THOR. *Tonind.-Ztg* 51, 1658 (1927).—The kiln described is 80 m. long, 3 m. wide and 2.4 m. high. It has a capacity

of 520 cu. m. and holds 136,000 bricks. About 50,000 bricks per week are fired in this kiln. H. G. SCHURECHT

Drying with moist air. E. GROSZKINSKY. *Tonind.-Ztg.* 51, 1195-6(1927).—At the entrance of the dryer the air has a temp. of 30° and is about 85% satd. The temp. of the air gradually increases until a temp. of 90° is reached. H. G. SCHURECHT

The firing of sewer pipe. SIECKENIUS. *Tonind.-Ztg.* 51, 1180-2(1927).—By scientific control of the firing of sewer pipe it was found possible to fire a 45-cu. m. kiln in 50 hrs. In 20 hrs. the temp. reached was 120°; in 30 hrs. it was 260°; in 38 hrs. it was cone 016; in 41 hrs. it was cone 06a; in 44 hrs. it was cone 01a; in 46 hrs. it was cone 3a; in 47.3 hrs. it was cone 5a; in 49.2 hrs. it was cone 7; and in 50.5 hrs. it was cone 8. H. G. SCHURECHT

The history of roofing tile. WILHELM LUDOWICI. *Tonind.-Ztg.* 51, 1297-1300 (1927).—The fact that roofing tile were used by the Romans has been revealed in excavations where they were found in a good state of preservation. Improvements have been made in the design of these tiles at different intervals, the most decided improvements having been made in 1881 when the Ludowici tile was patented. H. G. S.

Specifications for roofing tile in Czechoslovakia. O. KALLAUNER. *Tonind.-Ztg.* 51, 975-6(1927).—Roofing tile should be free from apparent defects, impermeable to water, have a uniform dense fracture free from laminations and should be capable of withstanding 25 freezings without failure. H. G. SCHURECHT

French roofing tile. ANON. *Céramique* 30, 517-37(1927). H. G. S.

Burning of roofing tile. A. NAWRATH. *Tonind.-Ztg.* 51, 1293-4(1927).—Firing roofing tile in chamber continuous kilns is described. H. G. SCHURECHT

Bibliography on refractories. ANON. *Tonind.-Ztg.* 52, 264-6(1928). H. G. S.

The present specifications for refractories. H. KNUTH. *Tonind.-Ztg.* 51, 1543-5, 1598-1600(1927).—Specifications for resistance of brick to spalling, coeff. of expansion, resistance to slag attack, and resistance to chemicals are given. H. G. SCHURECHT

Methods for conducting load tests on refractories. W. MIEHR, H. IMMKE AND J. KRATZERT. *Tonind.-Ztg.* 51, 1618-20(1927).—For conducting load tests on fire-brick cylinders about 31.7 cm. high with a diam. of 35.7 cm. are bored out of brick. The furnace used for these tests is usually 50 cm. high with a heating chamber of 25 35 cm. A pressure of 2 kg. per sq. cm. is used and the temp. is increased at a rate of 10° per hr. The data to be collected should include the temp. at which softening commences, and the temp. at which brick has become compressed about 40%. Clay and quartzite brick should withstand a temp. of 1300°, and silica brick should withstand a temp. of 1500°. H. G. SCHURECHT

Yellow discoloration on slip glazes. C. DEGEN. *Tonind.-Ztg.* 51, 1760-1(1927). The yellow discoloration which frequently appears on slip glazes was found to be due to CaFe silicates. The reduction of the lime in the glaze tends to prevent this discoloration. H. G. SCHURECHT

Decomposition of the calcium carbonate in ceramic pastes. MAURIZIO KORACH. *Atti congresso naz. chim. pura applicata* 2, 810-6(1926).—A review and discussion of the formation of craters in ceramic ware owing to the dissocn. of pockets of CaCO₃. L. T. F

Hygienic importance of the permeability of window glass to ultra violet light (EISENBERG) 14. Action of CO₂ on glass at high pressures (BOTVINKIN) 2.

ANDREWS, A. I.: **Ceramic Tests and Calculations.** London: Chapman & Hall, Ltd.; New York: J. Wiley & Sons, Inc. 172 pp. 11s. Reviewed in *Chemistry and Industry* 47, 680(1928).

Apparatus for feeding mold charges of molten glass. GEORGE E. HOWARD (to Hartford-Empire Co.). U. S. 1,678,291, July 24.

Apparatus for feeding mold charges of molten glass. LEONARD D. SOUBIER (to Owens Bottle Co.). U. S. 1,678,232, July 24.

Apparatus for molding blown articles of glass. LEONARD D. SOUBIER (to Owens Bottle Co.). U. S. 1,678,233, July 24.

Leer for annealing glassware. LEONARD D. SOUBIER (to Owens Bottle Co.). U. S. 1,678,234, July 24.

Feeding and shaping molten glass. ENOCH T. FERNGREN (to Owens Bottle Co.). U. S. 1,678,247, July 24. Mech. features are specified relating to the forming of glass articles. An app. is described.

Apparatus for delivering mold charges of glass to molds. C. H. RANKIN and RANKIN AUTOMATIC GLASS FEEDER CO., LTD. Brit. 281,382, Aug. 31, 1926.

Apparatus (of the "press-and-blow" type) for making glassware. T. C. MOORS-HEAD. Brit. 281,383, Aug. 31, 1926.

Apparatus for filling several glass molds at the same time. SOC. ANON. ATELIERS CONSTRUCTIONS MECANIQUEES ESCHER WYSS & CIE. Fr. 633,518, April 28, 1927.

Apparatus for drawing sheet glass. RAUL F. COLE. U. S. 1,678,104, July 24.

Apparatus for making sheet glass by upward drawing. JOHN L. DRAKE (to Libbey-Owens Sheet Glass Co.). U. S. 1,678,060, July 24.

Refractory material. DEUTSCHE GASLÜHLICHT-AUER-GES. Brit. 280,907, Nov. 22, 1926. In making refractory articles of oxides of Zr, Th or rare earths, mixts. of sintered and unsintered materials are heated as rapidly as possible to 1300° or higher.

Porous refractory bricks. I. SETTERBERG. Brit. 281,254, Nov. 26, 1926. Refractory materials as refractory clay, chamotte, kaolin, quartz, flint, magnesite, dolomite, ferrochrome and alundum are mixed with substances capable of evolving gas by reaction with water, *e. g.*, with powdered Al, Zn, Ca or CaC₂, then mixed with water to form a "dough," allowed to rise, dried and burned.

Filtering material. GEORGES DURRSCHMIDT. Fr. 633,018, April 21, 1927. A filtering material is made from abrasives such as corundum, emery, SiC, waste glass and porcelain which are granulated and mixed with powdered agglomerants such as clay, refractory earth borates, molded to the required shape, dried and heated to a temp at which the agglomerants will vitrify and adhere to the surface of the abrasives, leaving cavities all through the material.

Ceramic composition. R. MOHR and H. BECKER (to Patent-Treuhand-Ges für elektrische Glühlampen). Brit. 281,249, Nov. 26, 1926. A ceramic material which is fusible at a "reasonable temp." is formed from siliceous rock such as phonolite mixed with 20% or more of fluorspar or other F-contg. material. Alumina, clay or kaolin may be added; alumina favors devitrification and facilitates the obtainment of a product resembling porcelain. Alkali also may be added and by the prolonging melting operation a more glass-like product is formed.

Ceramic substances containing metals. MAX HAUSER. Fr. 633,047, April 21, 1927. Articles such as cooking utensils and chem. ware are made from an agglomerate mixt. of metals, alloys and non-metals such as oxides, silicates or borates. The mixts. are worked up as for ceramic materials and the ingredients are varied according to the articles required; the articles may be covered with a ceramic layer. Cf. C. A. 22, 1432. Fr. 633,048 describes the use of similar materials for elec. switches, tubes, plates, etc., being made up of conductors and non-conductors.

Silica ware. SOCIÉTÉ QUARTZ ET SILICE. Fr. 632,237, July 15, 1926. Vessels in silica, such as crucibles, are made slightly larger than their final dimensions, placed over a nickel shape, the exterior dimensions of which correspond to the internal dimensions of the crucibles, and heated till they soften and shrink on to the shape.

Spark-plug insulations. F. WOLFF. Brit. 281,548, June 7, 1927. The portion of the insulation nearer to the combustion chamber is formed of heat-resisting material such as porcelain, glass, mica, quartz, steatite or "fiber" and the outer portion is formed from plastic material such as artificial resin subjected to heat and pressure. Various structural details are described.

Rotary furnace for melting enamels, frits, glazes, etc. T. J. VOLKKOMMER. Brit. 280,895, Nov. 22, 1926.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Modern cements. I. White cement, waterproofed and masonry cements. P. H. BATES. *Eng. News-Record* 100, 887-90(1928).—II. High early-strength cements and standard portlands. *Ibid* 932-5.—A general discussion of the characteristics of modern cements. Data given in a tabulation of strength, characteristics of some quick-hardening cements show conclusively that the mortar test in predicting the strength of cement in concrete is valueless.

R. E. THOMPSON
The mechanism of the setting and hardening of cement. TUTOMU MAEDA. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 8; Supplement No. 2, 5-7(1928). (In Esperanto).—1. *The reaction.*—(1) At least one constituent of cement must be unstable in a system contg. a liquid phase, and it dissolves in the liquid phase. (2) A soln. super-satd. with respect to the stable compd. then forms. (3) When a new solid phase

seps. from the supersatd. soln., it adsorbs some constituents of the liquid phase. Consequently the growth of the particles of the solid phase is hindered by the adsorbed film and there can be particles of colloidal size. (4) When the supersatd. soln. seps. a new solid phase, the unstable constituents dissolve anew. Therefore particles of the new phase continue to form as long as conditions permit. 2. *Development of strength.*—M. thinks that the particles sepd. from the liquid phase do not have a reciprocal attraction but are united by adsorbed films. When cement is pulled apart the break can occur (1) in the adsorbed film, (2) in the sepd. particles, (3) at the interface between adsorbed film and particle. Beside the relation of at. arrangement in the particle to the direction of traction, the thickness of the adsorbed film is of special importance. If the distance between particles is not mol. and there is a capillary space filled with liquid phase, the strength of the cement will be small. Factors necessary for strength are: (1) Particles sepd. from the soln. must be very small, i. e., the area of interfaces must be very great. (2) The particles must be sepd. by an adsorbed film of mol thickness, i. e., there must be no free liquid phase. (3) The reciprocal attraction between particle and adsorbed film must be large. (4) The strength of the particles must be large. S. Yamane, in the author's lab., has obtained an opalescent suspension of apparently colloidal particles by shaking 1 g. powd. hardened portland cement with 5 cc. glycerol and 30 cc. abs. alc., heating and filtering; no such result was obtained from the original cement. AUSTIN M. PATTERSON

Studies of the occurrences during the setting and hardening of hydraulic cements. K. BIEHL. *Zement* 17, 487-92, 824-8, 934-7 (1928).—Samples of portland, aluminous, and blast furnace slag cements were observed microscopically during the setting processes in the presence of H_2O , dil. H_2SO_4 , HCl , $NaOH$, $Ca(OH)_2$, $CaCl_2$, $MgCl_2$, 9 salts of H_2SO_4 , Na_2CO_3 , $(NH_4)_2C_2O_4$, gelatin, sugar, and sea water (concd. 5 times). The normal processes consist of the formation of (a) needle-like crystals, (b) platey crystals, (c) gels in droplets, and (d) finally the crystn. of these gels. The action of the solns. upon these processes may be accelerating or retarding depending on their concn. If the solns. react with the liberated $Ca(OH)_2$ the crystals of these reactions appear before the normal cement crystn. begins. This occurred with oxalate and sucrose solns. The salt solns. have in general a flocculating effect on the gels. The crystn. is of more significance to the setting process than is the gel formation, while the latter is responsible for the hardening, the slow drying and gradual increase in strength and density of the mass. The effect of gypsum is to retard both the normal crystn. due to its changed soly. product in the presence of the liberated $Ca(OH)_2$ and the gel formation. The strength which gypsum adds to the mass is due to its own crystn. This method of study clarifies the action of both admixts. or naturally encountered substances which disturb the normal set either as retarders or accelerators. H. F. KRIEGER

A plastic mortar compression test for cement. EDWARD M. BRICKETT. *Proc. Am. Soc. Testing Materials* (preprint), 1928, 11 pp.—A compression test of a plastic mortar, of a water-cement ratio approximating 7.5 gal. per sack, shows encouraging possibilities as a specification test showing the concrete-making properties of a cement. RAYMOND WILSON

Methods of obtaining strong gypsum cement. TUTOMU MADA. *Sci. Papers Inst. Phys. Chem. Research (Tokyo)* 8, Supplement No. 3, 8-9 (1928).—By replacing part of the H_2O in a cement mixt. with alc. a stronger cement should result, as the particles sepd. would be smaller. With gypsum cement ($CaSO_4 \cdot 0.5H_2O$), $EtOH$ in fact retards the rate of hardening and increases the strength. $MeOH$ has a similar but greater effect. Portland cement did not show this phenomenon. Gypsum cement heated at 120° 8 hrs. a day for 1 month gives a stronger cement than when unheated. Heating at the highest temp. of the Bunsen burner, however, lowers the strength, even though the cement so treated has the same amt. of H_2O as that heated at 120° . Expts. are being continued. AUSTIN M. PATTERSON

Resistance of portland cement concrete to the action of sulfate waters as influenced by the cement. DALTON G. MILLER. *Proc. Am. Soc. Testing Materials* (preprint), 1928, 13 pp.—Lab. and field tests of 30 portland cements indicate that standard cements from different plants may vary greatly in resistance to sulfate waters. No concordance was found between the resistance to sulfates and the results of standard physical tests or ordinary chem. analyses. RAYMOND WILSON

Increased resistance of cement conglomerates following treatment with fused sulfur. M. G. LEVI AND A. TERNI. *Atti congresso naz. chim. pura applicata* 2, 797-809 (1928).—The tensile strength of normal cement impregnated with S was increased from 2 to 5 times, while the resistance to compression was about doubled. In a cement-sand mixt. of 1:3 the resistance of the sulfured material was 4 times the normal value,

while in 1:5 and 1:7 mixts. it varied between a min. of 5 times and a max. of 10 times the original. With hydraulic cements the effect was much more marked, being 15 times the initial resistance. The resistance to attrition was very marked in sulfured cements and approached in value that of a first quality granite. L. T. F.

Identification of blast furnace slag in cements. H. W. GONELL. *Zement* 17, 437-43 (1928).—Slag cements or slag admixts. can be identified microscopically by the brown to black color produced in the particles when treated with a soln. of $(\text{AcO})_2\text{Pb}$ (2 parts 5% $(\text{AcO})_2\text{Pb}$ soln. plus 1 part 50% AcOH). Portland cement particles color only at their corners while slag particles become uniformly colored because of the more perfect distribution of S in slag. Series of photomicrographs are given to show the intensity of color produced with time. H. F. KRIEGE

Phase equilibria in the system $2\text{CaO} \cdot \text{SiO}_2$ - MgO - $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$. W. C. HANSEN. *Bur. Standards. J. Am. Chem. Soc.* 50, 2155-60 (1928).—A study of this system was made to det. the condition of MgO in cement. Samples in which the $2\text{CaO} \cdot \text{SiO}_2$ varied from 3 to 48.1%, MgO varied from 2 to 11.2%, and $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$ varied from 40.7 to 95% were melted in Pt and powdered. Portions of these samples were quenched from temps. between 1290° and 1475° . The portions were examd. microscopically. Tables and graphs report data on 42 quenchings. MgO does not form solid solns. in $2\text{CaO} \cdot \text{SiO}_2$ or in $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$ nor is it capable of replacing CaO in these comds. F. E. BROWN

Water addition of standard cement mortar mixes. H. LUFTSCHITZ. *Zement* 17, 443-6 (1928).—To obtain uniform consistencies in the mortars for cement testing L. suggests the addn. of H_2O by the formulas: (a) $W/4$, (b) $W/4$ plus $1/4(W/4)$ and (c) $W/4$ plus $1/2(W/4)$, where W is the amt. of H_2O necessary to make plastic the neat cement. Where this is 28% a calls for a 7% H_2O content giving an earth moist mortar while c allows 10.5% H_2O and gives a plastic consistency. H. F. KRIEGE

Experiments on the influence of trass powder and other stone powders on the tensile and compressive strengths, water permeability and resistance to chemical attack of cement mortars. OTTO GRAF. *Zement* 17, 432-7, 492-7, 543-8 (1928).—Moderate addns. of stone powders are beneficial to the density and compressive strength of lean mortars since these are deficient in the finer fractions. In comparison with powd. sand, limestone, slate, mica, kieselsguhr and celite, trass meal admixts. proved most beneficial in compressive, tensile and permeability tests and especially in resisting the attack of 5% MgCl_2 and 5% MgSO_4 solns. An improved consistency was noted for most of the admixts. used. H. F. KRIEGE

Increase in strength of mortar with age. F. KOLKNER. *Zement* 16, 1125-7 (1927).—Plotting the strengths observed against log. of time in days gave a straight-line relationship for compressive, tensile, shearing and flexural tests. In the general formula strength = a plus $b \log D$, the const. a is the first-day strength while b is detd. by the conditions of the test such as mix, amt. of H_2O used, type of stress applied, etc. Thus for a 1:3 mortar the relation between the tensile strength of kg./cm.^2 and the age in days is expressed by strength = 23.0 plus $8.2 \log D$. For 1:5 concrete the flexural strength attained at any age is given by strength = 95.0 plus $14.7 \log D$ under the conditions maintained. H. F. KRIEGE

Comparative strength of concrete pavement cured by three methods. SEARCY B. SLACK. State Highway Dept., Augusta, Ga. *Eng. News-Record* 101, 170 (1928).—The av. compressive strengths at 210 days of concrete pavements cured with earth-and-water, Na silicate and CaCl_2 were 4089, 3906 and 3872 lb. per sq. in., resp. The av. slab lengths after 6 months, detd. by dividing the total length of the section by the no. of cracks plus the no. of joints, were 78, 62.9 and 63.4 ft., resp. The curing methods consisted of (1) covering with 2 in. of earth kept moist for 10 days, removing the covering after 15-20 days; (2) covering with flake CaCl_2 , using $2 1/2$ lb. per sq. yd.; (3) treating the surface with Na silicate, using 1 lb. (42 5° Bé.) per sq. yd. The Na silicate was dild. with water, 3:1, to facilitate covering of the surface. No difference in surface texture could be detected by rough tests. R. E. THOMPSON

Compression strength of oddly shaped concrete specimens. BERNWARD GARRE. *Zement* 17, 273 4 (1928); cf. C. A. 122, 3030.—Test pieces of mortar were made 50 sq. cm. at the base and of varying depths. These were built up on both sides with neat cement until a thickness of 7.07 cm. was attained. The compression values obtained at 28 days can be expressed for 1:3 and 1:9 mortar, resp., by the formulas: compression strength in $\text{kg./sq. cm.} = -10.68 h + 183.8$ and compression strength in $\text{kg./sq. cm.} = -2.56 h + 30.3$, where h is the height in cm. of the mortar piece. H. F. K.

Core tests lead to proportioning by weight. C. E. FORSTER. *Eng. News-Record*

101, 19-21(1928).—Details are given of core tests made on concrete pavements by the State Highway Dept. of Michigan during 1926-7. The results obtained demonstrate the extreme variations in strength of concrete made under volumetric specifications. As a result of the study the 1928 specifications provide for proportioning of aggregates by wt. and accurate measurement of the total water content. R. E. THOMPSON

Impregnation of wood for containers in the chemical industry. FRIEDRICH MOLL. *Korrosion* 3, 25-6(1928).—Impregnation with S is not recommended. J. H. MOORE

Chemically treated fir poles have long life. ANON. *Elec. World* 92, 256(1928).—Four 1/2-inch holes are bored into the butt of a "green" pole just above the ground line. Into the holes is placed a mixture of $HgCl_2$ 1 part, As_2O_3 1 part and $NaCl$ 4 parts. The ingredients are mixed dry by weight and thoroughly blended. The holes are then closed with corks. Moisture from the earth and the sap in the pole gradually turns the mixture into a paste. After a few months the salts are detected in the pole 6 feet above the ground. A \$2 10 fir pole thus treated at a cost of 30 cts. per pole gives the same long life as a cedar pole costing \$5.86. C. G. F.

Handbuch der Holzkonservierung. 2nd ed., revised. Edited by Friedrich Mahlke. Berlin: Julius Springer. 423 pp. Bound, M. 29. Reviewed in *Chem. Trade J.* 83, 78(1928).

Handbuch der Zementliteratur. Compiled by Friedrich Wecke under the direction of Vereins deutscher Portland-Cement-Fabrikanten. Charlottenburg: Zementverlag G. m. b. H. 1447 pp. Cloth, R. M. 40. Reviewed in *Mech. Eng.* 50, 656(1928).

ASTRUA, G. CLEMENTE: I materiali idraulici: Dei cementi portland naturali, artificiali; fabbricazione e proprietà; pozzolane; cementi speciali; super cementi; calci idrauliche; gessi; calce grassa od aera. Gubbio: Scuola tip. Oderisi. 35 pp.

ASTRUA, G. CLEMENTE: I materiali idraulici. I. Caratteristiche dei cementi; prove; apparecchi; conservazione. II. Applicazioni; malte; calcestruzzi; difetti, cause rimedi. Gubbio: Scuola tip Oderisi, 24 pp

SANTARELLA, LUIGI: Il cemento armato nelle costruzioni civili ed industriali. Vol. I. 2nd ed., revised. Milan: U. Hoepli. 687 pp. L. 75.

Cement. NIELS NIELSEN. Fr. 633,493, April 27, 1927. Dust rising from the slurry as it is delivered by a nozzle to a rotary cement kiln is collected and returned to the furnace just in front of the nozzle. A filter to prevent large particles reaching the nozzle is provided in the slurry tank.

Cement. PORTLAND-CEMENTWERK BALINGER, G. m. b. H. Fr. 632,633, April 11, 1927. See Brit. 269,549 (C. A. 22, 1454)

Cement for hydraulic constructions. S. L. A. ODEN, D. R. E. WERNER and STIG. GIERTZHESTROM. Fr. 633,197, Mar 29, 1927. To control the time of hardening of the binding agent it is submitted to the action of gases alone or mixed with H_2O , e. g., H_2SO_4 , HF, HCl, SiF₄, SO_2 , SO_3 and CO_2 which form a crust of matter difficultly sol. in H_2O .

Concrete. BLAW-KNOX Co. Brit. 281,138, Feb. 15, 1927. A system of detg. the voids in sand and stone is described. Sufficient mortar of cement and water is used to fill the voids and provide an excess of mortar.

Coating and impregnating concrete with pitch, etc. R. ROSTOCK. Brit. 281,241, Nov. 24, 1926. Small holes, channels or grooves are formed in the surface of the material to facilitate impregnation.

Waterproofing concrete articles. E. DOGGERT. Brit. 281,022, Aug. 27, 1926. A waterproofing compn. comprises alum and a soln. of shellac which may be dissolved with alc., HOAc, soda, borax or potash, to form a pasty mixt. to which sufficient water is added to carry the paste into the pores of the concrete.

Materials for roads, etc. SOC. ANON. KONINKLIJKE STEARINE KAARSENFABRIEK GOUDA. Fr. 632,923, Apr. 16, 1927. In a material for roads contg. crushed stone and a bituminous emulsion, substances of a sticky nature are added to the emulsion to prevent coagulation in contact with the crushed stone.

Paving blocks. FREDERICK MORTON. Fr. 632,690, April 12, 1927. See Brit. 261,260 (C. A. 22, 3443).

Artificial stone. LÁSZLÓ BOLGÁR. Fr. 632,314, April 6, 1927. Tar residues are heated with acids or acid salts and filling materials such as sand, stone, dust or graphite are added, the whole being stirred till homogeneous and then poured into molds to make drain pipes, tiles, etc.

Composite construction material. ADOLPHUS HERSCOVITCH. Can. 281,898, July

24, 1928. Articles are molded from a mixt. of saw dust, asbestos fibers, MgO, a dry color and a soln. of $MgCl_2$ at 28° Bé.

Gas-fire flue conduits. F. CORNELIUS-WHEELER. Brit. 281,392, Sept. 1, 1926. Flues are constructed of hollow units made of a cementitious compn. including an aggregate of fibrous material mineralized or impregnated by chemical treatment. Various structural features are described.

Millboard suitable for building construction. RICHARD V. MATTISON (to Keasbey & Mattison Co.). U. S. 1,678,345, July 24. A compn. is used comprising hydraulic cement, asbestos fiber and pptd. $CaCO_3$. U. S. 1,678,346 specifies a compn. comprising colloidal hydraulic cement, $Ca(OH)_2$ and $CaCO_3$, subjected to pressure before the cement sets.

Drying wood. BRUCE FORD. U. S. 1,677,963, July 24. Heat is applied to wood, *e. g.*, sheets for *storage-battery separators*, so as to vaporize moisture faster than it can escape from the pores of the wood and disruption of the latter is prevented by mech. restraining the wood, *e. g.*, clamping it between retaining plates.

Preserving wood. LEO P. CURTIN. Fr. 633,302, April 25, 1927. See U. S. 1,659,135 (C. A. 22, 1456).

Preserving wood. GILBERT GUNN. Fr. 632,917, April 16, 1927. See Brit. 273,007 (C. A. 22, 1838).

Apparatus for treating wood. JUVÉNAL MAXIMOFF ET SOC. DITE: BUSS A. G. Fr. 633,458, Aug. 30, 1926. An app. is described in which wood may be treated, either for making cellulose, impregnating it with chemicals, or washing or drying it.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

The recovery of nitrogen from fuel. C. PADOVANI AND I. MUTTI. *Atti congresso naz. chim. pura applicata* 2, 625-37(1926).—The addition of NaCl, CaO or $CaCl_2$ considerably modifies the total ammonia evolved by the distn. of lignite at 950° . A higher yield is always produced by the addn. of 5% of lime, while $CaCl_2$ depresses the yield. The ratio of volatile to fixed NH_3 (with lignite) distd. at 950° was 5.25, while the addition of 6.7% NaCl, 8.2% $CaCl_2$ and 5% CaO gave values, resp., of 0.14, 0.05 and 5.25.

L. T. F.

Some combustion problems in their relation to public health. SAMUEL W. PARR. *Ind. Eng. Chem.* 20, 454-6(1928).—The fundamental factor of life is motion which initially is mol. and has its inception in some form of chem. action. Hence, life and industries today thrive near the reserves of coal and oil, but may in the distant future center in regions now desert, but where the chem. activity of the sun will initiate the required elementary motion. The history of fuels from the discovery of coal in Illinois in 1679 to the present is briefly traced. In 1826 in the U. S. A. 11,000,000 tons of fuel were used, only 2% being smoke producing; a century later 600,000,000 tons were used per annum, 90% of it smoke making. The smoke evil and its causes, cold surfaces, overfilled combustion chambers, especially in domestic furnaces, and some remedies are outlined. The great importance, from technical and health standpoints, of sanitation of the air, reducing the quantities of soot, SO_2 and other fumes in the atmosphere is emphasized. Attention is called to the many advantages gained by complete gasification of fuels before their utilization and to the fact that chemists as well as mechanical engineers are needed to solve the problem. W. W. HODGE

Observations on Lomsakov's grates and combustion chambers. M. HAVELKA. *Paliwa a Topeni* 9, 12-4, 17-26, 33-42(1927).—The Lomsakov (Russian) grates were modified in the Ervénice power plant for use with the Czechoslovakian slate coal. The operating experiences and complete efficiency and working data are given in tables. An English translation of the complete article appears in the same numbers.

FRANK MARESH

Operating results on the Salzburg (Koppers) chamber ovens for 1926 and 1927. A. S. ROSSKOTHEN. *Z. österr. Gas Wasserfach.* 68, 117-24(1928).—A report covering a two-year operating period on a 2-chamber oven, 20 tons daily capacity. Illustrated.

W. C. EBAUGH

Turner's low-temperature process. G. KROUPA. *Montan. Rundschau* 20, 302-3 (1928).—The results obtained by Turner (C. A. 22, 1840) with his low-temp. coal-carbonization plant, the economics and cost data for the process are given and discussed.

W. W. HODGE

Report of committee D-5 on coal and coke. A. C. FIELDNER, *et al.* *Proc. Am.*

Soc. Testing Materials (preprint) **74**, 1-4 (June, 1928).—A proposed revision of the existing ammonium molybdate standard method of test for *P* in the ash from coal and coke, and proposed new tentative standards for methods of the test for *cu. ft. wt. of coke, cu. ft. wt. of crushed bituminous coal, sieve analysis of coke and a tumbler test for coke* are given with comments. W. W. HODGE

Coals of the Sarre basin. DECIO VITA. *Atti congresso naz. chim. pura applicata* **2**, 638-55 (1926).—Descriptive and statistical discussion of the coal obtained from various mines of the Sarre basin. Analyses are reported for the various types of coal. I. T. F.

Cleaning bituminous coal. J. R. CAMPBELL. *Am. Inst. Mining Met. Eng., Tech. Publ.* No. 117, 31 pp. (1928).—The great value of preliminary studies, feed surveys, screen analyses, sink and float tests of a given coal before installing expensive washing machinery is emphasized. A procedure is outlined for washability tests, the data so obtained being plotted in 4 curves which give a very complete graphic picture of the raw coal and indicate where the impurities lie; also something as to their character, and whether profitable to wash the coal commercially. Ten tables of exptl. data and sets of curves are given for samples of coals from the Elkhorn, Pittsburgh and Kittanning seams and the results are interpreted. The forms in which S occurs in coals and the possibilities of reducing the S content by washing the coals are discussed. Methods of washing coal with water or by air flotation are outlined and flow sheets are given for a simple wet washery (American Rheolaveur Corpn.) and a simple dry-cleaning plant (American Coal Cleaning Corpn.). The relative advantages, indicated applications and references to industrial installations are given for different types of coal-cleaning machinery, launder washers, jigs, concg. tables, tubs and cones, hydraulic classifiers, the S-J. and the Y tables. Methods of drying coal cleaned by wet processes, of sludge and of dust recovery are discussed. Calcs. showing 87.6% qual and 99.76% quant. washing efficiencies, a convenient form of chem. tests data sheet for float and sink expts. at a coal washery, and complete costs data are given for coal washing, together with 4 tables of results of cleaning different coals for metallurgical purposes in 3 going wet washeries and in 1 dry coal cleaning plant. W. W. HODGE

Total carbon in coal. A. R. CARR AND A. M. RENTE. *College of City of Detroit. Ind. Eng. Chem.* **20**, 548-9 (1928).—Descriptions, drawings and manipulations are given for an app. used in detg. the total C in coal from the % CO₂ in, and the vol. of the gas formed when 0.3 to 0.6 g. coal is exploded with approx. 15 atm. of O in a Mahler type bomb. The gas is collected in a rubber balloon submerged in water which fills a large bottle; as the gas fills the balloon the water overflows into a beaker and is weighed. The vol. of gas is calcd. and added to the vol. of bomb and leads. The barometric pressure is added to the reading of the manometer on the app. to obtain the abs. pressure on the gas, and the temp. of the water is noted. The % CO₂ in the gas is detd. over Hg by using a bubbling pipet contg. caustic soln. Tests were made for total C in BzOH and in 5 analyzed samples of different-type coals secured from the Bureau of Mines. Data and calcs. from these expts. are tabulated and show that this method using inexpensive app. gives rapid and accurate results. W. W. H.

Determination of volatile matter in coal. P. S. GROOM AND F. J. WATSON. *Chem. Eng. Mining Rev.* **20**, 323-4 (1928).—In the usual method for detg. volatile combustible matter it is stipulated that the sample shall be heated for 7 min. in a Pt crucible. Expts. with porcelain crucibles show that the results are always lower if the same flame is used as that used with the Pt crucible but if a Meker burner is used the results are very close to those obtained in Pt. W. T. H.

Coal sulfur. Investigations toward the technical utilization of "Arsa coal." M. DOLCH AND E. STRUBE. *Montan. Rundschau* **20**, 213-23 (1928).—The location, properties and especially the high S content of this "Arsa" European brown coal are discussed. The chem. analyses, phys. properties and results of coking tests on 3 samples of the coal obtained from "Arsa," Trieste, are tabulated and show marked differences exist in their appearance, structure, compn., the quality of gas and coke produced and in the distribution of their S contents, i. e., 57.7, 69.0 and 74.2% combustible S; and 42.3, 31.0 and 25.8% ash S, of the total S in the coals which was 7.8, 9.3 and 10.5%, resp. A brief discussion with references is given on methods of detg. S in coals. Results of further expts. are tabulated giving the % total, sulfide, sulfate, disulfide, org. and ash S; also the % which each of these forms of S was of the total S present in a sample of Arsa-coal and in the cokes formed when the coal was distd. at 550°, 600°, 700°, 800°, 900° and 1000°. Total S in the coal was 7.8% of which 7.53% or 96.6% of the total S was org. S; at 700° the coke yield was 82.1%, total S was reduced to 5.24% and org. S to 2.97%, while at 1000° the coke yield was

45.2%, total S 6.7%, but org. S, 0.45% or only 6.7% of the total S in the coke. Results of expts. carried out to det. the effect of different rates of heating at 700° and 800° show that the method of heating is an important factor. Much of the data secured are shown graphically in 4 sets of curves and diagrams. Photographs show the appearance of cokes obtained from Arsa coal when carbonized in: the Al coking app., in a revolving furnace and in a C. T. G. oven. The results of the different expts. are discussed and the conclusion is reached that it is possible by properly coking this Arsa-coal at around 700° so to reduce the total and the org. S and change the chem. compn. and improve the form of the coal that a compression-resistant, stable formed, satisfactory "schwel" coke is produced. W. W. HODGE

The improvement of coal by cooking. FELIX BRAUNEIS. *Montan. Rundschau* 70, 285-92, 321-8(1928).—The theoretical considerations at the basis of the cooking method for coal prepn involving differences in ash and coking properties of the vitrain, clarain, durain and fusain portions of coals; the cell structure of cellulose giving porosity and capillarity to coal; the various forms in which ash, water and S occur in coal; and the colloidal nature of pure coal substance are discussed at some length. Coals from different sources were used in expts. and test runs reported and all showed marked improvement in the dried cooked, over the raw coal, one example being, resp.; water 16.2% changed from 26.7%; ash 7.7%, 13.7%; volatile 34.4%, 31%; fixed C 41.7%, 28.6%; and heating value 5042, 3851 units. Changes made in the S content and in coking qualities were noted in some of the tests. Many tables of exptl. data, computations and graphs are given, also thermal calens and a diagrammatic thermal balance sheet for the process. Sketches are given of a normal coal washery using 6 cu. m., and a coal cooker requiring only 1.6 cu. m. water per ton coal treated. Ground coal is put into boiling water, a reaction takes place such that the outgoing gases from the cooker chamber attain a temp. of around 220°. Approx. 2 hrs are required for the cooking and this is followed by a drying period. Plants have been constructed for the handling of 100, 200 and 400 tons per day. Descriptions, elevation and section drawings are given for a complete coal handling and cookery plant, for an exptl. cooker, and for an automatic industrial-sized cooker of 400-450 tons daily capacity. Costs data and calens showing the profits possible from operating the cookers on Ausrian brown coals are given. W. W. HODGE

The effect of pre-oxidation on the primary distillation products of coal. II. Controlled preliminary oxidation of the coal. JAS. T. HERD, C. HAMILTON FOOTT, HARALD NIELSEN AND JOS REILLY. *J. Soc. Chem. Ind.* 47, 139-42T(1928); cf. *C. A.* 22, 1666.—A description and drawing are given of an improved coal-oxidation app. which insures a large excess of O being always present throughout the mass of coal; the absorption as formed of CO₂; the oxidation (by passing over CuO heated to 270°) of the CO formed to CO₂ and its absorption in a 2nd weighed soda-lime-P₂O₅ tube. A 0.5 mm. constriction in the gas tube regulates the speed of circulation of the gases through the system. The results of a new series of expts. on controlled oxidation of coal, with calens. and graphs, are given. Ten-g. samples of screened 20-30 mesh, undried, Durham coal were continuously heated at 185° in a stream of commercial O (97% pure) for time periods of 1/2 hr. up to 115 hrs., an automatically controlled elec. furnace being used. Calcd. percentages based on the wt. of dry coal used for the 1/2-hr. and 115-hr. expts. were: O used by coal 1.18 and 47.15%; CO₂ evolved 0.13, 17.60%; CO evolved 0.02, 5.51%; H₂O evolved 0.72, 19.63%; O absorbed by coal substance 0.43, 13.72%; increase in wt. of coal 0.32, 4.37%; CO₂/CO ratio 1.72 (1 hr.) and 3.18, resp. Graphs plotted show that in the early stages the CO₂ and CO evolved per unit wt. "total O used" are small, but they gradually assume values proportional to "total O used;" at the same time the CO₂/CO ratio increases until it reaches a const. value of approx. 3. The H₂O evolved was at all times proportional to the "total O used." The curves for "increase in wt. of coal" and for "O absorbed by the coal" are straight lines except for sharp bends at the 3rd and 5th hr. periods, resp. These sharp bends are called "O satn. points." Wt. balances calcd. on the expts. agreed within 0.05%. III. The effect of carbon dioxide, carbon monoxide, hydrogen and nitrogen on coal at temperatures up to 200°. W. J. BARRETT, C. HAMILTON FOOTT AND J. REILLY. *Ibid* 142-3T.—In the app. previously described (*C. A.* 22, 1666), sep. 10-g. portions of Durham coal were continuously heated at 200° in circulated currents of CO₂, CO, H and N for 7 days. Methods of prep. the gases are given; each was dried over CaCl₂ and P₂O₅ before introduction to the app. Analyses of the gases in the closed glass system before and after heating showed that no interaction had taken place. Approx. similar results were obtained with each of the 4 gases, the one with N being given as typical. The water evolved at 200° was in each case slightly

in excess of the moisture as detd. at 105°, but was a little less than the loss in wt. of the coal substance. For the N expt. these values were: loss in wt. of coal 0.798%; wt. H₂O evolved 0.772%. The "wt. balance" agreed within 0.10%. IV. The distillation at 600° of the oxidized coal samples. JAS. T. DONNELLY, C. HAMILTON FOOTT, HARALD NIELSEN AND JOSEPH REILLY. *Ibid* 189-92T.—The samples of coal oxidized in Part II of this investigation were distd. in a glass retort (16 × 2.8 cm.) while N was continuously recirculated through the coal and the app. The retorts in a horizontal position in an elec. furnace were heated up to 600° in 1 hr. 20 min. and then held at this temp. for 10 min. The products evolved were collected: (1) anhyd. heavy tar in a vertical Y glass condenser kept at 101° by a boiling brine bath; (2) light tar and water in a vertical glass condenser kept at -18° by a freezing mixt. bath; (3) volatile hydrocarbons in U-tubes filled with granular activated C; (4) traces of H₂O and tar oils in P₂O₅ tubes; and (5) the gas in a graduated cylinder over Hg. Water collected in (2) was quant. detd. by Masson's CaC₂ method. A description, 3 drawings and details of manipulation of the app. are given. Distn yields obtained from the untreated coal and from 8 portions of the coal which had been pre-oxidized for different periods of time are tabulated and some graphs plotted. Coke silhouettes show how the raw coal and the cokes appeared in their glass retorts. Distn yields calcd. on % wts. on dry untreated coal indicated a gradual falling off in wt. % of heavy and light tar fractions and of volatile hydrocarbons, but higher % yields of water and gas the longer the coal had been subjected to pre-oxidation. Swelling and coking properties decreased with increase in time of oxidation; the raw coal gave a strong, highly swelled coke; the coal pre-oxidized for 1 hr. was only moderately coking and swelling, while the coal which had been pre-oxidized for 115 hrs. was non-coking. Tars from the untreated coal were unstable and rapidly darkened in air, but tars from the longer pre-oxidized coals were quite stable. A more detailed investigation of the effects of preoxidation on the compn. and properties of distn. products of coal is now in progress.

W. W. HODGE

Oxidized coking coal as a raw material and fuel. R. KATTWINKEL. *Gluckauf* 63, 160-5; *Chem. Zentr.* 1927, I, 3164-5.—Three Westphalian coking coals, 2 fat coals and a gas coal were maintained for 90 days at 80° in beds 80 mm. deep in a steam drying oven and in this way oxidized. This treatment destroyed their caking power, caused a gain in wt. of 1.75, 2.92 and 3.50%, resp., increased the O content and changed but slightly the grain. The yield of coke changed very little; the yield of tar and of C₆H₆ diminished greatly; while the yields of gas liquor and of NH₃ were greater after oxidation. With respect to the yields of gas, the different types of coal differed to the extent that after oxidation the yield from the gas coke diminished much more than did the yield from the fat coals. The decreases in the calorific values were 5.37, 5.61 and 10.03%, resp., for the 3 types of coal. The ash, m. p. and the point of flow were not changed by oxidation of the fat coals, while the ash of gas coal began to fuse 25° lower after the treatment, which is attributed to an increase of about 0.5% in the Fe content of the ash. The mineral components of gas coal are therefore affected by the oxidation.

C. C. DAVIS

The influence of oxygen upon the ignition of fluid fuels. H. PAHL. *Z. Ver. deut. Ing.* 72, 857-60(1928).—Known mixts. of O and air were purified and led through a heated Cu tube into an "ignition block" contg. an 11-cc. combustion chamber provided with a small orifice for introducing the fuel studied. The block was heated electrically and its temp. detd. by an Fe-constantan thermocouple. Curves for temps. of ignition were plotted against O content of the atm. used. Fuels studied were C₆H₆, C₂H₅OH, benzene (d. 0.725) and "American gas oil" (d. 0.859). For C₆H₆ a gradual fall of ignition temp. from 840° for 10% O to about 700° for 100% O was obtained; for allyl alc. similarly it fell in a rather regular fashion from about 450° for 20% O to 393° for 100% O. With benzene there was irregular fall from 500° for 20% O to about 300° for 33% O, and after that the ignition temp. remained const. to 100% O; for the "American gas oil" there was an irregular fall from about 500° for 20% O to 265° for 22% O, and after that it, too, remained const. These facts are explained upon the basis of cracking complex hydrocarbons into simpler ones. The time from the fall of a drop of fuel into the combustion chamber until the ignition took place was taken as the "delay" or "lag" in explosion; for allyl alc., benzene and "American gas oil" it increased with the decrease of the O content as well as with the temp. concerned. The intensity of the explosions was measured roughly by comparing the heights of the flames produced; they decreased with decreasing O content. The expts. have shown that in the case of hydrocarbons of high mol. wts. the ignition temps. and time of lag are quite different with low and high O contents; with low O content mixts.

they behave like simple compds., like C_4H_6 and C_2H_5OH , indicating that by pyrogenic reactions they are first broken down into simpler hydrocarbons and then the explosion or ignition takes place. The surroundings have a great deal to do with the temp. of ignition and the nature of the explosion, as illustrated by the conditions of the walls of the combustion chamber, the amt. of heat stored in them, etc. W. C. EBAUGH

Determination of the heating value of coal by the Geipert method. K. BUNTE AND W. ZWEIF. *Gas u. Wasserfach* 71, 629-31(1928).—Tests of the quantity and the calorific value of gas from various gas coals as made by the Geipert method (C. A. 21, 166) agree fairly well with the semi-plant scale test results on the same coals. Three 10-g. portions of the coal are gasified in a special quartz furnace. Special means are given of detg. the calorific value of the small amt. of gas in an ordinary Junkers calorimeter, slightly modified, and a measuring flask. Precautions are given for securing comparable results. R. W. RYAN

Industrial low-temperature distillation of brown coal. HUGO NOVAK. *Paliva a Topeni* 9, 26-31, 42-6, 61-4(1927).—A discussion of low-temp. distn. practised in Germany, France and America is given in complete form with suggestions for new retorts and adaptations for com. use. Suggestions follow for adapting the present retorts to Czechoslovakian brown coal which does not seem to be suited for low temp. distn. FRANK MARESH

The investigation of brown coal from new points of view, with particular reference to the volatile coal constituents. M. DOLCH AND K. GIESELER. *Universitätsinst. f. tech. Chem., Halle a. d. S. Braunkohle* 27, 581-7, 608-13(1928).—The following method is proposed in place of the combination of low-temp. carbonization tests with the crucible analysis for the detn. of gas and tar. Al is unsuitable for complete carbonization because of the high temps. required. The usual Fischer retort was therefore replaced by a steel one of similar design, sealed with Pb and heated in a specially made electric furnace so designed that the temp. could be accurately controlled for the various stages. The coal was first dehydrated in a stream of CO_2 or N_2 at 110° , then carbonized to semicoke at 530° and finally degassed at 900° . Free and combined H_2O , primary tar, low-temp. and high-temp. gas and final coke were thus detd. in a single run. The results were closely reproducible. They were compared with crucible analyses and with results from the Fischer Al retort and Strache small tube. The final coke checked the crucible-fixed C closely. The H_2O values were checked by the xylene method. The volatile was somewhat higher than by the crucible analyses, in which the final temp. has been found to be about 750° , and considerably higher than with the Al retort. Detailed results, including gas analyses, for two brown coals and a bituminous coal are given and discussed with reference to information required in industrial practice. F. S. GRANGER

Recent developments in the production of motor fuels from coal. A. C. FIELDNER. *Bur. Mines, Circ. No. 6075*, 18 pp.(1928); cf. C. A. 21, 1175. E. H.

Fuels for motor vehicles with regard to the situation in Czechoslovakia. JOSEF ZD'ARSKÝ. *Chem. obzor* 3, 15-7, 42-4, 79-84(1928).—The substitutes and admixts. of gasoline, the use of which was recommended by J. Formánek more than ten years ago are: benzene, toluene, alc., kerosene, ether, tetralin and gas oil. The first in admixt. with gasoline till to 50% (for heavy trucks) is especially suitable to give a motor fuel devoid of knocking. Another fuel, dynalkol, widely used in Czechoslovakia, originally consisted of 60% benzene and 40% of 96% alc.; at present it consists of 50% of 96% alc., 30% gasoline and 20% motor benzene. The wt. of the carburettor float must be increased 5% as the mixt. has a higher sp. gr. (d_{15} 0.806) and the opening diam. of the main carburettor nozzle must be enlarged by 8% and the air preheated. Dynalkol with abs. alc. was tried also as an airplane motor fuel with success. Other motor fuel possibilities are briefly discussed. JAR. KUCERA

Determination of gasoline, benzene, alcohol, ether and tetralin in liquid fuels for motor vehicles. II. JAR. FORMÁNEK. *Chem. obzor* 3, 33-4(1928).—Tetralin (d_{15} 0.9800, refraction of colorless 1.5440, yellow 1.5470) can be detected as a higher fraction of motor benzene or heavy gasoline b. above 200° , by purified algol red B (also BTK), which colors tetralin intensively red or by lacquer red Ciba B, by detn. of sp. gr. and refraction, or chemically by 1% KI soln. + starch + 2 drops dil. HCl (1:4). The soln. becomes instantly dark blue, after a short time violet and after restirring and 30 min. green. Kerosene gives this reaction only slightly; gasoline, benzene and alc. show no reaction. JAR. KUCERA

The sulfur content of lignites. C. PADOVANI AND S. SCHIAVI. *Atti congresso naz. chim. pura applicata* 2, 609-24(1926).—Samples were prepd. in the usual way and the moisture contents detd. Total S was detd. by several methods of which Parr's

method furnished most consistent results. In addition the combustible S, volatile S and fixed S were detd. Distinction between the various forms of S present was based upon the method of Powell and Parr. Distn. in an inert gas was investigated with a view of further sepg. the volatile S. The S that passed into the distillate at various temps. was measured. A typical lignite (Bacu Abis) showed the following sulfur picture: free S 0.31%, S as pyritic S 3.41% and org. S 4.70%. L. T. FAIRHALL

Advances in furnace construction. H. WELLMANN. *Wärme und Kälte Tech.* 28, 79-82(1926).—The chain grate described has an area of 22 sq. m., and has a special compartment in which coal falling through in the first zone is collected. E. W. T.

Preheated air for boiler furnaces. P. H. N. ULANDER. *J. Inst. Fuel* 1, 187-212 (1928).—A discussion of the use of air preheaters for boiler furnaces, particularly in conjunction with economizers. LESLIE B. BRAGG

Determination of water in combustibles with the aid of magnesium methyl iodide. A. TAUBMANN. *Z. anal. Chem.* 74, 161-7(1928).—Zerewitinov showed in 1911 that water could be detd. in substances insol. in pyridine by extg. with it and adding $Mg-CH_3I$ to the resulting soln. of water in pyridine. Water reacts with the org. Mg compd., liberating 2 mols. of CH_4 which can be measured. This method applied to the detn. of H_2O in coal, coke, peat, lubricating oil and naphtha is now found to give results surprisingly close to those obtained by vacuum drying and much more reliable than those obtained by drying in a thermostat. Moreover, since 1 mg. of water liberates about 22 ml. of CH_4 , a small wt. of sample can be used. W. T. H.

Measurement of steam flow in works practice. H. C. ARMSTRONG AND T. NORDENSON. *J. Inst. Fuel* 1, 161-86(1928).—The value of steam flow measurement as a means of obtaining valuable information as to the production or utilization of steam by the various pieces of equipment is discussed. Flow meters and the calcn. of the flow are also considered. LESLIE B. BRAGG

Operating experiences with 1300-pound steam pressure. JOHN ANDERSON. *J. Inst. Fuel* 1, 131-60(1928).—Major troubles have been experienced in the operation of the high-pressure installation at the Lakeside Station in Milwaukee, largely due to scale and corrosion, but it is felt that widespread adoption of 1300 lb. pressure will occur in the near future. The experiences are discussed in detail. L. B. B.

Operating experience with high pressure and high temperature steam. GEO. A. ORROK. *Combustion* 18, 308-10(1928).—A review of operating experience and high pressure development in the last five years. LESLIE B. BRAGG

The generation of steam in the gas plant. F. T. LEILICH. *Combustion* 18, 181-2 (1928).—A discussion. LESLIE B. BRAGG

The producer gas process. J. G. DE VOOGD. *Het Gas* 48, 214-24(1928).—The work of Haslam and collaborators is reviewed and compared with practical experience at the Rotterdam gas plant. The calorific efficiency of a producer (total cal. in gas divided by those in fuel) is the most important factor for operation; it can easily be calcd. from a gas analysis (neglecting C loss in ashes) by $70.5 (CO + H_2) / (CO + CO_2) \%$ for the upper value (liquid H_2O) or $(70.5 CO + 60 H_2) / (CO + CO_2) \%$ for the lower value. From some numerical data on a Pintsch producer it is shown that a slightly lower heating value of the gas is sometimes accompanied by higher efficiency; a gas with 6.5% CO_2 , 1071 cal. per cu. m. was made with 80.9% efficiency (lower value), one of 4.3% CO_2 , 1082 cal. per cu. m., 79.8% efficiency. Low CO_2 content is a quite unreasonable criterion for the gas quality, a 3.2% CO_2 gas is shown of 60 cal. lower heating value and 5% lower efficiency than a 6.5% CO_2 gas. Increased steaming of central or built-in producers increases the vol. of the stack gases somewhat, but at the same time it promotes better heat transfer by radiation due to the H_2O vapors (Schack). The desirability of gas of const. quality in particular for built-in producers is stressed; for the latter high const. heating value is ideal. Higher fuel bed will not increase the height of oxidation or reduction zone; higher throughput may, up to a limit (higher temps.), raise the efficiency notwithstanding a shorter time of contact (up to 300 kg. coke per hr. and sq. m.); Haslam's results on a small exptl. producer may in this respect be misleading because of his relatively much larger radiation influence. The fuel bed should be 2-4 m. high. The most efficient steam: fuel ratio appears to lie around 0.7, i. e., considerably more than formerly found (around 0.4 by Bone, Clements, etc.); it apparently increases with increasing throughput. From concurrent CO_2 content and heating value charts on a Pintsch producer it was found that high CO_2 (high steam) is usually accompanied by high calorific value (between 1050 and 1250 cal. per cu. m.) (CO_2 from 2 to 7%) and also high efficiency. Figures tabulated from tests over 3-7-hr. periods of const. CO_2 content show increases of the efficiency from 82% (4% CO_2) to 85% (6% CO_2) and decreasing N_2 . The limit, to

be expected from cooling down of the reduction zone, is apparently high. The kg. steam per kg. carbon gasified (coke 86.6% C, 10.6% ash) ran in some expts. from 0.62 to 0.82; steam decompn. 88 to 65%; cals. per cu. m. (lower value) 1050 to 1174 for CO_2 , 5.8 to 6.4%; efficiency 81.3 to 86.3%, kg. coke per sq. m. hr. 137 to 110. A sharp relation between throughput and efficiency could not be established. B. J. C. v. D. H.

Determination of the calorific value of gas with a measuring flask and a Junkers calorimeter. ANON. Gas Institut. *Gas u. Wasserfach* 71, 660-1(1928); cf. C. A. 21, 813.—The gas is collected in a 12-l. calibrated flask, preferably provided with a water jacket. Means are described for insuring a const. flow of gas to the calorimeter. A 1-mm. jet is provided in the calorimeter burner. Comparative analyses for this method and the usual Junkers method are given for city gas and coal gas and these values agree well. R. W. RYAN

Determination of carbon monoxide in flue gases. K. HOFER. *Glückauf* 63, 660-1; *Chem. Zentr.* 1927, II, 200-1.—To det. CO on the spot in flue gases, where the usual method with CuCl_2 in an Orsat app. is not sufficiently precise, it is recommended that 2 Wilhelm pipets with 90 and 110 cc., resp., of ammoniacal AgNO_3 soln. be used and the detn. carried out as a purely colorimetric method. C. C. DAVIS

Measurement of the quantity of flue gas and its calculation from the amount of combustible material and the flue gas analysis. W. POHL. *Gesundh. Ing.* 51, 433-9, 452-7, 467-73(1928).—A mathematical discussion of the subject matter. Tables of tests in which different kinds of combustible material were used are given. P. finds that in order to obtain accurate analysis of flue gas consideration must be taken of the factor g/g_0 , where g is the quantity of flue gas per unit time and g_0 the av. quantity of flue gas per unit time. With this method it was found that the max. error of the uncorrected flue gas analysis is 11%. Under these conditions the efficiency of the furnace is calcd. to be 3% higher than the true value. WAYNE L. DENMAN

Gases absorbed in coal. R. VONDRÁČEK AND B. HLAVICA. *Paliva a Topeni* 9, 2-12(1927).—Large lumps of fresh coal from Ostrava, Rosice, Nřany, and Handlová, Czechoslovakia, were finely pulverized, filled immediately into glass bombs sealed with wax and evacuated. Evacuation commenced at 20 mm. and was reduced to 1 mm. It was continued until the daily increment of the gas was 1 cc. The bomb was submerged in an oil bath at 100° and the 24-hr. fractions were analyzed in a Hempel app. The CO was detd. by absorption in acid cuprous chloride or by combustion with H over Cu_2O at 250°, or absorption with anhyd. iodine pentoxide; CH_4 and satd. hydrocarbons by combustion over Cu_2O ; unsatd. hydrocarbons by absorption in Br water. Gases found regularly were: CH_4 0.0-59%, CO_2 0.8-11.8% and N_2 34.5-93.8% of gas evacuated. H was never found—not even at 100°; CO was less than 0.1% when found; unsaturated hydrocarbons were less than 0.02% (lignite Handlova showed 0.5%). Ethane and higher hydrocarbons were not found in fresh specimens. Coking coals showed a $\text{CH}_4:\text{CO}_2$ ratio which remained around 3; while gas coals had a $\text{CH}_4:\text{CO}_2$ ratio of 15. During evacuation, CH_4 escapes more rapidly than CO_2 . The gas evolved varied from 24 to 296 cc. per 100 g. of coal. Tables of results and a complete résumé follows in French. FRANK MARESH

Concerning certain special operating methods in American oil-water-gas plants. J. GWOSDZ. *Erdöl u. Teer* 4, 354-6(1928).—A discussion mainly of the blow-run and back-run processes with statistical data. F. S. GRANGER

Oxide purification. GUSTAV OFFE. *Am. Gas J.* 129, 37-40(1928).—See C. A. 22, 1841. E. H.

Low-temperature tar. G. E. FOXWELL. *Gas World* 89, Coking Sect. 13-5(1928).—A discussion. A satisfactory return on the tar is essential to the com. realization of low-temp. carbonization. Present difficulties, which should disappear in time, are the small quantity of such tar available and the lack of uniformity of the tars from the 250 proposed processes. The present method of disposal, by tar distillers, is by concealment in relatively large quantities of high-temp. creosote. Various possibilities of utilization of the tar as a whole or of its constituents individually, and current investigations along this line, of which wood preservation has already shown promising practical results, are reviewed with particular reference to recent articles by G. T. Morgan and H. D. Savage. F. S. GRANGER

Dust and ash determination in tar. R. ARBEITER. *Chem. Ztg.* 52, 529(1928).—Tar (4-5 g.) is placed in a pleated filter sustained in a bottomless crucible on a small glass tripod. The whole is placed in a beaker contg. CCl_4 , but not enough to reach the filter. The filter is covered with a round-bottom flask through which a current of cold water is maintained. A hot plate is used to boil CCl_4 , which condenses on the bottom of the flask. To prevent the condensate from hitting the filter and damaging it,

a glass arm is used with a flattened tip; it catches the falling drops and directs them onto the filter. After 30-40 min. the filter is dried and weighed, giving the amt. of ash and dust directly.

A. L. HENNE

Coke ovens. The aspiration of gases and its automatic regulation. C. ARNU. *Tech. moderne* 20, 452-8(1928).—The various app. used for the automatic control of gas flow in coke ovens are described.

P. THOMASSET

The dry coke-cooling system of Collin. ERNST ARNOLD. *Stahl u. Eisen* 48, 903-7(1928).—The Collin dry coke-cooling system consists of cooling chambers, one for each 3 coke-oven chambers, in which the coke is cooled from 750° to 220° in about 8 hrs. by a circulating current of gas. The hot gases leaving the chambers are collected and led into the waste heater steam generator where 400 kg. steam is produced after each ton of coke cooled. This cooling system is most advantageous in plants where the steam consumption is high, such as the Heinrichshütte at Hattingen, the cooling system of which is described in detail. Plans and cost of operation are given. The dry-cooled coke is as good as, if not better than, the wet-cooled coke.

J. A. S.

Does dry or wet quenching influence the reactivity of coke? G. A. BRENDER & BRANDIS and P. VAN'T SPIJKER. *Hel Gas* 48, 208-10(1928); cf. *C. A.* 21, 2376.—Coke samples were gathered (a) from the coke crusher (wet quenched), (b) hot from the retort and cooled in a closed steel vessel, both samples being from the same charge (vertical retort). The combustion rate at const. temp. in air was detd. (vertical elec. furnace with quartz tube, filled with fireclay granules and 3-cm. coke, 2 to 4 mm. size at 575°). From the O₂ content (CO and CO₂ also detd.) of the gases leaving it follows that the samples (a) were slightly more reactive, contrary to current opinion, than (b), e. g., for 3 sec. contact of air and coke (a) gave about 6, (b) 12% O₂. At higher temps. this difference becomes negligible. The ignition temp. in air according to Bunte, detd. in the same tube, air velocity 15 l. per hr. gave for wet quenched coke 498°, dry quenched 519°.

B. J. C. VAN DER HOEVEN

The formation and structure of cenospheres. F. S. SINNATT. *J. Soc. Chem. Ind.* 47, 151-5T(1928).—The importance of different kinds of coke in modern industry, the many layers and varying quantities of vitrain, clarain, durain and fusain in coal seams and effect of these variations on the coking properties of coals are outlined. Previous investigations on cenospheres are reviewed and discussed (cf. *C. A.* 21, 3262, 3729; 22, 310). A description and drawing are given of the vertically placed silica tube (28½" × 1½") and app. used to produce cenospheres by heating powd. (60/90 or 40-50 mesh I. M. M.) coal or pitch at different temps. from 420° to 950°. The properties and appearance of cenospheres, lattices, windows and tertiary structure (window spots) are described and illustrated with 8 photomicrographs of cenospheres obtained from coal or pitch, sugar, dust from a cement works and after the original cenospheres had their windows and lattices burned out or modified by higher temp. or CO₂. With a coal of 23.7% volatile matter the temp. of formation of globules larger than the original coal particles was 530° and there was a 6.2% loss in volatile matter from the carbonized globule. Differences in appearance, diameters and coking properties of cenospheres formed at 500°, 550° and 600° from durain, vitrain and clarain are tabulated. The av. diam. of cenospheres from clarain at 800° was 0.55 mm. The smallest cenosphere had approx. the same size as the original coal particle while the largest cenosphere was about 40 times the vol. of the coal particle. The wt. of a cenosphere has been found to be approx. 2.0 × 10⁻⁶ g. The sp. gr. of cenospheres is taken to be about 0.2 to 0.5 which may account for the collection of quantities of them in the dust from locomotives, a channel steamer and from a cement works (4000 deposited per sq. ft. in 8 hrs. at ¾ mile from the works). Possible correlations between the structure and method of formation of cenospheres and of lump coke are mentioned. A general discussion follows the article.

W. W. HODGE

Pulverized coal in metallurgy (BLYTHE) 9. The heat of formation of liquid water and of CO₂ (TRAVERS) 2. Base exchange and the formation of coal (TAYLOR) 8. Rotary filter for treating coal fines, etc. (Brit. pat. 281,390) 1. Treating light paraffin hydrocarbons to obtain olefins, etc. (U. S. pat. 1,678,078) 10.

BONCINELLI, L.: *Combustione e combustibili*. Vol. II. Milan: Hoepli. 1420 pp. L. 88.

GLUDD, W.: *Handbuch der Kokerei*. Vol. II. Revised. Halle (Saale): W. Knapp. 301 pp. Paper, R. M. 32; bound, R. M. 34.50. Cf. *C. A.* 22, 1461.

HAARMANN, ERNA: *Der betriebswirtschaftliche Produktionsprozess einer Kokerei*

mit Einschluss der Gewinnung der Nebenprodukte. Stuttgart: C. E. Poeschel. Part 4 of Produktions-prozesse. 61 pp. M. 5.50.

Motor fuels. I. G. FARBENIND. A.-G. Brit. 281,247, Nov. 26, 1926. Fuels with "anti-knock" properties are made by destructive hydrogenation of highly bituminous coals or like material by extg. the bitumen before or during the treatment, *e. g.*, by use of a solvent such as benzene before the hydrogenation.

Motor fuels. RUTGERSWERKE-AKTIENGESellschaft and LEOPOLD KAHL. Fr. 632,193, Apr. 5, 1927. A motor fuel comprises a eutectic liquid mixt. of hydrocarbons individually solid at ordinary temp. either alone or mixed with benzene, etc.

Liquid fuel produced by destructive hydrogenation. L. T. BATES. Brit. 281,240, Nov. 23, 1926. Hydrocarbon oils and coal are subjected to hydrogenation together in the presence of a catalyst (in an app. which is described) to obtain a fuel suitable for use in "semi-Diesel" or "hot-bulb" engines.

Fuel briquet. ROBERT M. HALE (to Minerals Separation North American Corp.). U. S. 1,678,387, July 24. Coal finer than 20 mesh is bonded with a binder which contains a considerable proportion of oil, a considerable proportion also of sulfite cellulose residues and substantially no added inorg. material.

Fuel briquets. GEORGE A. CHAPMAN and ELTOFT W. WILKINSON (to Minerals Separation North American Corp.). U. S. 1,678,379, July 24. Briquets which are adapted when burned in a deep mass in a grate to leave an ash contg. less than 10% of unconsumed C and which burn at least nearly smokelessly and without substantial softening are formed by molding and baking a mixt. of uncoked anthracite coal substantially passing 10 mesh with a binder consisting mainly of oil residue which is less than 10% of the coal.

Fuel briquets. ALBERT L. STILLMAN (to General Fuel Briquette Corp.). U. S. 1,677,994, July 24. A mixt. of coal 90, molasses lcs 5-7 and sulfite liquor 5-3% is ground, crushed and kneaded, molded and carbonized.

Fuel packages. E. W. BOWEN. Brit. 281,411, Sept. 9, 1926. Molded block or "ovoids" of artificial smokeless fuel are packaged in a container which may be formed of paper, together with readily ignitable materials such as wood, shavings, resin, $C_{10}H_8$ and tar.

Briquetting non-caking fuels. P. FUCHS (to Friedlaender & Co.). Brit. 281,326, Nov. 27, 1926. Non-caking fuels are briquetted with a binder consisting of a mixt. of org and inorg. substances, *e. g.*, waste sulfite liquor constituents and lime or cement. $C_{10}H_8$ and lime slaked with a satd. $MgSO_4$ soln. also may be used; and MgO may be mixed with the lime before slaking in different proportions according to the hardness desired.

Synthetic fuel. SOC. INTERN. PROCÉDÉS PRUDHOMME (S. I. P. P.). Fr. 633,112, Aug. 3, 1926. See Brit. 275,585 (C. A. 22, 2259).

Distilling powdered coal. A. GAERTNER. Brit. 281,110, Dec. 29, 1926. Finely divided coal is injected into a coking chamber solely by combustion gases. H or a gaseous mixt. such as water gas, contg. H, and a catalyst such as a finely divided metal may be used or injected into the distg. chamber. An app. is described.

Carburation of methanol. ÉMILE P. DUMANOIS. Fr. 633,443, Aug. 27, 1926. To obtain a fuel having a calorific value higher than MeOH, other alcs., aromatic hydrocarbons or products from the carbonization of oil are added. An example gives a mixt. of 70% by vol. of MeOH, 15% of EtOH and 15% of benzene.

Producing or modifying oils. RICHARD FEIGE. Fr. 632,293, April 6, 1927. Combustible solids, liquids or gases or tar or tar products are submitted to a high-tension elec. current, under pressure or not, to increase the low-boiling constituents. Catalysts may be added, or the electrodes may be made of a substance having a catalytic action such as tin.

Annular rotary-hearth tunnel furnace suitable for drying or distilling coal or lignite in thin layers. TROCKNUNGS-, VERSCHWELUNGS-, UND VERGASUNGS- GES and F. BARTLING. Brit. 281,169, May 13, 1927.

Furnace. FERNAND A. MARAS. Fr. 632,654, April 12, 1927. Construction details of hearth.

Furnaces. WALLSEND SLIPWAY & ENGINEERING COMPANY, LTD. Fr. 632,673, April 12, 1927. The burner of a furnace is adapted to use either powdered coal or a liquid fuel.

Furnaces. LUCIEN BRIGANDET. Fr. 633,022, April 21, 1927. To allow of charging by gravity the hearth of a furnace is sloping downwards.

Furnaces. GUSTAVE M. RIBAUD. Fr. 632,343, April 7, 1927. Furnaces, especially *elec. furnaces*, have a liquid heating medium of greater density than the material to be heated, and this liquid is rotated at a suitable speed to form a cavity in the center of which the material tends to remain.

Dust furnaces. SIEMENS-SCHUCKERT WERKE. Fr. 633,525, April 28, 1927. The combustion air is led into the furnace with a whirling motion whereas the dust fuel is led in approx. perpendicularly to the plane of the air whirl.

Furnace for liquid fuel. STEAM PRODUCTION CORP. Fr. 633,494, April 27, 1927.

Apparatus for charging furnaces with powdered fuel. FAY HARRY ROSENCRANTS. Fr. 633,031, April 21, 1927

Vertical retort furnaces. LOW TEMPERATURE CARBONISATION, LTD., and C. H. PARKER. Brit. 281,348, June 7, 1926.

Funnel for automatically charging gas generators or other furnaces. SOC. GRILLES ET GAZOGÈNES SAUVAGEOT. Fr. 633,580. April 29, 1927.

Down-draft gas producer. K. A. WIDEGREN and E. H. WIDEGREN. Brit. 280,912, Nov. 22, 1926. Structural features.

Gas. I. G. FARBENIND. A.-G. Fr. 632,466, April 8, 1927. In producing combustible gas from granular combustible solids, the solids are maintained by gasifying agents in progressive movement during the gasification either by carrying along the combustibles by gasifying agents having a sufficient speed, or by carrying along the combustibles first with air to transform the fine particles into producer gas and then with steam to transform the remainder into water-gas. Cf. C. A. 22, 2830.

Gas. RUDOLF LEDERER. Fr. 633,470, April 27, 1927. See Brit. 270,318 (C. A. 22, 1463).

Gas. OTTO MISCH. Fr. 632,826, April 15, 1927. An app. for the production of a gas having a calorific value of 3500 to 4500 calories per cu. m. from bituminous fuel is described.

Gas purifiers. SOC. INTERN. PROCÉDÉS PRUDHOMME. Fr. 632,360, July 21, 1926. See Brit. 267,138 (C. A. 22, 1200).

Gas purification. HUMPHREYS AND GLASGOW, LTD. Fr. 632,777, April 14, 1927. The purifying soln. contg. alkali sulfhydrate is revived by a paddle turning at high speed in the soln. under which air is bubbled.

Gas purification. FREDERICK W. SPERR, JR. (to Koppers Co.). U. S. 1,677,304, July 17. A liquid such as the waste NaOH soln. from the artificial silk industry which has been used for purifying gas from acidic impurities is regenerated by the action of air in the presence of hemicellulose which serves to increase efficiency of flotation and removal of S which is liberated.

Purifying coal gas and similar gases. C. COOPER, F. B. HOLMES and W. C. HOLMES & Co., LTD. Brit. 281,474, Nov. 30, 1926. After cooling the gas to obtain an aq. condensate contg. NH_3 the gas is subjected to the conjoint action of the condensate and of CaSO_4 and CO_2 may be introduced. Numerous details and modifications are given.

Desulfurization of gas. L'AIR LIQUIDE (SOC. ANON. POUR L'ÉTUDE L'EXPLOITATION PROCÉDÉS GEORGES CLAUDE). Fr. 632,559, July 30, 1926. The process of Fr. 585,979 for the desulfurization of coke-oven and other gases is improved by replacing Na glycerolate by other org. or inorg. glycerolates, by which means not only COS but CS_2 and the mercaptans are removed.

Gas rich in carbon monoxide. H. NIELSEN and B. LAING. Brit. 281,105, Aug. 25, 1926. In producing gas rich in CO by passing CO_2 through a mass of coke at a temp. of 750–850°, the semi-coke used as described in Brit. 262,834 (C. A. 21, 4055) is replaced by high temp. coke which may be made by internal heating as described in Brit. 276,407 (C. A. 22, 2456).

Washing flue gases. M. PRETOT and F. ULLMANN. Brit. 281,651, Dec. 4, 1926. A soln. of soda or potash, or both, is used for scrubbing gases to remove solid particles. An app. is described comprising turbine blades which are caused to rotate by the flow of gas.

Scrubber for removing tar from gases produced by distillation of wood, peat, lignite, etc. H. HENNEBUTTE (to Soc. anon. la carbonite). Brit. 281,653, Dec. 2, 1926.

Gas retorts. STETTINER CHAMOTTE-FABRIK A.-G. VORM. DIDIER. Fr. 632,809, April 14, 1927. A door for a gas or coke retort is described.

Separating ammonia from gases. GES. FÜR LINDE'S EISMASCHINEN A.-G. Brit. 281,288, Nov. 27, 1926. Coke-oven gases or similar gases from which tar has been removed are compressed to 4 atm. and passed at a temp. of about 140° through a coil in a water column in which the temp. falls from 105° to 50°. C_6H_6 is continuously

discharged in liquid form through a valve and dil. NH_3 liquor passed into the gas stream entering a parallel-flow washer. A 10% NH_3 soln. collects in a separator and the gas at about 15° passes into a counter-flow washer to which a small quantity of water is supplied. Residual NH_3 is removed and the gas is further cooled to about -20° in a counter-flow cooler as described in Brit. 275,633 (*C. A.* 22, 2260) for removing C_4H_8 . Then, after passing through a separator, it is expanded and further cooled to -60° . App. is described comprising a column in which the ammonia liquor from the first-mentioned separator may be heated to evolve NH_3 , CO_2 and H_2S .

Determination of naphthalene in illuminating gas. WALTER H. FULWEILER (to The U. G. I. Contracting Co.). U. S. 1,678,591, July 24. An app. for detn. of C_{10}H_8 in gas comprises a pair of cond. cells provided with fixed electrodes and means accessible from the exterior of the cells to vary the capacity of the cells so that the consts. of the cells can be adjusted to equality.

Removing sulfur compounds from gases. E. B. MILLER and G. C. CONNOLLY (to Silica Gel Corporation). Brit. 280,947, Nov. 19, 1926. Gas such as coke-oven gas, water gas or producer gas is treated with air or other oxidant in the presence of solid adsorbent material carrying a metal oxide, e. g., silica gel impregnated with about 1% of Fe_2O_3 or CuO or both. Two layers of material may be used heated, resp., to 200 – 210° and 185 – 200° . A preliminary treatment at a higher temp. (suitably 450°) may be carried out to convert org. S compds. into H_2S .

Tar distillation. SOCIÉTÉ DES ÉTABLISSEMENTS BARBET. Fr. 632,256, July 17, 1926. See Brit. 274,513 (*C. A.* 22, 2260).

Treating tar. FREDERICK C. BUNGE and HEINRICH MACURA. Fr. 633,643, April 30, 1927. Crude tar or products sepd. therefrom are treated with halogen compds. which in the presence of OH or SH groups eliminate hydrazides. Such compds. include COCl_2 , BCl_3 , AcCl , BzCl or chlorides of P, Sn, Cr, S, Si, Sb, Bi, As.

Cracking oils and tars. I. G. FARBENIND. A.-G. Fr. 632,533, April 9, 1927. In a process for cracking oils and tars to obtain low-boiling or gaseous hydrocarbons, the oils or tars are heated by one or several elements immersed in the liquid which are heated electrically to the b. p. of the liquid and against which a current of gas contg. O or H or of gas free from C but capable of liberating H is directed.

Recovery of sulfuric acid from acid tar. C. STILL and FIRM OF C. STILL. Brit. 281,547, Dec. 22, 1926. In treating acid tar, produced in purifying "benzols" by treatment with H_2SO_4 , as described in Brit. 277,619 (*C. A.* 22, 2656), the acid tar is mixed with $(\text{NH}_4)_2\text{SO}_4$ soln. at a temp. of about 55° and the resins are not further heated until the aq. layer has been withdrawn. An app. is described.

Separating neutral products from tar. FRIEDRICH C. BUNGE. Fr. 633,542, Apr. 28, 1927. Crude tar is treated with phosphoric acid which takes up the acid products, and the neutral products sep.

Treatment of hydrocarbon residues. RALPH T. GOODWIN (to Standard Oil Development Co.). Can. 282,000, July 24, 1928. Pressure tar is stabilized by treatment with $1\frac{1}{2}\%$ to 1% by vol. of H_2SO_4 of 30 – 60° B \acute{e} , heating to 200 – 275° F. to ppt. sediment and sepg. the sediment.

Coke-oven construction. FOUNDATION OVEN CORP. *Brit. 281,403, Sept. 3, 1926.

Coke-oven construction. FOUNDATION OVEN CORP. Brit. 281,405, Sept. 3, 1926.

Coke-oven and quenching car construction. DR. C. OTTO & Co., Ges. Brit. 280,944, Nov. 22, 1926.

Vertical coke-oven construction. J. VAN ACKEREN (to Koppers Co.). Brit. 281,221, Nov. 27, 1926. Numerous structural features are specified.

Reversing valves for regenerative coke ovens. FOUNDATION OVEN CORP. Brit. 281,404, Sept. 3, 1926.

Quenching coke. FRANK F. MARQUARD. U. S. 1,677,973, July 24. The hot coke is intermittently sprayed with water for relatively short periods, between which it is permitted to drain and cool. An app. is described.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

Effect of volatility of petroleum fractions on detonation value. J. C. GENIESSE AND H. F. HUF. *Ind. Eng. Chem.* 20, 794-6(1928).—There is a definite relationship between the sp. gr. of a fraction from a given crude oil and its detonation value, and also between the 50% (including loss) distn. temp. of a fraction from a given crude oil and its detonation value. A graph constructed from those data makes it possible to predict what effect changing the volatility will have on the detonation value.

G. CALINGAERT

Unsaturated hydrocarbons in various petroleum products. III. G. GANE AND M. ZILISTEANU-GHEORGHIU. *Bul. soc. chim. Romania* 8, 3-10(1926); *Chem. Zentr.* 1927, II, 354-5.—In finishing a study of the I no. of petroleum products, a no. of lubricating oils from Roumanian refineries were analyzed, detns. being made of the d₁₅, flash point, viscosity, f. p. and I no. (by the Wijs method). As with light petroleum products, the I no. increased with increase in d. and b. p., i. e., with the mol. wt. The I nos. of crude distd. oils were higher than those of the corresponding refined oils, which shows that aromatic and hydroaromatic hydrocarbons, olefins and terpenes are partially removed by the refining process. To det. whether the I no. gives a quant. indication of the content of unsatd. hydrocarbons in a petroleum product, the unsatd. hydrocarbons were detd. with Hg(OAc)₂ by the method of Tauss (cf. Danaïla, Andrei and Melinescu, *Bul. chim. pura applicata* 26, 4). The method was previously tested with hexane + amylene, hexane + amylene + mesitylene, a normal benzene, and mixts. of the latter with the aforementioned hydrocarbons, and was found to be reliable. The aromatic hydrocarbons were detd. by the method of Böttcher and Krämer, 10 cc of sample being shaken for 30 min. with 30 cc. of H₂SO₄.H₂O, which destroys aromatic and unsatd. hydrocarbons, so that the former are detd. by difference. Since this method gave good results with the artificial mixts. above, unsatd. hydrocarbons in petroleum fractions were detd. Only with light fractions were satisfactory results obtained. In 1 fraction of d. 0.730 the method of Tauss showed 12.5% unsatd. hydrocarbons. With heavier oil the method failed to give good results, since the higher-boiling hydrocarbons do not distil with steam.

C. C. DAVIS

Use of the acetylene tetrachloride method of porosity determinations in petroleum engineering field studies. CHASE E. SUTTON. *Bur. Mines, Repts. of Investigations* No. 2876, 10 pp.(1928).—The vol. of a chunk sample of the oil sand 3 to 4 cc. in vol. is detd. by displacement of C₂H₂Cl₄ in a development of the Le Chatelier sp. gr. flask, adopted as the standard for detg. the sp. gr. of cement (Eckel, *C. A.* 17, 619), following the method suggested by Russell (*Bull. Am. Assocn. Petroleum Geol.* 10, 931(1926)). The sample is then crushed to its sep. grains and their vol. are detd. in the same manner as for the solid specimen. The percentage porosity, *P*, by vol. is given by the formula: $P = [(1 - V_2)/V_1]100$, in which *V*₁ and *V*₂ represent vol. of the solid specimen and the sand grains, resp. This method gives results sufficiently accurate for use in making an engineering study of underground conditions.

RAYMOND E. SCHAAED

Degree of wetting of silica by crude petroleum oils. F. E. BARTELL AND F. L. MILLER. *Univ. of Michigan. Ind. Eng. Chem.* 20, 738-42(1928).—The adhesion tension of different crude oils against silica has been detd., with a displacement cell app. similar to that of Bartell and Osterhof (cf. *C. A.* 22, 523). A simple app. was devised to measure the interfacial tension of H₂O against oil. The adhesion tension of different oils against silica was different, and the values ranged from approx. 58 to 72 dynes per cm.

T. S. CARSWELL

Dew points of air-gasoline mixtures from distillation curves. OSCAR C. BRIDGMAN. *Ind. Eng. Chem.* 20, 821-6(1928).—Gasoline was vaporized by a dynamic method in the presence of known quantities of air at temps. permitting successive approach to complete vaporization. For each mixt. and gasoline, the curve of temp. vs. percent evapd. extrapolated to 100% gave the dew-point temp. These equil. distn. values agreed well with values obtained by the method of Stevenson and Babor (cf. *C. A.* 22, 1032), and with the results of these investigators. The dew-point temps. at 1 atm. pressure, of gasoline vapor and of mixts. from 1:1 to 30:1, were found to be simply related to the 90% A. S. T. M. points, corrected for loss, and to each other.

G. CALINGAERT

Sulfur toleration in gasoline. G. EGLOFF AND C. D. LOWRY, JR. *Ind. Eng. Chem.* 20, 839-43(1928).—An analysis of gasoline consumption in relation to temp.

shows that over $\frac{2}{3}$ of the country's total consumption is used in warm weather, when there is no danger of corrosion. The sulfur tolerance in gasoline should be regulated by climatic conditions. In warm weather the sulfur limitation might be revoked entirely. Also in *Oil & Gas J.* 27, No. 12, 152, 163 (1928). G. CALINGAERT

Estimation of benzene in petrol (gasoline). STANLEY KETTLE. *Chemist-Analyst* 17, No. 3, 14(1928).—Shake 20 cc. of the gasoline in a stoppered bottle with a small quantity of one of the indanthrene blues for 2 hrs. Filter into a tall glass cylinder standing on white paper. Compare the color with that obtained from known mixts. of benzene and gasoline similarly treated. W. T. H.

Antiknock compounds. J. H. FRYDLENDER. *Rev. prod. chim.* 31, 361-4(1928).—The problem of knocking is reviewed. The anti-knock power of different compds. is compared and the manuf. and properties of $PbEt_4$ and of Fe carbonyl are described. P. THOMASSET

Engine knock and related problems. ALFRED C. EGERTON. Univ. of Oxford. *Proc. Roy. Inst. Gr. Brit.* 1928, 15 pp.; cf. C. A. 22, 1034.—Previous work (E. and Gates, C. A. 21, 2065; 22, 870) shows that the presence of antiknock compds. does not influence the position of detonation at ordinary pressure in a tube in C_2H_6 , C_4H_{10} and H mixts. dild. with A, N and CO_2 . In a long electrically heated tube provided with glass windows, increase of pressure diminishes the distance from the spark at which detonation starts up to a limiting pressure above which further increase has little effect. E. confirms Weerman (C. A. 21, 2555) in that antiknock compds. raise the ignition temp. (I. T.) of gasoline in air. The ignition-inhibiting properties of metallic vapors have been detd. by Weerman by bringing them from an arc between the metallic electrodes in an A stream into an electrically heated pot provided with a thermocouple for measuring the I. T. The metals most effective in increasing the I. T. fall in the order: Ti, K, Pb, Fe, Ni, Mn, Bi, Se, Te, Na, Cd, Ca and Sb. The ineffective elements are: Al, Mg, Hg, I, P, Au and Zn. The following metals have a doubtful effect: Sn, Ce, V, Ti, Zr, Th, Ta, W, Cr, Co and U. Antiknock substances appear to "have the common property that a state of equil. exists at the temp. at which they operate between certain products of the antiknock." In the case of K the oxides K_2O_3 and K_2O_4 have been shown to exist in a state of equil. in favor of the higher oxide at 400°. This oxide if reduced to the lower can be regenerated by the next suitable impact with an O mol. Peroxide formation (cf. Callendar, C. A. 21, 1697) with the production of centers of high energy is considered as the initial stage in the combustion of a hydrocarbon mol. Antiknock substances inhibit (cf. E. and Gates, C. A. 21, 2554) the oxidation of fuels prior to ignition evidently by breaking the reaction chains. This view is supported by Bäckström's application of the chain reaction theory (C. A. 21, 2835; 22, 717) to work on the thermal oxidation of liquid aldehydes and by Hinshelwood's explanation (*Proc. Roy. Soc. (London)* A118, 170-83(1928)) of his measurements of the rate of reaction of H and O. Also in *Nature* 122, 20-6(1928).

RAYMOND E. SCHAAD

Lubrication. Round table discussion. D. P. BARNARD, 4TH, et al. *Ind. Eng. Chem.* 20, 843-9(1928).—The main part of the paper has been published elsewhere (*J. Soc. Automotive Eng.* 22, 213(1928)). The ensuing discussion covers the influence of the pour point of oils on circulation at low temp., the effect of the surrounding atm. (air or H_2) on the friction on a bearing, and the advantage of greases melting above 320° F. over oils, as lubricants for steam-engine cylinders and journals. G. C.

Kaluga petroleum as a lubricating material. M. RAKITIN. *Nefityanoe Khozyaistvo* 12, 705-6; *Chem. Zentr.* 1927, II, 1916. E. H.

The fundamentals of semiliquid friction. S. KIESSKALT. *Z. tech. Physik* 9, 207-12(1928).—A review with 24 references of the literature of lubrication. It is concluded that the "oiliness" of lubricating oils is a function not of their surface tension against air but of the adsorption on bearing metals and of the relation between viscosity and pressure. Lubrication is a boundary phase problem. B. J. C. VAN DER HOEVEN

The alteration test of transformer oils. SOCIÉTÉ DES HUILES DE CAVEL ET ROEGIER. *Bull. fed. ind. chim. Belg.* 7, 249-59(1928).—The temp. required by the Belgian test, 170°, is too high. A test at 120° should be adopted. A. L. HENNE

Experimental oil-shale plant of the Bureau of Mines. MARTIN J. GAVIN. *Ind. Eng. Chem.* 20, 784-91(1928); cf. C. A. 21, 316.—The exptl. oil-shale plant operated by the U. S. Bureau of Mines at Rulison, Colo., during 1926 and 1927 is described. Two retorts are used for producing oil, a standard Pumpherson retort (C. A. 17, 1711) of the size and type in com. use in Scotland for 25 yrs. and a N-T-U retort, of approx. 25 tons charging capacity, similar to the units used by the N-T-U Co. at Casmalia, Calif. The analyses given show that the oils produced by the 2 retorts are essentially

similar except that the Pumpherstons oil contains a greater amt. of secondary decompn. products and is lighter. By a combination of topping and cracking operations, 52% of motor fuel, final b. p. 437° F., has been made from the N-T-U crude oil and 64% from the other. The cracked fuel from the Pumpherstons crude oil has the higher antiknock rating.

RAYMOND E. SCHAAD

Oil shale developments in Canada. A. A. SWINNERTON. *Can. Chem. Met.* 12, 220-3 (1928).

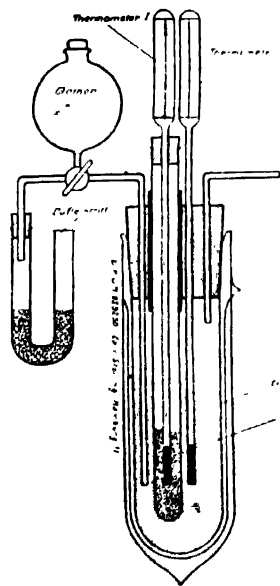
Dossor mineral oil. B. G. TUICHININ AND S. N. PAVLOVA. *Papers Karpon Chem. Inst. Bach. Memorial Vol.* 1927, 215-29.—The Dossor oil fields (in Caucasus) are disposed in 3 horizontal layers of which the 1st (upper) is not productive. The other 2 are productive and consist of asphalt-base oils contg. but very little paraffin. The oil of the 2nd layer has no benzene fraction, almost no kerosene fraction and is thick and viscous; the oil of the 3rd layer contains all the fractions. Most of the detns. were made not on the original oils, but on the mazouts obtained after distg. off the portion boiling below 300°, at which temp. they do not suffer decompn. The mazouts obtained from all the samples of the 2nd layer possess almost identical const., a circumstance which shows that the differences of the original samples taken from that layer were only due to differences in the degree of evapn. The samples of the 3rd layer have lesser sp. gr., lesser viscosity and contain less tarry asphalt than the samples of the 2nd layer. They give less mazout than those of the 2nd layer, and their mazout is lighter by 0.01-0.02 and possesses less viscosity. It is thus evident that the oil of the 3rd layer is a different oil from that of the 2nd layer since the difference between them is not merely a difference in the degree of evapn. Moreover, all the samples taken from different faults of the 3rd layer are not similar; there must have been at some spots infiltrations of the upper (heavier) oil into the lower layer. The S content is approx. the same for oils of both horizontal layers; when distg. the oils it is found that the S content increases with the b. p. of the fraction, and its max. is in the residue. The acidity and the N content also increase with the b. p. of the fraction. The content of N bases of the samples of the 3rd layer (0.016%) is about 5 times as large as that of the second layer.

BERNARD NELSON

Improved cold point apparatus for mineral oils.

ANON. *Chem.-Ztg.* 52, 520 (1928).—The app. (see fig.) is used as follows: in a first test, the air current sucked by the pump is so regulated that the temp. difference between the ether and the oil is about 5°. In a second test, the temp. difference is regulated at only 1° as soon as the cold point is approached.

A. L. HENNE



Paraffin tar. V. TVERZIN. *Neftyanoe Khozyaistvo* 11, 732-7 (1926); *Chem. Zentr.* 1927, 1, 2380-1.—Paraffin tar is the residue after distn. of 85% of the petroleum from the distn. of Grosnyi petroleum (which contains paraffin). Its f. p. (Holde) is approx. 50° and its d_4^{20} 0.986. It contains ceresin wax, but no paraffin. When oxidized with air at 250-80° it yields asphalt tar, which softens at 85-90°. Paraffin tar contains 10-13% and asphalt tar contains 20% asphaltene (benzene-insol.), which mixed with rosin or turpentine oil forms black varnishes or insulating materials. From the part of the paraffin tar remaining after removal of asphaltenes, vaseline is prepd. To this end it is treated 3 times with 0.5 part of SiO_2 gel which has been first satd. with HCl. The orange-yellow vaseline obtained can be almost decolorized with fuller's earth. The viscosities of the vaseline and of the viscosine are obtained by distg. off the lighter components between 50° and 150°. The difference in viscosities

of these products diminishes greatly with increasing temp. At 150°, at which viscosine is used, its viscosity is only slightly greater than that of vaseline. The advisability of producing viscosine is therefore doubtful. The adsorption of rosin from paraffin tar freed of asphaltenes by filtration through SiO_2 gel was measured. The adsorbing agent can be regenerated 5 times by extrn. with a mixt. of EtOH and C_6H_6 , but further regeneration is possible only through ignition.

C. C. DAVIS

Filter for lubricating oils, etc. (Brit. pat. 281,124) (U. S. pat. 1,677,892) 1. Agitator for mixing oil with chemicals (U. S. pat. 1,678,225) 1.

Cracking oils. HÉLIDOR ROSTIN. Fr. 633,127, Aug. 4, 1926. Oils are passed at a high temp. in the presence of H_2S over metals capable of combining with the S of the H_2S and liberating H, particularly alloys of Cu with Zn, Bi, Al or Fe. The metal may be regenerated by passing H or gases contg. H over it at a higher temp.

Cracking oils, etc. I. G. FARBENIND. A.-G. Fr. 632,850, Mar. 29, 1927. To avoid a deposition of C in cracking oils, the metals Co, Cr, Ni, Mn, W, Mo, Ti, Cb, Ta, Th, U, Cu, Tl and their alloys are used in the heated zone. Catalysts such as oxides or sulfides of Fe, Ni or Co may be used in the process. Cf. C. A. 22, 1847.

Cracking hydrocarbons. HENRI MARCHAND. Fr. 633,133, Aug. 5, 1926. See Brit. 275,642 (C. A. 22, 2222).

Cracking hydrocarbon oils. JAMES M. SCHOONMAKER, JR. (to The Texas Co.). U. S. 1,678,126, July 24. An app. is described in which cracking is inhibited during preliminary heating by applying pressure on the oil additional to the vapor pressure of the oil. After this heating under vapor and additional applied pressure, the oil is cracked by a reduction of pressure and further heating.

Purification of oil gases. CONSTANTIN CHILOWSKY. Fr. 632,499, Apr. 8, 1927. An app. is described for purifying gases produced by the pyrogenic transformation of heavy oils in which the temp. is maintained sufficiently high in the generator to avoid condensation of tars, and the gas is suddenly submitted on leaving the generator to a temp. below that of the condensation of the tars.

Purifying hydrocarbon oils with liquid sulfur dioxide. ALLGEMEINE GES. FÜR CHEMISCHE INDUSTRIE. Brit. 281,337, Nov. 26, 1926. A jet app. is used to produce reduced pressures and to cool the liquefied SO_2 . Cf. C. A. 22, 3042.

Treatment of hydrocarbon oils. HOWARD T. WRIGHT and FRED ESLING. Can. 281,879, July 24, 1928. Oil is preheated under pressure which inhibits vaporization and cracking, then a portion of the oil is sepd. by vaporization under temp. and pressure which inhibit cracking, the vapor is cracked, expanded into a region of relatively reduced pressure and its heavier fractions are condensed. The resulting condensate is an oil with a range of boiling points, substantially included in the boiling point range of the original stock. The condensate is cyclicly retreated.

Treatment of hydrocarbons. LOUIS BOURDELLES. Fr. 632,378, July 23, 1926. To obtain oils, heavy hydrocarbons are desulfurized and hydrogenated simultaneously by causing them to enter in the form of vapor or pulverized and mixed with a large vol. of steam, a vessel contg. divided metals heated to between 350° and 450° at approx. atm. pressure and which are regenerated periodically by changing the compn. of the vapors by the simple operation of valves.

Separating hydrocarbons by centrifuges. SOC. BERGENDORFER EISENWERK A.-G. Fr. 632,602, Apr. 11, 1927. To sep. liquid hydrocarbons by centrifuging from hydrocarbons which solidify on cooling, a liquid which is easily sol. in or readily dissolves the liquid hydrocarbons but does not dissolve the hydrocarbons to be sepd. is added to the mixt. during or after cooling, the sp. gr. of the said liquid being higher than that of the heaviest hydrocarbons to be sepd. C_2HCl_3 , C_2Cl_4 and CCl_4 are suitable liquids and hydrocarbons of a low viscosity may be added to them.

Oxidizing hydrocarbons. RHETHERFORD B. MARTIN (to Minerals Separation North American Corp.). U. S. 1,678,403, July 24. A continuous stream of vaporized hydrocarbon material such as a heavy petroleum distillate mixed with O is passed under the influence of ultra-violet rays to produce oxidation products such as are suitable for use as *frath flotation agents*. An app. is described.

Oil-shale treatment. JAMES N. VANDERGRIFF (to The American Shale Reduction Co.). Can. 282,120, July 31, 1928. Oil shale is heated to a temp. at which the volatile matter is about to be vaporized, then suddenly heated to an increased temp. to drive off the volatile matter in a body. The pyrobitumen or hydrocarbon element of the material treated is cracked, yielding products of lower sp. gr. than if vaporized at normal vaporizing temp. The unsatd. cracked vapors are hydrogenated by the H released from the decompn. of steam generated from the moisture of the shale. The hydrocarbon vapors before leaving the retort are catalyzed by passing through a shower of incandescent spent shale which takes up the excess of C in the vapors. The final product has a high percentage of satd. hydrocarbons.

Apparatus for oil-shale treatment. JAMES N. VANDERGRIFF (to The American Shale Reduction Co.). Can. 282,119, July 31, 1928. App. for the above process is specified.

Refining oils. WALTER A. PATRICK and ERNEST B. MILLER (to The Silica Gel Corp.). U. S. 1,678,298, July 24. An oil such as gasoline or kerosene is treated with a solid adsorbent material, *e. g.*, silica gel, having pores of such size that it will adsorb water vapor to such an extent as to contain not less than about 10% of its own wt. of water when in equil. with water vapor at 30° and a partial pressure of about 22 mm. Hg. An app. is described. U. S. 1,678,299 (E. B. MILLER) relates to app. for similar purposes.

Temperature-control system for separating towers used in petroleum-oil distillation, etc. RICHARD H. CARR and CORNELIUS B. WATSON (to Pure Oil Co.). U. S. 1,678,328, July 24. A preheater is placed in the tower and connections are provided for passing oil stock through the preheater or through a by-pass by automatic control according to the internal temp. of the tower

Mineral oils from peat, lignite, etc. CONSTANTIJN W. M. Bervoets. Fr. 633,623, Apr. 30, 1927. Mineral oils of the nature of gasoline are produced by the action of microorganisms on peat, lignite and other bituminous substances under favorable conditions for the growth of the microorganisms.

Sulfonating oils. I. G. FARBERNIND, A.-G. Fr. 632,633, April 11, 1927. Mineral oils, with the exception of coal tar oils, are sulfonated by means of chlorosulfonic acid. Examples are given of the sulfonation of solar oil, solar oil in solvent naphtha or chloro benzene and yellow oil in tetrahydronaphthalene. The products are wetting, emulsifying, etc., agents.

Heavy oil for furnaces. CHARLES PERDRISAT. Fr. 632,817, April 15, 1927. An app. is described for firing heavy oils for furnaces of different kinds.

Device for regulating oil burners, etc., automatically by temperature and pressure controls. SYNTHETIC AMMONIA & NITRATES, LTD., and F. E. SMITH. Brit. 280,977, June 21, 1926.

Improvements in oil burners. ALPHONSE KESSLER. Fr. 632,702, April 13, 1927.

Burners for liquid fuel, particularly mazout. JEAN A. FAUKE-HERMAN. Fr. 633,487, April 27, 1927.

Burner for insertion into oil wells to increase their production. JAMES B. GARNER and GEORGE B. LEYDEN (to Standard Oil Development Co.). U. S. 1,678,592, July 24

Thermostatic and safety control device for oil burners of domestic or other heating systems. I. E. McCABE. Brit. 281,619, Dec. 6, 1926.

Lubricants. A. HORN. Brit. 281,476, July 19, 1927. Oils such as castor oil are rendered water-sol. and miscible in all proportions with mineral oils by heating to about 300°, allowing the oil to cool, reheating to 100–110° and treating with gaseous HCl in the presence of a catalyst such as anhydrous AlCl₃, blowing with O, air or ozone at 150–200° until free from HCl and further blowing at 200° with addition of an alkali hydroxide, carbonate, percarbonate, or perborate or SnCl₂ or an org. compd. such as resorcinol, pyridine, quinone, hydroquinone, quinoline, hydroxylamine or trimethylamine. The polymerized products thus obtained may be neutralized at 50–60° with inorg. or org. bases and clarified by passing through a filter of clay coated with basic Zn acetate or Zn borate.

Apparatus for the carbonization of wood and for the distillation of wood and other substances. JEAN BONELLO and PIERRE AUBÉ. Fr. 632,377, July 23, 1926.

Lead acetate. MAX KLAR. Fr. 632,866, April 15, 1927. Lead acetate is obtained directly from pyroligneous acid from the dry distn. of wood, and impurities such as lead butyrate, condensation products of aldehydes, etc., are removed by activated carbon. Cf. following abstract.

White lead acetate from pyroligneous acid. MAX KLAR. U. S. 1,678,256, July 24. Pyroligneous acid is neutralized with Pb or a suitable Pb compd. and Pb acetate in solid form is produced from the resulting soln.; the solid Pb acetate is heated to 200–220° to render org. coloring impurities insol. in water, and the material is lixiviated with water, the soln. is filtered and crystn. is effected to obtain purified Pb acetate.

Methyleugenol. WILLIAM G. ANDREWARTHA. U. S. 1,678,416, July 24. The mill waste and topplings of Huon pine timber are treated in a closed vessel with steam under pressure for about 2 hrs. and the vapor is educted and condensed and water is sep'd. from the condensate.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Some recent developments in the cellulose industry. C. J. J. FOX AND L. HALL. *Kunstseide* 10, 10-12(1928).—A review of a paper by Cross and Bevan, giving a general discussion of recent developments in the production of cellulose and in the manuf. and application of various cellulosic products

FREDERICK C. HAHN

Degradation of cellulose by sulfite acid. W. H. BIRCHARD. *J. Soc. Chem. Ind.* 47, 49-52T(1928).—Bleached and unbleached sulfite and rag pulp, bleached soda and straw pulp, alpha fiber, and raw and purified cotton were subjected to regular sulfite cooks in an autoclave. Analysis showed that the purer the original material the greater the decrease in α -cellulose on cooking, raw sulfite losing 1%, pure cotton 30%. Microscopic examn. showed a loss in fiber length of 69-88%, but no loss in diam. Apparently the β - and γ -celluloses (dextrins and anhydro-sugars) present protect the cellulose to a greater or less extent, depending on the amt. present. The sulfite liquor in cooking breaks the cellulose mol. down into 2 compds., called β - and γ -celluloses, the reaction reaching an equil. which is maintained until the β - or γ -cellulose is destroyed. In agreement with this, β -cellulose was not affected by cooking, while pure α -cellulose was so degraded that it could not be analyzed. The fact that poplar pulp does not fit correctly into the above scheme is explained as due to the greater soly. and consequent smaller protective action of the sugars in this pulp. Mention is made of the appearance of microscopic crystals on dried slides of the recooked straw pulp, which had been thoroughly washed with distd. H_2O .

R. H. DOUGHTY

Mercerization of sulfite cellulose. II. V. I. SHAROV. *J. Chem. Ind. (Moscow)* 4, 666 8(1927); cf. C. A. 22, 2837.—Mercerization is influenced by many factors: temp., kind of alkali, presence of salts and of alcs., properties and purity of the cellulose used. KCNS is capable of mercerizing cellulose. When a mixt. of KOH and KCNS is used the effect on cellulose at lower temp. is incomparably greater than that of either of the 2 components of the mixt.; at higher temp., however, the swelling decreases; also the contrary might be supposed in view of the circumstance that hot KCNS can dissolve cellulose. Aq. LiOH has a powerful swelling effect on cellulose. B. N.

Metallic complexes of cellulose nitrate. A. APARD. *Mem. poudres* 23, 63-8 (1928).—See C. A. 22, 1511.

A. J. PHILLIPS

Dyeing celluloid. ADOLF GEBHARDT. *Deut. Färber Ztg.; Dyer, Calico Printer* 60, 34(1928).—A general description is given of the dyeing of celluloid in the production process as well as the finished product.

RUBY K. WORNER

Recent progress in the manufacture of artificial silk. J. V. G. *Rev. chim ind.* 37, 186-400(1928).—The improvements in the manuf. of silk by the different processes now in use are discussed. One of the major factors is the use of a cellulose containing a high percentage of α -cellulose.

P. THOMASSET

Investigations on viscose. MASAHARU NUMA. *Kunstseide* 9, 597-9(1928); cf. C. A. 22, 2464.—A review of work conducted on viscose at the Tokyo Imperial Ind. Lab. (see work of G. Kita and co-workers, C. A. 20, 2247-8; 21, 3457-8). Mention is made of a new method for the detn. of combined S in cellulose xanthate, which consists in treating cellulose xanthate, purified with AcOH and satd. NaCl soln., with NaOCl soln. contg. 5% available Cl and decompg. with HCl (sp. gr. 1.06), and, after 10 min., detg. H_2SO_4 by the usual method.

FREDERICK C. HAHN

Developments in the preparation of calcium-magnesium bisulfite liquors. D. W. STEWART. National Research Council, Ottawa. *Can. Chem. Met.* 12, 227(1928).

E. H.

Methods of analysis for black liquor and sulfite cooking liquors. E. ÖMAN. *Tek. Tidskr. Kemi.* 57, 51(1927).—For NaOH, 25 cc. liquor is dild. to 250 cc. with 95% EtOH and the mixt. allowed to settle to complete clarification (2 to 3 hrs.) 25 cc. of the alc. soln. is titrated with 0.1 N HCl, Nile blue (sulfate) being used as indicator. The purity of the alc. and the time of settling must be followed unconditionally. Other alcs. gave negative results. The usual method of pptg. with $BaCl_2$ is not accurate because of the large amt. of NaOH absorbed by the ppt. This method detcs. NaOH + $\frac{1}{2} Na_2S$ and about 10% of the Na_2CO_3 , if present. For Na_2S , 25 cc. of the alc. soln. is added to 300 cc. water contg. about 5 cc. 2 N acid, and titrated with I. For total S, 25 cc. black liquor is heated with an equal vol. of red, fuming HNO_3 in a distn. flask, and the gases are condensed. Heating is continued until the liquor becomes clear. The distillate is added to the liquor and the S detd. by $BaCl_2$. To show the presence of polysulfides in white liquor, \bar{O} . agitated the liquor with an excess of 95% EtOH in a

separatory funnel and obtained a yellow oil, which was sol. in water and yielded H_2S and free S on acidification. The polysulfides may be estd. by filtering, washing and drying the pptd S. When white liquor and black liquor are mixed a reaction takes place between the org. material in the black liquor and the free alkali in the white liquor. The free alkali concn. decreases considerably, lessening the severity of the chem. action on the fiber. During cooking more org. material is brought into soln., further decreasing the alk. concn. Lightly bound NaOH is liberated, aiding the digestion. The org. material also acts as a buffer for the free alkali. The relative proportions of combined and free alkali vary with the temp. The org. material reacts also with Na_2S , the reaction being dependent upon the time and the concn. of NaOH in the black liquor. C. F. PATERSON

Wood and pulp. ARTHUR ST. KLEIN. *Wochbl. Papierfabr.* 59, Sondernummer 23A, 60-7(1928).—A general review, covering the subjects of wood supply and forest management, the nature of wood substance, cellulose and lignin, and pulping processes, with numerous references to the more recent literature. R. H. DOUGHTY

Pulp freeness and the alkali solubility of pulp slimes. C. G. SCHWALBE. *Wochbl. Papierfabr.* 59, Sondernummer 23A, 107-8(1928).—There is a relation between alkali soly. and Schopper-Riegler freeness, which may be adapted to control testing. Soly. values of pulp beaten to a given freeness in a Lampen mill are lower than when the pulp is treated in the beater. The alkali-sol. material is detd. by treating a 15-g. sample with 30% NaOH and water to make a total vol. of 150 cc. 16% NaOH, pptg. the dissolved material in an aliquot with HNO_3 , adding EtOH, centrifuging for a standard time and measuring the vol. of ppt. R. H. DOUGHTY

Bleaching sulfite pulp. L. RYS. *Papier-Fabr.* 26, 256-60, 269-75, 288-9(1928); cf. C. A. 22, 2271; 21, 1711.—A large no. of lab.-scale expts. have shown that sulfite pulp is most efficiently bleached in 2 stages, using Cl water in the first and hypochlorite in the second, the ratio of active bleaching agent in the 2 stages being 3 or 4 to 1. If the pulp is treated before each stage with alkali equal to 0.5-1.0% of its wt., and thoroughly washed, the action is still further improved. This alk. extn. removes partially bleached products which are only sparingly sol. in water. Milk of lime is as effective an extn. agent as NaOH; SO_2 (sulfite liquor) soln. is valueless; addn. of bleach to the alk. soln. is of no advantage. The entire bleach is carried out at low density, the first stage at room temp., the second at about 35°. The saving in bleach over a one-stage bleaching with hypochlorite may reach 30%, being greater the more difficultly bleachable the pulp. This saving is as great as can be obtained by bleaching in 2 stages at high density. The time also is no longer than for a 2-stage high-density bleach, and might well be shortened further by catalytic acceleration in the second stage (cf. C. A. 21, 1361). The pulp produced is better in color and chem. quality than can be obtained by bleaching with hypochlorite alone under any conditions. The difficultly sol. chlorinated products formed with Cl water are also formed in bleaching with hypochlorite, but in the latter case are rapidly attacked and broken down to sol. compds., because of the alk. and strongly oxidizing nature of the soln. Since the chlorination is greater at high density, an intermediate alk. extn. should be of value in 2 stage high-density bleaching. The bleached pulps were compared for color and general purity by means of their fluorescence in ultra-violet light. Pure cellulose fluoresces a clear blue-violet, while an entirely unbleached pulp is brown. Very fine gradations in purity are clearly evident, and may be recorded photographically. R. H. DOUGHTY

A new liquor tower for sulfite pulp mills. ALOIS DANNINGER. *Wochbl. Papierfabr.* 59, Sondernummer 23A, 76-8(1928).—Three wooden towers 8 ft. in diam. are enclosed by a large iron tower, to combine max. strength, protection from weathering and acid resistance. R. H. DOUGHTY

Sulfite pulp from spruce. RAGNAR BERGQVIST. *Papier-Fabr.* 26, 440-6(1928); cf. C. A. 22, 2054.—The chem. theories of sulfite pulping (cf. Hagglund, C. A. 20, 284; Miller and Swanson, C. A. 20, 1516; Birchard, C. A. 21, 4064; 22, 084) are discussed and correlated. The cooking process may be divided into 3 steps: (I) Penetration period, from start of cook up to 100°, during which the liquor enters the chips, and sulfite addition compds. with lignin are formed. Even penetration is imperative for uniform cooking. (II) Alk. period, alkalinity being due to complete hydrolysis of sulfite to SO_3 and free base above 100° (Birchard). Carbohydrates and ligninsulfonic acids are dissolved during this period. Since temp. and OH-ion concn. are lower than in an alk. cook, the action is milder. (III) Third period, beginning when the free base is all consumed; the pH decreases slowly at first and then more rapidly, during this period, and must be closely followed if "burnt cooks" are to be avoided. The H-ion concn. of the cooking liquor appears to be a controlling factor throughout the

process. According to observations by B., resins are saponified during (II) by the free base, and reprecipitated during (III) on the fibers. The resin content during one cook decreased from 0.70% at 13 hrs. to 0.35% at 16 hrs. and rose to 0.86% at 17½ hrs. It is also suggested that the bad effect of sulfate in cooking is due to deposition of CaSO_4 in the chips, as the temp. rises, preventing penetration. R. H. DOUGHTY

Refiner calculations. N. WUNDERLICH. *Wochbl. Papierfabr.* 59, 374-7 (1928).—A mathematical analysis of the operation of the centrifugal or rotary pulp screen. The inlet conditions are more important than is generally realized; by proper subdivision of the streams at the inlet both capacity and efficiency of the machine can be increased. R. H. DOUGHTY

Synthesis of alpha spruce lignin. PETER KLASON. *Papier-Fabr.* 26, 208-11 (1928).—See C. A. 22, 1361, 1680. R. H. DOUGHTY

The size of paper fibers. PAUL KLEMM. *Wochbl. Papierfabr.* 59, Sondernummer 23A, 88-95 (1928).—The effects of length, diam. and length-diam. ratio on the character of the paper sheet are discussed theoretically. A closer study of this matter is a necessary step toward a better understanding of the relation between pulp quality, paper structure and paper quality. The present paper aims to prepare the way for such a study. R. H. DOUGHTY

Processes for the use of starch in paper. HANS WREDE. *Papier-Fabr.* 26, 301-9 (1928).—A comprehensive discussion of the importance of starch in paper, the characteristics of starch, its prepn for use and application in the beater to a variety of papers. R. H. DOUGHTY

The degree of dispersion and whiteness of paper fillers. RUDOLF LORENZ AND OTTO SEIDEREK. *Wochbl. Papierfabr.* 59, 201-5, 319-21, 377-9, 458-63 (1928).—Size-of-particle distribution for over 30 com fillers, including talc, kaolin, china clay, gypsum and blanc fixe, were detd., by an improved form of Wiegner-Gessner sedimentation app. The theory of such measurements is considered in detail (cf. also Lorenz, C. A. 20, 1519, 2746, for details of app. and theory of filling). Exptl. results confirm the general conception of the importance of degree of dispersion. Fillers may be coagulated by natural salts in water, by alum or by rosin size. NH_4OH tends to peptize them. The electrostatic theory of sizing also applies to filling; alum acts on negatively charged fillers in the same way as on size. Though the actual particle size of gypsum, as detd. in 50% glycerol-water suspension, is as small as that of kaolin, it is impossible to get a very high finish with gypsum fillers, because of rapid self-coagulation in H_2O . The same is true of blanc fixe. It is recommended that the latter be prepd. in the beater by adding rosin size, BaCl_2 and alum in the order named, with Na_2SO_4 if much ppt. is desired. Whiteness, as detd. by the Ostwald half-shade photometer, was, in %: blanc fixe >99, gypsum 99-93, china clay 94-88, kaolin 90-75, talc 95-49, the most highly dispersed samples showing the highest whiteness. The methods described furnish an accurate numerical expression of filler quality. R. H. D.

The change of breaking length, stretch, folding (and bursting) strength, and degree of sizing, with degree of finish of paper. V. POSSANER. *Papier-Fabr.* 26, 453-62 (1928).—Seventeen papers ranging from newsprint to rag bond were tested in the machine-finished condition and after 3, 6, 12 and 18 passes through a calender with a pressure of 150 kg./cm. A com. finish was given by 12 passes. The results are presented in detailed graphical and tabular form. Papers less than 60 g./sq. m. in wt. or those contg. much groundwood show but little increase in strength with increasing finish. Thicker papers and those contg. less groundwood show 5-6% increase in breaking length. Heavy papers, or those made of pure cellulose, whether wood pulp, straw pulp or rag, show increases of 9-11%. Stretch generally increased 20-30%, folds 30-50%, occasionally 100% or more. Burst increased 15-35%. A more free stock, or one contg. more ash, gave a smaller increase in strength values. The degree of sizing decreases to 70-10% of its original value on calendering. This is ascribed to breaking of the thin film of size which coats the fibers: a parallelism is drawn with glaze cracks in pottery. Repeated calendering of a few samples showed that the strength finally reached a const. high value, and did not tend to decrease. R. H. DOUGHTY

Valuation of rosin [for paper manufacture] (FILIPOVICH, TUKHOVITSEV) 26. **Estimation of starches [in bond papers]** (BOAST) 28. **Tanning materials [from cellulose waste]** (CASABURI) 29. **Determination of organic matter in mixed acid and of carbon in nitrocellulose** (CARRIERE, GILBERT) 7. **Determination of nitrites in nitrocellulose** (KOEHLER, MARQUEYROL) 7. **Detection of S and H_2SO_4** (NOLL) 7. **The uneven nitration of nitrocellulose** (BENEDICT) 26. **The status of lignin research** (JONAS) 10. **Apparatus for treating wood** (Fr. pat. 633,458) 20.

Cellulose esters. COURTAULDS, LTD. Fr. 632,636, April 11, 1927. Cellulose to be acetylated is treated with NaOH and then with a phenolic compd. such as phenol or *m*-cresol.

Cellulose esters. CAMILLE DREYFUS. Fr. 632,614, April 11, 1927. Phosphoric acid or mixts. of phosphoric acids with or without other catalysts are used in the esterification of cellulose in place of H_2SO_4 . The esterification is carried out in suspension by adding pptg. agents such as benzene or using the phosphoric acid in such strength that the ester does not dissolve. Fabric contg. cellulose or its derivs. may be so treated, after which it does not rot on exposure to sea air. Fr. 632,615 describes the esterification of cellulose by means of org. acids without the use of anhydrides or chlorides in the presence of a phosphoric acid, especially H_3PO_4 .

Cellulose ethers. CAMILLE DREYFUS. Fr. 632,616, April 11, 1927. Cellulose ethers, such as the Me, Et, Ph ethers or mixed ethers, are formed in the presence of phosphoric acids, especially H_3PO_4 with or without other catalysts.

Cellulose acetate. VERRIN CHEM. IND. A.-G. Fr. 632,619, April 11, 1927. See Brit. 269,543 (*C. A.* 22, 1473).

Cellulose derivative. GEORGE A. RICHTER, MILTON O. SCHUR and ROYAL H. RASCH (to The Brown Co.). Can. 281,946, July 24, 1928. Bleached wood fiber high in α -cellulose is treated with a soln. of caustic soda of mercerizing strength, the mercerized fiber is washed, acidified and again washed, dried and converted into cellulose derivs.

Cellulose derivative. GEORGE A. RICHTER, MILTON O. SCHUR and ROYAL H. RASCH (to The Brown Co.). Can. 281,947, July 24, 1928. Wood pulp high in α -cellulose is formed into nitration tissue, nitrated, the nitrocellulose dissolved and a nitro-cellulose product formed from said soln.

Cellulose for nitrocellulose manufacture. I. G. FARHENIND. A.-G. Brit. 280,922, Nov. 22, 1926. Cellulose is prepd. for use in making nitrocellulose by heating with water at 140–170° for a prolonged time (suitably 6 hrs.) to enable the production of nitrocellulose of desired viscosity characteristics suitable for use in making *varnishes*.

Drying cellulose films. ERNEST MULLER. Fr. 633,339, April 26, 1927. The films are dried by passing over rollers heated with H_2O , etc., and placed close together so that the surface in contact with one roller becomes exposed to the air on the next.

Swelling and loading treatment of cellulose ester films, etc. H. DREYFUS. Brit. 281,084, May 26, 1926. Fibers, films or ribbons of cellulose ester compn. or water-resistant cellulose ethers or condensation products of cellulose with polyhydric alcs. are rendered more absorbent of loading substances and their resistance to "laddering" is increased by preliminary treatment with swelling agents such as aq. glycolic acid, lactic acid, EtOH, acetone, diacetone alc., diacetyl, phenol, hydroquinone or NH_4CNS or other suitable thiocyanate; they may be further treated with loading reagents such as salts of Sn, Zn, Al, Bi, W or Sb followed by treatment with tannic acid, a phosphate or silicate or other pptg. agent.

Reduction of viscosity of cellulose esters. CAMILLE DREYFUS and GEORGE SCHNEIDER (to Camille Dreyfus). Can. 282,185, July 31, 1928. Cellulose acetate of low viscosity is obtained by acetylating cellulose in a porcelain vessel with a mixt. of 300 parts of AcOH, 400 parts of Ac_2O and 5 to 15 parts of H_2SO_4 contg. 0.2 part of $Fe(OAc)_2$, adding 25 parts of H_2O_2 (3%) after the completion of the acetylation and allowing the cellulose acetate to hydrolyze.

Increasing dielectric strength of cellulose ethers and esters. M. OW-ESCHINGEN. Brit. 281,663, Dec. 1, 1926. Films are soaked in oils such as paraffin oils, transformer oils or boiled linseed oil, preferably with accompanying use of vacuum and pressure.

Hydrating cellulose fiber. JUDSON A. DE CEW. Can. 282,228, Aug. 7, 1928. Cellulose fibers are hydrated in a beater of the Jordan type, by thickening the stock at an air dry concn. of over 4 parts of stock to 96 parts of H_2O and forcing it through the beater.

Fiber high in α -cellulose. GEORGE A. RICHTER (to Brown Co.). U. S. 1,678,230, July 24. See Can. 278,540 (*C. A.* 22, 2839).

Artificial silk. WILLIAM P. DREAPER. Fr. 632,609, April 11, 1927. In the spinning of artificial silk with a centrifuge box, collecting bobbins with a transverse guide are provided to which the thread is directed by hand while the box is being changed and a current of soln. is caused to descend the guide funnel to facilitate the restart of thread to the box.

Artificial silk from viscose. BRITISH DYESTUFFS CORPORATION, LTD., AND A. J. HALLWOOD. Brit. 281,117, Nov. 30, 1926. The caustic alkali customarily used in the prepn. of the viscose soln. is replaced, wholly or in part, by an org. sulfonium hydroxide such as Me_2SOH .

Artificial silk from viscose. L. LILIENFELD. Brit. 281,351, June 29, 1926. The process described in Brit. 274,521 (C. A. 22, 2273) is modified, when viscoses contg. not more than 5% of NaOH are employed, by using a coagulating bath contg. not less than 45% nor more than 55% H_2SO_4 . Various other details are given.

Artificial silk from viscose. L. LILIENFELD. Brit. 281,352, June 30, 1926. The extensibility of "viscose silk" or the like which may be produced according to the processes described in Brit. 264,161 (C. A. 22, 165), Brit. 274,521 (C. A. 22, 2273) and Brit. 274,690 (C. A. 22, 2273) is increased by treating them with a mercerizing agent such as an alkali hydroxide, alkali sulfide, H_2SO_4 , HNO_3 , H_3PO_4 , HCl, $ZnCl_2$ or a thiocyanate.

Rayon. GEORGE A. RICHTER (to Brown Co.). U. S. 1,678,354, July 24. See Can. 279,610 (C. A. 22, 2840).

Artificial thread. FREDERICK D. LEWIS (to Courtaulds, Ltd.). Can. 282,326, Aug. 7, 1928. In the manuf. of artificial threads from cellulose esters or cellulose ethers by a dry spinning process the soln. at the spinning nozzle and the air in the spinning chamber in the vicinity of the nozzle is maintained at the same temp. by subjecting the said soln. and the whole of the air in the spinning chamber to the action of the same supply of heat.

Artificial thread. CHARLES F. TOPHAM (to Courtaulds, Ltd.). Can. 282,327, Aug. 7, 1928. A soln. of cellulose acetate in acetone is projected vertically downward through a jet contg. a no. of fine holes into an atm. of warm air by a sudden considerable increase of pressure over that normally applied to produce artificial threads.

Artificial fibers and bands from viscose in acid baths. NAAMLOOZE VERNOOTSCHAP NEDERLANDSCHE KUNSTZIJDEFABRIEK. Dutch 18,030, May 15, 1928. Small addns. of Ni or Co salts (1%) to the usual sulfuric acid and sulfate spinning bath give in the product a greater affinity for dyes.

Apparatus for producing artificial silk by the stretch spinning method. ALBERT WAGNER (to Firm of Fr. Kuttner). U. S. 1,677,940, July 24.

Apparatus for maintaining uniform evaporation conditions in chambers of a plant for dry-spinning artificial silk. COURTAULDS, LTD., F. T. WOOD and E. G. TURNEY. Brit. 281,058, Oct. 11, 1926.

Pulp bleaching. CARL B. THORNE. Can. 282,025, July 24, 1928. Pulp mixed with a bleaching agent and H_2O is fed to the bleaching zone, and bleached at a d. of pulp 15 to 20%, and subsequently mixed again with the bleaching agent and H_2O and bleached at a d. of pulp of 10 to 5%. Cf. C. A. 22, 164.

Sulfite liquor. GEORGE A. RICHTER (to The Brown Co.). Can. 281,949, July 24, 1928. A composite cooking liquor for the production of high-grade sulfite pulp contains 1% combined SO_2 in the form of $Ca(HSO_3)_2$, about 1% combined SO_2 in the form of $NaHSO_3$ and about 5% free SO_2 .

Treatment of spent soda liquor. W. M. WALLACE and J. MACGREGOR. Brit. 281,035, Sept. 13, 1926. Spent soda liquors such as are obtained in the treatment of straw, grass or bamboo are calcined and discharged on a traveling furnace grate as described in Brit. 217,468 (C. A. 19, 383) and the calcined product is then passed to a dissolver, where large pieces are broken up; the soln. is led to a tank and thence to causticizing pots.

Treating "talloel." A. SCHULTZE & Co. (to Oel- und Fett-Chemie Ges.). Brit. 281,637, Dec. 4, 1926. A low absolute pressure such as 4 mm. or less is used in the sepn. of "talloel" into industrial fatty acids and resinic acids by vacuum distn., with or without steam. Fractionating columns are preferably used and the distn. is stopped when resinic acids begin to pass over. Cf. C. A. 22, 2676.

Paper. JOSEPH MCL. CATHCART. Can. 281,889, July 24, 1928. Water- and blood-proof paper is produced by introducing paper pulp into a beater, heating the pulp with live steam to 100°, adding 5% paraffin wax, and then passing the stock to a paper machine for completion in the regular manner.

Apparatus for drying paper webs, etc. J. G. OLSSON (to Aktiebolaget Svenska Flaktfabriken). Brit. 281,339, Nov. 29, 1926.

Apparatus for indicating and recording the moisture content of paper webs passing over drying rolls, etc. GEORGE S. WITHAM, JR. U. S. reissue 17,049, July 24. Original pat. 1,626,060 was issued April 26, 1927 (C. A. 21, 2063).

Suction rolls for paper-making apparatus. BELLOIT IRON WORKS. Brit. 281,590, June 24, 1926.

Removable type Fourdrinier paper machine. EARL E. BERRY (to Beloit Iron Works). U. S. 1,678,170, July 24.

Washable paper. LOUIS R. MÉCRE. Fr. 633,121, Aug. 4, 1926. See Brit. 275,617 (C. A. 22, 2274).

Waterproofing paper. J. REID (to Scutan Co.). Brit. 281,316, Nov. 26, 1926. Flexible sheets are produced by passing thin paper through a bath of bituminous material heated to about 120° or higher and removing it before it becomes completely satd. The waterproofing bath may be formed of "mineral rubber" 100, scale wax 10 and montan wax 10 parts.

Waterproofed paper. H. KUPPEL. Brit. 281,655, Dec. 2, 1926. Paper is treated with linseed oil, varnish or other waterproofing agent and is crimped to render it more resistant to tearing. It may be further reinforced by fabric, threads of jute or cotton, or by uniting one sheet of paper with another.

System of watermarking writing paper with parallel lines, etc. HENRY G. PROSSER (to Bermingham & Prosser Co.) U. S. 1,677,930, July 24.

Insulating papers. FELTEN & GUILLEAUME CARLSWERK A.-G. Fr. 633,540, Apr. 28, 1927. In making insulating papers the H_2O in the pulp is replaced by a solvent for phenolic resins, e. g., alc., and solns. contg. phenolic resins are added, and the resins are pptd. on the fiber by H_2O . Fr. 633,541 describes a process in which the resins are formed during the manuf. of the paper by adding phenols and aldehydes in the correct proportion to the pulp dild. in water.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Explosives and their properties. I. GRAGEROFF. *Mining J.* (U. S.) 11, 134 (1928).—A discussion of the many known properties which enter into complete utilization of the potential power of explosives. E. M. SYMMES

The hygroscopic properties of smokeless powders. R. DIVIS. *Z. ges. Schiess-Sprengstoffw.* 23, 169 (1928).—The hygroscopicity of various types of smokeless powders was studied. Exact detns. are not practicable because of volatilization of residual solvent. Powders in the form of flakes with high content of nitroglycerin were the least hygroscopic. The higher the nitrocellulose content, the greater the hygroscopicity. Absorption of moisture begins at the surface and progresses toward the interior, while loss of moisture progresses in the reverse direction; hence, there is a constant shifting of moisture content with changes in temp. It has not been found possible to eliminate hygroscopicity by incorporation of nonhygroscopic materials; such changes in compn. alter the rate of change but not the degree. Ballistic stability is strongly influenced by evapn. of nitroglycerin. C. G. STORM

An example of the influence of climate on projectile velocity and gas pressure (of smokeless powder). FRANZ WENZEL AND W. PACHMANN. *Z. ges. Schiess-Sprengstoffw.* 23, 12-7 (1928).—Expts. were conducted at the Bogota munitions plant to det. the effect on the velocity and pressure, with a uniform charge of smokeless powder in 7-mm. rifle ammunition, of variations in atm. temp. and pressure such as exist in Columbia, where altitude varies from sea level to about 9000 ft. A uniformly loaded lot of ammunition was ballistically tested at 5 different locations where barometric pressure varied from 546 mm. to 721 mm. and temp. from 14° to 30°. Correction being made for the influence of atm. pressure, a change of 1° in temp. causes a change of 0.9 in velocity and 11.4 atm. in chamber pressure. Increased uniformity in ballistics and a saving of powder can be obtained by a proper adjustment of charge for each climatic zone in which the ammunition is to be used. The tests are described in detail and results of all firings tabulated. C. G. STORM

Dinitrobenzene as a substitute war explosive. BELOV. *Vojensko-Technické Zprávy*, No. 2 (1928); *Z. ges. Schiess-Sprengstoffw.* 23, 170 (1928).—Although not suitable for use alone as a military explosive, dinitrobenzene in mixt. with TNT is equiv. to TNT in explosive effect, and such mixts. were largely used by Germany during the World War. The manuf. of DNB is described. C. G. STORM

The use of thermite for the blasting of ice jams. J. SOUHRADA. *Vojensko-Technické Zprávy*, No. 2 (1928); *Z. ges. Schiess-Sprengstoffw.* 23, 170 (1928).—An account of unsuccessful attempts to break an ice jam on the Danube in Jan., 1928. Three charges from 20 to 62.1 kg. of thermite were used without result. Seven hrs. later the jam broke 500 m. up-stream following a river rise of 1.62 m. (cf. *J. Franklin Inst.* 203, 611-34). C. G. STORM

The action of the thermite reaction in breaking up ice jams. N. HAMPL. *Vojensko-Technické Zprávy* No. 2 (1928); *Z. ges. Schiess-Sprengstoffw.* 23, 170 (1928).—The theory of Barnes (*J. Franklin Inst.* 203, 611-34), that the effect of thermite on ice jams

is largely due to the release of heat energy, is disputed. H. believes the main component to be the wave motion set up by the reaction, and specifies optimum form of container for the charge and its proper location in the ice. C. G. STORM

The Abel test. A. KOEHLER AND M. MARQUEVROL. *Mem. poudres* 23, 11-8 (1928).—From tests on a number of lots of pyroxylin and guncotton all of which contained small amts. of CaCO_3 , it is indicated that the latter reacts with the nitrocellulose to form Ca nitrite which decomposes to NO. Therefore the higher the percentage of moisture in the nitrocellulose before drying, the greater the decompn. and the lower the stability. During the first period of drying the nitrite is formed and during the last period of drying it is decompd. Decarbonated powders are unaffected while moist powders contg. CaCO_3 stored at ordinary temps. give a lower stability test with time. Drying in a vacuum does not decompose the nitrite and it may be removed by washing with pure cold water. It is concluded that the Abel test is worthless for measuring the stability of powders and it is recommended that (a) it be replaced by the Bergmann-Junk test or the coeff. of exchange (C. A. 22, 2275); (b) that it be used as a control for the elimination of nitrite formed during manuf.; (c) that specimens be washed with cold distd. water dried in a vacuum and tested at 77° or higher and (d) that specimens be decarbonated and the moisture content adjusted to 30% before drying. [The conclusion applies to powders purified with hard water or where CaCO_3 is added during beating.—ABSTR.] A. J. PHILLIPS

The fusibility of mixtures of picric acid and nitronaphthalene. M. JOVINET. *Mem. poudres* 23, 36-42 (1928).—A eutectic melting at 49.8° is formed from a 16-84 mixt. of picric acid and nitronaphthalene. Cooling and melting curves as well as phys. appearance showed the presence of a combination of 1 mol. of picric acid with 1 mol. of nitronaphthalene (57-43), which melts and dissociates at 71°. A. J. PHILLIPS

Estimation of camphor in powder. J. DESMAROUX. *Mem. poudres* 23, 43-53 (1928).—A method based on the measurement of the surface tension of aq. solns. of camphor. A quantity of powder corresponding to 0.15-0.2 g. of camphor is saponified and decompd. by NaOH or KOH and distd. into a long-necked flask with a mark at the 300-cc. level. About 150 cc. of distillate is collected in the flask, which is surrounded by a mixt. of ice and water and the wet pasty camphor is brought into soln. by filling to the mark with water and shaking vigorously. The surface tension is measured by the wt. of a falling drop from a capillary tube which forms a drop in 10-12 secs. The tip of the capillary is cone-shaped and the end is polished optically flat. The app. was calibrated with refined natural camphor, artificial camphor and fenchone. It was found that the variation in wt. of the drops was not a linear function of the concn., the results being represented by a parabolic curve. From a mathematical discussion of the errors involved it is concluded that accurate results are obtained within the above-mentioned concns. of camphor. The presence of nitroglycerin and of diphenylamine in the powder had no effects on the results, but the soly. of the substituted ureas and their effect on surface tension prevent the method being used on powders in which they are present. A. J. PHILLIPS

The fixation of camphor by nitrocellulose. J. DESMAROUX. *Mem. poudres* 23, 54-62 (1928).—Absorption curves made by measuring the refractive indices of solns. of camphor in a satd. hydrocarbon, in contact with nitrocellulose, showed the curves to be analogous to those given by the substituted ureas (cf. C. A. 17, 3606). Camphor is not absorbed below a crit. concn. and above it the nitrocellulose is satd. with camphor. There is a discontinuity in absorption corresponding to a crit. concn. A more direct method for measuring the absorption was found by dissolving nitrocellulose in ether-alc. with varying concns. of camphor, prep. thin films on glass of the gelatinized material, heating $40 \times 40 \times 0.15$ mm. squares of the film in an oven at 50° and measuring the loss in wt. as well as the rate of loss. The latter was plotted against the concn. of camphor. Above a certain concn. the rate increases sharply. This indicates the formation of a complex between nitrocellulose and camphor. It was found that the concn. limit increased with the N content of the nitrocellulose. The presence of nitroglycerin increased the rate of volatilization of the camphor, so that the two cannot be used in the same powder. A. J. PHILLIPS

Determination of alcohol, ether and water in the solvent eliminated from powder during drying. L. A. CHENAL. *Mem. poudres* 23, 4-6 (1928).—Absorption in an atm. of N is used in order to prevent the oxidation of alc. absorbed by KOH. N is generated by the action of Cu turnings on NH_4OH , purified and conducted to the absorption app. This consists of a bulb filled with pumice stone and H_2SO_4 of known vapor pressure, so that either wet or dry N may be employed, a tube contg. the powder to be tested, a K_2CO_3 tube to absorb H_2O , a KOH tube to absorb EtOH , a U tube with pumice-

H₂SO₄ for Et₂O and a H₂SO₄ safety tube. One l. of N is passed through the powder at a known temp. and then by means of a 3-way stopcock and a side tube, a 2nd l. is passed through the saturator, by-passed around the powder tube and passed through the remaining tubes in order to clean them out. A. J. PHILLIPS

Decomposition products of amyl alcohol in poudre B. M. MARQUEYROL. *Mem. poudres* 23, 7-10(1928).—Characteristic qual. tests on Poudre B of varied compn. which has been heated at 75° for 140-170 hrs. and then exposed to air for 11 yrs. indicated that the normal decompn. of nitrocellulose in the presence of amyl alc. gives rise to the formation of amyl nitrite. This further decomposes to valeric acid, amyl valerate and amyl nitrate. A. J. PHILLIPS

Distribution of diphenyl in poudre B. J. DESMAROUX. *Mem. poudres* 23, 33-5 (1928).—Analysis of material scraped from the surface and interior of both green and dried grains showed that there is a greater concn. of diphenylamine at the surface than at the center of the grain, that it takes place before solvent recovery is completed and that it is caused by the deposition of diphenylamine from the solvent which is diffusing from the center to the surface and evapng. A. J. PHILLIPS

Determination of organic matter in mixed acid and of carbon in nitrocellulose (CARRIERE, GUIBERT) 7. Determination of nitrite in nitrocellulose (KOEHLER, MARQUEYROL) 7. The uneven nitration of nitrocellulose (BENEDICT) 26. Nitration process in general and nitration of glycerol (MASHKIN) 10. Metallic complexes of cellulose nitrate (APARD) 23.

NAOUM, PHOKION: **Nitroglycerine and Nitroglycerine Explosives.** Translated by E. M. Symmes. Vol. I of the World Wide Chemical Series. Baltimore, Md.: The Williams & Wilkins Co. 470 pp. \$7. Reviewed in *Chemicals* 30, No. 7, 8(1928).

Safety device for protecting oil-storage reservoirs from lightning. GEORGE L. TICEHURST. U. S. 1,678,539, July 24.

Safety device for drawing oil from tanks when ignited. HENRY T. SCOTT and LUCIEN E. RONE. U. S. 1,678,605, July 24. A fusible device is connected to a lever which operates a draw-off valve.

Electric fuses. W. ESCHBACH and W. FRIEDRICH. *Brit.* 281,239, Nov. 23, 1926. Igniting pellets for elec. fuses are made of material having such a short period of combustion that dynamite and fire damp will not be exploded by the material, e. g. di and tri-nitrophenols.

Protector (of a soft rubber composition) for blasting fuses. GEORGE A. LIVERMORE (to B. F. Goodrich Co.). U. S. 1,678,257, July 24.

Storing inflammable liquids or gases under pressure. SOC. L'ACÉTYL. *Fr.* 633,637, Apr. 30, 1927. Peat used in storing liquids or gases, especially dissolved acetylene, has a degree of humidity between 2 and 19% so that it does not become dusty and is not too porous to risk danger in case of explosion, and the spaces between the grains are sufficiently small to prevent an explosion centering in these spaces

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Action of ultra-violet rays upon cotton dyes. EMILIO CRISPI. *Atti congresso nat. chim. pura applicata* 2, 833-5(1926).—Many of the hypotheses regarding the nature of light and its action are insecurely founded. There is no absolute parallelism between the action of solar radiation and ultra-violet radiation. Apparently the bleaching action of ultra-violet rays is due solely to their physico-chem. nature and not to ozone formation. L. T. F.

Beam dyeing. F. H. MCCOY. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 202-3; *Am. Dyestuff Rept.* 17, 474-5. L. W. RIGGS

Dyeing cotton with alizarin dyestuffs. A JACKSON. *Dyer, Calico Printer* 59, 226-7, 252-3; 60, 16-7, 29(1928).—Practical procedures, including formulas, are given. RUBY K. WORNER

Treating and dyeing ramie. FRED GROVE-PALMER. *Dyer, Calico Printer* 59, 248-50(1928).—The cultivation of ramie in different countries, its processing and its use for textile fabrics are briefly considered. RUBY K. WORNER

The dyeing of sisal hemp. FRED GROVE-PALMER. *Dyer, Calico Printer* 60, 53 (1928); cf. C. A. 22, 2276.—A brief discussion of the cultivation and uses of sisal hemp and a description of the general procedures for dyeing it with basic, direct or acid dyes are given.

Dyeing of natural silk. A. THOMSON. *J. Soc. Dyers Colorists* 44, 202-4 (1928).—Choice of dyes and methods of application to the fiber are discussed. L. W. RIGGS

Dyeing of acetate silk and of mixed fabrics. G. RUDOLPH. *Kunstseide* 10, 53-5 (1928).—A discussion of the use of the dyes manufd. by the I. G. Farbenind. A. G., Cellit fast dyes, Celliton and Celliton fast dyes and Cellitazoles. F. O. H.

Rayon dyeing and later processes. ANON. *Textile World* 74, 187-9 (1928).—Suggestions are given for the practical dyer. RUBY K. WORNER

Dyeing and waterproofing of viscose rayon. G. RUDOLPH. *Kunstseide* 10, 13-4 (1928).—Details are given for methods of dyeing rayon with Sirius colors. A procedure is given also for waterproofing rayon fabrics using Ramasit W. D., a recent product of the I. G. Farbenind. A. G. that is rich in paraffin. F. C. H.

Dyeing lenos and nets. D. WILLIAMS. *Dyer Calico Printer* 59, 251 (1928).—Practical methods, with formulas, are given. RUBY K. WORNER

Union dyeing from a garment dyer's point of view. A. J. CROCKATT. *J. Soc. Dyers Colorists* 44, 197-201 (1928).—This subject involves the handling of an endless variety of conditions and combinations of fibers, cloth, stains, faded materials and dyes. Procedures for many particular cases are given. L. W. RIGGS

Fastness: The silk dyer's problem. RAYMOND CURTIS. *Proc. Am. Assocn. Textile Chem. Colorists* 1928, 205-8; *Am. Dyestuff Rept.* 17, 477-80. L. W. R.

Printing mixture cloths of cotton or viscose and celanese. W. BENNETT. *Dyer, Calico Printer* 59, 204-5, 230 (1928); cf. C. A. 22, 872.—Practical directions are given for printing solid, bi-color and multi-color effects on mixed fabrics of cotton or viscose and cellulose acetate. RUBY K. WORNER

Dyeworks alums from wastes. E. T. ELLIS. *Dyer, Calico Printer* 59, 212-3, 236-7 (1928).—Methods of prepn. are described. RUBY K. WORNER

Starch-converting enzymes used in the textile industries. ROBERT P. WALTON. *Am. Dyestuff Rept.* 17, 461-2 (1928).—The various trade diastases are classified according to origin as malt, pancreatic, fungus and bacterial. The fatal temps. for the first 3 are 80°, 55° and 82°, resp. Optimum temps. range from 10° to 25° lower than fatal temps. The optimum p_H for malt diastase ranges from 4.0 to 5.0, for pancreatic diastase about 7.0, fungus diastase 5.4, while bacterial diastases are effective in both acid and alk. solns. The presence of salts has an activating and stabilizing effect on the diastases. L. W. RIGGS

Structure of natural silk. P. P. V. VEIMARN. *Kolloid-Z.* 45, 162-4 (1928).—From an ultramicroscopic study of the phenomena following the fiber cleavage in the swelling and dispersion of silk fiber in salt solns., V. states that the silk fiber becomes divided into small fibrils whose dimensions are never over 200 μ , that is, they are of colloidal dimension. This study also confirms V.'s theory that the vectorial field of the dispersed particles of fibroin possess especially strong cohesion at both ends. FREDERICK C. HAHN

Acetate rayon in fabrics made from mixed filaments. JAR. FRANĚK. *Chem. obzor* 3, 12-5 (1928).—After a short historical sketch and description of characteristics of acetate rayon (I) some newer methods of dyeing are proposed. The dyeing of I differs widely from the dyeing of other sorts of rayon and for this reason a combination of 2 or 3 different fibers (cotton, viscose and I, wool and I, silk and I, cotton, silk and I and finally semiwool (wool with cotton) and I) causes the production of two-color effects. By using certain dyes one color can be obtained. JAR. KUČERA

Some possible applications of p_H control in the cotton industry. CHARLES E. MULLIN. *Proc. Am. Assocn. Textile Chem. Colorists* 1928, 197-200; *Am. Dyestuff Rept.* 17, 469-72.—An address. L. W. RIGGS

The relation between the structure of organic fibers and their elastic qualities. R. O. HERZOG. *Naturwissenschaften* 16, 420-1 (1928).—The size of the fibrils in various vegetable or animal fibers is about 0.2 to 0.4 μ ; these are considered to be formed by directional coagulation from the fiber-forming sol, the primary unit being crystallites of the dimension 100 A. U. From an equation of Becker, $D\eta = \alpha/8\phi\delta^2$, where D is the coeff. of internal diffusion, η viscosity of gel, α material const., ϕ torsion modulus, δ diam. of colloidal particles in gel, indications as to which unit det. the elastic properties may be derived. By using a δ of about 10^{-6} cm. (crystallite), $\phi = 10^{10}$ dynes per sq. cm. (empirical values are given for 10 fibers), α is found to be of the order 10^{-4} . B. J. C. VAN DER HOEVEN

Identification of the reduction products of azo dyes (UBNO) 10. Sulfonation of textile oils (FLETCHER) 27. Color (PIERCE) 2. Cleaning textile-material boilers (U. S. pat. 1,678,089) 1. Device for delivering measured quantities of dyes, etc. (Brit. pat. 281,645) 1.

Handbuch des Zeugdrucks. Edited by Georg Georgievics, *et al.* 1fg. 2. Leipzig: Akademische Verlagsgesellschaft. Pp. 193-512. M. 32. Cf. C. A. 22, 1049.

Jahrbuch für Spinnerei, Weberei und Textilchemie. Edited by Karl Schams. Altenburg (Thür.): F. O. Müller. 864 pp. Cloth, M. 16.

CASSON, HERBERT N.: **The Story of Artificial Silk.** London: Efficiency Mag. 130 pp. 5s. net.

CHAPLET, A.: **Pour le blanchisseur.** Formules, recettes, tours de Main (trues) méthodes et procédés du praticien. Paris: Dunod. 176 pp.

HENGST, GUIDO: **Kaseinfarben und Kaseinemulsionsfarben und ihre Verarbeitung.** Munich: Callwey. 46 pp. M. 1.50.

McMYN, J. W., and BARDSEY, J. W.: **Bleaching, Dyeing, Printing and Finishing for the Manchester Trade.** New York: Pitman. 238 pp. Cloth, \$1.75.

MONFLIER, MARCEL: **Traité théorique et pratique de tissage du coton.** Rouen: Vallée. 243 pp.

Dyes. BRITISH DYE STUFFS CORP., LTD., and MORDECAI MENDOZA. Fr. 632,497, Apr. 8, 1927. New pyrazolones are produced when the hydrazines obtained by reducing diazo compds of the amino derivs of 3-carboxy-4-hydroxydiphenyl sulfide described in Brit. 260,058 (C. A. 21, 3468) are condensed with β -ketonic esters; thus the hydrazine from 2'-amino-3-carboxy-4'-hydroxy-4'-sulfodiphenyl sulfide is condensed with acetoacetic ester and oxalacetic ester to yield the corresponding 3-methyl- and 3-carboxypyrazolones. Azo dyes are obtained by coupling the above pyrazolones with diazo compds; thus, the 3-methylpyrazolone from 2'-amino-3-carboxy-4'-oxy-4'-sulfodiphenyl sulfide is coupled with diazotized sulfanilic acid, 2,5-dichlorosulfanilic acid, naphthionic acid, aminoazobenzene and benzeneazo-1-naphthylamine-6(or 7)-sulfonic acid and with tetra-azotized benzidine, and (2) the corresponding carboxypyrazolone is coupled with diazotized sulfanilic acid, 2,5-dichlorosulfanilic acid and naphthionic acid.

Dyes. C. M. BARNARD and BRITISH ALIZARINE CO., LTD. Brit. 281,114, Jan. 6, 1927. Dyes suitable for use on cellulose acetate or other cellulose esters are formed either by fusing citric acid with *p*-aminobenzeneazo- β -naphthol or other suitable azo dye contg. one or more free primary amino groups but no sulfonic group or by fusing an aromatic compd. such as *p*-nitroaniline with citric acid and then converting the product into an azo dye. Yellow and orange-brown shades are produced.

Dyes. BRITISH ALIZARINE CO., LTD., W. H. DAWSON and P. BECHIN. Brit. 281,016, Aug. 26, 1926. Non-dyeing by products obtained in the prepn of violanthrone and isoviolanthrone by alk. condensation of benzanthrone or Bz-1-halobenzantrones are converted into dyes by a further treatment with alkali at high temp.

Dyes. BRITISH DYE STUFFS CORP., LTD., JAMES BADDILEY, PERCY CHORLEY and RAINALD BRIGHTMAN. Fr. 632,740, Apr. 13, 1927. Silk fabric of regenerated cellulose, such as viscose, is dyed by the dyes obtained by combining in acid or alk. soln. 2-amino-8-naphtholsulfonic acid or their *N*-substituted derivs with diazo or tetrazo compds. Examples and the colors obtained are given.

Dyes. BRITISH DYE STUFFS CORP., LTD., and SIDNEY THORNLEY. Fr. 633,089, Apr. 22, 1927. The vat dyes prepd. by the alkali fusion of benzanthrone-sulfonic acids are treated with hydroxylamine or one of its salts to give new black or gray vat dyes. The vat dyes described in Fr. 632,671 (cf. following abstract) are so treated. According to Fr. 633,090 new vat dyes are prepd. by alkylation instead of treatment with NH_2OH . The dyes may be oxidized, or oxidized and reduced before alkylation.

Benzanthrone derivatives. BRITISH DYE STUFFS CORP., LTD., JAMES BADDILEY, ARNOLD SHEPHERDSON and SIDNEY THORNLEY. Fr. 632,671, Apr. 12, 1927. Benzanthrone is sulfonated by means of concd. H_2SO_4 or fuming H_2SO_4 with or without catalysts such as Hg. On fusing with alkalis vat dyes are obtained which readily form leuco compds. They also form starting points for new dyes. Examples are given of the sulfonation of benzanthrone and methylbenzanthrone. Cf. C. A. 22, 2470.

Dyes. I. G. FARBENIND., A.-G. Brit. 280,886, Nov. 18, 1926. Vat dyes are made by action of alk. reagents on benzanthrone-1-aminoanthraquinones alkylated at the N atom, *e. g.* *N*-methyl-Bz-1-benzanthronyl-1-aminoanthraquinone may be

heated at 98° with alc. KOH to form a product dyeing cotton in blue-green shades from the vat. *N*-methylbenzanthranyl-1-aminoanthraquinones are made by alkylating benzanthranyl-1-aminoanthraquinones or by condensing halobenzanthrones with 1-alkylaminoanthraquinones.

Dyes. I. G. FARBENIND. A.-G. Fr. 632,490, April 8, 1927. New coloring matters of the anthraquinone series are produced by introducing into the anthraquinone mol. hydroaromatic amine radicals or amino cyclic paraffins, such as hexahydroaniline or hexahydrotoluidine, *o*-aminocyclohexanol, pentamethylenamine and bornylamine. The compds. color wool blue to bluish green shades fast to light. An example is given of the prepn. of 1-amino-4-hexahydroanilinoanthraquinone-2-sulfonic acid from 1-amino-4-bromoanthraquinone-2-sulfonic acid and hexahydroaniline.

Dyes. I. G. FARBENIND. A.-G. Fr. 632,637, April 11, 1927. An alkylcellulose is added to insol. or slightly sol. dyes to preserve them in a fine state of division.

Dyes. I. G. FARBENIND. A.-G. Fr. 632,887, April 15, 1927. Artificial silk made from cellulose esters and ethers is dyed by means of monoazo dyes produced by coupling a diazo compd. of the benzene or naphthalene series contg. at the most one sulfo group, with a phenol substituted in the *p*-position.

Dyes. I. G. FARBENIND. A.-G. Fr. 633,109, June 25, 1926. Sol. dyes contg. at least 2 nitro groups in the mol. are prepd. by reaction of aromatic nitro compds. contg. an exchangeable halogen, except 1-halo-2,4-dinitrobenzene, with a mol. of 4-amino-diphenylamine or its derivs. or substitution products. Examples are given, all of which contain sulfonic groups. The products dye wool and leather.

Dyes. FABRIQUE DE PROD. CHIM. ROHNER SOC. ANON. PRATTELN. Fr. 632,577, Aug. 2, 1926. See Brit. 275,147 (*C. A.* 22, 2278).

Dyes. L. B. HOLLIDAY AND CO., LIMITED, and CECIL SHAW. Fr. 633,292, April 25, 1927. Black vat dyes which dye cotton violet and greenish blacks are prepd. by treating dibenzanthrone with energetic oxidizing agents, such as a dichromate, permanganate or chlorate in H₂SO₄. They probably contain 6 atoms more of O than dibenzanthrone as compared with the already known oxidation products contg. 4 atoms more of O than dibenzanthrone. Cf. *C. A.* 22, 2470.

Dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 633,473, April 27, 1927. Sulfur dyes are prepd. by the sulfuration of the leuco derivs. of indophenols obtained by condensation of nitrosophenols with carbazole, or its *N*-substituted alkyl derivs. or a mixt. of carbazole with these derivs. in the presence of an aliphatic N compd. such as urea, dicyanodiamide, semicarbazide, guanidine or its salts, thiourea, NH₄CNS, acetamide or malonamide. Examples are given.

Dyes. A. ZINKE (to F. Bensa). Brit. 281,281, Nov. 26, 1926. Chloroperylene quinones are made by treating highly chlorinated perylenes with fuming sulfuric acid at a temp. of 130-180°. Dodecachloroperylene yields a dye giving a red color on cotton from the vat, which changes to olive-green on exposure to the air and to red or violet on treatment with metal salts such as those of Fe and Cr. Highly chlorinated perylenes are made by passing dry Cl into a soln. or suspension of perylene or a low-chlorinated perylene in an inert solvent such as PhNO₂ contg. chloride of Al or of Sb. Cf. *C. A.* 22, 2668.

Dyes; photographic developers. I. G. FARBENINDUSTRIE AKTIENGESSELLSCHAFT. Fr. 632,273, Apr. 6, 1927. Aromatic *p*-diamines used for coloring dead and living hair and as photographic developers are made stable to air by treating them in the absence of H₂O in an indifferent solvent with SO₂.

Azo dyes from 2,3-hydroxynaphthoic acid arylides. LEOPOLD LASKA and ARTHUR ZITSCHER (to Grasselli Dyestuff Corp.). U. S. 1,678,599, July 24. Dyes producing various red shades are formed by the combination of diazo compds. of 2-aminotoluene-4-sulfodimethylamide, 2-amino-1-ethoxyphenyl-4'-sulfodimethylamide or 2-aminotoluene-4-sulfo-*N*-methylaniline with 2,3-hydroxynaphthoic acid arylides such as those of 4-chloro-2-anisidine, 2 phenetidine, α - or β -naphthylamine, 3-toluidine, 4-chloroaniline, 5-chloro-2-toluidine or 5-chloro-2-anisidine. The dyes may be produced as such or on the fiber or a substratum and give dyeings fast to kier boiling.

Copper compounds of substantive azo dyestuffs. I. G. FARBENIND. A.-G. Fr. 632,941, Apr. 16, 1927. Cu compds. of substantive azo dyestuffs are prepd. by treating with a compd. yielding Cu dyestuffs produced from diazo or diazoazo compds. of such monoamines or their derivs. as contain in the *o*-position to the amino group at least one unsubstituted or substituted alkyloxy, aralkyloxy or aryloxy group. Colors of the most varied shades are obtained, very fast to light, alkali and ironing. The invention is widely applicable and several examples are given.

Indigo. CHARLES J. STROSACKER and CHESTER C. KENNEDY (to Dow Chemical

Co.). U. S. 1,678,619, July 24. A phenyl compd. and an alkali, such as phenylglycine and caustic alkalies, are placed in a container, and heated in a bath of caustic alkali or other suitable molten material of about the same m. p. as that of the alkali; the container is finally removed from the heating agent and, without material access of air, is submerged in water.

Indigoid dyes for cellulose esters. C. M. BARNARD and BRITISH ALIZARINE CO., LTD. Brit. 281,213, Jan. 6, 1927. Citric acid is fused with unsulfonated indigo or thioindigo dyes contg. one or more free primary amino groups; *e. g.*, 7,7'-diamino-thioindigo yields a product dyeing cellulose acetate violet-red.

Indanthrone and its disulfonic acids. BRITISH DYESTUFFS CORP., LTD., ARNOLD SHEPHERDSON and ANTHONY J. HAILWOOD. Fr. 632,331, Apr. 7, 1927. 1-Nitroanthraquinone-8-sulfonic acid is reduced with less reducing agent than is necessary for reduction to the amino compd. The product, probably 1-hydroxylaminoanthraquinone-8-sulfonic acid, yields indanthronedisulfonic acid on heating with alkali. The sulfonic groups can be split off by electrolytic reduction. The disulfonic acid dyes cotton from the vat in fugitive shades and wool from an acid bath.

Ketones of the anthracene series. I. G. FARBENIND. A.-G. Fr. 633,071, April 22, 1927. *meso*-Anthracyl alkyl ketones are prepd. by the action of aliphatic acid chlorides on anthracene or its homologs or derivs. with condensing agents under moderate conditions. Under more energetic conditions α - or β -anthracyl alkyl ketones are produced. Oxidation gives the corresponding anthraquinone derivs. The compds are starting materials for dyes.

Sulfur black. RAYMOND VIDAL. Fr. 633,395, Aug. 14, 1926. Sulfur black liquids are prepd. directly by the use of nitroso-*o*- (or *m*)-cresols alone or with dinitrophenol and picric acid.

Lakes. I. G. FARBENIND. A.-G. Fr. 633,028, April 21, 1927. See Brit. 270,750 (C. A. 22, 1692).

Dyeing. I. G. FARBENIND. A.-G. Fr. 633,363, April 26, 1927. An app. is described for dyeing textiles difficult to dye, in which the textiles float freely in the bath and are stirred by alternate suction and compression. In the case of vat dyes the temp. is carried to 80-90° and an aldehyde or ketone is added.

Dyeing. I. G. FARBENIND. A.-G. Fr. 633,505, April 27, 1927. Aldehydes or ketones, particularly those of low mol. wt., are added to the dye bath, to enable the dyeing to be carried out near the b. p.

Dyeing. J. I. M. JONES, W. KILBY and STANDFAST DYERS & PRINTERS, LTD. Brit. 280,983, June 28, 1926. Sol ester derivs. of leuco vat dyes are applied by padding to textile materials, which are then steamed without drying and the shade of the dye is then developed in a suitable bath. Oxidizing agents may be added to the padding bath if of such character as to be relatively inactive during steaming or acid oxidizing agents may be used in the developing bath. Examples are given.

Dyeing and printing. DURAND ET HUGUENIN SOC. ANON. Brit. 281,336, Nov. 29, 1926. In dyeing or printing textile materials with ester salts of leuco vat dyes (such as those of Brit. 186,057; C. A. 17, 343) as described in Brit. 220,964 (C. A. 19, 1058), with development by steaming, there is added to the padding bath or printing paste contg. the ester salt and oxidizing agents a substance which yields acid when heated but which does not form an insol. salt with the ester salt. Among the substances which may be used are: mono- or di-chlorohydrin, chlorethyl alc., diethyl tartrate and K, Me or Et sulfate.

Dyeing with vat and azo dyes. WILHELM WINTERHALDER (to Grasselli Dyestuff Corp.). U. S. 1,678,580, July 24. In dyeing cotton, artificial silk and silk with vat and azo dyes, the goods are grounded with an azo component and at the same time with a vat dye dissolved without esterification, and the vat dye is converted into insol. form by oxidation and the ice color developed on the fiber by a diazo soln.

Dyeing mixed textile fabrics. HERMANN WAGNER, HEINZ EICHWEDE and ERICH FISCHER (to Grasselli Dyestuff Corp.). U. S. 1,678,611, July 24. Goods comprising mixed wool and silk are dyed with a pyrazolone-azo dye contg. at least one carboxylic acid ester group in the dye mol. and contg. no free COOH group linked to the C in the 3-position of the pyrazolone ring; *e. g.*, the dye from *o*-chloroaniline and 1-(4'-sulfo-phenyl)-5-pyrazolone-3-carboxylic ethyl ester.

Dyeing "viscose silk" or similar regenerated cellulose materials. BRITISH DYESTUFFS CORPORATION, LTD., J. BADDILEY, P. CHORLEY and R. BRIGHTMAN. Brit. 281,410, Sept. 7, 1926. Level shades are obtained by the use of dyes formed by coupling diazotized aromatic amines and their derivs., such as sulfonic or carboxylic acids, with 2-amino-8-naphtholsulfonic acids or their N-substituted derivs. (other than those

described in Brit. 270,446 (C. A. 22, 1691) and Brit. 270,883 (C. A. 22, 1693). Numerous examples are given.

Dyeing furs and leather. V. ZETTLITZ and A. PFERFER. Brit. 281,592, Nov. 30, 1926. See U. S. 1,649,502 (C. A. 22, 509).

Apparatus for washing or dyeing artificial silk threads, etc. JULIUS BRENZINGER (to Max Ams Chemical Engineering Corp.). U. S. 1,678,053, July 24.

Dye-baths. MARIUS RATIGNIER. Fr. 632,252, July 17, 1926. To ensure the normal immersion of the fabric in a dye-bath the tray or screen carrying the cloth is connected by belts to a crankshaft, raising of which tips up the tray and plunges the fabric into the bath.

Copying colors. I. G. FARBENIND. A.-G. Fr. 633,311, April 25, 1927. Copying colors suitable for copying pencils are prepd. from black azo dyes obtained by diazotizing phenosafranine and coupling it with a cresol. Thus the black dye prepd. from diethylphenosafranine and *p*-cresol, and the black dyes prepd. by coupling diazotized phenosafranine with a *p*-cresol contg. an alkyl or aralkyl group in the *m*-position to the OH group, *e. g.*, 4-methyl-3-monoethyl(or benzyl)amino-1-phenol, are particularly suitable.

Producing color effects on threads. CAMILLE DREYFUS. Fr. 632,339, April 7, 1927. Cops or bobbins of thread, *e. g.*, cellulose acetate silk, are plunged into a bath contg. several colors having different powers of penetration and drawing them out before they become uniformly colored.

Mercerizing cotton and similar materials. BRITISH DYESTUFFS CORPORATION, LTD. and A. J. HALLWOOD. Brit. 281,473, Nov. 30, 1926. An alkyl-substituted sulfonium hydroxide such as Me_2SOH is used instead of part or all of the caustic alkali usually employed in mercerizing or similar processes. Cotton fiber thus treated is improved as to strength and affinity for dyes.

Treating fabrics containing cellulose esters or ethers. BRITISH CELANESE, LTD., and G. H. ELLIS. Brit. 280,989, July 27, 1926. The material is rendered resistant to "laddering" by treatment with a soln. or dispersion contg. 8% or more of substances such as oleic, stearic or palmitic acids and sulfonated derivs. such as sulforicinoleic acid or their salts such as the alkali metal or ammonium salts, sulfoaromatic fatty acids such as sulfophenylstearic acid, hydroxysulfophenylstearic acid and sulfonaphthylricinoleic acid or their mixts. or salts, or sol. resin soaps. The treatment may be effected at 80–100°. Brit. 280,990, for the same purpose, specifies the use of solns. or dispersions contg. at least 5% of various hydrocarbons such as those of the paraffin, aromatic, naphthene or terpene series, their hydrogenated or halogenated derivs., various alcs., phenols, ketones or carbocyclic sulfonic or carboxylic acids. A large number of examples are given.

Stockings from fabric containing cellulose acetate or like material. C. DREYFUS (to British Celanese, Ltd.). Brit. 281,271, Nov. 26, 1926. Knitted fabrics contg. cellulose esters such as cellulose acetate are cut or stamped with a hot tool which serves to fuse or melt the threads together and prevent "laddering."

Nacreous threads. DESPOMMIERS ET PAQUIER. Fr. 632,107, July 13, 1926. The brilliant compd. extd. from fishes or animal products and known as "Essence d'Orient" is added to threads, particularly artificial silk, during their manuf.

Method and apparatus for cleaning and separating hair. EINAR J. OLSEN (one-half to Sealy Mattress Co. of Minn.). U. S. 1,678,525, July 24. Mech. features.

Compositions for treating animal hair or wool for making hats, etc. E. BÖHM. Brit. 281,646, Dec. 1, 1926. Nascent Cl is generated in contact with the material, *e. g.*, by use of NaCl , H_2O_2 and H_2SO_4 in dil. soln., in order to increase the luster of the material. Org. substances such as aniline-HCl may be used also for evolving Cl, and the treatment may be applied to material either before or after making up into hat bodies.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Progress in painting materials. H. VOLLMAN. *Farbe u. Lack* 1928, 222–3, 226–7.—The vast majority of coating materials are colloidal and the drying process passes through the stages: colloidal soln., highly solvated gel, weakly solvated gel film. Desolvation of the film progresses with age with consequent increase in hardness. The addn. of pigments decreases water permeability by lengthening the path the water mols. must

travel and perhaps by reaction with oils to form a denser film. Deterioration often starts at points of insufficient mixing of pigment and vehicle. G. G. SWARD

Paints for the graphic industry. LEO ARNSTEIN. *Chem. abstr.* 3, 34-6(1928).—A review on mineral pigments, new combinations of earth paints (cadmium yellow, titanium white), color lakes (pptd. by tungstomolybdic and phosphotungstic acids), soots and problems of the manuf. of varnishes confronting the chemist. J. K.

Paints, pigments, varnishes and resins, 1927. Reprint from *Reports of the Progress of Applied Chemistry* 12, 346-97(1927).—For Oil, Colour Chem. Assoc. 1928. This pamphlet briefly abstracts and gives a reference list of the work published during 1927. R. J. MOORE

Standardizing dry testing of colors. II. ALBERT GRUNDER AND R. S. SHEPHERD. *Paint, Oil, Chem. Rev.* 86, No. 6, 8-11, 25(1928); cf. *C. A.* 22, 2672.—Some of the tests now commonly used for pigments are criticized and certain variations or substitutions are suggested. The tests discussed are strength, opacity, oil absorption, permanence to light, bleeding and chem. identification tests. The strength testing of yellows by rubbing up with blue instead of white is approved. Analysis is shown to be of little value in detg. color strength of a lake. The Gardner-Colman oil absorption method is criticized as is also the method of measuring the vertical flow on glass of 5 drops of the thin pigment in oil. Artificial light tests for accelerating color changes in pigments are shown to be inconsistent. They are applicable when making comparative tests on colors of the same basic type. Various methods of making bleeding tests are offered. Identification tests are discussed and a table of H₂SO₄ spot tests is given to distinguish between various organic reds. R. J. MOORE

Color standardization and testing in the paint and color industry. C. A. KLEIN, et al. *J. Oil Colour Chem. Assocn.* 10, 309-34(1927).—A discussion of color problems from a no. of different viewpoints. The need for quant. terms and more exact comparisons is stressed. Various methods for pigment standardization and color measurement are described. R. J. MOORE

Colloid chemistry of paints, varnishes and their components. R. S. MORRELL AND W. E. WORNUM. *J. Oil Colour Chem. Assocn.* 11, No. 92, 49-62, No. 93, 90-112(1928).—A review which stresses the colloidal aspects of paints and varnishes under the following headings: yield value and mobility; wetting and grinding; pigments; drying oils with respect to emulsions, surface tension, polymerization and oxidation; resins; varnishes. A reference list to these subjects is given. R. J. MOORE

Some methods of testing the suitability of paints, varnishes, and lacquers for aeronautical purposes. E. W. J. MARDLES. *J. Oil Colour Chem. Assocn.* 11, 230-59(1928).—The exptl. results relate to protective coatings for metal and wood parts and not to the tightening action on fabric. The paper is divided into 4 sections as follows: (1) *Influence of wt. of film on protection afforded*—Data are tabulated for exposure and sea water spray and immersion tests on Al alloy, mild steel and silver spruce. (2) *Mech. properties of the film*.—These were detd. by a scratch-hardness test, bending test and an abrasion or erosion test, all of which are described and the results discussed. In the erosion test silver sand, 30-60 mesh, was blown by compressed air (5 lb. per sq. in.) against a panel held at a distance of 12 in. Hard tough films such as obtained from certain cellulose lacquers were found to be less resistant to sand erosion than softer oil varnish films. Apparently, the more resilient or rubber like a film was, the greater was its resistance. (3) *Resistance of protective coatings to water, oil and gasoline, dope solvents, etc.* (4) *Methods for the detn. of drying time, viscosity and gloss*.—A panel is defined as hard dry when upon pressure with the coated surface in contact with a bed of sand, using a load of 100 g. per sq. cm., it can be freed from all sand particles with a camel's hair brush without injuring the film. A discussion follows. R. J. M.

Laboratory apparatus for preparing duplicate uniform paint, varnish, and lacquer films. J. C. BRIER AND A. M. WAGNER. Univ. of Mich. *Ind. Eng. Chem.* 20, 759-64(1928).—A mechanical app. has been devised with a doctor blade having a micrometer adjustment, by means of which a uniform thickness of film can be secured. The fluid sample is contained in a tight basket, which prevents loss of volatile matter and permits weighing of the film. T. S. CARSWELL

Antique colors and color manufacture. TH. WOLFF. *Farbe u. Lack* 1928, 190-1, 203-4 231-2, 240. G. G. SWARD

Preliminary report of the sub-committee of the Royal Academy of Arts on modern pigments and mediums. A. P. LAURIE, et al. *J. Oil Colour Chem. Assocn.* 11, No. 97, 60-9(1928).—This report treats briefly of the following: prepg. of canvas for painting, deepening of tone of paints on aging, yellowing of linseed and other drying oils, and cracking of oil pictures. Deepening in tone is due to the slowly increasing index of re-

fraction of the dried linseed oil film and its yellowing. A table is given of the pigments least affected by changes in linseed oil. A hard finishing coat, *i. e.*, one that contains either a high pigment percent or a hard gum varnish, when used over a soft undercoat, is conducive to film cracking. A table of pigments is given ranging from low oil absorption at the top to high at the bottom. Those belonging to the upper $\frac{1}{2}$ are best used in the undercoat, while the lower $\frac{1}{2}$ are rather for the finishing coat. The best varnish for protecting the surface of a picture is beeswax dissolved in turpentine, brushed thin, dried 2 weeks and polished with silk.

R. J. MOORE

Application of methods of dyestuff analysis to the examination of pigments and lakes. ARTHUR G. GREEN. *J. Oil Colour Chem. Assocn.* 11, No. 92, 38-48(1928).—The principal chromophoric divisions used in pigments and lakes are discussed. The dyestuffs used are listed under the following general groups: insol. azo, acid, basic, mordant and vat. Procedure in investigating pigments and lakes is given and a table furnishing a complete scheme of analysis.

R. J. MOORE

Manufacture and properties of superdispersed minimum. J. H. FRYDLENDER. *Rev. prod. chim.* 31, 441-5(1928).—Superdispersed red lead is obtained by evapn. and condensation of litharge. Different processes in commercial use are mentioned.

P. THOMASSET

Large scale titanium pigment production based on old laboratory process. BRUCE K. BROWN. *Chem. Met. Eng.* 35, 427-8(1928).—A description of the Blumenfeld process and plant as operated by the Commercial Pigments Corp. at Baltimore, Md.

R. J. MOORE

Chrome yellow and its practical use. C. R. HALLE. *Farbe u. Lack* 1928, 300-3.—Review and photomicrographic study.

G. G. SWARD

Painting tests on panels impregnated with zinc chloride or creosote for highway markers and factory construction. H. A. GARDNER. *Am. Paint Varnish Manufrs. Assocn. Circ.* No. 334, 588-98(1928); cf. *C. A.* 21, 180.—Examm. of test panels exposed 20 months proved that freshly creosoted wood may not be satisfactorily coated with white paints made on a linseed oil base. The application of many types of primers (red lead, Al powder, Zn dust, etc.) failed to prevent bleeding through of the creosote. It is suggested that creosoted wood which has been weathered a year or so may be painted. Many coatings used over $ZnCl_2$ -treated panels gave satisfactory results. A series of new accelerated tests to det. the efficiency of paints on impregnated yellow pine for mill construction is described.

R. J. MOORE

A photographic study of a sign board. H. A. GARDNER. *Am. Paint Varnish Manufrs. Assocn. Circ.* No. 333, 583-7(1928).—Photographs (enlarged) and photomicrographs are presented to show the protective action of painted letters on a cypress panel exposed to weathering for 11 yrs.

R. J. MOORE

Paints for shingle roofs. Results of exposure tests conducted for 11 years. H. A. GARDNER. *Am. Paint Varnish Manufrs. Assocn. Circ.* No. 332, 569-82(1928).—Tests indicate that highly pigmented linseed oil paint made with mineral pigments which are not reduced by heat will weather satisfactorily upon and preserve shingle roof surfaces. The efficiency of shingle paint is shown in a series of photographs of shingles which have been exposed 11 yrs.

R. J. MOORE

Paints for metal. Iron, steel, copper, galvanized, tinned and other metal surfaces. H. A. GARDNER. *Am. Paint Varnish Manufrs. Assocn. Circ.* No. 331, 509-68(1928).—The relative degrees of usefulness of various pigments for metal protective paints are presented. Methods of painting various types of metals are given, and results of some recent tests are illustrated with photomicrographs. A brief history is finally given of some of the important paint tests made in America.

R. J. MOORE

Chipping and abrasion tests for paint coatings on metal. A. D. CAMP. *Ind. Eng. Chem.* 20, 851-2(1928).—Chipping and abrasion tests are used to det. relative toughness and durability of paints for Al alloy. The chipping test is made by dropping on the test panel under standard conditions a series of standard tools, and observing the extent and character of the impression made on the coating. The abrasion test is made by detg. the no. of revolutions of the panel, under a standard abrading disk, which are required to wear through the paint film. Details of method, equipment and interpretation of results are given.

R. J. MOORE

Paints on Jirotko-processed light metals. G. KUTSCHER. *Farbe u. Lack* 1928, 313-4.—Al panels with and without the Jirotko treatment were painted with red lead and then immersed in the North Sea. After 8 months the former were in excellent condition while the latter were severely corroded.

G. G. SWARD

Protective coatings for duralumin and other aircraft alloys. H. A. GARDNER. *Am. Paint Varnish Mfrs. Assocn. Circ.* 330, 482-508(1928); cf. *C. A.* 21, 657.—Tabular

results are given of the relative efficiencies of over 50 protective coatings on Al alloys. Photographs and photomicrographs are used in illustration. After 2 yrs. slightly accelerated exposure the following gave good results in linseed oil vehicles: dry lamp black, Zn chromate and a mixt. of Fe_2O_3 and Zn chromate. Drying ovens or ultra-violet light are suggested to speed the drying of such paints. Special rubber-coated (electrolytic) duralumin sheets gave promising durability results. Spraying the metal with Al gave a rough, spongy surface.

R. J. MOORE
Coating for protection against rust and weather. M. BERGER. *Apparatenbau* 40, 166-7 (1928).—"Gummolin," a linseed oil prepn., has given excellent results. J. H. M.

Some questions concerning the rust prevention problem. HANS WOLFF. *Farbe u. Lack* 1928, 299.—Rust prevention is not related to weatherability or thickness of a film but probably to a layer of the effective substance deposited from the paint onto the metal as a result of interfacial forces. Wolff accounts for the abnormally high vol of highly dispersed red lead paints by the formation of soaps about the particles.

G. G. SWARD
Problems in the painting of ship bottoms. D. SCHULZ. *Farbe u. Lack* 1928, 250-2, 267, 277, 291.—A review.
G. G. SWARD

Composition of zinc chrome. B. A. ELLIS, J. J. FOX AND J. F. HIRST. *J. Oil Colour Chem. Assn.* 11, No. 96, 194-8 (1928).—The confused state of the literature as to the formula for Zn chrome is reviewed. The divergence in compn. is due to variations in manuf. and to incomplete methods of analysis. An analytical method is recommended and results are given on com. samples. So far as any formula can be assigned to Zn yellow of av. com. grade, the analyses would indicate $5\text{ZnO} \cdot 4\text{CrO}_3 \cdot \text{K}_2\text{O} \cdot 4\text{H}_2\text{O}$. The $\text{NH}_4\text{-Zn}$ yellows give approx. $2\text{ZnO} \cdot 2\text{CrO}_3 \cdot (\text{NH}_4)_2\text{O} \cdot \text{H}_2\text{O}$.

R. J. MOORE
Precipitation of zinc chromate. J. L. BUCHAN AND J. J. FOX. *J. Oil Colour Chem. Assn.* 11, No. 96, 198-202 (1928).—Methods of prepn and analysis are given for the following Zn chromes: NH_4 , basic, K, Na and mixed. A discussion follows. R. J. M.

Study of the uneven nitration of nitrocellulose. P. A. BENEDICT. *Paint, Oil Chem. Rev.* 86, No. 7, 10 (1928).—This work was undertaken to study marked variations in viscosity of nitrated cellulose when dissolved in identical solvent mixts. Sol tests on individual nitrated fibers gave varied results, some parts dissolving, some swelling and some remaining unaffected. Individual cotton fibers, both long and short, were nitrated and the action was studied by photomicrographs. The action is very uneven, some parts of the fiber being more resistant than others.

R. J. MOORE
Studies in the drying oils. VIII. Absorption of liquids by oil gels. J. S. LONG, E. K. ZIMMERMANN AND S. C. NEVINS. *Ind. Eng. Chem.* 20, 806-9 (1928).—The adsorption of various liquids by extd. heat-bodied oil gels and by extd. dry linseed oil films produces similar changes in phys. characteristics. Both show selective adsorption of fatty acids from soln. Also comparison of the heats of combustion of extd. and unextd. films and of the extd. oil offers further support to the premise that the liquid phase in a film is adsorbed rather than mechanically entrained. IX. Action of cold-blowing on linseed oil. J. S. LONG AND W. S. EGGE. *Ibid* 809-11.—Linseed oil was air-blown at 30° in the presence of various substances. Positive catalysts caused decrease in unsatn.; negative catalysts prevented this. The effect of previous heat bodying on the blowing of the oil gave results indicating that a combination of these treatments would yield a greater variety of useful industrial products. Each of these treatments accentuates a certain type of reaction. *Thioglycolic* acid is recommended as a reagent for quant. precipitation of metallic driers from oils or varnishes. R. J. M.

United States Government master specification for raw linseed oil. Bur. Standards, *Circ.* No. 361, 8 pp. (1928).

E. H.
United States Government master specifications for boiled linseed oil. Bur. Standards, *Circ.* No. 362, 8 pp. (1928).

E. H.
Oxidation of linseed oil. II. D. CHATAWAY. *J. Soc. Chem. Ind.* 47, 167-71 T, (1928).—Linseed oil in bulk was oxidized by passing O through it. The av. rate of the reaction at different temps. and the total vol. of O absorbed at time of gelling were studied. Above 100° gelation occurs immediately on the formation of a certain min. % of oxidized glycerides; at lower temps. gelation requires the formation of a larger %. Irregularities in the rate of absorption proved to be largely due to some impurity in the O, which could be removed by passing through SnCl_4 soln.

R. J. MOORE
Certain physical and chemical characteristics of flax seed and linseed oil. A. L. BUSHEY, L. PUHR AND A. N. HUME. *S. Dakota Agr. Expt. Sta., Bull.* 228, 11 pp. (1927).—The av. % of oil in flax increased regularly from the first to the last cutting. The I no. varied invariably with the oil content. Early harvested seed would have a lower

oil content, but the oil would possess better drying qualities. The oil content of 9 varieties of seed varied from 34.3 to 37.4%. J. J. SKINNER

The determination of wood oil. JOHANNES SCHIEBER. *Farbe u. Lack* 1928, 274, 286 7.—To 5 g. of the sample mixed with 5 g. of sand add with const. stirring 5–10 cc. ether contg. 2–10% SnCl_4 . Place the mixt. in a desiccator until solid (1–30 hrs.), then ext. with dry ether. The wt. of the unextd. matter represents the wood oil. Samples of less than 6% oil do not solidify but an increase in viscosity may be noted. SnCl_4 will effect solidification of wood oil in the presence of substances which inhibit the solidification with iodine. The max. error in 58 detns. was 20.4, the min. 0.0 and the av. 3.8%. G. G. SWARD

Observations on an August inspection of Florida tung oil groves and on the quality of American oil submitted to various varnish makers. H. A. GARDNER. *Am. Paint Varnish Manufs. Asscn. Circ.* No. 336, 620–36 (1928); cf. C. A. 21, 1193.—This inspection report indicates a healthy condition of the Florida tung trees with this year's crop possibly doubling last year's. Details as to soil, planting and cultivation are given together with information regarding cost factors. Reports from 25 varnish manufs. show the oil to be superior to the imported oil. R. J. MOORE

Making gloss oil in the pebble mill. D. DAVIDSON. *Paint, Oil, Chem. Rev.* 86, No. 5, 11 (1928).—A gloss oil paler in color than that produced in the varnish kettle can be made by grinding rosin, lime and thinner in a pebble mill. In making an enamel the pigment is also introduced into this initial grind. It is possible by this method to introduce more lime than is usually employed in the kettle gloss oil. R. J. M.

Chemistry of lead "soaps" made from litharge and neutral fat. S. H. DIGGS AND F. S. CAMPBELL. *Ind. Eng. Chem.* 20, 828–9 (1928).—When fats are treated with PbO in the absence of H_2O , no glycerol is formed and there is no appreciable H_2O or aldehyde liberated. The reaction, unlike that for fatty acid and PbO , is an addn. of 1 mol. of fat to 3 mol. of PbO . This addn. compound formula is in agreement with mol. wts. detd. by the f. p. method. R. J. MOORE

Malayan damars. II. T. HEDLEY BARRY. *J. Oil Colour Chem. Asscn.* 11, No. 96, 203–18 (1928).—Classification, analyses and comparisons are made of the various damars. Results are given of steam and destructive distn. of some damars. The chief obstacles to the systematic development of Malayan damars are the scattered nature of the trees and the inaccessible position of the best specimens. (Cf. C. A. 22, 2672.) R. J. MOORE

Phenol-formaldehyde resinification. I. JAN NOVÁK AND VOJTECH CRCH. *Ind. Eng. Chem.* 20, 796–801 (1928).—Three methods for the detn. of the degree of resinification are described: (1) measurement of the refractive indexes of the reaction mixt., without sepn. of the resinous part from the aq. liquid; (2) detn. of the viscosity of a soln. of the reaction mixt. in EtOH by means of the Ostwald viscometer; (3) detn. of "bromine value" of the reaction mixt. by dissolving the tested sample in AcOH , pptg. the resinous substances by the addn. of H_2O and titrating the filtered liquids according to Koppeschaar's method. The results are plotted to illustrate the course of resinification, and the mechanism of the reaction is described on the basis of these data. Condensation is found to occur almost during the whole period of resinification, while polymerization sets in after pptn. of the insol. resinous substances. The catalytic powers of different agents vary. They are divided into condensation catalysts (acidic) and polymerization catalysts (basic). R. J. MOORE

Valuation of rosin by its physicochemical constants. I. V. FILIPOVICH AND N. V. TUKHOVITZKII. *J. Chem. Ind. (Moscow)* 4, 875–80 (1927).—The criteria used for valuating rosin are chiefly color, acid number, sapon number and m. p.; in some cases moisture content, ash, insoly. in petroleum ether and alc. and I no. are also taken into consideration. Usually rosin is considered of good quality if it is of light color, has an acid no. of 145–80 (the higher the better), a sapon. coeff. differing but little from its acid no. and a high m. p. Yet all these const., even if identical for several diff. samples of rosin, do not indicate that the compns. are the same, since rosins are not definite chem. compds., but represent complex mixts. of various substances. For the purpose of finding a better-founded criterion of valuation of rosins, and being guided by the desire of getting at least an inkling of their compn., F. and T. undertook a comparative study of rosins of various origins. There were studied 7 Russian turpentine rosins, 6 Russian wood rosins, American turpentine rosins H and J and Hercules wood rosin F. The m. ps. of the American rosins were 65–72°, those of Russian turpentine rosins were 60–77°, those of Russian wood rosins 49–58°. There is no interdependence (correlation) between the m. p. of rosin and its other properties, or the proportion of its components. Thus the m. p. is not an essential criterion. The acid and sapon. values and the dif-

ferences between the 2 were then determined. The 3 American rosins had acid values 155-69, sapon. coeffs. 162-73, differences between the 2 being 4-10. Russian turpentine rosins had acid values 146-67, sapon. coeffs. 151-72, differences 3-7. Russian wood rosins had acid values 151-59, sapon. coeffs. 156-61, differences 0.8-5.0. However, it is not correct to assume that the smaller the difference between the acid no. and the sapon. coeff. the better the rosin. From the standpoint of *soap manuf.* the value of rosin depends on the quantity of its constituents which can be saponified and salted out, all the other constituents being a useless ballast; an increase of acid no. which is not due to a corresponding increase of substances which can be saponified and salted out is rather harmful and decreases the useful action of alkali. To det. the contents of substances which can be salted out, F. and T. utilizing the investigations of O. Aschan (cf. *C. A.* 15, 3097) and of E. Knecht and N. Maurice (cf. *C. A.* 20, 299) worked out the following method: Dissolve 5-10 g. rosin in 100-200 cc. of ether, pass the soln. through a weighed filter, wash the residue, which consists of mechanic admixts. and impurities, with ether, dry to const. wt. and weigh. The resinous substances are obtained from the filtrate after evapg. the ether and drying to const. wt. at 100°. Saponify the resin with double the theoretical quantity of 1% NaOH soln. and reflux 40-50 min. on a water bath. Ext. the soln. obtained 4 times with ether with energetic shaking in a separatory funnel in order to extract the unsaponifiable; wash the ether ext. with NaOH and with water, evap. the ether and dry to const. wt. at 100°. Salt out the saponified portion by means of a 36% NaCl soln., using 3 cc. of the latter to 1 g. of rosin. Filter the dry sodium abietate obtained, transfer into an Erlenmeyer flask and decompose with 1% H₂SO₄. Filter the cheese-like ppt. of resinous acids, wash with water, dissolve in ether, wash the soln. with water in a separatory funnel, transfer to a tared Erlenmeyer flask and weigh the pure saponified and salted out constituents of rosin after evapn. of the solvent and drying to const. wt. To det. the saponifiable which cannot be salted out treat the filtrate obtained after sepn. of sodium abietate 3-4 hrs. with a current of CO₂, filter the ppt. formed, transfer to a separatory funnel, treat with 1% H₂SO₄, extract with ether, wash the ethereal soln. with water, transfer into a weighed Erlenmeyer flask and weigh after evapg. ether and drying to const. wt. at 100°. The portion of the saponifiable which does not ppt. with CO₂ and thus remains in the form of Na salt of colophenic acid (O. Aschan) in the filtrate is pptd. from the latter by 1% H₂SO₄; filter by means of a weighed filter, wash with water, dry and weigh. After the sepn. of the hydroxy acid the filtrate contains the coloring matter, which can be detd. by extg. with water, washing and weighing. By this method were found the following values of the contents of substances which can be salted out: American rosins 71.44-83.40, Russian turpentine rosins 70.45-89.40, Russian wood rosins 80.03-85.92. Comparison of these figures with the respective acid and sapon. numbers showed that no adequate relationship exists; the reason is that many rosin components possessing the groups COOH and OH are not susceptible to salting out. The acid and sapon. values are even less reliable criteria than the m. p. On the other hand, the quantity of substances which can be salted out is a good criterion of rosin valuation for *soap and paper manufacturers*; it may be called the *usefulness coeff.* Another valuable criterion is the *alkali consumption coeff.*, i. e., the quantity of alkali neutralizing a given wt. of rosin; it is obtained by dividing the acid (or sapon.) number by the usefulness coeff. The petroleum ether-insol. content appears to be in some inverse relationship to the usefulness coeff. of rosin; thus, e. g., a rosin contg. 14.98% petroleum ether-insol. had a usefulness coeff. of 74.00%, whereas a rosin contg. 1.29% petroleum ether-insol. had a usefulness coeff. of 84.52, etc.

BERNARD NELSON

False equilibria with special reference to rosin solutions and gold size. R. P. L. BRITTON. *Oil Colour Trades J.* 73, No. 1540, 1220-2(1928).—The peculiarities of rosin dissolved in mineral spirits and in MeOH with reference to crystn. are discussed. Under the heading "gold size" a no. of methods of prepn. are outlined with a view to reducing the tendency of Pb linolate to yield ppts. Thermodynamic equilibria possibilities existing between the "superfused" and the cryst. varieties of varnish materials are indicated. A discussion follows.

R. J. MOORE

Newer opinions of the reactions in the drying of fatty oils (SCHEIBER) 27. Wood oil and its many uses (OBST) 27. Determination of organic matter in mixed acid and of carbon in nitrocellulose (CARRIERS, GUIBERT) 7. Determination of nitrites in nitrocellulose (KOEHLER, MARQUEYROL) 7. Application of x-ray crystal analyses to the problems of chemistry (SHEARER) 3. Mill for grinding paints, etc. (Brit. pat. 281,062) 1. Zinc white (Fr. pat. 632,235) 18.

RINNE, RUDOLF: *Zum Problem des altitalienischen Geigenlacks.* Forschungsergebnisse e. Chemikers. Leipzig: Paul de Wit. 32 pp. M. 1.20.

Paint. HANS SACHS. Fr. 632,322, April 7, 1927. To give flexibility to paint while making it washable and resistant to changes of temp. and fire, glycerol bromohydrin is used instead of glycerol.

Paint. FERDINAND SICHEL KOMMANDITGES. Fr. 633,481, April 27, 1927. See Brit. 270,652 (C. A. 22, 1695).

Titanium pigments. TITANIUM PIGMENT CO. Brit. 281,459, Nov. 9, 1926. Preformed acicularly cryst. CaSO_4 is suspended in a Ti soln. such as a soln. of Ti sulfate and a Ti pigment is pptd. on to the particles of CaSO_4 . The composite pigment may be calcined with an agent such as H_3PO_4 or Ca phosphate which inhibits color changes during calcination.

Varnishes. J. F. BENNETT and J. HADFIELD. Brit. 281,377, Aug. 31, 1926. Varnishes are formed contg. in soln. both celluloid or nitrocellulose and a soln. of a base prepd. by treating a resin or a resin and an oil with HNO_3 . Bitumen, pitch or natural resins such as shellac or copal may also be added.

Varnishing plastic compounds. MARCEL DESBLANC. Fr. 633,380, April 27, 1927. AcOH is replaced in varnishing plastic compds. by AmOH or BuOH mixed with AcOH, the whole being dild. with benzene or alc.

Apparatus for adjusting the proportion of color to thinning agent in connection with intaglio printing machines. OTTMAR WILHELM (to Maschinenfabrik Augsburg-Nürnberg A.-G.). U. S. 1,678,091, July 24.

Preparing wood or other surfaces for coating with "cellulose lacquers." I. G. FARBENIND. A.-G. Brit. 281,310, Nov. 24, 1926. Before the application of the final coating, an intermediate coating is applied contg. a protein compn., a resin and a softening agent, e. g., casein, alc., shellac and camphor, or gelatin, water, shellac, alc., a condensation product of acetal and urea and MeOH or a compn. contg. gelatin, water, elemi resin, diacetone alc., tricresyl phosphate, glacial HOAc and alc. In some cases, an oil lacquer may be first applied.

Waterproof coating for walls, iron, etc. LÉON COURTAILLIEZ. Fr. 633,114, Aug. 3, 1926. Powdered resin is dissolved in alc. in a closed vessel and afterwards heated on a water bath.

Copal gums. SOC. PELISSIER & FREY. Fr. 633,669, Sept. 2, 1926. Copal gums are treated with a jet of sand to obtain a hard and purified product, while the dust produced becomes sol. in alc. and can be used for varnishes. Presumably an oxidation takes place during the working of the machine.

Resins. HERCULES POWDER CO. Fr. 632,838, Jan. 31, 1927. See Brit. 275,862 (C. A. 22, 2476).

Resinous composition. COURTNEY CONOVER (to The Selden Co.). U. S. 1,678,105, July 24. A resinous plastic compn. which is suitable for molding, coating or impregnating comprises the reaction product of glycerol, phthalic anhydride and furfural.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The problem of methods for determining fats. A. TICHONOV. *Oil and Fat Ind.* (Russia) 1926, No. 6, 38–40; *Chem. Zentr.* 1927, I, 2869.—A study was made of ordinary methods for fat extn. by the Soxhlet app. and cold extn. to det. the part played by the time of extn. and the choice of solvent. The 2 methods give concordant results with Et_2O and with petr. ether. In the Soxhlet extn. 97.6% of the fat is extd. after 1 hr., and extn. is complete after 5–6 hrs. Cold extn. for 2–3 days exts. nearly all fat, and an additional 2 days exts. only a few hundredths of a percent more. Extn. in the Soxhlet app. is simplified by the use of a separatory funnel with a tube between flask and the Soxhlet app., which is described in the original. At the termination of the extn. the stopcock of the funnel is closed, the vapor of the solvent passes through the tube into the extn. app., and the condensed liquid collects in the funnel. The fat remaining in the flask can be weighed without transferring. Two new methods for detg. fats are also described, which give satisfactory results, but which must be perfected. The first of these serves for the detn. of the d. of extd. material in which fat or oil is present, while in the other method the fat is detd. indirectly by

weighing the extd. residue. It has the advantage that several detns. can be carried out simultaneously in a Soxhlet app. C. C. DAVIS

Method of determining fat by the residue from which the fat has been removed. N. YERMOLAEV. *Oil and Fat Ind.* (Russia) 1926, No. 10-11, 25-8; *Chem. Zentr.* 1927, I, 3157.—The oil or fat content of a substance can be detd. not only from the extd. oil or fat but also by difference of the extd. residue. A series of analyses was made with a view to detg. the precision of the difference method. The chief source of error is the increasing water content of the substance and the extn. shell before and after the extn. Since abs. drying is inconvenient because of the hygroscopic properties of the filter paper of the extn. shell, a shell contg. the extd. substance is weighed as a control. Any difference in wt. of the control shell before and after extn. is used to calc. by proportion the shell employed in the analysis, and is regarded as hygroscopic moisture. The values obtained agree well with those of the ordinary methods of detn., the deviations being less than 0.5% in 62% of the cases. The method has the advantage that several substances can be detd. simultaneously in 1 extn. if they are wrapped individually in filter paper in the extn. shell. C. C. DAVIS

The fat in the residual material remaining after the unwinding of the silk cocoon. J. JELAKOV. *Oil and Fat Ind.* (Russia) 1926, No. 10-11, 35; *Chem. Zentr.* 1927, I, 315-6.—The unwound cocoon contains about 25% of a fat with d. 0.919, sapon. no. 191.0, I no. 105.2, R.-M. no. 3.24, mol. wt. 283 and m. p. 30°. It is suitable for the production of soap, and the residue, which contains P and 60% protein, is an excellent fertilizer. C. C. DAVIS

The prevention of autoxidation of vegetable oils and their fatty acids. V. NOVIKOV. *Oil and Fat Ind.* (Russia) 1927, No. 2, 17-20; *Chem. Zentr.* 1927, I, 3155.—Oleic acid of vegetable origin always contains small proportions of linoleic acid and has a tendency to oxidize or even ignite spontaneously. The rate of O absorption by pure linoleic acid in a thermostat and the action of various org. substances in retarding this oxidation were studied. To be of use technically a substance must be active in small quantities, it must not alter the properties of oleic acid; it must wash out with water in emulsification; and it must be capable of being washed out of wood and textiles by weak alkali lyes. β -Naphthol fulfils these requirements. Even 1% of this compd. prevents entirely the oxidation of linoleic acid in pure O to 60°. Technical expts. with wool balls which were impregnated with vegetable oleic acid and were heated at 60° confirmed these facts. Linseed oil contg. 1% β -naphthol did not change in I no. or in viscosity during 2 yrs. No attempt is made to explain the action of β -naphthol. A compilation of the most important works and patents in this field is included. C. C. DAVIS

Newer opinions of the reactions in the drying of fatty oils. JOHANNES SCHEIBER. *Z. angew. Chem.* 40, 1279-85 (1927); cf. C. A. 21, 184 --A review with 81 references. S. concludes that chem. reactions are necessary to produce the nuclei about which coagulation of the oil may take place. The drying of oils is a chemical-colloidal process, instead of a colloidal-chemical one as postulated by the gas coagulation theory of Auer. G. G. SWARD

Saponification with the Twitchell and Pfeilring reagents. G. PETROV. *Oil and Fat Ind.* (Russia) 1926, No. 6, 25-8, No. 7 8, 21-7; *Chem. Zentr.* 1927, I, 3156-7.—Comparative expts. were made with various aromatic thio fatty acids prepd. according to the directions of the Twitchell patents. The results show that the aromatic thio fatty acids of anthracene, phenanthrene, C_6H_4 , and xylene are less active than those of $C_{10}H_8$. An interchange of fatty acids in the reagent showed that cleavage agents from naphthalenesulfonic acid and the fatty acids of sunflower oil, linseed oil or train oil have about the same action. Nevertheless cleavage agents with a high oleic content show a greater activity and yield lighter fatty acids besides. Data on the Pfeilring cleavage agent, its methods of prepn. and its activity, and directions for the use of both reagents are included. C. C. DAVIS

The oil, candle and soap industry at the present time. S. FACHINI. *Atti congresso naz. chim. pura applicata* 2, 929-35 (1926).—A statistical review. L. T. F.

Further data on the necessity for drying seed. A. LOBASHOV. *Oil and Fat Ind.* (Russia) 1926, No. 1, 42-6; *Chem. Zentr.* 1927, I, 2251.—A predrying of flaxseed at 130-50° and a corresponding reduction of the water content to 1.5-2.5% diminishes by about 1% the quantity of oil retained in the oil-cake. Furthermore the seed may then be ground finer by milling. If the drying operation is carried out rapidly enough, drying of the oil in the seeds need not be feared. C. C. DAVIS

The distribution of oil in oil cake. A. LAPTEV. *Oil and Fat Ind.* (Russia) 1926, No. 10-11, 30-1; *Chem. Zentr.* 1927, I, 3154.—The oil content is in general higher in the middle than at the edges (0.7%) of oil cake. When cakes were pressed with a filter

cloth on one side only, the oil content was 6.8–7.4% higher on the side without the cloth. The thicker, longer and wider a cake is, the more the oil which remains in it. Filter cloth is very essential for obtaining a cake poor in oil, since it facilitates the draining of the oil.

C. C. DAVIS

The problem of obtaining average samples of oil cake. F. GOGOLEV. *Oil and Fat Ind.* (Russia) 1926, No. 4–5, 46–9; *Chem. Zentr.* 1927, I, 2783.—The variations in the oil content in the middle and on the edges of oil cake, and in cakes from various positions in open Anglo-American presses with 16 plates, were investigated. The oil content is highest in the middle of the cake and diminishes away from the middle. In the cases investigated it was 7.03% in the middle and 8.03% at the edges. Oil cakes from different positions in the press showed the same oil content up to the uppermost layer, in which the oil content was approx. 0.5% higher than in the others. A further investigation of the influence of the time of pressing and of the kind of channeling of the plates is advisable.

C. C. DAVIS

Volumetric analyses of oil cakes for their oil content and moisture. A. LAPTEV. *Oil and Fat Ind.* (Russia) 1926, No. 4–5, 49–52; *Chem. Zentr.* 1927, I, 2869.—The finely divided substance is covered with Et_2O in a Soxhlet app. and let stand overnight. By doing this the time of extn. is reduced from 8 to 3–3.5 hrs. At the bottom of the app. is placed some wadding (with fat removed), which prevents carrying away of solid particles with the liquid, so that the latter need not be filtered. The Et_2O with its extd. oil is collected in a previously weighed flask, from which the Et_2O is expelled after the extn. The last traces of Et_2O are expelled in a drying oven by means of a current of CO_2 , after which the flask with the extd. oil can be weighed. The ability to weigh the extd. oil in the flask and not be obliged to transfer it to the weighing vessel means a great saving of time. The extn. app. and the drying oven are heated with incandescent lamps, so that danger of ignition is practically avoided, and the app. can be left to itself.

C. C. DAVIS

Oil from apricot stones. V. TEMNOV. *Oil and Fat Ind.* (Russia) 1926, No. 10–11, 67–8; *Chem. Zentr.* 1927, I, 3155.—Expts. started for the first time in Russia on the production of oil from apricot stones showed far from satisfactory results, since the material to be pressed which had been previously disintegrated was squeezed out between the plates. After double pressing the yield of oil was 37%, while 10% remained in the oil cake. The oil had the following const.: d. 0.915, I no. 101.4, sapon. no. 196, acid no. 311.

C. C. DAVIS

Avocado oil. GEORGE S. JAMIESON, W. F. BAUGHMAN AND RAYMOND M. HANN. *Oil and Fat Ind.* 5, 202–7 (1928).—The pulp of the varieties grown in Cal. and Fla. constitutes from 65 to 85% of the fruit and contains at least 80% fat on the dry basis. The refined and bleached oil is too dark for edible purposes. The const. are: d_{20}^4 0.9132, n_{20}^D 1.4700, acid no. 2.8, sapon. no. 192.6, unsapon. 1.6, I no. 94.4, acetyl no. 9.2, R.-M. no. 1.7, Polenske no. 0.2, satd. acids 7.2%, unsatd. acids 84.3%, I no. of unsatd. acids 101.2. The compn. of the oil from the cull avocado fruit in % of fatty acids is as follows: oleic 77.3, linolic 10.8, myristic trace, palmitic 6.9, stearic 0.6, arachidic trace, unsapon. 1.6. It could be used for soap.

E. SCHERUBEL

Determination of the oil content of flaxseed by the results of mechanical analysis of the purity. I. ORLOV. *Oil and Fat Ind.* (Russia) 1927, No. 1, 1–16; *Chem. Zentr.* 1927, I, 2783–4.—To save time and to avoid extn. analysis, a method of calcn. was devised for detg. the oil content of flaxseed. The values of the mech. purity test of the seeds were converted into the oil content, on the basis that 1% purity corresponds to 0.35% oil, so that seeds of 100% purity contain 35% of oil and 11% moisture. This relation is the av. of numerous analyses. An error enters into the calcns. because allowance is not made for oil-free impurities and other seeds (rapeseed, etc.). A modification of the formula is, therefore, recommended, in which the oil content is $0.355a + 0.05b$, where a is the content of pure flaxseed and b is the content of other seeds contg. oil.

C. C. DAVIS

The oil of lemon seed. FRANCESCO OCCHIPINTI. *Atti congresso naz. chim. pura applicata* 2, 945–50 (1926).—The oil extd. from the seeds of *Citrus limonum* has an amber-yellow color somewhat obscured by a greenish fluorescence. It is sol. in the common fat solvents and responds to the color reactions of Heidenreich, Bach, Hauchecorne and Brullé. O. obtained the following principal physical and chem. const.: d_{15}^4 0.922; congealing point -6° ; n_{20}^D 70.8; acid number 21.1; I no. 173.5; drying property 5%. The solid fatty acids which were sepd. by a modification of Varentrapp's method melted at 55.5–56°, had an acid number of 221.7 and a mean mol. wt. of 263.8. The liquid fatty acids had an I no. of 134.3, an acid no. of 199.4 and a mean mol. wt. of 181.3.

L. T. F.

The composition of hydrogenated rapeseed oil. ANON. *Oil and Fat Ind.* (Russia) 1926, No. 2-3, 51; *Chem. Zentr.* 1927, I, 2251-2.—The compn. of a hydrogenated rapeseed oil from Odessa was investigated (1) by the Reimer and Will method involving extrn. of the Zn salts of the fatty acids with Et_2O , and (2) by sepgg. the fatty acids with a satd. soln. of stearic acid in EtOH , according to the Hehner and Mitchell method. The sample contained 10.4% behenic acid, 33.8% stearic acid, 41.6% erucic acid and 11.3% rapinic acid. Data on the phys. and chem. const. of the oil are given in detail in the original.

C. C. DAVIS

Purification of sunflower oil by means of clays. L. M. LYALIN AND N. A. VARIGIN. *J. Chem. Ind. (Moscow)* 4, 882-5(1927).—The purpose was to study the adsorptive capacity of various clays in relation to sunflower oil, the best conditions of purification and the change of properties of the oil after the action of the clays. The expts. have shown that Glukhov white kaolin had the greatest adsorption capacity, and Glukhov yellow kaolin the next. The 2 Glukhov clays also had the greatest bleaching power; the power of floridin was weak. The clays used should be as finely pulverized as possible, since expts. show that their adsorbing power is thereby greatly increased. The quantity of clay used need not be above 10% of the quantity of oil, as expts. show that an increase beyond this proportion has little effect. The most favorable temp. for the bleaching operation is 75-90° for sunflower oil and 40-60° for cottonseed oil. It is advisable to neutralize the oils before bleaching. The best temp. for drying Glukhov kaolin before use is 275-400°. It is sufficient to stir Glukhov kaolin with sunflower oil for 30 min.; a more prolonged contact has no effect. The contact of the air in the course of the bleaching operation has no unfavorable effect. After use, the clays can be regenerated by boiling with NaOH for an hr. followed by repeated washings with water and drying by calcination. Sunflower oil, after being bleached by clays, has a lower acidity, whereas the sapon. coeff. and I no. remain unchanged. If the oil acquires an unpleasant taste and odor on being bleached with clays, this can be remedied by blowing superheated steam through the oil.

BERNARD NELSON

Wood oil and its many uses. WALTER OBST. *Allgem. Öl-Fettztg.* 24, 401-2; *Chem. Zentr.* 1927, II, 1631.

F. H.

Cod-liver oil. E. M. BAILEY, HELEN C. CANNON AND H. J. FISHER. *Conn. Agr. Expt. Sta., Bull.* 295, 334-7(1928).—Twenty samples of cod-liver oil were examd. with reference to I and sapon. nos., free fatty acids, unsaponifiable matter and vitamin content. The chem. data were inconclusive. The Drummond color test for vitamin A was found to correlate fairly well with vitamin A potency as detd. by standard U. S. P. animal feeding tests. The color technic may be relied upon to give indices of relative concns. of vitamin A in cod-liver oil. Six samples gave a color value of 5 or less; 9 samples ranged from 5 to 10; 2 samples ranged from 10 to 20, and 3 samples showed color values above 20. The color values could be checked very closely on repeated tests. One cod-liver oil ext. which gave no color with SbCl_3 was found to be of very low vitamin A potency. The basal test ration as now recommended by the U. S. P. assay method could be improved by the addn. of vitamin A-free fat or oil. The present ration was not eaten well by exptl. animals, especially when they were in a weakened condition.

C. R. FELLERS

Halphen's reaction. J. PIERAERTS AND ÉMILE SIMAR. *Mat. grasses* 20, 8222-4 (1928).—The use of open tubes causes the emanation of harmful gases, to which the operator is inevitably exposed. An app. permitting the collection of gases under water or by condensation complicates the reaction to a too great extent. P. and S. recommend the use of sealed tubes immersed in a const.-level water bath kept at boiling temp. for one hr. Results obtained by this method (of which the details are given) on oil from fresh seeds of *Hibiscus manihot* are reported.

P. A. THOMASSET

Studies in photochemistry. I. The Halphen reaction. A. J. PACINI AND R. W. CROSBY. *Clin. Med.* 35, 403-6(1928).—Cottonseed oil exposed to infra-red radiations loses its ability to give the Halphen reaction. The phenomenon appears to be related to the intensity of the radiation and to the time of exposure.

M. H. SOULE

Sulfonation of textile oils. E. L. FLETCHER. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 203-5; *Am. Dyestuff Rept.* 17, 475-7.—The procedure of sulfonation is described. Turkey Red oils must be of a high purity to meet the present conditions of storage and usage. The current Turkey Red oils are judged mainly by their ability to stay in soln. in acid and salt solns. This, however, is not sufficient. The max. amt. of the original glyceride should be broken up and this necessitates carefully designed processing units and ample technical supervision.

L. W. RUCOS

Determination of the water content according to Markussön. A. LAPTEV. *Oil and Fat Ind.* (Russia) 1926, No. 10-11, 31-2; *Chem. Zentr.* 1927, I, 3157.—To test methods

which are based on the expulsion and distn. of the water with xylene, comparative detns. were made with the drying oven. The results show that both methods give values which differ by 0.3% at the most. One condition conducive to precise values is to weigh as large a sample as practicable with a large quantity of xylene. C. C. D.

Progress reports in the soap industry. II. Yellow spots. J. DAVIDSOHN. *Chem. Lab. Berlin Schöneberg. Chem. Umschau Fette, Öle, Wachse u. Harze* 35, 166-9 (1928); cf. C. A. 22, 1697.—A review of the literature in which the following causes of yellow spots are non-critically discussed; the use of lavender oil as perfume; the use of hardened oil and of cottonseed oil; sudden chilling in the cooling presses; traces of heavy metals (Cu, Fe) and incomplete sapon. D.'s method of cold sapon. is said to assure complete sapon. P. ESCHER

Analysis of soap. J. DAVIDSOHN. *Oil and Fat Ind. (Russia)* 1926, No. 6, 31-6; *Chem. Zentr.* 1927, I, 2870.—The paper deals with sampling, detns. of moisture, total fat and free fatty acids, and the calcn. of the yields of soap from 100 kg. of fat. II. *Ibid* No. 7-8, 42-9; *Chem. Zentr.* 1927, I, 1386-7; cf. C. A. 20, 2912.—Methods of analysis are given comprising detns. of unsaponified fat, unsaponifiable components, alkali combined with fatty acids and with resin acids, total alkali, pure soap, free alkali, alkali carbonates, fillers, silicates, NaCl, KCl and rosin. The importance of the detn. of combined and total alkali in soap analyses is discussed. C. C. DAVIS

Special manufacturing of soft soaps. I, II and III. ROBERT KRINGS. *Allgem. Öl- Fettztg.* 24, 110-11, 140-1, 197-9; *Chem. Zentr.* 1927, I, 2783.—The material should not contain more than 1% unsaponifiable matter and be free of "distillation odor" since it is not easily covered. The importance of using the correct quantities and of carefully operating are emphasized. A. L. HENNE

Soap and washing powders. F. KASSATKIN. *Oil and Fat Ind. (Russia)* 1926, No. 10-11, 57-8; *Chem. Zentr.* 1927, I, 3157.—The works of Markuse and of Shadin are criticized. Washing powders contg. Cl or O are objectionable because of their destructive effect on clothes. Pure soap chips or flakes, with, if desired, the addn. of soda, are recommended. C. C. DAVIS

The problem of the preparation of washing powders. M. MARKUSE. *Oil and Fat Ind. (Russia)* 1927, No. 1, 27-9; *Chem. Zentr.* 1927, I, 2869.—Calcns. show that it is disadvantageous to use pure soap powders for washing clothes, since a great part of the soap soln. is consumed by the Ca salts of the wash water. The prepn. of compounded soap powders which contain not less than 25% fatty acids is recommended. Several analyses of "Persil" are shown for comparison. C. C. DAVIS

Suitable soaps for silk mills. FRED GROVE-PALMER. *Oil and Fat Ind.* 5, No. 7, 194-201 (1928).—No soap which has a hard fat for a base can safely be used for silk and no soap whose 1% soln. will jelly when cool is suitable. Likewise rosin soap is injurious on account of yellowing the fiber. Three kinds of soap have proven excellent for boiling off silk: (1) A pure oil soap analyzing 65% fatty anhydrides, 8% combined alkali, 25% H₂O and 0.3% or less free NaOH. (2) Monopol soap, made from sulfonated castor or linseed oil, analyzing as follows: fatty anhydrides 65-75%, combined alkali 3%, free alkali none, H₂O 12-15%. (3) Marseilles soap, made from olive oil foots and analyzing 60-63% fatty anhydrides, 7% combined alkali, not over 0.3% free NaOH, and 26-30% H₂O. E. SCHERUBEL

Detergent experiments on cotton. ROBERT M. CHAPIN. *Oil and Fat Ind.* 5 No. 7, 208-12 (1928); cf. C. A. 22, 2284.—Cotton fabric was soiled with an ointment of lamp black and vaseline, lard, or medicinal mineral oil; after washing in a special machine the residual soil was evaluated by a colorimeter used as a reflectometer. Of pure Na laurate, myristate, palmitate, stearate and oleate the latter was the most powerful up to 40° while palmitate took first place at 60° and stearate at 80°. Addition of sufficient appropriate fat solvent enhanced detergent power. In parallel with C.'s findings on emulsification, excess fatty acid enhanced detergent power while excess alkali decreased it. Other resemblances between emulsification and detergency were not distinct. E. SCHERUBEL

Biological assay of cod-liver oil (ADAMS, McCOLLUM) 11B. Valuation of rosin [for soap manufacture] (FILIPOVICH, TUKHOVITZKI) 26. Agitator for mixing oil with chemicals (U. S. pat. 1,678,225) 1. The chemical study of Malvaleae (Pieraerts, de Winter) 11D.

SNODGRASS, KATHARINE: Copra and Coconut Oil. Stanford Univ., Cal. Food Research Inst. 148 pp. Fats and Oils Studies No. 2.

KRINGS, ROBERT. *Die Zeitgemässe rationelle Herstellung der Schmierseifen*. Berlin: Allgem. Industrie-Verlag. 167 pp. M. 5.

Extraction of oils. PERFECTION COMPANY. Fr. 632,853, April 13, 1927. An app. is described for extg. oil from animal matter such as waste from butcheries, the waste being reduced to small pieces, heated to below 100°, macerated and filtered.

Apparatus for extraction of palm oil or other oils with solvents. C. DOWNS and R. A. BELLWOOD. Brit. 280,986, July 21, 1926.

Apparatus for extracting oil from cod livers by treatment with steam. JAMES A. PATCH. U. S. 1,678,123, July 24.

Sulfonation of oils, etc. CHEM. FABRIK STOCKHAUSEN & CIE. Fr. 632,738, April 13, 1927. Sulfonated oils, fats, etc., are treated with weak saponifying agents such as dil. acid or H₂O. The sulfonation may take place in the presence of indifferent solvents such as C₂HCl₃, and the acid of above 30°C is added as quickly as possible with intensive cooling.

Soap. ARTHUR E. HATFIELD and EUSTACE A. ALLIOTT. Can. 281,881, July 24, 1928. Oleic acid is treated with an alk. soln. (K₂CO₃, Na₂CO₃, KOH, NaOH or NH₄OH) and there is incorporated a mixt. of cyclohexanol and a chlorinated hydrocarbon as stabilizing agent.

Soap. ADOLF WELTER. Can. 282,112, July 31, 1928. A dry non-caking and readily sol. soap in the form of threads formed by forcing pure curd soap through nozzles of at most 1.5 mm. diam.

Flakes of soap and other products. JACOTIN and BINOCHÉ FILS. Fr. 632,413, July 27, 1926. Soap and other products are made into rectangular flakes by spreading in a layer on a traveling band and cutting in parallel lines, after which the soap leaves the band and is cut perpendicularly by blades on a wheel rotating at an appropriate speed.

28 SUGAR, STARCH AND GUMS

F. W. ZERBAN

Calcium-free juices. L. VAN DER HEIDE. *Chem. Weekblad* 25, 274 (1928).

The relation between the p_H and the Ca content of solns. contg. (a) lime, (b) lime and soda, (c) lime and Ca salt and (d) lime, Ca salt and soda, and through which CO₂ is passed has been calcd. It has been found that: the min. Ca content in c is not always reduced to the min. found in a on the addn. of the equiv. quantity of soda; the p_H near which the min. Ca content is found in c is dependent on the nature and quantity of salt present, and, in general, is not equal to the p_H in a . A high value for the min. Ca content does not require a low p_H ; the further the p_H in c is from the p_H in a the less is the equiv. quantity of soda sufficient to remove the Ca completely from the soln.; the p_H in a is little influenced by the addn. of the soda required for the removal of the Ca. The possibility is suggested of treating Java cane juices with soda in order to obtain Ca-free juices.

A. L. HENNE

Electrical installations in sugar mills from the standpoint of safety. G. JÖBIS. *Arch. Suikerind.* 36, 383-412 (1928).—Precautions for installing and manipulating elec. plants in sugar mills are discussed.

P. R. PEKELHARING

The factor of the Siegert formula for bagasse. G. J. SCHOTT. *Arch. Suikerind.* 36, 420-8 (1928).—The factor in the Siegert formula is const. for coal, but variable for bagasse on account of the high moisture. A graph computed from the moisture of the bagasse and the CO₂ of the flue gases is given.

P. R. PEKELHARING

The reducing capacity of adsorption carbons. JOSEF VASATKO. *Z. Zuckerind. cecho-slovak. Rep.* 52, 221-6 (1928).—The importance of activated carbons for the sugar industry lies in their great adsorption capacity, their action as an efficient filter aid and the important property of possessing a marked power of reduction. In a former study (*C. A.* 22, 2287) V. observed that the reducing power of adsorption carbons may play an important role to explain the decompn. of sucrose. In the purification of sugar liquors adsorption of coloring matter is accompanied by simultaneous reduction reactions which place the sucrose, especially at higher temp., in danger of decompn. V. decided to measure the reducing power by treating 1-6 g. of each of the 12 carbons under consideration for 3 hrs. at 20° with 100 cc. of an acidified soln. of FeCl₃ contg. 103.5 mg. of Fe^{III} and detg. in the filtrate the relative proportion of

Fe^{III} and Fe^{II}. Carbons distinguished by a higher power of decompn. of sucrose were characterized by a lower reducing power for ferric salts and *vice versa*. He divides the carbons into two groups. To the first, of higher reducing power, belong: Carbo Animalis Supra Norit 2 x, 3 x, 5 x, Polycarbon, Standard Norit and Superior Norit. This group comprises only gas activated carbons. The second group, of lower reducing power, includes: Anticromos, Carboraffin, Blood char, Carboraffin H, Bone char K. In this group with the exception of 2 animal carbons, all carbons are made by impregnation processes. Great importance should be laid in the selection of an activated carbon by also considering the reducing power. F. R. BACHLER

Yield formula Winter and P. G. H. C. PRINSEN GEERLIGS. *Arch. Suikerind.* 36, 59-62(1928).—Comments on Sylmans' formula expressing the tech. result (C. A. 22, 1699). Postscript. C. SYLMANS. *Ibid* 62-4.—Reply to Prinsen Geerligs. H. C. PRINSEN GEERLIGS. *Ibid* 367.—Answer to Sylmans. P. R. PEKELHARING

Commercial dextrin. S. R. TROTMAN. *Dyer, Calico Printer* 60, 36, 59(1928).—A general article, dealing with the different types of dextrin, methods of analysis and manu. RUBY K. WORNER

Note on the estimation of starches. W. H. BOAST. *Chemist-Analyst* 17, No. 3, 15(1928).—To det. starch in bond papers and in patent, white-fiber boards, the usual practice is to follow directions furnished by the Technical Association of the Pulp and Paper Industry. Difficulty was encountered in the final titration with Fehling or Benedict reagents. The following procedure although somewhat longer has been found more satisfactory. Ext., hydrolyze and neutralize as in the standard method. Transfer 2 ml. of the hydrolyzed starch soln. to a Folin sugar tube. To a similar tube add 2 ml. of standard sugar soln. contg. 0.2 mg. of dextrose. To each tube add 2 ml. of alk. Cu tartrate soln. Place both tubes in boiling water and keep them there for 6 min. Cool with cold water and add 2 ml. of alk. phosphate molybdate soln. After the Cu₂O has dissolved, dil. to the 25-ml. mark, mix and compare the color of the unknown soln. with the standard in the colorimeter set at 20 ml. Calc. the dextrose found in terms of starch. W. T. H.

The chloroform test for the valuation of the quality of various starches. WILHELM PLAHL. *Z. Untersuch. Lebensm.* 55, 295-6(1928).—A brief discussion. W. J. H.

Grating machines in the manufacture of potato starch. SPROCKHOFF. *Z. Spiritus-ind* 51, 180-1, 188(1928).—A discussion of the possibilities in this field when fine grinding with the Excelsior mill is carried on. The mfg. processes which have com. application are also considered. C. N. FREY

Influence of oil-containing incrustations in the steam chambers of evaporators on the heat transmission and the capacity of the evaporators (SPOELSTRA) 13. Gas distribution in liquids by means of a rotating sieve (PSENICKA) 13. The occurrence of starch in oil-bearing edible nuts (GRIEBEL) 12.

HIRSCHFELD, W.: Tabelle zur Berechnung der Schmutzprozente bei Zuckerrübenlieferungen, Kartoffeln u. a. landwirtschaftlichen Erzeugnissen von 2 bis 65 Prozent für 500 bis 50,000 kg. Magdeburg: A. Rathke. 131 pp.

PAROW, EDMUND: *Handbuch der Stärkefabrikation*. 2nd ed., revised. Berlin: Verlagsbuchhandlung. Paul Parey. 784 pp. Linen bound, R. M. 58.

Purifying sugar solution. FRIEDRICH W. MEYER. U. S. 1,678,571, July 24. A sugar soln. is limed after heating to about 90° to effect decolorization, the soln. is neutralized, *e. g.*, with CO₂ or H₂SO₄, and is filtered and treated with high-grade decolorizing C.

Evaporating apparatus of the vertical-tube type, suitable for treating sugar juices. ERMIN POKORNY. U. S. 1,677,987, July 24.

Starch. CORN PRODUCTS REFINING COMPANY. Fr. 632,712, June 3, 1927. See Brit. 277,572 (C. A. 22, 2680).

29—LEATHER AND GLUE

ALLEN ROGERS

Critical study of the biochemistry of soaking. II. Effect of time, temperature and hide proportion upon soak waters. EDWIN R. THEIS AND ELLIOTT LEE MCMILLEN. Lehigh Univ. *J. Am. Leather Chem. Assn.* 23, 372-97(1928); cf. *C. A.* 22, 2681.—Soak waters were analyzed to show state of combination of their N_2 content, N_2 distribution according to Haussman's scheme, and biochem. O_2 demand. Increasing time of soaking increases total ammonia, amino, and org. N. Protein N remains fairly const. Nitrates first decrease and then increase. Nitrites increase slightly. Melanin N decreases; basic N is practically const.; amide N increases; and non-basic N decreases with time. O_2 consumption increases. Soak waters are strongly reducing in character. With increased ratio of hide to water, all constituents increase in concn., without much change in their relations among themselves. All components are increased with increasing temp. H. B. MERRILL

Sulfide stains on white hides. G. W. SCHULTZ. *J. Am. Leather Chem. Assn.* 23, 356-61(1928).—These stains are commonly attributed to formation of FeS . While hides that have come in contact with Fe always show stains when treated with Na_2S , Fe is not the cause of most stains observed in practice. Stains are most noticeable in poorly cured skins, and the proportion of stained skins increases with the length of time the skins are stored. By pretreating skins with dil. $NaOH$ or sulfide-free $Ca(OH)_2$ soln. before putting skins in a sulfide lime, stains can be entirely prevented. This pretreatment cannot remove Fe, and skins deliberately treated with Fe are not improved by the treatment. *Conclusion:* Sulfide stains are caused by the interaction of S^{--} and some decompn. product of hide H. B. MERRILL

Comparison of several methods of hydrolysis in determining nitrogen in leather. R. W. FREY, L. J. JENKINS AND H. M. JOSLIN. Bur. of Chemistry. *J. Am. Leather Assn.* 23, 397-402(1928); cf. *C. A.* 22, 192.—Samples of 5 leathers were digested for 0.5-3.5 hrs.; using (1) the A. L. C. A. method (no catalyst), (2) HgO , (3) $CuSO_4$, and (4) $KClO_4$. Addn. of each catalyst decreased the time for complete digestion by about 1.5 hrs. Otherwise the results were identical by all 4 methods. H. B. MERRILL

The effect of free sulfuric acid on leather and methods for its determination. M. KEH AND G. LAUFEROWNA. Lab. Poln. Gerbereibetriebe Krakau. *Przemysl Chemiczny* 11, 389-96; *Chem. Zentr.* 1927, II, 661. H_2SO_4 in leather was detd. by extg. with distd. water in a separatory funnel until the tannin test was negative, then titrating with $NaOH$ (rosolic acid as indicator), and finally pptg. as $BaSO_4$. Precise results are, however, obtained only by the method of Balland-Maljean, which must always be used when the SO_4 concn. exceeds 0.25%. C. C. DAVIS

The dyeing of leather. J. W. LAMB. *Dyer, Calico Printer* 59, 228-9; 60, 8, 9, 50, 1(1928).—A general article, dealing with the difficulties of leather dyeing, selection of dyestuffs and methods of application. Some typical recipes are included. RUBY K. WORNER

Topping black leathers. CHAS. A. MCNEIL. *J. Am. Leather Chem. Assn.* 23, 361-72(1928).—A discussion of different methods of operating and of the dyes employed therein. H. B. MERRILL

Tanning materials. VITTORIO CASABURI. *Atti congresso naz. chim. pura applicata* 2, 972-91(1926).—A review of the application of cellulose waste (waste sulfite liquor and soda cellulose liquor) to tanning and a discussion of the application of "Alphachrom" for which the author claims superior results. L. T. F.

Some aspects of tanning, coloring, and fat-liquoring. AUGUST C. ORTHMANN. *J. Am. Leather Chem. Assn.* 23, 351-5(1928).—A discussion of these operations with reference to chrome calf leather. H. B. MERRILL

Tannin content of Alaskan mountain hemlock (*Tsuga mertensiana*). P. B. DAVIDSON AND E. C. SHERRARD. U. S. Forest Products Lab., Madison, Wis. *J. Am. Leather Chem. Assn.* 23, 371-2(1928).—Pieces of bark 6 in. \times 6 in. were cut from 4 sides and 4 heights on 16 trees, making 256 pieces. The entire sample was ground and mixed. The sample was extd. by the A. L. C. A. method. Eight analyses of the ext. show the following averages: solids 26.81, sol. matter 21.39, non-tannin 9.18, tannin 12.21%. H. B. MERRILL

The drying of glue and gelatin. F. SAUER. *Kunst-dünger- u. Leim-Ind.* 24, 143-5, 171-2; *Chem. Zentr.* 1927, II, 663.—Diagrams show the influence of temp., size of batch and concn. of gelatin or glue on drying, in which the abscissas represent the no. of hrs. and the ordinates the diminishing wt. The results of Gerike (*Kolloid-Z.* 17,

78) show breaks in the dehydration curves at 70% and at 94% dry gelatin content on account of a firm union of water, and correspondingly in the present work the drying of larger sheets of glue involves at least 2 stages. Preliminary channel drying first at low temp. and then at 60° is recommended because of the lower m. p. of the glue or gelatin with an initial high water content.

C. C. DAVIS

Tanning with mixed tanning agents. R. ALCALAI. Brit. 281,292, Nov. 23, 1926. Vegetable tanning materials are mixed with a normal Cr salt and with an Al salt in such proportion as would be insufficient for tanning if used alone.

Wool and hair stripping. ROGER CAUJOLLE, LOUIS BARRIÉ and GEORGES DE CROZALS. Fr. 632,558, July 30, 1926. A compn. used for stripping skins of hair or wool contains KOH, vegetable oil, ammonia, oil of turpentine, oil of mirbane and talc.

Glue. MARCEL KOVÁCS and MICHAEL MESANAVITS. Fr. 632,380, July 23, 1926. Glue is made by adding flour of chestnuts to the ordinary constituents.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Patent review. CARL BÖHM V. BORNEGG. *Kautschuk* 1928, 134-6; cf. C. A. 22, 2489.—Numerous recent patents of various countries on the use of latex, raw rubber, mixing, vulcanization and manufactured products are itemized. C. C. DAVIS

The influence of some gas blacks on the properties of rubber mixtures. [FIRMA] ANTON ANDRÉ SOHN. *Kautschuk* 1928, 139.—Measurements of the particle size of C blacks gave the following values: Brand M and St. (A.A.S.), 60% of 15-40 μ , 38% of 40-90 μ ; Brand No. 200 (A.A.S.), 30% of 15-40 μ , 68% of 40-70 μ ; American, 65% of 15-40 μ , 35% of 40-70 μ ; Thermax, 20% of 15-40 μ , 73% of 40-100 μ . It is claimed that the A.A.S. blacks impart just as good properties to rubber mixts. as American blacks.

C. C. DAVIS

Yellow ochre in the presence of hydrogen sulfide. GORDON EASTWOOD AND A. M. MUNRO. *Chem. Eng. Mining Rev.* 20, 322-3 (1928).—In some expts. on compounding yellow ochre into rubber, one of the rubber compds. came out gray in color instead of yellow. This was apparently due to the formation of a film of Fe₂S₃. On standing in the air this tends to revert back to Fe₂O₃.

W. T. H.

Behavior of rubber-plated apparatus toward organic solvents (BRESSER) 1. Benzine and alcohol recovery equipment (MÜLLER) 1.

Rubber. SOC. DU CAOUTCHOUC ANODEX. Fr. 632,144, April 5, 1927. To prevent liberation of gas at the cathode in the electrophoretic deposition of rubber, the surface of the cathode is formed of an easily reducible metallic oxide such as PbO₂ and the cathode itself is preferably of Pb. An app. is described.

Rubber. THE B. F. GOODRICH CO. Fr. 632,474, Oct. 30, 1926. Addn. to 599,561. Fragments of rubber are treated with a sulfonyl chloride such as *p*-toluenesulfonyl chloride to produce a product plastic when heated.

Treating rubber latex. OMAR H. SMITH (to General Rubber Co.). U. S. 1,678,022, July 24. Latex is thickened with a buffer soln. such as a mixt. of primary and secondary Na phosphates, water-sol. substances are sepd. by stratification and a purified dispersible product is obtained.

Deposition of rubber. SOC. DU CAOUTCHOUC ANODEX. Fr. 632,143, April 5, 1927. The deposition molds used in the electrophoretic deposition of rubber are treated after use to recover their efficiency. If of unglazed clay they are heated to incandescence, or they are placed in an electrolytic bath contg. no colloid and current is passed in the opposite direction to that of the deposition, or they are washed under pressure with an alk. soln. or with the same electrolyte used for the impregnation of the molds in such a way that the liquid passes through the mold from the side which is turned towards the anode in the bath. If Ca salts have been added to the electrolytic bath the molds are washed with HCl. The amount of Ca salts required may be reduced by adding Mg compds.

Preserving rubber. J. TEPPERMA (to Goodyear Tire and Rubber Co.). Brit. 281,616, Nov. 30, 1926. The aging qualities of rubber are improved by the addition

of reaction products of phenols and amines such as phenyl α - or β -naphthylamine, α,β -dinaphthylamine, β,β -dinaphthylamine or diaminodiphenyldi- β -naphthylmethane. Directions are given for making these compds. and tables are given showing their effects when used with rubber.

Rubber composition. LORIN B. SEBRELL (to The Goodyear Tire and Rubber Co.). Can. 282,347, Aug. 7, 1928. Rubber is preserved by vulcanizing in the presence of a reaction product of an aldehyde and an amine formed at a temp. of approx. 0° and which is substantially a non-accelerator.

Rubber composition. LORIN B. SEBRELL (to The Goodyear Tire and Rubber Co.). Can. 282,348, Aug. 7, 1928. Vulcanized rubber is preserved by incorporating therein a reaction product of a crotonaldehyde and an aromatic amine, which is substantially a non-accelerator.

Rubber composition for facing molds. ADRIAN BAISH. U. S. 1,677,881, July 24. Molds suitable for forming rubber balls or other articles are faced with a compn. of rubber, S, Zn dimethyldithiocarbonate, methyl mustard oil, a filler, a "lightener" and a drier, *e. g.*, lime, clay, ZnO, MgO or MgCO₃ or asbestos.

Regeneration of waste rubber. WALDEMAR SCHEITHAUER. Fr. 632,990, April 20, 1927. See Brit. 270,675 (C. A. 22, 1706).

Vulcanizing rubber. WINFIELD SCOTT (to Rubber Service Laboratories Co.). U. S. 1,678,084, July 24. The CS₂ deriv. of the reaction product of diethylamine with paraformaldehyde is used as an accelerator in vulcanizing rubber with S. U. S. 1,678,085 specifies the similar use of the CS₂ deriv. of the reaction product of piperidine and furfuraldehyde.

Making and vulcanizing inner tubes of pneumatic tires. ERNEST W. MELVIN (to Fisk Rubber Co.). U. S. 1,678,015, July 24. Mech. features.

Rubber substitute. MORTIMER T. HARVEY. Fr. 632,454, Oct. 20, 1926. Addn. to 622,963. Cashew nut oil and glycerol are mixed and heated to about 245° to obtain a product similar to rubber, which can be vulcanized.

CHEMICAL ABSTRACTS

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No. 19

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

A colorimeter. KARL S. FELIX, HELMRICH AND WANDERSCHECK. *Wochschr. Brau.* **45**, 312-6(1928).—An app., fitted with a photoelectric cell, to det. color in malt worts and beers is described.

Extraction apparatus for liquids. J. FRIEDRICH. *Chem. Fabrik* **1928**, 91.—A new app. is described in which the usual glass spiral is replaced by a porous filter plate.

A continuous-extraction apparatus. H. L. MAXWELL. *Purdue Univ. Ind. Eng. Chem.* **20**, 871-3(1928).—The app. consists of two flasks connected together by a siphon and a vapor tube. A reflux condenser is in the neck of one flask. Solvent is placed in the flasks and the siphon tube filled. The flasks are then heated to boiling, after which the operation is automatic.

An automatic sample-collecting vacuum pump. E. R. WEAVER AND MARTIN SHEPHERD. *Bur. of Standards. J. Am. Chem. Soc.* **50**, 1829-35(1928).—The app. is an automatic Hg Topley pump, which acts as the backing unit to a high-speed Hg-vapor pump. The automatic control is accomplished by an arrangement of Hg displacement within an auxiliary cycle, which can be operated by a H₂O aspirator or a motor-driven vacuum pump.

New apparatus for boiling-point determinations. W. SWIENTOSLAWSKI. *Warsaw Polytechnic School. J. Chem. Education* **5**, 469-72(1928).—The app. consists of a Pyrex bulb connected with a vapor chamber, into which are inserted the thermometer and reflux condenser. Vapor bubbles in the bulb carry the liquid up and throw it out on the thermometer. In an improved form of the app., a Hg-filled glass thermometer well extends into the vapor space, so that any contact of the vapor with cork is eliminated. The app. is sensitive to 0.002°. In another form, the app. is provided with 2 consecutive vapor chambers, so that the boiling temps. of the soln. and of the pure solvent may be detd. simultaneously.

An efficient dehydrating apparatus for general use. WILBUR D. COURTNEY. *Oregon State Agr. College. Science* **67**, 653-4(1928).—To construct this unit, one end of a glass tube, bent into a U, is welded to the bottom outlet of a separatory funnel. The other end of the tube is welded to the small end of a test-tube (magazine tube). Near the top of this, and a little above the level of the stopcock in the separatory funnel, is inserted an overflow tube. Evapn. is minimized from the open end of the magazine by a cork, removable for charging or discharging purposes. At the bottom of the U is a drain-tube having a stopcock, allowing of complete drainage. The app. is best constructed of Pyrex glass, all rubber connections being eliminated, and is properly mounted on a ring-stand. Depending upon the size of the material to be dehydrated, object-glasses or cheese-cloth bags serve as containers, these being inserted in the magazine when filled. The stopcock in the separatory funnel may be so regulated that fluid passes through at the desired rate (a few cc. to l. per day) and into a dish.

The Rhode gas analyzer. RIZ. *Industriell. Norden*, No. 39, 309-10(Sept. 28, 1927); *Chimie et industrie* **19**, 1072-3(1928).—An illustrated description of the construction and operation of the app.

The Féry refracto-dispersometer. C. CHÉNEVEAU AND C. VAURABOURG. *Chimie et industrie* **19**, 787-92(1928); *Bull. soc. chim.* **43**, 374-84.—After a discussion of the importance and value of the detn. of n and of refractory dispersion, C. and V. describe the principle of the refractometer and of the refracto-dispersometer. The Féry refracto-dispersometer is essentially a refractometer with a chromatic objective, in which the ocular is provided with a small rotating disk perforated with holes which are covered by suitably selected monochromatic screens (corresponding more particularly to the green and indigo lines of the H γ spectrum). By turning the disk, any one of the screens

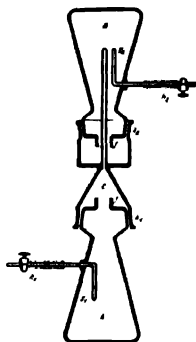
may be brought in front of the ocular and the n detd. for that particular wave length.

A. PAPINEAU-COUTURE

Apparatus for working with the exclusion of air or in a neutral atmosphere. P. DICKENS. Kaiser Wilhelm Inst. für Eisenforschung. *Instruments* 1, 311-2(1928).—

The app. can be evacuated through tube g_1 or filled with an inert gas through tube g_1 . The soln. to be treated enters the app. through g_1 . By reversing the app. the soln. can be filtered. Its use is suggested for the detn. of silica in carbon and low-silicon steels according to the Br method; of carbide C; of Cu, Zn and Mn as sulfide, for the formation of the addition products of CNBr to tertiary arsines, for the production of triphenylmethyl, etc.

D. GORDON



Automatic vacuum gages. L. SMEDE. Research Lab. Westinghouse Co. *Elec. J.* 25, 437-40(1928).—The development of the steel tank rectifier has created a demand for several types of automatic vacuum gages. The purpose of such gages is to turn on the vacuum pumps when the pressure reaches a certain definite value, prevent the power from being connected to the tank when the vacuum is too high, and cut the rectifier tank off of the line in case the pressure in the tank should rise to a dangerous value. Various types were investigated but the glow discharge type was found to be the best and was developed. The gage operates on

the principle of the variation of breakdown voltage of a gas with pressure. By properly choosing the distance between the electrodes and their size and shape, the gage can be made to operate over a range of from 1 to 40 microns. An Al cylinder 3 in. long and 1 in. in diam. is used as one electrode. The other electrode is a small cylindrical cap of graphite, about $1/16$ in. in diam. mounted on a small W rod sealed into the glass. In order to take care of irregular breakdowns which occur, a slow acting relay is used. Further details are given.

C. G. F.

A new model of condensation hygrometer. L. MARTINOZZI. *Staz. Aerologica Sperimentale Ufficio Presagi. Atti accad. Lincei* [6], 7, 389-93(1928).—The app was designed to eliminate the sources of errors inherent in hygrometers of the types of Regnault, Chistoni, etc. (cf. Ranzi, *Nuovo cimento* 4, (N. S.), No. 4 (1927)).

C. C. D.

Theory of magnetic separation. B. W. HOLMAN. *Trans. Inst. Chem. Eng.*, (advance proof), March, 1928, 3-11.—Theories of magnetism are briefly discussed in relation to the operation and design of magnetic separators, particular consideration being given to the influence of particle size, the shape of the pole pieces, the design of electro-magnets, the use of flux-meters and the detn. of permeability. B. C. A.

Dialysis of putrescible liquids. O. M. URBAIN. *Ind. Eng. Chem.* 20, 811(1928).—The app consists of a dialyzing tray of parchment paper contained in a metal dialyzing compartment, the lid of which is sealed in, and from which the air is aspirated by a current of N. The app. is kept at 0° by an ice jacket. The H₂O fed to the app. is first boiled to expel the O.

T. S. CARSWELL

Washing or dissolving various melts with water (VASSERMAN) 13.

Thermometer suitable for use on radiators of internal-combustion engines. C. L. BREEDEN. Brit. 281,781, Sept. 13, 1926. Structural features.

Use of substances of definite melting point, etc., in calibrating thermometers and pyrometers. N. M. HOPKINS. Brit. 282,424, Dec. 20, 1926.

Filter construction (with leaf filters carried on frames). J. H. DINE and C. H. BILLINGTON. Brit. 282,542, Nov. 15, 1926.

Filter for oil or other liquids. ERNEST J. SWEETLAND. U. S. 1,680,029, Aug. 7.

Filter for water or other liquids. GEORGE C. LEWIS (to Darco Sales Corp.). U. S. 1,678,676, July 31. See Brit. 262,328 (C. A. 21, 3493).

Filter for liquids or gases. A. PAHL. Brit. 281,879, Dec. 29, 1926. A woven wire screen is dipped in "liquid glass" or liquid enamel and then treated with charcoal, chalk or lime. After the coating has hardened it may be further treated with a reagent which will assist in the purification of the material to be treated or filtered. Exhaust gases from internal-combustion engines may be passed through filters some of which have been treated with caustic alkali and others with a soln. of Cl.

Fluid filter for absorption of "thermally active" rays. LOUIS BELL and WALTER

G. WOLFE. U. S. 1,681,276, Aug. 21. A soln. of ferrous NH_4 sulfate is used together with a soln. of $\text{Co}_2(\text{SO}_4)_3$, in "chromatic balance."

Bag filters for removing suspended particles from gases. MASCHINENFABRIK BETH A.-G. Brit. 281,994, Dec. 11, 1926. Structural features.

Apparatus for filtering and washing air or other gases. D. HALL, J. H. KAY and HALL & KAY, LTD. Brit. 282,233, Feb. 9, 1927.

Apparatus for cooling, humidifying and washing air. J. A. BROOKS. Brit. 281,914, March 21, 1927.

Centrifugal apparatus for removing dust from air, etc. WOODALL-DUCKHAM (1920), LTD., S. N. WELLINGTON and A. SCOTT. Brit. 282,258, April 5, 1927.

Suction device for removing dust from air or other gases. GEORG BÜHLER. U. S. 1,678,932, July 31.

Scraper for rotary continuous filters. ALBERT L. GENTER (to United Filters Corp.). U. S. 1,678,639, July 31.

Apparatus for washing and separating materials of different densities. FIRMIN BASCOUR (to Soc. anon. Cribla). U. S. 1,681,164, Aug. 21. An app. is specified which is suitable for treating coal to sep. it from shale.

Disintegrating and separating. ÉTABLISSEMENTS PILLARD FRÈRES. Fr. 633,996, May 6, 1927. An app. is described for disintegrating by shocks a soft material contg. harder granular particles with a view to sepg. the particles without destroying them. The shocks are caused by beveled knives turning at a high speed on an axle in a cylindrical container.

Heat exchange apparatus suitable for preheating air. NELS R. FORSSBLAD. U. S. 1,680,145, Aug. 7. Structural features.

Apparatus for distilling tar or other viscous materials on the surface of a heated coil. J. F. CARMICHAEL and J. F. CARMICHAEL & Co., LTD. Brit. 282,525, Oct. 28, 1926.

Dome construction for stills for tar, oils or other substances or for paper pulp digesters. BEACON OIL CO. and H. H. HEWETSON. Brit. 281,928, April 20, 1927. The main portion of the still is completely filled with liquid undergoing treatment, so that corrosive fumes are confined to the dome.

Apparatus for drying bagasse or other materials. FRANK L. ALLEN and ARTHUR D. FLOWER (to Edge Moor Iron Co.). U. S. 1,680,274, Aug. 14.

Apparatus for drying paper or other materials in long lengths. O. MINTON. Brit. 282,032, Dec. 10, 1926.

Heat exchange apparatus suitable for recording calorimeters. CHARLES V. BOYS. U. S. 1,680,850, Aug. 14.

Continuously operating flow calorimeter and indicator for gases. EDWIN X. SCHMIDT (to Cutler-Hammer Mfg. Co.). U. S. 1,678,918, July 3. A pair of positive displacement pumps serve to proportion the flow of a main stream of gas and of a test stream or continuous sample and a calorimeter and indicator indicate directly the caloric value of the sample.

Apparatus for regulating proportionate supply of chemical reagents. CHARLES H. SMOOT. U. S. 1,680,750, Aug. 14.

Apparatus for adding chemical reagents in regulated quantities to soften water or for other purposes. H. S. HATFIELD and UNITED WATER SOFTENERS, LTD. Brit. 282,168, Sept. 18, 1926. An analyzing or testing app. such as described in Brit. 264,237 (C. A. 22, 4) is combined with an app. for controlling the quantity of reagent added in accord with results of the test analyses. Numerous details are described.

Automatic recording apparatus for indicating proportionate changes in hardness of water (or other changes in liquids) by electrical conductivity tests. H. S. HATFIELD. Brit. 282,170, Sept. 20, 1926.

Apparatus for mixing different flowing liquids in determined volumetric proportions. H. KAUWERTZ. Brit. 282,503, Sept. 24, 1926.

Apparatus for making solutions. H. FRISCHER. Brit. 281,695, Dec. 6, 1926. Concentric perforated drums for material to be dissolved are placed within an outer vessel and may be surrounded with filtering material and provided with agitating blades. A plurality of drums may be used in series.

Perforated tube and associated apparatus for preventing froth being carried off with vapors from evaporating apparatus. SOC. DES CONDENSEURS DELAS. Brit. 282,022, Dec. 21, 1926.

Heat exchange device suitable for cooling compressed air. SVEN T. NELSON (to Sullivan Machinery Co.). U. S. 1,679,134, July 31.

Chemical autoclaves or other apparatus heated by electric induction. ARCHIBALD H. DAVIS (to National Aniline & Chem. Co.). U. S. 1,680,595, Aug. 14.

- Device for testing the heat conductivity of solids or fluids.** FRANCIS M. ROWAN. U. S. 1,680,638, Aug. 14.
- Continuous recuperator for use with various types of furnaces.** W. H. FITCH. Brit. 282,443, Dec. 18, 1926.
- Cooling drum for fatty emulsions or similar materials.** WILHELM G. SCHRÖDER. U. S. 1,679,685, Aug. 7.
- Electrically indicating apparatus for determining the moisture content of travelling webs of material.** A. ALLEN (to Atlantic Precision Co.). Brit. 281,693, Dec. 2, 1926.
- Spraying apparatus for coating metal, stone or other surfaces with glass, enamel or other coating materials.** A. PAHL. Brit. 281,885, Jan. 7, 1927.
- Apparatus for testing tensile strength and elongation.** ROBERT P. STEVENSON (to Henry L. Scott Co.). U. S. 1,679,751, Aug. 7.
- Gas-analysis apparatus.** SIEMENS & HALSKE A.-G. Brit. 282,080, Dec. 10, 1926. Structural features are specified of an app. for detg. the proportion of combustible gas in flue gases or other gas mixts. by burning them on an elec. heated wire and detg. the resistance of the wire.
- Gas-analysis apparatus.** CLARENCE H. PORTER. U. S. 1,681,047, Aug. 14. A single galvanometer is actuated by the combined effects of elec. devices responsive to the thermal cond. of burned and unburned portions of a gas sample.
- Apparatus for automatic control of valves of gas-producing plants, etc.** N. E. RAMBUSH and POWER-GAS CORP., LTD. Brit. 282,505, Sept. 27, 1926.
- Device for removing impurities from gases by centrifugal action.** L. L. BEURRIER. Brit. 282,420, Dec. 15, 1926.
- Catalytic apparatus for reactions between gases or vapors.** HANS HARTER. U. S. 1,678,778, July 31. An app. suitable for oxidizing NH_3 or for other reactions between gases or vapors comprises a propeller carrying Pt or other catalytic material with which the reacting materials are brought into contact.
- Gaseous discharge apparatus suitable for use as a rectifier.** CHARLES G. SMITH (to Raytheon Inc.). U. S. 1,679,449, Aug. 7. An anode comprising Ta is used with a coated cathode and an atm. of He.
- Apparatus (with superposed compartments and rotary atomizers) for effecting contact of liquids with gases.** S. WRIGHT. Brit. 281,958, June 9, 1927.
- Apparatus for treating gases with a counterflow of liquids.** E. M. SALERNI. Brit. 282,493, Sept. 21, 1926. Gas passes through a rotating spiral scroll of sheet metal or the like which may contain contact materials such as Fe filings, turnings or coke.
- Apparatus for gaseous reactions.** HANS HARTER. Fr. 634,582, Dec. 18, 1926. To facilitate the reaction of gases or vapors, rotating paddle wheels or screws are provided for mixing the gases. The vanes of the wheels, etc., may carry catalytic material.
- Preventing leakage of ether or other treating fluids from cyclic treating systems.** JESSE M. COAHN (to Olean Sales Corp.). U. S. 1,680,452, Aug. 14. A system such as an app. using ether to ext. HOAc from pyroligneous acid is vented to the atm. and treating fluid such as ether tending to escape through the vent is absorbed in material to be treated. An app. is described.
- Apparatus for leaching caliche or other materials with circulating liquid in successive stages.** WALTER L. REMICK. U. S. 1,678,787, July 31.
- X-ray tube.** GUSTAV BUCKY. U. S. 1,679,804, Aug. 7. Structural features.
- X-ray tube.** GUSTAV BUCKY. U. S. 1,679,332, July 31. Structural features.
- Röntgen-ray apparatus.** F. S. SMITH. Brit. 282,020, Dec. 8, 1926.
- Röntgen-ray apparatus.** SIEMENS-REINIGER VEIHA GRS. FÜR MEDIZINISCHE TECHNIK. Brit. 282,009, Dec. 8, 1926.
- Luminous discharge tube containing rarefied argon and mercury vapor.** RAYMOND R. MACHLETT (to Rainbow Light, Inc.). U. S. 1,680,271, Aug. 7.
- Luminous tubes.** RAYMOND R. MACHLETT (to Rainbow Light, Inc.). U. S. 1,680,272, Aug. 7. The tubes contain a rare atm. gas such as Ne under reduced pressure and electrodes which may be mainly formed of graphite and which contain occluded alkali metal vapor, e. g., Cs. Cf. C. A. 21, 1035.
- Electric discharge tubes.** SIEMENS-SCHUCKERT WERKE GES. M.B.H. Fr. 634,022, May 7, 1927. The walls of the tube are covered on the parts facing the electrode conductors with a conducting lining joined to the electrode conductors to avoid a discharge on the leads.
- Luminous electric discharge tubes.** F. MEYER, H. JOACHIM and E. GERMER (to Naamloze Vennootschap International Octrooibureau). Brit. 282,064, Dec. 10, 1926. In order that luminous discharge tubes may be operated at ordinary voltages,

they are provided with a highly active cathode which may comprise alk. earth oxide or similar active material. Various structural details are given.

Electronic discharge apparatus. LA RADIOTECHNIQUE. Fr. 634,551, April 21, 1926. A rigid supporting frame for a cathode having several elements in parallel is described.

Bolting machines. CHARLES A. GESNEL. Fr. 634,009, May 7, 1927. The material to be bolted is caused to strike the bolting cloth at an angle which varies according to the degree of fineness required.

Furnaces. GEOFFREY MARTIN. Fr. 634,013, May 7, 1927. In a shaft furnace for lime, gypsum and cement and for calcining ores, a preheating or decarbonating zone and a clinkering zone are provided. The cross-sectional area of the preheating zone is much greater than that of the clinkering zone so that the speed of the ascending gases in the clinkering zone is at least four times that of the gases in the preheating zone.

Thermionic valves. A. JUST (to General Electric Co., Ltd.). Brit. 282,539, Nov. 10, 1926. A thermionic cathode is formed with a metallic core such as W, Mo, Ni, Pt or an alloy, permeated or coated with a mixt. of oxides which may comprise mainly an alk. earth metal oxide together with a smaller proportion of other oxides such as those of Cr, U, Th, Nd, Pr or Sm or La. The oxides may be obtained from the corresponding azides.

Thermionic valves. W. C. SPROESSER (to Westinghouse Lamp Co.). Brit. 281,687 Dec. 1, 1926. An electron-emitting body is formed with a core of metal such as W treated with electron-emitting material such as Th, Zr, U or V. The materials may be heated together in H at 1150° for 1 hr. in an elec. furnace.

Thermostatic controls for electric resistance heaters. IRVIN G. THOMAS (to Westinghouse Elec. & Mfg. Co.). U. S. 1,678,885, July 31.

Thermostatic control system for resistance heaters, etc. ROLLO B. LINCOLN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,678,865, July 31.

Thermostatic device for controlling electric circuits. JOHN L. BROWN. U. S. 1,679,070, July 31.

Thermostatic device for regulating electric circuits. AUGUST J. MOTTLAU (to Westinghouse Elec. & Mfg. Co.). U. S. 1,680,428, Aug. 14.

Thermostatic control for electric switches. JOEL R. COOK (to Westinghouse Elec. & Mfg. Co.). U. S. 1,679,649, Aug. 7.

Thermostatic electric switch. HOWARD D. MATTHEWS (to Westinghouse Elec. & Mfg. Co.). U. S. 1,680,426, Aug. 14.

Thermostatic control and safety device for gas burners. MILEY W. THOMAS and PAUL H. HAMILTON (to Sands Mfg. Co.). U. S. 1,678,658, July 31.

Thermostatic valve for gas water heaters or other apparatus. CLARENCE H. MORROW (to Hotstream Heater Co.). U. S. 1,679,165, July 31.

Bimetallic thermostatic devices. VICTOR G. VAUGHAN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,678,889, July 31. One thermostatic element is formed of Ni steel and the other of an alloy of Co and Fe. Cf. C. A. 22, 2498.

Drying apparatus with air circulation controlled by a thermostat and hygrometer. A. F. WRIGHT. Brit. 281,785, Sept. 14, 1926.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

James Mason Crafts. AVERY A. ASHDOWN. Mass. Inst. of Technology. *J. Chem. Education* 5, 911-21(1928).—Bibliography. E. H.

Ellwood Hendrick. CHARLES F. ROTH. *Ind. Eng. Chem.* 20, 978-9(1928). E. H.

Edward Granville Nellis. An appreciation. M. C. WHITTAKER. *Ind. Eng. Chem.* 20, 984(1928). E. H.

Maurice Prud'homme (1848-1927). FÉLIX BINDER AND ANDRÉ WAHL. *Bull. soc. ind. Mulhouse* 94, 322-30(1928).—An obituary with bibliography. A. P.-C.

Some early industries in the United States. WM. V. SESSIONS. Princeton Univ. *J. Chem. Education* 5, 922-8(1928).—A historical sketch covering chemical industries from Colonial times to the middle of the 19th century. E. H.

Chemistry in the service of India. GILBERT J. FOWLER. *J. Indian Chem. Sec. 3*, 127-37(1928). E. H.

Experiences with oral recitations in descriptive high-school chemistry. FRED T. HART. Marshall High School, Chicago. *J. Chem. Education* 5, 994-6(1928). E. H.

Objectives and content of the elementary college course in qualitative analysis. J. H. REEDY. Univ. of Illinois. *J. Chem. Education* 5, 937-42(1928). E. H.

The first-year college course in chemistry for students who have studied the subject before entrance. C. PAULINE BURT. Smith College. *J. Chem. Education* 5, 990-3(1928). E. H.

The technic of conducting the introductory college course in qualitative analysis. N. HOWELL FURMAN. Princeton Univ. *J. Chem. Education* 5, 946-55(1928). E. H.

The technic of conducting the introductory college course in quantitative analysis. E. G. MAHIN. Univ. of Notre Dame. *J. Chem. Education* 5, 965-74(1928). E. H.

Objectives and content of the introductory course in quantitative analysis. H. H. WILLARD. Univ. of Mich. *J. Chem. Education* 5, 957-63(1928). E. H.

Advanced and graduate work in analytical chemistry. C. W. FOULK. Ohio State Univ. *J. Chem. Education* 5, 979-85(1928). E. H.

Support of graduate research in chemistry in American Universities, 1927-1928. CLARENCE J. WEST AND CALLIE HULL. National Research Council. *J. Chem. Education* 5, 1005-14(1928). E. H.

A lecture demonstration of the Cottrell precipitator. HOSMER W. STONE. Univ. of Calif. *J. Chem. Education* 5, 1001-3(1928). E. H.

A note on the agricultural biochemistry building at the University of Minnesota. R. A. GORTNER. Univ. of Minnesota. *J. Chem. Education* 5, 997-1000(1928). E. H.

The new low-temperature laboratory of the Physikalisches-Technische Reichsanstalt. W. MEISSNER. *Z. Ver. deut. Ing.* 72, 1069-76(1928). E. H.

Chemical warfare. A course in the study of toxic gases. C. F. WELLS. S. Dakota State College. *J. Chem. Education* 5, 929-32(1928).—The course given at S. Dakota State College is outlined. E. H.

The pressure transitions of the rubidium halides. P. W. BRIDGMAN. Harvard Univ. *Z. Krist.* 67, 363-76(1928).—The transitions which occur at high pressures are not what would be expected, and do not give rise to modifications of the CsCl type. L. S. RAMSDELL

The theory of plastic deformations. FRIEDRICH KÖRBER AND ERICH SEIBEL. *Naturwissenschaften* 16, 408-12(1928).—It is assumed that plastic deformations take place by 2 equiv. systems of slip planes with their axes perpendicular to an external main stress direction and crossed over an angle depending on the av. main stress. Each system consists of 2 perpendicular sets of slip planes at a 45° angle with the external main stress direction. The theory is essentially an elaboration of that of Roß and Eichinger. The slip planes are not crystallographic planes but av. empirical ones. The theory accounts for observations on contraction of stressed flat bands. B. J. C. VAN DER HOEVEN

X-ray investigation of some univalent perchlorates. W. BUSSEM AND K. HERMANN. *Z. Krist.* 67, 405-8(1928).—The perchlorates of NH₄, K, Rb, Cs and Tl form an isomorphous series, and crystallize in orthorhombic bipyramidal class. The unit cell dimensions (*a*, *b* and *c*) are 9.22 Å. U., 5.80, 7.42, 8.85, 5.66, 7.24; 9.27, 5.81, 7.53; 9.82, 6.00, 7.79; and 9.42, 5.88, 7.50, resp. These values agree with the axial ratios, except that the length of *a* is doubled. There are 4 mols. in the unit cells, which belong to space group *V_h¹⁶*, as is usual for compds. of type ABO₄. L. S. RAMSDELL

The crystal structure of the monopropylammonium halides. STERLING B. HENDRICKS. Rockefeller Inst. *Z. Krist.* 67, 465-71(1928); cf. *C. A.* 22, 2861.—The structures of propylammonium chloride, bromide and iodide are detd. by means of Laue and spectrum photographs. There is 1 mol. in the unit cells, which have the following values for *a* and *c*: (Cl) 4.48, 7.40 Å. U.; (Br) 4.57, 7.36; (I) 4.85, 7.33. L. S. RAMSDELL

The crystal structure of the triethylammonium halides. STERLING B. HENDRICKS. Rockefeller Inst. *Z. Krist.* 67, 472-81(1928).—The Et₃NH halides are hexagonal, and belong to space group 6c-4. There are 2 mols. in the unit cells, which have values for *a* and *c* as follows: (Cl) 8.38, 7.08 Å. U.; (Br) 8.56, 7.49; (I) 8.78, 7.74. L. I. R

The crystal structure of bixbyite and artificial manganese oxide. WM. ZACHARIA SEN. Univ. Oslo. *Z. Krist.* 67, 455-64(1928).—The structure of bixbyite is isomor-

phous with that of Mn₂O₃, showing that the formula is (Fe, Mn)₂O₃ rather than FeMnO₃. The space group is *T_h⁶*. There are 16 mols. in the unit cell, which has *a* = 9.35 ± 0.02 Å. U. An analysis of bixbyite is given. L. S. RAMSDELL

X-ray investigation in the system lead-thallium. F. HALLA AND R. STAUFER. *Z.*

Krist. 67, 440–54(1928).—A mixed crystal contg. 35 at. percent Pb and 65 at. percent Tl has a cubic space lattice with $a = 4.871 \pm 0.007$ A. U. The structure is identical with that of Pb, with slightly smaller spacing. There is no evidence of any intermetallic compound, the Tl being in solid soln. in the Pb. A new detn. for Pb gives $a = 4.924 \pm 0.010$ A. U.

L. S. RAMSDELL

Crystal data on cardiazole, pentamethylenaminotetrazole and dilaudid (of the Knoll Co.). H. STEINMETZ. *Z. Krist.* 67, 434–9(1928).—Cardiazole, or pentamethylenetetrazole, is monoclinic prismatic, with $a:b:c = 1.8171:1.15690$, $\beta = 120^\circ 15'$, $n_D = 1.617$. Pentamethylenaminotetrazole is monoclinic, $1.6455:1.24725$, $\beta = 95^\circ 23'$, $n_D = 1.592$ m. 91° . A hydrated form has $a:b:c = 0.5368:1:0.5943$, $\beta = 95^\circ 52'$, m. 58. Dilaudid ($C_{17}H_{15}NO_3$) is orthorhombic, with $a:b:c = 0.75:1:0.49$. L. S. RAMSDELL

Deformation of a single crystal of copper under tensile test. KEIJI YAMAGUCHI. *Bull. Inst. Phys. Chem. Research (Tokyo)* 7, 327–33(1928); *Abstracts* 1, 29–30.—From measurements of the 3 sides of a triangle drawn on one face of the test piece, the directions of the intersections of this face with the unextended cone were calcd., and since one of these intersections agrees with the direction of the slip-bands appearing on the face, it is concluded that the deformation is of the nature of a shear. The plane of the shear is one of the octahedral planes of the deformed crystal; its direction is one of the diad (110) axes on that face. The deformation occurs in the same manner as that of an Al crystal, which has a like structure.

A. L. HENNE

Molecular structure and the scattering of x-rays. G. W. STEWART AND M. MANNHEIMER. *Z. anorg. allgem. Chem.* 171, 61–72(1928); cf. Stewart and Morrow, *C. A.* 21, 3551.—A bibliography of the scattering of x-rays by non-cryst. substances is given. S. and M. doubt the assumption of crystal structure in liquids because the length of the C chain for liquid $C_{11}H_{23}OH$ calcd. by Sherrer's equation from their data is less than that observed for solid $C_{11}H_{23}OH$ by Bragg's method. The intensity of x-ray scattering of the hydrocarbons from C_4 to C_{12} , of the monobasic fatty acids from C_4 to C_{11} , of the normal primary alcs. from C_4 to C_{11} , and of several isomers is plotted to show the regular change of the curves with the change of chem. structure. MALCOLM DOLE

The active radius of lattice particles in crystals. W. F. DE JONG. *Physica* 8, 129–36(1928).—A table is given with the active radii for some 60 elements in at. or ionic state as detd. by several authors. The different values as derived from various structural types in numerous recently detd. minerals are compared and discussed on the basis of Goldschmidt's hypothesis of ball packing and polarization influences. J. finds, however, the exptl. evidence insufficient for definite support of this theory. It is suggested that an explanation of the interatomic distances on the basis of deBroglie's wave theory may finally appear as definite soln. of the problem. B. J. C. VAN DER HOEVEN

Molecular theoretical basis of the physical properties of crystalline substances. ADOLF SMEKAL. *Z. Ver. deut. Ing.* 72, 667–73(1928).—A discussion of the properties of a substance as related to cryst. structure and the lattice theory, with particular reference to the distinction between the "ideal crystal" and the "real crystal." A photoelec. method of detecting a loosening in the mol. structure of individual crystals is discussed with reference to the relation between such loosening and the properties of the material.

H. STOERTZ

Separation of mixed crystals from solution. G. TAMMANN AND A. YA. ZVORUKIN. *Z. anorg. allgem. Chem.* 173, 73–80(1928).—A discussion of the mechanism of the sepn. of mixed crystals from soln. The sepn. curves are detd. by growth characteristics and the protective action of one salt upon the other rather than by thermodynamic considerations. If the surface of the crystals has a uniformly inoculating action upon the soln., the sepn. curve runs very close to the diagonal of a square, and this is generally the case with salts contg. water. But if the inoculating action is located only at particular spots on the surface of the crystals, as is generally the case with anhyd. salts, then crystals sep. of such compn. as is protected against the action of the soln.; mixed crystals of 0–0.8 mol. of the more difficultly sol. component sep. from solns. with 0–0.8 mol. of the more sol. component, and the sepn. curve is far removed from the diagonal of the square.

H. STOERTZ

The lead tree. V. KOHLSCHÜTTER. *Festschrift A. Tschirch 1926*, 425–30; *Chem. Zentr.* 1927, I, 3178.—A review of the complicated origin of the lead tree, which is formed through interrelated chem. and morphological processes. The sepn. of Pb from the soln. is considered to be an electrochem. phenomenon: $Zn + Pb^{++} \rightarrow Pb + Zn^{++}$, in fact as *electrolytic crystn.* The motive force is a resultant of the soln. pressure of the Zn and the tendency of the Pb to sep., and also depends upon the concn. of both ions in the sphere of action and therefore diminishes with progress of the reaction. The local changes of concn. caused by the sepn. of Pb govern in part the external form of

the Pb tree, while the internal structure depends upon the manner in which the cryst. nuclei develop and the crystals grow. The character of the structure which develops is related to the crystallographic properties of the metal. Moreover secondary chem. reactions between the sepd. metal and dissolved salts and the formation of hydrolytic cleavage products exert an effect on the development of the Pb tree. Difficultly sol. basic salts sep. and the adsorption film and membrane which form change the potential and influence in a purely mech. way the distribution of nuclei and the growth of crystals. The first phenomenon leads to the formation of concd. chains and the so-called "auto-genic Pb tree formation."

C. C. DAVIS

An accurate method for comparing the compressibilities of gases below atmospheric pressure. C. G. ADDINGLEY AND R. WHYTLAW-GRAY. *Trans. Faraday Soc.* 24, 378-87(1928).—A differential app. is described for comparing the compressibilities of gases at pressures lower than 1 atm. in which equal vols. of 2 gases are expanded by known amts. until the pressures are again equal. By a repetition of this process the vols. at a series of equal pressures are compared. Two similar cylindrical volumeters contain the gases confined over Hg with 2 dead spaces forming the upper extremities of a short Hg manometer. The total gas-filled space is equalized on both sides of the manometer to the same pressure, and the Hg is then accurately withdrawn from the volumeters in order to expand the gases until they again exert equal pressures. The advantages of the method and app. are: (1) compactness, rendering accurate temp. control easy; (2) elimination of const. errors; and (3) increased accuracy of vol. measurement. The ratio of the compressibility coeffs. of H_2 and O_2 was found to be: $(1 + \lambda) O_2 / (1 + \lambda) H_2 = 1.00148$.

J. H. PERRY

Mutual attraction and repulsion of gas molecules and their relation to the theory of internal friction. LEON SCHAMES. *Physik. Z.* 29, 91-4(1928).—Mathematical. The potential energy (ϕ), between 2 mols., represented by the equation: $\phi = -(A/r^m) + (B/r^n)$ for the attractive and repulsive forces, resp., gives, for He, the values $m = 8$ and $n = 8$.

J. H. PERRY

The influence of glass upon vapor pressure. JACOBUS RINSE. *J. Chem. Soc.* 1928, 1442-9.—A detn. of the vapor pressure of HgI_2 showed a continuous passage from the satn. curve to the Gay-Lussac line similar to that previously found by McHaffie and Lenher (*C. A.* 19, 3188; 20, 3367; 21, 1576) for water and benzene. The deficiencies in vapor pressure were much greater with HgI_2 . The effect is independent of the degree of dryness and of the smoothness of the glass receptacle, and is augmented by the presence of glass powder. No reaction between glass and HgI_2 could be detected. If the phenomenon is one of adsorption, the layers would have to be 500 mols. thick, which is regarded as improbable.

C. H. GREENAWALT

Composition of vapors from boiling binary solutions. D. F. OTTHER, Eastman Kodak Co. *Ind. Eng. Chem.* 20, 743-6(1928).—A new app. is described for detn. of the relation between vapor and liquid compn. in boiling binary solns. New data are given for mixts. of H_2O and $AcOH$, C_6H_6 and $AcOH$, HCl and H_2O and Me_2CO and $MeOH$.

T. S. CARSWELL

The separation of constant-boiling mixtures; a problem for students of physical chemistry. ARTHUR A. SUNGER. *J. Chem. Education* 5, 879-81, 884(1928). Suppose a fair quantity of a const.-boiling mixt. must be sepd. into its components, pure A and pure B, what general phys. methods are available to accomplish this? Student answers include the following: (1) gaseous diffusion, since from the general gas equation $pV = \frac{1}{2} nmu^2 = RT$, and at const. temp. for 2 kinds of mols. the speeds of the mols. will vary inversely with the square roots of their mol. wts.; (2) non-equil. evapn., since $m_1/m_2 = p_1/p_2 \sqrt{M_1/M_2}$, and therefore with unequal vapor pressure sepn. ought to be possible; (3) thermal diffusion; (4) change vapor pressure of the soln. by addn. of a liquid or solid solute, as illustrated by certain methods for prep. abs. EtOH from the 95% grade; (5) change the pressure to something other than normal and then distil since the vapor pressure relations under the new conditions will not be the same as they were for the const.-boiling mixt.; (6) f. p. alterations—in reality an application of vapor pressure relations. A problem like the above stimulates thought on the student's part, particularly as not much can be found in the literature bearing on the subject.

W. C. EBAUGH

The vapor pressures of binary systems. II. Gold and mercury. ALFRED W. PORTER. *Trans. Faraday Soc.* 24, 405-7(1928); cf. *C. A.* 22, 3075.—An expression $\log(a_1/a_2) = \beta\mu_2^2/(1 + \rho\mu_2)^2$ has been fitted to exptl. detns. of the vapor pressure of Au in Hg. As this equation is of a form forbidden by Margules' equation, important properties of the mixt. are not brought out and the following equation is offered: $\log a_1 = a \log \mu_1 + \beta\mu_2^2 + \gamma\mu_2^3(4 - 3\mu_2)$. This satisfies the exptl. data under certain con-

ditions. The curve obtained from the data is discussed. III. Calcium chloride and water. *Ibid* 407-8.—From the data obtained by Harrison and Perman of vapor pressures of water in equil with sols. of CaCl_2 it has been found impossible to fit the exptl. values to the equation above except by employing 4 terms. Equations for 80° and 40° are given and the curves for these are drawn and discussed. Since at least 4 terms are necessary with substances like CaCl_2 it is not surprising that so little success has been achieved in the past in obtaining formulas for satn. G. H. W. LUCAS

New azeotropes. I and III. MAURICE LECAT. *Ann. soc. sci. Bruxelles* 45, 169-76, 284-94 (1926); *Chem. Zentr.* 1927, I, 2282-3; cf. *C. A.* 21, 1583, 2834.—Seventy-five binary systems were studied to det. whether const.-boiling, homogeneous mixts. (azeotropes) were formed. Glycol (b. 197.4°) showed a surprising behavior, for it gives in part heterogeneous const.-boiling mixts. with considerable lowering of the b. p., and in part homogeneous const.-boiling mixts., a behavior which is attributed to the mol. assocn. of the glycol. Azeotropes with increased b. ps. are comparatively rare. The following data show the b. ps. of the individual compds. used and the b. ps. of their mixts.: 22% CHBrCl_2 (90.2°) + trichloroethylene (86.95°), 86.7° ; 46% BzOMe (199.5°) + Et malonate (198.9°), 198.2° ; 40% glycol (197.5°) + linalool (198.7°), 182.2° ; 36.5% glycol + PhCH_2OH (205.1°), 193.1° ; 53.5% glycol + *p*-cresol (201.6°), 195.2° ; 46% glycol + guaiacol (205.1°), 190.4° ; 15% glycol + pentachloroethane (161.95°), 154.5° (heterogeneous); 25% glycol + *o*- $\text{BrC}_6\text{H}_4\text{Me}$ (181.75°), 166.8° (heterogeneous); 51% glycol + C_{10}H_8 (218.05°), 183.9° (heterogeneous); 20% glycol + camphene (159.5°), 152.5° (heterogeneous); 59% glycol + PhNO_2 (210.85°), 185.9° ; 24% glycol + PhNH_2 (184.35°), 180.55° ; 15% glycol + cineole (176.4°), 164.75° (heterogeneous); 28% cineole + PhOH (182.2°), 182.85° ; 57% cineole + AcOEt (180.4°), 168.8° ; 9.3% α -pinene (155.8°) + MeOH (64.7°), 64.55° ; (α -pinene with EtOH shows contrary to Maumené (*Compt. rend.* 57, 955 (1863) no azeotropy); 22% α -pinene + *iso*- AmOH (130.8°), 129.1° ; 25% α -pinene + CHBr_3 (149.3°), 146.5° ; 62% α -pinene + furfural (161.4°), 143.4° ; 63.5% α -pinene + α , α -dichlorohydrin (175.1°), 150.4° ; 50.2% α , α -dichlorohydrin + Et lactate (153.9°), 143.1° ; 56% C_{10}H_8 (218.05°) + $\text{PhCH}_2\text{CH}_2\text{OH}$ (219.5°), 214.2° ; 45% C_{10}H_8 + terpineol (217.8°), 212° (C_{10}H_8 shows no azeotropy with Me salicylate or $\text{ClCH}_2\text{CO}_2\text{H}$); Me salicylate (222.3°) shows no azeotropy with PhNO_2 or with safrol; 71% Me salicylate + AcNH_2 (220.9°), 205.8° ; 37% Me salicylate + terpineol (217.8°), 216.0° ; 43.5% camphene + cyclohexanone (155.6°), 150.7° ; 44% camphene + PhBr (156.15°), 155.0° ; 59% camphene + cyclohexanol (168.7°), 151.9° ; 45% camphene + Et lactate (153.9°), 144.95° ; 58% camphene + Me oxalate (163.5°), 146.65° (sep. at 62.6°); 60% camphene + furfural (161.4°), 146.75° (sep. at 48°); cyclohexanol + 55% furfural (161.4°), 155.55° ; C_6H_6 gives with CHBrCl_2 and with chloral no azeotropy; 20.5% EtOH + PrBr (71.0°), 62.75° ; 55% *iso*- AmOH (130.8°) + CHBr_3 , 129.9° ; 65% *iso*- AmOH + paraldehyde (124.0°), 122.9° ; 17% *n*-octyl alc. (195.15°) + PrNH_2 (184.35°), 183.95° ; 97% AcMe (56.3°) + PrBr , 56.15° ; 5% AcOEt + *iso*- Am butyrate (178.6°), 173.2° ; 73% tetrachloroethane (146.25°) + $\text{ClCH}_2\text{CO}_2\text{Et}$ (143.6°), 147.45° ; chloral (97.75°) + 40% *iso*- Bu formate (146.25°), 147.45° ; chloral + 49.5% AcOPr (101.6°), 102.55° ; pyrrole (129.2°) + 51% Et_2CO_3 (125.9°), 131.0° ; pyrrole + 67% ethylene bromide (131.45°), 131.0° ; 39.5% CH_3NO_2 (101.15°) + methylcyclohexane (100.95°), 81.25° (heterogeneous); 18% *iso*- AmI (147.65°) + *iso*- Am acetate (142.1°), 141.7° (cf. Holley, *J. Am. Chem. Soc.* 24, 448, the data of H. are incorrect for *iso*- AmOH - CHBr_3 as well). PrNH_2 b. 221.9° and not 213° as usually recorded. In the original are the temp. increases of mixts. and curves of the crit. soln. temps. of the system: MeOH - α -pinene. The earlier expts. were continued with 150 more systems. Amides readily give azeotropes with large depression of the b. p. Systems with lowered b. p. (A temp. marked ξ refers to the temp. of sepn.).—24% AcNH_2 (220.2°) + PhNEt_3 (217.05°), 198.05° , ξ 179° ; 27.2% AcNH_2 + C_{10}H_8 (218.05°), 199.5° , ξ 148.05° ; 16% AcNH_2 + carvene (177.8°), 169.2° (heterogeneous); 36% AcNH_2 + pulegone (224°), 205.9° , ξ 65.9° ; 16.3% AcNH_2 + acetophenone (202.5°), 197.45° , ξ 36.8° ; 28% AcNH_2 + α -terpineol (217.8°), 205.2° , ξ 46° ; 77% AcNH_2 + PhNO_2 (210.75°), 201.65° , ξ 54.6° ; 31.5% PrNH_2 (222.1°) + C_{10}H_8 , 204.65° , ξ 75.0° ; menthol gives with C_{10}H_8 , PhNO_2 , Me salicylate and $\text{PhCH}_2\text{CH}_2\text{OH}$ azeotropes with slight depression of the b. p.: 70% camphene (159.6°) + AcOEt (180.4°), 156.15° ; 87% camphene + PhNH_2 (184.35°), 157.5° , ξ approx. 30° ; 74% camphene + Et malonate (181.4°), 154.6° , ξ 55.4° ; 52% Et malonate + carvene (177.8°), 167.3° ; 78% Et malonate + α -pinene (155.8°), 151.5° ; 56% glycol + α -terpineol (217.8°), 189.55° ; 69% glycol + $\text{PhCH}_2\text{CH}_2\text{OH}$ (210.4°), 194.4° ; 67.5% glycol + geraniol (229.7°), 194.65° ; 54.2% glycol + borneol (213.2°), 198.25° , ξ 99° ; 47.5% carvene (177.8°) + methylheptenone (173.2°), 170.9° ; 72% PhNO_2 + tetra-

pineol (217.8°), 209.5°; 22% PhNO₂ + citronellal (207.8°), 206.8°; 56% PhCH₂OH (205.15°) + citronellal, 202.9°; 75% PhCH₂OH + *p*-IC₆H₄Me (213°), 203°; 12% PhCH₂OH + perchloroethane (185°), 182.0°; PhCH₂OH + 12% PhNH₂ (184.35°), 176.75°, ξ 101°; PhCH₂OH + 49.5% AcOEt (180.4°), 172.5°, ξ 86°; 25% PhCH₂OH + ClCH₂CO₂H (189.35°), 171.2°; 24.5% ClCH₂CO₂H + *p*-C₆H₄Cl₂ (174.1°), 167.55°; 56% *iso*-AmOAc (142.1°) + Me lactate (143.8°), b. 138.5°, 47% ClCH₂CO₂Et (143.0°) + Pr butyrate (142.8°), 141.7°; 66% *n*-heptane (98.45°) + Me butyrate (102.65°), 94.9°. Systems with increased b. ps.—40% Cl₂CCHCl₂ (161.95°) + mesitylene (164.6°), 166.0°; *p*-ClC₆H₄OH (219.75°) + Et succinate (217.25°), 231.8° (the compn. was uncertain); *p*-ClC₆H₄OH + 45% AcOCH₂Ph (214.9°), 226.5°; *p*-ClC₆H₄OH + 72% bornyl acetate (227.7°), 232.7°; *p*-ClC₆H₄OH + 50.2% α -terpineol (217.4°), 225.7°; *p*-ClC₆H₄OH + 42.5% menthol (216.4°), 223.5°; *p*-ClC₆H₄OH + 47.5% borneol (213.2°), 222.5°; *p*-ClC₆H₄OH + 8% PhNO₂ (210.75°), 219.9°; 62.5% thymol (232.8°) + PhCH₂CO₂Et (228.75°), 235.75°; 60% thymol + bornyl acetate (227.7°), 235.6°; 55% thymol + PhCO₂Pr (230.9°), 235.5°; 57.5% thymol + geraniol (239.6°), 235.6°; 60% thymol + *n*-decanol (232.5°), 234.5°; 52% thymol + carvone (230.95°), 238.55°. Non-azeotropic systems are also listed, which in part can be classified on a basis of their isobars. IV. *Ibid* 47, 21-7.—The expts. continued with an investigation of 104 more systems. Noteworthy in particular was the large depression of the b. p. of systems contg. glycol. With glycerol, 2 azeotropes with esters and 4 eutectics with hydrocarbons and ethers were observed. As in the preceding work, the following data represent only the more important compds.: 52% glycol (197.4°) + acetophenone (202.05°), 185.65°; 22.5% glycol + methylheptenone (173.2°), 168.1°; 9% glycol + (CHCl₃)₂ (146.35°), 145.05°; 7% glycerol (290°) + PhCH₂CO₂Et (228.75°), 228.6°; 10% glycerol + bornyl acetate (227.7°), 226.0°; 75% PhCH₂Cl (179.3°) + ClCH₂CO₂H (189.35°), 173.8°; azeotropism with *iso*-Am butyrate was doubtful, and with ClCH₂CO₂H there was a reaction at the b. p.; approx. 35% chloropicrin (111.85°) + EtOH (78.3°), 77.4°; 33.5% chloropicrin + *iso*-PrOH (82.45°), 82.0°; 58.5% chloropicrin + PrOH (97.2°), 94.0°; 67.5% chloropicrin + *iso*-BuOH (107.85°), 102.05°; 61% Et borate (118.6°) + Et butyrate (120.0°), 117.55°; Et borate forms other azeotropes with *iso*-BuOAc, *iso*-AmBr, chloroacetone. 71.5% PhMe (110.75°) + chloroacetone (119.7°), 109.2°; 22% PhOH (182.2°) + camphene (159.6°), 156.1°; approx. 1.8% ClCH₂CO₂H (189.35°) + (CHCl₃)₂ (146.35°), 146.25°; 9.9% ClCH₂CO₂H + Cl₂CCHCl₂ (161.95°), 158.65°; 78% ClCH₂CO₂H + C₁₀H₈ (218.05°), 187.1°; 39.5% *p*-BrC₆H₄Me (185°) + (CCl₄)₂ (185°), approx. 183.5°; 63.5% PhCO₂Me (199.45°) + glycol (197.4°), 182.2°; 39% cyclohexanone (155.6°) + trichlorohydrin (156.85°), 160.0°; 55% cyclohexanone + (CHCl₃)₂, 159.1°; 32% *iso*-AmOAc (142.1°) + (CHCl₃)₂, 150.1°; Approx. 13% PhOH (182.2°) + 1-octanol (195.15°), 1195.4°; 71% PhOH + pinacene (174.35°), 185.5°. C. C. D.

Change of the surface tension of mercury by the addition of small quantities of alkali and alkaline-earth metals. FRANZ OPPENHEIMER. Frankfurt-A.-M. *Z. anorg. allgem. Chem.* 171, 98-101 (1928).—O's. work is in conjunction with that of Fraenkel and his co-workers on reaction velocities between 2 liquid phases (*C. A.* 18, 1774; 22, 3334). The capillary-height method of measuring surface tension was employed with the use of a perfectly transparent quartz app. The amalgams were prep'd. free from oxide with difficulty, but suitable materials were finally procured by electrolysis of highly viscous salt-paste electrolytes, with a Hg cathode; they were purified by filtration *in vacuo*. While only relative values were sought, the surface tension of Hg was det'd. as 437 dynes/cm.; this may be offered as a standard of comparison. Amalgams of Ca, Li and Na in varying concns. were measured and found to have tensions lower than that of Hg. A table is given. The surface tension of bromoform is raised by the addn. of diazo-acetic ester.

WILLIAM E. VAUGHAN

Observations on the state equation of the adsorbed phase. II. BUN-ICHI TAMAMUSHI. *Bull. Chem. Soc. Japan* 3, 142-6 (1928), cf. *C. A.* 22, 706.—The following data refer to butyric, valeric, caproic, caprylic, capric and lauric acids, resp.: i (Rideal equation) = 0.73, 0.63, 0.43, 0.40, 0.35, 0.23; η = 1- i : 0.27, 0.37, 0.57, 0.54, 0.65, 0.77; P , in dynes/cm. = 10.6 31.4, 11.0 33.6, 9.2 34.3, 11.0 27.0, 14.9-24.7, 10.2-19.8; r = $\sqrt{A/N}$, where A is calcd. from P , and $P, A/RT$ or directly measured, and N is the Avogadro no. 6.5×10^{-8} , 6.0×10^{-8} , 5.6×10^{-8} , 5.5×10^{-8} , 5.5×10^{-8} , 5.5×10^{-8} ; μ in electrostatic units $\times 10^{-18}$ = 17, 18, 20, 19, 21, 22.

A. L. HENNE

The density of anhydrous chromic chloride and adsorption of water vapor from the atmosphere by the same. M. CRESPI. *Anales soc. españ. fis. quim.* 26, 152-63 (1928).—CrCl₃ adsorbs H₂O vapor, which causes a variable d. of the product. The adsorption is analogous to that of gases on glass walls, according to the equation $dx/dt = 1/(at + b)$.

The amt. of H_2O adsorbed exceeds 0.5 mol. of H_2O per mol. of $CrCl_3$, and mol. vol. increases with increase in H_2O adsorbed. $CrCl_3$ must be heated above 100° in a current of dry air to become dehydrated. Under such conditions it has a d. of 2.916. R. M. S.

Influence of viscosity on the rate of absorption of carbon dioxide by solutions of neutral sodium carbonate. PAUL RIOU AND PAUL CARTIER. *Compt. rend.* 186, 1727-6 (1928); cf. C. A. 22, 3079.—A previous report covers the effects of glycerol, dextrose and sucrose on the rate of absorption of CO_2 in solns. of neutral Na_2CO_3 (C. A. 21, 1576). Tabulated results are now given for the effects produced by the addn. of various concns. of ethylene glycol, levulose, MeOH, EtOH, HCHO and lactose. Taken in connection with the previous results R. and C. conclude that: (1) While viscosity has some influence on the rate of absorption of a gas by a liquid, it is in no case the principal factor involved. (2) The chem. function of the added org. crystalloid plays a very important, if not the preponderant, role in influencing the rate of absorption. (3) Org. crystalloids, not producing combinations with neutral Na_2CO_3 , increase the rate of absorption even though they increase the viscosity. MeCHO at a concn. of 0.0037 g. per 100 cc. of soln. increases the rate from 43.4 to 50. At a concn. of 0.3 g. the rate is increased to about 130. These results suggest catalytic action and might lead to interesting industrial applications in the washing of gas. This is to be investigated further. W. W. S.

The liquid-crystal state as a general property of material. VI. The liquid-crystal state of natural silk. P. P. VON VEIMARN. *Kolloid-Z.* 45, 161-2 (1928).

J. H. PERRY

The change of the hydrogen-ion concentration of stable kaolin suspensions due to mechanical agitation in capillary tubes. ALICE JEPPESEN. *Kolloid-Z.* 45, 156-8 (1928).—The decrease in the pH of kaolin suspensions with time is attributed to an increase of the adsorbing surface.

J. H. PERRY

The velocity of sedimentation of nickel hydroxide. HITOSI TOMINAGA. *Bull. Inst. Phys. Chem. Research (Tokyo)* 7, 298-301 (1928); *Abstracts* 1, 26-7.—The velocity of sedimentation of $Ni(OH)_2$ in various concns. depends on the concn. In contradiction with Perrin's experiments on gamboge, it is necessary to take the concn. into account to deduce the sizes of the particles from the sedimentation velocity. The sizes of the particles directly measured with a microscope are in good agreement with those deduced from the sedimentation velocities.

A. L. HENNE

Interpretation of the analysis of a hydrosol of arsenic trisulfide. VITTORIO GAZZI. *Zymologica chim. colloidi* 2, 10-2; *Chem. Zentr.* 1927, II, 27; cf. C. A. 22, 525.—In an analysis by Murphy and Matthews (cf. C. A. 17, 928) of a colloidal As_2S_3 , calcn. of the trisulfide from the total S minus the S in the H_2S gave smaller values than that calcd. from the As content of the $Mg_3As_2O_7$ ppt. From this M. and M. advance the hypothesis that a complex compd. of the As_2O_3 (As_2S_3)_n type exists in the soln. Contrary to this, G. maintains that a mixt. rather than a complex is present, because (1) when the II is expelled on prolonged heating, the ratio of the quantity of decompd. trisulfide to the total quantity slowly increases, and (2) As_2O_3 can be sepd. from the hydrosol by dialysis and ultra-filtration. The calcns. and the preps. of M. and M. are included.

C. C. DAVIS

Some properties of silicic acid gels. PAUL BARY. *Rev. gén. colloides* 6, 85-9 (1928); cf. C. A. 22, 2003.—Silicic acid gels prepd. by adding acid to solns. of Na_2SiO_3 in a tube coated with vaseline form hard transparent cylinders. When such silicic acid gels are dried in air until the H_2O content is between 27.2 and 35.1%, the gel is pulverized when thrown into water, slightly acidulated water, or ether. The density of the powder is 1.722. For a sample whose compn is SiO_2 1.5 H_2O , a reasonable distribution would be SiO_2 , 69%; combined H_2O , 20.7%, free H_2O , 10.3%; space filled by air 6%. When liquids whose surface tension is strong surround such a gel, the pressure exerted by the air compressed in the capillaries is sufficient to pulverize it.

F. E. BROWN

Stability of dispersoid systems. F. N. GAPON. *Ukrainskii Khim. Zhurnal* 3, No. 1, sci. pt., 133-7 (1928).—Continuing the researches of P. P. von Veimarn (cf. "Grundzüge der Dispersoidchemie," 1911) G arrives at the following conclusions: The life (he uses the expression duration of existence) Z of the dispersoid system, the concentration C (expressed in the number of mols. per unit of volume) of the dispersoid phase and the degree of activity S of the medium are bound up thus: $ZC = S$. The dispersoid systems $CuCl_2 \cdot 2H_2O$ formed by passing dry HCl into a soln. of copper oleate in moist C_6H_6 possesses an equal degree of dispersion. In the reaction $Cu_2H_2O_4 + 2HCl$ the increase of moisture decreases the stability of the dispersoid systems. In the reaction $Cu_2H_2O_4 + 12HCl$ $Z \times C$ is const., which proves that the degree of activity of the medium remains const.

BERNARD NELSON

The viscosity of gelatin solutions containing alcohol. A. JANEK AND BR. JIRGENSONS. Univ. Riga. *Lettlånd. pharmaceut. J.* 1927, No. 2, 7 pp.; *Chem. Zentr.* 1927, I, 2050.—With the aid of the Ostwald viscometer, the viscosities of 0.5% gelatin solns. contg. the same no. of mols. and then the same no. of cc. of water, MeOH, EtOH and PrOH were measured at 25°. The tables and graphs show that alcs. increase the viscosity of gelatin soln., this ability increasing with the mol. wt., thus: water < MeOH < EtOH < PrOH. The viscosities increased with the time of standing, most rapidly with MeOH and less rapidly with EtOH and least rapidly with PrOH. In the expts. with the same vols. of alcs. the viscosity curves intersected after a certain time, followed by a reversion of the series so that the gelatin soln. contg. MeOH became more viscous than those contg. PrOH, EtOH or water. C. C. DAVIS

The Hofmeister ionic series in the precipitation of the hydrophylic colloids. KUNIO ANDO. *Nagoya J. Med. Sci.* 2, 110-23(1927).—J. Loeb (cf. *C. A.* 17, 2590) stated that the Hofmeister series does not exist, when the p_H is exactly measured. K. checked this statement by examg. the pptn. of colloidal hemoglobin and egg-white solns. by various ions under proper consideration of the p_H . He concluded from his expts. that in the pptn. of the hydrophylic colloids the Hofmeister series is still valid except with the buffer salts (acetate, citrate, tartrate). Pptn. according to the valency also occurs, and it increases directly, the more distant the p_H is from the isoelec. point. Pptn. of the hydrophylic colloids is synchronous discharge and dehydration of the micelles. In the isoelec. point the hydrophylic colloids have a min. of stability against EtOH. On both sides of the isoelec. point there is an abrupt increase of sensitiveness to salts. G. SCHWACH

Application of the Donnan theory to the adsorption of ions by colloidal silicic acid. P. B. GANGULY AND SUBRAMONIA KRISHNAMURTI. *Trans. Faraday Soc.* 24, 401-5 (1928).—The adsorption of ions from HCl by particles of colloidal silicic acid prepared by different methods has been measured by application of the Donnan theory of semi-permeable membranes. The methods of prepn. were: Graham's method (hydrolysis of Me silicate), hydrolysis of $SiCl_4$, and hydrolysis of SiS_2 . The amt. of ion adsorbed generally increased with the activity of the acid from which the ion was adsorbed. The colloid prepd. from $SiCl_4$ showed a preferential adsorption for Cl ions, while that from Me silicate had a preference for H ions. The diffusibility of the colloid from Me silicate through collodion membrane was small as compared with that from $SiCl_4$. While the diffusibility of the colloid does not change regularly with the strength of the acid outside the membrane, the general conclusion that diffusibility increases as the strength of the acid increases, is justified. J. H. PERRY

Polychroism and orientation of ions in crystals of the rare earths. R. BRUNETTI. *Physik. Z.* 29, 571-5(1928).—See *C. A.* 22, 2311. E. H.

Projection of Brownian movement. N. HENRY BLACK. *J. Chem. Education* 5, 868-73(1928).—An app. is built up on an optical bench as follows: A 90° arc light from cored carbons, an aplanatic condenser of about 5 cm. focal length with an iris diaphragm, a water cell about 5 cm. thick with parallel sides, a double convex lens of about 20 cm. focal length, and then a perforated screen. On the end of the optical bench is placed a compound microscope on a stand, so as to be in the usual vertical position, and at such a height that the center of its mirror is exactly on the optical axis of the projection app. A "Kardiod Kondensor" (not a paraboloid dark-field condenser) is inserted under the stage, and on the stage is a fused quartz plate (Zeiss) made for this kind of work. A drop of rutile suspension is put on the plate, then a thin glass cover. A $1\frac{1}{2}$ -in. oil-immersion objective with an iris diaphragm (Zeiss 90 N. A. 1.25) and a low-power (Zeiss No. 1) objective are used. Above the microscope a 45° glass prism is employed to throw the image upon a vertical screen, a large piece of white cardboard. In a darkened room the movements of the rutile particles can be seen well by a class of 75 to 100. Following the above demonstration, B. uses a mechanical model (Pohl, of Göttingen) with lantern projection to show how the relatively large colloidal particles are made to move by collision with rapidly moving mols., larger wooden balls and tiny steel balls simulating the colloid particles and mols. respect. W. C. F.

Dimensional studies of colloids. Nobel-prize addresses. The heterogeneity of colloidal solutions and sedimentation in a centrifugal field. THE SVEDBERG. *Sep.* 14 pages.—A description is given of the various centrifuges designed and built under the direction of the author. Rate of sedimentation and the sedimentation equil. may be used independently for obtaining the mol. wt. of a substance. Tables are shown for data on hemoglobin. The two methods give good agreement. Data on equil. are also given for egg albumin both salt-free and in one percent NaCl. Many uses for this method of study are suggested. A study of the ultramicroscope and description of col-

loidal solution. RICHARD ZSIGMONDY. 12 pages.—The progress of visible studies of colloids and the development of the ultramicroscope are related. Studies of gold hydrosols in a Tyndall bean are described together with observed relations between the electric charge and coagulation. Photographs of gel structure of gelatin and soaps are given. The motion of a particle under an elec. current, the structure of particles, and their relative dimensions with respect to the mol. are reviewed. The results obtained with the ultramicroscope have important bearings on the mol. structure of matter.

R. H. LAMBERT

The theory of electrodialysis. RICHARD BRADFIELD. *Naturwissenschaften* 16, 404-8(1928).—Electrodialysis of colloids with two pos. or two neg. diaphragms tends to give alk. or acid reaction of the liquor dialyzed in the middle chamber. The exptl. Pauli cell consisted of 2 110-cc. chambers, sepd. by 25-sq. cm. diaphragms at a distance of 6 cm. The anode membrane was collodion treated for 40 hrs. with a 2% hemoglobin soln., and the cathode membrane was parchment. The hemoglobin membrane is positive (isoelec. point 6.8) in weakly acid solns. The results of the expts. on ion migration are given in tables; it is concluded that anions and cations are removed in practically equiv. amts., since little change in the p_H of the middle space was found. The resistance of the hemoglobin membrane is larger than that of parchment or collodion alone. The electro-dialytic activity of the system, as measured by $E = (\text{acid} + \text{base removed}) / \text{no. coulombs}$, is high, however, and the anion seems to penetrate the membrane easily. For 0.025 *N* salt solns., electrolyzed at 120 v. for 20 mins., E for NaCl is 0.71; for salts of weak acids (phosphate, acetate) it increases to 1.37 and 1.32. This rather abnormal behavior is explained by electroosmotic transport of liquid contg. undissoed. acid and is promoted by high local concn. of the latter. The hemoglobin diaphragm is always positive regardless of the reaction of the middle chamber as confirmed from expts. with agar gels contg. methyl red. It is caused by high anion concn. on both sides of the anode membrane. In the case of weak acids this effect may even lead to pptn. of slightly sol. acid (e. g., benzoic) and it will induce the transport of considerable undissoed. acid across the diaphragm. The opposite effect also exists: from Mg salt solns. $\text{Mg}(\text{OH})_2$ could be made to ppt. near the cathode membrane.

B. J. C. VAN DER HOEVEN

The decomposition velocity of tribromoacetic acid in water. OSC. DE GROOTE. Ghent Univ. *Bull. soc. chim. Belg.* 37, 225-39(1928).—The decompn. products of aq. $\text{CBr}_3\text{CO}_2\text{H}$ are exclusively CHBr_3 and CO_2 . Tables and charts record the velocity of the reaction. It is concluded that the reaction is unimol. and that only the $\text{CBr}_3\text{CO}_2^-$ ion controls it.

A. L. HENNE

The dilution and neutral-salt errors of buffer mixtures. CHARLES MORTON. *J. Chem. Soc.* 1928, 1401-13.—The properties of the following mixts. were studied: (1) $1/2$ neutralized solns. acetic and cacodylic acids; (2) $1/4$ neutralized solns. of aspartic acid and arginine; (3) $3/4$ neutralized solns. of *o*-phthalic and α -monoglycerolphosphoric acids; (4) mixts. of $\text{Na}_2\text{P}_2\text{O}_7$ and HCl in the mol. proportions of (a) 2.3, (b) 2.1. For these mixts., resp., (1) $p_H = p_K$, (2) $p_H = p_{K_1}$, (3) $p_H = p_{K_1}$, (4a) $p_H = p_{K_1}$, (4b) $p_H = p_{K_2}$, where $K = 10^{-p_K}$ is the apparent dissoen. const. of the buffer electrolyte. To these solns. various amts. of KCl, NaCl, K_2SO_4 , BaCl₂, and MgSO_4 were added and the p_H (or p_K) change produced by each addn. was noted. The effect of diln. was also studied. In all cases p_K decreased on the addn. of neutral salts but increased with diln., both effects becoming more pronounced with increase in valence of the buffer acid. When the concn. of added salt is small, the p_H change is independent of the sp. nature of the salt, depending only on the valence type; with larger addns. a sp. salt action is exhibited. As regards the importance of their effects in producing p_H changes in acid buffer mixts., the influence of the neutral salts is in the order $\text{BaCl}_2 > \text{MgSO}_4 > \text{NaCl} > \text{KCl} > \text{K}_2\text{SO}_4$ whatever the nature of the buffer acid. For basic buffers the order is reversed; $\text{K}_2\text{SO}_4 > \text{KCl} > \text{NaCl}$. In dil. soln. the p_K or p_H changes produced by further diln. or by the addn. of small amts. of neutral salts were described by the equation $p_K = p_H + \log (\text{acid})/(\text{salt}) + A\sqrt{\mu}$, within the p_H limits of 4 to 10, where μ is the ionic strength and p_K and A are true constns. In solns. of higher ionic strength, the H-ion relationships were defined by the equation $p_K = p_H + \log (\text{acid})/(\text{salt}) + A\sqrt{\mu} - B\mu$, where B is a coeff. expressing the sp. action of the ions. The value of A for an *n*-valent buffer mixt. is approx. ($n - 0.5$). The buffer unit of Van Slyke (*C. A.* 16, 2097) is not a complete criterion of buffer efficiency. It is suggested that this value should be supplemented by the unit $\pi = dp_H/d\sqrt{\mu}$ expressing the diln. and neutral salt errors. The limiting diln. error is independent of the strength and sp. nature of the buffer electrolyte, depending only on the valence type. For a monobasic buffer

mixt. the limiting diln. error is $\pi = -0.5$, that of an n -valent mixt. is approx. $(2n - 1)$. The thermodynamic disson. consts. of aspartic (K_{A1}), acetic, cacodylic, pyrophosphoric (K_3 , K_4), o -phthalic (K_2) and α -glyceryl-phosphoric (K_2) acids and of arginine (K_{B1}) were detd. to be, resp., $K_{A1} = 1.27 \times 10^{-4}$, $K = 1.84 \times 10^{-5}$, $K = 5.60 \times 10^{-7}$, $K_3 = 1.98 \times 10^{-7}$, $K_4 = 1.32 \times 10^{-10}$, $K_2 = 4.65 \times 10^{-6}$, $K_2 = 1.80 \times 10^{-7}$, $K_{B1} = 6.64 \times 10^{-6}$.

EDGAR R. SMITH

Bromophosgene. I. Thermal decomposition—a first-order wall reaction. SAM LENHER AND HANS-JOACHIM SCHUMACHER. Univ. Berlin. *Z. physik. Chem.* **135**, 85–101(1928).—The equil. $\text{CO} + \text{Br}_2 \rightleftharpoons \text{COBr}_2$ is established very slowly in the dark at room temp.; the yield of COBr_2 is less than 10%. The light stationary state, on the other hand, is reached in a few hours. For Br_2 at 200 mm. and CO at 500 mm. the yield of COBr_2 at equil. is 10%. The thermal decompn. is a first-order wall reaction, independent of added gases, but dependent on the character of the wall, being most rapid in quartz, second in borosilicate glass, and slowest in sodium glass. The temp. coeff. in borosilicate glass between 210° and 230° is 1.8 per 10° increase. C. H. G.

The oxidation of ferrous hydroxide in sodium hydroxide solution by means of air. SUSUMU MIYAMOTO. *Bull. Chem. Soc. Japan* **3**, 137–41(1928); cf. *C. A.* **21**, 1744.—The rate of the oxidation of FeO with air is independent of the amt. of FeO present. The values of the velocity consts. are almost the same as in the case of the oxidation of Na_2SO_3 or SnO under the same conditions. The effect of the temp. is small. NaOH decreases the velocity of the oxidation. The mechanism of this reaction is to be explained by considering that the oxidation velocity thus measured is no other than the solution velocity of O , and that NaOH decreases the solution velocity of O in the soln.

A. L. HENNE

A further study of the reaction between nitrogen dioxide and liquid mercury. WILLIS C. PIERCE and W. ALBERT NOYES, JR. *J. Am. Chem. Soc.* **50**, 2179–87(1928).—The rate of reaction between Hg and NO_2 as measured by the time of formation of a uniform visible film is dependent, among other things, on the shape of the reaction vessel. The times tend to become shorter the longer the reaction vessel is used. There are variable factors which have not been entirely detd. The reaction is accelerated by the presence of large nos. of ions. Positive and negative ions, as far as can be detd., have equal effects. The action of light in accelerating the reaction is most probably to be ascribed to the activation of a surface film. This seems in some way to be associated with the photoelec. effect. Acceleration of the dark reaction with continued use of the vessel may be due to the contamination of the surface by minute crystals swept in by the NO_2 . This acceleration may obscure the action of the light. E. R. S.

Mechanism of the saponification of cellulose esters of higher fatty acids. ICHIRO SAKURADA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) No. 132, **8**, 21–41(1928). (In Esperanto, with German summary.)—The tri-, di-, mono- and lower esters of *stearic acid*, prepd. from cotton paper and $\text{C}_{17}\text{H}_{35}\text{COCl}$, were sapon. with alc. KOH by a bimol. reaction which indicates a series of steps: triester \rightarrow diester \rightarrow monoester \rightarrow regenerated cellulose. If this heterogeneous reaction is expressed simply as $dx/dt = ks(a - x)$, in which s is the contact surface of ester with KOH soln., we have: $s = k(b - x)$; i. e., at each instant the contact surface of ester with KOH soln. is in direct ratio to the concn. of the latter. Shaking 150 times per min. increases the rate of sapon. about 50%. The effect of temp. from 0° to 38.5° follows the Arrhenius equation $\log k = -(A/T) + C$. Diln. of the KOH soln. with H_2O reduces the sapon. velocity very greatly ($\log k = mC + n$, where C = concn. of alc.); the retarding effect of neutral salt is not important.

AUSTIN M. PATTERSON

Saponification of cellulose acetate by alkali. ICHIRO SAKURADA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) No. 133, **8**, 42–53(1928). (In Esperanto, with German summary.)—Sapon. of acetone-sol acetate with aq. caustic alkali without shaking follows, up to about 50%, the equation: $dx/dt = k(a - x)$, where a is the original concn. of alkali, and x the amt. changed after time t . Above 50% the rate suddenly drops. With shaking the above equation holds to 90%. If the heterogeneous sapon. is expressed by: $dx/dt = k's(a - x)$, where s is the contact surface of ester with alkali soln., then during the reaction s must be a const. (why, is still unexplained). Sapon. with KOH in various strengths of alc., without shaking, proceeds rather rapidly at first and then slows up markedly. Without shaking, sapon. with KOH in fairly strong alc. follows the equation: $dx/dt = k(a - x)(b - x)$, where a and b are the original concns. of alkali and ester and x is the amt. changed after time t . A test for quality of acetylcelluloses is proposed, based on a comparison of sapon. velocities.

AUSTIN M. PATTERSON

Saponification of cellulose acetate during hydration. ICHIRO SAKURADA. *Sci.*

Papers Inst. Phys. Chem. Research (Tokyo) No. 134, 8, 54-61(1928). (In Esperanto, with German summary.)—The sapon. which occurs in prepg. acetone-sol. acetylcellulose by hydration of acetone-insol. primary triacetylcellulose with AcOH, H₂O and H₂SO₄ shows the same mechanism as sapon. with alkali (see the 2 preceding absts.). Assuming that the amt. of H₂O remains unchanged in sapon., the sapon. velocity as a whole may be expressed as: $dx/dt = k(b - x)$. The sapon. during ripening at various temps., when calcd. on this assumption, agrees fairly well with exptl. results obtained earlier in the same lab. The reaction velocities of tri-, di-, and mono-acetylcellulose are, resp., $dx_1/dt = 3k(b - x_1)$, $dx_2/dt = 2k(x_1 - x_2)$, and $dx_3/dt = k(x_2 - x_3)$, where b is the initial concn. and x_1 , x_2 and x_3 are the changed amts. of tri-, di- and monoester. The concn. is expressed in no. of g. mols. of C₆ unit in unit vol. The concns. of the different esters after a certain time interval are: $C_{tri} = be^{-3kt}$, $C_{di} = 3b(1 - e^{-kt})$, $C_m = 3b(1 - e^{-kt})e^{-kt}$, $C_{cat} = b(1 - e^{-kt})^2$. The values calcd. on this basis and on the assumption that monoester and regenerated cellulose are acetone-insol. agree with those obtained in practice by Hess *et al.* in the prepn. of acetone-sol. ester by sapon. of tri-Ac ester.

AUSTIN M. PATTERSON

Reactions in liquid hydrogen sulfide. IV. Thiohydrolysis of esters. A. W. RALSTON AND JOHN A. WILKINSON. *J. Am. Chem. Soc.* 50, 2160-2(1928); cf. C. A. 22, 1519.—The thiohydrolysis in liquid H₂S of Me, Et, Pr, iso-Pr and Bu thioacetates was calcd. from cond. measurements at various concns. The calcd. degree of thiohydrolysis increases with the mol. wt. of the ester and is larger than the degree of hydrolysis of esters of similar O acids in water at room temp. The results are tabulated.

E. R. SMITH

Studies on autocatalysis in the formation and reduction of cuprous oxide. J. OKAYAMA. *Z. Elektrochem.* 34, 294-8(1928).—The possible explanation of catalysis in the copper oxidation and copper oxide reduction are discussed. The autocatalytic course of the copper oxidation is established, and that of the reduction of copper oxide confirmed. In studies on the reduction of copper oxide, consideration must be given to the adsorption of the water vapor formed.

M. FENSKE

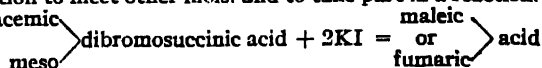
A study of auto-ignition temperatures. II. Pure compounds. HENRY J. MASSON AND WILLIAM F. HAMILTON. *Ind. Eng. Chem.* 20, 813-6(1928); cf. C. A. 22, 706.—The auto-ignition temps. of an addnl. no. of pure org. compds. have been detd. in air at ordinary pressures. The compds. selected cover a wide range of properties and structures in order to provide data for use in studying various combustion reactions. A study has also been made of the catalytic effect of various surfaces on auto-ignition temps.

G. CALINGAERT

The mechanism of catalytic hydrogenation in the cold. A note. M. BOURGUEL. *Bull. soc. chim.* 43, 231(1928); cf. C. A. 22, 2099.—A typographical error in the previous paper caused omission of names from the curves on page 1447. Curve 1 shows the complete reduction of cyclohexylpropine and curve 2 that of tolane. Reported lack of success in prepg. colloidal Pd according to the directions given in the previous paper is probably due to the use of rice starch instead of potato starch.

R. L. DODGE

Heterogeneous catalysis and adsorption. II. C. F. VAN DUIN. *Rec. trav. chim.* 47, 715-36(1928).—The acceleration of the reaction between α , β -dibromopropionic acid and inorg. iodides by the addn. of carbon, previously found by Kruyt and van Duin, was confirmed. An acceleration occurs with the Na salt as well as with the acid itself. The sapon. of Me *m*- and *o*-sulfobenzoates, Me isovalerate, monoacetin, mono-Me succinate, mono-Me *d*-tartrate, and di-Me *meso*-tartrate and the inversion of sucrose were investigated and it was shown that the addn. of carbon retards the reaction in all cases. Even in the most favorable case, the sapon. of di-Me *meso*-tartrate, the acceleration of the reaction, due to the undoubtedly favorable orientation of the adsorbed mols., is insufficient to overcome the decrease of the velocity of the reaction in consequence of the less favorable condition of adsorbed mols. to take part in a reaction, caused by the adsorption itself. The unimol. reaction, racemic dibromosuccinic acid \rightarrow bromofumaric acid + HBr, was shown to be retarded by the addn. of carbon. This supports the Kruyt and van Duin first hypothesis, that adsorbed mols. are in a less favorable condition to meet other mols. and to take part in a reaction. The velocity of both reactions: racemic



+ 2KBr + I₂ was shown to be greatly increased by the addn. of carbon, the acceleration being much greater than with the α , β -dibromopropionic acid and its Na salt. This supports the second hypothesis, that adsorption can cause positive catalysis only in the case where the orientation of the adsorbed mols. is such that the reacting groups

are turned away from the adsorbent and towards the surrounding liquid. This orientation must be such a favorable one that the primary decrease of the reaction velocity, caused by the adsorption itself, is overcome. The sapon. of mono-Me *d*-tartrate and di-Me *meso*-tartrate by means of an alk. SnO_2 suspension was investigated, in the former case a decrease of the reaction velocity being found and in the latter case the same velocity as in the absence of the colloidal SnO_2 . This result is explicable in only one way, that with mono-Me *d*-tartrate the orientation of the adsorbed mols. is less favorable than with di-Me *meso*-tartrate. With mono-Me *d*-tartrate the retarding influence due to adsorption itself preponderates, while with di-Me *meso*-tartrate this retarding influence is just compensated by the accelerating influence due to the favorable orientation of the adsorbed mols.

M. FENSKÉ

The decomposition of hydrogen peroxide on glass powder in presence of salts. WINIFRED M. WRIGHT. *Z. Elektrochem.* 34, 298-300(1928).—The decompn. of H_2O_2 in aq. soln. on glass powder is in agreement with the results of Elissaffoff (*C. A.* 9, 3015) in that it is considerably accelerated by metallic salts. AgNO_3 , CuSO_4 and $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$ are especially active. HgCl_2 retards the decompn. in presence of the glass powder. The decompn. velocity of H_2O_2 was measured in the presence of glass powder and different concns. of AgNO_3 at 0° . The reaction was approx. monomol., the const. decreasing somewhat with time. The adsorption of Ag^+ in AgNO_3 soln. on glass powder follows the ordinary adsorption isotherm. The decompn. velocity of H_2O_2 in presence of glass wool and AgNO_3 is about proportional to the amt. of Ag^+ which under the same conditions is adsorbed on the glass powder.

M. FENSKÉ

Silver-ion catalysis of persulfate oxidations. III. The oxidation of ammonium ion. CECIL V. KING. *J. Am. Chem. Soc.* 50, 2080-8(1928); cf. *C. A.* 22, 1521. —This reaction, previously studied by Marshall (*Proc. Roy. Soc. Edinburgh* 23, 163(1900)) and others, has been reinvestigated in more dil. solns. by the cond. method. Recent work of Yost suggests that Ag^+ ion is oxidized to Ag^{++} by the persulfate ion and is, in turn, reduced by the NH_4^+ to Ag^+ , at an immeasurably rapid rate. In the present work, the autocatalytic character of the curves shows that the reduction of Ag^{++} to Ag^+ is not immeasurably rapid in lower concns. (0.0005 *M* $(\text{NH}_4)_2\text{S}_2\text{O}_8$ and 0.0005 *M* AgNO_3) and that some small concn. of Ag^{+++} is built up in the soln. The mechanism of cane sugar inversion and of ester hydrolysis is discussed in the light of the present work. IV. Oxidation of oxalate ion. *Ibid.* 2089-99. —The rate of oxidation of oxalate ion by persulfate ion, in dil. aq. soln., has been measured. With no catalyst, the reaction is very slow. When Ag salts are added, the reaction is more rapid than similar oxidations of NH_4^+ , NH_4^+ , and Cr^{+++} . This difference in reaction rate is probably due to some peculiarity in the reaction itself, although vessel walls and accidental impurities are thought to have some catalytic effects. Some curves of autocatalytic type are shown. The intermediate compd. formed is not thought to be the Ag^{+++} ion postulated in the other oxidations (cf. above). The velocity of reaction is very irregular which makes it difficult to explain the mechanism of the reaction.

A. J. CURRIER

Heating powdered substances below their melting points and eutectic temperatures. BERNWARD GARRE. *Zement* 17, 446-8(1928).—The reactivity of powd. solids on heating below their m. p. or eutectic temps. is aided by compacting into pellets or by mixing with liquids, especially those liquids in which one or both solids are sol. H. F. K.

The eutectic in binary systems. F. KORDS. Kaiser Wilhelm Inst. Silikatforschung Berlin-Dahlem. *Metallhose* 17, 481-2, 541; *Chem. Zentr.* 1927, II, 8, cf. *C. A.* 21, 3010; 22, 530, 2106. —New equations are given for calcg. the eutectic temp. and the compn. of the eutectic mixt. from the f. ps. of the pure components. The depression of the eutectic point increases in systems with components of similar character in the following order: mol. compds. < ternary electrolytes < binary electrolytes < elements. A study of the influence of assocn. of pure compds. which takes place during fusion showed in systems with 2 binary electrolytes for the eutectic point depression the following order: neither component associated < both components associated < only 1 component assocd., while the f. p. depression diminishes up to the beginning of crystn. in dil. solns. because of assocn.

C. C. DAVIS

The system alumina-water. GUSTAV F. HÜTTIG AND EBERHARD VON WITTEGENSTEIN. Deut. tech. Hochschule, Prag. *Z. anorg. allgem. Chem.* 171, 323-43(1928). —The same method and app. have been used for the system $\text{Al}_2\text{O}_3\text{-H}_2\text{O}$ as in previous investigations (cf. *C. A.* 15, 2597; 16, 3280; 17, 2542). The following points are examd.: colloid system $\text{Al}_2\text{O}_3\text{-H}_2\text{O}$; transformation of an amorphous colloid system into a macroscopic cryst. system; hydrargillite and its dehydration products; products obtained by the aging of the colloid system $\text{Al}_2\text{O}_3\text{-H}_2\text{O}$; diasporé and its dehydration products;

effect of high temps. and high water-vapor pressure; activity of Al_2O_3 and $\text{Al}(\text{OH})_3$.

A. L. HENNE

The quaternary system: $\text{Na}_2\text{O}-\text{Na}_2\text{O}_2-\text{H}_2\text{Cl}_2-\text{H}_2\text{O}$. V. I. NIKOLAEV. *J. Russ. Phys.-Chem. Soc.* 59, 289-98(1927).—In the system: $\text{NaCl}-\text{NaNO}_3-\text{K}_2\text{O}$, the effect of the addn. of NaOH , or a mixt. of HCl and HNO_3 on the soly. of the two salts was studied at 15° , 25° and 35° . Measurements were made of the soly. of NaCl in presence of increasing quantities of NaNO_3 in neutral soln. A thermostat was used accurate to $0.1-0.2^\circ$. Equil. was reached in 8-96 hrs. (the latter in the case of some alk. solns.). The vessel contg. the solns. was sealed with Hg. Soly. tables are given. The quaternary system is represented by a tetrahedron. The mutual crystn. lines of NaCl and NaNO_3 located inside the tetrahedron meet at the eutonic point of max. salt content corresponding to a neutral soln. of min. vapor pressure. The soly. isotherms of NaCl and NaNO_3 are found on the surface triangles of the figure. The crystn. fields of NaCl and NaNO_3 extend from the resp. isotherms towards the mutual soly. line and each is divided (like the latter) into an alk. and an acid portion. If the variations of a 3-component system with temp. are represented by a triangular prism with the altitude serving as the axis of temps, the behavior of a quaternary system can be similarly plotted by placing a no. of its plane projections above each other at distances proportional to the temp. intervals. The quant. relationship between the elements of tri- and quadri-dimensional space is confirmed, points becoming lines, lines surfaces, and surfaces vols. of identical character.

BASIL C. SOYENKOFF

Representing a four-component system with a parallelogram. SPINDEL. *Tonind.-Ztg.* 51, 1239-41(1927).—In most phys.-chem. research only two- or three-component systems are studied; these can easily be represented with biaxial or triaxial diagrams. In *ceramic research*, however, the no. of components is usually more than 3; an attempt was made to represent a four-component system with a parallelogram. H. G. S.

The measurement of high temperatures in a carbon resistance furnace. W. MEHR, H. IMMKE AND J. KRATZERT. *Tonind.-Ztg.* 51, 1063-8(1927).—Sighting on the specimen through the top with an optical thermometer and inserting the thermocouple in the side was found to be better practice than sighting at the specimen through the side with the optical thermometer and inserting the thermocouple through the top.

H. G. SCHURECHT

The transition temperature of carbon tetrachloride as a fixed point in thermometry. JAMES C. McCULLOUGH AND HARRIS E. PHIPPS. *J. Am. Chem. Soc.* 50, 2213-6(1928).— CCl_4 when cooled below its f. p., has a reversible, solid-solid transition from the cubic to the monoclinic system at $-48.4 \pm 0.02^\circ$. Since the f. p. is generally regarded as a fixed thermometric point the use of pure CCl_4 will therefore also serve as a second fixed point.

J. H. PERRY

The measurement of high temperature by means of a tungsten-molybdenum thermocouple. D. BINNIE. *Roy. Tech. Coll. Met. Club J.* 1927-8, No. 6, 35-6.—A W-Mo thermocouple was used to measure temps. up to 1700° . The couple was formed by twisting the end of a 0.4-mm. W wire around the end of a 0.635-mm. Mo wire and pressing them tightly together with pliers. The thermoelec. curves for various W-Mo couples, in all cases, follow very closely the graph of a simple mathematical expression of the type $y = cx^n$, where c is a const. and n is a power approx. equal to 2. At a temp. of 1500° the power is 7 to 8 microvolts per degree, and at 1600° 8 to 9 microvolts per degree.

DOWNES SCHAAF

The specific heat and chemical constant of cadmium. FRITZ LANGE AND FRANZ SIMON. *Z. physik. Chem.* 134, 374-80(1928).—The sp. heat of a sample of Cd, proved by x-rays to contain only the ordinary hexagonal form, was measured from 10 to 50° A. U. From the formula for vapor pressure $\log_{10} p = -5819.4/T - 1.2572 \log_{10} T + 12.287$, the chem. const. is +1.57. The theory for at. gases gives 1.49. F. R. B.

The specific heat of nickel above the Curie point. PIERRE WEISS. *Compt. rend.* 187, 12-4(1928).—A theoretical discussion is given of recent data on the sp. heat of Ni. Above the Curie point the at. heat shows the same gradual increase with temp. as the at. heat of Cu. Their difference is const. and equal, within the precision of the measurements, to the part of the at. heat 0.993 corresponding to the kinetic energy of one degree of freedom.

W. W. STIFLER

Atomic number and heat of formation. W. A. ROTH AND O. SCHWARTZ. *Z. physik. Chem.* 134, 456-66(1928).—If the heats of formation of oxides and chlorides of metals of the same group are plotted against at. no. smooth curves are obtained. These curves have 2 branches, for the A and B group, which intersect at the common element. It is possible to interpolate for unknown heats of formation. To check this interpolation the heat of hydrolysis of $\text{SiCl}_4(\text{liq}) + 2\text{H}_2\text{O}(\text{liq}) + \text{aq.} = \text{SiO}_2(\text{gel})$

+4HCl(aq) was measured and found to be 70.1 ± 0.15 kg. cal. The heat of hydrolysis of GeCl_4 to form GeO_2 (solid) is 25.0 cal. F. R. BICHOWSKY

The heat of formation of water-alcohol mixtures partially miscible. PIERRE BRUN. *Compt. rend.* 186, 1729-31(1928).—The heats produced by mixing various proportions of H_2O , EtOH and iso-AmOH were measured calorimetrically by the classical Berthelot method. The results are presented in a tri-linear coordinate diagram. For ternary as for binary mixts. mixing involving a contraction is exothermic, and endothermic when expansion is involved. In either case $\Delta q = f\Delta V$. Also Biron's relation for sp. heats of binary mixts. is applicable to these ternary mixts. provided the 2 alcs. have approx. the same sp. heat. W. W. STIFLER

The heat capacity of hydrogen bromide from 15°K. to its boiling point, and its heat of vaporization. The entropy from spectroscopic data. W. F. GIAUQUE AND R. WIEBE. *J. Am. Chem. Soc.* 50, 2193-2202(1928).—HBr prepd. directly from the elements was used to det. the heat capacity and heat of vaporization. Three max. in the curve of heat capacity and temp. indicate gradual transitions of the type noticed with NH_4Cl by previous workers. The heat of fusion was 575.1 cal. per mole and the m. p. was $186.24 \pm 0.05^\circ \text{ abs.}$ The b. p. was $206.38 \pm 0.05^\circ \text{ abs.}$ The heat of vaporization at 760 mm. was 4210 ± 4 cal. per mole, and the entropy at the b. p. was 44.9 ± 0.1 entropy units. The entropy of HBr calcd. from spectroscopic data was 47.53 e. u. with the Tetrode const. at 298.1° abs. and 44.92 at $206.38^\circ \text{ abs.}$ J. H. PERRY

The heat capacity and entropy of cesium alum from 18° to 300° absolute. The entropy of aluminum ion. The potential of the aluminum electrode from thermal data. WENDELL M. LATIMER AND BERNARD S. GREENSFELDER. *J. Am. Chem. Soc.* 50, 2202-13(1928).—A detailed description is given of a vacuum calorimeter for measuring the heat capacity of solids from the triple point of H_2 to room temp. The heat capacity of $\text{CsAl}(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$ was detd. for the temp. range 18.7° - 297.8° abs. , and the entropy at 298.1° abs. was found by plotting C_p vs. $\log T$ and multiplying the area under the curve by 2.3026. The value is 163.85 entropy units. The f.-p. lowerings of dil. solns. of Cs and Rb alums were measured on nearly satd. solns. which were gradually dild. over the desired range. The activity coeffs for these alums were then calcd. from the f.-p. lowerings. The heat of soln. of Cs alum was $+13,560 \pm 25$ cal./mole at 298.1° abs. The entropy of soln. of Cs alum is $+2.18$ e. u., and the entropy of Al^{+++} at 298.1° abs. in a hypothetical one-molal soln. is -70.9 cal./deg./mole. The potential of the Al electrode is $+1.69$ v. J. H. PERRY

Molecular heat and entropy of hydrochloric acid calculated from band spectra data. ELMER HUTCHINSON. *J. Am. Chem. Soc.* 50, 1895-1900(1928).—The mol. heat of gaseous HCl is computed from band spectra data for temps. from 1° K. to 600° K. A max. in the mol. heat vs. temp. curve occurs at 12.5° K. At 0° the mol. heat obtained from band spectra data agrees very well with the exptly. detd. value. The method of Giauque and Wiebe was used to calc. the entropy at different temps. The molal entropy of HCl at 0° is 44.04 or 43.72 entropy units, depending on whether the Tetrode or the Lewis value of the chem. const. is used. M. FENSKE

Molecular pressure and latent heat of vaporization of liquids. K. STAKHORSKI. *Inst. angew. Chem. Charkov. J. Russ. Phys. Chem. Soc.* 58, 966-82(1926); *Chem. Zentr.* 1927, 1, 2043; cf. *C. A.* 20, 2769; 21, 3780.—The internal pressure B is calcd. by the following equations: $B = 41.35 l/v$, where l is the heat of vaporization per g., and v is the sp. vol.; $B = 1149 T/M$, where T is abs. temp. and M is the mol. wt. of the liquid; $B = 1.5a_c(22400)^2/(Mv)^2$, where a_c is the van der Waals const. a at the crit. temp.; and $B = 80p_c$, where p_c is the crit. pressure. The numerical consts. of the last 3 equations apply to $T = 0.5 T_c$ and give B in atms. With the aid of the B values obtained in this way, the validity of the following empirical relations is proved: $B = 235.9 \gamma T/T_c$, where γ is the surface tension; $B = \alpha T/\beta$, where α is the expansion coeff. and β the compressibility coeff. at low pressure (cf. Jäger, *Die Fortschritte der Kinet. Gastheorie*, 1906); $l = \alpha v T/41.35 \beta$ (cf. Lewis, *Z. phys. Chem.* 78, 24); $lT_c = 6.29 T_c \gamma v$; $\beta = 0.00392 \alpha T_c/\gamma$; $\gamma M v = 10.06 (T_c - T)$; $\beta = 2373/[M v (T_c - T)/T_c]$, and $M l = 57.39 (T - T_c)/T_c$. C. C. DAVIS

The dissociation of ammonium chloride vapor. H. BRAUNE AND S. KNOKE. *Z. physik. Chem.* 135, 49-62(1928).—Vapor density measurements on NH_4Cl showed complete disson. in the range 250 - 390° and 16 - 820 mm. Hg. The accuracy of the measurements is 0.1%. The heat of vaporization is given as 39.4 kg. cal/mol. at 320° and the sublimation temperature -340.3° . Values of $\log p$ plotted against $1/T$ show a linear function. C. H. G.

Thermodynamic properties of oxygen and nitrogen. RUSSEL W. MILLAR AND

JOHN D. SULLIVAN. *Bur. Mines Tech. Paper No. 424*, 20 pp.(1928).—Calcs. have been made on existing data of O and N up to 60 atms. pressure and from 80° to 300° K. The vol., heat content and entropy have been evaluated and are given in tabular form. Two large Mollier charts, one for each gas, accompany the article and are of great value for extrapolating or interpolating. The method of creating the charts is explained, together with the thermodynamic treatment involved. A good list of references is given. R. H. LAMBERT

Normal potential of the iodine-iodide electrode. GRINNELL JONES AND B. B. KAPLAN. *J. Am. Chem. Soc.* 50, 2066-76(1928).—The normal potential of the I-iodide electrode is redetd. against both the Hg_2Cl_2 and H electrodes, by using solns. of such dilns. that the effect of tri-iodide formation is minimized. In the calcs. the concn. of the ions is detd. from the activity coeff. and this is detd. by measurement of the potential of iodide concn. cells with transference contg. Ag-AgI electrodes. The normal potential of the I-iodide electrode against the Hg_2Cl_2 electrode is -0.2544 v. at 25° and -0.2522 v. at 0°, and against the H electrode -0.5362 v. at 25°. H. STOERTZ

The determination of the ζ -potential on cellulose—a method. D. R. BRIGGS. *J. Phys. Chem.* 32, 641-75(1928).—There is an excellent discussion of *electrokinetic phenomena*. The app. used to measure the potential for sulfite pulp and for S. & S. paper was based on the streaming-potential method. The diaphragm of cellulose must be tightly packed to prevent decrease in vol. under increased pressures. H/P (H is streaming potential, P is hydrostatic pressure) is not const. for diaphragms of the same material with different pore dimensions. The failure of H/P to be const. is ascribed to the increased cond. of the fluid in the presence of cellulose. When the correct cond. is used, the value $H\kappa/P$ is const. (κ is the cond. of the fluid in the presence of the diaphragm). The ζ -potentials for two S. & S. papers and a sulfite pulp (ash 0.02%) are 0.0214, 0.0161, and 0.0083 v., resp. The potential depends on the origin and history of the cellulose. The effects of La, Al, H, Mg and K ions were studied. ARTHUR FLEISCHER

Electric conductivity of silicon. H. J. SEEMANN. *Physik. Z.* 28, 765-6(1927).—The sp. elec. resistance of metals increases nearly in proportion to the abs. temp. In contrast to this Si, Ti and Zr are regarded as variable or semi-conductors. C as graphite is no longer considered a semi-conductor, since it has been shown by Ryschkewitsch (cf. *C. A.* 18, 2273, 3515) that single crystals of graphite show a positive temp. coeff. of elec. resistance. S. found the same conditions with Si, although no quant. accuracy could be obtained. Therefore Si is not to be regarded as a semi-conductor. The negative temp. coeff. of polycryst. Si is no doubt caused by insulating superficial oxide layers. It is probable that the same holds for single crystals of Ti and Zr, the oxides of which are good insulators which are likely to cover the true nature of elec. cond. in the polycryst. state. **Supplement.** *Ibid* 29, 94-5(1928).—The analysis of Si used above revealed the presence of Al, Fe, Zn, SiO_2 and traces of C and Mn. It is impossible for the present to indicate the influence of these impurities upon the temp. coeff. of the elec. resistance of pure Si. It appears from the work of Seemann, Clausen (cf. *C. A.* 19, 1513) and others that elements, hitherto regarded as semi-conductors (e. g., Si, Ti, Zr, Th, Hf) show the same behavior as the conductors proper. EMIL KLARMANN

The conductivities of sodium and potassium derivatives of β -ketonic compounds in alcoholic solution. EILEEN WHITE. *J. Chem. Soc.* 1928, 1413-5.—The mol. conductivities of the Na and K derivs. of Et acetoacetate, acetylacetone, benzoylacetone, Et isobutyl and iso-Am acetoacetate and of Na and K ethoxides and KI were detd. in alc. soln. at 25° and dilns. of from 4 to 1024 l. The expts. show that these substances are conductors in alc. soln. and have mol. conductivities only slightly less than that of KI. Dissoen. is not complete at the max. dilns. used. The results are tabulated. EDGAR R. SMITH

The dielectric constant of aqueous solutions of some amino acids. GUNNAR HEDESTRAND. *Inst. allgem. organ. Chemie Univ. Stockholm. Z. physik. Chem.* 135, 36-48(1928).—A modification of the Nernst bridge method was used to det. the dielec. consts. of aq. solns. of amino acids. Glycocoll, α -alanine, β -alanine and taurine increase the dielec. const. of water by an amt. which is linearly proportional to the molar concn. The dielec. consts. of solns. of the aminobenzoic acids decrease very slightly with increase in concn. Neutral salts decrease the dielec. consts. of pure water and glycocoll soln. to a like extent. C. H. GREENEWALT

The dielectric constant of benzil. L. SAINTE-ANTOINE. *Compt. rend.* 186, 1429-31(1928).—S. measures $K = (\lambda^1/\lambda)^2$, where λ is the wave length of the resonator in air (here 235 cm.), and λ^1 is the wave length in molten benzil or a benzene soln. of benzil. For a soln. contg. 10.6 g. of benzil and 100 cc. C_6H_6 , temp., 5, 15, 35°; λ^1 in cm., 424.4, 422.4, 418.2; K , 3.37, 3.34, 3.28; d , 0.920, 0.911, 0.895; $(n-1)/d$, 0.909, 0.908, 0.905.

For 20 g., in 100 cc., temp., 5, 15, 35°; λ^1 471.6, 469.4, 464.8; K, 4.17, 4.13, 4.05; d , 0.943, 0.932, 0.920; $(n-1)/d$, 1.103, 1.107, 1.100. For molten benzil: temp., 95, 110, 120°; λ^1 , 834.2, 818.1, 804.3; K, 13.04, 12.54, 12.12; d ., 1.095, 1.087, 1.077; $(n-1)/d$, 2.387, 2.337, 2.304. The results given by Malleman (*C. A.* 22, 1092), are correct.

A. L. HENNE

Dielectric polarization of liquids. I. Dielectric constants and densities of solutions of the chlorobenzenes in benzene and in hexane. C. P. SMYTH, S. O. MORGAN AND J. C. BOYCE. *J. Am. Chem. Soc.* 50, 1536-46(1928); cf. *C. A.* 18, 3498; 19, 2429.—The dielec. consts. of solns. of C_6H_5Cl and of o -, m -, and p - $C_6H_4Cl_2$ in benzene and in hexane, resp., were measured at 0°, 25° and 50°. These data together with the ds. at the temps. given were used for the calcn. of the polarization of the mixts. and the elec. moments of the mols. **II. Temperature dependence of the polarization in certain liquid mixtures.** C. P. SMYTH AND S. O. MORGAN. *Ibid* 1547-60.—Since the results of part I showed that the effect of polar compds. upon one another in dil soln varied both with temp. and concn. S and M. detd the dielec. consts. of solns. of EtBr, $CHCl_3$ and C_6H_5Cl in hexane over the whole range of temps. and concns. within which the solns. are liquid (approx. -90° to +60°). Mol. polarizations were computed and plotted against mol. fractions for different temps. The values obtained were used (1) to est. approx. values for the polarization due to the shifts of atoms and groups of atoms within the mol.; (2) to get accurate values for the elec. moments of the mols; and (3) to establish the validity of the Debye equation as applied to infinitely dil. solns. The mols. affect one another the more strongly, the greater their moments, the greater their concns. and the lower the temp.

H. S. v. KLOOSTER

Experimental and theoretical study of the variation of the dielectric constant of some liquids with the pressure. L. CAGNIARD. *Ann. phys.* 9, 460-553(1928); cf. *C. A.* 21, 526.—The first part of this monograph is a discussion of methods of measurement. To study the variation of the dielec. const. with pressure below 20 atm. requires a method of measuring capacity capable of detecting a change of 1 part in 1,000,000. The discrepancies between results given by different observers sometimes amount to 20%, though the methods used are said to be accurate to 1% or even 0.1%. C. ascribes these differences to the use of vacuum tubes as amplifiers in the measuring circuit. His method, to avoid these errors, consists essentially of a Wheatstone bridge network with 4 condensers of identical construction, forming the four arms. Two of the condensers are filled with the liquid under test and in one of these the liquid can be subjected to pressures up to approx. 20 atm. The bridge is balanced by an accurately calibrated variable condenser. A quadrant electrometer is used in place of the galvanometer and the sensitiveness is greatly increased by using a resonance method. The bridge is excited by a vacuum tube circuit having a frequency corresponding to a wave length of 6.000 m. Part II starts with a historical summary of previous work followed by details of the technic employed by C. It was found possible to measure not only the rate of change of dielec. const. with pressure at const. temp. (i. e., de/dp) but also the rate of change of this coeff. with temp. (i. e., $d^2e/dp dT$) over a range of 20° to 30°. For 3 of the liquids studied the change in dielec. const. is directly proportional to the pressure, and the curve giving de/dp as a function of temp. is concave upward. For C_6H_6 , $de/dp \times 10^{10}$ varies from 1.25 at 14° to 1.44 at 23.8°; for C_6H_{14} , from 1.55 at 1.1° to 2.10 at 31.7°; for CCl_4 , from 1.61 at 10.8° to 1.91 at 28.6°. Cyclohexane and AmOH present certain anomalies. In part III C. compares his results with those of Ortway. The Mosotti-Clausius, Langevin-Debye, and Gans theories of the dielec. const. are outlined. Both de/dp and $d^2e/dp dT$ show certain important deviations from the theoretical values calcd. by Debye's formula. Apparently if a dipole is present in a mol., the exptl. values of these two coeffs. are less than the theoretical, while the absence of a dipole leads to the opposite result. An attempt is made to interpret the anomalies observed with cyclohexane and AmOH, and the theory of electrostriction in insulating liquids is outlined.

W. W. STIFLER

Apparent changes in the dielectric constant of insulating materials. PAUL BÖNING. *Z. tech. Physik* 9, 212-4(1928).—It has been shown that technical insulating materials have dielec. consts. largely independent of the elec. field (cf. Mattenklodt, *C. A.* 3, 2267). Apparent changes occur however, and are now discussed. It is assumed on the basis of practical evidence that conduction in solid or liquid insulating materials is electrolytic that in boundary planes part of the ions are absorbed (boundary ions) and that in all materials continuous channels filled with electrolyte are present. These assumptions agree with colloidal chem. theories. For the actual dielec. const. ϵ' is derived (electrode distance d const.) $\epsilon' = \epsilon + (A/U)$ for U the potential of the condenser, A a const.; the free ions contribute a flux βd to the dielec. flux $4\pi Q$. For U from

50 to 900 v. this equation represents data (ϵ' from 5.6 to 2.64) of Hoer on paper insulation. If a variable β is introduced the agreement is still better: $\epsilon' = \epsilon + (A/U) - (A/U)\epsilon^{-\gamma}$ for U from 1 to 900 v., $\epsilon = 2.4$, $A = 200$, $\gamma = 0.0663$. Because of time lag ϵ will appear smaller for sudden potential peaks. For const. U and variable d changes in ϵ' will follow from $\epsilon' = \epsilon + Bd^2$.

B. J. C. VAN DER HOEVEN

The dispersion of the conductivity and the dielectric constant of strong electrolytes. P. DEBYE AND H. FALKENHAGEN. *Physik. Z.* 29, 401-26(1928); cf. *C. A.* 22, 2705.—This theoretical paper is a continuation of D. and E.'s study of the irreversible processes of elec. cond. They find 2 essential quantities, the thickness of the ionic atm. and its relaxation time (the time necessary for its formation or its disappearance). If the time of an oscillation of the ion is equal to or less than the relaxation time, then the unsymmetrical charge distribution can no longer completely form; so that for quite high frequencies or high field strengths the mol. cond. rises and approaches the value at infinite diln. This dispersion effect whose existence has hitherto been unsuspected provides the possibility of eliminating experimentally the Coulomb attracting forces between the ions, and a new method of estg. the true degree of dissocn. appears. The general theory of this dispersion phenomenon which takes into account the Brownian movement is given for the case of the dil. soln., and the influence of concn., temp., mobility of the ion, dielec. const and valence on it are calcd. and plotted. M. D.

Study and theory of pyroelectricity. A. MEISSNER AND R. BECKMANN. *Z. tech. Physik* 9, 175-86(1928).—Plates of tourmaline and of quartz $10 \times 10 \times 3$ mm., cut perpendicularly to an elec. axis, were heated on a hot plate from 20° to 300° . One electrode on top of the plate was connected to a string electrometer (Tegetmeyer). On heating, a negative electric moment appears on the side of the plate which has a positive piezoelec. effect; the value of it is const. and depends on the temp. On cooling down after moderate heating the moment goes through zero to positive values that disappear very slowly in the cold. The moment for tourmaline is 1.18 electrostatic units per degree per sq. cm.; for quartz 1.44×10^{-3} electrostatic units per degree per sq. cm. Individual variations of 1:30 occur. There is also an increased cond. effect, i. e., internal compensation of the dipole distortion by freely moving charges. As a result for quartz the negative moment for higher temps. disappears quickly with time but is followed after cooling by a considerable positive moment from which it takes days to recover. From earlier work (piezoelectricity, high-frequency vibrations, cf. Meissner, *Physik. Z.* 28, 621(1927)) has been deduced an almost cubical structure of the Si in quartz with the optical axis following the cube diagonal, the O atoms being paired on the sides of each Si. From a hexagon projection of this Si cube the piezo and pyro effects are schematically explained on the assumption that for the latter Si^{+++} shifts more than the 2O^{--} ions but less than twice as much. An equation relating the pyro effect to temp. and pressure is given.

B. J. C. VAN DER HOEVEN

The electric resistance of copper. A. BROIDO. *Z. tech. Physik* 9, 194-7(1928).—A review of historical attempts to establish a standard resistance value for Cu. In 1913 was adopted the international standard of 17.24 ohms for a wire 1 km. long and 1 sq. mm. in cross section.

B. J. C. VAN DER HOEVEN

Dispersoelectricity. II. Theoretical considerations. H. G. BOS. *Chem. Weekblad* 25, 259-63(1928); cf. *C. A.* 22, 1527.—The total elec. charging effect of a jet of liquid fog is considered to be due (1) to q_1 , the primary charge formed per sec. on the insulated disperser independent of the potentials of surrounding objects (due partly to shear of the electric double layer solid-liquid, partly to liquid and gas flow in the tubes leading to the disperser); (2) q_2 , the electricity leaving the disperser per sec. by ion-conduction, due to potential differences ($V + E$) between it and the surrounding walls: $q_2 = k(V + E)$; (3) q_3 the electricity loss of the disperser for zero dispersion pressures: $q_3 = KV + L$ for V the potential of the disperser tube, K cond. of the gas. Assuming $dV/dt = (q_1 - q_2 - q_3)/C$ for C the capacity of the dispersing system it follows that

$$V_t = (q_1 - kE - L)/(k + K) \left(1 - e^{-\frac{(k+K)t}{C}} \right) + V_\infty e^{-\frac{(k+K)t}{C}}$$
 and the optimum value Δ ("dispersel") for $t = \text{infinity}$ of V is $\Delta = (q_1 - kE - L)/(k + K)$. The leakage $(kE + L)$ can be found from blanks; K and k are preferably small and to be found from

$$e^{-\frac{(k+K)t}{C}} = \sqrt{\frac{\Delta - V_t}{\Delta - V_0}}$$
 thus yielding a value for the primary effect q_1 . In the app. used and described V_0 , E , K and L (hot gas) were 0. The calcn. method is further discussed. The results agreed with the equation given. For gasoline $q_1 = +0.0306$ C amps. was found.

B. J. C. VAN DER HOEVEN

The electrical moment of *p*-azoxyanisole. J. ERRERA. *Physik. Z.* 29, 426-9

(1928).—The dielec. const. of *p*-azoxyanisole was measured between 116° and 120° while the frequency was varied from one million to 400. At const. temp. the dielec. const. was independent of frequency, which indicates the presence of no rod-like aggregates of *p*-azoxyanisole mols and no dipole moment of the aggregate. The mols., however, have a permanent elec. moment, $\mu = 2.3 \times 10^{-18}$. MALCOLM DOLE

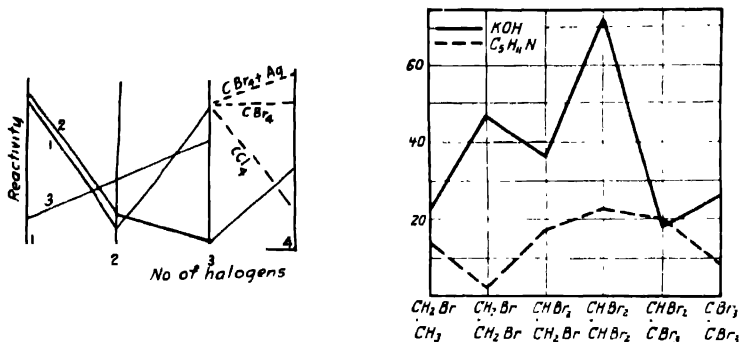
The magnetic moments of the cupric ion. FRANCIS BIRCH. *J. phys. radium* **9**, 137-41 (1928).—This is a somewhat more detailed account of the investigation previously reported by Collet and B. (*C. A.* **22**, 1528). The chief conclusion is that Cu^{++} regularly has a moment of 10 Weiss magnetons. A possible state having a moment of 9 magnetons is suggested by some of the results with CuCl_2 . Fractional moments in the neighborhood of 9.6 magnetons reported by earlier observers are ascribed to mixts. in varying proportions of the integral states. W. W. STIFLER

Magnetic transformations of the sesquioxide of iron, of its solid solutions and of its ferromagnetic combinations. H. FORESTIER. *Ann. chim.* **9**, 316-401 (1928).—Full exptl. details of app. and method, and complete results are given for work on which preliminary reports have already appeared (*C. A.* **20**, 698, 1939; **21**, 696). The technic is described for the prepn. from powd. substances, such as MgO , Al_2O_3 , Cr_2O_3 , Fe_2O_3 , FeO and various ferrites, without the use of any binder, of the small test rods for use in Chevenard's differential dilatometer (cf. *Rev. Met.* **14**, 610 (1917); cf. *C. A.* **11**, 2743). A comparative study of the dilatometric curves obtained with rods of the same oxide annealed from widely differing temps. indicates the absence of any allotropic transformations. The stable Fe_2O_3 is ferromagnetic (although its coeff. of magnetization is small) with 675° as the Curie point. Its temp. of magnetic transformation is lowered in solid solns. with Al_2O_3 or Cr_2O_3 . The prepn. of a no. of ferromagnetic ferrites is described. These include $\text{Fe}_2\text{O}_3\text{ZnO}$, stable, feebly magnetic; $\text{Fe}_2\text{O}_3\text{CaO}$ and $\text{Fe}_2\text{O}_3\text{CdO}$, unstable strongly magnetic, $\text{Fe}_2\text{O}_3\text{CuO}$, $\text{Fe}_2\text{O}_3\text{NiO}$, $\text{Fe}_2\text{O}_3\text{MgO}$, $\text{Fe}_2\text{O}_3\text{SrO}$, $\text{Fe}_2\text{O}_3\text{BaO}$ and $\text{Fe}_2\text{O}_3\text{PbO}$ stable, strongly magnetic. $\text{Fe}_2\text{O}_3\text{CaO}$ and $\text{Fe}_2\text{O}_3\text{CdO}$ lose their ferromagnetism irreversibly on heating, and are characterized by absence of residual magnetism and rapid attainment of satn. Both thermomagnetic and dilatometric study indicate the existence of the compd., $\text{Fe}_2\text{O}_3\text{MgO}$. All these ferromagnetic substances when heated and cooled in a const. magnetic field undergo an increase in residual magnetism. It is suggested that this property should be considered quite as characteristic of ferromagnetic substances as hysteresis. A recording app. for thermomagnetic analysis is described in detail. W. W. STIFLER

Theory of birefringence induced by flow in liquids. C. V. RAMAN AND K. S. KRISHNAN. *Phil. Mag.* [7], **5**, 769-83 (1928); cf. *C. A.* **20**, 539, **22**, 722.—In this paper a theory is developed for the effect discovered by Maxwell, viz., that a liquid in a state of viscous flow exhibits birefringence. The state of stress in the fluid consists of tensions and pressures in directions perpendicular to each other and inclined at 45° to the plane of sliding. When the mols. have an elongated form, these stresses tend to orient them so that their direction of greatest length lies along the axis of tension, and that of shortest length along the axis of pressure. The tendency to orientation is, however, resisted by their thermal agitation and the resulting state of statistical equil. may be found by application of Boltzmann's principle. The optical anisotropy of the mol. together with the orientations referred to, causes the medium to become birefringent. The magnitude of the effect is proportional to the product of the viscosity and the velocity gradient. The const. of proportionality, which is referred to as the Maxwell const. for the liquid, is evaluated in terms of the optical and geometrical anisotropies of the mol., the refractive index, density, and mol. wt. of the liquid, and Boltzmann's const. The data for 172 liquids recently obtained by Vorländer and Walter are critically discussed, and it is shown that the theory succeeds not only in giving an explanation of the general features of the phenomena, but also in giving quant. the observed values of the Maxwell const. GEORGE GLOCKLER

The law of periodicity. III. P. PETRENKO-KRITCHENKO, A. RAVIKOVICH, V. OPOTSKII, E. PUTYATUI AND M. DIAKOVA. *J. Russ. Phys.-Chem. Soc.* **60**, 149-52 (1928); *Ber.* **61B**, 845-54 (1928); cf. *C. A.* **21**, 3014.—Using compds. in which one function is repeated several times, the authors study their reactivity with the following reagents: KOH , NMe_3OH , $\text{Ba}(\text{OH})_2$, TlOH , H_2O , AgNO_3 , piperidine, MeONa and colloidal Ag. If halogen derivs. of methane, toluene, AcOH are considered, which contain an increasing no. of halogens in their mols., and the reactivity of their halogens is plotted, one of the curves given in Fig. 1 is obtained as follows: Iodo derivs. of methane curve 1 with AgNO_3 , NH_4OH piperidine; curve 2 with H_2O or alc. Chloro derivs. of toluene: curve 1 with piperidine and NH_4OH , curve 3 with Ag, H_2O , AgNO_3 . Chloro derivs. of AcOH is curve 1 with H_2O , 2 piperidine, 3 with Ag or AgNO_3 . Bromo derivs.

of AcOH. curve 1 with H_2O or $AgNO_3$, 2 with piperidine, 3 with Ag. Bromo derivs. of methane: curve 2 with piperidine



$CH_3(OEt)_2$, $CH(OEt)_3$, $C(OEt)_4$ and $(EtO)_2CHCH(OEt)_2$ have been saponified under the same circumstances; the percentages saponified were, resp., 13.6, 18, 9.7 and 3%. $CH_3(SH)CO_2H$ is more reactive than $CH_2(OH)CO_2H$; $O(CH_2CO_2H)_2$ is more reactive than $S(CH_2CO_2H)_2$. The repetition of a function in the same mol. lowers its reactivity, as shown by a comparison between $MeOH$ and $HOCH_2CH_2OH$, Ph_3COH and $Ph_2C(OH)C(OH)Ph_2$, $MeC(OH)CO_2Et$ and $EtO_2CCH(OH)CH(OH)CO_2Et$, NH_3 and H_2N-NH_2 , PH_3 and P_2H_4 , $CH_3(OEt)_2$ and $(EtO)_2CHCH(OEt)_2$. The reverse is true for a monoketone < α -diketone or HCO_2H < $(CO_2H)_2$. Fig. 2 shows the reactivity of the bromoethanes

A. L. HENNE

W. J. Muller's work and views on passivity. U. R. EVANS. *Chemistry & Industry* 46, 1219-22(1927).

E. H.

Non-polar bond and atomic refraction. I. R. Samuel. *Z. Physik* 49, 95-136 (1928) -- In the first section G. N. Lewis's octet theory is modified so as to treat the non polar bond as a sort of "excitation process" of the positive atoms. In the second part the limitations of the non polar are defined. With non-polar inorg. mols., as with org. mols., it is possible to split up the mol. refractions into at. refractions, by taking into account the type of bond and the valency. These at. refractions lead to statements concerning the strength of bond of non-polar mols. and the various types of bond.

W. W. STIFLER

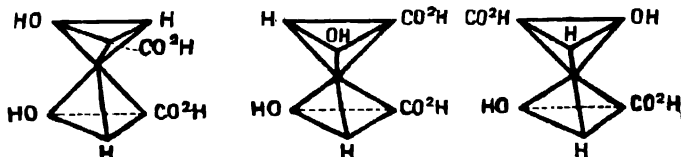
An improved method of ultra-violet polarimetry. Anomalous rotary dispersion of sodium tartrate. THOMAS M. LOWRY AND MAURICE A. VERNON. *Proc. Roy. Soc. (London)* 119A, 706-9(1928).—An earlier method (cf. *C. A.* 3, 1117) is applied to solns. of Na tartrate which is shown to have anomalous rotary dispersion with max. α at $\lambda = 3586$ A. U.

A. P. S.

Dispersion and absorption of high-frequency sound waves. K. F. HERZFELD AND F. O. RICE. *Phys. Rev.* 31, 691-5(1928).—The absorption of sound waves in gases had been explained heretofore by friction and heat conduction. A third factor is here introduced, namely: The slow rate of exchange of energy between the translational movement and the internal degrees of freedom of the mols. The formulas detg. the absorption and dispersion of sound waves, due to these three effects, are developed. Comparison with the exptl. data available show that the new effect is either of considerable influence or even predominant. The rate of exchange can be calcd. B. L.

Rotatory dispersion of solutions. RENÉ LUCAS. *Ann. phys.* 9, 381-459(1928).—L. subjects mathematical relationships for additive properties of substances to analysis and arrives at conclusions enabling him to generalize the rule and diagram of Darmonis (cf. *C. A.* 6, 2888) hitherto applicable only to binary mixts. Assuming that optical rotatory power is additive for the mols. in equil. in tartrates, L. shows that the data are consistent within exptl. error for the criteria his analysis developed and consequently a study of rotatory dispersion fixes the number of constituents of a mixt. Rotatory dispersions of tartaric acid in various solvents (H_2O , solns. of $CaCl_2$, $CO(NH_2)_2$, H_3BO_3 , H_2SO_4 , Na tungstate and molybdate) and for 7 monochromatic radiations (from $\lambda = 6708$ to $\lambda = 4358$ A. U.) show that tartaric acid behaves in all cases as a mixt. of 3 active substances the proportions of which vary with the solvent. Similar results appear for pure Et tartrate and for solns. of Et and Me tartrates in various solvents and at

various temps. The origin of the 3 active forms is sought in the possibility that the mols. exist in 3 mol. configurations in equil. with discontinuous passage from 1 form into another. Stereochemical models are proposed based on assumption that a single $\equiv C - C \equiv$ linkage is rigid and not mobile as commonly assumed. The stereochemical models are



and correspond to the existence of 3 forms of ethylene chloride (instead of the 1 known). L. adduces support for his configurations from the structures of various derivs. of tartaric acid and from x-ray diagrams. The 3 forms of ordinary active *d*-tartaric acid have the following consts: (1) α -form (of Longchambon) *l*-rotatory, of same structure as mol. in crystal, $[\alpha]_D \leq -88^\circ$, and $[\alpha]_D/[\alpha]_D$ between 2.15 and 2.14. (2) β -form, *d*-rotatory, $[\alpha]_D \geq +27^\circ$ and $1.51 < [\alpha]_D/[\alpha]_D < 2$. (3) γ -form, strongly *d*-rotatory, $[\alpha]_D \geq +544^\circ$ and $[\alpha]_D/[\alpha]_D \geq 2.3$. A. P. SACHS

Experimental investigations on the origin of the moon craters: a new contribution to the explosion hypothesis. STJEPAN MOHOROVIĆIĆ. *Arch. hem. farm.* 2, 66-76 (1928).—F. E. Wright's observations (*Proc. Nat. Acad. Sci.* 13, 535-40 (1927)) help to throw light on the formation of the moon craters. The photographs made by M. showing the effects of explosions with $Mg + KClO_3$ in dry and wet cement powder display great similarities to moon craters. On this basis a new hypothesis of the formation of moon craters is suggested. JAR. KUČERA

Negative catalysts as a means of improving the drying of oils (EIBNER) 26. Esterification velocities of monoaminobenzoic acids and 1- and 2-pyridinecarboxylic acids in glycol and glycerol (KAILAN, DIAB) 10. Esterification velocities of the nitrobenzoic acids in ethylene glycol and of naphthoic acids in glycerol (KAILAN, KRAKAUER) 10. Pressure of Ca in the sun's atmosphere (MILNE) 3. The system: Fe-P, Fe-Si and Fe-P-Si. I. Investigations of Fe-P solid solution in the binary system: Fe-P (HANEMANN, VOSS) 9.

Handbuch der Physik. Bd. 18. Geometrische Optik—Optische Konstante.—Optische Instrumente. Berlin: J. Springer. 865 pp. M. 72; cloth bound, M. 74.40.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

Matter, energy, action. MAURICE SAUGER. *Rev. gén. sci.* 39, 234-9 (1928).—A concise discussion is given of the exact meaning and relation of the concepts of matter, energy and motion. L. D. ROBERTS

The question of the origin of the penetrating radiation. V. PERSHKE. *Z. Physik* 49, 740-1 (1928).—Substitution of selected data in the Balmer formula shows that the production of He atoms from H atoms is accompanied by radiation of wave length 10^{-13} cm. which is exactly the lower limit for the penetrating radiation. W. F. M.

Pressure of calcium in the sun's atmosphere. E. A. MILNE. Univ. Manchester. *Nature* 121, 1017-8 (1928).—From calcs. of Unsöld (cf. *C. A.* 22, 1277) the no. of Ca atoms per sq. cm. column of the sun's atm. is 2.3×10^{19} . According to M., these should be mostly confined to a relatively thin layer (100 km.) directly above the layer where complete opacity sets in. The pressure for complete opacity is calcd. as 4.1×10^{-6} atm., neglecting radiation pressure. M. had previously obtained 5.5×10^{-5} atm., using Kramer's theory for the absorption coeff. in the continuous spectrum due to the ejection of photoelectrons. The agreement points to this effect as the chief source of the sun's continuous spectrum. It is convenient to regard the chromospheric layer as sep'd. sharply from the reversing and photospheric layers. In the former there are few collisions, permitting monochromatic radiative equil., with a strong selective radiation pressure. In the latter, there is local thermodynamic equil., and the dissocn. of different kinds of ions is det'd. by Saha's theory. A table is given of the pressures of Ca, Ca^+ and Ca^{++} at the various levels of the solar atm. F. A. JENKINS

The energy distribution of complex molecules. OSCAR K. RICE. Cal. Inst. Tech. *Phys. Rev.* 32, 142-9 (1928).—It is shown that for any distribution law in which Boltzmann's law holds for the various quantum states, $d \log W/dT = (\bar{\epsilon}_w - \bar{\epsilon})/kT^2$, where W is the fraction of the mols. in certain specified quantum states, $\bar{\epsilon}_w$ the av. energy of the mols in these states, $\bar{\epsilon}$ the av. energy of all the mols., T the abs. temp. and k the gas const. The distribution law will appear to be continuous if not viewed too closely, even though motions of the mols are quantized. In this treatment the continuous outline is considered and the fine structure neglected. If $W_e d\epsilon$ is the fraction of mols. whose energy lies between ϵ and $\epsilon + d\epsilon$, the general rule is derived $\partial^2 \log W_e / \partial T \partial \epsilon = 1/kT^2$. Proceeding along these lines the distribution law over a range of energies is found in a new and simple way, if the av. energy of the mols. (or the energy at which W_e is a max.) is given over a range of temps. At a given temp. the actual distribution law is compared with a classical one which makes W_e have a max. at the same energy. A limit is found beyond which the actual distribution law cannot depart from this particular classical law, provided the mol. is made up of a group of rotators and harmonic oscillators, and is sufficiently complex. An example is considered which concerns the theory of the decompn. of azomethane. BERNARD LEWIS

Ionization of mercury atoms by their reaction with helium ions. J. STARK. *Ann. Physik* 86, 541-6 (1928).—Hg vapor pressure not more than 0.001 mm. was added to He or Ne varying from 0.5 to 150 mm. pressure and excited by a 3500 v. discharge, and current from 5 to 60 m.-amp. At large c. d. the emission of lines by Hg^+ ions (spark lines) in comparison with the emission of neutral Hg atoms (arc lines) is much stronger in a Hg-He than in a Hg-Ne mixt. W. F. MEGGERS

Diffraction of cathode rays by mica. S. NISHIKAWA AND S. KIKUCHI. Institute Phys. and Chem. Research, Tokyo. *Nature* 121, 1019-20 (1928).—A diffraction pattern obtained by passing a cathode ray beam through a thin sheet of mica is reproduced. The distance from the crystal to the plate was 12 cm., and the voltage about 50 kv. The pattern consists of 3 sets of parallel bands intersecting each other at 60° , giving a net of triangular mesh. The intersections form an array of spots, some of which are intensified and somewhat elongated. The distance between the parallel bands decreases with increasing voltage, and the distribution of the intensified spots is changed. A magnetic field shifts the pattern and the central spot by the same amt. The diffracted rays are more homogeneous as regards velocity than the primary ones. The net-like pattern may be interpreted as due to the diffraction of the de Broglie waves by a 2-dimensional triangular lattice. The distance between the parallel bands gives the right order of magnitude for the at. distance. The intensified spots may result from the fact that the diffracting lattice is appreciably 3-dimensional, and may correspond to the Lau spots. Their elongation may be due to distortion of the specimen. F. A. JENKINS

Studies on the detection of elementary transformation caused by cathode rays. A. KOENIG AND F. V. KÖRÖSY. *Z. Electrochem.* 34, 305-11 (1928); cf. *C. A.* 22, 1271.—The app. is described at length. No artificial radioactivity was detected since the normal curves of the electrometer vs. time fall exactly on the curves obtained after exposure to radiation. M. FENSKÉ

The index of refraction of the electron waves. L. ROSENFELD AND E. E. WITMER. *Z. Physik* 49, 534-40 (1928).—A theoretical, mathematical discussion of recent work

such as that of Davisson and Germer (C. A. 22, 350). A bibliography of 13 references is included.

W. W. STIFLER

Thermal agitation of electric charge in conductors. H. NYQUIST. Am. Telegraph and Telephone Co. *Phys. Rev.* 32, 110-3(1928).—*The e. m. f. due to thermal agitation in conductors is calcd. by means of thermodynamic and statistical mech. principles. The results obtained agree with exptl. results.*

BERNARD LEWIS

Thermal agitation of electricity in conductors. J. B. JOHNSON. Am. Telegraph and Telephone Co. *Phys. Rev.* 32, 97-110(1928).—Statistical fluctuations of elec. charge exist in small conductors, producing random variation of potential between the ends of the conductor. The effect of these fluctuations has been measured by a vacuum tube amplifier and thermocouple and can be expressed by the formula $\bar{I}^2 = (2kT/\pi) \int_0^\infty R(\omega) |Y(\omega)|^2 d\omega$. I is the observed current in the thermocouple, k is Boltzmann's gas const., T the abs. temp. of the conductor, $R(\omega)$ is the real component of impedance of the conductor, $Y(\omega)$ is the transfer impedance of the amplifier, and $\omega/2\pi = f$ represents frequency. The value of Boltzmann's const. obtained from the measurements lies near the accepted value. The technical aspects of the disturbance are discussed. In an amplifier having a range of 5000 cycles and the input resistance R the power equiv. of the effect is $\bar{I}^2/R = 0.8 \times 10^{-16}$ watt, with corresponding power for other ranges of frequency. The least contribution of tube noise is equiv. to that of a resistance $R_c = 1.5 \times 10^6 i_p/\mu$, where i_p is the space current in milliamp. and μ is the effective amplification of the tube.

BERNARD LEWIS

Recent light on the nature of gaseous ions. LEONARD B. LOBB. Univ. of Cal. *Phys. Rev.* 32, 81-96(1928).—*The nature of gaseous ions from a study of mobilities in mixts. After a general survey of the previous status of the question of the nature of the gaseous ion, it is concluded that for pure gases the dielectric attraction of the mols. by the charged ion can account for the order of magnitude of the mobility nearly equally well on either the cluster or small ion theory. Such calcns. are therefore indecisive. The measurements of mobilities in mixts. use Blanc's law as a criterion for the absence of the change of the cluster ion. The results show that the law held in some cases but not in others. The observed nature of the mobility curves in mixts. shows 3 types of effects. These may be interpreted as indicating absence of clustering, labile clustering, stable clustering. The nature of the deviations in different gases indicates that where marked clustering occurs it is a sp. effect depending on the chem. nature of the gas and sign of charge on the ion. Such effects are superimposed on the dielectric attractions mentioned above. Erikson's results on aging are discussed.*

BERNARD LEWIS

The voltage-current relation in central cathode photoelectric cells. THORNTON C. FRY AND HERBERT E. IVES. Bell Telephone Lab. *Phys. Rev.* 32, 44-56(1928).—This paper presents a theoretical basis for the interpretation of the exptl. results described in the following abstract. It considers a source of photoelectrons located on the inner of 2 concentric spheres; derives the trajectory of an electron shot off at any angle at any speed; and then makes use of this information to compute the current which would be received by a small collector located anywhere on the outer sphere upon very general assumptions as to the directional distribution and velocity distribution of the photoelectrons. This theoretical study is followed by graphical presentation of results computed for several typical cases of special interest in connection with the exptl. study.

BERNARD LEWIS

The distribution and direction of photoelectrons from alkali metal surfaces. HERBERT E. IVES, A. R. OLPIN AND A. L. JOHNSRUD. Bell Telephone Lab. *Phys. Rev.* 32, 57-80(1928).—An exptl. study was made of the distribution in direction of photoelectrons emitted from alk. metal surfaces irradiated by light incident at various angles and polarized in different planes. The alk. metal surfaces used were of 2 sorts: (1) liquid alloys of Na and K, (2) thin films of K or Rb on polished Pt. In all cases the surface was at the center of a large spherical enclosing anode, provided either with collecting tabs at various angular positions or with an exploring finger. Emission closely obeyed Lambert's law, but the ellipse by which the emission was represented, in polar coordinates, was more elongated normally to the surface for perpendicularly incident light than for obliquely, when the direction of the elec. vector was in both cases parallel to the surface, and still more elongated for obliquely incident light with the elec. vector in the plane of incidence. The distribution curves are all perfectly sym. about the normal to the surface, showing no tendency to follow the direction of the elec. vector.

BERNARD LEWIS

Decomposition of the Faraday effect into two phenomena of different origins. Rotary diamagnetic polarization and rotary paramagnetic polarization. JUAN BAC-

QUERREL AND W.-J. DE HAAS. *Compt. rend.* 186, 1720-2(1928).—In 1908 B. showed that the magnetic rotary power (in the neg. sense) of certain rare earth minerals varies very nearly inversely as the abs. temp. (*Le Radium* 5, 16-7(1908).) The resemblance to Curie's law led him to affirm the existence of a paramagnetic rotation essentially distinct from the diamagnetic rotation. This has now been confirmed by expts. made at Leyden at temps. of 4.21° abs., 1.71°, 1.41° and 1.39° on 2 specimens of tysonite. The rotation, ρ , produced by a magnetic field, H , is given very exactly by the relation $\rho = \rho_{\infty} \tan h(AH)$, where ρ_{∞} , the rotation at satn., is a function both of the wave length of the light used and of the temp., and A is a function of the temp. only. The theory of magnetization in the principal direction of a crystal leads to the relation $A = \Sigma_{\infty}/RT$, where Σ_{∞} is the product of the moment of the elementary magnet by Avogadro's no., and R is the gas const. The values obtained for Σ_{∞} are very close to the Bohr magneton. W. W. STIFLER

Investigations on bismuth by the magnetic-molecular-ray method. ALFRED LEU. *Z. Physik* 49, 498-506(1928); cf. *C. A.* 21, 1754.—Mol. rays from Bi were studied by the Gerlach-Stern method. Details are given for a new steel vaporizing chamber arranged for heating by electron bombardment. Temps. from 800° to 1150° approx. were used. Two symmetrical deflected rays were obtained, as well as an undeflected ray. The intensity of the latter diminishes with increase of temp. and it is therefore attributed to the Bi₂ mol. The deflected rays are ascribed to Bi atoms. The observed deflections agree well with theory and indicate a magnetic moment of 0.85 Bohr units. A rough calcn. of the heat of dissocn., based on the change of intensity with temp. of the undeflected ray, gave 60,000 ($\approx 15,000$) cal, which agrees well with the value 56,000 cal. computed by the Nernst theory. W. W. STIFLER

Elementary theory of the magnetic and electrical properties of the metals at zero absolute. I. FRENKEL. *Z. Physik* 49, 31-45(1928).—The application of the Pauli-Fermi theory to the electrons in a metal rests on the assumption that in every phase cell of vol. h^3 there can be at most only 2 electrons, and this is possible only when their magnetic axes are oppositely directed. At zero abs. the distribution of electrons is detd. by the condition that the total energy shall have the least possible value. From this it follows that all the electrons will be combined in magnetic "married couples" ("magnetischen Ehepaare"). On this basis equations are derived for the paramagnetic state, and a more qual. discussion of ferromagnetism is given. The work necessary to liberate the free electrons is computed according to the virial law, and equations are developed for contact difference of potential, pressure and compressibility. W. W. S.

The diamagnetic layer of the earth's atmosphere and its relation to the diurnal variation of terrestrial magnetism. ROSS GUNN. Naval Research Lab. *Phys. Rev.* 32, 133-41(1928).—An investigation of the motion of ions and electrons in the region of long free paths shows that the elec. cond. in the direction of the earth's magnetic field is that predicted by simple theory. It appears that large circulating currents in the upper atm. of the type assumed in present theories of the diurnal terrestrial magnetic variations are hardly possible. A theory of the diurnal magnetic variation is worked out which explains quantitatively the major phenomena in terms of the diamagnetic effect produced by ions spiralling about the earth's magnetic field. The diamagnetic intensity of magnetization of the upper atm. in the region of long free paths depends upon the total no. of ions of all kinds per cc., their mean kinetic energy and the impressed magnetic field. The max. calcd. diurnal magnetic variation as a function of latitude agrees in form with observation. The av. max. no. of ions of all kinds per cc. in the upper atm. was then computed from observed magnetic data and found to be approx. 5×10^{10} , a no. not inconsistent with the ionic d inferred from data derived from radio phenomena. BERNARD LEWIS

The x-ray diagnosis of chemical and industrial materials, and a new type of biological diagnosis. GEORGE L. CLARK. Univ. of Ill. *Radiology* 10, 185-98(1928); cf. *C. A.* 21, 2427.—The chem. and industrial science of x-rays has 4 phases: (1) Spectroscopy. This is applied to the discovery of new elements and to the quant. and qual. analysis of mixts. (2) Direct chem. and elec. effects. A large number of these are known, and work along these lines is being done in the attempt to explain various biol. phenomena. (3) Radiography. Aside from its application in medical fields, this branch has many useful industrial applications. All sorts of opaque objects can be investigated during or after their manuf. (4) Fine structure of materials. The x-ray diffraction method can be applied to crystals, colloids or amorphous substances, and yields much information as to phys. and chem. properties. A very large number of actual applications of this method are given. E. H. QUIMBY

X-rays in science and industry. WHEELER P. DAVEY. Penn. State College.

Radiology 11, 101-14(1928).—X-rays are useful to industry in 2 ways—in getting the factory out of manufacturing difficulties, and in the search for new scientific principles which may serve to correlate and explain known facts or be applied to the development of new structural products. The solution of factory difficulties consists mainly in finding flaws in castings. The analysis of crystal structure makes possible the prediction of some mech. properties of metals and their behavior in alloys. Plasticity or ductility depends on the slipping of planes of atoms upon adjacent planes. Slipping takes place along the planes having the greatest atomic population, and these can be found for each type of structure. Hardness involves resistance to interplanar slip. Most alloys are ionic in nature, the electropositive metal giving over some or all of its valence electrons to the electronegative, producing a crystal structure of non-ductile type, harder than either constituent. The changes of behavior of Fe with heating can be explained by changes in structure of the Fe and in the positions of the atoms of alloy materials, particularly C, with reference to the Fe. The C atom acts like a tetrahedron. The shapes of the mols. in the paraffin and benzene series are being investigated. Studies on stretched rubber, gelatin, shellac, etc., are proving of practical importance. A good bibliography is appended. E. H. QUILMBY

Is the crystal reflection of x-rays entirely a classical phenomenon? G. E. M. JAUNCEY AND W. P. CLAUS. *Nature* 121, 983 (1928).—Recent papers by Woller and by Wentzel state that the regular reflection of x-rays can be treated as a purely classical phenomenon and that the modified scattering of the Compton effect can be disregarded. A mathematical treatment of the subject shows that the requirements of the classical theory are not satisfied by the assumptions accompanying this theory. G. L. C.

An experimental study of the relative intensities of x-ray lines in the L-spectrum of uranium. SAMUEL K. ALLISON. *Univ. of Cal. Phys. Rev.* 32, 1-11(1928).—The relative intensities of 17 lines in the L-spectrum of U have been measured as a continuation of previous work (*C. A.* 21, 3549). Changes in the app. are described which reduce the magnitude of the corrections to be applied. The variation of the intensity of $U L\alpha$ with voltage has been studied and may be closely represented by $I = C(V - V_0)^{1.8}$, and with less accuracy by a function $I = C[(V - V_0)/V_0 - \log(V/V_0)]$. The observed results at 52.8 kv. have been extrapolated to the relative intensities at voltages very much greater than the crit. voltages. Important results are: (1) The lines $\gamma_4\gamma_1$ and $\beta_3\beta_4$, known in other elements to deviate from the sum rule predictions, have equal intensities in U although a ratio 2:1 is predicted. (2) The lines $\gamma_4\beta_3$ are 17 times more intense in U than in W presumably because of the filling of the γ_4 orbits in the intervening elements. (3) The lines $\gamma_4\gamma_6$ which are present in the W spectrum are absent in the U and Th spectra. It is shown that if the second function above holds for electron collisions in which the velocity of the impinging electron is great compared to the velocities of the electrons in the atom, the relative intensities of lines of a multiplet under these conditions are equal to the product of the transition probability by the statistical wt. of the initial state with only a slight correction. The results are:

	I	α_2	α_1	η	β_4	β_3	β_4	β_1	β_4	β_1	β_3	γ_4	γ_1	γ_2	γ_3	γ_4	γ_5
Relative intensities at 52.8 kv.	2.4	11	100	0	83	1.6	28	3	2	0.4	6.4	40.5	3.3	0	9.7	1.1	1.1
Relative intensities at high voltage	2.4	11	100	1.0	1	6	28	4	1	0.4	6.4	49.4	4.2	0	12	1.5	1.4

BERNARD LEWIS

Evidence obtained by x-ray analysis of films of iron in magnetic fields as to the ultimate nature of magnetism. T. D. YENSEN. Westinghouse Lab., East Pittsburgh. *Phys. Rev.* 32, 114-23(1928).—The results of other workers showed that there is no change in crystal structure of single crystals of magnetite and hematite when placed in strong magnetic fields. In the present investigation films of electrolytic Fe were analyzed by x-rays to det. whether there is any change in the random orientation of the minute crystals (of the order of 150 A. U.) found in these films when placed in strong magnetic fields (up to 2600 gauss). If so, the uniform circular diffraction patterns resulting from the randomly oriented crystals should, because of the preferred orientation, be changed to show greater or less d. along a diam. parallel to the applied magnetic force than along the other, perpendicular to it. The circles were analyzed micro-photometrically and the results indicate no change in the orientation. The av. of all the measurements is a ratio of the intensities along the 2 diams. of 1.00 ± 0.08 , the variation being attributed to incidental sources arising from the developing and

handling of the film. Conclusion: The most minute crystal aggregates in Fe are not oriented in a magnetic field. This lends strength to the previous conclusion in regard to the ultimate nature of magnetism, namely, that the magneton is an at. property.

BERNARD LEWIS

The scattering of x-rays from gases. CHARLES S. BARRETT. Univ. of Chicago. *Phys. Rev.* 32, 22-9(1928); cf. *C. A.* 22, 1275.—Intensity of the scattering of Mo x-rays from CO_2 , A, O_2 , N_2 , He and H_2 at scattering angles from 20° to 155° . All except H_2 show excess scattering (with He it may be due to N_2 impurity): the excess scattering extends to larger angles from the primary beam as the at. no. of the gas increases and as the wave length increases. This excess scattering appears to be mostly, if not wholly, due to interference arising within the atom. Destructive interference is prominent with A, and seems probable (though it is very weak) with O_2 , CO_2 and N_2 . Mark and Schocken's (*C. A.* 21, 1730) results, which indicated scattering by gases follows the $(1-\cos^2\theta)$ law, are not confirmed. H_2 follows within exptl. error the quantum theory prediction of Breit, Dirac, Gordon and Waller. Even when the K-rays of Mo are used the scattering from H_2 does not show the irregularities by Debye's interference theory.

BERNARD LEWIS

Interpretation of atomic structure factor curves in crystal reflection of x-rays. G. F. M. JAUNCEY AND W. D. CLAUS. Wash. Univ., St. Louis. *Phys. Rev.* 32, 12-21 (1928).—The authors showed previously (*C. A.* 22, 2712) that for certain values of D the grating space of a crystal of rock salt the area under a radial electron distribution (or U) curve for Cl rose above 19 electrons. This result seemed perplexing, inasmuch as both the real ion and the model ion have but 18 electrons. The present paper is a further discussion of this point. It is proved that for any sym. atom F values, calcd. according to the classical theory and unmodified for the Compton effect, but multiplied by the Debye temp. factor, give U curves the areas under which never exceed the no. of electrons assumed in the model. It is also shown that an unsym. atom gives F values which behave in the same way. But since both exptl. and modified theoretical F values (that is, modified to take account of the Compton effect) give U curves the areas under which do exceed the true no. of electrons for certain values of D , there is an indication that the Compton effect is involved in the exptl. values. The truth of this indication would invalidate the use of the Fourier analysis method as now applied. The present paper also develops the Fourier integral as a quick method of calcg. a U curve from a model atom on the classical theory. It is shown that a U curve calcd.

from Compton's formula $U = (8\pi r/D) \sum_1^n (nF_n/D) \sin(2\pi rn/D)$ for a Fourier series is a very close approx. to the true U curve given by the Fourier integral $U(r) = 8\pi r \int_0^\infty x F(\lambda x/2) \sin 2\pi r x dx$, where F is the same function of $(\lambda x/2)$ as F in the series formula is a function of $\sin \theta$. An analysis by the Fourier integral of a model supposed to have all the electrons cond. at the center together with the Debye temp. factor shows $U(r)$ represents the distribution of electrons about a lattice point and not about the center of the atom.

BERNARD LEWIS

Test of the theory of R. W. Gurney with the helium lines of the chromosphere. WILHELM ANDERSON. *Z. Physik* 49, 479-52(1928).

W. F. MEGGERS

The elimination of Doppler effect in spectroscopic fine-structure and the exact determination of components. GUSTAV DOETSCH. *Z. Physik* 49, 705-30(1928).—Every spectral line is widened in consequence of the Doppler effect of the emitting atoms in thermal agitation; the intensity curve is a Gauss error function. Close lines such as fine-structures overlap on this account and the resulting displacement of the max. makes it impossible to obtain the exact wave-nos. of the components or even to establish the no. of components directly from the observed intensity curve. Two methods for the exact detn. of the components, i. e., for the resolution of a given function into Gauss error-curves, are presented, the first being a direct method and the second involving a reduction of the problem to one in heat cond. The methods are tested on intensity measurements of the H α line by Oldenberg and by Hansen. It is demonstrated that H α consists of at least 3 components.

W. F. MEGGERS

The $K\beta_1$ -line of the elements potassium to manganese. TORSTEN WETTERBLAD. *Z. Physik* 49, 670-3(1928).—New measurements of the wave-length differences $K(\beta_1 - \beta_2)$ of the elements 19 K to 25 Mn confirm earlier results by Bäcklin, Siegbahn and Thoriaeus showing an irregularity for K and Ca. Incidentally it is shown that the wave length of $K\beta_1$ depends in marked degree on the chem. binding. Thus as compared with anticathode of metallic Ca, one of CaO shifted the β_1 line 3.3 X. U.

W. F. M.

New regularities in the band spectrum of helium. I. G. H. DIBKE, T. TAKA-

MINE AND T. SUGA. *Z. Physik* 49, 637-69(1928).—A Pyrex glass tube about 1 m. long and 20 mm. in diam. contg. He gas at pressures varying from a few mm. to several cm. was excited by a condensed discharge from two 0.3 kw. transformers in parallel and the spectrum was photographed with a concave grating of 15 feet radius. Many new lines were recorded; the wave lengths and estd. intensities of lines belonging to the orthobands (λ 588, 589, 595, 445 m μ) and the para bands (λ 659, 624, 625, 631 m μ) are given in tables showing the P-, Q- and R-branches and quantum jumps. All of these new bands have properties which deviate considerably from the previously known terms. The present paper is restricted to a presentation of the empirical regularities, their interpretation is reserved for a later communication. Also in *Nature* 121, 793-4(1928). W. F. MEGGERS

The structure of the negative nitrogen bands. GERHARD HERZBERG. *Ann. Physik* 86, 189-213(1928).—An electrodeless ring-discharge in N₂ at very low pressures (0.05 to 0.01 mm.) produces the negative N₂ bands remarkably free from other bands and lines. These are photographed with prism-spectrographs and the wave lengths corresponding to the band heads are measured. The bands in the visible spectrum are thus traced for the first time to the point of inversion and even beyond. Nuclear vibration frequencies of the initial and final states are derived from these and a value of 3.5 v. is obtained for the dissoen. potential of the N₂⁻ mol. in the excited state. W. F. MEGGERS

A new regularity in the intensity ratio of the principal series doublets of the alkalis. S. SAMBORSKY. *Z. Physik* 49, 731-9(1928).—Although the intensity ratio of the resonance pair of lines of the alkalis (first member of the principal series) is usually observed as 2:1 in agreement with theory, various observers have found that the higher doublets deviate from this rule. Previous measurements, however, did not extend beyond 2 or 3 members of a series. Chlorides of the alkalis were vaporized in C arcs operated with 0.2 to 3.5 amp., 440 v., and the relative intensities of the successive members of series and intensity ratios of the doublets were detd. by photographic photometry. For Cs, the value 2 is adopted for the first doublet and the following values are measured for the succeeding 7 doublets: 5, 10, 15.5, 25, 15.8, 5.7, 4.5. The striking and entirely new phenomenon here shown is the rapid decline of the intensity ratios for doublets beyond the 5th, after a systematic increase had raised the value from 2 to 25. A similar trend is observed for Rb in which the intensity ratios for doublets 3 to 5 are detd. to be 3.5, 4.3, 5, 3. An empirical relation, $J_1/J_2 = cn^{0.66}$, represents the intensity ratios as a function of the effective quantum nos. of the p -terms up to the 5th but it is not valid beyond the inversion point. W. F. MEGGERS

Intensity ratio of the o - and p -series in relation to the atomic structure of helium. J. STARK. *Ann. Physik* 86, 530-40(1928).—The He spectrum consists of a group of series of singlets (p -series 2S — mP, etc.) and a group of series of triplets (o -series, 2s — mp, etc.). A p -series of the type 1S — mP is also known but an attempt to find a corresponding 1s — mp series failed. The ratio of intensity of the p -series to that of the corresponding o -series when excited by cathode rays decreases with increasing gas pressure; at the same pressure it is greater for high-speed cathode rays than for slow cathode rays and for canal rays. These facts may be simply explained on the basis that a p - or singlet-state is less stable and therefore does not occur as frequently as the o - or triplet-state. W. F. MEGGERS

The intensity ratio of the principal series doublets of the alkali metals. HANS JAKOB. *Ann. Physik* 86, 449-93(1928).—Using the method of photographic photometry suggested by Merton the intensity ratio of the components of the second doublet in the principal series of K, Rb and Cs is measured and its dependence on vapor density is detd. Solns. of various concns. were introduced in an oxy-hydrogen flame of least possible thickness to avoid reversal. The ratio of line intensities for K (4044 A. U./4047 A. U.) is about 2.00 for concns. under 4% but falls to 1.80 for concns. of 10%. The ratio for Rb (4202 A. U./4216 A. U.) is 2.06 for concns. of 1/4% but decreases to about 1.78 for 20%. Similarly the ratio for Cs (4555 A. U./4593 A. U.) decreases from 4.16 to 3.12 as the concn. is increased from 1 to 20%. The results for Rb and Cs are checked by measurements of the line absorption according to the method first described by Gouy. The true intensity ratio of the lines in the second member of the principal series is 4.0 for Cs and certainly greater than 2.3 for Rb. These results are evidently in conflict with the quantum intensity rule according to which the intensity ratio of the lines in question should be 2.0. W. F. MEGGERS

The question of spectral-line intensity. A. KUPFER. *Ann. Physik* 86, 511-20(1928).—The new mechanics of Heisenberg and Schrödinger is employed to calc. the intensities of "partial series" the algebraic sum of which represents the total intensities

of the Lyman-, Balmer-, Paschen- and Brackett-series of H. On account of the extraordinary sensitiveness of H-line intensities to small variations in observing conditions it is impossible to test these results with expts. but some further cases are computed and found to be in good agreement with measurements in Li and Na spectra.

W. F. MEGGERS

Regularities exhibited between certain multiplets for elements in the second long period. R. C. GIBBS AND H. E. WHITE. *Proc. Nat. Acad. Sci.* 14, 559-64(1928).—If, for a sequence of iso-electronic systems starting with any element in the periodic table, the energy levels representing any of the possible electron configurations be plotted on a Moseley type of diagram, the lines connecting points for corresponding terms of each successive element will be very nearly straight lines. Furthermore, it is found that the radiated frequencies resulting from those electron transitions involving no change in total quantum no. are displaced to higher and higher frequencies by very nearly a const. value. These general rules, the regular displacement of multiple levels and of multiplets, which were found to hold so well for sequences of iso-electronic systems in the first long period (*Phys. Rev.* 31, 309(1928)) have now been extended to the elements in the second long period, Rb to Ag.

W. F. MEGGERS

Absorption curves of the pulegonenols. JEAN SAVARD. *Compt. rend.* 186, 1738-41 (1928); cf. *C. A.* 22, 3157.—A study was made of the ultra-violet absorption spectra of pulegone, isopulegone and the corresponding enols. A comparison of the curves shows that the replacement of the CO group in the pulegones by the =C(OH) group causes (1) the disappearance of the first band (at about 3000-3200 A. U.) attributed to CO, (2) the appearance of part of a band, probably due to OH, in the extreme ultra-violet, and (3) no appreciable change in the position of the band due to C=C, but a decrease in the value of the intensity of max. absorption.

LOUISE KELLEY

The reaction between bromine and hydrogen in light of various wave lengths. W. JOST. Univ. Berlin. *Z. physik. Chem.* 134, 92-6(1928).—Borosilicate tubes contg. a mixt. of Br and H were illuminated by means of a Hg lamp, equipped with various filters. The HBr formed was measured, a check being obtained by the Br left intact. The precision of the measurements is not very high. From the exptl. results, the Bodenstein-Lütkenmeyer const. (cf. *C. A.* 19, 2453) has been calcd. in each case.

A. L. HENNE

Ultramicroscopic observations of silver bromide crystals. K. SCHAUM AND F. KOLB. *Z. wiss. Phot.* 25, 290-1(1928).—In light of long wave length (green to red) "optically empty" crystals did not show any change; in pre-exposed crystals, the no. of diffraction disks increased (photographic Becquerel effect). With very long exposure reversal of the color sequence could be observed; with red exposure a change in color from white to red was observed.

A. P. H. TRIVELLI

Influence of substitution of halogens, alkyls and amino groups on color and absorption spectra of indigo, thioindigo and indirubin. JAROSLAV FORMÁNEK. *Chem. obsor* 3, 133-41(1928).—Cl and Br atoms introduced into the benzene nucleus of indigo shift its absorption bands toward the red the more the larger the no. of halogen atoms, Br more than Cl atoms. Alkyl groups introduced into the benzene nucleus of indigo shift the absorption comparatively slightly; the shifting, however, is remarkable when introduced into the imino group of indigo. Two absorption bands are formed when halogens and alkyl groups are introduced into 6.6' position and both are shifted considerably toward the violet. Monothioindigo and thioindigo show 2 absorption bands shifted toward the violet. The changes in absorption caused by substitution are analogous to those of indigo derivatives. Indirubin gives non-fluorescing, red solns. and its derivs. show analogous changes in absorption spectrum to those of thioindigo derivatives.

JAROSLAV KUCERA

New type of discharge in neon tubes. F. A. LONG. Univ. Leeds. *Nature* 121, 1020(1928).—A com. Ne lamp is connected across the coils of an electromagnet excited by 110 v. On breaking the current, a new type of discharge is produced in the Ne tube. The relations between current, voltage and time are studied with a cathode ray oscillograph. Because of the self-induction, the voltage rises instantaneously to 300-400 v. and then drops to about 11 v. At this point the current attains a max. of over 6 amp. The voltage has a second small max. after about 1/2 second, at which time the current has fallen to zero. The extinction voltage is different from that with the ordinary discharge, and 3 or 4 successive flashes are sometimes seen.

F. A. J.

The arc spectrum of chlorine. OTTO LAPORTE. Imperial Univ., Kyoto. *Nature* 121, 1021(1928).—By the method used by Wood and Kimura to sep. the arc lines and spark lines of I, it has been possible to identify 23 arc lines of Cl in the region 4200-4700 A. U. They are due to transitions from the configuration $4p^4$ to $4s^4$. The analysis

leads to the identification of 3 pairs of ultra-violet lines $3p^4, 4s \rightarrow 3p^4$ found by Turner. The spacing of the terms in these states is normal, showing the usual vector coupling, but the higher states arising from $3p^4, 4p$ are of a different character, resulting in some ambiguity in the assignment of l values. F. A. JENKINS

The spectrum of the hydrogen molecules. O. W. RICHARDSON and P. M. DAVIDSON. King's College. *Nature* 121, 1018(1928).—Using the new wave-length measurements of Gale, Monk and Lee (*C. A.* 22, 1727), the combination relations in the bands of the H_α , H_β and H_γ systems are checked with considerable accuracy. The band systems in the violet are extended, and the numerical values for the vibrational term differences in the lower electronic state are given. The latter agree well with those of the B state of the far ultra-violet bands. The identity of these 2 states is further confirmed by calcs. of the moment of inertia. The bands now known account for about half the total intensity of the secondary H spectrum. The intensity ratio of 3 to 1 for successive lines in a band is found to hold in all cases. F. A. JENKINS

Light dispersion by two absorbing media. I. PLOTNIKOV and K. WEBER. *Z. Elektrochem.* 34, 316-20(1928).—See *C. A.* 21, 3314. M. FENSKKE

Relations between the absorption of light and chemical constitution. MARCEL BOUIS. *Rev. gén. sci.* 39, 240-5(1928).—The analysis of the spectra of absorption permits the detn: (1) of the different states of electronic activation of the mols.; (2) of the different frequencies of the atoms; and (3) the various values of the moments of inertia of the mols. L. D. ROBERTS

Explanation of some properties of spectra by the quantum mechanics of the spinning electron. II. J. V. NEUMANN and E. WIGNER. *Z. Physik* 49, 73-94(1928).—With the aid of the kinematical fundamentals presented in Part I (*C. A.* 22, 1729) the spectroscopic facts derivable from the Pauli model of the spinning electron are now investigated. The building-principle of series spectra, the selection rules for inner- and magnetic-quantum nos., and the quadratic Stark effect are treated. W. F. M.

The absorption of excited mercury vapor and the reversal of the green line and its satellites. M. PONTE. *Compt. rend* 187, 37-9(1928). W. F. MEGGERS

The spark spectra of chlorine and bromine. LEON BLOCH and EUGENE BLOCH. *Ann. Phys.* 9, 534-5(1928).—About 200 lines previously published (*C. A.* 21, 2845; 22, 914) as characteristic of the spark spectra of Cl and Br are withdrawn, they are explained as fourth order grating spectra overlapping the third order. W. F. M.

Spectra of krypton and xenon in the extreme ultra-violet. J. H. ARBINK and H. B. DORGELO. *Z. Physik* 47, 221-32(1928); cf. *C. A.* 22, 1540. B. C. A.

The relative intensities of the spectral lines H_α (H) and D_α (He) at different levels in protuberances. E. J. PEREPILKIN. *Z. Physik* 49, 295-305(1928). W. F. M.

The influence of a magnetic field on the band lines of the third positive nitrogen group. B. POGÁNY and R. SCHMID. *Z. Physik* 49, 162-6(1928).—A quartz tube contg. air at 5-mm. Hg pressure was operated with 5000 to 7300 v. d. c. and 0.1 to 0.2 amp. The tube was placed between the poles of an electromagnet, observations being made perpendicular to the lines of force and to the tube axis. At 26,000 gauss the most of the lines appear to be resolved into doublets with nearly the same sepn. as the normal Zeeman triplet. W. F. MEGGERS

The arc spectrum of uraninite from Kasolo. J. VERHAEGHE. *Bull. sci. acad. roy. Belg.* 14, Nos. 1-2, 18-30(1928).—Spectral analysis of uraninite from Kasolo was undertaken to det. if it differs in compn. from other samples of pitchblende analyzed chemically. The arc spectrum was photographed and several hundred strong lines between 3450 Å. U. and 4800 Å. U. were identified. On account of the greater sensitiveness of spectral methods, a no. of elements not chemically detected in U. minerals, were found; these included Ti, Ir, V, Th, W. W. F. MEGGERS

The spark spectrum of sodium. S. FRISCH. *Z. Physik* 49, 52-8(1928).—The spark spectrum of Na was produced by a d. c. discharge of 60 to 120 m. amp. (1500 to 2500 v.) in a tube with hollow cathode. The wave-lengths of 109 lines ranging from ultra-violet, 2493.19 Å. U., to violet, 4087.7 Å. U. are measured, and 40 of them are represented as combinations of 4 s -terms and 10 p -terms similar to those in the Ne spectrum. The differences between the s -terms of Na^+ are as follows: $s_1 - s_2 = 2481.3$, $s_4 - s_3 = 592.3$, $s_5 - s_4 = 765.6$. W. F. MEGGERS

Series in the spark spectra of germanium. K. R. RAO and A. L. NARAYAN. *Proc. Roy. Soc. (London)* A119, 607-27(1928).—The spark between Ge electrodes in an atm. of H_2 was photographed with a 5-foot concave grating and a large quartz spectrograph. Lines belonging to different stages of ionization were recognized by their behavior upon changing the self-induction or capacity in the circuit. 80 lines including doublets of Ge II, singlets and triplets of Ge III and doublets of Ge IV are classified.

The largest term of the Ge II spectrum is $^3P_1 = 128,635$, which corresponds to a second ionization potential of about 15.88 v. W. F. MEGGERS

Absorption investigations in excited hydrogen. NATHAN ROBINSON. *Z. Physik* 49, 137-45(1928).—The purpose of this investigation was to det. by means of absorption expts. the life of the at. state necessary for the absorption of the Balmer series. The method was similar to that devised by Meissner for observations on the rare gases (*Physik. Z.* 26, 766(1925) and *C. A.* 22, 1721) except that shorter-time intervals were obtained by employing oscillating condenser discharges and Holtz valve tubes as rectifier. The theory of the expt. is as follows: emission and absorption tubes are arranged end to end, and alternately excited. Absorption can occur only if the necessary excited at. states have not damped down in the absorption tube before the emission tube is again lighted. If one excites the tubes with a. c. of known period and employs suitable valves, one can det. from this the duration of the atom in the particular state required for the absorption. In the present case measurements were made with frequencies up to 5×10^6 per sec. but no absorption of $H\beta$ was detected. From this it follows that the life of the at. states capable of absorbing the Balmer series is less than 10^{-8} sec. at a pressure of about 0.5 mm. H. W. F. MEGGERS

Term representation of the band spectra of the neutral oxygen molecule. W. OSSENBRÜGGEN. *Z. Physik* 49, 167-216(1928).—A detailed analysis of the Schumann bands of O_2 in the ultra-violet, the Runge bands and the Fuchtbauer bands is presented; the oscillation and rotation terms are established and show that all these bands belong to one and the same system. Similar analysis of the atm.-O bands, A, B, α , α' and α'' confirms the suspicion that the Schumann bands and the atm. bands have a term in common. Another set of bands, called A', is assumed to belong to the same system as the atm. bands. The moment of inertia of O_2 in unexcited vibrationless condition is 19.20×10^{-40} g. sq. cm., and the at. sepn. is 1.201×10^{-8} cm. W. F. M.

Metallic reflection from rock-salt and sylvite in the far ultra-violet. A. H. PFUND. Johns Hopkins. *Phys. Rev.* 32, 39-43(1928).—From the rapid rise of the dispersion curve of rock-salt and sylvite in the ultra-violet the existence of regions of anomalous dispersion in the Schumann region have been long anticipated. By using a specially constructed vacuum tube in connection with a vacuum spectrograph the regions of metallic reflection for NaCl and KCl were found. From these results an est. was made of the wave lengths of the true resonance frequencies. The values 1547 Å. U. for NaCl and 1581 Å. U. for KCl are in agreement with those previously calcd. by Herzfeld and Wolf. BERNARD LEWIS

The first spark spectrum of palladium (Pd II). A. G. SHENSTONE. Princeton. *Phys. Rev.* 31, 30-8(1928).—The present analysis of Pd II differs completely from that given by McLennan and Smith. The terms found include $4d^3D(4d^3)$; $5s^4^2F$, $4s^3P$, 3D , $^3G(4d^35s)$; all the related triads from the structure $4d^45p$; $6s^4^2F$, 4P , 3G , $(4d^46s)$; and fragments of terms due to $4d^45d$. Zeeman effects of the majority of the lines have been measured and approx. g-values found for the low and middle sets of terms. The g-values depart largely from Landé's values, as do also the term intervals. Evidence is given that the term predicted by theory, $5s^3S(4d^45s)$, is present but it has not been fixed with respect to the other terms. The lowest term $4d^3D$ gives lines in the vacuum region and was found by H. E. White (Cornell) from plates taken there. The ionization potential is calcd. from the s^4F terms as 19.8 v. from $4d^3$ to $4d^4$. As in other spectra of this type there is some indication in the limits of the component series that the Hund theory of limits is incorrect. BERNARD LEWIS

Molecular heat and entropy of HCl calculated from band spectra data (HUTCHISON) 2.

MAHLER, KARL: *Atombau und Periodisches System der Elemente*. Berlin: O. Salle. 123 pp. Cloth bound, M. 3.20.

UPMARK, AUGUST: *Eine elektrostatische Theorie des Atombaues*. Lund: Ph. Lindstedts Univ.-Bokh. 209 pp. Kr. 9.

Device for impregnating water or other liquids with radium emanation. A. H. TYRER. *Brit.* 281,871, Dec. 11, 1926.

4—ELECTROCHEMISTRY

COLIN G. FINK

Some new applications of electric furnaces. A. N. ORIS. *Am. Metal Market*, Magazine Sec. 35, No. 11], 6-8, 23(1928).—Several types of furnaces for Cu-brazing with protective atms. are described; also, furnaces for bright annealing steel. One of the latter is of the elevator type and is used for annealing sheet steel and punchings for motors and generators in a protective gas atm. Elec. furnaces are well suited for use in the nitriding process for case hardening. Low heat losses, accurate temp. control and suitability for long cycle heating operations are characteristics of elec. furnaces. Other applications of elec. heaters are: to heat pipes carrying hot liquids; for galvanizing pots, and for annealing steel wire in coils; for bread and cake baking; annealing glass products, etc.

W. H. BOYNTON

Heating elements for electric furnaces. G. I. LE BARON. *Chem. Met. Eng.* 35, 242-3(1928).—Formulas are given for calcg. the most economical dimensions for rectangular resistance units for elec. furnaces giving consideration to power rating and thermal loading. Examples are given.

C. J. BROCKMAN

Resistor thermal rating calculated. WALTER J. RYAN. *Elec. World* 32, 303 (1928).—A method is devised for the predetn., from a single run, of the temps. that may be reached in a given time with any current. The exptl. detns. are made on a resistor designed for the grounding of the neutral of an 11-kv. system. The test arrangements are shown and a Cu-constantan thermocouple and potentiometer placed in direct contact with the resistor ribbon. To est. the performance characteristic under different conditions, a formula is developed for a mathematical expression of the behavior of a current-carrying conductor: $TI\sqrt{h/k} \tan h(I\sqrt{kh}t)$, where T = temp. difference between conductor and ambient, t = time in secs. after start of load, h = heating const. depending on resistance and thermal capacity of element, k = cooling const. depending on radiation and convection characteristics, and I = resistor load in amps. In the case of one test run, as illustrated by curve, $T = 2.61 \tan h(1 \times 0.00001575 t)$. It is only necessary to make one temp. test to plot such a curve.

W. H. BOYNTON

The electrolysis of fused sodium hydroxide and of its mixtures with other metallic oxides. MAZZA LUIGI. *Atti congresso naz. chim. pura applicata* 2, 719-47(1926).—In the electrolysis of NaOH the electrode material is of prime importance. The 3 principal electrodes studied were Fe, Ni and Ag. Fe and Ni show extremely small change in wt. with diff.-current densities. The Fe electrode is easily polarized in comparison with that of Ni. The author's expts. with fused NaOH to some extent agree with the results obtained by Le Blanc and Brode, but differ with respect to the polarization values of the two electrodes as compared with the decompn. range. The expts. with mixts. of soda and SnO were more complicated than with NaOH alone. For the cathodic polarization there is an abrupt change at 0.80 v. which corresponds to that of H on Ni. The anodic charge rapidly drops to zero. The decompn. tension shows 3 points of deflection at 1.10 v., 1.50 v. and 1.95 v. The first and last are due to H and Na and the second is due to Sn. With fused NaOH contg. 5% lead oxide there is a sepn. of lead at the cathode. The cathodic decompn. tension shows a deflection at 1.10 v. and another more accentuated at 1.60 v. The results obtained with Cr are more complicated than with the preceding electrodes.

L. T. F.

Electrolysis in the manufacture of white lead. A. V. PAMFILOV AND V. S. IOFINOV. Ivanovo-Voznesensk Polytechnicum. *J. Chem. Ind. (Moscow)* 4, 803-7(1927).—Electrolysis should only be used for obtaining metallic Pb solns. from which white lead can be obtained by a pptn.; these 2 operations should not be combined in one. The authors' expts. were devoted to the study of the best conditions of electrolytic soln. of Pb as a preliminary operation in the manuf. of white lead by the pptn. method. The electrolytes used were chiefly NaOAc solns., sometimes chlorates, of 10% concn. With Pb anode in neutral solns. the c. d. should not be above 0.02 amp. per sq. cm., as otherwise the anode becomes covered by a black film; below 0.02 amp. the anode is brilliant and clearly cryst. In alk. solns. the c. d. should be lower to avoid darkening the anode and splitting off of O. Under normal conditions the soln. of Pb takes place with current yields close to 100%. The influence of the c. d. at the cathode is not so important. It is inconvenient to use either Pb or Fe cathodes, but almost any other metal can be used. A diaphragm has to be used, since at the cathode Pb seps. in an amount equiv. to that which dissolves at the anode. The use of unglazed earthenware or of cloth bags as diaphragms is unsatisfactory. It is much more convenient to use liquid diaphragms by means of formation of a double layer of the electrolyte, which is

attained thus: soon after the beginning of electrolysis a surface of sepn. is formed between the anolyte and the catholyte which must be maintained at one level and regulated by the addition of fresh electrolyte to the anode. *Electrolytic litharge* (PbO) produced by the action of the Pb dissolved at the anode on the alkali formed at the cathode (in a soln. of NaOAc or NaClO₃) precipitates. BERNARD NELSON

Electrolytic refining of the noble metals. F. CHEMNITTUS. *Chem.-Ztg.* 52, 385-8 (1928).—A brief discussion of the electrolytic refining of Au and Ag. C. J. B.

Electrolytic separation of copper from cuprous chloride solution. P. P. FEDOTIEV. *Z. anorg. allgem. Chem.* 173, 81-91(1928).—The soly. of CuCl in HCl and NaCl solns. is detd. and given as follows: with HCl in g./l. = 49.6, CuCl in g./l. = 11.1; with HCl = 182.9, CuCl = 121.9; with HCl = 256.0, CuCl = 217.7. Likewise with NaCl in g./l. = 9.3, CuCl in g./l. = 1.2; with NaCl = 80.2, CuCl = 12.3; with NaCl = 170.7, CuCl = 54.4; with NaCl = 369.8, CuCl = 298.3. In the electrolysis, electrolytic Cu is used as anode; for current density up to 100 amp./sq. meter, solns. with about 145 g. HCl or 240 g. NaCl and 40-50 g. CuCl per l. are used. Under these conditions a dense deposit is obtained. With higher current density (260 amp./sq. m.) the Cu seps. as crystals which do not adhere to the cathode. With other conditions equal, stirring the electrolyte gives a better deposit, but the current efficiency is less (83.5% for NaCl, 90% for HCl). Addition of 1 g. gelatin per l. gives a good deposit and increases current efficiency somewhat. The results show that it is possible to deposit Cu in a pure adherent coat from CuCl soln. with anodes of commercial material contg. Fe, Ni, Zn and Pb. H. STOERTZ

Cadmium plating in quantity production. C. H. LOVEN. *Metal Ind.* (N. Y.) 26, 252-5(1928).—L. points out the value of Cd as a rust preventive, and describes methods of plating and of analysis of Cd-plating solns. Precautions necessary to secure a silvery deposit with good corrosion-resistant properties are pointed out. A cyanide bath is used and means of maintaining the soln., and detg. Cd as metal in soln., and detg. total CN are noted. W. H. BOYNTON

Electrodeposition on aluminum. W. E. HUGHES. *Metal Ind.* (London) 32, 393-5, 441-3, 467-9(1928).—The adhesion of electrodeposits to Al and its alloys is discussed. The causes of adhesion between electrodeposits and base metals are classified as: (1) mechanical, (2) physical, (3) metallurgical. Cohesion is the paramount cause for the adhesion, with diffusion of the metal of less importance. Various theories are discussed, and the "alloy" view of the union between the deposits is discounted. Cohesion operates between the atoms of matter—between those of amorphous bodies as well as between crystals, and even between amorphous and crystal bodies. W. H. B.

A new achievement in galvanizing. F. W. YOUNG. *Ind. Eng. Chem.* 20, 686-7 (1928).—A description is given of the zinc plating of a steel drum 8 ft. 6 inches in diam. by 10 ft. 6 in. face. The drum was suspended and rotated in a trough contg. the plating bath made up of water 1 gal., Crown galvanizing salts 2 lbs., No. 1 toning salts 1 oz., No. 2 toning salts 2 oz. Pure horsehead zinc anodes were also contained in the trough. The drum was so mounted that only one fifth of its circumference dipped into plating bath. While the drum was rotated at 1 r. p. m. the surface was scratched with metal brushes. Ten amps. at 6 volts for 100 hrs. deposited 169 lbs. of zinc. A. W. C.

Effect of superposed alternating current on the deposition of zinc-nickel alloys. HERBERT C. COCKS. *Trans. Faraday Soc.* 24, 348-58(1928).—The electrolyte used is 0.5N ZnSO₄, 0.5N NiSO₄, 0.5N (NH₄)₂SO₄, 0.01N H₂SO₄, and the cathode is Pt. The expts. are conducted first with d. c., and then with superposed 40-50 cycle a. c. in which a. c.:d. c. = 0.46:1, 0.75:1, 1.61:1, 2.83:1, and 3.87:1, and curves are plotted giving % Ni in the deposit against d. c. density, and current efficiency for Ni, Zn and H against c. d. With d. c. only and a c. d. of 0.010 amp./sq. cm., the deposit contains about 95% Ni, but as the c. d. rises this falls slowly, being about 85% Ni at 0.015 amp./sq. cm., and then very rapidly, the deposit contg. only about 30% Ni at a c. d. of 0.020 amp./sq. cm. With a. c.:d. c. = 0.46:1, only 60% Ni is found in the deposit at 0.010 amp./sq. cm., decreasing to about 40% Ni at 0.015 amp. and about 30% Ni at 0.020 amp. As the ratio a. c.:d. c. rises, the proportion of Ni rises and does not fall off as rapidly as the c. d. increases. Thus with a. c.:d. c. = 2.83:1 the deposit contains about 70% Ni at 0.010 amp./sq. cm., 65% Ni at 0.015 amp., about 56% at 0.020 amp., and about 40% Ni at 0.030 amp. In the deposition of the alloy, when a. c.:d. c. = 0.75:1, there is a slight depolarizing effect due to the small anodic pulses, but with a. c.:d. c. = 2.83:1 the depolarizing effect is much greater and the retardation to Ni deposition is slightly reduced, especially below the "critical current density" of about 0.015 amp./sq. cm. Deposition potential-current density curves are also given and show a very rapid rise in cathode potential (E_H) at the "critical current density" when a. c.:d. c. < 2.83:1. Thus

with a. c.: d. c. = 0.75:1, e_H = 0.540 at 0.010 amp./sq. cm., 0.561 at 0.0125 amp./sq. cm. 0.765 at 0.015 amp., and 0.796 at 0.030 amp., while with a. c.: d. c. = 2.83:1, the values of e_H at the above c. ds. are 0.526, 0.547, 0.583 and 0.585. Expts. conducted with an a. c. frequency of 400-450 cycles/sec. and with a. c.: d. c. = 2.83:1 give 60.3% Ni in the deposit at 0.010 amp./sq. cm., 33.8% Ni at 0.020 amp./sq. cm., and 27.1% Ni at 0.030 amp./sq. cm. H. STOERTZ

Electrodeposition of iron-nickel alloys. S. GLASSTONE and T. E. SYMES. *Trans. Faraday Soc.* 24, 370-8 (1928).—In the electrodeposition of Fe-Ni alloys from mixed sulfate solns., the effect of boric acid as a buffer in place of AcOH is tested, as well as the influence of the addition of NaCl and $(NH_4)_2SO_4$ to the AcOH buffered electrolyte. Curves are plotted giving the variation in compn. of the alloys deposited at different c. ds., and are practically identical with those obtained for sulfate acetate solns. (C. A. 21, 3025). The effect of increased temp. upon the electrodeposition of Fe-Ni alloys from sulfate acetate solns. is studied. As at lower temps. (15°) the H-ion concn. has no influence on the relative tendencies of Fe and Ni to deposit in the form of an alloy. At 53 and 90° the rate of increase of the proportion of Fe in the deposit with increasing c. d. is much less than at 15°. The initial deposits and those contg. the max. amt. of Fe contain less Fe at 53° than at 15°. Thus when the electrolyte contains 2% Fe, the max. Fe content of the deposit is 22.6% at 15° and 14.9% at 53°, and when the electrolyte contains 70% Fe, the max. Fe content of the deposit is 93.5% at 15° and 86.5% at 53°. The influence of diln. and stirring is similar but not so marked at 53° as at 15°. At higher temps. the min. Fe content of the electrolyte from which the initial deposit contains less Fe than the electrolyte is lowered. H. STOERTZ

Research on the electrolytic reduction potentials of organic compounds. IV. Reduction potentials of nicotinic acid. MASUZO SHIKATA and ISAMU TACHI. *Bull. Agr. Chem. Soc. (Japan)* 3, 95-6 (1927); cf. C. A. 22, 720.—The reduction potential of nicotinic acid was measured with the dropping Hg cathode and polarograph. By comparison of observed reduction potential with the theoretical value, the first stage of reduction has been concluded to be the reduction of carboxyl group to aldehyde and the second stage of reduction is considered to be the reduction of pyridine ring by comparison with the reduction potential of pyridine. K. GOTO

Nickel plating practice in Cuba. E. G. LOVERING. *Metal Ind. (N. Y.)* 26, 260 (1928).—General discussion. W. H. BOYNTON

Chromium as a corrosion preventive. LESLIE WRIGHT. *Metal Ind. (London)* 31, 577; *Metal Ind. (N. Y.)* 26, 74 (1928).—A discussion of failures in Cr plate and their causes. It is found that the H content of the deposit varies approx from 1000 vols. in the true mat deposit to 2000 in the milky bright deposit. With increasing H content hardness increases. Photomicrographs of unetched deposits $\times 1000$ are shown, and indicate a steady decrease in grain size with increase in c. d. Hardness increases with decrease in grain size. Internal stresses produced in the deposition of Cr upon brass are largely overcome by annealing the deposit and brass at 300° for 1 hr. In the deposition of Cr, improved conditions are obtained by reducing the striking voltage to 8 v. and by complete immersion of the article previous to the application of the current. H. STOERTZ

Polish essential for chromium plate. CHARLES H. ELDRIDGE. *Iron Age* 121, 1680-2 (1928).—Details of successful methods for the prepn. of rough casting or stamping, the undercoat of Ni and the final Cr plate are given. Practical points are given about the polishing of the metal surfaces before Cr plating. Speed for the lathe: for grinding, 1200-1800 r. p. m.; for polishing, 1800-2200; for buffing, 2200-2700; and for chrome buffing, 2700-3000. Rough cast or forged steel needs a preliminary smoothing. Cr plate reproduces all surface defects, even exaggerating them in some cases. W. H. BOYNTON

A coal conductivity cell. ERIC SINKINSON. *Lehigh U. Ind. Eng. Chem.* 20, 862-5 (1928).—A cube of lump coal has different elec. cond. in different directions. The ohmic resistance of powdered coal can be measured with accuracy by using a specially designed cell in which the powdered coal may be subjected to pressure. Powdered coal with a resistance of 12,730 ohms was washed with concd. HCl to remove 1.47% of the sol. part of the ash; after this treatment the resistance was 9360 ohms. The method can be applied in sampling coal. The mesh for the most satisfactory and reproducible results is 48. The mechanics of operation and some precautions are given. C. J. BROCKMAN

Graphitic oxide as a depolarizer in the Leclanche cell. B. K. BROWN. *Trans. Am. Electrochem. Soc.* 53, (preprint) (1928).—In C. A. 22, 1107, the last sentence should read: Its gassing is very slight and the gelatinized paste does not swell much. C. J. B.

Electrical synthesis of hydrazine. G. BREDIG AND A. KOENIG. *Naturwissenschaften* 16, 493(1928).—By passing pure NH_3 gas through an intensely cooled high-tension arc and subsequent liquid air chilling hydrazine formation and detn. as benzalazine were made possible. From analogy with the process of catalytic HCN synthesis from CO and NH_3 , it is assumed that the reaction is caused by free imide formation: $\text{NH}_3 = \text{NH} + \text{H}_2$; $\text{NH} + \text{NH}_3 = \text{N}_2\text{H}_4$.

B. J. C. VAN DER HOEVEN

Electrolytic oxidation of formic acid. ERICH MÜLLER AND S. TANAKA. Dresden, Germany. *Z. Elektrochem.* 34, 256–64(1928).—In the oxidation of formic acid the anodic current voltage curves were detd. as before at a Rh-Pt anode in a divided cell contg. as the anolyte and catholyte a soln. of 10 mols. HCOOH and 1 mol. HCOONa . The pulsation of the current voltage curves continues for some time and then changes to a smooth curve. The explanation for this pulsation is that intermediate compds. are formed at the anode, which then undergo decompn.; equations explaining this are given in electronic form. The pulsations are between -0.2 and $+0.2$ v. on the hydrogen scale at the start with a smooth rise finally at $+1.2$ v. The first period of pulsation may be 155 sec. and the time shortens as the current increases. C. J. B.

The electrochemical oxidation of hydrocinnamic acid. FR. FICHTER AND RUDOLF SENTI. Anstalt anorg. Chem. Basel. *Festschrift A. Tschirch* 1926, 410–4; *Chem. Zentr.* 1927, II, 54–5; cf. C. A. 21, 2260.—Among other products, hydrocinnamic acid (I) at the anode yields phlorotinic acid (*p*-hydrocoumaric acid) (II) which is also prepd. from phlorhizin. I is partially dissolved and partially suspended in 2 *N* H_2SO_4 and is electrolyzed in a Pb electrolytic cell coated with PbO_2 , with an anodic current d. of 0.004 amp. per sq. cm. A Pb stirrer serves as cathode. At the termination of the expt. the liquid is made alk. with Na_2CO_3 and is extd. with Et_2O . The alk. soln. yields a mixt. of quinone (III), hydroquinone and perhaps acetophenone. After the alk. soln. is exhausted, it is acidified with dil. H_2SO_4 and again extd. with Et_2O . The ext. is fractionally distd., whereby EtCO_2H , unattacked I, II and diphenolic condensation products of high mol. wts are obtained. $(\text{CH}_2\text{CO}_2\text{H})_2$ was isolated from the aq. liquor after extn. with Et_2O . A scheme of reactions is derived, according to which an OH first enters the *p*-position in the side chain of the I mol., with formation of II. Further oxidation seps. the side chain, with formation of III and EtCO_2H . III is then partially decompd. to maleic and fumaric acids, from which $(\text{CH}_2\text{CO}_2\text{H})_2$ is formed at the cathode. II as a phenol is responsible for the condensation, and it is conceivable that in the highest fractions a di-*p*-hydrocoumaric acid, formed from 2 mols., remains behind, which cannot be distd. without decompn. In further expts. the Kolbe hydrocarbon synthesis was studied. I and PCl_5 form hydrocinnamyl chloride, b_p 177–9°. The latter in AcMe treated with ice-cold Na_2O_2 soln. yields the peroxide of I, m. 37°, explodes at 130°. Its explosive decompn. through heating yields α,δ -diphenylbutane, m. 52°. C. C. D.

Electrochemical behavior of silicate glasses. III. Cathode and anode gases. M. J. MULLIGAN, J. B. FERGUSON AND J. W. REBBECK. *J. Phys. Chem.* 32, 779–84 (1928); cf. C. A. 22, 1526.—A photographic record of the disappearance of cathode gas upon the reversal of the current is reproduced. In the presence of NaOH , H_2 will disappear into the glass. The disappearance is probably due to the formation of water which is resorbed by the glass. No gas is formed when the Na is replaced by Ag. In some cases Ag does not completely replace Na in the glass. 1.2 v. is considered a higher e. m. f. than is necessary for the production of cathode gas. Anode gas was obtained at 275° by using soda-lime glass with 110 v. This is a lower temp. than previously reported for anode gas. IV. Solid electrolytic deposits. *Ibid* 843–51.—When soda-lime glasses were electrolyzed with Hg as anode and then as cathode for a shorter period of time a brown deposit appeared. They are very minute spots under the microscope. Further electrolysis produced rings and patches, always at least 1 or 2 microns below the surface. With well-annealed glass very fine, uniformly distributed spots obtained. This deposit was shown to be Si. With Ag as the anode and cathode a crystalline deposit, which was shown to be Ag, was obtained. When the direction of the current is reversed the glass is punctured, Na is liberated at the puncture, reacts and deposits Si which may build up a deposit at the punctured surface. This phenomenon explains the slowness of gas reappearance due to the fact that Na is used up, before reaching Hg.

ARTHUR FLRISCHER

Joffé's studies on electric breakdown strength. P. JORDAN. *Naturwissenschaften* 16, 460–2(1928).—A review of Joffé's recent work (C. A. 22, 518) on the mechanism of insulation breakdown.

B. J. C. VAN DER HOEVEN

Breakdown of spark gaps. J. SLEPIAN. *Elec. World* 91, 761(1928).—The great speed of breakdown of spark gaps at atm. pressures observed exptly. contradicts sharply the classical Townsend theory of sparkover, which calls for 10^{-5} sec. To solve this S.

suggests that the thermal ionization of the gas takes place in the single passage of an electron from cathode to anode, and before the T. process can develop. Calculation, taking the space-charge into account, confirms this view. Sparkover takes place at those gradients which produce thermal ionization, and good agreement is obtained between breakdown gradients calcd. on this basis and those observed exptly. The "suppressed discharges" figures of Torok (*Trans. Am. Inst. Elec. Eng.* 1928), which are difficult to explain otherwise, are a natural consequence of the theory of S. The time for breakdown with moderate overvoltages is of the order of 10^{-7} sec.

C. J. BROCKMAN

Puncture tests affected by strength of oil. J. T. LITTLETON, JR. AND W. W. SHAVER. *Elec. World* 91, 759(1928); cf. *C. A.* 21, 3836.—Expts. were made to det. the effect of the dielec. strength of oils on the puncture voltage of an insulator under oil (1) in air at a pressure of 60 lb. per sq. in., (2) in special steam-treated oil up to the potential used in (1), and (3) in regular insulating oil. Potentials ranged from 100 kv. to 205.5 kv. Dielec. failure took place at a much lower potential under regular oil than in air under pressure and under steam-treated oil. Results seem to show that the puncture of an insulator in regular insulating oil is preceded by a breakdown of the oil, which is instrumental in causing the puncture.

C. J. BROCKMAN

Economics of corona loss. J. T. LUSIGNAN, JR. Leland Stanford Univ. *Elec. World* 92, 405-7(1928); 6 illus.—Known facts regarding corona as developed by Ryan and Peek are reviewed. It is necessary to carry the investigations into the field of economic voltage range of power transmission.

C. G. F.

Refractories; Their manufacture and applications (HYSLOP) 19. **Scrubbing gas electrically** (BRAUNES) 21. **The lead tree** (KOHLSCHÜTTER) 2. **Alloys for hi.-tension electric conductors** (Brit. pat. 281,692) 9.

BILLITER, JEAN: Electrochimie appliquée: électrolyse de l'eau et des chlorures alcalins. Translated from the 2nd German edition, by J. and S. Salauze. Paris: Dunod. 435 pp. F. 84 (paper); F. 94 (bound). Reviewed in *Tiba* 6, 845(1928).

CASTEX, A.: Accumulateurs électriques. Paris: Albin Michel. 296 pp. F. 30 (paper). Reviewed in *Bull. soc. ind. Mulhouse* 94, 237(1928).

RALSTON, O. C.: Zinkelektrolyse und nass-metallurgische Zinkverfahren. Translated into German by G. Eger. Halle s. Saale: Wilhelm Knapp. 282 pp. M. 23 (paper). Reviewed in *Chimie et industrie* 19, 976(1928).

Electric battery with liquid depolarizer. A. SCHMID. Brit. 281,698, Dec. 2, 1926. One electrode comprises a container made of a metal such as Cr-Ni-steel or "leaded Al" which is not attacked by the electrolyte. A Zn electrode is supported in the container from a screw rod in the cover. The electrolyte may contain Mg or Al salts to diminish the production of ppts. The depolarizing liquid may contain a weak acid or a salt such as borax to diminish the production of free H. The battery is put into operation by inversion and may serve as a flashlight battery. Various structural features are described.

Dry cell electric batteries. NAAMLOOZE VENNOOTSCHAP ELEMENTENFABRIEK UTRECHT BATTERY CO. Brit. 282,578, March 22, 1927. Structural features.

Dry cell electric batteries. EDMUND B. WHEELER and JAMES C. WRIGHT (to Western Elec. Co.). U. S. 1,680,656, Aug. 14. In order to preserve dry cells without dissipation of energy, they are maintained at temps. below 10° .

Storage battery. CARL J. DUNZWEILER (to Willard Storage Battery Co.). U. S. 1,680,038, Aug. 7. Structural features.

Storage battery. H. F. JOEL. Brit. 281,770, Sept. 9, 1926. Structural features.

Storage battery. A. POUCHAIN. Brit. 282,449, Dec. 20, 1926. Negative electrodes may be formed of silvered brass, partially covered with Zn and varnished over the remaining portion. Structural features are specified.

Storage batteries. ALFRED BLAUSZTAIN. Fr. 634,609, May 18, 1927. The plates are made up of a series of surfaces in zigzag form.

Storage batteries. SILICA GEL CORPORATION. Fr. 634,479, May 16, 1927. The plates are of an active material with which is incorporated silica gel.

Storage batteries. SILICA GEL CORPORATION. Fr. 634,480, May 16, 1927. The spaces between the positive and negative elements are filled with silica gel.

Storage battery separators. P. MALLON. Brit. 282,100, Dec. 11, 1926. Structural features.

Box for electric batteries. WARREN E. GLANCY. U. S. 1,679,657, Aug. 7. A box of molded asphaltic compn. is provided with bail-receiving grommets of hard rubber and fiber.

Battery and accumulator. RAYMOND MOLET. Fr. 634,017, May 7, 1927. An app. combining the qualities of a battery and an accumulator comprises a positive rechargeable element formed of an alloy of Pb and Sb and carrying a paste of minium, litharge and powdered pumice made with H_2SO_4 , and a negative element of Zn amalgam in a tank made of ebonite or similar substance.

Electric accumulators. COMPAGNIE GÉNÉRALE D'ÉLECTRICITÉ. Fr. 634,076, May 9, 1927. The pole of an accumulator and the vessel surrounding it contg. oil or fat are made in two sep. pieces which are joined by sliding one on the other or by screwing or soldering. Cf. C. A. 22, 3359.

Pole for electric accumulators. COMPAGNIE GÉNÉRALE D'ÉLECTRICITÉ. Fr. 634,260, May 5, 1927. Details of construction.

Electrodeposition of tin. VULCAN DETINNING CO. Fr. 634,225, April 13, 1927. In the electrodeposition of tin, a compd. of tin which is insol. in water but sol. in the products of the electrolysis is added to the bath to maintain the supply of tin ions. Such a compd. can be prepd. by treating an alkali stannate with a suitable acid to neutralize the alkali of the stannate.

Electrodeposition of zinc. URLYN C. TANTON. Fr. 634,080, May 9, 1927. See Brit. 280,103 (C. A. 22, 2890).

Electroplating with chromium. J. C. PATTEN. Brit. 282,337, Dec. 20, 1926. Various mech. features and details of c. d. are specified in connection with the Cr plating of recessed articles, tire molds, etc. Parts nearest the anode may be blocked off (suitably with copal varnish or nitrocellulose lacquer) while recessed parts are plated during the first portion of the plating operation. Pb anodes conforming to the shape of the article may be spaced from it about 0.5–1.5 in. Cr-plated molds are not affected by vulcanization and tires are easily removed from them without need of employing lubricants. If desired, tire molds may be formed wholly of Cr or a Co-Cr alloy.

Copper-plating cylinders of rotary printing apparatus. H. KUPPEL and L. SIMÉANT. Brit. 282,274, May 10, 1927. Cylinders are prepd. for reuse by polishing to remove all ink and then electroplating in a bath formed of $CuSO_4$ 18, H_2SO_4 4 and water 78%, using Cu sheets as anodes and a temp. of 30–45° and a c. d. of 0.4–0.5 amp. per sq. cm. and periodically reversing the current. The c. d. is diminished near the end of the operation, to produce a hard deposit of fine grain.

Electrolytic generation of oxygen and hydrogen. G. F. JAUBERT. Brit. 281,674, Dec. 1, 1926. A diaphragm suitable for use in electrolysis of alk. solns. comprises material such as perforated sheet metal, wire gauze or asbestos cloth carrying a coating and filler of a hydrogel of an org. or inorg. colloid such as may be formed by dipping the material in a soln. of $MgCl_2$ or $MgSO_4$ and then in a Na silicate soln. The colloid may also be deposited on the diaphragm by a preliminary electrolytic treatment. When Na_2CO_3 or K_2CO_3 is used for the electrolyte, a hydrogel of Mg hydrocarbonate may be used, and among the other colloids which may be employed are: Fe silicate, kaolin, $Fe(OH)_3$, natural or artificial yellow ochre, limonites, clays, Mg or Al phosphates, graphite, C from blood, rubber, hydrates of alk. earth or rare earth metals, and Cu, Ni or other metal in flocculent form. When not in use the diaphragm may be dipped in a 50% glycerol soln. to prevent it from drying.

Electrolytic rectifier. EDGAR W. ENGLE (to Fansteel Products Co.). U. S. 1,680,210, Aug. 7. Ta and Pb electrodes are used with an electrolyte of dil. H_2SO_4 soln. contg. a small quantity of Co sulfate.

Metallic electrodes. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 634,574, Sept. 22, 1926. Electrodes are cut directly from metal foil in the shape of a rectangle having a narrow strip perpendicular to one of the sides of the rectangle, the strip acting as the current collector.

Electrodes suitable for use in production of aluminum. ÉLECTRO MÉTALLURGIQUE DE MONTRICHER. Brit. 282,672, Dec. 21, 1926. Electrodes are formed in sections bolted to each other and to rings. Other structural features also are specified.

Cell with conical electrodes for electrolysis of water to produce oxygen and hydrogen under high pressure. J. E. NONGGERRATH. Brit. 282,688, Dec. 21, 1926.

Self-baking electrodes for electric furnaces. JENS WESTLY (to Det Norske Aktieselskab for Elektrokemisk Industri of Norway). U. S. 1,679,284, July 31. Electrodes are made with a mantle of material such as Al and with internally projecting ribs of another compn. such as an alloy of Al with 10% Fe. Cf. C. A. 21, 3028; 22, 920.

Combined electrode and stirring device for electric resistance furnaces. STANLEY A. W. OKELL (to Industrial Chemical Co.). U. S. 1,680,630, Aug. 14. Gas such as reducing or oxidizing gas may be introduced into the reaction chamber through openings carried by a rotating disk-shaped device or electrode so that the gas serves to stir the material in the chamber.

Electric furnace and apparatus for tilting it. SAMUEL ARNOLD, 3RD. U. S. 1,680,237, Aug. 7.

Electric induction furnace. PORTER H. BRACE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,680,407, Aug. 14. Structural features.

Electric resistance furnace. GEORGE M. LITTLE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,680,422, Aug. 14. Carbonaceous electrodes are mounted so that their abutting ends are pressed together continuously and oxidation of the electrodes when traversed by elec. current is restricted mainly to their junction by projecting a jet of air adjacent their ends.

Electric resistance furnaces. M. MCGUINNESS. Brit. 281,837, Nov. 3, 1926. A stationary, tilting or rotating elec. furnace for roasting ores such as cinnabar has heating elements of Ni-Cr wires embedded in MgO and encased in malleable iron or steel and is provided with devices for assisting the travel of the material through the furnace. Various structural features are described.

Resistance-heated electric crucible furnace and associated apparatus for casting metals. KRAFTMETALL AKTIEHOLAGET. Brit. 282,047, Dec. 7, 1926.

High-frequency electric induction furnace. HIRSCH, KUPFER- UND MESSINGWERKE A.-G. Brit. 282,656, Dec. 23, 1926. The charge is arranged as tightly as possible within a metal vessel which fits inside the crucible and which may be formed of wire or strip and of the metal that is to be melted.

Electric furnaces for bright-annealing of metal articles. WILHELM ROHN (to Siemens-Schuckertwerke G. m. b. H.). U. S. 1,678,875-6, July 31.

Device for feeding materials to electric furnaces. PAUL L. J. MIGUET (to Soc. Electrometallurgique de Montricher). U. S. 1,680,163, Aug. 7.

Pyroelectric separation of materials such as mica and sand. GUSTAV A. OVERSTROM. U. S. 1,679,740, Aug. 7. The material is heated and dried and, after electrification by pyro-electric action, is passed over a stationary support of glass and allowed to fall from the surface in such a manner that sepn. of the mica from the rest of the sand is effected. U. S. 1,679,739 relates to similar processes. Both pats. describe app.

Apparatus for measuring the current density in a galvanic bath. PAUL E. BOURGEOIS. Fr. 634,333, May 13, 1927.

Detectors for electric waves. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 281,720, Dec. 6, 1926. A layer of metal such as Cu with a surface coating of oxide or other compd. of the metal is used in contact with a pointed electrode such as steel, brass, Sn or C.

Composite electrical conductor. FRANK F. FOWLE. U. S. 1,679,518, Aug. 7. Elec. conductors such as wires, plates or bars are formed with an inner layer of Cu, an outer body of steel contg. at least 0.30% chemically combined C and a bonding layer of steel or Fe which prevents alloying action between the main mass of steel and Cu during pouring of the metals in the manuf. of the conductor.

Loaded electric cables. W. S. SMITH, H. J. GARNETT and J. A. HOLDEN. Brit. 282,504, Sept. 25, 1926. The loading wire or tape is spaced from the conductor by wire or the like which is fusible at a temp. not exceeding the annealing temp. An alloy of Ag 60 and Cu 40% may be used. The loading strip is preferably slightly oxidized to prevent sticking to the spacing wire during annealing.

Sheathing for alternating current electric cables. FELTEN & GUILLEAUMS CARLSWERK A.-G. Brit. 281,709, Dec. 3, 1926. Losses due to induced currents are reduced by employing a sheathing of an alloy of Pb with over 5% of Bi and Sb. Cf. C. A. 21, 222.

Gas-tight seal for high-power vacuum tubes or other electrical devices. ALBERT W. HULL (to General Electric Co.). U. S. 1,680,738, Aug. 14. See Brit. 270,345 (C. A. 22, 2296).

Electric resistance heater unit. JAMES C. WOODSON (to Westinghouse Electric & Mfg. Co.). U. S. 1,680,404, Aug. 14. Structural features.

Heavy-duty electric resistance heater. EDWIN L. WIGAND. U. S. 1,678,838, July 31. Structural features.

Apparatus for making small electric lamp bulbs from short pieces of glass tubing, etc. GENERAL ELECTRIC CO., LTD. Brit. 282,057, Dec. 9, 1926.

Filaments for electric incandescent lamps. J. A. M. HAWADNER (to Soc. française

des lampes a incandescence Luxor). Brit. 281,685, Dec. 1, 1926. Refractory filaments such as those of W are provided with a light-emitting surface of metal of lower m. p. such as Mo, covered with lime, MgO or the like.

Electric incandescent lamps. P. A. CAMPBELL (to British Thomson-Houston Co., Ltd.). Brit. 282,066, Dec. 9, 1926. Helical filaments are mounted upon the bulb stem before the mandrel is removed; the mandrel may be dissolved out with a mixt. of HNO₃ and H₂SO₄, and supporting wires or other parts exposed to the action of the acid may be formed of W, Ni, chrome-Ni or chrome-steel. The preliminary heat treatment of the filament to set it may take place before or after removing the mandrel.

Electric incandescent and arc lamps. GENERAL ELECTRIC CO., LTD. Brit. 282,043, Dec. 7, 1926. A solid NH₄ halide is used in gas-filled lamps and decomposes when the lamps are in use to form a mixt. of H and a volatile halogen compd. as used as described in Brit. 248,680 (C. A. 21, 709). The NH₄ halide may be placed in a vessel having a capillary opening and located in the exhaust tube in the foot of the lamp bulb. Brit. 282,044 specifies bulbs with internal reflectors of refractory metal or alloy, the reflecting efficiency of which increases with the temp., e. g., W, Ta, Mo or their alloys.

Improvements in arc-lamps. SOC. ANON. ANCIENS ETABLISSEMENTS BARBIER, BÉNARD ET TURENNE. Fr. 633,944, May 5, 1927.

5—PHOTOGRAPHY

C. E. K. MEES

Practical digest of the year's work in photography. E. J. WALL. *Am. Annual of Phot.* 42, 187-97(1928).—In the review of progress in photography, the following subjects are covered: phototherapy and emulsions, amateur cinematography, development and fixation, optical and color sensitizing, after-treatment methods, motion picture work, special processes (bromoil, carbonyl, etc.), photolithography and color photography.

Short-wave radiation in the service of photography. H. C. JAQUET. *Phot. Kor.* 64, 203-5(1928).—Examples are given of portraits taken by the ultra-violet radiation (filtered) from an elec. projection lamp.

Dependence of the resolving power of a photographic material on the wave-length of light. O. SANDVIK AND G. SILBERSTEIN. *J. Opt. Soc. Am.* 17, 107-15(1928).—The resolving powers of six various emulsions have been investigated. The spectral region extends from wave length 380 mμ toward the red end of the spectrum as far as the sensitivity of the particular emulsion would permit. The resolving power has a max. value at wave length 380 mμ, decreasing rapidly in the blue-green to a min. value at about wave length 535 mμ. The change in resolving power with wave length corresponds approx. with the change in the absorption coeff. with the wave length in the spectral region investigated.

Parallelism of constant density curves using varying times of exposure. E. F. M. VAN DER HELD AND B. BAARS. *Z. Physik* 54, 364-8(1927).—H. and B. exposed fast plates over a time range of 1:1000 and found no variation from parallelism of density curves using rodinal developer.

Restoring daguerreotypes. E. KUCHINKA. *Phot. Kor.* 63, 367-70(1927).—The risk of ruining a daguerreotype in attempting its restoration by the usual technic (involving the use of a soln. of KCN) is much greater when the support has been silvered by rolling with foil than when it was silvered by electroplating. The method that has been used can be detd. by examn. with a magnifying glass.

Reversal process. A. REYCHLER. *Am. Phot.* 22, 113(1928).—If an exposed plate is treated with an oxidizing soln., flashed to light, and physically developed with Hg a positive of good quality can be obtained.

Riken reversing developer. HIROMU ISHIDŌ. *Bull. Inst. Phys. Chem. Research (Tokio)* 7, No. 3, 30(1928).—A positive is obtained by first development with a special solution, then bleaching, and finally redeveloping. It is claimed that the "Riken" developer, of which the composition is not given, produces less fog than metol-hydroquinone and can be used for high-speed emulsions as well as for low speed. It is stated that γ obtained by the reversal process is 1.85 for either special rapid or process plates, but that if the first developer is lowered in concentration to one-quarter, a γ of 1.35 is obtained.

Contribution to the Herschel effect. E. PETERL. *Phot. Kor.* 64, 205-6(1928).—P. shows how the Herschel effect ("red rays undo the action of white light," as Abney

expresses it) may assume practical importance when making prints on gaslight papers, if the exposed sheets are allowed to remain unduly long in the red light of the darkroom before development.

E. R. BULLOCK

Color fog as substance of image on a new lantern-slide plate. O. PARESCH. *Phot. Korr.* **64**, 165-7(1928).—P. refers in particular to the *Farb-Diapositiv* plate recently put on the market by the firm of Lainer & Hrdliczka in Vienna. He points out that the color of a developed image depends solely on the phys. constitution and size of the Ag grain; and considers that the colored images obtained with the above-mentioned plate for example, and the recommended NH_4OH -contg. developer are identical with dichroic fog.

E. R. BULLOCK

Role of electrolytes in the peptization of the silver of a negative. G. SCHWARZ. *Phot. Korr.* **64**, 207-11(1928).—On the basis of the Pauli theory of charged ionogen complexes, S. would expect that peptization of the Ag of photographic negatives by boiling (under the exptl. conditions prescribed by Lüppo-Cramer) would necessarily fail to occur in the absence of alkalis. After the latter have been removed by the most careful electrodialysis, he finds this expectation capable of exptl. proof. The role of alkali consists in the extraordinary acceleration of the breaking down of glutin, the resulting glutoses and peptones forming the mother substance for the charged ionogen complexes. When the gelatin is broken down by prolonged heating in the absence of alkalis there is finally produced a sol of acidoid character.

E. R. BULLOCK

Printing on development paper. B. T. J. GLOVER. *Am. Annual of Phot.* **42**, 9-14(1928).—A simple exposition of the fundamental principles underlying the making of prints on chloride, bromide, and chloro-bromide papers. The Watkins factorial system is advocated for detg. development times on the latter two papers. An analysis of print failures is included.

G. E. MATTHEWS

Method for the proportional reduction of excessive contrast in bromide and gaslight prints. H. KESSLER. *Phot. Korr.* **64**, 197-200(1928).—The print is partially bleached in a not too concd. $\text{K}_3\text{Fe}(\text{CN})_6\text{-KBr}$ soln., then darkened in Na_2S soln. or in Se "Carbon" toner, and finally treated with Farmer's reducer to remove the unaltered Ag. (It would seem difficult to secure proportional reduction by such a method — *Abstr.*)

E. R. BULLOCK

Direct sulfur toning. A. HERZ. *Camera* (Luzern) **6**, 288-9(1928).—Bromide prints are toned by transferring them from the fixing bath to a warm, dil. "hyposoln." contg. a few drops of H_2SO_4 . The prints are rubbed with cotton in the wash H_2O to remove pptd. S. Incompletely sulfided prints take on a brighter color, even after drying, if subjected to steam to complete the toning, or if treated with Farmer's reducer to remove unchanged Ag.

E. R. BULLOCK

Toning with selenium. C. BOSNJAK. *Phot. Korr.* **64**, 223-4(1928).—A short account is given of a modification of "bleach-and-sulfide" toning in which a relatively small quantity of Se is added to the Na_2S soln. It is pointed out the Se which seps. from the bath when not in use may be re-dissolved in fresh sulfide soln. The Se bath gives a superior tone, practically permanent, with many gaslight papers.

E. R. B.

Ultramicroscopic observations of Ag bromide crystals (SCHAUM, KOLH) 3.

EDER, JOSEF MARIA: *Die Photographie mit dem Kollodiumverfahren. Nasses und trockenes Kollodiumverfahren, Bromsilber- u. Chlorsilber-Kollodium-Emulsion.* 3rd ed., revised and enlarged. Halle (Saale): W. Knapp. 354 pp. Ausführl. Handbuch d. Photographie Bd. II. Tl. 2. M. 17.20; bound, M. 19.20

Color photography. MICHELE MARTINEZ. Fr. 634,073, May 9, 1927. Color photographs are taken at a single exposure in the ordinary way on a compd. negative formed of 3 superimposed layers or sections having emulsions of different rapidity and different color sensitivity and without the necessity of color filters. The positives are printed on compd. sensitive material comprising 3 layers which print out in the desired colors, and require only washing after printing and are superimposed to produce the finished print. Cf. C. A. **22**, 2891.

Multi-colored cinematographic and photographic films. JOHN E. THORNTON. U. S. 1,679,694-5, Aug. 7. Mech. features.

Photographic film. FRANK F. RENWICK (to du Pont-Pathé Film Mfg. Corp.). U. S. 1,680,635, Aug. 14. Nitrocellulose films are backed with a compn. comprising a cellulose ester and a protein compn., e. g., cellulose nitrate and acetate and gelatin. U. S. 1,680,636 specifies non-static cinematographic film with a backing comprising a

water-insol. protein material such as casein and which may also contain cellulose nitrate or acetate.

Recovery of silver from cinematographic films. CHARLES PERROT. Fr. 633,685, Sept. 6, 1926. Ag is recovered from old films by removing the gelatin layer with NaOH, warming with HCl to ppt. the gelatin, which is filtered, dried and reduced.

Sensitive photographic surfaces. MICHELE MARTINEZ. Fr. 634,074, May 9, 1927. Sensitive layers which print out in red, blue and yellow comprise for red a deriv. of urea such as alloxan, alloxanic acid, alloxantin or murexide either alone or with metallic salts; for blue, a mixt. having ferric salts as its basis along with a cyanide or ferri-cyanide; and for yellow, silver lactate and metallic oxalates and ferric salts, and preferably an excess of lactic acid. Formulas are given for prepg. solns. of the sensitizers.

Drying colloidal layers on photographic plates and films. M. ZIPPERMAYR. Brit. 281,700, Dec. 2, 1926. Drying and hardening are effected at a temp. above the m. p. of the layers, preferably *in vacuo*. Glycerol may be used to prevent curling of films during the drying.

Increasing sensitiveness of photographic emulsions. SAMUEL E. SHEPPARD (to Eastman Kodak Co.). U. S. 1,678,832, July 31. Sensitiveness of photographic materials is increased by the addn. of very small proportions of substances such as the salt of ethyl dihydroxythiocarbonate as prepd. by Debus (*Ann.* 72, 1; 75, 121), the "mustard oil oxides" obtained by the action of Br on mustard oils, or isothiocyanates (Freund, *Ann.* 235, 14), thiurets or benzoyldisulfide. Diselenides or ditellurides of the same general character also may be used instead of the disulfides.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Chlorides of ruthenium. H. GALL AND G. LEHMANN. Munich Techn. Hochschule. *Ber.* 61B, 1573-6(1928); cf. *C. A.* 21, 711.—Comment upon the paper by H. Remy and A. Lührs (*C. A.* 22, 2521). The reduction of Ru^{IV} to Ru^{III} is disputed, the blue soln. obtained being attributed to Ru^{II}. H. STOERTZ

The fractionation of mixtures of neodymium and samarium. L. ROLLA AND L. FERNANDES. *Atti accad. Lincei* [6], 7, 370-2(1928).—An examn. of curves in which the soly. is a function of the at. nos. of the rare earths shows a max. difference of soly. for the double Mn nitrates. The method of Lacombe, which is based on the crystn. of these salts, is satisfactory only for sepg. the intermediate fractions, i. e., for the purification of Pr and Nd and *vice versa*. Crystn. of the Sm fractions as double Mn nitrates is impossible because of their great soly. An attempt was therefore made to reach the correct degree of soly. by crystg. solid solns. of double Mg nitrates with double Mn nitrates. Two materials of different origin and compn. were used. (1) Nd oxide contg. Sm as impurity, from the initial crystn. with the bromate method. The oxide was converted into nitrate and equal quantities of Mg(NO₃)₂ and Mn(NO₃)₂ were added. Thirty series of crystns. from 6 fractions eliminated completely the Sm in the last 2 while abs. pure Nd was obtained in the first 4 fractions. Mn was concd. in the end fractions and Mg in the initial fraction. (2) Nd oxide contg. Pr and all the Sm originally present, from the end fractions of the fractionation of double nitrates of NH₄ and Tl. In this case the Mn was added in decreasing proportions from the initial to the end fractions and *vice versa* for addns. of Mg. After 15 series on 12 fractions, the last end fractions acquired a yellow color characteristic of Sm, and contained only a little Nd. After a new series of 50, all Sm was accumulated in the last 4 fractions, the last 2 contg. no Nd and only traces of Tb and Yt earths. The third from the last contained almost equal quantities of Nd and Sm, and the fourth from the last contained only Sm. Pr was recovered in the first 2 fractions still contg. a little Nd, and this was in an abs. pure state in 5 middle fractions. The method is therefore very satisfactory. C. C. DAVIS

The action of aluminum, ferrous and ferric iron and manganese in base-exchange reactions. O. C. MAGISTAD. Arizona Agr. Expt. Sta., *Tech. Bull.* 18, 445-63(1928).—Expts. with neutral and acid solns. of Fe and Al salts on artificial zeolites showed that the replaceable base previously present was released. The residue usually contained no H-zeolite, nor did ferric Fe or Al enter the zeolite complex in such a manner as to be replaced by other replacing agents subsequently used. Chem. analyses of zeolites before and after treatment with AlCl₃ in EtOH showed that there was no addn. of Al or marked loss of Al or Si. Similar trials with FeCl₃ in H₂O and EtOH showed that Fe took the place of Al in the zeolite. This reaction was almost complete in the EtOH

expt., the zeolite residue contg. practically no Al. The substitution did not take place in equiv. quantities. Soils and artificial zeolites treated with Al or ferric-salt solns. until the solns. remained acid and the previously held zeolitic bases had been removed lost all base-exchange capacity. The decrease in base-exchange capacity of zeolites and soils is a function of the concn. of the ferric Fe or Al salt solns. used. Ferrous Fe as FeSO_4 was found to be readily exchangeable for Ca in a zeolite and in soils. A small quantity of $\text{Fe}(\text{OH})_2$ was pptd. in the zeolite in addn. and a larger quantity in soils. The ferrous Fe replacing the Ca is itself replaceable by Ba salts. Mn as MnCl_2 and MnSO_4 replaced Ca in both zeolites and soils. Some pptn. of $\text{Mn}(\text{OH})_2$ occurred in both cases. The Mn replacing Ca is itself replaceable by Ba salts. The reaction equation for MnSO_4 and the particular Ca zeolite used was detd. The equation was of the same type as that for the usual base-exchange reactions. If the property of base-exchange is to be considered a factor in plant feeding, destruction of base-exchange capacity in soils by Al-contg. salts, or other means, may result in serious consequences. A bibliography is appended.

C. R. FELLERS

Effect of alkalinity on basic cupric sulfates. O. A. NELSON. U. S. Bur. of Chemistry and Soils. *J. Phys. Chem.* 32, 1185-90(1928).—There are described in the literature at least 30 basic cupric sulfates, in which the $\text{CuO}:\text{SO}_3$ ratio varies from 10:1 to 2:1, with diff. amts. of H_2O of hydration. The information in regard to these compds. is indefinite and contradictory. N. undertook to prep. a series of basic cupric sulfates in which it could be shown that the concn. of the SO_3 or the OH in the product was a continuous function of the ratio of the Cu salts and alkali used in the prepn. The stock solns. were 0.5 M CuSO_4 and M CO_2 -free NaOH. Twenty or 40 cc. of the CuSO_4 soln. was used in each expt., but before the addn. of NaOH the portions were dild. to a concn. of 0.01 M. The NaOH was dild. to the equiv. concn., and both solns. were cooled to below 5° . The CuSO_4 soln. was stirred violently during the addn. of the NaOH. The stirring was then continued for about 2 hrs., the temp. being kept between 0° and 5° . The CuSO_4 soln. was stirred violently during the addn. of the NaOH. The stirring was then continued for about 2 hrs., the temp. being kept between 0° and 5° . The flocculent ppts. were allowed to settle, the p_{H} of the supernatant liquid was detd., and the ppts. were analyzed. Plotting the results gave curves which did not show a series of distinct breaks as would be expected if a no. of true chem. compds. had been formed. The product represented by the vertical portion of one of the curves has an approx. formula of $7\text{CuO} \cdot 2\text{SO}_3$. The constancy of compn. of this product over a fairly wide range of concns. indicates that it is a true chem. compd. Any product with a Cu: SO_3 ratio of 3.5 to 1.0 or over may be prepd. by addn. of the proper quantity of base. The results indicate that the compns. of basic cupric sulfates as prepd. in the lab. depend on the method of prepn. and the ratio between the reacting substances.

LOUISE KELLEY

Precipitation of copper with sodium thiosulfate. M. G. RORER. *Tids. Kemi Berg.* 7, 94-5(1927).—Pptn. of Cu with $\text{Na}_2\text{S}_2\text{O}_3$ is complete in the presence of HNO_3 , HCl or H_2SO_4 . The Cu_2S is washed with cold H_2SO_4 soln.

B. C. A.

Optically active copper compounds. W. WAHL. *Soc. Sci. Fennica Commentationes Phys. Math.* [14], 4, 1-5(1927).—Diethylenediaminediaquocupric tartrate has been prepd. from Ba tartrate and the complex sulfate which is obtained when aq. solns. of CuSO_4 and ethylenediamine are mixed and evapd. to dryness. After filtration from BaSO_4 the Cu complex salt is pptd. by the addn. of alc. to the soln. The salt has $[M] +28.3^\circ$. After two extns. with alc. the residual compd. has $[M] -59.4^\circ$. When obtained by vacuum evapn. of the aq. soln., the salt has $[M] -38.3^\circ$, and of the residue after alc. extn. -134° . The *l*-diaquodiethylenediaminecupric ion must have $[M]$ at least 190° . A series of optically active iodides has been prepd. from the tartrates. Ni yields corresponding tartrates of varying activity, the highest observed value being about $+420^\circ$.

B. C. A.

Spacial configuration and rotatory dispersion in optically active cobalt and rhodium salts. F. M. JAEGER AND H. B. BLUMENDAL. Groningen Univ. *Verslag Akad. Wetenschappen Amsterdam* 37, 421-34(1928).—J. and B. replace 1, 2 or 3 ethylenediamine mols. in salts of the triethylenediamino cobalt-type by the same no. of 1,2-diaminocyclopentane mols. They record the changes occurring in the rotatory dispersion...

A. L. HENNE

The hydrates, transition temperatures and solubility of sodium iodate. H. W. FOOTE AND JOHN E. VANCE. Yale Univ. *Am. J. Sci.* 16, 68-72(1928).—Solns. contg. NaIO_3 were analyzed by adding an excess of KI, acidifying with H_2SO_4 and titrating with $\text{Na}_2\text{S}_2\text{O}_3$, or by detg. the H_2O in the residue by heating at $120-40^\circ$. Only two stable hydrates are found in soln., $\text{NaIO}_3 \cdot 5\text{H}_2\text{O}$ (I) and $\text{NaIO}_3 \cdot \text{H}_2\text{O}$ (II). Below 19.85°

I is stable; at this transition temp., I and II are in equil. From 19.85° to 73.4° II exists; at the higher temp. II and NaIO₃ are in equil. Solubilities were detd. at a given temp. by approaching equil. from supersatd. and under-satd. solns., after the mixts. had been shaken in a thermostat for 4–6 hrs. From the logarithmic curve, the soly. of II can be represented between 20° and 49.9° by: $\log \text{ soly.} = 3.6344 - (802.8/T)$; that of I between 0° and 15° by: $\log \text{ soly.} = 7.7793 - (2019/T)$. The f. p. of a satd. soln. of NaIO₃ is -0.35°.

J. BALOZIAN

The nature of Prussian blue. DAVID DAVIDSON and LARS A. WELO. Rockefeller Inst. Med. Research. *J. Phys. Chem.* 32, 1191–6 (1928).—Recently Reihlen and Zimmermann (*C. A.* 21, 3324) have proposed a constitutional formula for sol. Prussian blue in which the 2 Fe atoms are combined in the form of a complex polynuclear ion. Neither the cond. measurements in soln. nor the magnetic measurements in the solid state, as made by D. and W. on compds. of this type, have produced any evidence of the existence of the postulated polynuclear ion.

LOUISE KELLEY

The preparation of potassium and sodium tetrabismuth tartrates. PHILIP A. KOBER. *J. Lab. Clin. Med.* 12, 962–7 (1927).—Contrary to previous directions, alk. solns. of tartaric acid dissolved Bi(OH)₃ more efficiently at a low temp. When the reaction is allowed to go to completion, tetrabismuth tartrates result, instead of tribismuth tartrates as has been heretofore assumed. Two new compds., Na and K tetrabismuth tartrate, are described and the processes given for their prepn. Preliminary results indicate that these new tetrabismuth tartrates are much less toxic than other Bi tartrates isolated heretofore. Certain data given indicates if they do not prove, that the so-called tribismuth tartrates, mostly heretofore used in syphilitic therapy, are only mixts. of tetra- and dibismuth tartrates. Preliminary expts. show that the Na tetrabismuth tartrate can be put up in an aq. soln. and administered intramuscularly.

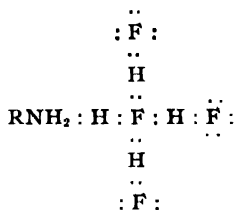
ETHEL W. WICKWIRE

Addition compounds of halides of bivalent metals and organic bases. VI. G. SCAGLIARINI and E. BRASI. Univ. Bologna and Univ. Ferrara. *Atti accad. Lincei* [6], 7, 509–11 (1928); cf. *C. A.* 21, 2623 and *Accad. sci. med. nat. Ferrara* Apr. 3, 1927.—The following addn. compds. of Cd salts and hexamethylenetetramine were prepd. in water and in acetone, the first time that addn. compds. of the latter and Cd salts have been described. All were cryst. $2\text{CdCl}_2 \cdot \text{C}_6\text{H}_{12}\text{N}_4$ is prepd. by adding aq. $\text{C}_6\text{H}_{12}\text{N}_4$ (not too concd.) to aq. CdCl_2 (also not too concd.) and washing the ppt. repeatedly. $\text{CdBr}_2 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4$ and $\text{CdI}_2 \cdot 8\text{H}_2\text{O} \cdot \text{C}_6\text{H}_{12}\text{N}_4$ were prepd. in the same way. $\text{CdCl}_2 \cdot \text{C}_6\text{H}_{12}\text{N}_4$ is prepd. by adding a cold, concd. acetone soln. of $\text{C}_6\text{H}_{12}\text{N}_4$ very slowly to a cold, concd. acetone soln. of CdCl_2 and washing repeatedly with acetone. $3\text{CdBr}_2 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4$ is prepd. by adding $\text{C}_6\text{H}_{12}\text{N}_4$ in acetone to cold concd. CdBr_2 in acetone, ceasing the addn. of $\text{C}_6\text{H}_{12}\text{N}_4$ when the sepn. of needle crystals can be detected microscopically. If on the other hand concd. CdBr_2 in acetone is added to concd. $\text{C}_6\text{H}_{12}\text{N}_4$ in acetone so that there is a deficiency of CdBr_2 , then the compd. $\text{CdBr}_2 \cdot \text{C}_6\text{H}_{12}\text{N}_4$ is pptd. The latter is also formed by mixing hot equimol. solns. of CdBr_2 and of $\text{C}_6\text{H}_{12}\text{N}_4$ in acetone. $2\text{CdI}_2 \cdot \text{C}_6\text{H}_{12}\text{N}_4$ is prepd. by adding a cold, satd. soln. of $\text{C}_6\text{H}_{12}\text{N}_4$ in acetone to a cold satd. soln. of CdI_2 in acetone and washing repeatedly with acetone.

C. C. DAVIS

The hydrofluorides of organic bases and a study of hydrofluoric acid. J. F. T. BERLINER and RAYMOND M. HANN. U. S. Bur. Chemistry. *J. Phys. Chem.* 32, 1142–62 (1928).—The HF derivs. of PhNH₂, *o*-, *m*- and *p*-toluidine, *m*- and *p*-nitroaniline, *m*-xylydine, cymidine, ψ -cumidine, *o*-tolidine, Ph₂NH, triphenylguanidine, *p*-phenetidine, *o*-anisidine, *p*-nitro-*o*-anisidine, α - and β -C₁₀H₇NH₂, iodo-*o*-toluidine, anthranilic acid, PhNHMe, PhNH₂Et, metanilic acid and sulfanilic acid were prepd. The analyses of these compds. in every case indicated the deriv. to be of the type B.4HF, where B represents an aliphatic or aromatic primary, secondary or tertiary base. The diamines gave derivs. of the type R(NH₂)₂.(4HF)₂. Compds. of this general compn. were prepd. in dil. and concd., hot and cold aq., ethereal and alc. solns. of HF. The method used was to add 0.4 to 0.7 mols. of pure 48% HF directly to the base or to an Et₂O or Me₂CO soln. contg. 0.1 mol. of the purified base. On cooling, the HF compd. sepd. in nearly quant. yields. The only hydrofluorides which gave characteristic m. ps. were those of *m*-nitroaniline (m. 207–9°, cor.), *p*-nitroaniline (m. 173–4°, cor.), anthranilic acid (m. 217–8°, cor.) and PhNH₂Et (m. 170–1°, cor.). Attempts were made to titrate solns. contg. known quantities of these hydrofluorides with NaOH, indicators with transformations in several ranges of *p*_H being used. When an indicator having a range above a *p*_H of 6 was used only $\frac{3}{4}$ of the combined acid could be titrated. Varying the temp., concn. of salt and of alkali, solvent and indicators used gave the same result. These results and those of electrometric titration studies indicate that one of the HF mols. of the (HF)₄ complex is combined in a manner diff. from that of

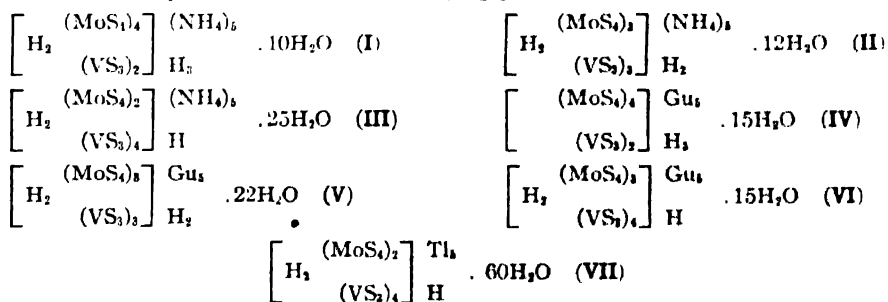
the other 3. On the basis of a consideration of the nature of both inorg. and org. compds. of HF, B. and H. suggest the following structure for the compds. of HF with org. bases:



The lack of agreement between the results of B. and H. and those of Weinland and his collaborators (*Z. anorg. Chem.* **45**, 39(1905) and *C. A.* **2**, 1436 disappears when one examines the data of the latter. In a no. of cases the formulas assigned by W. to the compds. prep'd. were based upon titration values with 0.1 *N* alkali. As B. and H. have shown, such titration allows the estn. of only $\frac{1}{4}$ of the combined HF. Moreover, several of the preps. described by W. were not prep'd. in the presence of an excess of HF, as were those of B. and H.

LOUISE KELLEY

Investigations of thio salts. VI. Molybdovanadothioaquaates. L. FERNANDES. *Atti accad. Lincei* [6], **7**, 496-501(1928); cf. *C. A.* **22**, 736.—Thiomolybdovanadates were synthesized by satg. an aq. soln. of the thiomolybdate with H_2S , adding the thiovanadate in very dil. NH_4OH , passing through H_2S for several hrs. until an iridescence appears, letting stand until the salt is completely pptd., and washing with EtOH and Et_2O . Water decomps. these salts rapidly. With too much H_2S or with insufficient alky. the salts become contaminated with amorphous by-products. The NH_4 salts are the only ones which can be synthesized directly and the other salts are prep'd. by double decompn., the NH_4 salt being added to a concd. soln. of the other salt, e. g., guanidine chloride or TiNO_3 . The NH_4 salts are unstable and liberate H_2S and free S, while the guanidine and Ti salts are relatively stable. The following new microcryst. compds. were prep'd. (Gu signifying guanidine):



I is black with maroon reflection, II black, III black with violet reflection, IV dark maroon, V violet-black, VI dark violet and VII dark violet.

C. C. DAVIS

Constitution of hydrazoic acid and its esters. HANS LINDEMANN and HANS THIELE. Braunschweig Techn. Hochschule. *Ber.* **61B**, 1529-34(1928).—This is an effort to det. whether the constitution of the derivs. of HN_3 , such as the azido esters, is

represented by the ring formula $\text{RN}:\text{N}:\text{N}$ or the formula $\text{RN}:\text{N}:\text{N}$. This is accomplished by calcn. of the *parachors* of these esters, given by the expression $P = [M/(D - d)] \cdot \gamma^{1/4}$, in which M is the mol. wt., γ the surface tension, D the density of the liquid and d the density of its vapor. D is det'd. by means of a pycnometer, and γ is measured in an app. constructed in the Techn. Hochschule Berlin. *Me azidoacetate* (I), *azidoacetone* (II), *phenyl azide* (III), and *o*-(IV) and *p*-(V) tolyl azides are exam'd., and the following values obtained for P . For I 277, II 220.9, III 267.3, IV 303.8, V 307.0. Calcn. of P for the 2 formulas given above, in which values for the double bond and the triple bond between N, are based upon values obtained for C:C, C:O, C:S, N:O and C:N, give figures for the first formula which agree very well with the exptl.

results. Thus in the case of I, P calcd. from the ring formula is 276.3 and calcd. from the $N:N$ formulas is 306.2, while the exptl. result is 277. Two other formulas have been suggested: $R-\text{N}-\text{N}\equiv\text{N}$ and $R-\text{N}=\text{N}=\text{N}$; P calcd. for the first of these is 281.4 and for the second 281.2, both for the azidoacetic ester. The constitution of these esters is therefore best represented by the formula $\text{RN}:\text{N}:\text{N}$. H. STOERTZ

The system alumina-water (HÜTTIG, WITTGENSTEIN) 2.

7—ANALYTICAL CHEMISTRY

W. T. HALL

Remarks on "the magnitude of errors of observation in chemical analysis," by F. Goudriaan. A. J. KORVEZEE AND N. H. J. M. VOOGD. *Chem Weekblad* 25, 242-7 (1928); cf. *G. C. A.* 22, 1295.—The accuracy of chem. analysis must be calcd. by making use of the mean square error of the measurements themselves. Several detailed examples are given.

Recommended specifications for analytical reagent chemicals. Citric and tartaric acids, alcohol 95 per cent and absolute, calcium chloride, anhydrous, magnesium chloride, methanol, potassium ferricyanide, potassium ferrocyanide, sodium bisulfate fused, sodium chloride, zinc chloride. W. D. COLLINS, H. V. FARR, JOSEPH ROSIN, G. C. SPENCER AND EDWARD WICHERS. *Ind Eng. Chem.* 20, 979-83 (1928); cf. *C. A.* 22, 553.

Analysis of dilute solutions by the opacity of fine suspensions formed in such solutions. A. BOUTARIC AND M. LLE. G. PERRÉAU. *Rev. gén. colloïdes* 6, 113-7 (1928).—See *C. A.* 22, 1747.

Capillary analysis. R. DUBRISAY. *Mon. prod. chim.* 9, No. 90, 4-7 (1927); cf. *C. A.* 21, 660.—The vol. of 40 drops of 1/600 N NaOH soln. (free from carbonate), dropped from a constricted tube into "vaseline" oil contg 1% of oleic acid, was 1.20 cc., while if to the soln. an equal vol of 1/800 or 1/80 N NaCl soln. was added, the vol. of 40 drops was 0.98 or 0.20 cc. The method should be applicable to the detn of alkali halide in 0.0002 M soln.

Drop reactions. F. FEIGL. *Mikrochem.* 6, 50-62 (1928).—A claim for priority. Many of the drop reactions recently described by Tananaev and his co-workers (*C. A.* 19, 1108; 21, 545; *Z. anal. Chem.* 72, 155-7 (1927)) had been described by Feigl and his co-workers several years previously.

Radioelements as indicators. F. PANETH. *Nature* 120, 884-6 (1927); *Science Abstracts* 31A, 192.—A brief summary of P.'s investigations on the use of radioelements as indicators in chem. investigations with the common elements. P. rightly anticipates that the method will become more commonly used the more familiar the advantages of the method become to non-radiologists. The method is based on the isotopic behavior of certain radioactive bodies with the ordinary elements. Thus Th C is chem. inseparable from Bi and consequently, once added to Bi, it always sticks to Bi through all possible chem. reactions. Th C is easily detected and measured by means of ordinary ionization app. (electroscopes, etc.), and it may therefore be used to indicate the presence, or otherwise, of Bi in a particular prepn. Other valuable methods of using the isotopic property are outlined in the paper, and a table is given showing the various radioactive indicators and their common isotopic elements. An application of Th C-Bi is suggested in therapeutics—to measure the proportion of Bi stored in the body, etc. The applications are very numerous.

Spectrophotometric determination of hydrogen-ion concentrations and of the apparent dissociation constants of indicators. V. Fast green F(C)F. W. C. HOLMES AND E. F. SNYDER. *Bur. of Chemistry and of Soils. J. Am. Chem. Soc.* 50, 1907-10 (1928).—Spectrophotometric data for the detn of the H-ion concn. for p -hydroxyeroglucine A are given over the range pH 6.7-10.0. The tetra-Na salt is colorless, the tri-Na salt is blue with an adsorption band at approx. 611 $m\mu$, and the di-Na salt is green with a band at 628 $m\mu$. Its apparent dissoc. const. is 8.1 at 29°. D. H. P.

Methods for the determination of hydrogen-ion concentration. KARLO WEBER. *Archiv. hem. farm.* 2, 146-57 (1928).—A review of the electrochem. and colorimetric methods used for the pH detn. with bibliography.

New methods for quantitative spectral analysis of metals. WALTHER GERLACH.

Z. Metallkunde 20, 248-51(1928).—A summary is given of exptl. results obtained by G and E Schweitzer. For the detn. of a small quantity of impurity, say Pb in Au, there are 5 methods given which do not depend upon the use of ultimate rays, as recommended by de Gramont. (1) Take photographs on the same plate under the same elec. and light conditions of the sample and of specimens contg. known amts. of the impurity. Then by comparing the intensity of certain lines caused by the impurity it is possible to det. 0.002-1% of Pb in Au within 10% of the truth. (2) Compare the intensity of lines caused by the impurity with certain lines of the pure substance. Then by means of an empirical table the % of impurity can be detd. (3) If there are no homologous lines suitable for such a comparison, the difficulty can sometimes be overcome by making a photograph of the spectrum of some other metal on the same plate. (4) For detg. Pb in Au another method is available which depends upon comparing Pb lines with lines produced by an alloy of 9 parts Cd to 1 part Sn, using different times of exposure for getting the spectrum of this alloy. When the desired lines of the Sn are of equal intensity with those of the Pb, it is possible to tell by comparing certain Au lines with those of the Sn, what the % of Pb is. (5) By increasing the temp. it is possible to intensify the lines of the more volatile element. Thus by melting the electrodes, 0.02% of Pb in Au gives the appearance of 3% of Pb at a lower temp. W. T. H.

Volumetric determination of antimony in presence of lead, tin and copper. A. VASSILIEV AND W. KARGIN. *Papers Pure Appl Chem Karpov Inst., Bach Festschr.* 1927, 143-56.—The reaction (Gvory): $\text{KBrO}_3 + 3\text{SbCl}_3 + 6\text{HCl} = 3\text{SbCl}_5 + \text{KBr} + 3\text{H}_2\text{O}$, using as indicator methyl orange, which is decolorized by excess of bromate, is employed. When the liquid contains PbSO_4 , low (1-3%) values are obtained; the soln. is therefore siphoned off, the PbSO_4 dissolved in concd. HCl , and the diluted soln. titrated with bromate. The presence of Sn does not affect the results. Low (0.3-1.7%) values are obtained in presence of Cu. In presence of Pb and Cu 96-97% of the Sb is found; treatment of the ppt. (as above) indicates a further 2% of Sb. With the pure metals, but not with technical alloys, tartaric acid is not oxidized by the bromate. B. C. A.

Volumetric estimation of copper and zinc. S. L. ROBERTON. *Roy. Tech. Coll. Met Club J.* 1927-8, No. 6, 37-40.—The reactions involved in the volumetric estn. of Cu by both the iodide and cyanide titration methods, and of Zn by titration with a soln. of $\text{K}_4\text{Fe}(\text{CN})_6$ are discussed. DOWNS SCHAAF

Determination of lead in Babbitt metal. G. V. SHESTAKOV. *J. Chem. Ind. (Moscow)* 4, 907-8(1927).—Heat 1 g. of finely divided alloy with 20 cc. of aqua regia in an Erlenmeyer flask which has a small funnel in its neck. After about 15 min. when the alloy is all dissolved, add 50 cc. of 10% citric acid soln. and neutralize to phenolphthalein with 20% NH_3 soln. If any PbCl_2 ppts., dissolve it by heating. Pour the soln. into a l. beaker, add 5 cc. of 60% AcOH , dil. to 500 cc. and heat to boiling. Into the boiling soln. introduce dropwise 20-30 cc. of 5% $\text{K}_2\text{Cr}_2\text{O}_7$ soln. and continue heating until the ppt. is heavy and cryst., which may require 30-60 min. Cool to below room temp., filter through a Gooch crucible, wash with 3% AcOH twice and once with 10% NH_3 soln. Heat to const. wt. Det. Cu in a sep. sample using the method of Walker and Whitman, *C. A.* 3, 2659. BERNARD NELSON

The determination of manganese in iron and steel by the silver nitrate-persulfate method. S. V. LIPIN. *Z. anal. Chem.* 72, 401-16(1927).—The journal reference was given incorrectly in *C. A.* 22, 1301. H. G.

Determination of small quantities of sodium. WEILAND. *Mitt. Kali-Forsch.-Anst.* 1927, 21-8.—Manipulative details are given for the method preferred, viz., the pptn. of Na^+ by a concd. uranyl Mg acetate soln. forming $3(\text{UO}_2)(\text{C}_2\text{H}_3\text{O}_2)_4 \cdot \text{Mg} \cdot (\text{C}_2\text{H}_3\text{O}_2)_2$, $\text{NaC}_2\text{H}_3\text{O}_2 \cdot 9\text{H}_2\text{O}$, which is practically insol. in alc. B. C. A.

A modification of Schneider-Finkener's method for the determination of zinc. IGNACIJ MAJDEL. *Arhiv. hem. farm.* 2, 127-36(1928).—Neutralize a dil. H_2SO_4 soln. contg. 0.2-0.3 g. Zn with ammonia using Congo-paper as indicator. Add 8 cc. 0.5 N H_2SO_4 , dil. to 300 cc. and introduce H_2S (2 bubbles per sec.) at 70°. After one hr., filter, wash and ignite in a Rose-crucible with S in a stream of H_2 . J. K.

Bromometric determination of chlorates. K. PETERS AND E. DEUTSCHLÄNDER. *Apoth.-Ztg.* 41, 594-5(1926).—The chlorate (0.05 g. ClO_3) is dissolved in 0.1 N arsenite soln. (25 cc.) and dil. HCl (10 cc.) and gently boiled for 10 min. after addn. of KBr (0.05-0.1 g.); the soln. is then diluted to about 100 cc. and titrated hot (methyl orange being used) with 0.1 N KBrO_3 soln. until colorless. B. C. A.

Electrometric determination of chromic acid in the presence of vanadic acid with the aid of induction and catalysis. RUDOLF LANG AND JOSEF ZWEŘINA. *Z. Elektrochem.* 34, 364-7(1928).—Zintl (*C. A.* 22, 556) has published a method for the detn. of

Cr and V in the presence of one another, but his method will give good results only when the V content is low. It is possible to solve the problem with larger quantities of V present if MnSO_4 is used as inductor and a trace of I as catalyzer. In this case the titration can be accomplished in *N* acid solns., whereas Z's method requires at least 25% of acid. Unless the inductor and catalyzer are present, the titration is tedious and the reduction potential of a little chromic acid is the same as that of considerably more vanadic acid. There are 3 ways in which it is recommended to work, the last one probably being the most convenient in actual practice. (1) Carry out the titration of the chromate with 0.1 *N* arsenite soln. in *N* HCl in the presence of 0.4 g. of MnSO_4 until the potential, which rises at first, begins to fall, then add a drop of 0.0025 molal KI or KIO_3 and finish titrating dropwise, until there is a marked drop in potential. (2) Add the catalyzer before beginning the arsenite titration. This method, which applies also to the titration of very small quantities of Cr, requires in a total vol. of 100 cc. 5–7 cc. of concd. H_2SO_4 and 10 cc. of concd. HCl. In the neighborhood of the equivalence point it is necessary to titrate very slowly. (3) First carry out a preliminary detn. of the Cr by adding an excess of arsenite soln. and the catalyzer, then KMnO_4 until an excess is shown by the color of the soln. and finally arsenite soln. to the electrometric end point. Then for the detn. of both Cr and V, make the soln. *N*–2*N* in H_2SO_4 , add 1–2 g. of NaCl or 2–5 cc. of concd. HCl, and 0.4 g. of MnSO_4 . Add at least 80% of the requisite vol. of 0.1 *N* arsenite soln., wait 2 min. to make sure that it has been entirely oxidized by the chromate anion, then add 1 drop of the catalyzer and titrate slowly to the potential break. Methods (2) and (3) can be carried out with simple reference electrodes consisting of Pt dipping in *N* HCl or 2 *N* H_2SO_4 and a little dissolved $\text{K}_2\text{Cr}_2\text{O}_7$. For the analysis of a soln. contg. Fe, Cr and V, and this is of practical interest, first make sure that the soln. is fully oxidized by adding H_2O_2 or HNO_3 to the HCl or H_2SO_4 soln. Then neutralize with soda until a permanent ppt. begins to form, add 60–70 cc. of 0.1 *N* KMnO_4 and heat at a vol. of 200–250 cc. until the soln. just begins to boil. Now add 3–5 cc. of 0.1 *N* AgNO_3 , 30 cc. of 5 *N* H_2SO_4 and 20 cc. of 6 *N* HCl. After a few min. all the higher oxides of Mn will be reduced. Boil until all Cl_2 is removed and the AgCl is well coagulated. Cool, make the acidity correct and titrate the $\text{Cr}_2\text{O}_7^{--}$ with arsenite according to one of the methods given above and the V by the method of Kelley and Conant (*C. A.* 10, 2179). This requires a fairly high acid concn. in order to get a marked potential change at the end point. It seems best, therefore, to add 5–10 cc. of sirupy H_3PO_4 , which makes the end point sufficiently distinct although by no means as marked as when considerable acid is present.

W. T. H.

Comparison of volumetric methods for determining chromates. P. I. SOKOLOV AND T. V. ARISTOV. *J. Chem. Ind. (Moscow)* 4, 905–6(1927).—Of the 3 common methods of titrating chromates, the iodometric method is too expensive for factory control, since it requires 4–5 g. KI per 0.1 g. $\text{K}_2\text{Cr}_2\text{O}_7$. Penny's method, in which the chromate is treated with an excess of FeSO_4 , and the excess of the latter is titrated with standard $\text{K}_2\text{Cr}_2\text{O}_7$ soln. must be carried out by dropping the chromate into the soln. of FeSO_4 , and not vice versa, as otherwise great errors may result. Schwarz's method, which is the same except that the final titration is made with standard KMnO_4 soln., is as exact as Penny's method.

BERNARD NELSON

The assay of phosphoric acid. F. A. MAURINA. Parke, Davis and Co., Detroit. *J. Am. Pharm. Assoc.* 17, 668–71(1928).—A specimen of H_3PO_4 was assayed by the molybdate method, finally weighing as $\text{Mg}_3\text{P}_2\text{O}_7$. The variations in 4 detns. were 85.57–85.67%. Four other methods including the U. S. P. X were used with unsatisfactory results. The substitution of $\text{Zn}(\text{OH})_2$ for ZnO in the U. S. P. X method gave satisfactory results. The results in 4 detns. were 85.57–85.62%.

L. E. WARREN

The microchemical determination of phosphoric acid as strychnine phosphomolybdate. C. ANTONIANI AND R. B. JONA. Reale Istituto Superiore Agrario Milano. *Giorn. chim. ind. applicata* 10, 203–5(1928).—The method of Embden, which involves the addn. of a reagent (prepd. by mixing a HNO_3 soln. of $(\text{NH}_4)_2\text{MoO}_4$ with strychnine nitrate) to the soln., thus pptg. strychnine phosphomolybdate (cf. *Z. physiol. Chem.* 113, 138), gives very satisfactory results. In the course of the expts. it was found that the ppt. may be allowed to settle and stand for some hrs. without influencing the results; that an excess of reagent does not vitiate the results, though the best conditions are with 6 parts of strychnine and the corresponding quantity of nitromolybdate soln. per 1 part of P_2O_5 ; that an excess of HNO_3 or of other free acid does vitiate the results; and that org. and mineral salts are without influence. The same results are obtained in the detn. of H_3AsO_4 . The method is the most sensitive of gravimetric methods, and is of special value for detg. P_2O_5 in soils, in superphosphates, in Thomas slag, and in animal

and vegetable products. One mg. or even less of P_2O_5 can be detd. precisely.

C. C. DAVIS

The ceruleo-molybdate method for determination of phosphates. V. P. GREEN-STREET. *Malayan Agr. J.* 16, 70-5(1928).—Denigés' colorimetric method, which depends upon the formation of a blue color when an acid soln. of H_3PO_4 is treated with molybdate and stannous ions, was applied to the analysis of tapioca tubes, stems and leaves, oil palm leaflets, pineapple ash and Serdang soil, materials contg. 0.1-5.0% of P_2O_5 , and found to give results which were, on the whole, fairly satisfactory. If the soln. is too acid and contains dissolved SiO_2 , the results are likely to be low.

W. T. H.

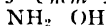
Determination of combined water in natural sulfates. O. ŠEBELÍK. *Chem. Obzor* 2, 46-9(1927).—Minerals contg. alunite lose water at 350° upwards, complete elimination being effected only at white heat. Sources of error are discussed; the methods of Kurizianov and of Dittrich give good results.

B. C. A.

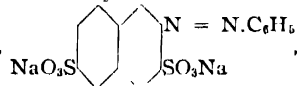
Uranyl acetate as a reagent in microscopic qualitative analysis. E. M. CHAMOT AND H. A. BEDIET. *Mikrochemie* 6, 13-21(1928).—In applying the uranyl acetate test for Na the best procedure consists in evapg. the soln. to be tested on a microscope slide until a dry film is formed, placing a drop of the reagent close to the edge of the film, and drawing a platinum wire through the drop, thence across the film. The formation of isotropic tetrahedra indicates the presence of Na; fine clusters of hair-like crystals the presence of the alk. earths or of Pb; tetragonal prisms K, Rb, Cs, Ag, Tl or NH_4 , square plates Ba and orthorhombic plates or prisms Mn, Mg, Zn, Cd, Fe (ferrous), Ni, Co or Cu. The presence of Na together with a member of the last-named group results in the sepn. of monoclinic triple acetates in the form of polysynthetic twins of somewhat indefinite chem. compn. In the absence of metals other than alkalis the formation of Na Zn uranyl acetate is probably the most sensitive test for the presence of Na; so sensitive is this reaction that silica object slides should be used to avoid possible contamination from Na of the ordinary glass slide.

B. C. A.

Colorimetric determination of small quantities of aniline. V. I. MINAEV, K. O. SVETLYAKOV AND S. S. FROLOV. *J. Chem. Ind. (Moscow)* 4, 840-2(1927).—The for-



mation of the blue dyestuff,



, can be used as a sensitive

test for aniline. Absorb the aniline in H_2SO_4 , if it is desired to det. aniline in air, cool the acid soln. with ice, add an excess of alkali nitrite and allow to stand 30-45 min. Treat the diazo soln. thus obtained with a slight excess of $NaHCO_3$, add an excess of H-acid and allow to stand 10-15 min. Compare the color with that obtained with known amts. of aniline in a colorimeter. This test is applicable to as little as 0.02 mg. of aniline in 100 cc. of soln.

BERNARD NELSON

Determination of anthracene and anthraquinone. H. PIRAK. *Z. angew. Chem.* 41, 231-3(1928).—In the original Höchst method the results obtained are too low on account of over-oxidation; the modified method of Sielisch (C. A. 21, 721) gives low results through incomplete oxidation, and a slight excess of CrO_3 soln. over the amt. indicated by them is necessary for accurate results. The time required for the detn. may be shortened by dilg. the hot H_2SO_4 soln. of anthraquinone with boiling H_2SO_4 . Loss by sublimation may be high at 110° in the original Höchst test (cf. Sielisch, C. A. 21, 721) but is reduced by use of the crucibles advocated by Jacobsohn (C. A. 20, 3145). A lower temp. is, however, preferred. In the procedure recommended, anthracene (1 g.) is dissolved and oxidized as in Sielisch's method, a further 1 cc. of the chromic acid soln. being added when the soln. is definitely brown. After cooling and dilution with 400 cc. of ice-cold water, the anthraquinone is collected on a Jena glass filter-crucible, washed as in Jacobsohn's method, and dried at $95-100^\circ$. The contents are then transferred to a glass beaker and heated with 10 cc. of H_2SO_4 monohydrate at 105° (boiling brine-bath) for 20 min.; acetic acid (25 cc.), free from traces of reducing impurities and previously heated to 100° , is added. On cooling, the anthraquinone seps. as a white lump at the bottom of the beaker. When the contents reach room temp., the beaker is placed in ice for 20 min. and 200 cc. of cold water are then added, rise of temp. being avoided by occasionally cooling in ice. The anthraquinone is collected on the original filter, washed as before and dried at $95-100^\circ$ to const. wt., after which it is sublimed at $180-200^\circ$ (1 hr.) in a drying oven. The door of the oven is not completely closed, and the stopper carrying the thermometer is notched to allow of a slight air-current. The detn. is complete in 4-5 hrs., and gives satisfactory results with

technically pure anthracene and anthraquinone, and with crude anthraquinone. With mixts. contg. less than 50% of anthraquinone the method gives low results for anthraquinone and consequently high values for anthracene. B. C. A.

Detection of hydrocyanic acid. N. A. ROOZENDAAL. *Pharm. Tijdschr. Nederl.-Indie* 4, 110-3; *Chem. Zentr.* 1927, II, 143.—In the Prussian blue test, the least possible alkali, preferably $\text{Na}_2\text{CO}_3 + \text{NaHCO}_3$ according to Kolthoff, should be used. The thiocyanate test is sometimes disturbed in toxicological work by thiocyanates that are likely to be present in corpses. The nitroprusside test is not sensitive enough; the picric acid, guaiacol resin, phenolphthalein, fluorescein, benzidine and pyrimidone tests are not definitely characteristic. Of these last, the fluorescein test is to be recommended. All these reactions are carried out better in soln. than with paper strips. The decolorization of I-starch by HCN is not characteristic. The AgCN reaction is discussed. C. C. DAVIS

Determination of organic carbon in soil and in pure organic compounds by means of permanganic anhydride. LUIGI UMBERTO DE NARDO. *Stazione Chimico-Agraria Sperimentale Udine. Giorn. chim. ind. applicata* 10, 253-5(1928).—The method is very precise; in fact it gives results almost identical with those obtained by elementary analysis. The app. is simple, a detn. requires only 20-30 min., the reagents are cheap, and altogether it is preferable to elementary analysis or the $\text{Ag}_2\text{Cr}_2\text{O}_7$ method, particularly for soils. Add 5 cc. of H_2SO_4 (concd. for org. compds. and 30% concn. for soils) to the sample (0.2-0.4 g. of soil, or 0.1-0.2 g. of org. compd.), then add 10 cc. of a soln. of KMnO_4 in concd. H_2SO_4 (1 g. per 10 of acid), heat, absorb the CO_2 in 50% aq. KOH and calc. from this latter absorption the % C. With calcareous soils, the carbonate CO_2 must first be eliminated by treatment with H_2SO_4 . Complete absorption of CO_2 is assured by the passage of a CO_2 -free air current through the system. In the prepn. of Mn_2O_7 it is very important to avoid the formation of oily drops of free Mn_2O_7 on the H_2SO_4 because of the danger of ignition. Thoroughly dry KMnO_4 , cold, concd. H_2SO_4 , slow prepn. of the reagent and the use of only fresh solns. will avoid this danger. C. C. DAVIS

Determination of halogens in organic compounds. M. PRONER. *Roczniki farm.* 4, 99-106(1926).—The method is specially suitable for naphthalene derivs., terpenes, and heterocyclic compds. The substance (0.1-0.2 g.) is slowly warmed with 95% alc., and small pieces of Na (1 g.) are added; the mixt. is warmed with 30% H_2O_2 soln. (5 cc.) until evolution of O ceases, acidified with HNO_3 , reduced with Na_2SO_3 , warmed and the chloride pptd. with AgNO_3 . B. C. A.

Micro-determination of mercury in organic compounds and the determination of carbon and hydrogen in such compounds. A. VERDINO. *Mikrochemie* 6, 5-12(1928).—The destruction of the org. matter by heating with concd. H_2SO_4 and HNO_3 leads to a small loss of Hg, but good results are obtained by heating for 2 hrs. at $250-270^\circ$ with fuming HNO_3 in a sealed tube. The Hg can be obtained from the soln. by electrolysis with 2.5-3.2 v., a gold-plated Pt gauze cathode being used. B. C. A.

Objectives and content of the elementary college course in qualitative analysis (REEDY) (WILLARD) 2. The technic of conducting the introductory college course in qualitative analysis (FURMAN) (MAHIN) 2. Advanced and graduate work in analytical chemistry (FOULK) 2.

AUGER: *Cours de chimie analytique*. 3rd ed., revised. Paris: Presses universitaires de France. 291 pp.

BARRAL, E.: *Précis d'analyse chimique quantitative. II. Métalloïdes et dérivés (anions), composés organiques*. 2nd ed., revised. Paris: J. B. Baillièrre et fils. 612 pp.

OLIVIER, ETIENNE: *L'analyse des zincs commerciaux*. 2nd ed., revised and enlarged. Méthode permettant de savoir rapidement si la composition des zincs commerciaux est conforme aux prescriptions standardisées. Paris: Ch. Béranger. 40 pp.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Determinative mineralogy. IV. P. C. PUTNAM, E. J. ROBERTS AND D. H. SELCHOW. *Am. J. Sci.* 15, 455-60(1928); cf. C. A. 22, 2529.—The reagent for testing Au was 1 vol. of pyridine in 9 vols. of 40% HBr. A minute fragment of the mineral was

treated with aqua regia (4HCl to 1 HNO₃) on a glass slide and evapd. to dryness, the residue was taken up with water, again evapd. to dryness and again dissolved in water. A portion (small drop) of this soln. was transferred to another part of the slide beside an equal vol. of the reagent. These were joined by means of a glass hair, when pleochroic crystals of (C₆H₅NH)AuBr₄ were formed within 30 sec.; limit, 0.0001 molar or 0.02 μ g. Au. For S the reagent was bromocresol green soln., alk. phase. A Pyrex tube 10 cm. long and 3 mm. bore was made with an S bend at the lower end and another S bend enlarged near the top. A fragment of sulfide or sulfite was placed in the lower bend and the reagent in the upper bend. The mineral was heated to the softening point of Pyrex (about 700°) and any S present passed up the tube as SO₂ and changed the color of the reagent, previously made blue by a trace of NaOH, to yellow; limit 0.2 μ g. S. An equally sensitive test for S using the same app. depends on a decoloration of a starch-iodine soln. L. W. RIGGS

A sulfoarsenite of lead near jordanite from the Andreevsk mine in the southern Urals. S. S. SMIRNOV. *Mém. soc. russe. min.* [2], 54, 21-5(1925); *Mineralog. Abstracts* 3, 448.—An analysis of jordanite gave: S 17.80, As 9.46, Sb 2.10, Pb 69.85, insol. 0.57, sum 99.78%; sp. gr. 6.38; formula 4 PbS.(As,Sb)₂S₃. J. F. SCHAIER

The hydrothermal paragenesis of quartz and arsenic minerals in the altered quartz porphyry of Saubach and some properties of pharmacosiderite and symplectite. F. HEIDE. *Z. Krist.* 67, 33-90(1928).—There is a definite relation between temp. of formation and type of twinning in quartz. Dauphiné and brazilian twins form up to 575°, but Japanese twins only at lower temps.; the latter are never found in pegmatites but occur on milky, smoky or rock crystal, never amethyst quartz. The quartz in these beds formed below 575°, and the As minerals under 200°. *Pharmacosiderite*, 2FeAsO₄.Fe(OH)₃.5H₂O, loses 5 mols. of zeolitic H₂O up to 233 ± 1°, where decompn. begins. The remarkable color change it shows when treated with acids or bases is due to incipient decompn., caused by the infiltration of the soln. in the large meshes of the lattice. *Symplectite*, Fe₃(AsO₄)₂.8H₂O, becomes blue-black because of oxidation of Fe⁺⁺ to Fe⁺⁺⁺; this can be produced artificially by H₂O₂. The mineral is decompd. by KOH, forming Fe(OH)₃. *Scorodite*, FeAsO₄.2H₂O, reacts toward KOH and HCl like symplectite. An extensive bibliography is included. L. S. R.

Structure of rutile. LASZLO TOKODY. *Mathematik Természettudományi Értesítő* 44, 247-53 (Hungarian), 254 (German summary) (1927); *Mineralog. Abstracts* 3, 429.—By the Debye-Scherrer x-ray method, rutile gave for the dimensions of the tetragonal cell $a = 4.4923$, $c = 2.8930$ A. U., contg. 2 mols.; calc. $d = 4.511$. The shortest distance between Ti and O atoms is 2.11 A. U. J. F. SCHAIER

Nomenclature of bauxite. FRITZ KERNER. *Montan. Rundschau* 20, 257-9 (1928).—The bauxite minerals may be divided into the following groups according to mineralogical and chem. compn.: only Al₂O₃.H₂O, diasporite; more Al₂O₃.H₂O than Al₂O₃.3H₂O, "unterbauxite" or "miobauxite;" equal amts. of Al₂O₃.H₂O and Al₂O₃.3H₂O, bauxite; more Al₂O₃.3H₂O than Al₂O₃.H₂O, "uber-bauxite" or "pliobauxite;" only Al₂O₃.3H₂O, gibbsite. Aluminous laterite and siliceous bauxite are synonymous. J. F. SCHAIER

Two scapolites from the river Slyudyanka region, Baikal. S. S. SMIRNOV. *Mém. soc. russe. min.* [2], 55, 354-61(1926); *Mineralog. Abstracts* 3, 448.—Analyses of "stroganorite" and "glaucolite" are given. J. F. SCHAIER

Association of gold and tetradymite in S. Rhodesia. B. LIGHTFOOT. *Trans. Geol. Soc. S. Africa* 30, 1-4(1927).—An analysis of the tetradymite occurring with Au at the New Mystery Mine, Ratanyana farm, West Givanda District gave: Bi 56.09, Te 33.40, Se trace, S 4.69, SiO₂ and insol. silicates 5.90, sum 100.08%. No Au telluride were found. J. F. SCHAIER

Mineral resources of the United States in 1927. FRANK J. KATZ AND MARTHA B. CLARK. *Bur. Mines, Mineral Resources of U. S. 1927*, preliminary summary, 120 pp. (published Aug. 13, 1928). E. H.

Tyuyamunite and some minerals of the uranite group. E. Y. RODE. *Mém. soc. russe. min.* [2], 54, 377-83(1925); *Mineralog. Abstracts* 3, 447.—After treating with acetic acid to remove calcite and drying over H₂SO₄ at room temp. an analysis of tyuyamunite gave: UO₃ 56.07, V₂O₅ 18.92, CaO 5.08, BaO 0.32, MgO 0.12, Fe₂O₃ 0.86, insol. 0.31, H₂O 17.53, sum 99.21%. The zeolitic nature of the H₂O in members of the uranite group is discussed. J. F. SCHAIER

Research in processes of ore deposition. WALDEMAR LINDGREN. *Am. Inst. Mining Met. Eng. Tech. Pub. No. 78*, 14 pp.(1928).—A general survey of geochem. research, outline of problems and suggestions for the future. J. F. SCHAIER

State and density of solutions depositing metalliferous veins. WM. H. EDMONS.

Am. Inst. Mining Met. Eng., Tech. Pub. No. 71, 13 pp.(1928).—There is little or no evidence to support the theory that metalliferous veins were deposited from ore magmas. At Lead, S. D., very dil. solns. are depositing vein material around fragments of schist. The general question of rock inclusions in veins is discussed at length. J. F. S.

Magmatic origin of ores. R. H. RASTALL. *Geol. Mag.* 65, 270-9(1928).—A definition of "magmatic" and general discussion of current and historical theories of ore genesis. J. F. SCHAIRER

Ore magmas (I) (II). J. H. L. VOGT. *Eng. Mining J.* 123, 645-50, 682-4(1927).—The term magma is defined as "liquid high-temp solns" often carrying dissolved volatile compds. in great quantity. Ore magmas are divided into classes: those due to 1, the formation of 2 liquid phases; 2, the concn. of first crystg. minerals; 3, the concn. within the residual magma. Normal contact metamorphism is a purely thermal process due to the reactions in the solid phase, and may be explained without involving hot gases from the magma. J. F. SCHAIRER

Status of leached outcrops investigation. ROLAND BLANCHARD AND P. F. BOSWELL. *Eng. Mining J.* 125, 280-5, 373-7(1928).—In studies of secondary enrichment of ore deposits criteria have been established to recognize limonite derived from the various Cu, Zn and Pb sulfides. Sufficient S must be present for sulfides to dissolve by oxidation. Even though oxidation of a sulfide occurs no limonite will form unless Fe salts are present in soln. Where Fe salts are present in a soln. of high acidity, and no neutralizer is encountered, Fe may be carried for long distances before pptn. as limonite. J. F. SCHAIRER

Tertiary mineralization of the northern Black Hills. J. P. CONNOLLY. S. Dakota School Mines, Dept. Geol. Min., *Bull. No. 15, 130 pp.*(1927).—Mainly geological. The age of the pegmatites obtained from radioactive data is not in agreement with geological observations. A bibliography of the economic geology of the northern Black Hills is included. An analysis of calcite from ore gang and assays and analyses of Homestake mine ore concentrates are given. J. F. SCHAIRER

Mineral constituents of the Broken Hill lode. F. L. STILLWELL. *Proc. Australasian Inst. Mining Met.* 1927, 97-172.—A complete mineralographic study of the Broken Hill ores was made and the microscopic data were given. *Analyses of arsenopyrite, meneghinite, mangan-hedenbergite and manganiferous calcite* are included. An unnamed and "probably new Ni-Co-Sb mineral" is incompletely described. It occurs as small inclusions in arsenopyrite. It is possibly orthorhombic, similar in color and hardness to arsenopyrite, and affects polarized light strongly. On etching with HNO₃ it effervesces more briskly than arsenopyrite and is slowly tarnished brown by FeCl₃. Microchem. tests on excavated particles indicate the presence of Co, Ni and Sb. It may be only antimoniferous safflorite. J. F. SCHAIRER

Principal base metal and base mineral resources of the Union of South Africa. C. J. N. JOURDAN. *J. Chem. Met. Mining Soc. S. Africa* 28, 1-13(1927); cf. C. A. 20, 3411.—Records of the total production of metallic and non-metallic minerals of S. Africa are given, with analyses of coals, Fe, Cu and Mn ores, asbestos, corundum, magnesite and talc, and a discussion of previous mining operations. J. F. S.

Occurrence of galena in clay, southern Shan States, Burma. W. H. RUNDALL. *Bull. Inst. Mining Met.* No. 276, 1-10(1927); No. 281, 37-42(1928).—Beds of argenterous galena occur in Shan carrying 10 to 70 oz. Ag to 1 ton of Pb. Analyses of Pb slag, limestone and gang are included. J. F. SCHAIRER

Sedimentary metalliferous deposits of the red beds. JOHN W. FINCH. *Am. Inst. Mining Met. Eng. Tech. Pub. No. 51, 7 pp.*(1928).—The original source of the Cu ores of the red beds was weathered rocks. The ores were concd. by stream action and after burial were altered from carbonates to sulfides. In early Tertiary time these sulfides were concd. by chem. action and secondary enrichment processes. The small size of the deposits and their nonuniform character render them commercially unprofitable. J. F. SCHAIRER

Mineral production of India during 1926. E. H. PASCOE. *Records Geol. Survey India* 60, 205-91(1927); cf. C. A. 21, 1239.—Decreases in production over 1925 are reported for chromite, Au, jadeite, magnesite, mica, oil, saltpetr, apatite, bauxite, gypsum, ocher, serpentine, soda. Increases are reported for coal, Cu, Fe, Pb, Ag, Mn, Sn, W, Zn, FeSO₄, Sb, amber, alum, diamonds, monazite, ilmenite, clays, fuller's earth and barite. J. F. SCHAIRER

Useful fossils, natural raw materials of the Kuban territory and Black Sea district. P. N. CHIRVINSKI. *Arbeiten Nord-Kaukasischen Assoc. wiss. Inst. Rostov am Don* No. 24, 232 pp.(1927)(Russian); *Mineralog. Abstracts* 3, 443.—Materials in Kuban territory include oil, gas, coal, graphite, peat, S, Pb-Zn-Ag ores, ores of Cu, As, Hg, Fe, Mn,

Cr, Ni, saltpeter, Na_2SO_4 , MgSO_4 , FeSO_4 , alum, gypsum, barite, celestite, salt, borates, Br and I salts, building and ornamental stones, refractories, lithographic stone, clays, sand and gravel, feldspar, granite, asbestos, serpentine, talc, petalite, precious stones. From the Black Sea are described fuels, pyrite, ores of Cu, Ag, Pb, Zn, Fe, building materials, cement shales, calcite, Iceland spar. A complete index of subjects and localities is added. J. F. SCHAIRER

A newly discovered manganese deposit in the northern Caucasus. A. KOLOD-JAZNY. *Bergjournal* 1925, No. 5; *Z. prakt. Geol.* 33, 167; *Chem. Zentr.* 1927, I, 1812.—The ore lies in 2 beds in Oligocene strata. Its Mn content is 30–60% and about 3,000–000 tons of ore are present. C. C. DAVIS

Fluorspar, lead and zinc deposits of Western Transvaal. W. KUPFFERBURGER. *Trans. Geol. Soc. S. Africa* 30, 5–56 (1927).—Descriptive. Analyses of dolomite rock, talc-calcite rock, talcy-dolomite and Mn-earths are included. J. F. SCHAIRER

Genesis of Grecian magnesite. J. R. THOENEN. *Am. Inst. Mining Met. Eng. Tech. Pub.* No. 67, 9 pp. (1928).—Alteration of serpentine by H_2O does not completely explain the occurrence of magnesite. T. suggests that the carbonate ore may be of magmatic origin. J. F. SCHAIRER

Corundum. C. J. N. JOURDAN. *J. Chem. Met. Mining Soc. S. Africa* 28, 230–6 (1928).—In the north of the Union of S. Africa the corundum fields have an area of 2000 sq. miles. A typical analysis of S. African corundum is: Al_2O_3 94.51, SiO_2 1.54, Fe_2O_3 1.23, TiO_2 0.02, combined H_2O 2.70%. Analyses of bauxites from France and the U. S. A. are given. The av. corundum content of the Transvaal reef ore is "probably somewhere near 40%." A plea is made for developing the deposits in S. Africa. E. G. R. ARDAGH

Mineralogical data on the bauvites of Pays de Fenouillet. JACQUES DELAPPARENT. *Compt. rend.* 186, 1560–1 (1928).—Lithological. L. W. RIGGS

Geology of Bundi State, Rajputana. A. I. COULSON. *Records Geol. Survey India* 60, 164–204 (1927).—The lower Bhandar limestone is an important raw material for lime and cement. Analyses of limestones used for lime and cement and complete data on the compn., setting time, tensile and compression strength of the cements are given. J. F. SCHAIRER

Kaolin and associated clays of Punk Island. L. H. COLE AND J. F. MCMAHON. *Investigations in Ceramics and Road Materials, Dept. of Mines, Can., No. 690*, 25 36 (1928).—This is a detailed report on the location and description of clay deposits of Punk Island in Lake Winnipeg. The topography of the island is given and means of transportation to the deposits. Tests were made of the clays and their economic importance was indicated. L. B. MILLER

Report of the director for 1926. H. B. MAUFE. *S. Rhodesia Geol. Survey* 1927, 11 pp.; *Mineralog. Abstracts* 3, 445.—The sequence of events in serpentinization has been worked out and it is observed that the nearer the fiber approaches the formula $3\text{MgO} \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$, the better it is commercially. J. F. SCHAIRER

Talc deposits near Kaaomuiden, in Eastern Transvaal. A. I. HALL. *Trans. Geol. Soc. S. Africa* 30, 69–88 (1927).—Three varieties of talc occur: green foliated talc of high quality, green massive talc and steatite. Analyses of talcs and dolomite are given. The origin of the talc beds is due to chem. reactions characteristic of the zone of weathering, i. e., hydration and carbonation. J. F. SCHAIRER

The origin of petroleum. J. A. LEBEL. *Bull. soc. chim.* 43, 654–7 (1928).—Three theories for the formation of petroleum are reviewed: (1) fermentation of org. material, (2) decompn. of coal under the influence of heat and pressure, (3) the reaction of water on the metals. The last theory is believed to account for the petroleum in the Baku or Mesopotamian fields, since no anthracite is found in this region and metals are found in the asphalts. A sample of granite was tested and believed to allow a penetration of water of 0.01 mm. per day, which would account for the presence of water. D. H. P.

Economic geology of the Castlegate, Wellington and Sunnyside quadrangles, Carbon County, Utah. FRANK R. CLARK. *U. S. Geol. Survey, Bull.* 793, 162 pp. (1928).—The Wellington and Sunnyside quadrangles are estd. to contain over 2 billion tons of bituminous coal of which 60% is recoverable. Analysis of about 50 samples of coal from this area gave only 6 samples, as from the mine, with B.t.u. below 12,000. The recoverable coal in the Castlegate quadrangle is estd. at 720 million tons. L. W. RIGGS

Constituents of igneous rocks. SUMINOSUKE ONO. *Proc. Phys. Math. Soc. (Japan)* 9, 109–13 (1927).—A simple relation between the amts. of constituents of igneous rocks is that the sum of the amts. of O, Ca, K and Ti is a const. a little above 53% while that of the other elements is 47%. The ratio of these figures may be given as

mass nos. of O and N. O. calls these the O and N series. This relation is correlated with Eddington's assumption of an extremely ionized state in hot stars. J. F. S.

Plutonic intrusions of the southern uplands east of the Nith Valley. FREDERICK WALKER. *Geol. Mag.* 65, 153-62(1928).—Analyses of porphyritic hornblende-biotite granodiorite, augite-biotite quartz-diorite, hornblende-biotite granodiorite and quartz-augite-hypersthene porphyrite are given. J. F. SCHAIRER

The tholeiites and dolerites of the Dalmahoy syncline. ROBERT CAMPBELL AND J. W. LUNN. *Trans. Roy. Soc. Edinburgh* 55, 489-505(1927).—Analyses of tholeiite, segregation veins and dolerite are given. J. F. SCHAIRER

Presence of alkaline lavas in the Northern Aegean Sea. CONST. A. KTÉNAS. *Compt. rend.* 186, 1631-3(1928).—This region furnishes calco-alk. lavas assocd. with magmatic alk. deposits. Four chem. analyses of the rocks by Raoult are reported and the results are discussed from the lithologic point of view. L. W. RIGGS

A new region of nephelinic intrusive rocks in Madagascar. A. LACROIX. *Compt. rend.* 186, 1457-60(1928).—The nephelinic syenite in question was found midway between Manatorwotra and Ankarimbolo in the province of Farafangana. Analyses by Raoult of 3 specimens are reported, and the lithological relations of the rocks are discussed. L. W. RIGGS

Igneous and metamorphic history of Cromar, Deeside, Aberdeenshire. H. H. READ. *Trans. Roy. Soc. Edinburgh* 55, 317-53(1927).—Equations showing chem. changes in contact metamorphism for the alteration of sillimanite, andalusite, staurolite and anorthite are given. Analyses of augen-gneiss, oligoclase-biotite gneiss, plagioclase-porphyroblast schist and granite are included. J. F. SCHAIRER

Chlorite schist from West Tatra. STANISLAW JASKOLSKI. *Bull. intern. acad. polonaise* 1927, 703-17.—Analyses of chlorite schists and chlorites are included. J. F. SCHAIRER

A metamorphosed nodular shale previously described as a "spotted" metamorphic rock. L. R. WAGER. *Geol. Mag.* 65, 88-91(1928).—The mineralogical compn. of nodules in a shale is calcd. from an analysis. J. F. SCHAIRER

Sketch of the geological features and of the mining at Jáchymov. JAN AUER. *Hornický věstník* 28, 532-6, 541-5(1927); *Mineralog. Abstracts* 3, 443.—New analyses of red dolomite are given. J. F. SCHAIRER

Dust fall in the central part of Poland on April 26 to 28, 1928. HENRYK ARCOWSKI AND EDWARD STENZ. *Compt. rend.* 186, 1858-60(1928).—Chem. analysis of the dust gave: SiO₂ 57.94, Al₂O₃ 12.30, Fe₂O₃ 5.49, MgO 1.77, CaO 2.03, Na₂O 0.31, K₂O 2.97, P₂O₅ 0.24, MnO 0.06, SO₃ 0.13, CO₂ 0.65, Cl trace, org. C 2.94, H₂O (105.3°) 5.15, H₂O (hygroscopic) 7.01, sum 99.69%. The H₂O and org. substances being deducted the compn. was silicates and quartz 76.46, colloidal substances (clay) 20.36, carbonates 2.38, sulfates 0.24, phosphates 0.56. From the chem. compn., microscopic appearance and the weather conditions which indicated a hurricane in the region north of the Black Sea on April 25, it was concluded that the dust came from south central Russia. L. W. RIGGS

Geological notes on the island of Dominica, B. W. I., KENNETH W. EARLE. *Geol. Mag.* 65, 169-87(1928).—Soil was extd. with 20% HCl and the soln. analyzed; data for 3 soils are given. J. F. SCHAIRER

Origin of the mineral springs of Tarasp-Schuls. AD. HARTMANN. *Vierteljahrsschr. naturforsch. Ges. Zurich* 72, 237-90(1927).—The origin of the acid springs lies not in pyrite weathering but in the reaction of volcanic gases with water and rocks. CO₂ is the principal dissolved gas. Seventeen water analyses and 7 gas analyses are included. Data are given on the rate of flow, temp., mineral and CO₂ content of 12 springs; 5 analyses of the country rock and efflorescences near the springs are given; B₂O₃, Cl and NH₃ were detd. with great care in many of the springs. All the analyses and data point toward a volcanic origin of the constituents of the springs. J. F. SCHAIRER

Joly's radioactivity hypothesis for the explanation of mountain formation. FRANZ LÖTZE. *Nachr. Ges. Wiss. Göttingen Math.-physik Klasse* 1927, 75-111.—A discussion of the relation of the earth's thermal history and radioactivity to the facts of geology with an extensive bibliography. Conclusion: the Joly radioactive theory as modified and interpreted is not in harmony with the facts of geology. A harmonic analysis of the data is given. J. F. SCHAIRER

The arc spectrum of uraninite from Kasolo (VERHAEGHE) 3. The crystal structure of bixbyite and artificial Mn₂O₃ (ZACHARIASEN) 2. Determination of combined water in natural sulfates (ŠEBELIK) 7.

BENSON, ALLAN L.: *The Story of Geology*. New York: Cosmopolitan Book Corp. 300 pp. \$4. Reviewed in *Ind. Eng. Chem.* 20, 987(1928).

GREGORY, J. W.: *The Elements of Economic Geology*. London: Methuen & Co., Ltd. 312 pp.; 10s. Reviewed in *Bull. Imp. Inst.* 26, 265-6(1928); *Engineering* 126, 155.

HESEMANN, JULIUS: *Die devonischen Eisenerze des Mittelharzes*. Halle (Saale): W. Knapp. 56 pp. M. 3.50.

LABOUREUR, M., AND PEPIN-LEHALLBUR, J.: *Chimie minérale*. Vol. II. Paris: Ch. Béranger. 557 pp. Reviewed in *Chimie et industrie* 19, 1180(1928).

9—METALLURGY AND METALLOGRAPHY

C. J. DEMOREST, R. H. ABORN

Utilization of by-products of the great siderurgical industry. GIUSEPPE TOMARCHIO. Reale Scuola Industriale Paolo Boselli, Savona. *Met. italiana* 20, 259-68(1928).—A review and discussion, dealing with distn. products of coal, blast-furnace gas and slag and cements. C. C. DAVIS

Copper milling research in Michigan. A. W. FAHRENWALD. Bur. Mines, *Repts. of Investigations* No. 2878, 5 pp.(1928).—In Michigan, Cu occurs almost entirely native (amygdaloid and conglomerate), a slight amt. of CuS being present. Since the conglomerate ore is efficiently treated, the amygdaloid, alone, is considered. Four to 7 lb. Cu per ton is lost in the tailings in the present-day practice. Microscopic examn. of the table tails showed that much flakey and fine metallic Cu was escaping, suggesting the use of flotation, which previously has been unsuccessful. In the present researches table concentrate contg. 28-mesh and 35-mesh Cu floated well and 65-mesh floated readily when xanthate was used in the pulp, which is made alk. with Na_2CO_3 , CaO or NaH_2PO_4 in small amts., in conjunction with Barrett No. 4 and No. 5 steam-distd. pine oils. Flotation is found to be easier when finely ground barren rock is mixed with the pulp. With table feeds of various operating mills this method of flotation repeatedly gave tailings which carried as little as 0.06% Cu. The advantages of this method of flotation over the all-gravity process are claimed to be: (1) the additional recovery of Cu (3,240,000 lb. per year); (2) lower smelting cost of concentrate; (3) lower slag loss; (4) no table middling regrind. This method of flotation of amygdaloid Cu ores is to be tested in Michigan mills. J. BALOZIAN

Flotation equipment of the Combined Metals Reduction Company. H. D. KEISER. *Eng. Mining J.* 126, 253-5(1928). E. H.

The evolution of slime treatment on the Witwatersrand and gold mines. J. R. THURLOW AND T. K. PRENTICE. *J. Chem. Met. Mining Soc. S. Africa* 28, 251-70(1928).—A brief description and comparison of respective systems of filtration employed in this district are given. Special reference is made to continuous filters. For practical metallurgical purposes all pulverized ores may be divided into two fractions: one sand, which is leachable, and the other slime, which is unleachable without the application of external pressure. Witwatersrand slime consists essentially of silica and clay. The leachable portion of the ore is sepd. by direct filling or by intermediate filling. Each of the following subjects in connection with the development of slime treatment is discussed sep.: (1) production of slime; (2) collection and thickening of slime; (3) soln. of the Au in slime; (4) sepn. of Au-bearing soln. from the treated slime; (5) pptn. of the Au from the cyanide solns; and (6) extns and costs. All the latest plants on the Rand have installed the Zn-dust process, which has the following advantages over filiform Zn pptn.: (1) a complete clean-up at month end, with elimination of the carry-over of a high % of monthly output; (2) reduced Zn consumption; (3) lower handling loss; (4) greater security against theft; (5) reduced labor cost; and (6) saving in smelting operation. Several charts, flow sheets and a brief discussion are included. W. H. BOYNTON

Carbon deposition near furnace top. F. C. HOWARD. *Iron Age* 122, 271(1928).—Calcs. based on the work of Kinney (*C. A.* 21, 1428, 2863) strongly indicate that the deposition of C in the top of the blast furnace comes from the blast-furnace gases themselves and not from the volatile matter in the coke charge. DOWNS SCHAAF

The operation of quicksilver retorts. HOMAR L. JOHNSON. *Eng. Mining J.* 126, 215-7(1928).—Recent high prices for Hg have resulted in renewed activity in several old producing mines. Two types of retorts are used: "D" retorts resembling the letter with the straight side lying horizontally and consisting of heavy cast iron; and Johnson-McKay tubes or pipe retorts of cast-iron pipes 12 in. or more in diam. and of varying

lengths. The "D" type is more substantial and offers less hazard of mercurial poisoning to the operator. Its initial costs are higher, it is easier to operate, but requires more fuel than the pipe retort per unit of ore treated. Two charges per 24 hrs. is rather common practice. Ores contg. S are mixed with hydrated or slaked lime to prevent pptn. of HgS in the condensers. On a "D" retort charge of 750 lb. (340 kg.) an av. figure for green scrub or jack pine is about 1 cord per retort day. The details of operation are described and several illustrations are included. Ways in which local conditions necessitate variations in practice are pointed out.

W. H. BOYNTON

The estimation of the material and heat balance of blast furnaces from throat gas analysis and the blast quantity. HUGO BANSEN. *Archiv Eisenhüttenwesen* 1, 245-61 (1927).—Formulas and tables are given for detg the analysis of combustion gases from those of the mixed throat gases, and from the values obtained the material and heat balance of the furnace is calcd. For calcg. the heat balance the principal assumption made for the thermal equil. is: $\text{coke} \times \text{metallurgically available heat} = \text{pig Fe} \times \text{metallurgically required heat}$. The heat available from a kg. of coke is calcd. from throat gas analyses, and throat gas and blast temps. That required for a ton of crude Fe is detd. from the crude Fe compn., that of the scrap Fe charged and the amt. of slag for a ton of pig Fe, and from this the coke consumed calcd. From the examples given, the influence on the consumption of coke of the gas compn., the gas and blast temps., and the quantity of slag is shown; in a sec., the effect of operating fluctuations on the material and thermal balance is discussed. These investigations show that blast furnaces should be operated under careful and continual supervision. An instrument board is developed which gives continuously the compn. and temp. of the waste gases.

J. BALOZIAN

The heat balance of the Siemens Martin furnace with special regard to waste-gas losses. CARL SCHWARZ. *Archiv Eisenhüttenwesen* 1, 273-83 (1927).—The heat balances of other investigators for the Siemens-Martin furnace are critically reviewed, the useful heat, and the heat losses in the hearth zone and in the lower part of the furnace being dealt with in detail. In expts. to show the influence of the distribution of flame, the relations between preheating, the temp. of the flame with and without disson., and the quantity of heat available on cooling the combustion gases are obtained. From these it is apparent, that with increasing temps. of preheating there is an increase both in the heat available over 1700°, and that tied up through disson. Conclusion: Even if one suitably suppresses the losses between the hearth and stack there will still remain sufficient waste-heat at a high enough temp. for utilization in the waste-heat boiler, even after as much heat as possible has been consumed in preheating. A thermal balance diagram is given which combines the advantageous points of the heat content-temp. diagram of S. (*Stahl u. Eisen* 45, 795 (1925)), and the heat-flow diagram for Bansen (*Ber. Stahlw. Aussch. V. d. Eisenh.* 92, 7 (1925)), replacing formulas for the comprehension of the relations of the balance.

J. BALOZIAN

The high-frequency induction furnace applied to metallurgy. FRANZ WEVER and GUSTAV HINDRICH. *Archiv Eisenhüttenwesen* 1, 345-55 (1927); cf. *C. A.* 22, 1282.—A continuation of the work performed at the *Kaiser Wilhelm Inst. Iron Research* in 1926 (*C. A.* 21, 2848) on the metallurgical behavior of the high-frequency induction furnace. When an acid hearth is used, the C contents of the steels are not markedly influenced by Mn in excess of 0.06-0.8% (excepting at very high concns.), cannot be lowered below 0.05% even by the addn. of a large excess of Fe_3O_4 and can only be quantitatively removed by an excess of dissolved Fe_2O_3 . By exactly measuring the charge and reaction time, the melt may be quantitatively deoxidized without the use of an excess of the deoxidizing material. Unalloyed soft steels and C-poor Cr steels when refined in the induction furnace are not equal in their C content to the basic C steels prep'd. earlier, and because of their small Mn and Si are free of red-shortness, all hot-working processes increasing. The multihardness nos. of acid-melted C steels and those from the acid Siemens-Martin furnace are reached at the same compns. The alloy and the trade crucible steels have the same qualities. Steels refined in a 100 kw. high-frequency induction furnace show multi-hardness nos. which are greater than those of trade steels normally, in spite of unfavorable conditions. The high reaction energy of the high-frequency furnace on account of the active bath motion also takes place in the larger furnaces as is shown by the low S content (0.008%).

J. BALOZIAN

The economical estimation of charges, sort of crude iron and the operating conditions in blast-furnace management. G. BULLE. *Archiv Eisenhüttenwesen* 1, 161-76 (1927).—The influence of various qualities of ores and coke, kinds of crude Fe and varying operating conditions in blast-furnace management on the heat needed, and the

probable price of ore and coke are calcd. from thermal and metallurgical considerations. The thermal calcs. are based on those of Osann (*Lehrbuch der Eisenhüttenkunde* Vol. 1 (1923), C. A. 18, 1107), but allow for losses in waste gas, and for cooling and radiation losses. It is proposed to obtain exactly the ore required for a run from a numerical tabulation of the thermal and metallurgical values of various charges, types of crude Fe and working conditions. J. BALOZIAN

The calculation of the carbon consumed or the oxygen gasified by direct reduction in the blast furnace. ED. MAURER. *Archiv Eisenhüttenwesen* 1, 331-7 (1927). J. B.

The use of silica gel as a medium for drying blast. EDWIN H. LEWIS. *Iron Coal Trades Rev.* 65, 444-6 (1927); cf. C. A. 21, 3868.—Silica gel is being used at the Wishaw works of the Glasgow Iron and Steel Co., Ltd., for the drying of the blast with considerable success. The moisture content is cut down from 3.5 (1925) to around 1.1 to 1.6 grains per cu. ft. This results in a 12 to 17% increase in output and a 4/6 to 5.7% saving in fuel. LESLIE B. BRAGG

Diffusion of zinc into copper. SAMUEL L. HOYT. General Electric Co. *Am. Inst. Mining and Met. Eng. Tech. Publication* No. 128, 4 pp. (1928).—The rate of diffusion of a Zn coating into Cu strips was detd. at 9 temps. by measuring its amt. for 3 time intervals, the expense of the investigation being reduced to the min. Plotting the time against the log of the penetration gave a straight curve at each temp. The strips 5 to 6 mils thick would be converted entirely into brass in 4 5 hrs. at 550°, or in 30 min. at 650°. The effect of temp. on the time required for a given penetration is plotted as a similar straight curve. The rate of penetration increased with time, indicating the existence of an "incubation" period. GEO. F. COMSTOCK

Speiss and the metals of the platinum group. H. RUSDEN and J. HENDERSON. *J. Chem. Met. Mining Soc. S. Africa* 28, 270-2 (1928); cf. C. A. 22, 2130.—Discussion by G. H. Stanley. There is a question whether osmiridium, etc., are combined in speiss as arsenide, dissolved, or in mech. suspension. Osmiridium alloys appear to be "wetted" by Pb with increasing ease as the temp. rises. Pt behaves similarly with Hg. Removal of As from speiss by roasting, S. considers, is preferable to the use of such large quantities of litharge in smelting, producing thereby such enormous amounts of Pb for subsequent treatment. The surprisingly low results obtained on smelting with Pb on the larger scale were due to the insol. of osmiridium in Pb. An elec. furnace might be preferable to a pan furnace, though the induction type would not be practical, because of the poor cond. of the charge. W. H. BOYNTON

Has aluminum a transformation point? ALFRED SCHULZE. *Z. Physik* 49, 146-54 (1928).—The results of a no. of previous investigations are summarized. Some of these indicate a transformation point above 500° while others give no indication of any such change. To settle the question the elec. resistance of 3 specimens of Al of varying degrees of purity was measured at intervals from 300° to 615°. The first sample was 99.6% Al with 0.18% Fe, 0.22% Si and 0.01% C as impurities; the second was 99.9% pure Al with 0.04% Fe; the third was 99.94% pure Al. The temp.-resistance curves for the first 2 show slight breaks in the neighborhood of 425° and again near 550°. These are verified by plotting variation of resistance against temp. However, both the resistance-temp. and the variation-of-resistance-temp. curves for the 99.94% sample are perfectly regular and neither shows any indication of a transformation point. It is therefore concluded that the breaks in the curves for the other samples are to be attributed to impurities, and that there is no transformation point in pure Al up to 610°. Results obtained for the coeff. of thermal expansion of 2 samples indicate that this quantity is not a suitable magnitude to use in investigations of this sort. W. W. STIFLER

The myth of the lost art of hardened copper. F. L. THURMOND. *Mining J. (U. S.)* 11, 15 (1928).—Present-day metallurgy shows the fallacy of the hardened Cu myth. E. M. SYMMES

Absorbability of gases in casting copper and effect of adding cuprosilicon. O. W. ELLIS. Westinghouse Elec. & Mfg. Co. *Am. Inst. Mining Met. Eng. Tech. Publication* No. 123, 26 pp. (1928).—Previous work on the soly. of gases in Cu is reviewed. Water vapor had a high soly. in Cu and caused oxide formation. Expts. are described in detail in which about 250 lb. of Cu were melted under different conditions of access of air and contact with charcoal and Si-Cu and poured into chill or sand molds. Excellent photomicrographs of Cu₂O in Cu are shown. Si reduced Cu₂O in accordance with the theoretical equation and, when all Cu₂O was eliminated, excess Si removed the gaseous O. The action of Si in promoting soundness was not entirely explained. Cu melted in a reducing atm. in an elec. furnace was nearly free from Cu₂O as well as CO and H₂ and contained chiefly CO₂, N₂ and H₂O. Oxidized Cu in contact with char-

coal absorbed C in the form of CO and CO₂ up to a limit of 21.9% by wt. of gas. Cu also absorbed C from a graphite mold. The presence of gaseous O was necessary for satn. of Cu with C. At higher temp., the ratio of occluded CO₂ to CO increased but the CO₂ cannot be more than 80.5% by wt. of the total occluded gas. The total gas occluded was greatest in aerated Cu and least in Cu free from oxide. H₂ was found in very small quantities, except when oil was used for melting, when Cu₂O may have been reduced by CH₄ with formation of H₂ in the metal. Expts. on the gases obtained by subjecting molten Cu to a vacuum showed that they were practically the same, except for more N₂, as those obtained in the same way from the solid castings, from which the results noted were derived. The vol. of gas occluded by solid Cu depends on the melting and cooling conditions. In oil furnaces, Cu₂O but not ZnO may be eliminated by a reducing atm. CO₂, CO and H₂O are the chief gases occluded when melting Cu with oil.

GEO. F. COMSTOCK

Effect of cold rolling and heat treatment on physical properties of Britannia metal. B. EGEBERG AND HENRY B. SMITH. International Silver Co., Meriden, Conn. *Am. Inst. Mining and Met. Eng. Tech. Publication No. 124*, 7 pp. (1928).—Sn contg. 7% Sb and 2% Cu (Britannia Metal) can be cold-rolled and highly polished, and resists corrosion. Samples cold-rolled in stages down to 0.032 in. thick, and heated to various temps. up to 440° F., were tested for hardness by the scleroscope and Brinell methods. The former method showed increased hardness as the thickness decreased by cold rolling, but the Brinell method showed a decrease in hardness, which is considered correct. Reheating the cold-rolled samples gave a progressive rise in Brinell hardness, on account of recrystn. The speed of cooling had little effect on the results. The Brinell hardness as cold-rolled to $\frac{1}{16}$ in. thickness was 13.3, and on reheating to 400° F. it was 18.6. The Brinell hardness was 23.8 as cast. Cold rolling to $\frac{1}{16}$ in. from $\frac{1}{8}$ in. thickness did not soften a sample appreciably, but from $\frac{3}{16}$ in. the softening was apparent. A shell spun from an annealed blank was twice as strong in compression as one spun from a blank not annealed. A thinner ingot will give a stronger sheet of a given size in this metal. The smaller the reduction in rolling, the higher is the annealing temp. required for stiffening.

GEO. F. COMSTOCK

Effect of cadmium on mechanical properties of brass. WALTER BANNAU. *Am. Metal Market* (Mag. Sect.), 35, 12-4 (1928).—A series of tests on 70 and 60% Cu-Zn alloys contg. from 0 to 4.5% Cd show that up to 0.5% Cd the structure is like brass contg. no Cd. With more than 1% Cd, free Cd is found in the alloy. The first effect of Cd is seen in lessened resistance to shock. With a higher % the elongation suffers and speedily becomes very low. The free Cd is isolated in filaments that have a tendency to surround the crystals of alloy. In brasses contg. 55% Cu even 3.6% Cd does not diminish the tensile strength markedly, but 1.8% Cd greatly affects the ductility and brittleness.

E. G. R. ARDAGH

Crystals of β -brass. V. GÖLER AND G. SACHS. *Naturwissenschaften* 16, 412-6 (1928).—Cu-Zn alloys with 50 to 54% Cu by weight (β -brass mixed crystals) show an unexplained transformation between 300° and 470°. By Laue photographs of β -brass between 400° and 500° no lattice changes could be found. The temp. influence (disappearance of weak interference spots, and weakening of sharp spots) appears at rather low temp. (300°), possibly indicating an increased heat motion effect which also is apparent from the case of recrystn. of brass at low temp. On a mono-crystal rod slip lines appeared after 4.4% elongation following a rhombododekahedral plane. Fracture planes were often found to have the same orientation. A short description is given of the novel goniometer furnace for Laue photography at elevated temps. (cc. tube furnace).

B. J. C. VAN DER HOEVEN

Effect of compression and tension on brass crystals. G. SACHS AND H. SHOJI. *Z. Physik* 45, 776-96 (1927).—The mech. deformation of single crystals of brass in the form of rods has been examd. for compressions and for tensions up to 200 kg. per sq. mm. For forces of the order of 4 kg. per sq. mm. such crystals exhibit mech. hysteresis.

B. C. A.

Cast iron resistant to acids and alkalis. H. G. HAASE. *Stahl u. Eisen* 47, 2112-7 (1927).—The most satisfactory resistance to attack by mineral acids is shown by cast iron of the following compn.: 3.3-3.5% C, 1.3-1.4% Si, about 0.75% Mn, 0.3-0.5% Ni, not more than 0.2-0.3% P, and not more than 0.07% S. Increase of S is particularly deleterious, more Mn increases the rate of corrosion relatively slightly, with Si max. occur in the corrosion curve at 2.5 and 7% Si, and with P and Ni little difference is noticeable in the rate of corrosion with double the above amts. The cast iron most resistant to alkali contains 3.3-3.5% C, 1.2-1.4% Si, 0.3-0.4% Mn, not more than 0.3% P, not more than 0.08% S and 0.3-0.5% Ni. Increase of P reduces the

resistance to attack by alkali hydroxides, as also does increase of Si to a max. of 7% Si. Metal with the casting skin intact is more resistant than metal from which this skin has been removed.

B. C. A.

Heat treatment of gray iron. EDWARD E. MARBAKER. *Iron Age* 122, 282-5 (1928).—Preceding investigations contained in 21 papers concerning the heat treatment of gray iron are recapitulated to show that the best results in normalizing strained castings are obtained by heating at a temp. considerably below the critical temp., and to make castings more easily machinable they should be softened by heating at a temp. above the critical point, held long enough at that temp. to insure thorough heating, and then cooled slowly at least through the first 100 degrees.

D. S.

Solubility of oxygen in iron or ferrous oxide (oxoferrite, wüstite). C. BENEDICKS AND H. LÖFQUIST. Metallografiska Inst., Stockholm. *Z. anorg. allgem. Chem.* 171, 231-8 (1928).—The diagram given for the system Fe-O (cf. *C. A.* 22, 937) contradicts the fact claimed by Schenck and Dingmann (cf. *C. A.* 22, 566) that the soly. of O is as high as 2.8% (oxoferrite). It is only 0.05%. It has been suggested that traces of Al_2O_3 picked up from the container by Fe_2O_3 would explain the discrepancies. The soly. of O in a pure Fe-O system is so low that it is difficult to admit that this soly. is increased by the presence of foreign matter, MgO for instance.

A. L. HENNE

Equilibrium relations in the reduction, oxidation and carbonization of iron. VI. 7. **Solubility of oxygen in iron.** RUDOLF SCHENCK AND TH. DINGMANN. Westfälische Wilhelms Univ., Münster. *Z. anorg. allgem. Chem.* 171, 239-57 (1928); cf. *C. A.* 22, 2132.—Polemical. Cf. preceding abstr. Sixteen references are given.

A. L. H.

The systems: iron-phosphorus, iron-silicon and iron-phosphorus-silicon. I. New investigations of iron-phosphorus solid solution in the binary system: iron-phosphorus. H. HANEMANN AND H. VOSS. Tech. Hochschule, Berlin. *Zentr. Hütten- u. Walzwerke* 31, 245-8; *Chem. Zentr.* 1927, II, 321.—To explain the difference between the expts. of Stead (cf. *C. A.* 12, 1751), which showed that the ability of solid Fe to dissolve P diminishes with decrease in temp., and data in the literature which show that the limits of soly. of P in Fe are 1.7% P, regardless of the temp., the capacity of solid Fe to dissolve P was investigated. By annealing and quenching of the system: Fe-P, a new line of segregation was drawn, along which the phosphide, Fe_3P , seps. as the temp. decreases. The max. capacity of solid Fe for dissolving P is around 2.5% P at the eutectic temp. The limit of soly. at room temp is around 1.4% P. II. Critical investigation of the binary system: iron-silicon. *Ibid* 2:9-62.—The peritectic equil. of Murakami for the system Fe-Si was confirmed by metallographic expts. The limit of soly. in α -Fe at normal temp. is around 16.8% Si. A crit. survey is made of views expressed in the literature on the 3-phase equil. at 22.5% Si.

C. C. DAVIS

The macrography of steels with high carbon contents. LUIGI LOSANA AND GIUSEPPE BLASICH. Reale Scuola Ingegneria Torino. *Mel. italiana* 20, 211-5 (1928).—Because of the growing use of stainless steels where it is imperative that no defects exist, it is of increasing interest to be able to detect the presence of various structural defects by simple treatment with a reagent. For this reason, 2 steels with high Cr content (a stainless and a silchrome steel) were treated with I-KI, $CuSO_4$, Stead-Le Chatelier cupric reagent, $\frac{1}{2}$ dil. H_2SO_4 and NaCl electrolyte. A 10% soln. of I in 20% KI did not corrode the steels, and even after several days the only effect was a tarnishing. A reagent composed of 10 g. of $CuSO_4 \cdot 10H_2O$ and 100 cc. of 1% H_2SO_4 deposited a strongly adherent coating of Cu, and after 24 hrs. revealed the configuration of the structure. A reagent composed of 1 g. of $CuCl_2$, 2 g. of HCl, 0.5 g. of picric acid, 10 g. of water and 100 g. of 95% EtOH gave better results than the preceding ones, the fiber structure being visible after 1 hr. and very distinct after 3 hrs. Here again, however, the coating of Cu was difficult to remove. At ordinary temps., 15% H_2SO_4 gave excellent results after several hrs. of immersion. With boiling 15% H_2SO_4 the attack was rapid, but the structural details were less evident. With 15% H_2SO_4 contg. 1% Br the attack was immediate, 30 min. was sufficient to attain the desired results, and at 60° 10 min. was sufficient. The effect is best if immediately after the attack the surface is polished with linen and then with Al dust. The configuration may be rendered still more visible by adding $SbCl_3$ in HCl to the dil. H_2SO_4 . With steel as the positive pole in an electrolytic bath of 10% aq. NaCl, a graphite negative pole and with 4 v., the attack was rapid, the fiber structure becoming visible after 10 min. and completely delineated after 30 min. Addn. of NaI or NaBr to the bath did not improve the effect. To obtain rapid results, and a pattern in which the true structure is plainly visible, in all details, it is recommended that the attack be made with 15% H_2SO_4 contg. 1% Br at 50-60°, immersion being for less than 10 min. The electrolytic method described above is too slow.

C. C. DAVIS

Roman damascus steel. BERNHARD NEUMANN. Tech. Hochschule, Breslau. *Arch. Eisenhüttenw.* 1, 241-4(1927); *Stahl u. Eisen* 47, 1695-6.—Many of the swords in the Nydam discovery show a damascene structure, 3 kinds of the welded (fluted, angular, blooming) being identified. The art of hardening steels was known to the Romans, since a microscopic examn. of the edges of some show the troostite-martensite structure. Hitherto, this structure could seldom be shown, as the martensite goes over into a more stable form in the course of time. Photographs illustrating the 3 types of swords and their microstructure are given.

J. BALOZIAN

Investigation of the rough steel from the "La Tène" time. H. HANEMANN. *Arch. hem. farm.* 2, 115-9(1928).—The metallographical investigations of the rough steel from the first centuries B.C. have shown its excellent qualities. Cementite present in this steel was found unchanged during 2000 years in the earth though it is usually regarded as a metastable system Fe-C.

JAR. KUCERA

Experimental investigation of plastic deformations (in mild steel). P. A. VÉLIKHOV AND N. P. STCHAPOV. Inst. Ingénieurs Transports, Moscow. *Rev. métal* 25, 299-311(1928).—Microscopical investigation of the structure of mild steel (0.2% C) angle-iron under increasing loads led to the following conclusions: The presence in the metal of grains more or less oriented in the same direction and the relatively low resistance to slippage around the contour of the grains resulting therefrom are considered to be decisive factors in the appearance of the first visible deformation. The presence of a harder constituent, even in minute proportion, plays an important part in the mode of plastic deformation, as its presence offers greater resistance to slippage. Long before breaking occurs, permanent deformation acquires (at least at the surface of the test piece) a character which cannot be explained solely by slippage along the crystallographic planes, but which requires that fragmentation be brought into play. The study of plastic deformation should be used as a complementary method in investigating the quality of metal; and, more particularly, the presence of a large no. of grains more or less oriented in the same direction can very easily be detected by observing the lines of slippage. Lorenz' app. for recording micro-deformations of the cryst. grains which occur at the surface of the test piece in the course of the test is described.

A. PAPINEAU-COUTURE

Tempering changes in carbon steels. R. HAY AND R. HIGGINS. *J. Roy. Tech. Coll. (Glasgow)* 1927, No. 4, 62-76.—The manner in which tempering temps. and "aging" are related to the phys. properties of quenched steels was studied. Since slow changes occur in the phys. properties of steels even at ordinary temps. it is pointed out that at elevated temps., where these transformations are more rapid, the time of tempering (soaking) is as important as the temp. of tempering. Working with samples of a low-C steel (C 0.26, Si 0.1, S 0.028, P 0.009, Mn 0.6%) which had been water quenched from 1000° and then tempered at various temps. up to 600°, the authors found irregularities in the phys. property-temp. of tempering curves at approx. 100°, 250° and 350°. The results of measurements of the following phys. properties of the samples are recorded: Brinell hardness, Charpy impact test, proportionality limit, max. stress, per cent elongation, reduction in area, Young's modulus. The influence of time upon the stability of the various structures found in quenched steels was investigated by means of the Brinell hardness and sp. vol. measurements. Samples were quenched from 14 temps. between 400° and 1150°; the phys. properties were detd. and then redetd. after "aging" for 2 months. All the samples quenched at 650° and below showed an increase in hardness and sp. vol. after 2 months. This is thought due to a deposition of finely dispersed carbide from soln. in α -iron. Specimens quenched from between A_{c1} and 900° show a continuous increase of hardness with temp. Above 900° the hardness falls off because of the increased amt. of retained austenite with increasing quenching temp. Because of marked changes in hardness, sp. vol., etc., in steels quenched from 650° the authors ran a series of Izod impact tests on samples of the above steel quenched from near 650°. The results substantiate those obtained by the other methods. Expts. with 2 samples of steel lower in C (0.025 and 0.129%) revealed age-hardening properties similar to those possessed by the steel first studied. The 0.025% C-steel, when quenched from 1000° and tempered at various temps., showed only a marked increase in hardness at 75°. An explanation of the irregularities noted at about 100°, 250° and 350° is offered. It is suggested that the change at 100° is due to the decompn. of the solid soln. of Fe₃C in α -iron. The change at 250° is attributed to the decompn. of residual austenite in the quenched specimens. The 350° change is accounted for by the fact that all the remaining austenite does not transform immediately to martensite and then to troostite, but that the change is periodic and takes a certain time to go to completion.

WILLIAM F. EHRET

Thermal expansion of some nickel steels. PETER HIDNERT AND W. T. SWEENEY. Bur. of Standards. *Phys. Rev.* 29, 911(1927).—Coeffs. of expansion and critical temps. are given for 5 Ni steels contg. from 36 to 42% Ni. Those contg. 38.4% and 42.2% Ni have lower coeffs. of expansion than invar in the range 20° to 500°. W. W. S.

Manufacture and characteristics of silicon steels. I. C. VOLLMANN. *Stahl u. Eisen* 48, 817-9(1928). II. H. KOPPENBERG. *Ibid* 819-22.—Two separate reports on plant experiences with Si steels. J. A. SZILARD

High-speed steel. J. S. GLEN PRIMROSE. *Roy. Tech. Coll. Met. Club J.* 1927-8, No. 6, 29-34.—The heat treatment usually recommended for high-speed tool steels is described and the phys. metallurgy for each of the steps involved is given at some length. Eight photographs are included, showing the microstructure of 18% W high-speed steel as cast, annealed, air cooled from fusion, rolled rod annealed, quenched from a temp. just short of fusion, over-heated and restored to the properly hardened state. DOWNS SCHAFF

Quantitative spectrographic analysis of refined steels. K. KELLERMANN AND O. SCHLIESSMANN. Bergakad. Clausthal and Univ. Jena. *Metallbörse* 17, 1069-70, 1125-6; *Chem. Zentr.* 1927, II, 630.—The visible region of the spectrum has not been recognized as particularly useful for the quant. analysis of refined steels. Comparative photographs of the visible region were taken, and a greater no. of previously unknown sensitive lines were established for W, V, Sn, Mo and Cr. The app. is described and the application of the method is shown for 2 refined steels. The influence of the C used for electrodes is discussed, and adsorption phenomena on the C electrodes are described. C. C. DAVIS

The development of high-quality structural steel. KOPPENBERG. *Z. Ver. deut. Ing.* 72, 918-20(1928).—A brief account of the development and uses of Ni steel (limited by the cost of Ni), low-Si steel, special C steels, etc., leading up to "Steel 48." Steel 48 (1923) had 0.25-0.35% C, 0.5-0.7% Mn, a tensile strength of 48-58 kg./sq. mm., an elastic limit of 29-32 kg./sq. mm., an elongation of 18-23%, and could be made in the open-hearth furnace or converter. It found application in bridges, ship-building and railroad work. Si-steel (1925) is a better material for such uses. It is a high Si-steel, low in C, with a high elastic limit (36 kg./sq. mm.), a tensile strength of 50-64 kg./sq. mm. and an elongation of at least 20%. Its use permits loads 50% greater than could have been used with structural steel in the "nineties," and about 30% greater than with steel 48. It requires great care in prepn. and treatment, must be made in a special open-hearth (Bosshardt) furnace, and consequently has a relatively high cost. Its quality, however, makes it indispensable in certain types of construction, such as bridges, elevated structures for railroads, railroad cars, ships, etc. W. C. EBAUGH

Development of a high-quality structural steel. E. II. SCHULZ. *Stahl u. Eisen* 48, 849-53(1928).—Si steel has little resistance to corrosion, but it can be improved by the addn. of Cu. This, however, does not change the fact, that the manuf. of Si steel is a very difficult process. Therefore the development of high-quality structural steel was tried, which does not have a high Si content. The new steel contains C 0.15, Si 0.25, Mn 0.80, Cu 0.5-0.8 and Cr 0.4%. The cost of the raw materials for this Cu-Cr-steel is higher than that for the Si steel; on the other hand the waste during the manuf. is lower. The new steel has practically the same strength as a 1% Si steel; its av. limit of elasticity is 38 kg./sq. mm.; the tensile strength is 54 kg./sq. mm. and the elongation 23%. A special advantage of the new Cu-Cr-steel is that the strength, particularly the limit of elasticity, does not change much with the conditions during rolling. The resistance to corrosion of the new steel is much higher than that of a 1% Si steel or a Cu-C-steel. J. A. SZILARD

The influence of heat-treating soft steel ingots before rolling on the structure and tensile properties of industrial steels. H. BITTER. *Arch. Eisenhüttenw.* 1, 371-8 (1927).—The ingots are made by blowing crude Thomas Fe in a converter, rolling one set immediately after pouring, while another is first cooled and reheated. Liquation is found to be greatest in the reheated ingots, there being present, also, greater differences in compn. in these. S prints, Oberhoffer- and picric acid etchings are made to det. the influence of heat treatment on the primary and secondary structures of the steels. The primary etchings show the presence of a P-rich zone between the surface and the core of the reheated ingots, attributable to the rolling. From the secondary structure it is seen that the grains of the reheated steels are larger than the cooled ingots, this difference being present principally in the interior of the ingot. The steels which were not reheated were marked by greater nick-hardness. Tests on 100 ingots, which were a part of the plant production, confirmed the above results. J. BALOZIAN

The influence of cobalt, vanadium and manganese on some properties of tool steel.

ROBERT SCHERER. *Arch. Eisenhüttenw.* 1, 325-9(1927); *Stahl u. Eisen* 47, 2035-6.—A study of the effect of increasing amts. of Mn, V, V and Si, Co, Co and V on the hardness, vol. changes on hardening and ability to hold their cutting edge of eutectoid steels. The positions of the arrests of the various steels show that Co and V exert no special influence on A_1 and A_c , while Mn sharply lowers the former and raises the latter. Steels alloyed with Co are particularly insensitive to various hardening conditions, especially to over-heating. These steels also show the least vol. change on hardening and the least hardening sensitiveness. The highest cutting power is shown by steels contg. 0.3-0.7% V; it is strongly raised in Co-alloyed steels, but remains const. with increasing Co. Steels alloyed with Co and V show on hardening, greater insensitiveness, less vol. change, a higher multi-hardness no. and the highest cutting power. Because of these properties they are the most suitable tool steels. J. B.

Corrosion of steels at high temperature. LUIGI LOSANA AND GIULIO REGGIANI. Reale Scuola d'Ingegneria Torino. *Notiz. chim.-ind.* 3, 271-5, 346-52(1928).—Systematic expts. were carried out to det. the corrosion of various types of common and special steels which occurs at temps. from 400° to 1000° in air. Where the expts. were similar to those of Hatfield (cf. *C. A.* 21, 2245) his results were confirmed. In no case could the progress of the corrosion be expressed as a linear function, and the greater the rate of oxidation the more did this deviate from a linear function. With all steels there was a very pronounced increase in the corrosion from 800° to 900°, and still more so between 900° and 1000°. Even the least readily oxidized steels, which were relatively little attacked up to 900°, underwent an intense corrosion at 1000°. This disproportionate increase in corrosion at the highest temps. was most marked in steels which withstood oxidation best at low temps. Thus homogeneous Fe showed 2.4 times as much corrosion at 1000° as at 900°, whereas a steel contg. 23.5% Ni showed 12.6 times as much. With respect to the influence of individual elements, Ni above 3% increased the resistance to oxidation, while Cr gave the best results, especially above 1.5-2%. Cr-Ni steels were particularly resistant when the C content was neither very low nor very high. Though cementation steels with less than 0.15% C were not resistant, steels of similar compn. except for a C content of 0.30-0.40% were extremely resistant. In all cases tempering greatly increased the resistance to oxidation. Exhaust gases contg. N, O, CO₂, CO, H₂O and traces of hydrocarbons had in general a more intense oxidizing action than air at the same temp., though with extremely resistant steels there was little difference. Qualitatively the progress of the corrosion as a function of time and temp. was the same in each case. The greater corrosion with the waste gases is attributed to the simultaneous action of carburization, cementation and oxidation caused either directly by atm. O in excess present in the exhaust gases, or indirectly by CO₂. Macroscopic examn. of valve sections showed a difference in the fibrous texture of valves which had been used for a long time from the texture of new valves, because of the annealing undergone. There was a zone of corrosion resulting from carburized products, accompanied by inclusions of oxides. In the great majority of valves this zone was removed by the continual shock and the seat appeared hollowed out to a considerable depth. Comparative expts. showed that steels rich in Ni and rich in Cr have a high resistance to oxidation by air or by exhaust gases. Steels with a high W content are also resistant but less so than Ni and Cr steels. In general, steels which lost their temper only at high temps. showed the most resistance to corrosion. The best results were obtained with Silchrome steel and a steel contg. 13.84% Cr. Steel contg. 25% Ni gave good results, but not so good as those above. Even with these steels, the resistance was high only up to 900°, above which temp. range, corrosion was rapid. Steels contg. around 4% Ni and less Cr were very resistant after they had been tempered. A bibliography of 19 references is appended.

C. C. DAVIS

Yield point in steel at various temperatures. J. MUIR. *J. Roy. Tech. Coll., Glasgow* 4, 14-23(1927).—The yield points at various temps. have been detd. for mild steel in the form of wire. The temps. required were obtained by electrically heating the wires. The rate of extension at a yield point is very greatly increased by increase of temp., while the phenomenon of the yield point (*i. e.*, the extension of the wire by jerks and not by creeping) disappears entirely at 250°, in opposition to the observations of Lea and Crowther (*C. A.* 9, 285).

B. C. A.

The fatigue-resisting properties of 0.17 per cent carbon steel at different temperatures and at different mean tensile stresses. H. J. TAPSELL. *J. Iron Steel Inst.*, May, 1928 (advance copy), 13 pp.; *Engineering* 125, 567-8(1928).—Fatigue expts. were carried out on normalized 0.17% C steel with a Haigh machine under direct pulsating stresses applied at the rate of 2400 cycles per min. Fatigue limits were detd. at different

mean tensile stresses up to 500°. Above 300° fatigue limits based on 10' alternations of stress are dependent on the rate of alternations applied. At temps. up to 200° (or 250°) the practical fatigue limits under different mean tensile stresses are dependent on the static limit of proportionality or yield point of the material. These practical fatigue limits do not alter appreciably at temps. up to 200° but above this temp. depend on a suitable proof stress.

A. W. COFFMAN

Heat-resisting steels. II. Mechanical properties. W. H. HATFIELD. *J. Iron Steel Inst. May, 1928* (advance copy), 22 pp.; *Engineering* 125, 589-90, 622 (1928).—Thirteen tables give the results of analyses and tensile tests on wrought iron and various steels. These tables illustrate the following points. Wrought iron pulled in tension at 800° gives a value as low as 2.03 tons per sq. in. while 0.15 C steel gives a value of 4 tons. Modern high-tensile hardened and tempered alloy steels of Ni, Ni-Cr, Ni-Cr-Mo, Cr-V give a max. value at 800° of 7.68 tons per sq. in. Si-Cr heat-resisting steels gave at 800° only 4 to 6 tons while high-speed tool steel ranged from 8 to 10.5 tons per sq. in. Co-Cr gave a value of 13 tons per sq. in. The improvement in tensile strength on addn. of Cr is only obtained with steels contg. considerable C (0.54 C). Addn. of Ni up to 36.5% gives a tensile strength at 800° of only 7.85 tons per sq. in. Combinations of Ni-Cr-C in steels gave somewhat higher results. The addn. of W to Ni-Cr steels gave greatly increased values of tensile strength at 800°, some being as high as 22.5 tons per sq. in. Mo and Si increase the strength of Ni-Cr steels at elevated temps. and C plays an important part in regulating the strength. An explanation is offered for the action of some elements in increasing the tensile strength at high temps.

A. W. COFFMAN

Results of using copper-bearing steel in freight cars. J. S. UNGER. *Railway Age* 84, 1060-2 (1928).—Comparative service tests by the Bessemer and Lake Erie R. R., of 100 hoppers and 100 gondolas built in October, 1914, using Cu-bearing steel in one half of the body and plain steel in the other half of the same car, show loss in thickness from corrosion of the Cu-bearing steel to be between 55 and 61% of the plain open-hearth steel. Paint adheres much better to Cu-bearing steel in a car body than it does to plain open-hearth steel.

R. C. BARDWELL

The effect of silicon on tungsten magnet steel. J. SWAN. *J. Iron Steel Inst. May, 1928* (advance copy), 9 pp.; *Engineering* 125, 554-5 (1928).—The "spoiling" of W magnet steel (Si 0.13%) by annealing above the Ac point is due to the gradual formation of free W carbide, which is only slightly sol in austenite so that the steel loses available C and W. W carbide segregates on prolonged soaking but is retarded by a Si content of 0.25%. Si up to 0.50 has no harmful effect. Conclusion: Increasing the amt. of Si does not eliminate the spoiling effect produced by reheating of the steel for forging or rolling and it is therefore necessary to use a max. reheating temp. for rolling (1200°) to obtain the best results. One % Si reduces the loss of coercive force on annealing by 1/2 but the other magnetic properties are made more inferior by such a practice.

A. W. COFFMAN

Heterogeneity of steel ingots. ANON. *J. Iron Steel Inst. May, 1928* (advance copy), 147 pp.; *Engineering* 125, 583-4 (1928).—A résumé of the report by the Comm. of the Iron and Steel Institute on the Heterogeneity of Steel Ingots. In the design of ingot molds 5 points must be remembered, namely: freedom from cavity, suitability for and ease of further working, stresses set up on cooling, elimination of planes of weakness and layout of segregate. The presence in the ingot of oxides and silicates, S and P gases may influence heterogeneity. A study was made of Ni, Ni-Cr, Ni-Cr-Mo steel ingots. The percentage variation of C, P and S in different parts of the ingots increases as the size of the ingot increases. The presence of Ni and Cr tends to diminish segregation. A study was also made of C steel ingots other than killed as well as of non-piping or semi-killed steel.

A. W. COFFMAN

Sink-head ingots. R. S. HARDEN. *Am. Ry. Eng. Assocn. Proc.* 29, 1075-1109 (1928).—Extended data and charts covering chem. content of steel used in rails indicate that waste of material from the top was reduced by the sink-head method from 22 to 17% and rejections were fewer in this rail by 2%. The annual av. no. of failures in sink-head rail per 100 miles of track was 1/3 less than ordinary rail.

R. C. B.

Steel rails from sink-head and ordinary rail ingots. GEORGE K. BURGESS. *Am. Ry. Eng. Assocn. Proc.* 29, 1110-74 (1928).—Extensive data covering chem. compn., type of treatment, and phys. properties are submitted and indicate a decided superiority of the sink-head ingot over comparable ordinary ingots of steel used for rails.

R. C. BARDWELL

Contribution to the study of the solution of aluminum and its alloys in acids. X. WACHÉ. *Rev. métal.* 25, 331-46 (1928); cf. *C. A.* 19, 2629.—The results obtained

(which are given in the form of tables, with several photomicrographs) show that soln. of ordinary Al in HCl comprises 2 stages, both of which depend on the physicochem. state of the impurities, Fe and Si. The rate of soln. increases progressively during the 1st stage, which is better characterized by the depth to which the metal is dissolved than by the time of attack. The induction period depends not only on the Al, but also on other exptl. factors which are foreign to it, such as concn., temp., etc. The depth to which the metal is dissolved during this stage, on the other hand, is but slightly affected by variations in the phys. or chem. conditions under which soln. is carried out, and depends mainly on the physicochem. condition and structure of the Al; it varies with the content of impurities, and especially with their distribution; it decreases when the impurities are most uniformly distributed, the best distribution being obtained either by rapid solidification or by rolling. During the 2nd stage, assuming that the concn. is const., soln. takes place at a definite rate, which is independent of the size of the grains, but which varies with the compn. of the metal, the rate at which it solidified, the degree of annealing and of cold-hardening. The lowest rate of soln. is obtained with the purest Al. The rate of solidification intervenes to the extent to which it detrs. the distribution of the free impurities throughout the mass of metal; and, as could be foreseen from the electrochem. theory, a more uniform distribution of impurities through rapid cooling frequently increases the rate of soln. Annealing decreases or increases the rate of soln. according as it causes soln. of part of the impurities or ppts. them. The effect of a given annealing treatment can be predicted to a certain extent by means of the diagrams of the alloys which Al forms with its chief impurities. Cold-hardening reduces the rate of soln. of ordinary Al in HCl, which appears to be due to the dislocation of the network formed by the impurities throughout the metal.

A. PAPINEAU-COUTURE

Antimony-tin alloys. W. BRONIEWSKI AND L. SŁIWOWSKI. *Ecole Polytechnique, Varsovie. Rev. métal.* 25, 312-21(1928); cf. *C. A.* 22, 3125.—After a brief review of previous work on Sb-Sn alloys, bringing out the contradictions between them, B. and S. describe the results of their investigation of the elec. cond., variation of resistance with temp., thermoelec. power and its variation with temp., soln. potential, expansion coeff. and its variation with temp., hardness, and fusibility of such alloys, from which they conclude that the only compd. formed is Sn_3Sb_2 , which forms limiting solid solns. with Sb. At ordinary temp. Sn_3Sb_2 forms mixts. with the solid soln. contg. 8% Sb, while the limiting solid soln. of the compd. (about 53%) forms mixts. with the solid soln. contg. 90% Sb. The results are given both graphically and in tabular form.

A. PAPINEAU-COUTURE

Hardening of aged silver-aluminum alloys. M. HANSEN. *Naturwissenschaften* 16, 417-9(1928).—The self-hardening properties of Al-Ag alloys were studied in 12 specimens with 0.45 to 11.8% Ag (the Al contained 0.097% Si and 0.158% Fe). Blocks of 20×35 mm., 120 g., were cast and hot forged down to 10 mm., heated at 525° for 5 hrs. and chilled in ice-water. The aging was done in oil baths at 100°, 150° or 175° and the Brinell hardness (5 mm. ball, 62.5 kg. pressure, 30 secs) detd. At 100° the max. hardness had not been reached after 6 weeks; at 150° it was obtained in 5 to 7 days, at 175° in 1 to 5 hrs. The alloy with 0.45% Ag hardened little and only at 100° and 150°; it shows that the soly. of Ag in Al below 150° is less than this percentage. The optimum hardening temp. is considered to be between 150° and 160°; the ratio between max. hardness and initial hardness increases from 1 up to 6% Ag. The abs. value of the hardness is lower for these alloys than for Cu-Al alloys; it runs from 20 up to 78 (Brinell) for material aged at 150° for 5 days, the initial Brinell value being for the same samples from 19 to 48.

B. J. C. VAN DER HOEVEN

X-ray analysis and crystalline structure of cadmium-silver alloys. III. G. NATTA AND M. FRERÉ. *Reale Politecnico Milano. Atti accad. Lincei* [6], 7, 406-10(1928); cf. *C. A.* 22, 1564.—The present work proves it necessary to revise existent data obtained by thermal analysis. The alloys were rapidly solidified and tempered, and were examd. by the powder method. There is a field of α solid soln. of Cd in Ag, which has a lattice like the latter, but becoming more and more deformed, according to the Vegard law, up to 35% Cd. The α phase is present in alloys contg. 0-45% Cd. The dimension of the elementary cell increases from 4.07 to 4.15 A. U. A compd., AgCd , which has a cube-centered lattice, and is capable of forming β solid soln., is present in alloys contg. from 47 to 55% Cd. Its elementary cell, with dimension increasing from 3.32 to 3.34 A. U., contains 1 mol. Its calcd. d. is 9.97-9.82. Alloys contg. 55-65% Cd are composed of solid solns. of a new phase which has a complex structure similar to the centered lattice, with cubic elementary cell of 9.96 A. U. contg. 52 atoms, i. e., 4 mols. of the compd., Ag_5Cd_8 . From 65 to 95% Cd, the structure is of the simple,

compact, hexagonal type with $c/a = 1.58$, and with its elementary dimension varying from 3.04 to 3.09 A. U. These alloys represent ideal solid solns. of Cd and Ag in the compd., $AgCd_3$. The dimension of the elementary cell, probably a multiple of 3.07 A. U., could not be detd. precisely because the Cd and Ag atoms have at. wts. so little dissimilar. For the same reason it was difficult to det. whether in these alloys there is a regular distribution of atoms of the solute. Alloys contg. 95–100% Cd are composed of a soln. of Ag in Cd, with the lattice of Cd. On annealing, transformations were observed only with β alloys. The compd. $AgCd$ is dimorphous, and below 420° is converted into a compact hexagonal modification, with $c/a = 1.62$ and $a = 3.01$ A. U. At temps. below 200° , some solid solns. of $AgCd$ become unstable and are transformed into a mixt. of the α and γ phases. There is a great similarity between the cryst. structure of Cu-Zn and $AgCd$ alloys, as shown by the fact that all phases present in tempered $AgCd$ alloys have lattices similar to those of brasses. Such similarity has an analogy in the homologous position occupied in the periodic system by Cu and Zn with respect to Ag and Cd.

C. C. DAVIS

Alloys of iron with low percentage of titanium. HANS MATHESIUS. *Stahl u. Eisen* 48, 853–8(1928).—Exptl. melts of steel made in an elec. furnace and contg. 0.38 to 3.21% Ti were prepd. Next a larger hatch of a steel contg. 0.2% Ti was prepd. by adding the Ti in form of $FeTi$ with 18.9% Ti. The addn. of Ti has a desulfurizing effect; the tendency for segregations is also decreased. Microscopical investigation shows a ferrite-pearlitic structure, with a few small red colored crystals of Ti_3N_2 and Ti_2C . The mech. characteristics show an increase in elastic limit of 80%; and in tensile strength of 50–55% as compared with ordinary C steels. The impact strength is also higher.

J. A. SZILARD

The effect of heat treatment on some mechanical properties of 86:4:6:3:1 copper-nickel-tin-zinc-lead alloy. ROBERT J. ANDERSON. *Am. Metal Market* (Mag. Sect.) 35, 1–3, 14(1928); cf. C. A. 22, 2913.—This is the last of a series of 8 articles on the effect of various heat treatments on the mech. properties of sand-cast Cu base alloys of the brass and bronze type. The alloy was sand-cast into suitable tensile-test bars, annealed for various periods in the range 400 – 750° , and air cooled. Annealing has in general a harmful effect on strength and elongation. Annealing at 650° has a very deleterious effect on the ductility and strength. The alloy shows rather wide variations in hardness for a given treatment, indicating non-homogeneity. It is evidently of the solid-soln type. Ni-bearing complex bronzes appear to have possibilities for considerable use in place of certain standard alloys, but there appears to be no particular field in which they excel. Photomicrographs and a bibliography are included.

E. G. R. ARDAGH

Nickel: an account of its alloys and its uses. ALFRED C. STURNEY. *Mining Mag.* 38, 341–7(1928).—The properties and uses of Ni, Ni steel, and all the important Ni alloys are discussed.

A. BUTTS

Effects of the addition of various elements on the properties of alloy steels. P. FROGER. *Aciers spciaux* 2, 238–51(1927); *Chimie et industrie* 19, 851–2(1928).—A review of the changes in properties of the Fe-C alloy brought about by the metals generally used in alloy steels: Ni, Cr, Mn, W, Co, V, Mo, Si and Al.

A. P.-C.

The secondary hardening of alloy steels. J. H. ANDREW. *Roy. Tech. Coll. Met. Club J.* 1927–8, No. 6, 7–8.—A Ni-Cr steel contg. 3.6% Ni, 1.65% Cr and 1.2% C had its Brinell hardness value raised from 187 in the quenched sample to above 500 by tempering at 650° for 15 min. A. considers the steel to cool from the quenching temp. to ordinary temp. without undergoing any transformation and tempering above 400° causes carbide of Fe to be removed from soln., leaving a solid soln. of a compn. that under ordinary conditions of cooling gives rise to a crit change at 150° . This transformation is the γ - α change, and the net result is the formation of martensite.

D. S.

The development of the electric arc welding process. A. R. ALLARD. *Westinghouse Co. Elec. J.* 25, 423–7(1928).—A review

C. G. F.

The soldering and welding of aluminum. G. MEIKLE. *Roy. Tech. Coll. Met. Club J.* 1927–8, No. 6, 41–2.—The application of solder to Al and high Al alloys is justified when used for repairing small defects in castings but is not recommended where exposure to atm. conditions is contemplated, since in moist air electrolytic corrosion is set up and very severe corrosion takes place at the junction of the solder and the Al. Welded Al joints are necessarily of somewhat uncertain quality and dependable results can only be obtained by highly skilled welders.

DOWNS SCHAAP

Pipes in relation to eutectic composition. BERNHARD OSANN. *Giesserei Z.* 15, 49–51(1928).—It is shown that preheating of the mold does not alone suppress the formation of pipes. Eutectic alloys do not "pipe". It is considered that the formation

of a pipe space is due to the diminution in vol. occurring in the change from the liquid to the solid and to the formation of crust from the surface of the casting to the interior, as solidification proceeds. Both actions take place simultaneously. Without the latter action pipe formation is missing, only a diminishing of the outer dimensions being apparent. Thus, pipes occur only when the melt is viscous, for when the liquid metal flows easily the spaces formed during the shrinking are immediately filled. A method of testing for pipes is given, depending on the fracturing of the casting.

J. BALOZIAN

Corrosion of zinc roofing. H. F. RICHARDS. *Metal Ind.* (N. Y.) **32**, 633-4 (1928).—From analyses of the corrosion products from Zn roofing it is concluded that the corrosion is due to the S compds. in the atm.

B. E. ROTHLEI

Bureau of Standards soil-corrosion studies. I. Soils, materials and results of early observations. K. H. LOGAN, S. P. EWING AND C. D. YEOMANS. *Bur. Standards, Tech. Papers* **1928**, No. 368, 447-554.—Test pieces of various metals and coated metals were buried in soils of different compns. Examns. of specimens removed after 1, 2 and 4 yrs. permit no definite conclusions to be drawn regarding the corrodibility of different metals of similar groups. The work thus far shows that the type of corrosion of a group is influenced by the nature of the soil. Most soils are but slightly corrosive. In many cases the corrosion rate and pitting rate fall off with time. Galvanized pipes are in general more resistant to corrosion than untreated pipe. The corrosiveness decreases with increasing wt. of Zn coating. Some soils corrosive to steel cause the formation of a protective film on Zn which affords good protection. Thin bituminous coatings yield insufficient protection against severely corrosive soils, probably because of the poor methods available for application. Pb and Zn fail by pitting in some soils and Al is rapidly attacked. Cu and high-Cu alloys are generally resistant in all soils. The investigation has not proceeded sufficiently far to warrant definite conclusions to be drawn regarding the relative merits of metals of the same type.

B. E. R.

Lining for oil stills (U. S. pat. 1,680,276) **22**. **Furnaces** [for calcining ores, etc.] (Fr. pat. 634,013) **1**. **Extraction of lead** (Fr. pat. 633,810) **18**. **Spraying apparatus for coating metal** (Brit. pat. 281,885) **1**. **Agglomerating ores** (Brit. pat. 282,104) **13**. **Apparatus for testing tensile strength and elongation** (U. S. pat. 1,679,751) **1**. **Chromium as a corrosion preventive** (WRIGHT) **4**. **Correlation of physical and chemical properties of cokes with their value in metallurgical processes** (BRAUNHOLTZ, et al.) **21**. **The effect of varying ash in the coke on blast-furnace working** (GILL) **21**. **X-ray investigation in the system Pb-Tl** (HALLA, STAUFER) **2**. **Deformation of a single crystal of Cu under tensile test** (YAMAGUCHI) **2**. **X-rays in science and industry** (DAVEY) **3**. **Passivity** (EVANS) **2**.

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Concentrating minerals by flotation. GUGGENHEIM BROTHERS. Fr. 634,124, May 10, 1927. The mineral is submitted in the form of a pulp or mud to a flotation operation in the presence of an alkyl, aryl or aralkyl deriv. of a thiocarboxylic acid, such as ethyldixanthogen or xanthic anhydride. Fr. 634,125 and Fr. 634,126 give further details of a similar process. Fr. 634,127 describes a similar process in which a metallic xanthate and an acid chloride are used.

Agitator and sluice box apparatus for concentrating ores. F. H. NASH. Brit. 282,298, June 21, 1927.

Riffle apparatus for concentrating precious metals. WILLIAM A. HUELSDONK. U. S. 1,679,035, July 31.

Ore separation. ANDREW T. SWEET (one-fourth each to William G. Rice and Herman Gendlach and one-tenth to Philip B. Woodworth) U. S. 1,678,884, July 31. A stream of ore such as one contg. Cu, Ag, Au or Zn is passed across a beam of light, and the ore is sepd. by a device controlled by a Se cell according to variations in light reflection of different masses in the ore stream. An app. is described.

Treating ores before leaching. F. DIETZSCH. Brit. 281,741, July 7, 1926. Oxidized ores such as those of Cu or Zn are heated, or roasting of the ore is effected, with not more than 2% of an alkali metal or alk. earth sulfate. The process may also be applied to Au ores before extn. with cyanide.

Apparatus for sintering sulfide ore concentrates. HENRY J. STEHLI. U. S. 1,680,345, Aug. 14.

Treating copper ores. JOHN C. MOULDEN and BRUCE TAPLIN (to Metals Production Co. of North America, Inc.). U. S. 1,679,337, July 31. Ore is heated with solid carbonaceous material such as coal or charcoal and with a halide such as NaCl at a temp. lower than the m. p. of Cu but sufficiently high to cause reaction (suitably about 400°). This treatment causes deposition of metallic Cu on the exterior of particles of the material. An app. is described. Cf. C. A. 21, 2868.

Treating copper sulfide ores. FERDINAND DIETZSCH. U. S. 1,679,294, July 31. The ore is mixed with not more than 2% of an alkali sulfate such as Na₂SO₄ and roasted; the values may then be extd. by dil. H₂SO₄ soln.

Treating iron ores. GRANULAR IRON COMPANY. Fr. 633,870, May 4, 1927. An app. is described for treating iron ores in which rotating or slightly inclined furnaces are used.

Preparing iron ore flue dust for smelting. FRANK F. MARQUARD. U. S. 1,680,107, Aug. 7. Ammonia still waste liquor is mixed with the flue dust, to agglomerate the fine particles. Blast-furnace slag also may be added.

Roasting and reducing iron ores or other ores with circulating heated gases. BROR CHRISTIANSEN. U. S. 1,680,861, Aug. 14. Ore is passed successively in a substantially horizontal direction through preheating, roasting, prereluction and final reduction zones of a channel furnace (which is described); in the final reduction zone the ore is subjected to the reducing action of circulating reducing gases, these gases are recarbonized outside the channel furnace in alternately operative recarbonizing furnaces; the excess of circulating gases is drawn off and partly burned in the inoperative recarbonizing furnace by a regulated air supply, for reheating the furnace; gases formed by the partial combustion are supplied to the prereluction zone and finally subjected to further combustion in the roasting zone. The process is suitable for producing spongy Fe.

Platinum from ores. J. W. MELLOR. Brit. 282,543, Nov. 18, 1926. Pt is extd. from ores by treating the ore with a molten metal such as Pb or Pb contg. a small

proportion of an alkali or alk. earth metal, which dissolves Pt. The process may be made continuous.

Treating zirconium ores. RHENANIA-KUNHEIM VEREIN CHEMISCHER FABRIKEN A.-G. Brit. 282,023, Dec. 13, 1926. Zr ore is mixed with an alk. earth carbonate, oxide or hydroxide, and with a halogenide of an alkali or alk. earth metal and sintered at a temp. of about 1200° without C or carbides to produce Zr oxide sol. in acids. The presence of steam facilitates the reaction and enables it to take place at somewhat lower temps. CaCO_3 may be used with fluorspar or CaCl_2 .

Reclaiming light metals from dross. THERON D. STAY and CHARLES O. TESSIER (to Aluminum Co. of America). U. S. 1,679,385, Aug. 7. An app. is specified comprising a device such as a special stirrer for reducing highly heated dross to a finely divided condition to liberate molten metal entrapped in the dross, and means for agglomerating and solidifying the liberated molten metal. Cf. C. A. 21, 2246.

Obtaining volatile metals from sulfides. HENNING G. FLODIN and EMIL G. T. GUSTAFSSON (Flodin to Harry Broady). U. S. 1,680,098, Aug. 7. Finely divided metallic Fe is used in making briquets in admixts. with finely divided ZnS ore or other material contg. sulfides which can be reduced by Fe; these briquets are heated in a closed elec. furnace to effect reaction and liberation of the metal from the sulfide.

Extracting gold from sea water. BORIVOJ CERNIK and BOHUSLAV STOKES. Fr. 633,998, May 6, 1927. A screen or partition on which is a removable layer of one or several substances capable of combining with the gold or of retaining it, is placed so that the sea water passes through.

Apparatus for filtering solutions from copper slimes, etc. WILLIAM M. MORRISON (to American Smelting and Refining Co.). U. S. 1,678,704, July 31.

Refining metals. RICHARD WALTER. Fr. 631,436, May 14, 1927. When alkali compds. are used in the refining of molten metals, their normal speed of decompn. is slackened by the addition of CaF_2 in from 1 to 38%.

Metal coatings. SOC. ANON. ACIÉRIES ET FORGES DE FIRMINY. Fr. 633,691, Sept. 7, 1926. See Brit. 277,307 (C. A. 22, 2332). Metals are protected against the action of N compds. by thick Ni electroplating.

Coating metal plates with aluminum. FRANZ JORDAN. U. S. 1,679,308, July 31. Al strips are rolled onto both sides of other metal such as Fe, to form a firmly adherent coating. Various mech. details are described.

Plating metals. W. E. WATKINS. Brit. 282,624, Dec. 24, 1926. The foundation metal, e. g., a sheet of ferrous metal, is coated with a mixt. of finely divided plating metal such as Cu or a readily reducible compd. of the metal and a reducing medium, e. g., C and asphaltic hydrocarbons, and the materials are passed through a furnace so that an adherent coating of the coating metal is formed on the foundation metal and a layer of oxide is formed on the coating metal. The oxide may then be removed by pickling.

Detecting minute holes in metal plating, etc. K. FITSCHNER (to American Chain Co.). Brit. 282,621, Dec. 22, 1926. A strip of paper or other suitable material is applied to the surface to be tested after having been treated with a substance which will react chemically with the base and form a visible record either directly or after development; e. g., paper may be treated with an aq. soln. of agar agar, NaCl, $\text{K}_2\text{FeC}_2\text{N}_6$, and EtOH or MeOH, and, on being moistened and applied to a coating of Cu on steel, blue spots appear where punctures reach through to the steel. The test paper may be coated with shellac varnish after the test, to preserve a permanent record.

Mold for casting metals. MARIUS GUYOT (to Aluminum Co. of America). U. S. 1,679,860, Aug. 7. Mech. features, especially relating to molds such as those used for Al or other metals of higher m. p.

Molds suitable for casting aluminum and its alloys. ALLEN B. NORTON and MARIUS GUYOT (to Aluminum Co. of America). U. S. 1,679,869-70, Aug. 7. Structural features.

Multi-part permanent molds suitable for casting metal articles such as aluminum or its alloys. MARIUS GUYOT (to Aluminum Co. of America). U. S. 1,679,861, Aug. 7. Mech. features.

Multi-part permanent molds for casting aluminum and its alloys. GEORGE KOHL (to Aluminum Co. of America). U. S. 1,679,864, Aug. 7. Structural features.

Ingot mold. EMIL GATHMANN. U. S. 1,680,872, Aug. 14. Structural features.

Molds for pig-iron. FELIX QUINN (one-half to Emil Neuhart). U. S. 1,679,876, Aug. 7. Material such as a plate coated with fireclay and lime is embedded in the mold (which may be mainly formed of pig iron) to retard the expansive force of the inner toward the outer portion of the mold wall.

Mold for centrifugally casting of pipe. HEINRICH BURCHARTZ (to Centrifugal Pipe Corp.). U. S. 1,678,633, July 31. Mech. features.

Rotatable low-conductivity mold for centrifugal metal casting apparatus. LUCIEN I. YEOMANS (to A. O. Smith Corp.). U. S. 1,678,929, July 31.

Apparatus for centrifugal casting of hollow metal bodies. JOHANN HOLTHAUS (to Centrifugal Pipe Corp.). U. S. 1,678,641, July 31.

Centrifugal casting of steel pipe couplings. HARRY BLUMBERG and MARTIN A. MIKESH (to A. O. Smith Corp.). U. S. 1,678,931, July 31. The interior surfaces of a metal mold are covered with graphite or ferro-Mn and Al or other suitable substance which will retard the freezing of the molten metal first introduced and form an alloy with the metal.

Casting ingots. JOSEPH A. DURFEE. U. S. 1,678,976, July 31. A partition is placed within an ingot mold so as to divide the mold into inner and outer compartments and metal is poured into the inner compartment and permitted to flow under the partition to the outer compartment. This serves to restrict segregation of metalloids and avoid contact of released gases with the mold wall.

Apparatus for casting metal articles such as steel ingots. JAMES M. NELSON. U. S. 1,679,582, Aug. 7.

Casting ingots of steel, gun metal, bronze, etc. K. HONDA. Brit. 281,992, Dec 9, 1926. To avoid defects in the ingots, a riser or header of the mold is filled with molten slag of about the same or a higher temp. than that of the metal, directly after casting.

Iron castings. KARL SIPP (to Heinrich Lanz A-G). U. S. 1,678,655, July 31. In producing gray iron castings in shapes of widely varying sections having a substantially uniform structure and hardness, casting is effected with a mixt. adjusted to produce under normal cooling conditions a workable gray iron in one of the thick sections and cooling of the metal in the thinner sections is retarded and in the thicker sections, if any, is hastened.

Malleable iron castings. H. A. SCHWARTZ (to National Malleable & Steel Castings Co.). Brit. 282,671, Dec 23, 1926. In producing malleable iron castings, the casting, while still at a temp. above the crit. point or after reheating to such temp., is quenched to room temp. or to a temp. of about 200-300°, the rate of cooling being about 5.5° or more per sec. The casting is then heated to above the crit. temp. (suitably to about 900°) and maintained at that temp. for a sufficient time to effect decompn. of the cementite in the iron, and is then cooled to below the crit. point, held at such temp. for about 30 hrs. and then cooled.

Metallic material for addition to cast iron while molten. PAUL D. MERICA and THOMAS H. WICKENDEN (to International Nickel Co.). U. S. 1,680,161, Aug. 7. An addn. material for molten cast iron baths comprises Ni alloyed with another material such as C, Si and Al in sufficient quantity to lower the m. p. to substantially the m. p. of the cast iron.

Rolling metal plates. GRAFENBERGER WALZWERK GES. and F. HOLZHAUSEN. Brit. 281,944, May 23, 1927. A pack of plates to be cold rolled are welded together at their longitudinal edges to prevent shifting.

Metal box for holding metal articles during carbonizing, etc. EDWARD P. VAN STONE (to General Alloys Co.). U. S. 1,679,510, Aug 7. Sheet metal side plates are mounted in cast metal corner pieces so as to permit free expansion and contraction.

Treating nickel-containing mat or metal. OTTO LELLEP (to International Nickel Co.). U. S. 1,680,155, Aug. 7. A pressure blast of preheated air is applied directly to the molten metal, in an app. which is described. Cf. C. A. 21, 1624.

Furnaces for metals. SOC. REBOURG ET DUPONT. Fr. 634,113, May 10, 1927. To prevent oxidation in the melting of metals when using heavy oils, the metal, as soon as it melts, pours down into an elec. heated chamber away from the oil flame.

Rotary or tilting oil-fired furnace for melting metals. G. REGNAC PAILLE. Brit. 282,627, Dec. 23, 1926.

Regenerative open-hearth furnace. STEWART J. CORT, TIMOTHY BURNS, ROBERT S. A. DOUGHERTY and CHARLES E. LEHR. U. S. 1,680,365, Aug. 14.

Blast furnace construction. BROKEN HILL PROPRIETARY CO. Brit. 282,042, Dec. 9, 1926.

Reversible metallurgical furnace. FRANK B. MCKUNZ (to Open Hearth Combustion Co.). U. S. 1,679,340, July 31.

Cupola furnace. ALPHONSE E. BAILLOT (51% to Archibald Harold Coplan and 49% to Archibald Hymen Coplan). U. S. 1,678,899, July 31.

Furnace (with cupola and fore-hearth) suitable for melting iron. HUGO LUYKEN. U. S. 1,681,043, Aug. 14.

Rotating furnace (with cooled walls) for refining steel, iron or other metals. JUVENAL MAXIMOFF, MARIA S. DE COSTA and ROBERT P. D. KREBS. U. S. 1,681,191, Aug. 21.

Electrically heated furnace for bright-annealing in a protective gas. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 282,079, Dec. 9, 1926. Structural features.

Furnace for use in copper plating ferrous metals. WILLIAM E. WATKINS (to Copper Plate Sheet and Tube Co.). U. S. 1,679,389, Aug. 7.

Furnace suitable for heating, puddling or forging operations. WILLIAM F. WEATHERS. U. S. 1,680,654, Aug. 14.

Furnace for welding bundles of scrap metal, etc. FRITZ MENNE (to Herman F. Hoevel). U. S. 1,680,468, Aug. 14.

Furnace suitable for heating rock drill steels. WADE H. WINEMAN (to Sullivan Machinery Co.). U. S. 1,679,145, July 31.

Built-up vertical zinc retort construction. FRANK G. BREYER and EARL H. BUNCE (to New Jersey Zinc Co.). U. S. 1,680,726, Aug. 14.

Pure iron. H. J. VAN ROYEN. Brit. 282,365, Dec. 14, 1926. In producing pure Fe by a blast or open-hearth refining process, a reductive non-carbonizing gas (suitably a mixt. of CO, CO₂, and N in proper proportions, or a mixt. contg. SO₂ and N) is blown through the metal bath which may be covered with a new layer of slag, after the ordinary refining process. The Fe produced is suitable for the manuf. of alloyed or unalloyed steel. Brit. 282,366 specifies carburizing the Fe thus prepd., by passing satd. hydrocarbons or other carburizing gases or vapors through the molten metal.

Utilizing scrap iron. T. GOLDSCHMIDT A.-G. Brit. 282,378, Dec. 20, 1926. In utilizing scrap iron as described in Brit. 257,905 (C. A. 21, 3040) the bundled metal is melted by elec. eddy currents, preferably in a high-frequency induction furnace, and the molten iron is worked to produce wrought iron, cast iron or steel by adjustment of the C content and adding any suitable alloying substances desired.

Iron from carbonyl. I. G. FARBERIND. A.-G. Brit. 281,963, June 25, 1927. In producing pure Fe of the kind described in Brit. 262,938 (C. A. 21, 3885), Fe carbonyl in undil. liquid or vaporous condition is allowed to nap gradually into paraffin oil heated to 270°; pyridine, salts such as a mixt. of NaNO₃ and KNO₃, or metallic Pb also may be used.

Pickling iron and steel. JAMES H. GRAVELL and ALFRED DOUTY (Douty to Gravel). U. S. 1,678,776, July 31. A stannous compd. such as SnCl₂ is used in pickling baths contg. acid pickling agents such as H₂SO₄ to control action of the bath. The quantity of stannous compd. is insufficient to cause the scale to dissolve. Sulfite waste liquor also may be added.

Regeneration of steel. HASSENFORDERER & CIE. Fr. 634,370, May 14, 1927. The steel is heated to redness and plunged into a bath contg. mutton fat, tallow, fish-liver oil, colophony, borax, soot, NaCl or saltpeter, calcined bone and leather.

"High speed steel." ARTHUR C. DAVIDSON (to D. Co., Inc., a corp. of N. Y.). U. S. 1,680,937, Aug. 14. Fe, Cr and W are melted, scavenged, Co is added, and, after further scavenging, V is added in less than 50% excess over the desired analysis, Mg or gunpowder also is added, and the metal is cast at a temp. above 1760°.

Steel with high elasticity limit. HERMANN J. SCHIFFLER. Fr. 633,909, May 5, 1927. Steels with a high elasticity limit at low and high temps. are made by adding 0.3 to 1.5% of Al. Other metals or elements may be added to give the steel other properties.

Alloys for bushings. STANISLAW CHOLEWINSKI. Fr. 633,992, May 6, 1927. See Brit. 272,889 (C. A. 22, 1754).

Alloy for coverings of electric meters. S. Z. DE FERRANTI and FERRANTI, LTD. Brit. 281,743, July 12, 1926. In order to prevent tampering with a meter, its cover is formed of a non-magnetic and "undrillable" metal such as Mn steel or an alloy of cast iron 87, Mn 9 and Cu 4%. Various structural features are specified.

Magnetic alloys for telegraphic cables. WILLOUGHBY S. SMITH and HENRY J. GARNETT. Fr. 633,974, May 6, 1927. See Brit. 279,549 (C. A. 22, 2917).

"Heat resistant" alloy. ALFRED L. BORGEHOLD (to General Motors Research Corp.). U. S. 1,680,007, Aug. 7. An alloy which is suitable for valve heads and guides comprises Fe together with C 2.40-2.80, Si 1.75-2.25, Ni 3.75-4.25 and Al 5.75-6.25%.

Alloys of high electric resistance and high initial permeability. W. S. SMITH, H. J. GARNETT and J. A. HOLDEN. Brit. 281,763, Sept. 8, 1926. Ni is alloyed with Fe 10-17, Si 1.5-4 and Cr, V, W and Mo 1-4%. A small proportion of Mn, Mg or Cd

may be used as a deoxidizing agent. Fine wire of the alloys may be annealed for a short time at 880° in N or other inert atm. and then rapidly cooled. Cf. C. A. 22, 2546.

Alloys for high-tension electric conductors. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 281,692, Dec. 2, 1926. Hollow high-tension overhead cables are formed of Al alloyed with Si 0.5-2.0 and Mg 0.4-2.0%. Structural features also are described.

Aluminum alloy. HENRI BENIT. U. S. 1,680,004, Aug. 7. An alloy which may be repeatedly melted without losing its characteristic properties comprises Cu 2, Ni 0.37, W 0.27, Mg 0.45 and "commercial aluminum" 96.91 parts, with 0.5-2.0% impurities.

Aluminum alloys. H. C. HALL and T. F. BRADBURY. Brit. 281,912, March 17, 1927. Al alloys are made contg. Cr 0.05-0.4, Ni 0.2-1.5, Mg 0.1-1.0, Si 0.2-1.5, Fe 0.7-1.5, Cu 2-5% and Sb and Ti (which serve as cleansing agents) up to 0.5% each. The Sb and Ti may be wholly or partly eliminated during the process of making the alloy.

Copper alloys. VICTOR O. HOMERBERG and DEXTER N. SHAW. U. S. 1,680,045, Aug. 7. Alloys such as those contg. Cu 60 and Zn 40 parts are heated above the crit. temp. to obtain substantially a single solid soln., quenched to obtain this solid soln. at room temp. and then reheated and cooled to control the properties of the final product. A chart is given covering the treatment of different alloys. U. S. 1,680,046 relates to the treatment of "muntz metal" which is given a tensile strength of over 75,000 lb per sq. in. and a Brinell hardness of over 200 by reason of very finely divided and uniformly distributed crystals. The metal may be obtained in this condition by heating to above the crit. temp., quenching quickly and reheating to 250°.

Copper alloys. E. MANOS. Brit. 282,095, Dec. 11, 1926. An alloy (for addn., up to 10%, to Cu alloys such as brass or bronze waste) consists of Mn, Al, Mg, Si, Ni and Fe. A final alloy thus formed may contain, e. g., brass waste 90, Mn 7, Al 1, Mg 0.01, Si 0.01, Ni 1.4 and Fe 0.58%. Brit. 282,096 specifies white alloys resistant to oxidation contg. Cu 25-90, Ni 0.5-70, Al 0.05-10, Zn 0.05-50, Fe 0.01-10, Si 0.01-10 and Mg 0.01-5%, with or without addn. of Mn and Cr. An alloy may, e. g., be made contg. Cu 56, Ni 21, Al 2, Zn 20, Fe 0.25, Si 0.5, and Mg 0.25%. Details of making the alloys are given.

Copper alloys. FELIX VISINTAINER. U. S. 1,680,577, Aug. 14. Alloys which are resistant to acids contain Cu 85-89, Al 9-13, Fe 0.25-0.65, Si 0.30-0.70, and Sn 0.07-0.12%.

Hardening copper or copper alloys. O. W. GUSTAFSON. Brit. 281,799, Sept. 21, 1926. The metal at ordinary room temp. is plunged into a bath formed of an inorg. acid and an inorg. salt, also at room temp., e. g., into a bath formed of HNO₃ and NH₄Cl or borax.

Alloying ferrous metal with nickel and other metals. PAUL D. MERICA and THOMAS H. WICKENDEN (to International Nickel Co.). U. S. 1,680,058, Aug. 7. A material for addn. to cast iron or steel comprises Ni and another alloying material such as Cr, Mo or W together with another added substance such as C and Si which serves to lower the m. p.

Iron alloys. A. L. FEILD. Brit. 282,387, Dec. 18, 1926. Stainless or rustless irons contg. about 12-18% Cr and 0.07-0.17% C are made by a 2-stage process in the first stage of which high-C ferro-chrome is incorporated in an Fe bath and C is eliminated by use of Fe ore (or, preferably, roll scale), Cr passing into the slag, and in the second stage of which the greater part of the Cr is reduced from the slag by the addn. of a reducing agent of non-carbonaceous character such as ferro-Si and a basic material such as lime and passes into the metal bath. Ni, Cu, Mo and V may be added.

Lead alloys. HIROSHI YOSHIKAWA. U. S. 1,681,272, Aug. 21. Alloys which are of good strength and resistant to corrosion are formed of Pb alloyed with Bi 0.025-4.0, and with a metal such as Cu or Ni, immiscible with Pb 0.025-5.0%. Cf. C. A. 22, 2351.

Magnesium alloys. JOHN A. GANN (to Dow Chemical Co.) U. S. 1,680,262, Aug. 7. An alloy which may be used for pistons of internal-combustion engines comprises Mg 80-99.5 and Sn 0.5-5-20%. Cf. C. A. 22, 378.

Alloys containing molybdenum. EMIL A. LUCAS (to Molybdenum Corp. of America). U. S. 1,681,123-4, Aug. 14. See Brit. 245,422 (C. A. 21, 221).

Malleable alloys of nickel, copper and iron. T. H. KELLY. Brit. 281,950, May 31, 1927. Alloys contg. Ni 20-40, Cu 20-40 and Fe 40-60 parts are made by melting the metals in an elec. furnace with fluxes which produce a non-oxidizing atm., and with use of Mg, Al, Mn or ferro-Si as a deoxidizer. In some cases, a portion of the Fe may be substituted by Cr.

Alloying and pulverizing nickel. WILLIAM R. VRAZEY (to Dow Chemical Co.). U. S. 1,680,825, Aug. 14. Metallic Ni and Mg are heated together at a temp. which is intermediate the m. p. of the 2 metals, until sufficient Mg is absorbed in the Ni to render it readily pulverizable. The product may be used in making other alloys.

Steel alloy. GEORGE L. NORRIS (to Vanadium Corp. of America). U. S. 1,680,301, Aug. 14. A steel alloy which has a high strength contains Si 0.40–2.0, V 0.05–0.5, Mn 0.20–0.60 and C 0.10–1.0, the remainder being mainly Fe together with the usual impurities of com. steel.

Steel alloys. F. KRUPP A.-G. Brit. 282,015, Dec. 7, 1926. Steel alloys such as Ni-Mn steel (particularly austenitic steels) are stated to have their "yield point" raised by rotating the article, such as a turbo rotor formed from the alloy, at such a speed that the stress in the material exceeds the yield point of the unrestrained metal.

Finely porous metals. I. G. FARBENIND. A.-G. Brit. 282,112, Dec. 13, 1926. One of the constituents of an alloy is removed by a solvent which does not substantially attack the other constituents; e. g., porous Cu is obtained by treating brass with NaOH and subsequently dissolving out the Na zincate with dil. HCl. Alloys of Cu with Sn, Al or Mn may be similarly treated. Alloys of Cu with Ca may be treated with dil. acid. Ni may be obtained from its alloys with Zn and Al, Fe from ferro-Si, and Sn from a Sn-Na alloy by use of water or alc. By eliminating one of 3 metals, alloy mixts. may be obtained such as Pb-Sn, Pb-Sb or Cu-Mn. The products may be used as catalysts.

Porous lead. I. G. FARBENIND A.-G. Fr. 634,032, May 7, 1927. See Brit. 270,763 (C. A. 22, 1549).

Apparatus for cleaning or "branning" tin plates. J. I. RICHARDS, O. G. RICHARDS, J. THOMAS and J. RICHINGS. Brit. 282,194, Nov. 2, 1926.

Apparatus for cleaning and polishing metal plates. J. H. THOMSON, W. E. CLEMENT and D. THOMAS. Brit. 282,532, Nov. 6, 1926.

Apparatus for sandblasting, heating and spray-coating with metal of articles such as pipes or tubes. F. G. COZENS and METALLISATION, LTD. Brit. 282,116, July 17, 1926.

Hollow steel drills, shafts, etc. C. P. MARRISON. Brit. 281,930, April 27, 1927. A tube of stainless steel packed with material such as silica sand is inserted in a hollow steel billet; after rolling, the ends are cut off leaving a tube with a lining resistant to rust.

Electrodes for arc welding. NORMAN B. PILLING and JOHN G. SCHOENER (to International Nickel Co.). U. S. 1,679,002, July 31. Electrodes comprising a normal Ni alloy are provided with a coating contg. Ti approx. 19% and Ca approx. 6% together with Fe 53, Si 17 and Al 5%. U. S. 1,679,003 specifies electrodes comprising a metallic nickelous matrix malleabilized by an alk. earth metal such as Ca with a coating comprising Ti 0.1–10% and Ca 0.1–8% together with Fe, Si and Al. Cf. C. A. 22, 2547.

Welding copper and copper alloys. FREDERICK M. BECKET (to Electrometallurgical Co.). U. S. 1,680,844, Aug. 14. A welding rod of Cu together with Si 1.25–4% is used for welding or brazing Cu or Cu alloys.

Solder. H. A. MEINHARDT. Brit. 282,007, Dec. 10, 1926. A solder bar comprises a tubular sheath of soft solder metal contg. a flux and a soft solder metal of higher m. p. than the sheath.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Chloromethyl benzyl ether and benzyl formal. P. CARRÉ. *Bull. soc. chim.* **43**, 767–8 (1928).—See C. A. 22, 3153. E. H.

Action of acetylene on aryl hydrocarbons in the presence of a mercury catalyst. II. J. A. REILLY and J. A. NIEUWLAND. Univ. of Notre Dame. *J. Am. Chem. Soc.* **30**, 2564–6 (1928); cf. C. A. 18, 2000.—The following ethylidene hydrocarbons were prep. from C_2H_2 and the proper C_6H_5 deriv. in the presence of concd. H_2SO_4 and HgO : $MeCH(C_6H_4CH_2CH_2Me)_2$, b_{12} 192–4°; $MeCH(C_6H_4CHMe)_2$, b_{15} 240–5°; $MeCH(C_6H_4CH_2CH_2CH_2Me)_2$, b_{17} 244–8°; $MeCH(C_6H_4CHMeCH_2Me)_2$, b_{11} 250–2°; $MeCH(C_6H_4CMe)_2$, b_{16} 212–4°, m. 94°; $MeCH(C_6H_4CH_2Et)_2$, b_{19} 234–6°; $MeCH(C_6H_4CHMeCHMe)_2$, b_{18} 225–8°. $C_{10}H_{12}$ gives the *comp. pd.* $MeCH(C_{10}H_{10})_2$, b_{18} 261–3°. These are all viscous, amber-colored liquids. Polynuclear hydrocarbons, such as Ph_3 , Ph_2CH_2 , $(PhCH_2)_3$, Ph_3CH and $C_{10}H_8$ do not react with C_2H_2 . C. J. WEST

The allenic hydrocarbons. MARCEL BOUIS. *Ann. chim.* 9, 402-62(1928); cf. C. A. 22, 213.—B. preps. new drivs. of allene by brominating vinylalkylcarbinols and removing Br_2 with Zn. The vinylalkylcarbinols were prepd. by treating RMgBr with $\text{CH}_2\text{:CHCHO}$ (I), using large vols. of Et_2O , avoiding traces of disacryl, avoiding an excess of I and by decomp. the Grignard with NH_4Cl . iso- PrMgBr with I gives 15% iso- PrCH(OH)CH:CH_2 , b. 125° , d_{20} 0.8368, n_D^{23} 1.4263, M. R. 30.64. iso- $\text{PrCH}_2\text{CH(OH)CH:CH}_2$, b. 118° , d_{20} 0.8288, n_D^{21} 1.4285, M. R. 35.42. The vinyl alcs. are brominated with PBr_3 in the presence of 10% $\text{C}_6\text{H}_5\text{N}$ to prevent the liberation of HBr , and the products distd. *in vacuo*. Rearrangement of the bromide occurs as soon as it is formed; $\text{EtCH(OH)CH:CH}_2 \rightarrow \text{EtCHBrCH:CH}_2 \rightarrow \text{EtCH}\cdot\text{CHCH}_2\text{Br}$, b. 35° , b. $123-4^\circ$, d_{20} 1.2545, n_D^{20} 1.4731, M. R. 33.33. Other allyl bromides similarly prepd. were: $\text{PrCH:CHCH}_2\text{Br}$, b. $42-4^\circ$, d_{16} 1.2119, n_D^{16} 1.4778, M. R. 38.06. iso- $\text{PrCH:CHCH}_2\text{Br}$, b. 46° , d_{24} 1.2208, n_D^{24} 1.4723, M. R. 37.41. $\text{BuCH:CHCH}_2\text{Br}$, b. $62-4^\circ$, d_{17} 1.1682, n_D^{17} 1.4760, M. R. 42.74. iso- $\text{PrCH}_2\text{CH:CHCH}_2\text{Br}$, b. 60° , d_{21} 1.1782, n_D^{21} 1.4750, M. R. 42.30. The bromides were condensed with excess NaOAc in boiling HOAc to give the corresponding esters: $\text{EtCH}\cdot\text{CHCH}_2\text{OAc}$, b. $149-51^\circ$, d_{22} 0.9019, n_D^{22} 1.4219, M. R. 36.06. $\text{PrCH:CHCH}_2\text{OAc}$, b. $171-3^\circ$, d_{18} 0.8976, n_D^{18} 1.4282, M. R. 40.72. iso- $\text{PrCH:CHCH}_2\text{OAc}$, b. 163° , d_{22} 0.8990, n_D^{22} 1.4260, M. R. 40.47. $\text{BuCH}_2\text{CHCH}_2\text{OAc}$, b. $192-4^\circ$, d_{18} 0.8915, n_D^{18} 1.4314, M. R. 45.33. iso- $\text{PrCH}_2\text{CH:CHCH}_2\text{OAc}$, b. $182-4^\circ$, d_{20} 0.8836, n_D^{20} 1.4280, M. R. 45.42. These allyl acetates have been found to be different from the acetates which would have been formed if the bromides did not rearrange. The acetates are hydrolyzed by heating with an excess of aq. NaOH contg. MeOH to aid soln. The alcs. obtained showed no traces of secondary alcs. $\text{EtCH}\cdot\text{CHCH}_2\text{OH}$, b. $138-9^\circ$, d_{23} 0.8444, n_D^{23} 1.4539, M. R. 26.62. $\text{PrCH:CHCH}_2\text{OH}$, b. $158-60^\circ$, d_{16} 0.8490, n_D^{16} 1.4403, M. R. 31.06, forming a naphthylurethan, m. 76° . iso- $\text{PrCH:CHCH}_2\text{OH}$, b. 150 , d_{21} 0.8348, n_D^{21} 1.4357, M. R. 31.30. $\text{BuCH:CHCH}_2\text{OH}$, b. $177-9^\circ$, d_{20} 0.8421, n_D^{20} 1.4410, M. R. 35.75. iso- $\text{PrCH}_2\text{CH:CHCH}_2\text{OH}$, b. 169° , d_{20} 0.8355, n_D^{20} 1.4390, M. R. 35.89. The allyl bromides are converted to the tribromides by the gradual addn. of Br_2 . $\text{EtCHBrCHBrCH}_2\text{Br}$, b. 118 , $122-4^\circ$, d_{19} 2.0714, n_D^{19} 1.5580, M. R. 48.09. $\text{PrCHBrCHBrCH}_2\text{Br}$, b. $117-9^\circ$, d_{16} 1.9429, n_D^{16} 1.5506, M. R. 53.01. iso- $\text{PrCHBrCHBrCH}_2\text{Br}$, b. $131-2^\circ$, m. 35° , d_{26} 1.9139, n_D^{26} 1.5470, M. R. 53.52. $\text{BuCHBrCHBrCH}_2\text{Br}$, b. $142-3^\circ$, d_{17} 1.8112, n_D^{17} 1.5393, M. R. 58.31. iso- $\text{PrCH}_2\text{CHBrCHBrCH}_2\text{Br}$, b. $134-5^\circ$, d_{21} 1.8116, n_D^{21} 1.5380, M. R. 58.19. These tribromides have been converted into the epidibromohydrins by addn. to KOH . EtCHBrCBr:CH_2 , b. $75-6^\circ$, b. 173° (decompn.), d_{19} 1.7442, n_D^{19} 1.5316, M. R. 40.48. PrCHBrCBr:CH_2 , b. $83-5^\circ$, d_{14} 1.6381, n_D^{14} 1.5248, M. R. 45.26. iso- PrCHBrCBr:CH_2 , b. 81° , d_{24} 1.6035, n_D^{24} 1.5180, M. R. 45.73. BuCHBrCBr:CH_2 , b. $108-10^\circ$, d_{18} 1.5595, n_D^{18} 1.5200, M. R. 49.90. iso- $\text{PrCH}_2\text{CHBrCBr:CH}_2$, b. $100-1^\circ$, d_{20} 1.5493, n_D^{20} 1.5155, M. R. 49.87. These dibromides have been added to Zn in boiling alc. to give the corresponding allenic compds. EtCH:C:CH_2 (II), b. 45° , d_{20} 0.6890, n_D^{20} 1.4149, M. R. 24.71. PrCH:C:CH_2 , b. 78° , d_{17} 0.7198, n_D^{17} 1.4298, M. R. 29.42. iso- PrCH:C:CH_2 , b. 70° , d_{22} 0.7061, n_D^{22} 1.4232, M. R. 29.58. BuCH:C:CH_2 (III), b. 106° , d_{21} 0.7374, n_D^{21} 1.4360, M. R. 34.04. iso- $\text{PrCH}_2\text{CH:C:CH}_2$ (IV), b. 96° , d_{19} 0.7225, n_D^{19} 1.4282, M. R. 34.20. α and β are also given. By the methods given above PhCH(OH)CH:CH_2 with PBr_3 gives $\text{PhCH:CHCH}_2\text{Br}$, b. $127-8^\circ$, m. 29° , d_{30} 1.3428, n_D^{30} 1.6157, M. R. 51.25; with NaOAc it gives $\text{PhCH:CHCH}_2\text{OAc}$, b. $139-40^\circ$, d_{22} 1.0520, n_D^{22} 1.5464, M. R. 53.01. Sapon. gives $\text{PhCH:CHCH}_2\text{OH}$, b. $142-5^\circ$, m. 32° , d_{26} 1.0382, n_D^{26} 1.5819, M. R. 43.07. The bromide with Br_2 gives $\text{PhCHBrCHBrCH}_2\text{Br}$, m. 127° . It has been difficult to convert this tribromide to the epidibromohydrin. By treating the allene, with Br_2 in CCl_4 the tetrabromides were formed: $\text{EtCHBrCBr}_2\text{CH}_2\text{Br}$, b. 120° , d_{22} 2.2839, n_D^{22} 1.5916, M. R. 57.46. $\text{PrCHBrCBr}_2\text{CH}_2\text{Br}$, b. 130° , d_{18} 2.1873, n_D^{18} 1.5850, M. R. 61.60. $\text{BuCHBrCBr}_2\text{CH}_2\text{Br}$, b. 140° , d_{20} 2.0675, n_D^{20} 1.5718, M. R. 66.19. II with HBr in HOAc gives a primary fraction which is believed to be a mixt. of $\text{EtCH}_2\text{CBr:CH}_2$ and EtCH:CBrMe ; the second fraction is PrCBr_2Me , b. $62-3^\circ$, d_{18} 1.6452, n_D^{18} 1.5031, M. R. 41.33. II with H_2SO_4 gives PrCOMe . The substituted allenes are added to

NaNH_2 suspended in boiling xylene to give a rearrangement: $\text{EtCH:C:CH}_3 + \text{NaNH}_2 \rightarrow \text{EtCH}_2\text{C:CNa} + \text{NH}_3$. In this manner II, III and IV rearranged to give PrC:CH , $\text{C}_6\text{H}_{11}\text{C:CH}$ and $\text{iso-PrCH}_2\text{CH}_2\text{C:CH}$. D. H. POWERS

The mechanism of action of certain oxidizing agents on alcohols. B. V. TRONOV AND M. A. LUKANIN. *J. Russ. Phys.-Chem. Soc.* 60, 181-91 (1928).—A review of previous papers by T. and co-workers. BASIL C. SOVENKOFF

Constitution of phytol. F. GOTTWALT FISCHER AND KURT LÖWENBERG. *Bayrischen Akad. Wissenschaften München. Ann.* 464, 69-90 (1928).—The phytol used in this investigation, prep'd. according to Willstätter, Mayer and Hüni (*C. A.* 5, 874), b_{10} 170-1°, b_{10} 202.5-4°, d_4^{25} 0.8491, n 1.4623, 1.4601, 1.692 for D, α and γ at 25°. Oxidation with CrO_3 gives the ketone (I), $\text{C}_{18}\text{H}_{36}\text{O}$, b_{10} 173-4°, d_4^{25} 0.8323, n_D^{25} 1.4432; semicarbazone, m. 66-7°; this is the same as obtained by W., M. and H. Oxidation with O_3 also gives I and HOCH_2CHO . It is shown to be 2,6,10-trimethyl-14-pentadecanone by the following synthesis: Catalytic reduction of farnesol gives 2,6,10-trimethyldodecane, b_{11} 119.5-20°, d_4^{25} 0.7682, n_D^{25} 1.4303, and 2,6,10-trimethyl-12-dodecanol, b_{10} 151-2.5°, d_4^{25} 0.8491, n_D^{25} 1.4487; the latter is best obtained by reducing the acetate of farnesol and then saponifying the reduction product. PBr_3 gives 2,6,10-trimethyl-12-bromododecane, b_{10} 150-4°, which, with $\text{AcCHNaCO}_2\text{Et}$, gives I. This suggests for phytol the structure: $\text{Me}_2\text{CH}(\text{CH}_2)_2\text{CHMe}(\text{CH}_2)_2\text{CHMe}(\text{CH}_2)_3\text{CMe:CHCH}_2\text{OH}$. C. J. W.

The hydrogenation of the ether oxides. ALBIN MARTY. *Compt. rend.* 187, 47-9 (1928).—Reducing Pr_2O , $\text{iso-Pr}_2\text{O}$, Bu_2O , Am_2O and $\text{iso-Am}_2\text{O}$ over Ni at 300° with H_2 gives the alc. and hydrocarbon. PhOEt at 180° gives C_6H_{12} and EtOH and at 250°, both EtOH and PhOH are formed. $\text{C}_{10}\text{H}_{18}\text{OMe}$ and $\text{C}_{10}\text{H}_{18}\text{OEt}$ hydrogenated at 280° give MeOH or EtOH and dihydronaphthalene, some tetrahydronaphthalene and tetrahydro- β -naphthol. Guaiacol at 300 mm. and 180° gives $\text{MeOC}_6\text{H}_5\text{OH}$, pyrocatechol, phenol and cyclohexanol. Ph_2O hydrogenated at 300 mm. at 180° gives 5% $(\text{C}_6\text{H}_{11})_2\text{O}$, PhOH , $\text{C}_6\text{H}_{11}\text{OH}$, C_6H_6 and C_6H_{12} . Hydrogenating at higher pressures does not prevent rupture of the mol. D. H. POWERS

Action of disilicon hexachloride on ether. FREDERIC S. KIPPING AND REGINALD A. THOMPSON. Univ. College, Nottingham. *J. Chem. Soc.* 1928, 1989-90.— Si_2Cl_6 , left in contact with about 10 vols. of Et_2O , most of the Et_2O distd., excess of NaOH added and 4-5 cc. of the aq. soln. distd., and the distillate treated with I and alkali, gives CHI_3 ; the recovered Et_2O , again mixed with Si_2Cl_6 , behaved similarly. The quantity of CHI_3 formed is only a few mg. and is not appreciably increased by gently heating the mixt. C. J. WEST

Influence of structure on the solubilities of ethers. I. GEORGE MACDONALD BENNETT AND WM. GEORGE PHILIP. Univ. of Sheffield. *J. Chem. Soc.* 1928, 1930-7.—The mutual solubilities of several ethers in H_2O det'd. in a modified Hill app., designed for 4-5 cc. of each liquid, are reported. The following phys. consts. are given: MeOBu , b. 70°, d_4^0 0.7635, d_4^{20} 0.7441; $\text{MeOCH}_2\text{CHMe}_2$, b. 58°, d_4^0 0.7523, d_4^{20} 0.7311; *Me sec.-Bu ether*, b. 59°, d_4^0 0.7621, d_4^{20} 0.7415; MeOCMe_3 , b. 54°, d_4^0 0.7578; EtOPr , b. 64°, d_4^0 0.7541, d_4^{20} 0.7330; EtOCHMe_2 , b. 53°, d_4^0 0.7440, d_4^{20} 0.7211; MeOPr , b. 37°, d_4^0 0.7494, d_4^{20} 0.7356; MeOCHMe_2 , b. 32°, d_4^0 0.7383, d_4^{20} 0.7237; Pr_2O , b. 91°, d_4^0 0.7360; PrOCHMe_2 , b. 83°, d_4^0 0.7597, d_4^{20} 0.7474; Bu_2O , b. 140°, d_4^0 0.7841; $(\text{CH}_3\text{CHCH}_2)_2\text{O}$, b. 94°, d_4^0 0.8449, d_4^{20} 0.8260. A table is given showing the wt. % of the ether in the aq. phase and the wt. % of H_2O in the ether phase for MeOBu , $\text{MeOCH}_2\text{CHMe}_2$, MeOCHMeEt , MeOCMe_3 , EtOPr , EtOCHMe_2 , diallyl ether and Pr_2O ; for the remainder the wt. % of ether in H_2O is given. Values for the mol. heats of soln. are also given for the 1st 7 ethers. The relative order of the solubilities of the compds. remains the same at all temps. The soly. increases with increased branching of the C chains of the alkyl groups. The considerable soly. of the ethers in H_2O indicates "abnormal" behavior and classifies them as "polar" in the sense suggested by G. N. Lewis. This abnormality, absent in the pure liquid but developed in the presence of H_2O , is evidence of the presence in the latter case of a new mol. species of a polar type. II. Some cyclic ethers. *Ibid* 1937-42.—The following compds. were studied: pentamethylene oxide, α - and β -methyltetramethylene oxides, β,β' -dimethyltrimethylene oxide, b_{178} 78°, d_4^0 (vac.) 0.8550, d_4^{20} (vac.) 0.8348; α,α' -dimethyltrimethylene oxide, b_{178} 71°, d_4^0 (vac.) 0.8490, d_4^{20} (vac.) 0.8279; and α,α' -methyleneethylethylene oxide. Data are given for the mutual soly. of these ethers in H_2O from 0° to 25° and also for the soly. of C_6H_6 in Bu_2O , EtOPr , EtOCHMe_2 , and all but the 2nd and 3rd of the above cyclic ethers. The soly. of the

cyclic ethers in H_2O increases with falling temp. but their relative order is independent of this change. The most striking feature of the results is the large increase of soly. caused by the closure of the ring, and this is also true of the solubilities of H_2O in the ethers. The increase of soly. due to the closure of the ring is also larger the smaller the ring.

C. J. WEST

Effect of structure of organic halides on their rate of reaction with inorganic halides.

II. The effect of the methylthio group. A new vesicant. W. R. KIRNER. Rice Inst. *J. Am. Chem. Soc.* **50**, 2446-55(1928); cf. *C. A.* **18**, 1977.—The method previously developed for detg. the effect of structure of org. halides on their rate of reaction with inorg. halides has been extended to include the influence of the MeS group. This group causes a definite, though weak, alternation in the reactivity of an ω -Cl atom through at least 3 C atoms in a satd. chain. $ClCH_2CO_2Me$ and $MeSNa$ in Et_2O give 38% of *Me methylthioacetate*, b_{11} 53-5°, b_{20} 60-2°; attempts to prep. $MeSCH_2OH$ by hydrolysis of the ester gave a product with 52.5% S. $HOCH_2CH_2Cl$ and $MeSNa$ give 78% of β -hydroxyethyl *Me sulfide*, b_{30} 80.5-1°, d_{20}^{20} 1.0640, n_D^{30} 1.4867; with $MeSK$ the yield is only 33%. With $SOCl_2$ there results the β -Cl deriv., b_{30} 55-6°, b_{20} 44°, d_{20}^{20} 1.1245, n_D^{30} 1.4902; the Grignard reagent from this could not be obtained. γ -Hydroxypropyl *Me sulfide*, b_{30} 105-5.5°, d_{20}^{20} 1.0314, n_D^{30} 1.4832 (76% yield); γ -Cl deriv., b_{29} 71.2°, d_{20}^{20} 1.0863, n_D^{30} 1.4833. The reaction velocities with KI at 50° and 60° are. $BuCl$, 0.0415, 0.1189; $MeSCH_2CH_2Cl$, 0.0629, 0.1666; $MeSCH_2CH_2CH_2Cl$, 0.1044, 0.2373. In an attempt to correlate the structure of ω -haloalkyl sulfides with vesicant action, it was found that only when the halogen atom was in the β -position with respect to the S atom did the resulting compd. possess vesicant action. This appears to be true of β,β -dihaloalkyl sulfides also. No apparent relation exists between vesicant action and the chem. reactivity of the halogen atom, a fact which is not in agreement with the acid theory of skin vesication. $MeSCH_2CH_2Cl$ seems to produce the same general effects as mustard gas and at approx. the same rate.

C. J. WEST

Symmetrical dichlorodimethyl sulfate. V. GRIGNARD, C. TOUSSAINT AND J. CAZIN. *Bull. soc. chim.* **43**, 537-42(1928); cf. *C. A.* **22**, 382.—A study is made of the prepn. of $(ClCH_2O)_2SO_2$ (I) by the action of SO_3 on $(ClCH_2)_2O$ (II) under various conditions. Products are formed which involve the reaction of different ratios of SO_3 and II, depending on the conditions used; in all cases the reactions are not clean. The highest yield (31%) of I, b_{12-13} 103-5°, d_{12} 1.634, n_D^{12} 1.4530, was obtained by heating equimol. quantities of SO_3 and II in an autoclave at 180° for 50 min. FREDERICK C. HAHN

The examination of citronellal and citronella oil. H. I. WATERMAN AND E. B. ELSBACH. Techn. Univ., Delft. *Rec. trav. chim.* **47**, 764-75(1928).—On keeping Java citronella oil in a closed bottle the refraction changes to only a slight extent, viz. n_D from 1.4688 (20.9°) to 1.464 (19.8°) in the course of 7 months; in an open test tube the refraction increases to a larger extent and more with Ceylon citronella oil than with Java citronella oil. The examn. of several com. samples of citronellal showed that the product, purified by means of the bisulfite compd., as well as a sample, the method of whose prepn. was not known, hardly deserve the name citronellal, distn. in a high vacuum not yielding a fraction with the phys. const. of citronellal. However, a sample obtained by fractional distn. of Java citronella oil consisted of nearly pure citronellal and the fractional distn. of this product in a high vacuum yielded several fractions with the same phys. properties, thus showing that the sample was homogeneous. On keeping this sample of citronellal protected from the air the refractive indices and the d. remained unaltered, but when not protected from the air both these phys. const. increased, the changes being due to oxidation. From the oxidation products *citronellic acid* was identified by means of the phys. const. and the Ag salt; the high refractive index of the oxidized citronellal, however, shows that also other oxidation products must be present, the quantity of citronellic acid found by titration not accounting for the high refractive index of the oxidized product. In connection with the researches of Moureu and Dufraisse (*C. A.* **16**, 1439; **17**, 1621) the influence of hydroquinone on the oxidation of citronellal was investigated and it appeared that the addn. of this phenol greatly retards the oxidation, the samples turning yellow after some time. Geraniol has the same influence as hydroquinone and thus the relative stability of Java citronella oil most probably is due to the stabilizing influence of the geraniol. In order to stabilize citronellal, much larger quantities of geraniol are necessary than of hydroquinone.

C. F. VAN DUIN

Reaction of nitrosyl chloride. Addition to III. HEINRICH RHEINBOLDT AND MARTIN DEWALD. Univ. of Bonn. *Ann.* **460**, 305-7(1928); cf. *C. A.* **21**, 1107, 2872.—

Octylaldoxime and NOCl in Et₂O give 1,1-chloronitrosooctane, m. 42° to a deep blue, liquid; the *nonane deriv.*, m. 50–1°; the *decane deriv.*, m. 62°; *dodecylaldoxime*, m. 73°, gives the *dodecane deriv.*, m. 63°. Isovaler- and phenylacetaldoximes give oily products confirming the earlier results. With increase of mol. wt., the stability of the dimeric form of chloronitroso compds. increases, as does the soly. in EtOH. The higher members of the series have only a feeble color in C₆H₆. C. J. WEST

New condensations of ketones with phenols. The phorone di-*m*-cresyl ether. JOSEPH B. NIGDERL. N. Y. Univ. J. Am. Chem. Soc. 50, 2230–5(1928).—Concd. H₂SO₄ (3 mols.), added to an ice-cold mixt. of 3 mols. Me₂CO and 2 mols. *m*-MeC₆H₄OH, keeping the temp. at 0° for 48 hrs. and then heating 1 hr. at 100°, gives 80% of *phorone di-m-cresyl ether* (2,6-dimethyl-2,6-di-[4-hydroxy-2-methyl]phenylheptan-4-one ether) b. 270° (partial decompn.), m. 127°; *di-Br deriv.*, m. 215°; *tetra-NO₂ deriv.*, yellow, m. 243°. Oxidation gives Me₂C(CO₂H)₂ and *m-cresylisovaleric acid*, m. 107° (*di-Br deriv.*, m. 140°; *NO₂ deriv.*, m. 108°). The mechanism of the condensation is discussed. C. J. W.

Diameter of the CH₂ chain in aliphatic acids. CHARLES S. PIGGOT. Carnegie Inst. J. Wash. Acad. Sci. 18, 330–3(1928).—Pentadecylic, palmitic, stearic and behenic acids as well as paraffin wax show on x-ray analysis by the powder method 2 lines of the 1st order which are practically the same distance apart in each case. Conclusion: This measures the short dimension of the acids studied, namely 4.235 Å. U. DAVID DAVIDSON

Constitution of eleostearic acid. F. FRITZ. *Farben-Ztg.* 33, 1224–5(1928).—A brief account of the work of various investigators on the constitution of eleostearic acid as revealed by its oxidation products. The validity of Boeseken and Ravenswaay's formula for the acid (C. A. 20, 44) is considered to be upheld. B. C. A.

Some ill-defined acids of the oleic series. III. "Rapic acid" and other acids of rape and mustard-seed oils. T. P. HILDITCH, T. RILEY AND N. L. VIDYARTHI. Univ. of Liverpool. J. Soc. Chem. Ind. 46, 462–7T(1927); cf. C. A. 21, 2661.—The unsatd. acids contg. 18 C atoms, present in rape, ravisson and mustard-seed oils, are mostly composed of ordinary oleic and linoleic acids, unsatn. commencing between the 9th and 10th C atoms from the CO₂H. In addn. there is present about 1% of isomeric forms of oleic acid. This feature is a characteristic of this group of fatty oils. The isomeric form is liquid at ordinary temp., forms a Pb salt sparingly sol. in cold alc. or Et₂O, and yields a dihydroxystearic acid, m. 117–8°. The lower satd. acid present was palmitic acid, to the extent of about 2%, with not over 0.2% of myristic acid. The erucic acid present was dodecenoic acid. IV. "Cheiranthic acid" of wallflower-seed oil. T. P. HILDITCH AND (MISS) E. E. JONES. *Ibid* 467–9T.—Examn. of English wallflower-seed oil showed the following % compn. for the combined acids: palmitic 3; lignoceric 0.5, oleic 12, linoleic 42, linolenic 4, erucic 38.5. The oil is of the same general type as rape, mustard and other seed-fats of the same general botanical order. The "cheiranthic acid" stated to be present by Matthes and Boltze (C. A. 6, 2187) is a case of mistaken identity. T. S. CARSWELL

A disulfosuccinic acid. H. J. BACKER AND J. M. VAN DER ZANDEN. Univ. Groningen. *Rec. trav. chim.* 47, 776–81(1928).—*meso*-(CHBrCO₂H)₂ was prepd. on exposing to sunlight in a beaker with boiling water a mixt. of 58 g. fumaric acid and 84 g. Br in a sealed Kjeldahl flask; the reaction was finished after 10 min., provided the flask was shaken several times; yield, 87%. Maleic acid can be used also, if it is first converted to fumaric acid, the transformation being carried out according to Wislicenus by means of a small quantity of bromine in sunlight (*Ber.* 29, 1080(1896)). The best way to prep. (:CCO₂H)₂ from *meso*-(CHBrCO₂H)₂ is to run 66 g. KOH in 250 cc. abs. EtOH gradually and with continuous shaking into 69 g. *meso*-(CHBrCO₂H)₂ in 200 cc. abs. EtOH, the mixt. being boiled for an hr.; yield, 92%. A disulfosuccinic acid is obtained on heating in a sealed tube at 100° during an hr. 7.6 g. of the acid K salt of (:CCO₂H)₂, 11.5 g. of potassium pyrosulfite and 50 cc. 1 N KOH; on adding 25 cc. 2 N HCl to the reaction mixt., the tri-K salt of a disulfosuccinic acid crystallizes in a yield of 80%. From this salt the normal K salt was prepd. and this was converted into the normal Ba salt, from which the free acid was obtained in the usual way. The free acid crystallizes with 4 mols. of water, C₄H₄O₁₀S₂·4H₂O, m. 163° (decompn.). The following salts were prepd. and analyzed in the usual way: the *tri-K salt*, C₄H₃O₁₀S₂K₃·H₂O; the *tetra-K salt*, C₄H₂O₁₀S₂K₄·4H₂O; the *tetra-Na salt*, C₄H₂O₁₀S₂Na₄·2H₂O; the *tetra-Tl salt*, C₄H₂O₁₀S₂Tl₄, m. 285°; the *di-Ca salt*, C₄H₂O₁₀S₂Ca₂; the *di-Ba salt*, C₄H₂O₁₀S₂Ba₂·3H₂O; the *tetra-Ag salt*, C₄H₂O₁₀S₂Ag₄; the *di-Pb salt*, C₄H₂O₁₀S₂Pb₂. The structure of the acid, 2,2 or 2,3, has not yet been detd.; the authors, however, think the 2,3-formula the most probable one. In the latter case the acid can be the *dl*-compd., which can be resolved into the optically active components or the inactive *meso*-compound; up to the present moment

the authors have not succeeded in resolving the acid into the optically active components.

C. F. VAN DUIN

Use of solid caustic alkalis for the saponification of esters. E. TASSILLY, A. BELOT and M. DESCOMBES. *Compt. rend.* 186, 1846-8(1928).—The method previously used by T., B. and D. (cf. C. A. 22, 1341), has been applied to many new cases. It consists in treating the ester with pulverized KOH (at least 2 mols. for each ester group). The yields are high.

REYNOLD C. FUSON

Alkaline hydrolysis of esters in aqueous alcoholic solution. II. The interaction of phenoxides and aliphatic esters. ERIC S. GYNGELL. Chelsea Polytechnic. *J. Chem. Soc.* 1928, 1784-5; cf. C. A. 21, 12.—The following table gives the values of $K_k \times 10^6$ in alc. contg. 0.2, 1.0, 2.0, 3.5, 5.0, 10.0 and 20.0%, resp., of H₂O, the concn. of the ester and PhOK being $N/4$ in every case and the temp. 70°. AcOMe, 1.26, 1.79, 1.25, —, —, 0.67, 0.57; AcOPr, 2.23, 2.06, 1.85, 1.71, 1.52, 1.35, —; AcOBu, —, —, 1.56, —, 1.45, 0.98, —; AcOBu(iso), —, 2.35, 2.83, 1.58, 1.50, 1.39, —; AcOAm(iso), —, 2.57, 2.76, 2.37, 2.13, 1.85, —; EtCO₂Me, —, —, 0.87, 0.83, 0.81, 0.71, —; EtCO₂Et, —, —, 1.00, 0.87, 0.73, 0.68, —; EtCO₂Pr, —, 2.57, 1.04, 0.84, —, 0.77, —; PrCO₂Me, —, —, 0.62, 0.62, 0.52, 0.47, 0.56; PrCO₂Et, —, —, 0.61, 0.64, 0.55, 0.43, 0.30; PrCO₂Pr, —, —, 0.66, 0.58, 0.42, 0.34, 0.28; PrCO₂Bu(iso), —, 0.51, 0.47, 0.44, 0.31, 0.23, 0.24; PrCO₂Am(iso), —, —, —, —, 1.17, 0.90.

C. J. WEST

Straight-chain acetylenic glycerols of five carbon atoms. R. LESPICU. *Bull. soc. chim.* 43, 657-62(1928); cf. C. A. 22, 2739.—L. continues the study of the action of (: CMgBr)₂ (I), alkyl halides and alcs. I with CH₂ClCHClCHO in Et₂O for 24 hrs. gives 13% CH : CCH(OH)CHClCH₂Cl (II), b_{12} 90-91°, d_{20} 1.305, n_D^{23} 1.500. Treating II with 10% KOH for 4 hrs. gives 85% CH : CCH.CH(CH₂Cl).O (III), b_{10} 58-60°, b_{100} 152°, d_{20} 1.159, n_D^{23} 1.472.

III sealed with H₂O at 100° for 30 hrs. gives CH : CCH, (OH)CH(OH)CH₂Cl (IV), b_{10} 131-2°, d_{16} 1.289, n_D^{16} 1.504. An isomer of this compd., m. 41-2°. IV with NaOMe in MeOH gives CH : CH(OH)CH(OH)CH₂OMe, b_1 100°, d_{17} 1.12, n_D^{17} 1.473; decompn. occurs at temps. above 100°. IV with H₂O at 90° for 20 hrs. gives CH : CCH(OH)CH(OH)CH₂OH (V), b_1 156-9°, d_{20} 1.217, n_D^{26} 1.489. V with 3 PhNCO gives the triurethan deriv., m. 204-6°. II and III react with NH₃-Cu₂Cl₂ but the remaining compds. do not. They all react with AgNO₃. In the same reaction by which II is prepd. some [CH₂ClCHClCH(OH)C :]₂ is also formed and seps. as crystals. Extg. with C₆H₆ and then with CHCl₃ effects the sepn. of a less sol isomer, m. 139-9.5°. A small quantity of another isomer, m. 96.5-7.5°, is isolated. Mg with CH : CCH₂OMe in Et₂O with ClCH₂CHO (VI) on treatment with HCl gas and K₂CO₃ on vacuum distn. gives 65% CH₂ClCH(OH)C : CCH₂OMe, b_{12} 117.5-8.5°, d_{24} 1.172, n_D^{24} 1.485. VI with BrMgC : CCH₂OMe for several days in Et₂O gives on evapn. of the

Et₂O at 80° and addn. of fresh Et₂O and KOH, 20% $\overline{O}CH_2CHC : CCH_2OMe$ (VII), b_{15} 75-6°, d_{20} 1.024, n_D^{20} 1.4573. VII with H₂O in a sealed tube at 100° for 3 hrs. gives 90% CH₂(OH)CH(OH)C : CCH₂OMe (VIII), b_{12} 155-6°, b_{18} 163°, d_{22} 1.1274, n_D^{22} 1.481. 21 g. of VII with 40 g. MeOH and 7 drops of H₂SO₄ heated 10 hrs. gives MeOCH₂CH(OH)C : CCH₂OMe, b_{10} 115°, d_{23} 1.0508, n_D^{23} 1.4608. VIII with Br₂ in CHCl₃ gives CH₂(OH)CH(OH)CBr : CBrCH₂OMe, m. 51-2°, b_{11} 192°. On treatment with gaseous HBr at 100° isomers are obtained of CH₂(OH)CH(OH)CBr : CBrCH₂OH. D. H. P.

The configuration of the butane-2,3-diols. J. BÖSEKEN and MISS R. COHEN. Techn. Univ., Delft. *Rec. trav. chim.* 47, 839-48(1928).—The configurations of a butane-2,3-diol of biochem. origin and of 2 synthetic products were examd. One of the synthetic products (I) was obtained in the following way: MeCOEt (500 g.), in the same quantity of moist ether, was reduced with 500 g. of Na (cf. Harries, C. A. 5, 3519), the larger part of the ketone being reduced to 2-butanol, the remainder being converted into the pinacol, m. 31°. On heating the 2-butanol with H₃PO₄ (d. 1.7) at 210°, 85% yield 2-butene was obtained, which was converted into the dibromide, which was again converted into the (CHMeOAc)₂ by means of freshly prepd. AgOAc. On sapon. the glycol was obtained with b. 177-80°. The 2,3-butanediol of biochem. origin (II) showed the same b. p. and $\alpha_D + 2.42^\circ$, on fractionation a large fraction being obtained, which solidified and m. 25°, $\alpha_D 0.18^\circ$. Although I appeared to be identical with II, B. and C. did not succeed in crystg. the synthetic compd. A third 2,3-butanediol (III) was prepd. by oxidation of 2-butene with AcO₂H in CHCl₃, a glycol, b. 177-80° being obtained in 54% yield. In order to investigate the configuration of the glycols, II was converted into the disulfate, the strychnine salt of which, (CHMeOSO₂H-

$C_{12}H_{22}N_2O_2 \cdot 2H_2O$, $[\alpha]_D^{20} -32^\circ$, $[M]_D^{20} -305^\circ$, on recrystn. gave several fractions, from which only *inactive* aq. solns. of the glycol disulfate were obtained. By means of brucine also several inactive fractions were obtained together with a small active fraction, thus showing that the biochem. glycol contains a small quantity of the optically active compd. and the same result was obtained by means of the dibrucine salt of the di-3-nitrophthalate, the ester, m. 217° , being obtained from the glycol and 3-nitrophthalic anhydride (m. 163°). The synthetic glycol (I) was also converted into the distrychnine salt of the disulfate, which showed the same rotation as the corresponding salt prepd. from the biochem. glycol and could not be resolved into optical components. The dibrucine salt of the disulfate of the synthetic glycol III on recrystn. gave fractions from which optically active solns. of the disulfate, and of the glycol itself could be prepd. The optically pure compds., however, were not obtained, partial racemization having taken place. The 2,3-butanediol, prepd. by the oxidation of 2-butene by means of AcO_2H thus consists for the greater part of the *dl*-compd., while the glycols I and II consist for the greater part of the *meso*-compd. The glycols I and II hardly have any influence on the cond. of H_3BO_3 , whereas with III a small decrease of the cond. was observed. The oxidation of olefins with AcO_2H acid always giving the *trans*-diol, the butene, which is formed by the action of H_3PO_4 on 2-butanediol, is the *cis*-compd. Probably at the high temp. of this reaction (210°) the stable compd. is formed and thus B. and C. conclude that the Me groups attract one another. C. F. VAN DUIN

Action of nitrous acid on amino compounds. II. Aliphatic amino acids. THOMAS W. J. TAYLOR. Dyson Perrins Lab., Oxford. *J. Chem. Soc.* 1928, 1897-906; cf. C. A. 22, 3131.—The velocity of reaction of HNO_2 with $H_2NCH_2CO_2H$, $MeCH(NH_2)CO_2H$ and $H_2NCH_2CH_2CO_2H$ has been measured at 25° in dil. aq. soln. The reaction is approx. of the 3rd order and is retarded by the presence of neutral salts or of mineral acids. The principal reacting species are undissociated HNO_2 and the NH_2 acid in its "Zwitterion" form $NH_3^+ \cdot R \cdot COO^-$. The implications of this result are discussed. The following values are reported for k (min. $^{-1}$) and K_s : $H_2NCH_2CO_2H$, 46, 4.7×10^{-3} ; $MeCH(NH_2)CO_2H$, 32, 2.45×10^{-3} ; $H_2NCH_2CH_2CO_2H$, 45, 2.49×10^{-4} . C. J. W.

Malononitrile and malononitrile condensations. I. RUDOLF SCHENCK, H. FINKEN, P. MICHAELIS AND FR. PLEUGER. Univ. of Münster. *Ann.* 462, 158-73 (1928).— $CH_2(CN)_2$ (6.6 g.) and 15 g. $(CO_2Et)_2$ in 100 cc. EtOH, condensed with 4 g. K in 50 cc. EtOH, give 76% of the K salt, m. 205° , of *Et dicyanohydroxyacrylate*, $(NC)_2C \cdot C(OK) \cdot CO_2Et$; the K salt of the Me ester is similarly prepd. (89% yield). There were also prepd. the Na salt, crystg. with $2H_2O$, the diethylamine salt and the Ag salt of the Et ester and the Ag salt of the Me ester. From 2 mols. of $CH_2(CN)_2$, there results the *di-K* salt of *aci-oxalylidimalononitrile*, $[C(OK):C(CN)_2]_2$, orange- to brick-red, sol. in H_2O with a red color; $AgNO_3$ ppts. the Ag salt; H_2SO_4 gives a ppt. of the free tetranitrile, which could not be filtered. $CH_2(CN)_2$ and HCO_2Et give 81% of the K salt, m. 268° , of hydroxymethylenemalononitrile, $(NC)_2C:CHOK$; the Ag salt is sol. in a large quantity of hot H_2O and NH_4OH and on long boiling ppts. Ag; warming with alkali gives NH_3 . $NCCO_2Et$ gives the K salt of *cyanohydroxymethylenemalononitrile*, which evolves HCN on crystg. from 90% EtOH. The Ag salt is easily sol. in NH_4OH . The Ag salt with the proper alkyl iodide gives the following derivs.: Me and Et dicyanomethoxyacrylate, and Me and Et dicyanoethoxyacrylate. Sapon. of these esters gives the free acids. Et dicyanohydroxyacrylate yields a phenylhydrazine salt, m. 100° , and an NH_4 salt, m. 176° . The Me ester gives a phenylhydrazine salt, m. 104° , and an NH_4 salt, m. 209° . The esters with 5% EtOH- NH_3 give the amides of dicyanoethoxy- and methoxyacrylic acids, m. 141° and 140° ; concd. aq. NH_4OH gives the NH_4 salt of dicyanohydroxyacrylic amide. C. J. WEST

Heterogeneous catalysis and adsorption. II. C. F. VAN DUIN. *Rec. trav. chim.* 47, 715-36 (1928); cf. C. A. 15, 3783; 17, 1745.—Previously Kruyt and van D. have shown that the addn. of C to a reacting system in general decreases the velocity of a reaction, even in cases where undoubtedly all the reacting compds. are present in the surface layer of the C in increased concns. An explanation of these results was given based on the theory of Langmuir and Harkins concerning the special conditions of mols. which are situated in the surface layer, the hypotheses being put forward: (a) that adsorbed mols. have lost more or less their mobility and consequently are in a less favorable condition to meet other mols. and to take part in a reaction; (b) that adsorption can cause positive catalysis only in the case when the orientation of the adsorbed mols. is such that the reacting groups are turned away from the absorbent and towards the surrounding liquid. The orientation must be such a favorable one that the primary decrease of the velocity of the reaction, caused by the adsorption itself, is overcome. Exptl. evidence in favor of these assumptions was given by means

of the reaction of inorg. iodides with the acid and normal Na salts of p -HO₂SC₆H₄-CHBr-CHBrCO₂H and with BrCH₂CHBrCO₂H, in accordance with the theory the reaction being *retarded* in the former case and *accelerated* in the latter case by the addn. of C. Previously the reaction with BrCH₂CHBrCO₂H had not been carried out quite satisfactorily, *viz.*, in the presence of air, and therefore it has now been repeated with the acid itself as well as with its Na salt, an acceleration being found again in both cases by the addn. of C. The sapon. of m -MeO₂SC₆H₄CO₂Me (K_{18} = 4.32), of o -MeO₂SC₆H₄CO₂Me (K_{18} = 0.00750), of iso-BuCO₂Me (K_{18} = 1.21), of mono-acetin (K_{18} = 11.55), of mono-Me succinate (K_{18} = 2.32), of mono-Me *d*-tartrate (K_{18} = 13.69), of di-Me *meso*-tartrate and the inversion of sucrose with 0.239 *N* HCl (K_{25} = 0.00191) were investigated and it was shown that the addn. of C *retards* the reaction in all these cases. Even in the most favorable case, the sapon. of di-Me *meso*-tartrate, the acceleration of the reaction, due to the undoubtedly favorable orientation of the adsorbed mols., is insufficient to overcome the decrease of the velocity of the reaction in consequence of the less favorable condition of adsorbed mols. to take part in a reaction. The monomol. transformation of *dl*-(CHBrCO₂H)₂ into bromofumaric acid and HBr (K_{25} = 0.000097) was shown to be *retarded* by the addn. of C. This result strongly supports the 1st hypothesis, put forward by K. and van D., *viz.*, that adsorbed mols. are in a less favorable condition to meet other mols. and to take part in a reaction, with truly monomol. reactions any effect due to adsorption is not to be expected unless the condition of the mols. is changed by the adsorption itself. The reaction between *dl*- and *meso*-(CHBrCO₂H)₂ and KI (formation of maleic or fumaric acid), was shown to be *greatly accelerated* by the addn. of C, the acceleration being much greater than with BrCH₂CHBrCO₂H and its Na salt. This result strongly supports the 2nd hypothesis of K. and van D., mentioned above. With *dl*-BrCH₂CHBrCO₂H we are dealing with the interesting case where the addn. of C *retards* the monomol. and *accelerates* the trimol. transformation of the same compd. Expts. have also been carried out on the sapon. of mono-Me *d*-tartrate and di-Me *meso*-tartrate with an alk. SnO suspension, in the former case a *decrease* of the velocity being found and in the latter case the same velocity as in the absence of the colloidal SnO. This result can be explained in 1 way only, *viz.*, that in the case of mono-Me *d*-tartrate the orientation of the adsorbed mols. is less favorable than with di-Me *meso*-tartrate. Thus in the former case the retarding influence, due to the adsorption, preponderates, while in the latter case this retarding influence is just compensated by the accelerating influence in consequence of the favorable orientation of the adsorbed mols. The prepn. of iso-BuCO₂Me, *b₇₆* 116.4–6.8°, of monomethyl succinate, *m. p.* 58–9°, from succinic anhydride and MeOH, of mono-Me *d* tartrate, 2H₂O, *m.* 76–7°, by esterification of *d*-tartaric acid with MeOH and of di-Me *meso*-tartrate, *m.* 114°, by esterification of *meso*-tartaric acid with MeOH and by interaction of the normal Ag salt with MeI, are described. C. F. VAN DUIN

Influence of constitution on the stability of racemates. ALEXANDER FINDLAY AND ALAN N. CAMPBELL. Univ. of Aberdeen. *J. Chem. Soc.* 1928, 1768–75.—The *f. p.* and *soly.* (in 93.8% EtOH by wt.) curves of active and *dl*-forms of tartaric acid, its Me ester, the Me esters of the di-Ac, di-EtCO and di-Bz derivs. and of the Et esters of di-Ac and di-Bz derivs. have been detd. The introduction of an acyl group into the Me or Et ester of the acid lowers the *m. p.* of the *dl*-form relatively to that of the active form and reduces the range of stability of the *dl*-form. In this respect the Ac group is much more effective than the EtCO or Bz group. *d*- and *l*-Tartaric acids form a eutectic at 161.6° and 94.3% of the *d*-acid; Me diacetyltartrates at 79° and 53.6% of the *d*-ester; Et diacetyltartrates at 42° and 55.7% of the *d*-ester; Me dipropionyltartrates at 24° with 75% of the *d*-ester; Me dibenzoyltartrates at 130.4° and 94.5% of the *d*-ester. *Et dl*-dibenzoyltartrate, *m.* 105°; *Me ester*, *m.* 144.5°. The transition point of Me diacetylracemate lies at about 23°; transition points are discussed. C. J. W.

Rotatory dispersion of derivatives of tartaric acid. III. Diacetyltartaric acid and its esters. PERCY C. AUSTIN. Westminster Training College, London. *J. Chem. Soc.* 1928, 1825–31; cf. *C. A.* 20, 50.—From earlier work it was concluded that diacetyltartaric acid afforded the 1st instance of simple dispersion in the tartaric acid series which was independent of ring formation. Because the conclusion was regarded with some suspicion the Me, Et, Pr, iso-Pr, Bu and iso-Bu esters were studied. The rotatory dispersion of the acid and the esters are reported for some 20 wave lengths from 6708 to 3720; the Pr, Bu and iso-Bu esters were used as such, the others in Et₂O or Me₂CO. The Bu, iso-Bu and Pr esters gave max. in the visible region and the Et ester in Me₂CO showed a reversal of sign in the red; the rotatory dispersion of the Me ester in Me₂CO was so nearly simple in the visible region that there was at first some uncertainty as to whether the dispersion was simple or complex. The readings in

Me_2CO could not be extended beyond 3720 Å. U. The complexity of the free acid was established by using dry Et_2O . The results show that the dispersion of the other esters is anomalous, but that of the Me ester and of the acid is complex but normal; the dispersion consts. λ_1^2 and λ_2^2 are 0.0507 and 0.0691, resp., for the acid and its Me ester, and 0.0457 and 0.0507 for the other esters. IV. Propyl and butyl tartrates. *Ibid* 1831-4.—Results are reported for the rotatory dispersions of Pr, iso-Pr, Bu and iso-Bu tartrates at 20° for some 20 wave lengths. In every case the rotatory dispersion is both complex and anomalous, but although the same dispersion consts. are used throughout the series, no simple relation appears to exist between the rotation consts. C. J. W.

Nitroaminoguanidine. ROSS PHILLIPS AND JOHN F. WILLIAMS. Univ. of Buffalo. *J. Am. Chem. Soc.* 50, 2465-70 (1928).— $(\text{NH}_2)_2\text{H}_2\text{SO}_4$ (32.53 g.) in 200 cc. H_2O and 500 cc. N NH_4OH , treated with 26 g. $\text{H}_2\text{N}(\text{HN}:\text{C})\text{NHNO}_2$ give 13.1 g. nitroaminoguanidine (I); no indication of $\text{HN}:\text{C}:\text{N}(\text{NH}_2)_2$ was obtained. A method of analysis is given. I is sol. in H_2O to the extent of 0.34% at 20° and 3.0% at 70°; I m., accompanied by explosion, about 190°; it reduces KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$, Nessler reagent and $\text{NH}_4\text{OH}-\text{AgNO}_3$, also Fehling with the formation of an explosive Cu compd. I in dil. alkali, treated with a trace of Ni salt, gives an intense deep blue color, which lasts for 15-20 min. This test can be made to detect as little as 0.0002 mg. of Ni. Co and a no. of other metals failed to give this test. Tests for I are described. Cryst. compds. were prepd. from aldehydes and ketones. With NiSO_4 and NH_4OH I gives the compd. $\text{NiO}[\text{HN}:\text{C}(\text{NHNO}_2)-\text{NHNH}_2]_2$, insol. in H_2O (hot or cold) but gives a deep blue alk. soln.; H_2SO_4 decomps. it with the formation of a toxic gas. It explodes when placed in a flame but may be heated to 220° without detonation. I may serve as a reagent for Ni detn. Reduction of I with Zn and AcOH gives diamingoguanidine. C. J. WEST

Acetylmonoses. IV. Two isomeric triacetylmethyllyxosides. P. A. LEVENE AND M. L. WOLFROM. Rockefeller Inst. *J. Biol. Chem.* 78, 525-33 (1928); cf. C. A. 21, 1969.— α -methyl-*d*-lyxoside triacetate, prepd. from α -methyl-*d*-lyxoside had the following properties: crystallizes in prismatic needles, sol. in Et_2O , CHCl_3 , MeOH, less sol. in EtOH and slightly sol. in petroleum ether and H_2O , m. 96°, $[\alpha]_D^{20}$ 30.4° in CHCl_3 . From α -*d*-lyxoside tetraacetate, the γ -methyl-*d*-lyxoside triacetate was prepd. which m. 90°, $[\alpha]_D^{20}$ -103.5° in CHCl_3 . Both isomers were also prepd. from the lyxose tetraacetate after bromination. The behavior of the 2 isomers to MeOH contg. 0.1% HCl varied, the γ -form giving a rapid fall in optical rotation (-98.3° to -16° in 10 min.) while the α -form was very resistant to such treatment (30.0° to 29.0° in 2 hrs.). The γ -compd. was found on analysis to be almost completely deacetylated at the end of 20 min. H. J. DEUEL, JR.

Influence of substituents in the benzene nucleus upon the reaction of silver salts of *o*-hydroxy carboxylic acids with acetobromoglucose. KARL JOSEPHSON. Univ. Stockholm. *Ann.* 464, 227-36 (1928).—The Ag salt of *m*-cresotinic acid and acetobromoglucose give a mixt. of tetraacetylglucose *m*-cresotinate, m. 151° (all m. p. cor.), $[\alpha]_D^{20}$ -46.5° (CHCl_3), and tetraacetylglucosido-*m*-cresotinic acid, m. 145°, $[\alpha]_D^{20}$ -28.3°. β -Glucosido-*m*-cresotinic acid, m. 142°, $[\alpha]_D^{20}$ -56.2°. With the following only the ester was obtained. Tetraacetylglucose 3-nitrosalicylate, m. 140°, $[\alpha]_D^{20}$ -42.8° (2-Ac deriv., m. 145°, $[\alpha]_D^{20}$ -73.8°); the 5- NO_2 isomer, m. 174°, $[\alpha]_D^{20}$ -47.2° (2-Ac deriv., m. 166°, $[\alpha]_D^{20}$ -44.3°). If we assume with Karrer that glucoside formation depends upon the complex nature of the corresponding Ag salt, then we must conclude that a Me in the 3-position to the CO_2H group or a NO_2 group in the 3- or 5-position to the CO_2H group hinders the inner complex formation of the Ag salt. C. J. WEST

α -Glucoheptulitol. GABRIEL BERTRAND AND GEORGES NITZBERG. *Compt. rend.* 186, 1773-6 (1928); cf. C. A. 22, 2740.— α -Glucoheptulitol is found to have the following properties: m. 144°, α_D^{20} -2° 24'; acetate, m. 116-7°. The problem of its structure is discussed. REYNOLD C. FUSON

Oxidation of glucose in alkaline solution with the production of carbon monoxide. Details of the reaction. Behavior of different sugars. MAURICE NICLOUX. *Compt. rend. soc. biol.* 99, 226-8 (1928); cf. C. A. 22, 2742.—A 0.5% soln. of glucose in a medium with an alk. 0.1 *N*, and 50 cc. of O was agitated at 5 temps. ranging from 81° to 92°. The max. O consumed and CO formed was at 84°. Slightly more CO_2 was formed at 88° than at 84°, but less CO_2 at 92°. The ratio CO/CO_2 changed from 1/3.08 at 81° to 1/43 at 92°. The % of O consumed on the basis of O supplied, increased from 19.6 at 81° to 32.1 at 92°. In the oxidation of glucose KOH, NaOH and LiOH have the same action. $\text{Ba}(\text{OH})_2$ and $\text{Ca}(\text{OH})_2$ are slightly weaker. When Na_2CO_3 is substituted for NaOH about 0.5 as much CO is produced. NaHCO_3 at 40° is without action.

Levulose, lactose, galactose and maltose acted like glucose in the production of CO. Sucrose in alk. soln. was not attacked by O under the conditions of these expts. so long as it was not inverted. L. W. RIGGS

Mechanism of tautomeric interchange and the effect of structure on mobility and equilibrium. III. The function of alkaline and acid catalysts in the mutarotation of some derivatives of tetramethylglucose. JOHN WM. BAKER. Univ. of Leeds. *J. Chem. Soc.* 1928, 1979-87; cf. *C. A.* 22, 3395.—Previous work showed that catalysts which facilitate the prototropic change involved in the mutarotation of sugars may be of two kinds—those which attack the ionizing proton directly and those which facilitate its liberation indirectly. Acids, which fall within the 2nd category of catalysts, function by inducing a positive charge on the N atom, which in turn facilitates the liberation of the attached proton. The action of acids and alkalies is now studied, by using derivs. of tetramethylglucose. With acid catalysts it is again found that, as the group R is varied, the velocity of mutarotation runs parallel with the strength as bases of the compds. RNH_2 , viz., $p\text{-MeOC}_6\text{H}_4 > p\text{-MeC}_6\text{H}_4 > \text{Ph} > p\text{-ClC}_6\text{H}_4 > p\text{-BrC}_6\text{H}_4$. The results obtained for alk. catalysts are more complicated and their interpretation is much less clearly defined than in the case of acid catalysts. It seems probable that at least 2 different types of mechanism may function, 1 of which is most powerful with the deriv. of the weakest base, the other reaching its max. with the deriv. of the strongest base. The superimposition of these 2 mechanisms may therefore lead to the existence of a min. value for the velocity of mutarotation at some intermediate point in the series. The following anilides of tetramethylglucose were prepd.: *p*-bromoanilide, m. 154°; *p*-chloroanilide, m. 141°; *p*-toluide, m. 151°; *p*-aniside, m. 110°. With 0.9 N AcOH in AcORt, the following values for the unimol. velocity coeff. (hr.^{-1}) were obtained: BrC_6H_4 , 0.39; ClC_6H_4 , 0.46; Ph, 1.30; MeC_6H_4 , 4.12; MeOC_6H_4 , 12.0. With 0.0006 N EtONa, the following values were found: ClC_6H_4 , 1.33; BrC_6H_4 , 1.24; Ph, 1.13; MeC_6H_4 , 1.21; MeOC_6H_4 , 2.41; with 0.001 N EtONa: ClC_6H_4 , 11.4; BrC_6H_4 , 9.1; Ph, 7.7; MeC_6H_4 , 6.1 (min); MeOC_6H_4 , 14.7. C. J. WEST

Mechanism of carbohydrate oxidation. X. The action of potassium hydroxide on mannose. A comparison with that of glucose and fructose. WM. LLOYD EVANS AND DAVID C. O'DONNELL. Ohio State Univ. *J. Am. Chem. Soc.* 50, 2543-56 (1928); cf. *C. A.* 22, 3140.—The action of aq. KOH of various concns. on mannose was studied at 25°, 50° and 75° in order to ascertain whether this hexose, like fructose and glucose, reacts in accordance with the suggestion that the alk. solns. of these well-known carbohydrates contain an equil. system which can be disturbed by changes in the exptl. conditions, temp. and alkali normality. The reaction mixts. were examd. quant. for AcCHO, lactic, acetic and formic acids. Changes in temp. and alkali concn. produced changes in the yields of these compds. which were of the same general character as those obtained under exactly the same conditions from fructose and glucose. The interdependence of the reactions producing AcCHO, lactic, acetic and formic acids in alk. solns. of glyceric aldehyde and $\text{CO}(\text{CH}_2\text{OH})_2$ is also found to exist between the reactions producing these same products when they are obtained from alk. solns. of mannose, glucose and fructose under the same exptl. conditions. This fact is regarded as evidence for the assumption that the formation of glyceric aldehyde, a fission product of 3,4-hexose enediols, is an intermediate step in the production of these compds. from the hexose sugars. It is predicted that this interdependence will be found to exist in the products of the interaction of aq. solns. of KOH and all of those hexose sugars which are not available for lab. experimentation at the present time. At the lower temps. and the lower alkali normalities, the quantities of reaction products obtained from mannose, glucose and fructose are not the same. This is understood on the ground that the equil. formed in each individual case with the hexose and alkali are not quant. identical. At 75° the quantity of lactic, acetic and formic acids obtained from mannose, glucose and fructose are practically the same in each case. These facts seem to support the view that the equil. systems in the alk. solns. of these hexose sugars are identical at this temp. C. J. WEST

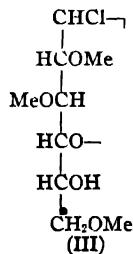
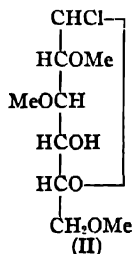
The α - and β -forms of diacetone-methylmannoside. P. A. LEVENE AND G. M. MEYER. Rockefeller Inst. for Med. Research. *J. Biol. Chem.* 78, 363-7 (1928).—Three diacetone-methylmannosides were investigated: the α -d-rotatory form (I) made by acetonization of normal α -methyl-d-mannoside; another α -d-rotatory form (II) made by methylation of diacetone-mannose by Ag_2O and MeI by Purdie's method; and the β -l-rotatory form (III) made by methylation of diacetone-mannose by Freudenberg's method with metallic Na and MeI. I and II differed in numerical values of their d-rotation. By purification it was possible to raise both these rotation values but the value of II was raised considerably more than I. It was found that all 3 preps. hydro-

lyze at the same rate, being completely hydrolyzed in 90 min. It is assumed that they all possess the <1,4> lactal structure. Based on this assumption it is concluded that acetynylation changes the <1,5> lactal structure of methylmannoside into the <1,4> lactal structure.

Chemical structure of α -lignin. PETER KLASON. *Svensk Kem. Tids.* **40**, 3-8 (1928).—Substances in sulfite-liquor wastes pptd. by $C_{10}H_7NH_2 \cdot HCl$ are designated α -lignosulfonic acids. Previous articles have shown their relation to cinnamic aldehyde derivs. To establish more definitely this relation coniferylhydrosulfonic acid was synthesized and pptd. with $C_{10}H_7NH_2 \cdot HCl$, starting from vanillin (Pauly, *C. A.* **17**, 2418). The sulfite-waste ppt. and synthetic product are strikingly alike. They melt at high temps. to a pitch which hardens to a friable resin with cold water. They continuously lose H_2O on prolonged drying. Dil. $Ba(OH)_2$ in the cold yields the neutral Ba salts but on warming and with excess $Ba(OH)_2$ they give insol. basic salts difficultly decompd. by H_2SO_4 . Coniferylaldehyde is to lignin what glucose is to cellulose. (See also Klason, *C. A.* **19**, 1854)

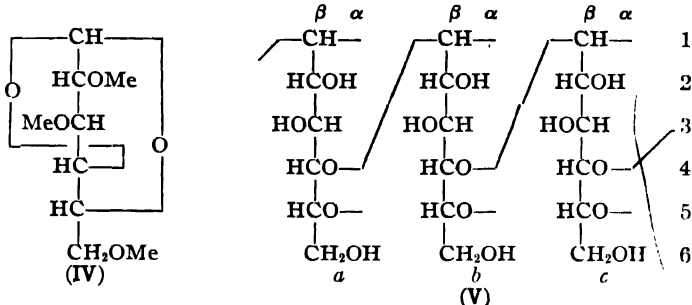
A. R. ROSE

Lignin and cellulose. V. Methylcellulose. KARL FREUDENBERG AND EMIL BRAUN. Univ. of Heidelberg. *Ann.* **460**, 288-304 (1928); cf. *C. A.* **21**, 1818.—It was shown recently by Urban (*C. A.* **20**, 3080) that the methylation of cellulose at 20° gives a tri-Me deriv. (I) essentially different from those obtained by previous investigators. It dissolves to a clear and very viscous soln. in $CHCl_3$, C_2H_5Cl and $AcOH$, while the specimens of Denham and of Irvine and Hirst did not. Further, it differs from the product obtained by Hess in being quite insol. in H_2O and not crystg. from other solvents. It is formed in 93% yield from unbleached cotton, while previous preps. were obtained in only about 75% yields. With $MeOH \cdot HCl$ it gives 91% of 2,3,6-trimethylglucoside and 9% of dimethylmethylglucoside, corresponding with the original MeO content (44.4%) of the sample used. No trace of tetramethylglucose was found. This establishes the structural identity and stereochem. similarity of all the glucose units present in the cellulose mol. When I, for the prepn. of which additional details are given, is treated with HCl in Et_2O (sealed tube at 35°), it yields 1-chloro-2,3,6-trimethylglucose (II or III), analyzed as the pyridinium salt, decomps. 180° , $[\alpha]_D^{16}$ 26.6° (H_2O). Powd. Na converts the Cl deriv. in cold Et_2O into 2,3,6-trimethylglucose anhydride (IV), a mobile oil, $b_{0.1}$ $83-5^\circ$, $[\alpha]_D^{16}$ -10.1° (in H_2O , 16.5° , in $CHCl_3$, -14.6°),



d_{15} 1.1593, n_D^{14} 1.4656; it contains no HO groups, is stable to Fehling soln., $KMnO_4$ and $Br \cdot H_2O$ and with 8% HCl gives 2,3,6-trimethylglucose. The complete dissimilarity of trimethylcellulose and the above anhydride (the latter gives a filterable mobile soln. in $CHCl_3$ and has a normal mol. wt. in C_6H_6 ; a 2% $CHCl_3$ soln. of the former is too viscous to be poured and the mol. wt. is immeasurably large) shows that I is not a trimethylglucose anhydride and therefore that cellulose is not a unimol. glucose anhydride as suggested by Hess. The results of Micheel and Hess (*C. A.* **21**, 173) for the prepn. of 2 forms of IV could not be confirmed; the IV had a considerable b. p. range and 2 fractions obtained from it had $[\alpha]_D$ 23° and 50° , resp., the former giving rise to a trimethylglucose with $[\alpha]_D$ only 63.5° . 1-Dimethylamino-2,3,6-trimethylglucose, by heating the glucose with $MeOH \cdot Me_2NH$ 2 days at 100° , $b_{0.1}$ 109° , $[\alpha]_D^{16}$ 7.2° ($MeOH$), 18.6° (H_2O); MeI gives a quaternary ammonium iodide, $[\alpha]_D^{16}$ -41.2° (H_2O); the chloride has $[\alpha]_D^{16}$ -9.4° (H_2O) (the product according to M. and H. had $[\alpha]_D^{16}$ -8.7°). A consideration of the facts shows that there can be no reversible interconversion of I and IV; moreover, cellobiose must be a degradation product of cellulose, not a product of resynthesis from glucose. Ordinary covalency linkings unite the glucose units in cellulose, probably as in V. If cellulose contains the linkings $a_1\alpha-a_4$, $b_1\alpha-b_6$ and $c_1\alpha-c_6$, degradation would

lead to reducing and tetramethylglucose fragments. With linkings $a_1\alpha-b_1$, $b_1\alpha-c_1$ and $c_1\alpha-d_1$, etc., the same might apply but is not necessitated. More probable linkings are either (with a_β attached to OH and c_4 to H) $a_1\alpha-a_1$, $b_1\alpha-b_1$, and $c_1\alpha-c_1$ or $a_1\beta-a_1$,



$a_1\alpha-a_1$, $b_1\alpha-b_1$ and $c_1\alpha-c_1$. 2,3,6-Trimethylglucose and PCl_5 in Et_2O give the compd. $(\text{C}_5\text{H}_{10}\text{O}_6)_2\text{PCl}_3$, decomps. 160° . Trimethylmethylglucoside and PCl_5 in CHCl_3 give a sirupy chlorohydrin (Cl in position 4?), $b_{0.1}$ 88–95°, $[\alpha]_D^{20}$ 1.64° (CHCl_3); with HCl it yields 2,3,6-trimethylglucose-4(?)-chlorohydrin, $b_{0.1}$ 140–50°, $[\alpha]_D^{20}$ 27.5° (CHCl_3); with Na this, in turn, yields a 2,3,6-trimethylhexose anhydride, $b_{0.1}$ 84°, $[\alpha]_D^{20}$ 106.8° (in H_2O , 112.8°). Hydrolysis of the latter with HCl gives a trimethylhexose, $[\alpha]_D$ 95.2° (H_2O), methylation gives a methylhexoside, $[\alpha]_D$ 33°, hydrolyzed to a tetramethylhexose, $[\alpha]_D$ 55°, not identical with tetramethylgalactose. The hexose anhydride, however, is not a deriv. of glucose. C. J. WEST

Possibility of ring-chain valency tautomerism and of a type of mobile-hydrogen tautomerism analogous to the Wagner-Meerwein rearrangement. III. Orientation of some cyclic derivatives of phorone. CHRISTOPHER K. INGOLD AND CHARLES WM. SHOPPEE. Univ. of Leeds. *J. Chem. Soc.* 1928, 1868–73; cf. *C. A.* 22, 3396.—The compd. $\text{AcOC}:\text{CBr}:\text{CMe}_2:\text{CMe}_2:\text{CO}$ and the corresponding $\text{AcOC}:\text{CH}:\text{CMe}_2:\text{CMe}_2:\text{CO}$

have been orientated by the prepn. from the dihydro deriv. of 5-acetoxy-2,2,3,3-tetramethylcyclopentanone oxime, m. 93° , whose HCl salt m. $136-7^\circ$ (evolution of HCl); reduction gives 2,2,3,3-tetramethylcyclopentylamine (I); this was also obtained by reduction of $\text{OC}:\text{CH}_2:\text{CMe}_2:\text{CMe}_2:\text{C}:\text{NOH}$, first with Na-Hg and AcOH and then with HI

and red P. Reduction of $\text{BzOC}:\text{CH}:\text{CMe}_2:\text{CMe}_2:\text{CO}$ (II) with Pd-BaSO₄ and H gives $\text{BzOCH}:\text{CH}_2:\text{CMe}_2:\text{CMe}_2:\text{CO}$ (III), whose oxime is also reduced to I. $p\text{-BrC}_6\text{H}_4\text{CH}_2\text{OC}:\text{CH}:\text{CMe}_2:\text{CMe}_2:\text{CO}$ is only slightly reduced by H and Pd-BaSO₄;

however, the acetoxime is reduced by Na-Hg and then by HI to I. BzOPh , heated with $\text{NH}_2\text{OH}:\text{HCl}$ and AcONa in abs. EtOH, gives PhOH and BzOH equiv. to about 20% hydrolysis; without the $\text{NH}_2\text{OH}:\text{HCl}$ no trace of BzOH was found. III gives an oily oxime and BzOH. 5-Methoxy-2,2,3,3-tetramethyl- Δ^4 -cyclopentenone with $\text{NH}_2\text{OH}:\text{HCl}$ gives the dioxime of 3,3,4,4-tetramethylcyclopentane-1,2-dione. Oxidation of II with $\text{K}_3\text{Fe}(\text{CN})_6$ gives $\text{HO}_2\text{CCOCMe}_2:\text{CMe}_2:\text{CO}_2\text{H}$, while H_2O_2 gives $\text{HO}_2\text{CCH}_2:\text{CMe}_2:\text{CMe}_2:\text{CO}_2\text{H}$. Oxidation of the corresponding 5-Ac deriv. with $\text{K}_3\text{Fe}(\text{CN})_6$ gives a poor yield of $\text{HO}_2\text{CCMe}_2:\text{CMe}_2:\text{CO}_2\text{H}$. $\text{HOC}:\text{CH}:\text{CMe}_2:\text{CMe}_2:\text{CO}$ and $\text{K}_3\text{Fe}(\text{CN})_6$ give a

good yield of the same acid.

C. J. WEST

cis-trans-Isomerism and steric hindrance. VII. A study of the α -isopropylcyclopentanols. G. VAYON AND A. APCHÉ. *Bull. soc. chim.* 43, 667–77 (1928); cf. *C. A.* 22, 1334.—V. and A. study the relative activities of the *cis*- and *trans*-cyclopentanols. An improved method of prep. cyclopentanone (I) is by distg. adipic acid (330 g.) with barytes (35 g.) at 300° . One lot of barytes can be used for 7 charges of adipic acid. I (50 g.) is mixed with Me_2CO (400 g.) at -10° and with 18 g. of Na in 700 g. of MeOH. After 24 and 48 hrs., resp. two 50-g. portions of I were added and the mixt. allowed to stand 4 days to give 39% α -isopropylidenecyclopentanone (II), $b_{1.1}$ 78–9°. At the same time cyclopentylidenecyclopentanone, $b_{1.1}$ 115–8°, diisopropylidenecyclo-

pentanone, m. 41°, and isopropylidenecyclopentylidenecyclopentanone, m. 37°, are also formed. II in an equal wt. of alc. is reduced with Pt black to give *isopropylcyclopentanone* (III), b_1 , 67°, b_{700} 174°; oxime b_1 , 121°, m. 43°. Hydrogenation of III with Na in alc. gives 85% *trans- α -isopropylcyclopentanol* (IV), b_{27} 93–4° d_4^{25} 0.910, n_D^{25} 1.4583, purified by formation and sapon. of the phthalate. IV with $(\text{CH}_2\text{CO})_2\text{O}$ gives the *trans-deriv.*, d_4^{25} 1.073, n_D^{25} 1.463. IV with PhNCO gives a *trans-phenylurethan*, m. 63°. Hydrogenation of III with Pt black in HOAc contg. 10% HCl gives a mixt. of the *cis-trans* alcs. Formation of the phthalate and partial sapon. leaves the ester of the *cis-form*, m. 105°. Sapon. gives *cis- α -isopropylcyclopentanol* (V), b_{20} 84–5°. V on heating in N_2 at 190° is partially converted to IV. V with PhNCO gives *cis-phenylurethan*, m. 103°, *cis-succinic acid deriv.*, m. 48–9°. V is esterified about 3 times more slowly than IV.

D. H. POWERS

Bicyclic lactones of hydroaromatic and cyclopentane series. JULIUS V. BRAUN AND WILHELM MÜNCH. Univ. Frankfurt *Ann.* 465, 52–72 (1928).— Δ^1 -Cyclohexene-acetic acid, m. 37°, b_{12} 140° without decompn.; it may be heated to boiling for some time in vacuum without change; lactone formation occurs with H_2SO_4 . The Δ^1 - α -acid, $(\text{CH}_2)_5\text{C}:\text{CHCO}_2\text{H}$, heated 10 hrs with 10 mols. NaOH (10% soln.), gives 40% of the Δ^1 -acid. $(\text{CH}_2)_5\text{C}(\text{OH})\text{CH}_2\text{CO}_2\text{Et}$, heated 2 days with 5 parts HBr-AcOH, then treated 1 day with an equal wt. of Zn dust and the product distd. at 14 mm., gives 90% of $(\text{CH}_2)_5\text{CHCH}_2\text{CO}_2\text{H}$, whose Et ester, b_{14} 100–1°, and 6% of the lactone, $\text{C}_8\text{H}_{10}\text{CH}_2\text{CO}_2\text{O}$, b_{13} 129–30°, d_4^{25} 1.0913, n_D^{25} 1.4784; the lactone is sol. in warm NaOH,

from which mineral acids ppt. the HO acid; oxidation gives 70% of adipic acid; if the oxidation product is esterified with HCl and EtOH, there results in addn. to the adipic ester, 36% of an ester, $\text{C}_{15}\text{H}_{20}\text{O}_6$, b_{12} 182–7°. Δ^1 -Cyclohexenesobutyric acid, m. 69–71°, may also be distd. in vacuum without change (b_{13} 150°); with HBr-AcOH, Zn dust and finally alkali, there results about 30% of *cyclohexylisobutyric acid*, m. 62–3°, and 70% of the lactone, $\text{C}_{10}\text{H}_{14}\text{O}_2$, m. 30°. Δ^2 -Cyclopentenylacetic acid, with H_2SO_4 , gives 50% of the lactone $\text{C}_7\text{H}_{10}\text{O}_2$, b_{14} 126–7°, d_4^{22} 1.113, n_D 1.4778; oxidation with HNO_3 gives glutaric acid. *o*-Methylcyclohexylacetic acid, with HBr, AcOH and Zn, gives the γ -HO acid, $\text{C}_8\text{H}_{16}\text{O}_4$, m. 107°, at temps. above 80° it gradually loses H_2O , forming the lactone, more easily obtained by distg. the original reaction product at 13 mm.; 3% of the distillate is 2-methylcyclohexylacetic acid, b_{13} 145–7°, while the remainder is the lactone, $\text{C}_9\text{H}_{14}\text{O}_2$, b_{113} 136–7°, d_4^{19} 1.0680, n_D^{19} 1.4764; reduction with Na and EtOH gives

70% of the glycol, $(\text{CH}_2)_4\begin{array}{c} \text{C}(\text{OH})\text{Me} \\ | \\ \text{CHCH}_2\text{CH}_2\text{OH} \end{array}$, b_{13} 153–5°, m. 75–6°; heated with 60%

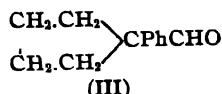
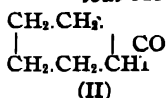
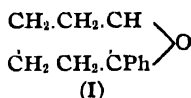
H_2SO_4 at 100°, there results 65% of a fraction, b_{18} 70–85°, b 175–6°, d_4^{27} 0.9372, n_D

1.4602, which is probably $(\text{CH}_2)_4\begin{array}{c} \text{H} \\ | \\ \text{C} \cdot \text{CH}_2 \cdot \text{CH}_2 \\ | \quad \diagup \quad \diagdown \\ \quad \quad \text{O} \quad \quad \quad \\ | \quad \quad \quad \quad \quad \\ \text{C} - \text{CH}_3 \end{array}$ The higher fraction, b_{18} 160–70°, has the

same compn. and is probably formed from several mols. of the glycol by the removal of H_2O . Et menthenacetate, b_{10} 135–7°, d_4^{17} 0.9518, $[\alpha]_D^{17}$ 32.79°, n_D^{17} 1.4642, with KOH gives about 20% of a lactone; with HBr and Zn, there results 4% of menthylacetic acid, b_{10} 164–6°, the remainder being a mixt. of lactones; of this 8–15% is solid, *lactone A*, $\text{C}_{15}\text{H}_{20}\text{O}_3$, b_{10} 156–9°, m. 114–5°, $[\alpha]_D^{16}$ ($\text{C}_6\text{H}_5\text{N}$) –24.68°; warm alkali gives an oily HO acid; Na and EtOH give the glycol, $\text{C}_{12}\text{H}_{24}\text{O}_2$, m. 94°, $[\alpha]_D^{23}$ 9.7° ($\text{C}_6\text{H}_5\text{N}$); the *lactone B*, $\text{C}_{13}\text{H}_{20}\text{O}_2$, b_{10} 156–9°, d_4^{17} 1.0153, $[\alpha]_D^{17}$ –3°; in $\text{C}_6\text{H}_5\text{N}$, $[\alpha]_D^{16}$ –30.6°. Reduction gives a glycol, $\text{C}_{12}\text{H}_{24}\text{O}_2$, b_{10} 163–6°, m. 108°, $[\alpha]_D^{18}$ 20° ($\text{C}_6\text{H}_5\text{N}$); with 60% H_2SO_4 at 100°, there results the γ -oxide, $\text{C}_{10}\text{H}_{18}\text{O}$, b 94–6°, d_4^{19} 0.9292, n_D^{19} 1.4700, $[\alpha]_D^{19}$ 23.4°.

C. J. WESS

The conversion of a six-carbon ring to a five-carbon ring through molecular rearrangement by isomerization of the phenylcyclohexene and phenylmethylcyclohexene oxides. (MLLE.) JEANNE LEVY AND J. SFRAS. *Compt. rend.* 187, 45–7 (1928).—1-Phenylcyclohexene oxide (I), b_{18-14} 136°, n_D 1.5494, d_4 1.0768, prepd. by action of BzO_2H on the hydrocarbon, isomerizes in the presence of a trace of ZnCl_2 to give 60% (II), and 9% (III), b_{18-14} 134°; semicarbazone, m. 196.5°. In a similar fashion 1-phenyl-



4-methylcyclohexene oxide, m. 36°, b_{16} 140-1°, isome. methyl-2-cyclohexanone and 2% 1-phenyl-3-methyl-1-cyctes to yield 55% 1-pentopentanaldehyde

Chaulmoogryl derivatives of lactates and salicylates. [SIMEON, D. H. PO AUGUSTUS P. WEST. Univ. of the Philippines and Bur. of Science, Manila. *SANTIA J. Sci.* **35**, 405-9(1928).]—The following chaulmoogryl derivs of OH acid ϵ . Ph prepd. by treating the corresponding ester with chaulmoogryl chloride for 4 ste about 140-80° and crystg. from MeOH with bone black: *Me chaulmoogryllacta*, 51-4° (38% yield); *Et chaulmoogryllactate*, m. 54-7° (33% yield); *Et chaulmo salicylate*, m. 48-51° (16% yield); *Bu chaulmoogrylsalicylate*, m. 49-50° (27% yic These esters decomp. readily on standing in warm weather. DAVID DAVIDSON

Effects induced by the phenyl group. I. Addition of polar reagents to sty and the behavior of the halogenated ethylbenzenes. FRANK ASHWORTH AND GEO N. BURKHARDT. Univ. of Manchester. *J. Chem. Soc.* **1928**, 1791-802.—Pos (*Ber.* **38**, 646(1905)), from his expts., deduced that PhSH added to PhCH₂CH₂ in opposite sense to HBr. The present work was to test his conclusion. HBr and PhC CH₂ give only PhCHBrCH₂. NH₄HSO₃ and PhCH₂CH₂ emulsified with kieselguhr shaken for 10 days, and, after filtration, boiled with Ba(OH)₂, give *Ba α-phenyletha sulfonate*, crystg. with 2H₂O, which was also obtained from PhCHBrMe and (NH SO₃). The *Ba salt* of the β-deriv. crysts. with 1H₂O. PhSH and PhCH₂CH₂ give, af oxidation, PhCH₂CH₂SO₂Ph, identical with that prepd. from PhCH₂CH₂Br by boil with PhSO₂Na; the sulfones could not be prepd. from PhCHClCH₂, which ge PhCH₂CH₂ or from PhCH₂CH₂Cl, which was unchanged. Pure PhCH₂CH₂SPh a PhCH(SPh)Me were prepd. by heating PhSNa with the corresponding Br deri the α-deriv., b_{16} 163-4°, n_D 1.6042; the β-deriv., b_{16} 188-9°, n_D 1.6082; in the react between PhCH₂CH₂ and PhSH there was formed less than 2% of the α-isomer. The velocity of the reaction was followed in the light and in darkness; in the light the reaction is practically complete in 1.5 days; in the dark the reaction is not complete af 25.5 days. The rate was also followed cryoscopically, with similar results. The acti of EtOH-KOH on PhCHBrCH₂Br gives at least 92% of the PhCHBrCH₂. PhCH CHBr is very stable towards HCO₂H, which may be used as a means of detecting t β-Br when mixed with the α-Br isomer. PhCHBrMe and EtOH-KOH give PhM CHO, while PhCH₂CH₂Br gives PhCH₂CH₂. C. J. WEST

Dichloro-o-xylenes. LEONARD E. HINKEL, ERNEST E. AYLING AND LILLI COLLIER BEVAN. Univ. College, Swansea. *J. Chem. Soc.* **1928**, 1874-8.—Cl, pass into o-C₆H₄Me₂ at -10° (Fe filings) until the gain in wt. corresponded to 2 atoms of Cl gave a mixt. from which were isolated the 3,6-di-Cl deriv. (I), m. 68°, b. 227° (all b. 1 cor.); the 3,4-di-Cl deriv. (II), m. 9°, b. 234°; and the 4,5-di-Cl deriv. (III), m. 76°, 240°. Each of these yields a tetra-Cl deriv. (IV), m. 227°. With 3 vols. fumi HNO₃ and 1 vol. AcOH, III yields the 3-NO₂ deriv. (V), m. 117°; with H₂SO₄ and HN it gives the 3,6-di-NO₂ deriv. (VI), m. 210°. Reduction of V with Fe and AcOH giv 4,5-dichloro o-3-xylidine, m. 88° (*Ac deriv.*, m. 197°); the diazo soln. with CuCl gives mixt. of the 3,4,5-tri-Cl deriv., m. 96°, and IV. Reduction of VI with NaHSO₃ giv the 3,6-di-NH₂ deriv., m. 186°. II yields a 5-NO₂ deriv., m. 78°, and a 5,6-di-NO₂ deri m. 172°. 5,6-Dichloro-o-4-xylidine, m. 63° (*Ac deriv.*, m. 147°); 3,4-dichloro-5, diamino-o-xylene, m. 176°. I yields a 4-NO₂ deriv., m. 95°, and a 4,5-di-NO₂ deriv., r 220°. 3,6-Dichloro-o-4-xylidine, m. 82° (*di-Ac deriv.*, m. 141°). 3,5-Dichloro-4-nitr o-xylene, m. 92°, the 4-NH₂ and 4-AcNH derivs m. 47.5° and 196° (cf. Crossley, *Chem. Soc.* **81**, 1536(1902)). C. J. WEST

Reactivity of halogens in aromatic linkage. H. LINDEMANN AND A. PABST. *Ann* **462**, 24-47(1928).—Nitration of m-BrC₆H₄Me with concd. H₂SO₄ and fuming HNO gives 2,4-dinitro-5-methylbromobenzene, m. 114°. Nitration of 2,4-BrMeC₆H₃CN wit concd. H₂SO₄ and KNO₃ gives 2-bromo-4-methyl-3,5-dinitrobenzonitrile, m. 165°, saponi the corresponding benzoic acid, m. 235°, better prepd. by nitration of 2,4-BrMeC₆H CO₂H; chloride, m. 111°; *Et ester*, m. 93°; *azide*, m. 101°, explodes on rapid heating heating in AcOH (1:1) gives 2-bromo-4-methyl-3,5-dinitroaniline, m. 170° (*Ac deriv* m. 151°); heating with EtOH gives the phenylurethan, m. 122°. Through the diaz reaction, the amine gives 2,4-dinitro-3-methylbromobenzene, m. 86°, which does not reac with PhNH₂. 2-Chloro-4-methyl-3,5-dinitrobenzoyl chloride, m. 106°; *azide*, m. 97

(decompn.); 2-chloro-4-methyl-3,5-dinitroaniline, yellow, m. 173° (*Ac deriv.*, m. 154°); 2,4-dinitro-3-methylchlorobenzene, pale yellow, m. 77°, unchanged by PhNH_2 . Catalytic reduction of 1-hydroxy-2-chloro-3-indone gives 1,3-indandione, m. 131°. The following spectrochem. data are given: 5,2,4-Me(O₂N)₂C₆H₂Cl, $d_4^{25.2}$ 1.4054, n 1.55341, 1.58002, for α and β at 99.2°; 6,2,4-Me(O₂N)₂C₆H₂Cl, $d_4^{100.8}$ 1.3999, n 1.54762, 1.57342 (α and β at 100.8°); 3,2,4-Me(O₂N)₂C₆H₂Cl, $d_4^{98.9}$ 1.3896, n 1.53398, 1.55660 (α and β at 98.9°); 2,4-(O₂N)₂C₆H₂Cl, $d_4^{99.4}$ 1.4717, n 1.55819, 1.58586 (α and β at 99.4°). The transformation of the addn. compd. of 2,4-(O₂N)₂C₆H₂Cl and α -C₁₀H₇NH₂ into the 2,4-nitrodiarylamine in boiling EtOH is not a monomol. reaction; the value of k , calcd. from the formula $k = (1/t) \ln [a/(a-x)]$ shows a continual decrease with time; the reaction velocity is independent of the concn. The mol. wt. of this addn. product in freezing C₆H₆ is only half of the theoretical value. The reaction velocity of the various nitrochlorobenzenes with PhNH_2 in EtOH was also detd. The Me-free derivs. show the greatest velocity; the 5-Me derivs. react less readily, the 6-Me deriv. still more slowly, while the 3-Me derivs. do not react at all.

C. J. WEST

Rearrangement of stereoisomeric hydrazones. JOHN XANTHOPOULOS. *Abstracts of Theses, Univ. Chicago, Science Series 4*, 195-201(1925-6) (publ. May, 1928); cf. *Ibid. Series 3*, 111-8(1924-5).—Two pairs of stereoisomeric hydrazones of the type $\text{RR}'\text{C}=\text{NNH}_2$ (R and R' = aryl radicals) were prepd. and their rearrangement studied. *Stereoisomeric p-bromobenzophenone hydrazones* (from $p\text{-BrC}_6\text{H}_4\text{COPh}$ and NH_2NH_2); α -form (I) m. 166-7°, β -form (II), m. 102.5-3.5°. The reaction product was sepd. into the isomers by means of CHCl_3 and ligroin. *p-Bromobenzophenone ketazine* was obtained as a by-product in the prepn. of the hydrazone. *Stereoisomeric p-chlorobenzophenone hydrazones* (from $\text{ClC}_6\text{H}_4\text{COPh}$ and NH_2NH_2); α -form (III), m. 154-5°, β -form (IV), m. 105-6°. MeOH was used as the sepg. agent; it dissolves principally the β -form, while the residue consists of the almost pure α -form. Evapn. of the MeOH soln. and further treatment with CHCl_3 and ligroin gives the β -form. For the rearrangement expts., several portions of 0.5 g. of II were mixed with ZnCl_2 in Pyrex flasks and heated to 450° for 2 to 3 min. and the cool melt was extd. in succession with dil. HCl and Et₂O. Analysis of the Et₂O soln. gave 13 mols. of $p\text{-BrC}_6\text{H}_4\text{CO}_2\text{H}$ (V) and 70 mols. of BzOH , per 100 mols. of II. The acid soln. yielded 69 mols. of $p\text{-BrC}_6\text{H}_4\text{NH}_2$ (VI) and 14 mols. of PhNH_2 per 100 mols. of II. The rearrangement of I, carried out in a similar way, gave 61 mols. of V, 11 mols. of BzOH , 16 mols. of VI and 59 mols. of PhNH_2 . In the case of III, 55 mols. of $p\text{-ClC}_6\text{H}_4\text{CO}_2\text{H}$ (VII), 15 mols. of BzOH , 20 mols. of $p\text{-ClC}_6\text{H}_4\text{NH}_2$ (VIII), and 60 mols. of PhNH_2 were obtained; while IV yielded 18 mols. of VII, 66 mols. of BzOH , 54 mols. of VIII and 12 mols. of PhNH_2 . The formation of the acids is caused by hydrolysis of the primarily formed nitriles. The rearrangement of the hydrazones involves 2 reactions: $\text{RR}'\text{C}=\text{NNH}_2 = \text{RC}:\text{N} + \text{R}'\text{NNH}_2$ and $\text{RR}'\text{C}=\text{NNH}_2 = \text{R}'\text{C}:\text{N} + \text{RNH}_2$. The differences in the quantities of the resp. products of rearrangement are due to the structural influence of the resp. isomer.

G. SCHWACH

Preparation and rearrangement of methylphenylmethylchloroamine. ANDREW MCN. NEFF. *Abstracts of Theses, Univ. Chicago, Science Series 4*, 141-9(1925-6) (publ. May, 1928); cf. *Proc. Nat. Acad. Sci.* 1, 196(1915).—A study on the rearrangement of methylphenylmethylchloroamine (I) (from $\text{MePh}_2\text{CNH}_2\cdot\text{HCl}$ in H_2O and aq. Na_2CO_3). When I was heated with soda-lime to about 200°, rearrangement occurred. Hydrolysis of the product of rearrangement gave NH_3 , PhNH_2 , and Ph_2CO . MeNH_2 could not be found; also other expts. carried out between 150° and 200° likewise failed to produce MeNH_2 . In the expts. carried out below 150°, rearrangement of I took place in EtONa in boiling EtOH, in Ph_2Hg in boiling xylene, and in boiling xylene. Hydrolysis yielded PhNH_2 , MeCOPh and Ph_2CO . No MeNH_2 was produced. N. concludes that on account of a rather large yield of PhNH_2 , the Ph group is more easily removed from the MePh_2C radical than the Me group. A general theory for the relative ease of migration is given.

G. SCHWACH

Preparation, rearrangement and reduction of β -methylphenylmethylhydroxylamine. MARY E. MAVER. *Abstracts of Theses, Univ. Chicago, Science Series 4*, 111-6(1925-6) (publ. May, 1928).—The rearrangement of $\text{MePh}_2\text{CNHOH}$ was studied in order to test Neff's hypothesis (preceding abstr.) concerning the ease of migration of radicals in mol. rearrangements. *β -Methylphenylmethylhydroxylamine* (I) (from MePhC:NOH and PhMgBr), m. 112-3°. It reduces alk. AgNO_3 and Fehling soln., and, in alc., it changes the color of FeCl_3 soln. to dark brown. *HCl salt*, m. 196°. *Chloroplatinate*, orange, rhombohedral crystals, decomp. 165°. *Bz deriv.*, $\text{MePh}_2\text{CNBzOH}$

(II), m. 183°. In alc., II darkens FeCl₃ soln. Reduction of I with HCl and Zn gives MePh₂CNH₂. When II is heated with soda-lime for 20 min. at 230–50°, rearrangement takes place, yielding almost quant. Ph₂C:NMe (III) and BzONa. Hydrolysis of the product of rearrangement gives only Ph₂CO and MeNH₂. Also treatment of I with PCl₅ gave III only. M. concludes that in these rearrangements only the Me group is migrating, which result does not confirm Neff's hypothesis. G. SCHWOCH

N,N'-Diphenyl-*o*-phenylenediamine. CHARLES S. GIBSON AND JOHN D. A. JOHNSON. Univ. of London. *J. Chem. Soc.* 1928, 1988–9.—The compd. of Wieland and Müller (*C. A.* 8, 346) stated to be C₁₄H₁₄(NHPh)₂ is really *o*-H₂NC₆H₄NPh₂ as suggested by Clermo, Perkin and Robinson (*C. A.* 19, 293). The latter compd., prep'd. according to W. and M., behaves as a primary amine towards HNO₂ and yields an Ac deriv., m. 131–2°. C. J. WEST

Phenacylhydrazine. M. BUSCH, WILH. FOERST AND W. STENGEL. Univ. Erlangen. *J. prakt. Chem.* 119, 287–302(1928).—BzCH₂Br (24 g.) and 15.2 g. NH₄H₂O in 180 cc. abs. EtOH at –5° give 60% of phenacylhydrazine (I), m. 85–6° (decompn.); it is stable for only a short time at room temp., but may be kept at 0° for several days, depending upon its purity; at 50° NH₃ is split off; held at 60° until NH₃ is completely evolved, a dark brown mass is obtained, from which no definite product could be isolated. I gives clear solns. in mineral acids but EtOH-HCl gives a dark yellow to brown soln., from which Et₂O pptts. a slimy mass. Oxalate of I, m. 149–50° (decompn.). Warmed with EtOH at 60° there results 2,5-diphenyl-3-keto-3,4-dihydropyrazine (II). I and Ac₂O give the *di-Ac* deriv., m. 123°. *o*-Nitrobenzalphenacylhydrazone, yellow, m. 156° (decompn.); *m*-NO₂ deriv., canary-yellow, m. 146–7°; *o*-HO deriv., m. 110° (decompn.). *p*-Bromophenacylhydrazine, m. 135–6° (decompn.); in EtOH it behaves as I and probably gives the 2,5-*di-p*-bromophenyl deriv. of II, m. 248–9°. HCl salt of II, pale rose, turns brown at 170° and m. 210°; perchlorate, m. 270°; the oxalate is practically insol. in H₂O. *o*-Hydroxybenzal-*p*-bromophenacylhydrazone, m. 125° (decompn.). EtOH-NaOH gives a red-brown soln. *m*-nitro deriv., yellow, m. 136° (decompn.); *p*-Cl deriv., orange, m. 134° (decompn.) (phenylhydrazone, yellow, m. 214° (decompn.)); the latter with BzH gives 2,3-diphenyl-5-bromophenyl-1-chlorobenzoalaminol-1,3,4-triazine tetrahydride, yellow, m. 163–4°, while HCHO gives 3-phenyl-5-bromophenyl-1-chlorobenzoalaminol-1,3,4-triazine, m. 180° (decompn.); the analogous compd from AcH m. 166°. *m*-Nitrophenacylhydrazine, m. 100° (decompn.); this did not condense with *p*-ClC₆H₄CHO. C. J. WEST

δ -Substituted semicarbazides. I. V. HOPPER. *J. Roy. Tech. Coll. Glasgow* 1927, No. 4, 48–57; cf. *C. A.* 16, 2481.—An improved method of prep'g δ -substituted semicarbazides is described. A temp. of about 130° instead of 180° was found to be sufficient to produce the reaction: $>C=NNHCONH_2 + RNH_2 = >C=NNHCONHR + NH_3$ (RNH₂ = aromatic amine), thus avoiding the formation of by-products and increasing the yield of the intermediate semicarbazone. On heating or by reaction with I the free semicarbazides decompose, forming *sym*-substituted carbamylhydrazines. The HCl salts give oxalates with (CO₂H)₂, azides with HNO₂, Cu derivs. with CuCl₂. δ -Benzylsemicarbazide (I) (80% from 20 g. PhCH₂NH₂ and 20 g. Me₂C=NNHCONH₂). *Ac* deriv., m. 145°. Oxalate, m. 135° (decompn.). Benzylcarbamazide, m. 84°, not explosive. CuCl deriv.—To a soln. of 1.5 g. CuCl₂ in 15 cc. cold H₂O was added 2 g. of the HCl salt of I in 20 cc. cold H₂O. After 1 min., pptn of blue prismatic needles occurs, which were quickly filtered off. The filtrate deposited the compd. PhCH₂NHCON(CuCl)NH₂HCl 4 5H₂O, olive-green plates. The blue substance (II) was very unstable, treatment with abs. EtOH or standing at warm temp. converting it into the green compd. (III). Probably, II is a higher hydrate than III. *sym*-Dibenzylcarbamylhydrazine, m. 237°. *dl*- δ - α -Phenylethylsemicarbazide (65% from MePhCHNH₂ and Me₂C=NNHCONH₂), m. 92° (decompn.). Oxalate, m. 160° (decompn.). *dl*- δ - α -Phenylethylcarbamazide, m. 87°. *sym*-Di- α -phenylethylcarbamylhydrazine, m. 187°. CuCl deriv., olive-green laminas, very unstable *di*- δ - α -Phenylethylsemicarbazide is an oil (IV). *d*- δ - α -Phenylethylcarbamazide, m. 73°, [α]_D¹⁷ 243.7° in abs. EtOH. δ -Phenylsemicarbazide. Oxalate, decomps. 165°. CuCl deriv., light green, rather stable. Benzaldehyde *d*- δ - α -phenylethylsemicarbazone (from BzH and HCl salt of IV) m. 102°, [α]_D¹⁸ –296.9° in EtOH. Semicarbazide oxalate, m. 146°, from H₂NCONHNH₂·HCl and (CO₂H)₂. G. SCHWOCH

The mechanism of the substitution of bromine in the aromatic hydrazones. II. VANGHELOVICI. *Bul. soc. chim. România* 9, 59–67(1927); cf. *C. A.* 22, 1341.—The bromination product of PhNHN:CHPh (I), is believed to be 2,4-Br₂C₆H₃NHN:CBRPh (II), rather than 2,4-Br₂C₆H₃NHN:CHC₆H₄Br (*p*), the formula assigned by Ciusa

(*C. A.* 10, 2893), because the condensation product *m.* 125.5° of 2,4-Br₂C₆H₃NHNH₂ with *p*-BrC₆H₄CHO has entirely different properties. II with KCN gives a CN deriv. indicating labile Br. The bromination of I is believed to occur as follows: I → *p*-BrC₆H₄NHN·CHPh → 2,4-Br₂C₆H₃NHN·CHPh → 2,4-Br₂C₆H₃NHNBr·CHBrPh → 2,4-Br₂C₆H₃NHN·CBrPh + HBr. With Cl₂ a similar reaction takes place. I in AcOH with Br₂ gives II, *m.* 114°. II with boiling alc. KCN gives the CN deriv., *m.* 138°. *o*-HOC₆H₄CHO with *p*-BrC₆H₄NHNH₂ in AcOH gives the *hydrazone*, *m.* 175°. *p*-O₂NC₆H₄NHN·CHPh with Br₂ gives 2,4-Br(ON)₂C₆H₃NHN·CBrPh, *m.* 169°. On treating with KCN the CN deriv., *m.* 90°, seps. I in AcOH at 0° is treated with Cl₂ gas to give 2,4-Cl₂C₆H₃NHN·CClPh, *m.* 87°; with KCN 2,4-Cl₂C₆H₃NHN·C(CN)Ph, *m.* 128°. PhNIIN:CHC₆H₄OMe(*p*) with Cl₂ gives 2,4-Cl₂C₆H₃NHNCClC₆H₄OMe, *m.* 111°. With KCN in EtOH the CN deriv., *m.* 150°, is obtained. D. H. P.

Relative reactivities of butyl bromide and bromobenzene towards magnesium in ether. HENRY GILMAN AND F. A. ZOELLNER. Iowa State College. *J. Am. Chem. Soc.* 50, 2520-3 (1928).—BuBr reacts more rapidly than PhBr with Mg in Et₂O; by using 0.5 mole, the % of RMgX formed after 45 sec. is: BuBr, 53.7; PhBr, 36.9; after 90 sec., BuBr, 65.4; PhBr, 51.7. This result is of direct value in connection with some theories proposed to account for orientation in the C₆H₅ nucleus. C. J. WEST

The characterization of the —OMgX group. HENRY GILMAN AND F. SCHULZE. Iowa State College. *Rec. trav. chim.* 47, 752-60 (1928).—The reaction between several org. compds. and Grignard reagents often can take place in more than 1 way and therefore a search is made for a reagent which will react with the primary product to give a compd. indicating the position taken up by the —OMgX group. The reaction between Ph₂C·CO and PhMgBr, which gives rise to the formation of Ph₂C·CPhOH, may involve an addn. to the C:O group or to the C:C, the reaction product being the same in both cases. On treating the primary reaction product with BzCl Ph₂C·CPhOBz is formed, thus showing that the Grignard reagent has added to the C·O group (*C. A.* 14, 1831). In the reaction of PhNCO with PhMgBr, BzCl does not react with the primary reaction product; with PhNCS and the same Grignard reagent, however, it does, showing that addn. has taken place at the C·S group (*C. A.* 18, 1992). By analogy, therefore, it is reasonable to conclude that with PhNCO addn. takes place at the C:O group. In this case also Me and Et iodide, allyl bromide Ph₂CHBr, Ph₂CCl, *p*-O₂NC₆H₄CH₂Br and Et₂SO₄ were tried under various conditions, but there was no apparent replacement of the —OMgBr group. It is an easy matter to replace the —MgX group attached to C, N and S by other groups which give products that are conveniently identified; for this purpose one can use Et₂SO₄, alkyl sulfonates, org. halides that have a highly active halogen atom (*e. g.*, allyl bromide), acid chlorides, acid anhydrides and PhNCO. Despite the researches of Kohler and Houben it is impossible to select any compd. or class of compds. that can be used generally to characterize the —OMgX group; in addn. to acid halides, acid anhydrides and some alkyl halides, with a highly reactive halogen atom, already used previously by others, they found PhNCO, phenylcarbamine chloride and bromide highly effective with certain types of —OMgX compds. They found the —OMgCl group more readily replaceable than the —OMgBr group and the —OMgI group the least satisfactory, and recommend that media of higher *b. p.* than that of PhMe be not used, several ROMgX compds. readily decompose at higher temps. Compds. with large R groups and those derived from secondary and tertiary alcs. undergo less ready reaction than simpler types. When a case arises where it appears impossible to replace the —MgBr group, attached to O, one can have recourse to 3 expedients: (a) the S analog can be used; (b) an organometallic compd. can be used that has a more positive element like the Na alkyl compds.; (c) from the impossibility of replacing the —MgBr group one can conclude that it is attached to O; this risk is hardly as great as it appears, inasmuch as the —MgX group attached to other frequently occurring elements (C, N, S) undergoes ready replacement. The following reactions were investigated experimentally: Ph₃COMgBr with Ac₂O, no reaction; Ph₂CHOMgBr with Bz₂O → Ph₂CHOBz, other reagents not replacing the —MgBr group in this compd.; BuOMgI with allyl iodide, no reaction; phenoxy-, benzyloxy-, diphenylmethoxy- and triphenylmethoxymagnesium bromide did not give the desired reaction with PhCH₂Br; PhOMgBr and Ph₂CCl gave a small quantity of *p*-HOC₆H₄·CPh₃; BuOMgBr and PhNCO gave 80% of PhNHCO₂Bu; PhOMgBr and PhCH₂OMgBr gave with PhNCO 70% of Ph and benzyl phenylcarbamate, resp.; but diphenyl- and triphenylmethoxymagnesium bromide did not react. With phenylcarbamine chloride and bromide Ph₂CHOMgBr did not react but PhCH₂OMgBr gave 70% of PhNHCO₂CH₂Ph with the former. COCl₂ and NH₃ sometimes give rise to the formation of urethans (Yoder, *C. A.* 17, 1429), but with PhCH₂OMgBr this reaction does not

take place. PhOMgBr and EtOMgBr did not give the desired reaction products with benzoyl bromo amide, while no reaction occurred between PhOMgBr and SOCl_2 , chloromethyl ether, CH_2N_2 and PhCN_2 , and between $\text{PhCH}_2\text{OMgBr}$ and BrCH_2OEt . A small yield of AcOPh was obtained from PhOMgBr and ketene and a small yield of Ph_2CHCl from $\text{Ph}_2\text{CHOMgBr}$ and PCl_3 . Again a reaction did not occur between PhOMgBr , Ph_3COMgBr , Ph_2CHOCaI , Ph_3COCaI , Ph_2CHOZnI , Ph_2COZnI and Et_2SO_4 . There was no appreciable replacement with the following combinations: PhCH_2Cl with PhOMgBr ; PhNCO with bromomagnesium benzoate; PhNCS with EtOMgI and BuOMgI ; diphenylcarbamine chloride with EtOMgBr ; chloro- and bromoacetophenone with PhOMgCl and PhOMgBr ; NH_3 with PhOMgI ; ethylene oxide with BuOMgI and PhOMgI ; ZnEt_2 with $\text{Ph}_2\text{CHOMgBr}$. Finally it was shown that PhCH_2OPh was split by MgBr_2 on refluxing during 48 hrs in C_6H_6 , besides the unchanged ether, PhCH_2Br , phenol and a high-boiling product being obtained. On boiling the same components in Et_2O during 46 hrs. a reaction does not take place.

C. F. VAN DUIN

Arylsulfonylphenylchloroamides. ERICH GEBAUER-FÜLNEGG AND EGON JUSA. Univ. Wien. *Monatsh.* 50, 61-7(1928).—A study is recorded of the reactions of $\text{PhSO}_2\text{N-ClPh}$ upon electrolysis in liquid SO_2 , with $\text{C}_6\text{H}_5\text{N}$, concd KOH , MeONa , Na in Et_2O , liquid NH_3 , Hg , Zn , NaI in Me_2CO , NaNO_2 in CHCl_3 , NaCN in Me_2CO and AlCl_3 in CS_2 ; the end products consist of *o*- and *p*-substituted arylsulfanilides; the position of the Cl depends upon the reaction of the medium.

C. J. WEST

Preparation of derivatives of phenolsulfonyl chloride. ERICH GEBAUER-FÜLNEGG AND FRANZ V. MEISSNER. Univ. Wien. *Monatsh.* 50, 55-60(1928).— PhOMe (10 g.) and 150 g ClSO_3H , allowed to stand overnight, give about 20% of *anisole-disulfonyl chloride*, m. 86° ; *amide*, m. $239-40^\circ$; *anilide*, m. 209° ; reduction of 5 g. of the crude chloride with Zn and H_2SO_4 gives 1.5 g. of *dimercaptoanisole*, m. 51° . PhOEt (5 g.) and 80 g. ClSO_3H give 0.2 g. of the disulfonyl chloride, m. $104-7^\circ$. PhSMc yields a disulfonyl chloride, whose *anilide*, m. $202-4^\circ$. $\text{C}_6\text{H}_5(\text{OH})(\text{SO}_2\text{Cl})_2$ and Ac_2O give 90% of *phenyl acetate-disulfonyl chloride*, m. 91° . In attempting to prep. the anilide, sapon. occurs. *m-Cresol acetate-disulfonyl chloride*, m. 109° (85% yield). PhSAc and ClSO_3H give *(p-ClO}_2\text{SC}_6\text{H}_4)_2\text{S}_2, m. 131° .*

C. J. WEST

Isomerization of a few ethylene oxides. ROGER LAGRAVE. *Ann. chim.* 8, 363-446

(1927).—Several oxides of the type $\text{Ph}_2\text{C}(\text{OCHR})_2$ have been prepd; heating isomerizes them generally to an aldehyde Ph_2RCCHO or to a ketone Ph_2HCCOR . The oxides have been obtained from the corresponding ethylenic hydrocarbons with BzO_2H . Oxides, $\text{Ph}_2\text{C}(\text{OCHR})_2$; $\text{R} = \text{Me}$, m. 34° , b_{21} $178-80^\circ$, d_4^{20} 1.1038 (supercooled liquid),

n_D^{15} 1.5755 (supercooled), isomerizes exclusively to Ph_2CHCOMe , whose oxime m. 165° ; *Et*, b_{18} $175-80^\circ$, d_4^{20} 1.114, n_D^{15} 1.5790, isomerizes to 85% Ph_2CHCOEt and 15% Ph_2EtCCHO ; *CHMe}_2*, b_{20} $182-3^\circ$, d_4^{20} 1.0507, n_D^{15} 1.5550, isomerizes to 18% $\text{Ph}_2\text{C}(\text{CHMe}_2)\text{CHO}$ and 82% $\text{Ph}_2\text{CHCOCHMe}_2$; *Pr*, b_{10} $175-80^\circ$, d_4^{20} 1.054, n_D^{15} 1.5595, gives exclusively Ph_2CHCOPr ; *CH}_2\text{CHMe}_2*, b_{17} $196-7^\circ$, d_4^{20} 1.035, n_D^{15} 1.5555, isomerizes to 20% $\text{Ph}_2\text{C}(\text{CH}_2\text{CHMe}_2)\text{CHO}$ and 80% $\text{Ph}_2\text{CHCOCH}_2\text{CHMe}_2$; *Bu*, b_{17} $195-7^\circ$, d_4^{20} 1.037, n_D^{15} 1.5485, gives 23% Ph_2BuCCHO and 77% Ph_2CHCOBu ; *CH}_2\text{Ph}*, m. 69° , gives 58% $\text{Ph}_2(\text{PhCH}_2)\text{CCHO}$ and 42% $\text{Ph}_2\text{CHCOCH}_2\text{Ph}$; *Ph*, m. 77° , gives exclusively Ph_2CHCOPh . *C}_6\text{H}_4\text{OMe}*, m. 104° , gives exclusively $\text{PhCOCHPhC}_6\text{H}_4\text{OMe}$. The formation of an aldehyde from the corresponding oxide is a 1-phase migration. To ascertain that the formation of a ketone also occurs without an intermediary product, the aldehydes were heated but never did they isomerize to a ketone. The formation of the ketone is thus also considered as a 1-phase process. If H_2SO_4 is present during the heating, the isomerization is liable to occur in several directions at the same time.

A. L. HENNE

The preparation of triiodophenol from 5-iodo- and 3,5-diiodo-salicylic acid. P. BRENNAN AND CH. GIROD. *Compt. rend.* 186, 1851-2(1928).—A soln. of 2.64 g. of 5,2-I(HO) $\text{C}_6\text{H}_3\text{CO}_2\text{H}$ (I) in 40 cc. of *N* NaOH (dild. 1.5 times with H_2O) is treated with a soln. of I_2 in iodide contg. 5.10 g. of I_2 . After 1 hr. an excess of dil. H_2SO_4 is added, the I_2 is removed by adding SO_2 and the unchanged salicylic acid is pptd. by BaCO_3 . The product is crystd. from hot C_6H_6 . The yield is 2.70 g. I is obtained from 3,5,2-I $_3$ (HO) $\text{C}_6\text{H}_2\text{CO}_2\text{H}$ by a similar procedure.

REYNOLD C. FUSON

Nitration of *m*-fluorophenol. HERBERT H. HODGSON AND JOSEPH NIXON. Tech. College, Huddersfield. *J. Chem. Soc.* 1928, 1879-82.—This study follows the same lines as those for the Cl and Br derivatives. (*C. A.* 19, 2937; 20, 1064). *m*- $\text{FC}_6\text{H}_4\text{OH}$ (29 g.)

yields 6 g. of the 6- NO_2 deriv. (I) and 9 g. of the 4- NO_2 deriv. (II). I, yellow, m. 32° , is volatile in steam; Na salt, red needles; Ag salt, orange-brown; Me ether, m. 52° ; benzoate, m. $110-1^\circ$. II, m. 42° , is non-volatile in steam; Na salt, pale yellow; Ag salt, bright yellow; Me ether, m. 56.5° ; benzoate, m. 118° . 3-Fluoro-2-nitrophenol, red, m. 39° , results on nitrating the disulfonated $m\text{-FC}_6\text{H}_3(\text{OH})$ and passes over on hydrolysis and distn. with steam; Na salt, reddish brown; Ag salt, very deep reddish brown; Me ether, m. 43.5° ; benzoate, m. 114° . 3-Fluoro-4,6-dinitrophenol, m. 80° , readily volatile in steam; Ag salt, yellow needles. 3-Fluoro-2,6-dinitrophenol, m. 68.5° ; Ag salt, orange-red needles. 3-Fluoro-2,4-dinitrophenol, pale yellow, m. 138.9° ; Ag salt, deep red. The action of NH_3 at 150° is described. 3-Fluoro-2,4,6-trinitrophenol, m. 173° ; it is not very volatile with steam but sublimes slowly from boiling concd. H_2SO_4 ; Ag salt, bright yellow.

C. J. WEST

Some derivatives of 3,5-dibromo-2-hydroxy-1-methylbenzene. E. BUREŠ AND FR. POLÁK. Charles Univ., Prague. *Časopis Československého Léčárnictva* 6, 117-22, 129-35(1926); cf. C. A. 22, 63.—By action of Br at room temp., without solvent or catalyst and without access of sunlight, B. and P. were able to prep. only 3,5-dibromo-*o*-cresol, m. 57° ; this establishes the lower limit for the action of Br on *o*-cresol. The following derivs. were prepd: Me ether, m. 33.5° ; Et ether, m. 34.5° ; acetate, m. 62° . The Br ortho to OH was replaced by NO_2 by the action of NaNO_2 , while by action of concd. HNO_3 both Br were replaced. The entry of Br in the mol. of *o*-cresol increases the stability of the ring.

WILLIAM J. HUSA

2,5,6-Trichloro-4-hydroxy-1,3-dimethylbenzene. E. BUREŠ AND SV. MAREK. Charles Univ., Prague. *Časopis Československého Léčárnictva* 6, 85-91, 101-6(1926).—By chlorination of 2,4- $\text{Me}_2\text{C}_6\text{H}_3\text{OH}$ is obtained tetrachlorodixylenol (m. 164°) and 30% of 2,5,6-trichloro-4-hydroxy-1,3-dimethylbenzene, m. 169° , b. 282° . The following derivs. were prepd.: Me ether (m. 86° , b. 283°), Et ether (m. 43° , b. 288°), benzoate, (m. 98° , b. 247°), acetate (m. 86° , b. 279°).

WILLIAM H. JUSA

Some bromine derivatives of *m*-cresol. E. BUREŠ AND A. BALADA. Charles Univ., Prague. *Časopis Československého Léčárnictva* 6, 158-63, 177-90(1926).—By bromination of *m*-cresol at ordinary temp. and pressure, without solvents or catalysts, 2,4,6-tribromo-*m*-cresol (I), m. $81.6-81.9^\circ$, was obtained, thus showing that the rule of substitution valid for the NH_2 derivs. of C_6H_6 is applicable in this case. The following derivs. were prepd.: Me ether of I, m. 67° ; Et ether of I, m. 47.5° ; acetate of I, m. 68° ; $[\text{MeC}_6\text{Br}_3(\text{OH})]_2\text{Hg}$, $\text{MeC}_6\text{Br}_3(\text{OH})\text{HgOH}$, $[\text{MeC}_6\text{Br}_3(\text{OH})]_2\text{BiOH} + \text{Bi}_2\text{O}_3$, 2,4,6-tribromo-3-amino-1-methylbenzene, m. $100.6-101^\circ$; 2,4,6-tribromoacetotoluide, m. 155° ; 2,4,6-tribromo-1-methyl-3-diazobenzene sulfate, 2,6-dibromo-4-nitro-3-hydroxy-1-methylbenzene, m. 134° ; 2,4-dibromo-6-nitro-3-hydroxy-1-methylbenzene, m. 87° ; 2-bromo-4,6-dinitro-3-hydroxy-1-methylbenzene, m. 104.5° ; 2,4,5,6-tetrabromo-3-hydroxy-1-methylbenzene (II), m. 194° ; Me ether of II, m. 146° ; Et ether of II, m. 108° ; acetate of II, m. 166° ; and tetrabromo-*m*-cresol brominated in the OH group. W. J. H.

Unusual substitution reaction. I. M. V. IONESCU. *Bull. soc. stiinte Cluj* 3, 54-9(1926); cf. C. A. 21, 3202.—Condensation of dimethylidihydroresorcinol with Et benzylideneacetate by means of piperidine in abs. alc. affords benzylidenebisdimethylidihydroresorcinol, m. 192° , which is also produced from dimethylidihydroresorcinol and Et benzylidenebisacetate, and is converted by H_2SO_4 or AcOH into Vorländer's phenyltetramethyloctahydroxanthenedione, m. $200-1^\circ$ (*Ann.* 309, 375-83 (1899)).

B. C. A.

Course of the Friedel and Craft reaction with dialkylresorcinols. F. MAUTHNER. Univ. Budapest. *J. prakt. Chem.* 119, 311-4(1928).—*o*- $\text{C}_6\text{H}_4(\text{OMe})_2$ (20 g.), 30 g. AcCl , 40 g. AlCl_3 and 80 cc CS_2 give 19 g. of a product consisting of 8 g. of 2,4,5- $\text{Ac}_2(\text{MeO})\text{C}_6\text{H}_3\text{OH}$, m. $121-2^\circ$, and 5 g. of 2,4,5- $\text{Ac}_2(\text{MeO})\text{C}_6\text{H}_3\text{OMe}$, m. $171-2^\circ$. *o*- $\text{C}_6\text{H}_4(\text{OEt})_2$ (20 g.), 30 g. AcCl , 35 g. AlCl_3 and 80 cc. CS_2 give 16.4 g. 2,4,5- $\text{Ac}_2(\text{EtO})\text{C}_6\text{H}_3\text{OH}$, m. 109° .

C. J. WEST

Catalytic condensation of acetylene with phenols. II. Resorcinol. S. AQUINAS FLOOD AND J. A. NEUWLAND. Univ. of Notre Dame. *J. Am. Chem. Soc.* 50, 2566-73 (1928); cf. C. A. 18, 1995.—Condensation of *m*- $\text{C}_6\text{H}_4(\text{OH})_2$ and C_2H_2 in MeOH with a Hg catalyst gives 83% of vinylresorcinol (I), 2,4-($\text{HO})_2\text{C}_6\text{H}_3\text{CH}=\text{CH}_2$, cryst. with 1 mol. MeOH, which gradually polymerizes on standing, and 10% of dihydroxymethylxanthene. Attempts to prep. directly the Me ethers have been unsuccessful. *m*- $\text{C}_6\text{H}_4(\text{OMe})_2$ condenses with C_2H_2 to give the *di*-Me ether of I, pale yellow, b. 235° (decompn.). Reduction of I gives ethylresorcinol. Ac_2O gives the acetate, m. $285-6^\circ$. The same products are obtained in the condensation of AcH under similar conditions. C. J. W.

Aromatic allyl and propenyl compounds. I. Safrole and isosafrole. H. I. WATERMAN AND R. PRIESTER. Techn. Univ., Delft. *Rec. trav. chim.* 47, 849-60(1928).—

Two com. samples of safrole were examd., both having a yellow color. Fractionation in a cathodic vacuum did not give pure safrole, the 4 fractions obtained showing the setting points 10.30° , 10.60° , 10.78° and 10.69° . Thus the safrole was purified by means of the $\text{Hg}(\text{OAc})_2$ addn. compd. (Manchot, *Ann.* **421**, 316(1920); cf. *C. A.* **14**, 3416), the pure product showing the setting point 11.0° , n 1.5331, n 1.5383, n 1.5518, n 1.5638 for C, D, F and G at 20° , and d_4^{20} 1.100. Isosafrole was purified by means of the addn. compd. with picric acid (Hoering and Baum, *C. A.* **3**, 2946), b. p. in a cathodic vacuum 46.8° , d_4^{20} 1.122, n 1.5708, n 1.5782, n 1.5986, n 1.6183 for C, D, F and G at 20° . According to Nagai (*C. A.* **16**, 418) this β -isosafrole is the *trans*-compd. Both with safrole and isosafrole the equil. const. in the reaction with I were detd: $K = [\text{concn. of the I addn. compd.}] / [\text{final concn. of the iodine}] \times [\text{final concn. of the unsatd. compd.}]$. When light is excluded, for safrole $K_0 = 2$ and $K_{25} = 1$ in CCl_4 and after a reaction time of 120 hrs. while in diffuse daylight after 32 hours $K_0 = 260$ was found. For isosafrole after 32 hrs. in diffuse daylight $K_0 = 20$. Partly the addn. of I is due to impurities, pure safrole and pure isosafrole hardly taking up any I at 0° , provided light be excluded. If, however, I has been taken up in diffuse daylight, it is not split off afterwards when the solns. are kept in the dark. The different behavior of safrole and isosafrole towards I solns. in CCl_4 makes it possible to analyze mixts. of safrole and isosafrole by means of the equil. const. which is found after a reaction time of 8 hrs. in diffuse daylight, provided the equil. const. of safrole-isosafrole mixts. of known concn. be detd. at the same time. Solns. of safrole and isosafrole in CCl_4 brought together in diffuse daylight with aq. KI liberate I, the safrole soln. being more active than that of isosafrole.

C. F. VAN DUIN

Color and constitution. III. The influence of the methylthiol, methoxy and chlorine groups on the colors of the nitrobenzaldehyde phenylhydrazones. HERBERT H. HODGSON AND FREDERICK WM. HANDLEY. Tech. College, Huddersfield. *J. Chem. Soc.* **1928**, 1882-6; cf. *C. A.* **22**, 1340.—Trustworthy conclusions could not be deduced from the colors of the solid hydrazones because of their wide variation with the mode of crystn., but equimol. alc. solns. exhibited a well-defined order. The absorption spectra curves confirm the results of the visual observations and the relative order of the effects of the substituent is the same whether these are present in the aldehyde or the hydrazone residue and is independent of the position of the NO_2 group: *o*-Cl (lemon-yellow) *o*-SMc, *p*-Cl, H, *o*-OMe, *p*-SMe (increasing depth), *p*-OMe (deep reddish orange). The influence of the substituents is, in general, less marked than in the case of the azo dyes. *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{CH}=\text{NNHPh}$ crystallizes from glacial AcOH in yellow needles, m. 194° , which slowly become pale orange without change of m. p. Exposure to ultraviolet light for some hrs. or to sunlight for some weeks produced no change. Addn. of H_2O to a glacial AcOH soln. ppts. a yellow variety changing in a few sec. into the red form. Reduction of 4-MeSC₆H₄N₂Cl with SnCl_2 and HCl gives the *HCl* salt, plates, of 4-methylthiolphenylhydrazine, m. 60° ; 2-methylthiolhydrazine, m. 40° . In the following the color on addn. of EtOH-KOH and the change on heating are given immediately following the m. p. Derivs. of benzaldehyde-*o*-nitrophenylhydrazones: *o*-Cl, orange, m. 178° , deep blue, unchanged; *p*-Cl, scarlet, m. $203-4^\circ$, blue, unchanged; *o*-MeO, bright red, m. $176-7^\circ$, violet-blue, unchanged; *p*-MeO, scarlet, m. 204° , blue-violet, unchanged; *p*-MeS, scarlet, m. $225-6^\circ$, blue-violet, unchanged. Derivs. of benzaldehyde *m*-nitrophenylhydrazones: *o*-Cl, pale orange, m. 171° , brownish yellow, deeper; *p*-Cl, orange-red, m. 172° , brownish yellow, deeper; *o*-MeO, reddish orange, m. 176° , orange, brownish orange; *p*-MeO, orange-yellow, m. 156° , brownish yellow, deeper; *p*-MeS, old-gold, m. 146° , brownish yellow, deeper. Derivs. of benzaldehyde *p*-nitrophenylhydrazones: *p*-Cl, deep orange, m. 224° , violet, deeper; *o*-MeO, brick-red, m. 204.5° , violet, deeper; *p*-MeS, deep orange, m. 183° (turns yellow at $140-5^\circ$), violet, deeper. Derivs. of benzaldehyde *o*-methylthiophenylhydrazones: *o*-NO₂, deep orange, m. $87-8^\circ$, yellowish green, olive-green; *m*-NO₂, orange, m. 118° , yellow, brownish yellow; *p*-NO₂, red, m. 147° , olive-green, bluish green. Benzaldehyde *p*-methylthiolphenylhydrazones, m. 93° , yellow, deeper; *o*-NO₂ deriv., brownish red, m. 204° , olive-green, bluer; *m*-NO₂, orange-red, m. 152° , brown, deeper; *p*-NO₂, scarlet, m. 179° , olive-green, bluish green. *p*-Methylthiolbenzaldehyde phenylhydrazones, m. 138° , yellow, deeper. Absorption curves are given for some of these compds.

C. J. WEST

Sulfur-containing derivatives of acetophenone. EUGEN RIESZ AND WALTER FRANKFURTER. Univ. Wien. *Monatsh.* **50**, 68-75(1928).—PhAc (5 g.) and 50 g. ClSO_3H , heated 1 hr. at 110° , give acetophenone-3,5-disulfonyl chloride, m. $195-6^\circ$; anilide, yellow, m. $195-6^\circ$ (decompn.). Reduction with Zn and HCl in EtOH gives 3,5-dimercaptoacetophenone, m. 128° (*Pb* salt, orange-red); oxidation with air in alk.

soln. gives no trace of a thioindigo dye. $p\text{-H}_2\text{NC}_6\text{H}_4\text{Ac}$, through the diazo reaction with alk. xanthate soln. and heating the resulting product, gives $p\text{-HSC}_6\text{H}_4\text{Ac}$, characterized by the formation of $p\text{-acetophenylthioglycolic acid}$, m. 155–6°; with ClSO_3H this gives a red dye. Oxidation of $p\text{-HSC}_6\text{H}_4\text{Ac}$ and the resulting Na salt treated with ClSO_3H gives an *acetophenonedisulfonyl chloride*, m. 210° (decompn.), (probably the 2,4-deriv.); *anilide*, yellow, m. 235° (decompn.); reduction gives 2,4-dimercaptoacetophenone, m. 215° (Pb salt, orange-red); this compd. also does not give a thioindigo dye.

C. J. WEST

New bromine substitution products of vanillin and some of their derivatives. L. CHAS. RAIFFORD AND W. C. STOESEER. State Univ. of Iowa. *J. Am. Chem. Soc.* **50**, 2556–63 (1928); cf. *C. A.* **21**, 1803, 2258.—6-Bromovanillin oxime and Ac_2O give 98% of the *Ac deriv.*, m. 149–51°. Acetyl-6-bromovanillin gives 89% of the *oxime*, m. 150–2°, whose *Ac deriv.*, m. 153–4°. 3-Methoxy-4-acetoxy-6-bromobenzonitrile, m. 148–9°, by boiling the *Ac deriv.* with Ac_2O for 1 hr. Refluxing with 6 N KOH for 3.5 hrs. gives 98% of 6-bromovanillic acid, m. 190–1°. Nitration of acetylvanillin gives a mixt. of the 2-nitro deriv., m. 136°, and the 6-nitro deriv., yellow, m. 212°. Acetyl-2-nitro-5-bromovanillin, m. 128°. Hydrolysis of this, or bromination of the above 2- NO_2 deriv., gives 2-nitro-5-bromovanillin, m. 150–1°; reduction with FeSO_4 and NH_4OH gives the 2-amino deriv., tan colored, m. 139–40°, which, through the diazo reaction with HBr, gives 2,5-dibromovanillin, m. 189°; *Ac deriv.*, m. 68–70°; $p\text{-nitrophenylhydrazine}$, yellow, m. 249°; *semicarbazone*, m. 233–4°; *bisbenzidine deriv.*, bright orange, m. above 350°; *oxime*, m. 154–5°; *oxime acetate*, m. 184–5°; *acetyloxime acetate*, m. 137–9°; *acetoxy-nitrile*, m. 89–90°; 2,5-dibromovanillic acid, m. 179–80°; 2,5-dibromo-3-methoxy-4-acetoxybenzal diacetate, m. 157–8°, hydrolysis gives the original vanillin. 2-Nitro-6-bromovanillin, cream colored, m. 168–70°; 2-amino deriv., yellow, m. 217–8°; 2,6-dibromovanillin, m. 155–6°; *oxime*, m. 144–5°; $p\text{-bromophenylhydrazine}$, flesh colored, m. 168–70°; *semicarbazone*, m. 216–7°; *bisbenzidine deriv.*, yellowish brown, m. 238–9°. Further bromination gives 2,5,6-tribromovanillin, m. 177–8°; *oxime*, m. 192°; $p\text{-bromophenylhydrazine}$, m. 169–70°; *semicarbazone*, m. 222–3°; *bisbenzidine deriv.*, brown, m. above 330°.

C. J. WEST

Condensation of heptanal with aromatic aldehydes. B. N. RUTOVSKII AND A. I. KOROLEV. Chem.-Pharm. Forschungskinst. Moskau. *J. prakt. Chem.* **119**, 272–4 (1928).— BzH (10.6 g.) and 11.4 g. $\text{C}_6\text{H}_{13}\text{CHO}$ in 100 cc. EtOH and 500 cc. H_2O , condensed by 7 cc. of 10% NaOH, give $\alpha\text{-amyl-}\beta\text{-phenylacrolein}$, pale yellow, b_D^{20} 174–5°, d_4^{20} 0.97108, n_D^{20} 1.5381; *oxime*, m. 72–5–3°; *semicarbazone*, m. 117.5–8°. With $\text{BzNH-CH}_2\text{CO}_2\text{H}$ it gives 4-[benzylidene-2-heptylidene]-2-phenyl-5-oxazolone, golden yellow, m. 97–8°.

C. J. WEST

Thermal decomposition of thiobenzanilide. ARTHUR WM. CHAPMAN. Univ. of Sheffield. *J. Chem. Soc.* **1928**, 1894–7.—Upon heating PhCSNHPh at 270–310° the following products were obtained: 38–58% of 1-phenylbenzothiazole (I), 11–9% of *sym*-diphenylbenzenyl amidine (II), stilbene, tetraphenylthiophene (III) and 37–40% H_2S . The following series of reactions would then represent the decompn.: $\text{PhCSNHPh} \rightarrow \text{I} + 2\text{H}$; $2\text{H} + \text{PhCSNHPh} \rightarrow \text{PhNH}_2 + \text{PhCHS}$; $\text{PhNH}_2 + \text{PhCSNHPh} \rightarrow \text{II} + \text{H}_2\text{S}$; $\text{PhCHS} \rightarrow \text{PhCH-CHPh} + \text{III} + \text{H}_2\text{S}$.

C. J. WEST

Esterification velocities of the nitrobenzoic acids in ethyleneglycol and of the naphthoic acids in glycerol. ANTON KAILAN AND EMIL KRAKAUER. Univ. Wien. *Monatsh.* **49**, 347–84 (1928).—The monomol. esterification constns. of the $\text{O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ in glycol and of the $\text{C}_{10}\text{H}_7\text{CO}_2\text{H}$ in $\text{C}_2\text{H}_5(\text{OH})_2$, catalyzed by HCl, have been detd. at 25° and expressed by formulas as functions of the H_2O (w) and HCl concn. (c) of the medium. The constns. increase in anhyd. $\text{C}_2\text{H}_5(\text{OH})_2$ and $\text{C}_2\text{H}_4(\text{OH})_2$ and in H_2O -contg. $\text{C}_2\text{H}_5(\text{OH})_2$ in proportion to the HCl concn., in H_2O -contg. $\text{C}_2\text{H}_4(\text{OH})_2$ more rapidly than the HCl concn. For $c = 1/6$ and $w = 0.065$, the relation of the monomol. constns. of BzOH to those of *o*-, *m*- and *p*- $\text{O}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ and the α - and β - $\text{C}_{10}\text{H}_7\text{CO}_2\text{H}$ in EtOH is: 1:0.054:0.57:0.70:0.39:1.00; in glycol, 1:0.038:0.69:0.79; in glycerol, 1:0.068:0.63:0.80:0.61:0.93. The steric hindrance through *o*-substitution is thus smaller in glycerol but greater in glycol than in EtOH. With a small H_2O content the esterification constns. in both media are smaller than in EtOH, but in large concns. of H_2O , the constns. are larger. Under the exptl. conditions, practically complete esterification occurs, so that resapon. does not enter into consideration. The esterification of the $\text{C}_{10}\text{H}_7\text{CO}_2\text{H}$ in $\text{C}_2\text{H}_5(\text{OH})_2$ is also studied without a catalyst.

C. J. WEST

Esterification velocities of monoaminobenzoic acids and 1- and 2-pyridinecarboxylic acids in glycol and glycerol. ANTON KAILAN AND YEHIA M. DIAB. Univ. Wien. *Monatsh.* **49**, 316–46 (1928).—The esterification velocities of the $\text{H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ and of

1- and 2- $C_6H_4NCO_2H$ at 25° with HCl as the catalyst were measured in anhyd. and H_2O -contg. $C_3H_7(OH)_2$ and in anhyd. $C_3H_7(OH)_3$, and for *m*- and *p*- $H_2NC_6H_4CO_2H$ and the 2- $C_6H_4NCO_2H$ in H_2O -contg. $C_3H_7(OH)_3$. The dependence of the monomol. velocity const. upon the H_2O content (*w*) of medium and the excess of the concn. of the HCl over that of the org. acid or its ester (*C'*) is expressed for the last 3-named acids by means of formulas. These velocity const. increase throughout, both in anhyd. and H_2O -contg. glycol and glycerol more quickly not only than the concn. of the total HCl but also than that of the "free" HCl. For $C' = 1/3$ and $w = 0.03$, the velocity const. of the *m*- and *p*- $H_2NC_6H_4CO_2H$ and of nicotinic acid in EtOH is 20-30%, for *o*- $H_2NC_6H_4CO_2H$ 70% and for picolinic acid 130% greater than in glycol; for $w = 0.7$, it is 35-50% smaller for the 1st 3 acids. In glycol the const. for *o*- $H_2NC_6H_4CO_2H$ and the $C_6H_4NCO_2H$ are smaller than in glycerol, but are greater for the remaining acids. The steric action of the NH_2 group in the *o*-position is greater in glycol but smaller in glycerol than in EtOH. Under similar conditions, the esterification velocity const. of nicotinic acid in glycol and glycerol is 4 times, in EtOH only about 2 times greater than that of picolinic acid.

C. J. WEST

Wandering of the alkyl groups in the Fries transformation. K. v. AUWERS AND W. MAUSS. Univ. Marburg. *Ann.* 460, 240-77(1928); cf. C. A. 20, 2154.—In continuing the earlier work, the Fries' transformation has been effected with a no. of other polyalkylphenyl acetates, by the methods of rapid or of slow heating with $AlCl_3$. In order to det. whether wandering of alkyl has occurred during the transformation, the Ac group is removed from the resulting hydroxyacetophenone and the new phenol identified. P_2O_5 used formerly for this removal is often less effective than boiling glacial AcOH-HBr. In general *o*- and *p*-hydroxyacetophenones are separable by steam distn.; the *m*-derivs. must be isolated by special methods. An alkyl group in the *m*-position to the AcO group favors the formation of *o*-hydroxyacetophenones. Two *m*-groups produce an even greater tendency in the same direction. Thus, 3,5-Me₂C₆H₃OAc and 3,5-Et₂C₆H₃OAc give no trace of a *p*-deriv. When 1 *m*-alkyl group is present, the Fries' change gives a little *p*-compd. A 2nd Me group in the *o*-position does not weaken the effect of the *m*-group in this respect. Ph acetates with a free *o*-position give a Fries' change only if 1 alkyl group is in position 2 and a 2nd in position 5. The Et group is much more readily displaced than Me. When Et groups are present in both *o*- and *p*-positions, the *o*-group is eliminated, the displaced Et group wandering into the *p*-position to that it originally occupied. Other new facts which show the greater valency requirement of Et over Me are the abnormal Gattermann aldehyde and Friedel-Crafts' ketone syntheses recorded with 2,4-MeEtC₆H₃OMe and 5,2,4-MeEt₂C₆H₃OMe. 2,4-Dimethyl-6-ethylphenyl acetate, b. 242°, in the Fries transformation, gives 70% of a mixt. of 2-hydroxy-3,5-dimethyl-4-ethylacetophenone (I), m. 52-3°, b₁₁ 153-5° (oxime, m. 157-5-8.5°; *p*-nitrophenylhydrazone, yellow, m. 212-4°; semicarbazone, pale yellow, m. 235-6°), and 2-hydroxy-4,5-dimethyl-3-ethylacetophenone (II) (semicarbazone, m. 219-21°; oxime, m. 115-6°; *p*-nitrophenylhydrazone, reddish yellow, m. 179-83°). I, upon reduction, gives 72% of 2,4-dimethyl-3,6-diethylphenol, m. 59.5-60.5°, b. 250-2°; Me ether, b. 218-20° which gives with AcCl and $AlCl_3$ only 2-hydroxy-5,6-dimethyl-3-ethylacetophenone, yellow, b₁₁ 143-5° (oxime, m. 153-4°; *p*-nitrophenylhydrazone, yellow, m. 251-3°); reduction gives 3,4-dimethyl-2,6-diethylphenol, b. 246-8°, m. 47-8°. 3-*o*-Xylyl acetate, b. 226-8°, with $AlCl_3$ and AcCl, gives 60% of 2-hydroxy-3,4-dimethylacetophenone, light yellow oil volatile with steam, b₁₂ 122-4° (FeCl₃ gives a deep violet-blue color) (*p*-nitrophenylhydrazone, red, m. 216-8°), which is reduced to 2,3-dimethyl-6-ethylphenol, m. 53-4°; its Me ether, b. 216-8°, with $AlCl_3$ and AcCl gives 4-methoxy-2,3-dimethyl-5-ethylacetophenone, volatile in steam, b₁₂ 138-40°, reduced to 2,3-dimethyl-4,6-diethylanisole, b. 234-6°, which is demethylated to 2,3-dimethyl-4,6-diethylphenol, b. 244-6°. 3,4-Dimethyl-6-ethylphenyl acetate, b. 247-9°, is converted by the Fries' transformation into a mixt. of hydroxyacetophenones, b₁₂ 145-7°, which cannot be sepd. by distn. Reduction gives as the only product 4,5,2,6-Me₂Et₂C₆H₃OH, m. 47-8°; fractionation of the *p*-nitrophenylhydrazones shows the presence of 2,3,5,6- and 2,3,4,5-HOEtMe₂C₆HOAc. 2,4-Dimethyl-6-ethylanisole, b. 210-1°, slowly reacts with AcCl and $AlCl_3$ to give some 6,2,4-EMe₂C₆H₃OH and, as the main product, 3-hydroxy-2,6-dimethyl-4-ethylacetophenone, b₁₁ 178-82°. 2,4-Dimethyl-5-ethylphenol, b. 242-4°, m. 39-40°; the acetate, b. 254-6°, is transformed (Fries) mainly into 4,3,5,2-EtMe₂(HO)C₆HOAc (converted in poor yield by H_3PO_4 into 2,4-dimethyl-3-ethylphenol, m. 70-1°), and some 2,3,5,6-EtMe₂(HO)C₆HOAc, isolated only as the impure oxime, m. 120-5°. 2,4-MeEtC₆H₃OMe, HCN, HCl and $AlCl_3$ give mainly 3,4-Me(MeO)C₆H₃CHO, the by-product being 2-hydroxy-3-methyl-5-ethylbenzaldehyde, a yellow oil, b₁₂ 120-2° (*p*-nitrophenylhydrazone, red, m. 167-9°). 2-*m*-Xylyl acetate, b. 214-6°, with $AlCl_3$,

slowly heated to 120°, gives mainly 4-hydroxy-2,6-dimethylacetophenone, m. 150–1°, which is reduced to 2,6-dimethyl-4-ethylphenol, b. 228–30°, m. 36–7°; the acetate, b. 245–7°, is converted (Fries) mainly into 4,3,5-HOMe₃C₆H₂Ac and some 2,4,3,5-HOEt-Me₃C₆H₂Ac. 4-Methyl-2,6-diethylphenol, b. 229–30°, m. 48–8.5°; benzoate, m. 103–3.5°; acetate, pale yellow oil, b. 242–3°. In the Fries' transformation the latter gives 60% of 2-hydroxy-5-methyl-3,4-diethylacetophenone, a yellow oil, b₁₂ 136–7° (oxime, m. 108–9°; semicarbazone, m. 228–9°; *p*-nitrophenylhydrazone, reddish yellow, m. 254–6°); reduction gives 3-methyl-2,3,6-triethylphenol, pale yellow oil, b. 242–4°. 3-Methyl-6-ethyl-anisole, b. 200°, with AcCl and AlCl₃ gives a very little 2-hydroxy-6-methyl-3-ethylphenol, b₁₂ 137–8°, and mainly 4-methoxy-2-methyl-5-ethylacetophenone, b₁₂ 139–40°, m. 29–30°; reduction gives 3-methyl-4,6-diethylanisole, b. 222–4° (75% yield); 3-methyl-4,6-diethylphenol, b. 247–9°; its acetate, b. 258–60°; phenylurethan, m. 109–10°. The acetate under Fries' conditions gives a mixt. of 5,3,4,2-MeEt₂(HO)C₆H₂Ac and 6,3,5,2-EtMe₂(HO)C₆H₂Ac(?). The anisole with AcCl and AlCl₃ gives a mixt. of 2-hydroxy-4-methyl-5-ethylacetophenone, m. 94–5°, and 2-methoxy-6-methyl-3,5-diethylacetophenone, pale yellow oil, b₁₁ 146–8°; reduction gives 3-methyl-2,4,6-triethylphenol, b. 252–4°; AlCl₃ gives 3-methyl-2,4,6-triethylphenol, b. 256–8°; the Na salt is sparingly sol. 3-Methyl-4-ethylphenol, b. 228–30°; the acetate, b. 239–40°, in the Fries' transformation gives 70% of 4,5,2-MeEt(HO)C₆H₂Ac, m. 94–5°. 2,4-MeEtC₆H₃OH yields a benzoate, m. 47–8°, and an acetate, b. 238–40°. With AlCl₃ the latter gives 77% of 2-hydroxy-3-methyl-5-ethylacetophenone, yellow oil, b₁₁ 129–31° (*p*-nitrophenylhydrazone, red, m. 196–8°); reduction gives 65% of 2-methyl-4,6-diethylphenol, b. 234–6°; the acetate, b. 250–2°, with AlCl₃ gives 2-hydroxy-3-methyl-4,5-diethylacetophenone, m. 50–1° (oxime, m. 125–6°; *p*-nitrophenylhydrazone, red, m. 187–90°); reduction gives 2-methyl-3,4,6-triethylphenol, m. 28–9°, b. 252°. Rearrangement of *p*-EtC₆H₄OAc with AlCl₃ for 6.5 hrs gives 70% of 2-hydroxy-5-ethylacetophenone, b₁₂ 119–21° (oxime, m. 118–9°); reduction gives 80% of 2,4-diethylphenol, b. 228–30°; phenylurethan, m. 96–9°; acetate, b. 242–4°; the latter with AlCl₃ gives 67% of 2-hydroxy-3,5-diethylacetophenone, yellow oil, b₁₂ 138–40° (*p*-nitrophenylhydrazone, reddish yellow, m. 136–8°). Reduction gives 2,4,6-triethylphenol, b. 244–6°; the acetate, b. 260–2°, with AlCl₃ gives 65% of 2-hydroxy-3,4,5-triethylacetophenone, yellow oil, b₁₂ 153–5°. 2,6-Me₂C₆H₃OAc when heated rapidly with AlCl₃ at 130–40° gives only 3,5,4-Me₂(HO)C₆H₂Ac, while 2-methyl-6-ethylphenyl acetate, b. 220–2°, gives some 2-hydroxy-3-methyl-5-ethylacetophenone, b₁₂ 130–2° (*p*-nitrophenylhydrazone, m. 191–5°), but chiefly 4-hydroxy-3-methyl-5-ethylacetophenone, m. 95.5–6.5°. Fries' conditions convert *o*-EtC₆H₄OAc into 2-hydroxy-3-ethylacetophenone, b. 213° (*p*-nitrophenylhydrazone, m. 213–7°), reduced to 2,6-Et₂C₆H₃OH, the acetate, b. 238–40°, of which when heated rapidly under Fries' conditions gives a little *o*-HO ketone but mainly 4-hydroxy-3,5-diethylacetophenone, m. 92–2.5°. 3,5-Diethylphenyl acetate, b. 250–1°, is converted by AlCl₃ into 2-hydroxy-4,6-diethylacetophenone, b₁₂ 140°.

C. J. WEST

Different methods of preparation of phenylethylmalonic dimethyl ester. THOMAS WM. RAY. *Abstracts of Theses, Univ. Chicago, Science Series* 4, 151–6 (1925–6) (publ. May, 1928); cf. C. A. 12, 908.—An attempt to prep. PhEtC(CO₂Me)₂ (I) through following steps: PhPr (II), PhCBr₂Et (III), PhC(CN)₂Et, failed, because bromination of II led to an unsatd. compd., which probably is PhCH·CHMe, instead of to III. In another expt., the starting material was PhCOEt, which by means of HCl and HCN was to be converted into EtCPhC(CO₂H) (IV). IV with AgCN should give EtCPh(CN)CO₂H, which with HCl and MeOH would give I. Instead of IV, the reaction gave methyl-atropic acid, PhC(·CHMe)CO₂H, m. 134–6°. In a 3rd attempt, PhCH₂CN was treated with NaNH₂ and EtI giving EtCHPhCN (V). Hydrolysis of V gave EtCHPhCO₂H, which was converted into EtCPhBrCOBr (VI) by means of PhBr₂ and Br. VI and MeOH gave Me α -phenyl- α -bromobutyrate (VII), unstable, decompd 95–100° at 2 mm. VII and KCN should give EtCPh(CN)CO₂Me (VIII), which with HCl and MeOH would give I. The reaction of VII with KCN gave either no VIII at all or only a very small quantity. Me α -phenyl- α -cyanobutyrate (from V by reaction with NaNH₂ and ClCO₂Me), b_{0.1} 120–30°. The yield was too small to render its transformation into I practical. Et α -phenyl- α -cyanobutyrate, b_{0.2} 100–40°.

G. SCHWOCH

Addition of halogens to unsaturated acids and esters. I. The addition of equimolecular mixt. of bromine and chlorine to cinnamic acid and its derivs. in non-hydroxylic solvents. NORMAN WM. HANSON AND THOMAS C. JAMES. Univ. College of Wales, Aberystwyth. *J. Chem. Soc.* 1928, 1955–60.—An equimol. mixt. of Br and Cl, in CCl₄, reacts additively with PhCH:CHCO₂H as BrCl, where such a compd. existent, the product of addn. being the 2 stereoisomeric PhCHClCHBrCO₂H. Such a BrCl soln. has been shown kinetically to react at a far more rapid rate with PhCH:CHCO₂H and some

of its derivs. than Br soln. itself. These phenomena appear to be readily explicable along the lines of modern polarity theories.

C. J. WEST

Preparation of nitrososalicylic acid and of aminosalicic acid. V. G. GULINOV. *J. Chem. Ind. (Moscow)* 4, 909-10(1927); 5, 225-8(1928).—Two groups of methods have been proposed for the prepn. of aminosalicic acid, viz. (1) through the nitro compd. and (2) from azo derivs. of salicylic acid. A method of prepg. aminosalicic acid from the NO compd. has hitherto not been proposed, although similar methods of prepn. of other aminophenols are widely used industrially. G. investigated the possibility of applying this method to aminosalicic acid and proceeded to prep. first *nitrososalicylic acid*. According to the Ger. pat. 25,469 (1883) the latter may be prepared by means of nitrites of heavy metals (cf. also *Ber.* 18, 705); G. modified this method as follows: 25-35 g. CuSO_4 and 7 g. NaNO_2 in 150-cc. water was poured in a thin stream into 16 g. Na salicylate in 450-cc. water. If the former soln. is introduced too rapidly Na salicylate is salted out and the operation is delayed considerably. CuSO_4 is taken in excess to insure the complete sepn. of the Cu-nitroso salt formed. The mixt. is left standing at room temp. for 24 hrs., then the ppt. of Cu-nitroso salt is filtered and the filtrate, after standing 9-10 days more, ppts. an addnl. quantity of the same substance, $\text{C}_6\text{H}_3\text{CO}_2\text{OCuNO}$. To avoid long standing of the filtrate the nitroso salt may be salted out by NaCl . The yield of the nitroso salt is 93-7% of the theoretical. To obtain free nitrososalicylic acid, 4,2-ON(HO) $\text{C}_6\text{H}_3\text{CO}_2\text{H}$, the freshly filtered ppt is treated with 5% NaOH not above 40-5°, whereupon the NO compd. dissolves as the Na salt; the latter, after sepg. the ppt. of Cu(OH)_2 , gives free nitrososalicylic acid by decomn. with HCl . There is no difficulty in obtaining *aminosalicylic acid* by reducing either the free NO compd. or its Na salt by Sn and HCl , or by $\text{Na}_2\text{S}_2\text{O}_4$. Aminosalicic acid can also be prepd. by passing through the NO compd. without isolating the latter, conforming to the Ger. pat. 48,491 (1889), which was modified by G. as follows. Concd. AcOH is added drop by drop to strongly acid reaction to a soln. of 16 g. Na salicylate and 7.5 g. NaNO_2 in 800 cc. water. After 20 hrs the NO compd. formed is reduced by 200 g. of $\text{Na}_2\text{SO}_3 \cdot 7\text{H}_2\text{O}$ crystals. After standing 3 hrs. the soln. is heated to 70-80° for the removal of SO_2 . The yield of aminosalicic acid is 76% of the theoretical. Friedlander (*Fortschritte* 2, 222) expressed doubt whether nitrososalicylic acid is actually formed as an intermediate product in this process.

BERNARD NELSON

Synthesis of a new gallic aldehyde. F. MAUTHNER. Univ. Budapest. *J. prakt. Chem.* 119, 306-10(1928).—4-Methylgallic acid and ClCO_2Me in N NaOH give 3,5-dicarboximethoxy-4-methylgallic acid, m. 120-1°; the chloride, m. 58-9°; reduction with Pd- BaSO_4 and H in PhMe at 110° and sapon. give 3,5-dihydroxy-4-methoxybenzaldehyde, m. 139-40°; *p*-nitrophenylhydrazone, red, m. 222-3°.

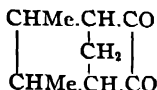
C. J. WEST

6-Aldehydocoumarin and dyes derived from it. RAJENDRANATH SEN and DUH-AHARAN CHAKRAVARTY. Presidency College. *J. Am. Chem. Soc.* 50, 2428-36(1928).—Coumarin (16 g.) in 27 g. NaOH and 40 cc. H_2O , heated on the H_2O bath and treated during 8-9 hrs. with 20 cc. CHCl_3 , gives 3.5 g. 6-aldehydocoumarin (I), pale yellow, decmps. 174-5°, the decomp. product, m. 205-7°; phenylhydrazone, yellow, m. 205-7°. I in NaOH condenses with Me_2CO , giving *dicaumaralacetone*, yellow, m. 159°; *coumaralacetophenone*, m. above 250°. I undergoes the benzoin condensation, giving *coumaroin*, reddish yellow, m. 178-80°. I and *p*- $\text{MeC}_6\text{H}_4\text{NH}_2$ in EtOH-AcOH give *coumaral-p-toluidine*, m. 145-7°. Other derivs. prepd. were: *β*-naphthylamine, m. 173°, pale yellow; *p*-nitroaniline, yellow, m. above 250°; aminoazobenzene, red-yellow, m. 169°; *dicaumaral-p-phenylenediamine*, brown, m. above 250°; *m-phenylenediamine*, brown, m. above 250°; *o-phenylenediamine*, yellow, m. above 250°; *safranin*, red-violet; *tricoumaralrosaniline*, red-violet, m. 142°; *coumaralhenzidine*, yellow, m. above 250°; *chrysoidine*, orange, m. 210-2°; the behavior with silk and wool is given. I and Ph-NMe_2 , heated on the H_2O bath for 30 hrs. with the addn. of 10 cc. HCl , give *tetramethyldiaminodiphenylcoumarylmethane*, m. 220° (90% yield); oxidation with PbO_2 gives the *carbinol* (coumaral green), the HCl salt of which is a deep bluish green, producing a bluish green shade on silk, wool and tanned cotton. I (1 mol.) and 4 mols. *m*- $\text{C}_6\text{H}_4(\text{OH})_2$, heated with concd. H_2SO_4 4-5 hrs. at 120-30°, give *tetraresorcinolcoumarin*, red, with a red-green fluorescence in alk. or EtOH solns., softens 225° (80% yield); *K* salt; *hexa-Br deriv.*, deep red. *Tetrahydroquinone deriv.*, red-violet; *tetra-K salt*; *tetra-Br deriv.*, yellow. *Tetra-β-naphthol deriv.*, the α -deriv. was also prepd. *Tetragallic acid deriv.*, black. *Coumaralrhodamine*, blue-violet.

C. J. WEST

Santenonequinone and a general method for the preparation of diketones. J. PALMÉN. *Finska Kemistamfundets Medd.* 36, 11-21(1927).—In the prepn. of isonitrosocamphor, NaNH_2 and benzene were substituted for Na and ether. Treatment with HCHO and HCl then yields a diketone, the method being convenient for diketones

having an unsubstituted CH_2 group next to the CO group. In this way were obtained isonitrososantenone and an oil, possibly a geometrical isomeride. Thence were obtained santenonequinone hydrate, m. $137-8^\circ$, and santenonequinone (annexed formula),



m. $84-5^\circ$ [disemicarbazone, m. 238° (uncor.)]. The dioxime, $\text{C}_9\text{H}_{14}\text{O}_2\text{N}_2$, m. $144-5^\circ$. Oxidation of the quinone with 2% KMnO_4 yields santenic acid, $\text{C}_9\text{H}_{14}\text{O}_4$. B. C. A.

Syntheses in the diphenyl series. LEONARD F. HINKEL and DONALD H. HEY. Univ. College, Swansea. *J. Chem. Soc.* 1928, 1838-40.—The view (C. A. 22, 2927) that 4,5,5-tribromo-1-phenylcyclohexan-3-one decomps. into 5,3-Fr(HO) $\text{C}_6\text{H}_4\text{Ph}$ (I) and 4,5,3-Br₂(HO) $\text{C}_6\text{H}_4\text{Ph}$ (II) is confirmed by their syntheses. 5-Bromo-3-nitro-4-aminodiphenyl, deep orange, m. 100° (Ac deriv., m. 95°); the diazo soln. with CuBr gives 4,5-dibromo-3-nitrodiphenyl, pale yellow, m. 125° ; reduction and acetylation give 4,5-*a*-bromo-3-acetaminodiphenyl, m. 177° ; hydrolysis, followed by the diazo reaction, gives II. 5-Bromo-3-aminodiphenyl, light brown, m. 88° ; Ac deriv., m. 140° ; the diazo soln., heated to boiling, gave a dark oil, identified as the Bz deriv. of I, m. 108° . 5,4'-Dibromo-3,4-diaminodiphenyl, m. 120° ; di-Bz deriv., m. 278° . C. J. WEST

Molecular configuration of polynuclear aromatic compounds. VII. 5,5'-Dichlorodiphenyl-3,3'-dicarboxylic acid. FRED B. MCALISTER and JAMES KENNER. Univ. of Sydney. *J. Chem. Soc.* 1928, 1913-6; cf. C. A. 20, 1801.—5,3- $\text{O}_2\text{N}(\text{H}_2\text{N})\text{C}_6\text{H}_3\text{CO}_2\text{H}$ and $\text{K}_2\text{S}_2\text{O}_8$, added to fuming HNO_3 at -2° and after 2 hrs., the dild. soln. treated with KI, gives 5-iodo-3-nitrobenzoic acid, m. $166-7^\circ$; Et ester, m. $59-60^\circ$. A di-Ph deriv. could not be prep'd. from the ester. 3-Bromo-5-iodotoluene, b_p , 150° , m. 23° . 5-Bromo-aceto-*m*-toluidide, m. $171-2^\circ$, on oxidation with KMnO_4 , gives 3-bromo-5-acetamidobenzoic acid, m. $279-81^\circ$; concd. HCl gives 5-bromo-3-aminobenzoic acid, m. $220-2^\circ$; 3-bromo-5-iodobenzoic acid, m. $209-11^\circ$; Me ester, orange, m. $59-61^\circ$. 3-Chloro-5-iodotoluene, b_p , $138-40^\circ$, m. 0° . With Cu at $250-60^\circ$, this gives 5,5'-dichloro-3,3'-ditolyl, m. $101-2^\circ$; no satisfactory results were obtained on attempting to oxidize this. 3-Chloro-5-aminobenzoic acid-HCl, m. $118-21^\circ$; Ac deriv. of the acid, m. $265-7^\circ$. 3-Chloro-5-iodobenzoic acid, reddish yellow, m. $190-1^\circ$; Me ester, orange, m. $43-4^\circ$; with Cu powder at $265-70^\circ$, this gives 25% of the Me ester, m. 156° , of 5,5'-dichlorodiphenyl-3,3'-dicarboxylic acid, m. $358-60^\circ$; the brucine salt, m. $178-9^\circ$, decomps. 193° ; the quinine salt, m. $170-2^\circ$, decomps. 174° , and the acid morphine salt, m. $218-9^\circ$, decomps. $223-5^\circ$, were each uniform and the solns. of NH_4 salt prep'd. from them were in each case optically inactive. The acid does not have the asymmetry of its 2,2',6,6'-structural isomer. C. J. WEST

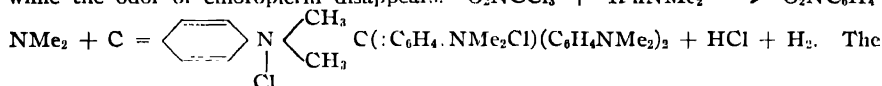
Stereoisomeric bromoimino ketones. HOYLAND E. YOUNG. *Abstracts of Theses, Univ. Chicago, Science Series* 4, 203-7(1925-6) (publ. May, 1928).—Six bromoimino ketones were prep'd. from aromatic imines according to the equation: $\text{RC}(\text{NH})\text{R}' + \text{HOBr} = \text{RC}(\text{NBr})\text{R}' + \text{H}_2\text{O}$. It was attempted to sep. each of the products obtained into 2 stereoisomeric forms; this was accomplished only in the case of bromoimino-*p*-chloro- and *p*-bromobenzophenone. In both cases evidence for the existence of a 3rd isomer was found. The isomer with the higher m. p. was called α -form, the other β -form. Bromoiminobenzophenone, m. 41° . Bromoimino-*p*-methoxybenzophenone (I), m. 95° . I reacts with Br giving 3 substances: red, m. 133° ; yellow, m. 105° ; orange, m. 134° . Bromoimino- β -naphthophenone, m. 102° . Bromoimino-*p*-chloro-*p*-methoxybenzophenone, m. 77.5° . Stereoisomeric bromoimino-*p*-chlorobenzophenones: α -form, pyramids and plates, m. 109° , and β -form, needles and plates, m. 85° (from *p*- $\text{ClC}_6\text{H}_4\text{CPh:NH.HCl}$ and KOBBr). The crude reaction product was sep'd. into the isomers by dissolving it in ligroin out of which at -20° principally the α -form crystd. Evapu. of the filtrate yielded the β -form. Stereoisomeric bromoimino-*p*-bromobenzophenones: α -form, plates, m. 104° , and β -form, prisms, m. $102-3^\circ$, were sep'd. by means of cold CHCl_3 and ligroin. The 3rd isomer, plates, m. $102-3^\circ$, was only obtained occasionally. G. SCHWOCH

***p,p'*-Diiododiphenylmethane.** A. M. NASTUKOV and V. V. SHEL'YAGIN. Univ. Moskau. *J. prakt. Chem.* 119, 303-5(1928).—Condensation of 100 g. formalin and 200 g. PhI with 100 cc. concd. H_2SO_4 by boiling 2 hrs., gives 16 g. *p,p'*-diiododiphenylmethane, m. $92-3^\circ$; its structure was established by oxidation to (*p*- IC_6H_4)₂ CO , m. 234° . C. J. WEST

2,4,7-Trinitrofluorenone. FRANK BELL. Battersea Polytechnic. *J. Chem. Soc.* 1928, 1990.—4-Nitrofluorenone, heated 2 hrs. on the steam bath with HNO_3 (d. 1.5),

gives 2,4,7-trinitrofluorenone, m. 175°. The same product was obtained by the nitration of fluorenone according to Schmidt and Bauer (*Ber.* 38, 3758(1905)), who stated that the product was the 2,3,7-tri-NO₂ deriv. Oxidation gave a very small quantity of an impure acid, m. 165–70°, which, if purified, would obviously m. higher than 3,4-(O₂N)₂-C₆H₃CO₂H (164°). C. J. WEST

New synthesis of methyl violet. G. D. SUTCHEV. Tomsk. Gosud. Univ. J. Chem. Ind. (Moscow) 5, 72–3(1928).—In the Ger. pat. 12,096 it is indicated that by the action of 3 parts chloropicrin on a mixt. of 7 parts PhNMe₂ and 3 parts BzH 2 dyestuffs are formed, which are not named. S. supposes that the 2 dyestuffs in question are Me violet and malachite green. According to S. the addn. of BzH in the reaction of formation of Me violet is not only useless, but even harmful. Ten g. chloropicrin and 30 g. PhNMe₂ are mixed in a hermetically stoppered flask and left standing under the hood at room temp. (16–8°) for 8 days. At first the nitro group of chloropicrin is split off and the nitration of PhNMe₂ takes place, as indicated by the appearance of a cherry-red coloration after 24 hrs. Then Cl is split off and the 1st signs of formation of Me violet appear after 3–4 days. The liquid thickens, darkens and finally crystallizes, while the odor of chloropicrin disappears. O₂NCCl₃ + 4PhNMe₂ → O₂NC₆H₄-



cryst. Me violet is extd. from the product of reaction by soln. in cold water and can be sepd. from this soln. by NaCl. The yield of the dyestuff is 24 g., i. e., 76.7% of the theoretical. The residuc, which is not sol. in cold water but slightly sol. in hot water from which it can be crystd., is *p*-nitrodimethylaniline of which 6 g. is obtained, the yield being 58.7% of the theoretical. Among other products obtained, aside from changed PhNMe₂, was a little *p*-phenylenediamine. S. thinks that his method has the following advantages over the 2 methods at present used for the manuf. of Me violet: (1) the reaction takes place in 1 phase, without heating and in a simple app. (a closed kettle could be used); (2) the methods of sepn. of the reaction products are simple; (3) technical (non-refined) chloropicrin and PhNMe₂ could be used for the manuf.; (4) traces of Cu accelerate the reaction approximately 2–3 times; (*p*-O₂NC₆H₄NMe₂, which is obtained as by-product is a valuable intermediate).

BERNARD NELSON

Theory of the betaines. III. P. PFEIFFER, H. BEHR, BR. BREYER, O. CLARENZ AND H. KUBLER. Univ. Bonn. *Ann.* 465, 20–52(1928); cf. C. A. 17, 62–4.—Since in the earlier work it was not possible to obtain a *cis-trans*-isomeric pair of betaines and since there was the possibility that the *trans*- might rearrange into the *cis*-form during the formation of the betaine, the work has been continued and now definite pairs of isomers have been obtained. *cis-m-Amino-α-phenylcinnamic acid* (I), by the reduction of the NO₂ deriv. (for which an improved method of sepn. is given), pale yellow, m. 189–91°, crystals with 1EtOH; P₂O₅ in CHCl₃ gives a deep orange ppt.; the H₂SO₄ soln., on heating, becomes dark orange to red; *HCl* salt, m. 229–32° (decompn.); *Bz* deriv., m. 184–5°, crystg. with 1H₂O; AcOH gives anhyd. crystals. The *trans-isomer* (II) pale yellow, m. 192°; P₂O₅ causes no change, while H₂SO₄ gives a red color only on long heating. *Bz* deriv., m. 255–6°; *Me* ester, pale yellow, m. 117°; *Et* ester, m. 65°. I, twice methylated with MeI and MeOH-KOH, gives the *dimethylamino methiodide*, m. 158° (decompn.); the aq. soln. with Ag₂O gives the *trimethylbetaine* of I, crystg. with 1H₂O, m. 186–8° (decompn.), the aq. soln. reacts neutral to litmus; heating a short time with concd. H₂SO₄ gives a blood-red soln. The *HCl* salt, m. 178° (decompn.); *HBr* salt, m. 170° (decompn.); the *nitrate*, m. 144–6° (decompn.); the *perchlorate*, m. 170° (decompn.); the *chloroplatinate* crystals with 1H₂O and m. 168° (decompn.). The *methiodide* of the *dimethylamino* deriv. of II, m. 163–7°, the *trimethylbetaine*, crystg. with 1H₂O, m. 112–4°; the warm concd. H₂SO₄ soln. is a pale greenish yellow; *HCl* salt, m. 163° (decompn.); *HBr* salt, crystg. with 1H₂O, m. 148–52° (decompn.); the *nitrate*, m. 166–9° (decompn.); the *perchlorate*, m. 173° (decompn.); the *chloroplatinate*, orange, m. 196°. *p*-Me₂NC₆H₄CHO and *p*-O₂NC₆H₄CH₂CN in 20% EtOH-NaOH give *p*-dimethylamino-*p*-nitro-*μ*-cyanostilbene, from C₆H₆ reddish brown, from AcOH violet-red, m. 240–1°; *methiodide*, needles, crystg. with 2H₂O. The sapon. with concd. H₂SO₄ gives 2 *amides* (III), m. 221–2°, cinnabar-red, sepd. by its soly. in C₆H₆ and (IV), reddish orange, m. 256°; with P₂O₅, both amides give the same nitrile. With MeOH-HCl, III gives a *Me* ester, orange, m. 169–70°; *Et* ester (V), light red, m. 134–5°. IV gives a mixt. of the *Et* ester, m. 134–5°, and a violet-red ester, m. 138–9°. The *free acid* forms red-orange needles, m. 249°. V and MeI give a *methiodide*, orange, m. 160–1° (decompn.); with

Ag_2O this yields the *betaine*, $^+\text{Me}_2\text{NC}_6\text{H}_4\text{CH}$, m. 210–1°; *perchlorate*, decomps.



explosively. *m*-Dimethylaminocinnamic acid-*MeI*, m. 202–3°; Ag_2O gives the *trimethylbetaine*, crystg. with $2\text{H}_2\text{O}$, m. 128° or anhyd., m. 206–7°; *HBr salt*, m. 196°; *perchlorate*, m. 230–1°. *p*-Dimethylamino-*o*'-amino-*p*'-cyanostilbene, brownish to greenish yellow, m. 226°; *HI* salt; *methiodide*, light yellow, m. 203°. *Me p*-dimethylamino-*o*'-nitrostilbene-*p*'-carboxylate-*MeI*, greenish yellow, m. 192°; the *Et ester-MeI*, yellow, m. 147°; *nitrate*, greenish yellow. The *betaine*, $\text{C}_{15}\text{H}_{18}\text{O}_4\text{N}_2$, results from the *Me ester-MeI* with Ag_2O , grayish, m. 210–20°, contg. $3\text{H}_2\text{O}$, the anhyd. *betaine*, m. 220–2°; it is also obtained from the nitrile-*MeI* deriv.; *Cl salt*, canary-yellow; the *dihydrate* is yellow. *p*-Dimethylamino- μ' , μ' -*dicyanostilbene*, yellow-orange, m. 205°. Sapon. with MeOH-HCl gives *Me p*-dimethylamino- μ' -cyanostilbene-*p*'-carboxylate, yellowish orange, m. 178°; *Et ester*, golden yellow, m. 145°, the *methiodide* of the latter, ocher-yellow, Ag_2O gives the *betaine*, m. 250°; it crysts. with $1.5\text{H}_2\text{O}$, *HCl salt*, crystg. with $2\text{H}_2\text{O}$. C. J. WEST

Relative reactivity of methylene groups in 1,3-diketones. ARTHUR BERTRAM, E. LOVETT AND ELWYN ROBERTS. Univ. of London. *J. Chem. Soc.* 1928, 1975–9.—This study was designed to discover which CH_2 group, in a diketone of the general formula $\text{CH}_2\text{RCOCH}_2\text{COR}'$, would be the more reactive as regards the condensation with aldehydes; in $\text{PhCH}_2\text{COCH}_2\text{Bz}$ (I), the more reactive CH_2 group is that adjacent to the Ph group, since the product from $\text{HOC}_6\text{H}_4\text{CHO}$ ($\text{HOC}_6\text{H}_4\text{CH CPhCOCH}_2\text{Bz}$) gives PhAc and 3-phenylcoumarin (II) on hydrolysis. The formation of II cannot be attributed to an initial hydrolysis, giving rise to $\text{PhCH}_2\text{CO}_2\text{H}$ and PhAc, since $\text{PhCH}_2\text{CO}_2\text{H}$ does not condense with $\text{HOC}_6\text{H}_4\text{CHO}$ to give II. Propionylacetophenone, b_p 149°, b_d 151°, gives a green salt, m. 151–2°; the *p*-nitrophenylhydrazone, yellow, m. 67–8°; with PhNH_2 there results propionylacetophenonanal, m. 48–9°. I and *o*- $\text{HOC}_6\text{H}_4\text{CHO}$ give *o*-hydroxybenzylidene phenylacetylacetophenone, m. 171–4°; the yield depends upon the quantity of piperidine used; BzII and $\text{PhCH}_2\text{CHCHO}$ gave resins. The use of substituted *o*- $\text{HOC}_6\text{H}_4\text{CHO}$ gave derivs. of II directly, the intermediate product not being isolable. The following derivs. of II were thus prepd.: 6-*Cl*, pale yellow, m. 199° (25% yield; 40% obtained by Perkin's reaction; these 2 values will be given for the following derivs.); 6-*Br*, pale yellow, m. 189–91° (25, 62); 6-*NO}_2* deriv., yellow, m. 146–7.5° (4, 60); 6-*Me*, pale yellow, m. 146–7.5° (42, 40); 8-*NO}_2*, pale yellow, m. 236–9° (4, 65); 6,8-*di-Cl*, m. 193 4.5° (16, 17), 6,8-*di-Br*, m. 186–7.5° (trace, 30); 6,8-*di-NO}_2*, pale yellow, m. 244–6° (0, 60); 6-*Cl*-8(*p*)-*NO}_2*, m. 212–4° (0, 70); 6-*Br*-8-*NO}_2*, m. 228–30° (trace, 74); 6-*Me*-8-*NO}_2*, yellow, m. 180 2° (12.5, 44). 3,5-Dinitrosalicylaldehyde, lemon-yellow, m. 58–60°. 5-Chloro-3(?)-nitrosalicylaldehyde, yellow, m. 105–7°. I and 2,1- $\text{HOC}_{10}\text{H}_8\text{CHO}$ give the compd. $\text{C}_{27}\text{H}_{18}\text{O}_4$, deep blood-red, m. 155–6°. C. J. WEST

The relative stabilities of isomers (according to their absorption spectra). Transpositions in the series of glycols and of aldehydes. MME. RAMART-LUCAS AND F. SALMON-LEGAGNEUR. *Compt. rend.* 186, 1848–50 (1928); cf. *C. A.* 22, 2717, 3154.—The dehydration of glycols by heat takes the course: glycol \rightarrow aldehyde \rightarrow ketone. $\text{Ph}_2\text{C}(\text{OH})\text{CH}_2\text{OH}$ and $\text{PhEtC}(\text{OH})\text{CH}_2\text{OH}$ when heated at 250–300° yield exclusively the corresponding aldehydes; at 400–450° these glycols yield only ketones. $\text{PhCH}(\text{OH})\text{CH}(\text{OH})\text{Ph}$ (I) heated at 250–300° gives Ph_2CHCHO (II) and a little unchanged I; at 400–450° PhCH_2COPh (III) is the chief product. (A little BzH is formed by the dissocn. of I.) II when heated at 400–450° is entirely transformed into III. A mechanism is given for these changes. REYNOLD C FUSON

Action of phthalyl chloride on *m*-methoxybenzoic acid and *m*-cresyl methyl ether. RICHARD WEISS AND WALTER KNAPP. Univ. Wien. *Monatsh.* 50, 10–15 (1928).—*m*- $\text{MeOC}_6\text{H}_4\text{CO}_2\text{H}$ (22 g.) and 30 g. *o*- $\text{C}_6\text{H}_4(\text{COCl})_2$ in 80 cc. CS_2 , treated with 35 g. AlCl_3 , give 40% of 4'-methoxybenzophenone-2,2'-dicarboxylic acid diacetone, m. 183°. *m*- $\text{MeOC}_6\text{H}_4\text{Me}$, *o*- $\text{C}_6\text{H}_4(\text{COCl})_2$, AlCl_3 and CS_2 give 80% of *m*-cresolphthalein di-*Me ether*, yellow, amorphous product; reduction with Na-Hg in MeOH gives 75% of *m*-cresolphthalein di-*Me ether*, crystg. from MeOH with 0.75 mol. MeOH; with KMnO_4 in dil. NaOH, this is oxidized to dimethoxytriphenylmethanetricarboxylic acid, amorphous; the *Me ester* is also amorphous. Heating with ZnCl_2 at 200° for 15 min. splits off H_2O , giving 1,2'-dimethoxy-9-phenylanthrone-3,4'-dicarboxylic acid, amorphous, dark red flakes, which decomps. 250° in a vacuum. C. J. WEST

New *o*-azo compounds. JAKOB POLLAK AND ERICH GEBAUER-FÜLNEGG. Wien Univ. *Ans. Akad. Wiss. Wien* 63, 145 (1927).—A comment on the work by ROWE (*C. A.* 20, 1802). In analogy with the formation of an *o*-azo compd. (diazo ether) (Bucherer,

C. A. 3, 902) in the reaction between diazotized *p*-nitroaniline and 2,1- $C_{10}H_6(OH)SO_3H$, and in contradistinction with Hewitt and Mitchell (*J. Chem. Soc.* 89, 1169(1906)) and Wahl and Lantz (*C. A.* 17, 2577), an intermediary *o*-azo deriv. was detected during the coupling of 2,1- $C_{10}H_6(OH)Br$, or similar compds. with diazotized *p*-nitraniline. The diazo ether isomerizes by crystn. into the normal azo deriv. of β -naphthol. This weak stability explains the results of the previous authors. A. L. HENNE

The action of some sulfur compounds on 1-chloro-2,4-dinitronaphthalene, 1-chloro-2,4,5-trinitronaphthalene and 1-chloro-2,4-dinitrobenzene. H. W. TALEN. Univ. Leiden. *Rec. trav. chim.* 47, 782-95(1928); cf. *Rec. trav. chim.* 20, 115, 121(1901); *C. A.* 21, 404; 22, 1350-1.—(In the following $R = 2,4,1-C_{10}H_5(NO_2)_2$ —.) An alc. soln. of 0.4 g. crystd. Na_2S was added 1 g. RCI in 100 cc. $EtOH$; after boiling for a few min. and cooling a ppt. of 2,4,2',4'-tetranitrodinaphthyl-1-sulfide, m. 283° from Ac_2O , is obtained. The same compd. is obtained when the reaction is carried out with an equimol. quantity of Na_2S_2 , 2,4,2',4'-tetranitrodinaphthyl disulfide not being formed in this way. This compd. could be prepd. in the following way: A warm alc. soln. of 0.95 g. crystd. Na_2S is added rapidly to 1 g. RCI in 100 cc. warm alc.; after standing for 5 min. the soln. of the Na salt of RSH thus obtained, is dild. with 5 times its vol. of water and concd. aq. $I-KI$, contg. 0.5 g. I , is added. An orange-yellow ppt. of 2,4,2',4'-tetranitrodinaphthyl-1-disulfide, decomp. explosively at 230° (from $AcOH$) is formed at once. On acidification of the above aq. alc. soln. of the Na salt of 2,4-dinitro-1-thionaphthol, the latter ppts., m. $117-8^\circ$; on exposure to air, it is oxidized to the disulfide. In the same way in which R_2S is formed from RCI , 2,4,5,2',4',5'-hexanitrodinaphthyl-1-sulfide, m. 323° from Ac_2O , is formed from 2,4,5,1- $C_{10}H_4(NO_2)_4Cl$ and Na_2S , the same product being obtained also by means of Na_2S_2 . The product formed by the interaction of $EtOCS_2Na$ and 2,4-(O_2N) $_2C_6H_3Cl$ (I) is dependent on the relative quantities of the reacting components, with 1 mol. of each 2,4,2',4'-tetranitrodiphenyl disulfide, exploding 280° (from $PhNO_2$), being the chief product and with 1 mol. $EtOCS_2Na$ and 2 mols. I 2,4,2',4'-tetranitrodiphenyl monosulfide, m. 196° from alc.-acetone, being the chief product of the reaction. The monosulfide is formed by the interaction of I and 2,4-(O_2N) $_2C_6H_3SH$, produced intermediately, while the disulfide is formed by atm. oxidation of the 2,4-(O_2N) $_2C_6H_3SH$. $C_6H_5(NO_2)_2SH + Cl(NO_2)_2C_6H_3 \rightarrow [C_6H_5(NO_2)_2]_2S + HCl$. Both these reactions were carried out in the way described above for the $C_{10}H_8$ derivs. About equal quantities of 2,4,2',4'-tetranitrodiphenyl mono- and disulfide are formed on boiling 1 mol. $CS(NH_2)_2$ and 1 mol. I in alc. during an hr., but the disulfide is the principal product of the reaction of 2 mols. of $CS(NH_2)_2$ and 1 mol. I in alc. On boiling 1 mol. $CS(NHPh)_2$ and 2 mols. I in alc., 1-anilino-2,4-dinitrobenzene, m. 157° , and [2,4-(O_2N) $_2C_6H_3]_2S$, are formed, the same products being obtained with 2 mols. $CS(NHPh)_2$ and 1 mol. I. In these reactions with $CS(NH_2)_2$ and $CS(NHPh)_2$ it is essential for the formation of the mono- and disulfide, that the HCl , set free during the reaction, should be neutralized. The interaction of 1 mol. $EtOCS_2Na$ and 1 mol. RCI gives rise to the formation of R_2S , ROH and 2,4-dinitronaphthyl 1-Et disulfide, m. 85° , from alc. The occurrence of this compd. is best explained by the assumption, put forward and made highly probable by Weeldenburg (*Diss. Delft* 1927, p. 86) that in a xanthogenate soln. an equil. exists between 2 isomeric forms, the *O*- and the *S*-ester, $CS(SNa)OEt$ and $CO(SNa)SEt$. The reaction between 1 mol. $CS(NH_2)_2$ and 1 mol. RCI yields R_2S , the formation of which also predominates in the interaction of 2 mols. $CS(NH_2)_2$ and 1 mol. RCI . Attempts have been made to prep. $RCNS$ (a) by the interaction of $KSCN$ and RCI in alc., R_2S , however, being formed, apparently the thiocyanate being hydrolyzed in the alk. medium; (b) by the same reaction with NH_4CNS , thus avoiding a strong alk. reaction of the medium. In this way a mixt. of 2,4,1- $C_{10}H_6(NO_2)_2CNO-RCNO$ and unchanged RCI was obtained, which could not be sepd., since decompn. readily occurred on warming. C. F. VAN DUIN

Action of chlorosulfonic acid on phenols. IV. JAKOB POLLAK, ERICH GEBAUER-FULNEGG and EUGEN BLUMENSTOCK-HALWARD. Univ. Wien. *Monatsh.* 49, 187-202 (1928); cf. *C. A.* 21, 2676.—(WITH EDUARD PETERTIL.) $ClSO_3H$ (I) acts on α - $C_{10}H_7OH$ (II) at the ordinary temp., the 2- SO_3H deriv. crystg. out. With an excess of I (5 times the wt. of II for 2.5 hrs., or 10 times, for 1.5 hrs.), there results 1-naphthol-2,4-disulfonyl chloride, m. 149° (anilide, m. 228°). Prolonged action (4-5 days) gives 1-naphthol-2,4,7(?)-trisulfonyl chloride, m. 172° (with 0.5 C_6H_6 , 160°); anilide, m. 240° (decompn.). Alk. hydrolysis splits off 2 SO_3H groups, giving probably the 7- SO_3H deriv. At 100° , I and II give the 4- SO_3H deriv.; at 160° , a black product, or with an excess of I, a resinous product, is obtained, from which a trichloronaphthalenesulfonyl chloride, m. 214° , is isolated. (WITH KURT WINTER.) The action of I upon β - $C_{10}H_7OH$ (III) at the ordinary temp. gives only the 1- SO_3H deriv.; on standing, a mixt. of disulfonyl chlorides

is obtained. In $C_2H_2Cl_4$ at 130° , there results the β - SO_3H deriv. Excess of I yields a mixt. of 2 *disulfonyl chlorides*, m. 111° (IV) and 177° (V), whose constitution is studied in the following abstr. The anilide from IV m. 191° , from V, 231° . Heating I and III at $130-40^\circ$ gives 2-naphthol-3,6,8-trisulfonyl chloride, m. 196° (anilide, m. $152-5^\circ$), also obtained from *O*-carbethoxy-2-naphthol-3,6,8-trisulfonyl chloride). Heating III with 50 parts I 80 hrs at $150-60^\circ$ gives a compd. contg. Cl but not S, m. $120-2^\circ$ (a dichloronaphthalene?) and a S-contg. compd., m. $135-40^\circ$, probably a naphthoquinone deriv.

C. J. WEST

Constitution of the β -naphtholdisulfonyl chlorides. J. POLLAK and EUGEN BLUMENSTOCK-HALWARD (WITH ALEXANDER SCHLESINGER, VIKTOR WEINMAYR and KURT WINTER). Univ. Wien. *Monatsh.* **49**, 203-12(1928); cf. preceding abstr.— $ClSO_3H$ and 2,6(or 1)- $C_{10}H_6(OH)SO_3H$ give β -naphthal-1,6-disulfonyl chloride, m. 111° , which establishes the structure of IV in the preceding abstr. 2,8- $C_{10}H_6(OH)SO_3H$, which might give the chloride, m. 177° , gave instead the 6,8-disulfonyl chloride (I), m. $161-2^\circ$ (anilide, m. 195°). The constitution of I is established by reacting 2,6,8- $C_{10}H_6(OH)(SO_3H)_2$ with $ClCO_2Et$ and then with $ClSO_3H$, giving *O*-carbethoxy- β -naphthal-6,8-disulfonyl chloride, m. 131° , whose anilide, m. 178° , on hydrolysis, gives the anilide of I. Similarly 2,3,6- $C_{10}H_6(OH)(SO_3H)_2$ gives *O*-carbethoxy- β -naphthal-3,6-disulfonyl chloride, m. 125° (anilide, m. $153-63^\circ$, which was not purified but hydrolyzed to 2-naphthol-3,6-disulfonanilide, m. 202°), this was not identical with the anilide from the chloride, m. 177° , as might be expected from the conversion of the latter into 2,3,6,8- $C_{10}H_4(OH)(SO_2Cl)_3$; this acid deriv., however, is also obtained from the chloride, m. 111° , which involves the migration of the SO_2Cl group from the 1-position. It is, therefore, suggested that the chloride, m. 177° may be the 1,8 deriv. Since 2,1- $C_{10}H_6(OH)SO_2Cl$ (Anschutz and Maxim, *C. A.* **13**, 431) does not form a sulfonyl chloride, it was thought that the SO_2Cl group might be in some other position, *O*-acetyl-2-naphthol-6- and 8-sulfonyl chlorides, m. 103° and 129° , resp., were therefore prepd. Since these are different from the compd. of A and M., there is no reason to question their structure. The 6-sulfonanilide, m. 95° , on hydrolysis gives 2,6- $C_{10}H_6(OH)SO_2NIPh$, m. 161° ; this m. p. does not agree with that of Zincke and Dercser (*C. A.* **12**, 2559), viz. $100-5^\circ$, the anilide was prepd. by their method and found to contain 2 mols. H_2O , m. $100-5^\circ$, but on crystn. from C_6H_6 , it m. $160-1^\circ$; recrystn. from H_2O did not again give the low-melting form, which must be regarded as a labile form *O*-Carbethoxy-2-naphthol-8-sulfonyl chloride, m. 118° ; anilide, m. 195° ; hydrolysis gives 2-naphthol-8-sulfonanilide, m. 195° , also obtained from the *O*-Ac deriv.

C. J. WEST

Action of bromine on naphthosulfonic acids. A remarkable color reaction in solution. G. HELLER, W. EISENSCHMIDT, G. REICHARDT and H. WILD. *Z. angew. Chem.* **41**, 171-7(1928).—On treatment with 2 mols. of Br in cold AcOH naphthosulfonate gives 4-bromonaphthosulfonate, m. 199° . Na naphthosulfonate-4-sulfonate and Na 1,4,8- $C_{10}H_6(OH)(SO_3Na)_2$ afford the same product when Br in AcOH is added to their aq. soln. acidified with H_2SO_4 . When treated with alkali in satd. soln. in presence of excess of solid, undissolved crystals of Na 2,4-dibromo-1-naphthol-8-sulfonate (obtained by brominating 1,8- $C_{10}H_6(OH)SO_3Na$ in a freezing mixt.) developed a reddish blue color which diffuses through the soln. and after some min. fades to olive-brown. The coloration is due to the formation of the quinhydrone of 2-bromo-1,4-naphthoquinone-8-sulfonic acid (Na salt, reddish brown crystals with green reflex), the latter being also produced by the addn. of $K_3Fe(CN)_6$ to the filtered soln. of the dibromonaphthosulfonate, and when the soln. of 1,8- $C_{10}H_6(OH)SO_3Na$ is only cooled with ice for bromination. 1,2,4,8- $C_{10}H_4(OH)(SO_3Na)_3$ affords the same quinhydrone. With excess of Br (4 mols.) Na 1-naphthol-8-sulfonate, 2,4,8-trisulfonate and 3,8-disulfonate all afford Na 2,3-dibromo- α -naphthoquinone-8-sulfonate, yellow, which is readily reduced to a colorless quinol, and with *p*-toluidine in alc. yields 3-bromo-2-*p*-toluidino- α -naphthoquinone-4-*p*-methylamyl-8-sulfonic acid, carmine-red, anthranilic acid giving an analogous deriv. With 1 mol of Br, 1,3,8- $C_{10}H_6(OH)(SO_3Na)_2$ gives Na 4-bromo-1-naphthol-3,8-disulfonate, which couples with diazotized *p*-toluidine to give 4-bromo-2-*p*-toluenazo-1-naphthol-3,8-disulfonate, and on treatment with a further mol. of Br affords Na 2-bromo- α -naphthoquinone-3,8-disulfonate, red needles, and traces of Na 3,4-dibromo-1-naphthol-8-sulfonate, which forms no quinone. Bromination of 1,3,6- $C_{10}H_6(OH)(SO_3Na)_2$ gives the readily sol. Na 2-bromo- α -naphthoquinone-3,6-disulfonate, yellow, which could not be obtained pure. Treatment of Zn 1-naphthol-4-sulfonate with 1 mol. of Br affords 2,1,4- $C_{10}H_6Br(OH)SO_3H$ (*K* salt), the constitution of which follows from its inactivity towards alc. *p*-toluidine and diazonium salts. With a further mol. of Br this *K* salt gives *K* 2,3-dibromo-1-naphthol-4-sulfonate. With 4 mols. of Br Zn 1-naphthol-4-sulfonate gives 2-bromo-1,4-naphthoquinone, m. $127.5-28^\circ$ (Zincke and Schmidt,

Ber. 27, 2753-62(1894)), together with a little 2,3-dibromonaphthoquinone, m. 216-7°. 4-Bromonaphthosulfone is converted by 10% NaOH into *Na 4-bromo-1-naphthol-8-sulfonate*, which with 3 mols. of Br gives *Na 2,3-dibromo- α -naphthoquinone-8-sulfonate*, and with diazotized *p*-toluidine, *Na 4-bromo-2-p-tolueneazo-1-naphthol-8-sulfonate*, analysis indicating displacement of Br and coupling in the 4-position to a slight extent. *Na 1-naphthol-2-p-tolueneazo-8-sulfonate* is described. 2,6-C₁₀H₆(OH)(SO₃)Na yields *Na 1-bromo-2-naphthol-6-sulfonate* and a *dibromo-2-naphthol-6-sulfonate*. 2,3,6-C₁₀H₅(OH)(SO₃H)₂ similarly affords mono- and di-Br-derivs., and 2,6,8-C₁₀H₅(OH)(SO₃H)₂ an easily sol. *Na tribromo-2-naphtholsulfonate*. 2,3,6,7-C₁₀H₄(OH)(SO₃H)₃ with 1 mol. of Br gives *Na 1-bromo-2-naphthol-3,6,7-trisulfonate* (sparingly sol. *p*-toluidine salt; does not couple with diazonium salts). In no case was quinone formation observed in the bromination of β -naphtholsulfonic acids. The quinone formation observed by Armstrong and Graham (*J. Chem. Soc.* 39, 137 (1881)) was probably due to the presence of α -naphthol in their β -naphthol.

Dinitrobindone and its scisson products. W. WISLICENUS AND H. SCHLICHENMAIER. *Ann.* 460, 278 88(1928).—Bindone in AcOH and concd. HNO₃ gives 40-5% of the *di-NO₂ deriv.* (I), m. 183°. With EtOH-KOH, I gives a red K salt of the unstable acid C₆H₄(CO)₂C·C(C₆H₄CO₂H)C(NO₂)₂·NO₂H (II), m. 94°, while Br and aq. KOH give the pale yellow *compd.* C₆H₄(CO)₂C·C(C₆H₄CO₂H)C(NO₂)₂·Br (III), exploding at 117°. When I is treated with ice-cold KOH and the red soln. is at once acidified, *phthalideneindandione* (IV), m. 253°, results, CH₂(NO₂)₂ being split off at the acidification stage. By prolonged heating of I with aq. KOH at 100°, CH(NO₂)₂K is formed, exploding at 204°. EtOK and I give the deep red K salt of the *Et ester* of II, m. first at 132° but changes rapidly to 124°; similarly, MeOK gives the K salt of the *Me ester*; the latter salt with Br gives a *tri-Br deriv.*, pale yellow, m. 139°. NH₄OH converts I into the *lactam* (V), C₁₇H₇NO₄, pale yellow, m. 265°, and CH₂(NO₂)₂, while if NH₃ is passed into I in C₆H₆ there results the *NH₃ salt of the amide* of II, red, decomp. 183°; the free amide is very unstable. I and PhNH₂, allowed to stand 48 hrs., give the *phenylammonium salt*, easily decompd., of the *anilide* of II, decomp. 125-8°; the salt, treated with warm MeOH-HCl, yields the *phenylimide*, orange-yellow, m. 234°, stable to acids and only slowly hydrolyzed by alkali. V, warmed with aq. NaOH, gives *2-o-carboxybenzoylindandione*, *crystg.* with 1MeOH, m. 155-60° (*cu salt*, green; *Me ester*, m. 123°). Bromination of II in CHCl₃ gives the *2-Br deriv.*, which rapidly passes into *dibromodiketohydrundene*, m. 175°, which is also formed by treating the acid in NaHCO₃ soln. with Br-H₂O.

Synthesis of meso-alkyl- and meso-arylanthracene derivatives. IV. EDWARD DE B. BARNETT AND JOHN L. WILTSHIRE. Sir John Cass Tech. Inst. *J. Chem. Soc.* 1928, 1822-5; cf. C. A. 22, 1972.—In the reaction of 2-chloro-9-anthrone (I) with Grignard reagents, only good yields are obtained with the Et and PhCH₂ derivs. Reduction of *o*-(4-ClC₆H₄CO)C₆H₄CO₂H by Zn in NH₄OH by heating on the H₂O bath for 20 hrs. gives *4-chlorodiphenylmethane-2'-carboxylic acid*, m. 132°; with concd. H₂SO₄ this gives I, m. 155° (cf. Mayer and Fischbach, C. A. 19, 2950); since this differs from the β -chloroanthrone of Barnett and Matthews (C. A. 18, 256) the latter must be the *3-Cl deriv.* (II); the *acetate* of I, m. 143°; of II, m. 146°. With I and the Grignard reagent, the following *comps.* were prepd.: *2-Chloro-9-methylantracene*, m. 84°; *9-Et deriv.*, m. 79° (*10-Br deriv.*, yellow, m. 128°); *9-Pr deriv.*, m. 82°; *9-benzyl deriv.*, m. 132° (*10-Br deriv.*, yellow, m. 167°; with an excess Br, a *bromo dibromide*, cream-colored, m. 150° (decompn.) results).

Stereochemistry of aromatic compounds. VI. An optically active vat dye without asymmetric carbon atom; *d*- and *l*-1,1'-dianthraquinonyl-2,2'-dicarboxylic acid. RICHARD KUHN AND OTTO ALBRECHT. Techn. Hochschule, Zürich. *Ann.* 464, 91-100 (1928); cf. C. A. 22, 413.—1,1'-Dianthraquinonyl-2,2'-dicarboxylic acid (I) and quinine give a ppt., purified by extg. with EtOH, of *quinine d-I*, m. 249-50°, [α]_D¹⁸ 369° (C₆H₅N); from the EtOH mother liquors a *quinine l-I*, decomp. 193°, [α]_D¹⁸ -110.7° (C₆H₅N). The *l-I*, m. 273°, [α]_D¹⁸ -237° (0.1 N NaOH); the *d-I*, m. 260°, [α]_D¹⁸ 346° (0.1 N NaOH); a mixt. of the 2 acids gives the *dl-acid*, m. 351-3°. The *d-I* is stable in 0.1 N NaOH at 140-60°, in Ac₂O at 99° and at the b. p. of Ac₂O showed a drop from 100.3° to 78.3° in 3.5 hrs. The optically active acid also shows no change when treated with NaHSO₄, and regenerating the acid from the red vat with O. Attempts at asym. dyeing failed.

C. J. WEST

Course of the Friedel-Craft reaction with anthraquinone-1,2-dicarboxylic anhydride. GUIDO MACHEK AND ANTON GRAF. Univ. Innsbruck. *Monatsh.* 50, 6-9(1928).—C₆H₄(CO)₂C₆H₃(CO)₂O (2 g.), 60 g. C₆H₆ and 6 g. AlCl₃, heated to boiling 2 hrs., give

3.3 g. of *anthraquinone-1,2-dicarboxylic diphenylphthalide*, m. 180–2°; the corresponding *HO acid*, m. 143–6°.

C. J. WEST

Constitution and mode of reaction of polynuclear polyhydroxyquinones. Naphthazarin and quinizarin. KARL ZAHN AND PAUL OCHWAT. I. G. Farbenindustrie Aktiengesellschaft Höchst a. M. *Ann.* **462**, 72–97(1928).—Heating a mixt. of 100 g. AlCl_3 and 20 g. NaCl with 10 g. maleic anhydride and 11 g. $p\text{-C}_6\text{H}_4(\text{OH})_2$ at 200–20° gives 4 g. naphthazarin (I), whose di-Ac deriv. m. 192–3°. Reduction of 5 g. I suspended in 60 cc. Et_2O with Zn and dil H_2SO_4 gives 1,4,5,8-tetrahydroxynaphthalene (II), m. 190°; the EtOH soln. shows a violet fluorescence; in the enolic form it is unstable and the solid form or solns. rapidly turn red in the air; $\text{Br-H}_2\text{O}$ and FeCl_3 instantly give I; the brown-red NaOH soln. turns blue very quickly with the sepn. of the Na salt of I. Heating a concd. EtOH soln. of II contg. some HCl to boiling in the absence of air gives 1,4-diketo-1,8-dihydroxy-1,2,3,4-tetrahydronaphthalene (III), m. 153–4°, identical with the compd. obtained from I and SnCl_2 and with that from heating succinic anhydride and $p\text{-C}_6\text{H}_4(\text{OH})_2$ with AlCl_3 and NaCl at 220°; this is stable in the air, the solns. show a fluorescence; $\text{Br-H}_2\text{O}$ and FeCl_3 have no action. EtOH-NaOH solns. with Me_2SO_4 give 1,4,5,8-tetramethoxynaphthalene, m. 170°. III (3 g.) in 50 cc. Ac_2O and 5 drops concd. H_2SO_4 gives 3.6 g. of the 5,8-di-Ac deriv., decomps. about 220°; the isomeric 1,4,5,8- $\text{C}_{10}\text{H}_4(\text{OH})_2(\text{OAc})_2$ results by the reduction of the di-Ac deriv. of I. $\text{C}_{10}\text{H}_4(\text{OAc})_4$, m. 277–9°, results from either di-Ac deriv. of III by heating with Ac_2O and AcONa . III, heated with $\text{C}_6\text{H}_5(\text{CO})_2\text{O}$, AlCl_3 and NaCl at 220° gives tetrahydroxynaphthacenequinone, reddish brown, m. above 300°; NaOH gives a bluish violet soln.; concd. H_2SO_4 gives a reddish blue soln., changed to greenish blue by H_3BO_3 and showing a characteristic spectrum. The *tetra-Ac deriv.*, yellow, gradually turns red and decomps. on heating. Oxidizing I in AcOH with $\text{Pb}(\text{OAc})_4$ gives 1,4,5,8-naphthodiquinone (IV), pale yellow, decomps. about 220°; heating in EtOH , AcOH or NaOH gives I; it is also reduced in the cold by H_2SO_4 , SnCl_2 and $p\text{-C}_6\text{H}_4\text{O}_2$. Soln. in concd. H_2SO_4 gives naphthopurpurin at once; *tri-Ac deriv.*, light yellow, m. 160–2°. HCl in AcOH gives chloronaphthazarin, dark red, m. 178–9°, identical with the product obtained from I dichloride with AcOH and AcONa ; the *di-Ac deriv.*, m. 193–4°. Satg. I diacetate in AcOH in the cold gives the compd. $\text{C}_{14}\text{H}_{10}\text{O}_6\text{Cl}_2$, m. 136–7°, which, heated in boiling EtOH , gives the above di-Ac deriv., m. 193°. Satg. a suspension of IV in CHCl_3 at 0° with Cl gives naphthodiquinone dichloride, light yellow, decomp. 252–4°; KI at 0° or H_2SO_4 at room temp. gives I. Hydroquinizarin and AcCl in $\text{C}_6\text{H}_5\text{N}$ give 1,4-diactoxy-2,3-dihydroanthraquinone, decomp. 215°; excess AcCl gives 1,4,9,10-tetraactoxyanthracene, pale yellow, m. 240–2°; acetylating with boiling Ac_2O and AcONa gives quinizarin diacetate and also 1,4,9-triactoxyanthracene, pale yellow, m. 210–1°. 5,8-Dichloroquinizarin (V) and PhNH_2 with AcONa , heated at 170°, give 80% of 1,4-dihydroxy-5,8-diaminoanthraquinone, dark blue, m. 258–60°; concd. H_2SO_4 gives a pure green soln., changed by H_3BO_3 to an olive. Reduction of V with Sn and HCl gives the *hydro deriv.*, orange-yellow, which reacts with PhNH_2 and H_3BO_3 to give 1,4-diamino-5,8-dichloroanthraquinone, dark blue, m. 234–5°; concd. H_2SO_4 gives a bluish green color not changed by H_3BO_3 . 2-Methylquinizarin (VI) gives a brownish yellow, *hydro deriv.*, m. 114–5°, which gives with $p\text{-MeC}_6\text{H}_4\text{NH}_2$ at 125° 1-hydroxy-2-methyl-4-*p*-toluidinoanthraquinone, violet-blue, m. 178°; concd. H_2SO_4 gives a greenish blue color, changed by H_3BO_3 to a reddish blue. Oxidation of VI with $\text{Pb}(\text{OAc})_4$ gives 1,3,4-trihydroxy-2-methylanthraquinone (2-methylpurpurin), dark red, m. 265–7° (*Ac deriv.*, red, m. 204–6°; *tri-Ac deriv.*, light yellow, m. 207–8°). Heating a mixt. of 50 g. $o\text{-C}_6\text{H}_4(\text{CO})_2\text{O}$ and 50 g. $p\text{-C}_6\text{H}_4(\text{OH})_2$ with 400 g. AlCl_3 and 80 g. NaCl at 120–5° for 1 hr. gives 48 g. 2,5-dihydroxybenzophenone-2'-carboxylic acid, brownish yellow, m. 189–90°; Me_2SO_4 gives the 2,5-di-MeO deriv., m. 161–2°, which, dissolved in concd. H_2SO_4 and allowed to stand several days at room temp., gives 1,4-dimethoxyanthraquinone (VII), m. 170–1°, identical with the product from quinizarin. Reduction of VII with NaHSO_4 gives 1,4-dimethoxy-2,3-dihydroanthraquinone, yellow, m. 186°, which is stable in the air; concd. H_2SO_4 gives a dark green color, quickly changing to brownish red. The 1,4-di-EtO deriv., olive-brown, m. 174–6°. 1,4-Dimethoxy-9,10-diactoxyanthracene, bright yellow, m. 225°; solns. show a strong green fluorescence; di-EtO deriv., light yellow, m. 203–5°.

C. J. WEST

The mercuration of neutral red and its sulfonic acid. ISRAEL M. LEVINE. *Abstracts of Theses, Univ. Chicago, Science Series* **4**, 105–10(1925–6) (publ. May, 1928).—Mercured neutral red was prepd. on account of its possible therapeutic use. Since this substance proved to be too little sol., sulfonated-mercured neutral red was prepd., the Na salt of which had the desired soly. The formulas given below for the new compds. are the probable ones only, since the positions occupied by the introduced groups

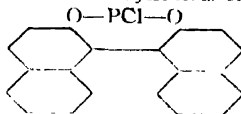
were not detd. exptly. *Acetate of 2,5-diacetoxymercureneutral red* (from neutral red, HgOAc , and $\text{Hg}(\text{OAc})_2$), green, insol. in H_2O . *Chloride of 2,5-dichloromercureneutral red* (from neutral red, HgOAc , $\text{Hg}(\text{OAc})_2$ and NaCl), insol. in H_2O . *Neutral red-2-sulfonic acid* (I) (45% from 5 g. neutral red and 15-cc. fuming H_2SO_4), brown, amorphous, sol. in NaOH and Na_2CO_3 , insol. in H_2O and NaHCO_3 . *Hg salt* of I, insol. in H_2O and alkali. *Na 5-hydroxymercureneutral red-2-sulfonate* (5 g. from 8 g. of I, 4 g. Na_2CO_3 and 7.5 $\text{Hg}(\text{OAc})_2$), orange plates, giving a red soln. when heated with H_2O . G. SCHWACH

The so-called balanophorin. A. J. ULRIE *Bull. Jardin botanique Builenzorg* [3], 8, No. 1, 3 pp. (1926); *Chem. Zentr.* 1927, II, 95.—The resinous substance of the wood of the Balanophoraceae, a parasitic plant of Java, and named balanophorin by Göppert in 1841, has been studied by Poleck (*Ann.* 67, 179) and by Simon (*Sitz.-Ber. Kais. Akad. Wiss.* 19, IIb, 1161 (1910); cf. *C. A.* 5, 1919). In a further examn. of this substance, U. chose EtOH instead of Et_2O as an extn. agent, with which 77% of almost pure balanophorin was obtained from the tubers. On a large scale petroleum ether was a good solvent. Sapon. of balanophorin by the method of Leys-Grimme (cf. Rosenthaler, *Grundzüge der chem. Pflanzenunters.* 2 Aufl. 1923), with addn. of C_6H_6 to increase the soly. of the balanophorin, yielded palmitic acid. The alc. in the wax is identical with β -amyrin, m. 195° ; β -amyrin acetate, m. 235° . Balanophorin m. 77° and is therefore identical with β -amyrin palmitate, which has already been synthesized by U. and shown to be the chief component of gondang wax (cf. *Pharm. Weekblad* 61, 1118). It has also been obtained from the wax of cacao leaves (cf. *Ann.* 271, 184 (1892)). Attention is called to the earlier prepn. of candles from the tubers. C. C. DAVIS

Condensation of aldehydes and phenols. III. Nitrated *ms*-phenyldinaphthopyrans. OTTO DISCHENDORFER AND EGON NESITKA. Tech. High School, Graz. *Monatsh.* 50, 16 39 (1928).—The f.-p. curve of $p\text{-O}_2\text{NC}_6\text{H}_4\text{CHO}$ and $\beta\text{-C}_{10}\text{H}_7\text{OH}$, which is given, shows 1 eutectic at 74.5° and 41% $\beta\text{-C}_{10}\text{H}_7\text{OH}$ and a 2nd at 75.5° and 55% $\beta\text{-C}_{10}\text{H}_7\text{OH}$, on mixing the 2 compds in CHCl_3 , C_6H_6 or Et_2O , the orange-yellow mol. compd. sepd., m. 76.5° . $p\text{-O}_2\text{NC}_6\text{H}_4\text{CHO}$ and $\beta\text{-C}_{10}\text{H}_7\text{OH}$ give a f.-p. curve with 1 eutectic at 31.5° and 23% $\beta\text{-C}_{10}\text{H}_7\text{OH}$. Condensation of 1 mol. $p\text{-O}_2\text{NC}_6\text{H}_4\text{CHO}$ and 2 mols. $\beta\text{-C}_{10}\text{H}_7\text{OH}$ in AcOH with concd. HCl gives *ms*-[4-nitrophenyl]dinaphthopyran (I), greenish yellow, m. 318° . Oxidation of I with MnO_2 and HCl , PbO_2 or H_2SO_4 gives *ms*-[4-nitrophenyl]dinaphthopyranol (II), analyzed as the FeCl_3 salt, bright red, m. 290° (decompn.). Werner (*Ber.* 34, 3304 (1901)) believed that, in the oxidation of the NO_2 -free compd., he obtained an anhydride or ether, repetition of the work shows that the compd. is *ms*-phenyldinaphthopyranol. II, in CHCl_3 contg. a little AcCl , gives with HCl the *chloride-HCl*, bright red, gradually losing HCl on standing; the HgCl_2 salt is red with golden luster, m. 253° (decompn.). II with HBr in AcOH , followed by addn. of Br , gives the *perbromide*, red. *Perchlorate*, red with green metallic luster, m. 299 – 301° (decompn.). Heating the FeCl_3 salt with abs. EtOH gives the *Et ether*, m. 243 – 4° ; *Me ether*, m. 263° (decompn.). Reduction of I or II with Zn and AcOH gives the *Ac deriv.* (III), m. 246° of *ms*-[4-acetaminophenyl]dinaphthopyran, m. 253 – 4° (decompn.). The oxidation of III in AcOH-HCl gives *ms*-[4-acetamidophenyl]dinaphthopyranol, m. 270° (decompn.), isolated as the FeCl_3 salt, dark red, m. 243 – 5° ; the HgCl_2 salt, red, m. 200 – 5° ; the *perchlorate*, red with golden luster, m. 260° (decompn.). I (1 g.), warmed with 100 cc. concd. HNO_3 0.75 hr., gives *dinitro-ms* [4-nitrophenyl]dinaphthopyranol, yellow, does not m. 380° ; HCl in Ac_2O , followed by FeCl_3 , gives the *chloride-ferrichloride*, light brown, m. 325° (decompn.); HBr and Br in Ac_2O give the *perbromide*, red, decomp. 260 – 70° ; *perchlorate*, orange-yellow, m. 301° (decompn.). *Dinitro-ms*-phenyldinaphthopyranol, greenish yellow, m. 297 – 8° (decompn.); *chloride-ferrichloride*, orange, m. 260° (decompn.); *perchlorate*, red, m. 288° (decompn.); *perbromide*, orange with golden luster, decomp. on heating. $2,4,6\text{-(O}_2\text{N)}_3\text{C}_6\text{H}_2\text{CHO}$ and $\beta\text{-C}_{10}\text{H}_7\text{OH}$ give an orange-yellow addn. mol. compd. $\text{C}_{17}\text{H}_{11}\text{O}_5\text{N}_3$, m. 153° . *Dehydro-4-dimethylaminobenzal-di- β -naphthol*, greenish yellow, m. 245° , by the action of NaOH

C. J. WEST

The industrial production of perylene. A. CORBELLINI AND G. AYMAR. Reale Univ. Milano. *Giorn. chim. ind. applicata* 10, 196–9 (1928).—An exptl. study was made of various methods proposed for the synthesis on an industrial scale of perylene



(cf. Scholl, Seer and Weitzenböck, *C. A.* 4, 2920), most of which are patents. Following the directions of Hansgirk (Ger. pat. 386,040 (1918)), a 19.3% yield was obtained. On

evapn. the residual soln. deposited a light yellow impure cryst. *compd.*, m. around 150°, probably a reduction product of β -dinaphthol, *viz.*, dinaphthalene oxide (cf. Schoepfle, *C. A.* 17, 2422). The reaction probably involves 2 stages, the initial formation of the *compd.* from β -dinaphthol and PCl_3 , and the formation of perylene from this on distn. The yield of perylene could not be increased by changing the temps. nor by distg. in an atm. of H or of N. The yield by the method of Pereira (Ger. pat. 390,619 and 391,825 (1921)) was 14%, and increasing the temp. and the time did not increase it. Another method of Pereira (Ger. pat. 394,437 (1922)) gave a 16.5% yield of perylene, and changing the temp. and the proportions and concns. of reagents did not increase the yield. By keeping the temp. at 120°, the yield was only 5.7%. With 5 times as much NaCl and of kieselguhr as Na_2CO_3 as a diluent, the yields were still 16.5%. With no diluent but 3.5 times the proportion of Na_2CO_3 , the yield was only 8.5%. Substitution of Na borate for Na_2CO_3 did not alter the yield. A 13.6% yield of perylene was obtained from β -dinaphthol and AlCl_3 , by the method described, but without Na_2CO_3 , a small proportion of dihydroxyperylene also being formed, contrary to Weitzenböck and Seer (*C. A.* 7, 2947). By the method of Marschalk (U. S. pat. 1,593,938), the yield of perylene was 13% and with the method of the Compagnie Générale des Matières Colorantes (Fr. pat. 571,738 and 571,739 (1922)) the yield was 17%. The low yields with all the methods render it very improbable that any of the methods is of promise industrially.

C. C. DAVIS

Preparation and properties of selenophene and certain halogen derivatives of selenophene. HENRY VINCENT AIRD BRISCO AND JOHN BUTTERY PEARL. Univ. of Durham. *J. Chem. Soc.* 1928, 1741-7.— C_2H_2 and Se at about 400° give, in addn. to the condensation products of C_2H_2 , about 15% of *selenophene*, b_{22} 1,109.9–10.1°, f. p. —38°, mol. wt. by Dumas methods 134, in CHBr_3 (f.-p. method) 132.2, in C_6H_6 156 (calcd. 131.2). The vapor pressure is recorded from 25° to 85°, d_{20}^{20} 1.5232; data are also given for 5 other temps. from 15° to 50°; the coeff. of expansion is 3α (15–30°) = 0.001040; 3α (30–50°) = 0.001040; 3α (15–50°) = 0.001045; n_D^{20} 1.568; surface tension (dynes/cm.): 15°, 36.49; 20°, 35.83; 25°, 35.14; parachor at the same temps., 210.6, 210.8, 210.5. Selenophene resembles thiophene in its remarkable stability and chem. inactivity. It forms no picrate or methiodide, is not oxidized by KMnO_4 , is not reduced by Zn and HCl and is only slightly changed by H and N at 250°. No definite *compds.* were isolated with H_2SO_4 or HNO_3 . Br gives 70% of a *tetra-Br deriv.*, m. 102°, slowly decompd. by boiling H_2O ; *tetra-Cl deriv.*, decomp. 87° (25% yield); the latter is not as stable as the Cl deriv.

C. J. WEST

Active constituents of paracoto bark. Synthesis of protocotoin and methylprotocotoin. ERNST SPATH AND HERMANN BRETSCHNEIDER. Univ. Wien. *Monatsh.* 49, 429–37 (1928); cf. *C. A.* 22, 3408.—Details are given of the synthesis of protocotoin (I) from 1,3,5- $\text{C}_6\text{H}_3(\text{OH})_3$ and $\text{CH}_2(\text{O})_2\text{C}_6\text{H}_4\text{CN}$ in Et_2O with ZnCl_2 and HCl, followed by methylation; the alkali-insol portion contains methylprotocotoin. That the free HO group of I is *ortho* to the CO group is shown by condensing with $\text{BrCH}_2\text{CO}_2\text{Et}$, saponig, the ester and heating the resulting acid in vacuum, thus forming 3,5-dimethoxy-3',4'-methyleneedioxy-2-phenylcoumarone, m. 116.5–7.5°.

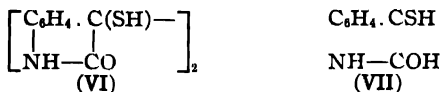
C. J. WEST

Condensation of rhodanic acid with 3-nitroisatin.* Rhodanal- $\Delta^{3,3,5,5}$ -nitrooxindoles. HOWARD A. JONES AND RAYMOND M. HANN. George Washington Univ. *J. Am. Chem. Soc.* 50, 2491–3 (1928).—5-Nitroisatin (2 g.) in 25 cc. AcOH was treated with a mol. quantity of the rhodanic acid and 5 g. fused AcONa and refluxed for 3 hrs. The following *aryl rhodanal- $\Delta^{3,3,5,5}$ -nitrooxindoles*, red, were thus prepd.: *Ph*, m. 260–7°; *o-anisyl*, m. 247°; *p-anisyl*, m. 370°; ψ -*cumyl*, m. 245°; β -*naphthyl*, m. 330°. H_2SO_4 solns. are brilliant red.

C. J. WEST

The chloroisindigotins. A. WAHL AND GEORGE FERICEAN. *Ann. chim.* 9, 277–315 (1928); cf. *C. A.* 22, 1354.—W. and F. study the structure of the chloroisatins and the disulfatides. Treating *o*- $\text{ClC}_6\text{H}_4\text{NH}_2$ with Cl_2CCHO and $(\text{NH}_4\text{OH})_2\text{H}_2\text{SO}_4$ gives the *o*- $\text{ClC}_6\text{H}_4\text{NHCOCH:OH}$. Heating the product with 5 times the wt. of concd. H_2SO_4 at 85° for 6 hrs. gives 7-chloroisatin (I), m. 248°. The *p*- $\text{ClC}_6\text{H}_4\text{NH}_2$ similarly gives 5-chloroisatin (II), m. 242°. I with dioxindole in alc., in the presence of a trace of $\text{C}_6\text{H}_{11}\text{N}$, gives quant. 7-chloroisatide, m. 238°. II with dioxindole gives 5-chloroisatide, m. 255°. I with oxindole (III), in alc. with a trace of $\text{C}_6\text{H}_{11}\text{N}$ gives 7-chloroisatin, m. 182°; II similarly gives 5-chloroisatin, m. 207°. I with III in HOAc with a trace of HCl gives 7-chloroisindigotin (IV), which in HOAc at 100° with Zn gives the white leuco form. II with III gives 5-chloroisindigotin (V), which can be reduced to the leuco form. IV or V in 10 parts of concd. H_2SO_4 gives the *monosulfonic acid deriv.* whose Na, K and Ba salts are isolated. Disulfatide was shown to have structure VI by Laurent but Sauder

believed it had structure VII. Formula VI is favored since the mol. wt. in PhOH checks



this formula and the quantity of S liberated on reduction with H_2S to the leuco form agrees closely. VI is easily sol in NaOH and in $\text{C}_6\text{H}_5\text{N}$. On boiling some III seps. and is characterized by its benzylidene deriv. VI in HOAc at 100° with Zn gives 90% leuco form. 7-Methylisatin in alc. with H_2S gas until decolorized after 10 days gives 80% dimethyldisulfatide; 5-methylisatin gives the corresponding deriv. I in MeOH satd. with H_2S for 6 days gives 7,7-dichloridisulfatide (VIII). II similarly gives the 5,5-di-CI deriv. (IX). Heating VIII in $\text{C}_6\text{H}_5\text{N}$ gives a red ppt. which is 7,7'-dichloroisindigotin (X); on heating in concd. H_2SO_4 X slowly sulfonates and is pptd. with NaCl. At the same time some 7-chlorooxindole (XI), m. 215° , is formed in the $\text{C}_6\text{H}_5\text{N}$ and is concd. in the distn. residues. XI is characterized by its benzylidene deriv., m. 185° . Corresponding reactions occur with II. Heating IX in $\text{C}_6\text{H}_5\text{N}$ gives 5,5-dichloroisindigotin (XII). On reducing with Zn in boiling HOAc XII gives the leuco deriv. XII with 10 parts of concd. H_2SO_4 gives the disulfonate; the Na salt crystallizes with $6\text{H}_2\text{O}$, the K salt with $4\text{H}_2\text{O}$ and the Ba salt anhyd. In the same way as in XI, 5-chlorooxindole, m. $192-5^\circ$, is also obtained and characterized by its benzylidene deriv., m. $204-5^\circ$. D. H. POWERS

Aminothiophenol derivatives. JAKOB POLLAK, EUGEN RIESZ and ZDZISLAW KAHANE. Univ. Wien *Monatsh.* 49, 213-28 (1928).—[4,2-Cl(O₂N)C₆H₃]₂S₂, reduced by Na₂S and NaOH in EtOH to the mercaptan and then treated with ClCH₂-CO₂H, gives 4-chloro-2-nitrophenylthioglycolic acid, m. $209-10^\circ$, with concd. H_2SO_4 this gives 5,5'-dichloro-7,7'-dinitrobisthionaphtheneindigo (D. R. P. 241,910), with H_2O_2 in AcOH there results 4-chloro-2-nitrophenylsulfocetic acid, m. 158° ; with Zn and AcOH, 6-chlorobenzoxetodihydro-1,4-thiazine, light yellow, m. 204° . If the [4,2-Cl(O₂N)C₆H₃]₂S₂ is reduced with Zn in AcOH, there results 4-chloro-2-aminomercaptobenzene II(C) (I), pale yellow, m. 207° ; Cu(OAc)₂ gives a dark bluish green, Pb(OAc)₂ a yellow ppt.; the free base is a dark yellow oil. With HNO₃ the salt gives 5-chlorophenylendiazosulfide, pale yellow, m. 107° . I gives a picryl deriv., yellow, decomp. on heating; if, immediately on adding the picryl chloride, concd. aq. AcONa is added, there results 2,4-dinitro-6-chlorophenothiazine, dark red, decomp. above 280° . Reduction of the disulfide in the presence of Ac₂O and AcONa gives 4-chloroethenylaminothiophenol, m. 78° . [4,2-Cl(H₂N)C₆H₃]₂S₂ and 4,2-Cl(O₂N)C₆H₃SCl in Et₂O give 2-[4'-chloro-2'-nitrobenzenesulfenylamino]-2'-amino-4,4'-dichlorodiphenyl disulfide, green, m. 164.5° ; HCl salt, light green, m. 182° ; the diazo soln gives with β -C₁₀H₇OH a red dye. Further treatment with Cl(O₂N)C₆H₃SCl gives the di-[4'-chloro-2'-nitrobenzenesulfenylamino] deriv., yellow, m. 159° . p -H₂NC₆H₄SH and 4,2-Cl(O₂N)C₆H₃SCl give 4'-chloro-2'-nitro-4-aminodiphenyl disulfide, dark yellow, m. $130-1^\circ$. HCl salt, yellow, m. 205° . Further treatment with Cl(O₂N)C₆H₃SCl gives 4'-chloro-2'-nitrobenzenesulfenyl-4-amino-4'-chloro-2'-nitrodiphenyl disulfide, yellow, m. 187° . Reduction of anilinetrisulfonyl chloride with Zn and concd. HCl gives a trimercaptoaniline, which cannot be isolated pure because of its easy oxidizability; the tripicryl deriv., yellow, explodes on heating; with EtOH-KOH there results a red-brown powder,



AcSC=CH—C S.CMe, which shows none of the properties of a S dye. The reduction of the trisulfonylchloride in the presence of Ac₂O and AcONa gives 3,5-di[acetylmercapto]ethenylaminothiophenol, m. 127° , and a small quantity of the dimercapto deriv., as the HCl salt, m. 180.1° . C. J. WEST

Carbazole-1-carboxylic acid. EDWARD F. BRISQOR and SYDNEY G. P. PLANT. Dyson Perrins Lab., Oxford. *J. Chem. Soc.* 1928, 1990-1.—The proof that the acid obtained by the action of CO₂ on K carbazole at 270° (Ciamician and Silber, *Gazz. chim. ital.* 12, 272 (1882)) or on Mg 9-carbazyl iodide at $265-70^\circ$ (Oddo, *C. A.* 5, 2638) is carbazole-1-carboxylic acid (I) is furnished by boiling a mixt of tetrahydrocarbazole-8-carboxylic acid, S and quinoline for 12 hrs. and purifying the product through the Na salt and the Me ester; the product, m. 268.9° , is identical with the I prepd. by the 1st mentioned method. C. J. WEST

Derivatives of 7,8,9,10-tetrahydro- α,β -naphthocarbazole and of 8,9,10,11-tetrahydro- α,β' -naphthocarbazole. STEPHEN H. OAKESHOTT and SYDNEY G. P. PLANT. Dyson Perrins Lab., Oxford. *J. Chem. Soc.* 1928, 1840-7.—7,8,9,10-Tetrahydro- α,β -naphthocarbazole (I) (*C. A.* 2, 1716) yields a picrate, m. 172° (decompn.); no

cryst. compd. could be isolated from nitration expts. in AcOH or H₂SO₄. Oxidation of I gives α,β -naphthocarbazole. I and EtMgBr give a dark oil, which gives with AcCl the 11-Ac deriv. of I, m. 125°; BzCl gives the 11-Bz deriv., yellow, m. 146–7° (HNO₃ gives a tri-NO₂ deriv., yellow, m. 255° (decompn.)). Electrolytic reduction of I (10 g. I in 100 cc. H₂SO₄ and 100 cc. EtOH at 80°, Pb electrodes and a current of 5 amps) gives 7,8,9,10,14,15-hexahydro- α,β -naphthocarbazole (II), m. 88°; the base develops a mauve color on exposure to the air and gives a blue fluorescence in Et₂O. HNO₃ in AcOH gives a di-NO₂ deriv., yellow, m. 139–40°; boiling II with Ac₂O for 5 min. gives the 11-Ac deriv., m. 132°; 11-Bz deriv., m. 148–9°. 8,9,10,11-Tetrahydro- α,β' -naphthocarbazole (III), m. 137°, yields a black picrate, m. 194° (decompn.); no nitro derivs could be obtained. Oxidation of III gives α',β' -naphthocarbazole, m. 134–5°. Boiling III with Ac₂O contg. a little H₂SO₄ gives a C-acetyl-7-acetyl deriv., greenish yellow, m. 185°, with dil. EtOH-KOH this gives the C-Ac deriv., yellow, m. 213° (oxime, pale yellow, m. 213–6°); with a much shorter reaction time (5 min. instead of 45 min.), there results the 7-Ac deriv., m. 162°; this is more conveniently prepd through the Grignard reaction as described for I; HNO₃ in AcOH gives a NO₂ deriv., bright yellow, m. 222°. 7-Bz deriv. of III, yellow, m. 139°; NO₂ deriv., yellow, m. 208–9°. III is not easily reduced electrolytically but red P and HI give 8,9,10,11,12,15-hexahydro- α,β',β' -naphthocarbazole, b₁₀ 198–202°; HCl salt, buff colored, m. 265° (sublimation) 7-Ac deriv., m. 120°, 7-Bz deriv., m. 131°. The hexahydro derivs. are most likely the *cis*-forms.

C. J. WEST

Condensation of hexahydrocarbazole and of tetrahydropentindole with cyclopentanone cyanohydrin. SYDNEY G. P. PLANT and DOROTHY MAY LYDDON RIPPON. Dyson Perrins Lab., Oxford. *J. Chem. Soc.* 1928, 1906–13.—Hexahydrocarbazole (I), cyclopentanone (II) and KCN in AcOH-H₂O give 1-[9'-hexahydrocarbazyl]-1-cyanocyclopentane (III), m. 76°. Attempts to hydrolyze III with concd. HCl or EtOH-HCl gave only I and II; allowed to stand 2 days in concd. H₂SO₄, III gave the 1-carboxamide, m. 160°; this was unchanged after boiling with EtOH-KOH for 4 hrs. or heating with 40% H₂SO₄; boiling with concd. HCl gives I as does heating with powd. KOH at 180–200°. 1-Anilino-cyclopentane-1-carboxylic acid nitrosoamine and II in glacial AcOH, heated to 50° and reduced with Zn, give 25% of 1-[9'-tetrahydrocarbazyl]-cyclopentane-1-carboxylic acid, m. 184°. When warmed with 60% H₂SO₄, when distd. or when heated with solid KOH, it dissociates into tetrahydrocarbazole and Δ^1 -cyclopentene-1-carboxylic acid, m. 119°. Electrolytic reduction of dihydropentindole gives the tetrahydro deriv., b₁₆ 152°, m. 21°. Ac₂O gives the 8-Ac deriv., m. 78°; 8-Bz deriv., m. 86°; picrate, yellow, m. 159°. MeI gives the 8-Me deriv., b₁₅ 136–7° (picrate, yellowish green, m. 116°; methiodide, m. 189°) 1-[8'-Tetrahydropentindyl]-1-cyanocyclopentane, m. 51° (picrate, yellow, m. 126°), with concd. H₂SO₄ this gives the 1-carboxamide, m. 130°; the amide could not be hydrolyzed to the corresponding acid.

C. J. WEST

Diketones. I. The reaction between 4-phenylsemicarbazide and acetylacetone. ALVIN S. WHEELER and R. D. NORTON. Univ. North Carolina. *J. Am. Chem. Soc.* 50, 2488–90(1928)—PhNHCONHNH₂ (9.5 g) and 4.6 g. Ac₂CH₂ in EtOH give 8.5 g. 1-phenylcarbamyl-3,5-dimethylpyrazole, m. 69°; 4-Br deriv., m. 100–1°. The structure was proved by boiling with EtOH, giving PhNHCO₂Et and 3,5-dimethylpyrazole and with H₂O, giving CO₂, PhNHCONHPh and 3,5-dimethylpyrazole. The Br deriv. and H₂O give 3,5-dimethyl-4-bromopyrazole.

C. J. WEST

Relation between atomic grouping and specific affinity. VII. Capacity of salt formation in imidazole derivatives. FRITZ FEIGL and HUGO GLEICH. Univ. Wien. *Monatsh.* 49, 385–400(1928).—Benzimidazole yields a Hg salt, C₇H₆N₂HgCl, a Cu salt, 4C₄H₁₀N₄Cu.NH₃.H₂O, a Cd salt, C₄H₁₀N₄Cd, a Co salt, bluish violet, C₄H₁₀N₄Co, a Zn salt, C₄H₁₀N₄Zn or 4C₄H₁₀N₄Zn.NH₃.H₂O. Ethenyl-*o*-phenylenediamine yields a Ag and a Hg salt. Phenylbenzimidazole yields a Ag and a Hg salt. *N*-Phenylbenzimidazole does not yield metallic salts. *N*-Benzylbenzimidazole, m. 105°, also does not give metallic derivs; nor does *N*-methyltolimidazole. Phenoxymethylenebenzimidazole, m. 162°, gives a Ag and a Hg salt. Ethoxymethylenebenzimidazole, m. 152° (Ag and Hg salts). Methoxymethylenebenzimidazole, m. 137° (Ag and Hg salts). *o*-Phenyleneurea and chlorobenzimidazole do not yield metallic salts. Anhydrooxanilide gives both Ag and Hg salts; amarine does not give a Hg salt. Lophine gives a Ag but not a Hg salt. *o*-Aminobenzylaniline does not yield a Ag salt, nor does diphenylethanamidine; *m*-tolimidazole and 2-chlorotolimidazole also give metallic salts (qual. investigated only). 1,2-Naphthimidazole gives Ag and Hg salts. Glyoxaline yields a Zn and a Co salt, but no ppt. was obtained with Cu or Cd. VIII. Several addition compounds of thallium dienolic salts with CS₂. FRITZ FEIGL and ERNST BACKER. *Ibid* 401–12.—Kurovskii (*C. A.* 4, 2464) proposed the reaction of Tl acetyl acetate with CS₂ as a test for small quantities of CS₂.

Salts of Ag, Cu, Pb and Hg are not reactive towards CS_2 ; Tl acetate or other org. compds. do not give the reaction, so that the reaction is dependent on the union of Tl with an enolic salt. On the other hand, other S-contg. compds. give addn. products with Tl acetylacetate. The reaction is now extended to other enolic derivs. of Tl. The Tl compd. of AcCHMeAc gives no compd. with CS_2 . $\text{MeCH(OH)CH}_2\text{Ac}$ gives no Tl compd. nor does CS_2 react with a mixt. with a Tl salt. AcCH_2Bz gives a light yellow Tl salt, which yields a cinnabar-red compd. with CS_2 , of the formula $\text{C}_{11}\text{H}_9\text{O}_2\text{S}_2\text{Tl}_2$; the anil does not react with Tl or CS_2 . AcCHMeBz gives a light yellow Tl compd., which does not react with CS_2 . CH_2Bz gives a yellow Tl compd., whose carmine-red CS_2 compd. has the formula $\text{C}_{16}\text{H}_{16}\text{O}_2\text{S}_2\text{Tl}_2$. $\text{AcCH}_2\text{CO}_2\text{Et}$ does not give a Tl compd., but with Tl_2CO_3 and CS_2 there results the yellow compd., $\text{C}_7\text{H}_5\text{O}_3\text{S}_2\text{Tl}_2$. $\text{BzCH}_2\text{CO}_2\text{Et}$ also does not give a Tl deriv., but an orange-red CS_2 compd., $\text{C}_{12}\text{H}_{10}\text{O}_3\text{S}_2\text{Tl}_2$, may be obtained as above. $\text{CH}_2(\text{CO}_2\text{Et})_2$ does not react with Tl or CS_2 ; neither does $(\text{AcCHCO}_2\text{Et})_2$. $\text{AcCH}_2\text{COCO}_2\text{Et}$ gives a yellow Tl deriv., which, however, does not react with CS_2 ; the same is true of $\text{BzCH}_2\text{COCO}_2\text{Et}$ and $\text{EtO}_2\text{CCOCH}_2\text{CO}_2\text{Et}$. Ac_2 and $(\text{AcCH}_2)_2$ do not react with Tl. The structure of the CS_2 compds. is discussed. C. J. WEST

Curtius rearrangement of carbamyl azides; formation of indazolones and dimolecular carbonylhydrazines. R. STOLLÉ AND N. MERKLE. Univ. Heidelberg. *J. prakt. Chem.* **119**, 275-8 (1928); cf. *C. A.* **21**, 2899. —Treating $\text{PhN}(\text{CON}_2)\text{N}:\text{CHC}_6\text{H}_4\text{Cl}$ in EtOH with NH_4OH and warming 15 min on the H_2O bath gives *o*-chlorobenzal-1-phenyl-2-semicarbazide, m. 181° . Heated with FeCl_3 in EtOH this yields 1-phenyl-3-*o*-chlorophenyl-5-hydroxy-1,2,4-triazole, m. 188° . C. J. WEST

Silver and mercury salts of aminobenzothiazole. FRITZ FEIGL AND ARNOLD DEUTSCH. Univ. Wien. *Monatsh.* **49**, 413 6 (1928) —Aminobenzothiazole (I) and neutral AgNO_3 soln. give a cryst. ppt. of $\text{AgC}_7\text{H}_6\text{N}_2\text{S}$; if this ppt. is dissolved in concd. NH_4OH and warmed on the H_2O bath there gradually ppts the yellow $\text{Ag}_2\text{C}_7\text{H}_4\text{N}_2\text{S}$. Aq. $\text{Hg}(\text{NO}_3)_2$, treated with a large excess of I in the presence of AcONa and heated 1 hr on the H_2O -bath, gives the deep yellow $\text{HgC}_7\text{H}_4\text{N}_2\text{S}$; I and HgCl_2 in EtOH give the addn. compd. $\text{I} \cdot \text{HgCl}_2$, turns pure yellow on heating with H_2O ; aq. HgCl_2 , I and AcONa , warmed on the H_2O bath, give $\text{HgClC}_7\text{H}_3\text{N}_2\text{S}$, yellow; aq. $\text{Hg}(\text{NO}_3)_2$, an insufficient quantity of I and AcONa , warmed on the H_2O bath, give $\text{Hg}_2\text{ONO}_3\text{C}_7\text{H}_5\text{N}_2\text{S}$. I in dil. HCl and I-KI give the compd. $\text{C}_7\text{H}_6\text{N}_2\text{S} \cdot \text{HI} \cdot \text{I}_2$. C. J. WEST

Rotenone, the physiologically active constituent of Derris elliptica. A. BUTENANDT in part with O. LINSERT AND D. BOTSCHWAR. Univ. Göttingen. *Ann.* **464**, 253-77 (1928); cf. Takei, *C. A.* **22**, 2941. —This work is published because of the appearance of the work of T. B. confirms the formula, $\text{C}_{23}\text{H}_{20}\text{O}_6$, suggested by T. for rotenone (I), which m. 163° , b₀ $210-20^\circ$; oxime, m. 249° ; hydrazone, m. 258° (decompn.) (70% yield); these derivs. result in slightly acid soln., are insol. in alkali and give no color with FeCl_3 . If I is treated with ketone reagents in the presence of alkali, derivs. of the CO_2 groups are obtained isomeric with the above but possessing phenolic characters, being sol. in alkali, and giving characteristic colors with FeCl_3 ; the *isoxime*, m. 230° , gives a bluish black color with FeCl_3 ; *isohydrazone*, m. 229° , gives a blue-green color with FeCl_3 ; *isophenylhydrazone*, m. 203° , gives a brownish yellow color with FeCl_3 . Catalytic reduction (1 mol. H) gives the dihydro deriv. (II), m. $214-6^\circ$ (20% yield); if the reduction is continued until 3-3.5 mols. H are used, there results *dihydrodesoxyrotenone*, m. 168° (70% yield), formed by the reduction of a CO group; this does not react with MeMgI , cannot be acetylated and does not yield a ketone deriv.; it dists. undecompd. in high vacuum at $220-30^\circ$ and is not changed by heating with 10% EtOH-NaOH at $130-40^\circ$. Catalytic reduction of I in EtOH-NH_3 gives a compd. $\text{C}_{23}\text{H}_{26}\text{O}_6$, m. 206° , which gives a pale blue color with FeCl_3 but does not contain a CO group. I and EtNO in AcOH give 60-50% of rotenone (III), m. $298-300^\circ$ (decompn.), $[\alpha]_D^{25} -3.5^\circ$ (CHCl_3); this also results by the oxidation of I with CrO_3 in AcOH ; *dihydrazone* (?), m. 242° ; reduction of III gives *perhydropyrenone*, $\text{C}_{23}\text{H}_{26}\text{O}_6$, pale yellow, m. $265-7^\circ$ (decompn.) (20% yield); *Ac deriv.*, yellowish green, m. 245° . With alc. KOH , III gives a HO acid, m. 250° , whose *Me ester*, m. $146-7^\circ$. Complete oxidation of I with KMnO_4 in C_6H_6 gives only $(\text{CO}_2\text{H})_2$; other oxidizing agents as well as alc. NH_3 give *dehydrorotenone* (IV), light yellow, dists. undecompd. at $240-50^\circ$ in a high vacuum, m. 218° ; *oxime*, m. 200° . Alc. KOH gives with IV a *hydroxyketo acid*, $\text{C}_{23}\text{H}_{24}\text{O}_8$, m. 152° ; FeCl_3 gives a red-violet color; *Ac deriv.*, m. 112° ; *oxime*, m. 140° (slow decompn.); *dihydro deriv.*, m. 168° ; FeCl_3 gives no color. Tubaic acid gives an *Ac deriv.*, m. 133° ; a *Me ester*, m. 48° ; and a *dihydro deriv.*, m. 166° . Reduction of I with Zn and KOH in EtOH gives *derritol* (V), $\text{C}_{23}\text{H}_{26}\text{O}_6$, deep yellow, m. 161° (32% yield); MeMgI gives 2 mols. CH_4 ; the by-product of the reduction is a compd., $\text{C}_{23}\text{H}_{24}\text{O}_6$, termed *rotenol*, m.

115–20°, distd. in high vacuum at 200–10° (dihydro deriv., m. 131°); it does not give an Ac deriv. nor does it react with ketone reagents. **V** gives an *oxime*, m. 191–2°. Distrn. of **V** at 0.06 mm. and 220–5° gives 20–30% of a *compd.*, $C_{21}H_{20}O_6$, m. 157°; *Ac deriv.*, m. 146°, whose *dihydro deriv.*, m. 131°. Alk. reduction of **II** gives the same dihydro deriv. of rotenol. A formula for **I** must explain its optical activity, its indifference towards $MeMgI$, $FeCl_3$, CH_2N_2 and Ac_2O , the reduction of Fehling and Tollen solns., the formation of 2 structurally different oximes and hydrazones, the ease of dehydrogenation to a dehydro deriv., which takes up 2 mols H_2O to form a mono- CO_2H acid; the decompn. of **I** with Zn and alkali to **V**, which contains 2 C atoms less than **I**, the alkali degradation of **I** to tubaic acid and the formation of a mono- CO_2H acid on reduction in NH_3 .

C. J. WEST

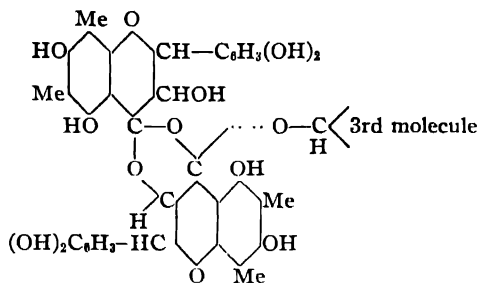
Spectrography of the compounds of the flavone series. I. Spectrographic investigations of some derivatives of flavones, flavonols and styrylchromonols. SHIZUO HATTORI. Imperial Univ. Tokyo. *Acta Phytochim* (Japan) **4**, No. 1, 41–61 (1928).—The mono-HO derivs. of the flavones, flavonols and styrylchromonols were used to study the influence of substitution on the absorption spectra. Of the 7 theoretically possible flavone isomers all but 8-hydroxyflavone could be synthesized. Several of the isomers gave only 1 absorption spectrum, others gave 2 or 3. The position and intensity of the spectra varied greatly. The monohydroxyflavones were grouped into (1) those with the OH group attached at the Ph nucleus and (2) those with the OH at the benzopyrone nucleus. The 2nd group seemed to show greater optical activity, with the exception of 4-hydroxyflavone, which gave marked optical properties. The optical equivalency of the MeO or the EtO group with the HO, and the same with the methylenedioxy group with 2 adjacent HO or MeO groups was established. Acetylation causes the disappearance of the auxochromatic influence of the HO group. Absorption spectra curves are given for 21 compds. **II. Synthesis of two new flavone glucosides. Spectrographic influence of the sugar attachment and acylation.** *Ibid* 63–75.—The new flavone glucosides are 7-glucosidoxyflavone, $ROC_6H_4OC(Ph)CH_2CO$ (I) and 4'-glucosidoxyflavone, $C_6H_4OC(C_6H_4OR):CH.CO$ (II) ($R = C_6H_4O$). Both are ob-

tained from their corresponding flavones by converting them first to tetraacetylglucosidoxyflavones (treatment with acetobromoglucose in acetone), which are dissolved in MeOH. NH_3 , dried over soda lime, is introduced into these solns. After about 10 min. of NH_3 treatment crystals of the glucoside form. **I** is obtained by crystn. from MeOH in fine yellow needles easily sol. in alc., $AcOEt$ and acetone on heating, but sepg. out on cooling in a gelatinous form. It m. 255°, $[\alpha]_D^{25} -160.42^\circ$ in abs. MeOH. **II** forms colorless needle crystals from MeOH, m. 252–4°, insol in ether, benzene, $CHCl_3$, CS_2 and in cold alkalis and NH_4OH , sol. in hot H_2O , alc., acetone and warm $AcOEt$ and MeOH. It is *l*-rotatory but the sp. rotation could not be detd. A comparison of the absorption curves of 7-propionyl-, and 7-capronyl oxyflavones indicates that both new derivs. of 7-hydroxyflavone are similar to 7-hydroxyflavone. From this it was concluded that the anti-auxochrome action shows no characteristic of the Ac group but is due to the EtCO and AmCO groups and probably also to higher aliphatic acyl groups. Acetylation of the free HO groups of a glucoside and comparison of their absorption curves with the acetates of 7 isomeric monohydroxyflavones, shows that the attachment position of the sugar is at the 1st C atom. In the flavonol glucosides the sugar residue is always attached at the 3rd C atom. Similar absorption curves are noted between chrysin and toringin and between apigenin and the glucosides apiin and acacin; this shows further the equivalency of the glucosidoxy and HO groups in relation to light absorption.

RUSSELL C. EBB

Cacao red. II. A. HEIDUSCHKA AND B. BIENERT. Tech. Hochschule, Dresden. *J. prakt. Chem.* **119**, 199–208 (1928); cf. *C. A.* **22**, 595.—The method of prepn. of the dyestuff has been shortened, in that the Pb ppt is directly decompd. with $EtOH-HCl$; a new formula, $(C_{34}H_{31}O_{13})_x$, is proposed, based upon analyses of certain derivs. Distrn. with Zn gives a small quantity of mesitylene. The action of alk. H_2O_2 gives a product contg. 66.91% C and 7.28% H; on standing it slowly takes up O. The *nona-Ac deriv.*, decompg. 210–5°, is an amorphous brownish yellow powder, which is decompd. by warming with KOH. The *nona-Bz deriv.*, pale yellow, amorphous powder, decomp. 219–20°, which is insol. in cold KOH but is easily sapond. with warm alkali. Me_2SO_4 gives a *hepta-Me deriv.*, light brown, amorphous powder, decompg. 213–6°; a 2nd fraction appears to be a mixt. of the tri- and penta-Me derivs. $PhNHNH_2$ gives a brown compd., which is split by boiling with $EtOH-HCl$. The dye in $EtOH$ gives a dark brown ppt. with $EtOK$, a dark brownish green ppt. with $NaOEt$; $EtOH-AcOK$ partially ppts. the dye from

EtOH as a brown ppt. It is believed that the dye has as its parent substance 3',4',3,5,7-pentahydroxy-6,8-dimethyl-2,3-dihydroflavone and that it has the following structure:



C. J. WEST

Preparation of some pyrrolidine derivatives. F. B. LAForge. U. S. Dept. Agr. *J. Am. Chem. Soc.* **50**, 2471-7 (1928).—A no. of pyrrolidine derivs. have been prepd. with reference to their chem. relation to nicotine and tested as contact insecticides. AcCHNaCO₃I₂t (50 g.) and 41 g. *p*-MeC₆H₄OCH₂CH₂Br in EtOH give 25 g. of *Et β-p-cresoxyuretoacetate*, b. 202-4°; hydrolysis with NaOH-EtOH gives *γ-p-cresoxypropyl Me ketone*, b. 175°; semicarbazone, m. 158°; and *γ-p-cresoxybutyric acid*, m. 84-5°. The *ketoxime*, m. 54°, is reduced by Na-Hg in 95% EtOH and AcOH to *1-p-cresoxy-4-aminopentane*, b₇₆₀ 280-3°; in the air it forms a cryst. carbonate, the HCl salt is somewhat hygroscopic. Heating with HCl at 100° gives *α-methylpyrrolidine*, b. 94-7°. *1-Phenyl-1-methylaminobutane*, b₃₃ 117-8°, b₇₆₅ 220°, results in 20 g. yield from 32 g. of the Br deriv. *α-Phenyl-N-methylpyrrolidine (I)* could not be obtained from this. Br(CH₂)₃CHBrPh, treated with MeNH₂, gives a *compd.* C₁₁H₁₃N, b₇₇₀ 209-16°, which is not **I**, since it is unsatd. Benzoyltrimethylene bromide and MeNH₂ give benzoyltrimethylene (any base behaves the same way) and *phenylmethylpyrrolidine (?)*, b₃₄ 134-9°; this could not be reduced. *β-p-Cresoxyethyl benzoylacetate*, b₃ 240-50°, *γ-p-cresoxypropyl Ph ketone*, b₈ 250-60°, m. 63°; *ketoxime*, m. 75°; reduction gives *1-p-cresoxy-4-amino-4-phenylbutane*, whose HCl salt, needles, heated with HCl for 20 hrs, gives *1-phenyl-1-amino-4-chlorobutane-HCl*, m. 200-5° (decompn.); with concd. KOH this gives *α-phenylpyrrolidine*, b₁₆₇ 236-8°; MeI gives the *N-Me deriv.*, b₁₆₀ 225-7°. C. J. W.

Preparation and properties of some new derivatives of pyridine. F. B. LAForge. U. S. Dept. Agr. *J. Am. Chem. Soc.* **50**, 2477-83 (1928).—Details are given for the prepn. of nicotinic acid amide, *β*-pyridine cyanide, *β*-pyridyl Me ketone and the *ketoxime*, reduction of the oxime with Zn and EtOH-AcOH gives *β-pyridylethylamine*, b₇₆₅ 219-21°; *picrate*, m. 186-7°. EtI gives the *N-Et deriv.*, b₇₇₃ 223-6°. *β*-Pyridine cyanide and PrMgI give *β-pyridyl Pr ketone*, which could not be obtained pure by distn. (b. 240-8°); the phenylhydrazone, m. 129-30° (literature gives 182°), *semicarbazone*, m. 169-70°; with concd. HCl, the hydrazone gives an *indole deriv.*, C₁₁H₁₁N₃, m. 158°; reduction of the hydrazone gives *1-β-pyridylbutylamine*, b. 247-51°; *N-Me deriv.*, b₇₆₀ 244-7°. Although these *compds.* are chem. very similar to nicotine, they are, nevertheless, of low toxicity to insects. Metanicotine, nicotyrine and dihydrometanicotine were of a high order of toxicity, the 1st mentioned being only slightly below nicotine.

C. J. WEST

Preparation of *α*-, *β*- and *γ*-benzylpyridines. F. B. LAForge. U. S. Dept. Agr. *J. Am. Chem. Soc.* **50**, 2484-7 (1928).—The method of Chichibabin for the prepn. of *α*- and *β*-benzylpyridine has been simplified by omitting the 1st treatment with NaOH and Et₂O extn., the reaction mixt. being poured directly into H₂O; the *α*-deriv. may be sepd. by fractional crystn. of the picrates. The *γ*-base was obtained by oxidation of the mixt. to the ketone and reduction of this by Zn-Hg in 10% HCl; the *Zn salt*, m. 161°. *β*-Benzoylpyridine is conveniently prepd. from the cyanide and PhMgBr; reduction of the oxime gives *β-pyridylphenylmethylamine*, b₇₆₀ 329-31°; NaNO₂ and HCl give the corresponding carbinol, which is reduced by HI to *β*-benzylpyridine. C. J. WEST

Synthesis of pyridine derivatives. ERNST SPATH and GEORGE BURGER. Univ. Wien. *Monatsh.* **49**, 265-70 (1928).—Condensation of BzCH₂CHO, which probably reacts as PhC(OH).CHCHO, with H₂NCMe:CHCO₂Et, which probably reacts as HN:CMech₂CO₂Et, gives the *Et ester*, b₂ 160-1°, m. 46-6.5° (*chloroplatinate*, m. 196°), of *2-methyl-6-phenylpyridine-3-carboxylic acid*, m. 186° (*HCl salt*, m. 288° (decompn.)), whose constitution was established by splitting off CO₂, giving 2,6-C₆H₄NMePh, and by

oxidation with KMnO_4 to 6-phenylpyridine-2,3-dicarboxylic acid, m. 148–50°, which, upon dry distn., yields $\alpha\text{-C}_6\text{H}_4\text{NPh}$.

C. J. WEST

A new method for the preparation of 2,2'-dipyridyl. J. P. WIBAUT AND J. OVERHOFF. Univ. Amsterdam. *Rec. trav. chim.* 47, 761–3 (1928).—On heating $2\text{-C}_6\text{H}_4\text{NBr}$ or $2\text{-C}_6\text{H}_4\text{NI}$ with finely divided Cu in *p*-cymene at about 180°, 2,2'-dipyridyl is formed, the yield being greater with the Br than with the I compd., while the Cl compd. does not react at all under these conditions. With $2\text{-C}_6\text{H}_4\text{NBr}$ a 60% yield of 2,2'-dipyridyl is obtained together with a small quantity of $\text{C}_6\text{H}_5\text{N}$. The best way to carry out the prepn. is to boil 40 g. $2\text{-C}_6\text{H}_4\text{NBr}$, 75 cc. *p*-cymene and 80 g. Kahlbaum "Naturkupfer C" during 2 hrs., it being advisable to crush the cake of Cu powder after half an hr. In order to obtain the 2,2'-dipyridyl from the reaction product, the *p*-cymene is distd. from it with steam after acidification with HCl and then the 2,2'-dipyridyl after having added a large excess of alkali. The following consts. were found for 2,2'-dipyridyl: b. 273–5°, setting point 70.1°, m. p. of the picrate 157–8.5°.

C. F. VAN DUIN

Natural rotation of polarized light by optically active bases. I. Influence of solvents upon the rotatory power of *d*- α -pipecoline and its hydrochloride. WOLFGANG LEITHE. Univ. Wien. *Monatsh.* 50, 40–7 (1928).—The following values for $[\alpha]_D^{15}$ (*c* about 10) are reported for *d*- α -pipecoline (36%) in various solvents. piperidine, 37°; hexane, 35.7°; Et_2O , 35.3°; C_6H_6 , 30°; AcOEt , 30°; Me_2CO , 29.3°; $\text{C}_6\text{H}_5\text{N}$, 26.6°; CCl_4 , 20.4°; CHCl_3 , 18.7°; EtOH , 9.3°; MeOH , 8.7°; H_2O , 7.5°; AcOH , -4.2°; for the HCl salt, H_2O , -3.1°; MeOH , -3.4°; EtOH , -4.2°; CHCl_3 , -1.5°.

C. J. WEST

Decahydroquinoline derivatives. III. The Hofmann degradation of decahydroquinoline. SHIN-ICHIRO FUJISE. *Sci. papers Inst. Phys. Chem. Research* (Tokyo) 8, 185–95 (1928).—Thirty g. trans-*N*-methyldecahydroquinoline-MeI treated with excess Ag_2O , filtered, cvapd. and distd. under ordinary pressure gave 9.6 g. (36% of theory) of trans-*o*-dimethylaminoallylcyclohexane (I), which purified through the picrate, b. 206°. I absorbs Br_2 in AcOH , reduces AuCl_3 . Picrate, m. 101–2°. Hydrogenation of I gave trans-*o*-dimethylaminopropylcyclohexane (II), b. 207°, which absorbed no Br_2 . Picrate, m. 114.5–5.5°. II. HIAuCl_4 . II. MeI (III), m. 185°. II. MeCl AuCl_4 , m. 91.5°. 15 g. of III distd. with Ag_2O as above gave 3.5 g. of Δ^2 -propylcyclohexene (?), b. 154.5–5.5°, which does not give a solid nitroschloride, Me_3N and II. 17 g. cis-*N*-Methyldecahydroquinoline-MeI distd. with Ag_2O gave 5.7 g. of cis-*o*-dimethylaminoallylcyclohexane (IV), b. 213–4°. IV absorbs Br_2 in AcOH . Picrate, m. 173°. Hydrogenation of IV gave cis-*o*-dimethylaminopropylcyclohexane (V), b. 214–6°. Picrate, m. 173°. V. HIAuCl_4 , m. 132°. Methiodide, m. 186°. Methochloride. AuCl_4 , m. 130°. D. D.

Synthesis of acridinic acid (quinoline-2,3-dicarboxylic acid). GEORG KOLLER AND ELSE STRANG. Univ. Wien. *Monatsh.* 50, 48–50 (1928).—Condensation of 4.2 g. $o\text{-H}_2\text{NC}_6\text{H}_4\text{CHO}$ and 4.6 g. $\text{EtO}_2\text{CCl}_2\text{COCO}_2\text{Et}$ in 64 cc. abs. EtOH by 0.04 g. KOH (1 week at room temp.) gives 2.5 g. of the *d*-*Et* ester, m. 54–5°, of acridinic acid, identical with the synthetic ester. The free acid is obtained by sapon.

C. J. WEST

Synthesis of acridone and acridine. GEORG KOLLER AND ERICH KRAKAUER. Univ. Wien. *Monatsh.* 50, 51–4 (1928).—Heating the ζ a salt of $o\text{-H}_2\text{NC}_6\text{H}_4\text{CO}_2\text{H}$ at 340° gives a compd. $\text{C}_{26}\text{H}_{22}\text{ON}_4$, possibly $\text{H}_2\text{NC}_6\text{H}_4\text{C}(\text{NC}_6\text{H}_4\text{COC}_6\text{H}_4\text{NH}_2)_2\text{C}_6\text{H}_4\text{NH}_2$, m. 233°; distn. with Zn dust in a stream of H gives acridine; heating with concd. HCl 16 hrs. at 170° gives acridone.

C. J. WEST

Steric hindrance in reactions of substituted quinoxalines. GEORGE MACDONALD BENNETT AND GERVASE H. WILLIS. Univ. of Sheffield. *J. Chem. Soc.* 1928, 1960–75.—The Me groups of 2,3-dimethylquinoxaline (I) are each in the α -position with respect to 1 N atom of the heterocyclic nucleus but each at the same time in the β -position with respect to the 2nd N atom; these Me groups might therefore be of the non-reactive or at least of a less reactive type, as regards aldehyde and other reagents. The observation that both Me groups have a high reactivity was of sufficient interest to warrant a detailed study. The reaction of I proceeds easily with most substituted BzH , including those with a NO_2 or Cl in the *o*-position, yet the 2nd stage of the reaction is inhibited when an *o*-MeO is present. The explanation is to be found in the polar character of the various atoms and groups and in the forces of attraction and repulsion which arise between them. 2-Benzylquinoxaline, dark oil; picrate, yellow, m. 117°. Ph β -methoxy-*p*-chlorostyryl ketone, b_{18} 238°, m. 45°; with HBr in AcOH this gives Ph *p*-chlorobenzyl diketone, m. 85°, which condenses with $o\text{-C}_6\text{H}_4(\text{NH}_2)_2$ to give 2-*p*-chlorobenzyl-3-phenylquinoxaline, m. 142°. Ph β ,3-dimethoxystyryl ketone, b_{18} 245°; HBr gives a compd., m. 175–80°, which was not the expected diketone. The quinoxalines were condensed with aldehydes by boiling with 5–6 mols. Ac_2O . 2-[2,4-Dinitrostyryl]quinoxaline, m. 219–20° (decompn.); 80% yield after 1 hr. 2-*o*-Nitrostyrylquinoxaline, pale yellow, m. 156°

(78% after 3 hrs.); *m*-NO₂ deriv., m. 199.5° (68% after 4 hrs.); *p*-NO₂ deriv., pale yellow, m. 200° (65% after 0.75 hr.). I and BzH after 2 hrs. give 50–70% of 2,3-distyryl-quinoxaline, yellow, m. 190.5°. 2-Methylenedioxydistyryl-3-methylquinoxaline, lemon-yellow, m. 150° (20%); 2,3-di[methylenedioxydistyryl]quinoxaline, yellow, m. 208° (30% yield) 2,3-Di-[*m*-nitrostyryl]quinoxaline, yellow, m. 237° (10% yield); the sol. fraction consisted of 2-*m*-nitrostyryl-3-methylquinoxaline, m. 184° (1–2% yield). The corresponding *p*-MeO deriv., yellow, m. 163° (10% yield), and yellow, m. 122.5° (10% yield). 2,3-Di-[*m*-methoxydistyryl]quinoxaline, yellow, m. 126° (10% yield); 2-*o*-methoxydistyryl-3-methylquinoxaline, yellow, m. 112° (1–2% yield) 2,3-Di-[3,4-dimethoxydistyryl]quinoxaline, yellow, m. 208° (10% yield); 2,3-di[β-furylvinyl]quinoxaline, yellow, m. 169° (5% yield). 2,3-Di-[*o*-nitrostyryl]quinoxaline, m. 194.5° (80% yield); the *p*-NO₂ deriv., deep yellow, m. 288° (decompn.) (75% yield). 2-[2,4-Dinitrostyryl]-3-methylquinoxaline, orange-yellow, m. 224–5° (decompn.). The *m*-*p* curve of this with 2,4-(O₂N)₂C₆H₃CHO is given; a compd., m. 96–7°, formed from the 2 compds. contains 2 mols. aldehyde to 1 mol. of base. 2,3-Di-[2,4-dinitrostyryl]quinoxaline, brown, m. 295–7° (decompn.) (75% yield). 2-[2,4,6-Trinitrostyryl]-3-methylquinoxaline, brown, m. 250–1° (decompn.) (25% yield). 2,3-Di-[*o*-chlorostyryl]quinoxaline, yellow, m. 189.5° (60% yield); *m*-Cl isomer, yellow, m. 149° (30% yield). *p*-Cl isomer, m. 218° (60% yield); *o*-I deriv., pale yellow, m. 179° (40% yield). 2,3-Distyryl-6-methylquinoxaline, yellow, m. 193° in 81% yield from 2,3,6-trimethylquinoxaline and BzH 2,3-Di-[methylenedioxydistyryl] deriv., m. 168° (10% yield). 2,3-di-[3,4-dimethoxydistyryl] deriv., orange-yellow, m. 205° (5% yield); 2,3-di-[*p*-methoxydistyryl] deriv., yellow, m. 136° (15% yield); 2,3-di-[*m*-nitrostyryl] deriv., m. 244.5° (10% yield); 2,3-di-[2,4-dinitrostyryl] deriv., orange-yellow, m. 251–5° (decompn.) (80% yield). 2-*p*-methoxydistyryl-3,6-dimethylquinoxaline, yellow, m. 116° (1–2%), 2-*m*-NO₂ deriv., m. 165° (1–2% yield) 3-Phenyl-2-methylquinoxaline and BzH give 90% of 2-styryl-3-phenylquinoxaline, pale yellow, m. 149°; 2-*p*-NO₂ deriv., bright yellow, m. 233°; 2,4-dinitro deriv., yellow, m. 215°. 2-Benzylquinoxaline and *p*-O₂NC₆H₄CHO give 2-[β-phenyl-*p*-nitrostyryl]-quinoxaline, pale yellow, m. 149°. Quinoxalinoocyclopentane and BzH give 40% of the dibenzylidene deriv., brown, m. 213°. *di-p*-nitrobenzylidene deriv., yellow, decompn. 268–70° (85% yield). 2,4-(O₂N)₂C₆H₃CHO and quinaldine give 60–80% of 2-[2,4-dinitrostyryl]quinoline, pale yellow, m. 200°; *N*-Me deriv., bright yellow, m. 198°; 3-Me deriv., brown, m. 257°. 2-Styryl-3-methylquinoline, m. 102° (50% yield). I and (CO₂Et)₂ with EtONa or better with EtOK give Et 2-methylquinoxaline-3-pyruvate, orange-yellow, m. 129°, *p*-nitrophenylhydrazones, orange, m. 189°. 2-*ω*-Tribromomethylquinoxaline, pink, m. 109° (10% yield). 2,3-di-(*ω*-dibromomethyl)quinoxaline, m. 228°. 3-phenyl-2-*ω*-dibromomethylquinoxaline, m. 148° (90% yield). 3-Phenyl-2-phenylacetoxyethylquinoxaline, m. 126°, in 90% yield from 3-phenyl-2-benzylquinoxaline, AcONa and Br in AcOH, the *p*-chlorophenyl deriv., m. 119°. I and MeI at 90° for 6.5 hrs. give 80% of a methiodide, greenish yellow, m. 192°.

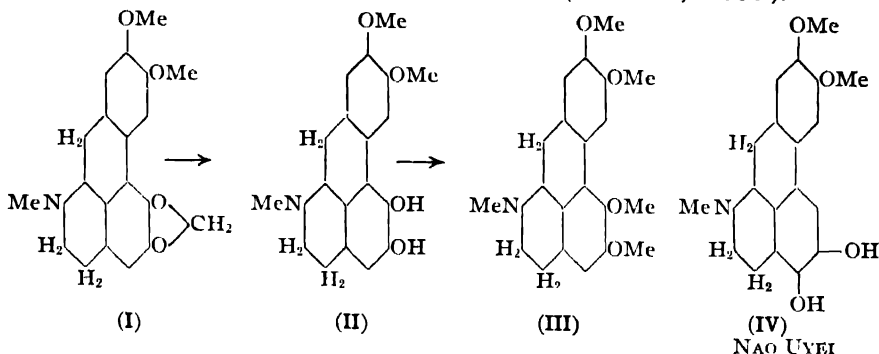
C. J. WEST

Decomposition of *o*-substituted aromatic acid azides. HANS LINDEMANN AND WERNER SCHULTHEIS. *Ann.* **464**, 237–53(1928).-*o*-HOCH₂C₆H₄CONHNH₂ with NaNO₂ (cooling) give *o*-hydroxymethylbenzoyl azide, m. 74.5° (decompn.) and then m. 119°; the azide is not very stable and gradually evolves N at room temp., heated in C₆H₆ or AcOH until gas evolution ceases, there results 2-keto-[4,5-benzo-1,3-oxazine] 1,2-dihydride, m. 119–20°; heated with 50% NaOH, this gives *o*-aminobenzyl alc., m. 83°. 2-Hydroxyphenylacetyl hydrazide, m. 152°; NaNO₂ and HCl give 2-hydroxyphenylacetyl azide, m. 51°, which is very unstable; with boiling C₆H₆ it yields 2-keto-[1,3-benzoxazine] 3,4-dihydride, m. 188°. With NaOH and BzCl there results 2-benzoyloxyphenylamine benzoate, m. 141.5°; 2 N NaOH gives the *N*-benzoate, m. 144°. Phthalyl diazide (I), m. 56° (decompn.); in another prepn. a very explosive compd. is obtained; either of these, warmed in C₆H₆ until N evolution ceases, gives 2-isocyanatobenzoate (II), m. 60° (decompn.); gradually heated over 100°, the mass solidifies and then m. 325°. In MeOH I or II gives 2-carbomethoxyaminobenzoyl azide (III), m. 80° (decompn.), then solidifies and m. 155°; the corresponding Et deriv. m. 64–6° (decompn.) and then m. 153°. Heating III in PhMe for 1 hr. gives *Me* benzimidazolone-*N*-carboxylate, m. 159°; the Et ester, m. 156°. II, heated with excess PhNH₂ in C₆H₆, gives *o*-carbonylazidodiphenylurea, m. 133°, detonates violently in a flame; heated in PhMe for 30 min., there results benzimidazolone-*N*-carboxanilide, m. 197°. I, boiled with PhMe for 45 min., gives dibenzimidazolonediuarea, m. 325°; aq. NaOH gives CO(NHPh)₂ and benzimidazolone.

C. J. WEST

Dicentrine and domesticine methyl ether. S. OSADA. Tokyo Imp. Univ. *J. Pharm. Soc. Japan*, **48**, 423–8(1928).—By boiling dicentrine (I) for 4 hrs. with 1,3,5-C₆H₃(OH)₃-H₂SO₄, the CH₂O₂ group is decompd. and the phenolic base (II) (red, sinters

140° and decomp. 175°, unstable to light) is obtained. The methylation of **II** with CH_3N_2 gave *d*-glauicine (**III**), bright yellow, m. 118°. The *l*-bitartrate, red, m. 202°, $[\alpha]_D^{20}$ 32°. In the same manner, domesticine mono-Me ether and 1,3,5- $\text{C}_6\text{H}_3(\text{OH})_3\text{H}_2\text{SO}_4$ gave the phenolic base (**IV**), m. 170–1° $[\alpha]_D^{20}$ 127.63°, which is more stable toward light than **II**. *l**l**l*Br salt, m. 253° (decompn.). The *l*-bitartrate, m. 196–7° (decompn.). **IV** and CH_3N_2 in MeOH gave the isoglauicine of Gorter (*l*-bitartrate, m. 204°).



NAO UYEE

Synthetic experiments on the aporphine alkaloids. III. Synthesis of corytuberine dimethyl ether. JOHN M. GULLAND AND ROBERT D. HAWORTH. Univ. of Durham. *J. Chem. Soc.* **1928**, 1834–8, cf. *C. A.* **22**, 2949.—2,3,4- $\text{O}_2\text{N}(\text{MeO})_2\text{C}_6\text{H}_3\text{CH}_2\text{COCl}$ and 3,4-(MeO)₂ $\text{C}_6\text{H}_3\text{CH}_2\text{CH}_2\text{NH}_2$ in C_6H_6 , shaken with 15% NaOH, give 2'-nitro-3',4'-dimethoxyphenylaceto- β -3,4-dimethoxyphenylethylamide, m. 64–5°, contg. solvent of crystn. lost at 100°; in CHCl_3 , PCl_5 at room temp for 36 hrs. it gives 2'-nitro-6,7,3',4'-tetramethoxy-1-benzyl-3,4-dihydroisoquinoline, pale yellow, m. 159–60°; *HCl* salt, very pale yellow, m. 227° (decompn.), *methiodide*, yellow needles with solvent of crystn., m. 105–7° and then gradually decomp. between 180–90°. Reduction of the *methiodide* with Zn and HCl gives 2'-amino-6,7,3',4'-tetramethoxy-1-benzyl-2-methyl-tetrahydroisoquinoline, analyzed as the *di-HCl* salt, m. 188–90°, with HNO_2 this gives a bright yellow soln., giving a vermilion azo dye with alk. β - $\text{C}_{10}\text{H}_7\text{OH}$. Warming the diazo soln. in $\text{MeOH-H}_2\text{SO}_4$ gives *dl*-corytuberine *di-Me ether* (**I**), pale yellow oil, whose *methiodide* decomp. 248°. **I** and *d*-tartaric acid in EtOH give *l*-**I** *d*-bitartrate, m. 219–21° (decompn.), $[\alpha]_D^{20}$ -148.2° (H_2O , *c* 1.005); the *d*-**I** *l*-bitartrate is identical with that of Gadauner from the natural product; other reactions and the *methochloride* appear to confirm the identity and thus establish the structure suggested by G.

C. J. WEST

Lupine alkaloids. I. GEORGE R. CLEMO AND GRACE CUMMING LEITCH. Univ. of Durham. *J. Chem. Soc.* **1928**, 1811–20.—The facts previously established regarding lupanine (**I**) are that it possesses a very stable, fully satd. ring system with 1 reactive tert. N atom, and no reactive CO, HO or MeO group. The basic nature of both N atoms is now shown by the formation of *I*-*di-HCl*, m. 185° (decompn.), which is deliquescent, its aq. soln. being acid to litmus; heated under 1-mm. pressure, a sublimate of the very deliquescent cryst. *mono-HCl* salt is formed. However, **I** yields only a *monomethiodide* (**II**), m. 262–3° (decompn.) and a *monomethosulfate*, m. 196°. The *methiodide* is unchanged after refluxing with MeOH-KOH ; distn. of the hydroxide gives **I** and MeOH; heated with NaOH and KOH at 1-mm. pressure, there results a mixt. of α -methyllyupanine, m. 123° (*mono-HCl* salt, m. 209° (decompn.) *methiodide*, m. 258° (decompn.)), and β -methyllyupanine, isolated as the *methiodide*, m. 272° (decompn.). **II**, heated with KOH at 260°, gives a base $\text{C}_{17}\text{H}_{22}\text{N}_2$, b₁ 130°; *picrate*, yellow, m. 137°; *dimethiodide*, m. 202°, decomp. 280°. Heating **I** with HI and red P 36 hrs. at 220° gives *deoxylupanine* (**III**), b₁ 145°; the aq. soln. has an alk. reaction; the *di-HCl* salt is deliquescent; *monopicrate*, yellow, m. 135°; *dipicrate*, lemon-yellow, m. 206–7°; *methiodide*, m. 226°. Oxidation of **III** gives *isolupanine*, m. 113°; *methiodide*, m. 208°. Oxidation of **I** with KMnO_4 gives *oxylupanine*, $\text{C}_{15}\text{H}_{22}\text{O}_2\text{N}_2$, m. 123°; *chloroplatinate*, brown, m. 232° (decompn.); it does not react with PhNHNH_2 , with BzCl , with piperonal or with AcOH satd. with HCl.

C. J. WEST

Etholides of coniferous waxes. J. BOUGAULT AND E. CATTELAINE. *Compt. rend.* **186**, 1746–8 (1928); cf. *C. A.* **3**, 783, 2445; **4**, 2094; **5**, 2441; Ruzicka, *C. A.* **21**, 2888; Kerschbaum, *C. A.* **21**, 2118.—From the studies referred to above it appears that juni-

peric acid is important as a basis for the prepn. of compds. with the odor of musk. A natural source of this acid was sought in *Abies nordmanniana* Spach., *Pinus austriaca* Link. and *P. maritima* Lamk., the leaves of which contain 1.0, 1.8 and 1.7 g. per kg., resp., of juniperic acid, and 0.0, 0.3 and 1.2 g. per kg., resp., of sabinic acid. L. W. R.

Acid constituents of sandarac resin. ALEXANDER ROLLETT, PETER TABAKOFF AND STEFAN FEIMER. Univ. Graz. *Monatsh.* 50, 1-5(1928).—The resin, purified as described in the literature, is sepd. into 2 parts by KOH; the K salt of sandaracolic acid ppts. as a heavy, sticky mass; HCl ppts. the free acid, which is purified through the Pb salt, when it m. 192°; Br in AcOH gives an amorphous product, m. 226°, probably not homogeneous; heating the acid with 8-10% H_2SO_4 on the H_2O bath gives a product, m. 212°. Dialysis of the acid in 0.5 *N* KOH gives callitricolic acid, $C_{20}H_{30}O_8$, m. 263°. Shaking an Et_2O soln. with 0.1% $(NH_4)_2CO_3$ gives sandaracinic acid, which is amorphous; the Me ether, amorphous, m. 159°. Further extn. with 0.1% Na_2CO_3 gives sandaracinolic acid, m. 199°; heating with Ac_2O raises the m. p. to 223° (rearrangement?); finally there is obtained sandaracopimaric acid, m. 248°. C. J. WEST

Toad poison. I. Composition of the Chinese remedy "senso." MUNIO KOTAKE. Inst. for Phys. and Chem. Research, Tokyo. *Ann.* 465, 1-11(1928).—Extn. of "senso" with 95% EtOH gives bufagin (I), to which is assigned the formula $C_{29}H_{38}O_7$ (Kodama gives $C_{27}H_{34}O_2$); *di-Ac deriv.*, m. 196-7°. Catalytic reduction of I gives a mixt. of the α -tetrahydro deriv., crystg. with $2H_2O$, m. 130-40°, and then 230-2°, and the β -deriv., m. 208-10°; reduction of the di-Ac deriv. gives a mixt. of 2 tetrahydro derivs., m. 238° and 254-7°. Acetylation of the α -tetrahydro deriv. gives the compd. m. 238°, while the β -deriv. gives a mixt. of the 2 isomers. Oxidation of I with CrO_3 gives bufagone, $C_{29}H_{36}O_7$, m. 232-5° (oxime, m. 170-3°). Bufalin chloride, m. 218-20°, with $AcONa$ and Ac_2O gives acetylanhydrobufalin, m. 221-5°. Oxidation of the chloride gives bufalinone chloride, m. 251-2°; Ac_2O and $AcONa$ give anhydrobufalinone, m. 181-3°. The action of KOH (1:1) on I gives AcOH, analyzed as the Ag salt. These results indicate that I contains a lactone group, an Ac group, a sec. HO group, a tert. HO group and 2 double bonds. Only 1 O atom remains unexplained. **II. The poisonous constituent of the secretion of the Japanese toad (*Bufo japonicus*).** *Ibid* 11-20.—Extn. of the skins of 5000 toads (*Bufo bufo japonicus*) with EtOH gives 35 g. gamabufotalin (II), $C_{27}H_{38}O_6$, m. 261-3° (decompn.). H_2SO_4 added to a $CHCl_3$ soln. is colored yellow; a few drops of concd. H_2SO_4 added to an Ac_2O soln. colors the soln. indigo-blue, quickly changing to green. No oxidation product could be obtained cryst. *Di-Ac deriv.*, m. 225°; 0.6 g. absorbs 100 cc. II, but a cryst. product could not be isolated. With alc. KOH I gives gamabufotilinic acid, $C_{24}H_{36}O_6$, decomps. 207-9°. Catalytic reduction of I gives a hydro deriv., $C_{24}H_{38}O_5$, crystg. with 1 EtOH, m. 131-3°. Concd. HCl and I give hydrogamabufotalin, m. 263° (decompn.). HCO_2H gives a diformyl ester, m. 156-7°; at the summer temp., a compd., $C_{27}H_{38}O_{13}$, m. 212-4°, is obtained. The formyl ester with HCl gives the anhydro deriv. With HCl I gives gamabufalin chloride, m. 217-9°, which with Ac_2O and $AcONa$ yields acetylanhydrogamabufalin, m. 227-9°. Acetylgamabufalin, m. 256-8°. C. J. WEST

Photochemical oxidation of ergosterol. A. WINDAUS AND J. BRUNKEN. Univ. Göttingen. *Ann.* 460, 225-35(1928); cf. C. A. 22, 2169.—Ergosterol undergoes photooxidation in 95% EtOH in the presence of eosin when submitted to radiation from a powerful filament lamp. Eosin may be replaced by other fluorescent substances, such as erythrosin, methylene blue, chlorophyll or hematoporphyrin. Acridone is feebly sensitizing but rosaniline has no effect. KCN does not inhibit the reaction but no action occurs in the dark. The reaction product is ergosterol peroxide, $C_{27}H_{42}O_8$, m. 178°; it shows a normal mol. wt. in $C_{10}H_8$ or camphor; $[\alpha]_D^{18} = -35.5^\circ$ (0.2805 g. made up to 10 cc. in $CHCl_3$). The peroxide is very unstable in the presence of acids. As $AsCl_3$ in $CHCl_3$ gives a greenish blue, then deep blue and finally a violet color; $SbCl_3$ gives a brown-violet, $SnCl_4$ a wipe-red color. Concd. H_2SO_4 , shaken with the peroxide in $CHCl_3$, becomes deep red. Distd. in a high vacuum, the peroxide gives a cryst. distillate, but it is for the most part unchanged up to 180-5°. Digitonin gives an addn compd., $[\alpha]_D^{16} = -39^\circ$ (0.1221 g. in 10 cc. C_6H_5N). Ac_2O gives the acetate, m. 202°, also obtained by the photooxidation of ergosteryl acetate in EtOH-eosin, followed by sapon. with 5% EtOH-KOH. Reduction of the peroxide with Na and EtOH gives ergosterol and then dihydroergosterol, m. 173-4°, $[\alpha]_D^{17} = -20.4^\circ$ ($CHCl_3$); acetate, m. 180-1°, $[\alpha]_D^{16} = -20^\circ$ ($CHCl_3$); these products are also directly obtainable from ergosterol. Traces of the latter may be removed from the dihydro deriv. by treatment with blood charcoal in EtOH or by photooxidation. The dihydro deriv. gives no color reactions with $AsCl_3$ or $SbCl_3$ but H_2SO_4 gives a yellow, then orange, soln. Reduction of its

acetate gives γ -ergostyl acetate. Ergosterol peroxide, whether irradiated or otherwise, has neither antixerophthalmic nor antirachitic action, while ergosterol prep'd. from the peroxide is still capable of activation. This suggests that it is ergosterol itself and not an impurity present in it which forms the antirachitic provitamin. Dihydroergosterol, before or after irradiation, is physiol. inactive.

C. J. WEST

Photochemical dehydrogenation of ergosterol. A. WINDAUS AND P. BORGEAUD. Univ. Göttingen. *Ann.* 460, 235–9 (1928).—Ergosterol in EtOH contg. eosin or erythrosin (chlorophyll has a feeble sensitizing action, while methylene blue and rosaniline have none) undergoes photo-dehydrogenation in a glass vessel in sunlight to give *ergopinacol*, $C_{28}H_{42}O_2$, m. 202–3° (decompn.), $[\alpha]_D^{16} -209^\circ$ (C_6H_5N). Conc'd. H_2SO_4 becomes orange when shaken with the pinacol in $CHCl_3$. On distn. at 0.1 mm. (bath at 210°) the latter affords *neobergosterol*, $C_{27}H_{42}O$, m. 151–2°, $[\alpha]_D -12^\circ$ (*acetate*, m. 122–3°), also formed by reducing ergopinacol with Zn and AcOH. Neither of the 2 new products possesses antirachitic action, whether previously irradiated or not.

C. J. WEST

The hydrofluorides of organic bases (BERLINER, HANN) 6. Constitution of hydrazoic acid and its esters (LINDEMANN, THIELE) 6. The electrochemical oxidation of hydrocinnamic acid (FICHTER, SENTI) 4. Crystal data on cardiazole, pentamethylencaminotetrazole and dilauidide [of the Knoll Co.] (STEINMETZ) 2. Absorption curves of the pulegonenols (SAVARD) 3. Influence of substitution of halogens, alkyls and amino groups on color and absorption spectra of indigo, thioindigo and indirubin (FORMÁNEK) 3.

LAWRIE, JAMES W.: Glycerol and the Glycols—Production, Properties and Analyses. New York: The Chemical Catalog Co., Inc. Am. Chem. Soc. Monograph No. 44. 457 pp. \$9.50. Reviewed in *Ind. Eng. Chem.* 20, 986 (1928).

Unsaturated hydrocarbons and hydrogen. I. G. FARBENIND. A.-G. Fr. 634,210, Mar. 28, 1927. See Brit. 269,547 (*C. A.* 22, 1364).

Catalytic production of unsaturated hydrocarbons. SOC. D'ETUDES ET D'EXPLOITATION DES MATIERES ORGANIQUES. Brit. 282,690, Dec. 21, 1926. C_2H_2 and other hydrocarbons of the same series are obtained from gaseous mixts. such as H, CH_4 and CO by incomplete combustion with O in the presence of a catalyst such as Pt black or sponge, oxides of Fe, Cu, Ni, Cr, V, Ag, Pd or Ce. An app. is described.

Partial oxidation products of aliphatic hydrocarbons. JOSEPH H. JAMES (to Clarence P. Byrnes, trustee). U. S. 1,681,185, Aug. 21. Products such as those obtained by catalytic partial oxidation of hydrocarbon vapors, which comprise a mixt. including aldehyde-like compds. and oxygenated org. acids, are treated to sep. the acids from the other constituents and convert them into salts, *e. g.*, by use of $Ca(OH)_2$.

Purifying partial oxidation products obtained from hydrocarbons. JOSEPH H. JAMES (to Clarence P. Byrnes, trustee). U. S. 1,681,228, Aug. 21. The mixt. obtained by catalytic partial oxidation of hydrocarbons or other similar mixt. contg. normally liquid hydrocarbons together with various products of partial oxidation ranging in degree of oxidation from alcs. through aliphatic aldehyde-like compds. to oxygenated org. acids, is purified by chem. addn. to unsatd. bonds of compds. present, *e. g.*, by hydrogenation or halogenation.

Products of heating of alcohol with catalysts. CONSORTIUM FÜR ELEKTRO-CHEMISCHE INDUSTRIE GES. Brit. 282,448, Dec. 18, 1926. EtOH is circulated at ordinary pressure and a temp. of 400–500° over BaO; the products comprise higher alcs. such as BuOH, acids, esters such as EtOAc, acetals such as diethylacetal and aldehyde. MgO lime, Mn oxide, Mg alcoholate and Na alcoholate also may be used as catalysts to effect similar reactions.

Polymerizing constituents of naphtha. STUART P. MILLER and JOSEPH B. HILL (to The Barrett Co.). U. S. 1,679,093, July 31. Naphtha contg. polymerizable constituents is emulsified with H_2SO_4 , $AlCl_3$, or other polymerizing agent in a continuous process. An app. is described.

Highly chlorinated perylenes. ALOIS ZINKE and KONRAD FUNKE (to Felice Bensa). U. S. 1,681,077, Aug. 14. Products such as hepta- to dodecachloroperylenes are formed by mixing an inert liquid solvent such as $PhNO_2$ with perylene and $AlCl_3$, $SbCl_5$ or other suitable inorg. chloride adapted to act as a Cl-transferring agent, and passing a current of dry gaseous Cl through the mixt.

Alkylcoumarans. HANS JORDAN (to Chem. Fabrik auf Aktien vorm. E. Schering). U. S. 1,679,664, Aug. 7. See Can. 278,727 (C. A. 22, 2754).

Amino compounds. FABRIQUES DE PRODUITS DE CHIMIE ORGANIQUE DE LAIRE. Brit. 282,083, Dec. 9, 1926. Production of primary amines by treatment of compds. such as oximes and nitriles with H in the presence of a hydrogenating catalyst is effected in the presence of NH_3 which may be added as such or in the form of a salt or complex ammoniacal compd. Examples are given of the production of (a) ethylamine from a mixt. of NH_3 , H and acetonitrile vapor in the presence of reduced Ni at 180° ; (b) benzylamine from NH_3 , H and benzonitrile vapor with reduced Cu at 250° ; (c) 2-aminopropane from propanone oxime, NH_3 , H and Ni; (d) ethylamine from a soln. of acetonitrile with NH_3 in aq. alc. satd. with NH_4Cl agitated with H in the presence of Ni under pressure at 50° ; (e) β -phenylethylamine from a mixt. of benzyl cyanide and an alc. soln. of NH_3 with H and reduced Ni, with or without use of heat and pressure; (f) benzylamine from benzonitrile and finely divided Ni agitated in an atm. of NH_3 and H under pressure at 100° .

Reduction of aromatic amines. I. G. FARBENIND. A.-G. Fr. 634,031, May 7, 1927. Substituted aromatic amino compds. are reduced by H under pressure in the presence of catalysts contg. metals such as Ni, Co or Cu. Examples are given of the prepn. of hexahydroethylamine, acetyl- α -tetrahydro- α -(or β)-naphthylamine, 2-amino-3- α -tetrahydronaphthoic acid.

Halogenated tertiary amines and ammonium compounds. I. G. FARBENIND. A.-G. Fr. 634,255, May 2, 1927. Halogenated tertiary aromatic amines are prepd. by treating with halogens the aq. solns. of the mineral acid salts of tertiary aromatic amines, the soln. may contain free acid. Ammonium compds. of the above are prepd. by treating them with alkyl esters of H_2SO_4 or of arylsulfonic acids with or without a solvent. Several examples are given.

Soluble products from fatty acids. RAYMOND VIDAL. Fr. 633,922, April 19, 1927. Fatty acids such as stearic, oleic or ricinoleic acid are treated with alkali hypochlorites or hypobromites and then with an acid such as H_2SO_4 . The products obtained, either alone or with org. compds. halogenated or not, give, with a smaller quantity of hypochlorite or bromite, a thick paste, which has various industrial applications, in tanning, lubricating, washing, etc.

Aliphatic dicarboxylic acids. J. D. RIEDEL A.-G. Fr. 634,196, Feb. 5, 1927. Aliphatic dicarboxylic acids are prepd. by oxidizing hydroaromatic alcs. and ketones in the presence of O transferors.

Organic arsenic compounds. I. G. FARBENIND. A.-G. Brit. 281,690, Dec. 2, 1926. N-substituted arsenobenzimidazolones are made by reducing the N-substituted benzimidazolonearsinic acids the prepn. of which is described in Brit. 256,243 (C. A. 21, 2908). Examples are given of the production of benzethyl, benzpropyl and benzallylimidazolones by reducing the corresponding arsonic acids with hyposulfite.

Organic arsenic compounds. I. G. FARBENIND. A.-G. Brit. 281,703, Dec. 2, 1926. 3,4-Benz-(3-N-methyl)-imidazolonecarsonic acid is made by diazotizing 1-amino-3,4-benz-(3-N-methyl)-imidazolone, adding arsenious acid and excess of NaOH, and isolating the product with HCl. 3,4-Benz-(4-N-ethyl or propyl)-imidazolonecarsonic acids are similarly prepd. from the corresponding amino compds. Examples are also given for producing the 1-amino-3,4-benz-(4-N-ethyl or propyl)-imidazolones.

Arseno compounds. ARTHUR BINZ and CURT RATH. U. S. 1,678,760, July 31. In producing various compds. contg. the —As:As— group, an org. arsonic acid such as 2-hydroxy-5-pyridylarsonic acid is reduced by the action of Na hypophosphite or other suitable reducing agent in the presence of 4-hydroxy-3-aminophenylarsine or like compd. contg. the group —AsH₂. Cf. C. A. 21, 1660.

Esters. GEORGE BARSKY (to American Cyanamid Co.). U. S. 1,678,719, July 31. In making esters such as ethyl hydroxybutyrate, an org. acid, e. g., butyric acid, is heated with the nitrile corresponding to the acid, and with an alc. such as EtOH in the presence of HCl or other suitable inorg. acid.

Esters of cholesterol with unsaturated organic acids. WALTER MINNICH (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,680,799, Aug. 14. By reaction of cholesterol with crotonic acid chloride in a reflux app. at 160° an ester is obtained which may be recrystd. from alc. It softens at 90° and melts to a clear liquid at 149° . Mention is also made of the production of similar esters, having therapeutic properties, from various acids of the general formula R.COOH (in which R stands for a low aliphatic hydrocarbon radical carrying at least one double bond). In forming the esters, cholesterol itself or its halides may be caused to react either with the free acid or its halide or anhydride.

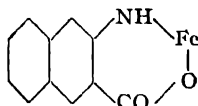
Ketones. SCHERING-KAHLBAUM A.-G. Brit. 282,412, Dec. 15, 1926. Alkyl

β -halomethyl ketones are prep'd. by reacting on C_2H_4 with an acyl halide in the presence of a catalyst or condensing agent such as Al or Fe halide, and treating the product with water, preferably without heating. Solvents or diluents such as $CHCl_3$, CS_2 , $PhNO_2$, C_6H_{14} or an excess of the acyl halide itself may be present. Methyl β -bromomethyl ketone and methyl β -chloroethyl ketone are made from C_2H_4 and acetyl bromide or chloride.

Oxalates. ISADORE S. MELLANOFF (to Kemikal, Inc.). U. S. 1,681,156, Aug. 14. Materials such as waste newspapers are pulped and heated with alkali such as NaOH, preferably while passing air through the mass, at a temp., of about 200° ; a small proportion of a heavy hydrocarbon oil or paraffin is then added and the heating is further continued at a slightly higher temp. (suitably about 210°) and the temp. of the reaction mass then very gradually reduced. Rags, straw and other waste materials also may be used. Na oxalate is formed together with some other salts of different aliphatic acids. The oil or paraffin promotes the reaction.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. Brit. 282,004, Dec. 9, 1926. 1-(2'-Carboxyphenyl)anthraquinones are made by oxidation of Bz-1-Bz-2-benz-benzanthrones or their derivs. The benzbenzanthrone used as starting materials are obtained by ring closure of benzylideneanthrones with $AlCl_3$.

Naphthalene derivatives. I. G. FARBENIND. A.-G. Brit. 282,450, Dec. 17, 1926. 2-Aminonaphthalene-3-carboxylic acid is obtained by heating 2-hydroxynaphthalene-3-carboxylic acid or an alkali salt under pressure with NH_3 and a ferrous salt and decomp. the resulting complex Fe comp'd. by prolonged heating with strong acid or alkali. The Fe comp'd. formed as an intermediate probably has the formula



Alkylpyrazoleanthrones. I. G. FARBENIND. A.-G. Brit. 282,375, Dec. 14, 1926. Pyrazoleanthrones are treated with alkylating agents such as $EtBr$, Me_2SO , or Et_2SO_4 in the absence of condensing agents and preferably in the presence of acid-binding agents. With Et_2SO_4 , a mixt. of 2 ethylation products is obtained which may be sep'd. by extn. with C_6H_6 .

Removing metal carbonyl from organic liquids. CARL MÜLLER, WALTER FRANKENBURGER and FRIEDRICH GRASSNER (to I. G. Farbenind. A.-G.). U. S. 1,679,256, July 31. Synthetic MeOH or other liquids contg. less than 10% of metal carbonyl such as Fe carbonyl are exposed to the action of ultra-violet rays which also act on aldehydes or ketones present. Ozone also may be used.

Acetic and formic acids. W. N. HAWORTH and J. NELSON, LTD. Brit. 281,827, Oct. 19, 1926. Aq. acetic or formic acid is conc'd. by adding an acetate or formate such as the Na salt and then distg. off the strong acid; at least part of the distn. is effected under reduced pressure. A rotary still with scrapers or a fixed still with agitating or grinding devices may be used.

Acetic acid and acetates. PHILIP A. SMITH and HAROLD G. SMITH (to Synthetic Ammonia & Nitrates, Ltd.). U. S. 1,679,994, Aug. 7. See Can. 273,715 (*C. A.* 21, 3906).

Concentrating acetic acid. I. G. FARBENIND. A.-G. Fr. 633,817, May 3, 1927. AcOH is conc'd. by extn. with org. bases not attacked by conc'd. AcOH, such as quinoline, quinaldine, $PhNMe_2$ or $PhNEt_3$. Substances insol. in water such as benzene, $CHCl_3$, CCl_4 , may also be added to reduce the amt. of water extd. along with the AcOH. An app. is described.

Acetic anhydride. CONSORTIUM FÜR ELEKTROCHEM. IND. G.M.B.H. Fr. 634,466, May 16, 1927. Vapor of AcOH is heated in the presence of a catalyst to temps. between 400° and 800° , the surfaces transmitting the heat of the heating chamber being composed of metalloids or metals resistant to heat, e. g., Si, SiC, C, Cu or Cu alloys. Cf. *C. A.* 22, 1783, 2755.

Acetic anhydride. HENRY DREYFUS. Fr. 633,856. May 4, 1927. See Brit. 279,916 (*C. A.* 22, 2951).

4'-Amino-2-benzoylbenzoic acid. NEWPORT Co. Brit. 282,001, Dec. 8, 1926. The Na salt of 4'-chloro- (or other halogen) 2-benzoylbenzoic acid is heated under pressure with aq. NH_3 (suitably in the presence of a catalyst such as Cu or $CuSO_4$).

Ethylidene diacetate. MAURICE E. BOUVIER and LUCIEN HUGONOT (to Soc. chimique des usines du Rhone). U. S. 1,680,760, Aug. 14. Absorption of C_2H_4 in

HOAc in the presence of a Hg salt is effected at a temp. below the b. p. of the liquid in the presence of a strong acid such as sulfoacetic acid and of Ac_2O in such quantity that when the reaction is completed some Ac_2O still remains in the liquid.

Butyraldehyde. CONSORTIUM FÜR ELEKTROCHEM. IND. G.M.B.H. Fr. 634,320, May 13, 1927. See Brit. 271,103 (C. A. 22, 1596).

Crotonaldehyde. ELEKTROCHEMISCHES WERK LONZA. Fr. 634,259, May 4, 1927. For the prepn. of crotonaldehyde AcH is mixed in an atm. of N with only so much dil. caustic alkali soln. that on neutralization with a mineral acid no pptn. takes place, and the reaction mixt. is fractionally distd. directly in an atm. of N.

Formaldehyde from methylene chloride. ERICH KRAUSE and KOLOMAN ROKA (to Holzverkohlungs-Industrie A.-G.). U. S. 1,679,673, Aug. 7. Methylene chloride is heated in the presence of water in a closed vessel to 120–170° and acid-binding materials such as NH_3 , Na_2CO_3 , or alkali metal hydroxides capable of reacting with CH_2O are added gradually in such quantities that alk. reaction of the mixt. is avoided. Cf. C. A. 21, 918.

Naphthalene. GEORG SCHROETER. U. S. 1,680,070, Aug. 7. In order to remove from C_{10}H_8 impurities which would act as catalyst poisons in the presence of a hydrogenation catalyst, the material, at a temp. above its m. p., is subjected to the action of Na amide or other suitable material comprising a metal loosely combined with a non-acid agent.

Nitroguanidine. ARTHUR P. TANBERG and RICHARD L. KRAMER (to E. I. Du Pont de Nemours & Co.). U. S. 1,679,752, Aug. 7. In order to obtain it in finely divided form, nitroguanidine is dissolved in water under superatm. pressure at a temp. above 100° to form a more concd. soln. than could be obtained at 100° and this soln. is then discharged into a cold liquid medium such as cold water to effect pptn. of the nitroguanidine.

Fructose. CHEM. FABRIK AUF AKTIEN. FORM. E. SCHERING. Fr. 634,363, May 13, 1927. See Brit. 272,876 (C. A. 22, 1871).

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Melibiose. II. R. WEIDENHAGEN. Z. Ver. deut. Zucker-Ind. 1928, 99–110; cf. C. A. 22, 608.—Purified yeast melibiase has a max. activity at p_{H} 4.8, but it does not vary much between p_{H} 3.5 and 5.5. With varying concns. of enzyme the same percentage of melibiose is hydrolyzed in times inversely proportional to the concn. of the enzyme provided the other conditions are kept const. The activity of melibiase in certain preps. is within limits approx. represented by the formula for a unimol. reaction. Suitable units in which to measure the activity of melibiase and the concn. of it in any particular material are suggested, following the principles used by Willstätter (C. A. 15, 1730) in relation to maltase. Methods are described for the prepn. of melibiase solns. and for the detn. of melibiase in yeast. B. C. A.

Investigations on the imitation of organic forms with albumin. II. L. A. HERRERA. Lab. Altí Studii Biol. Messico. Atti accad. Lincei [6], 7, 544–7 (1928).—In continuation of the earlier expts. (cf. C. A. 22, 1983) HCl was used in place of H_2SO_4 , the same technic being used again. The acid must be very dil. and more water must be added as soon as the org. forms are developed. HCl gives finer and more complex forms than does H_2SO_4 . Large vacuoles, pseudopods, protoplasm-like granules and hairs similar to those of infusoria are visible, and many of the forms resemble in a striking manner such living objects as the *Allogromia*, *Actinosphaerium eichornii* and *Paramoecium caudatum*. The hairs and pseudopods probably result from the rapid diffusion of albumin in the water, followed by an equally rapid gelation. Like living organisms, these forms are composed of partially hydrolyzed albumin, water, salts, traces of SiO_2 , etc. Plant and animal albumins always contain traces of SiO_2 , and it is possible that SiO_2 is the basis of life and the substratum of the first organisms. SiO_2 has a high adsorptive capacity, and the silicic micelles may have adsorbed products of photosynthesis and thus may have induced the appearance of life. C. C. DAVIS

Cozymase and its determination. KARL MYRBÄCK. Univ. Stockholm. Z. physiol. Chem. 177, 158–69 (1928); cf. C. A. 21, 1820.—Contrary to the views recently expressed by Kostychev and by Struyk the existence of cozymase as a necessary factor

in the fermentation of sugar is upheld. The factors required for the breakdown of sugar by yeast are (1) the enzyme system, (2) inorg. phosphates, (3) hexosediphosphate, (4) cozymase, (5) maintenance of proper acidity. The theory of cell-free fermentation is defended. Arguments against Kostychev's assertion of the non-existence of such fermentation are the fact that living yeast and dried yeast show different p_H optima and different degrees of sensitivity toward toluene. Where failures to obtain fermentation have been reported and attributed to the absence of living cells, it is probable that one or more of the above essential factors was lacking.

A. W. DOX

Experiments on carbohydrate metabolism in dried muscle. HANS V. EÜLER, EDVARD BRUNIUS AND STIG PROFFE. Univ. Stockholm. *Z. physiol. Chem.* 177, 170-6(1928).—The previously reported observation that purified cozymase gives a much feeblar activation of lactic acid formation from glycogen or glucose by dried muscle preps. than does boiled yeast ext. was not corroborated with new preps. of muscle. This difference is attributed to variations in the amt of inhibitory substances rather than to some unknown factor in the yeast ext. which contributes to the activation.

A. W. DOX

The nature of the proteases. I. The ratio of amino to carboxyl groups in various pepsin preparations. I. A. SMORODINTZEV AND A. N. ADOVA. Univ. Moscow. *Z. physiol. Chem.* 177, 187-200(1928).—The activity of various commercial pepsin preps. is directly proportional to their total N, amino N and COOH content. In the more active preps. the peptide-COOH is in excess of the amino acid-COOH, the ratio varying between 2.64 and 3.41; in the weak preps. it varies between 0.8 and 1.5. The NH_2 to COOH ratio is about 0.75 in the active preps., and below 0.5 in the weak preps. The electrotitration curve of solns. of weak pepsins shows a steeper rise than that of the stronger pepsins. When kept for some time with an equal amt. of glycerol the natural gastric juice of the dog undergoes a simultaneous diminution of activity and an increase in amino-N content, and the ratio of NH_2 to COOH rises to 6.82. Natural gastric juice which has lost its activity shows an increase in amino acid-COOH, and a drop in polypeptide-COOH almost to zero.

A. W. DOX

Enzymic experiments with dried muscle. EDVARD BRUNIUS. Univ. Stockholm. *Z. physiol. Chem.* 177, 201-4(1928).—After addn. of Meyerhof's activator (designated as MX) the lactic acid formation by dried muscle shows a distinct optimum with 0.06-0.08 M phosphate buffer, corresponding to 1-1.3% phosphate. Under ordinary conditions the phosphate optimum is 3%. The presence of PhMe has no apparent effect on lactic acid formation. When extd. with H_2O , and glucose, MX and cozymase added to the residue, the ability of the dried muscle to form lactic acid is considerably diminished, although the filtrate shows no activity. Treatment of dried muscle with 40% EtOH contg. sufficient HCl to give a faint red with methyl orange results in loss of activity which cannot be restored by addn. of the ext.

A. W. DOX

Buffer studies. X. The buffering of the feces. M. KARTAGENER. Univ. Basel. *Helv. chim. Acta* 11, 548-62(1928).—The purpose was to det. the influence of the solid phase of feces on the H-ion concn. of the liquid or soln. phase. Different dilns. of an AcOH-acetate buffer mixt. of known p_H strength were shaken $1\frac{1}{4}$ hrs. with insol. secondary and tertiary Ca phosphates, (as typical feces salts), and the p_H was detd. again. Conclusions: The H-ion concn. of a definite buffer soln. that is in equil. with a solid body is markedly influenced by the solid. The degree and direction of the change that the original p_H undergoes depend first on the state and concn. of the soln. and second on the chem. nature of the solid phase, which itself acts as a buffer tending to regulate the H-ion concn. of the soln. phase. The capacities of the buffers are unappreciably altered as long as the solid phase is present. By using lactic acid-lactate buffers instead of the acetate it was found that the nature of the acid ions also played a role in the change in p_H .

RUSSELL C. ERB

Oxidation of luciferin without luciferase and the mechanism of bioluminescence. E. NEWTON HARVEY. Princeton Univ. *J. Biol. Chem.* 78, 369-75(1928).—Luminescence in the absence of luciferase (I) did not occur on oxidizing luciferin (II) at anodes of various metals (Mn, Al, Ag, Ni, Sn, Cu, Fe, Pb, Zn, Cd, Pt) by nascent O; or oxidation by colloidal Pt or Pd and O or oxidizing agents. A soln. of I connected electrically with a soln. of II by Pt electrodes in metallic contact and a salt bridge gave no luminescence. Neither I nor II mixed with oxidized siloxene hydroxide and oxidized with acid permanganate luminesces. Fluorescent dyes do not luminesce in the presence of oxidizing I or II alone. II in alc. luminesces slightly on heating or on the addn. of $KMnO_4$, ozonized turpentine, disuccinyl peroxide and some other oxidizing agents, these being the only known conditions in which II luminesces without I. From these facts it is concluded that II is not the source but merely an accessory of bioluminescence.

and that I is the active cause of light. A probable hypothesis is that luminescence results through excitation of I by the energy of oxidation of II, and that I increases this rate of oxidation.

RUSSELL C. ERB

Chemical constitution of the respiration enzyme. OTTO WARBURG. *Naturwissenschaften* 16, 245-50(1928).—The equilibria hemoglobin- $\text{CO}\cdot\text{O}_2$ and respiration enzyme- $\text{CO}\cdot\text{O}_2$, including the action of light on them, are discussed. Hemoglobin differs from the respiration enzyme in that it has no catalytic action and it binds CO more firmly than the enzyme. Free hemin approaches more nearly the enzyme qualities. Even more similar to the enzyme are compds. of hemin with pyridine or nicotine. Cytochrome is shown to be different from respiration enzyme. Spectroscopic analysis of the compd. of hemin with nicotine shows the identity of its light-absorption curve and the curve of its catalytic activity *versus* λ . This method applied to live yeast yielded the absorption curve for respiration enzyme. It is a typical hemin spectrum with its max. absorption at 436μ instead of 408μ . Surface absorption on solid cell constituents of the hemin may possibly cause this shift.

B. J. C. VAN DER HOEVEN

Artificially increased permeability of skin to the short-wave rays and fluorescence of skin irradiated with ultra-violet rays. W. E. PAULI. *Strahlentherapie* 26, 577-85 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 606; cf. C. A. 22, 2759.—Glycerol contg. a little alc. was found to be the best agent for increasing the permeability of the skin to ultra-violet rays. The permeability increases with the length of irradiation. Normal skin has a pronounced fluorescence; rabbit's skin 540-420, max. 500μ , human skin max. 460μ . The exciting rays are 300μ . The fluorescence curve is to a large extent coincident with the erythema curve. The fluorescence of the skin is to be taken into account when the intensity of irradiation is measured.

MARY JACOBSEN

Differences in physicochemical properties of various proteins in plant seeds. III. Soy-bean proteins. TETSUTARO TADOKORO AND KATSUJI YOSHIMURA. *J. Coll. Agr. Hokkaido Imp. Univ.* 20, 355-62(1928); cf. C. A. 22, 967.—The ppt. obtained from dialyzing the H_2O ext. of soy beans was designated glycinin A. From the filtrate legumelin was pptd. with $(\text{NH}_4)_2\text{SO}_4$. From the residue of the H_2O extn. of soy beans glycinin B was extd. with 10% NaCl and from this residue glutelin was extd. by 0.2% NaOH. The order of decreasing ash and P and increasing N content is legumelin, glycinin and glutelin. The isoelec. point of glycinin is at the highest p_{H} and of legumelin the lowest. The order of increasing free amino N is glycinin, glutelin and legumelin. Glycinin, the main protein of soy beans, has the isoelec. point of the highest p_{H} value, the highest sp. rotation, nitrogen content and free amino N. H. R. K.

The enzymic oxidation of oxalic acid by plant seeds. A contribution to the knowledge of the constitution of oxalic acid. TORSTEN THUNBERG. *Skand. Arch. Physiol.* 54, 6-16(1928).—Powdered seeds of *Nalva crista* or exts. of the same as well as other seeds show an increased capacity to reduce methylene blue *in vacuo* after the addn. of $\text{K}_2\text{C}_2\text{O}_4$. The oxalate seems to participate as a H donor, which presupposes the hydration of the mol. The reaction is thought to proceed thus: $\text{K}_2\text{C}_2\text{O}_4 + 2\text{H}_2\text{O} \longrightarrow [\text{C}(\text{OH})_2\text{OK}]_2 \xrightarrow{-2\text{H}^+} 2\text{KHCO}_3$.

S. MORGULIS

Casein: acid casein and rennet casein, and the conversion of the former into the latter. CH. PORCHER. *École Nationale Vétérinaire, Lyon. Chimie et industrie* 19, 589-98, 809-16(1928); cf. C. A. 20, 3019.—Casein is a perfectly definite compd. of const. chem. compn, being of all the proteins (with the exception of crystd. albumin), the one that is most easily prepd. in a pure state. It occurs in milk in the form of a Ca caseinate-Ca phosphate complex. The manuf. of acid casein is based on a pptn. (not a true coagulation) of free casein (which may be considered as an insol. acid) by acidifying to the isoelec. pt ($p_{\text{H}} = \text{approx. } 4.6$); and when this reaction is carried out with proper precautions in the lab. and the ppt. is adequately purified, the product is identical, whether obtained by souring, HCl or other acid and practically free from inorg. constituents. The differences observed in practice in caseins obtained by different acid processes are due to imperfections in the method of treatment and purification, in consequence of which the products contain varying amts of impurities. From a study of the synthetic systems Ca caseinate-Ca phosphate, Ca caseinate- CaCl_2 and Ca caseinate- CaCO_3 , P. shows that the production of rennet casein proceeds in 2 stages: (1) proteolysis by the rennet of the Ca caseinate into sol. Ca paracaseinate (with splitting off of a sol. proteose equiv. to 4-5% of the wt. of the casein), and (2) pptn. or coagulation of the Ca paracaseinate by sol. Ca salts which are always present, at least in traces. The coagulum or ppt. obtained from milk and from a synthetic Ca caseinate-Ca phosphate complex contains practically the whole of the Ca phosphate (ash 7% or over according to the technic and care taken in purifying and washing); with a synthetic Ca caseinate- CaCl_2 system the ash

is reduced to 3.97%, while with a Ca caseinate CaCO_3 system it is only 3.60%. The last-mentioned coagulum is the most plastic, showing that plasticity is not due to the inorg. constituents; this is further supported by the fact that free paracasein (prepd by dissolving rennet casein and pptg. with acid at the isoelec. pt.) can be obtained almost free from ash (0.95%) and is highly plastic. Since acid casein is more or less impure free casein, dissolving in excess Ca(OH)_2 and neutralizing the excess Ca(OH)_2 with H_3PO_4 reconstitutes the Ca caseinate Ca phosphate complex which, on treating with rennet, gives rennet casein identical with that obtained directly from milk. On the other hand, since casein is proteolyzed by rennet, rennet casein cannot be converted into acid casein.

A. PAINÉAU-COUTURE

Hormones and vitamins. Apropos a new denomination for vitamins. (MME.) L. RANDOIN AND H. SIMONNET. *Bull. soc. chim. biol.* 10, 745-56(1928).—A review and discussion of recent conclusions with reference to hormones and vitamins are given. The hormones as excitors are called *endhormones*, and the vitamins are called *exhormones*.

L. W. RIGGS

Pepsin. H. PÉNAU AND J. PLÉ. *Bull. soc. chim. biol.* 10, 779-83(1928).—The object of this study was to det. the results of using acetone instead of alc. as an agent for pptg. pepsin. Five cc samples of a 10% aq. soln. of pepsin were placed in weighed centrifuge tubes and the p_{H} readings of the samples were adjusted to 1.03, 2.5, 3.6, 4.7, 5.4, 6.0 and 7.0. To each tube was added 20 cc. of acetone with brisk agitation, when the tubes were corked and allowed to stand from 0 to 48 hrs. before centrifuging at high speed until the liquid cleared. The liquid was poured off and the tubes with the pptd. pepsin were dried in a desiccator over P_2O_5 with a vacuum of 2 mm. Hg and were weighed. The pptd. pepsin was tested for pepsinic activity by the method of the Codex. The wt. of the ppt. obtained was slightly less than that of the pepsin used, indicating a sparing soly. in acetone. At p_{H} 1.03 the ppt. was insol. in 0.9% NaCl soln. and completely inactive. At p_{H} 2.5, which is near the isoelec. point of pepsin, the activity was entirely conserved even after 48 hrs. of contact with acetone. At p_{H} 3.6, 4.7, up to 48 hrs. and 5.4 up to 15 hrs. of contact with acetone, the wts. and activities are practically the same as at p_{H} 2.5. Beyond 15 hrs. of contact with acetone at p_{H} 5.4 the activity of the pptd. pepsin begins to decrease. At p_{H} 6.0 the av. activity of the pptd. pepsin decreased 50% after 1 hr. of contact with acetone, and at a p_{H} of 7.0 this decrease was 90%.

L. W. RIGGS

Limit of degradation of the lactotyrynes by trypsin. S. POSTERNAK. *Compt. rend.* 186, 1762-5(1928).—From the products of tryptic digestion of casein it is possible to isolate the α , β and γ lactotyrynes (cf. *C. A.* 21, 1281, 2278) in addn. to a polypeptide having the formula $\text{C}_{48}\text{H}_{100}\text{N}_{11}\text{O}_{42}\text{P}_4$, and which represents the ultimate product of degradation of the lactotyrynes by trypsin. No other oxamino acid than serine was found among the fragments of hydrolysis.

L. W. RIGGS

Action of different races of beer yeast on the blood sugars. E. J. BIGWOOD AND A. WUILLOR. *Compt. rend. soc. biol.* 99, 347-9(1928); cf. *C. A.* 21, 1468; 22, 2177, 2588.—The disagreements in the exptl. results of Fontes and Thivolle and the authors are attributed to particular sp. action of different races of yeast. **Nonfermentable residue of the blood serum or plasma.** *Ibid* 349-52; cf. *C. A.* 22, 2178.—The total glucemia was practically the same whether H_2WO_4 or Zn(OH)_2 was used as a defecating agent. An unfermentable residue remains after defecating with Zn(OH)_2 , but not with H_2WO_4 . **Proteinic sugar of the blood.** *Ibid* 352-6; cf. *C. A.* 22, 2178.—The difference of the reducing powers before and after acid hydrolysis of the blood serum does not det. the proteinic sugar of the serum.

L. W. RIGGS

Enzymes of oil-bearing seeds. X. Glycerophosphatases. O. FERNÁNDEZ AND A. PIZARROSO. Facultad de Farmacia de Madrid. *Anales soc. españ. fís. quim.* 26, 118-21(1928); cf. *C. A.* 15, 3852.—Glycerophosphatase, discovered by A. Némec (*C. A.* 13, 2904) in seeds of various plants, was investigated in order to complete data on enzymes of oil-bearing seeds. The enzyme which splits off glycerophosphoric acid was found in many oil seeds. The activity of the enzyme is increased by slight acidity, as Némec has shown. It was not possible to prove the favorable effect of glycerol; in fact it tends to decrease rather than increase the activity of the enzyme. E. M. S.

Effect of some of the chemical constituents of tubercle bacilli on the protoplasm of *Ameba dubia*. PAUL REZNIKOFF. Cornell Univ. Med. Coll. *J. Exptl. Med.* 48, 193-7(1928).—Protein fractions derived from tubercle bacilli are toxic to the interior of *Ameba dubia* but have no action on the plasmalemma. Phosphatide fractions dissolve the plasmalemma but have no effect on the internal cytoplasm. The fatty acid fraction has a marked solvent action on the plasmalemma when brought into contact with the surface of the cell. When injected it may slowly penetrate the cytoplasm to dis-

solve the contiguous plasmalemma. The polysaccharide fraction has no effect upon the surface membrane or upon the internal cytoplasm of *Ameba dubia*. C. J. WEST

Rapid formation of adipocere during cadaveric putrefaction. ET. BARRAL. *J. pharm. chim.* 7, 486-7(1928).—See C. A. 22, 969. S. WALDBOTT

The agricultural biochemistry building at the University of Minnesota (GORTNER)
2. Barley proteins (BISHOP) 16.

LUMIÈRE, AUG.: *La vie, la maladie et la mort. Phénomènes colloïdaux.* Paris: Masson et Cie. 520 pp. Reviewed in *Chimie et industrie* 19, 1181(1928).

RONDONI, P.: *Elementi di biochimica con applicazioni alla patologia ed alla diagnostica.* 2nd ed. revised and enlarged. Torino: Unione tip. edit. torinese (V. BONA). 1177 pp.

SLOEP, A. C.: *Onderzoekingen over pectinestoffen en hare enzymatische ontleding.* Delft: W. D. Meinema. 161 pp. Fl. 3.90.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Urine analysis. A. JOLLES. *Arch. Pharm.* 265, 717-20(1927); cf. Piorkowski, *Ibid* 264, 460.—When thymol is used as a preservative there is risk that erroneous results will be obtained in the Obermayer, Jaffé or Salkowski tests. The violet color due solely to the thymol is, however, easily distinguished as being such. Piorkowski recommends Spiegler's test for albumin, but this test sometimes gives a positive indication with normal urine, and sometimes fails to indicate albumin even when present, because there is a lack of NaCl in the urine. The author recommends a modified test, details of which are given, but suggests that reliance should not be placed on a single reagent. As confirmatory tests the ferrocyanide, AcOH, sulfosalicylic acid and the modified Spiegler are recommended, the last of which is the most sensitive. B. C. A.

Alcoholic potassium hydroxide as a microchemical reagent for starch and aleurone. FRITZ NETOLITZKY. *Festschrift A. Tschirch* 1926, 362-5; *Chem Zentr.* 1927, I, 2933.—Starch grains are altered by concd. alc. KOH only when the latter is warm, and different types of starch change at different rates. Aleurone granules in alc. KOH assume at first a globoid appearance, but after some time the protein crystalloids are clearly visible. By further soln. and warming, the changes progress. Alc. KOH does not attack starch, but removes fats and proteins. The residual globoids are examd. microscopically. Aleurone granules from *Bertholletia* seeds contained 13-15% ash, which consisted in turn of 35-36% P₂O₅, 8.5-9.5% CaO and 17-19% MgO. The mineral residue of 30% consisted of about 50% K₂O, which with H₃PO₄, Mg and Ca is regarded as an integrant component of the globoids. C. C. DAVIS

The clinical study of the quantitative bilirubin measurement in blood (bilirubin index) with special reference to its clinical value. KOKICHI NAKASHIMA. Imp. Univ., Kyoto, Japan. *Acta Schol. Med. Univ. Imp. Kioto* 9, 327-41(1927).—The method of Meulengracht was found most satisfactory for the detn. of bilirubin in the blood if carotemia is excluded. Blood samples were taken in the morning before food was taken. Normal bilirubin index is 1 to 5 and bilirubinuria appears when it exceeds 20. In simple icterus or with gallstones it may reach as high as 200. The bilirubin index in this condition soon reaches a max. and remains at this level until the cessation of the disease. In other liver diseases (spirochetosis icterohemorrhagica japonica, distomiasis hepatitis, carcinoma, sarcoma and cirrhosis) high values were also found. In pneumonia, hemophylia, purpura hemorrhagica, HgCl₂ poisoning, dysentery and ankylostomiasis duodenalis normal values for the bilirubin index were obtained. In one case of paroxysmal hemoglobinuria the value was slightly elevated while in a case of gastric carcinoma in which there was a liver metastasis, a high value was found. In some cases the blood bilirubin index shows a high value while visible jaundice is only slight. This offers a method for the study of latent jaundice as well as for studying the course of other liver diseases. H. J. DEUEL, JR.

A benzidine test for blood. K. SCHERINGA. *Pharm. Weekblad* 65, 712-3(1928).—The benzidine-H₂O₂ test for blood is not conclusive unless precautions are taken to insure the absence of other catalysts. Positive reactions were obtained with sand, wheat flour and talc. If the benzidine test for blood in feces is positive, the test should be confirmed by applying it to the residue obtained by evapg. the Et₂O ext. of a sample acidified with AcOH. A. W. DOX

Basal metabolism. IX. Simplified calculation for gasometer gas-analysis method. W. H. STONER. *J. Lab. Clin. Med.* 12, 884-8(1927); cf. C. A. 20, 1824.—Simplified formulas are developed for calcg. the respiratory quotient and basal metabolic rate from

gas analysis and gasometric data. The formulas for the basal metabolic rate are applicable to the Harris-Benedict, Dreyer or Aub and DuBois standards. **X. Simplified data blank for gasometer gas analysis.** *Ibid* 13, 164-71.—A blank for recording the data and calcs. described in the foregoing paper is described and illustrated. H. G.

A method of obtaining alveolar air from normal dogs and a comparison of the carbon dioxide tensions of alveolar air and arterial blood. RALPH G. SMITH AND PETER HEINBECKER. Washington Univ., St. Louis. *Am. J. Physiol.* 84, 271-82(1928).—Dogs were trained to lie quietly wearing a plaster of Paris mask to which valves were so connected that a portion of the air last expired was automatically collected. Alveolar air collected in this way was compared with arterial blood collected from the left ventricle with respect to CO_2 and O_2 . Equil between the air and blood was shown to exist for CO_2 but not for O_2 . J. F. LYMAN

Simultaneous determination of the pulmonary and systemic circulation times in man and of a figure related to the cardiac output. W. F. HAMILTON, JOHN W. MOORE, J. M. KINSMAN AND R. G. SPURLING. Univ. Louisville. *Am. J. Physiol.* 84, 338-44 (1928).—Na tetraiodophenolphthalein was injected into a vein in man and its appearance and reappearance in blood from the radial artery were timed. In dogs injection was into the right ventricle and appearance in the left ventricle. J. F. LYMAN

A simple slide rule for the calculation of respiratory quotients. W. A. M. SMART. *Proc. Physiol. Soc., J. Physiol.* 64, ix(1927).—This slide rule is designed for the rapid detn. of the respiratory quotient from the % compn. of the inspired and expired air. J. F. LYMAN

A characteristic reaction for bilirubin. LODOVICO BECCARI. *Boll. soc. ital. biol. sper.* 3, 332-3(1928).—B. studied the effect of various oxidizing agents on bilirubin in acid and alk. solns. and detd. the exact conditions in which bilicyanin is formed regularly. He combined the action of ammoniacal ZnCl_2 with that of iodine (soln. iodine-iodide) in such a manner that the oxidation of the pigment was arrested at the blue stage. A small amt. of ZnCl_2 was added to the bilirubin followed by a few drops NH_4OH and then a dil. soln. of iodine-iodide was poured drop by drop until a bright green-blue coloration was formed which had the characteristic spectrum of bilicyanin in alk. soln. This consisted of three well-defined absorption bands. The first very intense in the red region touched the line C ($\lambda = 656$) with limits λ 658- λ 627; the second, not so intense, in the yellow, covered the line D ($\lambda = 589$) with limits λ 658- λ 627; the third began at the line E ($\lambda = 527$) and in concd. solns. covered the entire violet region; in weak solns. it reached $\lambda = 503$. Further oxidation of bilicyanin with iodine-iodide changed the color to a yellowish rose, with an intense green fluorescence. P. M.

The determination of the sodium content of small amounts of serum or heparinized plasma by the iodometric method. M. DOROTHY ROURKE. Harvard Univ. *J. Biol. Chem.* 78, 337-44(1928).—By modifications of the Kramer-Gittelman method for the detn. of Na, R. was able to det. Na in serum or plasma without the removal of proteins, on either ashed or unashed samples. The detn. could be made on as little as 0.3 g. plasma or serum. C. RIEGEL

Method of determination of the respiratory elimination of acetone by man. R. COQUOIN. *Compt. rend.* 186, 1581-2(1928).—The normal human subject after 12 hrs. fasting and complete repose was given by mouth 5 cc. of acetone dild. with 120 g. of sweetened water (10%). After 15 min., 30 min. and thereafter at 30 min. intervals the expired air for periods of 5 min. was passed from a Tissot mask into a Cloez bubbler contg. NaHSO_3 20 g., Na_2SO_3 5 g. and H_2O up to 120 cc. The acetone was distd. from the sulfite soln. in a current of steam and estd. iodometrically. During the first 3 hrs. following the ingestion, 2 to 3 mg. of acetone were recovered from the expired air of a 5-min. period and 1.0 to 1.8 mg. were recovered during a 5-min. period after 6 or 7 hrs. L. W. RIGGS

Detection by micro-incineration of sodium and potassium in the cytoplasm of the red corpuscles. A. POLICARD AND D. PILLET. *Compt. rend. soc. biol.* 99, 85-6(1928).—The Na and K are converted to sulfates. This involves a somewhat complicated procedure of treating the corpuscles on the slide with SO_3 to avoid displacing certain elements of the corpuscles. L. W. RIGGS

Micro-estimation of glycogen in the liver. H. BIERRY AND B. GOUZON. *Compt. rend. soc. biol.* 99, 186-8(1928).—The tissue is dissolved in 35% KOH soln. and autoclaved at 120° for 30 min. After cooling the KOH is neutralized with an excess of HCl and the liquid again autoclaved at 120° for 30 min. The excess of acid is then neutralized and the proteins are removed by means of $\text{Hg}(\text{NO}_3)_2$ and the glucose is detd. by the micro-method of Bierry and Gruzewska. L. W. RIGGS

Micro-estimation of glucose: application to the determination of liver glycogen.

H. BIERRY AND (MLE.) L. GOIRAN. *Compt. rend. soc. biol.* **99**, 253-5(1928).—The method consists in heating, for 6 min. in the boiling water bath, 3 cc. of liver ext. with 6 cc. of cuproalkaline liquid and detg. the Cu_2O formed by the Mohr-Bertrand method.

L. W. RIGGS

Micro-estimation of glucose. L. DE SAINT-RAT. *Compt. rend. soc. biol.* **99**, 474-5 (1928).—The method of Bierry and Goiran (cf. preceding abstr.) compared with the author's method (cf. *C. A.* **14**, 3091) shows slightly higher figures for the latter. This difference is attributed to the difference in reduction time in the 2 methods.; L. W. R.

Detection of acetone. ANDREW WALLHAUSER. *J. Am. Med. Assoc.* **91**, 21 (1928).—This clinical method depends on the formation of a ppt. in a hanging drop of Scott-Wilson reagent suspended from the mouth of a container holding blood or urine.

L. W. RIGGS

Comparison of the colorimetric determination of adrenaline by Folin, Cannon and Denis, and by Suto and Inouye with the rabbit intestine segment method. TAKEO KOJIMA AND SHIDZUKA SAITO. *Tôhoku J. Exptl. Med.* **10**, 528-45(1928).—The values yielded by the two methods did not coincide, the ratio of the colorimetric to the biologic figures ranging between 1 to 1.1 and 1 to 2.1 in 5 expts. Suto's ext. cannot be simply applied to the rabbit intestine strip. **Experiments on the medulla of the bovine suprarenal gland.** *Ibid* 546-59.—By the application of liquid air for pulverizing and mixing the medullary tissue of the suprarenal body uniform material was obtained for the tests. Both methods have the same valuation for extg. and estg. the adrenaline in the bovine suprarenal medulla.

L. W. RIGGS

Differentiation of eosinophile and pseudo-eosinophile cells by means of peroxidase reaction (copper method) on the smear and in the counting chamber. HIROSHI SAKURADA. *Tôhoku J. Exptl. Med.* **11**, 1-5(1928). **Differentiation of eosinophile and pseudo-eosinophile leucocytes in rabbit blood by use of the oxidase reaction.** (Smear method and counting chamber method.) KENJI SHOJI. *Ibid* 6-9. The proper time for oxidase reagent (Winkler-Schultze) and peroxidase reagent (copper method) to be used. KAZUE SUZUKI. *Ibid* 10-3.—The papers comprise the 13th, 14th and 15th reports of the peroxidase reaction. The last paper refers to the keeping qualities of the reagents.

L. W. RIGGS

Tables for calculation of color index, volume index and saturation index based on recently determined standards. EDWIN E. OSGOOD. *J. Lab. Clin. Med.* **12**, 899-906 (1927).

ETHEL W. WICKWIRE

An apparatus for rapid quantitative routine determination of albumin and sugar in urine. JAMES J. SHORT. *J. Lab. Clin. Med.* **12**, 1205-8(1927).

E. W. W.

The x-ray diagnosis of chemical and industrial materials and a new type of biological and medical diagnosis (CLARK) 3.

BANG, IVAR: *Mikromethoden zur Blutuntersuchung*. 6th revised ed. Edited by Gunnar Blix. München: J. F. Bergmann. 54 pp. M 4.20.

Handbuch der biologischen Arbeitsmethoden. Edited by Emil Abderhalden. **Abt. 5. Methoden zum Studium d. Funktionen d. einzelnen Organe d. tier. Organismus.** **Tl. 3B, H. 4.** Die Darstellung von Insulin. Die Standardisierung von Insulin, by C. H. BEST. Physiologische Cholinbestimmungen, by J. W. LE HEUX. *Handbuch der biologischen Arbeitsmethoden*. Edited by Emil Abderhalden. Berlin and Vienna. Urban & Schwarzenberg. **Abt. 4. Angewandte chemische u. physikal. Methoden.** **Tl. 4.** Untersuchungen von gewebe u. Körperflüssigkeiten. **A. Blut u. Lymphe.** **H. 7 (Schluss).** ARNO ED. LAMPÉ: *Methodik d. Gewinnig. von Exsudaten u. Transsudaten.* E. MARK: *Einige amerikan. Mikromethoden zur Blutanalyse.* Pp. 1491-1552. Lfg. 241. M. 4.50. **Abt. 11. Chemische, physikalische und physikalisch-chemische Methoden zur Untersuchung des Bodens u. der Pflanze.** **Tl. 3. Ernährung. u. Stoffwechsel d. Pflanzen.** **H. 6.** JULIUS STOKLASA: *Biochem Methoden auf d. Gebiete d. Pflanzenhygiene.* HERMANN THOMS: *Die Phytochemie als Hilfsmittel zur Lösg. phylogenet. Fragen.* Pp. 865-997. Lfg. 243. M. 7.

C—BACTERIOLOGY

C. B. MORREY

The relation of combined nitrogen to the physiological activity of *Azotobacter*. A ZOOND. *Brit. J. Exptl. Biol.* **4**, 105-13(1926); *Physiol. Abstracts* **12**, 189.—The amt. of atm. N fixed in culture solns. of *Azotobacter* is decreased by increasing the concns. of nitrate, amino acid or peptone available. The addn. of sterile unheated plant exts. at first increases the amt. fixed, probably because it stimulates cell multiplication, but

heavy application checks this assimilation. *Azotobacter* would seem, therefore, to prefer to use combined N when such is available. H. G.

The production of gluconic acid by the *Penicillium luteum-purpureogenum* group. II. Some optimal conditions for acid formation. H. T. HERRICK AND O. E. MAY. *J. Biol. Chem.* 77, 185-95(1928).—The effect of varying the temp., glucose concn. and inorg. nutrient media on the production of gluconic acid by *Penicillium* was studied. A temp. of 25°, a glucose concn. of 20 to 25%, and a nutrient salt soln. contg. 0.25, 0.05, 0.1 and 1.0 g. of $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, KCl, Na_2HPO_4 , $12\text{H}_2\text{O}$ and NaNO_3 , resp., per l. of soln., gave the optimal results. ARTHUR GROLLMAN

Typical poisons for the metabolism of yeasts. WOLFGANG HEUBNER AND ROLF MEIER. *Nachr. Ges. Wiss. Gottingen Math. physik Klasse* 1927, 115-24.—A study of cell poisons was made by means of a manometric measurement of changes in O_2 consumptions and CO_2 evolution. The work was done with distillery yeasts, bottom yeasts and torula suspended in a soln. of 1% K_2HPO_4 and 3% $\text{C}_6\text{H}_{12}\text{O}_6$ at 28°. No increase in the life activity as indicated by O_2 consumption could be attributed to traces of poisons. A series of tabulated results is given for the following substances: Ag_3PO_4 , HgCl_2 , $\text{K}_2\text{Cr}_2\text{O}_7$, As_2O_3 , $\text{C}_6\text{H}_5\text{OH}$, quinine chloride, chloropicrin, mustard oil, cantharidin, histamine chloride and Me arsinoxide. N. A. LANGE

The antibacterial and anticomplementary action of bile. W. PFANNENSTIEL. *Z. Immunol.* 52, 445-67(1927).—Pure bile itself is not an ideal culture medium for typhoid bacilli, but when combined with serum the antibacterial action of both substances is inhibited and the mixt serves as an excellent enrichment medium. The higher the bactericidal action of the serum the higher the concn. of bile which must be used to neutralize this action. The bactericidal action of bile begins to be lessened when dild. 1:10. Bile acid salts alone inhibit the antibacterial action of serum but not urea. The destruction of the antibacterial action of serum is assocd. with a destruction of hemolytic complement function. The action of bile and bile acid salts rests on physicochem. changes which are produced on the colloidal system of proteins and lipoids of serum. JULIAN H. LEWIS

The octoplasma of bacteria. (The Gram stain, the nucleus of bacteria and the chemistry of disinfection.) Also remarks on the work of Gutstein. JOSEF SCHUMACHER. *Centr. Bakt. Parasitenk. I Abt. Orig.* 107, 161-80(1928).—This is a discussion of the previous work of Schumacher and of Gutstein (*C. A.* 21, 935). JOHN T. MYERS

To what extent are the numbers of typhoid bacilli influenced by osmosis and hydrogen-ion concentration during passage through the intestinal canal? KARL W. CLAUBERG. *Centr. Bakt. Parasitenk. I Abt. Orig.* 107, 184-9(1928).—The no. of typhoid bacilli gradually decrease from the duodenum to the rectum, apparently because of higher salt and acid concn. in the rectum. JOHN T. MYERS

The influence of the sodium salt of yatren on rabies virus. BORIS ABADJEFF. Robert Koch Inst., Berlin. *Centr. Bakt. Parasitenk. I Abt. Orig.* 107, 202-5(1928).—Equal vols. of fixed rabies virus (10% brain emulsion in isotonic NaCl) and 5% yatren mixed and kept at 37° for 3 hrs. became avirulent, as tested by subdural guinea-pig injections. JOHN T. MYERS

The identification of a number of strains of milk streptococci, with special reference to the isolation of *Streptococcus agalacticus* of Guillebeau. M. KLIMMER, H. HAUPT AND ELM. ROOTS. Veterinary Hygienic Inst., Leipzig. *Centr. Bakt. Parasitenk. I Abt. Orig.* 107, 206-31(1928). JOHN T. MYERS

The destruction of lower alkylamines by bacteria. ALEXANDER JANKE. Techn. Hochschule, Wien. *Centr. Bakt. Parasitenk. II Abt.* 74, 25-6(1928); cf. *Ibid* 71, 193-232(1927).—The term, "primoramino-microbes," is better than the term, "protamine bacteria." JOHN T. MYERS

The influence of radium on the metabolism of bacteria concerned in the nitrogen cycle in nature. JULIUS STOKLASA AND J. KŘÍČKA. *Centr. Bakt. Parasitenk. II Abt.* 74, 161-83(1928).— β - and γ -Rays depress the transformation of elementary N to nucleoproteins and albumins in the cells of *Azotobacter chroococcum*. α -Rays decrease the activity of ammonifying bacteria. β - and γ -Rays favor the action of proteolytic enzymes. Below a concn. of 28 ME, Ra emanation has no effect on denitrification; above this, it is a depressant; β - and γ -rays have no effect. Weak β -radiation stimulates bacterial hydrolytic and autolytic processes, while strong radiation gradually inhibits them. When *Azotobacter* acts on glucose the amt. of CO_2 is increased by α - and decreased by β - and γ -rays, the amt. of lactic acid is increased by all, the amt. of alc. is decreased by α and increased by β and γ , the aldehyde is increased by all, the AcH is increased by α and decreased by β and γ , and the HCOOH is increased by α and decreased by β and γ . Splitting of proteins by enzymes of denitrifying bacteria is little

influenced by α but markedly increased by β and γ . The N appears chiefly as amides and diamino compds. This process is of considerable significance in pathology and therapeutics.

JOHN T. MYERS

The occurrence of phytase in some yeasts and *Aspergillus oryzae*. CHŪJIRŌ SHIMODA. *Centr. Bakt. Parasitenk. II Abt.* 71, 232-47(1927).—Phytin from rice bran is a Ca-Mg salt of inositol-hexaphosphoric acid. On purification it splits off Mg more easily than Ca. It is decompd. by drying at 100° in *vacuo*. A soln. gives a yellow ppt. on warming with acid NH_4 molybdate. The yeasts, *Pichia farinosa* and *Mycoderma A. Takagashi* and *Aspergillus oryzae*, thrive with phytin as the only source of N, and contain phytase.

JOHN T. MYERS

The decomposition of agar, xylan, etc., and the sugars related to these hemicelluloses by *Vibrio andoi* (n. sp.). K. AOI AND J. OIKURA. Imperial Agr. Expt. Sta., Tokio. *Centr. Bakt. Parasitenk. II Abt.* 74, 321-33(1928).—A new aerobic microorganism was sepd. from a sub-culture of bacteria which decomp. cellulose. In pure culture it does not act on cellulose, but readily attacks xylan, agar, konjac-mannane and starch, utilizing these as a source of C for growth. It also utilizes cellobiose, xylose, galactose, glucose, mannose and fructose, but not peptone, as a source of C. NH_4 salts or NO_3 are adequate as a source of N, but peptone is not. Galactose inhibits its growth at concns. above 0.03%, and peptone above 0.25%. An infinitesimal quantity of an unknown substance is essential to growth, which is present in Witte peptone. The organism may be of value in cellulose decompn. by removing xylan from raw materials such as straw, making it more accessible to other organisms.

JOHN T. MYERS

The action of iron, zinc and copper salts on *Aspergilli*. MAX ROBERG. *Centr. Bakt. Parasitenk. II Abt.* 74, 333-70(1928).—Nutrient materials were freed from heavy metals, not by absorption with CaCO_3 , but by repeated recrystn. or distn., thus avoiding changes. *A. niger*, *fumigatus* and *oryzae* fail to grow in the absence of Fe or Zn. Cu stimulates fruiting. *A. niger* does not become black in the absence of Cu. The bibliography is very extensive.

JOHN T. MYERS

A thermophile coagulating milk under practical conditions. R. V. HUSSONG AND B. W. HAMMER. *J. Bact.* 15, 179-88(1928).—A thermophile was isolated from skim milk, which rapidly coagulated milk at 71°, because of formation of lactic acid of the *d* type. Volatile acid production was low. It only slightly increased the sol. N of the milk. It is believed to be an undescribed species and the name *Bacillus calidolactis* is proposed.

JOHN T. MYERS

A strain of *Clostridium welchii* causing abnormal gassy fermentation in Emmentaler or Swiss cheese. WM. R. ALBUS. *J. Bact.* 15, 203-5(1928).—A non-pathogenic strain of *Cl. welchii* was isolated from a Swiss cheese which showed abnormal gassy fermentation. Other factors than the presence of the gas-producing organism play an important part in detg. the type of gassy fermentation in cheese.

JOHN T. MYERS

The decomposition of cellulose by aerobic bacteria. RENÉ J. DUBOS. New Jersey Agr. Expt. Sta. *J. Bact.* 15, 223-34(1928).—A rapid and abundant growth of aerobic cellulose-splitting bacteria is obtained by the use of the following medium which is simple and very specific: NaNO_3 0.5, K_2HPO_4 1.0, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ 0.5, KCl 0.5, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ 0.01, distd. water 1000 g. Five cc. of this medium are placed in test tubes contg. a strip of filter paper partly immersed. The slightly alk. reaction of the medium (p_{H} 7.5) favors the growth of bacteria and retards that of fungi. The low concn. of N salts shortens the incubation period of bacteria, since, in almost all cases, cellulose decompn. can be recorded after 36 to 72 hrs. at 28°. Growth is obtained when only 1 or 2 cells are used for inoculation, making possible the use of the diln. method for detg. the nos. of cellulose bacteria and for isolating them in pure culture. Pure culture of organisms belonging to 3 different physiol. groups have been isolated by this method: (a) strict aerobes, unable to utilize any C compds. tested except cellulose; (b) strict aerobes, cellulose decomposers growing well on starch agar, but not on nutrient agar; (c) facultative anaerobes, cellulose decomposers, growing well in all ordinary media. For the aerobes, NH_4 salts and nitrates seem satisfactory sources of N. Peptone retards the growth considerably.

J. T. M.

The fermentation of maltose by *Bacterium pullorum*. PHILLIP R. EDWARDS. Kentucky Expt. Sta. *J. Bact.* 15, 235-43(1928).—When unheated maltose soln. is added to serum water which has been previously sterilized, *Bact. pullorum* does not ferment the sugar within 24 hrs., but upon prolonged incubation acid may be produced. It seems that *Bact. pullorum* does not attack dextro-maltose but may produce acid from the products of alk. hydrolysis of maltose, since cultures free from fermentable sugar may reach an alk. of p_{H} 8.15, which can hydrolyze maltose. Of 88 strains employed, none could ferment dulcitol; hence it is safer in differentiating *B. pullorum* from *B. sanguinarum* than is maltose.

JOHN T. MYERS

Some conditions affecting the production of gelatinase by proteus bacteria. ALICE T. MERRILL AND W. MANSFIELD CLARK. Hyg. Lab., U. S. Public Health Service. *J. Bact.* 15, 287-96(1928).—Results in investigations of the production of gelatinase by bacteria can be duplicated in synthetic media but not in peptone broth. A no. of synthetic media were tried. In the absence of both Ca and Mg, no gelatinase was demonstrable, which cannot be explained by the slight resulting decrease in no. of organisms. In the presence of Ca alone the production of gelatinase was small; with Mg alone it was only fair as compared with the amt. formed in the presence of both. *Proteus* can produce gelatinase under anaerobic conditions when glucose or small quantities of nitrate are added to a lactate synthetic medium. There is a good bibliography.

JOHN T. MYERS

Bacterial metabolism. The influence of phosphate buffer in carbohydrate-free and in glucose-containing media. CHARLES F. SLANETZ AND LEO F. RETTGER. Yale Univ. *J. Bact.* 15, 297-317(1928).—Phosphate buffer in reasonable amts. (1%) will in many instances maintain a sufficiently low level of H-ion concn. to permit nitrogenous changes in the substrate as though no utilizable carbohydrate were present. This ability differs with bacterial species or even with members of the same species. The methods used in the study of N metabolism were comparative detns. of total protein, non-protein, NH_3 , amino and polypeptide N and biuret.

JOHN T. MYERS

The effect of hydroxyl-ion concentration on the thermal death rate of *Bacterium coli*. R. P. MYERS. Cornell Univ. *J. Bact.* 15, 341-56(1928).—Different buffer mixts. of approx. the same p_H exert very different germicidal effects; the effect of p_H can only be compared with a single buffer system. Increase in p_H on the alk. side of neutrality increases the power of a given soln. to destroy *B. coli* at a given temp. J. T. MYERS

The carbohydrate metabolism of *Ps. aeruginosa* (*B. pyocyaneus*). H. J. SEARS AND M. F. GOURLEY. Univ. of Oregon, Med. School. *J. Bact.* 15, 357-66(1928).—*Ps. aeruginosa* produces an acid reaction in glucose peptone, and in glucose peptone meat ext media when the N content of the medium is kept low. Only a small quantity of glucose is used. When the N content is high (2% or more of peptone) no acid reaction is produced but large amts. of glucose are utilized. When other sugars are used in place of glucose an acid reaction is not produced even when N is low. Many sugars can be utilized, since while *Ps. aeruginosa* will not grow in an NH_4 tartrate mineral-salt medium, the addn. of such sugars causes good growth. JOHN T. MYERS

The electrophoresis of diphtheria bacilli. I. Some relations between the virulence, toxigenicity and electrophoretic mobilities of diphtheria bacilli. L. B. JENSEN AND I. S. FALK. Univ. of Chicago. *J. Bact.* 15, 367-411(1928).—Five avirulent and 45 virulent strains of diphtheria bacilli were indistinguishable when tested on the following substances: fucose, *d*-arabinose, *a*-glucoheptose, *a*-mannoheptose, cellulose, melibiose, trehalose, melezitose, rhamnose, xylose, levulose, glucose, galactose, mannose, sucrose, lactose, maltose, raffinose, inulin, starch, glycogen, dextrin, dulcitol, erythritol, *d*-mannitol, adonitol, *d*-arabitol, glycerol, arbutin, α -methyl glucoside, salicin, amygdalin, mannonic acid lactone, gulonic acid lactone, glucosamine-HCl, glucose, levulose, galactose, maltose, dextrin and glycerol were fermented alike by the 50 strains. Acid was not produced from any of the other substances except glucosamine-HCl and 5 virulent and 1 avirulent strain failed to ferment it. Measurements of electrophoretic potentials on 48-hr. veal broth cultures of toxogenic strains gave p. ds. of 4.2 to 1.0 μ per sec. with an av. of 3.4 μ . Similar measurements on avirulent strains which ferment glucose gave a p. d. of 12.1 μ . Non-fermenting avirulent strains gave p. d. of 7.9 to 10.0 μ . Some culturally typical but avirulent and non-toxogenic gave a p. d. of 4.4 to 6.2 μ . These p. ds. were not due to differences in p_H . Distd. water suspensions of corynebacteria washed 3 times in distd. water gave the following potentials: avirulent strains, 20 to 34 per sec.-110 v., virulent strains 2.6 to 11.0 per sec. There was no apparent parallism between the min. fatal dose of washed bacilli suspended in distd. water and their p. d. in the same menstruum. The toxigenicity is inversely proportional to the p. d. Salted out, purified, toxic materials depress p. d. in a quant. manner, but this has little significance till toxin can be better purified. II. Microelectrophoresis and the differentiation of virulent and non-virulent diphtheria bacilli. L. B. JENSEN AND I. S. FALK. Univ. of Chicago, AND F. O. TONNEY AND J. L. WHITE, Dept. of Health, City of Chicago. *Ibid* 413-9.—A p. d. of 5.0 μ per sec. was taken as the dividing line between virulent and non-virulent strains. In a series of 105 unknown cultures, 88 were virulent by both the electrophoretic and the guinea-pig tests, 13 were avirulent by both tests and 4 were virulent by electrophoresis and non-virulent by guinea-pig tests. Of the 4 cultures which did not agree, 3 had a p. d. of 4.8 and the other 4.2 μ per sec., thus being close to the avirulent type. III. The development of a simplified technic for electrophoretic

measurement of the virulence of diphtheria bacilli. I. S. FALK, L. B. JENSEN AND J. H. MILLS. Univ. of Chicago. *Ibid* 421-50.—Two methods are described, one using a special cell and the other, capillary tubes, the latter being the simpler will be described. Transfer 3-6 sep. colonies from 12- to 24- hr. Loeffler cultures directly to a few drops of distd. water, making a turbidity of about 1 billion per cc. The capillary tube should be a little longer than the distance between the electrodes and have a diam. of 2 to 3 mm. It is filled by capillarity and laid across the electrodes. The cell is filled with distd. water always to a definite level. Focus on the middle of the capillary. Apply a current of 25 to 50 v., and note the time required for the organisms to pass a definite distance. Reverse the direction of the current and read again. Make 10 or 12 readings. Any d. c. source of current can be used. Any microscope with a calibrated head on the fine adjustment screw will serve. A Sedgwick-Rafter ruling calibrated in μ is placed in the ocular. The cell should be wired to the source of current through a reversing switch with a small ammeter and voltmeter in circuit. The current flowing should be less than 10 milliamperes. An extra main switch is convenient. Under the influence of the external elec. field all the water moves toward the cathode at a velocity practically without a gradient across the diameter of the tube. Bacteria being negatively charged move toward the anode. Under a given set of conditions, the observed velocity is the difference between the endosmotic streaming of the water (End._w) and the electrophoretic velocity of the bacterium (Elect._b). Thus, observed motility = End._w - Elect._b. Hence the observed motility varies inversely with its true mobility.

JOHN T. MYERS

The practical application of the direct oxidase reaction in bacteriology. J. GORDON AND J. W. McLEOD. Univ. of Leeds. *J. Path. Bact.* 31, 185-90(1928).—Most of the bacteria which grow well only in the presence of O contain a thermolabile direct oxidase system which can be revealed by bringing the colonies in contact with a 1% soln. of dimethyl-*p*-phenylenediamine-HCl and subsequently exposing them to air. The dye is absorbed by the colonies and rapidly oxidized through red to black. Colonies if fished at the red stage are viable; hence a mixed plate can be flooded and reacting colonies fished. This applies especially to isolation of the gonococcus, which reacts.

JOHN T. MYERS

Further investigations on selective bactericidal action. E. ASHLEY COOPER AND JOHN MASON. Univ. of Birmingham. *J. Path. Bact.* 31, 343-51(1928); cf. *C. A.* 21, 3925.—Germicides can be divided into chem. and physico-chem. types. Dyes such as brilliant green, malachite green and crystal violet behave as chem. germicides, attacking *B. coli* preferentially to the *B. pyocyaneus* group. *B. mesentericus* is more sensitive to the physico-chem. germicides such as phenol which act by coagulation, racemization, etc. *B. proteus*, although more susceptible than *B. coli* to heat, has a greater resistance to phenol and alc. The thermophiles are highly resistant to physico-chem. disinfectants, but this is extended to certain chem. germicides as H₂O₂ and benzoquinone, although they are highly susceptible to certain dyes. Substances exerting a chem. reducing action are more highly germicidal to *B. coli* under aerobic than under anaerobic conditions. It is this secondary factor of O tension which makes reducing agents fall into the physico-chem. group instead of the expected chem. group. Under all exptl. conditions phenol attacks the pyocyaneus group preferentially, indicating that the selective action depends on internal colloidal conditions of the organism rather than on environmental factors. Picric acid and quinone behave alternatively as physico-chem. and chem. germicides according to exptl. conditions. Perhaps they have the power of either denaturing and acting chemically with cell constituents and either process may predominate under given sets of conditions.

JOHN T. MYERS

The influence of NaCl on the growth and metabolism of yeast (Speak, *et al.*) 16.

JOHNSTON, J. H., AND SIMPSON, R. H.: *The Principles of Practical Bacteriology for Scientific Workers*. London: Churchill. 118 pp. 5s. net.

D—BOTANY

THOMAS G. PHILLIPS

A chemical study of the development of cotton bolls and the rate of formation of gossypol in the cottonseed. WILLIS D. GALLUP. *J. Agr. Research* 36, 471-80(1928); cf. *C. A.* 21, 3218.—Cotton bolls picked at different stages of development show rapid changes in chem. compn. from the time the boll is first formed until ready to open. The young bolls are high in ash, N and carbohydrates. As they mature fat and crude fiber increase. Crude fiber also increases slightly after the bolls are open. The compn. of immature bolls seems to depend upon a number of factors, such as age of the boll,

time of maturation, climatic conditions during growth, and possibly nutrition of the plant. Cotton lint is variable in compn and although the mature lint is composed mostly of crude fiber other materials may be of importance. The development of oil and gossypol in the cotton seed occurs at about the same time and during a short and well-defined period of growth. The function of gossypol seems to be associated in some way with oil formation. M. S. ANDERSON

The newly discovered presence of coumarin in native plants. ALEXANDER V. LINGELSHIEIM. *Festschrift A. Tschirch* 1926, 149-54; *Chem. Zentr.* 1927, I, 2914-5.—By microsublimation with NH_3 , coumarin was found in *Prunus avium*, *Prunus fruticosa* and *Prunus fruticosa* Cerasus. Besides NH_3 , Et_2O , CHCl_3 and CS_2 vapors are suitable for bringing out the odor of coumarin. By steeping the leaves in boiling water, the ability to form coumarin is lost, whereas steam and freezing mixts promote the formation of coumarin. According to the opinion of L., the presence of coumarin in varieties of *Prunus* is an indication that they are members of some definite group. A survey of the extensive occurrence of coumarin in the plant world is included. C. C. DAVIS

The seeds of *Nerium oleander* L. HERMANN MATTHIES AND PAUL SCHUTZ. Univ. Königsberg. *Festschrift A. Tschirch* 1926, 162-73; *Chem. Zentr.* 1927, I, 2753-4.—A report of an investigation of the seeds of *Nerium oleander* L., the botanical and microscopic characteristics being described with the aid of numerous illustrations. To identify the seeds, the method prescribed by the D. A. B. V. for *Folia digitalis* was used. A bluish red zone is formed between the 2 liquids, while the upper liquid becomes after a time a delicate green. To ext. the oil, the seeds were treated with petroleum benzine (d. 0.640-0.660), and the pappus was extd. in the same way. The oil from the seeds was a clear green, while at ordinary temp. the pappus oil was turbid, an intense fluorescent green. The seeds contained 8.01% water, 17.43% fat, 2.8% N, 17.5% crude protein and 3.76% mineral substances. The oil from the seeds had a bitter taste, d_{15}^4 0.9355, n_D^{25} 1.4721, n_D^{40} 1.4669, acid no. 2.5, sapon. no. 206.8, Reichert-Meissl no. 16.30, Polenske no. 0.40, Hubl I no. (after 2 hrs.) 105.2, (after 18 hrs.) 108.6, Ac no. 12.5, Hehner no. 92.09, refraction of the Hehner fatty acids n_D^{40} 1.4595. There was 2.12% unsaponifiable material. The oil of the seta has a strongly bitter taste, contains 8% unsaponifiable substances, had d_{15}^4 0.9253, n_D^{25} 1.4550, sapon. no. 182.4, Hubl I no. (after 2 hrs.) 91.4. Oleander oil is a non-drying oil. Its water-insol. fatty acids consist of 12% solid and 88% liquid acids. These were sepd. by the Pb salt-alc. process of Twitchell. The solid fatty acids had an I no. of 3.6 and are probably a mixt. of palmitic and stearic acids. Bromination indicated that the liquid fatty acids consist of about 18% linoleic acid and 82% oleic acid. The presence of a more highly unsatd. fatty acid is possible. The unsaponifiable substances of the oil contain only a phytosterol, m. 137.5° and a sitosterol. The liquid unsaponifiable part had an I no. of 130.60. C. C. DAVIS

The red and the blue coloring matter of flowers and fruits. A. P. TSAKALOTOS. Univ. Bern. *Festschrift A. Tschirch* 1926, 291-8; *Chem. Zentr.* 1927, I, 2915.—Comparative capillary and spectral analytical studies were made of flowers and fruits which had been examd. by Willstätter and his collaborators. Cellulose was used for adsorption, according to the method of Schonbein and Goppelsröder. Three groups of flowers and fruits were investigated, those which had been considered by Willstätter to contain (1) cyanidine, (2) pelargonidine and (3) delphinidine. A no. of other plants and various vines were also examd. The blue and red coloring matter of flowers and fruits, aside from colorless cell components, is accompanied by chlorophyll and yellow coloring matter. The chlorophyll zone always lies on top in the capillary-analytical sepn., followed in most cases by a colorless or yellowish zone, and below this by the anthocyanine zone. By sepn. of the latter zone and soln. of the coloring matter in EtOH, a slightly colored soln. is obtained which becomes colored on addn. of HCl or of NaOH. Spectral analysis of this soln. showed no sharp differences in the anthocyanins. Capillary-analytical sepn. showed that the coloring matter of fresh berries of the whortleberry plant is a mixt. of 2 colored substances, though this is not true of dried whortleberries. A similar difference was found between the exts. of fresh and dried fruit of *Sambucus nigra*. The coloring matter of the radish varied from that of flowers and fruits. The coloring matter of the *Alcanna* showed by spectral analysis 2 distinct zones, as with fresh whortleberries. C. C. DAVIS

The presence and the significance of manganese in plants. D. H. WESTER. *Festschrift A. Tschirch* 1926, 321-5; *Chem. Zentr.* 1927, I, 2914; cf. C. A. 18, 141.—A summary of investigations by W. on the Mn content of a few types of digitalis, Dutch seeds, flowers and varieties of soil (cf. C. A. 17, 2339), with a report of new expts.

Mushrooms have a high ash and a low Mn content. A no. of leaves gathered at Ellemore were distinguished by their high Mn content. In *Lupinus luteus* the highest Mn content was in the active parts of the plants (young shoots and flowers). Fertilization expts. showed that Mn is of great importance to plants physiologically. It had a favorable influence on the active parts of *Prunus laurocerasus*, *Brassica nigra* and *Papaver somniferum*. C. C. DAVIS

Citrus oxidases. GUIDO AJON. *Atti congresso naz. chim. pura applicata* 2, 1092-1119 (1926).—A. has identified in the rind of citrus fruits an oxidase, a peroxidase and a catalase. Furthermore the development of the 3 enzymes was followed during the ripening of the fruit. In the rind of the green fruit a peroxidase protein in nature was sepd. which the author has designated as *sichelase*. The oxidase functions in the formation of the acid and the essences of the fruit. It is also concerned in the development of the yellow color in ripening owing to its action upon the green pigment of the ring L. T. FAIRHALL

The greasewood, *Sarcobatus vermiculatus*. A range plant poisonous to sheep. C. E. FLEMING, M. R. MILLER AND L. R. VAWTER. *Nev. Agr. Expt., Bull.* 115, 1-22 (1928); cf. C. A. 22, 3002.—A chem. examn. of 6 samples of greasewood leaves showed an av. of 4% of anhyd. oxalic acid or calcd. to a H_2O -free basis, 13.6%. Saponins were absent as were any of the common alkaloids strongly pointing to $H_2C_2O_4$ as the toxic agent. Expts. with sheep proved that greasewood caused the fatal poisoning. Hungry or salt-hungry sheep will eat greasewood leaves especially in the spring when the shoots are tender and green. Well-nourished animals usually do not consume enough to cause poisoning symptoms. C. R. FELLERS

Photosynthesis. I. C. C. BALY. *Proc. Roy. Inst. Gr. Brit.* 1928, 8 pp. (reprint); cf. C. A. 21, 3649.—To synthesize 1 g. mol. of glucose requires a min. of 673,800 cal. Although plants can absorb only 260,000 cal. from red light of wave length 660μ they can synthesize sugars under the influence of light of those wave lengths. Hence some unknown factor must operate in vital photosynthesis. From lab. expts. B. concludes that surface phenomena play an important role in the process. H. R. KRAYBILL

Feeding experiments with plants at different stages of development. III. Synthesis of vitamin in corn. MAXWELL KARSHAN, FRANCES KRASNOW AND BENJAMIN HARROW. *Columbia Univ. Am. J. Physiol.* 84, 314-20 (1928).—See C. A. 22, 2770. J. F. LYMAN

Konjak mannan. TORAO OHTSUKI. *Imp. Univ., Tokyo. Acta Phytchim. (Japan)* 4, No. 1, 1-39 (1928).—A crude powder prepd. from the tubers of *Amorphophallus konjak* yielded when taken up in water and ppt. with alc. a mannan having $[\alpha]_D^{14} = -42.8$, which caused no lowering of f. p., and yielded on hydrolysis mannose and glucose in the proportion 2:1. When treated with a malt diastase, or yeast, the mannan gave a substance (Konjak mannan) with the same rotation, and yielding the same products of hydrolysis but with a viscosity 7.7 times less than the mannan. By treating with the diastase for long periods of time a trisaccharide was obtained (levidulinose) having a rotation $[\alpha]_D^{14} = -15.6$, and yielding mannose and glucose on hydrolysis. Heating at 235° with glycerol gave a dissocn. product that is much more sol. in water, of lower viscosity, and the same rotation as the original material. The particles are of the same size as a trihexosan. The substance reassociated on standing to a higher colloid, and gave on hydrolysis mannose and glucose in the proportion 2:1. The acetylated product had a mol. wt. (dtd. by cryoscopic method) corresponding to a hexoseanhydride acetate. C. RIEGEL

Distribution of manganese in plants and its importance in plant metabolism. WILFRID B. S. BISHOP. *Australian J. Exptl. Biol. Med. Sci.* 5, 125-40 (1928).—Mn was found in the ashes of 25 species of Eucalypts. Mn in Eucalypts and other plants was most concd. in those parts of the plant where there was the most intense chem. change. By controlled plant growth expts. it was shown: (a) Mn is essential for plant development. (b) The concn. of Mn must be carefully limited to obtain beneficial results. (c) The effect of Mn is not due to reduced Fe absorption by the plant. (d) There is some relation between Mn and chlorophyll formation, and hence with C assimilation in plants. (e) Ca definitely counteracts the toxicity of high Mn concns. L. W. RIGGS

Mannan of iris seeds. H. COLIN AND A. AUGEM. *Bull. soc. chim. biol.* 10, 822-5 (1928); cf. C. A. 21, 3930; 22, 2393.—The horny material which constitutes the sugar reserve of the albumin of iris seeds is a manno-araban which yields on hydrolysis 18% arabinose and 82% mannose. This mannoaraban appears to be the same in each of the species *Iris pseudacorus*, *I. germanica* and *I. foetidissima*. L. W. RIGGS

Electrocapillary penetration of coloring materials in the cell. W. KOPACZEWSKI. *Compt. rend.* 186, 1758-61(1928).—The cells of living white flowers allow only the acid dyes to penetrate them. This penetration increases as the dispersion of the dye is greater. Only basic dyes penetrated the paramecium and this penetration did not depend on the degree of dispersion of the dye.

L. W. RIGGS

Transformation of starch granules into crystals of calcium oxalate in plant cells under the action of ultra-violet rays. G. NADSON AND F. ROCHLINE-GLEICHGEWICHT. *Compt. rend. soc. biol.* 99, 131-3(1928); cf. *C. A.* 22, 1792.—The transformation as seen under magnifications of 1000 to 1500 diams. is described and illustrated. Ultra-violet rays have a power to increase the oxidation in the cells, transforming starch to oxalic acid, with the probability of sugar as an intermediate stage. In general cells contg. a max. of CaC_2O_4 contain a min. of starch granules.

L. W. RIGGS

Staining reactions of fern gametes. J. R. JACKSON AND H. W. RICKETTS. *Science* 68, 89-90(1928); cf. Naylor, *C. A.* 21, 944.—Methods similar to those of Naylor were applied to fern antherozoids (microgametes). The prothallia of *Pteris longifolia* were grown in culture. Antherozoids were obtained by mounting prothallia in a drop of water on a slide. They were fixed by inverting the slide over 1% osmic acid for 30 sec. After drying the slides were immersed in 1% aq. solns. of stains and afterwards washed in buffer solns. composed of *M*/200 potassium acid phthalate and NaOH. The buffer solns. varied in p_H by intervals of 0.2 or 0.3 from p_H 4.1 to 6.0. The amt. of Na was held const. by the addn. of NaCl. The nucleus of the antherozoid retained the acid dyes and lost the basic dyes in buffer solns. acid to about p_H 4.5, but retained the basic dyes and lost the acid in more alk. solns. The isoelec. point of the nucleus by this method is, therefore, about 4.5. The isoelec. point of the cytoplasm in the same slides is near 5.0. Details of differential staining are given.

L. W. RIGGS

The extraction and separation of chlorophyll (a + b), carotin and xanthophyll in fresh green leaves, preliminary to their determination. F. M. SCHERTZ. *Plant Physiology* 3, 211-6(1928).—A method is described for quantitatively extg., sepg. and detg. chlorophyll (a + b), carotin and xanthophyll in fresh green leaves. The method is a modification of the one given by Willstätter and Stoll.

F. M. SCHERTZ

Coccus phyllosepticus and Coccus zymophyllosepticus m. sp. J. GRÜSS. *Wochschr. Brauw.* 45, 232-5, 241-4(1928).—The disease found on the leaves of the white sea rose, *Nymphaea alba*, is caused by the action of the cytase liberated by the above organisms.

A. SCHULTZ

The effect of the salt concentrations of the culture solution on the growth and composition of pineapple plants. C. P. SIDERIS, B. H. KRAUSS AND E. MASUNAGA. *Am. J. Botany* 15, 353-71(1928).—Pineapple plants grown in culture solns. of low concn. contain less salts than when grown in solns. of high concn. A very high salt concn. in the soln. will increase the salt content of the tissue fluid of young leaves 25 to 50% and of old leaves from 50 to 150%. The p_H of the external soln. had no influence on that of the tissue fluids. Plants grown in culture solns. of salt concn. equal to that of the tissue fluid, or higher, grew slowly and when grown in solns. of lower concns. than the tissue fluid grew very rapidly. A salt soln. of medium concn. developed the best plants. Salt content of older tissues of the same organ is higher than that of the younger tissues. Young leaves contain a lower salt concn. than older leaves. The acidity of the tissue fluid from different parts of the same organ varied considerably. The portion of the tissue fluid from different parts of the same organ varied considerably. The portion of the tissue lying between the white and green tissue of the leaf has the highest degree of acidity.

J. J. SKINNER

The importance of temperature in the use of chemicals for hastening the sprouting of dormant potato tubers. F. E. DENNY. *Am. J. Botany* 15, 395-404(1928); cf. *C. A.* 21, 1137.—When the germination of dormant potato tubers was hastened by dipping the cut tubers into a dil. soln. of ethylene chlorohydrin and storing in closed containers for 24 hrs., the temp. which prevailed during the 24-hr. storage period was found to be an important factor. Favorable results were obtained by adding 30 cc. of 40% ethylene chlorohydrin to 970 cc. H_2O at 20°, 25° and 30°, but at 35° the seed pieces were killed. The soln. was only partially effective at a temp. below 20° and many pieces remained dormant. When NaCNS was used the temp. of the soln. was of less importance. Good results were obtained at 15°, 22° and 30°. Toxicity was observed at 35°.

J. J. SKINNER

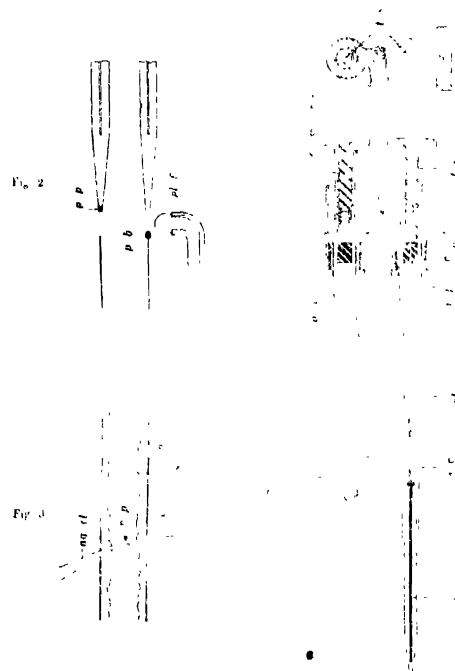
Catalase in relation to growth and other changes in plant tissue. J. F. KNOTT. *New York Agr. Expt. Sta. (Ithaca), Mem.* 106, 63 pp.(1927).—Young and old leaves of spinach and celery are usually lower in catalase activity than leaves of intermediate age. An increase of 10° in temp. increased the catalase activity of celery plants in 24

hrs. and when removed to a 10° lower temp the higher catalase content was maintained several days. No relation was found between the p_H of the juice of the plant as a whole or of the apical 2 in. of the seed stalk and the catalase activity of the intermediate leaves. No significant difference in catalase in the leaves of plants could be observed in respect to a vegetative or a reproductive type of growth. Respiration as measured by CO_2 evolution seemed to be higher in the apical tissues from vegetative plants. Fertilizing with P and N resulted in increased catalase activity. $Ca(NO_3)_2$, when added to catalase in bottles, decreased, while asparagine, sucrose and sol starch increased the activity after 24 hrs. when added in amts. which increased by 50 to 100% the N, amino acid, sugar and starch content of the tissue.

J. J. SKINNER

Potentiometric determinations in the protoplasm and cell sap of *Nitella*. C. V. TAYLOR AND D. M. WHITAKER. *Protoplasma* 3, 1-6(1927).—A non-polarizable micro-

electrode was constructed and used as a H electrode for the potentiometric measurement of the protoplasm and cell sap of *Nitella*. The protoplasm and cell sap behaved very differently toward the electrode. The protoplasm at once produced a potential of between +0.093 and +0.030 v. The values are interpreted as indicating the oxidation-reduction potential. Readings for the cell sap gave p_H values of 5.47 to 6.16. Explanation of Plate: Fig. 1.—Microelectrode enclosed within its quartz sheath which is terminal part of the micropipet apparatus, *el*, microelectrode; *i. c.*, inner cap; *o. c.*, outer cap; *p. w.*, Pt wire; *r. p.*, rubber plug enclosing small brass tube which supports quartz capillary on which is cemented electrode; *s. c.*, stopcock; *sh.*, shank of micropipet which is filled with Hg; *t. s.*, thumb-screw. Fig. 2.—Two views of micropipet tip, showing how it is sealed with paraffin plug; *p. b.*, paraffin ball on tip of quartz needle; *pl. f.*, Pt filament heated electrically for melting paraffin ball whereupon tip of pipet is brought in contact with the melting paraffin; *p. p.*, paraffin plug, formerly paraffin ball,



in tip of pipet. Fig. 3.—Diagram of portion of cell of *Nitella* showing H electrode and agar KCl electrode in cell sap, *ag. el*, agar-KCl electrode; *c. s.*, cell sap; *c. w.*, cell wall; *p. p.*, paraffin plug having been pushed out by tip of H electrode; *pr.*, streaming protoplasm, granular in contrast to the clear cell-sap.

M. H. SOULE

The permeability and the thickness of the plasma membrane as determined by electric currents of high and low frequency. J. F. MCLENDON. *Protoplasma* 3, 71-81(1927).—A review particularly of the change in resistance assocd. with life and activity.

M. H. SOULE

Temperature and other factors affecting the rest period of potato tubers. W. E. LOOMIS. Univ. of Arkansas. *Plant Physiology* 2, 287-302(1927); cf. *C. A.* 6, 241; 10, 1878; 21, 1137.—Extensive studies of the sep. and combined effects of humidity and temp. and also of nitrogenous fertilizers on breaking the rest period of Irish potatoes are described. Dormancy was broken in 4 weeks by storage during July in the attic of a low-roofed building. The optimum storage temp. varied with the size and the condition of the tubers and the duration of the expt. Temps. of 30-33° were found very satisfactory. Composted soils and low concns. of nitrogenous fertilizers had a stimulating effect. Dormancy is probably related to a greater degree to cytoplasmic structure than to chem. compn. or enzyme formation and the rest period may be broken by some such change as the reversal of the lipid, proteinaceous phases in the cyto-

plasm whereby the permeability of the cell is increased and the enzymes assocd. with the protein phase are liberated.

WALTER THOMAS

The basic nitrogen of plant extracts. HUBERT B. VICKERY. Agr. Expt. Sta., New Haven, Connecticut. *Plant Physiology* 2, 303-11(1927).—A discussion of the problem of the pptg. reagent most suitable for the investigation of the bases that occur in plant exts. Although phosphotungstic acid is fairly definite in its action on the mixt. of amino acids obtained from the hydrolysis of proteins, it is an uncertain measure of the true basic N of plants. Illustrations from V.'s investigations on yeast and alfalfa exts. (*C. A.* 18, 3407; 19, 3513, 20, 2806) are given to show that, in addn. to basic substances, phosphotungstic acid ppts. not only compds. of polypeptide nature which yield simple monoamino acids on hydrolysis but also nitrogenous substances that are not bases. This reagent is, therefore, far less selective than was formerly supposed. There is need for much further work before the different basic fractions can be sepd. from one another with certainty. The lysine fractions obtained by the usual procedure contained much N in forms other than lysine: probably a mixt. of polypeptides. Conclusion: The total N pptd. by phosphotungstic acid should be accepted as a measure of the basic N of plant exts. only when this ppt. has been produced in a relatively simple mixt. In general, pptn. with this reagent must be regarded as only a preliminary step. W. T.

Electrodialysis as a means of studying biochemical differences in abnormal apple tissue. JAMES C. MOORE, R. G. REEVES AND R. M. HIXON. Iowa State Coll., Ames. *Plant Physiology* 2, 313-24(1927).—Weighed quantities of the peelings from both diseased-free and spotted Jonathan apples were subjected to electrodialysis, a modified Mattson cell (*C. A.* 20, 3766) being used. After titration the dialyzates were evapd. to dryness and ashed. The data obtained confirmed Pentzer's theory (*C. A.* 20, 2185) that Jonathan spot was caused by a loss of acids during storage. K and Na are removed from the tissue in the first hr. of the dialyzing process, but Ca, Mg, Fe and Al are not removed until the lapse of 130 min. Conclusion: Electrodialysis offers a convenient means of studying chem. differences in the non-colloidal constituents of normal and abnormal tissue. Quant. differences which would be masked by large quantities of inert material are accentuated by this method of sepg. those portions which are sol. and chemically active.

WALTER THOMAS

Germination and growth of seeds as dependent upon selective irradiation. GEORGE M. HIGGINS AND CHARLES SHEARD. Mayo Clinic and the Mayo Foundation, Rochester, Minnesota. *Plant Physiology* 2, 325-35(1927); cf. *C. A.* 21, 3236.—The germination and growth of cucumber seeds were observed under filters of a known transmission, exposed to ultra-violet radiation for given periods of time. Selective irradiation modified the time of germination of the seeds and the rate of subsequent growth. Wave lengths of 320m μ to 390m μ in the "near" ultra-violet region (transmitted by Corning ultra-glass, 586 ÅW) were particularly effective in inducing growth; but wave lengths of 270m μ to 320m μ were inhibitory in their action, and also delay the time and reduce the rate of growth, due to coagulation of the seed albumin. Some of the energy emitted by the lamp and absorbed by the seed may be rendered ineffective by subsequent exposure of the seed to the visible and near infra-red regions of interior daylight. Certain wave lengths of radiant energy are more potent in germination than temp. With a const. temp., germination and growth in the dark greatly exceed those in daylight as transmitted by ordinary window-glass. A certain amt. of energy produced under the action of lesser wave lengths of sunlight is normally stored up within the seeds, and under proper conditions of light and moisture this energy induces germination. Lesser wave lengths of light act as stimulative agents which modify the control of endogenous processes and accelerate germination, while subsequent growth and development of the plant is a function of the visible or infra-red wave lengths. The article is illustrated with spectrograms.

WALTER THOMAS

The so-called balanophorin (ULTRÆ) 10.

E—NUTRITION

PHILIP B. HAWK

Rickets in rats. IV. The effect of varying the acid-base content of the diet. A. T. SHOHL, H. B. BENNETT AND K. L. WEED. Yale Univ. *J. Biol. Chem.* 78, 181-90(1928); cf. *C. A.* 21, 3387.—The same amt. of phosphate added to high-Ca, low-P, rickets-producing diets so that the resulting mixts. were alk., acid or neutral, resp., induced a cure of rickets in rats as manifested histologically. The blood serum under these conditions showed the characteristics of tetany with alk. diets, and of rickets with acid diets. The clinical picture showed the characteristics of tetany, occasionally in

the alk., always in the neutral and never in the acid diets. Greatest ash deposition in the bones occurred with the neutral diet; least with the acid diet. The largest retentions of Ca and P as shown by metabolic studies occurred when the neutral diet was used.

The effect of a tryptophan-poor diet. E. SCHILL. *Wiener Arch. inn. Med.* **15**, 547-60(1928).—On the theory that tryptophan is the basic substance of thyroxin, a diet high in calories but poor in tryptophan was tried in 22 cases of Basedow's disease. Such a diet may contain corn-meal and rye flour with but little wheat, no meat, but gelatin, potatoes, green vegetables, fruit, fats and carbohydrates. In 18 of the 22 cases such a tryptophan-poor diet continued for some months was followed by a lowered basic metabolism and an improvement in subjective symptoms which continued after return to a diet containing more protein. Animal expts indicate that a tryptophan-poor diet is preferable to a tryptophan-free diet.

The effects of protein-split products upon metabolism, and their relation to the specific dynamic action of proteins. DAVID RAPPORT AND H. II. BEARD. *Proc. Am. Physiol. Soc., Am. J. Physiol.* **81**, 505(1927).—In protein hydrolysis mixts. the fraction extd. by and pptd. in BuOH (monoaminomonocarboxylic acids) contained amino acids having high specific dynamic action. Phenylalanine and leucine were found to account for most of the stimulating effect in the ext. from hydrolyzed casein. The specific dynamic action of casein and gelatin cannot be explained wholly on the basis of constituent amino acids known to have such action.

Physiological investigation on baking powders. GEORGES SCHAEFFER, GEORGES FONTÈS, ELIANE LE BRETON, CHARLES OBERLING AND LUCIEN THIVOILLE. *Bull. soc. hyg. aliment.* **16**, 1-24, 49-79(1928).—Very extensive chem. and physiol. investigations, which are described in detail, lead to the following conclusions: (1) After baking, bread which has been raised with "alum phosphate baking powder" contains $AlPO_4$, which is not inert as it passes through the digestive tract. (2) $AlPO_4$ is dissolved by the HCl of gastric juice, both *in vitro* and *in vivo*. (3) The resultant $AlCl_3$ is not reprecipitated in the duodenum by the alk. pancreatic juice when the chyme is neutralized; bile prevents this reaction to a certain extent, in a manner as yet undetd. (4) Resorption of Al is shown by the fact that Al is found in detectable amts. in certain organs after prolonged ingestion of baking powders with Al base; microchem. detn. of Fe in the spleen shows a decrease in the Fe reserve of that organ, suggesting a displacement by Al. (5) Ingestion of bread contg. $AlPO_4$ (residues from reaction of alum phosphate baking powder during baking) causes a distinct retardation of gastric evacuation in dogs. Prolonged use of such bread does not cause any lesions of the gastric mucous membranes in that animal; but it produces diarrhea, particularly towards the beginning which disappears more or less when the system becomes accustomed to the Al. It causes clearly characterized irritative lesions of the mucous membrane of the large intestine; it does not affect the max. elimination of uric acid, showing it has no action on the kidneys. (6) Diets contg. $AlPO_4$ or alum phosphate baking powder are not immediately toxic to rats, excepting those weighing less than 90 g.; and above that wt. the growth remains normal with a suitable diet. (7) With chickens, such a diet affects only chicks less than 4 weeks old, provided the diet contains a considerable proportion of inorg. salts, as otherwise Al distinctly retards growth. (8) Alum and alum phosphate bread interfere neither with the equil. nor with the growth of mice. Anatomopathological examn. of the digestive tract shows ulcerous lesions of the pyloric and gastric mucous membranes after prolonged use of such bread. The intestine is unaffected. If an excess of Osborne and Mendel's synthetic salt mixt. is added to the diet, only ordinary gastritis lesions are observed, which is probably due to the added salts modifying the usual reaction between $AlPO_4$ and the HCl of gastric juice and preventing the formation of $AlCl_3$ by reaction of the HCl with the other cations. Under the ordinary conditions of the use of alum baking powders by man, production of $AlCl_3$ in the stomach takes place, and it can cause ulcers of the stomach and duodenum which are so prevalent in countries where such baking powders are habitually used. (9) Osborne and Mendel's salt mixt., even in the absence of alum or its reaction products, causes chronic gastritis when present in the diet in amts. treble the max. recommended by Osborne and Mendel (5%). (10) The most characteristic effect of diets contg. Al is a selective action on the female genital gland, which can be noticed at the end of 4 months, consisting of an approx. 50% atrophy of the ovaries with considerable follicular atresia. These lesions result in a reduction of the fertility of females, which is quite apparent after 4 months of the above-mentioned diet. Since control animals never exhibited this trouble, it is considered specific. In males which were fed on the same diet no disturbance was noted in the testicles, which always showed active spermatogenesis.

A. PAPINEAU-COUTURE

Deficiency and magnesium. PIERRE DELBET AND PALIOS. *Compt. rend. soc. biol.* 99, 390-2(1928); cf. *C. A.* 22, 3459.—Feeding expts. with guinea pigs indicated that $MgCl_2$ permits or regulates certain syntheses which are prevented or disturbed in the absence of antiscorbutic vitamins. L. W. ROGGS

The vitamin A content of cod-liver oils. J. C. DRUMMOND. *Lancet* 1928, I, 1353-4.—This is an answer to a criticism by E. Poulsen (*C. A.* 20, 3489). The former opinion, that, in general, Newfoundland oils possess a higher vitamin A potency than those from the chief center of the Norwegian industry, is still held and data are promised shortly to strengthen this statement. A discussion of the relative values of the colorimetric and biol. methods is given. F. B. SEIBERT

CENTANNI, EUGENIO. *Le ultime vedute sulla reintegrazione degli alimenti.* Milan: 1st. ed. Cisalpino. 46 pp. L. 10.

F—PHYSIOLOGY

E. K. MARSHALL, JR.

Relation between glutathione and the intracellular oxidation-reduction potential. P. JOYET-LAVERGNE. *Compt. rend. soc. biol.* 97, 140-2(1927).—Glutathione is an important factor in the r_H value and therefore influences the intracellular respiration. In organs the regions rich in glutathione appear to be those of the most intensive carbohydrate metabolism. B. C. A.

The problem of bilirubin. KIRKOVIC AND RUSSEV. *Vox medica* 7, 157-9; *Chem. Zentr.* 1927, II, 115.—The liver is not the place of origin of blood bilirubin. The latter is formed in the large blood vessels and in the heart and is in part retained by the capillaries. Though the mode of formation of bilirubin in the heart and in the blood vessels is not clear, it may be assumed to have its origin in the circulating blood or in the cardiovascular endothelium. There is no evidence that the liver bilirubin is formed at the expense of blood bilirubin, or that the liver bilirubin exists preformed in the liver. It can be assumed merely that blood bilirubin is of extrahepatic origin, and that biliary bilirubin is formed in the liver. The following proportions of bilirubin were found: ear lobe, 1:310,000; finger point, 1:240,000 to 1:280,000; cubital vein, 1:200,000 to 1:230,000. C. C. DAVIS

The alkaline tide in urine. JEAN M. D. SMALL. Univ. of Glasgow. *Glasgow Med. J.* [NS] 29, 33-9(1928).—Expts were made in which the urine was collected hourly for 2-6 hrs. after different breakfasts. The max. alk. tide was noted the 3rd and 4th hr. after the breakfast while no changes in urine acidity were found when tea alone was taken. The greatest response was noted when haddock or bananas were taken with roll and tea. It could not be proved whether it was related to gastric secretion. H. J. DEUEL, JR.

The iron content of blood serum. Comments on the paper of E. Abderhalden and P. Möller. GEORG BARKAN. *Z. physiol. Chem.* 177, 105-7(1928); cf. *C. A.* 22, 3201. Reply to the preceding comments of Georg Barkan. EMIL ABDERHALDEN. *Ibid* 207-10.—Polemical, regarding the non-hemoglobin Fe of blood serum. A. W. D.

Oxidizing substances in animal cells. W. LOELE. *Arch. path. Anat.* (Virchow's) 261, 484-502(1926). H. G.

New research on assimilation. MARIA KOBEL. *Naturwissenschaften* 16, 457-60 (1928).—A review with 21 references. B. J. C. VAN DER HOEVEN

Potassium content of the blood in the menstrual cycle. R. SPIEGLER. *Arch. Gynäkol.* 134, 322-7(1928).—The av. of 36 cases indicates that the K content of the blood is increased in the premenstrual period, is decreased during the menstrual period and slowly regains the normal value in the postmenstrual period. H. F. H.

The distribution and amount of calcium and potassium in normal tissue of the mouse. A histochemical study. G. L. ROHDENBURG AND J. GEIGER. *Arch. Path. Lab. Med.* 6, 215-27(1928).—K is found in largest amounts in tissues in which physiologic activity is marked, as pancreas, salivary glands, liver. It is also found in areas in which cell replacement is continually going on, as the layer germinativa. Ca is found in greatest amounts where reparative processes are most often associated with calcification, as lung, lymph glands. Peculiar concns. of K and Ca have been found in the nervous system and other places which for the present cannot be connected with the functions of the tissues involved. K is found in the female ovum while Ca is found in the male spermatozoa. K and Ca are segregated in the peripheral zone of the suprarenal gland and are possibly correlated with the dense K deposit in the thymus. H. F. H.

The concentration index of bile salts in the duodenal juice. L. DÉRER. *Wiener Arch. klin. Med.* 15, 303-8(1928).—The concn. index of bile salts in the duodenal juice

is expressed by the formula $J = a \cdot b/b_1 \cdot a_1$, in which a and a_1 are the mg.% of bilirubin in bile "A" and "B" and b and b_1 the mg.% of cholates in the same fraction. Bile "A" represents the bile obtained with the duodenal sound after 10-20 cc. of choledochus bile has been rejected and Bile "B" the bile obtained after instillation of MgSO_4 and produced by emptying of the gall bladder. The concn. index expresses the change in relation between bilirubin and bile salts during the storage of bile in the gall bladder.

HARRIET F. HOLMES

The influence of physical training on the basal respiratory exchange, pulse rate and arterial blood pressure. EDWARD C. SCHNEIDER, ROBERT W. CLARKE AND GORDON C. RING. Wesleyan Univ. *Am. J. Physiol.* **81**, 255-63(1927).—Physical training was accompanied by a decline in basal metabolism in three subjects and was unchanged in two others. Training slowed the basal and early morning standing posture pulse rates, but did not affect the early morning arterial pressure. J. F. LYMAN

Basal metabolism in the rat during the estrous cycle. MILTON O. LEE. Proc. Am. Physiol. Soc., *Am. J. Physiol.* **81**, 492(1927).—An increase in heat production of about 12% was observed during the last 10 hrs. of the diestrus and beginning of proestrus. There was no increase during estrus (stage II). After removal of the ovaries heat production fell about 10% from the original level. J. F. LYMAN

The respiration and lactic acid metabolism of excised testicular tissue. ROBERT O. LOEBEL AND R. A. HICKLING. Proc. Am. Physiol. Soc., *Am. J. Physiol.* **81**, 494(1927).—Testicular tissues from the rat showed a low and falling O_2 consumption in the absence of foodstuff. In the presence of sodium lactate, O_2 was used in larger and constant amts., while lactate disappeared and the respiratory quotient rose. J. F. L.

The specific dynamic action of glycocoll and alanine with special reference to the dehepatised animal. FRANK C. MANN, CHARLES M. WILHELMJ AND JEAN L. BOLLMAN. Proc. Am. Physiol. Soc., *Am. J. Physiol.* **81**, 496(1927).—The authors were not able to obtain a specific dynamic action toward amino acids in an animal whose liver has been removed. J. F. LYMAN

The excess metabolism and muscular efficiency for moderate work. M. FLIZABETH MARSH. Proc. Am. Physiol. Soc., *Am. J. Physiol.* **81**, 497(1927).—The respiratory quotient of the excess metabolism during work varied from 0.78 to 1.00. The net efficiency of a subject on a fat diet was less than on a carbohydrate diet but the difference at the end of 3 days was only slight and reached 11% at the end of 11 days. J. F. LYMAN

Factors influencing the anaerobic activity of cardiac muscle. ALFRED C. REDFIELD AND JOHN T. EDSALL. Proc. Am. Physiol. Soc., *Am. J. Physiol.* **81**, 505-6(1927).—Turtle's cardiac muscle contracting isometrically in the absence of O_2 fatigued according to the law that each systole diminishes the magnitude of the stress which is developed as the result of the next systole by a const. fraction of itself. J. F. L.

Effects of thymus, muscle and pituitary extracts on normal and thyro-parathyroidectomized dogs. E. LARSON AND N. F. FISHER. Univ. Ill. *Am. J. Physiol.* **84**, 330-7(1928).—Exts. of calf thymus and muscle prepd. by the same methods used for prepg. potent parathyroid exts. had a slight ameliorating action on acute parathyroid tetany, but did not cause sufficient changes in the Ca of the blood to account for their action. No parathyroid-like principle in the exts. could be demonstrated. J. F. LYMAN

The simultaneous study of the constituents of the sweat, urine and blood, also gastric acidity and other manifestations resulting from sweating. V. Gastric acidity. G. A. TALBERT AND I. ROSENBERG. Univ. N. Dakota. *Am. J. Physiol.* **84**, 520-3(1928).—During heat sweating there was a more or less sudden decline in gastric acidity. VI. Sugar. S. SILVERS, W. FORSTER AND G. A. TALBERT. *Ibid* 577-82.—Sweat contained sugar, 2.8 to 40 mg. per 100 cc. Sweating tended to increase the blood-sugar concn. J. F. LYMAN

The effect of low glycogen content on the fatigue curve and on lactic acid formation in excised muscle. J. M. D. OLMSTED AND H. S. COULTHARD. Univ. Toronto. *Am. J. Physiol.* **84**, 610-7(1928).—Normal isolated muscles when subjected to elec. stimulation or to CHCl_3 rigor showed a loss of glycogen which was exactly balanced by a gain in lactic acid. Frogs suffering from insulin convulsions were found to have very little or no muscle glycogen. When such muscles were fatigued they showed very trifling loss of glycogen or gain in lactic acid, the increase of the latter being greater than the loss of the former. Free carbohydrates and phosphate compds. in muscle cannot account for the excess of lactic acid gained over glycogen lost in muscles from insulin-treated frogs. J. F. LYMAN

Tissue respiration and endocrine functions. I. The influence of thyroidectomy on the indophenol oxidase content of animal tissues. J. A. DYER AND R. A. WAG-

GENER. Cornell Univ. *Am. J. Physiol.* 85, 1-13(1928).—Without exception, tissues of thyroidectomized animals (pups and lambs) showed a marked diminution in indophenol oxidase. In lambs this reduction varied from 24% for the heart to 50% for skeletal muscle. Lower values were obtained for the pups in which all tissues seemed to be affected to about the same extent. II. The indophenol oxidase content of animal tissues after total thyroparathyroidectomy in dogs. J. A. DYE AND R. A. WAGGENER. *Ibid* 14-20.—After thyroparathyroidectomy an increase in oxidation power was noted in all the tissues except kidney. J. F. LYMAN

The nature of the foodstuffs oxidized to provide energy in muscular exercise. II. In the phlorhizinized animal. DAVID RAPPORT AND ELAINE P. RALLI. Western Reserve Univ. *Am. J. Physiol.* 85, 21-32(1928); cf. *C. A.* 22, 3437.—Phlorhizinized dogs made to work on a treadmill showed a diminution in the oxidation of glucose, even though a hyperglucemia existed. The fuel requirements both during rest and exercise were provided by the oxidation of fat to a greater extent than in the normal animal. J. F. LYMAN

The inorganic constituents of the body with respect to their stimulating effect on sugar metabolism. W. F. BURGE AND A. M. ESTES. Univ. Ill. *Am. J. Physiol.* 85, 103-5(1928).—Goldfish were placed in 0.1% glucose solns. to which various salts were also added. After 30 hrs. the loss in sugar was detd., a sugar soln. without addition of salts being used as control. K_2HPO_4 produced a marked acceleration of the rate at which sugar disappeared; Na_2HPO_4 increased the rate somewhat; while $MgSO_4$ retarded it. Other salts were without effect. Similar results were obtained with *Paramecium caudatum*. J. F. LYMAN

Cutaneous respiration of the cat. LOUIS A. SHAW. Harvard. *Am. J. Physiol.* 85, 158-67(1928).—The cutaneous respiration of the cat was about 65-74% of the pulmonary respiration, and is the result of metabolic changes in the epidermis, the deeper layers of skin not being involved. The skin is thought to be freely permeable to the inward diffusion of CO_2 and the outward diffusion of O_2 but impermeable to CO_2 and O_2 when passing in the reverse directions. J. F. LYMAN

The digestion and absorption of fat. J. MELLANBY. Proc. Physiol. Soc., *J. Physiol.* 64, 1(1927).—A mixt. of neutral fat and bile, to which no lipase has access, was rapidly absorbed from the duodenum or jejunum into the lymphatics; therefore hydrolysis of fats need not precede their absorption from the intestine. J. F. L.

The influence of acid-base equilibrium on the activities of blood vessels. R. J. S. McDOWALL. Univ. London. *J. Physiol.* 65, 25-32(1928).—Dil. acids and also dil. alkalis either constricted or dilated the blood vessels through which they were perfused according to the conditions which prevailed at the time. J. F. LYMAN

Factors influencing the concentration of hydrochloric acid during gastric digestion. HUGH MACLEAN AND WILLIAM J. GRIFFITHS. St. Thomas's Hospital. *J. Physiol.* 65, 63-76(1928).—The changes in HCl and neutral chlorides in the stomach contents of man after the ingestion of a test meal or of solns. of Na_2SO_4 or H_2SO_4 support the conclusion that: (1) The fall in HCl and corresponding rise in NaCl in the stomach contents during digestion are not brought about by regurgitation of alk. fluid from the duodenum. (2) The normal stomach secretes the Cl ion in about the concn. in which it is present in the blood. Some of the Cl is secreted as HCl and some as NaCl, the proportion of the 2 forms being different at different stages of digestion. J. F. L.

Variations in the acidity and total chloride contained in the secretion from an isolated Pavlov pouch in the dog. HUGH MACLEAN, WILLIAM J. GRIFFITHS AND B. W. WILLIAMS. St. Thomas's Hospital. *J. Physiol.* 65, 77-82(1928); cf. preceding abstr.—The secretion obtained from an isolated Pavlov pouch of the dog stomach during digestion showed a rise in acid concn., followed by a definite fall, the total chloride remaining const. J. F. LYMAN

Oxygen usage by the kidney. A. R. FEE AND A. HEMINGWAY. Univ. Coll., London. *J. Physiol.* 65, 100-8(1928).— O_2 consumption in the isolated perfused kidney varied between 0.03 and 0.20 cc. per g. of kidney per min. As the vol. of urine gradually rose there was a corresponding rise in O_2 consumption. Increased arterial pressure caused a rise in O_2 consumption, while the addition of small amts. of pituitary ext. to the perfusing fluid produced a diminished vol. and an increased chloride concn. of the urine associated with a fall in O_2 used by the kidney. J. F. LYMAN

Tissue oxygen tension and hemoglobin. J. ARGYLL CAMPBELL. Nat. Inst. Med. Research, Hampstead. *J. Physiol.* 65, 255-72(1928); cf. *C. A.* 21, 1670.—When the hemoglobin in rabbits was markedly lowered by bleeding or by injections of hemolytic serum a decided lowering in tissue O_2 tension was observed; when hemoglobin was raised,

by injection of blood and by exposure to low O_2 pressure in the air, an increase in tissue O_2 tension occurred. J. F. LYMAN

Physiology of the liver and intestine. Method of study. CYRUS F. HORINE. Univ. of Maryland. *Arch. Surg.* 17, 289-95(1928).—A permanent cannula is used between the portal vein and the skin of the abdominal wall. It is sterling silver gold-plated and consists of 2 tubes which barely allow the passage of an 18-gage record needle. The tubes connect with a concave portion which is sutured to the portal vein and to a round flat plate about the size of a silver dollar, which is placed beneath the skin of the abdominal wall. JOHN T. MYERS

The effect of the administration of iodized substances on the feathers of chickens compared with that of thyroid. E. GIACOMINI. *Boll. soc. ital. biol. sper.* 3, 326-31 (1928).—Iodized egg-yolk fed to a capon produced the same results as thyroid feeding, i. e., the loss of feathers. Iodized proteins are capable of producing an action similar to thyroid not only on tad poles and axolotl but also on warm-blooded animals. PETER MASUCCI

Low blood pressure and secretory activity. WILLIAM ALEXANDER OSBORNE. *Australian J. Exptl. Biol. Med. Sci.* 5, 171-2(1928).—Low systemic arterial blood pressure produced by trinitrin, by vagal heart stoppage, or by hemorrhage fails to excite the dog pancreas and submaxillary to secretion. The secretion obtained by peptone and histamine can be otherwise explained. The conclusions of Lim and Schlapp and of Margaret MacKay are supported. L. W. RIGGS

Increase in metabolism produced by excitation of the sciatic nerve in the curarized animal. A. OZORIO DE ALMEIDA AND BRANCA DE A. FIALHO. *Compt. rend. soc. biol.* 99, 146-8(1928).—Expts. were made with frogs and toads to det. the O consumption per kg.-hr. in curarized animals with intact sciatic nerves. The increased metabolism in 4 frogs and 6 toads averaged 26.7%. In 4 curarized animals in which the peripheral extremities of the two sciatic nerves were excited the av. increase in O consumption was 14.1%. Apparently this nerve action is exercised directly upon the velocity of the chem. reactions which take place in the tissues. L. W. RIGGS

Excitability of the adrenalino-secretory fibers of the great splanchnic nerve. Frequencies, threshold and optimum of the stimulus. Role of the calcium ion. B. A. HOUSSAY AND E. A. MOLINELLI. *Compt. rend. soc. biol.* 99, 172-4(1928).—The tests were made on chloralosed dogs united in surreno-jugular anastomosis. The presence of the Ca ion appears necessary that the excitation of the great splanchnic nerve may produce its vasomotor and adrenalino-secretory effects. In general the results of this study agree with those of previous studies. L. W. RIGGS

Glycogen in the central nervous system of some mammals. I. The distribution of glycogen in the central nervous system of mammals and a comparison with it of the birds. HYOSAKU TANAKA. *Sei-i-kwai Med. J.* 47, 21-45(1928).—A large quantity of glycogen is found normally in the central nervous systems of birds, albino rats, guinea pigs and rabbits, the quantity for the different animals being in the order named. It occurs in brains and spinal cords and is commonly contained in ganglion cells, appearing in the form of Nissl granules. The glycogen content of glia tissues and epithelia of *Plexus chorioideus* is very small and very variable. In white substance, ependym cells and posterior lobe of *Hypophysis cerebri* glycogen granules were not demonstrated. L. W. RIGGS

Cholesterol and cholesterol ester content of bovine colostrum. RICHARD E. SHOFF AND JOHN W. GOWEN. Rockefeller Inst. *J. Exptl. Med.* 48, 21-4(1928).—The total amt. of cholesterol found in colostrum and milk is comparatively low. The amt. of cholesterol found in colostrum declines at an ever decreasing rate as milk secretion develops until at 48 hrs. the cholesterol is nearly the same as that found in milk 3 or 7 months after parturition. The morning milk differs from the evening milk in that the cholesterol bound as ester is greater in amt. C. J. WEST

Cholesterol and cholesterol ester in the blood serum of cattle late in pregnancy and during the early lactation period. R. F. SHOFF AND J. W. GOWEN. Rockefeller Inst. *J. Exptl. Med.* 48, 25-30(1928).—The total cholesterol and cholesterol ester of bovine blood serum during the "dry" period of late pregnancy is low. Following parturition the total cholesterol and cholesterol ester of bovine blood serum show a still greater, very transient decrease followed by a gradual rise to reach a rather const. level 40 to 50 days postpartum. This lactation level is very much higher than the "dry" level. C. J. WEST

Influence of light environment on the growth and nutrition of normal rabbits with especial reference to the action of neon light. WADE H. BROWN and MARION HOWARD. Rockefeller Inst. *J. Exptl. Med.* 48, 31-55(1928).—Growth and nutri-

tion were greatly affected by the light environment in which the animals lived. The effects produced by a given environment varied with the color and breed of the animal and appeared to be out of proportion to the differences in the intensity of the light or the energy represented.

C. J. WEST

Blood cell metabolism. I. Effect of methylene blue and other dyes upon the oxygen consumption of mammalian and avian erythrocytes. GEO. A. HARROP AND E. S. GUZMAN BARRON. Johns Hopkins Univ. *J. Exptl. Med.* 48, 207-23(1928).—The respiratory metabolism of non-nucleated mammalian erythrocytes is enormously accelerated and approaches the magnitude of the metabolism of the nucleated erythrocytes of birds on the addn. of methylene blue (I) and certain other dyes, to a final concn. of 0.005-0.0005%. In the presence of I the respiration is accelerated, even when 0.001M KCN is also present. The accelerated respiration due to I occurs at room temp. but it is most active at 38°. I in the above concn. accelerates the respiration of avian (goose) erythrocytes to a much smaller extent than it does the respiration of erythrocytes of mammalian blood, while the effect upon anemic blood seems to be less than it is upon cells of normal goose blood. Because of a rather large initial CO₂ formation in defibrinated blood on incubation, which may not be related to the immediate respiratory process, proper respiratory quotients cannot be obtained in whole blood. When the cells are sepd. from the serum and suspended in Locke's soln., respiratory quotients are obtained upon incubation comparable to those of other resting mammalian cells, as well as of the actively respiring erythrocytes of birds. The hypothesis is advanced that I acts in the role of an O carrier, supplying a substance which has disappeared from adult mammalian non-nucleated erythrocytes and restoring their metabolic activity to an extent comparable to that of the young immature forms, or to that of actively respiring avian blood.

C. J. WEST

G—PATHOLOGY

H. GIDEON WELLS

The reaction of colloidal gold in indicating endocrine function. BICK NEPPI. *Atti congresso naz. chim. pura applicata* 2, 919-22(1926).—N. has tested the application of colloidal gold to tissue exts. as a means of detg. hormone activity. In each case 1 g. of tissue was ground with 3 g. of MgSO₄ and then a few cc. of physiol. salt soln. added. Four cc. of 4% CCl₃CO₂H was added and the suspension filtered. Both red and blue colloidal Au solns. were used. Reaction with thyroid, testicle, hypophysis (posterior lobe), heart and pancreas, kidney, skin, muscle, connective tissue and fat was pronounced in the first case, but rapidly decreased in intensity, resp., and was entirely absent in the last case.

L. T. FAIRHALL

A confirmation of Kopaczewski's theory of anti-anaphylaxis. GIUSEPPE CAPPELLI. *Atti congresso naz. chim. pura applicata* 2, 1087-91(1926).—The anti-tuberculosis therapy following the method of Capelli-Memmo of injection of colloidal lipase-peroxidase solns. is complicated in about 1% of cases by anaphylactic reaction. Besredka's method of injection alone is insufficient to overcome this. If the lipase-peroxidase soln. is made anti-anaphylactic however according to Kopaczewski's method anaphylaxis is prevented.

L. T. FAIRHALL

The precipitin test for blood. HERBERT S. SIREWSBURY. *Analyst* 53, 380(1928).—Anti-human serum made from fowl is no weaker than serum made from rabbits or guinea pigs. Sera will only remain potent in Trinidad for 3 months, although kept on ice. It is desirable to test the reactions of the blood stain solns. They should be neutral to litmus. Although in applying the antiserum, layering is a good method, sometimes more definite zone reactions are obtained by allowing the antiserum to flow gently down the side of the test tube which is inclined at 45°.

W. T. H.

Tuberculosis allergy and reticulo-endothelial system. W. PAGEL. *Klin. Wochschr.* 7, 700(1928).—Tuberculous guinea pigs, whose reticulo-endothelial cells had been blocked with india ink, react to tuberculin exactly as do the untreated controls. Removal of the spleen is also without effect. This indicates that the tuberculin reaction is not an anaphylactic shock.

MILTON HANKE

Intensifying effect of muscular work upon the action of insulin in normal and in diabetic individuals. M. BÜRGER AND H. KRAMER. *Klin. Wochschr.* 7, 745-50(1928).—Muscular work leads to a protracted hyperglucemia in untreated diabetics. The same amt. of work leads to a hypoglucemia in normal individuals. A given dose of insulin leads to a slight hypoglucemia in a diabetic; but the combination of muscular work plus this same amt. of insulin leads to a marked hypoglucemia. The muscular work increases the intensity of the action of insulin.

MILTON HANKE

Blood sugar in arterial and venous blood. GEORG ROSENOW. *Klin. Wochschr.* 7, 750-2(1928); cf. *C. A.* 21, 3952. MILTON HANKE

The chemistry of the Gaucher substance. HANS BEUMER. *Klin. Wochschr.* 7, 758(1928).—Cerasin and cerbron were present in the alc. ext. from the spleen of a patient afflicted with Gaucher's disease. MILTON HANKE

Sensitization with allergens and the nature of the allergens. L. FARMER LOEB. *Klin. Wochschr.* 7, 803(1928).—The aq. ext. from goose feathers or from pollen contains substances that act as specific allergens. The substances are colloidal and can be pptd. with colloidal $\text{Fe}(\text{OH})_3$ or with alc. MILTON HANKE

The relation of cholesterolemia to disturbances of the estrual cycle. MAX REISS. *Klin. Wochschr.* 7, 849(1928).—A brief report. A detailed report is to appear in the *Endocrinology*. MILTON HANKE

Alcapton in the cerebrospinal fluid of an infant. G. KATSCHE AND A. MADER. *Klin. Wochschr.* 7, 895-6(1928).—The presence of homogentisic acid was demonstrated in the cerebrospinal fluid of an infant afflicted with alcaptonuria. The concn. was approx. 0.1 mg %. The method of Katsch and Metz was employed. M. H.

The metabolism of white blood cells. (Bone marrow cells, blood leucocytes and blood platelets). AKIJI FUJITA. *Klin. Wochschr.* 7, 897-8(1928).—The white cells of the marrow and the blood leucocytes show a basal metabolism (Warburg method) like that of normal embryonic cells and not like that of carcinoma cells. M. H.

The Freund-Kaminer reaction as applied to tissue cultures. ANDREAS KUBÁNYI AND MICHAEL JAKOB. *Klin. Wochschr.* 7, 943-4(1928).—Carcinoma cell cultures die about as rapidly in normal plasma as they do in the plasma from a carcinomatous person. They seem to live just a little longer in a normal isoplasm. MILTON HANKE

Studies on the carcinoma problem. II. The structure of the serum in carcinomatous women. Rapidity of sedimentation of red blood corpuscles, surface tension, viscosity and oncotic pressure. H. GUTHMANN AND H. FRÜHAUF. *Arch. Gynakol.* 134, 425-38(1928).—In women with carcinoma of the genital organs there is a disturbance of the physicochem. conditions of the serum. There is a decrease in surface tension. The erythrocytes show an increased rate of sedimentation though not always in proportion to the severity of the disease. There is a decrease in the oncotic pressure proportional to the extent and severity of the disease and which indicates not only a hydration of the blood but also a disturbance of the entire colloidal system. The viscosity of the serum is increased which is an indication of an increase in size of the protein particles.

HARRIET F. HOLMES

Experimental pigment cirrhosis due to copper poisoning. Its relation to hemochromatosis. E. M. HALL AND E. M. BUTT. *Arch. Path.* 6, 1-25(1928).—Chronic poisoning with Cu salts over long periods produces in rabbits and to a slighter degree in white rats a pigment cirrhosis resembling closely the early manifestations of hemochromatosis in man. Rabbits given Cu acetate in their food or by subcutaneous injection store relatively large quantities of Cu in the liver while only traces of Cu can be found in other organs. Each of two sheep that were given Cu acetate by subcutaneous injection for 26 weeks stored in his liver 54% of the pure Cu administered. Alc. administered in conjunction with Cu acetate not only fails to hasten or augment the production of pigment cirrhosis, but also reduces materially the storage of Cu in the liver of both rabbits and white rats. Hemofuscin is produced in the livers of rabbits treated with Cu. The quantities of this pigment found closely parallels the Cu in any given liver. Hemofuscin contains Fe in masked form. Hemosiderin in small amounts is seen in a few of the livers of the rabbits. It appears to be derived from hemofuscin. Both pigments are no doubt derived from hemoglobin.

HARRIET F. HOLMES

Lipoid cell splenohepatomegaly (Niemann). M. LEDERER. *Arch. Path.* 6, 90-5(1928).—A description is given of a case of lipoid cell splenohepatomegaly in man. In most respects the microscopic changes coincide with those described as occurring in Niemann's splenohepatomegaly. The presence of the characteristic lipoid-bearing cell, the absence of demonstrable Fe, and the most important characteristic, the absence of pathologic cells in the splenic sinuses, distinguish the condition from Gaucher's disease. The great difference from previous experiences as reported is the insolubility of the granules in fat solvents.

HARRIET F. HOLMES

Identification of human seminal stains. Precipitin reaction of seminal fluid. L. HEKTOEN AND G. J. RUKSTINAT. *Arch. Path.* 6, 96-9(1928).—The seminal precipitin reaction reveals the presence in semen of a substance or substances peculiar to it and consequently the reaction may be of value in studying the nature of suspected spots and stains. Landsteiner and Levine (*C. A.* 21, 606) have found that spermatozoa from persons belonging to blood groups A and B absorb specifically the agglutinins for the

red cells of these groups. This fact at once suggests that it may be possible to trace seminal stains to persons of certain blood groups. HARRIET F. HOLMES

Diabetes insipidus. A clinical review and analysis of necropsy reports. E. B. FINK. *Arch. Path.* 6, 102-20(1928).—A general review. HARRIET F. HOLMES

Cancerization of tissue. B. SOKOLOFF. *Neoplasmes* 7, 81-7(1928).—The process of the cancerization of the cell seems to take place in two stages. In the first stage there is a change in the equil. within the tissues brought about by alterations in reaction, in ionic equil. in metabolism of vitamins and cholesterol and in viscosity of the intercellular lipoids. Exogenous factors play an important role at this time. This is the stage of cancerization of the tissue and is followed by the second stage of cancerization of the cells. The cells, freed from the influence of the tissue and with lipid membranes already altered, proceed to the realization of their potential energy. The rhythm and character of cell multiplication alter and the cell no longer is part of a tissue entity but becomes an autonomic unit not obedient to the laws of histogenesis. H. F. H.

The pathogenic role of lymphoid elements in neoplastic processes. B. SOKOLOFF. *Neoplasmes* 7, 88-91(1928).—Studies on lympholytic and hemolytic cancerous sera indicate that the pathogenic principle of neoplasms is comprised not in the malignant cells themselves but in the lymphoid elements, particularly in the macrophages. The macrophages seem to influence cell anarchy by bringing about an alteration in the character of the intercellular lipoids and in the processes of oxidation of the tissue and respiration of the cells. HARRIET F. HOLMES

Oxido-reductions and cancer. P. LEMAY. *Neoplasmes* 7, 92-8(1928).—In cancer there is an acceleration of the synthetic process and in this abnormal growth the part played by the enzymes is great and of these oxidases and reductases are the most important. HARRIET F. HOLMES

The absorption of cholesterol by the tumor. A. H. ROFFO. *Neoplasmes* 7, 147-55(1928).—In human tumors as well as in tumors of the rat and the chicken, there is less cholesterol in the blood which comes directly from the tumor than in the blood supplying the tumor. This indicates a considerable adsorption of cholesterol and is related no doubt to the energetic power of growth of the tumor cells. However, the diminution of cholesterol is not due to a simple adsorption only but there is also a more complicated process connected with tissue disintegration. HARRIET F. HOLMES

Physiology and pathology of peptidase metabolism. H. PFEIFFER. *Wiener Arch. klin. Med.* 15, 209-48(1928).—A study was made of the occurrence of glycytryptophanase in the body and excretions in normal and pathologic conditions. Glycytryptophanase is a constant constituent of all cells. It is found in the albumin fraction of the serum. The peptidase content of the serum varies in different animals and in the guinea pig the ability to split glycytryptophan is about 4 times as great as in man. The quantity of the enzyme in the intestinal contents is large and in man, particularly during youth, is reabsorbed into the circulation from the large intestine and excreted in the urine, while in many animals, as the guinea pig, the body is better protected against the entrance of colloidal material from the intestine. The detn. of the peptidase content gives a measure of the extent of destruction of living tissue and for the permeability of the large intestine permitting the passage of colloidal material into the circulation. It also gives insight into the functional activity of the kidney with regard to the excretion of enzymes. Though peptidase of itself is atoxic its detn. furnishes an indicator of intoxication due to protein decompn. products and as such may be of importance to both pathologists and clinicians. HARRIET F. HOLMES

The value of blood-sugar curves in the test for alimentary galactosuria. R. BAUER AND D. WOZASEK. *Wiener Arch. klin. Med.* 15, 287-302(1928).—In general the detn. of the blood-sugar curve confirms the results obtained by detn. of the sugar content of the urine. The one superiority of the blood-sugar detn. is in the case of ascitic cirrhosis of the liver where the sugar content of the urine is lower than expected. However, as passive congestion due to other causes gives similar results the detn. of the blood sugar is not of value in differential diagnosis. HARRIET F. HOLMES

"Alimentary hypoglycemia" in diabetes mellitus with and without hypertonus. E. KYLIN. *Wiener Arch. klin. Med.* 15, 325-30(1928).—The administration of 75-100g. sugar has been used by Depisch and Hasenöhrl as a functional test for the insular app. of the liver. In cases of diabetes with hypertonus there was a transitory hyperglucemia followed by a marked hypoglycemia. In cases without hypertonus there was no hypoglycemia. The "postalimentary hypoglycemia" in diabetes with hypertonus is often much greater than occurs in healthy persons. In one case of diabetes with hypertonus the administration of sugar was followed by hypoglycemic shock. It

is difficult to reconcile this finding with the theory that diabetes with hypertonus is due to a lack of insulin.

HARRIET F. HOLMES

The effect of grape sugar and insulin on the acetone and β -hydroxybutyric acid content in the blood and urine in diabetes mellitus. O. PUSKO. *Wiener Arch. klin. Med.* 15, 331-48(1928).—Glucose and insulin were injected in various combinations and at various time intervals and the effect was noted on the "acetone bodies" of the blood and urine. The acetone bodies of the blood in control tests without any therapeutic measures were found to vary at different times of the day. Sugar followed by insulin was found to give a more favorable result than insulin followed by sugar. The best results were obtained when glucose was given intravenously and followed 1.5 hrs. later by a subcutaneous injection of insulin and this measure may be of therapeutic value in the treatment of diabetes. In all cases, including the control cases there was a distinct excretion of the acetone bodies in the urine at night, 9-18 hrs. after the injection.

HARRIET F. HOLMES

Determination of biological relationship by means of skin sensitization tests.

HANS FRÖHLICH. Univ.-Hautklinik, Breslau. *Z. Immunitäts.* 55, 236-57(1928).—The biol. relationship of animals was studied by sensitizing human individuals with a subcutaneous injection of a given antiserum and after a given incubation period making skin reactions at the site of injection with the various sera to be compared. With this technic the following groupings of animals were made: (a) *Macacus rhesus* and *Macacus cynomolgus*, (b) sheep, goat, cow, (c) white rat and white mouse, (d) hen, pigeon, turkey, goose, (e) horse, mule and ass. No relationship existed between the rabbit and guinea pig and between the pike, carp and tench. Just as Uhlenhuth was able to produce antibodies in the lower monkey against human serum so human skin could be sensitized against the serum of lower monkeys, showing that the 2 classes of animals were biologically different. As a whole this method confirms the results obtained with other methods.

JULIAN H. LEWIS

Effects of injections of acid and trauma on jejunal transplants to the stomach. WILLIAM J. GALLAGHER. Univ. of Chicago. *Arch. Surg.* 17, 279-88(1928).—An artificial hyperacidity produced by injections of varying concns. of HCl once or twice daily into the stomach of 7 animals for periods of 24 to 58 days did not increase the incidence of chronic ulcer in the stomach itself, in the scar tissue of the transplant, or in the transplant mucosa.

JOHN T. MYERS

Measurements of the p_H of normal, fetal and neoplastic tissues by means of the glass electrode. HORACE MILLET. Univ. of Liverpool. *J. Biol. Chem.* 78, 281-8(1928).— p_H detns. were made on tissues by the use of a glass electrode and liquid air for freezing the tissues. The p_H of normal tissues was 7.1; of carcinomatous tissues 6.8; of human innocent neoplasms 6.92; of malignant neoplasms 6.78. The p_H of the normal tissue surrounding the innocent neoplasms was 7.1, while the p_H of the tissue around the malignant neoplasms was 7.04. Fetal rabbit tissue had a lower p_H than the maternal tissue. The p_H of the fetal tissues increased with increasing age, and 12 hrs. after birth was the same as that of fully grown animals.

C. RIEGEL

Thermic polypnea and alkaline reserve. L. AMBARD AND F. SCHMID. *Compt. rend. soc. biol.* 99, 217-9(1928).—Tests with 2 chloralosed dogs showed that 10 min. after the establishment of thermic polypnea, with the respiration raised from 16 to 240, the alk. reserve fell from 40 to 33 and from 34 to 26, resp.

L. W. RIGGS

Possible origin of uric acid. LUCIEN BERNARD. *Compt. rend. soc. biol.* 99, 314-5(1928).—The presence of uric acid in cases of hepatic insufficiency and glucosuria may be explained as follows: The degradation of glucose yields methyl glyoxal which with NH_3 and HCHO gives methylimidazole. It is suggested that methylimidazole may unite with urea and O to yield uric acid and H_2O .

L. W. RIGGS

Velocity of the oxido-reduction processes in nephritic rabbits. E. AUBERTIN, P. MAURIAC AND E. AUBEL. *Compt. rend. soc. biol.* 99, 321(1928); cf. C. A. 22, 1988. —The velocity of oxido-reduction processes in the kidney is diminished in rabbits with acute or chronic nephritis caused by injections of $UO_2(NO_3)_2$, a much greater reduction in velocity being noted in cases of chronic nephritis. The velocity of reduction in liver and muscles was not modified by nephritis even in animals with high azotemia.

L. W. RIGGS

Experimental chronic nephritis in the rabbit. PIERRE MAURIAC. *Compt. rend. soc. biol.* 99, 322-3(1928); cf. C. A. 21, 3081. —The elimination of N, albumin, glucose and the N and glucose contents of the blood were studied in rabbits with exptl. nephritis caused by $UO_2(NO_3)_2$. Ingestion of urea in 0.05 g. doses in normal rabbits but slightly affected the azotemia, but with nephritic rabbits the azotemia was increased 4-fold after 4 doses distributed over 10 days.

L. W. RIGGS

Composition of the liquid of edema in a case of "edema of Quincke." PAUL GOVAERTS. *Compt. rend. soc. biol.* 99, 339-41(1928).—Analysis of the liquid of edema in this case gave total protein 31.15 g. per l., albumins 21.35, globulins 9.8, fibrinogen traces, non-protein N 0.28. A sample of blood taken at the same time gave total proteins 69.3 g. per l., albumins 52.1, globulins 17.2, non-protein N 0.21. L. W. RIGGS

The Meinicke micro-reaction. DAVID PRENTICE. *Lancet* 1928, I, 493-4.—The serum in this reaction can be collected from a finger prick. The antigen is a cholesterol-free ext. of horse heart muscle with the addn. of balsam of tolu. The technic is described. There is a high percentage of agreement with the Wassermann reaction and the no. of those diagnosed as syphilitic has almost doubled. F. B. SEIBERT

Immunity and vitamin deficiency. A review of the evidence. ANON. *Lancet* 1928, I, 670.—The literature is reviewed in regard to the various diseases which are related to vitamin-A deficiency. Mortality in certain diseases seemed to be decreased also by the administration of vitamin D. The relationship of tuberculosis to vitamin deficiency is so far indefinite. P alone out of the following list—Ca, Fe, K, Cl, P, Na, certain amino acids, antiscorbutic, antineuritic and fat-sol. vitamins—had an effect in lowering the titer of agglutinins and amboceptor. F. B. SEIBERT

Some effects of alteration of oxygen pressure in the inspired air upon cancer growth and body weight of rats and mice. J. ARGYLL CAMPBELL AND W. CRAMER. *Natl. Inst. Med. Res. Lancet* 1928, I, 828-30.—Rapidly growing implanted tumors in rats and mice show a greatly diminished rate of growth and extensive necrosis during prolonged exposure (2 weeks) of the animals to low O pressure, confirming Warburg and his collaborators. The normal O pressure is about 21% atm.; low O pressure used was 10% atm. or less; high O pressure used was about 60% atm. Exposure to high pressure produced no effect. The decrease occurring under low pressure is accompanied by a decrease in growth of the normal body tissues. There is no evidence that variations in O pressure in the inspired air is of therapeutic value. F. B. SEIBERT

Fermentation and growth. OTTO ROSENTHAL. *Z. Krebsforsch.* 27, 125-31 (1928).—A general discussion of recent observations with particular bearing on the problem of cancer growth. No new material is given. H. G. WELLS

Immunological processes in malignant tumors. KARL LEWIN. *Z. Krebsforsch.* 27, 138-51(1928).—A general discussion with reports on the effects of immunization with casein compounds, Na nucleinate, yatran and silacid. These reduce the no. of successful inoculations of tumors in mice and rats. No expts. were conducted with spontaneous tumors, and the strains of inoculation tumors used had a large no. of neg. results in the controls. H. G. WELLS

The interferometer method in the diagnosis of pregnancy and malignant conditions. G. S. HAYNES AND C. G. L. WOLF. *Cambridge Eng. J. Cancer Research* 11, 301-23(1927).—The interferometer method for detg. the Abderhalden reaction has been recommended by Paul Hirsch for the diagnosis of pregnancy and of malignant growths. Much of the observed effect is found to be due to sol. substances coming from the rubber stoppers which close the incubation tubes. When the rubber is coated with sterile tinfoil, most of the differences which have been observed disappear. Conclusion: The method, either in its original form or with the subsequent precaution in technic which the authors have contrived, does not yield any useful results. H. G. WELLS

The treatment of Flexner-Jobling rat carcinomas with bacterial proteolytic enzymes. J. C. TORREY AND M. C. KAHN. *Cornell Med. Coll. J. Cancer Research* 11, 334-76(1927).—A report is made on the results of treatment of exptl. tumors in white rats with certain bacterial proteolytic enzymes. The tumors were the Flexner-Jobling carcinoma type and the proteolytic enzymes employed were those of certain spore-bearing anaerobes (*B. sporogenes* and *B. histolyticus*). The purpose of the study has been to find a tissue-destroying agent of bacterial origin which would have a selective action, at least in some degree, on tumor cells and which might eventually be applied to certain types of human neoplasms. Whole broth cultures of *B. histolyticus* will produce an energetic digestion of tissue in whatever part of the animal body it is injected. The problem, thus, has been to hold in check or limit this proteolytic activity so that it may be confined wholly or in large part to the neoplastic tissue. With sterile filtrates of 24-hr. *B. histolyticus* growths in this medium injected directly into the rat tumors, "cures" may be achieved in 25 to 50% of animals in which the growths have not reached a diam. greater than 2 cm. This result depended on the presence of a few living bacteria. A drawback in the exptl. treatment of tumors by this method is encountered in the immunity factor. It is necessary to accomplish the complete destruction of the tumor tissue within a week or 10 days, otherwise an immunity to the proteolytic enzyme will begin to appear and subsequent injections will have little or no effect. H. G. W.

Chemotherapeutic attempts with coal-tar derivatives on spontaneous mouse tumors. MILLARD C. MARSH AND BURTON T. SIMPSON. N. Y. State Inst. Study Malignant Diseases, Buffalo. *J. Cancer Research* 11, 417-35(1927).—145 chem. compds., nearly all found in or derivable from coal tar, were administered to mice bearing spontaneous mammary tumors during an av. period of 34 days for each case, by intravenous and subcutaneous injections. The compds. are dyes and their antecedents—hydrocarbons, bases, acids and "intermediates" of industrial chemistry—together with a few miscellaneous org. compds. and solvents. All yielded neg. results. The highly toxic org. compd., Pb tetraethyl, has a regressive action on the mouse tumor, perhaps equal to that of colloidal Pb. It is hardly to be exhibited except by lethal doses.

Agglutination by precipitin. II. F. S. JONES. Rockefeller Inst. *J. Exptl. Med.* 48, 183-92(1928); cf. *C. A.* 21, 3082.—Collodion particles sensitized with various proteins adsorb sufficient protein to agglutinate in the presence of precipitin sp. for the adsorbed protein. The amt. of adsorption, judged by agglutination, is not dependent on the concn. of the sensitizing protein beyond a certain max. The agglutination resulting from the addn. of immune serum to particles sensitized with protein is immunologically sp. Particles exposed to a no. of antigenic substances in succession are agglutinated by all of the appropriate antisera. Particles exposed to immune serum and subsequently washed fail to agglutinate in the presence of antigen, although some of the protein constituents of the immune serum are fixed upon them and its antibody content diminishes.

Immunological studies in relation to the suprarenal gland. III. Effect of injection of adrenaline on the hemolysis formation in normal rats. J. MARMORSTON-GOTTESMAN AND DAVID PERLA. Montefiore Hospital. *J. Exptl. Med.* 48, 225-33(1928).—Large amts. of adrenaline injected repeatedly before and after the injection of antigen depress the antibody-forming capacity of normal adult albino rats to a marked degree. The depression in antibody formation is roughly proportional to the quantity of adrenaline injected. Small quantities have no detectable effect on antibody formation.

Bacteriophage of d'Hérelle. IX. Evidence of hydrolysis of bacterial protein during lysis. D. M. HETLER AND J. BRONFENBRENNER. Rockefeller Inst. *J. Exptl. Med.* 48, 269-75(1928).—During the process of lysis of bacteriophage, there is an appreciable increase in the amt. of free NH_2 acid present in the culture, which is due to hydrolysis of bacterial protein. X. Toxin production by normal and by phage-resistant Shiga dysentery bacilli. RALPH S. MUCKENFUSS AND CHARLES KORB. *Ibid* 277-83.—The production of exotoxin and of endotoxin by normal Shiga dysentery bacilli and by strains resistant to Laudman phage was found to be the same. The presence of phage did not alter toxin production by the resistant organism. C. J. W.

The van den Bergh reaction for serum bilirubin with notes on interpretation and technic. W. W. HALL. *J. Lab. Clin. Med.* 12, 529-35(1927). E. W. W.

SAINT-LAURENS, GERMAINE: De l'opacité des calculs biliaires aux rayons x et leur composition chimique. Paris: Arnette. 132 pp. P. 13.

H—PHARMACOLOGY

A. N. RICHARDS

Morphine treatment and epilepsy by excitation in dogs. G. AMANTEA AND G. MARTINO. *Boll. soc. ital. biol. sper.* 2, 311-6(1927).—Dogs were found to tolerate up to 6 cg. per kg. of weight of morphine injection subcutaneously, without showing any symptoms of epilepsy. But when treated with strychnine as well, even dogs not susceptible showed symptoms of epilepsy.

The change in glucose content of the blood by the effect of strychnine. V. ZAGAMI. *Boll. soc. ital. biol. sper.* 2, 320-3(1927).—Rabbits were treated subcutaneously with doses of strychnine varying from 0.1 mg. to 0.6 mg. In most cases the glucose content of the blood increased from 1% to as high as 29% in 15 min., the av. being about 10%. In one-half hr. a max. of 52% was reached in one case, the av. being about 25%. The glucose content gradually drops back to normal, which results after about 2 hrs.

The pharmacology of Chinese aconite, T'sao-wu-t'ou. HUNG-PIH CHU. *Chinese J. Physiol.* 1, 7-14(1927). E. J. C.

Feeding experiments with lead. H. MIESSNER. *Tierärztl. Hochschule Hannover. Deutsch. tierärztl. Wochschr.* 35, 297-301; *Chem. Zentr.* 1927, II, 123.—Expts. are described in which domestic animals were fed chem. pure Pb, PbO, natural galena contg. As and PbSO₄. Hens and ducks succumbed after 65 g. of chem. pure Pb had been given

in large doses, and sheep after a total of 121 g. Goats and cattle tolerated doses of 86 and 83 g., resp., without injury, when administered in small doses. PbO is 2-3 times as poisonous as pure Pb . With respect to sensitivity to PbO , cattle are the most sensitive, followed by goats, ducks and hens in the order named. Galena, in spite of its As content, was tolerated relatively well by all the animals. After feeding 100 g. of galena, an ox was not taken ill, while a young calf succumbed after 7 days to 150 g. $PbSO_4$ is harmless. The Pb present in waste waters in the vicinity of Pb mines is probably in the form of PbO , and in such form is taken in by the animals, partly from the water and partly from the soil.

C. C. DAVIS

The pharmacology and toxicology of oil of turpentine and of terpenes. HERMANN KUNZ-KRAUSE. *Festschrift A. Tschirch* 1926, 121-35; *Chem. Zentr.* 1927, I, 2927.—With the aid of numerous examples, the now harmless and then toxic course of action of oil of turpentine and of terpenes is shown. The toxic action is greater when they are absorbed by respiration than when they are taken into the stomach. From the different phases during the course of the poisoning, 2 complex effects are to be distinguished, the cerebral effect and the irritant effect. These effects were studied with a view to explaining etiologically the effects by the phys. or phys.-chem. properties of the oil of turpentine. Because of the high d. of oil of turpentine, the blood corpuscles are stifled, the CO_2 in the blood increases and lactic acid is formed, upon which the cerebral phenomena depend. The irritant effect is a result of the high absorptive capacity of oil of turpentine for O, and of the catalytic action. O_3 and H_2O_2 are formed, as a result of which oxidative irritation sets in. Because of the poisonous action of the levogyrotary synthetic camphor prepd. from *l*- α -pinene, the varied course of the phenomena of poisoning is attributed to the difference in the poisonous properties of *d*- α - and *l*- α -pinenes. This would explain the common idea of the non-poisonous nature of American turpentine, which consists solely of *d*- α -pinene.

C. C. DAVIS

The behavior of arspphenamine and of neoarsphenamine in the organism. I. ABELIN. *Festschrift A. Tschirch* 1926, 370-6; *Chem. Zentr.* 1927, I, 2925.—As a result of researches of A. and of other investigators on the behavior of arspphenamine and of neoarsphenamine in the organism, it is concluded that each substance is in part eliminated in its original form. That part not eliminated immediately after injection leaves the blood stream very rapidly and penetrates the organs and tissues where it is completely decomposed. Arspphenamine was identified by the red color which appears after diazotization and coupling with resorcinol (cf. Remy, *C. A.* 17, 3351).

C. C. D.

Aromatic nitro and amino compounds as blood poisons. W. LIPSCHITZ. *Zentr. Gewerbehyg. Unfallverhüt.* 14, 11-4; *Chem. Zentr.* 1927, I, 2752.—Both NO_2 and NH_2 compds. cause methemoglobinemia as the chief symptom. Not only different animals but individual workers are differently affected, probably because of the widely varying gas exchange. H_2O accelerates the reabsorption of benzenes contg. N. Quinine and administration of O are remedies. The effect of *m*- and *o*-compds. and their substitution products, their elimination in the urine, and the different reactions of different kinds of blood are described. In case methemoglobin formation does not exceed 60%, reformation by reducing cells occurs, which in expts. on animals was promoted by the injection of $Na_2S_2O_3$.

C. C. DAVIS

Dynamics of the heart. III. Dynamical analysis of the action of digitalis on the heart. NORIMI ISHIDA. Imp. Univ., Kyoto, Japan. *Acta Schol. Med. Univ. Imp. Kioto* 9, 391-420 (1927).—When digitalis preps. (digitin, digifolin, cynarin, helleborein, convallin) or $BaCl_2$ was introduced into the perfusion fluid of a heart, there was an increase in diastolic capacity, a decrease in systolic capacity and an increase in the max. of the intracardiac pressure. These changes are traced to an increase in absolute contractility of the heart muscle and a decrease in its tonus. However, the increase in diastolic capacity can only increase the intracardiac pressure slightly if at all.

H. J. DEUEL, JR.

The action of acids and bases on cardiac muscle tone in anodon. M. DU BOISSON. Univ. Ghent, Belgium. *Arch. intern. physiol.* 29, 22-4 (1927); *Physiol. Abstracts* 13, 24.—In acidosis (HCl or $CH_3CHOHCOOH$) systole was greater and diastole was decreased while in alkalosis ($NaHCO_3$ or neutral Na_2CO_3) the reverse was true.

H. J. DEUEL, JR.

Ethylene-oxygen anesthesia with reports of 521 cases at Letterman General Hospital, U. S. Army. JOHN D. BRUMBAUGH. *Military Surgeon* 63, 32-45 (1928).—The disadvantages of this method of anesthesia are the explosibility of ethylene and the oozing of the wounds which is slightly more than with other anesthetics. This latter feature, however, is minimized since the effect ends immediately on the cessation of the administration of the ethylene. On the other hand the advantages are the ease

of induction and the rapidity of recovery, the lack of effect on the pulse, and blood pressure (there may be a slight elevation of the latter) and the kidney, a decreased incidence of sweating and gas pains, and a lessened incidence of vomiting and of post-operative pneumonia. There is also practically no effect on the blood sugar. H. J. D., Jr.

Tobacco and blood sugar. A. CAPONNETTO. *Klin. Wochschr.* 7, 701(1928).—Smoking increases the blood-sugar concn. 0.4 to 0.5 g % in diabetics. The highest values are obtained about 2 hrs. after smoking. The intramuscular administration of 0.001 g. nicotine leads, after 1½ hrs., to a rise of 0.9 to 1.0 g. % in the blood-sugar concn. The hyperglucemic action of the nicotine can be depressed with atropine or with ergotamine. MILTON HANKE

The influence of pancreas preparations on the disturbance of food resorption in pancreasectomized dogs. MARTIN NOTHMANN. *Klin. Wochschr.* 7, 886-8(1928).—Pankrophorin, a powerful pancreas prepn., when fed with a normal diet to pancreasectomized dogs, leads to a disappearance of fat and muscle fibers from the feces. MILTON HANKE

The presence of caffeine in the milk of women after drinking coffee. E. SCHILG AND R. WOHINZ. *Arch. Gynäkol.* 134, 201-4(1928).—After the ingestion by nursing mothers of 15-g. coffee, containing 99-mg. caffeine, 1% of the caffeine was found in the milk. HARRIET F. HOLMES

Calcium and cardiac output. S. LAUTER AND BAUMANN. *Deut. Arch. klin. Med.* 155, 222-34(1927).—The intravenous injection of 5 cc. 10% CaCl_2 was followed in 80% of the cases studied by a slower pulse rate. No regularity was observed in the amt. of slowing, or in the no. of min. required for the normal rate to be reattained. In a few cases the rate was faster after the injection. Only slight and irregular changes were noted in the blood pressure; frequently the blood pressure remained const. after injection. As a control, no effect was noticeable after the injection of NaCl soln. The cardiac output was detd. by the EtI method of Henderson and Haggard. In more than half the cases there was an increase in the cardiac output, the max. increase being 70%; in 27% a decrease, the max. being 19%. The vol. per min., or product of pulse vol. and pulse rate, varied from +54.5% to -26.5%; in 12 cases there was an increase, in 14 a decrease. P. Y. JACKSON

The chemotherapeutic action of a new gold preparation (Orosan) in tuberculosis. P. RONDONI. *Biochim. terap. sper.* 14, 257-73(1927).—Colorless, clear solns. of 0.1% and 0.086% Orosan (I) ($\text{Na}_2\text{Au}(\text{SO}_3)_4$; cf. Oddo, Mingoa *C. A.* 22, 1553) turn red and turbid on 45 min. heating to 100° or 10 min. autoclaving at 130°. Under the same conditions 0.1, 0.5 and 1% solns. of *Sanocrysin* (II) turn distinctly brown. Boiled solns. of either prepn. had no inhibiting effect on *B. tuberculosis* cultures. Emulsions of tubercle bacillus were completely lysed by 0.5% II and 0.4% I. Above these concns. I is somewhat superior to II; below the reverse is the case. The growth of a broth-glycerol (5%) culture of human tubercle bacillus was suppressed by a 1:5000 soln. of I and inhibited for 1 week by a 10⁻⁴ soln. A concn. of 1:40,000 had a noticeable effect. Rabbits tolerate 50-60 mg./kg. intravenously, with only a slight indication of renal lesions. In guinea pigs repeated subcutaneous injections of 5-6% solns. into the same spot did not produce local inflammations. Intraperitoneally administered, the max. tolerated dose is 0.1 g./kg., the m. l. d. 0.2 g./kg. Individual variations and acquired tolerance were observed. The degenerative and hemorrhagic lesions of liver and kidney are relatively inextensive, suggesting that death is caused by central nervous or capillaritoxic action in the sense of Heubner. Guinea pigs infected with a virulent strain of human tubercle bacillus tolerated 1.35 g. I per kg., given subcutaneously or intraperitoneally within 80 days, or over 15 mg./kg. daily. Unlike II, I is better tolerated by the tuberculous than by the normal organism. The therapeutic effect was very moderate and limited to the promotion of proliferative and calcification processes. M. J.

Pressure changes in the capillaries of human skin due to electrically applied medicaments. Action of alcohol, quinine and atropine. LUDOLPH FISCHER. *Z. Biol.* 87, 197-209(1928).—There is effected a hyperemia and increase in capillary pressure. The greatest effect is obtained with quinine. FRANCES KRASNOW

Further studies on the influence of parasymphathicotropic and sympathicotropic drugs on "Thyraden" and natural metamorphosis. OTTO GETZNER. *Z. Biol.* 87, 228-38(1928).—That muscarine, pilocarpine and acetylcholine inhibit the metamorphosis and "Thyraden" action of *Alytes* larvae and that atropine accelerates these processes is applicable also to the frog and food larvae. Choline has the same effect as acetylcholine. Ergotamine acts like atropine. FRANCES KRASNOW

The combined action of veratrin and curare on striated frog muscle. II. The electrogram. JULIUS GRUNDIG. *Z. Biol.* 87, 240-8(1928); cf. *C. A.* 22, 1805. F. K.

The thermodynamics of acid and alkali contraction of collagen tissue. The thermic tension coefficient of isometric contractions. EDGAR WÖHLISCH. *Z. Biol.* **87**, 353-63 (1928).—Expts. on tendon show that the isometric strength increases with increasing temp. in the presence of lactic and acetic acids, whereas in the presence of alkali it decreases. The contraction is not in the muscle fibers themselves but in the contained collagen.

FRANCES KRASNOW

The thermodynamics of muscle contraction. I. The thermic strength coefficient of acid and chloroform contraction and rigor mortis. EDGAR WÖHLISCH AND RENÉ DU MESNIL DE ROCHEMONT. *Z. Biol.* **87**, 364-76 (1928).—The contraction of muscle due to lactic and acetic acids has a positive coeff., an anomalous thermoelastic behavior. This effect is similar to that shown by collagen. CHCl_3 contraction proceeds in 2 stages, showing 2 temp. coeffs. The positive coeff. is, in all probability, chem., the negative one, phys. In rigor mortis the thermic strength coeff. is negative.

FRANCES KRASNOW

Methods and results of experiments on the effects of drugs on bird malaria. ROBERT HEGNER, EDWIN H. SHAW, JR. AND REGINALD D. MANWELL. *Am. J. Hyg.* **8**, 564-782 (1928).—Birds may be used in the trials of new therapeutic agents for malaria since the drugs of the quinine type have a similar effect on avian and human parasites. Quinine is the most effective drug in malaria. It is assumed that the parasite is within the cells of the host and the drug must penetrate the cell in order to be effective; its toxicity must be much greater for the parasite than for the host. The toxicity of the drugs was measured before administration against *Paramecium caudatum* in a medium of H-ion concn. 8.2. The partition coeff. of the drug between erythrocytes and a medium surrounding them was ascertained by the Shaw method. Drugs insol. in the erythrocytes were incapable of action against malaria. Compds. which do not yield ions at the neutral point are absorbed by erythrocytes while those yielding ions are not absorbed. Canaries were infected with *Plasmodium cathemerium* by injecting the parasite intramuscularly or intraperitoneally. The drug treatment was begun on the day after the inoculation and the lapse of time before the appearance of the parasites noted. Six series of drugs were tested. Quinine and plasmochin were the most efficient while mercurophen appears promising. Thirty-two references are given. G. H. W. L.

The absorption of chemical compounds by red blood corpuscles and its therapeutic significance in the treatment of bird malaria. EDWIN H. SHAW, JR. *Am. J. Hyg.* **8**, 583-603 (1928).—Measurements of the absorption of various compds. by red blood cells of chicken and man were made *in vitro*. Ninety cc. of blood were treated with 10 cc. of 10% Na citrate and then centrifuged. Following this they were washed 5 times in a physiol. salt soln. during which time the white corpuscles were removed. The washed red corpuscles were suspended in the physiol. salt soln. and the vol. was brought up to 70 cc. To 10 cc. of this suspension were added 10 cc. of 6-10,000 soln. of the compd. in the original physiol. soln. After 30 min. of gentle rotation the sample was centrifuged and the clear liquid was compared with that of a control in an interferometer. This technic is applicable to any colorless compd. The partition coeff. is calcd. thus: concn. in corpuscles/concn. in salt soln. Measurements of the absorption by red blood corpuscles were made on cinchona, quinoline, and pyridine derivs. and on dyes. Conclusions are drawn as to the effects of changes in structure on the partition coeff. between corpuscles and salt soln. As proof that the absorption is a true partition desorption expts. were performed with pyridine and quinoline. The absorbed compd. is not firmly bound by the corpuscles but is readily given off and is free to act on the malarial parasite.

G. H. W. LUCAS

Action of camphor on the frog heart. HARUYOSHI YOSHIDA AND INOSUKE HAYASHI. *Nagoya J. Med. Sci.* **2**, No. 1, 1-5 (1927).—Expts. were made on isolated frog's heart by the Straub method using a Locke-Ringer soln. contg. camphor in concn. 1×10^{-3} to 2×10^{-4} . Low dilns. 1×10^{-6} had practically no effect while dilns. of 1×10^{-3} caused the heart to stop in diastole. Poisoned hearts could be washed free from camphor and would recover; if left standing from 3 to 25 hrs. without washing there was spontaneous recovery depending on the degree of oxidation. Colorimetric detns. of the camphor were made in the test solns. Six tracings are given. G. H. W. L.

The relationship between the chemical constitution and pharmacological action of local anesthetics. I. Comparative experiments of novocaine, tutocaine, cocaine and psicaine. KINGO TOMINAGA AND INOSUKE HAYASHI. *Nagoya J. Med. Sci.* **2**, No. 1, 6-10 (1927).—From Willstätter's formula for cocaine it is evident that 12 stereoisomers are possible; expts. on 6 of these show that there is a real quant. difference in their anesthetic action. Modifications of the formula for tropacocaine are discussed and 9 conclusions are drawn as to the effects of changing groups, etc. Phys. properties such as soly., m. p., f. p. and H-ion concn. show no specific dependence on the chem. consti-

tution. Novocaine and tutocaine show similar color and pptn. reactions while cocaine and psicaine react somewhat differently. The pharmacol. action of the drugs was tested on hemolysis, wheal formation on man, surface anesthesia on rabbit ear; the toxic effects were measured on mice. Tables are given. Conclusions: Novocaine, tutocaine, cocaine and psicaine show no remarkable difference in phys. properties. From the chem. standpoint novocaine and tutocaine are closely related; cocaine and psicaine are not so much so. In pharmacol. action cocaine and psicaine are very similar; tutocaine is weaker than either and in its poisonous action psicaine lies between tutocaine and novocaine. A parallelism does not always exist between the relationship of chem. constitution and the similarity of pharmacol. action in the local anesthetic of the benzoyl ester of *p*-aminobenzoyl ester series.

G. H. W. LUCAS

The effect of insulin injected directly into the renal artery upon the nitrogen and sugar elimination of the phlorhizinized dog. JACOB GOLDSTEIN and DORAN J. STEPIENS. Proc. Am. Physiol. Soc., *Am. J. Physiol.* **81**, 480(1927).—When insulin was injected slowly into the right renal artery of a phlorhizinized dog there was a prompt decrease in sugar elimination and increase in N excretion by that kidney. There was no change in the compn. of the urine from the left kidney for some time, until the insulin had time to reach it in sufficient concn.

J. F. LYMAN

The effect of calcium on the toxicity of carbon tetrachloride in dogs. ANNE S. MINOT. Proc. Am. Physiol. Soc., *Am. J. Physiol.* **81**, 502(1927).—Even large doses of CCl_4 produced no outward signs of intoxication in dogs fed well-balanced diets, though functional tests showed some liver injury. Dogs on low-Ca diets were killed in coma or convulsions by similar doses of CCl_4 . The symptoms were relieved by repeated intravenous injections of CaCl_2 or by NH_4Cl given by mouth. Death seemed to be due to a lack of Ca ions in the blood.

J. F. LYMAN

Action of myrtilin in pancreatic insufficiency. LEONARD BENJAMIN SHIPNER. Univ. of Chicago. *Am. J. Physiol.* **84**, 396–400(1928).—Myrtilin lowered the hyperglucemia and glucosuria in depancreatized dogs, prevented the high blood sugar and urinary sugar in dogs after removal of 95% of the pancreas and restored carbohydrate metabolism to normal in dogs after removal of 88% of the pancreas and the administration of dried thyroid.

J. F. LYMAN

The mechanism of the strophanthin mydriasis in the rat. ROBERT D. BARNARD. Univ. of Chicago. *Am. J. Physiol.* **84**, 407–9(1928).—The dilatation of the pupil of the rats eye by strophanthin is thought to depend on its power to lower surface tension rather than to a sp. effect. Other substances also lowering surface tension and having a similar effect on the eye are digitalis, saponin, Na taurocholate and resorcinol.

J. F. LYMAN

The effects of some diuretics on the urea-excreting capacity of the kidney. W. SCOTT POLLAND. Stanford Univ. Med. School. *Am. J. Physiol.* **85**, 141–8(1928).—All of the xanthin diuretics increased the urea-excreting capacity of the kidney, theophylline being most powerful, caffeine less so and theobromine least. HCl and NaHCO_3 given by mouth each increased urea excretion by the kidney. Novasurol, given intravenously, markedly depressed urea excretion.

J. F. LYMAN

Effect of ether anesthesia on some blood constituents. H. E. MAGEE and MISS A. E. GLENNIE. Rowett Inst., Aberdeen. Proc. Physiol. Soc., *J. Physiol.* **64**, x(1927).—During ether anesthesia in fasting rabbits there was an increase in blood acidity, reaching a max. in about 15 min., and then slowly returning toward normal. Luorg. P was nearly always definitely increased, while serum Ca was slightly lowered.

J. F. L.

The effect of injections of pituitary extract, adrenaline and insulin on ketonuria. J. H. BURNS and H. W. LING. Proc. Physiol. Soc., *J. Physiol.* **64**, xxii(1927).—Ketonuria in rats, fed a ration of filtered butter during May and June (period of greatest ketonuria), was suppressed by injections of pituitary ext. or by adrenaline. Insulin produced a primary rise in ketonuria followed by a fall, and finally by a second rise and then by a return to normal conditions.

J. F. LYMAN

The influence of ether anesthesia upon the gaseous composition of the blood. N. E. PRITT. Proc. Physiol. Soc., *J. Physiol.* **64**, xxiv(1927).—In anesthetized blood through which air was bubbled there was a decreased rate of O_2 absorption and an increased rate of loss of CO_2 as compared with normal blood.

J. F. LYMAN

The action of insulin and sugar on the respiration quotient and metabolism of the heart-lung preparation. L. E. BAYLISS, E. A. MÜLLER and F. H. STARLING. Univ. Coll. London. *J. Physiol.* **65**, 33–47(1928).—App. is described for ventilating the lungs with a small const. quantity of air in which the amts. of O_2 and CO_2 are kept const. by adding the first as fast as it is used up and removing the second as rapidly as it is formed. The respiratory quotient of the heart and lungs was not greater than 0.95,

probably less. In the absence of insulin enormous concns. of glucose were needed in the blood in order to permit the heart to function properly, and subsequent addition of insulin caused a rapid disappearance of glucose occurring only when the glucose concn. was initially greater than 0.5%. The glucose that disappeared was not oxidized. A reaction is suggested: free glucose (+ insulin) \rightarrow glucose complex. The glucose complex formed in the above reaction constitutes the actual material used by the heart muscle cells to provide energy for their contraction. Insulin may be a (1) reactant or (2) catalyst in the above reaction. Insulin and glucose had no specific effect on metabolism of the heart-lung prepn., since they only changed it if the heart vol. changed at the same time.

J. F. LYMAN

The action of insulin on the perfused mammalian liver. R. BODO AND H. P. MARKS. Natl. Inst. Med. Research, London. *J. Physiol.* 65, 48-62(1928).—A technic is described for isolating dog liver and perfusing it through the hepatic artery and portal vein with defibrinated blood which was ventilated by perfusion through isolated dog lungs. Glycogen storage in the absence of insulin was observed. Added insulin either stopped glycogen storage or caused a breakdown of glycogen. Added adrenaline caused a rapid breakdown of glycogen, which was not abolished by the previous addn. of insulin. The new formation of sugar by the liver of a fat-fed animal was not affected by insulin.

J. F. LYMAN

The relation of synthalin to carbohydrate metabolism. R. BODO AND H. P. MARKS. Natl. Inst. Med. Research, London. *J. Physiol.* 65, 83-99(1928).—Synthalin (decamethylenediguanidine, *C. A.* 21, 772) produced in the normal animal a rapid fall in blood sugar to a fatally low level. Two actions are involved: (1) an increased sugar disappearance; (2) a direct action on the liver shown by a rapid depletion of its glycogen and a failure of the liver to react to adrenaline. The disappearing sugar was not burnt since the respiratory quotient fell. A production of lactic acid was observed and this is the most important of its effects on carbohydrate metabolism. Synthalin had a toxic action on the liver and circulatory system.

J. F. LYMAN

The effect of insulin on acetonuria. J. H. BURN AND H. W. LING. Pharmaceutical Soc. Gt. Britain, London. *J. Physiol.* 65, 191-203(1928).—Rats fed a ration of butter and salts excreted much more acetone bodies in the summer than in the winter. Insulin injections at both seasons increased this ketonuria. Insulin injections delayed the formation of liver glycogen in fat-fed rats, the delay in the rise of liver glycogen corresponding in time to the period in which insulin augmented the ketonuria. The results indicate a transformation of fat into liver glycogen in rats on butter rations.

J. F. L.

The effect of insulin on protein metabolism. VRON C. KIRCH AND JAMES M. LUCK. Stanford Univ. *J. Biol. Chem.* 78, 257-64(1928).—The effect of insulin on protein metabolism in rats was studied by analyzing the entire animal for urea and amino acid N after the injections. Animals receiving insulin had a higher urea content, and lower amino acid N content than control animals given injections of NaCl. Conclusion: Insulin increases amino acid catabolism and inhibits protein hydrolysis.

C. RIEGEL

The effect of morphine and papaverine upon the peristaltic and antiperistaltic contractions of the ureter. CHARLES M. GRUBER. Washington Univ. *J. Pharmacol.* 33, 191-9(1928).—Strips of pig ureter were suspended in Tyrode-Locke soln. When morphine sulfate was added to the soln. in which the pace-maker end of the segment was suspended peristaltic activity was increased if it existed originally, or antiperistalsis, if it existed originally. If morphine sulfate was added to the dependent segment peristalsis is converted into antiperistalsis, and *vice versa*. Papaverine added to the soln. bathing the pace-maker causes reversal of movement also. It depresses both peristalsis and antiperistalsis and exerts this action in the presence of 100 times the quantity of morphine.

C. RIEGEL

A note on the influence of sodium phenobarbital upon the peristaltic and antiperistaltic activity of the ureter. CHARLES M. GRUBER. *J. Pharmacol.* 33, 201-6(1928).—Na phenobarbital added to the soln. bathing the pace-maker caused a depression in contractions, and the production of antiperistalsis if peristalsis previously existed, and *vice versa*. Na phenobarbital added to the bath of the dependent segment affected only the height of contractions.

C. RIEGEL

Variations in blood pressure on repeated administration of *l*- and *dl*-ephedrine. K. K. CHEN. Johns Hopkins Univ. *J. Pharmacol.* 33, 219-35(1928).—Repeated injections of *l*-ephedrine, *dl*-ephedrine or of the two alternately into anesthetized, decerebrated or pithed cats, dogs or rabbits caused a gradual decrease and a reversal of the pressor effect, the response depending on the size of the dose, time interval between injections, and the rate of injection. The gradual loss of pressor effect is attributed to failure of cardiac stimulation, and the reversal effect to cardiac depression. In one

case of bronchial asthma in man, the 1st dose of *l*- or *dl*-ephedrine by mouth caused the greatest rise in blood pressure, two subsequent doses causing smaller increases. C. R.

A comparative study of synthetic and natural ephedrines. K. K. CHEN. Johns Hopkins Univ. *J. Pharmacol.* 33, 237-58(1928).—Synthetic ephedrine, in its action on blood pressure, on strips of guinea-pig uterus, on blood sugar, and its action after arecoline or physostigmine, and in its mydriatic action, resembled natural ephedrine. The *m. l. d.* in rabbits by intravenous injection for both synthetic and natural ephedrines was 60 mg. per kg. In cases of congested nasal mucous membranes, and of hypertrophied turbinates the action of the synthetic ephedrine was similar to the natural. In about 50% of the cases of bronchial asthma studied synthetic ephedrine gave relief, but the action was weaker than that of the natural ephedrine. C. RIEGEL

The seat of the emetic action of the digitalis principles. NATHAN B. EDDY AND ROBERT A. HATCHER. Cornell Univ. *J. Pharmacol.* 33, 295-300(1928).—Nicotine abolished the emetic action of pure digitalis principles and of some crude preps., the effect persisting for 3 hrs. or more. C. RIEGEL

Influence of insulin on the disturbances of nitrogenous metabolism in severe diabetes. LABBÉ, FLORIDE NÉPVEUX AND HIERNAX. *Compt. rend.* 186, 1384-6 (1928).—In normal persons the azotemic index (cf. Laudat, *C. A.* 16, 1443) is 48 to 50%. In benign diabetes the ratio remains normal, but in severe diabetes it is lowered and ranges from 15.8 to 36%. The amino N of the blood is increased by 25 to 100% over the normal figure in severe diabetes, and the ratio of amino N to total N is similarly increased. The administration of insulin, in general, restores these abnormal ratios to their normal values. L. W. RIGGS

Influence of insulin on the disturbance of fat metabolism in severe diabetes. MARCEL LABBÉ, FLORIDE NÉPVEUX AND HIERNAX. *Compt. rend.* 186, 1445-6(1928); cf. preceding abstract.—In each of 13 cases observed the action of insulin tended to restore the metabolism of the fats. The acetone bodies of the blood fell to zero and at the same time the alk. reserve was raised to its normal figure. When the alk. reserve reached 50 vol the acetone bodies disappeared from the blood. The cholesterol of the blood generally fell, but in 3 out of 10 cases there was a slight rise. Sometimes a hypercholesterolemia resists the action of insulin. The lecithin content generally varied with the cholesterol. Insulin influenced the pancreatic function more rapidly with reference to fats than to proteins or even carbohydrates. L. W. RIGGS

Uterine action of uzara is not sympathomimetic. ROTHILIN AND RAYMOND-HAMET. *Compt. rend. soc. biol.* 99, 164-6(1928).—Uzara has a strong contracting action on the uterus *in vitro*. Like adrenaline, it does not act on the uterus after ergotamine, nor should it be considered as a sympathomimetic substance. L. W. RIGGS

Comparative action of insulin and decamethylenediganidine on the glycogen content of liver and muscles of the rabbit. P. RUBINO, J. A. COLLAZO AND B. VARELA-FUENTES. *Compt. rend. soc. biol.* 99, 178-80(1928).—Insulin accelerates the process of hydrolysis and utilization of glycogen of the tissues, but favors the phase of synthetic transformation which ends in the formation of glucose. Synthalin in small doses appears to inhibit this synthetic phase and diminishes the mobilization of glycogen in the liver. The muscular glycogen is not changed appreciably. L. W. RIGGS

Synergic action of adrenaline and ephedrine hydrochlorides. L. LAUNOY AND P. NICOLLE. *Compt. rend. soc. biol.* 99, 198-200(1928).—Tests with rabbits indicated that the mixt. of adrenaline and ephedrine in the proportions of 1 to 2000 and 1 to 5000, resp., causes a hypertensive action of which the intensity and duration are always greater than that caused by either alkaloid alone and often greater than the sum of their actions taken alone. When adrenaline is injected after ephedrine or *vice versa*, the vascular action is more intense than that following a repetition of the same dose of the same alkaloid. L. W. RIGGS

Action of pseudopelletierine on the cardiac pneumogastric. RAYMOND-HAMET. *Compt. rend. soc. biol.* 99, 204-6(1928); cf. Hazard, *C. A.* 21, 776, 1845.—Expts. with dogs under artificial respiration prove that pseudopelletierine paralyzes neither the vagus nerve terminations nor those of the sympathetic. Its action on the cardiac pneumogastric is analogous to that of nicotine and is not comparable to that of atropine. L. W. RIGGS

Excitability of the vomiting center in narcotized animals. Stimulating action of apomorphine associated with pentamethylenetetrazole (cardiazole). ALFRED SCHWARTZ. *Compt. rend. soc. biol.* 99, 222-4(1928).—It is possible to cause vomiting in a dog deeply anesthetized by veronal, without danger to the animal, by the combined actions of apomorphine and pentamethylenetetrazole on the vomiting center. L. W. RIGGS

Paradoxical reactions of certain secretions after an intravenous injection of acid

E. HUG AND A. D. MARENZI. *Compt. rend. soc. biol.* 99, 240-1(1928).—Chloralosed dogs weighing 15 kg. or more were injected with HCl or H_2SO_4 in varying concns. up to normal. The effects on the blood were the same as those reported by Haggard and Henderson, Winterstein and others. The action on the bile was remarkable in that the p_H , total CO_2 , and alk. reserve were increased in each of the 13 dogs tested. The ions Cl, Na and Ca remained about const. but K was notably increased. In the saliva there was a slight increase in p_H and a decrease in total CO_2 . L. W. RIGGS

Toxicity of uranyl nitrate by subcutaneous injection in the rabbit. MARCEL GARNIER, E. SCHULMANN AND J. MAREK. *Compt. rend. soc. biol.* 99, 269-71(1928); cf. C. A. 22, 2002.—The subcutaneous injection of uranyl nitrate in doses of 3 mg. per kg. in the rabbit causes a nephritis that is usually fatal in 5 or 6 days. With the dog 2 mg. per kg. is usually fatal in 10 days. In rabbits the albuminuria may exceed 0.6 g. in 10 cc. of urine and persists until death, while in dogs the albuminuria may nearly disappear before death. The vol. of urine excreted constantly diminished and sometimes ceased before death. L. W. RIGGS

Local edema caused by the injection of nephrotoxic substances. E. SCHULMANN AND J. MAREK. *Compt. rend. soc. biol.* 99, 272-3(1928).—The local edemas produced in rabbits by injections of $UO_2(NO_3)_2$, K_2CrO_4 and $HgCl_2$, resp., are compared. L. W. RIGGS

Action of decamethylenediguanidine on the glucemia of depancreatized dogs. F. RATHERY, R. KOURILSKY AND (MLLÉ.) S. GILBERT. *Compt. rend. soc. biol.* 99, 282-4(1928).—Synthalin in moderate but greater than therapeutic doses caused a hyperglucemia and an increased glucosuria in depancreatized dogs. It impeded somewhat the intense and prolonged hyperglucemia which followed the ingestion of glucose. Action of decamethylenediguanidine on the glucemia of the normal dog. *Ibid* 284-7.—With normal dogs the action of synthalin varies with the individual, now causing hypoglucemia and again hyperglucemia. The hypoglucemia may appear in 1.5 or in 24 hrs. The paradoxical hyperglucemic reaction was observed in both rabbits and dogs, and occurs usually within 0.5 to 3 hrs., but sometimes 24 hrs. after the initial phase of lowered glucemia. The action of synthalin is extremely variable on the hyperglucemia caused by the ingestion of glucose. It may increase, prolong or decrease the hyperglucemia, or may have no apparent action. These differences of action are not dependent exclusively on the size of the dose of synthalin. Contrary to insulin, synthalin is not to be considered a const. agent for the production of hypoglucemia in the dog. L. W. R.

Causes of hyperinsulinemia following intravenous injection of non-hypotensive solution of secretin. EDGARD ZUNZ AND JEAN LABARRE. *Compt. rend. soc. biol.* 99, 335-7(1928); cf. C. A. 22, 2992.—The injection of non-hypotensive secretin in a dog of which the principal pancreatic vein is connected with the jugular vein of a reactive dog causes a hypoglucemia in the latter. The present exp. was to det. if this hypoglucemia occurred after double subcardiac vagotomy of the donor animal. Double vagotomy of the donor dog does not prevent the gradual diminution of the glucemia of the receptor animal caused by the increase of insulin in the pancreatic vein of the donor by the action of secretin. L. W. RIGGS

Action of histamine and of acetylcholine on the vascular system of the kidney of the dog. E. DICKER. *Compt. rend. soc. biol.* 99, 341-5(1928).—With the isolated kidney, histamine in isotonic Locke soln. causes a fleeting increase in the output of the renal vein, always followed by a diminution in the output of the renal vein and of the collateral circulation. Acetylcholine at 1 in 100,000 isotonic Locke soln. diminished the output of the renal vein and did not sensibly affect the collateral circulation. With kidneys *in situ* histamine caused a dilatation followed by a diminution of the renal vol. and later an increase in vol. occurred but without reaching the normal vol. Acetylcholine was complex in its action and caused a passive diminution of the renal vol. immediately followed by an increase of vol. which was not proportional to the return of the carotid pressure. This occurs whether the pneumogastrics are sectioned or not. Action of excitation of the splanchnic nerve on the circulation in the kidney of the dog. *Ibid* 345-6. Reaction of the vascular system of the kidney in dogs desensitized after anaphylaxis. *Ibid* 346-7. L. W. RIGGS

Radium treatment of the nasal lesions of leprosy. R. P. SANDIDGE AND M. H. NEILL. U. S. Pub. Health Service, Pub. Health Bull. No. 168, 36-70(1927).—Ra was of value in removing the nodules of leprosy from the nasal cavity, while its effect on the leprosy bacilli in the nose was rather uncertain. G. SCHWOCH

Chemotherapy in malignant diseases, with special reference to lead. W. BLAIR BELL. Univ. of Liverpool. *Lancet* 1928, I, 164-5.—Every chemotherapeutical agent employed in malignant neoplastic disease should have 2 attributes at least: (1) the

power to arrest cell growth generally, (2) a special affinity for malignant cells and the chorionic epithelium. Both of these properties belong to a pure Pb colloid. The special chem. constitution, function or evocable reactions of the differentiated (specialized) tissue in which the neoplasm has developed, should be considered, and the Pb complex should be made accordingly. The present position of Pb therapy is discussed.

F. B. SEIBERT

Carbon dioxide thermo-saline springs in the light of modern research. ADOLF SCHOTT. *Lancet* 1928, I, 546-8.—The natural Nauheim CO₂ thermo-saline baths lower blood pressure in hypertension. There is also a decrease in pulse velocity. F. B. S.

Benzyl cinnamic ester in tuberculosis. The method of Jacobsen. H. BAINSBOROUGH. St. George's Hospital. *Lancet* 1928, I, 908-9.—Benzyl cinnamate given intramuscularly daily for 12 days and then 2 similar courses again after 15-18 day intervals caused improvement in tuberculous patients. Three typical cases are reported. No reaction follows administration.

F. B. SEIBERT

p-Phenylenediamine labyrinthitis. E. WATSON-WILLIAMS. *Lancet* 1928, I, 1123.—*p*-C₆H₄(NH₂)₂ is the essential ingredient in several popular hair dyes or "restorers." It often produces dermatitis and a selective action on the labyrinth. Several cases are cited.

F. B. SEIBERT

Carbon monoxide poisoning. H. HARTRIDGE. Univ. of London. *Lancet* 1928, I, 1137-40. The mechanism by which CO produces poisoning and the acute symptoms occurring, as well as the amt. of CO in air which is necessary to produce poisoning, are discussed. The content of CO in coal gas, producer gas, in products of incomplete combustion, in other gases and in gasoline motor exhaust are noted. Eleven tests for CO are mentioned. The prevention and treatment of acute CO poisoning, chronic CO poisoning and the medicolegal aspect are considered.

F. B. SEIBERT

Chemotherapy of malignant tumors. KARL LEWIN. *Z. Krebsforsch.* 27, 132-7 (1928).—A brief review of the topic with particular reference to L.'s work with various I compds., which are believed to offer possibilities for a successful chemotherapy of cancer. An org. compd. of I and Ce is reported to have given encouraging results.

H. G. WELLS

The toxicity of tetraethyl lead and inorganic lead salts. ROBERT A. KEOH. *J. Lab. Clin. Med.* 12, 554-60 (1927).—The toxicity of PbEt₄ was detd. for rabbits for the various methods of administration. Comparison of its toxicity with inorg. Pb indicates this toxicity is a function of its Pb content. An explanation of the delayed effect of PbEt₄ as compared with salts of Pb is offered in that it is suggested that PbEt₄ owes its toxicity to a decompn. reaction which produces H₂O-sol. compds. of Pb that are capable of coagulating proteins.

ETHEL W. WICKWIRE

Some notes on glycol; glycol-chloretone anesthesia. H. B. HAAG AND W. R. BOND. *J. Lab. Clin. Med.* 12, 882-3 (1927).—As a substitute for EtOH glycol did not have the same solvent action on the active principles of digitalis. Intraperitoneal administration of glycol to dogs of 5 cc. per kg. body wt. apparently showed no injurious effects. Intravenous injections of 1.5 cc. per kg. body wt. were tolerated with little or no discomfort. For 2 yrs. a glycol soln. of chloretone has been used as an anesthetic for dogs and cats in such lab. expts. as the use of chloretone will permit. 0.5 cc. of a 40% soln. in glycol. per kg. body wt. injected intraperitoneally suffices to maintain the animals in a satisfactory state of anesthesia, and seems to possess all the advantages and none of the disadvantages of the older 10% chloretone-olive oil solns.

ETHEL W. WICKWIRE

Studies in local anesthesia. VI. Further observations of *p*-aminobenzoate compounds on the rabbit's eye. SEYMOUR J. COHEN. *J. Lab. Clin. Med.* 12, 983-8 (1927).—The drugs, 28 in no., were prepd. in mol./concn., which corresponds to about 1.7% cocaine soln. The results indicate that the greatest anesthetic efficiency for this series of drugs occurs when the terminal amino group contains either the ethyl, propyl or butyl radicals. The introduction of the methyl radical in this terminal amino group causes a loss of the anesthetic action of the drug while the introduction of the amyl radical produces a drug that is very irritant and sometimes corrosive when compared with the same concn. of a cocaine soln. The substitution of the piperidine ring in place of the terminal amino group renders the drug much less anesthetic. The substitution of the cyclohexane radical for the alc. portion of the mol. produces a drug with strong anesthetic properties. The one phosphate salt is much less anesthetic than the hydrochloride salt.

ETHEL W. WICKWIRE

The action of indole and skatole on the heart. J. A. WADDELL AND J. A. CALHOUN. *J. Lab. Clin. Med.* 12, 991-7 (1927); cf. C. A. 21, 3977.—Indole and skatole were found to affect the hearts of cold-blooded animals more actively than those of warm; to de-

crease the amplitude and rate and even arrest the hearts of frogs, turtles, rabbits and cats; to have variable quant. results on animals of the same species; to become more effective on repetition and withdrawal is not followed by complete recovery; are antagonized by adrenaline but not by atropine; and are antagonistic in sequence but, mixed in balanced proportions, each exhibits its peculiar effect, both systole and diastole being decreased.

ETHEL W. WICKWIRE

Preparation [and pharmacological action] of potassium and sodium tetrabisphosphate tartrates (KÖBER) 6. The outlook in pharmacology (BRADFORD) 17. *Sclerocarya caffra* (BRANDWIJK) 17. The problem of active iron (KÖTSCHAU) 17.

BUSH, ARTHUR DERMONT: A Textbook of Pharmacology. Philadelphia: Blakiston. 191 pp. Cloth bound \$2.

MAYEDA, SEIBUN: Beiträge zur Erforschung des Wirkungsmechanismus der China-alkaloide bei freilebenden Organismen. Leipzig: Joh. Ambr. Barth. 30 pp. M. 2.

TIFFENEAU, M.: Abrégé de Pharmacologie. Paris: Vigot frères. 88 pp.

TRAUBE, J.: Über die Wirkung von Arzneimitteln und Giften. Pharmakolog. u. toxikolog. Probleme. Die Kolloidlehre und die Homöopathie. Radeburg: Dr. Madaus & Co. M. 2.

I—ZOOLOGY

R. A. GORTNER

Time factors in relation to the acquisition of food by the honeybee. O. W. PARK. Ia. Agr. Expt. Sta., *Research Bull.* 108, 185-225 (1928).—A scheme is detailed for the marking of individual bees with a pigment composed of white shellac with EtOH. H₂O-carriers cannot be distinguished from nectar-carriers by their appearance because H₂O and nectar are both carried in the honey-sac located inside the abdomen of the bee. To avoid the necessity of killing bees to det. the nature of the contents of the honey-sac, a simple technic was devised. The bee to be tested was held fast while the abdomen was gently pressed, thus causing the disgorging of a portion of the honey-sac on a piece of white filter paper. The nectar produced a translucent spot on the paper somewhat similar to that produced by a drop of oil, while H₂O drops left no residue. Refinements in the test allow an approx. detn. of the sugar concn. present—even as low as 2%. The sugar content of nectars from Iowa plants probably exceeds 25%. Nectar and pollen carriers make only about 10 trips per day while H₂O-carriers may make as many as 100 trips per day. The av. speed in flight was detd. to be about 15 miles per hr.

C. R. FELLERS

The extractive substances in *Octopus octopodia*. KIVOSHI MORIZAWA. Kioto Univ. *Acta Schol. Med. Univ. Imp. Kioto* 9, 285-98 (1927).—A 50-g. sample of fresh material from Akashi was placed in boiling H₂O for several min., then ground, extd. several times with warm H₂O, the exts. were treated with 20% tannin soln., filtered, the excess tannin was removed from the filtrate by treating successively with Ba(OH)₂, H₂SO₄, freshly pptd. Pb(OH)₂ and H₂S, the filtrate evapd. *in vacuo* at 40°; a large amt. of taurine (I) sepd. at this point; the filtrate was adjusted to 5% acidity with H₂SO₄, the remaining I pptd. with 30% phosphotungstic acid, washed with 5% H₂SO₄ and the ppt. decompd. with Ba(OH)₂ in the usual manner; the filtrate was made slightly acid with HNO₃ and the purine fraction (II) was pptd. with 20% AgNO₃; the filtrate was satd. with solid Ba(OH)₂, which pptd. the histidine and arginine fractions (III); the filtrate was made slightly acid with H₂SO₄, the excess Ag removed with H₂S, evapd. *in vacuo* to a small vol., adjusted to 5% acidity with H₂SO₄ and the lysine (IV) fraction pptd. with 20% phosphotungstic acid. Fraction II was sepd. (cf. Krüger and Schittenhelm, *Z. physiol. Chem.* 35, 153 (1902)) into guanine, adenine, hypoxanthine and xanthine. Fraction III was sepd. (cf. Kossel and Patten, *Z. physiol. Chem.* 38, 39 (1903)) into histidine, guanidine, cytosine and a new base, C₈H₁₈N₄O₄, which was named *octopine* and which forms a *picrate*, m. 225°, and a *picrolonate*, m. 234°. Fraction IV contains sarcosine, creatinine, betaine, *D*-alanine and probably carnitine. Attempts will be made to det. the constitution of octopine.

N. A. LANGE

Behavior of mitochondria within the living cell. E. S. HORNING. *Australian J. Exptl. Biol. Med. Sci.* 5, 143-8 (1928).—The observations were made on the behavior of mitochondria in the protoplasm of *Heterotrachea* as shown by dark ground illumination. The mitochondria are scattered throughout the protoplasm where they undergo active Brownian movements. Denser aggregations of mitochondria were near the meganucleus and the food vacuoles. This effect may be due to a surface tension phenomenon dependent upon their phosphatidal nature. The presence of mitochondria within the

food vacuoles is regarded as a direct demonstration of the origin of digestive enzymes from mitochondria. L. W. RIGGS

Variations in the protein substances coagulable by heat in the plasma of normal and sacculine *carcinus maenas*. A. DAMBOVICEANU. *Compt. rend. soc. biol.* 98, 1633-5 (1928).—The plasma proteins coagulable by heat are increased 2 to 3 times in normal over sacculine crabs, also in crabs having lost their sacculus. After removal of the proteins coagulable by heat, a corresponding increase was observed in the albumins and globulins. The p_H of the plasma remained at 7.7, and Δ changed but slightly. L. W. RIGGS

Effect of the p_H of the medium on the galvanotropism of *Paramecium*. T. MAYEDA. *Compt. rend. soc. biol.* 99, 108-10 (1928).—The *Paramecium* shows cathodic galvanotropism in distd. water. Beginning with a neutral reaction the galvanotropism is cathodic until p_H 4.0 is reached. With more acidity it is indecisive and disappears at 3.6. On the other hand as the p_H increases from 7.0 the galvanotropism remains cathodic up to 9.0 when it generally becomes anodic. Below p_H 3.2 and above 10.4 the organisms are killed. When the acidity is made by HNO_3 and the alkyl. in the same soln. is made by $Ba(OH)_2$ the galvanotropism is always cathodic. L. W. R.

Action of certain electrolytes on the polarity of *Infusoria*. PAUL ROTH. *Compt. rend. soc. biol.* 99, 144-6 (1928).—Salts of the univalent cations ($NaCl$ and KCl) act in a similar manner on the polarity of *Infusoria*, their differences of action being one of degree. Salts of bivalent cations ($CaCl_2$ and $MgCl_2$) have identical actions. They depolarize a little, but are more toxic than the salts of the univalent cations. Mixts. of salts of univalent and bivalent cations show a sharp antagonism. If $CaCl_2$ hinders the depolarizing action of KCl the latter also prevents in a measure the toxic action of $CaCl_2$. In a mixt. of the 4 salts the univalent groups slightly dominates the bivalent group. L. W. RIGGS

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Analysis of some Chinese foods. A. ABEL. *J. Orient. Med.* 7, 134-5, 197-209 (1927); *Ber. ges. Physiol. expul. Pharmacol.* 44, 637.—The non-protein N of *Pien-tan*, preserved duck egg, is 0.21363%; that of fresh duck egg 0.07285%. The latter is increased to 0.23599-0.24668% by 48 hr. autolysis to 0.21213% by 48 hr. storage at room temp. and to 0.22145% by incubation. The proteolysis was possibly effected by an enzyme originally contained in the yolk although ripe *Pien-tan* contains no enzyme. *Nai-tofu*, Mongolian cheese, is one of the most important stock foods of the Mongols. It contains 8.44% water, 50.63% protein, 24.45% fat, 2.44% salts, no carbohydrates. MARY JACOBSEN

Report of the Committee on Methods of Analysis. D. A. COLEMAN, et al. U. S. Dept. Agr., Wash., D. C. *Cereal Chemistry* 5, 269-76 (1928); cf. C. A. 21, 3092.—Collaborative protein studies were made by 40 representative cereal chemists. The samples submitted for test were durum wheat (whole) and durum wheat (ground), white wheat (whole) and white wheat (ground). The range of values as given by the 40 analysts follows: for the durum (whole) 0.4%; durum (ground) 0.51%; white (whole) 0.44%; white (ground) 0.46%. Then 40 sep. portions of the durum and white wheats were ground and analyzed by the same analyst who found for the durum (whole) a range of 0.30%; the durum (ground) 0.26%; the white (whole) 0.32%; and the white (ground) 0.19% or an average of 0.27%. To check equipment and standard solns. a soln. contg. 0.5% $(NH_4)_2SO_4$ was submitted to 22 collaborators with the request that they distil and titrate, also digest, distil and titrate and multiply N by 5.7. The range here was 0.52% by both methods. Collaborative studies were also made on the analyses of feeding stuffs. Here the results for crude fiber and moisture were the least satisfactory. Nine collaborators also reported on the analysis of bran. Here again the results for crude fiber were unsatisfactory. L. H. BAILEY

Inspection of army biscuit on the basis of chemical analysis. J. STRAUB AND J. PH. PEPPER. *Pharm. Weekblad* 65, 765-76 (1928).—Discussion of the baking recipe, the losses of fat and sugar during baking, and the detn. of moisture, fat and sugar in the finished product. [Protein is not mentioned.—Abstr.] A. W. DOX

Report of Committee on Standardization of Experimental Baking Test. Present status of standard experimental baking test. M. J. BLISH, et al. Univ. Nebraska. *Cereal Chemistry* 5, 277-300 (1928).—The standard baking test (C. A. 22, 2007) is used as a basis for discussion and explanation. Certain additional and supplementary tests

are also proposed. These allow for variations in absorption, fermentation period, the use of oxidizing agents and mechanical development of the dough. If the standard method is not a precise scientific method, it at least more nearly approaches a scientific approximation than any procedure now available. The committee recommends the adoption of the proposed method as a tentative standard exptl. baking procedure by the American Association of Cereal Chemists. C. H. Bailey, C. C. Fifield and R. C. Sherwood reported on baking 51 flours by the proposed A. A. C. C. method and a method for making a commercial loaf using 350 g. flour. More than 1000 bakes were made and the results were subjected to statistical analyses which showed that the small-dough method is in no sense less satisfactory than the large-dough method. When small quantities of flour are available there is an advantage of the possibility of additional replicates, or the introduction of more variables into the manipulation of the dough. Blish calls attention to the need for an adequate standard reporting system for use in connection with the proposed standard baking procedure. Certain terms are defined and six types of loaves shown by photographs and it is tentatively suggested that these may be used as a basis for the development of a standard method of reporting. C. B. Morrison, R. M. Bohn and W. Siedhof reported on loaves having different textures and grains. Cross sections of such loaves are shown by photographs. C. G. Harrel reported on possible causes for variation in collaborative reports and mentions particularly the yeast and the fermentation. L. D. Whiting reported on the application of the proposed method to soft wheat flours and noted that a lower absorption would be necessary with the soft wheats, also a shorter period of fermentation.

L. H. BAILEY

Some application of spectrophotometric methods to baking problems. EVA L. STEPHENS, ALICE M. CHILD and C. H. BAILEY. Agr. Expt. Sta. Univ. Farm, St. Paul, Minn. *Cereal Chemistry* 5, 256-68(1928).—Color of baked cookies, as measured spectrophotometrically, is related in a measure to the color of the molasses used in the formula. Dosage of NaHCO_3 likewise exerts a substantial effect upon the color of the cookies, tending to cause them to brown, or take on a darker hue, as the quantity increased through the ordinary working proportions. Increasing the temp. at which the cookies are baked tends to increase the depth of color, or reduce the percentage of light reflected from their surface. Degree of alky. of the baked cookies is a function of (a) dosage of NaHCO_3 used, and (b) time and temp. of baking. In general, the degree of alky. (as p_H) tends to increase with increase in the NaHCO_3 dosage. When normal or optimum dosage of NaHCO_3 (3 g. per 220 g. of flour) was used, it appeared that the OH-ion concn. tended to rise in the early stages of the baking. This was followed by a decrease in the same values, probably because of the formation of acid-reacting compds. from the sugars present, which in turn either served as buffers, or tended to neutralize the alkali present.

L. H. BAILEY

Some aspects of the effect of heat upon flour. D. W. KENT-JONES. Woodlands, Ltd., Dover, England. *Cereal Chemistry* 5, 235-41(1928); cf. Berliner and Rüter, *Z. ges. Mühlenwesen* 1928, 209.—Loaf vol. is not a reliable guide as to the "strength" of a flour, especially with tin loaves as so many factors, more or less under the control of the baker, enter into the matter. By "strength" is meant the power of a dough to retain the gas produced within it. Undue prominence is given to oven-spring. Size of loaf is not so important as a dough that works well and can be handled easily. Improvement is obtained by adding 0.7% strongly heated flour to ordinary flour. This is in lieu of chemical improvers.

L. H. BAILEY

Effect of dry skim milk on baking quality of various flours. EMILY GREWE. Bur. of Dairy Industry, U. S. Dept. Agr. *Cereal Chemistry* 5, 242-55(1928).—Flour samples representing 95% flours milled from hard winter, hard spring, and soft winter wheat were used in making bread for a study of the incorporation of dry skim milk in the dough batch. Four % dry skim milk was used. Flours differ in their reaction to the use of dried skim milk in bread making. In some the baking qualities are improved, in others they are not. The hard spring wheat flours used in this expt. reacted more favorably to the use of dry skim milk than hard winter wheat flours. The range in fermentation time in which doughs give good bread is increased by the use of dried skim milk. This adds to the ease of bread manuf. and is a very important property. Lactose, which is not fermented by yeast, imparts a beautiful golden brown color to the crust of the baked loaf of bread. Forty-eight % of dried skim milk is lactose. Break and shred are improved by the use of dried skim milk. The shreds are long and smooth and there is a decrease in the tendency to break. The color of the crumb is more creamy and more glassy as a result of the use of dry skim milk. Proof period is affected by the use of dry skim milk in bread. Overproofing of milk bread is more detrimental than overproofing bread made without milk. There is a greater increase

in vol. as a result of overproofing a dough containing milk than a dough which has no milk; and with this increase in vol. there is an increase in the coarseness of the grain. Doughs containing dry skim milk proofed at 27° and 30° and at 30° and 35° were compared. When proper adjustments for time were made, with these changes in temp., similar results were obtained regardless of the proof temp. used. No harmful effects were obtained by proofing at 35°.

L. H. BAILEY

Report of the Committee on Method of Testing Cake and Biscuit Flours. MARY M. BROOKS, *et al.* Purity Bakeries Corp., Chicago. *Cereal Chemistry* 5, 301-9 (1928).—From a questionnaire the committee ascertained that practically all test labs. are making the usual routine chem. detns. of protein, ash, moisture, and occasionally acidity. There is some difference of opinion as to the worth of viscosity and H-ion detns. A baking test of some kind is usually made in addition to the chem. tests. A white shortening cake was chosen for the work of the committee. Three formulas and two procedures were used. The size of pan was considered and the following suggested: $3 \times 6\frac{3}{4}$ in. bottom measurement, $3\frac{1}{2} \times 7\frac{1}{2}$ top and $2\frac{1}{4}$ in. deep. Vol. of the pan is 52.8 cu. in. Allow 5 cu. in. for each ounce scaling weight or about $10\frac{1}{2}$ oz. for this pan. Line the pan with thin manilla paper and bake at about 375° F.

L. H. B.

Improvements in the fermentation of bread produced by (the addition of) yeast nutrients. L. ELION. *Z. angew. Chem.* 41, 230-1 (1928).—The fermentation of dough, as measured by the amt. of CO_2 evolved, is increased by the addn. to the mixing of yeast (1 g.) and flour (50 g.) of small amts. (0.1 g.) of yeast nutrients such as carbamide, peptone, asparagine and NH_4Cl , tartrate, lactate or phosphate. NH_4 phosphate gave the most marked increase, pronounced increase being also observed with the lactate. When the proportion of yeast in the mixing was increased to 3 g., the increase in fermentation produced by addn. of the nutrients was less pronounced, and a deficiency of sugar was observed. With yeast ext. in place of NH_4 phosphate fermentation was increased but sugar deficiency occurred even with 1 g. of yeast, although in the absence of the ext. sufficient sugar was always present. Addn. of "super-rapidase" produced a remarkable increase in fermentation, and this product appears to act as a sugar producer, by virtue of its diastatic properties, in addn. to functioning as a yeast nutrient.

B. C. A.

The baking powder controversy. HARVEY W. WILEY. *Science* 68, 159-62 (1928).

E. H.

Cause of "fishiness" in dairy products. W. L. DAVIES AND A. T. R. MATTICK. *Nature* 121, 324 (1928).—Butter-fat olein easily absorbs O , yielding a labile peroxide; the reaction is strongly catalyzed by salts of heavy metals, especially Cu. The nitrogenous base portion of lecithin is thereupon oxidized with the production of volatile bases (chiefly trimethylamine) and their fatty acid salts. Appreciable amts. of Cu were present in all fishy dairy products. In the absence of metallic contamination the absorption of O and development of rancidity would be slow.

B. C. A.

Parchment paper as a source of mold infection in butter. H. MACY AND G. M. PULKRABEK. Minn. Agr. Expt. Sta., *Bull.* 242, 1-23 (1928).—Areas of distinct, visible mold growth were produced on the surface of a mold-free butter by infection with spores brought into contact with the butter by contaminated parchment paper. Several weeks often elapse, depending largely upon humidity and temp. before the growth of mold becomes visible to the naked eye as deeply colored areas on the butter or parchment. Contaminated parchment paper may be rendered mold-free by complete immersion of the paper in boiling H_2O or boiling satd. brine for at least 5 min. A no. of chemicals, when in sufficiently concd. solns. and when allowed to act for sufficient periods of time, destroyed mold spores, but the objections to their use are such that none of them is recommended. Among those tested were boric, benzoic and salicylic acids, CH_3O , NaOCl , $\text{Ca}(\text{OCl})_2$, and chloramine. Traces of chemicals which may remain on the parchment papers after treatment by the methods described do not inhibit the growth of the mold on the surface of butter when the butter itself is the source of the mold, nor do these methods of treatment prevent the occurrence of moldy areas on the parchment paper. A full bibliography is appended.

C. R. FELLERS

The chemical composition of some Italian milk foods. L. SETTIMI. Univ. Roma. *Atti accad. Lincei* [6], 7, 586-9 (1928); cf. C. A. 22, 2008.—Analyses of 2 series of Roman buttermilk curds, the 1st from whole milk whey and the 2nd from skimmed milk whey, gave the following av. % comps., resp.: water 56.00, 66.30; total N substances 8.51, 8.30; sol. N substances 1.04, 1.10; fats and phosphatides 33.80, 23.50; lecithin 1.16, 0.94; lactose 0.90, 1.10; ash 0.48, 0.49; acidity (as lactic acid) 0.21, 0.23; calories per 100 g. 353, 257. The sol. N substances consist chiefly of proteoses and peptones, with traces of amino acids. The ash consists chiefly of $\text{Ca}_3(\text{PO}_4)_2$, with small proportions

of Na_2SO_4 , NaCl , KCl , K_2SO_4 , MgSO_4 and MgCl_2 . Analyses of Roman and of Cardito *mozzarella* (from skimmed milk) gave the following av. % compns., resp.: water 67.00, 61.00; total N substances 27.00, 16.00; sol. N substances 5.10, 2.15; amino N 0.25, 0.12; fats and phosphatides 3.00, 20.00; lecithin -, 1.05; lactose trace, 0.50; ash 2.42, 2.40; calories per 100 g. 139, 253. The sol. N substances were chiefly proteoses and peptones, with a small proportion of amino acids. The ash was chiefly NaCl and $\text{Ca}_3(\text{PO}_4)_2$ with small proportions of Na, K and Mg phosphates, chlorides and sulfates.

C. C. DAVIS

Chemical sterilization of milk bottles in relation to tubercle bacilli. E. M. WADE, R. W. ARCHIBALD AND H. A. WHITTAKER. State Dept. of Health, Minneapolis. *J. Bact.* 15, 189-94(1928).—The expts. suggests that under the conditions tried, CaClOCl solns. contg. even up to 500 parts per million of available Cl cannot be depended on to kill human tubercle bacilli in the app. and utensils of milk plants. Chloramine in a strength of 93 to 95 parts per million applied for 3 min. is effective. If solns. are stronger the time can be decreased.

JOHN T. MYERS

Microorganisms and the production of dahi. C. S. RAM AYYAR. *Agr. J. India* 23, 107-10(1928).—Dahi is a product made in India by curdling milk through the growth of certain lactic-acid-forming bacteria. It is prepd. by heating fresh milk to boiling, allowing it to cool to about 98-100° F. and adding a small quantity of dahi from an earlier batch. Upon standing overnight in a covered container a smooth homogeneous curd with an acid taste is produced. Examn. of dahi smears showed the presence of very long rods, short rods joined in pairs, cocci and yeast cells. In summer, dahi 24 hrs. after inoculation contains the long rods (*Streptothrix Dahi*) almost exclusively, the acidity of the product at the end of that time being 1 to 1.4%, calcd. as lactic acid, when the milk is kept at 98° F. In winter, the chief agent responsible for curdling is the short rod-type organism which grows well at 68° F. and produces 0.5 to 0.7% acid in 24 hrs. The product of low-temp. fermentation is known as "sweet dahi." A non-spore forming yeast of the *Torula* type is always assocd. with both types of lactic acid organisms in dahi. This yeast grows only in curdled milk of acid reaction and consumes the lactic acid produced by other organisms. It grows well in media contg. sucrose or glucose and does not produce alc. from any sugars. Lactic-acid-forming bacteria live longer when assocd. with this yeast because of its ability to prevent the accumulation of toxic quantities of acid.

K. D. JACOB

The accuracy of composite cream samples. W. B. COMBS, L. M. THURSTON, A. E. GROTH AND S. L. COULTER. Minn. Agr. Expt. Sta., *Bull.* 243, 1-38(1927).—The amt. of evapn. is greatest from glass-stoppered bottles. Rubber- and cork-stoppered bottles follow in order. The rubber stopper is preferred to the cork, as a small quantity of butterfat may be absorbed by the cork stopper. The composite cream sample cannot be condemned as inaccurate. Where possible, the composite cream sample should be prepd. in aliquot portions or in proportion to the weight of cream delivered. The dipper composite did not yield as accurate results as the aliquot. The operation of the Babcock test can be a more serious source of error in detg. the lb. of fat in cream than the method of prepg. the composite cream sample. The dropping of 0.5% when reading the Babcock test should never be practised where accuracy is desired. The cream producer can expect an accurate test on 60.8% of his deliveries if composites are prepd. in aliquot and in 45% of his deliveries if the dipper is used. The av. variation per 100 lb. of fat delivered is -0.745 lb. by the aliquot composite test and -1.012 lb. by the dipper composite test.

A. R. FELLERS

The manufacture of Cheddar cheese. C. P. CALLISTER. *Chem. Eng. Mining Rev.* 20, 317-9(1928).—A review.

J. C. JURRJEHS

The microflora of Gorgonzola cheese. A. DE TOMASI. Univ. Leipzig. *Centr. Bakt. Parasitenk. II Abt.* 74, 184-91(1928).—The characteristic odor and taste depend on chem. changes produced by spore-forming aerobic bacteria rather than by *Penicillium* Weidmanni.

JOHN T. MYERS

Aeration of grains. M. HIRSCH. *Wochschr. Brau.* 45, 256-9(1928).—In the aeration of stored grains the cooling, drying and washing action of the air depends on the temp., moisture and amount of air and the temp. and moisture content of the stored product. A table is given showing the interrelation of these factors.

A. SCHULTZ

Desiccating potatoes. HANS GRASSMÉ. *Z. Ver. deut. Ing.* 72, 1001-6(1928).—An historical résumé of the processes and economics of desiccating potatoes, with illustrations of the types of plants and machinery used. Even in 1806 efforts to salvage frozen potatoes were made successfully. About 1901 a new impetus was given the industry by the introduction of driers of the rotary drum type. Pressing or centrifuging ground potatoes resulted in a loss of part of the nutrients with the water; such proc-

esses were not successful commercially. Reducing the washed potatoes to a pulp and then drying on heated rollers give an excellent product. A water content of 15% or less, and the retention of the nutrients in an unimpaired and easily digestible form, are the requisites of a satisfactory product. Roll driers operate at about 80% thermal efficiency. 100 kg. of potatoes (80% H₂O) yield about 23.5 kg. desiccated potatoes and 76.5 kg. H₂O. 100 kg. of desiccated potatoes require about 36 kg. of coal (7000 cal./kg.) for drying and 14 kg. additional for power. Somewhat more than this is required with roll driers yielding a product contg. 12-14% H₂O. A (German) government questionnaire showed that the cost of operating factories was such that, on the average, potatoes costing more than 1.97 marks per Zentner (50 kg.) could not be desiccated profitably. As this price is less than the av. market price of potatoes it becomes necessary to develop methods that will operate at a lower cost. W. C. EBAUGH

Edible canna in the Waimea district of Hawaii. J. C. RIPPERTON AND R. A. GOFF. Hawaii Agr. Expt. Sta., *Bull.* 57, 1-41 (1928).—An exptl. planting in 19 months yielded 43 tons per acre. For starch manuf. the canna should be harvested in about 17 months. Analysis of the different parts of the canna plant showed in the fresh material as an av. of the tops in %, moisture 85, fat 0.09, crude protein 0.8, fiber 4.4, N-free ext. 8.2, ash 1.3, N 1.3, CaO 0.18, P₂O₅ 0.11 and K₂O 0.34. The root-stalk contained moisture 77.3, fat 0.08, crude protein 0.49, fiber 2.4, N-free ext. 19.2, ash 0.8, N 0.08, CaO 0.07, P₂O₅ 0.15 and K₂O 0.19. The residue or pulp after manuf. into starch was found to be a very useful fertilizer or feed. The process of edible-canna starch is described. C. R. FELLERS

Heat penetration in the pasteurizing of sirups and concentrates in glass containers. J. H. IRISH, M. A. JOSLYN AND J. W. PARCELL. *Hilgardia* 3, 183-206 (1928).—The rates of heat penetration in bottled sirups as affected by sugar concns., viscosity of liquids, size of bottle, and variety of sirup were detd. It was found that sugar exerted only a slight retarding effect on heat penetration at low concns. but an appreciable retarding effect at concns. above 50%, thermocouples being used. A very marked decrease in rate occurred between 60 and 70%. This was proved to be due to increase in viscosity of the solns. with increase in sugar concn. Differences in the rate of heat penetration in containers of different sizes were not very great in small containers such as pints, 8-ounce and 4-ounce bottles, but a marked difference was found in the rate between the gal. and the smaller containers. This last fact probably accounts for the greater loss by molding of fruit juice in gal. containers than in small containers inasmuch as most manufacturers give little or no greater time to gallon-size than to smaller containers. Sirups rich in pectins and gums transmitted heat very much more slowly than those poor in these constituents. This was proved to be caused by the effect of pectin on the viscosity. Pectin very greatly increased the viscosity of the sugar solns. of fruit juices and thereby greatly reduced transmission of heat by convection. Where the juice, sirup, or concentrate actually jellied, heat penetration became very slow, but was not noticeably affected by increase or decrease of the sugar content, provided the sugar content was not reduced below that required for jelly formation. C. R. FELLERS

Revolving grinder and "carrousel" heating room in the chocolate industry. ADOLF GRAUMANN. *Z. Ver. deut. Ing.* 72, 1025-6 (1928).—Great savings are effected in time, wages and power, and an improvement in quality of the product is obtained, when revolving chocolate mills are used rather than those of other types. Such a mill is described and illustrated. The chocolate must be kept at 80° for 3 to 5 days in a "heating room" with carefully regulated temperature. In place of such rooms of the ordinary type it has been found advantageous to use the "carrousel" (revolving) chamber, with pipes for heating or cooling, and with doors for introducing and removing pans of chocolate so arranged that little change of temp. occurs when these operations are carried out. W. C. EBAUGH

Determination of cacao shell. W. PLÜCKER, A. STEINRUCK AND F. STARCK. *Z. Untersuch. Lebensm.* 54, 488 (1927).—The authors claim priority for the method of detg. cacao shell by a count of the stone-cells. B. C. A.

Note on the loss of weight of onions on storage at Pusa. J. H. WALTON. *Agr. J. India* 23, 136-7 (1928).—In a 5-months' test onions stored on racks lost 58% in wt. and those stored in baskets 46%. Rotting was greater in the latter case than in the former. K. D. JACOB

Notes on the lemon industry in Italy. G. S. CHEEMA. Dept. Agr. Bombay. *Bull.* 137, 9 pp. (1927).—The principal lemon-growing districts of Italy are Sicily, Calabria, Campania, Puglie, Liguria and Sardinia. Soils suitable for growth of lemons vary rather widely in chem. and mech. compn. The percentages of acid and sugar in lemons from different provinces are: Messina 7.61, 1.55; Cantania 8.05, 1.80; Acereale

6.02, 0.63; Naples 7.43, 0.63; Sorrento 8.68, 0.55; Palermo 8.15, 0.56, resp. The *manuf. of lemon oil and citric acid* is briefly described. Statistics are given on the production and exports of lemons, lemon oil and citric acid from Italy in 1923, 1924, and 1925.

K. D. JACOB

Injury to pears by hydrochloric acid solution. F. W. PETREY. *Farming in South Africa* 3, 875, 901(1928).—There are 2 types of injury that may result from treatment of pears for the removal of spray-residue by submerging them in a weak soln. of HCl. One type consists of the collapse and blackening of the breathing pores of the skin of the fruit, and the other consists of the burning of the skin area, which turns brown. The first type of injury generally results from too long submergence of the fruit in the acid soln., or to the accumulation of too much acid in the rinsing water. The second type of injury occurs when fruit that has been rinsed in acid-contg. rinsing water is left for some time in the boxes. The skin injury occurs where the fruit touches either the contaminated wood-wool or the boards of the box. Some varieties of pears could withstand submergence in 1% HCl soln. for 5 min. at 70° F. without injury to the skin, while other varieties could not be submerged for more than 1 min. without injury. Varieties of pears growing inland in hot, dry districts appeared to be more resistant to lenticel injury than those growing near the coast, and immature pears appeared to be more susceptible than fully developed ones.

K. D. JACOB

Clouding of olive brine. S. HENRY AYERS, H. A. BARNBY AND E. L. VOIGHT. Research Lab. Glass. Container Assoc., N. Y. *Glass Container* 7, No. 10, 5-38(1928).—One cause of clouding in green olive brine is the growth of *mycoderma* yeasts. These appear as white to gray surface flecks or flakes. The NaCl content cannot be increased to a point high enough to prevent growth without rendering the olives unpalatable. Growth may be prevented by reducing the O tension of the container either by hot packing and filling or vacuum sealing methods. A tight seal is essential. Upon opening a jar of green olives, thus readmitting O, the film yeast will again proliferate. The yeast was entirely destroyed by a heat treatment of 60° for 10 min. when the NaCl concn. of the brine was 8% or more. Pasteurization of bottled green olives is advocated. No change in flavor or texture due to the heat treatment was detected. C. R. F.

Cider making. F. DE CASTELLA. *J. Dept. Agr. Victoria* 26, 356-60(1928).—The small-scale *manuf.* of different varieties of cider is discussed.

K. D. JACOB

A comparative study of the effect of copra meal and dried shrimps as supplements in rations for laying hens. JOSE A. SERRANO. Univ. of the Philippines, Los Baños. *Philippine Agr.* 17, 95-104(1928).—Dried shrimp is much better than copra meal as a source of protein. The av. annual egg production and increase in weight per hen with the two feeds were 92.6 and 59.5 eggs and 248 g. and 156 g., resp.

A. L. M.

The crops of the Bombay Presidency: Their geography and statistics. G. R. AMBEKAR. Dept. Agr. Bombay, *Bull.* 146, 148 pp.(1928).—Chem. analyses of the grain, vegetable and forage crops of Bombay are given.

K. D. JACOB

The biology of green feed preservation. KURT TRAUTMAN. Agr. Hochschule, Weihenstephan. *Centr. Bakt. Parasitenk. II Abt.* 74, 1-13(1928).—The enzymes which cause lactic acid fermentation in ensilage are of bacterial origin exclusively. Green plants cannot of themselves produce lactic acid under anaerobic conditions. J. T. M.

Japanese honeydrip sorghum silage versus June corn silage for milk production. W. S. CUNNINGHAM AND J. R. REED. Ariz. Agr. Expt. Sta., *Bull.* 122, 142-55(1927).—Japanese honeydrip sorghum yielded 21.6-35.6 tons per acre or double that of June corn. Cows relished the sorghum silage more and the milk production was 91-96% as much as where corn silage was fed. Corn gave increased butter fat yields of 1.68-2.94% over the sorghum.

C. R. FELLERS

The manufacture of cellulose sausage casings (HENDERSON) 23. **Report of the first economic botanist, Bengal, for the year 1926-27** [storage of potatoes] (HICKOR) 15. **Physiological investigation on baking powders** (SCHAEFFER, *et al.*) 11E. **Antirachitic products** (U. S. pat. 1,680,818) 17.

BISCHOFF, JOSEF: *Illustrierte Nahrungs- und Genussmittelkunde.* Wittenberg: A. Ziemsen. 430 pp. Cloth, M. 16.

FRITSCH, J.: *Fabrication de la margarine et de graisses alimentaires.* Paris: A. Legrand. 208 pp. F. 25.

MOHS, KARL: *Mehlchemie Neue Erkenntnisse auf d. Gebiete d. Müllerei u. Bäckerei.* Frankfurt a. M.: Eigenverlag. 213 pp. Bound, M. 8.95.

VAN SLVKE, L. L. *Modern Methods of Testing Milk and Milk Products.* 3rd

ed., revised. New York: Orange Judd Pub. Co.; London: Kegan Paul, Trench, Trubner & Co. 344 pp. Reviewed in *Expt. Sta. Record* 58, 870(1928).

WATSON, ELIZABETH C.: *The Story of Milk*. New York: Harper (City and Country Series). 37 pp. \$1.25.

Algae as food. ALBERT CARTIER and PAUL GLOESS. Fr. 633,696, Sept. 8, 1926. Marine algae, particularly brown algae belonging to the family of Laminariaceae, are made palatable by treatment with bases such as magnesia which form sol. compds. with the colloidal matter therein.

Neutralizing protein food materials, etc., with glutamic acid or its salts. MASAO FUJII. U. S. 1,680,865, Aug. 14. See Brit. 279,985 (*C. A.* 22, 3002).

Coating for the inner surface of receptacles for foods. HILLHOUSE BUEL (one-half to William P. Hammond). U. S. 1,680,934, Aug. 14. The inner surface of pulp milk bottles or other receptacles is treated with a soln. of ethyl acetylcellulose in acetone contg. a plasticizing agent of light oil such as white poppy seed oil which is free from objectionable taste or odor; the deposited material is subsequently fused on the coated surface. Antiseptics, gums, etc., also may be added.

Coloring foods. HARRY H. REPLOGLE (one-half to John Young). U. S. 1,678,648, July 31. "Amaranth 107" or other edible org. coloring substances for use in foods are dissolved in ethylene glycol.

Apparatus for processing foods in cans, etc. JOHN COYLE (to Continental Can Co.). U. S. 1,681,101, Aug. 14.

Absorbing deleterious gases from canned food products. THOMA M. RECTOR (to Rector-Tenney Co.). U. S. 1,679,543, Aug. 7. A strip of uncoated Fe or small mass of steel wool or the like is used within cans for taking up gases.

Centrifugal emulsifying apparatus. A. W. EMPSON. Brit. 282,466, June 26, 1926. An app. is described suitable for the treatment of milk and cream, manuf. of margarine, etc.

Baking and preserving bread and similar foods. JEAN MATTI. U. S. 1,680,898, Aug. 14. Bread or the like is baked in a mold such as a tin can which during baking is provided with a vent for the escape of vapors and after baking this vent is closed so as to preserve the product in a gas-tight package.

Bread-making. OTTO OECHSLER. Fr. 633,822, May 3, 1927. To reduce the amt. of flour used in bread-making, NH_4Cl is added to the dough, with or without other substances such as starch, salt or flour.

Starch conversion product for use in bread-making, etc. W. D. STRIN. Brit. 281,979, Sept. 28, 1926. In making bread, cakes, macaroni or the like, a starch conversion product such as described in Brit. 282,178 is used in the dough. A formula is given for a yeast-leavened dough. Brit. 282,178 specifies heating starch with HOAc. Glacial HOAc mixed with a small quantity of $(\text{NH}_4)_2\text{S}_2\text{O}_8$ or methylamine sulfate may be sprayed on powd. starch, followed by heating, or the starch may be treated with HOAc vapors such as those produced by heating acid Ca acetate.

Yeast stimulant for use in dough. THEODORE B. WAGNER. U. S. 1,680,827, Aug. 14. The dried solubles of corn steepwater are mixed with substances such as flour or starch.

Apparatus and method of treating wheat with currents of moist air. LOUIS E. SMITH (to International Milling Co.). U. S. 1,679,099, July 31. A conditioning treatment is described for increasing the acidity and vol. of sol. carbohydrates and decreasing the starch and dry gluten content.

Apparatus for pasteurizing and deodorizing cream. FREDERICK L. ARMITAGE. U. S. 1,680,720, Aug. 14.

Electrically controlled valves for pasteurizing apparatus, etc. H. L. HOLMEN. Brit. 282,394, Dec. 16, 1926.

Cooked potato chips. MEYER F. RUFFNER (to Potato Waffles Inc.). U. S. 1,676,160, July 3. Perforated slices of potato of lattice-like form and about 0.125 in. thick are immersed in water at a temp. of about 17° for about 2.5 hrs., dried at atm. temp. for about a half hr., cooked for about 8-11 min. at a temp. not materially above 205° in a mixt. of about equal quantities of corn oil and cottonseed oil free from any material amt. of stearin and contg. about 1% of tallow, and the cooked product is then dried at an elevated temp. It is suitable for preserving in crisp condition for some time before use.

Treating fish for food. DAVID D. PREBBLES. U. S. 1,677,364, July 17. Fresh fish after being cleaned and washed is perforated and heated to dry off the wash water

and partially dry and harden the skin, then subjected to a broiling action which effects shrinkage, further sets the skin and partially renders the oil, and then cooled.

Refrigerating and preserving fish, meat or other foods. PAUL W. PETERSEN. U. S. 1,681,009, Aug. 14. Foods such as fish or meat are washed in a soln. contg. a germicidal agent such as NaOCl , frozen with the soln. remaining on the surface of the material, and then coated with ice.

Preserving moist comminuted coconut or other foods. DWIGHT TENNEY (to Rector-Tenney Co.). U. S. 1,679,386, Aug. 7. An app. is described for packing and preserving the material by subjecting it to a vacuum treatment to remove air and then sealing the material in dehydrated and sterilized air, alc. vapor or an inert gas such as N. The vacuum and gas or vapor treatments may be repeated.

Concentrated almond and milk sirup for use in foods or beverages. H. HOFER-MASSARD. Brit. 282,088, Dec. 10, 1926.

Apparatus for producing beverage extracts from holly leaves. STEPHEN M. HOYE. U. S. 1,679,525, Aug. 7.

Sterilizing vegetable juices. ANDRÉ KOEHLER. Fr. 633,878, May 4, 1927. To sterilize fermentable liquids such as fruit juice or wort, the microorganisms are centrifuged out, and a small quantity of SO_2 is then added.

Drying chamber for fruit. RENÉ DONZEAU. Fr. 634,201, Mar. 16, 1927.

Food for animals from fish waste, etc. CHEMISCHE FABRIK SCHLUTUP M. STERN. Brit. 282,068, Dec. 7, 1926. In leaching fish waste or the like contg. salt for removal of the salt, the water used for the extn. is treated to render it less capable of dissolving proteins, e. g., by addn. of protein or protein-pptg. substances such as salts of Fe, Al, Zn or Cr.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

The Institute of Industrial Chemistry of the University of Bucharest. CONSTANTIN BELCOT. Univ. Bucharest. *Notiz. chim.-ind.* 3, 279(1928). (In French).—The events leading to the founding of the Institute are described (cf *Giorn. chim. ind. applicata* 5, 446(1922)). C. C. DAVIS

The recent development of the Russian chemical industry. ROMOLO ANGELONE. *Notiz. chim.-ind.* 3, 357, 359(1928).—A brief review, with economic data. C. C. D.

Impressions of the I. G. Plants of Europe. CHARLES F. MULLIN. *Am. Dye-stuff Rept.* 17, 499–501(1928). L. W. RIGGS

High-pressure industries in Germany. F. SCHULZ. *Pativa a Topeni* 9, 158–9 (1927).—S reviews the influence of the development of NH_3 synthesis upon other industries in which high pressure is essential in bringing about chem. reactions on a com. scale as the making of synthol, alcs., etc. FRANK MARESH

Sixty-fourth annual report on alkali, etc., works in England and Wales in 1927. T. LEWIS BAILEY. *Ann. Rept. Alkali Works 1928*, 3–35.—The results of the operation of the Alkali Regulation Act of 1906 during 1927 are outlined. They cover: alkali and Cu (wet processes), cement, smelting, H_2SO_4 (chamber and contact), chem. manure, $(\text{NH}_4)_2\text{SO}_4$ and gas house liquor, Cl, HCl, sulfide, $\text{Fe}(\text{NO}_3)_3$, Venetian red, bisulfite, tar and Zn works. In general, causes for complaint were quickly remedied. Tables show the no. of works registered, av. amts. of acid gases escaping and the amt. of NH_3 products produced in 1927. Methods of analysis are given for ammoniacal and spent liquors and notes on the estn. of polyhydric phenols. Analyses are included for condensates and effluents made at gas works using final acid catch. Results from 3 works using vertical retorts are tabulated, as are results of analysis of NH_3 liquors from low-temp. carbonization of coal where retorts are internally heated with addn. of steam. W. H. BOYNTON

Many new fields invaded by spray drying. EARL D. STEWART. *Chem. Met. Eng.* 35, 470–2(1928).—The process is briefly described together with its application to the drying of blood products, eggs, gelatin, soap, potato and banana flours, sugar products and inorg. salts. E. H.

Washing or dissolving various melts with water. S. S. VASSERMAN. *J. Chem. Ind. (Moscow)* 5, 404(1928).—It is not convenient to wash or dissolve melted substances such as Na_2S , BaS , etc. in Chanks' app. or any other app. at present used, since in these app. very large quantities of washing liquid are required which involve a large expense of steam for heating the liquid and also require much time. The same is true when washing crude *ultramarine* from Na_2SO_4 . V. recommends to operate as follows: Pieces

of the melt together with a small amount of water are heated with steam under pressure of 2-5 atm. in an autoclave. The mass is transformed into a paste which can easily be filtered in filter presses or vacuum filters. Even pieces of *Na silicate*, which dissolve with very great difficulty in water, can thus be brought into soln. within 5 hrs. A drawing of an autoclave particularly adapted for this purpose is given; this app. has been adopted by a Russian factory for solution of Na-silicate chunks. B. N.

Introfiers, or impregnation accelerators. MARC DARRIN. Mellon Institute. *Ind. Eng. Chem.* **20**, 801-4(1928).—An introfier is a substance that accelerates impregnation, by changing the fluidity and specific wetting properties of the impregnating material toward the substance being impregnated so as to increase the facility with which penetration is affected. A large number of introfiers are described which accelerate the impregnation of wood fiber by S. The mol. structure required by all S introfiers is a plurality of cyclic nuclei. Cl or OH substituted compds. may be used.

T. S. CARSWELL

The countercurrent use of decolorizing carbons. M. T. SANDERS. *Ind. Eng. Chem.* **20**, 791-4(1928).—The magnitude of savings possible through the use of stepwise countercurrent treatment is calcd. by means of a modified Freundlich's equation.

D. GORDON

The right of protest in cases of patents pending. GUSTAV SCHUCHARDT. *Chem.-Ztg.* **52**, 573-4(1928).—According to section 24 of the (German) patent law anyone can protest a prospective patent within 2 months of the publication of the claim in the official gazette. The applicant then receives notice of the objection and can reply. This process, introducing a third party to the proceedings, can be repeated and thus delay issuing the patent indefinitely; it works to the disadvantage of the applicant, especially in the case of an inventor working alone or on his own resources. On the other hand the protestant who "holds up" the patent does it practically without expense. The proposal is now made that the protestant be compelled to submit drawings, records of expts., testimony of witnesses, etc. in support of his objection and that the patent office then function as a court in deciding the questions involved. W. C. EBAUGH

Occupational intoxications due to chlorinated aromatic and aliphatic hydrocarbons, and their prevention. FLORET. *Zentr. Gewerbehyg. Unfallverh.* **14**, 372-7(1927); *Chimie et industrie* **19**, 1066-7(1928); cf. C. A. **22**, 2628.—A review. A. P.-C.

Electrical insulating materials. O. KRAUSE. *Z. Elektrochem.* **34**, 49(1928), cf. Güntherschulze, C. A. **21**, 3995.—Polemical. H. G.

Carbon monoxide poisoning (HARTRIDGE) 11H. Feeding experiments with lead (MIESSNER) 11H. The x-ray diagnosis of chemical and industrial materials (CLARK) 3. X-rays in science and industry (DAVEY) 3. Synthetic resin [for insulation] (U. S. pat. 1,680,408) 26. Plastic compositions [as insulating material] (Brit. pat. 282,635) 18. Plastic material from latex and asbestos [for insulating wire] (U. S. pat. 1,680,234) 30.

BEECKMANN, LOTHAR: *Erfinderbeteiligung, Versuch einer Systematik der Methoden der Erfinderbezahlung unter besonderer Berücksichtigung der chemischen Industrie*. Berlin: Verlag Chemie, G.m.b.H. 190 pp. M. 7.50 (paper); M. 8 (bound). Reviewed in *Chimie et industrie* **19**, 976(1928).

EBERT, VON W.: *Die chemische industrie Deutschlands*. Berlin and Leipzig: Verlag Chemie, G.m.b.H. M. 8. Reviewed in *Bull. soc. ind. Mulhouse* **94**, 239-40 (1928).

LANGE, OTTO: *Chemische Technologie und ihre chemischen Grundlagen in leichtfasslicher Form*. Lfg. 2-3. Leipzig: Akad. Verlagsges. 145-464 pp. M. 18. Lfg. 4-5 (Schluss) pp. 465-737. M. 18. Complete, bound, M. 48.

MACCHIA, OSVALDO: *Manipolazioni e preparazioni chimiche ad uso specialmente degli istituti industriali*. Torino: A. Giani. 227 pp.

Controlling the temperature of exothermic chemical reactions. SELDEN CO. Brit. 282,559, Jan. 10, 1927. In reactions such as the production of phthalic anhydride by catalytic oxidation of $C_{10}H_8$ vapor with air, a compn. contg. Pb 3, Sn 3 and Hg 4 parts is maintained in heat-transferring relation with the reaction zone, this metal compn. having a b. p. of about 405° and serving to prevent too great rise of temp. in the reaction zone. An alloy of Cd 1 and Hg 3 parts (boiling about 400°) or other similar alloys also may be used.

Separating and recovering various gases from their mixtures. OSCAR L. BARNEBEY (to American Solvent Recovery Corp.). U. S. 1,680,840, Aug. 14. The gaseous

mixt. is passed under superatm. pressure through sepd. layers of solid adsorbent material such as activated C in an app. which is described. Numerous details are described.

Separating nitrogen oxides from other gases. SOC. L'AIR LIQUIDE, SOC. ANON. POUR L'ETUDE ET EXPLOITATION DES PROCÉDÉS G. CLAUDE. Brit. 281,675, Dec. 4, 1926. In some instances gases may be heated to bright redness to decomp. N oxides into N and O to purify the gas. Also to prevent contamination of gases such as coke-oven gases, with N oxides, when treated with H_2SO_4 ; any nitrosylsulfuric acid present in the H_2SO_4 may be decompd. by reducing agents such as gases evolved in distg. NH_3 liquor and contg. H_2S which also serves to ppt. As.

Baffle system apparatus for purifying gases. GRANT D. BRADSHAW (to Blaw-Knox Co.). U. S. 1,678,844, July 31.

Catalytic purification of gases. F. FISCHER. Brit. 282,634, Dec. 24, 1926. Gases such as water gas (which may be first freed from H_2S) are treated for the removal of S compds. other than H_2S by use of a catalyst of precious metal such as Au or Ag which convert the S compds. in the presence of H to H_2S without causing any other change in the gas. The gas is then further treated by a usual method for removing the H_2S formed. Silverized asbestos may be used at a temp. of 200–300°.

Adsorption of gases by solids. SOC. POUR L'EXPLOITATION DES PROCÉDÉS EDOUARD URBAIN. Fr. 634,424, Sep. 17, 1926. A rate of absorption of the carbon used is fixed and the speed of the gas is varied until this rate is reached but not passed.

Storing and transporting gases. PAUL N. LUCAS-GIRARDVILLE. U. S. 1,680,873, Aug. 14. CH_4 or other substance with a b. p. below 0° is stored in liquid or solid state in a heat-conducting vessel which is in heat-conducting contact with a liquid such as liquefied N exposed to atm. pressure and maintained in a heat-insulated vessel. The liquid used has a lower b. p. than the substance stored so that the slow and gradual evapn. of the liquid acts to maintain the stored material in its liquid or solid state.

Storing acetylene or other explosive gases. GAS ACCUMULATOR CO. (United Kingdom), Ltd. Brit. 281,718, Dec. 4, 1926. Porous fillings for storing gases consist of inorg. materials such as pumice or burnt clay, which have been soaked with solns. of inorg. salts such as $ZnCl_2$, NH_4 compds. and B compds. and silicic acid and then dried.

Oxidizing hydrogen sulfide in gases. I. G. FARBERIND. A. G. Brit. 282,508, Sept. 27, 1926. Illuminating gas after the usual ammonia washing step, or other industrial gas, of a humidity of about 80% of satn. or higher, is subjected to the action of active C, silica gel or other adsorbent. Cf. C. A. 22, 848.

Spray desiccation of various liquids. INDUSTRIAL WASTE PRODUCTS CORP. Brit. 282,480, Sept. 6, 1926. Waste sulfite liquors and sirups contg. sugar, molasses, malt exts., Cr tanning compns., glue or other materials are dried to obtain solid "glass-like" particles which are not hygroscopic by spraying into a current of heated gas the temp. of which, it is stated, may be as high as 540°.

Determining concentration of turbid suspensions. RALPH F. HALL (to John M. Hopwood). U. S. 1,681,339, Aug. 21. The suspension is dild. until a luminous object, when viewed through a predetd. thickness of the dild. suspension, has a definite standard of visibility. An app. is described.

Apparatus and liquid circulation system for recovery of suspended solids from liquids. WALTER L. REMICK. U. S. 1,678,788, July 31.

Dialyzing putrescible liquids. OLIVER M. URBAIN (to Travers Process Corp.). U. S. 1,680,349, Aug. 14. A putrescible liquid is maintained in a dialyzing tray floated in water in a zone free from O. An app. is described.

Agglomerating ores, coal or other powdered materials. A. UHLMANN. Brit. 282,104, Dec. 11, 1926. Powd. materials such as ore, coal, coke or ceramic materials are subjected to a high-frequency magnetic field to frit the particles together. The material may be preliminarily moistened with weak acid or an alk. soln. such as lime water.

Emulsions. WILFRED A. WHATMOUGH. Fr. 634,035, May 7, 1927. See Brit. 280,096 (C. A. 22, 3006).

Apparatus for the production of ice. GUSTAVE MANSIO. Fr. 634,319, May 13, 1927.

Can and air-pipe system for making artificial ice. JOSEPH A. MARTOCCELLO. U. S. 1,681,190, Aug. 21.

Apparatus for supplying dehumidified air to ice-making plants. IRVING C. JENNINGS. U. S. 1,680,381, Aug. 14.

Refrigerating system. FERNAN O. CONILL. U. S. 1,679,205, July 31.

Refrigerating systems employing liquid, vapor and gas. RANSON W. DAVENPORT (to Chicago Pneumatic Tool Co.). U. S. 1,680,453–4, Aug. 14.

Refrigerating system of the absorption type. CARL G. MUNTERS (to Electrolux Servel Corp.). U. S. 1,679,440, Aug. 7.

Refrigerating system of the absorption type. PLATEN-MUNTERS REFRIGERATING SYSTEM AKTIEBOLAG (to Electrolux, Ltd.). Brit. 281,710, Dec. 4, 1926.

Refrigerating system of the absorption type. A. EINSTEIN and L. SZILARD. Brit. 282,428, Dec. 16, 1926. MeBr and NH_3 may be used together in an app. which is described.

Refrigerating apparatus of the absorption type. SULZER FRÈRES SOC. ANON. Brit. 282,652, Dec. 24, 1926.

Reversing refrigerating system of the absorption type. SULZER FRÈRES SOC. ANON. Brit. 282,056, Dec. 8, 1926.

Reversing refrigerating system of the absorption type. C. G. MUNTERS (to Electrolux, Ltd.). Brit. 282,065, Dec. 8, 1926.

Refrigerating system of the compression type. FREDERICK E. LYNN. U. S. 1,679,729, Aug. 7.

Refrigerating apparatus of the compression type. G. ZWICKY. Brit. 282,031, Dec. 13, 1926.

Refrigerating apparatus of the compression type. FABRIQUE D'APPAREILS ÉLECTRIQUES F. SAUTER, SOC. ANON. Brit. 282,307, Dec. 14, 1926.

Insulating material. ISOLA-GES. m. b. H. Fr. 634,542, May 17, 1927. Minerals contg. Mg such as hornblende, dolomite or magnesite are melted and drawn into threads in a jet of vapor or compressed air.

Heat insulating material. HARVEY B. LINDSAY (to Dry Zero Corp.). U. S. 1,679,251, July 31. Insulation suitable for various purposes comprises kapok fibers in parallel arrangement.

Waterproof heat insulation. BENJAMIN F. WALLACE. U. S. 1,678,659, July 31. Insulation comprising porous MgCO_3 and fibrous asbestos is impregnated with a highly penetrative waterproof grease such as degreas which is water-repellent and which will readily float on water.

High-tension electric insulating bushing. QUARTZ ET SILICE. Brit. 281,734, Dec. 3, 1926. Structural features are specified of a device comprising a fused silica body supported by metal and enclosed in oil within a glass container.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Experimental studies on combined indole and fermentation methods for the identification of colon bacilli in drinking water. I. E. MINKEVICH. Military Medical Academy and State Inst. for Exptl. Medicine, Leningrad. *Centr. Bakt. Parasitenk. II Abt.* 73, 338-46(1928).—The most satisfactory fermentation medium is that of Bulir. It is tryptophan made by treating peptone for 3 days with pancreatic ext., plus 1% of mannitol. An indole test by the method of Gersbach is a useful supplement, i. e., a reddish violet color with Cl_2 water. Glucose inhibits indole formation. Maltose is unsatisfactory, as is a 46° incubation temp. CaCO_3 has no effect on the rate of indole formation.

JOHN T. MYERS

The effect of chlorination on drinking water. The use of α -naphthoflavone as indicator for free chlorine. M. HAHN, F. SCHÜTZ and SPIRO PAVLIDIS. Univ. Berlin. *Z. Hyg. Infektionskrankh.* 108, 439-73(1928).—A relationship exists between the oxidizability of a given sample of water and the necessary amt. of Cl_2 for destruction of the bacteria present. By titrating chlorinated water with α -naphthoflavone as indicator the point where an excess of Cl_2 is present can be easily detd., and thus a sufficiency maintained.

E. R. LONG

Principles of chlorine sterilization of drinking water. G. LUTZ. *Z. Hyg. Infektionskrankh.* 107, 585-91(1927).—The disinfecting action of chlorine is a Cl_2 effect. In the first few hrs. after chlorination the chlorine decreases only slightly, and the amt. of O_2 formed is small; yet a notable decrease in the no. of added bacteria occurs.

E. R. LONG

Use of liquified gases for the disinfection and eradication of infesting insects. H. PICK. *Chem. обзор* 3, 8-11, 40-1, 73-9(1928).—After a brief and comparative description of the phys., chem. and physiol. properties of liquid Cl_2 , SO_2 and HCN the application of the first gas for sterilization of water for drinking, bathing and sewage in Germany and N. America is described and its economy and advantages are stressed. Liquid SO_2 is used not only for destroying bacteria, but also for killing insects and other

organisms, e. g., in apartments and ships. For this purpose SO_2 becomes more and more replaced by HCN which can be applied in the liquified state as well. It is transported either in thick-walled steel vessels or, preferably, as "cyclone." This consists of liquid HCN absorbed in a porous granular material with addn. of stabilizing substances, and is transported in tin cans.

JAR. KUČERA

Boiler-scale formation and feed-water purification. HANNS FREYTAG. *Teer u. Bitumen* 26, 399-403 (1928).—A review.

F. S. GRANGER

Treatment and disposal of distillery slop by anaerobic digestion methods. S. L. NEAVE WITH A. M. BUSWELL. *Ind. Eng. Chem.* 20, 837-8 (1928).—Unless the slop is diluted it will not ferment. At diln. of 1-4 bacterial growth is slow because of the acidity of the slop. Excess CaCO_3 will improve the fermentation slightly. One part of slop to 9 of sewage ferments rapidly and completely. No offensive odor is obtained and 55% of the total solids of the slop are destroyed.

C. N. FREY

Report of an investigation of the pollution of Lake Michigan in the vicinity of South Chicago and the Calumet and Indiana Harbors. H. R. CROMBIE AND M. V. VELDER. U. S. Pub. Health Service. *Pub. Health Bull.* No. 170, 134 pp., 29 tables, 27 diagrams (1927).—Data were taken for 10 months, January and February being lacking. The Calumet district is primarily devoted to iron and steel and contains over 300,000 population. Much waste is discharged to Lake Michigan in spite of works designed to divert it to the Chicago Drainage Canal. Previous investigations are reviewed. Results are much influenced by wind and pptn. Vol. and kind of waste from 123 industrial plants are given. Of these 109 discharge practically no offensive industrial wastes. The remainder discharge over 2.5 m. g. d. of putrescible org. wastes and 8 m. g. d. of possibly taste-producing wastes. Sewage from 21,000 persons goes directly to Lake Michigan, that from 94,000 to the lake via the Indiana Harbor ship canal, that from 146,000 might reach the river by prolonged reversal of flow of the Calumet and Little Calumet Rivers. Dissolved color was absent but colored industrial wastes in suspension were frequently noted. Taste and odor were directly dependent on wind and location of the sampling station. On several occasions such tastes were strong at Chicago intakes at Dunne and 68th sts. Because of shallowness no important temp. differences were noted. Turbidity varies with direction and velocity of wind, depth, character of bottom and presence of added turbid wastes. Turbidity is in general higher with on-shore winds and decreases rapidly with distance from the shore. The turbidity is over the Treasury Department standard of 10 p. p. m. at 5 intakes located in this district from 38.6 to 9.5% of the time. Had samples been taken in January and February these figures would be higher. Samples taken at the cribs throughout the year agree substantially with these conclusions. Dissolved O_2 and B. O. D. indicate there is little discharge of the Calumet River into the lake as compared with the Indiana Harbor Ship Canal. The max. reversal of flow of the Calumet River into the lake was 1 or 2 days. Bacteriol. examn. shows a regular decrease with increasing distance from shore. Occasional pollution was found 8 miles offshore from the Calumet district. In general along the north shore gross pollution is not present while along the south shore to beyond the Indiana Harbor Canal gross pollution is usual. The water intakes of Hammond, Whiting and E. Chicago all lie in this zone of heavy pollution. At the 68th St. and Dunne cribs the mean agar count is 500-1000 per cc. and the *B. coli* index 10-100 per cc. The 4 mile crib is somewhat better. There is danger that all of these supplies may be subject to occasional pollution far in excess of that indicated. The supplies of Waukegan, Lake Forest, Hammond, Whiting and E. Chicago are grossly polluted by sanitary sewage, particularly the latter 3. That of Gary is questionable at times. The Chicago and Evanston supplies are suitable for use after chlorination.

FOSTER DEE SNELL

The toxicological analysis of air: diffusion of fumes and experiments at the Eiffel tower. E. KOHN-ABREST. *Chimie et industrie* 19, 979-88 (1928); 20, 29-32 (1928).—A discussion of the most reliable methods for detg. CO_2 , CO, other acids (HCl , SO_2 , etc.), H_2S , NH_3 , PH_3 , N oxides, O_3 , HCN, H and hydrocarbons, condensable vapors and compds. in a vesicular state. The importance of the pollution of the atm. of large cities, particularly the possible presence of CO due to motor traffic, is discussed. Expts. carried out at the Eiffel Tower showed that, if anything, the air in Paris is purer at ground level than at an altitude of 288 m., and that, contrary to results obtained in New York (where up to 0.04% CO was found in the atm. of busy thoroughfares), the air of Paris was found to be but very little polluted.

A. PAPINEAU-COUTURE

Concrete control methods in the construction of a filtered-water reservoir (MABES)
20. The action of Al, ferrous and ferric iron and Mn in base-exchange reactions (MAG-

ISTAD) 6. Filter for water (U. S. pat. 1,678,676) 1. Apparatus for adding chemical reagents in regulated quantities to soften water (Brit. pat. 282,168) 1. Automatic recording apparatus for indicating proportionate changes in hardness of water (Brit. pat. 282,170) 1.

BACH, HERMANN: *Die Abwasserreinigung*. Einf. zum Verständnis d. Kläranlagen f. städt. u. gewerbl. Abwässer. München: R. Oldenbourg. 183 pp. M. 8; bound, M. 9.60.

BERNARD, P.: *Les solutions modernes du problème des ordures ménagères*. Paris: Librairie Générale des Administrations et Services Publics. 126 pp. F. 18. Reviewed in *Chimie et industrie* 20, 198(1928).

DUMBLETON, J. E.: *The Construction of Wells and Boreholes for Water Supply—The Elements of The Analysis and Purification of Water*. Student's Ed. London: Crosby Lockwood. 168 pp. 6 s., net.

EHNERT, GÜNTHER: *Die Entsandung städtischer Abwässer unter Berücksichtigung der Geschiebebewegung in Abwasserkanälen*. München: R. Oldenbourg. 31 pp. M. 4.50.

KLUT, HARTWIG: *Untersuchung des Wassers an Ort und Stelle*. 5th ed., revised. Berlin: J. Springer. 182 pp. M. 7.80.

Purifying water. RALPH B. DERR (to National Aluminate Corp.). U. S. 1,680,506, Aug. 14. Water contg. less than about 50 parts per million $MgSO_4$ is mixed with a water-softening compd. such as lime and Na_2CO_3 and Na aluminate and the formation of a coagulant is activated by adding $MgSO_4$ or other material supplying Mg and SO_4 ions.

Purifying water. ARTHUR R. MOBERG (to National Aluminate Corp.). U. S. 1,679,777, Aug. 7. A relatively small quantity of Na aluminate and a relatively large quantity of Al sulfate are added to water, for purification and clarification.

Purifying water. W. PATERSON. Brit. 282,165, Sept. 17, 1926. To effect softening and sterilization, water is treated with excess of caustic lime, then carbonated and passed through a zeolite bed.

Apparatus for purifying water. J. F. JONES. Brit. 282,193, Nov. 1, 1926. A vessel contg. a treating reagent is placed in a by-pass between the inlet and outlet mains of a filter or base-exchanging treatment vessel, so that differences in pressure control the quantity of reagent supplied.

Apparatus for purifying water with lime water and sodium carbonate. JEAN-BAPTISTE GAIL and NOEL ADAM. U. S. 1,680,867, Aug. 14.

Filter for attachment to water faucets, etc. HERBERT H. CULVER. U. S. 1,680,323, Aug. 14.

Tank suitable for filtering and softening water. CHARLES P. EISENHAEUER (to The Duro Co.). U. S. 1,678,770, July 31. Structural features.

Apparatus for filtering water of irrigation ditches to remove moss, etc. ERNST L. BISHOP. U. S. 1,680,848, Aug. 14.

Apparatus for automatically determining and recording the quantity of gas present and temporary hardness of water. H. S. HATFIELD. Brit. 282,487, Sept. 20, 1926.

"Boiler composition" and disincrustant. HANS KARPLUS and WILHELM BACHMANN (to the Firm E. de Haen A.-G.). U. S. 1,679,037, July 31. Colloidal graphite is used with about 5 times its quantity of sulfite liquor from cellulose production.

Adding measured quantities of sulfuric acid or other reagents to water. GEORGE CAWLEY (to The Permutit Co.). U. S. 1,678,766, July 31. An app. is described in which a continuously flowing body of water is divided into major and minor portions; a proportioned quantity of reagent such as H_2SO_4 is added to the minor portion and it is then remixed with the major portion.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Report on agriculture. J. A. VERRET. *Proc. Hawaiian Sugar Planters Assoc., 47th Ann. Meeting 1927*, 72-8(1928); cf. C. A. 21, 3282.—*Germination tests with cane seed* stored for several months in an atm. of CO_2 over $CaCl_2$ showed that seedlings from the stored seed are weaker than those from fresh seed and the mortality is higher. In expts. with several forms of *phosphate as fertilizer for sugar cane*, ground

raw rock phosphate gave in most cases almost as good results and in some cases better results than superphosphate and reverted phosphate. The indications are that raw rock phosphate can be used to a good advantage as a supplement to the sol. phosphates in building up the soil. Better results with molasses as a fertilizer for sugar cane are obtained if it is plowed in at least 6 weeks before planting the cane. When applied to young cane it should be placed in the middle of the row away from the cane stools in order to avoid burning and possible checking of growth.

K. D. JACOB

Tropical agriculture in Malaya, Ceylon and Java. W. ORMSBY-GORE. *India Rubber J.* 76, 94-9 (1928).—A review of recent research and developments and of present conditions.

C. C. DAVIS

Report of the work done by the agricultural chemist, Bengal, for the year 1926-27. M. CARBERY. *Dept. Agr. Bengal, Ann. Rept. for 1926-27*, 1927, 53-74; cf. *C. A.* 21, 3698.—Chem. analyses of a large no. of samples of diseased and healthy betel vines, and of soils on which they were grown, confirmed the previous conclusion that the *betel vine disease* is caused by some phys. condition of the soil and is not due to chem. action. Tables are given showing the *mech. analyses of soils from various districts in Bengal*; the *yield of juice and sugar from different varieties of sugar cane* and the *compn. of ash from different varieties of tobacco leaves*. Changes in the p_H of field soils were detd. during the period August 6 to October 11, but the results were inconclusive. In all cases the supernatant liquids from the soil exts. were more alk. than the residual muds. There was no definite indication that superphosphate, applied at the rate of 200 lb. per acre, has any effect on the p_H of the supernatant liquids or the residual muds of alk. soils. In expts. with castor and mustard cakes and manure as fertilizers for hemp the nitrate content of the soils reached a max. in 1 month after application of the fertilizer and then decreased to almost zero during the rainy season, August 1 to October 1, afterwards increasing to a second max. in March. Nitrates accumulated more rapidly in the surface soil than in the sub-soil during the dry season and were removed more rapidly from the surface soil during the wet season. The *compn. of the ash of juice from several varieties of sugar cane* varied as follows: SiO_2 0.65-3.53, P_2O_5 18.72-30.18, K_2O 22.27-32.44, Mn_2O_4 1.09-3.24, CaO 11.51-17.72, MgO 12.56-20.46%, and traces of Fe_2O_3 and Al_2O_3 . The *compn. of juice from date palms* was— P_2O_5 0.021-0.0399, KCl plus $NaCl$ 0.120-0.409, sucrose 11.66-17.27 and glucose 0.19-0.70 g. per 100 cc.

K. D. JACOB

Report on chemistry. G. R. STEWART. *Proc. Hawaiian Sugar Planters Assoc.*, 47th Ann. Meeting 1927, 134-51 (1928); cf. *C. A.* 21, 3415.—The following major constituents of H 109 sugar cane were present in the tops, trash, bagasse and mixed juice in 3 expts.— SiO_2 1527.6 to 2391.6; CaO 88.1 to 134.6; P_2O_5 104.8 to 142.9; K_2O 324.1 to 463.7; and N 174.1 to 203.2 lb. per acre. The cane juice contained the largest total quantities of P_2O_5 and K_2O , and the bagasse the smallest. The cane trash tended to have a higher total N content than the other portions and it also contained most of the SiO_2 and a larger portion of the CaO . With the exception of SiO_2 , the bagasse contained the smallest total quantities of the major inorg. constituents. Soils from small areas where H 109 cane suffered from acute root failure were found to contain more replaceable Mg than was present in adjoining fertile soils. Pot tests indicated that this excess of replaceable Mg may be partly responsible for root failure. The excess of replaceable Mg is probably due, partly, to the use of rather saline waters for irrigation and partly to the Mg freed by the weathering of soil minerals. Applications of mud press cake, molasses and org. matter gave notable reductions in nematode injury to sugar cane grown in pots. Under practically sterile conditions the more common soil-inhabiting nematodes did not multiply greatly and root destruction caused by them was small. It was difficult to obtain normal cane growth in practically sterile soil. Growth failure of Lahaina cane at Waipio could not be traced to the presence of harmful salts, toxic acidity, or deficiencies of plant nutrients in the soil, but comparative studies of the compn. of good and poor Lahaina canes showed a higher % of K_2O and a lower % of SiO_2 in the former. Spectroscopic examns. of the ash of both canes showed the presence of minute amts. of B and Pb in the good cane while these elements were almost entirely lacking in the poor cane. The oxidizing power of soils from good fields was found to be higher than that of soils from poor fields. Evidence was obtained indicating that this was due, in part, to the presence of Mn in the form of MnO_2 in larger quantities in the good soils. In the poor soils, Mn was either entirely absent or was present in very small quantities. Spectroscopic examn. of the ash of H 109 canes which were susceptible to eye spot disease and of those which were resistant to the disease showed that the latter contained small amts. of Zn while the susceptible canes were almost entirely free from this element. Soils upon which eye spot disease was prevalent were notably deficient in available P_2O_5 . Applications of S at the rate of 1000-

2000 lb. per acre gave effective control of *Pahala blight of sugar cane*. The larger applications appeared to be more efficacious in preventing the chlorotic condition. Such large quantities of S may be safely used on neutral or slightly alk. soils, but careful study of the change in reaction should be made before applying S to acid soils. Nitrous acid was a particularly valuable reagent for the preservation of cane stalks cut from the plant, where it was desired to develop roots on the stalk and then to feed the shoot with a nutrient soln. Aeration of the culture with a slow stream of O_2 was also beneficial. *Sealing pores in earthen reservoirs*.—Porous earthen reservoirs may be sealed by satg. the soil lining the reservoir with a sol. Mg or Na salt and washing out the displaced Ca with pure water. The Na- or Mg-satd. colloid then becomes highly dispersed and effectively seals up the pores of the soil lining. This method of treatment is successful only if comparatively pure water is to be stored in the reservoir after the surface is deflocculated. The pores will open up again if the water contains appreciable amts. of Ca.

K. D. J.

Report on entomology. O. H. SWEZEY. *Proc. Hawaiian Sugar Planters Assoc., 47th Ann. Meeting 1927*, 94–106(1928); cf. *C. A.* 21, 3249.—Expts. were carried out with molasses, mud press cake, org. matter, S, etc., for the control of *nematodes in sugar cane soils*. Molasses applied at the rate of 40 to 60 tons per acre produced excellent growth of cane roots with absence of cortex and stele rots, and with only moderate nematode infestation. Mud press cake at the rate of 40 tons per acre produced roots as good as those obtained with molasses, with no decay and only light nematode infestation. Org. matter at the rate of 70 tons per acre produced similar good effects, but the minute pit-making spring-tail insect, *Isotomodes*, increased in great numbers in this medium because of the abundance of its favorite food. CaO and P_2O_5 , in amts. equal to the application in mud press cake, produced good root growth which was accompanied by a great amt. of decay and by heavy nematode infestation. Uninoculated S at the rate of 5 tons per acre killed the plants or allowed only very poor growth, but there was no decay of the few roots present and nematodes were entirely absent. A proprietary S mixt., known as "sulfogerm," at the rate of 5 tons per acre gave good root growth and little decay, but with heavy nematode infestation. K. D. JACOB

The relation between the total chemical composition of the soil and the water extract. W. O. ROBINSON. *J. Am. Soc. Agron.* 20, 793–801(1928).—There is no obvious dependence of the compn. of the soln. upon the compn. of the soil except in the case of the more sol. anions and to a less degree of Ca and Na. The effect of soil minerals and soil colloids on the relation of the soln. to the soil is considered. Soil minerals are so complex and variable in different soils that little dependent relation can exist. On the other hand, the colloidal matter contains fewer combinations and some dependence of the compn. of the soln. upon the compn. of the colloid can be expected. This relation should apply to a soil chiefly made up of clay or of clay and pure quartz sand. E. F. S.

Alpine agronomy applied to the study of the formation of cultivated soils. LAURENT RIGOTARD. *Compt. rend.* 187, 249–51(1928).—A complete remodeling of the classification of soils is considered, based on a better knowledge of their progressive formation beginning with the various rocks composing the surface of the earth, and a more precise knowledge of the action of the various factors acting to create the cultivated soil among rocks. All of the classifications attempted appear to be made from a too particular point of view or else from studies made on the soils which are not representative of all cases which are produced in nature. None should therefore be adopted at this time as classic, and the problem should be taken up on a very general and extended basis.

E. F. SNYDER

Determination of soil reaction by means of Merck's universal indicator. H. WIESSMANN AND K. STEINFATT. *Forts. Landw.* 2, 488(1927).—Values of pH obtained by the Merck universal indicator agree closely with those detd. by Sørensen buffer solns. and by electrometric methods, although the limits of differentiation are much narrower in the latter processes.

B. C. A.

The mechanical analysis of soils by the tube sedimentation method. M. R. RAMASWAMI SIVAN. *Madras Agr. Dept. Yearbook 1926*, 29–39(1927).—Comparative mech. analyses were made on 4 soils by the Murray tube sedimentation and the usual beaker sedimentation methods. The Murray method gave results which compared favorably with the beaker method and an analysis could be completed in 24 hrs., while several days were sometimes required for the completion of an analysis by the beaker method. In expts. with 7 soils the av. time for deposition of various sized particles, by the Murray method, was—0.2–1.0 mm. 2 min. and 15 sec., 0.04–0.2 mm. 12 min. and 10 sec., 0.01–0.04 mm. 2 hr. and 10 min., and 0.01–0.002 mm. 24 hrs., while material in suspension after 24 hrs. was classed as clay.

K. D. JACOB

Alkali soil studies and methods of reclamation. P. S. BURGESS. Arizona Agr. Expt. Sta., Bull. 123, 157-81(1928).—White alkali soils contg. NaCl and Na_2SO_4 and black alkali soils contg. Na_2CO_3 and NaOH are unsuitable for crop production without reclamation. Black alkali is colored by the org. matter which it dissolves. White alkali has little or no solvent action on org. matter. Not only arid climates, but periodical excesses of moisture, causing a rise of ground water, are necessary conditions for alkali accumulations in surface soils. The salts differ greatly in their motility through moist soils. Nitrates and chlorides migrate with greatest speed, sulfates and bicarbonates next, while carbonates and hydroxides move very slowly. The freezing up or puddling which often occurs during reclamation of alkali soils is due to 2 factors. First, to the dispersing of the clay brought about by the strongly alk. reaction of the soil soln. This condition, in turn, is caused by the formation of small quantities of black alkali from the hydrolysis of Na zeolites. Second, to the filling-up of the very small openings or pores between the soil particles by pptd. $\text{Al}(\text{OH})_3$ when the alk. of the soil has been reduced by leaching to the proper point for the pptn. of this compd. The only economical method known whereby excess sol. salts may be removed from soils is by leaching, and for this to be successful, good drainage is the first essential. Reclamation measures were not permanent unless the water table was held below the reach of the root zone which, in fine-grained soils is from 8 to 10 ft. from the surface. A hard water is preferable to soft water and Na salts should not be present in excess of 600 p. p. m. Intermittent flooding and drying until leaching is practically complete, followed by an application of 1-2 tons of CaSO_4 per acre, is recommended to displace all the Na present in the soil zeolites. The gypsum opened up the soil by forming the more granular Ca zeolite and in addn. prevented the loss of essential plant food elements, particularly N and P. Several applications of gypsum followed each time by intermittent flooding and drying sometimes were necessary completely to free the soil from alkalis. A heavy application of some form of org. matter, preferably manure, is often feasible at the end of the leaching period. Upon decompn, CO_2 is evolved which unites with the last traces of black alkali to form Na_2CO_3 . Several alkali areas were successfully reclaimed. The use of rice as a cash crop during alkali soil reclamation was successfully carried out. C. R. FELLERS

The results of drainage and leaching trials at Peradeniya during 1927. A. W. R. JOACHIM. Trop. Agr. (Ceylon) 70, 302-11(1928).—Pots were filled with loam to a depth of 3 ft. and various fertilizer materials were worked into the surface at the rate of 60 lb. per acre of the fertilizing constituent. Two pots were treated with each fertilizer, of which one was planted with *Ilibiscus* and the other was uncropped. The drainage from the cropped and uncropped series averaged 38.6 and 65.1%, resp., of the 76.6 in. of rainfall. The total solids in the drainage from the uncropped pots was 2.1 times that from the other. Although N was added in the form of KNO_3 , NaNO_3 , $(\text{NH}_4)_2\text{SO}_4$, dried blood and cyanamide at the rate of 60 lb. per acre only, the equiv. of over 500 lb. per acre were recovered from each uncropped pot in the drainage water. The fallow pots lost 3.5 times as much nitrate as the planted ones. The control pots lost as much N as any to which nitrogenous fertilizer was added. These extremely high losses are attributed to the lack of compactness of the soil in the pots allowing good aeration, the soil temp. ranging from 24° to 30° throughout the period and the high amt. (7.8%) of org. matter in the soil stimulating nitrification to an unusual degree. CaO was recovered in the drainage from the cropped and uncropped pots at rates of approx. 200 and 600 lb., resp. Similar leaching of K_2O was equiv. to 40 and 70 lb. per acre. The losses of NH_3 averaged at a rate of about 1 lb. per acre. Only traces of P_2O_5 were obtained in the drainage from any of the pots. The pots receiving superphosphate gave drainage contg. less P_2O_5 than the controls. The H_2O draining from the control and KCl pots contained at the rate of 115.2 and 161.5 lb. Cl per acre per annum and this was the only case in which additions of sol. material noticeably increased the % of the same in the drainage over that in the controls. A. L. MEHRING

The effect of soil type and fertilization on the composition of the expressed sap of plants. M. M. MCCOOL AND M. D. WELDON. Mich. State Coll. J. Am. Soc. Agron. 20, 778-91(1928); cf. C. A. 21, 788.—Greenhouse samples of barley, sugar beets, field beans and red clover, and field samples of celery, cabbage, sugar beets, wheat and rye have been studied as to the content of nitrate N, P, K, Ca and Mg in the expressed juice. Field samples generally contain more of these nutrients than greenhouse samples. The % of each nutrient in the juice of the leaves is usually greater than in that of the stems, but in rainy weather K may be leached from the leaves to a greater extent than from the stems. Applications of the various mineral nutrients to the soil as fertilizer generally result in increased concns. of those elements in the juice of the crop. If one

element is decidedly a limiting factor, the slow growth of the plant appears to permit the accumulation of high concns. of other elements. Under these conditions, applications of the limiting element to the soil as fertilizer are likely to decrease the concns. of the other elements in the plants. E. F. SNYDER

The Neubauer method (for determining root-soluble nutrients in soils). F. MAJEWSKI. *Polish Agr. Forest Ann.* 17, 35(1927).—The Neubauer method does not compare favorably with that of Lemmermann (relative soly.) or with field trials, results obtained being, in general, the same as those arising from direct chem. analysis. Wheat is a more suitable plant than rye for use with the seedling method as it is more sensitive to changes in potash and phosphate concns. in the soil. B. C. A.

Plant composition as a guide to the availability of soil nutrients. ROBERT M. SALTER AND J. W. AMES. *Ohio Agr. Expt. Sta. J. Am. Soc. Agron.* 20, 808-36(1928).—In general the rates at which common crop plants take up N, P and K bear no const. relation to the rate at which the plant increases in dry wt., nutrient absorption being commonly more rapid during the early stages of growth and slower during the latter stages than the total growth rate. On the whole the Neubauer seedling method does not offer any advantages over the strictly chem. methods for exchange K or that sol. in dil. acids. The Neubauer test has little, if any, value as an indicator of P needs of the soil. From the data on corn S. and A. do not consider the stalk tests for either K or N requirements as sufficiently reliable to warrant their practical use under Ohio conditions. Forty-six references are given. E. F. SNYDER

Relation between water and potash in plant production. FRED W. MORSE. *J. Agr. Res.* 35, 939-46(1927).—Pot. expts. show that in soils with a low natural K soly. millet and soy beans obtain their supplies of K in direct proportion to the supplies of H_2O . When K is added together with other fertilizers millet is nearly indifferent to varied amts. of H_2O . For testing the availability of K in a soil millet appears to be a better crop than soy beans because the millet is less affected by variations in the water supply. The results are in accord with the law of the minimum. M. S. ANDERSON

Relationship between the sodium chloride content of soils and plant growth. TACKE. *Abhandl. Naturwiss. Vereins* 26, 503-27(1927).—The NaCl content of subsoils is more nearly const. than that of surface soils liable to flooding with saline river water. Variations in plant growth are more closely correlated with the salt content of subsoils than of surface soils. In general, the salt content and natural flora of soils are closely related, and variations in the former bring about periodic changes in the nature of the latter. B. C. A.

The agronomic application of a microbiological test. S. WINOGRADSKY. *Compt. rend.* 187, 161-5(1928).—A microbiological method for detg. the lime and P requirements of soils. E. F. SNYDER

Principal observations on nitrogen fixation by microorganisms. AUGUST RIPPPEL AND HANS POSCHENRIEDER. *J. Landw.* 76, 101-12(1928).—The principal considerations about the active relations of the N combinations, which take their origin from the large carbohydrate supply of the leguminous nodules in the form of starch and the disappearance of this starch in the hunger condition, make it probable, that the N fixation by microorganisms does not proceed so economically as might appear, if one takes into consideration the facts of the exothermic course of the NH_3 formation from elementary N and H. Contrary views have not considered that the necessary H can originate only in the limits of the conversion of org. substances, so that the N fixation can be considered only in this connection. E. F. SNYDER

Soil inoculation with "Nitrofer" (mixed cultures of Azotobacter). FR. ZUCKER. *Univ. Leipzig. Centr. Bakt. Parasitenk. II Abt.* 74, 208-13(1928).—It is effective in increasing N fixation. JOHN T. MYERS

The effect of soil amebae on the growth and development of Azotobacter chroococcum in sterile soil. THAIS-FEODROVA-VINOGRADOVA. *State Univ., Leningrad. Centr. Bakt. Parasitenk. II Abt.* 74, 14-22(1928).—*Azotobacter* in sterile soil is stimulated by amebae. Mannitol (1%) favors the development of amebae and hence of *Azotobacter*. There is a good bibliography. JOHN T. MYERS

The fig industry in Asia Minor. G. S. CHEEMA. *Dept. Agr. Bombay, Bull.* 131, 7 pp.(1927).—Analyses of the fine portions of soils from fig gardens at Nazilli, Meandre Valley, Asia Minor, gave— H_2O 0.22 to 0.28, org. matter 2.56 to 2.80, N 0.04 to 0.06, $CaCO_3$ 0.60 and P_2O_5 0.28%. The soils contained 26.90 to 38.99% of stones. In general, the fig soils are very rich loams contg. considerable humus. K. D. JACOB

Estimation of potash in soils and fertilizers. A quick method in the technique. M. R. RAMASWAMI SIVAN AND M. RAJAGOPALA AYYAR. *Madras Agr. Dept. Yearbook* 1926, 1-6(1927).—A HCl ext. of the ignited soil or fertilizer is prepd. in the usual man-

ner. An aliquot is evapd. to dryness and carefully ignited at a low temp. to avoid volatilization of KCl, and to convert chlorides of Fe, Al, and Mg into insol. oxides. The residue is extd. with boiling H_2O and sulfates are pptd. with $BaCl_2$. Ca and excess Ba are pptd. with Na_2CO_3 , the total vol. of soln. not exceeding 100 cc., and the ppt. is settled by centrifuging for 3 min. The clear filtrate obtained by decantation through a dry double filter contains only NaCl and KCl. Small aliquots of the filtrate are acidified with HCl and the K is pptd. as K_2PtCl_6 or $KClO_4$. A detn. can be made in 2 hrs. with a min. use of reagents. Several tables of results show that the method gives excellent results in the presence of Fe, Al, Ca, Mg, sol. SiO_2 and H_3PO_4 . K. D. J.

Some effects of fertilizers on the nature of the soil solution with special reference to phosphorus. C. H. SPURWAY. Mich. State Coll. *J. Am. Soc. Agron.* 20, 802-7 (1928).—In general a rough correlation exists between test results and quantity of fertilizer applied. Because of the intervention of certain modifying factors, one cannot expect to find a direct correlation between test results and quantity of P added to the soil. As a general observation soils showing 0.5 p. p. m. or less of sol. P respond to P fertilization. On soils showing 2.0 p. p. m. or more, the profitable use of P fertilizer is doubtful, except perhaps in intensive farming systems where the other nutrient elements are supplied in abundance. E. F. SNYDER

Annual report of the 1st economic botanist, Bengal, for the year 1926-27. G. P. HECTOR. Dept. Agr. Bengal. *Ann. Rept. for 1926-27, 1927, 35-8*; cf. *C. A. A.* 21, 3698-7 (1928).—Application of phosphate fertilizers tended to reduce the *transpiration ratio of aus paddy*. There was a distinct indication that the *osmotic pressures of the cell-saps of varieties of highland aus paddies* were higher than those of transplanted and of deep-water aman paddies, but there was no appreciable difference in the osmotic pressures of the cell saps of early and late varieties of aus paddy, and also between transplanted and deep-water aman paddies. In expts. on the *storage of potatoes*, untreated potatoes spread on racks kept better than those stored in bags, and also better than those treated with 1:1000 $HgCl_2$ solns., followed by fumigation with gasoline and loose storage in bags. K. D. JACOB

Some relations of green manure to the nitrogen of a soil. T. L. LYON AND B. D. WILSON. Cornell Agr. Expt. Sta. *Memoir* 115, 1-29 (1928).—Green-manure crops consisting of legumes, non-legumes and combinations of the two were grown repeatedly as cover crops on the same soil for a period of 10 years. The effect on the accumulation of nitrate N and on the gain or loss of total N was studied. The plants used were hairy vetch, field peas, rye, oats and buckwheat, in addn. to which grass sod was maintained continuously on certain plats throughout the 10 years. The crops, except the grass, were plowed under in late fall or early spring, and the land was kept cultivated until the middle of July when the crops were replanted. The greatest accumulation of nitrates during the fallow period was in the soil in which vetch was plowed under. The order of effectiveness of the other crops in this respect was rye, peas, oats, buckwheat. Conclusion: Not all legumes are more effective than non-legumes in producing a high content of nitrate N during the main part of the growing season. The advantage lay with those crops which reached less advanced stages of growth before being plowed under, even when the quantity of the crop above ground was less than that of the more rapidly maturing crops. Liming the soil increased the accumulation of nitrate N. The effect of the liming on the nitrate N content of the soil was more pronounced in the rye plats than in the vetch and the oat plats. The soil of all of the plats planted annually to cover crops lost more or less total N during the 11 years intervening between the taking of samples for detn. of that constituent. Vetch plats lost practically no N; peas, which as a legume might be expected to conserve soil N, were not so effective in this respect as was rye. The plats continually in grass gained 415 lb. of N to the acre. There was a close correlation between the nitrate N accumulation in the plats planted to the various cover crops and the loss of total N in the soil of these plats. The loss of total N was, without exception, in inverse order to the nitrate N content of the soil during the period when nitrates were highest. On the other hand, there was a less definite relation between the % of total N in the soil and nitrate N accumulation. The form in which this N was lost is not apparent, but it would appear to be protected from loss other than in drainage when in the form of nitrate, since the plats having a high nitrate content each year were the ones that lost the least N. Since the N lost is the part most readily available to plants, and since the amts. lost are often large, there may result a serious curtailment of fertility. The methods of mitigating the loss suggested by this expt. are (1) laying the soil down to grass for a period of years, and (2) the culture of those legumes which are most active in fixing N, among which is vetch but not field peas. C. R. FELLERS

Mathematical interpretation of experimental results (obtained with fertilizers for sugar cane.) Y. KUTSUNAI. *Proc. Hawaiian Sugar Planters Assoc., 47th Ann. Meeting 1927*, 171-5(1928).—The theoretical yield curves for sugar cane fertilized with varying quantities of K_2O but receiving const. amts. of N and P_2O_5 were calcd. from Spillman's formula, $Y = M - AR^x$, where Y is the yield when x units of fertilizer are used, M is a const. equal to the theoretical max. yield due to the combined effect of unlimited amt. of fertilizer and the soil fertility, A is a const. representing the theoretical max. yield due to unlimited amt. of fertilizer only but not including the natural fertility of the soil, and R is the ratio between the increment due to $x + 1$ units of fertilizer and that due to x units of fertilizer. This ratio is supposed to be const. for any given expt. and smaller than unity. M , A and R are evaluated from actual exptl. data. Cane yields calcd. by this formula approximated closely those actually obtained when K_2O was used at the rate of 60 to 240 lb. per acre, the actual yield differing from the calcd. yield by -0.27 to $+0.76$ tons per acre.

K. D. JACOB

The effect of fertilizing and surface tillage on the retention of moisture in the soil at the Kasaragod Experiment Station. K. GOVINDAN NAYAR. Madras Agr. Dept., *Yearbook 1926*, 80-5(1927).—Uncultivated plots retained much less moisture than cultivated ones. In the latter case, plots receiving green manures and cattle manure retained more moisture than the corresponding unmanured plots. In general, the application of mineral fertilizer, composed of $(NH_4)_2SO_4$, K_2SO_4 , and superphosphate, appeared to decrease the H_2O -holding power of the soil as compared with the soil in unfertilized plots. This effect was not due to any great differences in the phys. compn. of the soils in the 2 plots.

K. D. JACOB

The relative nitrifiability of different nitrogenous organic manures in certain soils of the Central Farm, Coimbatore. K. S. VISWANATHA AYYAR. Madras Agr. Dept., *Yearbook 1926*, 85-91(1927).—Pungam cake (*Pongamia glabra*), groundnut cake (*Arachis hypogea*), castor cake (*Ricinus communis*), horn meal, fish guano, and ganja cake (*Cannabis indica*), were used in nitrification expts. on a black cotton soil and a red garden soil. With the black cotton soil the % nitrification in 6 weeks was pungam cake 80, groundnut cake 100, castor cake 90, horn meal 12.5, fish guano 50, and ganja cake 50, while, in the same order, the % nitrification in 6 weeks in the red garden soil was 64, 84, 80, 84, 27 and 90. The cause of the high nitrification of horn meal and ganja cake in the red soil was not detd. $CaCO_3$ had no effect on nitrification in these soils. Data are given on the nitrite and NH_3 formation from the fertilizers at various periods after application.

K. D. JACOB

A note on the relative availability of the nitrogen of oil cakes as indicated by pot-culture studies. S. KASINATHA AYYAR. Madras Agr. Dept., *Yearbook 1926*, 92-5(1927); cf. preceding abstr.—Pot expts. with ragi were carried out with groundnut castor, hoongay and ganja cakes, steamed horn meal, and $(NH_4)_2SO_4$ on a brown loam garden soil contg. N 0.036%, total P_2O_5 0.069%, and available P_2O_5 0.011%, 100 mg. of N being used in each case. With N fertilizers alone the increases in yield of grain were in the following order—groundnut, hoongay, steamed horn meal, castor, $(NH_4)_2SO_4$ and ganja cake, while with N fertilizers plus superphosphate the yield of grain was in the following order—steamed horn meal, groundnut, castor, ganja cake, $(NH_4)_2SO_4$ and hoongay. Expts. on certain soils of the Central Farm and at Koilpatti showed that superphosphate when applied alone considerably depressed the yield of grain as compared with the yield from unfertilized soil, although the soil was not rich in available P_2O_5 . Favorable increases in yields of both grain and straw were obtained when N fertilizers were used in connection with superphosphate. The investigations are being continued.

K. D. JACOB

Liming and fertilizing of pasture at Winton Experimental Farm. R. MCGILLIVRAY. *New Zealand J. Agr.* 36, 96-8(1928); cf. C. A. 21, 3247.—In a 3-year comparative expt. with basic slag and Nauru ground raw rock phosphate as fertilizers for pastures, the growth of clover and the total yield of hay were decidedly lower on the plots fertilized with ground rock phosphate during the first 2 years, but ground rock phosphate gave as good results as basic slag in both respects during the third year.

K. D. JACOB

Artificial farmyard manure. M. CARBERY AND R. S. FINLOW. *Agr. J. India* 23, 80-5(1928).—Expts. were carried out on the manuf. of artificial manure from sugar cane trash, water, hyacinth, weeds and litter, dried teak leaves, etc. Satisfactory decompn. of all these materials was obtained in 3 to 4 months and the final products approximated the compn. of cow manure. Urea, diluted cattle urine, and cow manure and water gave the best results as promoters of cellulose decompn. NH_4 acetate also gave good results and NH_4 phosphate was an efficient substitute for $(NH_4)_2SO_4$ plus bone

meal. In field tests composts made with liquid manure gave slightly better results than ordinary cow manure, but NH_4 acetate composts gave lower results. K. D. J.

Davison Chemical Company exemplifies stability in fertilizer industry. ANON. *Fertilizer Green Book* 9, No. 8, 11-6(1928).—This is an illustrated description of the superphosphate and H_2SO_4 plants of the Davison Chem. Co., Baltimore, Md. MgSiF_6 and Na_2SiF_6 are produced from the F-bearing gases and vapors resulting from the treatment of phosphate rock with H_2SO_4 for the manuf. of superphosphate. A Pt-impregnated SiO_2 -gel contact mass is used as a catalyst in the contact H_2SO_4 plant.

K. D. JACOB

Superphosphate industry in Japan. KATSUMOTO ATSUKI. *J. Soc. Chem. Ind. (Japan)* 31, 109-10B(1928).—A review.

K. K.

Influence of various potash salts on the yield and starch content of potatoes. O. NOLTE AND R. LEONHARDT. *Mitt. deut. Landw.-Ges.* 1927, 689.—Confirming earlier observations that K salts other than sulfates tend to reduce the starch content of potatoes if applied late in the season, "Patent Kali" (mixed sulfates of K and Mg) produced a higher yield of tubers of higher starch content than "40% potash salts" in field trials.

B. C. A.

Important nitrogen losses during the fermentation and humification of highly nitrogenous plants. I. Lucerne. J. ZOLCINSKI. *Rocz. Nauk Poln. i Lesnych* 17, 349-77(1927).—During the humification of lucerne (in flower) as much as 40% of its total N is lost in 10 days and 60% in 100 days. Of this loss, approx. one half is as NH_3 and the balance as elementary N. The loss is minimized by leaving undisturbed and avoiding destruction of the covering layer of fungus mycelium. The considerable losses of N may to a large extent be attributed to physico-chem. processes. It is suggested that plants of moderate N content build up protein matter differing in constitution from that of legumes, and characterized by the presence of NH_2 and OH groups in the *meta*-position (*i. e.*, the least oxidizable position), and contain also more aliphatic groupings which are quite unoxidizable. There is practically no loss of N during the humification of plant tissue of moderate N content. **II. Red clover.** J. ZOLCINSKI AND A. MUSIEROWICZ. *Ibid* 377-96.—Red clover loses 28% of its total N during humification, largely as free N. The formation of nitrite or nitrate during the process was not observed. The C/N ratio of the fermenting mass approaches that of soil humus. The total P in the humified material does not vary. Temp. and time govern the extent of the humification process. The combination between chalk and humic acids is accelerated by a rise of temp. Leguminous plants serve as an excellent source of humus substances. Sufficient lime supplies are necessary to complete the humification process, which is very largely a phys. and chem. as well as a biol. one.

B. C. A.

The relationship between fertilizing and callus formation in tea. P. A. KEILLER. *Trop. Agr. (Ceylon)* 70, 288-301(1928).—The theory is advanced that inability of tea bushes to grow callus over wounds made in pruning is due to carbohydrate starvation resulting from continued plucking and pruning. Specimens of wood which contained starch in all tissues before pruning showed a total disappearance of starch from all tissues except in a thin band immediately below the cut surface 4 days after pruning. When tea is fertilized with readily available materials at pruning, the wounds heal very well.

A. L. MEHRING

Report of the tobacco substation 1927. Conn. Agr. Expt. Sta., *Tobacco Sta. Bull.* 10, 17T-82T, March, 1928.—**Influence of some fertilizer ingredients on the burn of tobacco.** P. J. ANDERSON, N. T. NELSON AND T. R. SWANBACK. *Ibid* 17T-34T.— $(\text{NH}_4)_2\text{SO}_4$ seriously lowered the fire-holding capacity both when tested by the strip test and when the cigar test was used. Dark muddy ash, uneven burn and coaling also characterized the cigar test. The fire-holding capacity was lowered by large quantities of dry ground fish in the mixt., but not so much as by $(\text{NH}_4)_2\text{SO}_4$. Tankage had no pronounced effect. Results with NaNO_3 were not entirely conclusive but did not indicate serious, if any, impairment of burn. Urea did not affect the fire-holding capacity but increased the whiteness of ash. Large quantities of P lowered the fire-holding capacity on the strip test but made no difference in the cigar test. KCl almost destroys the fire-holding capacity. K Mg sulfate lowered the fire-holding capacity when compared with high-grade sulfate. With KNO_3 , K_2CO_3 and K_2SO_4 the differences in fire-holding capacity were not large, but 2 yrs.' results ranked carbonate first, nitrate second and sulfate third. Ash characters were in the same order. Lime in large amt. reduced the fire-holding capacity when tested on the leaf. On the cigar, however, the fire-holding capacity was good. From the standpoint of whiteness of ash, closeness and evenness of burn, the cigars from the lime plots ranked highest. **Chemical analysis of tobacco from the nitrogen plots.** E. M. BAILEY AND P. J. ANDERSON. *Ibid* 35T-

50T.—Comparing the effects of fertilizer formulas in which cottonseed meal, castor pomace, NaNO_3 , $(\text{NH}_4)_2\text{SO}_4$, dry ground fish and tankage were used in combinations previously described, the results are: Different sources of fertilizer N have not substantially affected the quantity of total N, "ammonia" N, nitrate N or nicotine in the leaf, nor the ratios between them. The percentages of total N, "ammonia" N and nicotine N are invariably higher in the upper than in the lower leaves. Nitrate is more abundant in the lower leaves. The different fertilizer treatments have not affected appreciably the % of total ash, sol. silica, Fe, Ca, Mg, P, or K in the leaf. Increased percentages of Mn, S, and, to a less degree, alumina in the leaves were found in those plots treated with $(\text{NH}_4)_2\text{SO}_4$. This correlated with a more acid soil reaction and a poorer burn of the tobacco. The lower leaves of the plants (seconds and lights) have higher percentages of total (crude) ash, potash and Ca than the upper leaves. The upper leaves (darks) have higher percentages of P, N and Cl than the lower leaves. **The effect of some nitrogenous fertilizers on soil reaction.** M. F. MORGAN AND P. J. ANDERSON. *Ibid* 51T-4T.— $(\text{NH}_4)_2\text{SO}_4$ has had the strongest influence in changing the soil reaction, consistently making the soil more acid. NaNO_3 has just as consistently made it less acid but its influence in this direction is not quite so marked as the influence of sulfate toward acidity. Cottonseed meal has not made any appreciable change in reaction. Dry ground fish and tankage have had a very slight tendency to make the soil more acid. Urea produces a slightly more acid condition after the initial period of rapid NH_3 formation is concluded. One yr.'s experience with $\text{Ca}(\text{NO}_3)_2$ showed no appreciable difference from the check plots. Plots treated with KNO_3 for 3 yrs. at the rate of 267 lb. per A. (43% K_2O) show no significant change in reaction during that time. **Synthetic urea as a source of nitrogen.** *Ibid* 55T-6T.—The purpose of this expt. was to see whether urea can be used to replace, partly or entirely, the original ammoniates in the fertilizer mixt. It is shown that the av. yield during 3 yrs. is so nearly the same that the differences are not significant. **Fractional application series.** *Ibid* 57T-60T.—No advantage is gained by making several applications as compared with a single original application of the same quantity and kind of fertilizer. Where high yields are desired there seems to be no evidence in favor of fractional application. **Single sources of nitrogen.** *Ibid* 60T-2T.—An expt. to det. the effect of single sources of N. It seems that the response of a plant to particular nitrogenous fertilizers may depend largely on the seasonal factors of rainfall and temp. **Manure as a supplement to commercial fertilizer.** *Ibid* 62T-6T.—Results for the first yr. show some advantage from the use of manure. Stable manure and "Adco" manure used as a supplement have been about equally efficient in increasing the yield and improving the quality of tobacco in a dry and wet yr. **Organic matter in tobacco soils.** M. F. MORGAN. *Ibid* 66T-72T.—Forty-three fields in tobacco over 20 yrs. show almost exactly the same av. amt. of org. matter in the soil as the same no. of fields in tobacco for less than 7 yrs., in nearly all cases after a long period of practical non-use for agricultural purposes. **Progress report on the cover crop experiments.** *Ibid* 72T-5T.—For 1927 only all cover crops with the exception of timothy increased the yield. **Tobacco mosaic.** G. P. CLINTON AND FLORENCE A. MCCORMICK. *Ibid* 75T-82T.—The effect of this disease on the tobacco plant, its cause, known facts of mosaic and preventive measures are discussed. E. F. SNYDER

Report on pathology. H. ATHERTON LEE. *Proc. Hawaiian Sugar Planters Assoc., 47th Ann. Meeting* 1927, 109-20 (1928); cf. C. A. 21, 3414.—The toxin produced by the eye spot fungus was isolated, and shown to be inorg. in nature, apparently an inorg. nitrite. Applications of N fertilizers in the autumn months increased eye spot infection severely, while P_2O_5 and K_2O fertilizers slightly reduced the disease. N fertilizers should be applied to cane during the period of longest days of sunlight and least probability of rain. Increasing the interval between irrigation applications in the winter months to 30-45 days reduced eye spot infection considerably. S dusts were much more efficient when combined with oxidizing agents which produce more quickly the active pentathionic and other polythionic acids upon which S is dependent for its fungicidal and germicidal value. The development of varieties of cane resistant to the eye spot disease has given considerable promise. Applications of S to alk. soils for the control of root rot disease of sugar cane had no beneficial effect although the soil was rendered distinctly less alk., and variations in applications of P_2O_5 and K_2O fertilizers had no visible effect on the disease. The H 109 variety of cane was in general highly resistant to *Pythium* root rot. Exptl. results obtained thus far indicate that various fertilizer treatments have no effect in controlling the mosaic disease. Inoculation of healthy tissue with young, fresh gall material did not result in production of stem gall of sugar cane, but in one case definite gall was obtained by inoculation with NH_3 .

solns. With both NH_3 and sucrose solns. a rind reaction was produced with a striate appearance similar to that present when stem galls occur. This indicates that stem gall may result from the injection into the plant tissues of some org. compd., or NH_3 , by insects feeding on the plant. The investigations are being continued. Such factors as wind and strong sunlight, which will cause excessive transpiration by the leaves, seem to be the cause of *leaf burn of cane*. K. D. JACOB

Germination tests on millet seeds. G. N. RANGASWAMI AYYANGAR AND C. VIJAYARAGHAVAN. Madras Agr. Dept., *Yearbook 1926*, 14-20(1927).—Addn. of 1.5 g. naphthalene to tightly closed 8-oz. bottles of millet kept the seed free from insects and had no effect on germination when the seeds were stored for 2.5 years. Seed preserved in this way cannot be used as food because of the persistent naphthalene taste.

K. D. JACOB

Annual report of the fiber expert to the Government of Bengal, for the year 1926-27. K. McLEAN. Dept. Agr. Bengal. *Ann. Rept. for 1926-27*, 39-43(1927).— $(\text{NH}_4)_2\text{SO}_4$ gave a good increase in the yield of jute, but CaCN_2 was not effective. Expts. were made to det. the % of fiber to green plant in different varieties of jute. The plants were stripped of leaves and retted with a soln. contg. 0.05% NH_3 acetate and 0.05% KH_2PO_4 . The % of stripped plant on green wt. varied from 86 to 89 and the % of fiber on green wt. from 6.0 to 8.0. The % of stripped plant and of fiber was not const. for any one variety and the heavier plants gave a smaller % of fiber. As much as 7% of pure alc., on the dry wt., was obtained in expts. on the rain pods tree as a source of alc. K. D. J.

Studies in the shedding of mango flowers and fruits. I. P. V. WAGLE. Agr. Research Inst., Pusa. *Memoirs Dept. Agr. India, Botanical Series* 15, 219-49(1928).—Shedding of mango flowers and fruits could not be traced entirely to mildew and mango jassid hopper attacks. Whether pests and blight were present or not, spraying with Bordeaux mixt. and fish oil resin soap solns. increased the loss of unfertilized flowers but in some cases reduced the fall of flowers after fertilization. When mildew was present, spraying with Bordeaux mixt. resulted in a considerable increase in the % of ripe fruit, but spraying with fish oil soap soln. was distinctly harmful. In the presence of mango hoppers, spraying with fish oil soap soln. increased, in the flowers heads under examn., the yield of ripe fruit by 62%, while a combined spray of Bordeaux mixt. and fish oil soap soln. was not effective even against the hoppers. The investigations are being continued. K. D. JACOB

Cockroach destruction in buildings. B. B. FULTON. Ia. Agr. Expt. Sta., *Circ.* 112, 1-4(1928).— NaF used as a dry dust is particularly effective against cockroaches in dry places only. The use of $\text{Ca}(\text{CN})_2$ as a fumigant at the rate of 2.5 lb. per 1000 cu. ft. in damp basements gave excellent results. C. R. FELLERS

Clarification of waste tannery liquors and their utilization for agricultural purposes (HLAVINKA) 29. **Edible canna in the Waimea district of Hawaii** (RIPPERTON, GOFF) [as fertilizer] 12. **The agricultural and biochemistry building at the University of Minnesota** (GORTNER) 2. **Determination of organic C in soil** (DE NARDO) 7. **The microchemical determination of P_2O_5 as strychnine phosphomolybdate** (ANTONIANI, JONA) 7. **Injury to pears by HCl solution** (PETTEV) 12. **Injurious field rats of Lower Lind and their extermination** (WAGLE, MAHOMED) 18. **The action of Al, ferrous and ferric Fe and Mn in base-exchange reactions** (MAGISTAD) 6.

MOHR, E. C. JUL.: *De beteekenis der bodenkunde, in het bijzonder voor de tropen*. Utrecht: J. van Druten. 21 pp. Fl. 0.75.

RABATÉ, E.: *Nettoyage et fertilisation des céréales avec l'acide sulfurique dilué*. Paris: G. Rey-Robert. 4 pp.

SCHIRMER, KARL: *Vom Saatbeizen*. Freising: F. P. Datterer & Co. 52 pp. M. 1.

Fertilizer. F. G. LILJENROTH. *Brit.* 282,330, Dec. 14, 1926. Crude Ca phosphate is leached with HNO_3 or other acid, the Ca salt of which is sol., and CaSO_4 is pptd. by the simultaneous or subsequent addn. of a sol. sulfate, preferably $(\text{NH}_4)_2\text{SO}_4$; the soln. is filtered, neutralized (preferably with NH_3) and evapd. to form a fertilizer. The CaSO_4 may be treated with NH_3 and CO_2 to form $(\text{NH}_4)_2\text{SO}_4$ and CaCO_3 or may be heated to produce SO_2 for prepn. of H_2SO_4 and manuf. of alkali sulfate. K compds. such as KCl may be added to the fertilizer. Cf. C. A. 22, 2434.

Fertilizer. C. F. BOEHRINGER & SOHNE G.M.B.H. Fr. 634,588, Mar. 2, 1927. See *Brit.* 268,744 (C. A. 22, 1440).

Fertilizers. SYNTHETIC AMMONIA & NITRATES, LTD., AND A. E. MITCHELL. Brit. 282,463, June 19, 1926. Superphosphate and NH_4NO_3 are mixed with K_2SO_4 or other alkali metal sulfate.

Removing magnesium salts from fertilizers. FRANS G. LILJENROTH. Fr. 633,830, May 3, 1927. K salts are freed from Mg salts by dissolving in water and adding NH_3 and CO_2 in excess, the NH_3 being in excess of the CO_2 .

Fertilizers and insecticides. VITTORIO CASABURI. Fr. 632,516, Aug. 19, 1926. Addn. to 611,545. The alkali lye used in the parent case as an adhesive for insecticides or fertilizers is replaced by the vegetable substances called hemicelluloses prep'd. from carob beans.

Insecticide and fungicide. FRANCIS M. ROGERS and CLAUDE P. MCNEIL (to Standard Oil Co. of Ind.). U. S. 1,679,919, Aug. 7. A compn suitable for use in the form of an aq. emulsion on plants or seeds comprises a "mahogany soap" or other suitable salt of a sulfonic acid derived from mineral oil, an oil-dispersible Cu compd. such as the naphthenate or sulfonate and a mineral oil such as paraffin oil. Other substances also may be added.

Fungicides. I. G. FARDENIND. A.-G. Fr. 634,605, May 18, 1927. See Brit. 271,480 (C. A. 22, 1648).

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Acetylmethylcarbinol formation in the alcoholic fermentation of sugar. L. ELJON. Ned. tijdschr. hyg. microbiol. 1, 171-9(1926).—The appearance of AcCHMeOH as a product of the fermentation of sugar fixes the AcH , which can no longer act as H acceptor. Free H, however, is not evolved, but a complex reduction process takes place, the nature of which is under investigation. B. C. A.

Adulterated wines and Micko distillation. CARL BREBECK. Chem.-Ztg. 52, 377-9(1928).—Government regulations and the analyses of various wines are discussed. The procedure used in making the Micko distn. is described. The residue left after distn. is important in detg. the adulteration. The odor and the taste of the distillate serve as a means of identifying impurities. The Micko method is the only one giving an accurate knowledge of the character of the wine and the adulterants employed.

C. N. FREY

A volumetric method for the determination of carbon dioxide in beer. HARRY LUNDIN AND JOHN ELLBURG. Wochschr. Brau 45, 339-41, 349-52(1928).—The CO_2 in the beer is dissolved by NaOH and then measured in a Van Slyke app. after liberation with H_2SO_4 . A SCHULTZ

An antique refractometer for testing beer. H. W. VAN URK. Pharm. Weekblad 65, 758-61(1928).—Description of a simple refractometer constructed in 1847. Tests with EtOH and glycerol solns. showed the detn. of n to be accurate within 1 unit in the 3rd decimal. A. W. DOX

The influence of sodium chloride on the growth and metabolism of yeast. H. B. SPEAK, A. H. GEE AND J. M. LUCK. Univ. of Toronto. J. Bact. 15, 319-40(1928).—Wort contg. NaCl up to a concn. of 10% can be fermented by *S. cerevisiae*. The wt. of the yeast crop decreases with increase in salt concn. The lag phase of the fermentation period is progressively lengthened by increasing NaCl concn. The influence of NaCl on the max. rate of CO_2 production depends on the size of inoculum as well as salt concn.; small inoculum and low concn. are stimulating and large inoculum and high concn. depressing. When NaCl is added at some point during active fermentation, concns. up to 1.5% are stimulating but not immediately and above that depressing to the rate. The effect of NaCl is not on cell metabolism but on cell division. The N content of yeast crops from media contg. NaCl , and inoculated with 0.002 to 0.04 g. of yeast increases up to 6% NaCl , and from 6 to 10% is the same as the controls. When the inoculum is a total crop of yeast, 0.4 g., which ferments the medium with great rapidity and doubles in wt., the N figure changes qualitatively in a similar manner over the same range of salt concn. The quant. changes are much smaller. Yeast crops of this type exposed to the salted media for times equal to the length of normal fermentation do not show any greater changes in N content, indicating that the time factor is not important. This quant. difference is probably due to the different effects of NaCl on existing cells and those formed by division in the exptl. media. The ratio, sugar fermented; yeast crop, increases with NaCl concn. up to 5%. In higher concns. the crops have a gradually diminishing efficiency. This holds when the time factor for controls and salted

medium is const. and its significance is increased in the light of a gradual prolongation of the lag phase by these concns. of salt. The changes in efficiency parallel the N content. As the concn. of NaCl increases (up to 2%) the ratio, CO_2 : sugar utilized, rises gradually. In higher concns. the ratio gradually falls to considerably below the control figure. During a normal wort fermentation, this ratio rises, suggesting an accumulation of intermediates in the early stages.

JOHN T. MYERS

Advantage or disadvantage in drying barley. HERMANN KROFF. *Wochschr. Brau.* 45, 336-7(1928).—The drying of barley for malting is beneficial because of the improvement in germinating qualities and also because respiration losses in stored undried barley are greater than drying costs.

A. SCHULTZ

Barley proteins. I. The composition and quantitative estimation of barley proteins. L. R. BISHOP. *J. Inst. Brewing* 34, 101-18(1928).—Osborne (*J. Am. Chem. Soc.* 17, 539(1895)) found in barley an albumin, a globulin, a gliadin (hordein) and a glutelin, and subsequent work has not materially affected this classification of barley proteins. B. made a study of the conditions necessary for sepg. the proteins and evolved a method of sepn. Ext. 10 g. of finely ground barley with 70 cc. K_2SO_4 soln., p_H 5-6, 5 successive times and centrifuge each to sep. the extns. from the barley. Make up the resulting extracts to 500 cc and use 100 cc. for N detn. Buffer 200 cc. of the salt ext. with $N \text{ NaC}_2\text{H}_3\text{O}_2$ and $\text{HC}_2\text{H}_3\text{O}_2$ to p_H 4.6, heat to 82° for 20 sec. and det. in the ppt.; this represents the albumin N. For the non-protein N, titrate 70 cc. of the salt ext. with 0.1 $N \text{ CuSO}_4$ after adding 10 cc. of 0.1 $N \text{ NaOH}$, until the violet color changes to green. N detd. in the ppt. obtained by centrifuging represents non-protein N. To det. hordein mix the salt-extd. barley with 60 cc. of 70% EtOH in a tube closed with a rubber stopper and screwed tightly in a small brass app. Put the tube into a bath at 82° , shake at frequent intervals during a period of 30 sec., allow to cool a minute and centrifuge. Make 2 further extns. and make up the total exts. to 250 cc. Det. N on 100 cc. of the ext. Det the glutelin N by subtracting the sum of the salt and alc.-sol. N from the total N of the barley. To minimize bacterial action all extns. and detn. of N are carried through as quickly as possible. These detns. were carried out on a number of different barleys of from 1.2 to 2.3% total N and the glutelin in the barleys was found to remain const. at 36% of the total N. The hordein increased as the total N increased, rising from 26% in the 1.2% N barley to 40% of the total N in the 2.3% N barley. The salt-soluble N fell from 36% to 24% as the total N increased from 1.2% to 2.3%. B. therefore concludes that total N is a good measure of the quantities of individual proteins present, and there appears to be a balance between the various proteins which adjusts itself according to the total N present, which in turn is influenced by soil and season.

PETER J. F. WEBER

Malting barleys of 1927. JAMES STEWART. *J. Inst. Brewing* 34, 128-43(1928).—A summary of general characteristics of English barleys as to acreage, crop, quality and price. Some statistics regarding those barleys usually imported are also given.

PETER J. F. WEBER

Modern malt kilns. A. FERNBACH. *Pasteur Inst., Paris. J. Inst. Brewing* 34, 119-27(1928).—C. Winckler has proposed a single-floored kiln with direct heating and which uses a loading of green malt three to five feet deep. The hot gases coming into contact with the green malt give rise to a considerable evapn. and any tendency of the damp malt to increase in temp. is checked by the refrigeration due to evapn. The hot gases which are blown in through the green malt by a ventilator at a pressure of about 2 in. of water have a temp. of 70° to 80° during the whole process. The temp. of the gases leaving the malt rises to 24° in 2 hrs., remains const. at 24° for 6 hrs., then rises to 60° in 2.5 hrs. and finally reaches 70° to 75° . There is no turning of the malt at any time. Only 14 hrs. is necessary for kilning (as against 48 hrs. with usual kilns) and this results in no detrimental effects on the malt such as dark color or steely malt. Advantages of the Winckler kiln are small space, less height, lower fuel consumption and lower labor costs.

PETER J. F. WEBER

History and uses of vinegar. C. A. SMITH. *The Fleischmann Co., N. Y. Glass Container* 7, No. 10, 20-31(1928).—Vinegar manuf. is described together with a general discussion of properties, and uses. It is maintained that vinegar is a true food.

C. R. FELLERS

Analytical data on malt, apple, melon and spirit vinegar, on apple and pear wine, as also general information respecting the composition of grape wines. PAUL HASSACK. *Deut. Essigind.* 32, 266-8(1928).—Three different samples of malt vinegar had the resp. const.: d. 1.0143, 1.023, 1.020; total acid 4.25, 6.61, 5.50%; alc. vol. % 0.585, —, —; total ext. 2.27, 4.23, 2.75%; ash 0.22, 0.57, 0.44%; P_2O_5 0.073, 0.13, —%; N 1.08, —, —; sugar as glucose 0.79, —, —%; As and metals none; dextro rotation 200 mm.

tube —, 2.9, 1.7. Complete analysis of *cider vinegar*: d. 1.0177; total acid 5.21; non-volatile acid as lactic 0.18; alc. vol. % 0.35; glycerol 0.30; total ext. 2.40; reducible sugar as invert 0.47; volatile ester as EtOAc 0.060; sugar-free ext. 1.90; pentosans 0.16; formic acid 0.003%. Av. compn. of *grape must*: d. 1.040–1.124; total sugar in 100 cc. not under 7 g. nor over 28 g.; ash 0.2–0.55 g. per 100 cc.; P_2O_5 15–70 mg. Analysis of *vinegar* from a mash of *sugar cane molasses*: acid 4.66, total ext. 2.09, sugar-free ext. 1.73, reducible sugar 17.0, ash 32.4, P_2O_5 0.017%; *melon vinegar*: d. 1.0248, acid 4.25, alc. none, total ext. 4.85, ash 0.48%, color yellow (caramel); *spirit vinegar*: d. 0.008, acid 4.31, alc. 0.05, total ext. 0.18, sugar-free ext. 0.16, ash 0.016%. In addn. the paper contains analytical values (limits) for grape, true and malt port, pear wines, as also dry fermented apple wines. W. O. E.

A colorimeter (FELIX, *et al.*) 1. Aeration of grains (HIRSCH) 12. Report of the fiber expert to the Government of Bengal [on the rain pods tree as a source of alcohol] (MCLEAN) 15. Treatment and disposal of distillery slop by anaerobic digestion methods (NEAVE, BUSWELL) 14. Utilizing acid waste sulfite liquor for the production of yeast (U. S. pat. 1,680,043) 23.

LANDRÉ, T: De groote bedrijven in werking. Het bierbrouwerijbedrijf. ANTWERP: De Sikkel. F. 32.50.

NEHBEL, HARALD: Über den Bau und die Bedienung von Destillier- und Rektifizier-Apparaten für alkoholhalt. Maischen (Gewinnung u. Reinigung des Spiritus) nebst e. Anh. über Wasser-Destillier-Apparate. 2nd ed., revised and enlarged. Berlin: Maetzig & Co. 537 pp. Cloth, M. 24.

Fermentation. TREUHAND-GES. M.B.H., BARTMANN & Co. Fr. 634,119, May 10, 1927. Cereals, potatoes and like starch-contg. materials for the prepn. of alc., sugar, or malt are allowed to swell in a suitable medium till they become pasty and then are submitted to mechanical pressure.

Citric acid by fermentation JOSEF SZÜCS (to Montan- und Industrialwerke vorm. Joh. Dav. Starck). U. S. 1,679,186, July 21. Organisms which produce citric acid are cultivated on molasses at temps. of 15–30° and cultures are selected which are adapted for producing citric acid fermentation without producing oxalic acid, and the selected cultures are used for producing citric acid by fermentation of molasses.

Dihydroxyacetone. I. G. FARBENIND. A.-G. Brit. 282,347, Dec. 18, 1926. The process described in Brit. 269,950 (C. A. 22, 1433) is modified by the use of substances extd. from the waste products of malt such as brewer's grains as a nutrient medium for the bacteria employed for production of dihydroxyacetone from glycerol.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Thalleoquinine reaction. B. OLSZEWSKI. *Rocz. Farm.* 4, 119–30(1926).—Optimally, 1 mol. of quinine is treated with 4–8 atoms of Br for 15 sec. In the micro-reaction, the ppt. is dissolved in 30% AcOH, the acid removed by evapn., and the residue, after soln. in water, treated with 1 drop of dil. Br water. B. C. A.

Ethylene oxide as a fumigant. R. T. COTTON and R. C. ROARK. Bureau Chemistry. *Ind. Eng. Chem.* 20, 805(1928).—Ethylene oxide is highly toxic to insects, the relative toxicity of $CH_3O.CH_3$, CS_2 , and CCl_4 being 1:1.5:30, resp. For commercial

fumigation it should be used at the rate of 2 lb. per 1000 cu. ft. of space. It has no deleterious effect on foods, clothing, furniture, or metals. T. S. CARSWELL

Comparative tests with certain fumigants. L. F. HOYT. Larkin Co. *Ind. Eng. Chem.* 20, 835–7(1928).—Fumigation tests were made on different fumigants in an air-tight room. The following dosages in lb. per 1000 cu. ft. were found to give a 100% kill of all insects used: calcyanide, 0.5; chloropicrin, 0.8; trichloroethylene, 7.6; ethylene oxide, 2.0; lethane 23, 1.5; $ClCH_2CH_2Cl-CCl_4$ mixt., 14.0. Except for ethylene oxide, none of the fumigants had a deleterious effect on seed germination. T. S. CARSWELL

Nutmeg culture in the Dutch Indies since abolition of the monopoly. A. H. W. M. HERMANS. *Pharm. Weekblad* 65, 737–58(1928).—A description of the methods

employed in the cultivation, prepn. and marketing of both nuts and leaves, and data on the phys. consts. of the oil from numerous species of *Myristica*. A. W. DOX

The essential oil of *Podocarpus ferrugineus*. J. E. HOSKING and W. F. SHORT. Univ. College, Auckland, New Zealand. *Rec. trav. chim.* 47, 834-8 (1928).—From the leaves and terminal branches of *Podocarpus ferrugineus* (Miro-pine) the essential oil was extd. by steam distn., the yield being 0.14% from material collected during the spring and 0.09% from that collected during the autumn. The autumn oil showed the following constns: d_4^{25} 0.9602, n_D^{25} 1.4922, $[\alpha]_{5461}^{25}$ 32.97°. 276 g. were distd. and the following fractions collected: (1) 152-60° (745 mm.), 35.3%; (2) 110-70° (745 mm.) 1.6%; (3) 170-80° (745 mm.), 5.0%; (4) 104-25° (12 mm.), 6.3%; (5) 125-39° (12 mm.), 8.3%; (6) 139-46° (12 mm.), 1.1%; (7) 150-6° (12 mm.), 4.1%; (8) 149-52° (2 mm.), 21.8%; (9) 152-70° (2 mm.), 4.4%; (10) 140-70° (0.2 mm.), 0.7%; (11) a resinous residue, 5.4%. Refractionation of fractions 1 and 2 yielded 80 g. of a hydrocarbon, b_{783} 156-7° d_4^{15} 0.8620, n_D^{15} 1.4663, $[\alpha]_{5461}^{15}$ 47.48°, the identity of which with *d- α -pinene* was established by the prepn. of the *nitrosochloride*, m. 103°, the *nitrobenzylamine*, m. 122°, and the *semicarbazone of pinonic acid*, m. 201°, obtained by oxidation of the hydrocarbon. By redistn. of fraction 3, 8 g. *d-limonene* were obtained, b. 174-6°, n_D^{14} 1.4771, $[\alpha]_{5461}^{15}$ 38.42°. Its identity with *d-limonene* was established by means of the *tetrabromide*, m. 103°, some *dipentene tetrabromide*, m. 121°, being obtained during its purification. Fraction 4 on redistn. gave a small quantity of liquid with a cineole-like smell. The hydrocarbons present were destroyed with cold 5% $KMnO_4$, the remainder (3.6 g.) b_{714} 175.5-76°, n_D^{20} 1.4582. It was identified as *cineole* by the prepn. of the *iodole deriv.*, m. 112°. Systematic refractionation of fractions 5, 6, and 7 gave a hydrocarbon, $C_{15}H_{24}F_2$, b_{10} 129-31°, d_4^{15} 0.9193, n_D^{15} 1.5065, $[\alpha]_{5461}^{15}$ 11.68; its identity with *cadinene* was established by the prepn. of *cadinene-di-HCl*, m. 118°. Fractions 8, 9 and 10 on several distns. yielded a colorless oil, b_{98} 151-2° which soon crystallized completely and after 3 crystns. from ether-alc. m. 102-4°, $[\alpha]_{5461}^{15}$ 27.15° (3% soln. in $CHCl_3$). Analysis showed this substance to consist of a *diterpene* $C_{20}H_{32}F_2$, called *mirene*, which, on treatment with dry HCl in ether-AcOH, yields *mirene-HCl*, $C_{20}H_{33}Cl$, m. 97-8°, optically inactive in $CHCl_3$. On heating the mono-HCl salt with 10% excess of alc. KOH at 100° during 16 hrs., mirene is regenerated, which then m. 105°. The approx. compn. of the autumn oil is therefore as follows: *d- α -pinene* 36%, mirene 27%, *cadinene* 12%, *d-limonene* and *dipentene* 5%, cineole 2%, resinous material 5%, undetd. and loss 13%. From the water oil 0.02% of an acid liquid was obtained, which could be sepd. into *AcOH* and *iso-BuCO_2H*. An examn. of the spring oil showed it to consist of *d- α -pinene* 24%, *d-cadinene* 6%, mirene 47%. Thus the essential oil extd. later in the year contains a higher % of pinene and a lower % of mirene than that collected during the spring. A similar seasonal increase of the pinene content at the expense of terpenes of higher mol. wt. has been observed to occur in the essential oil of *Agatha australis* (C. A. 22, 2027).

C. F. VAN DUIN

Methods for the production of technical drugs. ANON. *Pharm. Presse* 33, 228-9 (1928).—Production of $FeCl_3$. The subject is treated under 3 headings: (1) prepn. of $FeCl_3$ soln., (2) oxidation of $FeCl_2$ to $FeCl_3$, (3) evapn. of the soln. and crystn. of $FeCl_3$.

W. O. E.

Estimation of free iodine and potassium iodide in the official tincture. K. WINTERFELD and H. SIECKE. *Apoth. Ztg.* 43, 852-4 (1928).—The results of an exptl. study of the official Ger. prepn. with respect to its evaluation are given in considerable detail.

W. O. E.

Spongia fluviatilis seu lacustris. W. PEYER. *Jahresbericht d. Caesar & Lorets A.-G. in Halle a. S.* 1925, 181-8; 1926, 111 pp.; *Chem. Zentr.* 1927, I, 2449.—Analysis of dried *Spongia fluviatilis seu lacustris* gave: moisture 5.6%, inorg. 55.2, insol. in 10% HCl 52.4, EtOH ext. 6.6, EtO ext. 3.2, N 2.59, protein 16.8%. The ashes contain Fe, Al, Ca, Mg, Na, CO_2 , K, PO_4 and NO_3 . A tincture prepd. from it showed a capillarity different from that described in the homeopathic pharmacopeia. The active constituent of the drug consists of SiO_2 needles which partly formed a solid structure (macroscle), and partly were loose in the parenchyme (microscle). The various forms are shown in illustrations. The drug is used in the more varied ways in homeopathy. The vogue of the drug (used under the name of "Badiassa") is due to its iodine content of 2.3 mg. per 100 g. of dry material.

A. L. HENNE

The outlook in pharmacology and pharmacy. JOHN ROSE BRADFORD. *Quart. J. Pharm.* 1, 3-6 (1928).

E. H.

The problem of active iron. K. KÖRSCHAU. *Verh. deut. Ges. inn. Med.* 1927,

398-9; *Ber. ges. Physiol. exper. Pharmakol.* **44**, 609; cf. *C. A.* **21**, 3531.—K. recommends for injections a soln. of ferrohdrocarbonate which has remained active toward benzidine and H_2O_2 after 4 weeks standing in sealed ampules. It was well tolerated by rabbits.

MARY JACOBSEN

The essential oil of leaves of "Hiba." So. UCHIDA. Tokyo Higher Tech. School. *J. Soc. Chem. Ind. Japan* **31**, 491-501(1928).—By steam distn. of 82.5 kg. of leaves of "Hiba" (*Thujaopsis dolablate*, Sieb. et Znce), was obtained 686 g. of an essential oil, light yellow, fresh odor, d_{16}^{25} 0.8857, n_D^{27} 1.4729, $[\alpha]_D + 27.67$, acid value 3.76, sapon. value 32.68, ester value 29.12, and ester value after acetylation 113|2. Compds. isolated from the oil are undercyclic acid, sabinene, dipentene, borneol, sabinol, bornyl and sabinyl acetates, a bicyclic sesquiterpene ($C_{15}H_{24}$, b. 270-80°, d_4^{25} 0.9232, n_D^{25} 1.4949, forming an addition product of light yellow liquid with 2 mol HCl), a monocyclic sesquiterpene alc. (b. 290-300°, d_4^{25} 0.9328, n_D^{25} 1.5049 and mol. refraction 70.60) and a tetracyclic diterpene ($C_{20}H_{32}$, b. 336°, d_4^{20} 0.19629, n_D^{20} 1.5131 and mol. refraction 84.92). About 50% of the oil is the terpene (a mixt. of large amt. of sabinene and a small amt. of dipentene), 22% the terpene alc. (sabinol and borneol, the former predominating). 10% the ester (mainly sabinyl acetate with a small amt. of bornyl acetate), 13% the diterpene, 3% sesquiterpene alc., 2% sesquiterpene and 0.1% undercyclic acid.

K. KASHIMA

The essential oil of "Hiba"-wood and its relation to the resistance of the wood to destruction by fungi. So. UCHIDA. Tokyo Higher Tech. School. *J. Soc. Chem. Ind. Japan* **31**, 501-3(1928).—By steam distn. of 353.1 kg. (H_2O content 27.73%) of sawdust of "Hiba"-wood (*Thujaopsis dolablate*, Sieb. et Znce), is obtained 3820 g. of the essential oil, reddish brown, d_{16}^{22} 0.9574, n_D^{22} 1.5110, $[\alpha]_D - 26.72$ in a 17.23% $CHCl_3$ soln., acid value 5.62, ester value 11.97 and sapon. value 17.59. The main component of the oil is a tricyclic inactive sesquiterpene, $C_{15}H_{24}$, of colorless slightly viscous liquid having good flavor, b. 261-2°, d_4^{22} 0.9458, n_D^{22} 1.5055 and mol. refraction 64.09. The essential oil is toxic to fungi which destroy the wood. For example, *Merlius lacrymans* Fr. cannot live in a culture medium contg. 0.1% of the oil. Although *Polyporus gilvus* Schw. can live in a culture medium contg. 0.1-0.2% of the oil, it cannot in a medium contg. 0.3% of the oil. Resistance of the wood to fungus action is therefore concluded to be due to the action of the oil; the content of the oil in the wood is about 1%.

K. KASHIMA

The essential oil of leaves of "Sawara." S. UCHIDA. Tokyo Higher Tech. School. *J. Soc. Chem. Ind. Japan* **31**, 642-50(1928).—By steam distn. of 94.4 kg. of leaves of "Sawara" (*Chamecypris prisifera*, Endl) was obtained 1004 g. (yield 1.07%) of an essential oil of light yellow color, fresh odor, d_4^{14} 0.8939, n_D^{14} 1.4710, $\alpha_D^{12} + 12.55$, acid value 1.50, sapon. value 55.20, ester value 53.70 and ester value after acetylation 64.49. The following compds. were isolated from the oil: pelargonic acid, undecylic acid, d - α -pinene, dipentene (liquid addn. product, $C_{10}H_{18}$.HCl), borneol, bornyl acetate and formate, a sesquiterpene alc. ($C_{15}H_{28}OH$, b. 290-300°, n_D^{24} 1.5002), and a tetracyclic diterpene ($C_{20}H_{32}$, b. p. 320-35°, d_4^{24} 0.9452, n_D^{24} 1.5125, mol. refraction 86.54). About 75% of the oil is the terpene (mainly α -pinene and a small amt. of dipentene), 20% the esters (mainly bornyl acetate and a small amt. of bornyl formate), 3% the alc., 2% diterpene and a very small amt. of the acid.

K. KASHIMA

The essential oil of leaves of "Hinoki." So. UCHIDA. Tokyo Higher Tech. School. *J. Soc. Chem. Ind. Japan* **31**, 650-9(1928).—By steam distn. of 77 kg. of leaves of "Hinoki" (*Chamecypris obtusa*, Endl) there is obtained 894 g. of an essential oil of light yellow color, fresh odor, d_4^{12} 0.9053, $\alpha_D^{12} + 41.25$, n_D^{12} 1.4794, acid value 0.60, ester value 75.37 and ester value after acetylation 100.2. The following compds. are isolated from the oil: a new cryst. sesquiterpene acid ($C_{14}H_{26}CO_2H$, named "Hinoki" acid, white silky threads or prisms, m. 166° (cor.), tasteless and odorless, insol. in boiling H_2O , sol. in alc. ether, etc.; its *Ag* salt is amorphous; *hydrochloride*, needles, m. 119°), d - α -pinene, d -limonene, d -borneol, bornyl acetate and monylate, a tricyclic 1-sesquiterpene ($C_{15}H_{24}$, b. 265-8°, d_4^{20} 1.5009, $[\alpha]_D - 15.67$ in a 3.8% alc. soln., mol. refraction 64.2%; addn. product with 1 mol HCl is a liquid having camphor-like odor), cadinene, a bicyclic d -sesquiterpene alc. ($C_{15}H_{28}OH$, b. 290-5°, d_{16}^{25} 0.9607, n_D^{20} 1.5020, $[\alpha]_D + 18.0$ in a 7.3% $CHCl_3$ soln., mol. refraction 68.22; it gives a Bz ester) and a tetracyclic inactive diterpene ($C_{20}H_{32}$, b. 340-3°, d_{16}^{25} 0.9632, n_D^{20} 1.5190, mol. refraction 85.21). About 40% of the oil is the terpene (a mixt. of d -limonene and d - α -pinene, the former

predominating), about 25% the ester (bornyl acetate and a very small amt. of the nonylate), 20% the sesquiterpene (mainly a tricyclic sesquiterpene and a small amt. of cadinene), about 10% the alc. (mainly a bicyclic *d*-sesquiterpene alc.) and about 5% tetracyclic inactive diterpene.

Tobacco industry of Mauritius. ANON. *Bull. Imp. Inst.* 26, 135-40(1928).—Samples of tobacco leaf grown and graded in Mauritius were found to be of promising quality. Analysis of 2 samples gave: H₂O 14.0, 14.0; nicotine 3.88, 5.41; N 2.02, 2.53; ash 10.3, 11.1%, resp. The ash contained; CaO 34.75, 33.12; MgO 11.31, 9.93; K₂O 17.74, 17.42; Na₂O 1.55, 1.18; SO₃ 5.78, 7.16; Cl 3.99, 3.67; CO₂ 20.72, 23.62%, resp.

The amellaroside, a new glucoside from the bark of the *Amelanchier vulgaris* Moench. M. BRIDEL, C. CHARAUX AND G. RABATÉ. *Compt. rend.* 187, 56-7(1928).—With fresh or dried twigs of the *Amelanchier vulgaris* Moench emulsine characterizes a hydrolyzable glucoside (I) α_D -86.56°. The twigs are extd. with 92% EtOH. The residue from the distn. of the EtOH is dissolved in water treated with MgO, re-extd. with hot 92% EtOH, distd., and the residue taken up in a small quantity of boiling water. Ten g. of I are obtained from 1 kg. of twigs or bark. I with FeCl₃ gives a violet coloration; 1 g. reduces 0.0641 g. of glucose; with 3% H₂SO₄ 1 g. gives 0.6043 g. of a reducing sugar α_D + 51.4°. The non-glucidic product is called *ameliarol* m. +110° (Maquenne block), sublimes at +120°, index of enzyme reduction 232, index of hydrolytic acid reduction 229.

Estimation of alkaloidal principles in the pharmaceutical form by the mercurimetric method. AL. IONESCO-MATIU AND H. VÂRCOVICI. *Bull. sci. pharmacol.* 35, 417-21(1928); cf. *C. A.* 21, 2445, 3575.—The method may be applied with success to the detn. of the alkaloidal content of pharmaceutical preps.

Characterization of the gum of *Acacia Verek*. A. HAMY. *Bull. sci. pharmacol.* 35, 421-2(1928).—The rotatory power of the gum of *Acacia Verek* ranges from -29 to -38. Gums from other species of *Acacia* give a + rotation.

Pharmacodynamic study of ephedrine. PAUL BOYER AND JEANNE LÉVY. *Bull. sci. pharmacol.* 35, 431-58(1928).—An elaborate review of the subject is given with 193 references to the literature.

New organic aromatic compound of bismuth suitable for intravenous injection in the treatment of frambesia. R. N. CHOPRA, J. C. GUPTA AND M. N. MULLICK. *Indian Med. Gaz.* 63, 361-3(1928).—The compd. is the Na salt of *p*-aminophenylbismic acid in combination with urea. The formula of the latter is NH₂CONHC₆H₄BiO(OH)ONO, and contains 50.1% of Bi. The substance has a low toxicity of 0.5 g. per kg. to white mice, and is a remarkable curative agent in frambesia.

Rational control of the production of tablets, pills, etc. HÅKAN SANDQVIST. *Svensk Farm. Tid.* 32, 101-5, 128-30, 181-4, 207-9, 249-51, 293-6, 337-40, 385-7(1928).—A better control of the wts. and contents of pills, tablets, etc., produced in large quantities is advocated and the use of the statistical methods for this purpose discussed 60/√wt. is suggested as limit of tolerance.

Pharmacopoea Suesica. X (1925). T. DELPHIN. *Svensk Farm. Tid.* 32, 125-7, 184-7, 205-7, 232-4, 276-8, 313-6, 411-3, 449-51(1928).—A critical review in which many items are discussed in detail.

Two simple tests for impurities in anesthetic ether. EDWIN B. ROBINSON. Univ. of Manchester. *Lancet* 1928, I, 856.—The test for aldehydes was described by W. Wobbe. Ether is tested by adding 10 cc. of the sample to 2.5 cc. of a fresh alk.-ammoniacal soln. of AgNO₃. Presence of aldehyde is detd. by a black ring or ppt. or a Ag mirror. To test for peroxides add equal parts (1.25 cc.) each of 50% KI soln. and 1% phenolphthalein soln. to 10 cc. of ether; in 2 min. a red color becomes apparent if peroxides are present.

A non-irritating silver-arsenic compound. HAROLD O. LONG. *Lancet* 1928, I, 964-5.—A new compd., metarseno-argenticum (14% Ag and 16-17% As), is suggested as an improvement for intramuscular injections over the formerly used compd. arseno-argenticum (13-15% Ag and 21-24% As), since it is much less irritating to the tissues and causes very little pain. A possible but not entirely satisfactory formula for metarsenobillon is 3.4-NaO₂SOCH₂NH(HO)C₆H₄As₂.

Biological standardization of insulin. R. WERNICKE, F. MODERN AND C. M. SCOTT. *Anales asocn. quim. Argentina* 15, 324-36(1927); Cf. *Publications of the League of Nations Health* 1926, III, 7.—The preliminary test on white rats consists in detg. the dose of insulin capable of producing the same percent of symptoms of hypoglycemia as a known dose of standard insulin, both insulins being injected subcutaneously into an equal no. of rats raised and kept under appropriate conditions. The

rats weighed 15 to 20 g. each, and were starved for 14 to 16 hrs. in a moderately warm place, with water available. The injections were 0.5 cc. for each 20 g. wt. of rat. All lots of rats were kept during the tests in a vessel maintained at 37° to 38° by being partially submerged in water heated to this temp. The rats were observed for 2 hrs. from the instant of injection, and the time was noted at which symptoms of hypoglycemia appeared, either as convulsions or inability to get up after being turned over on their backs. At the end of 2 hrs. the no. of rats in each lot which show symptoms was noted to det. the proportion affected. This preliminary test was repeated with different concns. of insulin, until the degree of diln. of the unknown insulin which equals standard insulin was reached. This value was checked by tests on rabbits; the animals weighed 1800 to 2200 g. each and were starved 24 hrs. with water available; 1 clinical unit of insulin per kg. of animal wt. was injected subcutaneously without causing convulsions. After 3 to 4 days of such tests 10 to 12 rabbits which endure it can be used, starved 24 hrs. as before. Initial glucemia is detd. on a sample of blood from the marginal vein of the ear. Animals of nearly equal wt. are selected. Standard and unknown insulin solns. are prepd. contg. 0.5 clinical units per cc., based on the tests with rats, and 2 cc. (1 clinical unit) of each injected subcutaneously. At the end of each 5 hrs. after injection a 0.1 cc. blood sample is taken, mixed together, and the final av. glucemia of each animal for the first 5 hrs. detd. by the Hagedorn and Jensen method. The difference between the initial and av. final glucemia of each animal gives the drop in glucemia, Δ , and the percent of this value with respect to the initial glucemia called the hypoglycemic action. These operations should be repeated 3 or 4 days later on the same animals and under the same conditions except injecting the unknown insulin into the lot which had first received the standard insulin, and *vice versa*. Comparison of the av. values of hypoglycemic action of each insulin on all the rabbits allows establishing the relation of activity of both solns., since they are used in direct proportions. The quotient of the av. values of hypoglycemic action is equal to the quotient of the concns. in clinical units of solns. of insulin injected. Since the concn. of the standard insulin is known, the other is defined. Itemized test data are shown in tables. This method, adopted in the Bacteriological Institute, follows that published by the League of Nations.

E. M. SYMMES

Arsenious oxide in neutral and alkaline solution. WM. H. MILLAR. *Pharm. J.* 120, 214-5, 224-5; *Chemist and Druggist* 108, 352-3(1928).--Recent views on the chem. reaction in the prepn. of *Liquor arsenicalis* Brit. Pharm. agree that KAsO_2 is formed by the interaction of K_2CO_3 and As_2O_3 . Upon measuring the quantity of CO_2 given off, M. finds that 8% of the quantity of K_2CO_3 directed in the Brit. Pharm. is sufficient to bring all the As_2O_3 used into 1% soln. By interaction of As_2O_3 and K_2CO_3 in the new proportions, KAsO_2 is formed, detd. by titration with 0.1 N H_2SO_4 . In another expt., the quantity of K_2CO_3 was further reduced to 4%; with this, complete soln. of As_2O_3 was effected. The soln. was then neutralized with 0.1 N H_2SO_4 (methyl orange). This neutral 1% soln. is very stable toward light and air, and is compatible with both acid and alkali; the small quantity of K_2SO_4 present is comparatively inert. Theories are adduced to explain the high sply. of As_2O_3 in the dil. K_2SO_4 soln. The concd. soln. of As_2O_3 in dil. K_2CO_3 seems to be of colloidal nature.

S. WALDBOTT

Control of coca leaves and its preparations according to the International Convention of Geneva. PIERRE BRETEAU. *J. pharm. chim.* 7, 492-5(1928).--Com. coca leaf and its preps. should not be classed with opium; official control should be confined to supervision of statistics in manuf. and trade.

S. WALDBOTT

Sclerocarya caffra, Sond. MARIE G. BRANDWIJK. *Pharm. J.* 120, 172, 192-3, 212(1928).--The bark of this S. African tree is said to be useful in malaria. The dried fruit kernels yield 60% of a non-drying oil suitable for soap manuf. and possibly for edible use (cf. *Bull. Imp. Inst.* 1920, 481; 1923, 129; and Rindl, *C. A.* 15, 3759). A systematic chem. study of the bark showed about 20.5% of tannin present, and a trace of alkaloids; glucosides or neutral principles are absent. No poisoning followed the subcutaneous injection of the alc. ext. into a cat, but very drastic local effects were produced. The alleged usefulness of the bark in malaria is doubted. A list of 12 references is given.

S. WALDBOTT

Studies in toxicologic chemistry. II. The formaldehyde-sulfuric acid reaction of the opium alkaloids. VICTOR E. LEVINE AND ESTELLE A. MAGIERA. *J. Lab. Clin. Med.* 12, 773-89(1927).--The $\text{CH}_2\text{O}-\text{H}_2\text{SO}_4$ reaction is given by all types of phenols and their various derivs., phenolic glucosides and phenolic alkaloids. Nitrated phenols do not give it. The reaction can be used for detecting phenols in biologic fluids and is also given by morphine and its allied alkaloids because of their phenolic character. The color produced by phenols differs markedly from that given by the morphine alka-

lids, although some phenols of biologic occurrence, such as *p*-cresol and pyrocatechol, give colors that are indistinguishable from those produced by the alkaloids. Many tests known for the morphine alkaloids have been correlated and classified into these 6 type reactions: (1) tests involving pptn. by the so-called alkaloidal reagents, which are general for all alkaloids (phosphomolybdic acid, I in KI, K | Bi | iodide, K | mercuric iodide); (2) tests involving reduction of the reagents used; (3) tests involving oxidation of the alkaloid; (4) tests depending upon the presence of the phenol group (5 different reagents); (5) tests involving the preliminary formation of apomorphine; (6) Biological tests. It is suggested that clinical tests for these alkaloids should include at least one reaction taken from each of these 6 characteristic type reactions. E. W. W.

Essential oil of the bark of Cinnamon sintok. Bl. T. KARIYONE AND S. MOROTOMI. *J. Pharm. Soc. Japan* **48**, 563-5(1928).—The essential oil of the bark of *Cinnamomum sintok*, Bl., a wild plant in Dutch East Indies, was obtained in the yield of 6%, $[\alpha]_D^{15}$ -1.84° , d_4^{15} 1.0410, n_D^{15} 1.5298, acid no. 850, sapon. no. 11.34, total phenol 84% (by vol.). It contained 76.7% eugenol (Thom's method). The phenolic constituent b_1 120-1°. The non-phenolic part of the oil contains cineole and sesquiterpene.

NAO UYEI

Estimation of alkaloids in Scopolia extract. S. AOYAMA, S. NAGAE AND T. DAIGO. Tokyo Imp. Hyg. Lab. *J. Pharm. Soc. Japan* **48**, 566-75(1928).—A comparison of CHCl_3 (I) and Et_2O (II) as a solvent for the extn. of the alkaloids in *Scopolia* ext. showed that I always gave quant. higher values than II because of the extn. of tropine, a physiol. inactive constituent, while II gave results which represented the amt. of active constituents. The following is recommended for the detn. of alkaloids in the ext.: Shake 3 g. ext. for 30 min. with 5 cc. H_2O , 30 cc. II and 4 cc. concd. NH_4OH . Add 1.5 g. tragacanth powder and shake again. Filter the clear Et_2O layer, evap. 20 cc. of the filtrate, and dry at 60° . Dissolve the residue in 1 cc. abs. alc. Add 5 cc. H_2O , 5 cc. 0.1 N HCl, and titrate the soln. with 0.1 N KOH using methyl red. NAO UYEI

Estimation of volatile oil of clove and cinnamon powder. K. SUTO. *J. Pharm. Soc. Japan* **48**, 576-83(1928).—A comparative study of U. S. P. method and a slightly modified method for detn. of volatile oil of clove and cinnamon powder is reported. N. U.

Essential oil of *Artemisia vulgaris* L., var. *parviflora*, Maxim. K. TAKASHIMA. *J. Pharm. Soc. Japan* **48**, 590-2(1928).—From the flowers of *Artemisia vulgaris* L. var. *parviflora*, Maxim., was obtained 0.05-0.092% of essential oil, sp. gr. 0.86, having a characteristic odor and possessing a venenous anthelmintic action. NAO UYEI

The mercuration of neutral red and its sulfonic acid (LEVINE) 10. The assay of phosphoric acid (MAURINA) 7. Esters of cholesterol with unsaturated organic acids (U. S. pat. 1,680,799) 10.

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Synthetic drugs. I. G. FARBENIND. A.-G. Brit. 282,143, Sept. 11, 1926. 4-Amino-2-styrylquinoline and its nuclear substitution products are prepd. from 2-methylquinoline compds. substituted in the 4-position by a halogen, alkoxy, hydrazino, carbamino or carbazido group, by exchanging these substituents for the amino group and converting the 2-methyl group into a styryl residue; e. g., a 4-halogen- or 4-alkoxy-2-styrylquinoline may be heated with NH_3 or with a primary or secondary amine, a 4-hydrazino-2-styrylquinoline may be reduced, the 4-carboxylic acid amide of a 2-styrylquinoline may be treated with a hypohalogenite, the 4-carboxylic acid azide of a 2-styrylquinoline may be treated with water or alc. and the resulting urea or urethan then hydrolyzed, or a 4-substituted-2-methylquinoline may be converted by any of the specified methods into a 4-amino-2-methylquinoline and the latter then condensed with an aromatic aldehyde. The products possess bactericidal properties. Examples are given of the production of 4-amino-6-ethoxy-2-styrylquinoline, 2-styryl-4-amino- β -naphthoquinoline, 2-*m*-aminostyryl-4-amino-6-ethoxyquinoline, and similar compds.

Synthetic drugs. I. G. FARBENIND. A.-G. Brit. 282,453, Dec. 20, 1926. In the

process described in Brit. 267,169 (C. A. 22, 1216) the external N atom is introduced in heterocyclic combination, *e. g.*, in the form of piperidyl or pyrrolidyl; also, the aliphatic connecting link between the N atoms may be replaced by a residue of hydroaromatic or heterocyclic character; the ring system contg. N and the connecting link may contain further substituents. *N*-(β -chloroethyl)-piperidine is condensed with 8-aminoquinoline; 1-dimethylamino-2-bromocyclohexane is condensed with 6-methoxy-8-aminoquinoline; 2,2,6,6-tetramethyl-4-brom-N-methylpiperidine is condensed with 6-methoxy-8-aminoquinoline; a thiazine is obtained by joint oxidation and condensation of *N*-methylpiperidylethyl-aniline and *p*-aminodimethylaniline. *N*-Methylpiperidylethylaniline is made by condensing *N*-(β -chloroethyl)-piperidine with methylaniline.

Synthetic drugs (metal-mercapto acid esters). SCHERING-KAHLBAUM A.-G. Brit. 282,427, Dec. 16, 1926. Metal-mercapto acid esters are made by treating a mercapto acid ester of the aliphatic, aromatic or heterocyclic series with an oxide or salt of a metal such as Au, Ag, As, Sb or Bi, preferably in the presence of a solvent. The products are sol. in oils and other org. solvents and possess therapeutic properties. Examples are given of the reaction of Bi oxide with thiosalicylic acid butyl ester and of Sb_2O_3 with thiosalicylic acid methyl ester by heating the materials in a stream of H or CO_2 ; the same products may also be obtained by reacting on the mercapto acid ester in ether soln. with an ethereal soln. of Bi or Sb compds. such as the bromide or iodide which are sol. in org. solvents. Ag and Au mercapto acid esters are obtained by treating a soln. of a mercapto acid ester in an org. solvent with alc. AgNO_3 or a soln. of K auribromide in acetic ether.

Cinchona alkaloids. CHEMISCHE FABRIK VORM SANDOZ Brit. 282,356, Dec. 17, 1926. Cinchona alkaloids are converted into their salts with bile acids such as cholic, glycocholic, taurocholic, desoxycholic, dehydrocholic and apocholic acids. The products possess antiparasitic properties and their soln. in water is increased by addn. of urea or urethan. Natural or synthetic alkaloids may be employed such as quinine, quinidine, cinchonine, dihydroquinine, and the Et, iso-Am and *n*-octyl ethers of dihydrocupreine.

Arylated azotized diaminopyridines. IVAN OSTROMUISLENSKII (to The Pyridium Corp.). U. S. 1,680,108, Aug. 7. These compds. are suitable for use in the treatment of germ infections such as produced by various cocci. Diazotized aniline may be coupled with 2, 6-diaminopyridine, a sol. acid salt formed, *e. g.*, by use of HCl, and the salt may be purified by treatment with a suitable alk. substance such as dil. NH_4 soln. and, after sepn. of by-products, the purified basic material may be treated with HCl to reform an acid salt of phenylazodiaminopyridine.

Pyridium. IVAN OSTROMUISLENSKII (to The Pyridium Corp.). U. S. 1,680,109, Aug. 7. A diazotized amine of the aromatic series such as diazotized aniline is directly coupled with diaminopyridine salts in HCl soln.; over one-half but less than 2 mol. proportions of the diazotized amines are used.

Neopyridium. IVAN OSTROMUISLENSKII (to The Pyridium Corp.). U. S. 1,680,110, Aug. 7. A di-Na salt of diamino pyridineazophenyl-*o*-carboxylic acid, probably having the formula $\text{C}_6\text{H}_4(\text{COQNa})\text{N}_2\text{C}_6\text{H}_4\text{NNH}_2\text{NNa}$, is obtained by treating the normal salt of diaminopyridinephenyl-*o*-carboxylic acid with org. acid such as HOAc and treating the product with NaOH.

1-Alkoxyethyl-3,7-dimethylxanthines. KARL SCHIRANZ and CLEMENS LUTTER (to Winthrop Chemical Co.). U. S. 1,679,053, July 31. 1-Alkoxyethyl-3,7-dimethylxanthine is made by treating the Na salt of theobromine with chloromethyl ethyl ether. It forms needles m. 152-3°. The corresponding iso-Pr deriv. m. 107-8°, the Pr deriv. 130-2°, the Bu deriv. 102-3°, the iso-Bu deriv. 128-9°, the benzyl deriv. 95-7° and the allyl deriv. 108-10°. These compds. possess diuretic properties and form double salts with org. acid salts. Together with a salicylate soln. they form neutral solns. suitable for subcutaneous use.

Monohydroxy- ω -aminoacetophenone derivatives. HELMUT LEGERLOTZ. U. S. 1,680,055, Aug. 7. *p*-Hydroxy- ω -methylaminoacetophenone (colorless leaflets m. 147-8°) is made by reaction of methylamine on *p*-benzoyloxy- ω -bromacetophenone, sepg. the cryst. mass from the reaction mixt. and purifying it by transforming it into a hydrochloride, recrystg. the latter and sepg. the base. The hydrochloride m. 239-40°. *p*-Hydroxy- ω -diethylaminoacetophenone m. 177-8°; its hydrochloride m. 194°. These compds. may be used as intermediates in the manuf. of other therapeutic compds.

Substituted 4,4'-dihydroxybisacylamino arsenobenzenes. LOUIS BENDA (to I. G. Farbenind. A.-G.). U. S. 1,680,845, Aug. 14. Details are given for the production of 3,3'-dichloro-4,4'-dihydroxy-5,5'-diacetamino-arsenobenzene and the corresponding 2,2'-dichloro compd. These compds. are insol. in water, easily sol. in dil. caustic alkali

sols. and somewhat sol. in alc. They may be used in the treatment of syphilis and may be administered by the mouth.

2-Hydroxy-3-bromo-5-pyridinearsonic acid. ARTHUR BINZ and CURT RÄTH. U. S. 1,680,587, Aug. 14. See Brit. 263,142 (C. A. 22, 140).

Phenyldiazo- α,α -diaminopyridine dihydrochloride. IVAN OSTROMUISLENSKII (to The Pyridium Corp.). U. S. 1,680,111, Aug. 7. This compd. forms fine needle-like silky glistening crystals with violet shading. It is made by treating the corresponding mono-hydrochloride (pyridium) with not less than 10% of HCl and may be used for therapeutic and bactericidal purposes.

Laxative. RICHARD PASTERNAK (to Charles Pfizer & Co.). U. S. 1,681,361, Aug. 21. An amorphous laxative substance is formed by treating phthalic anhydride and phenol with the usual condensing agents to form phenolphthalein, extg. the reaction product with an alkali, reprecip., *e. g.*, by HOAc or H₂SO₄, dissolving the ppt. by a solvent such as alc., crystg. out the phenolphthalein, and extg. the new product from the residue after crystn. by use of ether.

Nutritive substance. KARL STEJSKAL. Fr. 634,502, May 17, 1927. See Brit. 271,120 (C. A. 22, 1655).

Antirachitic products. HARRY STEENBOCK (to Wisconsin Alumni Research Foundation). U. S. 1,680,818, Aug. 14. See Brit. 236,197 (C. A. 20, 953).

Preparing antirachitic substances. AUGUST J. PACINI (to Charles M. Richter). U. S. 1,681,120, Aug. 14. Ext. of ergot of rye or other materials contg. growth-producing substances are treated to convert some of the latter into antirachitic products by use of rays longer than about 3022 Å U.

Diastatic product. KEIZO WOYENAKA and TATSUO OKOCHI (to Takamine Ferment Co.). U. S. 1,680,926, Aug. 14. A culture medium such as wheat bran is impregnated with an aq. soln. of Na salicylate and NaF in a closed receptacle and steamed to effect sterilization, a dil. inorg. acid such as HCl is then added to liberate the acid radicals of the antiseptics, and the material is inoculated with *Aspergillus oryzae* spores and incubated.

Parathyroid product. LOUIS BERMAN. U. S. 1,680,660, Aug. 14. Comminuted parathyroid glands are extd. with water contg. HPO₃ and the aq. ext. is subjected to a treatment, to sep. proteins, comprising neutralization of the soln. with NaOH, filtering off the ppt., rendering the soln. alk. and forming a phosphate gel, filtering off and neutralizing the liquid.

Urease preparation. OTTO LIND. U. S. 1,679,250, July 31. In producing a stable, dry, easily sol. urease prepn. urease-contg. vegetable materials such as soy beans are extd. with water, alkali metal phosphates are added to the aq. ext. and the ext. is freed from moisture by spray desiccation.

Biliary acids. CHÉMISCHE FABRIK VORM. SANDOZ. Fr. 634,234, April 20, 1927. See Brit. 269,925 (C. A. 22, 1375).

Bacterial remedies. H. BECKER. Brit. 282,434, Dec. 16, 1926. A prepn. for use in the treatment of diseases such as tuberculosis or diabetes comprises a culture of "*Bacillus erodians*," originating from the intestines of dogs or doves, alone or with a digestive enzyme, which may be formed into pills or the like coated with keratin so as to be liberated only in the lower part of the intestine. The culture also may be administered *per anum* or given to animals with their fodder in the form of a potato culture.

Rinsing and cleansing liquid for use in the mouth, nose or ears. KLEMENS BERGL AND WALTER DIETRICH (to the Firm Max Gottlieb). U. S. 1,681,320, Aug. 21. The container of an injection or irrigating device is filled with water shortly before use and to this there are added carbonic acid salts such as NaHCO₃ and tartaric acid or other suitable solid acids; the liquid is allowed to flow to the point of use under the pressure of the gas generated by reaction of these added reagents. An app. is described.

"Tobacco substitute" with therapeutic properties. FRANK K. CHISHOLM. U. S. 1,680,860, Aug. 14. The cell structure of semi-dried natural eucalyptus leaves is caused to burst by rolling the leaves, they are macerated in an aq. soln. contg. about 10% each of glycerol and KNO₃ and are heated, compacted under pressure in heated molds and further cured by aging.

Testing nicotine solutions. EDWIN COX (to Tobacco By-Products and Chemical Corp.). U. S. 1,678,636, July 31. In detg. the nicotine content of sols. such as dipping bath the soln. is acidified and WO₃ is added in at least sufficient quantity to combine with all org. impurities, and the soln. is then directly titrated with silicotungstic acid.

Tobacco products. A. SCHAARSCHMIDT and M. POPOFF. Brit. 282,369, Dec. 20, 1926. Tobacco waste such as cuttings or dust is mixed with acetylcellulose or other

acid esters of cellulose or hydrocellulose and solvents for the latter and formed into films for use as cigaret or cigar wrappers or formed into a cake which can be sliced or comminuted for smoking.

Dental powder. LOUIS C. LUDIN. Fr. 633,684. Sept. 6, 1926. A dental powder is made from powdered pumice, oil of anise, $\text{Ca}(\text{HCO}_3)_2$, and Marseilles soap.

Disinfectants. DEUTSCHE GOLD- UND SILBER-SCHNEIDANSTALT VORM. ROESSLER. Fr. 634,519, May 17, 1927. See Brit. 271,514 (C. A. 22, 1643).

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Hydrochloric acid absorption, its mechanism and the apparatus necessary. B. WAESER. *Chem. Fabr.* 1928, 101-2.—Data from literature are given, including relations between gas and soln. concns., calcons. of cooler dimensions, back pressures of absorption towers, and various data for different tower packings. For the prepn. of very pure synthetic acid fused silica only must be used, and stoneware, coke, packing rings, etc., excluded. For joints a mixt. of pitch with BaSO_4 or clay and asbestos is recommended. B. C. A.

Use of aluminum in the manufacture of nitric acid. A. A. SVESHNIKOV. *J. Chem. Ind. (Moscow)* 4, 321-4(1927).—In HNO_3 manuf., tubes, pipes, condensers, etc., hitherto made of earthenware or of glass, have lately been replaced by Al, the main advantage of which is that its coeff. of heat cond. is 12.4-13.0, whereas that of earthenware is only 0.7-1.0. This permits a much more rapid condensation of HNO_3 . Since these parts are exposed to the action of both liquid and gaseous HNO_3 , S. investigated the dissolving action on Al of HNO_3 in both phases and at various temps. He found that the max. corrosion corresponds to acid fumes contg. 30-40% of monohydrated HNO_3 . Stronger and weaker acids have much less effect on Al. The temp. of operation has by far the greatest influence on the soly. of Al in the acid; the higher the temp. the greater the dissolving effect. Drawn Al is incomparably more resistant to the acid than cast Al. The smoother the surface of Al the less it is affected by the acid. It is practicable to use Al pipes and condensers in the manuf. of HNO_3 , and to use Al containers for storage of weak and of strong HNO_3 . BERNARD NELSON

Use of a Valentiner still for concentration of dilute nitric acid. B. DONAT. *J. Chem. Ind. (Moscow)* 4, 750-3(1927); 5, 216-8(1928); (cf. C. A. 3, 2039).—A com. method of concn. of 36° Bé HNO_3 obtained by NI_3 oxidation has been worked out and used for a year in a Russian plant. To avoid losses of HNO_3 due to rise in temp. during preliminary mixing of dil. HNO_3 with concd. H_2SO_4 large tanks are used, utilizing only part of their capacity, thus avoiding expensive artificial cooling. Distn. of the mixed acids *in vacuo* gives 97.82% HNO_3 contg. less than 2% N oxides. The spent acid contains 82-85% H_2SO_4 , is free from HNO_3 , and can be concd. again. Al condenser tubes are recommended. The acid corrosion of the still is insignificant. B. N.

The production of concentrated nitric acid by oxidation of ammonia under pressure. GIACOMO FAUSER. *Giorn. chim. ind. applicata* 10, 183-95(1928); *Chem. Met. Eng.* 35, 474-8.—There are various reasons for the failure up to the present time to obtain very concd. HNO_3 by the oxidation of NH_3 , chief among which are the impossibility of oxidizing more than 90% of the NH_3 , the difficulty of absorbing by water the last traces of N oxides and the conditions of equil. of the reaction. In practice not even 60% concn. is reached. By extended and systematic researches on the oxidation of NH_3 in the presence of Pt as catalyst, under different conditions of pressure and velocity of the current of gas, and with different proportions of air and of O_2 in the oxidizing mixt., it was found that when NH_3 is oxidized with air enriched with O_2 and under pressure (5 atm.) the process is much improved. The absorption of nitrous vapors is more efficient, so that HNO_3 of 75% concn. (theoretical 77.7% concn.) can be obtained, the wt. of Pt is greatly reduced and the plant is relatively very small. The process has already been applied industrially in 2 plants having a capacity of 100,000 quintals of 48° Bé. HNO_3 per yr. The velocity of oxidation of nitrous vapors increases rapidly with increase of pressure, and absorption is much more nearly complete, which allows a great reduction in the size of the towers. The small proportion of additional energy required because of the pressure is compensated by the various advantages, particularly by the lower cost of the plant and the greater concentration of the acid. In developing the process, a systematic study was made of the influence of pressure on the oxidation of NH_3 , on the rate of peroxidation of NO, on the reaction between NO_2 and H_2O ,

and on the heat transmission, the recovery of energy and the resistance of Cr steels to HNO_3 . Within the limits studied, the pressure has no influence on the yield by oxidation of NH_3 , while enrichment of the air with O_2 increases the yield. Pressure has a great influence on the oxidation of NO, e. g., at atm. pressure 98% of NO was transformed into NO_2 in 1200 sec., while at 5 atm. pressure 98% was transformed in 59 sec. The rate of oxidation of NO increases roughly with the square of the pressure. This in itself explains the relatively small plant required. The influence of the pressure on the polymerization of NO_2 to N_2O_4 , the coeff. of absorption of N_2O_4 by water and the transformation of the dissolved N_2O_4 into HNO_3 were also studied and quant. data recorded. The process could not have been developed industrially except by the use of Cr steel equipment, which tests showed to be highly resistant to HNO_3 and to be by far the best metal of which to construct the equipment. The exptl. results and the industrial process developed from them are described in great detail, the data being recorded in tabular and graphical forms, and the large-scale plant equipment being illustrated with photographs and diagrams

C. C. DAVIS

Formation of ammonium phosphate in gaseous reaction. F. V. BRITZKE AND A. P. DUNAIEV. *J. Chem. Ind. (Moscow)* 5, 161-70 (1928).—It is known that P distd. in elec. furnaces with C oxidizes to gaseous metaphosphoric acid, which by the action of H_2O vapors, and NH_3 gas can, under certain conditions, be transformed into NH_4 orthophosphates (cf Ross, *Am. Fertilizer* 57, 40 (1922)). $(\text{HPO}_3)_x$ suspended as a mist, or H_2O vapor and NH_3 gas, can give 2 types of reactions: (a) addn. of NH_3 to HPO_3 or to products of its hydration; (b) addn. of H_2O to HPO_3 or to $\text{HPO}_3 + \text{H}_4\text{P}_2\text{O}_7$, and the products of reaction may be either meta-, pyro-, or orthophosphates and their hydrates, the temp. being the main factor influencing the results. All NH_4 phosphates, particularly the orthophosphates, are unstable at high temps. and finally are converted into metaphosphoric acid according to the following 4 reactions: I $(\text{NH}_4)_2\text{HPO}_4 = \text{NH}_4\text{H}_2\text{PO}_4 + \text{NH}_3$; II $2(\text{NH}_4)_2\text{HPO}_4 = (\text{NH}_4)_2\text{H}_2\text{P}_2\text{O}_7 + 2\text{NH}_3 + \text{H}_2\text{O}$; III $(\text{NH}_4)_2\text{HPO}_4 = \text{NH}_4\text{PO}_3 + \text{NH}_3 + \text{H}_2\text{O}$; IV $(\text{NH}_4)_2\text{HPO}_4 = \text{HPO}_3 + 2\text{NH}_3 + \text{H}_2\text{O}$ (Knorre, *Z. anorg. Chem.* 24, 393 (1900)). To study the influence of temp. and time, 1.5 g. $(\text{NH}_4)_2\text{HPO}_4$ was placed in a thermostat, weighed from time to time, and finally analyzed. At 100° the salt lost by evapn. of NH_3 about 0.38% during the first 15 min., but the speed of NH_3 evapn. gradually decreased with time, and after 26 hrs. 15 min. a const. wt. was reached. The total loss was 13.1%, the residue consisting of $\text{NH}_4\text{H}_2\text{PO}_4$, while $\text{P}_2\text{O}_7^{--}$ and PO_3^- were absent. At 120° the original speed of evapn. was 1.28% for the first 15 min., const. wt. was reached after 22 hrs. 45 min., the total loss was 13.08 to 13.05%, and the residue had the same compn. as in the test at 100° . At 168° the original speed was 10.39% in the first 15 min., after 30 min. it dropped sharply to 0.37%, after 52 hrs. 40 min. the wt. was not yet const. and analysis of the residue gave $\text{P}_2\text{O}_7^{--}$, PO_3^- , P_2O_5 71.50 to 71.57%; NH_3 10.5 to 10.33%. The results are shown as curves, from which it becomes apparent that the decompn. of $(\text{NH}_4)_2\text{HPO}_4$ by heat takes place according to reactions a and b independently of one another with different speeds and at different temps. The decompn. of reaction I is complete at 100° ; the decompn. of reaction II does not take place at 100° and 120° ; the speeds of the reactions II, III and IV are, at the same temp., considerably less than the speed of the reaction I. Since type a reactions have not hitherto been studied sufficiently, the dissocn. pressures of $(\text{NH}_4)_2\text{HPO}_4$ within the temp. limits of 98 – 147° conforming to the equil. $(\text{NH}_4)_2\text{HPO}_4 \rightleftharpoons \text{NH}_3 + \text{NH}_4\text{H}_2\text{PO}_4$ were detd.; the data satisfy the Clausius-Clapeyron equation. These data were verified by thermochem. calcn. from the heats of neutralization and of dissolution. The results obtained by calcn. confirmed those obtained by expt. It is evidently a reversible reaction. The literature is abundant on type b reactions, but the data given by different authors are not in agreement because the results depend on the structure metaphosphoric acid happens to possess. In practice $(\text{NH}_4)_2\text{HPO}_4$ is obtained at temps. not above 130° in the presence of an excess of NH_3 and H_2O , but without complete utilization of NH_3 . The amts. of the latter to be taken depend on the temp., and can be calcd. from the partial pressures of NH_3 in the gases. By varying the quantity of NH_3 any desired mixt. of mono- and diphosphate can be obtained. $\text{NH}_4\text{H}_2\text{PO}_4$ can be obtained at temps. below 130° with complete utilization of all reagents by taking 2 mols. of NH_3 per mol. of P_2O_5 . The interaction of phosphoric acid and NH_3 , with formation of products containing 2 mols. of NH_3 per mol. of P_2O_5 takes place instantly and is not influenced by the speed of a current of inert gases, but in the formation of $(\text{NH}_4)_2\text{HPO}_4$ (4 mols. of NH_3 per mol. of P_2O_5) the speed of the reaction depends on the temp. and on the partial pressure of NH_3 in the working gas. The concn. of $(\text{HPO}_3)_x$ has no influence on the reaction. Complete utilization of metaphosphoric acid is thus possible even in case of low concn. in the distn.

gases of P. The hydration of metaphosphoric acid depends on the conditions of its formation, since its structure depends on them. The product of reaction, NH_4 phosphate, seps. as a smoke and technically can be condensed only in a Cottrell app. All other methods of condensation tried gave unsatisfactory results. NH_4 phosphate is obtained in a high degree of purity in the form of dry crystals.

BERNARD NELSON

Refining commercial barium chloride. I. F. ADADUROV. *J. Chem. Ind. (Moscow)* 5, 219-20(1928).—A com. BaCl_2 had the following compn: $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ 97.10%, PbS 0.05%, PbCl_2 0.60%, FeCl_2 0.02%. Its color was gray from PbS formed during manuf. while evapg. in Pb vessels its soln. contg. free S and H_2S formed by decompn. of BaS by HCl . To obtain white BaCl_2 free from PbS it is best to boil with com. concd. HCl , which transforms PbS into PbCl_2 and dissolves it; BaCl_2 remaining undissolved. After this treatment, chem. pure BaCl_2 can be obtained by crystn. from H_2O .

BERNARD NELSON

Utilization of crude magnesium sulfate for the manufacture of Glauber salt. V. P. IL'INSKII AND G. S. KLEBANOV. Gos. Institut Priklad. Khimii. *J. Chem. Ind. (Moscow)* 5, 3-10(1928).—Glauber salt is obtained by cooling aq. solns. contg. a mixt. of MgSO_4 and NaCl : $\text{MgSO}_4 + 2\text{NaCl} \rightleftharpoons \text{MgCl}_2 + \text{Na}_2\text{SO}_4$. Mixed salts obtained by evapn. of salt lakes contg. MgSO_4 , and even straight lake water, can be utilized for this purpose. To det. the conditions at which the purest Na_2SO_4 can be obtained at the best yields, the authors tried using artificial mixts. having the following compns.: I: MgSO_4 89.89%, NaCl 10.11%; II: MgSO_4 78.46%, NaCl 21.54%; III: MgSO_4 67.83%, NaCl 32.17%; IV: MgSO_4 59.20%, NaCl 40.80%; V: MgSO_4 49.55%, NaCl 50.45%; VI: MgSO_4 39.60%, NaCl 60.40%; VII: MgSO_4 31.10%, NaCl 68.90%; VIII: MgSO_4 20.00%, NaCl 80%; IX: MgSO_4 10.35%, NaCl 89.65%. Various concns. and temps. of cooling, and duration of freezing-out were tried on these mixts. Curves showing compns. of the ppts. obtained under different conditions are given for solns. satd. with these mixts. at 18° to 19° . The solid phases obtained by freezing at 0° , -5° , -10.5° , -15.6° had the following compns. in g. per 100 g. of soln.:

		0°	-5°	-10.5°	-15.6°
I	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	12.72	15.54	19.28	Frozen solid
II	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	12.41	15.78	19.32	
	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	—	—	5.05	
III	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	12.75	14.98	16.48	
	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	14.03	16.42	12.10	
IV	$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	10.20	12.10	10.25	10.03
	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	20.05	21.70	28.40	28.82
V	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	23.15	28.10	31.05	32.7
VI	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	23.04	26.00	27.90	28.90
VII	NaCl	—	0.12	0.86	1.62
	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	18.80	21.18	22.35	22.59
VIII	NaCl	—	—	0.83	1.53
	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	10.62	12.54	13.51	14.00
IX	NaCl	—	—	0.82	2.69
	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	3.43	5.61	5.93	6.82

I gives pure $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ at all temps. Mixts. V and VI give pure $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ at all temps. By diln. of these solns. pure Glauber salt may be obtained at any temp. of cooling and with any mixt. except I. Thus, when cooling to 0° the percents of H_2O (first figure) to be added to the above solns. to obtain a ppt. of pure $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ (second figure) are as follows: II: 15.01, 1.15; III: 9.73, 12.94; IV: 50.04, 19.28; V: 8.15, 22.05; VI: not tried; VII: 5.58, 18.03; VIII: 5.10, 10.24; IX: 5.00, 3.60. The amts. of H_2O to be added when operating at -5° , -10.5° , and -15.6° are also given, as well as the quantities of pure Glauber salt obtained under these conditions. Glauber salt crystallizes quickly; prolonged freezing is therefore unnecessary, but it is necessary to add a crystal of Glauber salt to create centers of crystn.

BERNARD NELSON

Graphite, its occurrence and importance. W. LANDGRAEBER. *Montan. Rundschau* 20, 223-4(1928).—The great importance of graphite in modern life is emphasized and many of its uses are enumerated. The location of a no. of deposits of graphite in European countries and in N. America, dates of starting mining and qualities of graphite obtained are given. Common impurities in natural graphite are silicates, Fe, clay, mica and iron pyrite. The different processes, crushing and grinding followed by direct calcining at 400° to 500° in a revolving furnace, or concn. by flotation using brown coal-tar oils and then heating, or wet grinding and sepn. in shaking settling chambers

or by flotation and roasting, which are used to purify the raw graphite, are outlined and their relative advantages stated. The newer electrothermic method of producing in a sealed furnace a 99% clean graphite is mentioned.

Concentrating graphite in Southern California. W. G. HUBLER. *Eng. Mining J.* 125, 1059-60(1928).—Discussion of operations at the Standard Graphite Corp. mill. A flow sheet is included.

Extraction of bromine or iodine from water by solvents. B. G. PANTLEIMONOV. *J. Chem. Ind. (Moscow)* 4, 713-9(1927).—The best com. conditions of extg. Br or I dissolved in H_2O by means of kerosene, sp. gr. 0.82, were investigated. The aq. Br solns. contained 0.32-0.97% Br. The extg. power of kerosene for Br is great. When operating in direct sunlight a single treatment absorbs all the Br; in darkness fresh kerosene usually leaves 5-10% unextd. By repeated treatment of Br- H_2O with kerosene in darkness only a trace of free Br is left behind. I is extd. completely in a single operation. The extd. halogens partly dissolve in kerosene, partly form with it addn. products, and partly give rise to substitution derivs. with simultaneous formation of HBr at the expense of the nascent H. HBr thus formed remains in water, but represents no loss, for it is easy to liberate Br from it. Br dissolved in kerosene can be extd. from it very easily by treatment with alkalies, most of the Br being transformed into NaBr, a small portion forming NaBrO₃. When using CaO bromide of lime is obtained, and it is perhaps best to obtain Br in this form, since it is most convenient for shipping, and since lime bromide gives off Br very easily by the action of acids. The use of $NH_3 \cdot H_2O$ for extg. Br from kerosene solns. is not recommended, as it removes less than NaOH and moreover has a greater tendency to form stable emulsions with kerosene. Stable emulsions are often formed also with NaOH, particularly if the kerosene contains much combined Br. These emulsions are broken up without difficulty by centrifuging. To recover the Br. combined with kerosene is not so easy. By distg. the brominated kerosene the most volatile fraction (b. up to 110°) contains almost no Br and can be used again for extg., but to sep. the Br from the rest of kerosene chem. treatments are not effective and it is best to soak lime or soda-lime with this kerosene and to burn the latter, thus obtaining bromide of lime, the loss of Br amounting to only 1 to 5%. The proportion in kerosene of free, dissolved Br to that of combined Br was also studied. The data obtained form the basis for an application for a patent. The length of time of keeping kerosene after extn. has no influence on the transformation of free Br to combined Br. Increase of temp. of treatment decreases the amt. of dissolved Br and increases the combined Br. The most important factor is light. When operating in direct sunlight all absorbed Br combines with kerosene, the only Br remaining in H_2O being that combined with H. When operating in darkness several extns. are necessary, and the percent of free, dissolved Br increases by repeated extns., whereas the percent of chem. combined Br decreases. Kerosene does not begin to act as solvent of free Br until part of it first combines with some Br. Thus fresh kerosene combines with four times as much Br as it dissolves free Br, but when kerosene gradually becomes satd. by combining with Br, five times more Br dissolves than combines. It is advisable to use brominated or chlorinated kerosene, and not pure kerosene, so as to ext. free Br and to use the same kerosene repeatedly for further extns. Oversatn. of kerosene by dissolved Br decreases its extg. capacity, so that free Br should be removed from it from time to time. Instead of kerosene petroleum ether can be used for Br extn. I is extd. in the same way as Br.

BERNARD NELSON

The importance of carbon monoxide as a reducing agent in the production of hydrogen by the contact method. A. LOSHKAREV. *Oil and Fat Ind. (Russia)* No. 6, 22-5(1926); *Chem. Zentr.* 1, 2936-7(1927).—In the reduction of the Fe contact agent used for producing H_2 from H_2O in hardening fats, the CO of the water gas, with which reduction of the oxidized Fe is accomplished, enters into reaction much sooner than H. Accordingly, a disproportionately great quantity of CO is consumed, compared with the proportions of CO and H in water gas. The greater the proportion of CO in the water gas, the sooner is the reaction completed. It is recommended therefore that the CO content be increased artificially, either by partial injection into the water-gas producer of gas already used for the reduction, which contains CO₂, or else by the addn. of O₂ to the air for combustion. Fuel with the smallest possible S content should be used, since otherwise part of the O₂ of the air for combustion is rendered useless. A table shows the compn. of water gas before and after the reduction, and the relatively great consumption of CO.

C. C. DAVIS

Factors affecting the world nitrogen situation. HARRY A. CURTIS. *Yale Univ. Chem. Met. Eng.* 35, 469(1928).

E. H.

Production of pure sulfur and ammonium sulfate from crude impure sulfur ob-

tained from coke-oven gas. W. GLUUD, R. SCHÖNFELDER AND W. RIESE. *Ber. ges. Kohlentech.* (Dortmund-Ewing) 2, 118-41.—See *C. A.* 22, 482. C. C. DAVIS

The purification by simple distillation of crude sulfur obtained from coke-oven gas. A second method for the utilization of crude sulfur. W. GLUUD, R. SCHÖNFELDER AND W. RIESE. *Ber. ges. Kohlentech.* (Dortmund-Ewing) 2, 142-7; *Chem. Zentr.* 1927, II, 198.—If the quantity of crude S deposited according to the process of G. and S. is small, its purification according to the process of G., S. and Riese (cf. preceding abstr.) is not advantageous. In such cases, purification by simple distn. is practicable. A small quantity of FeS is formed, which can be converted into Fe₂O₃ by combustion. Calcs. of the economy of the processes are included. C. C. DAVIS

Sulfur and motive power. LUIGI CANTIMORRI. *Giorn. chim. ind. applicata* 10, 182(1928).—Comments on a paper by Buogo (cf. *C. A.* 22, 2641), which show that there are several difficulties involved in the general adoption of the proposed method of treatment, one of the most difficult of which is the fact that treatment with superheated steam does not remove all S, a considerable proportion remaining in the gang. C. C. DAVIS

Recovery and utilization of sulfur dioxide in the extraction of sulfur. ALBERTO GALLETTI DI S. CATALDO. *Atti. congresso naz. chim. pura applicata* 2, 708-18(1926).—In the extn. of Sicilian S the common practice is to burn the ore, the heat evolved being sufficient to melt the greater part of the S, which is run off free from impurities. C. recommends utilization of the SO₂ evolved to form H₂SO₄ and dissolve out the carbonates of the raw material, leaving a product much richer in S. The process is particularly applicable to ore rich in carbonates, but is not so satisfactory when there is much siliceous gang present. The residue from a carbonate ore originally contg. 30.49% S had a S content of 90% after extn. with H₂SO₄. L. T. FAIRHALL

A Pacific Coast setting for industrial research. PAUL D. V. MANNING. *Chem. Met. Eng.* 35, 460-2(1928).—The new lab. and the operations of the Celite products Co., producers of diatomaceous earth and manufs. of Sil-O-Cel, are described. E. H.

New developments in the production of American gas black. WERNER LÖSCH. *Kautschuk* 1928, 127-8.—A review and discussion. C. C. DAVIS

Determinations of the density of different kinds of carbon black. LOTHIAR HOCK. *Kautschuk* 1928, 140.—The d. was detd. by removing the adsorbed air *in vacuo* and then utilizing the pycnometer method with toluene. The av. d_4^{23} of 4 kinds of oil blacks was 1.762 (varying from 1.7515 to 1.7690) and the av. d_4^{23} of gas black (Arrow) was 1.770 (varying from 1.7530 to 1.803). C. C. DAVIS

Fuller's earth from New Zealand. ANON. *Bull. Imp. Inst.* 26, 148-51(1928) --- Comparison of fuller's earth from Whangarei, N. Auckland district, with 3 samples of good-grade English earth showed the N. Z. earth to be superior for the bleaching of neutralized cottonseed oil and about equal to the English earths for bleaching neutralized soy-bean oil. Igniting the earths 4 hrs. at 600° did not affect their action on cottonseed oil, but greatly improved the bleaching action of the N. Z. earth toward soy-bean oil. A. PAPINEAU-COUTURE

Adhesives and adhesion; pure chemical substances as adhesives. JAMES W. MCBAIN AND W. BELL LEE. Stanford Univ. *J. Phys. Chem.* 32, 1178-84(1928); cf. *C. A.* 21, 991; 22, 142.—Observations on the adhesive property of pure compds. are extended by measurements on a no. of org. compds., including 5 highly purified carbinols of the type *l*-R₁EtCHOH, where R is *n*-decyl, un-, do-, tri- and penta-decyl. As might be expected, these compds., which are good lubricants, are poor adhesives. Measurements on the tension strengths were also made on thin layers of cetyl alc., elaidic, cerotic, stearic, dihydroxystearic and cinnamic acids, *p*-nitroaniline, β -naphthol, resorcinol, catechol, *p*-toluidine, azelaic and uric acids, S, rosolic acid, malachite green G and aurin. The breaking points varied from 120-1000 lb. per sq. in. for Ni and steel surfaces, and were usually somewhat lower for Cu, Al and duraluminum. The adhesive strength of aurin, the formula of which is related to triphenyl-carbinol, previously reported as a good adhesive, was found to be as high as 1000 lb. per sq. in. between Ni plates. "Overheated" glycolic acid which, like shellac, contains a lactide structure, has a tension strength of 2200 lb. per sq. in. between Ni surfaces. The joints, when not overloaded, are stable for as long as a month. In all cases the fracture takes place in the adhesive itself and not at the interface. Tests on fused coumarin between walnut surfaces show that the liquid wets the wood and that the shearing strength may be as high as 1 ton. H. F. JOHNSTONE

Detection of phosgene in chemical fire extinguishers. E. GLASER AND S. FRISCH.

Z. angew. Chem. 41, 263-5(1928).—Most chem. fire extinguishers contain CCl_4 , which on thermal decompn. in presence of O_2 produces phosgene. A no. of accidents have occurred from this cause, and it has been claimed that the addn. of ethylene dibromide reduces the formation of phosgene. The authors found that by passing a mixt. of dry air and CCl_4 vapor through a 30-cm. tube heated to 250° and charged with anhyd. FeCl_3 and pumice, phosgene up to 45% of the theoretical yield is obtained. The resultant gases were freed from Cl and passed into aq. aniline, and the ppt. of diphenylurea was weighed. The reaction proceeds up to equil. and the residual gases freed from phosgene can be further oxidized; methyl bromide, if present, increased the yield of phosgene, but ethylene dibromide reduced it. The compns. of solns. in various fire extinguishers are given, and the use of those containing CCl_4 condemned as dangerous.

B. C. A.

Methods of examination of fine pearls and of cultivated pearls. J. GALIBOURG AND F. RYZIGER. *Rev. optique* 6, 97-133(1927); *Chimie et industrie* 19, 874(1928).—A description of the formation and characteristic structure of fine (or "spontaneous") pearls and of cultivated pearls, and of the methods used in practice to differentiate them. Cultivated pearls contain a spherical nucleus of mother-of-pearl, a few mm. in diam., the presence of which is detected by means of the following detns.: d, structure, transparency to light rays, x-ray interference, propagation of light in the body of the pearl. The 5 detns. are based on different properties of the material constituting the pearl, and the results of the different detns. should be interpreted in conjunction with one another, it being unsafe to draw conclusions from the results of only 1 detn.

A. PAPINEAU-COUTURE

Injurious field rats of Lower Sind and their extermination. P. V. WAGLE AND GUL MAHOMED. *Dept. Agr. Bombay, Bull.* 138, 34 pp.(1927).—Raw sugar, coconut oil and aniseed oil appeared to detract from the value of wheat bran, rice and rice flour as baits for the Sind mole rat (*Gnomys indicus*). Strychnine-HCl and white As were more effective poisons than BaCO_3 , while plaster of Paris and a proprietary P prepn. were not effective. Ingestion of 0.1 grain of strychnine-HCl caused death within 12 hrs., and 0.2 grain of white As was fatal in 36 hrs.; while 1.2 grains of BaCO_3 was fatal in 48 hrs. In field expts. strychnine-HCl was successful in 35-65% of the trials when the poison was used on meat and whole wheat, but white As and BaCO_3 gave very poor results. Excellent results were obtained with CS_2 when the vapors were pumped into the burrows by means of a special vaporizer. S fumes and tobacco smoke also gave good results, but gasoline was not effective. Ca(CN)_2 dust gave as good results as CS_2 and at a lower cost. Fumigation should be done between the middle of August and the first of November as the burrows are relatively short during this period.

K. D. JACOB

Report on alkali, etc., works in England and Wales (BAILEY) 13. Apparatus for leaching caliche with circulating liquid in successive stages (U. S. pat. 1,678,787) 1. Catalytic apparatus [for oxidizing NH_3] (U. S. pat. 1,678,778) 1.

KEGHEL, MAURICE DE: *Traité général de la fabrication des colles, des glutinants et matières d'apprêts*. Paris: Gauthier-Villars et Cie. 715 pp. F. 125 (paper). Reviewed in *Chimie et industrie* 19, 976(1928).

Fluorine compounds. ALBERT F. MEYERHOFER. Fr. 632,840, Feb. 22, 1927. An app. is described for the decompn. by heat of complex F compds. such as the fluosilicates of Na, K, Ba, etc., in which a gas such as air, steam, H, or combustion gases is passed over the heated material to reduce the partial pressure of the volatile fluoride disengaged.

Hydrocyanic acid. MORTIMER J. BROWN and EARLE A. HARDING (to Roessler & Hasslacher Chemical Co.). U. S. 1,680,662, Aug. 14. Crude cyanide-contg. material such as crude NaCN is mixed with an acid salt, e. g., NaHCO_3 , and water and the mixts. are agitated under a pressure less than atm. pressure to effect boiling of the water at a temp. below that at which the HCN would polymerize; the water vapors evolved serve to sweep evolved HCN from the reaction mass. An app. is described.

Hydrocyanic acid. STICKSTOFFWERKE GES. (to A. R. Frank and N. Caro). Brit. 282,379, Dec. 17, 1926. HCN is formed by passing NH_3 and CO at a temp. of about $700-800^\circ$ over oxides of the alk. earths, including MgO, or over compds. such as carbonates or hydroxides which yield oxides on heating, or over the cyanamides which are the first product of the reaction. Other gases such as H and N may be present as found in industrial gas mixts. Metals which tend to decomp. NH_3 or HCN are excluded or their action is prevented by adding sulfide compds. or water.

Apparatus for continuous production of nitric acid or hydrochloric acid and sodium bisulfate. GIUSEPPE GUADAGNI. U. S. 1,680,019. Aug. 7. A reaction chamber is mounted within a furnace so that combustion gases may circulate freely all around the chamber; a const.-level discharge pipe for the reaction residue and special supply conduits for admission of the reagents and outlet pipe for the gaseous product provide for continuous operation.

Concentrating nitric acid. H. FRISCHER. Brit. 281,691, Dec. 6, 1926. Concn. is effected by heating dil. HNO_3 admixed with a water-absorbent substance such as H_2SO_4 , in successive stages at increasing temps. A steam-jacketed column still is described which may be heated by superheated steam.

Phosphoric acid. HERMANN LANG (to I. G. Farbenind. A.-G.). U. S. 1,680,625, Aug. 14. See Can. 273,514 (C. A. 21, 3715).

Phosphoric acid. JULIUS KERSTEIN. Fr. 634,117, May 10, 1927. Phosphoric acid is made by passing HCl over phosphorite at a red heat. SiO_2 is preferably added to prevent fusion.

Phosphoric acid and calcium compounds. FRANS G. LILJENROTH. Fr. 633,828, May 3, 1927. Crude phosphates contg. Ca are treated by a wet process to recover the lime as well as H_3PO_4 . In an example crude phosphate is suspended in water and gaseous SiF_4 is passed in, which liberates H_3PO_4 and forms CaF_2 . The H_3PO_4 is removed, and SiO_2 , clay or aluminous material is added and the mixt. heated in a furnace, whereby SiF_4 is re-formed and a cement aggregate is obtained. Instead of CaF_2 , CaSO_4 may be formed.

Phosphoric acid and calcium carbonate. FRANS G. LILJENROTH. Fr. 633,866, May 4, 1927. In treating Ca phosphates to obtain H_3PO_4 and recover the Ca, CaSO_4 is formed and NH_3 and CO_2 are passed in to form $(\text{NH}_4)_2\text{SO}_4$ and CaCO_3 , the latter being used for making cement. The $(\text{NH}_4)_2\text{SO}_4$ formed is used to sep. more lime from the phosphate.

Sulfur dioxide from hydrogen sulfide. HANS BAHR (to I. G. Farbenind. A.-G.). U. S. 1,678,630, July 31. In purifying gases contg. H_2S oxidation of the latter is effected by use of a mixt. of metals, one of which such as Fe, Ni or Cu has the property of binding S and another such as V or W the property of promoting oxidation.

Storage and transportation of acids in steel drums. JAMES H. GRAVELL. U. S. 1,678,775, July 31. Action of acids such as H_2SO_4 on steel containers is inhibited by use of As or Sn or other suitable metal "below Fe and above Hg in the electromotive series" together with an "acid-regulator" such as a distillate contg. pyridine bases for forming a protective coating on the steel.

Synthetic ammonia. ROLAND E. SLADE and KENNETH GORDON (to Atmospheric Nitrogen Corp.). U. S. 1,679,792, Aug. 7. In order to remove NH_3 from compressed synthesis gases, the gases are scrubbed at high pressure with an aq. medium in such quantity as to form a soln. contg. about 50-70% NH_3 .

Ammonia synthesis. HANS SVANOE (to The Ammonia Corp.). U. S. 1,678,964, July 31. The reaction is initiated by a catalyst in the presence of excess H to provide high heat cond. and control the reaction and there is subsequently introduced another gas contg. supplemental N to lower the heat cond. and render the reaction more active.

Apparatus for ammonia synthesis or similar catalytic reactions. SOC. L'AIR LIQUIDE, SOC. ANON. POUR L'ÉTUDE ET L'EXPLOITATION DES PROCÉDÉS G. CLAUDE. Brit. 282,658, Dec. 24, 1926. In app. of the type described in Brit. 268,721 (C. A. 22, 1444), reacting gases are circulated through the inner catalyst-contg. receptacle in indirect contact with the catalyst, in excess of the quantity which will pass into direct contact with the catalyst, and the excess is discharged to the outside of the app. after heating. Various structural details are described.

Catalyst "compact." WILLIAM SCHULTZE (to Atmospheric Nitrogen Corp.) U. S. 1,680,807, Aug. 14. A catalyst suitable for use in synthesis of NH_3 , which is porous to the gases to be catalyzed, is formed of hard granules of MgO carrying Fe oxide or other catalyst material which does not readily cohere, substantially free from added adhesive agents; the granules are caused to cohere sufficiently by compression into tablets that the catalyst is not disintegrated under the conditions of the reaction in which it is used.

Alkali metal hydroxides. LEO P. CURTIN. U. S. 1,678,767, July 31. An aq. suspension of PbO is agitated while adding an alkali metal sulfide such as that of Na and the supply of sulfide is regulated to avoid any substantial accumulation of sulfide ions in the soln.

Alkali iodates. I. G. FARBENIND. A.-G. Fr. 633,994, May 6, 1927. Alkali iodates are prepd. by allowing O to act on a fused mixt. of an alkali hydroxide and alkali

iodide, or O is allowed to act on an alkali iodide at about 600° and at a pressure above 100 atms., or alkali iodide is oxidized in aq. soln. at a temp. above 100° and at increased pressure, with or without a catalyst.

Persalts, etc. HENKEL ET CIE., GES. Brit. 282,302, Dec. 24, 1926. Solns. of the reagents used in prepg. persalts and percompds. (e. g., borax, NaOH and Na₂CO₃ used in making perborates or percarbonates, K₂SO₄ and Na₃PO₄ used for making persulfate or perphosphate, and H₂SO₄, water, etc., used in making H₂O₂) are purified by treatment with silica gel to ppt. heavy metals which otherwise might cause catalytic decompn. of the percompds. The solns. may be boiled with silica gel and afterward crystd.

Soluble phosphates. F. G. LIJENROTH. Brit. 282,619, Dec. 23, 1926. Sol. phosphates are prepd. by leaching crude Ca phosphate with a smaller proportion of H₂SO₄ than that "corresponding to the Ca" in the crude material to give mono-Ca phosphate and free H₃PO₄. Ca is simultaneously or subsequently pptd. by alkali or NH₄ sulfate, leaving sol. phosphate in soln. The filtered soln. is neutralized, preferably with NH₃, and evapd. (NH₄)₂SO₄ and CaCO₃ are formed from the CaSO₄ by CO₂ and NH₃. An excess of KCl or K₂SO₄ may be added and if K phosphate is desired KOH, K₂CO₃ or KCl may be used as a neutralizing agent.

Double silicates. F. SINGER Brit. 282,402, Dec. 17, 1926. Double silicates similar in type to natural plagioclase compds. are made by reacting on the oxides, carbonates, sulfates, silicates or aluminates of bivalent metals such as Mg, Ca, Ba, Sr and bivalent Fe (or their mixts.) with alumina and silica at temps. below the fusion point of the mixt. (preferably at least 50° below this point). The alumina may be introduced in the form of oxide, hydroxide, silicate, double silicate or aluminate, and the silica as quartz sand, alk. earth silicate, Al silicate or double silicate. The products are resistant to HF and other acids and possess good insulating properties, and may be used for making muffles, filters, insulators, "stones" or abrasives.

Zirconium compounds. FRIEDRICH RUSBERG and PAUL SCHMID (to Rhenania-Kunheim Verein Chemischer Fabriken A.-G.). U. S. 1,681,195, Aug. 21. A Zr ore such as one contg. 75% ZrO₂ and 15% SiO₂ is mixed with an earth alkali such as CaCO₃ and with CaF₂ or other alk. earth metal halide, without addn. of any carbonaceous material, the mixt. is heated to a sintering temp. and the sintered product is treated with a quantity of HCl insufficient to dissolve the basic constituents of the product; the soln. is sepd. and HCl is added to it, to prep. it for crystg. zirconyl chloride.

Alumina and alkali metal carbonate. FRITZ ROTHE and HANS BRENEK (to Rhenania Verein Chemischer Fabriken A.-G.). U. S. 1,680,066, Aug. 7. Aluminous minerals such as bauxite are mixed with alkali metal sulfate and the mixt. is heated to incandescence in the presence of steam at a temp. of at least 1100° while avoiding any reduction in the mixt., in order to form aluminate suitable for further treatment with H₂O and CO₂.

Alumina. JEAN-CHARLES SEAILLES. Fr. 634,430, Sept. 18, 1926. See Brit. 277,697 (C. A. 22, 2642).

Aluminum sulfate. ROY M. MEIKLEJOHN (to General Chemical Co.). U. S. 1,679,366, Aug. 7. An aluminous material such as clay or bauxite is treated with H₂SO₄ of such strength (suitably about 50%) that substantially complete decompn. is effected and a basic product is formed, while maintaining the temp. at about 178° to maintain the reacting substances in liquid condition.

Carbon disulfide. I. G. FARBENIND. A.-G. Brit. 282,049, Dec. 13, 1926. In prepg. CS₂ as described in Brit. 237,716 (C. A. 20, 1696), a superheater for S vapors is positioned in the furnace chamber which contains the reaction chamber contg. C.

Chromium oxide and chromium hydroxide. I. G. FARBENIND. A.-G. Fr. 633,956, May 5, 1927. Cr(OH)₃ and Cr₂O₃ are prepd. by treating solns. of chromates with org. reducing agents such as sawdust, molasses, lignite dust, or residual dyes from the manuf. of cellulose, etc., at a temp. above 100° and preferably under pressure.

Lead carbonate. STANLEY C. SMITH. Fr. 633,813, May 3, 1927. See Brit. 272,053 (C. A. 22, 1658).

Lead chloride. NORDDEUTSCHE CHEMISCHE FABRIK IN HARBURG. Brit. 282,306, Aug. 8, 1927. PbSO₄ is treated with a soln. of a chloride under pressure at a temp. above 100°, e. g., boiled with a concd. soln. of NaCl for 10–15 min. at 140–150° under 4–5 atm. pressure.

Crystallization apparatus for potassium dichromate, barium chloride, etc. WALTER SEMEL (to I. G. Farbenind. A.-G.). U. S. 1,679,055, July 31. A crystg. vessel is provided with a centrally located raised portion of its bottom so that by rocking the

vessel liquid can be caused to flow from one lateral chamber of the vessel to another while restraining movement of crystals.

Recovering combined nitrogen from crude calcium cyanamide. GUY H. BUCHANAN and PALMER W. GRIFFITH (to American Cyanamid Co.). U. S. 1,678,721, July 31. "Lime nitrogen" 1 is mixed with water 1-4 parts, the soln. is filtered, and the sepd. solids are digested in an autoclave with addnl. water, to recover addnl. N as NH_3 .

Hydrating lime. CHRISTIAN P. BERG. U. S. 1,679,149, July 31. A mixt. of lime and water is held in a curing zone and a substantial portion of the water is drained off; addnl. water is passed through the mixt., and the putty thus cured is removed from the app. (details of which are described).

Hydrogen peroxide. J. D. RIEDEL A.-G. Fr. 634,195, Feb. 5, 1927. In making H_2O_2 by the distn. of solns. of persulfates, use is made of a soln. which contains a mol. of H_2SO_4 for each mol. of persulfate and sulfate.

Hypochlorite composition. JAMES D. MACMAHON (to Mathieson Alkali Works). U. S. 1,678,987, July 31. A dry mixt. which is suitable for making solns. comprises anhyd. Na_2SO_4 and $\text{Ca}(\text{OCl})_2$. H_3BO_3 or NaHCO_3 also may be added.

Bleaching powder. JAMES T. CONROY, ALFRED LAMBLE and JOHN J. LATHAM (to United Alkali Co., Ltd.). U. S. 1,680,087, Aug. 7. See Brit. 246,000 (C. A. 21, 479).

Highly activated carbon. SOC. POUR L'EXPLOITATION DES PROCÉDÉS ÉDOUARD URBAIN. Fr. 634,415, Sep. 16, 1926. Highly activated carbons are made from vegetable substances such as peat, vegetable ivory, bark, moss, lichen, or algae, which contain, besides cellulose, vegetable matter capable of being transformed into carbohydrates or of forming with H_3PO_4 a gel, such that after division into grains of the appropriate size the matter takes on, when dried and calcined, a very high mechanical resistance.

Extraction of lead. CREM. AND MET. CORP., LTD. and STANLEY C. SMITH. Fr. 633,810, May 3, 1927. In a process for extracting Pb from ore wherein PbCl_2 is suspended in a soln. of NH_3 , PbCO_3 is obtained without the basic chloride by passing in CO_2 at such a speed that the presence of carbonic acid is avoided as far as possible.

Sulfur. WILLIAM H. BENTLEY (two-thirds to John Riley & Sons, Ltd). U. S. 1,680,079, Aug. 7. See Brit. 252,938 (C. A. 21, 2537).

Metal catalysts. I. G. FARBERIND. A.-G. Brit. 282,410, Dec. 14, 1926. Metals such as Ni, Co or Cu are pptd. from ammoniacal soln. by H, preferably under pressure and in the initial presence of catalytic metal, with or without use of a carrier such as kieselguhr.

Composition for producing heat by chemical reaction. CHARLES E. LYON (to Hooker Electrochemical Co.). U. S. 1,679,432, Aug. 7. A compn. suitable for generating heat on the addn. of H_2O comprises an alkali metal hydroxide and a salt which reacts with the hydroxide with evolution of heat, e. g., a mixt. of NaOH 90 and Na Al chloride 10%.

Apparatus for evaporating brine. METALLWERKE VORM. J. ADERS A.-G. Brit. 281,726, Dec. 4, 1926. In a plant comprising a vacuum evaporator and a preheater, deposition of crystals between the evaporator and heater is prevented by forcing the brine rapidly through a narrow barometric tube. Various structural features are described.

Furnace for calcining soda. DWIGHT R. MEANS (to Pittsburgh Plate Glass Co.). U. S. 1,679,486, Aug. 7. A covered calcining pan is arranged to discharge the material at one end and is provided with agitators; a rotary furnace is placed to receive the material as discharged from the pan. Combustion gases from a furnace beneath the pan pass along the shell of the rotary furnace.

Dispersing agent. FRIEDRICH FELIX (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,680,778, Aug. 14. The resinous residue which is obtained as a by-product in the rectification of benzaldehyde is treated with sulfonating agents such as H_2SO_4 contg. SO_3 . The product thus formed is suitable for use as a dispersing agent in forming emulsions.

Urea-formaldehyde condensation products. F. SCHMIDT. Brit. 281,993. Urea- CH_2O condensation products are formed in the presence of "carrier substances" or mixed with such substances prior to dehydration and then dehydrated while being kept in motion. Among the "carrier substances" which may be used are: casein, cellulose and its derivs., natural and artificial resins, polymerized vinyl esters, and fibrous or amorphous fillers such as wood meal, peat meal or alumina. Other substances forming resinous products with CH_2O such as urethan, aniline, benzanilide and other anilides, *p*-toluenesulfonamide and other amides or PhOH may be used with the urea, and gelatinizing and softening agents, coloring substances, etc., also may be added.

Urea-aldehyde condensation products. SOC. ANON. POUR L'IND. CHIM. A BALÉ. Brit. 281,717, Dec. 4, 1926. Condensation products of urea with an aldehyde such as CH_2O , having a porous structure, are prepd. by first condensing the materials to a stage beyond the methylol-urea phase, then polymerizing in the presence of a catalyst such as an acid or salt and finally removing the catalyst (suitably by washing—after neutralization in the case of an acid—or by electroösmosis). The water usually present may be replaced by alc. or other solvent, and softening, filling and coloring agents may be added either during the condensation or to the finished product. Various details and examples are given.

Composition for making molded articles. HARRY S. SNELL (to Western Elec. Co.). U. S. 1,678,713, July 31. A material which may be used as a dielectric is formed by the condensation of furfural and an insol. proteinate such as Al soy-bean or milk caseinate.

Artificial substances. CARL GUSTAF ALBERT LUNDBERG. Fr. 634,120, May 10, 1927. See Brit. 271,076 (C. A. 22, 1659).

Plastic composition. OSCAR A. CHERRY and CLETUS F. CHOSA (to The Cutler-Hammer Mfg. Co.). U. S. 1,678,635, July 31. A molding compn. comprising asbestos or other relatively inert filler impregnated with a binder such as coal tar pitch, stearin pitch, gilsonite and S is incorporated with a small proportion of a halogen deriv. of S, e. g., S chloride and a phenolic compd. such as cresol which will react together to form addnl. binder.

Plastic compositions. I. G. FARBENIND. A.-G. Brit. 282,635, Dec. 23, 1926. Methylol compds. such as those of ureas are mixed with wood, lignin or other suitable fillers which have been impregnated with phenol, urea, thiourea or their derivs. or condensation products with aldehyde and the mixt. is hardened. Catalysts, buffer, casein, horn, yeast and aldehydes may also be added. The product may be used as an elec. insulating material.

Plastic material from peat. ISADORE S. MELLANOFF (to Kemikal, Inc.). U. S. 1,681,155, Aug. 14. A compn. which is suitable for molding is formed by the interaction of peat, an alk. material such as NaOH, a phenol and an aldehyde, e. g., PhOH and CH_2O .

Coloring plastic substances. I. G. FARBENIND. A.-G. Fr. 634,457, May 16, 1927. Plastic or plastifiable substances having a basis of celluloid or cellulose ester or ethers, or natural or artificial resins are colored by incorporating therein with or without org. solvents, Cr or Cu compds. of coloring matters, particularly *o*-hydroxyazo colors which contain also SO_2H , COOH or sulfamidic groups.

Adhesive material from soy beans. OTIS JOHNSON (to I. F. Laucks, Inc.). U. S. 1,680,264, Aug. 7. Soy beans are soaked in water at a temp. not exceeding about 70° , ground while moist, mixed with water and an alkali such as borax, NaOH or NaHCO_3 at a temp. not above about 70° ; juice is sepd. from the mass; oil is sepd. from the juice; a curdling agent such as a dil. acid is added to the oil-freed juice, and the curd is washed and centrifuged or otherwise treated to remove moisture. The product may be used in paints, calcimine, sizings, etc.

Composition for expansion joints. ALBERT C. FISCHER. U. S. 1,680,144, Aug. 7. Fibrous material such as excelsior and cork is mixed with tar, pitch or other suitable bituminous material while the latter is of a consistency below that at which it will sat. fibrous material.

Plaster bandages. JOHNSON & JOHNSON (Gt. Britain), Ltd. Brit. 282,243, Feb. 28, 1927. Plaster of Paris for use with open-mesh fabric is mixed with a bonding material such as that formed by boiling an aq. soln. of sugar and dextrin, or gum arabic or starch, and adding HOAc or other retarder of setting.

Refining graphite. STÉPHANE H. M. CHANIOT. Fr. 634,505, May 17, 1927. The mineral is treated by malaxage and flotation, fine bubbles of air being formed in the liquid which attach themselves to the particles of graphite previously oiled.

Coating objects. FÉLIX CLAIREAUX. Fr. 634,410, Sep. 15, 1926. The objects are dipped in a bath of melted gelatin, oil of turpentine and glycerol, and afterwards treated with CH_2O and dipped in a bath of petroleum jelly.

Binding agent for colors, varnishes, etc. JOHANN TENGLER. Fr. 634,275, May 12, 1927. See U. S. 1,660,851 (C. A. 22, 1498).

Coloring slate or other mineral materials. HARRY C. FISHER (to The Richardson Co.). U. S. 1,680,941, Aug. 14. Particles of crushed slate or other material are colored by forming on their surface a layer of a ferrite, which may be produced by use of CuSO_4 and FeSO_4 successively.

Composition for removing paint. H. L. LEASE. Brit. 282,549, Dec. 8, 1926. A

wax such as beeswax, paraffin or "earth wax" is used with an "unseparated" coal-tar light oil. C_6H_6 and an alc. such as "methylated spirits" may be added.

Printing-plates of celluloid. C. H. E. OGILVIE. Brit. 282,465, June 25, 1926. A design is applied to the surface of a celluloid sheet, in casein or other substance which will resist the action of a celluloid solvent, and the sheet is then treated with a solvent such as acetone to leave the design in relief.

Printing-surfaces. M. ULLMANN and F. ULLMANN GES. Brit. 282,474, Aug. 19, 1926. In producing printing-blocks for lithographic offset printing-machines, in which a sensitive layer, hardened by exposure, serves as the resist for the etching soln., and in which the etched surfaces serve directly as the carriers for ink, the metal is etched in a single operation, the plate then rinsed with water, dried, rolled up with a fat ink which adheres to the metal parts, and the colloid layer is removed with HCl and the block further prepd. for printing in the usual way. The sensitive layer is formed of a soln. of gelatin, $(NH_4)_2Cr_2O_7$, NH_3 and NH_4 formate. The etching soln. comprises a mixt. of halogen salts, preferably chlorides of Al and Fe, one of which etches the metal and the other of which serves to render the exposed colloid layer less sol.

Gluing, cementing and impregnation. SOC. CONSORTIUM FÜR ELEKTROCHEM. IND. G. M. B. H. Fr. 634,136, May 10, 1927. The various polymerization products of vinyl acetate obtained with or without catalysts are used for gluing, cementing and impregnating such as waterproofing.

Impregnating hats to prevent perspiration stains. OCTAVE BROTELLE. U. S. 1,680,852, Aug. 14. A sol. alk. saponif. agent such as Na_2CO_3 is used for impregnating that portion of hats of felt or other material which is adjacent the head of the wearer, to render stain-forming constituents of the perspiration inactive after coming in contact with the impregnated material.

Composition for impregnating shoe-stiffening fabrics. UNITED SHOE MACHINERY CORP. Brit. 281,771, Sept. 9, 1926. A thickened drying oil such as China wood oil polymerized to an "incipient gel" is used with other ingredients such as colophony, copal, montan wax, carnauba wax, lime, MgO and ZnO.

Stencil sheet. SHINJIRO HORII. U. S. 1,679,034, July 31. A suitable base of fibrous material such as yoshino paper is coated with a compn. comprising esters of polysaccharides and squalene, *e. g.*, a compn. formed from cellulose nitrate 10, EtOH 15, EtOAc 15, AmOAc 30, AmOH 10, petroleum benzine 20, squalene 20, naphthenic acid glycerides 5, olein 5 and stearin 5 parts. Cf. C. A. 22, 2819.

Separating diamonds from sedimentary rocks. TALBOTT H. FRANCE U. S. 1,679,857, Aug. 7. The material is heated to induce differences in expansion between the diamonds and their matrices and the heated material is then abruptly cooled, *e. g.*, by quenching in water.

Detergent. YOSHITARO KATAYAMA. U. S. 1,678,815, July 31. A compn. suitable for use on wood, metal or leather comprises an aq. decoction prepd. from wild rhubarb root 95, cedar oil 1 and a strong alum soln. 4%.

Composition for filling roots of teeth. ERIK G. HEDSTRÖM. U. S. 1,678,940, July 31. See Brit. 276,526 (C. A. 22, 2447).

Demineralization of bones. GÉLATINES HASSELT & VILVORDE. Fr. 634,361, May 13, 1927. Bones are treated with an aq. soln. of H_3PO_4 and the leaching liquors are treated with milk of lime. The necessary H_3PO_4 may be obtained by treating a part of the leaching liquors with H_2SO_4 .

Acoustic disks. POLYPHONWERKE A.-G. Fr. 633,790, May 3, 1927. To obtain disks of artificial resin or cellulose compds. entirely free of solvent, old or newly formed disks are ground up and freed from volatile matter in a vacuum, after which gum lac, artificial resin, or similar plastifying substances are added and the disks are formed in the usual manner.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

New views on the chemical constitution of glass. O. KNAPP. *Chem. Rundschau Mitteleuropa u. Balkan* 1927, Sept. 30, 155; *J. Soc. Glass Tech.* 12, No. 45, 4.—Glass was considered most probably to be, chemically, a silicate in mutual soln. in free acids and bases. From the physicochem. point of view it was suggested that those substances were to be considered as glasses which possess at the temp. prevailing below the equil. curve a liquid phase corresponding with the field above the curve. H. G.

Contribution on the subject of the constitution of glasses. HERBERT SCHONBORN. *Sprechsaal* 61, 99–101, 117–20(1928).—The thermal coeff. of expansion and the elec. cond. were detd. and are given for glasses of various compns. which were quenched from different high temps. The correlation between the detd. phys. constns. and the quenching temp. permits the drawing of conclusions on the mol. constitution of the glasses. In addn. the contractions were measured which quenched rods of glass undergo at higher temps. and the dependence of time and the temp. at which the tests were made are expressed by formulas. Phenomena of inertia noted in viscosity measurements are given.

R. A. HEINDL

Elastic constants of glass. EDGAR P. PERMAN AND WM. D. URRY. *Proc. Phys. Soc. London* 40, 186–92(1928).—The coeff. of compressibility, bulk modulus, modulus of rigidity, Young's modulus, and Poisson's ratio were measured at intervals of 10° from 30° to 80° . The glasses used were standard Jena 16^{III} and a typical soda glass of compn. 66.00% SiO₂, 4.99% Al₂O₃ + Fe₂O₃, 7.49% CaO (+SrO), 13.05% Na₂O, 8.30% K₂O. The measurements were made by 2 methods. In method I a long cylindrical bulb with a capillary sealed on one end was filled to the mark with water and subjected to longitudinal compression. The app. was immersed in a thermostat and a mass of 5000 g. was used as the compressing force. The rise of the capillary was measured with a cathetometer. In method II the glass piezometer bulb was placed inside a steel cylinder contg. Hg, the capillary of the bulb extending through the rubber packing of the cylinder. The bulb was filled with water and the rise of the capillary observed as above, when pressure was applied to the Hg. The results are expressed mathematically in the table.

	Soda Glass	Jena 16 ^{III}
$10^{-8} \times$ coeff. of compressibility per atm.	238.0 + 0.185t	220.6 + 0.28t
$10^{-11} \times$ bulk modulus (C.G.S.)	4.241 – 0.00296t	4.577 – 0.0051t
Poisson's ratio	0.2207 – 0.00012t	0.2475 – 0.00068t
$10^{-11} \times$ modulus of rigidity (C.G.S.)	2.99 – 0.002t	3.29 – 0.0036t
$10^{-11} \times$ Young's modulus (C.G.S.)	7.27 – 0.005t	7.97 – 0.009t

A. E. BADGER

The weathering and durability of glass. KIYOSHI UEDA. *Rept. Asahi Glass Co., Ltd., Research Lab. No. 17*, 39–55(1927).—Durability and density of a glass increase with the progress of annealing. The surface of annealed glass is far more durable than its interior. A cleaned glass, consisting of SiO₂ 69.43, CaO 11.49, Na₂O 16.46, Fe₂O₃ and Al₂O₃ 1.46, MgO 0.66 and SO₃ 0.63%, was heated at 600° for 30 min. in a current of acidic gas or vapor. After cleaning, it was placed in moist air at 60° until it was permanently dimmed. The following figures give the time required for permanent dimness after treatment with the various reagents: untreated glass 1, air 3, steam 3, combustion gases from coal gas 4, SO₂ 10, H₂S 21, Cl 21, HCl 21, H₂SO₄ 21, CO₂ 22, Br 23, NO 25, HNO₃ 25, H₂SO₃ 35. The same glass was exposed to the action of various reagents at lower temps. and tested for its durability. The time in days required for permanent dimness after treatment with cold HNO₃ for 10 days was 2, cold fuming H₂SO₄ for 10 days 2, boiling N Na₂CO₃ soln. for 3 hrs. 2, steam at 100° for 1 hr. 6, concd. H₂SO₄ at 130° for 3 hrs. 7, boiling 1% H₃PO₄ for 3 hrs. 10, boiling water for 3 hrs. 13, boiling 5N HCl for 3 hrs. 14. To find the action of various reagents under pressure, the glass and each reagent were sealed in a test tube and heated at 120° for 3 hrs. The time in days required for permanent dimness was CO₂, dry 1, CO₂, moist 6, SO₂, dry 2, SO₂, moist 12, HCl, dry 4, HCl, moist 7, water 13. Five g. of the same glass ground to 0.5–1.0-mm. size was boiled in distd. water. The following figures give the no. of hrs. of boiling, loss in mg. at 100° and at 100 – 500° , no. of mg. of alkali dissolved calcd. as Na₂O: 1, 6.8, —, 2.7; 2, 10.9, 0.3, 4.0; 3, 13.3, 0.7, 5.1; 5, 13.8, 1.1, 5.0; 7, 16.2, 1.4, 6.1; 10, 19.3, 1.6, 6.7. The result indicates that water penetrates to the interior of the glass on long boiling.

S. KONDO

"Rational" analysis of clays. W. SINGLETON. *Chem. Age (London)* 18, 6–7, No. 451, *China Clay Trade Rev. Sect.*, No. 455, 7(1928).—The usual better-known procedures are not given but modifications to provide either greater accuracy or speed are reviewed. The most useful is Kallauner's method which consists of igniting the sample at 750 – 800° for about 2 hrs., and digesting with HCl to dissolve the Al₂O₃ of the clay present. This Al₂O₃ calcd. as kaolinite is subtracted from 100 to give the quartz and feldspar present. These may be detd. microscopically or by chem. analysis for the K₂O or the Al₂O₃ present in the residue of the HCl treatment.

H. F. K.

The varieties of clays of Washington and their adaptability to ceramic industry. EDW. BURKHALTER. *Bull. Am. Ceram. Soc.* 7, 236–9(1928).—Brief descriptions are given.

C. H. KERR

Kaolin content of clays. H. BOEGE. *Chem. Erde* 3, 341-69(1927).—Chem. analyses are given of eight clays from German localities. By digesting the material in HCl (d. 1.1) for 2 hrs. from 6.00 to 14.08% $\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$ passed into soln., this represented the colloidal portion of the Al silicate. After ignition of the material at 700° HCl extd. more (up to 36.82%) Al_2O_3 , the addnl. amt. representing the broken-down kaolin. From these results the amt. of kaolin in the clay can be calcd. The amt. of HCl present in each of these clays was also detd. by the dehydration method of Calsow (C. A. 21, 3112). B. C. A.

Mineralogical constitution of clays. G. LINCK. *Chem. Erde* 3, 370-4(1927).—Remarks on the paper by Boege (preceding abstract). B. C. A.

Fuel mixing with clay. R. C. GANGWERE. *Bull. Am. Ceram. Soc.* 7, 234-6 (1928).—Mixing fuel or cinders with the clay in making heavy ceramic products may show great economy in firing cost. C. H. KERR

China clay preparations in England and Czechoslovakia. R. C. CALLISTER. *J. Council Sci. Ind. Research* 1, No. 4, 242-8.—C. describes the mining and treatment of certain crude clay deposits to extract the china clay. Several general processes are used: (1) After preliminary treatment the clays are purified by electroosmosis. This treatment also serves to replace filter pressing. (2) Method of sedimentation and filter pressing. (3) Cornish method. The clay is obtained by hydraulic methods which serve to remove coarse particles by deposition. The dil. clay suspension is gradually thickened and finally dried. L. B. MILLER

Effect of reducing gases on the transverse strength of fireclay bricks. A. E. R. WESTERMAN. *Ceramic Eng. Expt. Sta., Univ. of Illinois. J. Am. Ceram. Soc.* 11, 633-8(1928).—The effect of city gas, for 56 hrs., at 550° and at 1100°, upon 3 brands of brick, showed no significant change in transverse strength at 1100°; at 550° 2 of the brands showed small decreases in strength, while the 3rd brand, although highest in Fe content, was unaffected. C. H. KERR

Cause and prevention of kiln and dry-house scum and of efflorescence on face brick walls. L. A. PALMER. *Bur. Standards, Tech. Paper* No. 370, 579-629(1928).—The results of 288 panel tests continued over a period of six months indicate that limes, portland cement, brick layers' cement, etc., used either in the brick wall or as backing, contribute to the development of wall efflorescence. An admixture of either NH_4 or Ca stearate to mortar materials in an amount equal to 2% by wt. of the lime or cement will tend to prevent efflorescence. Sol. salts existing in the raw clay or formed during the mfg. process may also cause efflorescence. Dry-house scum or efflorescence is defined as the scum or efflorescence formed on the brick during drying. It is presumably due to the presence of sol. salts, especially Na_2SO_4 and K_2SO_4 , in the raw clay and once formed is very difficult to remove. It may be overcome by rapid drying, a reducing atm. in the kiln held at a temp. below the melting temp. of Na_2SO_4 , or by barium treatment. Sol. compds. of Ba such as BaCl_2 or $\text{Ba}(\text{OH})_2$ are preferable to BaCO_3 . BaF_2 is also used. Kiln scum may be due to sol. salts in the raw clay but is generally due to the reaction of SO_2 from sulfur in the fuel with basic constituents in the surface of the brick. Passing through the period of water smoking and through the temp. range 700 to 1000° F. as rapidly as possible decreases scum formation. Burning with a reducing atm. is also helpful. A brick contg. less than 0.05% of water-sol. SO_4 in the outer $\frac{1}{8}$ inch of its surface is fairly safe from efflorescence. LEWIS B. MILLER

Refractories: Their manufacture and applications. J. F. HYSLOP. *World Power* 10, 137-44, 256-78(1928).—Survey of the characteristics of the chief refractory materials, silica and silica-alumina, illustrating the main factors which det. their service behavior and use: strength, effect of temp., elec. properties, etc. C. G. F.

Refractories for brass foundry furnaces. H. M. ST. JOHN. *Metal Ind. (London)* 32, 543-6(1928).—See C. A. 22, 2647. E. G. R. ARDAGH

Properties of refractories, their testing and behavior in operation. F. KANHÄUSER AND J. FLÉK. *Chem. obzor* 3, 18-20, 44-6, 85-6, 103-10, 145-51(1928).—The properties of ten refractories, their micro- and macroscopical structure, behavior in heat and principal methods for testing are described. Detns. of refractoriness by a modified procedure of Endell, detn. of porosity by using Hartmann's volumeter, Endell's method of testing resistance to sudden temp. changes, and detn. of chem. resistance by using Hartmann's method are criticized. Photographs of app. and bibliography are added. JAR. KUČERA

The thermal expansion of refractory construction materials. (A synopsis of the literature.) K. SCHÖNERT. *Arch. Eisenhüttenw.* 1, 379-86(1927).—The heat expansion curves of refractories are influenced by: (I) the firing temp. and its duration; (II) the chem. compn.; (III) the sp. gr.; (IV) the porosity; (V) the grain size. From

the results found in the literature, the influence and mode of action of these factors are studied, the refractories investigated being silica brick (contg. quartz, cristobalite, tridymite), ordinary fireclay brick ($\text{Al}_2\text{O}_3:\text{SiO}_2$ ratio (VI) being approx. 1:2 and $\text{Al}_2\text{O}_3 = 38-46\%$), alumina-rich fireclay brick (VI > 1:2, $\text{Al}_2\text{O}_3 > 46\%$), silica-rich fireclay brick (VI < 1:2, $\text{Al}_2\text{O}_3 < 38\%$), magnesite, chromite and SiC bricks. The permanent and the temporary expansion of silica bricks depend on I, II, III and V, the effect of IV being still uncertain. Results of Miehr, Immke and Kratzert (*C. A.* 21, 3113) obtained

by the use of the relation: $\frac{\text{linear expansion}}{\text{sp. heat}}$ are unreliable, as the expansions were

not detd. on the same bricks as were the sp. heats. The relation appears to be const. for temps. up to 1400° , being about 5.4. The heat expansion of fire-bricks is detd. mainly by II, although I, V of the free SiO_2 therein and, to a lesser degree, IV are of significance. Here, the expression: $\frac{\text{linear expansion}}{\text{sp. heat}}$ is const. at a given temp.

but increases with the temp. (at 600° is 1.89, at 1000° is 2.73, at 1300° is 3.20). The expansion coeffs. as detd. by various investigators for magnesite are in good agreement, there being a slight increase in the coeff. with increase in firing-temp. Detailed expts. of the expansions of chromite bricks could not be found, the coeffs. given being, however, in good agreement. SiC has a const. value for the coeff. of expansion of 47.1×10^{-7} for the entire range from 0 to 1700° . With clay for a binding material, there is a slight increase in the coeff. of the material with increase in firing-temp. The influence of various binding materials has not yet been investigated. An extensive survey of the literature is given

J. BALOZIAN

Measurement of the electrical resistance of porous materials. A. E. KNOWLER. *Proc. Physical Soc.* 40, 37-40(1928).—The resistance of a specimen of refractory material is detd. by passing a known current through and measuring the potential between two wires inserted in it a known distance apart. The method avoids errors due to contact resistances.

B. C. A.

Kilns, furnaces, bodies and glazes for small commercial production and educational work. PAUL E. COX. Dept. of Ceram. Eng., Iowa State College. *J. Am. Ceram. Soc.* 11, 649-57(1928).—Drawings, specifications, formulas and instructions are given.

C. H. KERR

Photomicrography in natural colors. THOS. S. CURTIS. *J. Am. Ceram. Soc.* 11, 609-32(1928).—The processes and technic used in the lab. of Vitrefax Corporation, Los Angeles, Calif., are described.

C. H. KERR

Preparation of brilliant gold. F. CHEMNITZUS. *J. prakt. Chem.* 119, 215-7(1928).—A recipe is given for ceramic brilliant gold contg. Au, Rh, Bi, Cr and resins. Cf. *C. A.* 22, 1023.

G. B. TAYLOR

Spray room control with a camera. HARRY E. DAVIS. *J. Am. Ceram. Soc.* 11, 639-43(1928).—Photographic records of terra cotta finishes are recommended.

C. H. KERR

Pottery dusts: Their collection and removal. W. M. ODDIE. *Pottery Gazette* 53, 1280-2(1928).—Results are given of certain investigations at the works of the Soho Pottery, Cobridge, England.

R. A. HEINDL

Crushing and grinding studies of quartz. JOHN GROSS and S. R. ZIMMERLEY. *Bur. Mines, Repts. of Investigations* No. 2880, 10 pp.(1928); cf. *C. A.* 22, 1072. E. H.

Progress report on cast iron for enameling purposes. W. N. HARRISON, C. M. SAEGER, JR., and A. I. KRYNITSKY. U. S. Bur. of Standards. *J. Am. Ceram. Soc.* 11, 595-608(1928).—Blisters due to castings were studied by an enameling test which included a variety of firing treatments. Different irons showed different blistering tendencies. Successive heats of the same iron "may have different blistering tendencies." The main source of blisters from the irons studied was overcome by the removal of a thin surface layer of the casting, either mechanically or chemically.

C. H. K.

Enamels containing antimony. F. M. LITERSCHIED. *Z. Untersuch. Lebensm.* 55, 296-7(1928); cf. *C. A.* 22, 2040.

WILLIAM J. HUSA

The effect of lepidolite in a high-tension electrical porcelain body. ROBT. TWELLS. General Elec. Co. *J. Am. Ceram. Soc.* 11, 644-8(1928).—Lepidolite was tried as a substitute for feldspar. Results show that changing the RO by molecularly replacing K_2O by Li_2O raises the vitrification temp., but replacing feldspar, lb. for lb., by lepidolite lowers the vitrification temp. Lepidolite gives a fine, white appearance. The chief improvement due to lepidolite is increase in resistance to thermal shock. Lepidolite is too expensive for wide use. Its chief ceramic use will doubtless be in glass and enamels where the full benefit of its F content and low fusing temp. can be utilized.

C. H. K.

The cementing of high-tension insulators. KARL WAGNER. *Sprechsaal* 61, 91-9 (1928).—A discussion on the prepn. and method of application of cements to high-tension insulators. R. A. HEINDL

Tests of clay and concrete load-bearing pipe (SCHLICK) 20. Electrochemical behavior of silicate glasses (MULLIGAN, *et al.*) 4. Kaolin and associated clays of Punk Island (COLL, MCMAHON) 8. The change of the hydrogen-ion concentration of stable kaolin suspensions due to mechanical agitation in capillary tubes (JEPPSEN) 2. Representing a four-component system with a parallelogram (SPINDEL) 2.

BITTERLING, AUGUST. *Lehrbuch der Emaillierkunst*. Leipzig: W. Diebener. 98 pp. Cloth bound. M. 7.75.

Apparatus for feeding mold charges of molten glass. SIDNEY S. GROTTA (to Hartford-Empire Co.). U. S. 1,680,735, Aug. 14.

Apparatus for feeding mold charges of molten glass. KARL E. PEILER (to Hartford-Empire Co.). U. S. 1,680,391, Aug. 14.

System of feeding mold charges of molten glass. GEORGE E. HOWARD (to Hartford-Empire Co.). U. S. 1,680,543, Aug. 14.

Apparatus for producing mold charges of molten glass. WILLIAM J. MILLER (to Hartford-Empire Co.). U. S. 1,681,127, Aug. 14.

Apparatus for making sheet glass. JOTHAM F. BLACK (to Hartford-Empire Co.). U. S. 1,680,588, Aug. 14.

Apparatus for forming sheet glass. HARRY G. SLINGLUFF (to Pittsburgh Plate Glass Co.). U. S. 1,679,504, Aug. 7.

Apparatus for producing and rolling sheets of glass. JAMES C. BLAIR (to Libbey-Owens Sheet Glass Co.). U. S. 1,680,241, Aug. 7.

Apparatus for drawing glass in endless sheets. LEWIS D. BLACKSHERE (to Libbey-Owens Sheet Glass Co.). U. S. 1,680,240, Aug. 7.

Forming sheet glass. LEOPOLD MAMBOURG (to Libbey-Owens Sheet Glass Co.). U. S. 1,680,227, Aug. 7. A protective film such as a graphite "para mica" and oil mixt. is applied by spraying to either the glass sheet or to parts of the app. with which the sheet comes into contact during its formation.

Sheet or plate glass. Y. BRANCART. Brit. 282,638, Dec. 21, 1926. Air or other suitable gas is introduced between sheet or plate glass and its support, to equalize cooling of the 2 sides of the material. An app. is described.

Uniting different layers of glass by rolling. Y. BRANCART. Brit. 282,637, Dec. 21, 1926. Mech. features.

Tunnel leer for annealing glassware. THOMAS E. BEACH (to Hartford-Empire Co.). U. S. 1,680,361, Aug. 14.

Glassware. PIERRE ARBEIT (to Hartford-Empire Co.). U. S. 1,680,357, Aug. 14. A flame is directed upon the region of the surface of glass in a tank where gathering takes place to reheat glass which may be chilled by contact with a gathering implement.

Blowing hollow glassware. HENRY W. INGLE (to Hartford-Empire Co.). U. S. 1,680,544, Aug. 14. Mech. features.

Molding bottles or similar hollow glassware in single-mold machines. KARL E. PEILER (to Hartford-Empire Co.). U. S. 1,680,746, Aug. 14. Mech. features.

Glass for incandescent lamps. COMPAGNIE DES LAMPES. Fr. 634,384, May 14, 1927. Flame-colored glass is made by adding red oxide of iron, MnO_2 , and niter to a standard compn. of clear glass.

Purification of kaolin. YVES M. PIRAUD. Fr. 633,745, May 3, 1927. The kaolin is made into a milk in water and colloids such as gum arabic, gum tragacanth, agar or pectin, etc., are added which transforms the kaolin into the colloidal state and the impurities settle.

Silica articles. EUGENE HERZOG (to General Electric Co.). U. S. 1,680,681, Aug. 14. Massive silica articles are heated at the time of their manuf. (or for repair) to "an ambient temp." of about 1000° and the surface of the article is locally fused while the article as a whole remains unfused; the article is annealed before cooling begins. An app. is described.

Ceramic material. F. SINGER. Brit. 282,403, Dec. 17, 1926. A ceramic material of low coeff. of expansion is formed by mixing steatite or other similar compd. of Mg or of the alk. earths, in the solid state, with Al compds. and heating until 3 phases are formed, one phase being a glass having a n of 1.53-1.55 and the other 2 phases being crystallites, the first crystals of the sillimanite type, including mullite, and the second

crystals of the forsterite and enstatite type. Brit. 282,404 relates to preventing aging of ceramic materials (minimizing the formation of amorphous constituents) by adding compds. of elements such as Ce, Zr, Cr, Mn, P, W and V to the main ingredients comprising silicates of Al or Mg and double compds. of these fundamental constituents such as kaolin, quartz and feldspar clay, steatite and $\text{Al}(\text{OH})_3$, kaolin and magnesite. The addns. may be in the form of oxides, carbonates, silicates or aluminates.

Drying chambers for ceramic materials. ALBERT GÉIS and LÉON FRITSCH. Fr. 634,101, May 10, 1927. The drying chambers are heated indirectly by the smoke from the furnaces.

Casting ceramic articles. ARTHUR O. AUSTIN (to The Ohio Brass Co.). U. S. 1,679,345, Aug. 7. A slip is deposited about a yielding core which may be formed of rubber and the core is removed from the formed article.

Centrifugal molding of insulators or other porcelain articles. LAURENCE R. WILDER. U. S. 1,680,832, Aug. 14. Mech. features.

Refractory materials. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 634,021, May 7, 1927. A refractory material is made from a refractory metallic oxide, such as zirconia, with lime and short white asbestos fibers. An example gives 65% of zirconia, 5% of slaked lime and 30% of asbestos. The mixt. is moistened with water, molded and heated in a furnace and then submitted to steam pressure and again dried.

Refractory structure with vertical passages, for air heaters, etc. OTTO STRACK (one-half to the Firm Pfälzische Chamotte- und Thonwerke Schiffer & Kirscher A.-G.). U. S. 1,679,993, Aug. 7. Structural features.

Abrasive compositions. L. E. BARRINGER (to British Thomson-Houston Co., Ltd.). Brit. 281,711, Dec. 3, 1926. Grinding-wheels, whetstones, "sand paper" or other abrasive articles are made of abrasive grains bonded with a condensation product of a polybasic acid and polyhydric alc., suitably with the addn. of plasticizing agents such as indene polymer, tricresyl phosphate, glycol diacetate, diethyl phthalate, benzyl benzoate, triacetin, cumar resin, ester gum, pitch, diphenyl or a natural gum. The material may be molded hot and subsequently cured under heat and pressure.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Volume changes in portland cement as affected by chemical composition and aging. ALFRED H. WHITE. Univ. of Michigan. *Proc. Am. Soc. Testing Materials* 1928 (preprint 56), 24 pp.—Aging of sound portland cement prior to use does not minimize vol. changes in the hydrated cement caused by continuous storage under water or by changes in its moisture condition. A cement burned from a normal raw mix to which 5% of 12-20 mesh calcite had been added, and therefore contg. free lime, showed excessive increase in vol. after hardening when stored in water and in air. After exposing the same clinker outdoors for 4 months the cement exhibited normal vol. changes. One and two % of finely ground, hard-burned magnesia added to cement did not greatly affect vol. changes observed over a period of 26 years. The same cement with 3% added MgO was about normal for 3 years, showed a marked expansion for the next 5 years and was normal thereafter, the total expansion being about 1.1%. Similar behavior was observed with cements from lab.-burned clinker which from its compn. presumably contained free MgO . Portland cements high in Al_2O_3 had rather rapid but otherwise normal expansion. A high Fe_2O_3 content in portland cement apparently decreases vol. changes. RAYMOND WILSON

Volume changes in hydrated portland cement. ALFRED H. WHITE. Univ. of Michigan. *Cement* 33, No. 2, 41-5 (1928).—The stiff gel which is one of the products of hydration of portland cement absorbs and gives up water with changing humidity. The length of a neat cement bar may vary by as much as 0.5% between the dry and the satd. state (cf. C. A. 13, 2117). RAYMOND WILSON

Alternate hardening of portland cements. HANS KIEHL. *Pit and Quarry* 16, No. 9, 43-6 (1928).—Data are given on mortar strengths in tension and compression of 25 cements cured in water, in air and by various combinations of the 2 methods. RAYMOND WILSON

The effect of litharge on the hardening of portland cement. BERNWARD GÄRNER. *Z. anorg. allgem. Chem.* 169, 305-8 (1928); cf. C. A. 22, 149. RAYMOND WILSON

The effect of several mechanical features of testing on the determination of the

flexural strength of plain concrete. T. F. WILLIS AND F. N. WRAY. Missouri State Highway Commission. *Proc. Am. Soc. Testing Materials* 1928 (preprint 64), 9 pp.—The relation between the results obtained by several different methods and the effect of certain features, such as length of span, type of bearings, and rate of application of stress, are shown. Results obtained with the different methods vary widely, indicating the need for standardization of this test. RAYMOND WILSON

Some accelerated freezing and thawing tests on concrete. C. H. SCHOLER. Kansas State Agr. Coll. *Proc. Am. Soc. Testing Materials* 1928 (preprint 62), 15 pp.—The alternate freezing of satd. concrete at low temps. and thawing at room temps. is a valuable means of studying the durability of concrete and concrete aggregates. Variations in the water-cement ratio of plastic workable concrete have a very marked effect upon its durability. A water-cement ratio of 1.0 is near the max. permissible for a desirable durability of concrete in exposed situations. The use of unsound aggregate produces unsound concrete, the resistance of the mortar to disintegration being only slightly effective in protecting the aggregate. The disintegration of concrete through the failure of the mortar is a surface action and the outside is very badly disintegrated before the interior is affected. The phys. characteristics of the mortar after failure are such as to give the impression of chem. or soln. action. The results secured are comparative only, and it is not feasible to translate them into actual length of life under natural conditions. RAYMOND WILSON

Concrete control methods in the construction of a filtered-water reservoir. W. C. MABEE. *J. Am. Water Works Assoc.* 19, 193-200(1928).—The ratio of water to cement when mixing concrete was made part of the contract when constructing a covered, filtered-water reservoir for the Indianapolis Water Company. A 28-day strength of not less than 2500 lb. per sq. in. in compression was aimed at and achieved by careful control of this ratio and by study of the conditions relative to aggregates, time of mixing, distribution, placing, puddling, etc. On test, under 14-ft. head, the tank lost only 0.3% of its volume in 24 hrs. B. C. A.

Failure of lean concretes to harden. BERNWARD GARRE. *Z. anorg. allgem. Chem.* 169, 301-4(1928).—Quantities of salts in aggregate or mixing water which would not noticeably affect rich concrete may prevent hardening in lean concrete. R. W.

Experimental tests of concrete-steel bond. L. N. EDWARDS AND H. L. GREENLEAF. Maine State Highway Commission. *Proc. Am. Soc. Testing Materials* 1928 (preprint 65), 14 pp.—Bond tests were made on specimens molded with 1-in. rods placed horizontally. Mineralogical and granulometric compn. affect bond strength. High cement content may reduce bond strength, probably because of greater vol. changes on drying. Very wet mixts. have lower bond strength than plastic mixts.; the lower surface of the bar as molded has little or no bond with very wet mixts. R. W.

Tests of clay and concrete load-bearing pipe. W. J. SCHLICK. Eng. Expt. Sta. Iowa State College. *Proc. Am. Soc. Testing Materials* 1928 (preprint 66), 12 pp.—This paper discusses some of the more common problems of test procedure. Particular attention is given the problems encountered in the use of the two most common of the standard bearings, sand bearings and three-edge bearings, in tests of different sizes and classes of pipe and to the necessity for controlling the moisture and temperature of the specimens if truly comparable test results are to be obtained. The real meaning and value of the absorption test are discussed and certain common, but incorrect, procedures in the drying and immersion treatments are pointed out. The freezing and thawing test is the only direct durability test that has been standardized. The problems of durability against chem. attack have been solved only partially. R. W.

Deterioration of structures of timber, metal and concrete exposed to the action of sea-water. JOHN PURSER AND H. J. GROSE. *Dept. Sci. Ind. Research, 8th Rept. Comm. Inst. Civil Engineers* 1928, 75 pp.—This report is a brief summary and abstract of a broad field study of deterioration of exptl. structures carried on by the committee over a period of years. Included are a summary of reports on periodical exams. of the iron and steel specimens exposed at Colombo, Plymouth, Halifax and Auckland, a report on the final examn. of the first series of iron and steel specimens exposed at Auckland, N. Z. over a period of 5 years, a summary of report on the periodical inspection of the first series of painted steel plates exposed to aerial corrosion at Southampton, a report on the painting of a second series of steel plates for exposure to sea action, a report on work on the protection of timber, a report on the condition of specimens of timber exposed to sea action and a report on expts. on reinforced-concrete test blocks, with various depths of cover, exposed at Brisbane. There is, in general, but little difference between the rates of corrosion of Low Moor wrought iron and mild steel when exposed to complete immersion in the sea. In the alternate wet and dry

tests the advantage lies with the wrought iron, but in the aerial tests the mild steel proved distinctly superior. The presence of S in steel tends to enhance its rate of corrosion. The addition of Cu up to about 2% enhances to an appreciable extent the resistance of the metal to corrosion. Cr and Ni steels are very resistant to sea air and to alternate exposure to sea water and air. Under conditions of continuous immersion in sea water, the advantage over wrought iron and C steels is less marked insofar as loss in wt. is concerned. They are, moreover, liable to very severe pitting. The cast irons apparently proved the most resistant metals to corrosion when loss in wt. and pitting are considered. In certain cases there is evidence of internal corrosion and this is being investigated. When dissimilar metals are placed in contact or riveted together, there is a tendency for one metal to be preserved at the expense of the second, which corrodes very severely. This is especially noteworthy where mild steel is in contact with Cr or Ni steels, the mild steel undergoing rapid disintegration, while the alloy steels remain practically perfect. In general, bars that had been ground free from scale before exposure lost less in wt. and appeared less deeply corroded than when exposed with the scale adhering. Attention is directed to the extreme danger of drawing conclusions from isolated and unconfirmed tests. In this connection it is indicated how marine growths may mislead the investigator. At one place oil present on the surface of the sea afforded some protection to the corroding metals. One steel, high in S and P and low in Mn, was the worst steel bar as regards pitting and loss in wt. in the aerial tests. Impregnation of wood was found to be much better than painting as a protective measure. Tar was found to be very effective as a preservative of steel plates exposed to corrosion. Biol. studies on various marine organisms causing deterioration of wood structures are being continued.

L. B. MILLER

Report of Committee D-4 on road and paving materials. JULIUS ADLER, *et al.* *Proc. Am. Soc. Testing Materials* 1928 (preprint 73), 34 pp.—A tentative method of test for abrasion of gravel, a tentative recommended practice for bituminous paving plant inspection and several minor revisions of existing tentative standards are proposed. An appendix gives results of distn. tests by several labs. on 2 tars using Engler and E-1 distn. flasks. Agreement between the 2 methods of test is of the order of 2%. R. W.

Slag bricks and paving stones in Germany. A. GUTTMANN. *Arch. Eisenhüttenw.* 1, 339-44(1927).—Processes in use in Germany for the manuf. of slag building bricks are indicated, and the suitability of blast furnace slags for such purposes is discussed. The properties of the bricks are described and methods for testing their strength suggested.

J. BALOZIAN

Experiments with blast-furnace slag pieces as track bedding material. H. BURCHARTZ AND C. SAENGER. *Arch. Eisenhüttenw.* 1, 177-86(1927).—Comparative tests are made with 9 slags and 9 quarry stones, including their resistance to the action of rain and frost, their chem. action on Fe and wooden sleepers and the resistance of the materials to breaking (according to Rudeloff). From these expts. it is apparent that the slags tested are equiv. to most scrap quarry stones.

J. BALOZIAN

The rational carbonization of wood. V. GAMBAROTTA. *Notiz. chim.-ind.* 3, 355, 357(1928).—Various reasons are given to show that the present practice of carbonizing wood in heaps to charcoal is so uneconomical that it should be replaced by new and better systems, where the wood is heated in the absence of air and the by-products are recovered completely. The distn. equipment should be located at the source of the wood. Some of the present types of portable app. are superior in various respects to carbonization in heaps, particularly in the much higher yields, and carbonization by the older method should immediately be discontinued in favor of portable app. carbonizing where the wood is obtained.

C. C. DAVIS

Prevention of sap stain in white pine. C. E. DIXON. State Forest Service, Wellington. *New Zealand J. Agr.* 36, 118-24, 194-200(1928).—Sap stain of New Zealand white pine (*Podocarpus dactyloides*) is caused by (1) chem. action due to enzymes in the wood which produce more or less permanent discoloration in both the heartwood and sapwood and (2) fungal attack which produces blue discoloration resulting from several genera of fungi, mostly *Penicillium* and *Cladosporium*, which feed on the sol. sugars present in the sapwood. Sap stain attack may be retarded and almost eliminated by (a) dipping the freshly sawed timber in a satd. borax soln. and (b) by using the open-filletted box type of stacking. Neither (a) nor (b) is in itself sufficient to prevent sap stain attack, and both operations must be carried out in conjunction.

K. D. JACOB

Concrete-lined [oil] storage reservoir (HOUGH) 22. The essential oil of "Hiba"-wood and its relation to the resistance of the wood to destruction by fungi (UCHIDA) 17.

Examination of a Nigerian lignite [for cement manufacture] (WOOD, NICHOLAS) 21. Furnaces [for cement and gypsum] (Fr. pat. 634,013) 1. Phosphoric acid and calcium compounds [cement aggregate] (Fr. pat. 633,828) 18. Rubber-composition flooring (U. S. pat. 1,678,948) 30. Distilling oil shale [product for use in cement manufacture] (U. S. pat. 1,678,751) 22. Fungicides [for wood treatment] (Fr. pat. 634,605) 15. Spraying apparatus for coating stone (Brit. pat. 281,885) 1.

SPARRE, DE: Determination du coefficient d'élasticité du ciment ou du beton au moyen de la vitesse du coup de bélier dans les conduites. Paris: Gauthier-Villars et Cie. 6 pp. F. 1.

Cement. DR. A. WACKER GES. FÜR ELEKTROCHEMISCHE INDUSTRIE. Brit. 282,458, Dec. 20, 1926. Dry $\text{Ca}(\text{OH})_2$ obtained from producing C_2H_2 by reaction of a small proportion of water on CaC_2 is mixed with clay or other siliceous and aluminiferous material to form portland cement.

Cement. G. POLYSIUS. Fr. 634,518, May 17, 1927. A fused aluminous cement is made by charging the crude substances in lumps into a rotating furnace. Cf. C. A. 22, 3277.

Acid-proof cement. I. G. FARBERNIND. A.-G. Brit. 281,680, Dec. 1, 1926. Instead of pure Si, as described in Brit. 258,616 (C. A. 21, 3114), a pulverized alloy of Si with Mg, Ca, Al or Fe is added to waterglass cements. Cf. C. A. 22, 1225.

Apparatus and mixing system for hydrating cement or for similar operations. ERLE P. HALLIBURTON. U. S. 1,680,678, Aug. 14.

Pitch concrete for roadways, etc. MARCEL LEVY (to "Prodor" fabrique de produits organiques S. A.). U. S. 1,681,353, Aug. 21. A graded aggregate and filling material are incorporated into a hard pitch by the action of heat and this pitch concrete is laid as a substratum; it is hard and non-plastic and has a crushing strength of at least about 4000-5000 lbs. per sq. in. and a tensile strength, when the large aggregate is not present, of about 400-500 lbs. per sq. in. A thin adherent surface layer of plastic material such as asphalt is placed on this substratum.

Centrifugal molding of concrete pipes, etc. R. A. WHITSON. Brit. 281,941, May 17, 1927. Springy sheet metal liners are placed within the mold used and these may be coated with oil, wax and grease and may be withdrawn from the mold before its sepn. from the molded article. Various mech. features are described.

Artificial stone or plaster. W. A. OAKLEY. Brit. 281,757, Sept. 6, 1926. A hot soln. of MgCl_2 , FeCl_3 or other suitable chloride is added to a mixt. of MgO and a filler such as a carbonate, siliceous or aluminous clay, calcareous earth, kaolin, sand or CaSO_4 . A sulfate such as alum also may be added when a calcareous earth or alk. clay is used as a filler to produce a dry material which sets on addn. of water by mixing the ingredients in appropriate order. A small proportion of alk. silicate may be added to the chloride soln. when other fillers are used.

Tar for roads, etc. PAUL GLOESS and MICHEL MARINI. Fr. 633,687, Sept. 6, 1926. Alginic acid or alginates are used for making emulsions of tar, asphalt, oils, etc., to be used on roads.

Wall coverings on brick walls. R. J. BIEBER & Co. GES. Brit. 282,329, Dec. 14, 1926. Brick walls are coated with a waterproof cement (which prevents saline excrecence) and a covering material is directly applied to the moist cement without glue or paste.

Protective coatings on metal, wood, masonry or other surfaces. JOHN B. W. GARDINER. U. S. 1,678,980, July 31. An emulsion of bituminous material which may contain soap or clay and which is formed free from soap is applied to the surface and while still wet is covered with a layer of dry cement which abstracts water for its hydration from the emulsion.

Staining wood. GEORGE A. RICHTER, WALLACE B. VAN ARSDEL and JOHN G. GOSSELINK (to Brown Co.). U. S. 1,680,529, Aug. 14. Wood is heated above 100° to vaporize free moisture and expel the air content of the wood together with the steam produced; the wood is confined and is treated with NH_3 while hot, under pressure, and the stained wood is removed from confinement while still in heated condition.

Impregnating wood. WACŁAW IWANOWSKI and JOSEF TURSKI. Fr. 634,106, May 10, 1927. Di-, tri- or polychlorophenols or nitrochlorophenols or the condensation products of chlorophenols with AsCl_3 are used for preserving wood.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

The production of domestic fuel. IV. JOHN ROBERTS. *Gas J.* **183**, 153-4 (1928); cf. *C. A.* **22**, 3278.—Discussion of the Hellar-Bamag process. V. *Ibid* 211-2.—Systems employing producer-type retorts are described. The Sutcliffe briquetting and Midland Coal Products processes are discussed. VI. *Ibid* 265.—The MacLaurin and L. & N. processes are discussed. F. S. GRANGER

Testing and sampling of different fuels. *Izvestiya Teploekkh. Inst.* (Russian) (*Bull. Inst. for Fuel Research*) **1927**, No. 8, 65-93.—Instructions have been adopted by the "Second All-Union Fuel Congress" and "Fourth All-Union Mendeleyeff Chemical Congress" for the sampling and analysis of firewood, peat, lignite, coal and other fuels. These are contained in this article. A. A. BOEHTLINGK

National fuels (of Italy). L. VERTÙ. *Notiz. chim.-ind.* **3**, 421-2 (1928).—A discussion of the present fuel situation in Italy, with quant. data on the phys. and chem. characteristics of the most important Italian fuels. C. C. DAVIS

The use of carbon as an economic fuel (in internal-combustion engines). A. CHARLES ROUX. *Chimie et industrie* **19**, 793-800 (1928).—An address discussing the relative merits and disadvantages of various forms of C (raw wood, wood charcoal, peat charcoal, lignite charcoal, raw bituminous coal and semi-coke) for use in gas producers for automobiles. R. considers that by a suitable blending of these various materials a product (which he calls "granol") may be obtained suitable for use in automobiles, at a retail cost not over 50% that of gasoline (for the same calorific power) and in a form which could be distributed as conveniently and easily as gasoline. A. PAPINEAU-COUTURE

Low-temperature carbonization. DAVID BROWNLEE. *Iron Coal Trades Rev.* **66**, 940-1 (1928).—Twelve of the latest and lesser known low-temperature carbonization processes are described. LESLIE B. BRAGG

Low-temperature carbonization. C. H. LANDER. *Iron Coal Trades Rev.*, Diamond Jubilee Issue, 83-7 (Dec., 1927).—A review and discussion. LESLIE B. BRAGG

The "Turner" process of low-temperature carbonization. A. W. SANDERS. *Iron Coal Trades Rev.* **64**, 520-2 (1927).—The process, which consists chiefly of a continuous vertical retort, internally heated by superheated, low-pressure steam, is described in detail. Pressure is alternately built up and then suddenly released in the retort, which, it is claimed, assists in releasing the volatiles. LESLIE B. BRAGG

Some facts regarding the low-temperature carbonization of coal. G. S. HASLAM AND R. V. WHEELER. *Fuel in Science & Practice* **7**, 292-9 (1928); *Trans. Inst. Mining Eng.* **75**, Pt. 2, 175-87 (1928).—A discussion of the products obtained and technical and economic considerations of low-temp. carbonization. D. A. REYNOLDS

A general review of low-temperature carbonization. F. S. SINNATT. Sheffield, Eng. *Fuel in Science & Practice* **7**, 305-29, 364-75 (1928), cf. *C. A.* **22**, 1456.—Yields and compns. of tars and gases for the following processes are given: Parker, Midland Coal Prod., Fusion Rotary, Freeman Multiple, MacLaurin, Lehigh Smokeless Fuel, Illingworth, K. S. G., Salerno, Fuel Research. These and other processes are discussed. D. A. REYNOLDS

The relation between low- and high-temperature carbonization of coal. AKIRA SHIMOMURA. Kyoto Imperial University, Japan. *Fuel in Science and Practice* **7**, 119-27 (1928).—The behavior of 7 coals of different geological age during a 2-stage carbonization process is described. For the low-temp. carbonization test 20 g. of air-dried coal, passing a 0.25-mm. mesh, were heated to 500° in 45 min. in a Fischer Al retort, and that temp. was maintained for 45 min. For the high-temp. carbonization test 15 g. of semi-coke, passing a 0.25 mesh, were heated in a tube furnace from 500° to 900° in 40 min. and held at that temp. for 30 minutes. The yields of various products were detd. and the gas and coke analyzed. In these tests: (1) tar is driven off completely below 500°; (2) only 10 to 20% of the total NH₃ is formed below 500°; (3) the vol. of gas generated at the higher temp. is 2 to 2.5 times that generated at the lower temp. The differences in the values of low- and high-temp. gases are stated thus: (a) the yields of CO₂ and CO are reversed, the latter predominating in high-temp. gas; (b) practically no generation of unsatd. hydrocarbon gases occurs by further heating the semi-coke; (c) in the low-temp. gas, CH₄ and C₂H₄ exist in large quantities (30-35% and 13-22%, resp.), while H is low (9-21%). The high-temp. gas contains 55 to 70% H and 19 to 22% CH₄. D. A. REYNOLDS

Conversion of coal into oil by treatment with hydrogen under high pressure. J.

IVON GRAHAM. *Iron Coal Trades Rev.*, Diamond Jubilee Issue, 87-90(Dec., 1927); cf. C. A. 22, 1665.—A review and discussion. LESLIE B. BRAGG

The optimum utilization of coal. OTTO HUPPERT. *Z. Ver. deut. Ing.* 72, 975-83 (1928).—Developments in coal utilization by the use of the Haber-Bosch NH_3 synthesis process, newer gas producers employing powdered coal, manuf. of $(\text{NH}_4)_2\text{SO}_4$ from NH_4OH and gypsum, prepn. of NaNO_3 and HNO_3 , coal-gas distn., by-product coke ovens, low-temp. distn. processes, prepn. of petroleum substitutes, hydrogenation of coal and tar, reactions involving CO , CO_2 and H to produce alcs., aldehydes and acids, gas producers with O-feed, Bergius process for oil production, hydrogenation of hydrocarbons, use of selective catalysts to produce specific substances, the controlled oxidation of CH_4 to form CO and H_2O or CO_2 and H , are discussed in a most general way. Recent work of the I. G. Farbenindustrie is given prominence. W. C. EBAUGH

Developments in coal treatment and utilization. JOHN CADMAN. *Iron Coal Trades Rev.*, Diamond Jubilee Issue, 70-2(Dec., 1927).—A review and discussion. LESLIE B. BRAGG

The treatment and utilization of coal in gasworks. G. M. GILL. *Iron Coal Trades Rev.*, Diamond Jubilee Issue, 78-83(Dec., 1927).—A review. L. B. B.

The present stage of British coal cleaning. HENRY LOUIS. *Iron Coal Trades Rev.*, Diamond Jubilee Issue, 67-70(Dec., 1927).—A review. LESLIE B. BRAGG

Spontaneous heating of coal. JOSEPH D. DAVIS and D. A. REYNOLDS. *Bur. Mines, Tech. Paper* 409, 74 pp.(1928).—The affinity of coal for O and other properties and conditions which underlie its tendency to heat spontaneously, the erratic heating behavior of coal in storage, and some common storage practices are discussed. The important results obtained in different countries during the past 50 yrs. through fundamental investigations on the factors which influence spontaneous heating of coal are assembled and correlated with the work done on this subject by the Bureau of Mines, discussions being limited mainly to work done since 1900. The names and chief contributions of each of the prominent investigators are given in approx. chronological order, followed by a general summary of conclusions to be drawn from their researches. The theories of spontaneous heating of coal, early pyrite, coal-O complex, reactions of parts of coal with O and equil. between coal and O are explained. The methods which have been used to det. the oxidizing tendency of coals are divided into large-scale tests and lab. methods; of the latter there are 4 general classes: those that depend on the self-heating of coal at elevated temps., isothermal, adiabatic and purely chem. methods. An extended critical review of these methods, with their variations and of results obtained by each, is given together with abstracts of the data secured, 14 sets of graphs, some drawings and descriptions of app. used, and 3 photomicrographs showing banded constituents and fine pyrites in coal. These reviews include oxidation expts. on samples of whole coal, wet, dry and preheated to various temps.; on each of the banded constituents of coal including mineral charcoal; on materials extd. from coal by solvents; on coals treated with CaCl_2 , $\text{Ca}(\text{OH})_2$, NaHCO_3 , FeSO_4 , NaOH , KOH , NH_4OH , ozone, and bacteria; of weathering and ulmification; and on low-temp. cokes. Expts. on the chem. and phys. factors affecting spontaneous heating of coal are also considered. The authors present these conclusions: All coals except anthracites undergo spontaneous heating; the chem. constitution of coal varies with its rank and low-rank coals heat more easily than high-rank or older coals; oxidation of the coal substance itself is the main cause of spontaneous combustion, but no one constituent exerts a preponderant influence. The 1st stage in spontaneous heating is operative at room temp. as soon as freshly broken coal is exposed to the air and consists in the formation of a solid compd. of coal and O; the 2nd stage involves the decompn. of this compd. and with Appalachian coals begins at about 85°F and is completed at about 445°F . There is no sharp transition temp. from one stage to the other and both processes go on simultaneously from about 85° to 445°F . Pyrite present in finely divided form is a contributing chem. factor, but is seldom the detg. one. Moisture other than being needed for the oxidation of pyrite is probably not a chem. factor. Org. S, ozone in the air, other chemicals tested and bacteria are not important practical factors. The most important phys. factors are size of coal and the initial temp. of exposure, provided sufficient O is present to sat. the coal. Heat capacity and cond. depend largely on moisture content and size of coal. Occluded gases probably have little effect. Suggestions made applying these conclusions to storage of coal are to exercise special care in storage of sub-bituminous coals and non-storage of coals contg. fine pyrites; avoid segregation of fine coal in the storage pile and carefully exclude foreign matter; wetting down the surface of the whole pile changes its ventilation and may favor heating at points not reached by the water. It is well to use temp. measurements to a depth

of at least 6 ft. from the surface of the coal pile. In common practice 150° F. is considered as approaching the danger point, but the heating curve for coal is a smooth one with no sharp breaks. The most fruitful studies of the future will probably be those that deal with storage conditions, especially on the effect of air supply. A nine-page bibliography containing over 200 references is included in this tech. paper.

W. W. HODGE

Combustion of powdered coal. B. MOORE. *Trans. Inst. Chem. Eng.* (advance proof), March, 1928, 12-24.—The degree of fineness of powdered coal affects considerably its rate of combustion, ignition properties, and "combustible capacity," as detd. by the method previously described (*C. A.* 19, 2398; 20, 3553). The rate of combustion increases and the "glow point temp." falls with increasing degree of fineness of the coal. The results indicate that there is a critical temp. and a critical degree of fineness at which the combustion of the particles becomes almost instantaneous.

B. C. A.

Wetting and its measurement. E. F. GRIEG. Sheffield, Eng. *Fuel in Science & Practice* 7, 136-8(1928).—G. measures the resistance to the spread of a liquid through coal dust by use of a modified form of the Sven Oden continuous weighing balance. The method is described and illustrated.

D. A. REYNOLDS

Notes on recent developments in fuel technology. R. WIGGINTON. *Fuel in Science & Practice* 7, 287-9, 333-5(1928); cf. *C. A.* 22, 2254.—Brief reviews of the following subjects: rockets, sea-temperature energy, vanillic acid from lignin, flue dust recovery, a high-pressure locomotive.

D. A. REYNOLDS

Kizel coals in U. S. S. R. N. P. CHIZHEVSKII. *J. Chem. Ind.* (Moscow) 5, 11-3 (1928).—The compn. of Kizel coals is as follows: ash 17.43-28.62%, S 5.2-7.86%, moisture 0.77-0.79%, volatile matter 37.25-38.66%, coke 60.56-61.96%. Microscopic examn. shows that S presents itself chiefly in the form of pyrite grains of less than 0.5 mm. size. Preliminary expts. have established that the coals may be enriched considerably by means of flotation after being pulverized. The cokes obtained from these coals by distn. on a small scale are hard and generally of good quality. Distn. of the coals on a large scale is being considered.

BERNARD NELSON

The "Kohlenveredelungs" process. DAVID BROWNLIE. *Gas Age-Record* 62, 129-31, 138(1928).—The "Kohlenveredelungs" retort for the continuous low-temp. carbonization of semi-dried lignite, a modification of the "Rolle" retort, is described. A plant, including 8 retorts and having a capacity of 480 tons of semi-dried lignite, 15-18% moisture, per 24 hours, is being constructed at Cothen-Anhalt, Germany.

LESLIE B. BRAGG

Some experiences gained in the control of the operation of steam boiler plants. GUSTAF EDLING. *Svensk Pappers-Tid.* 31, 277-9(1928).—An account is given of some experiences gained by the "Mellersta och Norra Sveriges Ångpanneforening" (Central and North Swedish Steam Boiler Assocn.) in carrying out a caloritechnical control of the operation of steam-boiler plants. Attention is called particularly to the defects and unsatisfactory conditions frequently demonstrated by this control. Coal users should consider not only fuel guarantees, but the conditions under which the coal is to be used. Pre-heated combustion air is beneficial with wood fuels of high moisture content. Mech. stoking is recommended, but requires care and watching. Firing with wood-waste alone or with wood-waste on top of coal is advantageous. Use of cam-flange economizers utilizes heat of exhaust gases.

WILHELM SEGERBLOM

The new orientation in the utilization of bituminous coals: conclusions to be drawn from the First International Conferences at Pittsburgh. CH. BERTHELOT. *Rev. métal.* 25, 322-30(1928).—A critical review of the papers presented at the Conference, particularly from the standpoint of French economic conditions. A. P.-C.

Manufacturing oil from oil shale and bituminous coal. G. W. WALLACE. *Combustion* 19, 87-90(1928); cf. *C. A.* 22, 3285.—The results of a series of tests on the low-temp. carbonization of bituminous coals and lignites are tabulated and discussed. The N-T-U direct heating process was used and a profit of \$2.18 per ton of coal was calcd. for a plant at the mine.

LESLIE B. BRAGG

New extraction apparatus for bitumen determination. R. KATTWINKEL. *Teer u. Bitumen* 26, 368(1928); cf. *C. A.* 22, 699.—The novel feature is in the condenser, near the bottom of the jacketed part of which is a reservoir for solvent recovery after extn., formed by an enlargement of the inner tube. When it is desired to collect the solvent, a stopcock in the lower neck of the condenser is closed and the vapor is then diverted through a side tube from below the stopcock into the top of the jacket and down through it into the reservoir. Both inner tubes are zig-zag. The app. is manufd. by W. Feddeler, Essen (Ruhr).

F. S. GRANGER

The production and utilization of benzene. R. BRUNSCHWEIG. *J. usines gaz* 52, 334-40(1928).—A statistical discussion. F. S. GRANGER

Progress in the purification of crude naphthalene. A. PENSA AND F. NANNI. Societa Sipe, Cengio. *Notiz. chim.-ind.* 3, 411-4(1928).—An historical review, with diagrams of equipment C. C. DAVIS

Examination of a Nigerian lignite and the isolation of montan wax. C. E. WOOD AND S. D. NICHOLAS. *J. Inst. Petroleum Tech.* 14, 493-501(1928).—Examn. of Nigerian lignite indicates that it is suitable for briquetting and considerable yields of montan wax can be obtained from it by extn. with common solvents, 25%, e. g., with Bu alc. The bitumen is better than some com. crude montan waxes of high melting point. The ash from the lignite is suitable for cement manuf. D. F. BROWN

The lignites and brown coals of the British Empire and the use to which they may be put. RICHARD REDMAYNE. *Bull. Imp. Inst.* 26, 151-61(1928).—A brief account of the several uses to which lignite is applied. A. PAINNEAU-COUTURE

The resins of Wealden lignite. R. WIGGINTON. Sheffield University, England. *Fuel in Science & Practice* 7, 118(1928).—Wealden lignite yields 3.6% sol. ext. with C_2H_5OH . Of this ext. 41.7% is sol. in $(C_2H_5)_2O$. A method of examn. of the ethereal soln. is given. D. A. REYNOLDS

A new low-temperature carbonization process. ANON. *Fuel in Science & Practice* 7, 134-5(1928).—The Bonnevie furnace recently tried out in France is described and illustrated. This furnace is formed of a series of horizontal retorts having internal mixers and placed vertically one above the other. They thus form a fractional distn. column in superimposed stages to sep. the by-products. The gases are drawn off at the temp. of each retort and there is a minimum of overheating and cracking. D. A. REYNOLDS

The past, present and future prospects of the gas industry. MICHELANGELO BOEHM. *Giorn. chim. ind. applicata* 10, 255-60(1928).—A general discussion, of particular interest to Italian chemists. C. C. DAVIS

Scrubbing gas electrically. F. BRAUNEIS. *Montan. Rundschau* 20, 198-202(1928).—A review. C. G. F.

Dutch bog ore and gas purification. ANON. *Gas World* 89, 33(1928).—Dutch bog ore has displaced lime as the favored purifying agent. Its value cannot be based on the content of hydrated ferric oxide alone. A mixt. of H_2S and coal gas was passed over 3 specimens in which the % Fe_2O_3 decreased while the % org. fibrous matter increased. The one contg. the least Fe_2O_3 yielded the highest S absorption and *vice versa*, in consequence of the better penetration afforded by the presence of the fibrous matter. A 4th specimen, of about the same Fe_2O_3 content as the lowest of the other 3, but with the remainder consisting mostly of siliceous clay instead of fibrous matter, absorbed more S than the one of highest Fe_2O_3 content but less than the others. F. S. GRANGER

The synthesis of ammonia from coke-oven gas. THOMAS BIDDULPH-SMITH. *Iron Coal Trades Rev.* 66, 179-80, 222-3(1928).—The extn. of hydrogen from coke-oven gas, by the liquefaction of the other constituent gases, for use in the synthesis of ammonia is discussed. LESLIE B. BRAGG

Use of coke-oven gas for town's supply. E. W. SMITH. *Iron Coal Trades Rev.* 64, 148(1927).—A discussion. LESLIE B. BRAGG

Coke—the domestic fuel. JOHN T. BYRNES. *Gas Age-Record* 62, 97-100(1928).—A discussion. LESLIE B. BRAGG

The progress and prospects of the coking and by-product industry. A. H. MIDDLETON. *Iron Coal Trades Rev.*, Diamond Jubilee Issue, 72-5(Dec., 1927).—A review. LESLIE B. BRAGG

Present commercial prospects for low-temperature coking. R. S. MCBRIDE. *Chem. Met. Eng.* 35, 468-9(1928). E. H.

New plant of Montreal Coke and Manufacturing Company. DONALD G. MUNKOE. *Iron & Steel Can.* 11, 228-30(1928). E. H.

New by-product coke-oven plant at the "A" Winning Colliery of the Blackwell Colliery Company, Limited. ANON. *Iron Coal Trades Rev.* 65, 128-30(1927).—The new battery of Koppers coke ovens and accompanying equipment is described. LESLIE B. BRAGG

The Orgreave coking plant. ANON. *Iron Coal Trades Rev.* 65, 257-61(1927).—A description. LESLIE B. BRAGG

Correlation of physical and chemical properties of cokes with their value in metallurgical processes. W. T. K. BRAUNHOLTZ, G. M. NAVE AND H. V. A. BRISCOE. Armstrong College, Newcastle, England. *Fuel in Science & Practice* 7, 100-17(1928).

—In an effort to correlate various properties of cokes with their known blast-furnace values chem. and phys. tests of the cokes were made. Shatter tests of 11 cokes were made by the U. S. Bureau of Mines method, modified slightly; in general, the blast-furnace values of these cokes increase with increasing shatter index and the quantity of fines ($< 1/8$ in.) caused by dropping increased with decreasing shatter index. Reliable results are obtained on using 25 lbs. instead of the usual 50-lb. samples. On using 50-lb. samples in a box 28 in. \times 18 in., there was indication of a cushioning effect not found with a box 30 in. \times 30 in. The cokes examd. varied little in density. Combustibility tests of 5 to 10 mesh (I. M. M.) coke in a const. air current were made in a silica tube-furnace of 2 in. internal diam. External heating was stopped at the time of ignition of the coke and fuel consumption was calcd. from the ratio of CO_2 to CO . Ignition temps. found were: by-product cokes 500° to 560° , beehive coke 613° , carbon 415° and activated charcoal 252° . The av. temp. maintained by the by-product cokes was 1180° to 1290° , by the beehive coke 1310° . These av. temps. showed no relation to the shatter indices; however, on dividing the cokes into 2 groups according to their max. temps., there was found a tendency for increasing fuel consumption to be accompanied by decreasing shatter index and decreasing "apparent" porosity. Methods for the detn. of sp. gr., porosity and water absorbed are given. By coking 50-lb. samples of coal contained in an iron box in full scale oven charges, it was found possible to obtain quant. information concerning the strength of the coke obtained from a given coal under given conditions. Further investigation of these "box" tests are to be made.

D. A. REYNOLDS

Determination of the coking value of coal. G. DORFLINGER. *Archiv. Eisenhüttenwesen* 1, 3-8(1927); *Rev. metal.* 25(Extraits), 263-6(1928).—In order to get coke of uniform quality, not only must the operating conditions be uniform, but so also must be the quality of the coal. The Borsig coking plant has devised a test (technic described in detail) for detg. the coking value of coal consisting essentially in sepg. the crushed coal into fractions of different d by means of $\text{CCl}_4\text{-C}_6\text{H}_6$ mixts. of d. 1.28, 1.32, 1.36, 1.40 and 1.595 and coking the various fractions in the lab. via Mück. Irregularities in the coking qualities of the coal can be compensated by judicious blending of the coal from different seams according to the results of the tests. A. P.-C.

Volatile matter and the reactivity of coke. YOSHIKIYO OSHIMA. *Imp. Fuel Res. Inst. J. Soc. Chem. Ind. Japan* 31, 506-7(1928).—O. has detd. moisture and volatile matter of coke under different conditions: (1) air-dried sample, (2) No. 1 sample but exposed to the atm. for 24 hrs. after the detn. of moisture and volatile matter, (3) No. 1 sample but exposed to the atm. for 24 hrs. after prepn. and (4) No. 1 sample but immersed in H_2O for 24 hrs. and then air-dried. From the result it is concluded that coke absorbs moisture which is not completely driven off at $105-10^\circ$, but remains at a higher temp. and it may be taken as a volatile matter. Volatile matter of coke is, therefore, not the same as that of coal, but mostly moisture absorbed or occluded and a part of it is eliminated at about 110° , while some of it can only be driven off at a higher temp. This is naturally due to the surface structure and it is accordingly correct to say that the reactivity is influenced by surface conditions, porosity and the state of C which govern the adsorption, but not the content of the so-called volatile matter.

K. KASHIMA

The effect of varying ash in the coke on blast-furnace working. C. S. GILL. *Iron Coal Trades Rev.* 65, 528-9(1927); cf. *C. A.* 21, 3868.—A 1% reduction in ash was found to save 42 lb. of coke per ton of pig and to give a 6.4% increase in make, with a more regular production.

LESLIE B. BRAGG

A process for partially dehydrogenating certain hydrocarbons in order to render them able to agglomerate carbon. ANDRÉ LÉAUTÉ and GEORGES DUPONT. *Compt. rend.* 186, 1558-60(1928).—Pitch, fuel-oil or coal-tar oil is heated with about 10% of S, when H_2S is liberated and partial dehydrogenation takes place. The product contains about 1% residual S, is more viscous and has much greater adhesive power than the original oil. It is suitable for use as a binder for briquetting fine particles of coal or C.

T. S. CARSWELL

A coal conductivity cell (SINKINSON) 4. Viscometry [experiments on motor fuels] (ROWELL, FINLAYSON) 22. Economic geology of the Castlegate, Wellington and Sunny-side Quadrangles, Carbon County, Utah (CLARK) 8. The caking of $(\text{NH}_4)_2\text{SO}_4$ (ADAM) 18. Production of pure S and NH_4 sulfate from crude impure S obtained from coke-oven gas (GLUUD, *et al.*) 18. The purification by simple distillation of crude S obtained from coke-oven gas (GLUUD, *et al.*) 18. Apparatus for carbonizing wood or similar materials (U. S. pat. 1,680,613) 22. Gas analysis apparatus (Brit. pat. 282,080) 1.

Apparatus for washing and separating materials of different densities [coal from shale] (U. S. pat. 1,681,164) 1. Catalytic purification of gases (Brit. pat. 282,634) 13. Apparatus for distilling tar on the surface of a heated coil (Brit. pat. 282,525) 1. Oxidizing H_2S in gases (Brit. pat. 282,508) 13. Desulfuration and hydrogenation of mineral oils, etc. (Fr. pat. 32,509) 22. Dome construction for stills for tar (Brit. pat. 281,928) 1. Agglomerating coal (Brit. pat. 282,104) 13. Apparatus for automatic control of valves of gas-producing plants (Brit. pat. 282,505) 1.

BAUMONT, M.: *La grosse industrie allemande et le lignite*. Paris: Gaston Doin et Cie. 158 pp. F. 18. Reviewed in *Chimie et industrie* 20, 202(1928).

KOREVAAR, A.: *Verbrennung im Gaserzeuger und im Hochofen*. Eine neue Theorie. Halle (Saale): W. Knapp. 137 pp. M. 8.40.

SCHNEIDER, GUSTAV AND WINTER, HEINRICH: *Handbuch der Kokerei*. Bd. I. Edited by Wilhelm Gluud. Halle (Saale): W. Knapp. 302 pp. M. 26.50, bound, M. 29.

Fuel. J. M. W. KITCHEN. Brit. 282,118, June 15, 1926. Graded particles of coke or hard coal of relatively large size are mixed with particles of soft bituminous coal of relatively small size, with or without anthracite dust. The mixt. may be partly coked in a retort or on a traveling grate and cooled before use.

Fuel. HUGH S. REID (to Canadian Electro Products Co., Ltd.) U. S. 1,680,392, Aug. 14. See Can. 280,524 (C. A. 22, 2829).

Gelatinizing liquid fuel for transport. JULES DONNER. Fr. 633,731, May 2, 1927. A soln. of soap in alc. with lime water is added to a hydrocarbon fuel to gelatinize it. To bring it back to the liquid state a small quantity of a 10% soln. in H_2O of $CaCl_2$ is added.

Distilling briquets of solid fuel. COMPAGNIE DES MINES DE BRUAY. Brit. 282,340, Dec. 18, 1926. Solid fuels may be mixed with powd. charcoal from sawdust, formed into briquets and these are embedded in material such as dust or grains of coal schist, roof coal of a schistous nature, sawdust, waste peat, bark scrapings, oil cake waste or other material adapted to produce gases and oils at the distn. temp.; this entire mass is then heated to a temp. which is raised in stages from 100° to 560° and tar and other volatilized products are collected. Cf. C. A. 22, 1842.

Carbonizing mixed fuels. JOSEPH M. W. KITCHEN. U. S. 1,678,863, July 31. Relatively large-sized particles of coke are mixed with smaller particles of bituminous coal and with anthracite dust and the mixt. is subjected to a "bituminous-coal-melting" temp.

Charging device for vertical retorts for fuel distillation. R. B. PARKER. Brit. 282,417, Dec. 14, 1926.

Vertical gas retort construction. R. B. PARKER. Brit. 282,418, Dec. 14, 1926. A sliding closure is arranged to vary the position of gas outlets at the upper portion of a retort to prevent channelling in the charge. Some other structural details are also specified.

Grate construction for retorts. R. B. PARKER. Brit. 282,419, Dec. 14, 1926.

Coal. ARVED PISTORIUS and CURT BUNGE. Fr. 634,351, May 13, 1927. See Brit. 277,293 (C. A. 22, 2456).

Pulverization of coal. ISAAC E. BRITT. Fr. 634,405, Sep. 14, 1926. The coal is carried along by a rapid current of compressed air and forced against baffle plates, which soon reduce it to powder.

Drying coal and other fuels. HANS FLEISSNER. U. S. 1,679,078, July 31. Coal or similar fuel of colloidal character is dried without disintegration by first heating it in satd. steam under pressure to a temp. (suitably about 120 – 180°) above that required for drying and then reducing the partial pressure of the steam to effect quick drying. Cf. C. A. 21, 2552.

Stable suspension and paste of coal. ROBERT GRIESSBACH and JULIUS EISELE (to I. G. Farbenind. A.-G.). U. S. 1,681,335, Aug. 21. In forming fuels, coal is mech. dispersed in a liquid alc. such as crude isobutyl alc. with addn. of a base such as NaOH, pyridine or aniline which is sol. in the alc.

Treating coal and oil for the production of liquid hydrocarbons. ALBERT E. HODGSON. Fr. 633,954, May 5, 1927. Finely divided coal is dispersed in an oil such as residual mineral oil, and the dispersion is heated under pressure if necessary. A part of the coal unites with or dissolves in the oil. The liquid is sepd. from the residue and may be used as a fuel or may be distd. for the recovery of hydrocarbons.

Manufacture of oils from coal. JOSEPH TRAUTMANN. Fr. 633,945, May 5,

1927. Instead of condensing the gases from the slow distn. retorts they are sent direct to a hydrogenation plant. Gases such as H_2S are first removed and H , CO , water gas, superheated steam or catalysts in powder form may be added to the gas before it enters the reaction chamber.

Carbonizing coal or briquets. MIDLAND COAL PRODUCTS, LTD., AND C. INGMAN. Brit. 282,511, Oct. 5, 1926. Low-grade gas produced in a primary coal or briquet carbonizing retort is used to carbonize the charge in one or more secondary retorts; the gas is burned and the combustion products are used to superheat steam which is passed through the secondary retorts.

Annular or straight ovens for carbonizing coal, peat, wood, shale or other materials. CHARLES B. WINZER. U. S. 1,678,687, July 31.

Apparatus for manufacture of mixed gas from coal or other carbonaceous material. MORRIS W. TRAVERS and FRANK W. CLARK (to Regenerative Coal Gasification System, Ltd.). U. S. 1,681,313, Aug. 21. A gasification chamber is located beneath and is in communication with a carbonization chamber; air and gas are alternately supplied to the bottom of the gasification chamber; a regenerator communicates with the top of the gasification chamber and with the bottom of the carbonization chamber and a sep. gas-enriching chamber communicates with the regenerator and is provided with an oil-spraying device; some of the gas issuing from the top of the carbonization chamber is forced through the regenerator and into the bottom of the carbonization chamber.

Heating carbonaceous materials with oils, etc. I. G. FARBENIND. A.-G. Brit. 282,691, Dec. 22, 1926. Materials such as coal, brown coal or coal residues from which bitumen has been extd. are heated under pressures of 10–1000 atm. with high-boiling hydrocarbons or their derivs. having no constituents boiling below 300° , such as anthracene oil, mineral or tar oils or their distn. products or products obtained by cracking, destructive hydrogenation or similar processes or synthetic products of high b. p. obtained from H and oxides of C . The products obtained may be used for making lubricating oils or as a fuel for Diesel engines, etc.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 282,384, Dec. 20, 1926. In the destructive hydrogenation of coal, mineral oils or tar as described in Brit. 249,155 (*C. A.* 21, 1002), when the hydrogenating gases are substantially free from CO or substances leading to its formation, the reaction chamber and such parts of the app. as are exposed to temps. above 300° are formed of materials free from uncombined Fe and Ni , and also from Cu and Ag if S is present. The app. is preferably constructed of Al or of alloys high in Al , or of Cr , Mo , W , V or Mn . The steels V2A and WT2 made by Krupp contg., resp., Cr 20, Ni 7 and C 0.1–0.3%, and Cr 18, Ni 60 and C 0.2% together with Fe may be used as may also the Cr Ni alloy B made by Heraeus contg. Fe 24.2, Ni 60.1, Cr 13.38, and C 0.02%. The alloys used should be freed from impurities in the boundaries of the grains by treatment with moist H .

Gas producer. RENÉ MARION. Fr. 634,365, May 13, 1927. A cylindrical gas producer is provided with a short inner cylinder which the combustion air enters, and the gases formed escape downwardly outside this inner cylinder.

Gas producer. ROBERT M. A. E. CÉZANNE. Fr. 634,396, Aug. 13, 1926; and Fr. 634,399, Aug. 30, 1926. Constructional features.

Gas producer for use on vehicles. DEUTSCHE ERDOL-A.-G. Brit. 282,341, Dec. 20, 1926. Structural features.

Gas-producer construction. GEORGE H. BENTLEY and EDMUND G. APPLEBY. U. S. 1,679,645, Aug. 7.

Gas-producer-conduit system. HARRY M. ROBERTSON (to American Dressler Tunnel Kilns, Inc.). U. S. 1,680,340, Aug. 14.

Production in a gas producer of a solid smokeless fuel. ILLINOIS ANTHRACITE CORP. Fr. 634,447, May 14, 1927.

Purifying gas. WALTER H. FULWEILER (to U. G. I. Contracting Co.). U. S. 1,679,858, Aug. 7. Illuminating gas or other gas contg. H_2S is treated with a soln. of an alk. salt to absorb H_2S as sulfhydrate, and the foul soln. is passed in film form over coke exposed to air for effecting preferential oxidation of the sulfhydrate.

Incandescent material for gas illuminating burners. A. STEPHENSON and ALLEN-LIVERSIDGE, LTD. Brit. 281,800, Sept. 22, 1926. A jet of C_2H_2 or other gas is caused to impinge on a pastille of thoria, lime, strontia, zirconia or the like in such a manner that ignition takes place at the point of contact of the jet with the pastille; the velocity of the jet is sufficient to prevent propagation of the flame towards the nozzle.

Water gas. SYNTHETIC AMMONIA & NITRATES, LTD., AND K. GORDON. Brit. 282,141, Sept. 11, 1926. In gasifying solid carbonaceous materials by reaction with

steam, with or without air or O, heat is applied externally through a heat-resisting metal such as an alloy steel, such as "Staybrite," "Era/A.T.V." or "V2A" steel. Reaction tubes $\frac{1}{2}$ in. in diam. may be heated to 1000° and when air is added a gas may be obtained suitable for NH₃ synthesis after removal of CO.

Water gas, methanol and hydrogen. SYNTHETIC AMMONIA & NITRATES, LTD., and H. A. HUMPHREY. Brit. 282,573, Feb. 22, 1927. Coal is dried at 200–300° by hot combustion gases to which air is added to effect partial oxidation and control the coking properties of the material and is then further subjected to low-temp. carbonization at not above 600° to produce a semi-coke for use in a water-gas generator. The water gas formed may be treated with steam at high temp. to convert the CH₄ into CO and H, or the semi-coke may be heated to a higher temp. before use for generating watergas free from CH₄. The gas mixt. is then passed over a catalyst containing finely divided Fe or other suitable metals at 200–300° to produce higher paraffin hydrocarbons. The residue from this treatment (or the original gas mixt.) is compressed and passed (after sepn. of paraffins and CH₄ if present) over a catalyst such as basic Zn chromate for producing MeOH, or may be treated with steam in the presence of an Fe oxide catalyst at about 500°, converting the CO into CO₂ which is then removed, leaving H which may be mixed with N for NH₃ synthesis.

Plant for making carburetted water gas. C. S. CHRISMAN (to Humphreys & Glasgow, Ltd.). Brit. 282,034, Dec. 10, 1926. A regenerator adapted to store the heat of the carburetted water gas is placed between the superheater and the wash box and is used for preheating the gas-making fluids. Various other structural features are also described.

"Heat accumulator" for generating steam in water gas plants. F. SCHUSSL. Brit. 281,727, Dec. 4, 1926.

Automatic control device for admixture of gas and air for combustion. FREDERICK H. WILLCOX (to Freyn Engineering Co.). U. S. 1,680,833, Aug. 14. An automatic device controls the proportion of gas and air in accord with the CO₂ content of the products of combustion.

Fire lighter. JULES BOUDY. Fr. 633,932, May 2, 1927. A fire lighter is made from naphthalene or naphthalene and resin and sawdust, the melted naphthalene being projected on to the sawdust.

Distilling tar. G. E. BRANDON (to Barrett Co.). Brit. 282,367, Dec. 14, 1926. Tar is distd. by spraying it into the hot gases produced in the carbonization of coal directly after the gases leave the retorts. App. is described.

Coking. R. B. PARKER. Brit. 282,416, Dec. 14, 1926. In the low-temp. carbonization of fuel in an upwardly tapering retort, a zone of combustion is maintained at a temp. of about 425° at the lower end and the residue is continuously removed from the lower end and fresh fuel supplied to the upper end without opening the retort to the atm. Air, steam, CO, or distn. gases may be supplied under pressure to the combustion zone and distn. products are withdrawn from near the top of the fuel column. Auxiliary heating flues may be provided in the walls of the retort.

Coke furnaces. TAR AND PETROLEUM PROCESS COMPANY. Fr. 634,541, May 17, 1927. Constructional features.

Vertical coking retort with interconnected charging and discharging devices. R. B. PARKER. Brit. 282,415, Dec. 14, 1926.

Coking retort oven construction. JOSEPH BECKER (to The Koppers Co.). U. S. 1,678,801–2, July 31.

Coking retort oven construction. JOSEPH VAN ACKEREN (to The Koppers Co.). U. S. 1,678,803, July 31.

Apparatus for cooling coke (partly by inert gas used for heating a steam generator). SOC. ANON. DES FOURN A COKE SEMET-SOLVAY ET PIETTE. Brit. 282,286, May 5, 1927.

Apparatus for recovering heat from coke. SOC. ANON. DES FOURN A COKE SEMET-SOLVAY ET PIETTE. Fr. 633,997, May 6, 1927.

Semi-portable carbonizing plant for making and for semi-coking briquets or balls from sawdust or similar material. J. R. RONGIER (to L. Dupont). Brit. 282,058, Dec. 8, 1926. An app. is described which is adapted for fuel drying, carbonizing and tar recovery.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

Economic and technical considerations dealing with the cracking process. M. NAPHTALI. *Notiz. chim.-ind.* 3, 277-8(1928).—A review and discussion of present developments. C. C. DAVIS

Survey of cracking plants, January 1, 1928. G. R. HOPKINS. *Bur. Mines Information, Circ. No. 6074*, 14 pp.(1928). E. H.

Cracking topped West Texas crude oil. W. F. FARAGHER AND J. C. MORRELL. *Universal Oil Products Co. Oil & Gas J.* 27, No. 9, 34, 136(1928).—West Texas crude oils from Pecos, Upton, Crane-Upton, and Winkler Counties, when topped and cracked on a non-residuum basis by the Dubbs process, gave an av. yield of 60% N. E. P. gasoline, with 15% bottoms. Recycling of the bottoms gave an additional yield on 7.5% gasoline, or a total of 67.5% based on the topped crude oil, or 49.5% based on the crude oil. The ultimate yield by topping and cracking averages 75%, and blending straight-run with the cracked gasoline gives a product very nearly equal to the Navy gasoline specifications. The av. yield of N. E. P. gasoline obtained when the same topped crude oils were cracked on a residuum basis was 48.5%, leaving 8.7% bottoms, which when recycled gave an added yield of 3.2% gasoline. The total yield based on the crude oil was 39%. The pressure distillates and topped naphtha were refined by plumbite treatments. Tables are given showing the properties of the crude oils and the yields. M. B. H.

Vapor phase cracking in refining oil. D. M. EVANS. *Petroleum Conversion Corp., Texas City, Texas. Oil & Gas J.* 27, No. 8, 146-7(1928).—Commercial operation of the Knox vapor phase cracking process has shown that it produces an antiknock motor fuel unequaled by any gasoline on the market. M. B. HART

Treat cracked distillates with acid in continuous operation. W. R. HOUNSELL. *Houston Oil Co. Oil & Gas J.* 27, No. 3, 201, 205(1928).—A continuous acid-treating plant for cracked distillate is described. M. B. HART

Spontaneous decomposition reactions of berginization—a reaction common to various petroleum hydrocarbons. E. PYHALA. *Petroleum Z.* 24, 308-14(1928).—Expts. with the paraffin-contg. still residues from Grosny, Tscheleken and Surachany petroleum have shown that when the residue is heated slowly at ordinary pressure, a sudden, rapid distn. occurs in two phases, 380-410° and 430-450°, and a large percentage of the paraffins and asphalts in the residue are decomposed without giving pitch or coke. In one instance 71% of the paraffin and 90% of the asphalt were so decomposed. This reaction is common to all petroleum and petroleum residues, and may be regulated, to a certain extent, by regulating the rate of temp. increase. Gases, kerosene, benzene and a residue are produced. The reaction may be used to produce fuel oil with a low f. p. from high-f. p. residues or viscous, pitchy still-ends. Because of the similarity in temp. and charging material, it is thought that this reaction may be of importance in berginization. M. B. HART

A method to determine hydrogen sulfide in petroleum distillates. RUDOLF LIND. *Selig Co., Atlanta, Ga. Nat. Petroleum News* 20, No. 29, 63-6(1928).—A check on the amt. of NaOH soln. used up in the desulfurizing of petroleum distillates consists in titrating an aliquot portion of the spent treating soln. with standard HCl soln., using methyl orange as an indicator, and oxidizing another aliquot portion with H_2O_2 before titrating in the same way. The difference between the two results indicates the amt. of NaOH used up in the treating. In general, about 1.15 or 1.20 mols. of NaOH should be used per mol. of H_2S in the distillate. The same method may be used to det. the amt. of H_2S in gas. M. B. HART

Examination of petroleum distillates. I. Preparation of a standard motor spirit and a standard kerosene. S. T. MINCHIN AND G. R. NIXON. *J. Inst. Petroleum Tech.* 14, 477-92(1928).—In an attempt to produce standard motor fuel and kerosene fractions, high melting point refined paraffin wax from Burmah crude was cracked and the cracked products were fractionated in a Hemple column to (a) distillate to 150° or motor spirit fraction, (b) distillate 150° to 285° or kerosene fraction and (c) residue. The first 2 fractions were then refined with acids and distd. in a Hemple column, cuts being made at each 10°. Sp. gr. at 20°, aniline point, abs. viscosity at 20°, surface tension and n at 20° were detd. for each fraction and the data are given in tabular form. Graphs of the sp. gravities, n s. and surface tensions of the fractions of the motor spirit compared with those of pure hydrocarbons indicate the absence of naphthenes.

and presences of branch chain and normal paraffins. Conclusion: The fractions of motor spirit so prepd. are practically pure paraffins. D. F. BROWN

Composition of petroleum (kerosene and other) fractions. III. Applications of the aniline point, specific gravity and refractive index tests, with properties of individual hydrocarbons. J. A. CARPENTER. *J. Inst. Petroleum Tech.* 14, 446-76(1928); cf. *C. A.* 21, 1702.—Aniline point detns. throughout the b.-p. ranges of kerosene oil are given for paraffins and other classes of hydrocarbons, and for paraffins in the solid wax range. The paraffins were isolated throughout the whole series while naphthenes gave more difficulty. In general all other classes of hydrocarbons can be removed by sulfonation, nitration or solvent extn. or combinations. In the higher ranges these methods are supplemented by freezing. Early fractions of Burmah crude oils contain high proportions of branching-chain paraffins, also naphthenes based on cyclopentane and cyclohexane rings. Simple types of naphthenes have aniline points about 20° below those of their paraffin counterparts while the effects of unsatd. compds. are irregular. Correlation of sp. gr. and *ns* to det. different classes of hydrocarbons proved unsuccessful. Tentative rules for the detn. of unsatd. compds., aromatics, naphthenes and paraffins, based on aniline point detns. in conjunction with acid treatments, are given for kerosene fractions. Applications of the aniline point method are particularly suitable in such problems as identification of kerosenes from different sources, forecast of their burning qualities, detns. required on working out the effect of solvent extractors, decision as to best points at which to cut refined products, detns. of the nature of cracked products and the value of various crude oils from a refining point of view. D. F. B.

Steam temperature control in distillation and in paraffin manufacture. E. BELANI. *Petroleum Z.* 24, 199-201(1928).—The temp. of steam raised in a Benson boiler or similar app., by heating water under critical pressure to its critical temp., may be regulated by means of an app. in which steam entering at the bottom meets a spray of water which in vaporizing cools the steam to the desired temp. Thermometer-controlled regulators at the inlet and outlet automatically adjust the vol. of water in the spray so that const.-temp. steam is produced regardless of fluctuations in inlet temp. M. B. HART

Nature of petroleum filtering earths. P. G. NUTTING. U. S. Geol. Survey. *Oil & Gas J.* 27, No. 6, 138-9(1928).—Filtering earths are silicates which are combinations of bases with the weak silicic and aluminosilicic acids. The filtering action is due to open O and Si bonds which are produced by the removal of H₂O from terminal OH radicals by heating, and takes place by attaching certain alkyl or weakly basic radicals causing either adhesion or a surface action producing insol. org. silicates. Clays of the kaolin type contain no hydroxyl H₂O which can be driven off; hence they are useless as filters. Clays of the bentonite type are poor filters which contain only a little alkali which can be converted to hydroxyl by acid treatment. Any clay contg. either hydroxyl H₂O or terminal alkali radicals which can be converted to hydroxyl by acid treatment makes a valuable material for filtering oils. Theoretically, complex silicates may be split up by fused alkali and the components converted into filter clay by acid treatment. The selective action of filters is readily accounted for by the varying activity of open bonds toward org. radicals retained by bonds of varying strength. M. B. HART

Important investigations under way relative to filtering clay. C. E. KERN. *Oil & Gas J.* 26, No. 50, 126, 128(1928).—A preliminary report of the committee conducting the investigation into the properties of filtering clays, on which the U. S. Geological Survey, National Research Council, National Museum and P. F. Kerr of Columbia University are represented. Clay minerals fall into the kaolin group (which are crystalline and show a mean index of refraction and a low double refraction), the Montmorillonite group (which includes bentonite, fuller's earth and most oil-refining clays, which contain a large proportion of adsorbed H₂O and are cryst., showing a high double refraction and low index of refraction), and clays contg. essential potash (on which little work has been done). The clay minerals show mica-like cleavages and are large in their greatest dimension but in thickness have colloidal proportions, so they have a great area in proportion to their mass which is the principal factor in the adsorption capacity and plasticity. M. B. HART

Influence of physical properties and sizes of filling elements in fractionating columns on the fractionating capacity. K. V. KOSTRIN. *Neftyanoye Khozyaistvo.* 14, 616-26(1928).—A lab. still was charged with 3 l. of Surakhanui crude oil and the rate of distn. kept at 10 cc. per min. Steam distn. with superheated steam and open-fire distns. were made, a distn. column filled with different elements being used. Special care was taken to have all distns. made under exactly the same conditions. Some of them were repeated without showing any deviations. Raschig rings of exactly the same

size made of Al, brass, iron and glass were used in 4 sep. open-fire distns. The 4 distn. curves were identical and also the temps. of heated oil, and vapors. The sp. gr. checked very closely. With Raschig rings of different size an increase in sp. weights and a decrease of temps. were observed with the increase of the size of rings. The Engler distn. of distillates obtained had a tendency to increase the temp. for larger rings. Analogous results were obtained with an open-fire and superheated steam distn. The amt. of oil distd. over was always limited to 150 cc. Conclusion: The nature and shape of filling elements in fractionating columns do not affect the sepn. of fractions. The sepn. of fractions depends on the surface of the elements. A. A. BOERTLINGK

Naphthenic acids from Baku crude oils. D. O. GOLDBERG AND V. L. GURVICH. *Azərbaycan. Neft. Khoz.* 1928, No. 5, 46-51.—Samples were taken from the refinery, at different stages of the distn. process. Kerosene, Solar oil "L," Solar oil "T," machine oil and cylinder oil fraction, and a sample of crude oil were investigated. The oils were saponified with a 2% soln. of NaOH and the soap was decompd. with 10% HCl. The crude acids were treated according to Spitz and Hönig, and their physical consts. were detd. The Balakhanui-Sabunchi crude oil contains 1.06% of naphthenic acids with av. acid no. 202 and av. mol. wt. 277. The acidity of distillates and the % of naphthenic acids increase from light distillate towards heavy and decrease at the end. The max. is with the distillate of sp. gr. 0.882. With the increase of the mol. wt. of acids their sp. gravities decrease; the viscosity, η and I no. increase. The surface tension of naphthenic acids decrease with increase in mol. wt.; the capillarity increases. Naphthenic acids from Balakhanui crude oil are monobasic. Boiling temps. of naphthenic acids do not correspond to b. ps. of fractions from which they are obtained. A. A. BOERTLINGK

Laboratory in refinery operation. I. S. CANNON. Marland Refining Co. *Oil & Gas J.* 27, No. 3, 201-2(1928).—The properties and tests applied to crude oils and products are described. M. B. HART

Concrete-lined storage reservoirs. J. F. HOUGH. Portland Cement Assoc. *Oil & Gas J.* 27, No. 5, 78, 176, 178, 180, 183-4(1928).—Cement used in the construction of oil-storage reservoirs should have a low water-cement ratio, 5 $\frac{1}{4}$ -6 gallons H₂O per sack for low-S crude oils and 5-5 $\frac{1}{2}$ gallons per sack for high-S crude oils. It should be thoroughly mixed, not less than 2 min., with sufficient aggregate to make it workable and be placed over the reinforcement in alternating slabs 4-6 in. thick on the floor and 3-4 in. thick on the sides of the reservoir. A bulkhead should be placed at the edge of each finished slab to provide a joint with the adjacent slab, which must be laid within 12 hours of the completion of the first slab. Cement should be cured 7-10 days by sprinkling or inundating with H₂O to assure a strong, impervious cement structure. M. B. HART

Fifteen men are full operating crew of 8000 bbl. refinery. J. C. CHATFIELD. *Nat. Petroleum News* 20, No. 27, 28-30(1928).—At the Borger refinery of the Phillips Petroleum Co., Hutchinson County crude, which contains enough salt water in suspension to cause severe corrosion of refinery equipment, is sprayed against a bank of tubes through which hot fuel oil runs en route to storage, whereby the water in the oil is vaporized and the salt pptd. while the oil is preheated before passage to the flash tower. The salt is recovered by flushing out with water while the coils are still hot, and the gasoline vaporizing during the treatment is recovered with the steam by passing the vapors to the towers. M. B. HART

Oil well and later developments at Hardstoft, Derbyshire. A. WADE. *J. Inst. Petroleum Tech.* 14, 357-87(1928).—Of the 11 wells sunk at various parts of the British Isles only 2 were successful, these being at Hardstoft in Derbyshire and Darcy near Edinburgh. The first is the only one which has ever looked like a com. proposition. The oil was struck at 3070 ft. and is of very good quality, resembling Pennsylvania crude. Distn. analyses show it to yield 4.5-10% of gasoline, 30-45.5% kerosene and 20-30% of light lubricating oil and wax—S content is about 0.26 to 0.42%. The oil is dark brown in color with green fluorescence. Conclusion: There are com. deposits of oil in England but it would not be profitable at present to try to locate them. D. F. BROWN

The sulfuric acid test for mineral oils. ТУРКЕ. *Petroleum Z.* 24, 314(1928).—Bauer and Baader have proposed a test for transformer and similar oils consisting in detg. the amt. of oil absorbed by concd. H₂SO₄. Other investigators question whether this test gives valuable results, and it is suggested that treatment with acid removes constituents which are of value in increasing the resistance of an oil to oxidation or its lubricating qualities. Much further evidence is needed to decide the ultimate result of the test. M. B. HART

Breaking emulsions in the mineral oil industry. RUDOLF KOETSCHAU. *Kolloid-chem. Technologie* 1927, 23 pp.—The interpretations of Clayton and the classical works of Donnan and Potts are recalled. The measuring methods are enumerated. The methods used in general practice for breaking emulsions are described. A. L. H.

Application of the Lewis' method for the calculation of columns in the mineral oil industry. V. KACHATUROV. *Neftyanoe Khozyaistvo* 14, 627-42(1928). A. A. B.

Shale oil industry in Manchuria. KATSUMOTO ATSUKI. *J. Soc. Chem. Ind. (Japan)* 31, 109B(1928).—A review. K. K.

The vertical steam still applied to fat oil distillation. E. G. ROGATZ. Union Oil Co., Calif. *Nat. Petroleum News* 20, No. 23, 37-9(1928).—A discussion of the equil. relationships in stripping absorption oil brought out by Lewis and McAdams (C. A. 22, 1511). M. B. HART

Volatility test for motor oil both criticized and commended. F. W. BROWN. Emery Manufacturing Co. *Oil & Gas J.* 26, No. 49, 142, 151(1928).—The volatility test for motor oils, suggested by the Cadillac Motor Car Co., consists in detg. the evapn. loss on heating 24 hrs. at 230° F. under conditions similar to those actually occurring in the crankcase, combined with a distn. test. Advantages and disadvantages of this test are discussed. M. B. HART

Diesel fuel-oil specifications vary. G. H. MICHLER. Standard Oil Co. of New Jersey. *Oil & Gas J.* 27, No. 6, 156, 161(1928).—A wide variation in Diesel fuel specifications has come into existence due to the varying requirements expressed by engine builders. This variation tends to increase the cost and difficulty of obtaining fuel of the right quality because of the expense of preparing and storing a no. of different grades for which there is little demand. Suggested specifications include a min. gravity of 24° A. P. I., a max. S content of 1.5% and a min. flash of 150°, closed cup. M. B. HART

Narrow distillation range oils are best for gas absorption. L. D. McLOUTH. Pan American Petroleum Co. *Oil & Gas J.* 27, No. 12, 71, 78, 98, 130-1(1928); *Nat. Petroleum News* 20, No. 32, 54-71(1928).—Tests run on kerosene and gas oils have shown that the superiority of the oils as absorbents is a function of the gravity, viscosity and distn. range of the oil. A general increase in absorption was noted with increases in gravity, narrowing of the distn. range and decrease in the absolute viscosity of the oil. Signal Hill oil fractions were superior to Ventura fractions. Absorption increases with increase in absolute pressure according to Henry's law, with certain exceptions. A "satn. point" is reached, i. e., the point where the partial pressure of the gas becomes equal to the vapor pressure of the components of the oil. It is impossible to absorb gases beyond this point unless the absorption will reduce the vapor pressure of the oil or maintain the partial pressure in equil. with the partial pressure of the gas. An oil from a particular field does not necessarily exert the greatest affinity toward the gas from that field. M. B. HART

Corrosion in oil equipment in West Texas. J. H. DAMERON. *Oil & Gas J.* 27, No. 10, 42, 218(1928).—It is estd. that the annual corrosion toll in West Texas will av. 20% of the original cost of steel tankage. The spongy material removed from the corroded tanks has a high S content, and burns easily, sometimes even igniting spontaneously on short exposure to the outside atmosphere. Lowering the temp. in the tanks and keeping out O₂ seem to help retard corrosion. A protective paint is being developed which is claimed greatly to retard corrosion. M. B. HART

New motor fuel. ANON. *Oil & Gas J.* 27, No. 10, 210(1928).—Sohio, the new motor fuel announced by the Standard Oil Co. of Ohio, is a "high test ethyl motor fuel" having a gravity of 64-66 and end point of 375-390°. Distn. tests indicate that it practically meets government specifications for the domestic aviation grade. The gasoline is made by the Tube and Tank cracking process operating at 1000 lb. pressure and at 825-850° F. and special bubble tower fractionating equipment is used. M. B. HART

Audible spark-advance test method. D. R. ROESCH. Armour Inst. of Tech. *Oil & Gas J.* 27, No. 10, 208-9(1928).—Fuel characteristics detd. at the Armour Inst. of Tech. before conducting routine audibility spark-advance antiknock tests permit checking the specific engine conditions and detn. of the magnitude of such modifying factors as mixt.-ratio, fuel flow while operating with various fuels at a fixed carburetor adjustment, and the effects of the more or less generally accepted antiknock agent benzene. The ratio of air to fuel should be known for practically every internal-combustion engine test. The effect of mixt.-ratio variations on the antiknock index can be evaluated by the use of a graph and it should be detd. A graphical method is described for detg. the benzene equiv. of an unknown fuel. M. B. HART

Light fractions from stabilizer offer new opportunities. F. L. KALLAM. Southwestern Engineering Corp., Los Angeles. *Nat. Petroleum News* 20, No. 30, 21(1928).—The new max. volatility specifications for gasoline make it necessary for natural gasoline manufacturers to weather their product or add fractionating columns to their equipment. The use of a stabilizer permits a finished product from which all the gaseous constituents and C_3H_8 have been removed while C_4H_{10} is retained. The plant gasoline production is decreased but ultimate recovery of high-gravity finished gasoline is raised by the use of a stabilizer, while the light fractions removed can be further processed to liquid C_3H_8 - C_4H_{10} mixts. suitable for domestic gas, and other products. C_3H_8 may find a future use as a substitute for C_2H_2 in cutting, and C_4H_{10} , which is now used for enriching blue gas, may find a use as a refrigerant. One company, by chlorinating residual vapors in the rectifying tower, has marketed CH_2Cl , CCl_4 , $CHCl_3$ and HCl .

M. B. HART

Doctor test now required of natural gasoline. ANON. *Nat. Petroleum News* 20, No. 27, 37(1928).—The revised specifications of the Natural Gasoline Association of America require a doctor test.

M. B. HART

Determining gasoline vapor pressure by the A. S. T. M. distillation test. G. G. OBERFELL, R. C. ALDEN AND L. H. FITCH. Phillips Petroleum Co. *Nat. Petroleum News* 20, No. 31, 58, 62, 64(1928).—Expts. have shown that the A. S. T. M. distn. curve for gasoline furnishes data which, if properly interpreted, give a reasonably close approximation of the vapor pressure of motor fuel as detd. by the Beistle-Prather, Reid and Phillips Petroleum Co. lab. methods.

M. B. HART

Making Skelgas at Panhandle plant. W. T. ZIEGENHAIN. *Oil & Gas J.* 27, No. 7, 166, 177(1928).—Skelgas, which is almost pure C_3H_8 , is made at the Skelly Oil Co.'s Borger, Texas, plant by withdrawing the raw material from the top tray of the fractionating tower in the gasoline system and passing it to a still where it is stabilized by the reduction of pressure. Vapors from the still are returned to the gasoline system while the stabilized product is treated by flowing upwardly through a tower counter-current to hypochlorite soln. The purified material then goes to storage whence it is withdrawn to fill the containers for distribution.

M. B. HART

Factors in design and operation of absorption plants [for natural gasoline]. A. J. L. HUTCHINSON. Engineering, Research and Equipment Co. *Oil & Gas J.* 27, No. 12, 133, 143(1928).

M. B. HART

Magenta plant operates above 600 lbs. pressure. G. REID. *Refiner Natural Gasoline Mfr.* 7, No. 5, 62-4(1928).—The absorption natural gasoline plant of the Natural Gas and Fuel Corp. at Magenta, La., operates at 600-640 lb. per sq. in. The plant operation is described.

M. B. HART

Natural gas used for blending in North Texas. RALPH GOODE. *Refiner Natural Gasoline Mfr.* 7, No. 5, 61(1928).—The use of natural gas instead of air in blending light distillates with natural gasoline has been found to be more economical, to reduce loading and time losses and to produce a thorough and efficient distribution of the natural gasoline. Explosion hazards are virtually eliminated.

M. B. HART

Analysis of natural gas. A. C. ALLEN. Univ. of Kansas. *Oil & Gas J.* 27, No. 4, 131(1928).—Compn. of natural gasoline and its compn. after being run through the gasoline plant as well as the amt. and gravity of gasoline recovered are tabulated.

M. B. HART

Natural gas as fuel for automobiles. C. K. FRANCIS. *Oil & Gas J.* 27, No. 10, 40, 219(1928).—Wild fractions from natural gasoline stabilization manuf. consisting largely of C_3H_8 and C_4H_{10} , or natural gas itself can now be compressed in cylinders and used directly as motor fuel. A special mixing valve must be substituted for the usual carburetor. Tests have shown the fuel to be as satisfactory as gasoline and much cheaper.

M. B. HART

The solubility of gases in liquids. F. E. E. GERMANN. Univ. of Colorado. *Oil & Gas J.* 27, No. 4, 81, 86(1928).—A study of the laws of adsorption of gases in liquids in the presence of colloids and suspensoids indicates that, if there is a greater soly. of gas in oil-permeated sands than in oil alone, the difference in soly. is very slight and may be due only to the difference in conditions rather than to an actual difference in degree of soly. Accurate exptl. methods must be developed to det. exactly what soln. laws are operative underground before detg. the best use to make of natural and repressuring gas.

M. B. HART

Causes of fire in the petroleum industry with methods of prevention. CHRISTOPHER DALLEY. *J. Inst. Petroleum Tech.* 14, 154-73(1928); cf. Epps, C. A. 21, 3737.—A high-class plant and fittings and all-steel, properly grounded storage tanks are the best insurances against fire caused by lightning or other means of ignition. Org. sulfides

and H_2S may react with the Fe of the tank or roof, producing pyrophoric FeS which is dangerous in a dry atm. Static or friction sparks cause little risk of fire but precautions are necessary. Foam is more efficient than CCl_4 as an extinguisher. Burning soot causes a special danger if expelled from the flues of an oil tank during or just after the loading or discharging period when the fire risk is greatest. R. E. SCHAAD

Experiments in viscometry. H. S. ROWELL AND D. FINLAYSON. *J. Inst. Petroleum Tech.* **14**, 402-45(1928).—From the results of viscosity measurements of motor fuels and lubricating oils, data for which are given, the conclusion is reached that viscometry combined with densimetry may be an effective instrument in the analysis or identification of complex carburents, and that there is no abnormal change in the viscosity-temp. curve at elevated temp. D. F. BROWN

Some aspects of the problem of lubricating oils. HENRI WEISS. *École du pétrole et des combustibles liquides, Strasbourg Chimie et industrie* **20**, 3-9(1928).—After a brief outline of the usual processes used for refining mineral oils, W. briefly reviews the tests by means of which the nature of an oil and its lubricating qualities can be ascertained. An investigation of the various methods of detg. the f. p. ("cold test") has shown that the most consistent results are obtained by freezing some of the oil in a capillary tube, cutting the end of the tube, immersing in an alc. bath at a temp. below the f. p., allowing the temp. to rise slowly and noting the pt. at which the oil meniscus begins to rise. Volatility is best detd. by fractional distn. in vacuum (obtained by means of a Hg pump), at the same time passing a current of H through the liquid to insure thorough agitation and also entrainment of the vapors, and using wire gauze to prevent entrainment of particles of liquid. There is a parallelism between the temp. of the first drop of distillate obtained in this way and the fire-point detd. in the usual manner, but much more complete information is obtained from this distn. curve than from the fire-point alone. Very good agreement cannot be expected from viscosity detns. carried out in the same lab. with different instruments, or in different labs. with the same type of instrument. The best results were obtained with the Barbey viscometer and with a well-standardized German instrument (not mentioned by name). The difficulty of devising a satisfactory test for detg. the deterioration of an oil is discussed. A P.-C.

The lubricating properties of mineral and tar oils and their dependence on chemical composition. I. The relations between the lubricating value of brown-coal lubricating oils and their chemical constitution. J. HERZENBERG AND ERIKA JUNGFER. *Braunkohle* **27**, 601-8, 628-33; *Erdöl u. Teer* **4**, 370-3, 387-90, 406-8(1928).—A literature survey and discussion under the general title are given first. The work was done on a machine oil manufd. from brown-coal tar by a process unknown to the writers. The approx. compn. was found to be 24% phenols, 15% resins and 60% neutral oil consisting approx. of 10-12% aromatic, 2% hydroaromatic, 20-25% satd. and 50-60% unsatd. hydrocarbons and 8-10% O and S compds. The usual tests were made on the original oil and after removal of various constituents and on some of the constituents. The essential properties are viscosity and its variation with temp. The lubricating value of the oil was impaired by a high viscosity temp. coeff. and its use as a transformer oil by a high tar-formation no. The temp. coeff. was greatly reduced by removal of the phenols, but the viscosity was then too low to meet machine oil requirements. Removal of the resins by distn. lowered and flattened the viscosity-temp. curve still more. The resins themselves showed a very high viscosity temp. coeff. and an I no. of 25.6. Distn. 3 times over Na, *in vacuo*, for the purpose of removing labile unsatd. constituents, etc., removed 40% of the distillate but reduced the I no. only from 33.3 to 29.4. The viscosity-temp. curve was again lowered, so that it no longer met the requirements for even a light spindle oil, and flattened, and the tar-formation no. fell from 1.48 to 0.14%. This was well within the requirements of a good transformer oil, but the improvement was gained at the cost of too great a material loss. The aromatic hydrocarbons could then be removed as picrates. The satd. hydrocarbons were isolated by removing the total unsatd. and aromatic together from a sep. sample of the Na distillate by means of H_2SO_4 . The unsatd. compds. were then detd. by difference. The hydroaromatics were detd. by catalytic dehydrogenation, over Ni or Al_2O_3 at 380°, and removal of the product as picrates. The properties of these minor constituents are given and discussed. Their viscosities were close together. The less important properties, such as sp. gr., flash, ignition and setting points, and volatility (1 hr. at 100°) which was found strikingly independent of b. p. range, are also covered. The outstanding point is that, in the case of this brown-coal tar oil, at least, which is evidently regarded as typical, the required viscosity is contributed by the phenols, resins and labile unsatd. substances, which are also the constituents responsible for the characteristic objectionable properties, such as gumming, etc. F. S. GRANGER

Natural bitumens, with special reference to bituminous shale. W. ZWIEG. *Petroleum Z.* 24, 243-6(1928).—A peat, resembling cannel coal, which from its appearance and analysis is to be classified with shales rather than with brown coal, has been found in northern Germany. It contains 82.7% volatile matter, and yields 25% dry bitumen on distn. The solid bitumen found in this peat has a very low decompn. point. Gas made from this peat by the von Geipert method has 52.6% of the potential heating power of the peat. Tables give the analysis of the peat, other shales, and gas produced.

M. B. HART

Comparison of the ball and ring method of determination of the softening point of bitumens with Kramer-Sarnow method. B. SHALFEEV. *J. Chem. Ind. (Moscow)* 5, 223-5(1928).—To compare the degree of exactness of the 2 methods, the following 5 substances have been tested on their softening points 5 times each by the ball and ring method and as many times by the Kramer-Sarnow method: natural asphaltic lime, natural asphaltic sand, coal-tar distn. residue, artificial mixt. prepd. from coal-tar distn. residue and oil, petroleum distn. residue (tar). The last-named substance was characterized by the slowness of passage from the semisolid state to the liquid state, whereas the coal-tar residue, on the contrary, passed from the solid to the liquid state within a comparatively short temp.-interval. It could be expected that the data obtained by the 2 methods would differ, not only conforming to the degree of softening temp., but also in accordance with the speed of melting of a given bitumen. Conclusion: The ball and ring method is undoubtedly more exact than the Kramer-Sarnow method. Whereas the deviations of results in the repeated detns. by the first method never exceeded 1°, by the Kramer-Sarnow method the deviations often reached 2°. The figures obtained by the Kramer-Sarnow method were in all cases higher than those obtained by the ball and ring method, and the difference between them (which is usually about 10%) was the greater the higher the softening temp.

BERNARD NELSON

Determination of asphalt in minerals. I. CASMIR. *Petroleum Z.* 24, 315-8(1928).—Asphalt may be detd. in minerals by extn. with C_6H_6 or $CHCl_3$ in a Soxhlet or Graefe app., or by the Prettner method which consists in treating with an ether-HCl soln. and filtering and taking up the residue with benzene. The extn. method gives higher results than the Prettner method because, in the latter, part of the asphalt is converted into a benzene-insol. residue, and S is, to some extent, lost as H_2S ; these two losses are greater than the compensating Cl present in the asphalt after treatment. In both methods the extd. asphalt contains ash in colloidal soln.

M. B. HART

The toxicity of tetraethyl lead (KEHOE) 11H. The origin of petroleum (LE BEL) 8. Treating coal and oil for the production of liquid hydrocarbons (Fr. pat. 633,954) 21. Annular or straight ovens for carbonizing wood, shale or other materials (U. S. pat. 1,678,687) 21. Heating carbonaceous materials with oils (Brit. pat. 282,691) 21. Destructive hydrogenation [of mineral oils] (Brit. pat. 282,384) 21. Dome construction for stills for oils (Brit. pat. 281,928) 1. Insoluble soaps from partial oxidation products of mineral oils (U. S. pat. 1,681,237) 27. Filter for oil (U. S. pat. 1,680,029) 1.

BAUMONT, L.: *La grosse industrie allemande et le charbon*. Paris: Gaston Doin et Cie. 754 pp. F. 45. Reviewed in *Chimie et industrie* 20, 202-3(1928).

COLOMO, JOSE, and ORTEGA, GUSTAVO: *La industria del petróleo en México*. Su aspecto legal y su reglamentación. El estado actual de esa industria by Gustavo Ortega. México: Talleres Gráficos de la Nación. 23 pp.

KRESSKALT, ERNST J.: *Untersuchungen über den Einfluss des Druckes auf die Zähigkeit von Ölen und seine Bedeutung für die Schmiertechnik*. Halle (Saale): W. Knapp. 302 pp. M. 26.50; bound, M. 29.

VLÈS, F.: *Cours sur la physico-chimie des pétroles*. Paris: Vigot frères. 200 pp.

Obtaining petroleum from natural subterranean deposits by tunnelling and injection of fluids under pressure. JOHN L. RICH. U. S. 1,679,683, Aug. 7.

Fractional extraction of petroleum hydrocarbons with alcohol. THEODORE A. WERKENTHIN (to Solar Refining Co.). U. S. 1,680,352-3, Aug. 14. See Brit. 254,784 (C. A. 21, 2793).

Cracking oils. UNIVERSAL OIL PRODUCTS CO. Fr. 633,653, May, 2 1927. An app. is described for cracking oils in which the oils circulate in one or several currents through a heated zone and pass from there into a reaction zone. An incondensable

gas which may be the gas produced by the cracking itself is introduced into the reaction zone (cf. *C. A.* 22, 3288).

Cracking oils. UNIVERSAL OIL PRODUCTS CO. *Fr.* 633,652, May 2, 1927. In cracking oils the condensate is submitted to a second distn. to sep. the lighter fractions and the residue from this distn. is submitted to a final "cracking." The second distn. is carried out while the condensate is still warm.

Cracking petroleum oils. GUSTAV EGLOFF (to Universal Oil Products Co.). U. S. 1,679,208, July 31. In a continuous process, a stream of oil is heated to a cracking temp. in a heating zone such as pipe coil in a furnace and the heated oil is then passed into an enlarged reaction chamber in which a body of liquid oil accumulates and vaporization occurs; liquid and vapors are withdrawn from the chamber and the vapors are dephlegmated, portions of the residual liquids are removed from the system and the remaining portions of the residual oil are united with uncondensed gases produced in the process and this mixt. is returned directly to the vapor space of the reaction chamber. An app. is described. Cf. *C. A.* 22, 2461.

Refining petroleum oils with "doctor solution." ROBERT L. HALLETT (to National Lead Co.). U. S. 1,678,984, July 31. Pb chloride is dissolved in a NaOH soln and the resulting soln. is used to remove S from petroleum oils.

"Artificial petroleum." HIROTARO NISHIDA and KEIICHI SHIMADA. U. S. 1,680,908, Aug. 14. Hydrocarbons of rubber waste are destructively distd. in the presence of a natural bleaching earth such as dehydrated "Japanese acid earth." The product is fractionated.

Oils resembling petroleum by destructive distillation of rubber. H. NISHIDA and K. SHIMADA. *Brit.* 282,565, Jan. 22, 1927. See U. S. 1,680,908 (precedin. abstr.).

Cracking hydrocarbon oils. WILLIAM S. HADAWAY, JR. (to The Texas Co.). U. S. 1,678,728, July 31. An app. is specified in which a multi-tubular heat-exchange device is mounted longitudinally within a vertical cracking chamber; oil is introduced into the bottom of the exchanger and discharged from its upper end into the cracking chamber. An agitator is also mounted within the cracking chamber and connections are provided for drawing off liquid from the bottom and vapors from the top of the chamber.

Production of light hydrocarbons from heavier hydrocarbons. DAVID G. BRAND (to Doherty Research Co.). U. S. 1,681,321, Aug. 21. Heavy hydrocarbon material such as fuel or crude oil is preheated under pressure to about 230° by means of heat transfer from vapors undergoing condensation and then passed to a cracking zone in which it is brought into contact with hydrocarbons at a temp. of about 350–425° to effect cracking of the heavy hydrocarbons. Vapors produced are withdrawn and the heaviest fraction of the vapors is condensed and returned to the cracking zone; the next heavier fraction of the vapors is condensed and this portion is preheated by heat transfer from the vapors and is passed in fine streams through a heating zone at a temp. of about 540–600° and thence into the cracking zone; the remaining condensable portion of the vapors is condensed and the portion still remaining uncondensed is passed through the heating zone in contact with the previously mentioned fraction passing through this zone and these materials are thence passed together through the cracking zone. An app. is described.

Distilling hydrocarbon oils. FRANK F. WELLMAN (to Kansas City Gasoline Co.). U. S. 1,680,580, Aug. 14. A hydrocarbon oil is subjected to a cracking temp. and pressure on one zone and the vapors produced in this zone are fractionated in a second zone and are further condensed and fractionated in a third zone to which heavier fractions are refluxed for redistn. Vapors produced by redistn. are separately fractionated in a fourth zone and from this light vapors are led off and condensed; the heavier fractions from the fourth zone are returned to the third zone, and all the heavier fractions from the third zone are returned in liquid phase into the first zone. An app. is described.

Fractional distillation of hydrocarbon oils. JOSEPH W. LEWIS, JR. (to Atlantic Refining Co.). U. S. 1,680,421, Aug. 14. Vapors of the oil are passed countercurrent to and in contact with reflux oil; a portion of the reflux oil intermediate the lightest and heaviest fraction is withdrawn and this portion is passed countercurrent to and in contact with steam to remove constituents of low b. p. and yield an intermediate fraction of higher flash point; the other portion of the reflux oil is continued countercurrent to the vapors in an earlier stage of the fractionating system. An app. is described.

and labile unsaturation of volatile hydrocarbons. M. OKOSHI. *Brit.* 282,541, Nov. 12, 1926. Characteristic objects of hydrocarbons carried by natural gas, air or other gases are adsorbed by silica

gel, C, fuller's earth or other suitable materials at a low temp. and at either atm. or higher pressure and cooling is effected by sudden expansion of previously compressed gases. Another part of the compressed gas may be employed for cooling a condenser in which the adsorbed substances are recovered after distn. An app. is described.

Lining for oil stills. ORRIN E. ANDRUS and SUNE HERMANSON (to A. O. Smith Corp.). U. S. 1,680,276, Aug. 14. A thin sheet of corrosion-resisting alloy such as a Cr alloy is secured against the inner wall of vessels such as oil stills by elec. spot welding.

Inclined tubular oil-cracking still. WILLIAM T. HANCOCK and JOHN W. HANCOCK. U. S. 1,680,541, Aug. 14. Free balls are placed in the still in spaces between disks of an agitating device mounted on a shaft extending through the still along its axis.

Apparatus for removing carbon deposits from petroleum stills. BUTLER P. CRITENDEN and ALVIN C. KILLINGER (to Beacon Oil Co.). U. S. 1,680,322, Aug. 14.

Apparatus for distilling oil shale or similar material in a bath of molten metal. C. A. SPOTZ. Brit. 281,769, Sept. 9, 1926.

Distilling oil shale. OSKAR TETENS (to the Firm Record Cement-Industrie G. m. b. H.). U. S. 1,678,751, July 31. The shale is burned in mixt. with non-combustible calcareous material such as limestone or marl in a water-jacketed combustion zone in the jacket of which steam is produced; a column of the mixt. is maintained above and below the combustion zone and the oil distd. is deducted with the ascending hot gases. A raw material suitable for use in the manuf. of hydraulic cement is discharged as a residue. An app. is described.

Desulfuration and hydrogenation of mineral oils, etc. BERGIN COMPAGNIE VOOR OLIE EN KOLEN CHEMIE. Fr. 632,509, July 7, 1926. Addn. to 559,787. In a process for the simultaneous desulfuration and hydrogenation of heavy mineral oils or their products of distn. or the distn. products of coal using alkali metals in the presence of H, the starting material is given a preliminary treatment with solid KOH, or metallic oxides, under pressure of H at a high temp.

Dephlegmators for oil vapors. DANIEL PYZEL (to Simplex Refining Co.). U. S. 1,678,823, July 31. Structural features are specified of a plurality of dephlegmators connected with each other so that condensate from one passes into the top of another.

Heat exchange apparatus suitable for condensing oil vapors. EDOARDO M. SALERNI (to E. M. S. Industrial Processes, Ltd.). U. S. 1,680,641, Aug. 14.

Furnace for heating oils, etc. C. F. DE GANAHL. Brit. 282,287, May 31, 1927.

Water trap for gas wells. EDWIN L. POSTON (one-half to Daniel E. Alexander). U. S. 1,680,255, Aug. 7.

Apparatus (with an annular carbonizing chamber) for carbonizing wood or similar materials. HENRI HENNEBUTTE and EDOUARD GOUTAL. U. S. 1,680,613, Aug. 14.

Apparatus for purifying gasoline used in "dry cleaning" (by sedimentation and chemical treatment). FREDERICK G. LONDAGIN. U. S. 1,681,002, Aug. 14.

Device for purifying oil used in lubricating internal-combustion engines. DAVID F. ZOOK. U. S. 1,680,716, Aug. 14. The oil is heated, and is subjected to sedimentation and filtration.

Lubricant. STANDARD DEVELOPMENT CO. Fr. 634,442, May 14, 1927. A lubricant is made by adding to a hydrocarbon oil possessing lubricating properties, less than 1/2% by wt. of soap, and heating the mixt. to a temp. above 176°, but not above the b. p. of the oil.

Emulsions of asphalt or other materials. LESTER KIRSCHBRAUN. U. S. 1,679,475, Aug. 7. A colloidal emulsifying agent such as bentonite or clay is mixed with such a proportion of the end product of an emulsion of the same general character as that desired as to form a paste, liquid heated bituminous material is added and is agitated to effect dispersion. An app. is described.

Acetic acid. HERMANN SUIDA. Fr. 634,202, Mar. 14, 1927. To obtain concd. AcOH in the distn. of wood, the mixt. of distd. gases is freed from tar and then passed through a column contg. an extractor for AcOH of higher b. p. and not miscible with water such as cresol. The water and MeOH are not condensed at the temp. of the column.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

The structure of cellulose. JOHANNES SCHEIBER. *Farbe u. Lack* 1928, 334-5, 346-8.—Review. G. G. SWARD

The colloidal properties of "pure" cellulose. P. P. VON VEIMARN. *Kolloid-Z.* 44, 212-8(1928).—The resistance of many types of cellulose fibers to the dispersing

action of hot salt solns. is not a characteristic property of the cellulose itself, but must be referred to the effect of the surface coating of the fibers. Thus, cotton is but slowly dispersed in a NaSCN soln. boiling between 142–50°, and the gel formed on cooling the sol contains fibers. Extn. with petroleum ether increases the ease of dispersion. Exhaustive extn. with petroleum ether and xylene renders the material as readily dispersible as pure filter paper, and gives a clear gel. A cellulose cannot be considered as actually "pure" until this resistant surface coating is entirely removed; to do this, the fibrous structure must be completely destroyed. The procedure necessary to purify a "fibrous" BaSO₄ ppt. is cited (cf. C. A. 3, 393; 22, 1712). There should be but one "pure" cellulose, and this should in theory be obtainable in macro-cryst. form. Guignet cellulose approaches such a "pure" cellulose in its properties. R. H. DOUGTRY

The extraction of cellulose by the chlorine process. B. OGLIETTI. *Notiz. chim.-ind.* 3, 279–80(1928).—A crit. review of the development and the present status of the Cl process leads to the conclusion that in the present condition of the chem. industry, the Cl process can be applied economically only in special cases where the raw materials do not give satisfactory results on a large scale with other processes, or where, because of their low com. value more money can be put into the process. Chestnut residues fulfil these conditions, for with the aid of the Cl process in modified form, a white cellulose can be obtained which can be used with satisfactory results in paper. The utilization of these residues for the production of cellulose can and should alleviate the dependence of Italy on foreign sources of cellulose. C. C. DAVIS

Cellulose resources. I. The annual wood crop. GEO. M. ROMMEL. *Ind. Eng. Chem.* 20, 494–6(1928).—A survey of the sources of cellulose material in the U. S. made for the U. S. Dept. of Agr., this phase covering wood. The annual growth increment of a no. of common American trees is estd. in cu. ft. and in tons per acre per year. The growing rates of the northern and southern woods are contrasted and the favorable outlook for the latter is pointed out, especially for newsprint production, if some effective means can be discovered for eliminating the resins. The com. possibilities of wood wastes for pulp are also discussed and the likelihood of some other cellulosic raw material, such as cornstalks eventually replacing wood. II. Cellulose from field crops. *Ibid* 587–91; cf. C. A. 22, 2837. The possible utilization of cornstalks for cellulose (pulp) and various factors of growth, yields per acre, methods of cultivation, etc., are considered. Conversion of cornstalks to pulp offer one means of combating the corn borer. The pulping possibilities of various cereal straws, flax, hemp, soy beans, cotton waste and bagasse are considered and deemed favorable. C. E. CURRAN

Cellulose esters. I. Depolymerization and mechanical properties of the nitrates. H. OKADA. *Cellulose Ind.* (Tokyo) 3, 285–96(1927).—Having worked out a method for prepg. regular nitrocellulose films under standardized conditions, O. has studied the relations between viscosity and mech. properties. Various types of cellulose in the form of cotton, celluloid, tissue paper, bleached sulfite wood pulp and sulfite pulps specially purified with lime and Na₂SO₃ were subjected to preliminary treatments calcd. to induce depolymerization while avoiding definite hydrolysis and oxidation. Treatments comprised heating at 145° and 125° with water, dil. alkali, and glycerol; treatment with NaOH under mercerizing conditions; regeneration from alkali cellulose after various aging periods; regeneration from viscose and in the form of viscose silk; treating nitrocellulose with water under pressure. These modified celluloses were nitrated under identical conditions, the viscosities of the nitrated products were detd. in 1% acetone soln. and films were made 0.10–0.12 mm. thick from the ether-alc. solns. Over a wide range of relative viscosities from 126 down to 2.5 the tenacity of the films was almost const. at 15 kg. per sq. mm., and the crumpling resistance was rather less const. at about 200. The influence of depolymerization of the cellulose, while very marked on the viscosity, had a nearly negligible degrading effect on the mech. properties. Only at a very advanced stage of depolymerization, with reduction of the viscosity figure below 2, was a very sudden breakdown of the mech. resistance of the nitrocellulose film recorded, obviously brittle products being thereby produced. B. C. A.

Lignocellulose of Victorian mountain ash (*Eucalyptus regnans*). HOWARD W. STRONG. *J. Soc. Chem. Ind.* 47, 87–90T(1928).—In detg. the cellulose in *E. regnans* the sample is extd. with an alkali, preferably by boiling with 1% NaOH for 1 hr. Alkali solns. of greater concn. give low yields of both cellulose and α -cellulose. In reacting with Cl the amt. forming HCl is double that combining with lignin, which with this material is 7.5 to 8% of the total. C. E. CURRAN

Helianthus argophyllus. Commercial possibilities as indicated by its composition. K. S. MARKLEY AND W. T. SCHREIBER. *Ind. Eng. Chem.* 20, 636–7(1928).—The cellulose content of *H. argophyllus* is 46.5%, lignin 13.38%, the balance being pentosan

derivs. which yielded furfural up to 13.34%. Pulping tests gave a yield of 34.4%. The competition of this material with wood as a source of cellulose is not deemed likely but it compares favorably with bagasse, cotton and grain hulls, which are frequently proposed as sources of cellulose.

C. E. CURRAN
The manufacture of cellulose sausage casings. W. F. HENDERSON. *Ind. Eng. Chem. (News Ed.)* 6, No. 12, 12(1928).—Descriptive of the production of artificial sausage casings from cotton linters by the viscose process.

C. E. CURRAN
Carbon disulfide in viscose manufacture. JOHANN EGGERT. *Chem.-Ztg.* 52, 289-90(1928).—Industrial hazards are discussed. CS₂ is highly volatile; the most efficient ventilation cannot remove all the vapors from some parts of the plant. The vapors form explosive mixts. with air, which may be ignited by steam pipes or overheated bearings. It may also explode in the absence of O. CS₂ in Fe tanks may form extremely explosive pyrophoric Fe sulfide, especially if moisture is present. CS₂ is a poison; it can be absorbed through the skin as well as the lungs, producing a variety of symptoms. Individuals vary greatly in sensitiveness to the poison, women being especially sensitive. The best practice is to exercise all possible precautions, and to select the most resistant workmen for the most exposed positions.

R. H. DOUGHTY
A semi-chemical pulping process. J. D. RUE, S. D. WELLS, F. G. RAWLING AND J. A. STADL. *Chem. Met. Eng.* 34, 611-3(1927); cf. C. A. 20, 3807.

C. E. CURRAN
Shortening the cooking time in the Mitscherlich (sulfite pulping) process. LEO FRIEDLÄNDER. *Papier-Fabr.* 26, 335-7(1928).—By using a liquor-tube heat-interchanger instead of the customary steam coils in a vertical Mitscherlich digester, it should readily be possible to double the rate of heating, with a consequent important decrease in total cooking time. Such a heater if properly designed would be readily cleanable, and would not interfere with the mech. operation of the digester.

R. H. D.
Chemistry of wood. III. Composition of Tsuga and Momi. Y. UEDA AND T. YOSHIDA. *Cellulose Ind. (Tokyo)* 3, 297-8(1927); cf. C. A. 22, 3293.—Air-dried samples of Japanese pulp woods *T. sieboldii* and *Abies firma* on analysis gave: cellulose 48.71%, 45.24%; lignin 21.53%, 25.74%; furfuraldehyde (as pentosans) 4.69%, 6.26%, and resins (as benzene ext.) 2.17%, 2.26%, resp. These woods bear a close similarity in compn. to the Kabafuto spruce, but showed an exceptional difficulty in the chlorination process of analysis due to the strong affinity between the cellulose and the lignin in these woods; this has an important significance in the pulping process. Because of their compact structure these woods are only suitable for pulping by chem. methods.

B. C. A.
Paper pulp from logging waste in the Douglas fir region. A. H. HODGSON. U. S. Forest Service. *Ind. Eng. Chem.* 20, 819-21(1928).—A survey in the Oregon, Washington and British Columbia logging areas shows that about 20,000 feet board measure per acre (all species) is left in the woods, a waste wood source of some 8,200,000 cords per year. This consists of western hemlock, Sitka spruce, white fir, Douglas fir, cedar and pine. The possibilities of utilizing this for pulp and the steps already taken in that direction are pointed out.

C. E. CURRAN
The importance of hydrogen-ion concentration in pulp and paper manufacture. H. T. S. BRITTON. *Ind. Chemist* 4, 49-52(1928).—An exposition of the influence of p_H in various pulp and paper making processes and benefits to be secured by its control. The list includes sulfite pulping, bleaching and sizing.

C. E. CURRAN
The measurement of p_H and its application in the paper-mill. RUDOLF LORENTZ. Tech. Hochschule, Tharandt. *Papier-Fabr.* 26, 365-70, 427-33(1928).—The theory of p_H detns., buffers and methods of measurement are considered. It is important that the p_H of fresh and waste waters for process use be known. Since most mill waters contain buffer substances, actual acidity (p_H) is a better control than potential acidity (titration) in most cases. To obtain good results in sizing with rosin, it is necessary that the p_H be 7 or over before the size or alum is added (cf. Shaw, C. A. 19, 3590).

R. H. DOUGHTY
Drying with warm air in the pulp and paper industry. ERNST BLAU. *Papier-Fabr.* 26, 393-4(1928).—Air in positive circulation at controlled temp. is the most efficient means for drying pulp, boards and similar material. Mech. arrangements in use are mentioned.

R. H. DOUGHTY
Technology of straw-pulp production during the last 25 years. G. ODRICH. *Papier-Fabr.* 26, 132-3. WILLI SCHACHT. *Ibid* 333-5(1928).—Controversial, regarding the merits of the Braun (monosulfite) process.

R. H. DOUGHTY
Kraft pulp and paper from Pinus insignis. L. R. BENJAMIN, J. L. SOMERVILLE, R. B. JEFFREYS AND W. E. COHEN. *Australia Council Sci. Ind. Research Bull.* No. 35, 5-32(1928).—Lab. expts. in the cooking of insignis pine by the sulfate process showed

that the best results were obtained by using about 21% alkali (of which 30% was Na_2S) and 100 lbs. steam pressure. These pulps tested by the ball-mill method gave bursting strength values of 1.3+ per lb. per ream, $25 \times 40-500$. Reuse of the black liquor was found to affect adversely the tearing strength of the pulps. These results were tried on a com. scale with essentially the same results as lab. expts. and subsequent paper-making tests indicated that the pulp was equiv. to standard Swedish kraft in all respects. The economics of manuf. this product in Australia is discussed. C. E. C.

Paper pulp from Australian timbers. L. R. BENJAMIN. *J. Council Sci. Ind. Research (Australia)* 1, 65-73.—A descriptive summary of expts. in the pulping of eucalypts and other timbers indigenous to Australia, as well as grasses, sedges, etc., by the standard processes. The eucalypts were successfully reduced by the soda, sulfite, sulfate and ground-wood methods, the latter yielding best results with immature timbers. Especially good kraft pulp was produced from insignis pine. The possibility of eucalypt. newsprint paper is discussed. C. E. CURRAN

Grinding of immature eucalypts for mechanical pulp and possibilities of manufacturing newsprint in Australia. L. R. BENJAMIN. *Australia Council Sci. Ind. Research Bull.* No. 31, 5-38(1927).—Expts. were made relative to the grinding of swamp gum (*E. regnans*), brown stringybark (*E. obliqua*), blue gum (*E. globulus*), gumtop stringybark (*E. delegatensis*), mountain ash (*E. regnans*) and silvertop (*E. sieberians*) light-colored pulps being produced without difficulty. These were combined with varying proportions of eucalypt sulfite in papers approximating newsprint grade. Best results were obtained from 70% eucalypt sulfite and 30% eucalypt ground-wood pulp. It is shown that this combination is economically feasible in Australia. C. E. C.

Aluminum sulfate in paper manufacture. H. ROSCHER. *Papir-J.* 16, 108-10 (1928).—Sizing of paper cannot be accomplished as effectively with acids and acid salts as with alum, since this phenomenon depends not only upon the degree of acidity but also upon the fact that alum hydrolyzes, producing the colloidal hydroxide, which is absorbed on the fiber, thus fixing the size and color. C. E. PETERSON

The mechanism of the loading of paper. KATSUMOTO ATSUKI and MITSUO NAKAMURA. Univ. Tokyo. *Cellulose Industry* 3, 5-8; *Chem. Zentr.* 1927, II, 190-1; cf. *C. A.* 22, 163.—The loading of paper with Chinese clay (particle size $3-6\mu$, loss on ignition 3.39%) was investigated. The dried clay, which was neutral to phenolphthalein and to methyl orange, was agitated with comminuted paper pulp and water; after coming to equil. the mass was filtered through a sieve through which only the clay passed, 25 cc. of the filtrate was pipetted off and the dry residue detd. From the decrease in concn. the quantity of clay retained by the paper could be detd. This quantity increased with the concn. of clay in suspension up to 3-4%, beyond which more clay did not result in increased retention by the paper. After addn. of starch paste to the reaction mixt., considerably more clay was retained, and this was also increased by the addn. of viscose when the latter was pptd. with acids after the reaction, otherwise the alkali of the viscose reduced the retentive capacity. The addn. of glue did not influence the retentive capacity. By the simultaneous addn. of $\text{Al}_2(\text{SO}_4)_3$ and NaHCO_3 the quantity of clay retained was increased. Increasing the concn. of paper did not materially influence the proportion of clay retained. By a finer subdivision of the paper, the retention increased to a max when the paper was divided into its individual fibers. The retention of clay by paper pulp is explained as occlusion of the clay by the paper, for since clay and fiber are both negatively charged, the clay is not in a colloidal state and therefore the elec. and surface adsorption can be only insignificant. With diminishing H-ion concn. (pH 2.0-13.0), the quantity of clay retained by 1 g. of paper pulp decreased from 1.57 to 0.46 g. C. C. DAVIS

Parchment, glassine and imitation parchment papers. FRITZ HOYER. *Kunststoffe* 18, 154-6(1928).—Parchment (pergament) paper is produced by a suitable surface treatment with chemicals. Glassine (pergamyn), on the other hand, is produced by appropriate beater treatment. Imitation parchment (pergamentersatz) is produced similarly to glassine but lacks its transparency, glassiness, water and greaseproof qualities etc., the similarity to glassine being attained by high calendering and being only superficial. All of these papers are used for wrapping of food stuffs and greasy materials. Their manuf. is described. BONIFANT HAMILTON

Vegetable and synthetic tannins (GERNGROSS) 29. Lignin and cellulose. V. Methylcellulose (FREUDENBERG, BRAUN) 10. Chemical structure of α -lignin (KLASON) 10. Mechanism of the saponification of cellulose esters of higher fatty acids (SAKURADA) 2. Apparatus for drying paper (Brit. pat. 282,032) 1. Dome construction for stills

for paper pulp digesters (Brit. pat. 281,928) 1. Boiler composition and disincrustant (U. S. pat. 1,679,037) 14.

Extraction of cellulose. SOC. FRANÇAISE DES CELLULOSES "BARBOU & Co." Fr. 634,402, Sep. 14, 1926. In a process for leaching cellulose material with Na_2SO_3 , fresh Na_2SO_3 is added to the residual lye and this is used again until a strength of about 20° Baumé is reached, when it becomes economical to recover the org. matter and Na_2SO_3 contained therein.

Cellulose derivatives. LEON LILIENFELD. U. S. 1,680,224, Aug. 7. Alkyl esters of cellulosexanthic acids are obtained by acting on a cellulose xanthate with an alkyl ester such as Et_2SO_4 , EtI , EtBr , Me_2SO_4 or MeI . The products may be used for manuf. of artificial threads, films, plastic masses or coatings or for the manuf. of other compds. or derivs. of cellulose.

Cellulose acetate. EDWARD S. FARROW, JR. (to Eastman Kodak Co.). U. S. 1,679,966, Aug. 7. Cellulosic material such as cotton linters is treated with an aq. HCl soln. of over 25% strength and free from oxidizing agents, at room temp. for 2-6 hrs. The action is stopped before the phys. appearance of the material is changed and the treated material is then acetylated, *e. g.*, by use of Ac_2O . The preliminary treatment with HCl serves to facilitate acetylation.

Cellulose esters. I. G. FARBENIND. A.-G. Brit. 281,927, April 19, 1927. Cellulose acetates and other cellulose esters are prepd. by treating cellulose with a small proportion of H_2SO_4 (suitably 0.5-1.0%) in the presence of a diluent such as HOAc or other aliphatic acid, then adding Ac_2O or other suitable esterifying agent to effect partial esterification of the cellulose, and subsequently adding addnl. H_2SO_4 , with or without more of the esterifying agent, to complete the esterification. The starting material may be cotton, wood pulp, hydrocellulose, oxycellulose or slightly nitrated cellulose.

Cellulose ethers. CHAUNCEY U. PRACHEL and LEONARD E. BRANCHEN (to Eastman Kodak Co.). U. S. 1,679,943, Aug. 7. An acid such as HCl or HOAc is permitted to react on cellulose ethers such as water-insol. ethylcellulose until the viscosity characteristics of the ether are lowered by at least one-third.

Acetylating cellulose. CLAUDE DIAMOND (to Courtaulds, Ltd.). U. S. 1,681,103, Aug. 14. Cellulose which has been treated with NaOH is prepd. for acetylation by treatment with a phenol, *e. g.*, with PhOH or *m*-cresol, which serves to facilitate the acetylation.

Viscose. R. SAJITZ and E. POTT (TRADING AS CHEMISCHE FABRIK POTT & Co.). Brit. 281,679, Nov. 30, 1926. In the manuf. of viscose, salts of aromatic sulfonic acids are added, especially salts of those acids which are alkylated in the nucleus such as naphthalenedi- and -trisulfonic acids alkylated in the nucleus or sulfonic acids of hydroaromatic compds. of the phenanthrene and anthracene series. If the salts are added to the mercerizing lyes, the temp and duration of ripening of the alkali cellulose does not require such exact adjustment; or, the salts may be added at a later stage, and avoid need of exact adjustment of the compn. of the coagulation bath.

Artificial silk. NAAMLOOZE VENNOOTSCHAP NEDERLANDSCHE KUNSTZIJDEFABRIEK. Brit. 282,326, Dec. 17, 1926. See U. S. 1,672,365 (C. A. 22, 2663).

Artificial silk. JEAN H. BRÉGEAT. Fr. 633,969, May 5, 1927. To recover volatile products in the spinning of artificial threads, the loom is entirely covered by a tunnel with necessary means of access. The unevapd. solvents are recovered by damping the threads after their passage through the drawplate.

Apparatus for making artificial-silk filaments. GRUNERT & GIANNETTI (to K. Grunert). Brit. 282,670 Dec. 24, 1926. Air or other gas is bubbled through the coagulating liquid to carry off the larger bubbles present in the liquid and leave only smaller bubbles which have no injurious effect on the formation of the filaments.

Alloy for jets for making artificial-silk filaments. WILLIAM P. DREAPER. U. S. 1,680,598, Aug. 14. See Brit. 260,672 (C. A. 21, 3461).

Softening vegetable fibers. SIDNEY D. WELLS. Fr. 633,801, May 3, 1927. Vegetable fibers such as wood, straw or grass are softened by treatment with a soln. of CaCO_3 and S under high pressure and at a temp. of about 145°. Cf. C. A. 21, 2063.

Sizing fibers. HUBERT L. BECHER (to The Agasote Millboard Co.). U. S. 1,678,720, July 31. See Can. 275,625 (C. A. 22, 1243).

Threads or films, etc., from cellulose nitrate or acetate or other cellulose derivatives. ERNST BERL. U. S. 1,679,850, Aug. 7. A soln. or "gelatin" of nitrocellulose or other cellulose deriv. is treated with a pptg. bath contg. both salts and solvents, *e. g.*, H_2O , alc. and NaCl , NaOAc or $\text{Ca}(\text{NO}_3)_2$.

Hollow artificial filaments. ERSTE BÖHMISCHE KUNSTSEIDEFABRIK A.-G. Brit. 282,687, Dec. 21, 1926. In making hollow filaments as described in Brit. 258,582 (C. A. 21, 3129), the added solid or liquid substance is eliminated from the filaments by subjecting them to a vacuum and if necessary also heating them; *e. g.*, when a petroleum fraction b. 200° is added, a pressure of 10–20 mm. and a temp. of 75–90° is suitable for its elimination.

"Wool-like" cellulosic derivatives from xanthates. WILLIAM HARRISON. U. S. 1,680,021, Aug. 7. The unstable insol. xanthate formed by the combined action of a caustic alkali or alk. sulfide and CS₂ on cellulosic material is subjected to the action of HNO₃ or other suitable mild oxidizing agent which does not completely split off the CS₂ previously combined with the cellulose and which converts the unstable insol. xanthate into a stable compd.

Oxidizing carbohydrate xanthates. WILLIAM HARRISON. U. S. 1,680,020, Aug. 7. A dil. soln. of viscose contg. not more than 5% of cellulose is treated with an aq. soln. of HNO₃ in the presence of a "weak acid" such as HOAc or other acid which is not derived from a N oxide. Cf. C. A. 22, 164.

Treating "black liquor" from soda and sulfate cellulose manufacture. ERIK HÄGGLUND. U. S. 1,680,540, Aug. 14. See Brit. 273,267 (C. A. 22, 1854).

Utilizing acid waste sulfite liquor for the production of yeast. GUSTAF O. W. HEIJENSKJÖLD (to Aktiebolaget Basta). U. S. 1,680,043, Aug. 7. An app. and process are described in which acid waste sulfite liquor may be neutralized to "at least the neutral point," filtered and then added together with other desired nutrient substances for yeast, to a wort of high sugar concn. in which yeast is being propagated with aeration.

Pulp from wood. FRANCIS G. RAWLING. U. S. 1,679,682, Aug. 7. Wood chips are treated with an aq. soln. of Na₂SO₃ and NaHCO₃ or other suitable Na salt of a weakly ionized polybasic acid, at a temp. of 100–150°, unabsorbed liquor is removed from the wood and the latter is subsequently treated with SO₂ at 100–160°. Cf. C. A. 21, 3743.

Continuous cooking of wood pulp or other fibrous materials. THOMAS L. DUNBAR (to Chemipulp Process, Inc.). U. S. 1,679,336, July 31. The material is fed through a series of cooking chambers arranged end to end and is cooked in each of the chambers by a cooking liquor such as acid sulfite soln. The material in the first chamber is subjected to hydrostatic pressure and, in the succeeding chambers, to higher temp. and super-atm. pressure. An app. is described.

Washing cooked straw. DEWITT C. AMERINE. U. S. 1,678,718, July 31. In treating straw to prep. it for making strawboard or paper, it is cooked in a lime-S compn. in a rotating vessel while treated with steam under pressure and washing water is subsequently supplied against the steam pressure while continuing the rotation of the vessel; the steam pressure is reduced and a portion of the liquid is withdrawn from the vessel. An app. is described.

Paper-making apparatus. C. MOES. Brit. 282,620, Dec. 24, 1926.

Paper-making apparatus. RALPH E. HEISEL (to Paper Machinery Corp.) U. S. 1,679,523, Aug. 7.

Paper-making apparatus. JAMES K. DARBY (to Frank C. Trowbridge). U. S. 1,679,854, Aug. 7.

Paper-making apparatus. ARTHUR BELLEMARE U. S. 1,680,277, Aug. 14.

Pulp for paper manufacture. DINSHAW R. NANJ1. U. S. 1,679,441, Aug. 7. See Brit. 280,629 (C. A. 22, 3300).

Suction roll for paper-making apparatus. EARL F. BERRY (to Beloit Iron Works). U. S. 1,679,598, Aug. 7. Structural features.

Flexible metallic cloths for paper-making apparatus. R. KASTNER. Brit. 282,685, Dec. 24, 1926. Structural features.

Apparatus for beating paper pulp. HOMAR D. MARTINDALE. U. S. 1,680,912, Aug. 14.

"Beating engine" for paper pulp. LEO SHILICK. U. S. 1,679,056–7–8–9, July 31.

Fiber board from liquid pulps containing digested cane material. ROBERT A. MARR. U. S. 1,680,896, Aug. 14. Various mech. and manipulative features are specified.

Coating paper with wax. ELIE W. LABOMBARDE. U. S. 1,681,350, Aug. 21. Mech. features.

De-inking paper. ALAN R. LUKENS (to The Richardson Co.). U. S. 1,680,949, Aug. 14. A fibrous pulp such as that formed from printed paper is soaked in an alk. soln. such as Na₂CO₃ soln. in the presence of a Na sulfonate or other suitable sulfonic acid compd. and the pulp is washed with water without the use of further addn. of soap or fatty acid.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Annual report of explosives division, Department of Mines (Canada) for 1927. G. OGILVIE. *Separate* 23 pp.—The various activities of the inspectors in the enforcement of the Act are described in detail. Among accidents at factories was one on Mar. 4, at Brownsburg, P. Q., of a bundle of delay-action elec detonators which exploded while being waterproofed by dipping, and which, by influence, fired upwards of 10,000 other detonators in the building. It is thought that the accident originated in an unusually severe blow on the bundle of detonators while shaking them in the dipping barrel to remove the excess fluid. A second accident, in manufacture, on Oct. 14, was the explosion of approx. 10,000 0.22 primed shells *en masse* as an operator was shaking shells into a loading-plate. The shells were rim-fire and it was found difficult to clean the walls of the shells completely from the priming composition. There is recorded a case of spontaneous decompn. of a mass of sawdust saturated with nitroglycerin, produced in the cleaning out of a sump with sawdust. During a severe ice storm a magazine on the shore of Lake Erie was wrecked and its explosive contents were discharged into the lake. An account is given of the recovery, inspection and reconditioning of the explosives and detonators. Many instances of mislaid and abandoned explosives and detonators are given. The table on "Playing with detonators" records, with descriptions, 25 accidents through which 4 small boys or girls were killed and 29 others seriously injured while 19 others, including 1 man, were injured while playing with explosives. Many of the detonators and some of the samples of explosives were "found" where they had been mislaid or abandoned.

CHARLES E. MUNROE

New apparatus for automatically detecting combustible vapors (benzene, ether, etc.) in air. BIBEL. *Zentralbl. Gewerbehyg. Unfallverh.* 14, 291-3(1927); *Chimie et industrie* 19, 1067(1928).—The presence of combustible or explosive vapors in air can be detected by an app. similar to the one used for detg. CO₂ in flue gases. The method is based on detg. the relation between the viscosity and d., the viscosity being measured by means of Poiseuille's law by the resistance to its passage through a capillary tube, and the d. being measured by Bunsen's law by the rate of flow through a small aperture. The app. used in practice comprises a metal recording pressure gage and a suitable elec. warning device to tell when the danger point is reached. It is claimed that 0.02% C₆H₆ can be detected.

A. PAPINEAU-COUTURE

Estimation of products formed during the storage of powder SD. LECORCHE AND JOVINET. *Mem. poudres* 23, 69-78(1928).—A study of the products formed in powder stored for 4 years at 50°. The powder had the compn. CP₂ (cotton powder No. 2) 66%, nitroglycerin 27%, centralite 7%. It was dissolved in NaOH and steam-distd., the study being concerned with those products which are volatile with steam. Characteristic tests are given for the detection of ethylphenylnitrosamine and volumetric methods for the detn. of centralite in the presence and absence of nitrosamine and ethylphenylnitrosamine. The centralite is reduced in acid or alk. soln. with Zn to ethylaniline, converted to the hydrochloride and titrated with NaOH and methyl orange. Corrections are given for the errors involved.

A. J. PHILLIPS

The limits of inflammability of fire damp in atmospheres which contain black damp. H. F. COWARD AND F. J. HARTWELL. *Safety in Mines Research Board* No. 19, 11 pp.(1928).—Though self-propagating inflammation is possible in any mixts. of CH₄ with atms. consisting of air to which there has been added (a) 25%, or more, of CO₂; or (b) 38.5%, or more, of N, the amt. of black damp (CO₂ + N) that must be mixed with air to form an extinctive atm. for CH₄ flames lies between these percentages according to the proportions of CO₂ and N in the particular sample of black damp. There is a rapid fall in the value of the upper limit of inflammability of CH₄ as a diluent is added to the air, which is mainly due to a reduction of the O-content of the atm. The comparatively slow rise in the value of the lower limit in atms. containing up to 20% of diluent gas indicates that the addition of moderate amts. of either N or CO₂ would not appreciably diminish the danger of a fire damp explosion underground. C. E. M.

The electric ignition of fire damp; alternating and continuous currents compared. R. V. WHEELER. *Safety in Mines Research Board* No. 20, 18 pp.(1928).—The variables upon which the igniting power of a "break-flash" or "momentary arc" depends were investigated separately. In default of an absolute measure of the energy in a break-flash, its relation igniting power has been expressed in terms of the circuit (in amperes) flowing in the circuit at the moment of interruption, which yielded a spark just capable of causing ignition. The igniting-current for a given mixt. of CH₄ and air varies di-

rectly with the volatility of the metal at the spark-gap, being lower the lower the b. p. of the metal. Other conditions remaining const., the igniting current for a given mixt. of CH_4 and air is lower the more rapid the break of circuit, the smaller the area of contact at the moment of break of circuit, the lower is the igniting current required for a given mixt. of CH_4 and air under otherwise identical electrical conditions. There is no simple universal law connecting the value of the igniting-current with the inductance of the circuit, but the relationship varies with the mechanical conditions under which the sparks are produced. Under one particular set of conditions, the relationship could be expressed by $Li^{1.4} = k$, meaning that the energy required in the circuit before break ($1/2 Li^2$) to produce the igniting sparks was nearly const. In general, particularly with highly self-inductive circuits the amt. of current in the circuit is of far greater importance than the impressed voltage if its value is comparatively low as regards the igniting power of the flash produced on breaking the circuit. The character of the current supply, whether continuous or alternating, does not materially affect the incendiary of break-flashes.

C. E. MUNROE

Some economic aspects of dust explosion and fire prevention. DAVID F. PRICE. Bureau Chemistry and Soils. *Separate* 6 pp.(1928).—A review of accomplishment with detailed examples in starch factories and pulverized-fuel systems showing methods of procedure by which prevention has been accomplished.

C. E. M.

Danger of explosion or fire from persulfates. WALTER ROTH. *Ind. Eng. Chem. News. Ed. 6, No. 7, 5-6*(1928).—Such apprehension has been felt that in water transportation it has been required that persulfates shall be packed in "strong, tight, securely closed kegs of galvanized iron" and stowed on deck. Tests were made of persulfates alone and mixed with sweepings from wooden floors by Professors Agde and Alberti. The detonation and percussion tests gave negative results. With the mixt. with sweepings a charring of the org. matter only was observed at 160° . It is recommended persulfates be packed for shipment in wooden kegs paraffined to prevent penetration of moisture through crevices and that such kegs be stowed below deck. CHARLES E. MUNROE

Explosives. HAMBURG DYNAMITE-A.-G. VORM A. NOBEL & Co. Brit. 282,631, Dec. 21, 1926. Solns. of one or more nitrates of solid multivalent alcs. such as sorbitol, mannitol and arabitol in nitroglycerin, nitroglycol or like materials are gelatinized with nitrocellulose and may be also mixed with other ingredients such as sawdust and NaNO_2 . Examples are given.

• **Priming mixture for explosives.** ARLIE W. SCHORGER (to C. F. Burgess Laboratories, Inc.). U. S. 1,681,259, Aug. 21. A solid deflagrating oxide of C suitable for use in priming mixts. is obtained by known methods of making "graphitic oxide." This product may be mixed with Hg fulminate, trinitrotoluene, picric acid, etc.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Simplification applied to color fashions. WALDON FAWCETT. *Am. Dyestuff Rept.* 17, 504-5(1928).—A concert of action is suggested within an industry to the end that colors will "take turns" in their presentation to the public. L. W. RIGGS

Production of bright colors on textiles. XXXVI. RAFFAELE SANSONE. *Am Dyestuffs Rept.* 17, 376-80(1928); cf. C. A. 22, 2843.—Mordanting and padding processes are described. XXXVII. *Ibid* 484-6.—Methods of management of differently filled padded fabrics are given. XXXVIII. *Ibid* 505-8.—The work of filling and sizing is shown with reference to special machinery. L. W. RIGGS

Colored fabrics. ABEL CAILLE. *Chimie et industrie* 19, 1139-50(1928).—A historical review of the development of the industry from early days. A. P.-C.

Action of light on dyed colors. F. SCHOLEFIELD, EVA HIBBERT AND C. K. PATEL. *J. Soc. Dyers Colourists* 44, 236-7(1928).—The fading product of Ciba Blue 2B dyed on cotton was isolated; it appears to be dibromoisatin. The fading product from cotton dyed with methylindigo gave the reaction for o-methylisatin. L. W. R.

Use of buffers in the determination of color by means of titanium trichloride. I. AMARANTH, PONCEAU 3R, and ORANGE I. O. L. EVENSON AND D. T. MCCUTCHEN. *Ind. Eng. Chem.* 20, 860-2(1928).—Accurately to det. the color content of dyes by titration with TiCl_3 , the correct buffer must be used for each dye. For Amaranth, Na citrate, NaHCO_3 or potassium antimony tartrate is suitable. For Ponceau 3R,

Na citrate or NaHCO_3 may be used. For Orange I, Na citrate, NaHCO_3 or the tartrates (except potassium antimony tartrate) may be used. T. S. CARSWELL

Colored reserves under sulfur dyes. HENRI FLEISCHER. *Bull. soc. ind. Mulhouse* 94, 195-7 (1928). Sealed Note 1941, Oct. 23, 1909.—The process, consisting essentially in fixing basic dyes on Zn ferricyanide in presence of Zn tungstate, is carried out as follows: jig the fabric in $\text{K}_3\text{Fe}(\text{CN})_6$ soln. (35 g. per l.), print with the color paste (contg. a basic dye dissolved in PhOH , a soln. of Zn tungstate in a suitable org acid, Zn Cl_2 , kaolin and gum senegal), dry, steam 4 min. in a Mather-Platt at $102-8^\circ$, dye with S dyes in a jig, wash with cold water, then with 5° Bé. H_2SO_4 at 50° R., again with cold water and finally with soap at 50° R. The washing should be carried out immediately after dyeing. There is formed a ppt. of Zn tungstate which is washed, filtered, pressed and dissolved in a cold soln. of tartaric acid (7 parts acid to 14 parts H_2O), giving a soln. of $46-8^\circ$ Bé. after filtration. A no. of formulas are given. Report. VALENTIN SCHWARTZ. *Ibid* 197-8.—Reserving under S dyes by fixing basic dyes with ferro- or ferricyanide has long been known, but the fastness is not satisfactory. By working in presence of Zn tungstate there is formed a double lake with the ferrocyanide and Zn tungstate, which greatly improves the fastness to soap. The process possesses the serious drawback of greatly weakening the fabric at the points where the reserve is applied in consequence of the presence of large amounts of tartaric acid. This could easily be prevented by adding Na tungstate to the jiggling soln. and then printing a reserve consisting of the dye, ZnCl_2 and kaolin. A. PAPINEAU-COUTURE

Colored reserves under sulfur dyes. L. GOUBYRIN. *Bull. soc. ind. Mulhouse* 94, 367-70 (1928). Sealed Note 1933, Sept. 28, 1909.—In obtaining colored reserves under S dyes, use may be made of the power of resorcinol- CH_2O to fix basic dyes; but when this is carried out in the usual manner (applying the resorcinol to one side of the fabric and then printing with the color contg. CH_2O) diazo dyes cannot be used. These dyes can be used by first applying β -naphthol- CH_2O to the fabric and then printing with a paste contg. the dye, resorcinol, ZnCl_2 , etc. On steaming 4 min., there is a double decomposition, the CH_2O combining with the resorcinol probably through the presence of ZnCl_2 . A no. of formulas are given. Report. VALENTIN SCHWARTZ. *Ibid* 370-1.—The process is a happy combination of the previously known processes for reserving diazo dyes by means of β -naphthol and basic dyes by means of resorcinol- CH_2O . The colored reserves obtained in this way (as shown by the samples accompanying the note) are generally good (though some obtained with basic dyes are rather dull), and possess good fastness to soap. A. PAPINEAU-COUTURE

Derivatives of indophenol sulfur dyes derived from carbazole and its substitution products. ED. JUSTIN-MUELLER. *Bull. soc. ind. Mulhouse* 94, 185-6 (1928). Sealed Notes 2126 and 2138 of Nov. 6 and Dec. 22, 1911.—On treating indophenol S dyes derived from carbazole (e. g., Hydron Blue R and Hydron Blue G) in soln. in 66° Bé. H_2SO_4 with a mixt. of equal vols. H_2SO_4 and HNO_3 , pouring into cold water, washing, filtering and neutralizing, nitro derivs. are obtained which, on dyeing, give shades different from those of the original dyes. On prolonging the nitration, nitro derivs. of different shades are obtained. On dyeing in alk. hyposulfite, the NO_2 groups are reduced to NH_2 , so that these dyes can be either diazotized and developed, or else coupled. These shades are perfectly fast to washing, but have but a poor fastness to Cl. Report. A. RASOUMEFF. *Ibid* 186-7.—J.-M. does not check the rise in temp. due to the nature of the reaction, which may be of considerable importance in view of the vulnerability of the characteristic radicals of S dyes. As regards conversion of the nitro derivs. obtained into amino derivs., which can be either diazotized and developed, or else coupled, the latter treatment has already been suggested for certain S dyes contg. the required radicals. Otherwise, no anteriority was found. A. PAPINEAU-COUTURE

Effect of sulfur dioxide on azo dyestuffs and a proposed new standard test for fastness to stoving. A. T. KING. *J. Soc. Dyers Colourists* 44, 14-8 (1928); cf. following abstr.—Alky. has a strong influence on the sensitivity of azo dyes on wool to the action of SO_2 . The present standard of fastness to stoving has no relation to the effect of SO_2 when there is present in the dyed material sufficient alkali to form NaHSO_3 with the SO_2 absorbed. This sensitivity is due to the formation, within the limits of alky., of a definite stable compd. (azo-sulfite) of the azo dyestuff with NaHSO_3 . The azo-sulfites are usually very different in color from the original dyestuffs. With dyestuffs of reputedly good fastness to stoving, which readily form an azo-sulfite under favorable conditions, such conditions may be realized (1) in actual stoving, (2) through accidental exposure of wool or yarn-dyed material to SO_2 , and (3) through the presence of residual sulfite from previous processes. These 3 topics are discussed at length. Complete de-

tails for a new standard test for fastness to stoving are reserved for a future communication.

L. W. RIGGS

Chemical effects of the natural sulfur in wool on the fading of azo dyestuffs. A. T. KING. *J. Soc. Dyers Colourists* **44**, 233-6 (1928); cf. preceding abstr.—Wool is a source of SO_2 aside from external contamination. The azo dyes affected by SO_2 may be classed as follows: (1) those which are reduced and do not reform on treatment with NH_3 and (2) those which form azo-sulfites reconvertible to the original dye with NH_3 . The relative fastness to light of azo dyes and their azo-sulfites was detd. for Crystal Scarlet Orange II, Fast Red A and Acid Orange GG, and showed much greater fading for the azo-sulfite. The actual quantity of S present in the wool necessary to produce a fading effect in the dyed material when oxidized to SO_2 is less than 2% of the av. S content of wool.

L. W. RIGGS

Note on the catalytic action of certain substances on the removal on indigo dyes by means of nitric acid. N. WOSNESSENSKY. *Bull. soc. ind. Mulhouse* **94**, 187-9 (1928). Sealed Note 1924, Sept. 2, 1909.—The possibility of removing indigo dyes by means of HNO_3 instead of chromates has long been known, but has not been applied industrially because of the necessity of using H_2SO_4 at a concn. of 29° Bé. and at a temp. of 70°. The concn. and temp. can both be reduced by operating in presence of N oxides (e. g., by adding NaNO_2), which apparently exert a catalytic action. Acceleration of the oxidation of indigo by HNO_3 in acid medium can also be accelerated by Zn, Al or Cu powder, and to a less extent by K_2SO_3 , NaHSO_3 and hyposulfite; they do not seem to act as true catalyzers, but rather give rise to what Ostwald calls conjugate reactions. **Note on the use of flavanthrene and of thioindigo red B for removal on indigo blue.** *Ibid* 189-90. Sealed Note 1925, Sept. 2, 1909.—Because of their fastness to soap, light and oxidizing agents, flavanthrene dyes and thioindigo dyes seem particularly suitable for colored removals on indigo; but as they must be applied in reducing medium they could not be used in the presence of chromate, and it is the NaNO_2 process which has allowed of their use for this purpose. It is carried out by printing the fabric with a mixt. of dye, alkali, rongalite and NaNO_2 , steaming (during which operation the leuco deriv. formed penetrates into the fabric), allowing to stand overnight to facilitate oxidation of the indigo (which gives brighter shades), passing through 30° Bé. H_2SO_4 at 75° and rinsing. Thioindigo Scarlet R similarly gives a brick-red, which is considerably dulled, possibly because of incipient nitration of the dye. **Nitroso- β -naphthol dyes: removal on indigo blue.** *Ibid* 190-1. Sealed Note 1940, Oct. 18, 1909.—The NaNO_2 process of removal has enabled W. to obtain a transparent olive on indigo blue, which could not be obtained with chromates and albumin dyes. The dyes which can be used with the NaNO_2 process can also be used in conjunction with *o*-Nitroanisidine Red and Dichloro-aniline Yellow by printing the nitrosoamines of those bases and the NaNO_2 soln. after prepg. the goods with NH_4OAc according to W.'s Sealed Note 1916. **Report.** LOUIS PAULUS. *Ibid* 191-2.—Tests carried out by P. showed that: (1) NaNO_2 acts as a catalyzer in the removal on indigo by NaNO_3 , enabling the concn. and temp. of the H_2SO_4 to be reduced. (2) NaNO_2 is better than sulfites, etc., which were used for the same purpose. (3) Vat dyes can be used in the NaNO_3 process, giving beautiful and fast illuminations on indigo ground. (4) The removal pastes on indigo blue with NaNO_3 , together with Fe or Cr nitrate and nitroso- β -naphthol, with or without basic dyes (prepd according to formulas in Note 1940), give beautiful olive and brown shades on indigo.

A. PAPINEAU-COUTURE

Production of thioindigo scarlet on the fiber. MORAND BAUMANN. *Bull. soc. ind. Mulhouse* **94**, 372-3 (1928). Sealed Note 1955, Nov. 24, 1909.—Thioindoxyl or thioindoxylcarboxylic acid easily combines with isatin to give thioindigo scarlet, and B. produces the reaction directly on the fiber in dil. alk. soln. Best results are obtained with hydroxythionaphthencarboxylic acid dissolved in borax (α -hydroxythionaphthene must be dissolved in Na_2CO_3 , in presence of which combination takes place too rapidly) and isatin- NaHSO_3 (instead of free isatins in Na_2CO_3). **Report.** M. BATTEGAY AND J. SCHMID. *Ibid* 374.—Note 1954 treats of the synthesis of thioindigo red on the fiber by oxidizing a suitable soln. of oxythionaphthene or of hydroxythionaphthencarboxylic acid which was covered by Kalle's D. R. P. 184,956, of Oct. 28, 1905. The prepn. of thioindigo scarlet on the fiber as described in Note 1955 differs from Kalle's D. R. P. 229,369, of Feb. 13, 1909, according to which a soln. of intermediate is used, previously prepd. by condensation of isatin with hydroxythionaphthene in alc. soln. A. P.-C.

The fixation of basic dyes on complex inorganic salts. MARIO MICHELS. *Bull. soc. ind. Mulhouse* **94**, 344-57 (1928); cf. C. A. 22, 1477, 2468.—M. considers that the fixation of basic dye is due to the action of certain radicals in the mordant, the active radicals being: SiO_2 , CrO_3 , MoO_3 , WO_3 , UO_2CN , $\text{M}(\text{CN})_x$, SCN , $\text{M}(\text{SCN})_x$.

When the active radicals are combined in the form of simple compds. which are sol. in H_2O , they react with basic dyes to give ppts. which are slightly sol. in H_2O and can in many cases be crystd.; when the active radicals are combined in the form of simple compds. which are insol. in H_2O , they do not fix basic dyes, but they can acquire fixative or mordanting properties if their mol. undergoes a slight change giving rise to traces of complex substances. Sol. complex salts contg. active radicals react with basic dyes to give ppts. which are slightly sol. or insol. in H_2O . Insol. complex salts contg. active radicals, if they are very finely divided or in colloidal aq. soln., can fix insol. basic dyes forming lakes which are fast to water and to light. These various points are supported by means of examples.

A. PAPINEAU-COUTURE

New effects on silk-cotton fabrics. PAUL DOSNE. *Bull. soc. ind. Mulhouse* 94, 358(1928). Sealed Note 1386, April, 4, 1903.—Effects different from those obtained by union silk-cotton fabrics are obtained by spinning cotton with waste silk. **Report.** LOUIS PAULIS. *Ibid* 358-9.—Spinning of such yarn is expensive, as the material must be carded and it is difficult to obtain a perfectly uniform mixt. No anteriority was found.

A. PAPINEAU-COUTURE

The mordant RS, an acid in dyeing. VITTORIO CASABURI. *Boll. ufficiale staz. sper. ind. pelli mat. concianti. supplemento tecnico* 6, 49-55(1928).—The new mordant RS is a liquid of dark reddish color; its density is 22° Bé. and its reaction is almost neutral. It is employed in dyeing chrome leather, the chromed hides being first treated with the mordant and then with an aniline base.

L. L.

Modern emulsifying agents. S. R. TROTMAN. *Chem. Trade J.* 83, 49-51(1928).—A lecture in which are discussed methods for the prepn. and use of emulsions as wetting agents, as vehicles of insol. dyestuffs, as agents for silk processing and as agents in the application of azoic colors to wool and silk.

L. W. RIGGS

Bleaching and soupling Italian yellow gum silk yarn. NOEL D. WHITE. *Am. Dyestuff Rept.* 17, 512-4(1928).

L. W. RIGGS

The proper bleaching of silk and rayon. THOMAS F. HUGHES. *Am. Dyestuff Rept.* 17, 496-8(1928).—Methods for large-scale operation are given.

L. W. R.

Absorption of acids by wool. I. Summary of the literature. H. WILKINSON AND A. G. TYLER. *J. Soc. Dyers Colourists* 44, 241-5(1928).—A review with 42 references to the literature.

L. W. RIGGS

Discussion of soap in its relation to the scouring of wool. II. Potash or soda soaps—which? PROCTER & GAMBLE. *Textile Research Div. Procter and Gamble Wool Scouring Bull.* No. 2, 1-17; cf. *C. A.* 22, 2063.—Claims for the superiority of K soaps rest on tradition and prejudice rather than on scientific proof. Na oleate has been shown to be equal, and in many respects superior to K oleate. The exptl. results of this study may be summarized as follows: (1) Na oleate exceeds any textile demand for soly. In its flaked form it dissolves far more rapidly than potash gel. Moisture is absorbed equally by the two when on wool. (2) Na soap hydrolyzes less and loses less alkali through absorption by wool; it therefore has a less harmful effect on the softness, elasticity and strength of wool. (3) Na soap rinses better than K soap because of its greater soly. and less absorption. (4) The fatty acid emulsions are equally stable for both soaps since this stability depends on the low titer of the oil stock. (5) K soap, both in flake and gel form, becomes rancid in a much shorter period than Na soap. K soaps are 10 to 15% more expensive than Na soaps.

L. W. RIGGS

Ingenious new chart devised for simplifying the solution of cotton cloth analysis problems. A. S. MARK. *Textile World* 74, 694-5(1928).—A logarithmic chart is described for rapidly computing the count, the wt. of cloth in yards per lb., or the lbs. of yarn per yard of cloth. The value of such charts in the textile industry is stressed and the development of other similar charts urged.

RUBY K. WORNER

Practical method and new gage developed for measuring quantity of nap on Canton flannel. F. W. CARTLAND. Westinghouse Elec. & Mfg. Co. *Textile World* 74, 425-6, 431(1928).—A new gage and a definite method of operation have been developed to meet more closely the following requirements: (1) The gage should be a dead-weight type of instrument of rigid construction. (2) The load should be applied directly to the pressure foot in such a way as to maintain uniform frictional forces as small as possible. (3) The pressure foot should be self-aligning for very small displacement forces. (4) The dial gage should be well made, have a stroke of at least $\frac{3}{4}$ in., and be calibrated in thousandths of an inch. (5) The instrument should be equipped with some suitable device which would allow the raised pressure foot to descend to the specimen at a uniform speed, independent of the operator. The procedure outlined offers a more exact means of detg. the quantity of nap on a napped flannel than the present method of vis-

ual comparison. It makes possible also a comparison of several different flannels without bringing them together. A picture of the gage is included. RUBY K. WORNER

The setting of crepe twist and the shortening due to twisting. WARREN P. SEEM. *Textile World* 74, 699, 703, 705(1928).—The soaking and steaming methods for "setting the twist" are described. The effect of the pliability of the raw silk thread, wt. and style of flyers, speed and tension on thread, temp. and humidity in the spinning room, and tension and moisture in the thread when redrawing on to the shipping bobbin have a decided influence on the shortening of the finished thread. Since the method of throwing crepe varies in different plants, shortening values to be detd. mathematically are suggested as a possible acceptable standard. A mathematical treatment of this subject by Andrews is presented.

Processes and chemicals used to render fabrics water-repellent and waterproof. HERMAN E. WENNSTROM. *Textile World* 72, 2185-7(1927).—Fabrics may be rendered water-resistant by the application of certain water-repellent impregnants, or they may be rendered waterproof by the application of certain mixts. which not only render the fibers waterproof but also leave an impervious coating on the whole surface of the fabric. Several methods for rendering fabrics water-repellent or waterproof are discussed.

Investigations on mineral oil stains (on textile fabrics). R. F. MENNECKE, LUCIEN PICARD, VICTOR SILBERMANN, TH. BAUMANN AND PAUL DE CHAMBRIER. *Bull. soc. ind. Mulhouse* 94, 241-67(1928).—A detailed report is given of exhaustive investigations on the removal of stains caused by spinning oils. With the grades of mineral oils generally used, the stains can be removed when fresh by boiling 6 hrs. in a Mather-Platt with a soln. of NaOH, Na₂CO₃ and rosin, at the end of 3 months' exposure to the atm. at about 10-5° the stains begin to become indelibly fixed on the fiber. Mineral oils which were specially purified and deparaffined by the Pechelbronn Company could still be removed at the end of 8 months; but it is doubtful if such oils could be economically prepd. on a commercial scale. Use of a mixt. of mineral oil and colza oil instead of pure mineral oil greatly facilitates removal of the stains. Scheurer and Wallach suggested (1911) use of spinning oil contg. 75% of colza oil, but it is now found that 33-60% is sufficient according to the quality of mineral oil used.

The "Zair" process. Treatment of animal fibers with ozone. REGINALD B. BROWN. *J. Soc. Dyers Colourists* 44, 230-3(1928).—Many tests of the process were described, some of the tests being on a reduced factory scale. It is suggested that the process may acquire a com. importance.

Percentages of moisture and soluble matter in substances used by North Carolina mills (GRIMSHAW) 28. Tests on ash, grit, color, pasting points and lasting qualities of starch (GRIMSHAW) 28. Soap for the silk dyer (GROVE-PALMER) 27. Dyeing of gloving and clothing leathers (LAMB) 29. The utilization of coconuts (SCHMÜLLING) 27. The liquid crystal state as a general property of material. VI. The liquid crystal state of natural silk (VEIMARN) 2. Report of the fiber expert to the Government of Bengal [on jute] (McLEAN) 15. Rubberized fabric driving belts (Brit. pat. 282,271) 30.

RISTENPART, E.: *Die Praxis der Bleicherei*. Berlin: Verlag von Krayn. Reviewed in *Tiba* 6, 845(1928).

Dyes. BRITISH DYESTUFFS CORPORATION, LTD., W. D. ROGERS, H. EVANS and W. F. A. ERMEN. Brit. 282,481, Sept. 13, 1926. Brominated pyranthrone are made by brominating pyranthrone in chlorosulfonic acid soln. or suspension in the presence of I (suitably at 80-85°, followed by pouring the mixt. on to ice and subsequently boiling the dye with weak alkali).

Dyes. BRITISH DYESTUFFS CORP., LTD., and H. W. MOSS. Brit. 282,548, Dec. 7, 1926. Trisazo dyes which dye cotton bluish black shades which can be diazotized on the fiber and developed with usual components such as β -naphthol or *m*-tolylene-diamine are made by coupling a diazotized nitroamine or acyldiamine of the benzene series such as *p*-nitroaniline or *p*-aminoacetanilide, with or without other substituents, with a *peri*-aminonaphtholsulfonic acid such as H acid in an acid medium, further coupling in an alk. medium with a tetrazotized diamine of the benzene series such as tetrazotized benzidine, and again coupling the resulting diazodisazo compd. with α -naphthylamine or its 6- or 7-sulfonic acids or their mixts. The nitro group is reduced or the acyl group removed by hydrolysis at any stage after the first coupling. Several examples are given.

Dyes. I. G. FARBENIND. A.-G. Brit. 282,107, Dec. 13, 1926. *o*-Hydroxyazo dyes are converted into more easily sol. dyes by treatment with chlorosulfonic acid or its esters. The reaction may be effected in the presence of pyridine, dimethylaniline or other tertiary base, and the products may be treated in substance or on the fiber with metallic salts such as those of Cu or Cr. Several examples are given.

Dyes. I. G. FARBENIND. A.-G. Brit. 282,409, Dec. 14, 1926. Acid wool dyes of reddish tint are produced by reaction of 1-amino-4-bromo-2-anthraquinonesulfonic acid with a *p*-aminoacetanilide substituted in the acylamino group by a Me, Et or other alkyl group, a benzyl group or a hydroaromatic group. The reaction may be effected in the presence of CuSO_4 and aq. NaHCO_3 .

Dyes. I. G. FARBENIND. A.-G. Brit. 282,629, Dec. 23, 1926. Vat dyes giving orange dyes from an alk. hyposulfite vat are produced by treating Bz, Bz'-diarylpyranthrones with condensing agents, *e. g.*, with MnO_2 and H_2SO_4 while cooling and sepg. the resulting dye by pouring into water.

Dyes. I. G. FARBENIND. A.-G. Fr. 632,501, Dec. 24, 1925. Addn. to 578,690. Condensation products are prep'd. from dibenzanthrone or dibenzanthronyl or their derivs. not substituted in the Bz2-Bz2'-positions by the action of an aliphatic or aromatic acid chloride or COCl_2 , or phthalic anhydride in the presence of a condensing agent such as AlCl_3 . The products dye cotton in shades of blue. Halogenated products are obtained by carrying out the process in an atm. of halogen.

Dyes. I. G. FARBENIND. A.-G. Fr. 633,869, May 4, 1927. A yellowish green azo dye which can be readily transformed into a lake is made by coupling diazotized 4-chloro-2-nitroaniline with the *p*-chloroanilide of acetoacetic acid.

Dyes. I. G. FARBENIND. A.-G. Fr. 634,198, Feb. 19, 1927. Vat dyes of the 2-thionaphthene-2'-indolindigo series are prep'd. by condensing the 3-hydroxy-1-thionaphthenes substituted in the 4, 6 and 7 positions by 3 halogen atoms, or by an alkyl group and 2 halogen atoms, or by 2 alkyl groups and 1 halogen atom, with the α derivs. of isatin, or its substitution products or homologs. Thus, 4-methyl-6,7-dichloro-3-hydroxy-1-thionaphthene is condensed with 5, 7-dichloroisatin 2-chloride. The product dyes cotton from the vat in reddish violet tints fast to boiling with Na_2CO_3 .

Dyes. I. G. FARBENIND. A.-G. Fr. 634,232, Apr. 19, 1927. Azine dyes are prep'd. by condensing 3-arylamino-1,8-naphthosultams or their derivs. with nitroso aromatic derivs., or by submitting to simultaneous oxidation the 3-arylamino-1,8-naphthosultams with *p*-diamines or *p*-aminophenols or their homologs or derivs. Thus, 3-phenylamino-1, 8-naphthosultam-6-sulfonic acid is condensed with 4-nitrosodimethylaniline-HCl or 3-(4-tolylamino)-1,8-naphthosultam-6-sulfonic acid and 4-amino-dimethylaniline-3-sulfonic acid are oxidized together. The first gives a reddish violet and the second a violet on wool in an acid bath.

Azo dyes. I. G. FARBENIND. A.-G. Fr. 633,811, May 3, 1927. Azo dyes, which dye cellulose ethers and esters in intense shades are prep'd. by coupling diazo compds. of the benzene or naphthalene series or their derivs. not contg. S or COOH groups, other than picramic acid, either with phenols substituted in the *p*-position and not contg. S or COOH groups or with their homologs capable of being coupled in the *o*-position. Examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Fr. 633,812, May 3, 1927. A yellow dye particularly suitable for dyeing acetate silk is obtained by coupling diazotized *p*-nitroaniline with 1-nitro-2,4-diaminobenzene.

Azo dyes. I. G. FARBENIND. A.-G. Fr. 634,620, May 18, 1927. The diazo compds. of 2,4,6-trinitro-1-aminobenzene, its homologs, or its substitution derivs. are coupled with *N*-alkyl-, *N*-aralkyl-, or *N*-arylanilinesulfonic acids, their homologs, or their substitution products, giving dyes resistant to heat, acids and dil. alkalies and are especially suitable for acetate silk. Examples are given.

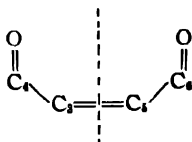
Azo dyes. I. G. FARBENIND. A.-G. Brit. 282,151, Sept. 14, 1926. The azo dyes obtained by coupling diazo compds. with dihydroxynaphthalenesulfonic acids are converted into new dyes by treating them with an aromatic sulfonyl halnide such as *p*-toluenesulfonyl chloride, in equimol. proportions, in the presence of an acid-binding substance such as Na_2CO_3 . Examples are given of dyes which dye wool in reddish shades fast to light and fulling.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 282,682, Dec. 22, 1926. Azo dyes yielding violet shades are formed in substance, on a substratum, or on the fiber by coupling diazo compds. of monoaminocarbazoles such as diazotized 1-aminocarbazole with arylides of 2,3-hydroxynaphthoic acid such as the dianiside, naphthylamides, *p*-phenetide and *p*-aniside.

Monoazo dyes. I. G. FARBENIND. A.-G. Brit. 282,683, Dec. 23, 1926. Monoazo

dyes yielding blue and violet to black shades on wool and suitable also for dyeing "acetate silk" clear fast shades are made by coupling the diazo compds. from 4-nitroaniline-2-sulfonic acid or its substitution products, 5-nitro-2-aminobenzyl- ω -sulfonic acid or a sulfonic acid of 4-nitro-1-aminonaphthalene with 2-(4'-hydroxyphenyl)aminonaphthalene or its substitution products. Several examples are given.

Indigoid dyes. HERMANN STAUDINGER, RICHARD TOBLER, ROBERT STOCKER, JAKOB MÜLLER AND ARMIN BUCHER (to Soc. anon. pour l'ind. chim. à Bâle. U. S. 1,679,277, July 31. Unsymmetrical indigoid dyes are characterized by the symmetrical atom grouping:



the first member of which is attached by the carbon atom C_3 to the S atom of a thionaphthol nucleus and by the carbon atom C_4 to a β -C atom in α -position to this S atom, and the second member of which belongs to a five-membered heterocyclic complex contg. a S atom or an NH group and condensed with a benzene nucleus. These dyes form dark powders which dissolve in H_2SO_4 of 98% strength with violet-red to green and olive color, yielding with hyposulfite and caustic soda soln. yellow to olive-green vats which dye cotton fast brown to Bordeaux, violet, blue and gray tints. Numerous examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 633,958, May 5, 1927. Vat dyes which give violet colors on cotton and are resistant to soap and boiling with Na_2CO_3 are prepd. by condensing α -diamines with a perylenetetra-carboxylic acid contg. one to three halogen atoms. In an example dichloroperylene-tetra-carboxylic acid is condensed with α -phenylenediamine.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 634,305, May 12, 1927. The derivs. of 2,3-naphthhisatin, which are substituted by halogen in the nucleus and in which the O of the keto group in the α -position is replaced by substituents easily replaced, are condensed with monoethers of 1,4-dihydroxynaphthalene or their derivs. in which the α -position to the OH group is free. Dyes are obtained which dye textiles green from the vat.

Vat dyes and intermediate products. I. G. FARBENIND. A.-G. Fr. 634,583, Dec. 21, 1926. The products which result from the action of alkylating agents, or of alkyl derivs. contg. two substituents capable of being exchanged, on pyrazolanthrone or its derivs. substituted in the nucleus are treated with alk. condensing agents to produce yellow to orange vat dyes. The alkylpyrazolanthrones may be prepd. by the action of alkyl ethers of toluenesulfonic acid or of H_2SO_4 .

Dye intermediates. BRITISH DYESTUFFS CORP., LTD., J. B. PAYMAN and H. WIGNALL. Brit. 281,795, Sept. 20, 1926. Sulfoamidoarylates of 2,3-hydroxynaphthoic acid are made by condensing the acid with aromatic sulfonamides contg. a primary or secondary NH_2 group as a substituent in addn. to the sulfonamide group, the H of which may also be substituted by a hydrocarbon radical. Aniline- m -sulfonamide, aniline- m -sulfonanilide, o -toluidine-4-sulfonamide, p -toluidine-3-sulfonanilide, methyl-aniline-4-sulfonamide, ethyl- o -toluidine-4-sulfonanilide and like compds. may be used and the production of some of these starting materials also is described.

Intermediate products for dyes. I. G. FARBENIND. A.-G. Fr. 634,199, Feb. 22, 1927. Diazosulfamic acids of the aromatic series are prepd. by treating disulfamic acids or aminoarylsulfonic acids in the cold with the quantity of nitrous acid necessary for the diazotization of one amino group. Several examples are given.

Chlorinated hydroaromatic compounds containing nitrogen. THEODORE VOLTZ (to The Firm Durand & Huguenin Soc. Anon.). U. S. 1,679,998, Aug. 7. By chlorinating the aromatic amines or their hydrochlorides in an indifferent medium such as $PhCl$ or C_6H_6 which does not allow hydrolysis, with exclusion of moisture, chlorinated products contg. N are obtained. If aniline is treated in $PhCl$ and heat is applied toward the end of the reaction while continuing the introduction of Cl, there is obtained the octachlorochloro-*ketiminohexahydrobenzene*, a "fairly cryst." substance, m. 151° . When the reaction between aniline and Cl is effected in C_6H_6 and the introduction of Cl is interrupted soon after soln. takes place, hexachlorochloro-*ketiminotetrahydrobenzene*, m. 125° , is obtained. These compds. are stable at ordinary temp. but when

heated to about 170° decompose with liberation of Cl. α -Naphthylamine yields pentachloro- α -chloroketimino-tetrahydronaphthalene, prismatic crystals, m. 122°. β -Naphthylamine gives the pentachloro- β -chloroketimino tetrahydronaphthalene, prisms, m. 118.5°. The aminoanthraquinones react similarly. Pentachloro- α -chloroketimino-tetrahydroanthraquinone forms bright yellow prisms, m. (decompn.) 190°; the corresponding β -deriv. forms rhombic leaves, m. 210°. Various details of procedure are given. The products obtained may be used as dye intermediates.

Fast dyes formed on the fiber. THEODOR KIRCHHEISEN and JOHANNES GÜRTLER (to Grasselli Dyestuff Corp.). U. S. 1,680,791, Aug. 14. In dyeing material such as cellulose acetate, pelts, hairs or feathers, a diazotizable amine, *e. g.*, aminoazobenzene or dichlorobenzidine, is diazotized on the fiber in the presence of Na 2-hydroxynaphthalene or other compd. to be coupled. Numerous examples are given.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. Brit. 282,452, Dec. 20, 1926. The process described in Brit. 276,408 (C. A. 22, 2470) is applied also to the introduction of cyclic paraffin amine residues generally into the anthraquinone nucleus; *e. g.*, 1-amino-4-bromoanthraquinone-2-sulfonic acid is condensed with pentamethyleneamine or bornylamine in the presence of Na₂CO₃, CuSO₄ and aq. alc. The products dye wool from an acid bath blue shades fast to light.

Indanthrene. DONALD G. ROGERS (to National Aniline & Chemical Co.). U. S. 1,679,230, July 31. In making *N*-dihydro-1,2,1',2'-anthraquinoneazine by subjecting 2-aminoanthraquinone to fusion with KOH, the fused mass is dissolved in water and the alkali metal salt of the leuco dye is crystd. from the resulting soln.

Arylaminonaphthalene derivatives for use in dyeing. I. G. FARBENIND. A.-G. Brit. 282,111, Dec. 13, 1926. Arylaminonaphthalene derivs. are obtained by heating in an open vessel or in an autoclave, and in the presence of a bisulfite soln., an amino- or hydroxy-substituted naphthalene or a deriv. other than sulfonic or carboxylic acids of 1,8-diamino-, dihydroxy-, or aminohydroxy-naphthalene, with an aminobenzene deriv. contg. a further free or substituted amino group or a free or substituted OH group. The naphthalene derivs. which may be used include: α - and β -naphthol, α - and β -naphthylamine, 2,7- and 1,5-dihydroxynaphthalene; benzene derivs. which may be used include *o*-, *m*- and *p*-phenylenediamine, *o*-, *m*- and *p*-aminophenol, leucoindophenols, leucoindamines and sulfonic, carboxylic or other substitution products of these compds., 4,4'-aminohydroxydiphenylamine, 4,4'-diaminodiphenylamine-2-sulfonic acid. Instead of reagents contg. the amino group there may be used the corresponding NO₂ compds. with the addn. of formic acid as a reducing agent. The products may be used for producing dyeings fast to water on pelts, animal fibers in general, and "acetate silk" by after-treatment with oxidizing agents.

Sulfonation. HENRY B. FABER (to National Aniline & Chemical Co.). U. S. 1,679,211, July 31. "Spirit blue" or other alc.-sol. org. coloring matters are sulfonated in solid state with gaseous SO₃.

Dyeing artificial silk. I. G. FARBENIND. A.-G. Fr. 634,036, May 7, 1927. Azo dyes contg. a dihydroxydialkylamino group are used for dyeing acetate silk. Thus, 4-nitroanilineazodihydroxydiethylaniline gives a clear yellowish red, 3,4,5-trichloroanilineazodihydroxydiethylaniline a clear orange, 4-nitroanilineazodihydroxydiethyl-3-amino-1-methylbenzene a rich yellowish red and 2,4-dinitroanilineazodihydroxydiethyl-3-amino-1-methylbenzene a deep Bordeaux.

Dyeing cellulose esters and ethers. W. WHITEHEAD and C. DREYFUS (to British Celanese, Ltd.). Brit. 282,036, Dec. 11, 1926. Dyes such as 1,4-hydroxyamino-anthraquinone, 1-methylaminoanthraquinone and *p*-nitrobenzene-azodimethylaniline are applied as solns. in an org. solvent or solvent mixt. such as C₆H₆, toluene, xylene, ethylene dichloride, dichloroethylene, trichloroethylene, perchloroethylene, and MeOH, EtOH, PrOH, BuOH or AmOH.

Dyeing cellulose acetate. GEORGE H. ELLIS, HENRY C. OLPHIN and WILLIAM B. MILLER (to Celanese Corp. of America). U. S. 1,679,935, Aug. 7. Material comprising cellulose acetate is treated with 3,3'-dinitro-4,4'-diamino diphenyl or other suitable nitro deriv. of a compd. contg. at least 2 aryl radicals linked together by a linkage only partly comprising N. Numerous examples are given.

Dyeing "acetate silk" and similar materials. SOC. ANON. POUR L'IND. CHIM. A. BALZ. Brit. 281,704, Dec. 4, 1926. A dye of the general formula NH₂-R'-N:N-R''-NH₂, in which R' and R'' are the same or different aryl radicals of the benzene series, *e. g.*, the dye obtained by sapon. the product from diazotized *p*-aminoacetanilide and cresidine, is first applied and then diazotized on the fiber and coupled with 2,3-hydroxynaphthoic acid or β -naphthol in acid or neutral soln. The dye bath may contain a "distributing agent" such as delimed sulfite cellulose lye, condensation products of CH₃O

and naphthalenesulfonic acids, "sulfonation products of residues from org. chemical manufactures," humin substances or soap solns. Fast deep black or marine blue shades may be obtained depending on the proportion of the primary dye used.

Dyeing cellulosic fibers. HERMINGHAUS & Co., GRS. AND K. WENZ. Brit. 281,696, Dec. 1, 1926. The dyeing properties of cotton, artificial silk or other cellulosic material are altered by treatment with POCl_3 after a preliminary treatment with a dil. alkali soln. (suitably a 3% NaOH soln. in alc. for cotton or a 1.5% alc. NaOH soln. with artificial silk). The affinity of the material for substantive dyes is reduced and its affinity for basic dyes is increased.

Reserve dyeing on vegetable fibers. HANS LEEMANN and GIOVANNI TAGLIANI (to Munitex Corp.). U. S. 1,679,477, Aug. 7. Fiber, yarn or fabric of vegetable material is locally printed with an alkalinizing agent and then treated with a suitable esterifying aromatic acid chloride to alter the locally treated fiber and form a reserve effect; the material is then washed and the reserved parts and remaining fibers are subsequently successively dyed (cf. C. A. 22, 503). U. S. 1,679,478 specifies a similar process in which dyeing is effected by successive use of acid and substantive dyes. U. S. 1,679,479 specifies dyeing in a single bath contg. both substantive and acid dyes. U. S. 1,679,480 specifies dyeing by treating the material, after washing, with a salt of a diazotizable base and then diazotizing and treating with a developing substance. U. S. 1,679,481 specifies treating the locally altered fibers with a covering substance and then treating the material successively with basic and substantive dyes.

Apparatus for dyeing yarn on perforated metal bobbins. LOUIS BOUNOUS. U. S. 1,681,088, Aug. 14.

Absorbent textiles. ALBERT CHARBONNEAU. Fr. 633,719, Sept. 11, 1926. To render textiles such as linen absorbent, they are treated in alkali lye contg. milk of lime and $\text{Na}_2\text{S}_2\text{O}_4$ and then in an acid bath.

Sizing textiles. HENRY BERTRAND ET CIE. Fr. 634,560, Sept. 20, 1926. A sizing bath is made of gelatin, wax and linseed oil in suitable proportions, which is heated to 55° and the textile is dipped for about 15 min., dried in the cold, shaken and dried in a warm chamber.

Textile fiber from sugar cane. JOAQUIN J. DE LA ROZA, SR. (to Bagasse Products Corp.). U. S. 1,681,223, Aug. 21. Cane is subjected to fermentation by the action of enzymes naturally present to initiate generation of acids by the fermentation, and the fibrous portion of the cane is then retted with running water. Burned cane stalks may be utilized.

Apparatus for aging textile fabrics by steam treatment. J. S. WILSON, G. W. SHEARER, J. THOMAS and SCOTTISH DYES, LTD. Brit. 282,133, Sept. 9, 1926.

Impregnating fabrics. HERMAN E. BROWN and JORDAN H. STOVER (to Respro, Inc.). U. S. 1,680,497, Aug. 14. An unspun unwoven fabric is treated with rubber compn. or other suitable binding material in the form of a dough-like semi-solid plastic material having such high cohesiveness and adhesiveness as to be capable of penetrating around and between the natural fibers and the material is subjected to pressure to cause only partial filling of the interstices of the fiber by the binder. An app. is described.

Coating cloth with a cellulose derivative. CAMILLE DREYFUS. Fr. 634,345, May 13, 1927. A cellulose ester or ether is spread on a polished surface and dried and cloth wetted with a solvent for the ester or ether, is pressed on to the surface and dried, whereby a film of the cellulose deriv. is obtained on the cloth.

Apparatus for recovery of volatile solvents from coated fabrics. HERBERT S. THOMPSON. U. S. 1,678,886, July 31.

Wet-spinning of flax, hemp and like fibers. G. PETROV and N. ALEXEEV. Brit. 281,897, Feb. 1, 1927. In order to enable working of the fiber at lower than usual temps. or even without any heating it is treated with a substance selected from free sulfonic acids of aromatic compds. with and without hydrocarbon side chains, sulfonic acids of hydrogenated aromatic hydrocarbons or their derivs., naphthasulfonic acids, fatty-aromatic sulfonic acids, or sulfonic acids which are obtained by sulfonating aromatic, hydroaromatic or naphtha hydrocarbons in the presence of an alc. such as PrOH , BuOH or iso- Pr alc. or salts of such acids, which may be used instead of the substances specified in Brit. 251,590 (C. A. 21, 1362). Various sulfonated tars, hydrocarbons, glycerides or fatty acids and their emulsions and mixts. with other substances may be used.

Drying threads and cloth. ÉDOUARD JUSTIN-MUELLER. Fr. 634,079, May 9, 1927. An app. for drying threads and cloth comprises a roller suitably covered and an extensible endless band arranged so that the thread or cloth passes between them, a

suction being applied at the side of the band away from the thread in the neighborhood of the roller.

Treating artificial threads, films, etc. HENRY DREYFUS. Fr. 634,166, May 11, 1927. The physical properties of artificial threads, etc., are improved by submitting the threads to a weighting or charging process, such as treatment with tannic acid or SnCl_2 followed by a fixing agent such as a phosphate.

Treating artificial threads, films, etc. HENRY DREYFUS. Fr. 634,165, May 11, 1927. In weighting artificial threads, etc., of cellulose acetate or other deriv. of cellulose, the capacity to absorb the weighting agents is increased by treatment with a soln. which swells the cellulose deriv. such as an aq. soln. of lactic acid, alc., acetone, phenol or NH_4CNS . The weighting is accomplished in two steps, the application of an aq. soln. of a metal chloride or other salt followed or preceded by the application of a pptg. agent such as a phosphate, silicate, or tannic acid.

Artificial silk. BENNO BORZYKOWSKI. Fr. 634,045, May 9, 1927. Artificial silk produced in the centrifugal process is put on perforated tubes for washing, bleaching, etc.

Artificial silk cloth. BENNO BORZYKOWSKI. Fr. 634,043, May 9, 1927. Artificial silk from viscose alone or mixed with other fibers is made into cloth before desulfuration or bleaching.

Sizing artificial silk. GEBRÜDER SUCKER. Fr. 634,068, May 9, 1927. In a sizing machine for artificial silk, the thread passes over rollers mounted on springs to compensate for variations in tension on the thread.

"Linen appearance" on fabrics such as cotton. D. DEGONCZ and A. S. JONES (to Arnold Print Works). Brit. 282,002, Dec. 9, 1926. The fabric is impregnated with caustic alkali, dried, and then treated with cuprammonium soln. Cf. C. A. 22, 2472.

"Wooly appearance" on goods of vegetable fiber. EMIL GMINDER. U. S. 1,679,767, Aug. 7. Woven, knitted, or other fabrics of vegetable fiber are treated to produce a slight nap on the fabric and then treated with an alk. soln. such as a 15% Bé NaOH soln. to cause the nap to shrink or curl.

Forming yarn from asbestos pulp. JOHN A. HEANY (to World Bestos Corp.). U. S. 1,681,234, Aug. 21. Mech. features.

Degreasing wool. I. G. FARDENIND. A.-G. Brit. 282,164, Sept. 17, 1926. Raw wool is degreased by use of the Me, Et or other org. ester of carbonic acid, alone or mixed with other usual solvents. Residual solvent is removed by washing the wool with water, and may be recovered by extn. with $\text{C}_6\text{H}_6\text{Cl}_2$ and distn.

Washing clothes. H. VONTOBEL. Brit. 282,588, May 19, 1927. Clothes are "steeped" in a cold aq. soln. of Na_2CO_3 , soap, borax and Na perborate to which has been added enzymes such as peroxidase, oxidase, oxygenase, tyrosinase or catalase and catalytic agents such as FeSO_4 or CuSO_4 .

Laundry blueing composition. H. H. ROCKWEG. Brit. 281,998, Dec. 8, 1926. A compn. not affected by soap or by Cl is formed of ultramarine 75-150, NaHCO_3 1000-2500, and dragon's blood 3-15 parts, with or without soap 4000-7000 parts.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Modern paint mills. FRIEDRICH HUTH. *Farbe u. Lack* 1928, 339-40.—A new roll mill (Bandwalzenmühle) consists of 6 horizontal rolls planetarily surrounding a 7th. The rolls are hollow and the walls are slotted spirally. Each roll is in contact with the adjoining ones. The center roll rotates counter to the outer rolls. The machine occupies 16 sq. m. floor space and requires but one operator. The capacity is 900-1200 kg. pigment. G. G. SWARD

Rapid testing apparatus for paint. A. V. BLOM. *Chem. Fabr.* 1928, 102-3.—Two parallel chains are mounted on pairs of cog-wheels 2 m. apart so as to carry between them 50 test sheets 10×20 cm. The chains travel at 20 cm./min. and carry the sheets through 3 heating chambers and one freezing box. Sprays are fitted between the chambers, one of which can be filled with corrosive gases if desired. The strips are also submitted to the action of ultra-violet light and that from a "Sollux" lamp. A typical time of treatment is 5 days, and it is claimed that with this app. natural weathering conditions are closely imitated. B. C. A.

"Accelerated testing" of paints. K. WÜRTH. *Farben-Ztg.* 33, 1470(1928).—A brief account of the historical development of accelerated paint tests. B. C. A.

Acidproof paints. RUD. SCHWARZ. *Farbe u. Lack* 1928, 315, 325.—A review.

G. G. SWARD

Pigment and vehicle. E. KLUMPP. *Farben-Ztg.* 33, 1044-5(1928).—The absorption by white lead, ZnO, blanc fixe and china clay of various aq. and oily vehicles is tabulated, the value being expressed in terms of vol. The results are discussed with reference to the relation between adsorption and absorption. A white lead-linseed oil paste (67% of oil on pigment by vol.) consists of primary white lead particles sep'd. by a thin layer of oil, but a ZnO-paraffin oil paste (440% of oil on pigment by vol.) consists of agglomerates or secondary particles composed of wetted primary particles. Other factors possibly tending to raise the vehicle absorption of a pigment are the presence of adsorbed gases or vapors and the formation of "vehicle-sheaths" of relatively considerable diameter around the particles.

B. C. A.

Pigments. I. Basic carbonate and basic sulfate white lead. H. WOLFF. *Farben-Ztg.* 33, 1343-6(1928).—The chem. similarity of basic carbonate and basic sulfate white leads is reflected in parallelism in their properties. Comparisons of oil absorptions, drying times of paints contg. these pigments, mech. properties of films, resistance to weathering, etc., support this contention in general; exceptions are indicated in questions of opacity, retention of gloss, and tendency to support rusting (the greater tendency of the carbonate in this connection being tentatively attributed to CO₂ derived from the pigment rather than to impurities therein).

B. C. A.

Titanium oxide as a new white pigment. MARIO TALENTI. *Giorn. chim. ind. applicata* 10, 261-4(1928).—A description of the production, properties and uses of TiO₂, with particular reference to the process used at the plant of the Società Titanium at Bovisà (Milano), and with illustrations of the plant. The av. compn. of the product made at Bovisà is TiO₂ 98.4, ZnO 0.9, SiO₂, Fe, etc. 0.4 and H₂O 0.25% and its covering power is 4 times that of white lead.

C. C. DAVIS

Metallic lead in red lead. K. WÜRTH. *Farben-Ztg.* 33, 1473-4(1928).—Heinrich's work on the presence of metallic lead in red lead used in glass manuf. is discussed from the point of view of paint technology.

B. C. A.

Red lead problems. I. Settling and hardening of red lead. II. Color of red lead. III. Red lead as a composite pigment. C. P. VAN HOEK. *Farben-Ztg.* 33, 981-3, 1046-9(1928).—A review of the literature on the causes of settling and hardening of the sediment in red lead-oil paints, and their successful overcoming in modern "dispersed" red leads. Among the many influences discussed are grinding, presence or absence of turpentine or other diluent, formation of lead soaps and lead glyceroxide (an important factor in hardening), dependence of this factor on free monoxide content of the pigment and free fatty acid content of the oil, particle size, and rate of settling (a slow-settling red lead usually not hardening). A somewhat full reference to Junk's work indicates that the settling and hardening cannot be attributed to one particular cause, many varying factors being jointly responsible. Microscopical examn. reveals "active" and "inactive" particles, absence of the latter in "dispersed" red lead giving it its favorable non-settling properties. This activity or non-activity is accounted for by variations in the structure of the labile combination of lead monoxide and peroxide constituting the pigment. Suggestions that water is adsorbed on the surface of "dispersed" red lead are disproved. The variation in color of red lead is discussed with reference to the color of different varieties of lead monoxide and peroxide, the probable constitution of red lead being a lead monoxide substratum on which are adsorbed ultra-microscopic particles of PbO₂. Microscopical examn. shows that conversion of lead monoxide into red lead is not accompanied by any appreciable increase in particle size, the heterogeneous nature of the red lead particles being demonstrated under ordinary and polarized light. Various views on the composite nature of the pigment are discussed.

B. C. A.

Comparative examination of some lithopones. C. R. HALL. *Farbe u. Lack* 1928, 322-4.—A review of the recent improvements in lithopone. Photomicrographs under various conditions of some German and Dutch products are given.

G. G. SWARD

Oil absorption of highly dispersed red lead. SCHERTEL. *Farbe u. Lack* 1928, 314.—Polémique with F. Hülsenkamp (cf. C. A. 22, 3053). S. claims that H. has confused the ratio of the dry pigment with that of the prep'd. paint.

G. G. SWARD

Negative catalysis as a means of improving the drying of oils. A. EIBNER. *Farben-Ztg.* 33, 1222-4(1928).—A general discussion of the functions of neg. catalysts; with special reference to the effects of undercoats on coats subsequently applied and the neutralization of such effects by "flattening" the undercoats.

B. C. A.

Comparison between linseed oils from Palestine, Semirechie and Smolensk, and drying oils obtained from them. F. GOGOLEV. *Oil and Fat Industry* (Russia)

1928, No. 2, 46-8.—Characteristics of the 3 kinds of seeds are given and the following consts. for the oils from Palestine (1925), Palestine (1926), Semirechie, and Smolensk, resp.: Color faint, yellow, yellow, golden yellow; sp. gr. 0.936, 0.936, 0.933, 0.932; refraction 81.7, 82.2, 81, 84; acidity 2.4, 3.4, 2.9, 0.8; sapon. no. 196, 190.8, 189.6, 189; solidifying point 13.5°, 15.5°, 20°, 28°; I no. 173, 174.7, 165.7, 179; drying time in days 9, 12, 9, 10; O no. 14.4, 16.2, 15.6, 17.2. Drying oils prepd. from the Palestine (1926), the Semirechie and the Smolensk oils by adding 4% Pb Mn oleate and heating to 155°, had, resp.: Refraction 96.7, 93.6, 99.1; O no. 13.1, 12.5, 15.3; drying time 9 hrs. 30 min. to 15 hrs. 40 min., 6 hrs. 40 min. to 12 hrs. 10 min., 8 hrs. 20 min. to 14 hrs. The viscosities of the drying oils decreased with the increase of I no.

A. A. BOEHLINGK

Modern solvents for the varnish industry. A. BRESSER. *Notiz. chim.-ind.* 3, 280-5(1928).—Following a description of the development of this industry (cf. C. A. 22, 1485), the properties and uses of various individual solvents are reviewed, with quant. data in tabular form.

C. C. DAVIS

"Crystallizing" varnishes and "crackle" varnishes. F. KOLKE. *Farben-Ztg.* 33, 1281-3(1928).—The nature of "crystallizing" varnishes and "crackle" varnishes is indicated, the former depending on the drying peculiarities of tung oil and the microscopically wrinkled surface produced under specified conditions, while the latter (which are generally nitrocellulose lacquers) owe their characteristic behavior to low content of non-volatile matter, freedom from plasticizer, and contrast in elasticity with the undercoat. The undercoat is made necessary by the obviously poor adhesion of the "crackle" lacquer, and is preferably not dry when the latter is applied.

B. C. A.

Viscosity of nitrocellulose. H. DABISCH. *Farben-Ztg.* 33, 1105-6(1928).—The statement by Merz (C. A. 22, 2269) that the Engler viscometer gives "scientifically exact" measurements of the viscosity of nitrocellulose is criticized on the grounds that all nitrocellulose solns. are more or less plastic, but no distinction between plasticity and true viscosity is recorded in Engler detns. An ideal viscometer will work at sufficiently high pressure to render plasticity effect negligible. From consideration of the influence of various solvents and diluents on the viscosity of nitrocellulose, a mixt. of 45 pts. of abs. EtOH and 55 pts. of pure BuOAc is recommended as the most desirable solvent. The concn. of the soln. is adjusted for each type of nitrocellulose used so that normal lacquer consistency is obtained.

B. C. A.

Binding agent for colors, varnishes, etc. (Fr. pat. 634,275) 18. Electrolysis in the manufacture of white lead (PAMFILOV, IOFINOV) 4. Snow-white and bright-colored, non-poisonous, highly elastic rubber varnish with TiO₂ (DITMAR) 30.

MARGIVAL, F.: *Détrempe et badigeons*. Paris: Desforges, Girardot et Cie. 160 pp.; 15 francs. Reviewed in *Chimie et industrie* 19, 1182(1928).

Titanium pigment. LOUIS E. BARTON and LONNIE W. RYAN (to Titanium Pigment Co.). U. S. 1,680,316, Aug. 14. See Can. 274,070 (C. A. 21, 4079).

Product from drying oils. COMTAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 633,784, May 3, 1927. Drying oils, e. g., linseed oils, are heated beyond the point of becoming a jelly till they become liquid again. The product obtained can be dissolved in org. solvents, or mixed with resinous matters or can be hardened by heating in thin layers in the air.

Lacquers. W. SCHMIDDING. Brit. 282,574, Feb. 28, 1927. In the manuf. of lacquers as described in Brit. 247,599 (C. A. 21, 660), a special app. is used which is described in detail.

Polishing celluloid or enameled or lacquered surfaces, etc. M. B. MOORE. Brit. 281,751, Aug. 27, 1926. Various polishing compns. are specified comprising a mild volatile solvent of the base of the surface coating, e. g., a mixt. of "methylated spirits" and turpentine, a lubricant such as a mixt. of linseed oil, paraffin and Japanese wax or tallow, and sufficient of a polishing grit or abrasive to form a paste.

Polishing wax. JEAN MAS. Fr. 634,291, May 12, 1927. A polishing wax for floors is made by mixing and heating together, carnauba wax, ceresin, ozocerite, beeswax, oil of turpentine, mineral oil and a little alc.

Synthetic resins. BAKELITE GES. Brit. 282,414, Dec. 14, 1926. Phenol-aldehyde condensation products are rendered sol. or readily dispersible in oils by heating them with polyhydric or polycyclic phenols, such as naphthols, resorcinol, xanthine, dihydroxydibenzyl, diphenols, dicresols, dithymols, dicarvacrols and dinaphthols, or

mol. compds. of these phenols. The reaction may be assisted by catalysts such as substances like hydrated Mn oxide and Pb oxide which promote the formation or drying of varnish and the reaction mixt. may include oils such as linseed oil and mild oxidizing agents such as α - or β -nitronaphthalene or nitronaphthol; air or N oxides may be passed through the mass. The products are suitable for use in varnishes or paints mixed with other usual ingredients of such compns.

Synthetic resin. ARTHUR L. BROWN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,680,408, Aug. 14. A condensation product is formed by reaction of a phenol, China wood oil and CH_2O or other substance contg. an active CH_2 group. The product is suitable for *elec. insulation*.

Synthetic resin. GUSTAVE E. LANDT (to Diamond State Fibre Co.). U. S. 1,679,312, July 31. Substantially pure xylenol is caused to react with CH_2O to form an initial condensation product which by further heating may be converted into a hard, infusible and insol. product.

Synthetic resin. JAMES MCINTOSH (to Diamond State Fibre Co.). U. S. 1,679,322, July 31. A phenolic compd. such as PhOH is caused to react with an essential oil having an aldehyde base, *e. g.*, with oil of cassia, to form a fusible, sol., non-cryst. condensation product which by further heating can be transformed into a hard, infusible product. Cf. *C. A.* 21, 3756.

Synthetic resins. SELDEN CO. Brit. 281,742, July 7, 1926. A resinous substance capable of being hardened by heat, such as a glycerol phthalate resin, is admixed with a liquid, high-b. p., non-resinifiable ester of an aromatic polybasic acid, such as di-Et phthalate, before hardening. Natural resins such as shellac also may be used.

Synthetic resins. F. VACHER (to Soc. anon. la fibre Diamond). Brit. 282,435, Dec. 16, 1926. Condensation products which may be rendered insol. and infusible by further heating are obtained by condensing an aldehyde with an amine and heating the product under reduced pressure. Either aliphatic or aromatic aldehydes and amines may be used and the condensation may be assisted by catalysts such as acids, bases or salts, or, preferably, phenols. An example is given of the condensation of PhNH_2 and CH_2O with or without cresol.

Resinous products by polymerization. WESLEY R. GERGES (to The Barrett Co.). U. S. 1,679,214, July 31. Material such as solvent naphtha contg. polymerizable constituents of the coumarone and indene classes is subjected to a polymerizing action, *e. g.*, by use of H_2SO_4 , and before the polymerization is complete it is arrested by the addn. of a non-neutralizing diluent such as water. The product is of lighter color than products made without the use of the diluent.

Urea-formaldehyde resins. ALPHONSE GAMS and GUSTAV WIDMER (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,679,246, July 31. Insol. urea CH_2O condensation products are converted into sol. form by heating under pressure with aq. CH_2O .

Purifying phenol aldehyde resins. FRITZ SEEBACH (to Bakelite G. m. b. H.). U. S. 1,681,368, Aug. 21. In order to obtain alkali-sol. phenol-aldehyde resins free of acids, the resins are dissolved in alkalies such as NaOH solu. and there is added to the solns. Na soaps or other hydrotropic salts which have the property of rendering difficultly sol. or insol. substances sol. in water but do not affect the soly. of the phenol resin, and the resins are pptd. with CO_2 or other acid in the presence of the added hydrotropic salt or salts. U. S. 1,681,369 specifies treating fusible sol. phenol aldehyde resins with not more than an equal quantity of water and with sufficient alkali such as NaOH to form a colloidal suspension and then pptg. the resins by adding salts such as NaCl which have the property of salting out the resins.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

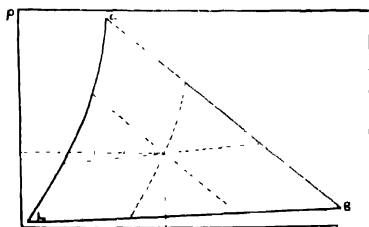
The fatty acids of seed oils of Brassica species. The composition of rape, ravisson, and mustard seed oils. T. P. HILDITCH, T. RILEY and N. L. VIDYARTI. Liverpool Univ. *J. Soc. Chem. Ind.* 46, 457-62T(1927).—The compn. of the fatty acids combined with glycerol in the fats of 4 representative oils of the genus *Brassica* has been detd. by quant. fractional distn. of their Me esters after preliminary sepn. of the mixed fatty acids by means of the varying solubilities of the Pb salts in alc. and Et_2O . The following gives the % of combined fatty acids in different oils: English rape seed (*Brassica campestris*), palmitic 1, lignoceric 1, oleic 32, linoleic 16, linolenic 1, erucic 50, Danubian ravisson (*B. campestris* var.), palmitic 2, behenic trace, lignoceric 2, oleic 20.5, linoleic 25.5, linolenic 2, erucic 47; English black mustard (*B. Sinapis nigra*), palmitic 2,

stearic trace, arachidic trace, lignoceric 2, oleic 24.5, linoleic 19.5, linolenic 2, erucic 50; English white mustard (*B. Sinapis alba*), palmitic 2, stearic trace, arachidic 1, lignoceric 1, oleic 28, linoleic 14.5, linolenic 1, erucic 50%. The total proportion of unsatd. fatty acids with 18 C atoms is fairly const. and approximates 45 to 47%.

T. S. CARSWELL

Approximate determination of butter and coconut fat in fat mixtures. THURE SUNDBERG. *Svensk Kem. Tids.* 40, 9-21(1928).

—From the accompanying graph the 70 butter fat, coconut fat and lard may be found when the Reichert-Meissl no. (RM) and Polenske no. (P) have been obtained. The point C is 100% coconut fat, P 16, RM 7.6; B is 100% butter fat, P 1.8, RM 27.7; and L is 100% lard, P 0.4, RM 0.5. The lines C-B and L-B are straight and C-L is slightly curved towards B. One % intervals are represented on the triangle by cross lines. The broken lines in the figure illustrate the lines involved in the coordinate-trilinear systems when the fat mixt. consists of equal parts of lard, coconut fat and butter fat. The graph is based on the consts. of 70 fat mixts. and results with it agree closely with established procedures.



Paul Jaeger's flow method for differentiating oils. HANS VON NABELL. *Chem Umschau Fette, Oele, Wachse u. Harze* 35, 121-3(1928).—N. shows 24 illustrations of patterns, obtained when various oils are dropped on Jaeger's specially prepd. carton-paper, representing drying oils, blubber, oleins of different origins and vaseline. N. considers Jaeger's method (Fließverfahren zur Unterscheidung pflanzlicher Oele. Stuttgart 1927, Verlag des Forschungs- und Lehrinstituts für Anstreichtechnik G. m. b. H.) a useful adjunct in analysis.

A. R. ROSE

Paul Jaeger's flow method for differentiating oils. JOHANNES SCHEIDER. Leipzig Univ. *Chem. Umschau Fette, Oele, Wachse u. Harze* 35, 123-5(1928).—Jaeger's method of differentiating wood oil from linseed oil is restricted to crude oil and is based on the formation of air bubbles along the fibers of the carton paper; wood oil dries with a wrinkled surface while linseed oil will fill the capillaries of the paper fibers and subsequent wetting of the spots brings out the difference in appearance. Only 3 types of patterns can form in Jaeger's method; the long time required for a test (7 days and more) will make its general adoption doubtful.

P. ESCHER

Hydrogenation of polymerized and oxidized oils. Z. TALANZEV (N. NOVGOROD). *Oil and Fat Ind. (Russia)* 1927, No. 8, 20-1.—Linseed oil previously polymerized by heating up to 300° was hydrogenated at 260°. A white and solid hydrogenated oil was obtained of superior quality with a titer of 63° and I no. = 12. T. suggests heating the oils before polymerization as less H₂ is required and the hydrogenated product obtained is of a different chem. structure and much higher in quality. Evidently no catalysts are required for a polymerization. G. BRAKHAMAN-DAM'VE. *Ibid* 22-3.—

A. A. BOEHLINGK

Action of air on the nickel catalyst prepared for oil hydrogenation. A. BAG. *Masloboino-Zhirovoye Delo.* No. 5, 6(1928).—Two samples of a Ni catalyst prepd. in the usual way and cooled in an atm. of CO₂ gas were used for the following expt. • The first sample was left exposed to the air for 1 month, and 0.34% mixed with 99.66% of cottonseed oil. The second sample was mixed with the same oil in the same proportion immediately after the Ni catalyst was prepd. The table shows the action of both catalysts.

Time of hydrogenation	Temp. of hydrogenation	Iodine no. Sample No. 1	Sample No
1 hour	240°	79.3	75.6
2 hours	240°	59.4	47.6
2 1/2 hours	240°	47.4	36.8

Because of the treatment of the Ni catalyst with CO₂ its deterioration can be considered negligible.

A. A. BOEHLINGK

The utilization of coconuts. E. SCHMÜLLING. *Z. Ver. deut. Ing.* 72, 989-91 (1928).—In 1927 more than 1.5 million tons of copra were produced, with a value of about 900 million marks. For each ton of copra at least 5000 coconuts are needed. From copra an edible oil, about 65% of the wt. of the copra, is prepd. When 5%

H₂O remains in the copra the material is quite stable, but when more than this quantity is present, it spoils rapidly, its fats undergoing hydrolysis. The profit from coconuts is small; by utilizing the fiber also additional income can be had. Biologists and chemists had always said that only ripe nuts would make good copra, and only unripe nuts good fiber. B. G. H. van der Jagt, an engineer, found that if the ripe nuts were softened by treatment with NaOH soln., with heating, and the fiber flattened by pressure or rolling, it was possible to prepare a good quality of yarn. A new industry has developed accordingly. Machines for making yarn and copra have been perfected, and now coconuts are worked up on a factory scale, with yarn, copra and fuel (from waste) as the products. At present efforts are being made to prepare finer yarn than Nos. 1 and 2, and to utilize the parts of the coconut now burned, as in making artificial wood.

W. C. EBAUGH

Cottonseed and its by-products. W. L. DAVIES. *Fertilizer Feeding Stuffs and Farm Supplies J.* 13, 451-2(1928).—A brief discussion of the manuf. and compn. of cottonseed products.

K. D. JACOB

The fluorescence of Italian olive oils in Wood light. R. STRATTA and A. MANGINI. *Reale Scuola Ingegneria Torino. Giorn. chim. ind. applicata* 10, 205-7(1928).—When the surface of virgin-pressed olive oil was exposed to Wood radiation, a fluorescence varying from yellow to dark lemon-yellow was obtained. On exposure for at least 0.5 hr., this fluorescence changed to a natural sienna color. Olive oil extd. by solvents and refined gave a brilliant sky-blue fluorescence which did not change on prolonged exposure. Lower grade refined oils gave a blue-gray fluorescence. Virgin olive oils to which had been added refined lower grade oil or oil extd. by solvents changed their fluorescent colors as soon as 1% had been added. With 10% addn. the fluorescence became almost white, with 30% it became light blue, and from 60 to 100% the fluorescence became brilliant sky-blue, i. e., the color of the refined oil. By examn. of olive oil in Wood light, either by eye alone or with the aid of a colorimeter which is described, it is possible to ascertain whether a shipment of oil is identical with a sample. The spectrum of the fluorescence of a crude olive oil, particularly of a virgin oil, has a sharp red characteristic band which lies at 669 μ and is the same for all oils. This band allows the identification of a virgin oil even when 90% refined oil is present. This red band was absent in all refined oils. The intensity of the red band indicates the concn. of the virgin oil in a mixt.

C. C. DAVIS

Investigation of a distillate of tallöl. K. FRICKE. *Allgem. Öl- u. Fettztg.* 24, 45-6; *Chem. Zentr.* 1927, I, 1907.—The distillate was clear and oily. The unsapon. material (10.27%, Spitz-Hönig) was yellowish, with a green fluorescence and had a pleasant resinous odor. Treated with H₂SO₄ (1.53) and Ac₂O, it turns red, then brown. The fatty acids pptd. from the soap soln. show a sapon. no. 188.6 and an I no. (Wijs) 147.5. The esterification (Wolff) showed 28.44% of resinous acids, whose MeOH soln. gave crystals m. 138-40°, sapon. no. 181.3, I no. 162.2. The Storch-Morawski test gave an intense blue color, gradually turning green. A comparison with pure abietic acid shows that the present acid is a new compd.; its formula is C₂₀H₃₀O₂ and it is named "tallic acid."

A. L. HENNE

Application of castor oil in the manufacture of curd soap. V. SKVORZOV. Moscow Techn. School for Fat Industry. *Oil and Fat Industry (Russia)* 1928, No. 3, 15-17.—The following proportions were used for making soap with castor oil: 66% sunflower oil, 31% mixt. of sunflower and castor oil (castor oil being in the proportions of 5 to 15% to sunflower oil), 3% rosin. Five batches contg. 5, 7.5, 10, 12.5 and 15% castor oil, resp., produced soaps of the following compns.: total fatty acids 62.15, 62.77, 63.41, 63.92, 63.17%; unsaponified matter, 0.51, 0.68, 0.73, 0.77, 0.81%; free NaOH 0.080, 0.024, 0.063, 0.08, 0.08%. The cooking took 8 hours, settling 40 hrs. The data on castor-oil soaps supplied by G. Heffer and Ubbelode are not quite accurate. By using the above mixts. there is obtained a soap of high quality, in normal yield, and of normal water content. The cake is very hard. It lathers abundantly even with cold water. The soap does not soften in use. If more than 15% of castor oil is used the good qualities of soap disappear gradually.

A. A. BORHTLINGK

Washing sulfonated oils with salt solutions. C. RIESS. *Collegium* 1928, 298-301.—If a sulfonated oil is washed with NaCl or Na₂SO₄ soln. to remove free H₂SO₄, the Na salt of the sulfonated oil is formed and HCl or H₂SO₄ is set free. The reaction goes to completion. The titration curve of a sulfonated oil shows two breaks, one at pH 7.5, the methyl orange end point, caused by neutralization of the sulfo groups and the second at pH 10, the phenolphthalein end point, caused by neutralization of COOH groups.

I. D. CLARKE

Soap for the silk dyer. FRED GROVE-PALMER. *Am. Dyestuff Rept.* 17, 493-5

(1928).—A suitable soap should contain fat anhydrides 65% or more, combined alkali 8, free alkali less than 0.3, water 23. The low content of free alkali is important. A green olive oil soap gave good results. Failure to rinse out all of the soap is a frequent cause of trouble.

Wetting and emulsifying agents. AUGUST NOLL. *Papier-Fabr.* 26, 318-26 (1928); cf. C. A. 22, 710.—The chem. nature and physical properties of 16 more trade-named emulsants and 5 salts of tetrahydronaphthalene- β -sulfonic acid are reported, special attention being given to the emulsifying power. These wetting and emulsifying agents are rapidly increasing in importance and popularity. They all contain high-molecular alkali sulfonates, which have the great advantage over ordinary soaps of being unaffected by hard water or acid.

L. W. RIGGS

R. H. DOUGHTY

Discussion of soap in its relation to the scouring of wool (PROCTOR & GAMBLE) 25. Fuller's earth from New Zealand (ANON.) 18. *Sclerocarya caffra* [for use in soap manufacture] (BRANDWIJK) 17. The seeds of *Nerium oleander* L. (MATTHES, SCHÜTZ) 11D. Filter for oil (U. S. pat. 1,680,029) 1.

JAEGER, PAUL: Prüfung und Unterscheidung pflanzlicher Öle durch das neue Fließverfahren. Stuttgart: Forschungs- und Lehrinstitut für Anstrichtechnik. 26 pp. M. 1.60.

Stabilizing oils, fats and waxes by addition of a small proportion of furfural. JOHN Y. HUBER, JR. U. S. 1,680,047, Aug. 7.

Purifying palm oil or similar oils. AMERICAN SHEET & TIN PLATE CO. Brit. 282,321, Sept. 13, 1926. In connection with processes such as removal, purification and recovery of oil from tin plate, the oil is sepd. from an emulsion of oil and water and purified and dried by heating sufficiently to vaporize and expel substantially all the water. The emulsion obtained by scouring the oily metal plates may be broken by use of H_2SO_4 and steam or by use of niter cake, waste pickle liquor, lime, $CaCl_2$, $FeSO_4$, or Na_2SO_4 or alum. An app. is described.

Washing or extracting seed or oil cakes or other materials. E. SILVANO and V. L. CERRI. Brit. 282,446, Dec. 17, 1926. The material is treated in a thin layer on a conveyor belt or the like which acts as a filter for the treating liquid or ext. after it has passed through the layer. An app. is described.

Extraction of fatty materials. ADOLPHE PANSKY. Fr. 634,595, May 18, 1927. Fatty materials are extd. from animal and vegetable products by a solvent in known manner but under reduced pressure at a low temp.

Extracting fat from cacao beans. IVAN S. HOCKER (to The Hocker Corp.). U. S. 1,680,943, Aug. 14. Finely divided cacao beans are heated with water to dissolve water-sol. constituents and gelatinize the starch; the mixt. is then treated with a diastatic enzyme such as malt ext. at a temp. at which the starch is saccharified, and an agent such as yeast capable of inducing alc. fermentation is then added after a lowering of the temp. to a point suitable for the alc. enzyme; gases are thus produced which cause coalescence of the fat globules in the emulsion and carry them to the surface of the mixt., whence they are removed.

Apparatus for extracting grease from bones, hide trimmings or other materials by use of solvents. FREDERICK E. LYNN. U. S. 1,679,728, Aug. 7.

Fatty acids and their salts from oils and fats. G. PETROFF. Brit. 281,896, Feb. 1, 1927. Drying or semi-drying fats and oils such as linseed, sunflower, fish or castor oils are mixed with aromatic hydrocarbons or phenols or hydrogenated hydrocarbons or phenols, not exceeding 15%, and the mixt. is treated with not over 15% of concd. H_2SO_4 . When reduction of the I value and hydrolysis of the acid have been effected, the excess hydrocarbons are distd. off and the neutral glycerides obtained are split by use of sulfo-fatty acids of high mol. wt. Partial polymerization of the unsatd. fatty acids may take place.

Sulfonating fats, etc. H. FLESCH. Brit. 282,626, Dec. 23, 1926. Olive oil, ricinoleic acid, olein, castor oil or other materials are sulfonated by SO_3 or chlorosulfonic acid in the presence of glacial HOAc, formic, propionic, butyric, lactic or similar acids or the anhydrides of chlorides of the lower aliphatic acids. Mention is made of the sulfonation of linseed oil, fish oil or rosin oil by SO_3 in the presence of glacial HOAc.

Insoluble soaps from partial oxidation products of mineral oils. JOSEPH H. JAMES (to Clarence P. Byrnes, trustee). U. S. 1,681,237, Aug. 21. A product formed by catalytic partial oxidation of hydrocarbon vapors, or other similar partial oxidation product contg. aldehyde fatty acids, is treated with $Al(OH)_3$ or $Pb(OH)_2$ or otherwise

suitably treated to sep. the aldehyde fatty acids from other assocd. constituents and convert these acids into insol. soaps.

Substitute for black soap. JEAN-ULRIC MAROGER. Fr. 634,409, Sept. 15, 1926. Soap is mixed with a special earth found in the Gard department and known as "Sommières cleaning earth" in the proportion of 1 part of soap to 3 of earth.

28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

Seedling propagation and selection. A. J. MANGELSDORF AND C. G. LENNOX. *Proc. Hawaiian Sugar Planters' Assoc.*, 47th Ann. Meeting 1927, 160-9(1928).—Male sugar-cane tassels shed their pollen normally when placed in H_2SO_4 soln. and female tassels live long enough to mature viable seed when kept in the same medium. This is a discovery of tremendous importance for crossing work, because it makes possible the complete isolation, from other canes, of the tassels used in crossing and permits of a certainty of parentage in breeding work that otherwise could be obtained only at a great expense. The Yellow Tip variety of cane lost 58.8% of its recoverable sucrose when allowed to lie in the field for 7 days after cutting, while the Badila variety lost only 16.2% in the same time. C_2H_4 did not have any effect in converting glucose into sucrose in cane during storage, but it did have a positive effect on germination of cane seed. Hard body seed stored for several days in a chamber contg. 0.01% C_2H_4 showed a marked increase in germination. K. D. JACOB

Preservation of cane seed and other experiments. R. E. DOTY. *Proc. Hawaiian Sugar Planters' Assoc.*, 47th Ann. Meeting 1927, 179-80(1928).—The factors involved in the CO_2 - $CaCl_2$ method of preserving sugar-cane seed were studied. The best procedure is to use air-dried seeds and seal them in air-tight cans in an atm. of CO_2 with $CaCl_2$ at the rate of 8.9 g. per 1000 cc. of gas space, and to store at 31°F. Excessive quantities of $CaCl_2$ should be avoided. Germination of seed cane was almost completely prevented in 30 days by planting the stalks in a bed of green cane leaves. Planting in dry cane leaves resulted in 13-17% germination, while 23-27% germination was obtained in rotted cane trash. Germination in normal soil was 41%. K. D. JACOB

Statistics of the distribution and yield of cane varieties in the season of 1927 (Java). W. J. HEYLIERS. *Arch. Suikerind.* 36, III; *Mededeel. Proefstat. Java-Suikerind.* 443-534(1928); cf. C. A. 21, 3478.—Statistics are given of the area and production of the varieties for 177 mills, representing 93.8% of the total area planted, in 4 tables as before. The area in EK 28 has been further reduced to 35.25% (sugar yield 13.4 metric tons per hectare). DI 52 has also lost ground (26.25%; 13.4 tons). No. 247 B, EK 2, SW 3, 90 F and EK madoc have become unimportant. But the area planted to POJ 2878 has expanded to 12.25% (15.7 tons sugar), and other POJ varieties to 10.5% (11.1-13.8 tons). P. R. PEKELHARING

Sugar cane variety tests in Louisiana during the crop year 1926-7. R. D. RANDS, SIDNEY F. SHERWOOD AND F. D. STEVENS. U. S. Dept. Agr., *Circ.* 36, 1-14(1928).—Analyses of 36 seedling mosaic-resistant varieties of sugar cane gave juice varying from 10.6° to 18.5° Brix with purity (sucrose) values from 53 to 87.2%. The mill used expressed about 61% of the total juice. Several promising new varieties are recommended for La. C. R. FELLERS

Sugar-cane mills and small power crushers in the Bombay Presidency. P. C. PATIL. Dept. Agr. Bombay, *Bull.* 139, 19 pp.(1927).—A considerable portion of the crude sugar produced in India is made on the native farms. Iron crushing mills and modern equipment are gradually replacing the old wooden mills which are operated by bullock power. K. D. JACOB

Sugar technology. W. R. MCALLEP. *Proc. Hawaiian Sugar Planters' Assoc.*, 47th Ann. Meeting 1927, 121-34(1928); cf. C. A. 21, 3477.—Exptl. results with the Oliver filter for juice settlings are tabulated. By acidifying the settlings to p_H 5.8-6.0 with HCl and then liming to p_H 7.3 the filtration rate of the settlings was improved to practically the same degree as with the Borden process, but filtering difficulties and contamination of the juice with $CaCl_2$ more than offset the low cost of the treatment. The effect of the addn. of varying quantities of inorg. salts, known to be present in settlings, on the filterability of cane juice was studied. $FeCl_3$, $AlCl_3$, $MgCl_2$, and the Na phosphates and aluminates had little effect. By acidifying Na_2SiO_3 to about p_H 7.5 and then adding it to settlings low in SiO_2 , at p_H 7.0-8.0, filtration was almost entirely stopped, although the total SiO_2 present did not exceed the amt. frequently occurring

naturally. When acidified Na_2SiO_3 was added to clarified juice a very voluminous and very slimy gelatinous ppt. was formed, which after drying contained 92% SiO_2 and 1.3% CaO . When this gelatinous ppt. was treated with H_3PO_4 it slowly dissolved until at p_H 6.8, which is the end point of the Borden process, it was no longer visible. The changes undergone by SiO_2 during the processing of cane juice are being investigated further. From a study of the compn. of press cakes from a no. of factories it was established that the ratio of fiber to SiO_2 in the cake solids is an indication of the cake-forming properties of the settlings. When this ratio decreases below 3.0 difficulties are experienced in filter press operation, requiring some special treatment of the settlings, but with greater ratios filtration usually proceeds without particular difficulty. A study of the *invertase method for detn. of sucrose* showed that it gives values lower than the regular acid hydrolysis method, by from 0.15 to 0.20% of the total sucrose. Red colors are the most desirable for p_H detns. on sugar-factory products, chlorophenol red being the most satisfactory in this respect. After liming, whether or not the juice has been heated, changes in p_H occur when the juice seps. into clear and muddy fractions. The mud is usually higher and the clear juice lower in p_H than the original mixt., but changes sometime occur in the opposite direction. Remixing the clear juice and settlings restores the original p_H except for the development of such acidity as may take place during the time required for manipulation. *Viscosities of molasses* produced at different factories ranged from 200 to 2000 poises. The relation of molasses viscosity to grain characteristics of the sugar is being studied by photomicrographic methods. *Colloidal material in com. sugar*.—The substance remaining in permanent suspension at p_H 6.3 coagulating and settling out below, and imparting an intense brown color to solns. above this p_H , has the ultimate compn. of $\text{C}_{20}\text{H}_{26}\text{O}_8$ and a mol. wt. of 404. This compd., originally sepd. from com. sugar may also be obtained by digesting bagasse as it comes from the mill with solns. of p_H 8.0. The material remaining in permanent suspension at p_H 7.6, sepg. out above, and imparting an intense brown color to the soln. below this p_H is in reality 2 substances. The compn. of one is a multiple, probably a rather large multiple, of $\text{C}_2\text{H}_2\text{O}_2$; the other is $\text{C}_2\text{H}_2\text{O}_4$. The first of these 2 compds. was also obtained by digesting bagasse in a moderately alk. soln.

K. D. JACOB

Report of the raw sugar technical committee. S. S. PECK, *et al.* *Proc. Hawaiian Sugar Planters' Assoc.*, 47th Ann. Meeting 1927, 23-36 (1928); cf. *C. A.* 21, 3477.—Of the total shipments of sugar received at the Crockett refinery during the first 8 months of 1927, 1.15, 0.36 and 0.96% was classed as sour, caked and sticky sugar, resp. The av. filtration rate was 79.3 and the polarization 97.62. The figures for caked and sticky sugar do not include sugar discharged from boiler hatches. *Caked sugar* results from storage too near boiler bulkheads during shipment and to stacking the bags while the sugar is still hot. Severe drying of sugar contg. excessive moisture also results in caking. Reduction of the alky. to the point where the sugar becomes slightly acid increases the tendency of the refined product to cake, while screening out the fine crystals greatly reduces caking. The term "caked" is applied to sugar solidified into a rigid mass which does not disintegrate to any great extent during the somewhat rough handling between the ship and the cut-in station. Caked sugar is a serious problem at the refinery because of the extra labor required, losses through damaged bags, damage to grain in grinding up the lumps, and a less satisfactory sepn. of the mass into individual crystals in the mixt. prepd. for affination. If the mass is at all plastic but still in such condition that it can only be removed from the bag with considerable difficulty, the sugar is designated as "sticky". The cause of *sticky sugar* is not definitely known but factories shipping caked sugar also produce sticky sugar, the latter usually in larger amts. In many cases stickiness seems to be caused by drying out that has not proceeded far enough to cement the sugar into a rigid mass. *Contamination of refined sugar with specks due to sulfate scale* can be greatly reduced by frequent and thorough cleaning of heating surfaces. A very small difference in the size of the sugar grains has a very great effect on refining characteristics. As the proportion of fine grains increases the efficiency of sepn. of the crystals and liquor in the centrifugals decreases very rapidly and the efficiency of sepn. of sucrose from impurities decreases greatly. *Dark crystals* are due to the inclusion of solid particles and microorganisms in the grain. The solids vary in size from particles too small to be resolved clearly under the microscope to particles of plant material of sufficient size to be easily identified. The greater part of the microorganisms consists of yeast and spores of fungi. The dark grains are objectionable in refining because of the effect of the fine matter in retarding filtration, rather than because of the introduction of coloring matter. There is considerable evidence to indicate that atm. conditions during storage and the length of time

of storage are important factors in the production of caked and sticky sugars.

K. D. JACOB

Examination of sugar-cane juice for p_H values after various treatments. T. LAKSHMANA RAO AND G. GANAPATI AYYAR. Madras Agr. Dept., *Yearbook 1926*, 73-9(1927).—The effect of boiling, centrifuging, addn. of kieselguhr and of filtering through paper on the p_H of cane juices was detd. by colorimetric and electrometric methods. There was no appreciable difference in the p_H values of juices from the same varieties of cane when treated by the various procedures. The p_H values of juices from different varieties of cane varied from 5 to 5.89. Colorimetric detns. with bromocresol purple gave p_H values which were very close to those detd. electrometrically. Methyl red gave much lower values.

K. D. JACOB

Preliminary boiler tests with preheated air at the sugar mill Wonoaseh (Java). I. HES AND H. J. SPOELSTRA. *Arch. Suikerind.* 36, III; *Mededeel. Proefstat. Java-Suikerind.* 535-62(1928).—The object of these tests was improvement in boiler efficiency, and reduction in cost of upkeep of furnaces and boilers, and of labor. On account of local conditions the preheater was placed in the first flue, and therefore it was not possible to investigate the attainable cooling down of the flue gases and the increase in efficiency resulting from it. But all tests showed an increase in efficiency of the boiler plant, without any operating difficulty.

P. R. PEKELHARING

Nature of the acidic substance formed on hydrolysis of acacia. LEONARD H. CRETCHER AND C. L. BUTLER. *Science* 68, 116-7(1928).—Gum arabic hydrolyzed with dil. H_2SO_4 yields an aldobionic acid of the formula $C_{12}H_{10}O_{12}$, which gives a strong naphthoresorcinol test (cf. Tollens, *C. A.* 2, 2693) and reduces Fehling soln. vigorously. On boiling with 12% HCl, the correct amt. of CO_2 is liberated and the glucose value calcd. from the amt. of I consumed in oxidation, as well as the percentage of Ca in the Ca salt, corresponds to the requirements of $C_{12}H_{10}O_{12}$ contg. 1 aldehyde and 1 carboxyl group.

L. W. RIGGS

The organization and cost of gul (crude sugar) making in the Deccan sugar cane tracts. P. C. PATIL. Dept. Agr., Bombay. *Bull.* 147, 18 pp.(1927).—In the small-scale operations common in India, the av. production of crude sugar is 60-65 lb. per man employed in crushing the cane, and evapg the juice, on the basis of a 12-hr. day. Production costs vary considerably in the different districts.

K. D. JACOB

Furnaces for making gul or crude sugar in the Bombay Presidency. P. C. PATIL. Dept. Agr. Bombay, *Bull.* 144, 35 pp.(1928).—The various types of native furnaces for the evapn. of sugar-cane juice are described and their merits discussed. Double, triple and multiple furnaces designed with special reference to efficient utilization of heat, are described and illustrated.

K. D. JACOB

Percentages of moisture and soluble matter in starches used by North Carolina mills. A. H. GRIMSHAW. N. C. State College Textile School. *Textile World* 74, 184-7(1928).—The results of tests are reported for moisture and soly. of the mill starches previously examd. microscopically (cf. *C. A.* 22, 2853). Of the 63 samples submitted by the N. C. mills, the majority were corn starch, but a few samples of potato and wheat starch were included. The methods used in this study as well as those of several manufacturers are described.

RUBY K. WORNER

Tests on ash, grit, color, pasting points and lasting qualities of starch. A. H. GRIMSHAW. N. C. State College Textile School. *Textile World* 74, 696-9(1928); cf. preceding abstract.—A report of further tests on starches submitted by the N. C. mills. The methods of analysis used as well as those of several manufacturers are described.

RUBY K. WORNER

A new soluble starch and an improved polarimetric Lintner method. H. C. GORE. Fleishmann Labs. *Ind. Eng. Chem.* 20, 865-6(1928).—Potato starch is mixed with 1.5 parts of 13% HCl, allowed to stand 6 days, thoroughly washed, and dried in warm air. The resulting product is used in an improved Lintner method for detn. of diastatic power.

T. S. CARSWELL

Entomology [in relation to sugar-cane soils] (SWEZEY) 15. Report of the work done by the agricultural chemist, Bengal, for the year 1926-27 (CARBERRY) 15. Report on agriculture (VERRET) 15. Pathology (LEE) 15. Mathematical interpretation of experimental results obtained with fertilizers for sugar cane (KUTSUNAI) 15. Chemistry [sugar cane] (STEWART) 15. Apparatus for drying bagasse (U. S. pat. 1,680,274). 1. Textile fiber from sugar cane (U. S. pat. 1,681,223) 25.

OWEN, B. J.: Desiccation of Sugar Beet and the Extraction of Sugar. London Min. Agr. and Fisheries. 84 pp. Reviewed in *Expt. Sta. Record* 58, 884(1928).

Sugar manufacture. ALOIS RAK. Fr. 634,135, May 10, 1927. A battery is made of diffusers and screw presses arranged alternately and in such a way that the juice circulates from the bottom to the top and the slices from the top to the bottom of the diffusers.

Treating sugar juices. DORR COMPANY. Fr. 633,946, May 5, 1927. To control the alky. of sugar juices during the process of defecation, use is made of the fact that the alky. is proportional to the elec. resistance, *e. g.*, a reversible motor controls a valve regulating the feed of the reagent, and is actuated by a suitable relay according to the fluctuations of an instrument indicating the variations produced in the resistance.

Purification of sugar juices. ELECTRO-OSMOSE A-G. (GRAF SCHWERIN GES.). Fr. 634,493, May 16, 1927. The juice is submitted to the action of a continuous elec. current between 2 diaphragms of the same elec. character, so that before the positive and negative electrodes so-called "negative diaphragms" are inserted, and the water which flows through the cathode chamber is caused to flow through the anode chamber.

Centrifuges for sugar. GABRIEL KREPELKA. Fr. 633,781, May 3, 1927. Constructional features.

Counter-current extraction apparatus for diffusion of sugar beets, etc. J. & F. HOWARD, LTD. and G. E. ROWLAND. Brit. 281,813, Oct. 7, 1926.

Removing hydrochloric acid from sugar solutions. FRITZ KOCH (to the International Sugar and Alcohol Co., Ltd.). U. S. 1,678,819, July 31. A sugar soln. contg. HCl, such as a soln. produced by the treatment of sawdust with HCl, is sprayed into heated air or oil to volatilize and remove HCl from the soln.

Starch from rice. OTTO JASCHKE. U. S. 1,681,118, Aug. 14. Rice grains are dry ground or crushed sufficiently to break down the starch cells and starch granules, so that the starch particles and glutinous particles of the grain may be quickly enveloped, permeated and satd. by treating liquids such as used in sepg. rice starch. An app. is described.

29—LEATHER AND GLUE

ALLEN ROGERS

Contribution to the study of the pickling of the hides. ENRICO SIMONCINI. *Boll. ufficiale staz. sper. ind. pelli mat. concianti supplemento tecnico* 6, 17-32, 35-48 (1928); cf. C. A. 22, 2487.—The expts. were made on samples of bison or cow hides. H_2SO_4 and NaCl were used as the constituents of the pickle. In pickling, the physicochem. state of the hide is altered by a specific action of the acid; within 30 min. the acid absorbed by the hide is in equil. with the acid in the soln. The intensity of absorption is proportional to the concn. of the acid. In solns. of equal concn., the absorption is proportional to the percentage of acid employed, calcd. on the wt. of hide. In presence of salt, the acid causes contraction of the tissues and synchronous dehydration of the fibers. If the increase of the liquid is considered as a measure of the intensity of the pickling, this value is nearly proportional to the amt. of acid fixed by the hide. Also, after the fixation of the acid is completed, the vol. of the pickle is still increasing; therefore, a prolonged pickling is recommended in practice. The absorption of salt is proportional to the initial concn. of NaCl in the pickle; an excess does not produce better results.

A new apparatus for determining the ethyl acetate figure of tannins. C. RIESS. *Collegium* 1928, 275.—An extn. vessel similar to that described by Procter (*Pocketbook* p. 53,) has a coarse glass filter fitted around the funnel which conveys the condensed ethyl acetate to the bottom of the extn. vessel. The solvent is broken up into small drops and extn. is therefore rapid.

A rational chemical analysis of synthetic tannins. (Technical condensation products of aromatic sulfo acids). I. BERKMANN AND A. KIPRIANOFF. *Collegium* 1928, 177-97.—The direct detn. as $BaSO_4$ of SO_4 in syntans is not possible because syntans prevent pptn. of $BaSO_4$. A soln. of 0.03 g. $Na_2SO_4 \cdot 10H_2O$ and 0.5 g. of Neradol FB in 300 cc. H_2O treated with $BaCl_2$ is clear even after warming for half an hr.; after cooling a milky ppt. seps. in 1 or 2 hrs. Several methods of removing the org. matter were tried; the following was most satisfactory. Mix 0.5 g. of powdered syntan and 8 g. of Na_2CO_3 in a Pt crucible, ignite gently at first and then fuse. Ext. the melt, oxidize by boiling 15 min. with Br, acidify with HCl, heat to remove Br and then ppt. with $BaCl_2$. This method was used to det. (a) total SO_2 ; (b) SO_2 in the ash of the carefully neutralized substance was also detd. (a) is SO_2 in both org. and inorg. combination; (b) is half that in org. combination plus the inorg.; half the org. is lost during ashing according to the

reaction, $2 \text{RSO}_2\text{Na} \rightarrow \text{Na}_2\text{SO}_4 + \text{SO}_2 + \text{R}_2$ where R is a syntan mol. Instead of neutralizing before ashing it is usually more convenient to titrate the syntan with 0.5 N alkali and methyl orange paper, calc. the acid as SO_3 and add this to the SO_3 found in the ash of the unneutralized syntan. If NaCl is present, moisten the syntan with H_2SO_4 , then ash and det. SO_3 . Ash another portion with soda, det. Cl in the ash and calc. and correct for the Na_2SO_4 formed from NaCl. All the Cl is assumed to be inorg.; data are given which support this view. From the SO_3 in org. combination and the neutralization figure the quantity of sulfo salt can be calcd. Analyses of 9 German syntans are given.

I. D. CLARKE

A new synthetic tannin: Alpha NK. VITTORIO CASABURI. *Boll. ufficiale staz. sper. ind. pell. mat. concianti* 5, 377-9(1927).—The by-products obtained in manufg cellulose treated according to the Italian-soda method are brought into reaction with a mixt. of phenols and homologous substances, instead of β -naphthol, which latter yields the tannin Alpha C. The new tannin, Alpha NK, tans skins even when employed alone; the color of the leather is uniform. An analysis of the tanning liquor gave these results: tanning substances 20.4, non-tans 17.0, H_2O 62.6%, d_{15} 1.18. For neutralizing 1 g. of liquor, 16 cc. N NaOH is needed.

GUNTHER SCHWOCH

Vegetable and synthetic tannins. O. GERNGROSS. *Papier-Fabr.* 26, 380-5 (1928).—An address. The chem. nature, sources, prepn. and testing of naturally occurring vegetable tannins are outlined. The color with which a dil (1:1000) soln fluoresces in ultra-violet light (cf. C. A. 22, 183, 419) is a valuable indication of the nature of the material. Synthetic tanning agents may be classified roughly as (I) condensation products of aromatic hydrocarbons, phenols, etc., (II) condensation products of carbohydrates, (III) oxidation products of brown coal, etc., and (IV) products obtained from sulfite waste liquor. Class II includes certain condensation products of cellulose esters.

R. H. DOUGHTY

The future of chestnut tanning materials. CHARLES R. OBERFELL. John H. Heald & Co., Lynchburg, Va. *Chem. Met. Eng.* 35, 468(1928).

E. H.

Process for tanning by means of the condensation products of phenols, their substituted derivatives or oxidation products, with aldehyde. CHARLES BLANC. *Bull. soc. ind. Mulhouse* 94, 359-64(1928). Sealed Note 1928, Sept. 9, 1909.—When phenols (or their substituted derivs. or oxidation products) are condensed with aldehydes under such conditions as to obtain sol. reaction products, the latter have valuable tanning properties. Report. LOUIS MEUNIER. Faculté des Sciences, Lyon. *Ibid* 364-7. Though the reaction of sol. phenol-formaldehyde condensation products with gelatin was known previously (Bayer, *Ber.* 5, 1904(1872); Nierenstein, *Collegium*, 1905, 221; 1906, 434; Stiasny, *Der Gerber* 31, 186, 202, 216, 231(1905); Kauschke, *Collegium* 1906, 351, 361; Weinschenk, *Chem.-Ztg.* 31, 349(1907)), its application to the tanning of hides was not systematically studied before B.'s work, Wolessenky's investigation coming much later (C. A. 20, 1336, 1535).

A. PAPINEAU-COUTURE

Clarification of waste tannery liquors and their utilization for agricultural purposes. V. HLAVINKA. *Sbornik Českoslovenké Akad. Zemědělské* 2, 41-54(1927).—The inorg constituents, with the exception of compds. of Cr and As, of tannery waste liquors are usually harmless, and no danger is likely to arise from bacteria unless pathogenic bacteria are present; these are only imperfectly removed by treatment with Cl or bleaching powder. To obtain efficient sedimentation the tanning liquors should be kept sep. from the lime-pit liquors. Sedimentation is carried out in sand pits and in raking plants where the chem. reactions are allowed to complete themselves so that coagulation of suspended matter is accelerated. The slime obtained contains 98% of the inorg. and 75% of the org. solids suspended in the liquors. The clarified liquors retain only 10% of the Cr content, while the slime has a N content of 5-6%. After drying to a water content of 60% it may be used as a fertilizer.

B. C. A.

Emulsions. E. STIASNY. *Collegium* 1928, 230-41.—A review of present theories of emulsions, introductory to further work. For fat-liquoring leather the emulsion must be stable enough to penetrate the leather but it must not be too stable for the oil must deposit in the leather.

I. D. CLARKE

Fat liquors and fat emulsions. HCH. ARNOLDI. *Collegium* 1928, 292-5.—General discussion of fat liquoring chrome leather.

I. D. CLARKE

Chromium-fatty acid compounds and their existence in leather. WILHELM SCHINDLER and KARL KLANFER. *Collegium* 1928, 286-91.—Four types of compds. were identified. Type a is formed as a violet sticky mass on boiling solns. of Cr alum with Na soaps. When dry it is a blue-green wax-like substance contg. about 7.2% Cr. It dissolves slowly in $\text{C}_2\text{H}_5\text{Cl}$. It is not hydrolyzed by boiling concd. HCl, only slowly by HCl in $\text{C}_2\text{H}_5\text{Cl}$, but at once by boiling 30% NaOH. Type b is pptd. from

cold solns. of soap and Cr alum. It forms a blue-green soln. in C_2HCl_3 . It changes into type *a* on standing and so is not important in leather technology. Type *c* is formed by treating boiling basic Cr alum solns. with soap. It could not be sepd. from the basic sulfate and $Cr(OH)_3$ ppt. Type *d* is formed by the action of oleic acid on cold freshly pptd. $Cr(OH)_3$. It contains about 16% Cr and is insol. in all solvents when dry. It is slowly hydrolyzed by boiling HCl in absence of C_2HCl_3 . Ten leathers were extd. with CCl_4 . All the exts. contd. Cr (0.4 to 1.7%). By treatment of the ext. with solvents small amts. of compds. richer in Cr could be sepd. but none as rich as in Cr as type *a*.

I. D. CLARKE

Dyeing of gloving and clothing leathers. M. C. LAMB. *J. Soc. Dyers Colorists* 44, 225-9(1928).—See *C. A.* 22, 2076.

L. W. RIGGS

The dipping refractometer for determining the concentration of dilute glue liquors. A. C. HART. Armour Glue Works. *Ind. Eng. Chem.* 20, 870-1(1928).—The specific refractivities for different types of glue were detd.: the av. specific refractivity for commercial glues on a 100% dry basis was 0.00183. The refractivities of different glues were not equal, presumably because of different degrees of hydrolytic decompn.

T. S. CARSWELL

Washing sulfonated oils with salt solutions (RIESS) 27.

Tanning. KURT H. MEYER and HERMANN SCHÜTTE (to I. G. Farbenind. A.-G.) U. S. 1,678,998, July 31. Hides are treated with a slightly acid soln. contg. a sulfonation product of an aliphatic tar such as a tar oil from lignite.

Preparing fish skins for tanning. A. EHRENREICH. *Brit.* 281,918, Jan 25, 1927. Glands or secretions of fish such as sharks are used as the source of enzymes for treatment of fish skins to effect their chem. disintegration, puring or bating prior to tanning.

Tanning fish skins. A. EHRENREICH. *Brit.* 281,919, Jan 26, 1927. Skins such as those of sharks, after liming, are treated with gums such as gum tragacanth or exts. of algae or of fenugreek. The skins may be preliminarily treated with enzymes and after treatment with the colloids may be treated with vegetable or inorg. tanning agents. Solns. of rubber or Ca stearate in C_6H_6 may be used for waterproofing the product. Cf. *C. A.* 22, 2855.

Composition for treating hides and skins. HARRY DODGE. U. S. 1,680,136, Aug. 7. See *Can.* 279,525 (*C. A.* 22, 2855).

Preserving hides and skins. SALT UNION, LTD., W. CLAYTON and W. E. GIBBS. *Brit.* 282,128, Aug. 13, 1926. Preservation is effected and discoloration by bacterial action is prevented by treatment with NaCl contg. a small proportion of a chloride or other salt of Pb or Cd, such as salt which is crystd. from brine contg. a small proportion of a Pb or Cd salt. The crystals may be colored with a small quantity of eosin. Mention is also made of the possible use of other bactericidal substances such as salts of Cu or Bi.

Waxing leather articles by use of heated molds shaped to the article. W. C. MATTHEWS. *Brit.* 282,256, March 29, 1927. Wax may be applied directly by a mold or by intervening waxed paper.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The preparation and use of rubber solutions. K. GASTEN. *Chem.-tech. Ind.* 29, 193-4, 209-10(1928).—A review and description of rubber cements used for shoes and other important products.

C. C. DAVIS

Cooling water for use in rubber manufacturing plants. W. F. SCHAPHORST. *Rubber Age* (N. Y.) 23, 431-2(1928).

C. C. DAVIS

Technical rules for the formulation of rubber mixtures. WERNER ESCH. *Kunststoffe* 18, 53-5, 86-90, 107-13(1928).—See *C. A.* 22, 511.

C. C. DAVIS

Power consumption of calenders. J. MORRISON. *Trans. Inst. Rubber Industry* 3, 480-87(1928).

C. C. DAVIS

Artificial silk and its uses in the rubber trade and possible lines of development. A. B. SHEARER. *Trans. Inst. Rubber Industry* 3, 454-61(1928).

C. C. DAVIS

Further studies of rubber under compression. C. H. BIRKITT and T. J. DRAKELEY. *Trans. Inst. Rubber Industry* 3, 462-7(1928).—In continuation of earlier expts. (cf. *C. A.* 20, 1920), the influence of the area and thickness of the test piece and of the friction between the compression plates and the upper and lower surfaces of the test

piece were investigated. The compression is proportional to the original thickness but corrections for area follow no definite law and must be detd. experimentally. The compression at given loads depends upon the lubricant. A general discussion follows.

C. C. DAVIS

Carbon blacks and their use in rubber. I. Comparative properties of blacks and tests in uncured rubber. NORRIS GOODWIN AND C. R. PARK. *Ind. Eng. Chem.* 20, 621-7(1928).—The phys. and chem. properties of 5 C blacks and of rubber mixts. contg. them were studied to det. the relative value of the individual blacks as pigments in tire treads. The blacks included: (1) "Charlton" lampblack, an oil black; (2) "Micronex," made by the channel process black for rubber; (3) "Super Spectra," made by the channel process for varnishes and enamels; (4) "Thermatomic," made by thermal decompn. of natural gas, and (5) "Goodwin," made by incomplete combustion of natural gas at high temps. The true d., apparent d., particle size and shape, x-ray structure, tinting strength, light scattering and absorption, extractable substances, adsorptive capacity, moisture content, oil absorption capacity, sedimentation max. capacity of incorporation in rubber, the behavior during the milling operation, the soly. of the resulting mixts. in C_6H_6 , the plasticity of these mixts. and their tendency to bloom were detd. II. Experiments in cured rubber. *Ibid* 706-15.—The 5 C blacks were tested in rubber mixts. with different accelerators to det. the phys. properties of a C black which are most responsible for the properties of rubber mixts. contg. the black. The relative properties of the mixts. were judged by stress-strain data, hardness and resistance to abrasion. The results indicate that particle size, adsorption capacity and the nature of the non-C components all play a part in detg. the phys. properties of a rubber mixt. contg. the C black. Of these the adsorption capacity has the most influence on the properties of rubber mixts. In all but 1 case, the higher the adsorption capacity the more the C black retarded the rate of cure. Resistance to abrasion does not vary directly with tensile strength or resilient energy, but is a complex function of the stress-strain curve and particularly of the hardness. Increased resistances to abrasion with increased proportions of C black indicate that a C black which is inferior to another in the same proportion may in larger proportions excel the other. The effects with stearic acid and with the individual accelerators are described in detail.

C. C. DAVIS

Effect of various types of carbon black on certain physical properties of rubber compounds. D. J. BEAVER AND T. P. KELLER. *Ind. Eng. Chem.* 20, 817-9(1928).—Tests of various C blacks in vulcanized rubber show that in general the presence of O in C black retards the rate of vulcanization in direct proportion to the quantity of O adsorbed by the black, and that O decreases the phys. properties obtainable with a given proportion of an accelerator. Furthermore, aging data show that the presence of O in the black increases the rate of deterioration, though this rate does not increase in direct proportion to the quantity of O. Therefore blacks which contain a relatively low proportion of O, such as "Thermatomic" black and acetylene black, give rubber mixts. with better aging properties than do blacks like lampblack and channel C blacks, which contain relatively large quantities of O. No correlation could be found between the acetone ext., I absorption and oil absorption of the blacks and the effects of the blacks on the rate of vulcanization and on the aging of the rubber mixts. contg. them.

C. C. DAVIS

The permeability of rubber and methods of testing it. H. A. DAYNES. *Trans. Inst. Rubber Industry* 3, 428-53(1928).—A crit. review and discussion of the phenomena of permeation, absorption, diffusion, equil. conditions, and the influence of various factors on permeation, diffusion and the time to reach equil., including the nature of the gas, the pressure, the thickness, the temp., the state of vulcanization, and the presence of compounding ingredients. The practical importance of these phenomena in the deterioration of air bags for curing tires, in tennis balls, inner tubes and balloons, in the vapor cure, in the Peachey process, in the natural and artificial aging of rubber, in connection with antioxidants, in rubber under expansion, in drying rubber, and in elec. insulation are then discussed. Finally methods of measuring the permeability of rubber to gases are described. The subjects are discussed from a critical point of view, with many original references, and certain new points of view are introduced. Stability toward O is of great importance in its influence on the life of rubber, but accessibility of O is sometimes of equal or greater importance. Balloon fabric may be stable for yrs. in darkness, but on exposure of one side to O for a few seconds, O passes through without chem. combination to the other side. In this case stability is the predominant factor. When rubber is heated, its rate of combination with O increases more rapidly than the diffusivity, and a condition is reached where the rubber can combine with more O than is available.

Under such conditions, when 2 rubber mixts. are equally stable, the one in which O diffuses more rapidly deteriorates the more rapidly, whereas the 2 mixts. deteriorate at the same rate at a lower temp. These conditions apply to the 70° air oven test, where the rate of deterioration is increased about 180 times and the permeability only 5 times. In aging tests with O under pressure at elevated temps., the concn. of O must be increased disproportionately to increase the rate of deterioration, and the increase of the concn. of O probably does not take the place of time for uniform penetration and leads to uneven oxidation. There is much to recommend a low concn. of O with slower deterioration, as in the Bruni test (cf. C. A. 16, 4093). The effect of an *anti-oxidant* on the accessibility of O depends upon whether it acts as an antioxygen, as defined by Moureu and Dufraisse, or is merely a preferential reducing agent. The latter would be very limited in its protective action at normal temps., whereas it would be effective in protecting rubber for short periods against high temps., as in dry heat cures, in hot water bottles, or in accelerated aging tests where accessibility of O plays an important part. A general discussion follows the paper. C. C. DAVIS

Softeners and antisofteners. FRLE C. ZIMMERMAN AND LESLIE V. COOPER. *Ind. Eng. Chem.* 20, 812-3(1928).—By measuring the plasticity of rubber before and after the addn. of a substance, the whole procedure being carried out under standardized conditions, it is possible to judge whether the substance softens or stiffens a rubber mixt. The relative effects of different softeners and stiffeners may also be detd. by this method. Stearic acid, pine tar, liquid asphalt, pine oil and degreas showed the greatest softening action of 14 softeners tested, while benzidine and *p*-aminophenol are among the substances found to have a distinct stiffening action. C. C. DAVIS

Machine for testing rubber products used to absorb vibration. FRANZ D. ABBOTT. *Ind. Eng. Chem.* 20, 853-7(1928).—A machine, termed a *compression flexometer*, for judging the resistance of rubber to prolonged vibration by its resistance to flexure while under compression is described and illustrated. Tests of rubber for shock insulators, motor supports and other objects which absorb vibration or undergo flexure while under compression show that the new method is a reliable indication of the behavior of the rubber in service. This is not true of elongation, tensile strength modulus and hardness tests or of static compression-set tests. C. C. DAVIS

Plasticity and elasticity of rubber. A. VAN ROSSEM AND H. VAN DER MEIJDEN. *Rubber Age* (N. Y.) 23, 438-40(1928).—See C. A. 22, 3063. C. C. DAVIS

The variability in the plasticity of plantation rubber. F. L. ELLIOTT. *Trans. Inst. Rubber Industry* 3, 468-79(1928).—The expts. are a part of the Ceylon Rubber Research Scheme. Comparative tests of the plasticity of raw rubbers, the same rubbers after mastication and after mixing with S showed that in most cases there is a definite relation between the plasticity of a raw rubber and its plasticity after mastication. With normal estate rubber, the plasticity of rubber-S mixts. was about 1.7 times that of the corresponding masticated rubber, but with special types, *e. g.*, sprayed latex rubber, this relation was not true. The rubbers were masticated with the same consumption of power in all cases, and the plasticity detns. were made on a Williams' plastimeter, and on a newly devised *extrusion plastimeter*, the construction and operation of which are described and illustrated. The vol. of rubber extruded per unit time is inversely proportional to the abs. viscosity, so D_{30} (de Vries) is inversely proportional to the 4th root of the vol. extruded. This extrusion method is therefore far more sensitive to differences of plasticity than is the parallel plate method, *e. g.*, 10% difference between D_{30} values (less than 0.1 mm.) corresponds to approx. a 45% difference in the rate of extrusion. With this procedure, it was found that the difference between the max. and min. values of crepe or of sheet is much greater than the difference between the mean values of the 2 types of rubber, *i. e.*, the differences in plasticity which depend upon the methods of prepn. of crepe and sheet are much smaller than those between individual samples. Sprayed latex rubber varied considerably and fine hard para was harder and less variable than crepe or sheet. The rate of vulcanization varied with the plasticity, the harder the rubber the more rapid its rate of vulcanization. By maturing rubber for different times, it was found that the state of maturation plays the predominant role in governing plasticity, an increase of maturation so slight that little change in the rate of cure was manifest, hardening the rubber 50%. The high values obtained by de Vries (*Mededeelingen* No. 46) for the viscosity of matured rubber with little change in the D_{30} values are contrary to experience of the Ceylon Research Scheme. The plasticity changes on keeping, and perhaps this accounts for the conflicting results. Machine-dried crepe averaged approx. 25% more plastic than that dried at av. temps., so that the temp. of drying influences the plasticity. Thus rubber dried at 180° F. was about twice as plastic as rubber dried at 140°. The smok-

ing process also increases the plasticity. A general discussion follows the paper.

C. C. DAVIS

Snow-white and bright-colored, non-poisonous, highly elastic rubber varnish with titanium dioxide. RUPPOLD DITMAR. *Chem.-Ztg.* 51, 506-7(1928).— TiO_2 gives excellent results when used as a pigment in white and bright-colored rubber varnishes.

C. C. DAVIS

The effect of antioxidants on the color of rubber mixts. T. L. GARNER. *Trans. Inst. Rubber Industry* 3, 417-27(1928).—Systematic tests of the color produced by antioxidants in different colored rubber mixts. were carried out. Preliminary tests showed that the same effects are manifest in cured and uncured mixts., so in most cases uncured mixts. were used. They were maintained (1) in air in darkness; (2) in air in daylight and (3) in N in daylight. The results show that in general uncured and cured rubber mixts. contg. antioxidants become discolored on exposure to daylight in air or in an inert gas, whereas there is little or no effect when they are kept in darkness in air. The color effect is only on the surface. The antioxidants tested were all aldehyde-amines, and the amine constituent may be responsible for the undesirable effects. Therefore the introduction of antioxidants of quite different chem. nature might furnish antioxidants which can be used in light-colored rubber products.

C. C. DAVIS

The coloring of cold-cured rubber. W. E. SANDERSON. *Rubber Age* (N. Y.) 23, 379-81; *Trans. Inst. Rubber Ind.* 4, 22-39(1928).—See C. A. 22, 3066.

C. C. DAVIS

Reclaimed rubber. HENRY P. STEVENS. *Bull. Rubber Growers' Assn.* 10, 425-32(1928).—A review and discussion of recent developments and of the present economic situation.

C. C. DAVIS

Vulcanization of rubber. NICHOLAS BACON. Cornell Univ. *J. Phys. Chem.* 32, 801-27(1928).—A review of theoretical and exptl. work on the nature of vulcanization indicates that there are at least 4 possible assumptions, that (1) "combination" of rubber and S is simply the formation of a solid soln., in which case it should be possible to ext. S by treating a vulcanizate with excess raw rubber in a suitable solvent; (2) vulcanization is simple adsorption or absorption accompanied by a chem. reaction, in either of which cases a vulcanizate should be heterogeneous and it should be possible to fractionate it by peptization in C_6H_6 and thus obtain fractions with different S contents; (3) the compn. or structure of rubber is altered by vulcanization, combination with S being only a secondary reaction, in which case it should be possible to induce vulcanization without the vulcanizing agent taking a part, and also to obtain raw rubber from vulcanized rubber; or (4) the rubber mol. is very large and forms a series of compds. with S, the larger the mol. the smaller the differences between 2 successive compds. and the more difficult their sepn. In the present work, these 4 theoretical possibilities were investigated experimentally to ascertain which is the most probable explanation of vulcanization. To test (1), hard rubber was extd. with acetone and was then heated to 190° with aniline contg. raw rubber in excess of that in the hard rubber. Though S is very sol. in aniline under these conditions, no S was extd. from the hard rubber, showing that "combined" S in hard rubber is more firmly held than in ordinary solid solns. According to (2), it should be possible to obtain soft vulcanized rubber from a mixt. of hard rubber and raw rubber provided their mutual adsorption could be effected, but after heating 15 parts of hard rubber with 85 parts of raw rubber at 150° , the 2 components could be sepd. by peptization in C_6H_6 . Likewise heating at 180° or 245° a mixt. of hard rubber and of excess raw rubber, each peptized in aniline, failed to yield a vulcanized product, and from the product obtained by evapn. the hard rubber was recovered by C_6H_6 (cf. *J. Soc. Chem. Ind.* 13, 14(1894)). Similarly, when a mixt. of hard rubber and raw rubber in xylene was refluxed, the raw rubber was sepd. from the solid product by peptization in C_6H_6 . The addn. of vulcanization accelerators and ZnO to mixts. of hard rubber and raw rubber, either in the solid state or peptized, did not bring about vulcanization. In the fractional peptization tests, mixts. contg. much less combined S than those of Stevens (C. A. 13, 3039) were used to ascertain whether even under such conditions homogeneity persisted. Rubber cured with different proportions of S was extd. with acetone and was then peptized in hot C_6H_6 and successive fractions were analyzed. All samples were homogeneous, including those which contained less than 0.1% "combined" S. With the aid of ultra-accelerators and ZnO, samples, which from a phys. point of view were well cured, were obtained which contained less than 0.5% S. Removal of protein did not influence the results with mixts. of raw and cured rubber. Further vulcanization tests showed that when coeffs. of vulcanization are very close together, e. g., 0.37 and 0.57% combined S, homogeneous mixts. cannot be obtained by heating them in peptized form. Homogeneous products were also obtained when mixts. cured below the m. p. of S were extd. with acetone and then

peptized in C_6H_6 . Accordingly even below its m. p., S is sol. in rubber. When sheet rubber was heated with a layer of S on one side, the surface in contact with S had a much higher coeff. of vulcanization than the part farthest from the S, and on fractional peptization fractions contg. different proportions were obtained. This proves that rubber is not composed of "giant" mols. Boiling $BuOH$ does not peptize rubber but dissolves S, so that equil. between resin-free rubber and S was studied in this solvent at 117° . Different concns. of S, i. e., different proportions based on the rubber, were used, and after drying *in vacuo* and extg. with acetone, the S content was detd. In all cases the rate of increase of S content diminished progressively until ultimately it became so slow that it could not be decided whether equil. had been reached or whether diffusion became so slow that the reaction was inhibited. The data show no evidence whatever of the formation of a chem. compd. up to the compd., $C_{10}H_{16}S_2$, which was formed in each case when sufficient S was present. The proportion of S combining with the rubber was practically proportional to the concn. of S. Because the soly. of S in rubber increased with increase in the coeff. of vulcanization, which in turn was counteracted by the lowered diffusion, there was probably a static condition reached which was a false equil. The results as a whole show that the union between rubber and S is chem., and that the theory of C. O. Weber is in modified form the most satisfactory for explaining vulcanization. Since fractional peptization shows that homogeneity exists even with a coeff. of vulcanization of 0.1%, the initial compd. of the Weber series must be wrong. The mol. wt. of the rubber hydrocarbon is at least 32,000 to account for the initial compd. of a series extending to a compd. contg. 32% S. This compd. would be $(C_6H_8)_{470}S$, and if analytical methods were more delicate, it might be found that homogeneity existed below 0.1% S; in which case the value of n in the initial compd. $(C_6H_8)_nS$ would be even greater than 470. C. C. DAVIS

Binding agent (from rubber) for colors, varnishes, etc. (U. S. pat. 634,275) 18. Oils resembling petroleum by destructive distillation of rubber (Brit. pat. 282,565) 22.

UTTÉE, A. J.: **Kautschuk**. Bearbejdet fra hollandsk af Frits Heide. Copenhagen: J. H. Schultz. 76 pp.

Rubber. HAROLD E. CUDE (to Naugatuck Chemical Co.). U. S. 1,680,862, Aug. 14. Commiunited rubber is treated with oleic or stearic acid or other org. acid capable of forming a water-sol. soap, until the mass has assumed a putty-like consistency, and residual acidity is neutralized with a base such as NaOH capable of forming a water-sol. soap. The product may be dispersed in aq. liquids.

Rubber. TECHNISCHE CHEMIKALIEN-COMPAGNIE G.M.B.H. Fr. 633,794, May 3, 1927. Rubber is treated before vulcanization with mineral oils contg. unsatd. compds. of S and OH and is characterized by the fact that the oils are activated by heating to $135-150^\circ$ and drying.

Treating rubber latex. W. A. GIBBONS (to Naugatuck Chemical Co.). Brit. 282,011, Dec. 9, 1926. Concd. latex contg. alkali preservative is neutralized or slightly "overneutralized" to improve its plasticity and cohesiveness on the mixing mill or other app. H_3PO_4 or $HOAc$ or a buffer material or salt which hydrolyzes to give an acid reaction such as primary Na phosphate or Zn acetate may be used.

Treating rubber latex. SIDNEY M. CADWELL (to Naugatuck Chemical Co.). U. S. 1,680,856, Aug. 14. In making various rubber articles, a rubber dispersion is treated with a metallic compd. such as ZnO and with NaOAc or other suitable org. acid salt capable of reacting to liberate metallic ions in the dispersion to form an uncoagulated compn. of increased filterability, and rubber is deposited from the latex thus obtained directly on a porous form in the shape of the desired article. U. S. 1,680,857 specifies prepg. a vulcanized latex by adding, to an approx. NH_3 -free latex contg. sufficient non-nitrogenous CS_2 accelerator, ZnO and S to cause the latex to be vulcanized to a soft elastic product, and then sufficient addnl. S, ZnO and tetramethylthiuramdisulfide to cause the rubber to be vulcanizable to a hard rubber at temps. below 100° . U. S. 1,680,858 specifies forming rubber articles from latex by vulcanizing the latex in the presence of a salt of a thiol acid such as Na dithiobenzoate and depositing the latex directly on a porous form.

Warming mill and associated apparatus for treating rubber stock. OSCAR D. HOLLENBECK. U. S. 1,680,171, Aug. 7.

Mold for rubber airbags, etc. LEON S. WASHBURN (to The Goodyear Tire & Rubber Co.). U. S. 1,679,554, Aug. 7. Structural features.

Apparatus for making seamless rubber tubing. CHARLES H. ROTH (to The Goodyear Tire & Rubber Co.). U. S. 1,679,545, Aug. 7.

Abrasion testing machine for testing rubber tire treads, etc. DUNLOP RUBBER Co., LTD., and L. J. LAMBOURN. Brit. 282,131, Sept. 1, 1926.

Coating metals with rubber. FRITZ AHRENS. Fr. 634,128, May 10, 1927. In coating metals with a soln. of rubber, the product obtained by treating oxidizable oils with sulfur chloride is added to the soln.

Rubberized fabric driving belts. C. MACINTOSH & Co., S. A. BRAZIER and T. E. ANDREW. Brit. 282,271, May 6, 1927. Driving belts, bands, ropes or the like such as those for use in textile machinery are immersed in a natural or artificial rubber dispersion, which may contain added compounding or vulcanizing ingredients, dried and vulcanized. The material may be preliminarily treated with dil. NH_3 soln. to render it more permeable, and may be alternately dipped in the rubber dispersion, and dried between dippings, to obtain any desired degree of rubberization. Vulcanization may be effected by steam or dry heat.

Rubber-composition flooring. JOHN B. LOSEY and WALTER R. STONE. U. S. 1,678,948, July 31. Structural features are specified of a material comprising a base of relatively soft rubber compn. and surface sections of harder rubber compn.

Treating waste material containing rubber and fiber. REED P. ROSE (to Mechanical Rubber Co.). U. S. 1,680,915, Aug. 14. Tire casings or similar waste material is disintegrated and worked mechanically with about 10% its quantity of a soap-forming fatty acid such as oleic or stearic acid until a mixt. of plastic, putty-like consistency is produced; NaOH in quantity 1.2-1.5 times that of the added fatty acid is then added, and the material is further worked and then beaten in an aq. medium contg. an alkali such as NaOH together with glue, casein or other protective colloid, until the rubber is completely removed from the fiber and in dispersed form.

Composition for softening and use as a filler in making vulcanized rubber mixtures. CLAYTON O. NORTH (to The Rubber Service Laboratories Co.). U. S. 1,679,000, July 31. A mineral lubricating oil of a viscosity of not over 120 sec. Saybolt at 38° is mixed with a small proportion of cotton seed oil.

Vulcanizing rubber. LORIN B. SEBRELL (to The Goodyear Tire & Rubber Co.). U. S. 1,679,548, Aug. 7. Vulcanization is accelerated by the use of mercaptoamino benzothiazole or other mercaptoarylthiazole, the aryl structure of which contains an amino group. Cf. C. A. 22, 2686.

Vulcanizing rubber coverings of rollers or other hollow articles. C. H. GRAY. Brit. 282,502, Sept. 24, 1926. Mech. features.

Plastic material from latex and asbestos. WILLIAM B. WESCOTT (to Rubber Latex Research Corp.). U. S. 1,680,234, Aug. 7. A product suitable for insulating wire is made by washing asbestos with acid and mixing it with latex.

CHEMICAL ABSTRACTS

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No. 20

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

A large capacity laboratory extractor. F. E. HOLMES. Procter & Gamble Co. *Ind. Eng. Chem.* 20, 888(1928).—A 1 l. Pyrex flask serves to hold the boiling solvent; above this is placed a second 2-l. flask, connected to the first by a vapor line blown in the bottom of the second. The vapor line extends up almost to the top of the second flask. A small hole blown in the bottom of the vapor line returns the condensed solvent. A condenser is mounted on the top of the second flask. T. S. CARSWELL

A precision pipet viscometer. S. W. FERRIS. Atlantic Refining Co. *Ind. Eng. Chem.* 20, 974-7(1928).—The app. consists of an all-glass pipet with a carefully ground orifice, which is mounted in a water jacket which serves as a const. temp. bath. The capacity of the instrument is 4 to 5 cc. Calibration curves, Saybolt seconds being plotted against pipet seconds, are straight lines which intersect in one point on the Saybolt axis, thus making it possible to calibrate a pipet with one oil of known viscosity. The pipet may be calibrated with an accuracy of 1% by water alone. T. S. C.

A buret cleaner. F. H. FISH. Virginia Polytech. Inst. *Science* 67, 654-5(1928).—A method is given for cleaning a buret which is still unclean after trying chromic acid. After the buret is washed once with 95% EtOH, 2 cc. of this and 5 cc. concd. HNO₃ are added to it, a large test tube being placed over the open end. The reaction starts in a few min., throwing the contents up the full length of the tube repeatedly. At the end of the reaction the products are easily washed out, the buret being clean. J. B.

New continuous filters for sludges, etc. KURT W. GEISLER. *Z. Ver. deut. Ing.* 72, 1089-92(1928).—The construction of different types of vacuum drum filters are described. In one type the sludge is contained inside the rotating drum and in contact with a filtering screen so that its wt. aids the suction required to draw it through the screen; furthermore the tank ordinarily used as the liquid container in drum filters is here dispensed with. A filter especially adapted for *cellulose pulp* and one totally enclosed so that *filtration in an inert atm.* may be carried out are described. D. G.

Self-acting filtration apparatus. J. V. DUBSKÝ AND A. RABAS. Masarykova Univ. Brno. *Chem. Weekblad* 25, 293-4(1928). (In German).—A cylindrical glass vessel of 1000 cc., with a glass stopper at the bottom movable by a glass rod which emerges through a rubber stopper at the top, is used instead of a turned-over flask for const. supply of liquid to a filter. Ease of filling is thus obtained. J. GROSSFELD. *Ibid* 294.—The same result can be obtained by using a large separatory funnel with wide cock. B. J. C. VAN DER HOEVEN

Automatic supply of liquid. W. P. JORISSEN. *Chem. Weekblad* 25, 294-5(1928).—Old methods are described for liquid supply to a filter. B. J. C. VAN DER HOEVEN

The "A" tube—an improved form of "U" tube. A. O. JONES AND F. HOBSON. *Chemistry & Industry* 46, 1222-3(1927).—The app. consists of 2 pieces of glass tube which form an inverted V, joined near their lower extremities by a third tube so as to form an A. The lower ends of the first 2 tubes are closed with rubber stoppers, and the upper ends are drawn out to make connections for rubber tubes, or supplied with cocks. T. S. CARSWELL

The T. C. B. photo-colorimeter. J. PINTE. *Tiba* 6, 517-25, 637-47(1928); *Rev. gén. mat. plastiques* 4, 323-9, 410-3, 477-80(1928); cf. *C. A.* 21, 3492, 22, 1499.—A description of recent improvements in the instrument. A. PAPINEAU-COUTURE

A new turbidimeter. W. EWALD. *Instruments* 1, 371-5(1928).—Two light bundles from the same source pass through the app., 1 through the turbid soln. and the other through a standard adjustable turbid wedge, after which they are reflected onto a divided field, the halves of which are brought to the same intensity by means of the wedge and the results read from a scale. J. H. MOORE

Micro-apparatus for the determination of molecular weight by the cryoscopic method. KENJI IWAMOTO. *Sci. Repts. Tôhoku Imp. Univ.* 1st. ser., 17, 719-22

(1928).—The app. uses a Beckmann thermometer of reduced size, similar to that used in Pregl's ebullioscopic method, and the tube holding the solvent is so small that 1.5 cc. solvent will cover the bulb of the thermometer. The solvent tube is stirred with a Ni or Pt stirrer, and fits into a larger tube which serves as an air-jacket. The whole is immersed in a liquid 2–3° lower than the crystn. pt. of the solvent. From 7 to 30 mg. of solute are sufficient. T. S. CARSWELL

A new apparatus for a rapid sedimentation analysis. C. J. VAN NIEUWENBURG AND WA. SCHOUTENS. Tech. Univ., Delft, Holland. *J. Am. Ceram. Soc.* 11, 696–705(1928).—The app. is based on the detn. of the changes in concn. in one definite layer. The changes are measured by the changes in apparent wt. of a suspended body. C. H. KERR

An apparatus for continuous gas analysis. ERNEST C. WHITE. U. S. Bur. Chemistry and Soils. *J. Am. Chem. Soc.* 50, 2148–54(1928).—An app. is described for the continuous automatic analysis of gases, utilizing the change in elec. cond. of a soln. that has been exposed to the gas in a device for controlling the vol. ratio. A gas actually analyzed is CO in the presence of H₂ and hydrocarbons. Other gases capable of extn. are NH₃, HCl, SO₂, Cl₂, H₂S and CO₂. L. A. PRIDGON

A vacuum grating spectrograph for ultra-violet and soft x-rays. JEAN THIBAUD. *J. Optical Soc. Am.* 17, 145–54(1928); cf. *C. A.* 22, 1539.—Description of an app. for using ruled gratings at high glancing incidence, with 5 spectrographs and table showing wave lengths of lines for O, N, C, B, Fe, Mo, Ta, W, Pt and Au. J. H. MOORE

Direct-vision spectroscopic apparatus and monochromator with two prisms and constant deviation. C. LEISS. *Z. Physik* 47, 143–6(1928).—A direct-vision spectro-scope is described which can be used with either 1 or 2 prisms. Mirrors are mounted in permanent connection with the prisms, which can be adjusted together with one movement. It is so arranged that any line focussed on the cross-wires or on the emergence slit has passed through the prism with min. deviation. B. C. A.

Spectrometer or monochromator with lenses or mirrors for use with one or two prisms of glass, quartz, rock salt, etc. C. LEISS. *Z. Physik* 47, 137–42(1928).—A new form of const. deviation spectrometer is described which can be used according to requirements with 1 or 2 prisms of glass (for visible region), quartz (up to 4μ), or rock salt (up to 16μ). The arrangement of mirrors (or lenses) and prisms is such that the prisms are always used in the position of min. deviation. The instrument is very compact and simple of adjustment. B. C. A.

The condensate trap and its heat-technical significance. MAX BERGER. *Apparatebau* 40, 169–71(1928).—General remarks on heat losses due to inefficient traps, with descriptions of 2 types of Pieron traps. J. H. MOORE

An electrically heated furnace for organic combustions. MAX PHILLIPS AND R. HELLBACH. Bur. of Chemistry and Soils. *J. Assoc. Official Agr. Chem.* 11, 393–6(1928).—After briefly outlining the disadvantages of the ordinary 3-unit type of elec. combustion furnace, P. and H. describe a 4-unit furnace in which all the heating units are small, allowing of the use of a smaller combustion tube which permits C and H detns. to be made on 70–100 mg. samples if desired. A. PAPINEAU-COUTURE

Crucible melting furnaces. A. J. SMITH. *Met. Jurgist* (Suppl. to *Engineer* 146, No. 4) 101–3(1928).—An account of new designs used in Italy, France and England. D. B. DILL

An adjustable thermostat. BRADFORD NOYES, JR. *J. Optical Soc. Am.* 17, 127–31(1928).—A detailed description, with 2 cuts, showing connections of thermocouple, potentiometer, photoelec. cell, vacuum tube, relays, resistances and batteries. J. H. MOORE

A device for controlling the rate of cooling and heating of the Haughton-Hanson thermostat. J. D. GROGAN. *J. Sci. Instruments* 5, 217–9(1928).—An electrolytic cell delivers O at a steady rate to the thermostat bulb to regulate cooling, or to a bulb on the other side of the Hg relay to regulate heating. J. H. MOORE

WRIGHT, LEWIS: *The Microscope: A Practical Handbook*. Enlarged and re-written by A. H. Drew. London: R. T. S. 293 pp. 7s. 6d., net.

Filters. SOC. ANON. DES CHARBONS ACTIFS E. URBAIN. *Brit.* 283,192, Jan. 8, 1927. Capillary filters for liquids are formed of wicks of fibrous material or of material such as C, SiO₂, wood, powd. glass or resin, packed in siphonic tubes or agglomerated in the form of a siphon. By washing with suitable agents the capillary material may be given a charge corresponding to that of the particles to be sepd.

Hydrometer. LEO EDELMANN (to E. Edelmänn & Co.). U. S. 1,683,452, Sept. 4. Structural features.

Hygrostat. GEORGE R. LAWRENCE. U. S. 1,682,915, Sept. 4. Structural features.

Gasometer with sliding disk. MASCHINENFABRIK AUGSBURG NÜRNBERG A.-G. Fr. 635,061, May 27, 1927.

Rotating-disk photometer. CARL W. KEUFFEL (to Keuffel & Esser Co.). U. S. 1,682,528, Aug. 28.

Röntgen-ray apparatus. W. OTTO. Brit. 283,106. Jan. 3, 1927.

Meter for proportioning the flow of fluids. FREDERICK N. CONNET (to Builders Iron Foundry). U. S. 1,681,762, Aug. 21.

Filter and settling chamber for separating dust from air, etc. H. WARING AND ASSOCIATED LEAD MANUFACTURERS, LTD. Brit. 282,849, Aug. 28, 1926.

Apparatus for removing dust from air or other gases by centrifugal action. H. G. KAMRATH (to A. C. Spark Plug Co.). Brit. 282,726, Dec. 29, 1926.

Centrifugal apparatus for separating dust from air or other gases. GEORGE KEITH (to James Keith & Blackman Co., Ltd.). U. S. 1,682,285, Aug. 28.

Apparatus for liquefying and separating constituents of air or other gases. STUDIEN GES. FÜR GAS-INDUSTRIE. Brit. 282,813, Dec. 29, 1926.

Apparatus for liquefaction and rectification of air or other gases. W. L. DEBAUFFRE (to S. G. Allen). Brit. 283,101, Jan. 3, 1927.

Apparatus for humidifying air or other gases. BRITISH ARCA REGULATORS, LTD. AND T. LINDSAY. Brit. 282,915, Oct. 9, 1926.

Apparatus for controlling the mixture in suitable proportions of gases such as air and fuel for furnaces. CHARLES H. SMOOT. U. S. 1,682,689, Aug. 28.

Gas purifier construction. H. H. HOLLIS. Brit. 283,283, Oct. 8, 1926.

Reversing valve construction for gas purifiers. H. H. HOLLIS. Brit. 282,943, Nov. 9, 1926.

Gas cooling and washing apparatus. METALLBANK UND METALLURGISCHE GES. A.-G. Brit. 282,939, Nov. 3, 1926.

Gas washing apparatus. W. C. HOLMES & Co., LTD., C. COOPER and D. M. HENSHAW. Brit. 283,028, April 13, 1927.

Apparatus for obtaining mixtures of gases, particularly for anesthesia. ROBERT MARCEL MACHAVOINE and LUCIEN LOUIS GIRARD. Fr. 635,092, May 27, 1927.

Apparatus for feeding air mixed with steam into furnaces. HENRY MARCU. Fr. 635,116, May 28, 1927.

Furnace for annealing articles in an inert atmosphere. AKT.-GES. BROWN, BOVERI, ET C^{IE}. Brit. 282,799, Dec. 27, 1926.

Furnace construction with silicon carbide or similar heat-radiating flues, combustion chambers, etc. C. E. HAWKE (to Carborundum Co., Ltd.). Brit. 282,720, Dec. 27, 1926.

Retort furnace (with superposed horizontal heating chambers) for heating pulverized fuels and treating them with water, steam or air. H. A. PROCTOR. Brit. 283,388, April 30, 1927.

Ducts and ovens for baking varnished wires. FERDINAND HANFF (to Siemens-Schuckertwerke G.m.b.H.). U. S. 1,682,123, Aug. 28. Structural features.

Tubular system heat-exchange apparatus. O. SIMMEN. Brit. 282,717, Dec. 28, 1926.

Heat-exchange apparatus suitable for fractional condensation, etc. CARL F. BRAUN. U. S. 1,683,236, Sept. 4.

Apparatus for utilizing solar heat for heating water, etc. F. MARGUERRE. Brit. 282,773, Dec. 23, 1926.

Liquid heating apparatus. ALBERT JOHN LAMBERT and THE LAMBERT HEATER AND ENGINEERING COMPANY, LIMITED. Fr. 635,065, May 27, 1927. The liquid passes through shallow rectangular cells heated by flame or internal elec. resistances.

Carbide-feed acetylene generator. D. A. BROWN and A. F. DRINKWATER. Brit. 282,886, Sept. 29, 1926. Structural features.

Multiple-chamber continuous kiln construction. A. E. OSMAN. Brit. 283,009, Feb. 19, 1927.

Apparatus for controlling the flow of water or other fluids by temperature and pressure variations. RICHARD E. B. WAKEFIELD (to Westinghouse Electric & Mfg. Co.). U. S. 1,683,317, Sept. 4.

Apparatus for spray desiccation of milk or other liquids. WM. D. CALLAN (to Economic Powdered Products Co.). U. S. 1,682,596, Aug. 28.

Apparatus for treating milk or other liquids with ultra-violet rays. FRANZ HOFFMANN. U. S. 1,681,538, Aug. 21.

Apparatus for purifying dry-cleaning liquids. MAURICE M. SCHWAB and SAMUEL S. SCHWAB. U. S. 1,682,939, Sept. 4.

Apparatus for generation and distribution of mercury vapor ("mercury boiler"). FRANK SHORT (to Chemical Machinery Corp.). U. S. 1,683,310, Sept. 4.

Catalytic apparatus suitable for vapor phase reactions. ALPHONS O. JAEGER (to Selden Co.). U. S. 1,682,787, Sept. 4. A catalytic material such as a Pt or V catalyst is arranged in an annular layer and reaction gases such as SO_2 or C_2H_2 or C_4H_{10} vapor may be passed through the layer of catalyst at approx. at right angles to its axis, through perforated cylinders.

Centrifuge for the purification of oil. AKTIEBOLAGET SEPARATOR. Fr. 634,903, May 24, 1927.

Grinding and separating apparatus for minerals, coal, etc. PAUL LOUIS CROWE. Fr. 635,083, May 27, 1927.

Surface condensers. SOCIÉTÉ ANON DES ATELIERS DE CONSTRUCTIONS MÉCANIQUES ESCHER WYSS & C^{IE}. Fr. 634,904, May 24, 1927. An arrangement of the cooling tubes and flow plates for the condensed liquid is described by which max. efficiency from the cooling tubes is obtained.

Apparatus for "magnetic analysis" of drills or similar articles. THOMAS SPOONER (to Westinghouse Elec. & Mfg. Co.). U. S. 1,682,435, Aug. 28.

Apparatus for making coffee, tea or other extracts, infusions, decoctions, etc. LOUIS M. POUGER. U. S. reissue 17,077, Sept. 4. The original pat., No. 1,556,026, was issued Oct. 6, 1925.

Apparatus for extracting mucilage from flaxseed (for use in steam boilers). JOSEPH F. SANFTLEBEN (to Filtrators Co.). U. S. 1,683,102, Sept. 4.

Apparatus for drying paste, etc. JEAN B. VERNAY. U. S. 1,681,690, Aug. 21.

Apparatus for diffusion treatment of sewage or other materials. LORENZO S. WASHBURN (to Norton Co.). U. S. 1,681,890, Aug. 21. A porous diffusion plate for use in the bottom of the app. is formed of granular material such as cryst. Al_2O_3 bonded by a vitrified ceramic material and having the walls of its pores treated with a water-repellant substance such as paraffin.

Electric discharge device. A. W. HULL (to British Thomson-Houston Co., Ltd.). Brit. 282,766, Dec. 23, 1926. The cathode of a rectifier or lamp consists of a tube of Ni, Ni alloy or Mo open at one end and coated internally with one or more of the alk. earth metal oxides, oxides of rare earth metals such as Ce or with misch metal. A cylindrical anode of Ni, Mo or C closely surrounds the cathode and retains its heat and a heating coil of W insulated by thoria or MgO is supported within the cathode. Particles of the coating driven off from the cathode are deposited again inside the cathode. A bulb filling of rare gases such as A or Ne is used at a pressure of 1-100 microns or a small quantity of Hg may be inserted in the bulb. Various other structural details are described.

Thermionic valves with four electrodes. MARCONI'S WIRELESS TELEGRAPH CO., LTD. Fr. 634,648, May 3, 1927.

Thermostatic device for electric circuits. HARRY C. MILLER and AUGUST J. MOTT LAU (to Westinghouse Elec. & Mfg. Co.). U. S. 1,682,395, Aug. 28.

Thermostatic control device for electric circuits. REUBEN S. TICE (one-half to Arthur L. Holcomb). U. S. 1,681,446, Aug. 21.

Thermostat for control of electric circuits. HERBERT J. SAUVAGE (to Drying Systems, Inc.). U. S. 1,683,264, Sept. 4.

Thermostatic valve suitable for regulating fuel supplied to water heaters. LORAN F. DOGN (to Cleveland Heater Co.). U. S. 1,683,172, Sept. 4.

Thermostatic valve for controlling the supply of fuel to furnaces. N. H. FREEMAN. Brit. 282,864, Sept. 25, 1926.

Thermostatic safety device for liquid fuel burners. IRA E. McCABE. U. S. 1,681,421, Aug. 21.

Thermostatic switch for controlling the temperature of electrically heated melting pots, etc. HOWARD D. MATTHEWS (to Westinghouse Elec. & Mfg. Co.). U. S. 1,682,391, Aug. 28.

Thermostatic valve for chemical apparatus, heating systems, etc. EMIL T. JOHNSON. U. S. 1,682,227, Aug. 28. Structural features.

Thermostatic control for radiator valves. EARL V. HILL. U. S. 1,682,905, Sept. 4.

2—GENERAL AND PHYSICAL CHEMISTRY

GEORGE L. CLARK AND J. H. REEDY

- Ferdinand Braun. L. MANDELSTAM AND N. PAPALEXI. *Naturwissenschaften* 16, 621-6(1928).—Biography with portrait. B. J. C. VAN DER HOEVEN
- Prof. Carl Axel Hjalmar von Feilitzer. PAUL KRISCHE. *Ernähr. Pflanze* 24, 153-4(1928).—An obituary with portrait. LAWRENCE P. MILLER
- Karl Karlovich Klaus. B. N. MENSHTUKIN. *Ann. inst. platine* (Lenigrad) No. 6, 1-10(1928).—A biography with portrait. E. J. C.
- The life work of Justus von Liebig. PAUL KRISCHE. *Ernähr. Pflanze* 24, 154-62 (1928).—With portrait and 11 other illustrations. LAWRENCE P. MILLER
- Hendrik Antoon Lorentz. MAX PLANCK. *Naturwissenschaften* 16, 549-55 (1928).—A memorial lecture with portrait. B. J. C. VAN DER HOEVEN
- Peter Grigor'evich Melikov. P. PETRENKO-KRITCHENKO. *J. Russ. Phys.-Chem. Soc.* 60, 727-34(1928).—An obituary with portrait. E. J. C.
- Boris Semenovich Yakobi and his work on platinum. O. E. ZVYAGINTZEV. *Ann. inst. platine* (Leningrad) No. 6, 11-22(1928).—Portrait included. E. J. C.
- Founding of the American Section (of the Society of Chemical Industry). ALLEN ROGERS. *Chemistry and Industry* 47, 871-2(1928). E. H.
- More direct avenues to chemical training. ROBERT SAXON. *Chem. News* 137, 50-2, 68-70(1928). E. H.
- Liquid stars and atomic volume. A. S. EDDINGTON. *Nature* 121, 496(1928). H. G.
- Liquid stars and atomic volume. J. H. JEANS. *Nature* 121, 496-7(1928). H. G.
- The atomic weight of protactinium. FRANZ LOTZE. Univ. Göttingen. *Naturwissenschaften* 16, 558(1928).—By analysis of at. wt. detns. of radioactive Pb a mixt. of Ra G, Act D and Th D and possibly some "ordinary" Pb the attempt has been made (cf. C. A. 22, 2106) to find the at. wt. of Act D. From 6 values the av. is 207.42, corresponding to an at. wt. of protactinium of 231. B. J. C. VAN DER HOEVEN
- Discrepancies in Moseley's law. V. DOLEJŠEK. *Z. Physik* 46, 132-41(1927).—It is shown that for the homologous elements of at. no. 36, 54 and 86, the value of $\sqrt{\nu/R}$ is given by the empirical expression $a + bN + cN^2 + dN^3$, where N is the at. no. and a, b, c, d are consts. The difference between the exptl. value of $\sqrt{\nu/R}$ and that calcd. from the above empirical expression is shown to be a periodic function of the at. no. B. C. A.
- Density and axial relations of hexagonal silver iodide determined with Röntgen rays. N. H. KOLKMEIJER, W. J. D. VAN DOBBENBURGH AND H. A. BOEKENOOGEN. *Verslag Akad. Wetenschappen Amsterdam* 37, 481-94(1928).—AgI, prepd. for another study, was purified and a d. 5.683 was finally obtained. Since the d. did not change any more by further purification, it was assumed that the crystals were physically pure. To check this assumption, the d. was calcd. from x-ray measurements and found the same. Conclusion: The sample was physically pure cubic AgI. Similarly, a d. 5.49 was found for hexagonal AgI. Changes in d. are attributed to vacuoles. A. L. H.
- The structure of silver subfluoride, Ag₂F. H. OTT AND H. SEYFARTH. Univ. München. *Z. Krist.* 67, 430-3(1928).—Ag₂F was prepd. by evapn. or electrolysis of H₂O soln., the latter giving greenish metallic hexagonal plates. No lines were found in x-ray patterns for either Ag or AgF. The structure is of the CdI₂ type, hexagonal, with $a = 3.0$ and $c = 5.14$ Å. U. There is 1 mol. in the cell, with F at 000, and Ag at $1/3, 2/3, p; 2/3, 1/3, -p$, where $p = 0.306$. L. S. RAMSDELL
- The lattice-plane contraction of crystal faces. WERNER BRAUNBEK. Techn. Hochsch. Stuttgart. *Naturwissenschaften* 16, 546(1928).—The Davison-Germer contraction effect has been explained previously by Bethe (C. A. 22, 538, 2511). H. calcs. for a NaCl crystal the amt. of actual contraction which can be expected. The lattice planes are stiff, and the mutual forces are composed of Born's at. forces (Coulomb attraction, r^{-8} repulsion, β factor of $-1/2$). For the widening of the surface plane relative to the internal planes the following values are found: no. 1 —0.0030, no. 2 +0.000001, no. 3 —0.000005, no. 4 —0.000001, no. 5 —0.000004. Because of an actually more rapid decrease of the repulsive forces (cf. Unsöld, C. A. 22, 536) it is probable that the contraction diminishes considerably faster toward the inside. Only the first value of 0.3% is of practical significance. Its influence on electron scattering will be negligible anyway. B. J. C. VAN DER HOEVEN

Crystal structure of urea and the molecular symmetry of thiourea. STERLING B. HENDRICKS. Rockefeller Inst. *J. Am. Chem. Soc.* 50, 2455-64(1928).—The crystal structure of $\text{CO}(\text{NH}_2)_2$ has been detd. by the use of Laue and spectrum photographs. The unit of structure contg. $2\text{CO}(\text{NH}_2)_2$ has d_{100} 5.73 A. U. and d_{001} 4.77 A. U. The space group is $4d - 3 (\sqrt{2})$ with O and C at $(c) 0\frac{1}{2}, \frac{1}{2}, 0$; and N at $(e) u, \frac{1}{2} - u, v; \frac{1}{2} - u, u, v; u, u + \frac{1}{2}, v; u + \frac{1}{2}, u, v$. The probable parameter values are u_N 0.13 \pm 0.01, v_N 0.20 \pm 0.02, v_O 0.32 \pm 0.02 and v_O 0.57 \pm 0.03. Laue and spectrum photographs were made from crystals of thiourea. The unit of structure contg. $4\text{CS}(\text{NH}_2)_2$ has a_0 5.50 A. U., b_0 7.68 A. U. and c_0 8.57 A. U. The space group is $2D_2 - 16 (\sqrt{2})$ with S and C at $(c) 0uv, \frac{1}{2}, \frac{1}{2} - u, v; 0, u + \frac{1}{2}, \frac{1}{2} - v; \frac{1}{2}, v + \frac{1}{2}$ and with N in the general positions. The mol. symmetry is that of the point group $2c$ (Cs) which has a plane of symmetry. C. J. WEST

An old experiment on collisions of the second kind. J. RUD NIKLSEN. Univ. of Oklahoma. *Science* 67, 651(1928).—Gooch and Hart (*Am. J. Sci.* 42, 448(1891)), observed that Na in a flame increases the intensity of the red K doublet. They dipped a helix of Pt wire into a KCl and NaCl soln., dried and then ignited it in the outer zone of a Bunsen flame. The K line, observed through a spectroscope and so fitted with a telescope that the Na doublet falls outside the field of view, increases in intensity with the Na concn. of the soln., reaching a max. when the ratio of Na to K is 100. An explanation of the phenomena is most likely to be found in the theory of at. collisions of the sec. kind (Klein and Rosseland, *C. A.* 15, 1654; Franck, *C. A.* 18, 1241). The Na atom, whose resonance potential is greater than that of the K atom, imparts some of its energy to the latter on colliding with it, thus increasing the intensity of the K doublet. J. BALOZIAN

Influence of electrolytic ions upon the moisture of steam (analog of Wilson cloud experiment). ARTHUR W. EWELL. Worcester Polytechnic Inst. *Phys. Rev.* 29, 912(1927).—The breaking of bubbles of vapor at the free surface of a liquid always throws some of the liquid into the vapor space. If the vapor is drawn away continuously, some of this liquid accompanies it. Increase in d. and viscosity increase the effect, but the presence of electrolytic ions decreases it. W. W. STIFLER

The vapor pressure of binary liquid mixtures. II. J. BROWN. *J. Soc. Chem. Ind.* 46, 482T(1928); cf. *C. A.* 19, 1800.—The following errata occur in the previous section of this series: equation (1) should read: $P'_m = P_a (1 - e^{-\Delta\gamma_a/RT}) + P_b (1 - e^{-\Delta\gamma_b/RT})$, whence $\Delta P_m = P_a c_a [1 - (1 - e^{-\Delta\gamma_a/RT})/c_a] + P_b c_b [1 - (1 - e^{-\Delta\gamma_b/RT})/c_b]$, where P'_m is the total vapor pressure of the mixt. at temp. T ; P_m is the divergence of P'_m from the simple mixt. law; c_a and c_b are the fractional concns. of components a and b of the mixt.; P_a and P_b are the vapor pressures of the pure substances a and b at temp. T ; λ_a and λ_b is the latent heats of vaporization of a and b in the mixt. The applicability of the formulas previously derived to a non-volatile solute is given. Equation (8) of the previous paper should read: $P'_m = P_a + (P_b - P_a) [(c_b - k)^n - k^n] / [(1 - k)^n - k^n]$. J. H. PERRY

Unimolecular films. B. C. J. G. KNIGHT AND P. STAMBERGER. Univ. College, London. *Nature* 122, 97(1928).—The suggestion of Sheppard and Keenan (*C. A.* 22, 3327) that the low values for the film thickness of cellulose esters on Hg are due to the formation of chains or sheets of polymerized mols. is supported by expts. with vulcanized triolein and a series of polymerized products obtained from it. With increasing degree of polymerization the thickness of the film on water is practically const. at 14 to 16 A. U. Triolein gives 13.0 A. U. From these and other measurements with the vulcanized fatty acids obtained on sapon., it is concluded that in the polymerized compds. the mols. are joined and definitely oriented in long chains, leaving the polar groups unaltered. F. A. JENKINS

Adhesion. II. (SIR) W. B. HARDY AND (MISS) M. E. NOTTAGE. *Proc. Roy. Soc. (London)* A118, 209-29(1928); cf. *C. A.* 20, 3605.—Measurements of the tensile strength of a solid joint between a steel or Cu cylinder and plate are described. The joint was formed by melting solid paraffins, fatty acids, or alcs. on the plate, allowing some of the liquid to be drawn under the cylinder by capillary attraction and then freezing it. A microscopical examn. of the disk of "lubricant" found on either the plate or cylinder on breaking the joint supports the view that it is composed of a central plate of flat crystals between 2 primary layers, one on each of the enclosing solids. The break appears to occur at one or both of the surfaces between the primary film and the plate of crystals. The effect of added impurity on the strength of the joint, and the position of the surface of break was investigated and the relation of the adhesion to the temp., pressure, chem.

compn. of the lubricant and compn. of the cylinder and plate is discussed. As in the case of static friction, the adhesion varies linearly with the mol. wt. of the lubricant for a given chem. series. The distance between the surfaces of the cylinder and plate, measured by means of a specially constructed spherometer, was found to be independent within the limits of error, of the nature of the lubricant and of the enclosing solids. A few measurements are recorded of the tangential pull required to break a joint. The fracture occurs at the same surface as with a normal force. B. C. A.

The relationship between crystal structure and the rate of adsorption of hydrogen on palladium, iron and nickel. G. TAMMANN AND J. SCHNEIDER. *Z. anorg. allgem. Chem.* 172, 43–64 (1928).—The rate of adsorption of H by Pd foil was measured at 100, 150 and 200°. Exposure to air of foil contg. dissolved H caused a marked diminution of adsorption rate. The rate was not affected by air exposure if the foil were H-free. The effect of air is undoubtedly connected with the presence of H₂O mols. in the crystal lattice. The rate of adsorption on O-free foil was dependent on the previous thermal treatment of the foil. Rapid adsorption occurred after heating to 400°, but the rate decreased if preliminary heating were carried to higher temps. The rate measurements were correlated with known changes in crystal structure of heated Pd foil. It is concluded that the max. rate of adsorption of both mol. and at. H occurs on the icositetrahedron planes of the crystals. The max. adsorption rate for electrolytic Fe foil accompanied preliminary heating to 300°. As with Pd, changes in crystal orientation accompanying preliminary heating above 300° decreased the adsorption rate. With Fe conversion to the γ modification exerted a still more marked decelerating effect. The rate of adsorption by Ni foil at 200° was greater than with Fe. No measurements were made with Ni that would permit correlation of crystal structure changes and adsorption rates. Adsorption of electrolytically evolved H on Ni and Fe cathodes at 20° was quite different from adsorption of gaseous H. Preliminary heating of the cathodes had the opposite effect on the rate of adsorption. The adsorption of electrolytic H represents a diffusion of H atoms into the metal, while with gaseous H the mols. must first be transformed to atoms before diffusion takes place. R. L. DODGE

Comparative adsorption by active charcoal. II. Isoelectric point of charcoal. O. SPENGLER AND E. LANDT. *Z. Ver. deut. Zucker-Ind.* 1928, 81–98; cf. *C. A.* 22, 178.—The charcoal is added to a series of buffer solns. at various p_H values, and the isoelec. point of the charcoal is taken to be the p_H value of the buffer soln. which is not changed by the addn. of the charcoal. The isoelec. points so obtained fell between p_H 5.7 and 8.7. B. C. A.

Adsorption of ammonia, carbon dioxide, benzene and acetone vapor by titanium oxide and stannous oxide gels. N. I. NIKITIN AND V. I. YUR'EV. *Z. anorg. allgem. Chem.* 171, 281–4 (1928); cf. *C. A.* 20, 3615.—The adsorption of C₂H₆ and (CH₃)₂CO by TiO₂ and SnO₂ gels was detd. by the dynamic method; that of NH₃ and CO₂ was detd. by the static method. At 1 atm., and 16° TiO₂ adsorbed 8.5% of its wt. of NH₃; SnO₂ about 1/4 as much. At 14.9° TiO₂ adsorbed 32% of its wt. of C₂H₆ while at 25° it adsorbed 30.4% of its wt. of (CH₃)₂CO. R. L. DODGE

Adsorption of gas on the faces of heteropolar crystals. J. H. DE BOER. N. V. Philips Gloeilampenfabrieken, Eindhoven. *Physica* 8, 145–56 (1928).—The residual field on the surface of heteropolar crystals can attract neutral atoms or mols. by dipole induction and thus hold them adsorbed. The theory is worked out for CaF₂ and I, CaF₂ being assumed to have on its surface a two-dimensional lattice of Ca⁺⁺ and F⁻ ions. For α the polarizability of the I atom, p the induced I dipole moment and r the distance between F and Ca, the energy liberated on adsorption of one I atom will be $\varphi = -(S\epsilon p/r^2) + (p^2/2\alpha)$; for $\delta\varphi/\delta p = 0$, the equilibrium position, $\varphi = -S^2\epsilon^2\alpha/2r^4$. The factor S , a numerical const., includes the action of + and - ions all over the surface. Its value drops rapidly for distances larger than r from the I atom. Assuming $\alpha = 5 \times 10^{-24}$ for I, estd. from the Fajans and Gross value (7.5×10^{-24}) for gaseous undeformed I⁻, $r = 1.93 \times 10^{-8}$ cm. for CaF₂, the Ca-I distance = 1.25 r (from ion radii of Ca and I) and the resulting $S = 0.36$, the energy $\varphi = 7600$ cal. heat of adsorption per g. atom is found, and $p = 2.3 \cdot 10^{-18}$ e. s. u. (equal to H₂O dipole moment). This adsorption can be continued in more than one I layer by dipole induction as long as the mols. are close enough together. For considerable distances between the (preformed) dipoles (e. g., for fatty acids) only unimol. layers can be formed. For I₂-CaF₂, the energy will be less than calcd. because of mutual repulsion of the I dipoles, the estd. value being 3450 cal.; including the reaction of the successive layers it will be about 3750 cal. The dipole moment decreases with every layer so that for the n th layer $P_n = k^{n-1}P_1$ (k includes r , α and S), also $\varphi_n = (k^2)^{n-1}\varphi_1$. The heat of evapn. of the adsorbed substance will increase by the adsorption thus: $\ln \pi = -(\varphi_1 + \varphi_n/RT) + B$ for π the

vapor pressure. For a satd. vapor pressure of π_0 , $\ln \pi/\pi_0 = -\varphi_n/RT = C k_1^{n-1}$. This represents an adsorption isotherm with 2 consts. c and k_1 for adsorption in multimol. layers. Expts. on this theory were made by evapg. I_2 in an evacuated tube on to a thin (invisible) CaF_2 film, which covered part of the wall. The I_2 in an extension of the tube was first cooled in liquid air; after heating to 0° the I_2 began to appear as a brown layer on the CaF_2 , at room temp. and it distd. all through the tube. By regulating the I_2 temp. π could be found and the amt. m of the I pptd. detd. analytically. Several isotherms were so detd., and curves are shown for a glass surface of 75 sq. cm. covered with 7.5 mm. CaF_2 . Even if the CaF_2 surface is unknown, still $\ln(\pi/\pi_0) = c/k_1^m$ will hold, i. e., $m = f\{\log[-\log(\pi/\pi_0)]\}$ is a straight line. This was completely confirmed; the equation $-am + b$ for this line had a const. $b (= \log_{10} \varphi_1/4.57T)$ which yielded a φ_1 of 3500 cal. per g. atom, agreeing well with the theory. Decreasing the amt. of CaF_2 finally leads to a convergence of a (0.2 mg. CaF_2 per 75 sq. cm. glass), probably due to the formation of a compact CaF_2 film (no pores) of const. surface (80×10^{-8} cm. thick); the I layer was calcd. from data of this type to be 30 mols. thick. It is typical for the isotherms that they run up rapidly for π/π_0 close to one. Previously this has been attributed to condensation in capillaries (Hückel). Results for thin (compact) CaF_2 surfaces with few capillaries are contrary to this view. Conclusion: A less pronounced rise of m with π/π_0 is due to filling up of capillaries, which decreases the effective surface. For thick CaF_2 layers deviations in b are more pronounced in a less ideal condition. Adsorption on powders is for the same reason less typical. The adsorbed I layer is brown because of a shift in spectrum toward short λ caused by the polarization. The spectrum begins at 6000 A. U., with a max. at 2950.

B. J. C. VAN DER HOEVEN

Structure in colloidal solutions. H. ZOCHER. *Collegium* 1928, 203-8.—A lecture giving a general discussion of the optical character of certain colloidal sols. I. D. C.

Studies on cerium hydroxide sols and gels. B. N. DESAI. *Kolloidchem. Beihefte* 26, 422-39 (1928).—Ce hydroxide sols were prepd. by dialyzing an NH_4 soln. of $Ce(NO_3)_3$. The sols set to gels when cooled or when electrolytes were added. The vapor pressure-concn. relation is given. The viscosity of the sol. increases as a linear function of the time of dialysis within the limits of the expts. Viscosity-concn. curves are irregular in shape. Heating the sol above 40° decreases the viscosity of the sol permanently. The sol-gel transformation is thought to be caused by an increase in the hydration of the micelle following increased elec. charge.

J. G. McNALLY

The influence of concentration of a sol on its stability. SUBODH GOBINDA CHAUDHURY. Univ. College of Science, Calcutta. *J. Phys. Chem.* 32, 1231-5 (1928).—Previous explanations of the effect of diln. of a sol on its stability have failed to take into consideration the fact that there is a decrease in charge on the particle as well as a decrease in surface and increase in the distance between the particles. The first 2 of these changes tend to make the sol unstable toward coagulation by electrolytes, provided it is assumed that the potential at which a sol coagulates does not change on diln. of the sol and that the relative adsorption of all ions on the surface remains the same. The greater distance between the particles of the dild. sol tends to make it more stable. That, in a no. of cases, the sol becomes unstable on diln., is presumably due to the preponderance of the first 2 effects over the third. When the ratio of the amt. of adsorption of similarly charged ions to that of the pptg. ions increases, another factor enters which tends toward greater stability. This increase in adsorption is probably due to the greater adsorbability of similarly charged ions.

H. F. JOHNSTONE

The coagulation of thorium hydrosols by electrolytes. B. N. DESAI. *Kolloidchem. Beihefte* 26, 357-421 (1928).—The velocity of the coagulation was detd. by an optical method and found to follow Smoluchowski's law for rapid coagulation. When dialyzed well enough to remove peptizing agents, the sols followed the Schulze-Hardy rule. This rule failed with the chlorides of the alkali and alk. earth metals where the salts formed the series $Li < Na < NH_4 < K$ and $Mg < Ca < Sr < Ba$ in their ability to stabilize the sol. It is suggested that stabilizing ability is a function of the valence and migration velocity of the ion. Ionic antagonism was found with $KCl + HCl$, $KNO_3 + HCl$, $K_2SO_4 + HCl$ and $LiCl + BaCl_2$.

J. G. McNALLY

Motion of sub-microscopic silver particles in gases. O. TRAUNER. *Z. Physik* 46, 237-52 (1927).—The rate of fall of Ag particles, 1.16×10^{-8} – 4.13×10^{-8} cm. in diam., in N has been examd. by Ehrenhaft's method. The results show that the velocity of fall is normal and that particles produced from Ag vapor or from a low-tension Ag arc are spherical and of normal d. The elec. charge carried by such particles is generally less than the electron charge; the min. value observed is 1.13×10^{-10} e. s. u.

B. C. A.

Influence of hydrogen and hydroxyl ions on colloidal systems. M. P. VENKATARAMER. *J. Mysore Univ.* **1**, 183-6(1927).—The distinctive properties of H and OH ions with respect to the stability of colloids are due to the fact that many substances adsorb water and that the outermost hydration layers are slightly dissoed. The changes in stability are due to the neutralization of either H or OH ions, preferentially adsorbed on the surface. The fact that acid does not reverse the charge on silica indicates that soil acidity cannot be ascribed to the silica acting as an acid in stoichiometric proportions, but is rather due to the preferential adsorption of H ions by the hydrated substances. The colloid behavior of stearic acid illustrates the importance of hydration.

B. C. A.

Theory of the spontaneous division of drops of microscopic size. N. VON RASCHESKY. *Z. Physik* **46**, 568-93(1927).—The method of Gibbs has been employed in the investigation of the stability of drops of microscopic size. It is shown that, if the velocity of change of the size and constitution of the drops is small due to chem. transformations, and if effects due to elec. charges are neglected, the drops are absolutely stable for a pos. surface tension in the absence of capillary-active adsorbents. Under the same condition but with neg. surface tension, the drops are always labile and tend to disperse. In the presence of dissolved capillary-active adsorbents and with a pos. surface tension the drops are stable. A no. of other related problems are discussed.

B. C. A.

The Brownian displacements and thermal diffusion of grains suspended in a non-uniform fluid. S. CHAPMAN. *Proc. Roy. Soc. (London)* **A119**, 34-54(1928).—The Einstein derivation of the distribution function for the displacement of grains at any time after $t = 0$ in a uniform stationary liquid has been generalized for non-uniform fluids. Non-uniformity may be due to temp., concn., or any other factor affecting the coeff. of diffusion. An undetd. const. is included which is assumed to be zero for Brownian grains large compared to the mean free path of the mols. of the fluid. It is possible to produce a uniform distribution of grains by having a vertical temp. gradient opposing the gravitational effect since grains tend to go from warm to cold regions. This effect is more pronounced with liquids than with gases as the medium. Cases are cited where the densities of grains and medium are the same or different. R. H. L.

The molecular displacements in diffusing gas-mixtures. S. CHAPMAN. *Proc. Roy. Soc. (London)* **A119**, 55-60(1928).—The more sp case of mol. displacement in a gaseous medium (cf. preceding abstr.) is studied. It is of interest from the standpoint of the kinetic theory of gases. The treatment is considered both for uniform temp. and a temp. gradient. The effect for mols. as rigid spheres and of different sizes is also shown.

RAYMOND H. LAMBERT

Relative rate of diffusion of the electrolytes in the charged gels. (MLLE.) F. CHOUCKOUN. *Compt. rend.* **187**, 296-7(1928); cf. *C. A.* **22**, 3084.—C., continuing work which showed that the rate of diffusion through a membrane was modified only if its charge is the same as the less mobile ions, establishes quant. the diffusion coeff. of ferrocyanide through neutral and alk. gelatin gels. The diffusion of the ferrocyanide is detd. by its adsorption of a beam of light of uniform intensity passed through the gel. The ratio between the 2 diffusion coeffs. at 28° is 1/2.5. The rate is the same in neutral and alk. soln. The diffusion coeff. is 0.47×10^{-8} c. g. s. units at 28°. D. H. POWERS

Determination of vapor pressure of saturated aqueous solutions. F. POHLE. *Mitt. Kali-Forschungs-Anst.* **1927**, 33-43.—Detns. were made of the satn. pressure of satd. solns. of Mg, Na and K chlorides and sulfates, and of various mixts. of the salts. The b. ps. were also detd.

B. C. A.

The state of ionization of solutions of hydrogen sulfide. MAURICE AUMERAS. *Compt. rend.* **186**, 1724-6(1928).—An expression is given for the law of soly. of CdS in HCl at a temp. of 16°. The soly. product const. of CdS is 3.6×10^{-29} and the values 0.59×10^{-16} and 0.37×10^{-16} are given for the second dissoen. consts. of H₂S. Values of the first const. of dissoen. of H₂S, given by Walker and Conrad, are 5.7×10^{-8} and 9.1×10^{-8} .

H. R. MOORE

The effect of salts on weak electrolytes. I. Dissociation of weak electrolytes in the presence of salts. HENRY S. SIMMS. Rockefeller Inst. Medical Research. *J. Phys. Chem.* **32**, 1121-41(1928); cf. *C. A.* **20**, 2774.—The term index is introduced to signify the negative logarithm of a quantity. Thus $-\log X = P_X = \text{index of } X$. Titration data of 0.01 M solns. of acetic, oxalic, malonic, succinic, azelaic, citric and aspartic acids, succinimide, aminoethanol and glycine were obtained, in the absence of salt, in the presence of 2 concns. of NaCl and in the presence of 2 concns. of MgCl₂. (K₂SO₄ and MgSO₄ were also used with malonic acid.) From each observation a dissoen. index value (P_k') was calcd. and plotted against the sq. root of the ionic strength ($\sqrt{\mu}$).

The slopes of these curves show the extent of the agreement of the activity of the ions with the activities predicted by the Debye-Hückel equation. Singly charged anions from univalent or bivalent acids obey the Debye-Hückel equation in the presence of either NaCl or MgCl₂, or the salt of the weak acid, but not with K₂SO₄ or MgSO₄. Multivalent anions in the presence of NaCl obey a modified form of this equation which includes a correction for the distance between the charges. Multivalent anions behave anomalously with MgCl₂. This effect is much greater for oxalic, malonic and citric acids than for succinic, azelaic and sebacic acids. Sulfate ions produce an effect on both mono- and dianions which is opposite to the effect of Mg ions. Cations from amines or amino acids do not obey the Debye-Hückel equation but show a deviation with both NaCl and MgCl₂ which varies with the substance. P_{K_1}' of glycine and P_{K_1}' of aspartic acid are anomalous in the presence of MgCl₂ but normal with NaCl. Isoelectric points drop with increase in ionic strength. E. R. SMITH

The transport number of the cation in aqueous solutions of nickel salicylate. FREDERICK E. JONES AND C. R. BURY. Univ. College of Wales. *J. Phys. Chem.* **32**, 1272-5(1928).—Transference nos. in Ni salicylate solns. at 25° were detd. throughout the range 0.02 to 0.2 (the limit of soly.) mols. per 1000 g. of H₂O. The cation transference no. varied from 0.573 at 0.2046 molal to 0.612 at 0.0192 molal. The results show that Ni salicylate ionizes mainly in a normal manner but also suggest the presence of small quantities of a complex acid form. E. R. SMITH

Kinetics of the combination of hydrogen and oxygen. C. N. HINSHELWOOD AND H. W. THOMPSON. *Proc. Roy. Soc. (London)* **A118**, 170-83(1928).—The whole course of the gaseous reaction between H and O has been examd. by a static method at const. temp. and vol. over a range of temp. from the region where the reaction is undoubtedly a heterogeneous surface reaction to near the point at which the combination ceases to be isothermal and passes into explosion. The app. was essentially the same as that previously described (cf. *C. A.* **18**, 1444). At temps. below or not much above 500°, the reaction is approx. of the first order, in agreement with the results of Bone and Wheeler (*Phil. Trans.* **206A**, 1(1906)). It is greatly accelerated by the presence of powd. silica in the bulb, and somewhat retarded by the presence of steam. From about 520° to 530° a reaction comes into prominence which is quite different from the low-temp. reaction. A definite order cannot be assigned to the reaction, for the apparent order tends to increase with pressure and with rise of temp. but on the av., the influence of pressure between 540° and 560° is roughly characteristic of a fourth-order reaction. It is strongly autocatalyzed by steam and has a high temp. coeff. At high temps. the normal pos. catalytic effect of the walls of the reaction chamber is replaced by a neg. effect, which may be due to the catalytic destruction of an autocatalyst for the principal reaction (cf. Egerton and Gates, *C. A.* **21**, 2555), or to the interruption of "reaction-chains" (cf. Christiansen, *C. A.* **18**, 1419), or to a combination of both causes. It is suggested that the high-order reaction is the true gas reaction between H and O. B. C. A.

Decoloration velocity of potassium permanganate by oxalic acid, and its influence by substances present in the solution. M. BOBELSKY AND D. KAPLAN. Hebräische Univ. Jerusalem. *Z. anorg. allgem. Chem.* **172**, 196-212(1928).—The appearance of the induction and its behavior are discussed. The induction has been connected with the elec. state of the soln. The decompn. of the MnO₄ ion has been examd. The influence of various compds. in the solns. has been investigated. In dil. soln. neutral ions have very little effect. In concd. soln. they play an important role. Zn, Cd, Al and Cl ions accelerate the reaction very markedly. Fe⁺⁺, Fe⁺⁺⁺, Ag, Mn⁺⁺, Hg⁺⁺, Pb⁺⁺, Br and I ions, As₂O₃ and SO₂ have a decided effect: their relative importances are tabulated. It is possible quantitatively to titrate the above ions by measuring the influence undergone in the decoloration of the MnO₄ ions. A. I. HENNE

The inversion point of second order. WITOLD JAZYNA. Tech. Inst. Leningrad. *Z. Physik* **49**, 270-8(1928).—The inversion point of second order is given by $X = (\partial\mu/\partial p)_T, J$, where μ (the first order inversion point) is defined by $(\partial t/\partial p)_J$. J is energy content. A change of μ with pressure at const. temp. has been established for air, O₂ and CO₂. The existence of max. and min. values of μ for air and H₂ proves the existence of a second order inversion point where $(\partial\mu/\partial p)_T = 0$. Variations of expansion coeffs. $(\partial\alpha/\partial p)_T$ in the neighborhood of the second-order inversion are also expld. criteria. H. R. MOORE

Reactivity of iodine in organic solvents. I. FRITZ FRIGL AND ERWIN CHARGAV. Univ. Vienna. *Monatsh.* **49**, 417-28(1928).—The brown soln. of I in Et₂O, EtOH, dioxan, cyclohexanol and cyclohexane reacts with Ag saccharin with quant. formation of AgI; the violet soln. of I in CHCl₃ and C₆H₆ also reacts quant., while that in CS₂,

CCl_4 and petr. ether forms very little AgI . Br in CS_2 and Et_2O behaves like I. Hg succinimide and I in CS_2 and Et_2O behave like Ag saccharin. C. J. WEST

The reduction of silver sulfide by means of carbon. N. PARRAVANO AND G. MALQUORI. Univ. Roma. *Atti accad. Lincei* [6], 7, 367-9 (1928).—The method was that already used for MoS_3 (cf. C. A. 22, 2091). A current of N was passed over a mixt. of Ag_2S and graphite at 1015° and at 1050° in an elec. furnace, vapors of S and CS_2 were condensed, and the quantity of each was detd. The values of S_2/CS_2 were 0.113 at 1015° and 0.188 at 1050° , from which it was calcd. that p_{CS_2} was 35.6 mm. of Hg at 1015° and 39.6 mm. of Hg at 1050° . These values agree well with those calcd. from the equation: $p_{\text{S}_2}/p_{\text{CS}_2} = \text{const.}$ C. C. DAVIS

The dissociation of chromium azide. G. VALENSI. *Compt. rend.* 187, 293-6 (1928).— CrN is prepd. by heating pyrophoric Cr in N_2 at 800° . The dissocn. is detd. by measuring the N_2 after allowing about 10 hrs. for equil., tracing the curves for increasing and decreasing temps. The analogy to the Pd- H_2 network is striking. Each isotherm has a plateau of decreasing amplitude with increasing temp. Solns. of CrN in Cr may be formed. D. H. POWERS

The system calcium oxide, silica and water. JOHN R. BAYLIS. *J. Phys. Chem.* 32, 1236-62 (1928).—When lime is added to a suspension of silica gel in water there appears to be formed a compd. of CaO and SiO_2 corresponding to the hydrated $\text{CaO} \cdot \text{SiO}_2$. The addn. of more CaO to the suspension results in the adsorption of $\text{Ca}(\text{OH})_2$ to an extent equal to 30-45% of the lime chemically united with the silica. These conclusions are drawn from expts. in which the p_{H} value of the soln. and the total alky. toward H_2SO_4 were detd. after each addn. of lime to the suspended gel. The points of min. p_{H} and alky. correspond approx. to monocalcium silicate. Further addn. of CaO causes these values to increase rapidly up to those at the satn. point of $\text{Ca}(\text{OH})_2$. No evidence of compds. with a higher Ca content is shown. That the equil. between the soln. of $\text{Ca}(\text{OH})_2$ and the adsorbed $\text{Ca}(\text{OH})_2$ is reversible is shown by the fact that it is approx. the same whether it is estd. by the addn. or the extn. of $\text{Ca}(\text{OH})_2$. The same type of reversible adsorption is shown when lime is added to a suspension of the diatomaceous earth "Celite." It is possible that this condition of surface equil. materially retards the rate of hydrolysis of some of the compds. in concrete submerged in water. According to B. the assumption of Bogue (C. A. 22, 1452) that dissocn. of the Ca silicates causes the variable p_{H} or alkali concn. as the Ca is leached out is not correct. H. F. J.

Contribution to the knowledge of the precipitation of salt from sea water. The polytherms of the equilibrium solubilities in the potassium chloride region and of the points Y and Z. GEORG LEIMBACH. *Mitt. Kalb-Forschungsanstalt* 1925, 11-48; *Chem. Zentr.* 1927, I, 414; cf. C. A. 20, 1970.—L. extends to 103° the values detd. by Feit-Przileylasch (*Kali* 3, 393 (1909)) for the soly. of KCl and NaCl in MgCl_2 solns. of various concns. at 15.40° and 90° , and he interpolates the figures at 83° . F.-P. considers only the influence of MgCl_2 on the soly. of KCl and NaCl at various temps. L. detcs. the line P-R, where MgSO_4 also begins to crystallize as Langbeinite. The line P-R is detd. exptly. at 83° , 95° and 105° . The point Y_{83} shows an appreciable deviation from the data obtained by synthesis (Serowysch). Approx. values of Y_{93} and Y_{105} are also detd. L. confirms the value of Z. (theoretical limit to which the mother liquor should be evapd. to recover MgCl_2) at 25.55° and 83° and detcs. it at 95° and 105° . A. L. HENNE

The heterogeneous equilibrium between metallic chlorides and hydrogen sulfide, or metallic sulfides and hydrogen chloride at higher temperatures. KARL JELLINEK AND GEORG VON PODJASKI. *Techn. Hochschule, Danzig. Z. anorg. allgem. Chem.* 171, 261-70 (1928).—The equilibria for the reactions between H_2S and CdCl_2 , MnCl_2 and AgCl , resp., were detd. at several temps. In the formation of CdS , 76.5% of the total amt. of HCl is obtained at 352° . Only 13.1% of the HCl is obtained at 232° . The extent of conversion is less for the other sulfides studied. Equil. data are shown graphically. The heat of reaction (endothermic) for each metallic chloride with H_2S is calcd., viz., CdCl_2 —18,230 cal.; MnCl_2 —20,030 cal.; 2AgCl —16,790 cal. A. J. C.

The heterogeneous equilibrium for the reaction, $\text{CdBr}_2 + \text{H}_2\text{S} \rightleftharpoons \text{CdS} + 2\text{HBr}$, at higher temperatures. KARL JELLINEK AND LEON ZUCKER. *Techn. Hochschule, Danzig. Z. anorg. allgem. Chem.* 171, 271-4 (1928).—The technic was the same as that in a previous study (preceding abstract). The reaction is endothermic (—28,030 cal.), 89.2% of the total amt. of HBr was obtained at 502° , 40% at 446° , 16.4% at 387° and 4.4% at 299° (extrapolated to 0 rate of flow of gases). A. J. CURRIER

Equilibrium of molten sulfides and silicates. WILHELM JANDER AND KURT ROTHSCHILD. Würzburg Univ. *Z. anorg. allgem. Chem.* 172, 129-46 (1928).—The systems: $\text{Na}_2\text{SiO}_3 + \text{PbS}$; $\text{PbSiO}_3 + \text{FeS}$; $\text{Cu}_2\text{SiO}_3 + \text{FeS}$; $\text{NiSiO}_3 + \text{FeS}$; PbSiO_3 ,

+ Cu_2S ; Cu_2SiO_3 + NiS and NiSiO_3 + PbS have been experimentally investigated in the molten state. The simple mass-action law is not available for these systems. An approximation $K = C + aC^2$, derived from the Lorenz modification of the mass-action law, has been used and gave satisfactorily checking consts. In nearly every case, the reaction const. of a system could be computed from the reaction consts. of 2 other systems. At high temp., the affinity of the various metals for O and S undergoes important modifications.

A. L. HENNE

Catalytic hydrogenation. E. J. LUSH. *Notiz. chim.-ind.* 3, 361, 363, 365, 367, 369(1928); cf. *C. A.* 21, 2390, 3475.—A review and description, with illustrations and diagrams of the continuous hydrogenation of oil, catalysts and their oxidation, the recovery of inactive catalyst, the use of catalytic "cages," hydrogenation app. and equipment and hydrogenated oils. Eight references are included. C. C. DAVIS

Catalysis. H. E. DALE. *Pharm. J.* 120, 92(1928).—A concise review of catalysis illustrating by selected examples its theoretical and practical importance. S. W.

A new interference method of measuring the surface area of film catalysts. I. The theory. F. HURN CONSTABLE. *Proc. Roy. Soc. (London)* A119, 196-201(1928).—By adsorption methods only a fraction of the true surface of catalysts can be measured. Direct spectrophotometric measurements of the intensity and wave length of the light reflected from oxidized surfaces of Fe, Ni and Cu leave no doubt that interference is the main cause of production of the color sequences. The color of the oxide film det. its thickness when the order of the color and the n of the film is known. A general method is developed mathematically by means of which the surface area of films can be evaluated. II. **Nickel—method of preparation of the film, an apparatus for activation, and study of the surface area.** *Ibid* 202-13.—China-clay rods were first coated with a continuous film of graphite-oleic acid paste and the oleic acid was removed by elec. heating. The graphite-coated rods were covered with a measured amt of Ni film by electrolysis from Ni solns. at a known rate. An app. was devised to move the rod in such a way as to insure a uniform deposit. The change of elec. resistance and of refractivity of the film when subjected to oxidation and reduction was measured. The app. was of special design. The surface area was calcd. from the refraction measurements. The max. area of the film per unit mass of Ni was measured for various temps. of activation by alternate oxidation and reduction. The max. increase in surface area on activation was found to be about 5 times. Reduction at 563° decreased this to 1.3 times.

R. L. DODGE

Catalysts used in the synthesis of higher hydrocarbons from water gas. A. ERDELY AND A. W. NASH. *J. Soc. Chem. Ind.* 47, No. 32, 219-23T(1928).—A continuation of Elvin's expts. (*C. A.* 22, 3130). From the expts. with different, unpromoted catalysts at 285° , and with a gas mixt. contg. equal parts of CO and H_2 , a Co-Cu-ZnO catalyst appears to be most suitable. After the initial period its activity was very const., causing a contraction of about 50% for several days continuous operation. A Co-Cu- Al_2O_3 catalyst gave nearly as satisfactory performance, although less oil and more H_2O was formed in its presence. The oil yield was highest with an unpromoted Co-Cu catalyst, although the activity of this catalyst decreased most rapidly. A Co-Cu- CeO_2 catalyst gave the lowest yield of H_2O and a fair yield of oil, but although the initial activity of this catalyst was the greatest, its activity decreased about as rapidly as that of the Co-Cu. Catalysts supported on silica gel were as active as the Co-Cu-Mn catalyst only in one instance. In this connection, the importance of the relative proportions of catalyst to support was shown. The optimum temp. for the formation of liquid hydrocarbons was found to be $280-290^\circ$ for the Co-Cu- Al_2O_3 catalyst. Above 290° CO_2 and CH_4 are the chief products, and below 230° no reaction was observed. An excess of H_2 in the initial gas mixt. increased the H_2O formation, while an excess of CO rapidly decreased the activity of the catalyst. The gas velocity exerts a marked influence on the yield of products. The optimum space velocity for the Co-Cu-ZnO catalyst was about 120 vols. of gas per hr. per unit vol. of catalyst.

J. H. PERRY

The thermal decomposition of ammonia on tungsten, molybdenum and nickel. I. C. H. KUNSMAN. *J. Am. Chem. Soc.* 50, 2100-13(1928).—The rate of decompn. of NH_3 on W, Mo and Ni filaments was measured at 900° to 1300° by observing the rate of pressure increase in a closed glass system contg. the electrically heated filaments. The order of the reaction was detd. by the usual method and found to be an apparent zero order. Diln. of the NH_3 and N had relatively little effect on the decompn. rate. H diln., however, showed a large retarding effect, greatest at the lowest temps. Preliminary heating of the filaments to 1600° caused a marked decrease in activity. Thoriated W wire showed no greater activity than W. The value of the E in Arrhenius

equation as calcd. from the data decreased with increase in temp. being about 45,000 cal. at about 900°. The change in E with increase in temp. is no doubt due to a change of the surface of the wire.

R. L. DODGE

Catalytic chlorination of acetic acid to chloroacetic acid. H. BRÜCKNER. *Z. angew. Chem.* **41**, 226-9(1928); cf. *C. A.* **21**, 3345.—The velocity of chlorination of acetic acid in presence of I, P or S increases with the amt. of catalyst used, but not in direct proportion. Of the 3 catalysts I gives the best results, but more effective chlorination is obtained with mixts. of 3 catalysts, chlorination in presence of a mixt. of I, P and PCl_5 being more rapid than in presence of S, PCl_5 and P. Binary mixts. of catalysts are less effective than the ternary mixts. Ac_2O is chlorinated in the absence of a catalyst, and in the chlorination of AcOH the presence of chloroacetyl chloride and the mixed anhydride of acetic and chloroacetic acid has been established. The suggested mechanism of the chlorination is represented by a series of equations. S and P appear to act by accelerating the formation of acetyl chloride, and I by the dispersion of the Cl through the reaction mixt. in consequence of the formation of I chloride and I trichloride.

B. C. A.

Mechanism of 2,4-dinitrophenol formation from benzene and nitric acid in presence of mercury salts as catalysts. A. I. ZAKHAROV. *J. Chem. Ind. (Moscow)* **4**, 960-4 (1927); **5**, 26-7(1928).—To find the course of the reaction it is necessary to det. its speed at arbitrary time intervals and thus find the order to which the reaction belongs. A soln. of 10 g. C_6H_6 , 50 cc. HNO_3 sp. gr. 1.36 and 1 g. of the Hg catalyst was kept at 15° for 432 hrs., being agitated every 1-2 hrs. The concn. of HNO_3 in this soln. was detd. at definite time intervals and $K^2 = (1/t) \cdot x/(a-x)a$ and $K^3 = (1/t) \times (2a-x)/(a-x)^2$ have been calcd. The figures obtained for K (const. of speed) gradually decreased, which indicated the decrease of speed with the time. To det. the order (class) of the reaction van't Hoff's method has also been applied and gave the same neg. result; complicated combinations between the components are thus indicated. However, while it has been established that in this freshly prepd. soln. in which $\text{Hg}(\text{NO}_3)_2$ served as catalyzer, the course of the reaction is complicated, in solns. in which the catalyzer has already oxidized C_6H_6 , the course of the reaction is simplified considerably, in the latter case the speed, after some initial fluctuations, becomes const. and, from the figures obtained, indicates a reaction of the second order. The complications which take place at the outset of these reactions, particularly when using freshly prepd. solns., can be explained by the peculiarity of the catalyzer: in order to become active the catalyzer requires a certain amt. of acid, which thereby ceases to take part in the main reaction and causes complications. Expts. were instituted to det. whether each of the 2 intermediates PhOHgNO_3 and $\text{O}_2\text{NC}_6\text{H}_4\text{OH}$ is actually formed in the reaction. It was expected that by operating with very dil. HNO_3 and at low temp. the passage from one intermediate into another would become slow, which would permit detecting the presence of either of them by means of appropriate sensitive reagents. All attempts in this direction failed. If the Hg salt is the transmitter of O, then an increase in the strength of the acid would be increasing only the process of formation of mono- and polyphenols, which is in contradiction with exptl. data. Expts. show that the nature of the final products of reaction depend on the concn. of the acid. If the acid is dil. its activity is directed towards oxidation and the final product consists of nitrophenols; if, on the contrary, the concn. is comparatively great, its oxidizing power is decreased and the course of the reaction is the resultant of 2 factors, namely the nitrating influence of HNO_3 and the nitrating influence of the catalyzer, and the final product of the reaction is nitrobenzene. The role of the catalyzer consists in nitrating the original C_6H_6 . It is known that the oxidation of C_6H_6 is the greater the more nitro groups it contains; but the process of oxidation depends on the strength of HNO_3 used. As a whole, the process of formation of nitrophenols takes place through the formation of unstable Hg nitrobenzene compds as intermediates, and this explains the fact that a certain amt. of nitrobenzene always accompanies nitrophenols in this reaction. It is thus evident that used solns. must be in a more active state than freshly prepd. solns., since in the former the catalyzer is contained in another form which is the real catalyzer of the reaction, whereas in freshly prepd. solns. the active form is at first absent and some time is required for its formation. Expts. show that freshly prepd. solns. of 59-60% acidity and 30% catalyzer content give at 35-40° an av. dinitrophenol yield not above 40%; when these solns. are used for the second time under the same conditions the yield of dinitrophenol is increased to 50-55% and, after using them 3, 4, etc., times, the yields reach 65, 75 and 80%.

BERNARD NELSON

Determination of heat of combustion with Féry's calorimeter. F. KARAS. *Chem. Obzor* **1**, 121-5(1926).—The max. deviation of results obtained with Féry's and the

Berthelot-Mahler-Kroeker calorimeters is 1.21%; Féry's method occupies half the time of the latter method. Errors may arise from the radiation from incandescence lamps; day- and night-values may differ by 2%. B. C. A.

Heat conductivity of metals as factor in heat transfer. ROBERT WORTHINGTON. International Nickel Co., New York. *Chem. Met. Eng.* 35, 481-2(1928).—Argument that the controlling factor in heat transfer is the existence of various types of surface films and not thermal cond. of metals. G. B. TAYLOR

Heat transmission of liquids flowing through tubes. L. SCHILLER AND TH. BUBACH. *Z. Ver. deut. Ing.* 72, 1195-6(1928).—See C. A. 22, 3076. H. G.

Difference $c_p - c_v$. A. BACHINSKII. *Z. Physik* 45, 892-4(1927).—The sp. heats of a gas for which the equation of state $p v = RT$ is assumed valid are related to the gas const. by the equation $c_p - c_v + p(dc_p/dp)_v - v(dc_v/dv)_p = AR$, where A is a const. When c_p and c_v are functions of temp. only, the equation of state becomes $T = \alpha p v + \beta p + \gamma v + \delta$, where α, β, γ and δ are arbitrary const., and $c_p - c_v = AT/(\alpha T + \beta \gamma - \alpha \delta)$. By choosing values so that $\alpha \delta = \beta \gamma$, the following relationships are derived: $c_p = c_v = A/\alpha$ and $T/\alpha = [p + (\gamma/\alpha)]v + (\beta/\alpha)$. The latter expression is identical in form with the equation of state observed by Tammann for a series of liquids at 0-50° and at pressures from 10^3 to 3×10^3 atm., $CT = (p + K)(a - b)$; by identifying α with $1/C$, $c_p + c_v$ should have a const. value of AC . It is shown from Tammann's data that this is roughly true. By extending this analysis a soln. has been obtained for the equation of state for which $c_p - c_v$ has a const. value AR . B. C. A.

Rotational and vibrational specific heat of a diatomic gas, the molecules of which have a doublet P normal state. ENOS E. WITMER. Harvard Univ. *Phys. Rev.* 29, 918(1927).—A description is given of the differences between the sp. heat-temp. curve of a diatomic gas in which the mols. have a single electronic state as the normal level and the curve when the mols. have a double level. W. W. STIFLER

Simplified formulas for specific heats of gases and solids, especially of explosion products. NORUJI YAMAGA. *Proc. Imperial Acad. (Japan)* 4, 102-5(1928).—Following Eucken, Y. has deduced formulas for the sp. hts. between 3000° and 4000° for each of the commonly occurring gases and for a diatomic gas. CHARLES F. MUNROE

Classical thermodynamics and the new problems of chemical dynamics. HORACE DAMIANOVICH. Univ. Buenos Aires. *Anales soc. cient. Argentina* 105, 225-71(1928); cf. *Ibid* 84, 105(1917); *Revista del Centro Estudiantes de Ingeniería* No. 180 (1917); *Revista de Filosofía* III, 227(1917).—Classical thermodynamics deals only with systems in equil. and fails to yield any theoretical deductions concerning the mechanism by which a new equil. is reached. D. reviews the views of Duhem, Hatanson, Helmholtz, van't Hoff, Nernst Berthelot, Ostwald and Marcelin on this subject. In D.'s previous work he has developed an equation for the velocity of reactions by introducing the concept of acceleration. Combining this with Marcelin's equation, D. derives an equation in which the velocity is connected with the affinities. Using the equation he classifies physicochem. transformations in the following way: First category (A) coeff. K depends on temp.; (a) unimol. chem. reactions, irreversible, reversible and simultaneous; (b) soln., simple diffusion, evapn., sublimation and dehydration of crystals; (B) coeff. K does not vary with temp.; (a) radioactive transformations considered as unimol.; (b) unimol. photochem. transformations. Second category: the variables of evolution depend on the concn. at every instant; (A) transformations in which no catalyst is used: (B) catalytic transformations; simple catalysts, autocatalysis, complex catalysis (diastases, etc.) No concrete examples are given. A. F.

The van der Waals-Clausius equation leading to the necessary integrating factors of thermodynamics as a function of two variables. A. PRESS. *Z. Physik* 49, 306-10(1928).—The general integrating factor $\mu = T^{-1}$ of thermodynamics usually suffices for all conditions of integrated equations of the van der Waals type, but a rigorous derivation of an equation of state requires that μ be taken as a function of 2 variables, i. e., $\mu = f(v, t)$. The equation of state is simplified when $\partial U/\partial T$ is independent of temp. H. R. MOORE

Chemical constants in the new quantum statistics. G. E. GIBSON AND W. HETTLER. Univ. Göttingen. *Z. Physik* 49, 465-72(1928).—The application of the new quantum statistics to the dissocn. of a diatomic mol. composed of like atoms gives the equil. equation, $\ln K = D/kT + 3/2 \ln (\pi m k T/h^2) - \ln (8 \pi^3 J/h^2) + \ln (1 - e^{-h\nu/kT}) + \ln 2 + 2 \ln g_s$, where ν = vibrational frequency of mol. in the normal state; D = heat of dissocn. of the mol., J = moment of inertia, and g_s the statistical weight of the normal state of the atom. Substitution of the spectral values for D, J, ν and g_s gives values for the equil. const. in close agreement with Starck and Bodenstein's exptl. values. W. West

The quantum theory of molecule formation. HANS LESSHEIM. *Naturwissenschaften* 16, 576(1928); cf. *C. A.* 22, 1531.—London's solution (*C. A.* 22, 1531) of the symmetry character of the center of gravity function is only 1 out of 3 possible solutions of the problem of mol. formation. By using another one, which neglects the interaction of orbit impulse and electron moment, a better picture of the chem. conduct of elements can be obtained. In particular the character of the noble gases and the difference between pos. and neg. elements follows more clearly. B. J. C. v. d. H.

Electrification produced by friction between gases and solid surfaces. I. M. A. SCHIRMANN. *Z. Physik* 46, 209-36(1927).—Two types of electrification by friction have been identified during the operation of Hg vapor diffusion pumps: the first, which takes place at low rates of vapor flow, is due to friction between Hg droplets and glass surfaces; the second takes place at flow rates of the order of 10^4 cm./sec. and is due to friction between the vapor and glass surfaces. Confirmatory expts. have been carried out by releasing compressed N from a highly insulated metal bomb in which the bomb attains a potential of several hundred volts. B. C. A.

Electrification in gases due to friction with solid surfaces. E. PERUCCA. *Z. Physik* 46, 747-52(1928).—Expts. are described in which electrification results from the friction between a stream of Hg vapor and an Fe electrode; the conditions were chosen so that the vapor was free from droplets. It is therefore concluded that droplets play no part in the observed phenomenon. B. C. A.

Effect of temperature on polarization capacity and resistance for gold and platinum electrodes in different concentrations of sulfuric acid and at different audible frequencies. E. F. ZIMMERMAN. Cornell Univ. *Phys. Rev.* 29, 913-4(1927).—For Pt electrodes in 12.7% soln. of H_2SO_4 , the temp. coeff. of polarization capacity is pos. between 0° and 90° , decreasing in value at higher temps. For Au electrodes the value is about 0.1 that for Pt and increases at higher temps. Cell resistance with Pt electrodes decreases at higher temps. but the reverse is true of Au. For both the temp. coeff. of capacity decreases with increase in frequency between 650 and 3900 cycles. W. W. S.

The influence of movement of electrolyte upon the steadiness of the potential of the oxygen electrode. H. V. TARTAR AND VICTOR E. WILLMAN. Univ. of Washington. *J. Phys. Chem.* 32, 1171-7(1928).—The effect of the rate of flow of electrolyte on the potential of the O electrode has been studied and it has been shown that the potential is quite steady for a given electrode in a given electrolyte if the rate of flow remains unchanged. Under the same conditions of flow bright Pt electrodes seem to give fairly reproducible potential values within a few millivolts. The behavior of the O electrode may be more easily interpreted by the assumption of the formation of a sol. substance, possibly H_2O_2 , than by the so-called insol. Pt oxide theory. E. R. SMITH

The tarnishing of palladium by heating in air and by anodic polarization. G. TAMMANN AND J. SCHNEIDER. Univ. Göttingen. *Z. anorg. allgem. Chem.* 171, 367-71(1928).—Pd foil after heating in air to $400-750^\circ$ becomes vari-colored and at higher temps. resumes its original appearance. Heated for an hour, in air at 400° , it changes to red (I order). At 500° , 550° , 600° , 680° and 750° the color varies from orange (I) to yellowish green (II). The measurements showed that Pd tarnishes in air similarly to other metals according to the log. law. Data are plotted as follows. logs. of time, in min. as abscissas and air film thickness in μ equiv. to the colors, as ordinates. A straight line is obtained for each temp. which cuts the abscissa at the log. of time. By action of anodic O_2 , films of greater thickness are formed (from brownish yellow I to V order). A Pd foil served as anode in 1.6 N H_2SO_4 between two Pt cathodes of the same size. The film was thicker, by 400μ , at the edges than in the center of the foil. Values of μ /milliamp., for varying c. ds. (after 2 min.) show that not all evolved O_2 goes into the oxide layer. Since they decrease with increasing c. d. PdO only could be formed on oxidation in air for according to L. Wohler, PdO_2 and Pd_2O_3 are no longer stable above 200° . The film formed by electrolysis is probably a hydrated oxide, which changes either in compn. or form. A film of 352μ , equiv. to air film thickness formed at higher temp. in air, disappears in O_2 gas at 20° within 20 min. The same holds true for the electrolytic film of equal thickness. Pd black could not be detected in either case. At approx. 700μ the electrolytic film first disappeared in O_2 gas after 50 min. at 20° and left a visible coating of Pd black. A. J. CURRIER

Critical potentials of copper. RICHARD HAMER AND SURAIN SINGH. Univ. of Pittsburgh. *Phys. Rev.* 29, 901-2(1927).—The method consisted in searching for repeatedly recurring breaks in the current-potential curves when a Cu cylinder and insulated central Cu rod were heated to approx. 700° in a highly evacuated quartz tube. This preliminary report up to 30 v. indicates critical potentials at 3.3, 7.9, 14.2, 19.5 and 25.3 v. W. W. STIFLER

Polarity and piezoelectric excitation. A. HETTICH AND A. SCHLEEDÉ. *Z. Physik* **46**, 147-8(1927).—Arguments are advanced claiming to invalidate the suggestion of Mark and Weissenberg (*Z. Krist.* **65**, 435(1927); cf. *C. A.* **22**, 1507) that the piezoelec. excitation of pentaerythritol affords evidence of polarity in the direction of the principal axis. B. C. A.

Conductivity of powdered salts. JEAN CICHOCI. *Compt. rend.* **187**, 287-9 (1928).—C. verifies the hypothesis of Peczkalski (*C. A.* **22**, 2870) that the cond. of powd. salts is due not only to the cond. of the solid particles but also to the cond. of the salt vapors. BaCl_2 is put in a Cu tube (1 cm. \times 12 cm.) contg. a concentric Cu wire (0.7 mm. diam.). The tube is put in a flask and kept under 1 mm. pressure. The wire and tube serve as electrodes and the temp. is measured by a thermocouple. Detns. are made of the external temp. (*t*), the intensity of the current (*b*), the potential drop along the wire (*v*), the intensity of the anodic current (*i*) and the time of flow of current (*a*). From *b* and *v* the resistance of the wire is deduced. Curves are given plotting *a* against *i*. Results confirm Ohm's law. The major part of the salt is below the temp. of the emission of ions but its cond. is of the order of the cond. observed at the temp. of the heated wire. This can only be explained by the presence of salt vapors uncondensed in the cold part of the tube. The cond. is also partly due to the dispersion of the Cu in the salt when the wire is used as the anode. D. H. POWERS

Influence of gelatin on the potential and discharge potential of zinc in zinc sulfate solution. E. RABALD. *Z. Elektrochem.* **33**, 532(1927).—A reply to Izgaruishev and Titov (*C. A.* **21**, 3163) B. C. A.

The local element theory of metal solution. A. THIEL AND J. ECKEL'S. *Sitzber. Ges. Beförderung gesamten Naturwissenschaften zu Marburg* **61** (Sept., 1926); *Chem. Zentr.* **1927**, 1, 857 —Preliminary paper. To gain insight into the problem of the metal soln. in acids, it is essential to follow a well-defined and clear exptl. method. This precludes the use of alloys or of metals pptd. on an active surface. T. and L. use 2 identical plates of metal, one of pure Zn, and the other of the metal to be investigated. The plates are connected through an ammeter which indicates the rate of liberation of H by the second metal in relation to that of the Zn during and after combination. Sp. expts. showed that the evolution of H at the second metal follows Faraday's law, so that measuring the current intensity of the metal combination affords the simplest way of detg. accurately the catalytic or activating effect of foreign metals on the Zn soln. in acids. The fraction given off by Zn is the difference between the total rate of formation and that calcd. for the second metal. The overvoltage at the metal liberating H is detd. by measuring the potential at the electrode, in the absence of air. This should be equal to the potential observed at the second metal (compared with H_2 in the same electrolyte, without stirring). The rate given by the combination of the 2 metals falls always short of sum of the rate of soln. of Zn alone, and that calcd. from the potential of the second metal. No satisfactory explanation of the rate variations has been found as yet. The same observations were made in the soln. of Al in NaOH. A. L. HENNE

Resistance change of single crystals of bismuth in a longitudinal magnetic field. G. W. SCHNEIDER. *Phys. Rev.* [ii], **31**, 251-9(1928).—The resistance change as a function of the orientation of the vertical crystallographic axis was investigated. B. C. A.

Measurements of the disturbance caused by a magnetic field on the superconductivity of thallium. W. TUIJN. *Verslag Akad. Wetenschappen Amsterdam* **37**, 476-80 (1928).—A TI resistance, maintained at low temp., is subjected to the variations of a magnetic field (transverse to the current flow) (cf. *C. A.* **21**, 3305). If the temps. in $^\circ\text{K}$. are: 2.47, 2.21, 2.20, 2.19, 1.85 and 1.83, the values of $H(0.5)$ in gauss are: 0, 31, 32, 34, 65 and 67, resp. A. L. HENNE

The paramagnetism of iron in the ferricyanide of potassium. MILLE. PAULE COLLET AND FRANCIS BIRCH. *Compt. rend.* **187**, 35-6(1928).—Measurements by the method of attraction in a non-uniform field were made on $\text{K}_3\text{Fe}(\text{CN})_6$ between 0° and 250° . Special precautions were taken to insure purity of test sample and accuracy in exptl. details. Two series of measurements were in excellent agreement. After correcting for the diamagnetism of the remainder of the mol., the at. susceptibility of the Fe is very approx. inversely proportional to the abs. temp. The moment is 11.95 Weiss magnetons with θ of the Weiss-Curie law -13° abs. Other measurements between 0° and -80° seem to indicate that in this temp. range the moment is 13 magnetons, thus confirming the earlier work of Honda and Ishiwara (*Sci. Repts. Tokio* **3**, 303(1914)). W. W. STIFLER

Magnetic moment of iron in complex salts. L. A. WELO AND O. BAUDISCH. Rockefeller Inst. for Med. Research. *Phys. Rev.* **29**, 612(1927); cf. *C. A.* **20**, 2781.—

The moment of Fe is 29 magnetons in Fe^{+++} , 26 in Fe^{++} , zero in ferrocyanides, the pentacarbonyl and the nitroprusside, 10 in ferricyanides being about the same as in the bivalent Cu ion. Other moments in Fe may be found which may correspond to ions of other transition elements and to test this 45 rare Fe salts were examd. Of these, 28 salts behaved like simple Fe^{+++} , 7 salts, hexaacetates of the type $[\text{Fe}_2(\text{CH}_3\text{COO})_6(\text{OH})_2]\text{Cl}$ show a moment of 16 which is the same as the Ni ion, and a complex hexabenzozoate also has this value. Two complex glycolates correspond to the Cr ion with 19. It was assumed that the salts obey the Curie law and expts. are to be made to test this.

S. L. B. ETHERTON

Magnetic moment of helium and molecular hydrogen. IRVIN H. SOLT. Univ. of Cincinnati. *Phys. Rev.* **29**, 904(1927).—The method of Gerlach and Stern was used with a field gradient of 1.5×10^6 gauss/cm. The beam of atoms or mols. was explored by a Pt wire 0.017 mm. in diam. and 2.5 mm. long which formed one arm of a Wheatstone's bridge. No influence of the magnetic field on the beam was observed.

W. W. STIFLER

An interferential method for measuring magnetic susceptibility of liquids. O. SPECCHIA. *Atti accad. Lincei* [6], **7**, 574-6(1928).—The app. and technic are described in detail. The method is rapid and precise and has several advantages over the Fabry method.

C. C. DAVIS

Magnetic moment of atomic iodine. JOHN B. TAYLOR and T. E. PHIPPS. Univ. of Illinois. *Phys. Rev.* **29**, 904(1927).—Rays of I dissociated in an electrically heated quartz tube furnace were received on a liquid-air-cooled glass target coated with a thin film of Hg. On spectroscopic grounds a multiple sept in a magnetic field corresponding to a magnetic moment of 2 has been predicted. The rather imperfect images obtained seem to agree with this.

W. W. STIFLER

Thermomagnetic effect on gases. NOEL C. LITTLE. Bowdoin College. *Phys. Rev.* **29**, 901(1927).—A temp. gradient was maintained in a gas enclosed in a metal box placed between the poles of an electromagnet. A non-uniform magnetic field warped the isothermal surfaces, the effect varying with the nature of the gas. With a temp. gradient of 15° per cm., a thermocouple placed midway between the poles showed drops of 16° in air, 18° in O_2 , 6.6° in H_2 and 16° in propane when a field of 15 kilogausses was excited. N_2 and CO_2 showed no effect.

W. W. STIFLER

The optical properties and changes in state of zircon. W. FR. EPLER. *Z. Krist.* **64**, 510-11; *Physik. Ber.* **8**, 734(1927).—According to Stevanovic there are 3 kinds of zircon distinguished by d. a has a d. of 4.0 unchanged on heating; b has a const. value 4.7; c is unstable and goes over to b on heating. Densities and refractivities are now detd. on 7 specimens of different colors. Hyacinth from Laacher See at 197° has a reversible change in n of 30 units in the 4th decimal place. With c -zircon (green from Ceylon) there is a monotropic modification change at 1950° to normal b -zircon. Reversible color changes were observed, the color being due to content of Si, Zn, Hf, Ti, Cu, Fe, Zn and Ca.

G. I. CLARK

The law of mixed actions. ALEXANDER SOOS. *Chem. Rundschau Mitteleuropa u. Balkan* **3**, 129-31, 137-40, 148-50(1926); *Chem. Zentr.* **1927**, I, 1926.—Actions (such as light absorption, or rotation of the polarization plane) which affect substances as a function of the layer thickness form the resultant of 2 originally different components, after emerging from the substance. They are quantized, i. e., their transmission is accompanied by quantized variations of state. A plot of action vs. layer thickness gives a wavy line; the "elemental thickness" may be calcd. from the wave length. S. defines as "elemental thickness" h , a layer in which the dissolved particles cover completely, but once only, a plane of projection, the limit of absorption bands for instance. S. detcs. the absorption of light through Au, Ag and MnO hydrosols, in a Martens-Grunbaum polarizing spectrophotometer, increasing the thickness by 0.5 to 1.0 mm. each time. Values of h ranging between 4 and 10 mm. are found. S. calcd. the particle sizes (assumed to be cubic) of Au sols prepd. at different temps., by Zsigmondy's ultramicroscopical method, and by the law of mixed actions. The latter method gives values for the edge of the cube 100 times smaller than the former. S. explains it by assuming that the ultramicroscope detects only the larger particles and that a mol. does perhaps not absorb in its whole vol. as defined. The quotient $S = h^2/\pi r^2$ (r = particle radius), is called the "elemental number." At const. concn., it is independent of dispersion or of h , and is characteristic of the elements or compds. The mol. projections actually overlap each other 2, 3, n times before the field is completely covered. This fact does not alter the law of mixed actions.

A. L. HENNE

The reflecting power and color sequences shown by metals on activation. F. HURN CONSTABLE. St. John's College, Cambridge. *Nature* **122**, 57(1928).—Hinshel-

wood (C. A. 17, 657) observed that the brightening of color sequences on repeated oxidation and reduction shown by Cu goes hand-in-hand with increase in catalytic activity. That the brightening of the color sequence is due to the increased reflecting power (I) of the underlying metal, and that the I of Fe, Ni and Cu when reduced from the granular oxide increases with the no. of oxidations and reductions until a limiting value of I is reached has been shown spectrometrically (C. A. 22, 1720). It has now been shown experimentally that a burnished metal surface becomes duller on activation and that the color changes accompanying it become less pronounced. J. BALOZIAN

The azo-chromophore. I and II. J. S. PETRUS BLUMBERGER. *Chem. Weekblad* 25, 282-6, 315-8(1928).—The attempt is made to connect the color with the modern valency theories. An asymmetric position of the azo group (elec. polarity) gives rise to a powerful selective absorption. The factors increasing this polarity have a bathochromic effect, and *vice-versa*. A. L. HENNE

Graphic representation of colors. S. RÖSCH. *Physik. Z.* 29, 83 91(1928).—Every color can be defined by means of its "relative brightness," the relative width of its spectrum and the mean wave length. An app. is described whereby any color may be compared by synthesis in terms of these 3 coordinates B. C. A.

Optical and electrical properties of liquids. C. V. RAMAN AND K. S. KRISHNAN. *Proc. Roy. Soc.* 117A, 589-99(1928); cf. C. A. 21, 1053, 2419.—Theoretical. A review of the existing theories of the optical and elec. behavior of liquids shows that they are inadequate to explain the changes of refractivity and dielec. behavior with d. and temp. A new theory is developed based on the assumption that the mols. of a liquid are optically and electrically anisotropic, and that the polarization field acting on a mol is a function of its orientation. The formulas deduced are used to show why with increase of d. the Lorentz refraction const. usually diminishes. The changes in refractivity and dielec. const. are closely related to a change in the effective optical or electrical anisotropy of the mol. produced by the influence of its neighbors. The anisotropic consts. appearing in the formulas, can be evaluated with the aid of the theory of light-scattering in liquids previously developed (*loc. cit.*). B. C. A.

Variation in rotation and conductivity of sugars in aqueous solution with and without boric acid. II. R. VERSCHUUR. *Rec. trav. chim.* 47, 423 57(1928); cf. C. A. 22, 3142.—Numerous measurements of the rotatory powers and conductivities of solns. of maltose, levulose, α - and β -glucose, α - and β -galactose and inulin, both in absence and presence of boric acid, have been made. The cond. of maltose + boric acid shows a max. at equimol. concns. (0.5 M) and diminishes slightly with either increase or decrease of sugar. Levulose is the only sugar for which the consts. of mutarotation and cond. are proportional to the concn. of boric acid, and it is found that even traces of the acid cause a large increase in the cond. Dextrose shows a greater increase in cond. than does galactose, if comparison is made between the equil. mixts. In view of the above results and those previously obtained (*loc. cit.*), the structural formulas of xylose, arabinose, dextrose, galactose and mannose are discussed. B. C. A.

Absolute intensity measurements on a sodium burner and the life period derived from them. E. F. M. VAN DER HELD. Univ. Utrecht. *Physica* 8, 165-71(1928).—A review is given of expts. on the detn. of the time of excitation of Na atoms for the D line by measurement of the abs. intensity of the latter. A Na_2CO_3 soln. was dispersed in a flame of illuminating gas with a flame velocity of 418 cm. per sec. (Andrade method with revolving mirror and C particles), radius of 1.7 cm. The flame temp. was found by inserting a hot Pt filament in the flame and balancing the radiation from it as called from its optically detd. temp. with the elec. energy used. It was found to be $1970^\circ \pm 20$ abs. The light examd. was taken from a 1.08×1.14 -cm. strip of the flame, its intensity measured by the method (cf. van Dyck, C. A. 22, 21) of the abs. thermopile. The Na vaporized was found by weighing and no concn. changes were noticed. For a comparison radiator a quartz mercury lamp, previously standardized, was used (green line). The Na flame observations consisted of 3 abs. ones, direct spectrographic comparison with the Hg lamp, and 2 relative ones, comparison of Na intensities for varying flame concns. For a no. of atoms per cu. cm. $N = 4.16 \times 10^{14}$ to 7.12×10^{16} were found ratios of 0.199 to 1.15 (for normalities 1/1.17 to 1/10480), the relative width of the Hg lamp being from 0.066 to 0.0098. The calcd. quanta per sec. per atom q varied from 10.2 to 243 under these conditions. Plotting q against $\log \rho$ ($\rho = 4\pi N e^3/m$) gives an S-curve, in which q approaches 250 for extreme flame dilns. (no absorption). With this value in Einstein's equation for the time of excitation a value of 5×10^{-8} sec. is found higher than Minkowski's (1.6) by magnetic rotation, in fair agreement with Kerschbaum's of 4×10^{-8} . For the intensity ratio of the 2 D lines was found at the lowest concn. used 1:2.05. B. J. C. VAN DER HOEVEN

Refractivity of normal saturated monobasic aliphatic acids. P. E. VERKADE AND J. COORS, JR. *Rec. trav. chim.* **47**, 415-7(1928); cf. *C. A.* **22**, 571, 1326.—A polemic on the refractivity of the fatty acids. The mol. coeff. of refractivity is a phys. quantity whose const. homology increments $\Delta(M/d)$ and $\Delta(M, n)$ first occur in the rather higher members of the series. Abnormally small mol. vols. and high mol. coeffs. of refractivity cause homology increments to behave irregularly for initial members. Such data as are available on the latter therefore are of no value in detg. the oscillation phenomenon by means of mol. refractivity.

RAYMOND H. LAMBERT

The degree of association of sodium vapor. DONALD S. VILLARS. Univ. of Ill. *Proc. Nat. Acad. Sci.* **14**, 508-11(1928).—A detn. of the heat of dissoen. of the mol. Na_2 , was made from band-spectra observations and from this, by using the theoretical Sackur-Tetrode equation, the degree of assocn. was estd. The results contradict all previous hypotheses concerning the monatomicity of Na vapor and indicate that a very large portion of it is diatomic.

MALCOLM DOLÉ

A new method for observing the smallest birefringence. G. TODESCO. *Atti accad. Lincei* [6], **7**, 394-9(1928).—The method is based on the use of a photoelec. cell located to receive the light, which by means of interposing the birefringent object between 2 crossed Nicol prisms, emerges from the Nicol analyzer. The app. and technic are described in detail with diagrams. The app. is extremely sensitive, and the distribution of internal forces of glass subjected to pressure, tension or flexure can be detd. *Magnetic and elec. birefringence* are also readily measured. The Majorana effect in colloidal Fe is very distinct. Various substances are being studied with the new app.

C. C. DAVIS

Color, molecular weight and electrolytic character of triphenylmethane derivatives (LIFSCHITZ, GIBBS) **6**. Reduction of BaCO_3 by Al (LINHORST, SCHLUNDT) **6**. Corrosion in the tin can. I. The electrochemical relations of Fe and Sn (LUECK, BLAIR) **4**. Conductivity of organic solvents (KEYES, *et al*) **4**. The effect of adsorbed gas on the contact resistance of C (WRIGHT, MARSHALL) **4**. The detonation wave in gaseous mixtures and the predetonation period (PAYMAN) **24**. The reactions of activated Mg(Terent'ev) **10**.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

S. C. LIND

Anatomic model for the chemist. IX. FLORENCE LANGWORTHY. *Chem. News* 137, 82-5(1928); cf. *C. A.* 22, 1721, 1900. E. H.

Application of the quantum mechanics to the structure of the hydrogen molecule and hydrogen molecule ion and to related problems. LINUS PAULING. California Inst. of Technology. *Chem. Reviews* 173-213.—A general account of the application of quantum mechanics to the problems of mol. formation and decompn. A new first-order perturbation treatment of the H_2 molecule ion is given. W. WE-R

Comprehensive form of energy-level diagram for atoms. RAYMOND T. BIRGE. Univ. of California. *Phys. Rev.* 29, 922(1927).—The diagram is intended to include all energy levels of an atom and its singly, doubly, etc., charged ion, provided not more than one electron is in an excited level. For the neutral atom all levels are represented by parallel sets of vertical columns, grouped in one section. All the levels of the singly charged atom are grouped in an adjoining section. Transitions representing monochromatic radiation do not cross the division between sections, while all crit. absorption limits do cross. W. W. STIFLER

Coordination and atomic structure. P. RAY. *J. Indian Chem. Soc.* 5, 73-89 (1928).—Views concerning the electronic configuration of complex compds. are summarized, and a scheme for electron distribution in complexes is suggested. Complex compds. are differentiated as strong (perfect) or weak (imperfect), the former include most six-fold cobaltic, some six-fold ferrous and ferric, all six-fold and four-fold Pt, and the six-fold chromic, tervalent Rh, tervalent and quadrivalent Ir and a few Ru complexes, while the latter are transitional between true complexes and double or assoc. compds., e. g., Ni, Cu, Zn, Ca and cobaltous complexes. Tendency to assume the external electronic configuration of the next higher inert gas by the central ion is the main factor in the formation of perfect complexes. For the weak class it is assumed that the various units share electrons with the central ion at different levels, in the perfect class a more or less inner level of electrons takes part in the sharing. Thus the nature of the electron distribution in the central ion det. the type of coordination. The stability of the complex increases with the number of electrons in any sub-group as it gradually becomes filled up, a lone electron tends towards instability. B. C. A.

The statistical deduction of some properties of the atom. III. Calculation of the Rydberg correction for the s terms. E. FERMI. *Atti accad. Lincei* [6], 7, 726-30(1928), cf. *C. A.* 22, 1721, 2314.—Mathematical. The value of s terms of the spectra of all the elements, *i. e.*, the Rydberg correction of the s series, is calcd. A graphical representation of the results, where the abscissas are the at. nos. and the ordinates are Rydberg corrections, shows good concordance between exptl. data and theory. C. C. DAVIS

Velocity of cadmium atoms regularly reflected from a rock-salt crystal. A. ELLERT AND H. F. OLSON. *Science* 68, 89(1928).—The specularly reflected beam of Cd atoms produced by the incidence of a beam of such atoms on the cleavage face of a rock-salt crystal was found for 3 angles of incidence, 22.5°, 45° and 67.5°, to consist of atoms whose velocities were very nearly the same; the velocity of the atoms in the reflected beam was independent of the temp. of the crystal for temps. from 200° to 500°. If the assumption is made that in the deBroglie equation for the wave length of the phase wave assoc. with the particle of mass M , $\lambda = h/MV$, the mass of a single proton, and not that of the atom is to be substituted, and, further, that the reflection law is the same as that used by Davisson and Germer for reflection of electrons by crystals, namely, $n\lambda = nh/MV = 2d(\mu^2 - \sin^2\theta)^{1/2}$, where n in this case is 1, values for the velocity of the reflected atoms are obtained which are in close agreement with expt. W. WEST

"Nebulium" spectrum in new stars. C. T. FLVEY. *Nature* 121, 453(1928).—The discrepancy between the conclusions of Pike (*C. A.* 22, 1532) and those of E. are ascribed to the inapplicability of the theory of thermal ionization. B. C. A.

An attempt partially to separate the isotopes of cadmium. ARTHUR A. SUNIER. *Abstracts of Theses, Univ. Chicago, Science Series* 4, 173-7(1925-6).—No difference in at. wt. is found for 2 extreme fractions of Cd produced by 13 successive evapns. in vacuum, in each of which the amt. is decreased by $1/2$. The neg. result may be due to the slowness of self-diffusion in molten Ca. A study is made of the most advantageous scheme of fractionation. The relative at. wts. of the final samples were studied by comparing the densities of cast pellets, and the precautions necessary to obtain Cd castings of uniform density are given. F. A. JENKINS

The separation of the element chlorine into isotopes (isotopic elements): Light fraction. FRANCIS A. JENKINS. *Abstracts of Theses, Univ. Chicago, Science Series 4*, 93-8(1925-6).—By a systematic fractionation of HCl gas, consisting of diffusions against air at atm. pressure through porous pipe-stems, 28 g. of HCl is obtained in which the Cl has an at. wt. 35,418, as found from the ratio Ag/AgCl. At. wt. changes for intermediate fractions are detd. from the densities of HCl solus., and afford a comparison of the efficiencies of 2 forms of *diffusion app.*

F. A. JENKINS

New theory of the origin of the actinium series. T. R. WILKINS. Univ. of Rochester. *Phys. Rev.* **29**, 352(1928).—It is suggested that the Act series comes from an isotope of U (actino-uranium I) whose decay const. is several times that of U_1 . This would explain the variations of the radii of pleochroic rocks. Decay consts. of actino-uranium are calcd. from a study of haloes. Some uranium Pb is due to Act. The ages of rocks calcd. from Pb or He content is probably as much as 40% in error in the oldest rocks.

L. D. ROBERTS

The number of ions produced by radium C' in air. IRENE CURIE AND FREDERIC JOLIOT. *Compt. rend.* **186**, 1722-4(1928).—The app. of Mme. P. Curie (C. A. **19**, 2448) for the estn. of very intense α -ray sources is used. Ionization currents equiv. to $1/10,000$ part of total α -radiation are measured. These measurements are obtained in the presence and absence of a magnetic field and with the interposition of a series of screens of Al 0.02-0.1 mm. in thickness. Numerical results are deferred to another paper.

H. R. MOORE

Apparent evidence of polarization in a beam of β -rays. R. T. COX, C. G. MCILWRAITH AND H. KURRELMAYER. New York Univ. and Columbia Univ. *Proc. Nat. Acad. Sci.* **14**, 544-9(1928).—Preliminary attempts to obtain exptl. evidence of polarization in a beam of β rays are described and discussed. The "somewhat inconclusive results" seem to indicate a true polarization due to the double scattering of asymmetrical electrons.

MALCOLM DOLE

The scintillation method. BERTA KARLIK AND ELISABETH KARA-MICHAILOVA. *Z. Physik* **48**, 765-83(1928).—The factors concerned in the scintillation method for counting α -particles, H particles, etc., are analyzed. ZnS screens, which phosphoresce in the region of max. sensitivity of the eye, were used in the expts. Quant. expts. were performed with a comparison microscope provided with 2 objectives and a common eyepiece. Scintillations from α -particles are 3 times as intense as those from H particles. For α -rays the intensity of scintillation is detd. by the energy transferred to the phosphorescent crystal. Measurements of the total intensity made by a photoelectric cell show proportionality of the intensity to the number of α -particles. The prepn. and testing of phosphorescent screens are considered in the light of the results obtained.

W. WEST

Preparation of highly concentrated polonium preparation by distillation. ELISABETH RONA AND EWALD A. W. SCHMIDT. *Z. Physik* **48**, 784-9(1928).—The concn. of Po on metallic surfaces by the original method of I. Curie, by pptn. of Po from concd. almost neutral soln. on Ag or Ni sheets rotating for about 20 hrs. in the soln., suffers from the disadvantages of requiring great purity of the initial materials, fine adjustment of the soln., and of the impossibility of further concn., once the sheet has been removed from soln. These disadvantages are evaded by the following distn. method. Po is first sepd. on large Pt electrodes by electrolysis of Ra D soln. contg. 0.1 N HNO_3 with a c. d. of 5×10^{-6} amp./sq. cm. The electrode is cut into strips 1 cm. \times 0.3 cm. and a strip placed in the constricted part of a quartz tube and distd. by heating with a micro-oxygen blow lamp on to Pd or Pt plates 3 mm. diam. placed in the wider part, and kept cool by contact with a large Cu rod. The distn. is carried out in a slow stream of pure H_2 . Point preps. can be similarly made. Preps. of strengths up to 20,000 e. s. u. on sheets of 4 sq. mm. area and point preps. of 1400 e. s. u. per sq. mm. have been made. It was also shown that the radiation from different points of these surfaces was quite uniform.

W. WEST

The radioactivity of the lighter elements. WILLIAM G. GUY. *Abstracts of Theses, Univ. Chicago, Science Series 4*, 87-91(1925-6).—A method of balancing the ionization currents from two chambers charged to opposite potentials is used to detect radioactivity. The arrangement will detect an activity of $1/300$ of the β -radiation from K. No activity is found for salts of Na, Ca, Ba, Sr, C, Cl, Br, Cu, Fe, Pb, Mg, Mn, Ni, Ag and Zn, or for the elements Ta, W, La, Se, As, Sn, Au, Sb, Al and Hg. The activities of Rb and K are found to be in the ratio 1.39/1.00. The absorption coeff. in Al of the β -rays from KCl under satn. conditions varies from 39.6 to 55.4 with Al thicknesses 0.0135 to 0.0405 cm., while with Rb salts it decreases from 593 to 522 with Al thicknesses 0.0017 to 0.0051 cm. Certain org. salts of K show an anomalous behavior in

that they retard the electrometer deflection instead of accelerating it. The effect is ascribed to the presence of a free surface charge on the compd. F. A. JENKINS

Physical-chemical investigations of ordinary and uranium-lead chloride. W. A. ROTH AND O. SCHWARTZ. Braunschweig Tech. Hochschule. *Ber.* **61B**, 1539-45(1928).—The phys.-chem. constns. of ordinary and uranium PbCl_2 are measured; salts carefully purified by repeated crystn. from HCl are used. Density is detd. in ethylene bromide, a xylene mixt. ($d_{18} = 0.86451$), and a satd. H_2O soln. of PbCl_2 in the case of the ordinary salt or a satd. HCl soln. in the case of uranium PbCl_2 . d_{18} for the ordinary salt is 5.909 ± 0.001 and for the U salt 5.884 ± 0.001 . Calcn. of mol. vol. from the d. detns. gives 47.07 cc. in each case. d_{18} for concd. solns. is given as 1.00720 for ordinary PbCl_2 and 1.00716 for uranium PbCl_2 . Measurement of the n of H_2O solns. shows that, while the mol. refraction is the same for the 2 salts, the increase in the n of H_2O is slightly greater for the U isotope than for ordinary PbCl_2 . Elec. cond. of the 2 salts is practically equal, the equiv. cond. of a 0.062 N soln. at 18° being 75.4. Heat of pptn. as chromate is likewise equal and is given as 11.17 kg.-cal. per mol. at 18° . H. S.

Electron counting tube for the measurement of weak activities. H. GEIGER AND W. MÜLLER. *Naturwissenschaften* **16**, 617-8(1928).—A thin wire covered with a uniform poorly conducting surface film is axially suspended in a metal tube. The insulating skin allows the wire-wall potential to rise above the spark value. This causes an electron ray penetrating the wall to give a powerful ionization current which stops rapidly on charging the insulating skin. The individual current peaks can easily be demonstrated by a string electrometer. The app. as a whole represents a counter for corpuscular rays with the whole surface of the external cylinder as active opening. The recording intensity is actually proportional to the tube surface and, over a range of 50 v., independent of the potential. It is extremely sensitive; hundreds of hits were recorded in one min. from cosmic radiation, radiation of room objects, etc. With an 80-sq. cm. tube and 25-cm. iron armor this no. was reduced to 0.6 per min. per sq. cm. surface. The γ -radiation of K could be shown on 100 g. KCl in a few min.; 50 mg. KCl inside the armor prevented any other observations due to β -radiation of K. Activities of one thousandth the K activity can be measured. B. J. C. v. D. H.

Quantum theory of the spinning electron. FRIEDRICH MÖGLICH. *Z. Physik* **48**, 852-67(1928).—A formal amplification of Dirac's treatment of relativistic quantum mechanics (C. A. **22**, 1535). In particular the transformations are considered which replace the Lorentz transformations for the electron spin and the characteristic functions. A Lagrange function is further found from which, by variation, both the Dirac and the Maxwell equations can be obtained. W. WEST

Relation between the spectral lines of hydrogen and of ionized helium and the movements of the electrons. A. M. TIROV. *Ann. Inst. Polytech. Oural* **5**, 37-48(1926).—Mathematical. B. C. A.

Magnetic analysis of a luminous canal-ray beam in hydrogen. C. J. BRASEFIELD. *Phys. Rev.* **31**, 215-9(1928).—A luminous canal-ray beam in H is sepd. by means of a transverse magnetic field into 4 component parts: neutral particles, and the charged ions H_2^+ , H^+ and H_2^{+-1} , (ions which passed through the elec. field as H_2^+ , but disocd. into H^+ before reaching the magnetic field). Measurements of the variation of the intensity of the H_2^+ and H_2^{+-1} beams with the pressure lead to a value for the free path for disocn. of a 1000-v. H_2^+ ion into H_2^{+-1} of 0.37 cm. at 0.01 mm., about 0.25 of the value, calcd. from the kinetic theory, for the neutral mol. B. C. A.

Electronic emission in a vacuum tube. L. TIERI AND J. RICCA. Univ. Messina. *Atti accad. Lincei* [6], **7**, 720-6(1928).—The object of the expts. was to det. whether there is a relation between variations of the filament current and variations of the thermionic current when the potential between the plate and filament was increased. The app. and technic are described in detail, with diagram. The results, which are recorded graphically, are to be interpreted in a forthcoming paper. C. C. DAVIS

Electric discharge in rarefied gases. Distribution of the electric field in the dark space. M. MORAND. *J. phys. radium* **B**, 451-72(1927); *Science Abstracts* **31A**, 202.—According to the ideas developed by Townsend and others the persistence of the discharge in a rarefied gas is due both to ionization by pos. rays and to the cathodic emission. A simple and general method of calcn. is here used to show that the exptl. laws discovered with regard to the distribution of the elec. field in the dark space are only explicable if pos.-ray ionization is effective. If λ is the mean free path given by the kinetic theory for an ordinary mol., comparison of exptl. curves with theoretical results shows that (1) for the pos. rays, whose mean free path is, on account of their velocity, equal to $\lambda\sqrt{2}$, the calcd. ionizing power is near that detd. by Townsend:

(2) the cathode rays, whose mean free path is $4\lambda\sqrt{2}$, produce on an av. 2 ions for every 3 or 4 impacts; (3) the current of pos. ions issuing from the neg. glow is, in general, only a small fraction of the total current traversing the discharge tube; (4) the cathodic emission represents an appreciable fraction of the total current in the tube. In the majority of cases cathodic emission gives to the discharge a certain instability. The current traversing the tube can only be const. if a certain condition relative to the no. of ions formed in the dark space by the cathode rays is fulfilled. When this condition is satisfied, ionization by pos. rays should necessarily take place also. Thus the conclusions are in agreement with Townsend's results. H. G.

Electron emission and diffusion constants for tungsten filaments containing various oxides. S. DUSHMAN, D. DENNISON AND N. B. REYNOLDS. Gen. Elec. Co. *Phys. Rev.* **29**, 903(1927); cf. *C. A.* **21**, 2220.—The emission phenomena are similar to those observed with thoriated W filaments. The values of A and b , resp., in the thermionic emission equation are for Y 7.0, 31,300; La 8.0, 31,500; Ce 8.0, 31,500; Zr 5.0, 36,500; U 3.2, 33,000; Th 3.0, 30,500. Data are also given for the diffusion consts. and heat of diffusion of U, Th, Ce, Zr and Y. W. W. STIFLER

The resistivity of thin metallic coats obtained by cathodic atomization. FREDERIC JOLIOU. *Compt. rend.* **186**, 1526-8(1928).—Pt films have been deposited on glass by cathodic atomization; the film thickness was detd. by weighing with a microbalance. For a const. thickness, the resistivity decreases when the anode-cathode tension increases. When the Pt film is heated, the resistance increases first linearly, until it reaches a max.; then it decreases. By cooling the film down to -185° , the resistance decreases linearly; the latter phenomenon is entirely reversible. The effect of a long heating is to remove the gases included in the Pt film, so that its resistivity and its temp. coeff. tends to be the same as in the case of solid Pt. If the Pt films are not carefully maintained at const. temp., the heat evolved by the current during the expt. will offset the measurements. A. L. HENNE

Dissociation of hydrogen chloride by positive-ion impact. WALTER M. NIELSEN. Duke Univ. *Phys. Rev.* **29**, 907(1927).—Pos ions were projected between two electrodes P_1 and P_2 toward a third electrode P_3 . HCl was fed in through a fine capillary at a pressure corresponding to a mean free path of 2 cm. With a potential on P_1 such as to prevent pos. ions from reaching it and with a small drawing out potential for positive ions on P_2 and P_3 , no neg. current to P_1 was observed for a driving potential less than 34 v. Above this value the ratio of neg. current to total pos. current increased rapidly with the driving potential. W. W. STIFLER

Electron emission in intense electric fields. R. H. FOWLER AND L. NORDHEIM. *Proc. Roy. Soc. (London)* **A119**, 173-81(1928).—No theoretical justification can be found for the proposed simple equation connecting thermionic and strong field emission of electrons from a metal. The formula which includes the effect of an external field is shown to be independent of T at low temps. Potential energies as found exptly. are rounded off by an image effect but this fact does not appreciably alter the results obtained. The treatment has been carried out by using the same underlying picture of the metal as given by Sommerfeld. RAYMOND H. LAMBERT

Reflection of electrons from molybdenum. W. R. HAM. Penn. State College. *Phys. Rev.* **29**, 908(1927).—The % of reflected electrons relative to incident electrons was plotted against velocity of reflected electrons from data obtained from several water-cooled Coolidge tubes with Mo anticathodes, operated at various potentials between 1000 and 22,000 v. Peaks of reflection seem to occur as the impressed voltage passes the crit. potentials for the L levels of Mo, and also probably for the K level. Residual gas seems to have little if any effect on the results. W. W. STIFLER

O- and N-energy levels in the secondary emission of hot tungsten. HERMANN E. KREFFT. Gen. Elec. Co. *Phys. Rev.* **29**, 908(1927).—The secondary emission was measured from W at about 1200° K. A no. of breaks in the curve were found for velocities corresponding to voltages between 5 and 750 v. A particularly prominent one at 70.5 v. seems to correspond to the O_1 -level and is in excellent agreement with the previous work of Bohr and Coster. Other breaks are in agreement with the values computed by Nishina for the N_I , N_{II} and N_{III} levels. W. W. STIFLER

Angular scattering of electrons in hydrogen and helium. GAYLORD P. HARNWELL. Cal. Inst. of Tech. *Proc. Nat. Acad. Sci.* **14**, 564-9(1928).—"No favored angles for electron scattering from H_2 or from He were observed, and in the case of He the results obtained by Dymond were not able to be reproduced." H. covered the inside of his scattering chamber with Mg, which prevented the charging up of the glass walls of the scattering bulb and consequent deflection of the electron stream by the electrostatic charge. MALCOLM DOLÉ

Velocity distribution and 180° scattering of low-velocity electrons from iron. H. E. FARNSWORTH. Brown Univ. *Phys. Rev.* **29**, 908-9 (1927).—The no. of electrons leaving an Fe target nearly normally was measured relative to the total no. The results give no evidence of inelastic collisions. The fraction, for primary velocities of a few volts, is much greater than that predicted by a cosine law of distribution, and decreases rapidly with increasing primary velocity up to approx. 30 v. W. W. STIFLER

Residual ions and critical restriking potential in mercury arcs. M. L. POOL. Univ. of Chicago. *Phys. Rev.* **29**, 915 (1927).—The restriking of a Hg arc at the lowest radiating potential is attributed to the large concn. of electrons and positive ions near the filament. Under certain conditions it may result from the ionization of the metastable atoms formed by continual recombination. W. W. STIFLER

A possible relation between radiation and ionization potentials of iron. ORTO STUHLMAN. Univ. of N. C. *Phys. Rev.* **29**, 354 (1927).—By retaining (I) potentials 11.1, 19.4, 41.2, 54.6, 103.5, 169.4, detd. by Thomas and new (I) potentials of 5.72, 7.29, 11.14 and a (R) potential at 8.14 v., all crit. (R) potentials can probably be attributed to multiple impact. L. D. R.

The 29-volt critical potential of hydrogen. ROGERS D. RUSK. N. Central College. *Phys. Rev.* **29**, 354 (1927).—A tube contg. 2 hot filaments and 2 Ni anodes gave low-voltage arc characteristics for varying anode distances and gas pressures in H. For the type of glow observed 29 v. was the lowest maintaining potential. L. D. R.

Polarization of canal-ray light in weak electric fields. I. H α -radiation in a transverse field. E. RUPP. *Ann. Physik* **85**, 515-28 (1928), cf. *C. A.* **22**, 727. The polarization ratio I_p/I_s (I_p being the intensity parallel to, and I_s that at right angles to the ray axis), of the H β -line from canal-ray light in weak elec. fields, has been detd. for various fields and velocities. When the polarization ratios for points along the canal-ray stream are plotted against the distance, the curves exhibit characteristic periodicities, which become more marked with decreasing velocities and increasing fields. The phenomena are qualitatively in accord with the oscillations of a classical anharmonic oscillator showing different phases along the stream. B. C. A.

Significance of photoelectric conduction in crystals. A. M. MACMAHON. Univ. of Chicago. *Phys. Rev.* **29**, 902 (1927).—The theory of the Rutherford Bohr atom is applied, with certain appropriate modifications, to the conduction of electricity in light-sensitive crystals such as Se. The differential equations thus obtained are said to be in agreement with the exptl. facts. W. W. STIFLER

Effect of oxygen on photoelectric emission from potassium. I. R. KOLLER. Gen. Elec. Co. *Phys. Rev.* **29**, 902-3 (1927).—An adsorbed layer of O one atom deep produced no effect on the sensitivity of a K photoelectric cell. Addn. of O up to 355 microns produced no appreciable effect. The next 800 microns increased the sensitivity three-fold, after which additional doses of O produced an immediate drop followed by a gradual recovery, but for each successive addn. the drop was to a lower level and the recovery less complete. This is explained by the absorption of O by the K. Small amts. diffuse into the K, leaving no oxide on the surface. When the K is nearly satd. the diffusion takes place more slowly. W. W. STIFLER

Photoelectric cell for medium ultra-violet. I. MALLET AND R. CLIQUET. *Compt. rend.* **185**, 1031-3 (1927). *Science Abstracts* **31A**, 209.—The KH cell is not sensitive to wave lengths below 3600 Å. U. Zillard has constructed a Cd cell sensitive as far as 2900 Å. U. The authors adopt an alloy of Cd and Ag, which is quite insensible to the visible spectrum, but shows a max. photoelec. effect at 2536 Å. U. H. G.

Periodicity of photoelectric thresholds. GEORGE B. WELSH. Cornell Univ. *Phys. Rev.* **29**, 615.—The photoelec. threshold may be considered a measure of energy taken from the incident radiation to detach one of the outer electrons from its atom. Consequently, the elements with most loosely bound electrons should permit detachment with expenditure of min. amts. of energy. The curve for photoelec. thresholds and at. nos. shows a periodicity with a max. for alkali metals and minor peaks for Cu and Ag but none for Au although one may be expected. The values of Ge and Be thresholds are given; they fall upon the curve. S. L. B. ETHERTON

Remark on Rud. Suhrmann's note. "A novel photoelectric effect of thin alkali metal films." B. GUDDEN. Univ. Erlangen. *Naturwissenschaften* **16**, 547 (1928); cf. *C. A.* **22**, 2512.—G. explains the quasi-free electrons found by Suhrmann for thin films and low frequencies by local differences (spots) of the condition of the metal film (cf. Richardson and Young, *C. A.* **19**, 1813). These spots cause potential differences of several 0.1 v. in the exit work of the electrons and consequently local fields, with resulting deviations of electrons and difficulty in reaching satn. conditions. The cause

of the spots is probably incomplete covering of the underlying material.

Remark on the communication: "A novel photoelectric effect of thin alkali metal films." RUD. SUHRMANN. *Techn. Hochschule, Breslau. Naturwissenschaften* 16, 616-7(1928); cf. preceding abstract.—It is believed that the magnitude of the effect described is too large to admit Gudden's explanation of spots on the surface. Rather will R.'s explanation hold of a retarding ion layer. Examn. of the temp. influence will allow a definite decision on this point.

Theory of the magnetic nature of gravity and electrons. CORNELIO L. SAGUI. Castelnovo dei Sabbioni, Italy. *Phys. Rev.* 29, 906(1927).—Electrons are considered as an assembly of a large no. of electromagnetic quanta while protons result from an assembly of electrons, the pos. charge being due to a symmetrical difference in structure. The frequencies predicted by Einstein's photoelec. equation are explained as due to the splitting up of the electrons themselves into smaller units of energy, the effect being wholly mech.

Existence of zero-point energy in the rock-salt lattice by an x-ray diffraction method. R. W. JAMES, I. WALLER AND D. R. HARTREE. *Proc. Roy. Soc. (London)* A118, 334-50(1928).—Within certain limits of frequency, the atomic scattering curve (giving F as a function of $\sin \theta / \lambda$, λ being the wave length of the radiation employed and 2θ the angle of scattering) of an atom for x-radiation can be calcd. by assuming that every element of charge scatters according to the classical laws. The F curves calcd. from the Schrodinger distribution of charge for the ions of Na and Cl, obtained theoretically by an approx. method, are compared with the exptl. values of F obtained from an investigation of the temp. factor of x-ray reflexion from rock salt (*C. A.* 22, 2691). The F -curves so calcd. are in very close agreement with the exptl. curves, if it is assumed that the crystal possesses zero-point energy of half a quantum per degree of freedom, as proposed by Planck. For both Na and Cl the observed curve is higher than the calcd. one for small values of θ . For somewhat higher angles the observed curve falls below the calcd. one, but crosses it again and lies slightly above it for values of $\sin \theta / \lambda$ greater than 0.9. The difference between the F -curves with and without zero-point energy is very considerable, especially for large angles of scattering, since the mean amplitudes of vibration of the atoms at zero abs. are somewhat greater than the radii of the regions within which the d. distributions of the K-electrons are concd., and for high angles of scattering the form of the F -curves depends almost entirely on the K-electrons.

X-ray absorption formulas. S. J. M. ALLEN. Univ. of Cincinnati. *Phys. Rev.* 29, 918(1927); cf. *C. A.* 22, 1906(1928).—General formulas for the absorption of high-frequency x rays, based on Schroedinger's wave mechanics, are discussed and a complete equation with numerical values is given for the absorption of the L series of Ag.

Effects of the surface conditions on the intensity of reflection of x-rays by quartz. YOSHITARO SAKISAKA. *Bull. Inst. Phys. Chem. Res. (Tokyo)* 7, 748-62(1928); English Ed. 1, 66-7. —See *C. A.* 22, 2512.

L x-ray absorption edges of Sn (50), In (49), Cd (48), Ag (47), Pd (46), Rh (45) and Ru (44). G. D. VAN DYKE AND G. A. LINDSAY. *Phys. Rev.* 30, 562-6(1927); *Science Abstracts* 31A, 187.—The L x-ray absorption edges of the elements Sn (50), In (49), Cd (48), Ag (47), Pd (46), Rh (45) and Ru (44) have been photographed and measured with a Siegbahn vacuum spectrograph of the precision type. The absorbing screens were made of the pure elements, since in this case the values of the energy levels obtained are admittedly more characteristic of the element than if chem. compds. were used as absorbers. Tables of wave lengths of absorption edges and assocd. energy levels are given.

Absolute x-ray wave-length measurements. A. P. R. WADLUND. Univ. of Chicago. *Proc. Nat. Acad. Sci.* 14, 588-91(1928).—An exptl. method is described for making absolute x-ray wave-length detns. by means of a ruled grating. The following preliminary values are given, Cu K_{α} , 1.5374 \pm 0.0006 A. U., Fe K_{α} , 1.937 \pm 0.004 A. U., Mo K_{α} , 0.708 \pm 0.002 A. U.

The spectrum of x-rays from the back of a tungsten target. EGON LORENZ. Harvard Univ. *Proc. Nat. Acad. Sci.* 14, 582-8(1928).—With a W anode x-ray tube, L. measured the intensity distribution as a function of wave length of both the focal spot and the stem radiation. Voltages of 22,400, 36,500, 71,600 and 82,500 were used. The stem radiation seems to be produced mostly by secondary electrons knocked out from the levels of a W atom; the intensity is a function of the applied voltage first increasing and then decreasing as the voltage is raised. The absorption of a

primary electron in any level becomes nearly zero if its energy exceeds the excitation voltage of the level by about 40 times. MALCOLM DOLE

The spectrum and state of polarization of fluorescent x-rays. A. H. COMPTON. Univ. of Chicago. *Proc. Nat. Acad. Sci.* 14, 549-53(1928).—The spectrum of fluorescent x-rays from Ag shows no continuous spectrum, the radiation being more than 99% line radiation. By filtering the fluorescent beam, the homogeneity may be made as great as 98%. The relative intensity as well as the positions of the spectrum lines is approx. the same in the fluorescent as in the primary x-rays. The characteristic fluorescent x-rays from Ag are completely unpolarized, within a probable error of 0.5%. MALCOLM DOLE

Polarization factor in x-ray reflection. R. W. JAMES. *Nature* 121, 422 3(1928).—James and Firth's detns. of the at. scattering factor (*C. A.* 22, 2691) do not appear to be affected by errors arising from the degree of polarization of the incident beam. B. C. A.

The polarization of characteristic radiation. J. A. BEARDEN. Univ. of Chicago. *Proc. Nat. Acad. Sci.* 14, 539-42(1928).—Previous investigators have thought that characteristic radiation is polarized, but in this paper expts. were performed using a monochromatic beam of x-rays which indicated that characteristic radiation from an x-ray tube is probably unpolarized. The geometric symmetry of the app. was carefully tested. MALCOLM DOLE

The index of refraction of glass for x-rays of long wave length. JEAN THIBAUD. *Compt. rend.* 187, 219-21(1928).—The considerable discrepancies between the results of spectrographic measurements of long-wave-length x-rays by diffraction (a) from a crystal, and (b) from a ruled grating, may be explained as due to refraction within the crystal, which has an index of refraction less than unity, so that the difference, $\delta = 1 - \mu$. The purpose of the present exptl. work was to det. the index, μ , of glass for very soft x-rays by the total-reflection method, which depends on detg. the limiting angle of total reflection from a plane mirror. If θ_m is the limiting angle at which total reflection occurs, this is related to the index of refraction by the equations $\theta_m = \sqrt{2\delta} = \sqrt{2(1 - \mu)}$. A vacuum spectrograph (cf. *C. A.* 21, 3158) was used with photographic registration and monochromatic rays between 17 and 65 A. U. as follows: FeL α , O $_2$ K α , N $_2$ K α , CK α , MoM. The limiting angle was not sharply marked, and a qual relationship was shown by recording the angles at which the intensity had decreased to one-half. A more exact detn. was attempted by observing the extinction of the diffracted rays of higher orders. For $\lambda = 44.9$ A. U. there is a regular decrease between $\theta_m = 4.2 \times 10^{-2}$ and 6.4×10^{-2} . For $\lambda = 65$ A. U. there is a decrease between the angles 4.8×10^{-2} and 10.5×10^{-2} . The lack of sharpness can be attributed to the high absorption of the x-rays in the glass, which makes it extremely difficult to det. the limiting angle of reflection with high precision. The following values were obtained for $\delta \times 10^{-4}$: 0.07, 4.8, 13, 18.6, 30.5 for wave lengths of 1.5, 20, 44.9, 54.9 and 65 A. U., resp. Thus δ varies approx. as λ^3 and θ_m approx. linearly with λ . The observed angles varied between 21' and 3°. The theoretical formula of Drude-Lorentz gives values of θ_m approx. twice as large as those observed. A. W. KENNEY

A new method of x-ray spectrography. Application to the study of the orientation of fatty acids by mercury. JEAN J. TRILLAT. *Compt. rend.* 187, 168 9(1928).—The x-ray study of the orientation of long-chain org. compds. at surfaces has yielded much valuable information. The rotating-crystal method has proved particularly advantageous, but it would be interesting to study other interfaces than the liquid-solid or solid-solid. The object of the new method is to obtain without rotation a continuous series of angles between the beam of x-rays and the interface which is the object of study, as is accomplished by rotation of the specimen or by actual bending of a crystal like mica. The new technic consists in placing a small drop of Hg on a plane surface and covering it with the material to be studied. Thus the curvature of the drop gives all values of the angle between 0° and the angle of contact, and rotation is unnecessary. The material may be either liquid or solid. The drop of Hg is raised until it cuts in two the beam of x-rays, and the center of the drop may, with sufficient precision, be taken as the origin of the diffracted rays. The method has been tried in the study of the fatty acids with very clear photographs after one or two hrs.' exposure. In spite of the fact that the Hg is liquid, a perfectly oriented layer has been obtained at the interface, whether the fatty acid was liquid or solid. The spectra show a regular diminution corresponding to a linear increase in the interplanar distances with the number of C atoms. The excess acid gives either an amorphous halo if liquid or its own spectrum if solid. The effect of temp. has been followed up to 100°, where the orientation is still perfect. Publication of details will follow. A. W. KENNEY

The reflection of x-rays from glass and quartz. T. H. LABY, J. SHEARER AND R. BINGHAM. Univ. Melbourne. *Nature* 122, 96-7(1928).—Evidence is obtained for regular reflection of x-rays of about 50 A. U. from glass and quartz up to glancing angles of 45°. To produce the radiation, electrons of 10,000 and 375 v. from a Wehnelt cathode were used with Cu and C targets, resp. The observations were made with a vacuum spectrometer. The ratio of the intensities of the incident and reflected beams is 2:1 up to angles of 35°, and greater at larger angles. The reflected radiation is absorbed by glass and fluorite, penetrates 0.0006 mm. Al foil, and has a photographic intensity detd. by the electronic current in the tube at const. potential. These facts exclude the possibility of its being radiation of the Lyman-Millikan region or of longer wave length, and the potentials prevented the reflection of cathode rays to the plate. With the C target, the radiation was probably the K line, λ 45 A. U. The results do not seem to be reconcilable with the Lorentz dispersion formula. F. A. J.

Anomalous dispersion in the x-ray range. J. A. PRINS. *Naturwissenschaften* 16, 555-7(1928); cf. C. A. 22, 2512.—Photographs are shown of the reflected and direct x-ray on an Fe mirror. From these it appears that a slight anomalous dispersion exists (increase of angle of total reflection more than linear with λ). Also from measured values of this angle φ_m in a $\varphi_m - \lambda$ graph it follows that they lie on a theoretical curve $\varphi_m = (e\lambda/C\sqrt{\pi m}) \sqrt{A[1 + B(\lambda^2/\lambda_k^2)\ln(1 - (\lambda_k^2/\lambda^2))]}$, an equation of Kallmann and Mark (C. A. 22, 1905). The only assumption different from K. and M.'s is that the "total strength" of the K oscillators is taken equiv. to 1.3 (instead of 2). Several references are given. B. J. C. VAN DER HOEVEN

Explanation of Whiddington's rule for x-ray electrons. E. C. WATSON. California Inst. of Technology. *Phys. Rev.* 29, 919(1927).—According to Whiddington's pioneer investigations on the velocities of electrons ejected by x-rays, an electron can be ejected only when the incident radiation has a frequency double the value corresponding to the energy level of the electron concerned. This result, which Robinson failed to confirm, is now explained as due to the fact that Whiddington studied only those electrons which left the radiator in the forward direction of the x-ray beam, while Robinson worked with those leaving at right angles to it. W. W. STIFLER

Theory of atomic structure and spectral series. L. DÉCOMBE. *Compt. rend.* 185, 1263-5(1927); *Science Abstracts* 31A, 155-6.—L. develops the theory previously put forward, which regards the protons as spherical electrified films vibrating radially. The radial vibrations of the electrons probably do not have much to do with gravitation, but appear to be of fundamental importance spectroscopically. On certain assumptions there are deduced formulas for the frequency of this vibration in an electron the velocity of translation of which is zero, and for one with velocity v . The differences between the frequencies at different velocities are not large, and beats may result when two electrons have different velocities. The frequency of these beats, when the electrons are revolving in suitable circular Bohr orbits, follows Rydberg's formula. The frequency of the radial vibrations when $v = 0$ is calcd. as 1.2×10^{20} ; for an electron with velocity v this frequency is $1.2 \times 10^{20} + (\mu_0 v^2/2h)$, where μ_0 is the mass of an electron with velocity zero and h is Planck's const. The theory also explains the production of the continuous background of the x-ray spectrum, limited on the high-frequency side, when a metal is bombarded by electrons with velocity v , and also the production of the characteristic spectrum with the lines of the same series appearing simultaneously. H. G.

Images of the solar chromosphere obtained with the spectroheliograph with the infra-red line of ionized calcium, λ 8542. L. D'AZAMBUJA. *Compt. rend.* 187, 201-3 (1928). W. F. MEGGERS

Use of Winther's gauze in spectrophotometry. G. LANDSBERG. *Z. Physik* 46, 106-8(1927).—The use of a blackened gauze as a constant extinction filter (Winther, C. A. 17, 3284) has been examd. in the visible region and up to 2026 A. U. The extinction of such gauzes is const. within 1% in the range examd. B. C. A.

Intensity distribution in Fraunhofer lines. M. MINNAERT. *Z. Physik* 45, 610-9 (1927).—The distribution of intensity in the Fraunhofer lines H_α and CaK has been detd. The results are discussed with reference to those of von Kluiber (C. A. 21, 3553). B. C. A.

Use of single thermo-junctions and of echlette gratings in the far infra-red. Richard M. BADGER. *J. Optical Soc. Am.* 15, 370-3(1927).—Methods of focusing radiation of the order of 100 μ on to single thermo-junctions are described whereby the diffuse images due to aberrations in reflection are avoided. The construction of a simple echlette grating from plane parallel glass strips is also described. B. C. A.

The broadening of spectral lines. F. RASSETTI. Univ. Roma. *Atti accad. Lincei* [6], 7, 561-5(1928).—Mathematical, dealing with the perturbations produced on an atom by like atoms in close proximity to it, a phenomenon similar to resonance.

C. C. DAVIS

A simple method for measuring rotatory dispersion. ISAAC BENCOWITZ. Rockefeller Inst. *J. Phys. Chem.* 32, 1163-70(1928).—The chief difficulty in measuring rotatory dispersion lies in the lack of light sources of sufficient purity and intensity. In place of the expensive quartz Cd-Ga lamp of Bates, B. has used the continuous spectrum as a source. The light from a small elec. lamp is passed through a spectro-scope, the telescope end of which is replaced by a slit similar to that at the collimator end. From here the small patch of light enters the polarimeter, which further resolves the spectrum. With a narrow slit there is a point of extinction for which the mean rotation, α_c , of the different wave lengths transmitted depends on λ_c , the wave length of the "polarimetric" optical mean of the patch of light from the continuous source. In order to evaluate α_c and λ_c a calibration is made using the soln. to be tested and light from some monochromatic source. After substituting for the soln. a quartz test plate, the rotatory dispersion curve of which is known, the light from the spectro-scope is so adjusted that λ_c is equiv. to the wave length of the monochromatic source. The method is accurate to within 0.02° and may be used for any wave length, the rotation of which in quartz is known.

H. F. JOHNSTONE

The theoretical relation between infra-red and ultra-violet bands. R. T. BIRGE AND J. J. HOPFIELD. *Phys. Rev.* 30, 365-6(1927).—The frequency of infra-red (vibration-rotation) bands of a diatomic mol. can be calcd. from the measured frequencies of certain ultra-violet (electronic) bands correlated with the normal state of the mol. Thus for CO infra-red bands have been observed at 4.67μ , 2.35μ and 1.573μ , while from accurate data for the ultra-violet system the wave lengths of the infra red bands are calcd. to be 4.6672μ , 2.3475μ and 1.5744μ . The probable error in the calcd. values is about 1 part in 2000. Because of the greater resolution and sensitivity of the photographic plate, compared to infra-red recording app., this example encourages the hope of obtaining infra-red standards from measurements of ultra-violet radiation, in band spectra, as well as in the now familiar case of line spectra.

W. F. MEGGERS

Polarization of the resonance radiations of cadmium. PAUL SOULET. *Compt. rend.* 187, 212-4(1928).—Cd has 2 resonance radiations in the ultra-violet, viz. $1^1S_0 - 2^3P_1$ (3261 A. U.) and $1^1S_0 - 2^1P_1$ (2288 A. U.). In a previous note (C. A. 21, 3312) some preliminary results on the polarization of the first resonance line and on the influence of a weak magnetic field upon the polarization were given. These expts. are repeated with certain improvements. From measurements of 3261 A. U. an av. life of the Cd atom in the 2^3P_1 state is deduced as 2×10^{-6} sec. This orbit appears to be much more stable than the corresponding orbit of the Hg atom. Polarization of the 2288 A. U. line leads to the conclusion that the 2^1P_1 state has at least a double hyperfine structure, the more stable orbit having a life exceeding 10^{-6} sec. and the unstable one a duration of the order of 10^{-9} sec.

W. F. MEGGERS

The influence of different nuclei on the absorption spectra of organic compounds. J. E. PURVIS. *Proc. Cambridge Phil. Soc.* 24, 421-5(1928).—The effect of different nuclei on the absorption spectra of various compds. has been discussed in various papers (C. A. 20, 1030; 21, 2430). The problem is further investigated with the following substances: formanilide, phenylacetanilide, oxanilide, nitroso-*o*-cresol and nitroso-*m*-cresol, phenyl- α -naphthylamine, phenyl- β -naphthylamine, *ar*-tetrahydro- α -naphthylamine and *ac*-tetrahydro- β -naphthylamine. The general results show that in the phenyl derivs. of the 2 naphthylamines the introduction of the C_6H_5 group produces an addnl. band; that in the *ar*- and *ac*-hydrogen derivs. of these 2 compds. the type of absorption is controlled by the satd. or unsatd. condition of each constituent ring; that in the cresols the introduction of a NO group produces color; and that in the anilides the position of the typical absorption of aniline is destroyed, and it is replaced by a band due to a C_6H_5 group.

W. F. MEGGERS

Width of the lines of the Balmer series. MILE. M. HANOT. *J. phys. radium* [6], 9, 156-69(1928).—See C. A. 22, 3093.

H. G.

Some experiments on the continuous spectrum of hydrogen. YUTAKA TAKAHASHI AND YOSISIGE HUKUMOTO. *Science Repts. Tôhoku Imp. Univ.* [1st ser.], 17, 675-8(1928).—The effect of temp. on the continuous spectrum of H was studied by comparing the intensities of the spectrum emitted by a discharge tube cooled with liquid air and the spectrum of the same tube at room temp. The continuous spectrum was enhanced, at least in the region of wave lengths greater than 2300 A. U., while the intensities of

the lines belonging to the secondary spectrum and Balmer's series were reduced. (Cf. C. A. 21, 3829.) W. F. MEGGERS

Studies in the infra-red region of the spectrum. I. Description of prism spectrometer and apparatus. ROBERT ROBERTSON AND J. J. FOX. *Proc. Roy. Soc. (London)* A120, 128-48(1928). **II. Calibration of prism spectrometer; general procedure; and preparation of pure ammonia, phosphine and arsine.** ROBERT ROBERTSON, J. J. FOX AND E. S. HISCOCKS. *Ibid* 149-60. **III. Infra-red absorption spectra of ammonia, phosphine and arsine.** ROBERT ROBERTSON AND J. J. FOX. *Ibid* 161-89. **IV. Discussion of absorption bands of ammonia, phosphine and arsine.** *Ibid* 189-210.—For a projected investigation on the rate of decompn. of an explosive gas, AsH_3 , it became necessary to know its absorption in the infra-red spectral region. Interest in the absorption spectrum of AsH_3 led to the exploration of the same region for PH_3 and for NH_3 . A series of 4 papers describes (I) the app. and (II) methods adopted, (III) the results found for these 3 gases, together with (IV) a comparison of inter-relationships and their bearing on mol structure. The app. consisted of a Nernst filament as source, absorption tubes of 100 mm. or 450 mm. length, a Hilger No. 2 infra-red spectrometer with either a rock-salt, quartz or fluorite prism, a 20-element Bi-Ag thermopile and a Paschen galvanometer. The absorption spectra of NH_3 , PH_3 and AsH_3 in the interval 1μ to 17μ are described in tables and curves, and some of the bands are resolved into P, Q and R branches. From the fine structure of certain bands the mean moment of inertia J, for the NH_3 mol is found to be 2.88×10^{-40} g. per sq. cm. and the radius of gyration 0.82×10^{-8} cm. For PH_3 these consts. are 4.78×10^{-40} g. per cm. and 1.025×10^{-8} cm., resp., while for AsH_3 there are two values of each depending on which band they are derived from; the moments of inertia are 6.51×10^{-40} g. per sq. cm. and 5.53×10^{-40} g. per sq. cm., the corresponding radii of gyration are 1.165×10^{-8} cm. and 1.07×10^{-8} cm. W. F. MEGGERS

The time intervals between the appearance of spectral lines in the spectra of alkali and alkaline-earth metals. GORDON L. LOCHER. *J. Optical Soc. Am.* 17, 91-101 (1928).—By the method of Beams and others, the time intervals between the appearance in spark discharge spectra of about 50 lines of Na, Li, Ca, Ba, Sr, Mg, Cd, Zn and N were measured to det. if there was any relation between these times and the nature of the lines or the positions of the elements emitting them in the periodic table. The time intervals for different lines varied from zero to about 2×10^{-8} sec. Most of the lines appeared to be emitted at the very beginning of the discharge, before the potential across the spark gap had dropped appreciably. There did not appear to be any definite relation between the time intervals and the nature or origin of the lines. A variation of the time intervals with the amt. of inductance was observed; the times were independent of the other elec characteristics of the circuits. W. F. MEGGERS

Regularities in the spark spectrum of hafnium (Hf II). WM. F. MEGGERS AND BOURDON F. SCHRIBNER. *J. Optical Soc. Am.* 17, 83-90(1928).—Assuming that enhanced lines which are developed with great intensity in the arc as well as in the spark spectrum must involve low-energy states of the ionized atoms, the relative values of 16 low levels combining with 27 higher energy states, have been established. These combinations account for 206 lines of the Hf II spectrum. Although it is impossible without Zeeman effects to assign all the quantum nos. to each level it appears likely that the normal state of the Hf atom is represented by a $2D$ spectral term arising from the electron configuration d^{2s} . W. F. MEGGERS

The band spectrum of water vapor. III. DAVID JACK. *Proc. Roy. Soc (London)* A120, 222-34(1928).—In previous papers (cf. C. A. 21, 3157; 22, 2109) details were given of bands in the spectrum of H_2O vapor, including the arrangement of the band 2608 A. U. and 8428 A. U. into P, Q and R branches, and measurements of a series of singlet lines lying close to the head of the band 2811 A. U. The advances which have recently been made in the theory of band spectra throw some light on their structure; in the present paper the new methods are applied to the analysis of the water vapor bands. These bands can be interpreted as arising from transitions between 2S and 2P levels; the 2P levels being double while the 2S levels are probably rotationally single. The P and R main branches are due to transitions, 1 A to 1 B, and 2 A to 2 B, while the Q branches show "crossing over," 1 A to 1 A and 2 A to 2 A. Other combinations give rise to satellites, in some of which the σ -selection rule does not hold. The most striking feature exhibited by these bands is the presence of a singlet branch for which the combination principle definitely indicates a transition of two units in j_k . It is therefore, concluded that, although the j -selection rule, $\Delta j = \pm 1, 0$ probably holds rigidly, the other selection rules (j_k and σ) are only an expression of the most probable transitions and cannot be taken as final. W. F. MEGGERS

The Zeeman effect in the band spectrum of helium. W. E. CURTIS AND W. JEVONS. *Proc. Roy. Soc. (London)* A120, 110-27(1928).—The Zeeman effects of the He band spectrum have been investigated in fields up to 20,000 gauss with an 8-foot concave grating and with a Fabry-Perot 1-cm. étalon crossed with a const.-deviation glass prism spectrograph. The ranges of wave lengths investigated with the grating were 4758-4365 Å. U. and 4162-3626 Å. U. while the range covered by the prism spectrograph was 5000-4300 Å. U. Although none of the magnetic components was fully resolved, a great many instances of line broadening have been observed, and some information as to the polarization of the components has been obtained by means of a double-image prism. With those bands which are due to transitions between S and P electronic states the results are in qual. agreement with theoretical predictions. The effects, i. e., widths of patterns, decrease rapidly with increase of rotation, and the polarization of the outer components is opposite in character for Q and for P and R type branches.

W. F. MEGGERS

The absorption spectra of solutions of cobalt chloride, cobalt bromide and cobalt iodide in concentrated hydrochloric, hydrobromic and hydriodic acids. W. R. BRODE AND R. A. MORTON. *Proc. Roy. Soc. (London)* A120, 21-33(1928).—In an earlier paper (cf. *C. A.* 22, 1907) the selective absorption in the spectral interval 600 to 710m μ of CoCl₂ in concd. HCl was shown to consist of a no. of superimposed, similarly shaped absorption bands. The frequency values at which these component bands exhibited a max. of absorption corresponded with integral multiples of a common or fundamental frequency, 12.28 f. (= fresnel = vibrations ÷ sec. $\times 10^{13}$). The same app. and method have now been used to extend the observations to 400m μ ; the fine structure observed in this region is a continuation of that previously found for CoCl₂ in HCl. The absorption of CoBr₂ in HBr has been detd. throughout the visible spectrum, and the curve has been analyzed into a series of component bands, the centers of which are multiples of the frequency difference, 11.70 f., between the bands. The absorption spectrum of CoI₂ in HI, between 500 and 900m μ has been detd. by a combination of visual and photographic methods, and has been analyzed into a series of component bands, the centers of which are multiples of the frequency difference, 10.79 f., between the bands. An increase in the mol. wt. of the cobalt-halide complex causes a decrease in the frequency difference. The similarity of the curves indicates a similar constitution for the 3 cobalt-halide complexes investigated.

W. F. MEGGERS

The theory of the Ramsauer effect. J. HOLTSMARK. Univ. København. *Naturwissenschaften* 16, 614-5(1928).—The treatment of the Ramsauer effect previously given (C. A. 22, 1273) is compared with that of Ehrenfest and Rutgers (*Naturwissenschaften* 16, 184(1928)) and is shown to be analogous to Rayleigh's theory of line gratings as well.

B. J. C. VAN DER HOEVEN

Interference of light quanta. A. PROCA. *J. phys. radium* [vi], 9, 73-80(1928).—Theoretical. If time is taken as one of the coördinates in developing the quantum theory, it is found that quanta must be coherent.

B. C. A.

The spectrum of ionized sodium. F. H. NEWMAN. Univ. College of the Southwest of England. *Nature* 122, 97(1928); cf. *C. A.* 22, 1099.—Several pairs of wave-no. differences in Na II previously reported by N. are interpreted on the term scheme given by Laporte (C. A. 22, 2887), and it is predicted that others correspond to differences between s', d and d' terms. The series of Na II should resemble those of Ne I, but more exptl. data in the Schumann region will be needed for a complete analysis.

F. A. JENKINS

Scattering of light in dispersed systems of high concentration. G. I. POKROVSKII. *Z. Physik* 46, 753-8(1928).—It is shown that for dispersed systems of high concn the intensity, I_d , of a beam after scattering by a thin layer is expressed by the equation $I_d = I_0[1 - e^{-(a\psi/\theta)}]$, where ψ and θ are quantities that can be calcd. from the n of the medium and from the relative n of the dispersed phase, a is a constant and I_0 the incident intensity. Values calcd. in this way agree fairly well with Woronkoff's data for silk fibers dispersed in various media.

B. C. A.

The quantum theory of scattering and dispersion. ADOLF SMEKAL. *Naturwissenschaften* 16, 612-3(1928).—Referring to a previous article (C. A. 18, 2834) predicting the possibility of wave-length shift of light scattered by excited mols., S. now points out the first exptl. confirmation in the Raman effect (C. A. 22, 1907). It is considered a new argument in favor of the profound analogy between the effects of electrons and of light quanta on atom systems; in the Raman effect an analogue of second-order collisions is found.

B. J. C. VAN DER HOEVEN

The spark potential of pure gases at low pressures. KURT ZUBER. *Naturwissenschaften* 16, 615-6(1928).—By assuming that n_0 positive ions liberate one electron from

the cathode on impact, Townsend's equation gives $\ln n_0 = \pi c_1 e^{-c_2 \pi/V}$ for $\pi = pL$, p pressure in mm. Hg, V potential difference between electrodes at distance L mm., c_1 and c_2 gas consts. For $0.8 < (\pi/\pi_{\min.}) < 7$, the V values for N_2 follow the equation for n_0 const. If $c_1 = k/\Delta_0 \ln n_0$, the Δ being the mean free path of electrons at pressure of one mm., it follows that $\pi_{\min.} = (\Delta_0/k) \ln n_0$ with k for H_2 or N_2 0.453 or 0.455, resp. For a mean velocity of the electrons of A volts $c_2 = (P - A)/\Delta_0$ due to elastic collisions; A is found for H_2 at 5.1 to 6.2 v., for N_2 5.2 to 6.2 v., depending on the P value.

B. J. C. VAN DER HOEVEN

The first spark spectrum of krypton. P. K. KICHLU. Science College, Patna. *Naturwissenschaften* 16, 546(1928) (In English); cf. C. A. 22, 27.—From the work of Abbink and Dorgelo (C. A. 22, 1540) K. has come to a complete analysis of the first Kr spark spectrum, accounting for 200 lines. The lowest states are 3P terms, originating from an electron configuration of $5N_2$; they combine with 4P , 3P , 2D , 2S from $4N_2O$.

B. J. C. VAN DER HOEVEN

A novel effect of light scattering in crystals. G. LANDSBERG AND L. MANDELSTAM. Univ. Moskau. *Naturwissenschaften* 16, 557-8(1928).—A quartz crystal was illuminated by a Hg arc light beam. The normal spectral lines (quartz spectrograph) of the light scattered perpendicular to the incident ray (2 to 14 hrs. exposure) have for 2 different quartz pieces distinct companion lines of slightly longer λ , one sharp, and indications of 2 or 3 more. These lines are not absorbed by an interposed quartz vessel filled with Hg vapor. For λ 2536 was found $\Delta\lambda = 30$, for 3126 $\Delta\lambda = 47$, for 3650 $\Delta\lambda = 63$. The frequencies found can be explained by assuming excitation of a $\lambda = 20.7\mu$ ultra-red proper frequency of the quartz. In calcite the same thing was found with $\lambda = 9.1\mu$ for the ultra-red frequency.

B. J. C. VAN DER HOEVEN

Characteristics of the neutral and of the singly and doubly ionized spectra of cerium. ARTHUR S. KING. *Phys. Rev.* 30, 366(1927).—By comparing the arc and spark spectra of Ce with that of the elec. furnace it was possible to distinguish between the ionized at. spectrum and the spectrum of the neutral atom. The latter for which the furnace is the only effective source, has been to a large extent unrecognized. A condensed spark discharge gave a large no. of doubly ionized lines, of which only the strongest group has been previously measured.

W. F. MEGGERS

Excitation of Cu II spectrum by positive neon ions. O. S. DUFFENDACK AND J. G. BLACK. Univ. of Michigan. *Phys. Rev.* 29, 925(1927).—Low-voltage arcs were maintained in mixts. of A and Cu and Ne and Cu in a suitable furnace and the spectra were photographed with a quartz spectrograph. The mixt. with A failed to produce spark lines but in the Ne mixt. the lines were strongly developed. The lines from the higher level were considerably more intense, relative to those from the lower level, than they are in the ordinary spark.

W. W. STIFLER

Infra-red spectrum of ammonia. W. F. COLBY AND E. F. BARKER. Univ. of Michigan. *Phys. Rev.* 29, 923(1927).—The absorption band of NH_3 at 10μ was analyzed into 2 overlapping bands with zero branches at 10.3μ and 10.7μ . About 12 lines were observed in each branch. Other NH_3 bands previously reported are interpreted.

W. W. STIFLER

Infra-red reflection spectra of some carbonates. E. K. PLYLER. Univ. of North Carolina. *Phys. Rev.* 29, 923(1927).—On reflection from the surface of clear calcite maxima were found at 6.36μ , 6.54μ and 6.62μ . These are ascribed to isotopes of Ca and suggest 3 isotopes instead of 2. The reflection spectra for $FeCO_3$ and for dolomite each showed 2 maxima.

W. W. STIFLER

Light absorption of some salts and its explanation. A. HANTZSCH. *Z. physik. Chem.* 134, 453-5(1928).—Solid alkali halides are transparent throughout the ultra-violet, while solns. of the bromides absorb considerably and solns. of the iodides strongly; the explanation suggested is that in the solids the halogen ions are completely satd., whereas in soln. they are hydrated. Solns. of the chloride, if purified to optical constancy, are transparent in the ultra-violet. SnI_4 gives an orange soln. in ether, no change in color from the solid occurring, while red HgI_2 gives a colorless soln. in ether. The difference is due to the fact that solid SnI_4 is a monomol. pseudo salt and dissolves unchanged, while solid HgI_2 is an assocd. pseudo salt and dissolves as a monomol. substance.

W. WEST

Ultra-violet absorption and emission spectra of carbon monoxide. J. J. HOPFIELD AND R. T. BRIDGE. Univ. of California. *Phys. Rev.* 29, 922(1927).—The pressure of CO in the receiver of the spectrograph was varied gradually from 0.05 to 850 mm. The spectrograms thus obtained made it possible to identify 9 absorption systems between 920 A. U. and 2064.5 A. U., representing transitions from the normal level to all the

excited electron levels previously known and to 4 new levels, viz., 58,927, 92,923*, 99,730 and 105,270 cm.⁻¹. These new data permit many tests of the combination principle. W. W. STIFLER

Light absorption of liquefied gases. F. G. BRICKWEDDE AND W. A. MACNAIR. Bureau of Standards. *Phys. Rev.* **29**, 916(1927).—The absorption spectra of liquid O, N and H from 2000 to 6500 Å. U. were photographed with a quartz spectrograph. A no. of new bands were found in the O spectrum. There were no absorption bands in the N spectrum throughout the entire range and none in the H spectrum between 2000 and 3800 Å. U. W. W. STIFLER

Conditions of emission of forbidden lines. A. S. EDDINGTON. *Month. Not. Roy. Astron. Soc.* **88**, 134-8(1927).—Possibilities are discussed to account for the brightness of forbidden lines in nebulas in comparison with ordinary lines. It is suggested that the stimulating radiation must be so weak that the atom is unlikely to absorb a quantum during the full duration of the metastable state. A similar explanation would hold if nebular light were due to ordinary temp. collisions, but the latter is regarded as improbable. It is shown to be unlikely that the coronium spectrum can consist of forbidden lines. R. C. A.

Shading of band spectra and degeneration. H. LUDLOFF. *Naturwissenschaften* **16**, 611-2(1928).—Two neutral atoms can bind each other either by the spatial distribution of their charge "clouds" and mutual polarization or by exchange and degeneration of their electron systems. The sum total of the effects detrs the energy of the bond. Which one of the bond types predominates can be seen from the shading of some band spectra. Shading to the red signifies that the valence electron promotes the bond (the lower energy level has smaller nucleus distance and higher bond energy); violet shading indicates disturbance of the bond by the valence electron. Examples of both cases, H₂ for red shading, MgH, CaH, ZnH, CdH, HgH for violet shading, are discussed on a basis of their quantum mechanics. In the first case the Pauli principle leads to an attractional effect, the result of the mutual interaction; in the second case to repulsion. The 2 types often correspond to even and odd electron mols., resp. B. J. C. VAN DER HOEVEN

The ultra-violet band spectra of nitrogen. R. T. BIRGE AND J. J. HOPFIELD. Univ. of Calif. *Phys. Rev.* **29**, 356(1928).—Previous work by the same authors has been extended to include 60 bands between λ 1205 and λ 2025. The assignment of this system to NO is not justified. L. D. R.

Multiplets in the spectra of Cr (III) and Mn (III). R. C. GIBBS AND H. E. WHITE. Cornell Univ. *Phys. Rev.* **29**, 917(1927); cf. *C. A.* **21**, 1063, **22**, 1276. The systematic arrangement of radiated frequencies arising from the transition of an electron from a $4p$ to a $4s$ orbit in the presence of 0, 1, 2, 3, etc., $3d$ electrons is extended for the elements of the first long period from K to Cu. The Mosely diagrams for the deepest lying terms give very straight lines and reveal a regular and systematic displacement in passing from one isoelectronic system to another. W. W. STIFLER

The alleged luminosity of liquids on adiabatic compression. G. TAMMANN AND C. KRÖGER. Univ. Göttingen. *Z. anorg. allgem. Chem.* **171**, 364-6(1928).—The luminosity of liquids and gases unter pressure, as shown by Desaignes and Heinrich, is not due to a compression of enclosed air bubbles, according to expts. In one series of expts., in which air bubbles were held in the compressed liquids, castor oil, e. g., was luminous in 46 cases, and non-luminous in 94 cases. In another series in which air bubbles were absent, castor oil was non-luminous in all (33) cases. Heinrich states that the luminosity was greatest at the lower end of vertical compression tubes where the no. of air bubbles must be very small. A. J. CURRIER

The afterglow of mercury resonance radiation on addition of nitrogen. G. RAMSAUER. *Astrophysik. Observat., Berlin. Naturwissenschaften* **16**, 577(1928).—The resonance luminescence λ 2537 of Hg vapor in a 5-cm.-long quartz vessel at room temp., with N₂ addn. up to 8 cm. pressure, excited by Hg light, continued for $1/300$ sec. after excitation, decreasing in intensity with time. No such effect was found without N₂. For the most favorable conditions (cooled lamp, 4 mm. N₂), the line appeared on a photographic plate after $1/2$ -hr. exposure (Fuess spectrograph, Becquerel phosphoroscope). The effect is explained by assuming that metastable excited Hg atoms in 2^3P_0 condition, produced by the N (Wood, *C. A.* **20**, 17), are brought back to 2^3P_1 by impact with N₂ (Foote, *C. A.* **21**, 3555) and from there emit resonance radiation while returning to 2^3P_0 . The time period of radiation has to be of the order of that of the life of the metastable state (Dorgelo, *C. A.* **20**, 1173). The theory was confirmed by introducing an amt. of H₂ in the Hg tube sufficient to reduce the resonance line to $1/4$ of its previous strength; the H₂ destroys the metastable Hg state; simultaneously all afterglow dis-

appeared (less than $1/2000$ sec.). A Br filter in the path of the exciting light does not influence the effects.

B. J. C. VAN DER HOEVEN

Phosphorescent aluminum nitride, activated by silicon. ERICH TIEDE, MAX THIMMANN AND KARI SOMMER. *Zeits. Physik.* **B**, 612, 1563-75(1927). In an analogous manner to the activation of BN by C, AlN becomes phosphorescent when it contains a small quantity of Si. Two methods of prepg. activated AlN are described. In one, finely divided Al to which has been added pure SiO_2 or which contains up to 10% SiO_2 , is heated at 1300° in a Mo-lined Ni tube while a stream of NH_3 is passed over it. In the other method, AlCl_3 is purified by sublimation and then converted by the action of NH_3 into the addn. compd. $\text{AlCl}_3\cdot\text{NH}_3$. This is placed in a specially constructed app. in which it can be vaporized by heating to about 400° , the vapor coming in contact with a W spiral heated to about 1000° , N being passed through the app. at the same time. The N is previously bubbled through SiCl_4 to provide the necessary Si. The AlN obtained is yellowish white, hard and shows a pronounced blue phosphorescence. The activating effect commences with a Si content of about 0.5%, is a max. at about 5% Si and then slowly decreases. Analysis of the emission shows it to consist of very short-wave-length radiation (under 300μ), lying chiefly in the blue zone, and showing 3 bands, analogous to BN. AlN phosphorescence is excited best by the Fe arc and then the Hg vapor lamp. No other element possesses the property of activating AlN. BN and AlN are distinguished from the sulfide phosphors in the fact that they are activated by non-metals while the sulfide phosphors are activated by extremely small quantities of the heavy metals. X-ray examn. of the AlN phosphor shows its crystal structure to be of the diamond type, similar to that of Si, and only when this structure is found is the material phosphorescent. H. S.

Active nitrogen. V. The decay of the nitrogen afterglow. ERIC JOHN B. WILLEY. *J. Chem. Soc.* **1928**, 1620-9; cf. *C. A.* **22**, 915.—Investigations are made to det. if the total N_2 pressure greatly influences the N-glow decay process. Gas flow speeds up to 3500 cc. hr. and pressures to 10 mm. give brilliant glows. An r.m.s. current of 20 milliamp. is used in the discharge, 4 quart-size Leyden jars being in parallel with it. Intensities of glow arc measured with an Eastman colorimeter (*Nature* **118**, 30(1926)). From measurements of the decay in the observation tube at varying flow speeds and pressures, curves of the sq. root of the glow intensity against the time (distance along the tube) are plotted. With times so expressed, comparable results are obtained only when the slopes of these lines are multiplied by $\frac{\text{gas pressure}}{\text{flow rate}}$. Tables of cor. slopes

show that the decay rate increases with the gas pressure. Graphically it is seen that $\log S/\log p = 3$ (slopes vary as the gas pressures cubed). These expts. indicate that the decay of the N after-glow is of the 5th order between 2 and 8 mm. pressure. Calcns. show that if the reaction, in reality, is bimol., the concn. of the glow-producing system (assuming it to be at.) is $10^{-5} - 10^{-6}$ of the chemically active N present under the same conditions. W. suggests, to overcome this difficulty, that the decay process consists of an initial slow ternary collision ($2\text{N} + \text{N}_2 = 2\text{N}_2$), followed by 2 rapid binary impacts, neutral N_2 being involved as one of the two reactants. The neg. temp. coeff. is accounted for by this theory, which also renders probable the independence of glow and chem. activity under certain circumstances. If one at least of the decay stages gives an excited mol. of $10^{-6} - 10^{-8}$ sec. life, then the order of the decay process, and the chem. and luminous phenomena connected with active N most probably depend on the total N_2 pressure. J. BALOZIAN

Nature of the nitrogen afterglow. A. G. WORTHING. Nela Research Laboratory and Univ. of Pittsburgh. *Phys. Rev.* **29**, 907-8(1927).—Three 15-cm. glass bulbs, symmetrically joined by large glass tubing, were filled with N_2 at 1 to 5 mm. pressure. The effects observed under various conditions of discharge are described. It seems probable that either the afterglow carriers or some of the agents active in the production of these carriers are electrically charged. The theory that the afterglow is due to impacts of neutral unexcited atoms and mols. is not supported by these observations. W. W. STIFLER

Chemiluminescence by oxidation of dyes by ozone. N. N. BISWAS AND N. R. DHAR. Allahabad Univ., India. *Z. anorg. allgem. Chem.* **173**, 125-36(1928).—Chemiluminescence due to oxidation of various fluorescent and non-fluorescent dyes by ozonized O has been studied. The light phenomenon is stronger in solns. other than water and depends on the solvent. O alone has no effect. A photographic plate is not affected by the action and a quartz spectrograph, calibrated by a He tube, was therefore used to measure the effect. The dyes studied were eosin, uranin, safranin,

neutral red, rhodamine B, rhodamine B. J. N. N., thioflavine, cartharamin, erythrosine and esculin. Reducing agents such as terpine, hydroquinone sodium sulfite, nicotine, brucine, etc., suppress the illumination. The relation between chemiluminescence and fluorescence is discussed from the viewpoint of activation of the mol. It is believed that when Na and Cl react in the presence of Hg atoms of the latter are absorbed in the activated state. This would account for the Hg line 2537 Å. U. produced. A similar explanation would explain activation of H on Pt and Pd surfaces. The decompn. of ozone by a suppression of illumination is not always the reason for the retarding action in chemiluminescence.

RAYMOND H. LAMBERT

The chemistry of band spectra. R. Mücke. *Naturwissenschaften* 16, 521-9 (1928).—A review including the constitution of "spectrographic" mols., energy of chem. bonds, distances of atoms and vibration frequencies, dissocn. energy, interpretation of reaction processes, etc., as found from the study of band spectra. Several tables are given of vibration frequencies of hydrides, oxides, nitrides, halides and mols. of elements, also one of the dissocn. energy of 20 compds. B. J. C. VAN DER HOEVEN

The interpretation of diffuse molecular spectra. Experiments on the photochemical decomposition of ammonia. K. F. BONHOEFFER AND L. FARKAS. Kaiser Wilhelm-Inst., Berlin-Dahlem. *Z. physik. Chem.* 134, 337-44 (1928).—V. Henri interprets those mol. electronic-vibrational spectra which show no rotational fine structure as indicating a state of "predissociation" in which the mol. passes to an excited state unquantized with reference to rotation. B. and F. see rather a Heisenberg resonance phenomenon, in which an excited mol., instead of returning to the normal state with the emission of radiation, spontaneously decomposes, the very short life in the excited state causing an abnormal broadening of the rotational lines and consequent disappearance of fine structure. Evidence for this view is seen in expts. on NH_3 , which, in spite of its small moment of inertia, shows in the far ultra-violet a system of partial bands without fine structure (cf. Liefson, *C. A.* 20, 1951). (1) NH_3 streaming through a discharge tube at sufficiently high velocity gave no emission spectrum, despite the low excitation potential. Conclusion: The NH_3 mol. is really excited, but does not radiate. (2) At pressures of a few mm. and slower stream, the NH_3 bands were obtained in absorption against a continuous background on passing a discharge through the tube. (3) An attempt to observe fluorescence in NH_3 gave a neg. result, again in accordance with a very short life period. (4) NH_3 was decompd. rapidly at 0.001 mm. Hg by radiation in its absorption region suggesting spontaneous decompn. The low quantum yield observed by Warburg and by Kuhn must be due to a reversal of the decompn. In general, predissocn. spectra will exist when the absorbed quantum is greater than the energy required to dissoc. the mol. at the part linked by the electrons concerned in the absorption.

W. WEST

The quantum yield on photolysis of silver chloride. P. FELDMANN. Bayer. Akad. Wissensch., München. *Naturwissenschaften* 16, 530-1 (1928).—The photochem. yield of decompn. of AgCl by 365μ light was measured on pure AgCl , suspended in water, the Cl being detd. potentiometrically (Lange and Schwartz method with NaNO_2 addn.). The energy irradiated was measured with a standard thermopile. The quotient (Cl atoms)/(quanta) was found from the av. of 8 expts. to be $0.86 \pm 2\%$. Further irradiation of exposed AgCl gives considerably lower values, the difference of the quotient from 1 is therefore ascribed to inactive absorption of some quanta by free Ag atoms. The result agrees with that of Eggert and Noddack (*C. A.* 19, 2452) by Ag detn. in AgCl gelatin.

B. J. C. VAN DER HOEVEN

Photochemical reactions. III. Influence of polarized radiations on certain photochemical reactions. S. S. BHATNAGER, H. L. ANAND AND A. W. GUPTA. *J. Indian Chem. Soc.* 5, 49-57 (1928).—Polarized and heterogeneous light of equal intensities have the same effect on the photochem. reactions occurring between diammonium oxalate and HgCl_2 and on the decompn. of alk. H_2O_2 . From previous results (*C. A.* 19, 3429; 20, 870) it is concluded that polarized light possesses a selective effect only in heterogeneous systems.

B. C. A.

The products of the photochemical decomposition of hydrogen azide. ARNOLD O. BECKMAN AND ROSCOE G. DICKINSON. Calif. Inst. Technology. *J. Am. Chem. Soc.* 50, 1870-5 (1928).—On brief illumination HN_3 gives a gas, non-condensable in liquid air, while on longer illumination a white solid, presumably ammonium azide (NH_4N_3) is formed. The photochem. threshold was certainly below $\lambda 2400$, and light absorption of gaseous HN_3 was shown to set in at $\lambda 2200$ Å. U. The quant. extent of decompn. and identity of the products of decompn. were established by measurements with quartz-fiber and McLeod gages. From expts. with long times of illumination,

the formation of N_2 , H_2 and NH_3 , occurred simultaneously. The mol. wt. of HN_3 detd. by pressure measurements is 43.6 ± 2.1 . H. R. MOORE

Experimental technic of photochemistry. V. Reflection losses in the optical system of the higher ultra-violet monochromatic illuminator. H. N. RIDYARD AND D. W. G. STYLER. *J. Phys. Chem.* **32**, No. 6, 861-7(1928).—The reflection of the Hg lines by the mirror in the Hilger ultra-violet monochromatic illuminator has been studied experimentally. The reflection losses at the various quartz surfaces in this instrument have been calcd. From the figures obtained, the total transmission of the Hg lines has been calcd., together with factors to reduce results obtained with the instrument to a common base. Wave lengths in μ : 254, 265, 313, 365, 405, 436, 546, 579; transmission in %: 43.1, 44.6, 46.2, 47.5, 47.5, 48.0, 48.4, 48.5; factors: 1.13, 1.09, 1.05, 1.02, 1.02, 1.01, 1.00, 1.00. A. L. HENNE

The photochemical action of x-rays of different wave lengths. R. GLOCKER AND O. RISSÉ. *Techn. Hochschule. Stuttgart. Z. Physik* **48**, 845-51(1928).—The decompn. of H_2O_2 and $K_2S_2O_8$ in $M/600$ aq. soln. produced by x-rays of wave lengths 0.19, 0.56, 0.71, 1.54 A. U. was investigated. The quantity of substance decompd. is proportional to the amt. of x-ray energy converted to electronic energy, independent of the wave length. For the complete decompn. of 1 mol. of H_2O_2 in $M/600$ aq. soln., 70,000 cal. of electronic energy is required; for $K_2S_2O_8$ the quantity is 2.45 times greater. Not only the electrons liberated from the atoms of dissolved substance, but all the electrons produced in the soln. are effective. The Einstein photochem. equiv. law is inapplicable for x-rays, because of the great no. of secondary electrons produced besides those primarily liberated by the radiation. W. WEST

Photographic action of H-rays from paraffin and atom fragments. MARIETTA BLAU. *Z. Physik* **48**, 751-64(1928).—It has already been shown that an α -particle obliquely incident on a photographic plate produces a track appearing under the microscope as a row of points. H particles produced by the action of α -particles on paraffin or by at. disintegration show similar tracks. While for α -particles, every grain in the path is affected, the distance sepg. the blackened grains produced by H-particles shows that not every grain is changed; the ratio of the av. distance between the points for α - and for H-particles of the same velocity is 0.64, and for faster H-particles 0.51. The photographic method is not suitable for quant. measurements in at. disintegration because of the unfavorable yields caused by the necessary oblique incidence; and because H-rays of a residual range of less than 2.8 cm. are only partly observed, and those below 1.5 cm. residual range not at all. The method is suitable for the qual. recognition of H-particles, since in the absence of α -particles, a single point track is objective proof of H-particle. W. WEST

Combination of hydrogen and oxygen by electric discharges and x-rays. ROGERS D. RUSK. North Central College. *Phys. Rev.* **29**, 907(1927).—The results obtained in the low-voltage arc indicate that combination occurs chiefly at or near the cathode. In the Geissler tube and the electrodeless discharges and with x-rays the combination seems to be a matter of gaseous collision. The results agree with the idea that combination is proportional to the no. of ions present. W. W. STIFLER

The absorption spectra of nitric oxide. MAURICE LAMBREY. *Compt. rend.* **187**, 210-2(1928); cf. *C. A.* **22**, 2325.—Two curves are published to represent the coeff. of absorption α of NO as a function of the wave length, special details being given for 2 doublets, 2267.85 A. U., 2261.5 A. U. and 2153.75 A. U., 2148.15 A. U. W. F. M.

Spectrochemistry and constitution of azoxy compounds. K. VON AUWERS AND P. HEIMKE. Chem. Inst. Marburg. *Ber.* **61B**, 1037-41(1928).—Homogeneous azoxy-compds. are most readily prepd. by oxidizing azo compds. with H_2O_2 . The following data, among others, are recorded for the homogeneous substances: azoxybenzene, d_4^{20} 1.1590, n_D^{20} 1.65103; *o,o'*-azoxytoluene, d_4^{20} 1.0548, n_D^{20} 1.57686; *m,m'*-azoxytoluene, d_4^{21} 1.1136, n_D^{21} 1.63345; α -*p*-bromoazoxybenzene, d_4^{20} 1.4068, n_D^{20} 1.64967; β -*p*-bromoazoxybenzene, d_4^{20} 1.4138, n_D^{100} 1.64497; α -*p*-ethoxyazoxybenzene, d_4^{20} 1.1082, n_D^{99} 1.62363; β -*p*-ethoxyazoxybenzene, d_4^{20} 1.1068, n_D^{100} 1.61348; *p*-ethoxyhydrazobenzene, d_4^{20} 1.0556, n_D^{100} 1.57491; *p*-phenetidine, d_4^{15} 1.0652, n_D^{15} 1.55715. Observations for certain compds. in quinoline are also given. The data strongly support the constitution assigned to azoxy compds. by Angeli. The behavior of *o,o'*-azoxytoluene is, however, exceptional and may possibly indicate the presence of a 3-membered ring. B. C. A.

Spectrochemical observations on azo compounds. K. VON AUWERS AND P. HEIMKE. Chem. Inst. Marburg. *Ber.* **61B**, 1030-6(1928).—Observations on Me and Et azoisobutyrate give the value $D = 3.179$ for the unconjugated—N:N—group,

which is in good agreement with the datum $D = 3.266$ deduced by Lochte, Noyes and Bailey (*C. A.* 17, 267) from expts. on azoisopropane. Observations on purely aromatic azo compds. are hampered by the difficulty of obtaining homogeneous products by reduction of nitro compds. in alk. soln. since these usually contain varying amts. of azoxy substances; homogeneous azo derivs. are obtained by treating pure hydrazo compds. with the necessary amt. of Br. The color of the substances usually inhibits measurement except with the H_{α} and sometimes the yellow He line. In cases where the high m. p. of the compd. necessitates the use of a solvent, quinoline is found very serviceable. The sp. exaltations for azobenzene and its homologs are grouped closely round the mean value $+3.05$. This high value is due to the structure of the substances since the value of EF_n^{20} for the analogously constituted *m*-methylstilbene is $+3.1$; the twice-broken, treble conjugations $C \cdot CR \cdot C \cdot C \cdot CR \cdot C$ and $C \cdot CR \cdot N \cdot N \cdot CR \cdot C$ are therefore spectroscopically equiv. Entry of a hydroxyl or an alkoxy group into the azobenzene mol. invariably increases these exaltations, but the action of the groups is unequally strong and depends on their position. The following data, among others, are recorded for the homogeneous substances: Me azoisobutyrate, $d_4^{17.3} 1.0365$, $n_D^{17.3} 1.43335$; Et azoisobutyrate, $d_4^{18.9} 0.9932$, $n_D^{18.9} 1.42831$; phenylazoethane, $d_4^{21.9} 0.9628$, $n_D^{21.9} 1.53133$; azobenzene, $d_4^{78.1} 1.0362$, $n_D^{78.1} 1.62662$; *m*-methylazobenzene, $d_4^{17.6} 1.0658$, $n_D^{17.6} 1.64822$; *o,o'*-dimethylazobenzene, $d_4^{65.3} 1.0215$, $n_D^{65.3} 1.61804$; *m,m'*-dimethylazobenzene, $d_4^{66.2} 1.0123$, $n_D^{66.2} 1.61519$; *o*-methoxyazobenzene, $d_4^{100} 1.0728$, $n_D^{100} 1.62652$; *p*-ethoxyazobenzene, $d_4^{99.6} 1.0400$, $n_D^{99.6} 1.62355$; benzencazothymol, $d_4^{100.2} 1.0328$, $n_D^{100.2} 1.63169$; benzencazothymol ethyl ether, $d_4^{100} 0.9791$, $n_D^{100} 1.59345$; *n*-propyl *p* hydroxybenzoate, $d_4^{102.1} 1.0630$, $n_D^{102.1} 1.50503$; *n*-propyl anisate, $d_4^{100} 1.0054$, $n_D^{100} 1.47977$. Measurements are also recorded for certain of the compds. dissolved in quinoline, abs. alc., or propyl butyrate. The ethyl ether of benzencazothymol, m. 85° , has not been described previously.

B. C. A.

Absorption of ultra-violet light by organic substances. IX. L. KWIECINSKI AND L. MARCHLEWSKI. *Bull. soc. chim.* 43, 725-43 (1928).—See *C. A.* 21, 3828, 22, 1102, 2108, 3096.
A. S. CARTER

Analysis of pitchblendes (KÖRNER, HECHT) 7. The content of Katanga pitchblende (HECHT, KÖRNER) 7.

LYMAN, THEODORE. **The Spectroscopy of the Extreme Ultra-Violet.** 2nd ed. New York. Longmans, Green & Co. Price, about \$3.75.

PERRIN, J. **Les atomes.** Paris. Dunod 334 pp. F. 10

REINICKE, RICHARD: Über die Veranschaulichungsmöglichkeit des gesamten Spektralgebietes durch ein gemeinsames kubisches Elektronengitter. München-Schwabing. Selbstverlag. 16 pp. M. 1.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electrometallurgy of steel for foundry use. R. J. RICHARDSON. *Iron & Steel Canada* 11, 232-7 (1928).—A brief illus. review of different types of elec. furnaces. Characteristics are noted of: furnace linings; basic operation; removal of the elements; refining slags; acid practice; reducing acid conditions; time of heat; and a comparison of acid and basic elec. steel. The chief disadvantage of acid steel is the presence of occluded or dissolved oxides which with higher S causes rearing of the castings during contraction and possibly loss of mech. strength. Elec. conversion costs are higher in fuel, refractories and electrodes, while the converter uses more expensive scrap and has higher melting losses. A few test results are tabulated. The future of the elec. furnace depends upon: (1) the regularity of high-grade production; (2) the ability to cast thin sections without re-run; and (3) the lower % of rejected castings.

W. H. BOYNTON

The high-frequency induction furnace for chemical preparations above 1000° (ferrous oxide). C. N. SCHURTE and CHAS. G. MAIER. *Trans. Am. Electrochem. Soc.* 54 (preprint), 13 pp. (1928).—The use of the high-frequency induction furnace for

chem. preps. above 1000° involves many special problems of technic. Varieties of furnace equipment, including a simple type of *vacuum furnace* not hitherto described, are discussed. Some special types of *crucibles*, and methods of making them, are given in detail. New methods for the prepn. of FeO , using the induction furnace, are described. Miscellaneous items of technic, which may be helpful to those having to prep. chem. samples above 1000° , are included. C. G. F.

The consumption of electrodes in the electric furnace and its causes. A. TENIVELLA. *Met. ital.* **20**, 253-8(1928).—A review and discussion, dealing with the various conditions of operation of the elec furnace and the factors which lead to destruction of the electrodes. C. C. DAVIS

Observations relative to the control of a charge in the electric furnace. A. TENIVELLA. *Met. ital.* **20**, 205-10(1928).—A discussion of the best methods of operating an elec. furnace, including its inspection and repair, charging, the oxidizing period of the fusion, refining, control of the compn., control of the temp., pouring and the economic balance. C. C. DAVIS

Time switches increase usefulness of electric furnaces. JAMES FAULKNER. Commonwealth Edison Co., Chicago. *Elec. World* **92**, 368(1928).—The current is automatically switched on and the furnaces start operating several hours before the working day for the attendant begins. C. G. F.

Further data on operating cost of a platinum-wound electric furnace. EDWARD ORTON, JR., AND J. F. KREHBIEL. *J. Am. Ceram. Soc.* **11**, 685-6(1928); cf. C. A. **21**, 2849. C. H. KERR

The production and uses of beryllium. KURT ILLIG. *Trans. Am. Electrochem. Soc.* **54** (preprint), 11 pp (1928); cf. C. A. **22**, 938. —Although Wohler obtained metallic Be a hundred years ago, by reduction with K, it was not until recently that Stock and Goldschmidt produced the metal by the fused electrolyte (fluoride) method. Their method has been developed by the Beryllium Institute, and large masses of metal (150 g.) are now turned out commercially. Properties of certain new metal alloys are enumerated. C. G. F.

The effect of adsorbed gas on the contact resistance of carbon. ROBERT H. WRIGHT WITH MELVILLE J. MARSHALL. *Trans. Am. Electrochem. Soc.* **54** (preprint), 11 pp.(1928). —The effect of adsorbed gas on the contact resistance of C has been investigated, in the light of the hypothesis that adsorbed gas films on the C surface may be responsible for part of this contact resistance. The contact resistance of C filaments was measured, both in air and after outgassing at 1700° in a high vacuum. Curves were obtained showing the variation of resistance with pressure under these conditions. For contacts too light to be measured, much lower resistances could be obtained after outgassing. For intermediate contact pressures outgassing reduced the resistance to about $\frac{2}{3}$ of its original value. Heavy contacts showed about the same resistance for the 2 conditions. It is shown that this is in accordance with the theory proposed. C. G. F.

A voltaic hydrogen generator. W. CECIL GARDINER AND GEO. A. HULETT. Princeton Univ. *Trans. Am. Electrochem. Soc.* **54** (preprint), 9 pp (1928).—A H generator is described which is applicable for use when a slow, steady evolution of pure H is desired for a long time. The generator consists of an amalgamated Zn anode and a Pt black or Ni cathode in an electrolyte of NaOH contg. a little Ba(OH)_2 . The generator operates at full capacity on short-circuit, but may be controlled by introducing a variable resistance in the circuit. No impurities are introduced into the H when the generator is allowed to run on a short-circuit. The generator has been shown to give off O_2 -free H. The generator is designed to eliminate dead space. C. G. F.

Cathodic halogen. R. H. CLARK AND R. H. BALL. *Trans. Am. Electrochem. Soc.* **54** (preprint), 5 pp.(1928).—The electrolytic products of certain *N*-halogen compds., *N*-bromo- and *N*-iodo-succinimide and *N*-bromo-acetanide, in various org. solvents have been investigated. Measurements of the oxidizing power of these compds. support the belief that the halogens are positive. On electrolysis, with Ag electrodes, 1.5 cm. apart, the halogen deposited on the anode in all solvents used with the exception of acetonitrile. In this latter solvent the halogen from freshly purified $(\text{CH}_3\text{CO})_2\text{NBr}$ deposited wholly on the cathode. The halogen from $(\text{CH}_3\text{CO})_2\text{NI}$ and AcNHBr in the same solvent repeatedly deposited on both electrodes. C. G. F.

Conductivity of organic solvents. D. B. KEYES, SHERLOCK SWANN, JR., AND H. W. HOERR. *Trans. Am. Electrochem. Soc.* **54** (preprint), 7 pp.(1928).—The conductivities of several of the more common org. solvents, pure compds. and mixts. were measured. The d. c. method of cond. measurement was used, due to the fact that the Kohlrausch method was unsatisfactory on account of the low cond. of some

of the materials examd. The method described is satisfactory for detns. of conductivities of com. org. liquids.

Solvent	Cond. (reciprocal Int. ohm.-cm.) $\times 10^{-12}$ at 25°	Solvent	Cond. (reciprocal Int. ohm.-cm.) $\times 10^{-12}$ at 25°
1. Pentasol (com. Am alc.)	360,000	6. Toluene	49
2. Pentasol acetate (Am acetate)	1,600	7. Bu alc.	2,900,000
3. Isoamyl alc.	8,000	8. <i>tert</i> Bu alc.	280,000
4. Cellosolve (ethylene glycol monoethyl ether)	1,800,000	9. Et lactate	1,000,000
Cellosolve acetate (ethylene glycol monoethyl ether acetate)	47,000	10. Diethyl carbonate	910
		11. Et acetate 85%	320,000
		12. Et acetate 99 to 1	3,000
		13. Bu acetate 85%	16,000

Electroplating on aluminum and its alloys. HAROLD K. WORK. *Metal Ind.* (London) 33, 81-4, 105-8 (1928).—See C. A. 22, 1915, 2516. C. G. F.

Polarization and resistivity in nickel plating solutions. ROY L. DORRANCE AND W. C. GARDINER. *Trans. Am. Electrochem. Soc.* 54 (preprint), 9 pp. (1928).—With a Haring cell, the anodic and cathodic polarizations and resistivities of various Ni-plating solns. were measured at 17°. The anodic polarization was considerably reduced by the presence of chloride ion, although no appreciable difference is noted in the action of the metallic ion, K, Na, NH₄, Ni or Mg assocd. with the chloride ion. The effect of bromide ion is the same as that for the chloride ion, while the fluoride ion does not materially reduce anodic polarization. Measurements were also made on other recommended solns. H. G.

Nickel anodes and the acidity of the solution. R. G. SUMAN. *Metal Ind.* (N. Y.) 26, 350 (1928).—A short summary of an extended expt. with Ni anodes as to *p_H* change. The object of the expt. was: (1) to det. why a Ni soln. tends to become either acid or alk.; (2) thence, to discover a remedy; (3) to ascertain the proper amt. of chlorides; and (4) to furnish a good Ni soln. for electrotyping. The reaction varied with the compn. of the anodes. The soln. was used in Pb-lined tanks and contained 9 oz. (255 g.) single Ni salts, 0.7 oz. (19.8 g.) NH₄Cl, and 1 gal. (3.8 l.) water. A 6.1 *p_H* soln. is about the most efficient for Ni plating. A graph gives detailed observations of the expt. C. G. F.

Automatic cadmium plating. FAY LEONE FAUROT. *Iron Age* 122, 341 2 (1928).—A brief description of the automatic Cd plating equipment at the Fordson plant for plating Model A brake shoes. Four main tanks are: (1) the elcc. cleaning soln.; (2) the first water rinse; (3) the Cd plating tank; and (4) the hot water cleaning or rinsing tank. The parts in groups of 10 are hung on the suspension frames which are placed on conveyor hangers in pairs. To get from the loading position and from tank to tank, a slowly revolving telescopic arm picks the hanger off the supporting conveyor fingers, lifts it straight up, carries it forward to its elevated position, and lowers it again on the forward moving conveyor and the work is submerged in the next soln. The cleaning soln. contains Na₂PO₄, soda ash, NaOH and a little NaCN. Small parts are handled in tumbling barrels. W. H. BOYNTON

Porosity of electrodeposited chromium. E. M. BAKER AND A. M. RENTZ. *Trans. Am. Electrochem. Soc.* 54 (preprint), 9 pp. (1928).—A study was made of the porosity of Cr deposited from CrO₃ plating baths. Findings of other workers have been confirmed and extended. Within the thicknesses of nil to 4×10^{-3} mm., a point of min. porosity was found to exist for all bath compns. and temps. investigated. The thickness of deposit necessary to give min. porosity increases with increasing bath temp., but the least porous deposits can be obtained at higher temps., about 55°. The nature and cause of porosity of electrodeposited Cr are discussed in some detail. C. G. F.

Present status of chromium plating technic. A. SIRMENS. *Z. Elektrochem.* 34, 264-9 (1928).—A review of the earlier work on Cr plating, followed by a discussion of the methods in use at present. H. STOERTZ

Steel anodes for chromium plating. E. M. BAKER AND E. E. PETTIBONE. *Trans. Am. Electrochem. Soc.* 54 (preprint), 3 pp. (1928).—Steel anodes are frequently used in Cr plating baths. The effects of variation in the % of C in the steel on the rate of anode corrosion, and on the oxidation of trivalent to hexavalent Cr, were studied. The steel having the lowest C was most resistant to corrosion; and electrolytic Fe was more resistant than steel. The equil. concn. of trivalent Cr was about the same for all of these anodes. C. G. F.

The co-deposition of copper and graphite. COLIN G. FINK AND JAMES D. PRINCE. *Trans. Am. Electrochem. Soc.* 54 (preprint), 6 pp. (1928).—Cu and graphite were co-deposited from CuSO_4 solns. Upon electrolyzing "aquadag," the graphite was deposited on the anode. Upon addn. of aquadag to acid CuSO_4 solns., graphite was deposited, with the Cu, on the cathode. Gelatin was used for stabilization, a little over 1 g./l. being sufficient. Upon analysis, as much as 16% graphite (42% by vol.) was found in the cathode deposit, the balance being Cu. C. G. F.

Current capacities of copper bars. ANON. (Electrolytic Equipment) Commonwealth Pr. Corp. of Mich. *Elec. World* 92, 407-8 (1928).—Data are presented for the detn. of the most economical max. current-carrying capacities of $\frac{1}{4}$ in. bus Cu bars. The values are given for a 30° rise in temp. with an ambient temp. of 25° . Various bus mountings are taken into account. C. G. F.

Process for maintaining or restoring the activity of negative plates in lead storage batteries. LÉON GAGNAUX. *Bull. soc. ind. Mulhouse* 94, 192-4 (1928).—(Sealed Note 1910, June 30, 1909).—Treatment of org. substances such as resins, starches, oils, fats, hydrocarbons, etc., with hot concd. H_2SO_4 yields products which, when added to the electrolyte in storage batteries (about 2-4 g. per l.), maintains, increases or restores the activity of the neg. plates. The method of treatment may vary with the nature of the substance, e. g., PhOH need only be heated to about 75° to form $\text{C}_6\text{H}_4\text{OHSO}_3\text{H}$ which is much more efficient for the purpose than PhOH, while resins must be heated above 100° . The activity can be repeatedly restored by repeated addns. The latter have no harmful effect on the pos. plates, but on the contrary retard their disintegration. The unsulfonated material can be incorporated into the plates in the course of manuf., either alone or in conjunction with the inert fillers generally used, and they are then sulfonated during the charging of the battery. Neg. plates prepd. by the Planté process can be treated either by reducing in an electrolyte contg. a certain amt. of the sulfonated products, or by immersing after reduction in a concd. soln. of the unsulfonated product, drying, and then immersing in H_2SO_4 at a high enough temp. to carbonylize and sulfonate the substance. Report. EDMOND BANDERET. *Ibid* 194-5.—The neg. plate of a small storage battery was treated with $\text{C}_6\text{H}_4\text{OHSO}_3\text{H}$. At the end of a few months, after repeated charging, the capacity had not varied. A. P.-C.

Maintenance of the volt (Weston cell). G. W. VINAL. *Trans. Am. Electrochem. Soc.* 54 (preprint), 9 pp. (1928).—The history of the international volt since it was defined by the Elec. Congress of Chicago, in 1893, is briefly reviewed. The present standard for the volt in the U. S. is a group of Weston normal cells, maintained by the Bur. of Standards at Washington. Seventeen years have elapsed since the value 1.01830 volts at 20° was established for the Weston normal cell, and it is a matter of importance, therefore, to det. how well the working standards have maintained this value. Results of recent measurements, which are the beginning of an extended investigation, indicate that the standard in this country has not changed by more than 1 or 2 parts in 100,000. Such data as are available on the value of the volt in several countries indicate differences that emphasize the importance of renewed work on this subject. Some suggestions for the proper care of the unsatd. form of standard cell which is used commercially are given. C. G. F.

A thermionic voltmeter for measuring the peak value and the mean value of an alternating (current) voltage of any wave form. E. B. MOULLIN. *J. (Brit.) Inst. Elec. Eng.* 66, 886-94 (1928).—Approx. analysis shows that the mean grid current is sensibly proportional to the peak value of any wave form, and results are tabulated of direct tests on 5 different wave forms the oscillograms of which are reproduced. C. G. F.

Corrosion in the tin can. I. The electrochemical relations of iron and tin. ROGER H. LUECK AND HAROLD T. BLAIR. *Trans. Am. Electrochem. Soc.* 54 (preprint), 22 pp. (1928).—In acid solns. free from appreciable concns. of oxidizing substance the usual electrochem. relations of Fe and Sn are reversed, Sn assuming an anodic relation to Fe. The polarity reversal in the Fe-Sn cell is due to the large value for the H overvoltage of Sn as compared with that of Fe. No reversal occurs if the accumulation of H on the initially cathodic Sn surface is prevented. A hypothesis is suggested to explain the perforating character of certain red fruits, as opposed to many uncolored fruits of equal H-ion concn. which do not perforate. C. G. F.

The use of misch metal as an electrolytic rectifier. H. C. KREMERS AND D. C. THOMAS. *Trans. Am. Electrochem. Soc.* 54 (preprint), 7 pp. (1928).—Many of the rare earth metals, including misch metal, form satisfactory films for electrodes in electrolytic rectifiers. The presence of Fe is detrimental. Electrolytes composed of aq. solns. of mono-, di- and tri-sodium phosphates, Na tungstate and a mixt. of NaOH and tri-

sodium phosphate were used. The latter soln. was found best for practical purposes. The mono-sodium phosphate soln., being slightly acid, caused too rapid corrosion of the misch metal electrode, and hence was proven unsatisfactory. The Na tungstate soln. indicated a slight tendency to corrode the misch metal. The disodium phosphate, although better than the Na tungstate, was not wholly satisfactory. The tri-sodium phosphate gave very good results; after continued operation for 2 weeks, the misch metal showed practically no corrosion. The electrolyte composed of 25% Na_2PO_4 and 10% of NaOH gave results equal to that of the 30% Na_3PO_4 , with the advantage of a considerable increase of cond. of the soln. From the series of tests it was concluded that misch metal, when prep'd, Fe free, is a satisfactory metal for electrolytic rectifiers. The formation of the film is very rapid, and once formed is permanent. With electrodes fabricated in sufficiently generous proportions, this metal should be entirely satisfactory for com. use. Alloys of misch metal with Al and Mg seem to promise satisfactory results. Exptl. work along these lines is being continued C. G. F.

The color temperature and luminous efficiency relation for tungsten. H. BUCKLEY, L. J. COLLIER AND F. J. C. BROOKES. *Rec. trav. comm. intern. éclairage* 6th Session, Geneva, 1924, Reprinted in *Natl. Phys. Lab. Collected Researches* 20, 387-401 (1927). E. J. C.

From Cu ore to heavy current cable (REDZICH) 9. An electrically heated furnace for organic combustions (PHILLIPS, HELLBACH) 1. Nickel mirrors by the nickel carbonyl method (FINK, KING) 19. Increasing the conductivity of metals (U. S. pat. 1,683,209) 9.

CRENNELL, F. M., AND LEA, F. M. **Alkaline Accumulators.** New York: Longmans, Green & Co. 140 pp. Price, about \$4.

Electric batteries. ALBERT FAUCHER. Fr. 634,688, May 19, 1927. Pb electrodes are placed in porous cells filled with an amalgam of granulated Pb and active material which consists of fragments of old battery plates, minium, litharge and MgSO_4 , the proportions differing for the positive and negative elements.

Dry-cell electric battery. EDWARD C. SMITH (to National Carbon Co.) U. S. 1,682,995, Sept. 4. Structural features.

Two-fluid electric battery with hollow carbon electrode. R. SCHUSTER. Brit. 283,142, Jan. 5, 1927. Structural features are specified of batteries which may have an electrolyte of K_2SO_4 or Na_2SO_4 , with or without K or Na silicate to form a jelly, and C and Zn electrodes.

Storage batteries. ACCUMULATEUR FARAD. Fr. 634,889, May 23, 1927. A new method of assembling the plates is described. Fr. 634,890 describes a battery made up of a no. of small elements contained in glass tubes, and a method of mounting these elements.

Wood separators for electric batteries. W. L. KANN. Brit. 283,221, Jan. 7, 1927. Virola wood or other similar suitable wood may be used for making separators without pretreatment.

Electric conductor. JAMES V. CAPICOTTO (to Dubilier Condenser Corp.). U. S. 1,683,064, Sept. 4. A material suitable for filaments of thermionic tubes comprises finely divided and intermingled Pt and Ir together with Ba and Sr which are evenly distributed through the mass of the conductor.

Electric condensers. R. BOSCH A-G. Brit. 283,144, Jan. 5, 1927. Material of condensers is impregnated with S and before solidification the materials are immersed in an insulating substance of low m. p. such as molten montan wax. This treatment prevents formation of air cavities as the S solidifies.

Electric rectifiers of the metallic oxide type. SIEMENS-SCHUCKERTWERKE A-G. Brit. 282,815, Dec. 31, 1926. In forming rectifiers such as those with Cu and Cu oxide elements, the oxide coating is formed on the metal by heating the latter in an O-contg. atm. in which the partial O pressure is reduced as compared with air at normal pressure, to an amt. which does not exceed the dissoen. pressure of the oxide at the reaction temp. This enables the desired oxide coating to be formed at temps. considerably below the m. p. of the metal and avoids formation of undesired products of oxidation.

Electrolytic rectifier. HARRY C. KREMERS. U. S. 1,682,846, Sept. 4. Filming electrodes of rare earth metals such as Ce, La and Nd are used with non-filming electrodes such as Pb or C and an electrolyte such as NaOH.

Electric resistance devices. VLADIMIR K. ZWORYKIN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,682,457, Aug. 28. Resistance devices suitable for use with thermionic tubes are prepd. by coating glass or other suitable carrier (to which a negative potential is applied) with material such as metal which is deposited from a vaporized state. An app. is described.

Electric resistance materials. R. C. BENNER and E. S. CAPRON (to Carborundum Co.). Brit. 283,076, April 5, 1927. A resistance such as a grid leak is molded from a plastic mixt. of a cond. material such as SiC and a non-cond. material such as clay, calcined and soaked in a waterproofing material of high dielec. const. such as paraffin or ceresin.

Electrodeposition of metals on aluminum and its alloys. H. WEBB and S. O'BRIEN & PARTNERS, LTD. Brit. 283,288, Oct. 9, 1926. Al or an Al alloy is treated with strong HNO_3 before being electroplated with Ni, Zn, Cu or other metals, with or without treatment with alkali to remove grease, etc., and after the plating operation is heated considerably above 100° . When a metal salt other than a nitrate is used in the plating bath, the metal to be plated is dipped in a soln. of the acid corresponding to the salt used after being treated with HNO_3 . Cu may be deposited and Au, Ag, Sn, Pb or Cd then deposited on the Cu from a cyanide bath. Various details and modifications are given.

Cadmium plating. LEON R. WESTBROOK (to Grasselli Chemical Co.). U. S. 1,681,509, Aug. 21. A compn for use in forming an electrolyte for Cd plating comprises Cd hydroxide 50, a compd. of Ni such as Ni sulfate which is sol. in an aq. alkali metal cyanide soln. about 0.18, Na_2SO_4 38 and guiac about 11.5 parts. Cf. C. A. 22, 1906.

Nickel-plating. L. F. NELISSEN. Brit. 282,748, Dec. 30, 1926. Articles to be Ni-plated are cleaned and given a preliminary thick coating of Cu, and then polished by brushing before deposition of the Ni.

Electrolysis, particularly for the manufacture of caustic soda. PAUL LÉON HULIN. Fr. 634,952, Sept. 22, 1926. Metal electrodes particularly those used in the manuf. of NaOH are de-amalgamated by combining with the usual electrode, a non-amalgamated supplementary electrode, which forms, when desired, another galvanic couple with the first and so produces de-amalgamation thereof.

Electrolytic treatment of materials containing copper and nickel. CHEMISCHE FABRIK JOHANNSTHAL GES. AND F. TROSTLER. Brit. 283,132, Jan. 4, 1927. Cu- and Ni-bearing materials such as alloys, mat or speiss are treated as anode in a neutral or weakly basic electrolyte such as NaCl soln. Cu and Ni hydroxides are pptd. as mud which is then treated with a soln. of a Cu salt such as the chloride or sulfate (preferably in excess, and repeatedly if required) until the Ni hydroxide goes into soln. Pb, when present, remains with the Cu together with As and S. Numerous details are given.

Apparatus for electrolytic production of sheets and similar articles from metals or other materials. JOHANN C. F. A. SCHUTTE. U. S. 1,682,426, Aug. 28. Ores may be used in the app.

Coating aluminum. EUGÈNE PAUL, MARIUS GAT and EUGÈNE MARIE LOUIS CARRIÈRE. Fr. 635,002, May 25, 1927. To cover Al or Al alloys with a protecting coat, the surfaces to be coated are first dipped in an electrolytic bath contg. sulfate of iron, in dil. H_2SO_4 for a very short time and then into an electrolytic bath of Ni, Cu, Cr, Co or the like.

Aluminum. SOCIETÀ ITALIANA DI ELETTROCHIMICA. Fr. 634,727, May 20, 1927. For the production of Al in elec. furnaces, hydrated AlCl_3 , or $\text{Al}(\text{OH})_3$ prepd. by partly or completely decomp. hydrated AlCl_3 , or $\text{Al}(\text{OH})_3$ to which hydrated AcCl_3 has been added, is used.

Aluminum. SOCIETÀ ITALIANA DI ELETTROCHIMICA. Fr. 634,728, May 20, 1927. To prevent $\text{Al}(\text{OH})_3$ rising as dust when used in elec. furnaces for the production of Al, it is agglomerated in small grains or larger pieces by substances such as gelatin, gum or colloids or is submitted to pressure at a convenient temp.

Electric furnace for annealing metal articles. EISEN- UND STAHLWERK HOESCH A.-G. AND W. HEIDENHAIN. Brit. 282,750, Dec. 28, 1926. Articles of iron, steel or other ferro-magnetic materials are held in tubes of an elec. furnace heated by a coil, by a magnetic field (produced by another coil) until magnetic change occurs when they slide down the tube (which is inclined) and drop into a tempering bath after having been heated to the hardening temp.

Electric induction furnace. G. E. TAYLOR and ELECTRIC FURNACE CO., LTD. Brit. 283,302, Oct. 25, 1926.

Electric induction furnace adapted for melting metals. ROLLO B. LINCOLN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,682,388, Aug. 28. Structural features.

Water-cooled electric induction furnace. EDWIN F. NORTHRUP (to Ajax Electro-Thermic Corp.). U. S. 1,681,950, Aug. 28. Structural features.

Electrode mounting for electric furnaces. SOC. ELECTRO-METALLURGIQUE DE MONTRICHTER. Brit. 282,747, Dec. 28, 1926.

Carbon electrodes. VICTOR C. DOERSCHUK (to Aluminum Co. of America). U. S. 1,683,587, Sept. 4. A normally unconsolidated mixt. of granular material such as crushed C material and viscous bituminous binder is placed in a mold and the mold is jarred to effect molding into a coherent mass.

Electrodes for arc lamps. IAN J. LAVOISIER (to Burdick Corp.). U. S. 1,682,847, Sept. 4. A dehydrated and glazed mixt. of Zr and Yt oxide is used for electrodes of *therapeutic lamps*. Various modifying substances may be added.

Filling tubular electrodes. COMPAGNIE GÉNÉRALE D'ÉLECTRICITÉ. Fr. 634,882, May 23, 1927. The active material is projected into tubular electrodes, particularly for Edison accumulators, as a thick paste and compressed by centrifugal force.

High-frequency electric induction heating apparatus suitable for heating materials in crucibles. ELIHU THOMSON (to General Electric Co.). U. S. 1,683,146, Sept. 4.

Electrically heated oil bath vacuum oven. PAUL E. KLOPSTEG (to Central Scientific Co.). U. S. 1,683,359, Sept. 4.

Electric wave collector. HALL ÉLECTRIQUE MODERNE. Fr. 634,690, May 19, 1927. A wave collector mounted in a vacuum tube of SiO_2 is made of a spiral Cu wire covered with a thin layer of pure gold, and the extremities of the spiral embedded in the tube are of Mo.

Treating gases with high-tension electric arcs. EMIL EDWIN (to Aktieselskapet Norsk Staal Elektrisk-Gas-Reduktion). U. S. 1,683,534, Sept. 4. See Norw. 43,570 (C. A. 21, 2106).

Lamp filaments. SOCIÉTÉ DES ÉTABLISSEMENT INDUSTRIELS DE E.-C. ET DE ALEXANDRE GRAMMONT. Fr. 634,828, May 21, 1927. A lamp filament is attached to a Mo support by a strip of metal such as Ni soldered to the Mo, and squeezed on to the filament.

5—PHOTOGRAPHY

C. E. K. MEES

Investigations of the sensitizing action of some panchromatic sensitizing agents. EMILIO VITERBI. Univ Padova. *II Progresso Fotografico* 1927, No. 1-2, 9 pp.; *Chem. Zentr.* 1927, II, 202-3; cf. C. A. 21, 710, 2852.—Following the methods reported previously, plates of medium sensitivity (Cappelli green label) were treated with aq. alc. solns. of the following sensitizing dyes in order to study their action: Orthochrome T, Pinaverdol, Pinachrome, Pinacyanol, Pinachrome Violet, Pinachrome Blue, Ethyl Cyanine, Isoquinoline Red, Pinaverdol and Dicyanine A. C. C. DAVIS

Photographic action of H-rays from paraffin and atom fragments (BLAU) 3.

• **Color photography.** ERNST A. LAGE. U. S. 1,683,560, Sept. 4. See Brit. 266,468 (C. A. 22, 548).

Photographic emulsions. I. G. FARBENIND. A.-G. Brit. 283,222, Jan. 7, 1927. Sensitivity of Ag salt emulsions is increased by using as a carrier for the Ag salt (either alone or mixed with gelatin) the product obtained by treating gelatin or similar material with S or S compds. such as an alk. earth sulfide or CS_2 . A very small proportion of Na_2S may be used with gelatin soln. and any excess of sulfide may be rendered harmless by careful oxidation, e. g., with HClO_4 . Brit. 283,223 specifies increase of sensitivity by addn. of substances such as K dithiocyanate, disulfide of HOAc, disulfide of β -mercaptothiocinnamic acid or compds. of similar character.

Photographic films. H. J. HANDS and SPICERS, LTD. Brit. 282,980, Dec. 29, 1926. Supporting films are formed of mixts. such as those of cellulose and cellulose acetate (or other suitable carbohydrate and carbohydrate esters or ethers) together with solvents, plasticizing agents, etc.

Photographic diazotype processes. E. GAY. Brit. 282,894, Sept. 30, 1926. In processes involving the formation of azo dyes by reaction of diazo compds. sensitive to light upon phenols, naphthols or amines in the presence of an alkali such as Na_2CO_3 ,

diazo compds. are used which are derived from anisidines or naphthanisidines and alkyl ethers or *o*-aminophenol or *o*-aminonaphthols or their nuclear substitution products. Several examples are given.

Photographic diazotype processes. E. GAY. Brit. 283,274, Oct. 6, 1926. The process of Brit. 282,894 (preceding abstr.) is modified by including in the sensitive layer phenol or naphthol derivs. which form with the diazo compd. a stable mixt. and which regenerate phenols or naphthols when treated with alkalis, so that a developer contg. alkali only may be used. Acetyl derivs. of phenols, naphthols, dihydroxynaphthalenes or aminonaphthols, and phenolic esters derived from formic acid, oxalic acid or benzenesulfonic acid may be used. Several examples are given.

Chromophotographic apparatus. COMPAGNIE INTERNATIONALE TRICROMIA. Fr. 634,860, May 23, 1927. Means for accurately adjusting the reflecting shields of Fr. 560,438 are described.

Coating composition. WM. H. GARDNER. U. S. 1,682,957, Sept. 4. A compn. suitable for coating developed photographic plates is formed from spar varnish 1 pint, ether 4 oz., japan drier 1 oz., Venice turpentine 1 oz. and collodion 2 oz.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Reduction of nitrites, nitrates and nitric acid with magnesium amalgam: a new method of preparing hyponitrites. PANCHANAN NEOGI AND BIRENDRA LAL NANDI. President College, Calcutta. *J. Chem. Soc.* 1928, 1449-55.—The action of Mg amalgam (I) on metallic nitrites and nitrates is studied, a convenient method of prepg. hyponitrite(s) (II) being afforded. Its advantages, over the Na I method of prepg. the known II, are that it is more direct, and that $Mg(OH)_2$ is more readily removed than NaOH, does not enter into secondary reactions and does not tend to decomp. unstable II. The magnesium amalgam used is prepd. by heating for 2-3 min., Mg (20 g.) and Hg (400 g.), shaking every 10 min. until the Mg is completely dissolved, cooling and cutting into small pieces. In prepg. II all solns. must be kept below 5° in an ice-salt mixt. In all cases the method of reduction used is similar to that employed in prepg. the Li salt. This process is repeated until the soln. contains no nitrite, before concg. In prepg. the Li, Na, K, Ca, Ba and Sr II, the solns. resulting from the reduction contain NH_4OH , hydroxylamine (III), and the resp. II and hydroxide (IV), but no Mg salt; with Rb and Cs II they contain NH_4OH , and the resp. II and IV, but no III; and with Zn, Cd and Pb II they contain NH_4OH and III, but none of the resp. II, this going entirely into the ppt. **Lithium hyponitrite** ($Li_2N_2O_2$) is prepd. by adding Mg I to a concd. $LiNO_3$ soln., keeping for a short time, filtering off the pptd. $Mg(OH)_2$ and washing with ice water. This reduction is repeated until no nitrites and nitrates are present in soln., after which the final soln. is placed in a vacuum desiccator over concd. H_2SO_4 (call this operation, V) for 2 weeks in which time III is decompd. (the resulting NH_3 being absorbed by the acid), and a white, solid mass of LiOH and $Li_2N_2O_2$ remains. By repeatedly extg. with abs. alc. and pptg. with Et_2O , $Li_2N_2O_2$ is obtained free of LiOH, which is dissolved in a min. of H_2O , evapd. to dryness in V and analyzed, the slightly high results being due to hydrolysis during the final crystn. **Sodium hyponitrite** and **potassium hyponitrite** are prepd. by reducing $NaNO_3$ (35 g. in 200 cc. H_2O) and KNO_3 (40 g. in 250 cc. H_2O), resp., with 5% Mg I (420-450 g.), evapg. for 20 days in V, extg. the IV with abs. alc., leaving Na and K II which are dried in a vacuum desiccator. **Rubidium hyponitrite** ($Rb_2N_2O_2 \cdot 2H_2O$) and **cesium hyponitrite** ($Cs_2N_2O_2 \cdot 8H_2O$) are prepd. by reducing their nitrates, keeping overnight in V, neutralizing with dil. AcOH, concg. in V and washing with abs. alc. until the crystals are free of acetate. **Magnesium hyponitrite** is prepd., but not isolated, by reducing $Mg(NO_3)_2$ (40 g.) in H_2O (250 cc.), the Mg II being totally pptd. When this is dissolved in 6% AcOH, the filtered soln. gives a test for II, but keeping overnight in a vacuum desiccator decomposes the Mg II therein. Alkalies also decompose it and attempts to isolate it in org. media proved unsuccessful. **Zinc hyponitrite** ($Zn_2N_2O_2 \cdot H_2O$) is prepd. by reducing $Zn(NO_3)_2$ (20 g. in 200 cc. H_2O) contg. a few drops of HNO_3 , filtering off the ppt., washing, dissolving (with cooling) in a min. of AcOH (6%), neutralizing with NH_3 , and after keeping for 2-3 hrs. filtering the gelatinous ppt., sepg., washing, dissolving in AcOH and repptg. by neutralization, repeating this 5 times to remove completely the $Mg(OH)_2$ and $Zn(OH)_2$, the ppt. finally obtained being Zn II. **Cadmium hyponitrite** ($Cd_2N_2O_2$) is prepd. by reducing $Cd(NO_3)_2$, treating the ppt. similarly to the Zn, redissolving in HNO_3 and neutralizing 6 times, being finally

obtained as a yellow powder. *Cadmium hydroxyhyponitrite* ($\text{Cd}(\text{OH})(\text{NO})$) is obtained during the soln. and reprecip. of the preceding. *Calcium hyponitrite* ($\text{CaN}_2\text{O}_4 \cdot 4\text{H}_2\text{O}$), *strontium hyponitrite* ($\text{SrN}_2\text{O}_4 \cdot 5\text{H}_2\text{O}$) and *barium hyponitrite* ($\text{BaN}_2\text{O}_4 \cdot 4\text{H}_2\text{O}$) are prepd. by reducing their nitrates, the **II** present in small quantity in the ppt. extd. with cold H_2O and combined with the soln., which is then kept in **V** for a day to remove NH_3 and **III**, neutralized with H_3PO_4 (to remove the resp., **IV**), filtered, concd in **V**, the cryst. mass washed with abs alc and dried. *Lead hyponitrite* (PbN_2O_4) is prepd. by reducing $\text{Pb}(\text{NO}_3)_2$ (20 g in 200 cc. H_2O), the ppt dissolved in cold dil. AcOH and neutralized, this dissoln. and neutralization being repeated, and the resulting ppt. filtered off, washed and dried. *Lead oxyhyponitrite* ($\text{PbO PbN}_2\text{O}_4$) is obtained when the final ppt of the preceding is treated with AcOH and NH_3 4-5 times at room temp., the resulting ppt. being filtered off, washed and dried. $\text{Hg}(\text{NO}_3)_2$, $\text{Hg}_2(\text{NO}_3)_2$, $\text{Co}(\text{NO}_3)_2$, $\text{Cu}(\text{NO}_3)_2$, $\text{Ni}(\text{NO}_3)_2$, AgNO_3 and NH_4NO_3 were also reduced, but in no case was a **II** obtained. *Hydroxylamine sulfate* is prepd. by reducing HNO_3 (200 cc of 10%) and H_2SO_4 (20 cc. of 10%), filtered, the filtrate reduced with H_2SO_4 (5 cc of 10%), repeating 5 times, the resulting soln. evapd. on water bath, and **III** sulfate removed from MgSO_4 and $(\text{NH}_4)_2\text{SO}_4$ by repeated extn with warm abs alc. The yield of **III** sulfate is 60% of the HNO_3 used, its purity being estd. as 97.8% by Raschig's method. Analyses of the compds. checked with the theoretical. J BALOZIAN

The reduction of barium carbonate by aluminum. ERWIN F. LINHORST AND HERMAN SCHLUNDT. *Trans. Am. Electrochem. Soc.* **54** (preprint), 8 pp (1928). -The reaction was found to be vigorous, and the immediate product was found to be complex. Pptd. Ba carbonate and powd. Al, the particles of which were all less than 4 microns in diam., were well mixed in a molar ratio of 1 to 2. An iron sand bath contg. 1000 g. of this mixt. was heated over a large burner, until the temp. at the hottest portion reached 400° . The reaction then started at the hottest point and traveled to all parts of the mass, even though most of the material had not been heated much above 200° , as detd. by a mercurial thermometer projected into the body of the material at various points. The reaction is highly exothermic. The temp. rises above 1400° in the interior of the reaction mixt., high enough to fuse the product into a dense mass. During the reaction, gases are given off in considerable amt. They take fire and burn with a bluish flame at first, but later the flame becomes luminous and intensely bright. The reaction product obtained is a heavy gray mass, d 3.5 and hardness about 5.5, as it scratches glass but not orthoclase: $\text{BaCO}_3 + 2\text{Al} \rightarrow 0.12\text{C} + 0.41\text{CO} + 0.428\text{Al} + 0.104\text{BaC}_2 + 0.087\text{Al}_2\text{C}_3 + 0.328\text{Ba}(\text{AlO}_2)_2 + 0.284\text{Ba}_2\text{Al}_2\text{O}_5$. C G. F.

Hydrated tricalcium aluminate. A TRAVERS AND SEHNOUTKA. *Compt. rend.* **187**, 381-2 (1928). -When T. and S. repeated the expts of Allen (*Am. Chem. J.* **24**, 304 (1900)) in an attempt to prep. the hydrated dicalcium aluminate mentioned by him, they were able to obtain only cryst. lime. Believing that the method used by Lafuma (*Thesis*, Paris, 1925), namely that of starting with anhyd. aluminates, gave inaccurate results, they used very dil. solns. for the prepn. of the compd. sought. To 1 l. of $M/30 \text{ KAlO}_2 \cdot 3\text{H}_2\text{O}$ was added 1.1 l. of a mixt. composed of 1 l. of $M/47 \text{ Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ and 100-150 cc. of satd. limewater. After several hrs. pure $\text{Al}_2\text{O}_3 \cdot 3\text{CaO} \cdot 21\text{H}_2\text{O}$ (**I**) crystd. If only 50 cc. of limewater were used a mixt. of $\text{Al}(\text{OH})_3$ and tricalcium aluminate was pptd.; if 200 cc., there appeared in addn. to **I** other cryst. forms not yet studied. The ρ_{H} at which **I** was formed was between 11.55 and 11.62. LOUISE KELLEY

The preparation of pure platinum. E. H. REERINK. Lab. of Phillips Lamp Works, Eindhoven. *Z. anorg. allgem. Chem.* **173**, 45-8 (1928). -A simple method for the prepn. of pure Pt consists in heating a thin Pt wire in the vapor of a volatile Pt compd. to a temp. at which the compd. decomposes, depositing a compact layer of Pt on the wire. Other metals may be used for the wire. A layer of Pt may be deposited upon metals, e. g., W, Mo, Ni, where, by electrolytic methods it is difficult if not impossible. The coatings thus formed are thick and adhere well and wire thus covered has almost all of the properties of a Pt wire. The volatile Pt halogen carbonyl compds. are used. Asbestos wool is impregnated with concd. PtCl_4 and then placed in a vertical glass tube set over a porcelain filter plate. Dry CO_2 is passed through slowly for 2 hrs. After most of the PtCl_4 is changed to PtCl_2 , CO_2 is replaced by CO at 250° . The product is evidently a mixt. of compds. of which the following have been described: $\text{Pt}(\text{CO})_2\text{Cl}_2$, $(\text{PtCl}_2)_2(\text{CO})_2$, PtCoCl_2 and $\text{PtCl}_2(\text{COCl})_2$. Analysis of the product gave Cl 23%; Pt 61.4%. This material collects in the lower part of the app. where, at the completion of the reaction, it is fused into a compact mass in which form it is more resistant to moisture. The optimum temp. for decompn. of these volatile compds. is 600° . The gaseous products contain CO , Cl_2 and COCl_2 . The best deposits are obtained at 0.02-0.01 mm. pressure. Attempts to form analogous halogen-carbonyl

comps. with Rh, Pd or Ir under similar conditions were unsuccessful. The Pt compd. can thus be prepd. free from the other metals.

The stability of rhodium sesquioxide and iridium dioxide. S. PASTORELLO. Univ. Milano. *Atti. accad. Lincei* [6], 7, 754-7(1928).—The suggestion of Levi and Faldini (C. A. 21, 3106) that the poisonous action of Rh and Ir on the catalytic action of Pt in the oxidation of SO_2 is a result of oxide formation induced P. to investigate the stability of Rh_2O_3 and of IrO_2 in SO_2 . X-ray examn. of Rh_2O_3 in SO_2 at 350°, 450° and 500° showed a splendid photograph of pure metallic Rh at 500°, which conforms to the rapid change of direction of the curve of Levi and Faldini (*loc. cit.*) above 450°. The small temp. interval of the transformation is noteworthy. With IrO_2 in SO_2 at 350°, 450°, 550°, 650°, 750°, 850° and 900°, x-ray examn. showed only pure IrO_2 from 350° to 650°, a mixt. of IrO_2 and metallic Ir at 750° and only pure Ir at 900°. No intermediate oxides were detected. From the intensities of the lines at 750°, it was calcd. that at this temp. the mixt. of IrO_2 and Ir contained 68.80% Ir. The results indicate that the deleterious action of Ir and Rh in the oxidation of SO_2 with Pt catalyst results from the formation of their oxides.

Selenium tetrafluoride. EDMUND B. R. PRIDEAUX AND CHARLES B. COX. Univ. College, Nottingham. *J. Chem. Soc.* 1928, 1603 7.—Selenium tetrafluoride (colorless, fuming liquid) is prepd. by mixing 4-5 parts of AgF (prepd. by Ruff's method, cf. Prideaux and Cox, C. A. 22, 1924) and 1 of Se in a Pt vessel set in a Monel metal pot, heating to 50-60° to start the reaction, distg. and redistg. from AgF completely to remove SeCl_4 . The yields are reduced by the presence of SeOF_4 , most probably due to Ag_2O in the AgF used. On prepg. again, 9.14 g. of SeCl_4 gave 5.12 g. of distillate, which on redistn. below 140° yielded 4.42 g. SeF_4 , analysis by different methods showing 51.0-52.1% Se and 47.2-47.7% F_2 . The d. of SeF_4 , as detd. in the Monel bottle (C. A. 22, 1924), is 2.77; the b. p., detd. in the same, is 93°. The m. p. is detd. by inserting the bulb of Pt-foil-covered pentane thermometer into the liquid contained in a small Pt vessel, which in turn is set in a glass tube. The liquid is quickly frozen and allowed to warm slowly, a graph of the temp.-time readings detg. the m. p. as -13.2° . SeF_4 attacks Si in the cold, giving SiF_4 , this being proportional to the combined F; it also reacts with red P giving PF_3 and POF_3 , with a residue of red Se and SeO_2 , this action being proportional to the Se in combination and soln., but inhibited by an excess of HF .

Precipitated zinc sulfide. G. R. LEVI AND C. G. FONTANA. Univ. Milano. *Atti. accad. Lincei* [6], 7, 502-8(1928).—A survey of the rather extensive literature on the pptn. of ZnS (references to which are given) shows a disagreement in results. ZnS was therefore pptd. under different conditions and was examd. to det. (1) its cryst. form under varying conditions, and (2) whether the cryst. granules had different dimensions. The ZnS was pptd. by H_2S from N ZnSO_4 (1) made alk. with NaOH , (2) made alk. with NH_4OH , (3) made acid with AcOH and (4) with no other reagent, after which it was let stand 24 hrs., filtered, washed, dried *in vacuo* and examd. by the powder method with x-rays. The data, recorded in complete form, show dimensions of the 4 preps. of 19.74, 18.60, 22.00 and 20.60 Å. U., resp., which is considered evidence that all 4 preps. were of identical size. Therefore the different behavior during analysis of ZnS under different conditions must depend upon the varying state of agglomeration and not upon the dimensions of the granules. The cryst. form was in all cases the same as that of Zn blende.

Salt-like hydrides. III. M. PROSKURNIN AND I. KAZARNOVSKII. *Z. anorg. allgem. Chem.* 170, 301-10(1928).—App. is described in which the d. of the hydrides can be detd. pycnometrically with the exclusion of air. The d. of the hydrides of Na, K, Rb and Cs is detd. and given as follows: for NaH 1.38 ± 0.04 , KH 1.47, RbH 2.60 ± 0.07 , CsH 3.42 ± 0.1 . Moissan's values are much too low. In taking up H , a large contraction of the metal lattice takes place, which is greater for the alkali hydrides than for the alk. earth hydrides. Thus with LiH the vol. contraction in % is 24.6, with NaH 26.6%, KH 40.0%, RbH 40.7%, CsH 44.9%, CaH_2 4.2%, BaH_2 13.3%. Comparison of the mol. vol. of the hydrides with the halogenides shows a great similarity between the hydrides and fluorides. Mol. vol. of LiH is 9.8, LiF 9.98, LiCl 20.53; while for CaH_2 mol. vol. is 24.8, CaF_2 24.6, CaCl_2 50.0. The ion radius of the H ions is 1.45 Å. U.

The system copper sulfate-ammonium oxalate-ammonia. M. HERSCHKOWITZ. Carl Zeiss Works, Jena. *Z. anorg. allgem. Chem.* 173, 222-4(1928).—A bath of Cu NH_4 oxalate gives a lustrous thick deposit with good scattering power. Within a short time a deposit forms leaving the bath poorer in Cu and then the anodes become covered with this deposit. Different crystals are found, difficult to sep. and which

gave varying analytical results. While the molar proportion of Cu to oxalic acid was always 1:1, the ratio of NH_3 to H_2O of crystn. and to Cu was neither const. nor integral. The Cu oxalate ppt. was dissolved in NH_4 oxalate and this was added to a soln. of CuSO_4 . A clear soln. was obtained which was stable for several months. Upon adding NH_3 a cryst. ppt. was obtained, heterogeneous under the microscope. Tiny bluish green crystals were analyzed as $\text{Cu}(\text{CO}_3)_2\text{NH}_3$ derived from a soln. contg. 0.04 mol. CuSO_4 , 0.12–0.16 mol. NH_4 oxalate and 0.02–0.08 mol. NH_3 . From solns. with a large excess of NH_3 homogeneous hexagonal ultramarine-blue crystals were obtained which analyzed as $\text{Cu}(\text{CO}_3)_2 \cdot 2\text{NH}_3 \cdot 2\text{H}_2\text{O}$. These lose all their water below 50° , forming $\text{Cu}(\text{CO}_3)_2 \cdot 2\text{NH}_3$. The addn. of oxalic acid to solns. of CuSO_4 in NH_4 oxalate produces a turbidity and the ppt. is a blue green difficultly drying amorphous mass which contains no NH_3 and is Cu oxalate.

S. L. B. ETHERTON

The system $\text{KCl-HCl-H}_2\text{O}$ between 0° and 80° . G. MALQUORI. Univ. Roma. *Atti accad. Lincei* [6], 7, 738–9(1928).—Data on the same system at 0° (cf. Seidell, *C. A.* 14, 380) and at 25° (cf. M., *C. A.* 22, 529) have already been published. With these data and new data for 40° , 60° and 80° , a 3-dimensional diagram is given, in which the coordinates are the temp., the concn. of HCl (only 10 and 25% are shown) and the soly. of KCl. HCl lowers the soly. of KCl but does not alter the course of the curves as functions of the temp.

C. C. DAVIS

The system $\text{AlCl}_3\text{-HCl-H}_2\text{O}$ between 0° and 80° . G. MALQUORI. Univ. Roma. *Atti accad. Lincei* [6], 7, 740–4(1928).—Like the data on the system $\text{KCl-HCl-H}_2\text{O}$ (cf. preceding abstr.), the present data are of importance in the fractional crystn. of liquids from the attack of leucite with HCl by the Blanc process (*C. A.* 19, 1616; 20, 3335). To construct a polythermic diagram of the system $\text{AlCl}_3\text{-HCl-H}_2\text{O}$, the system $\text{AlCl}_3\text{-H}_2\text{O}$ was first studied by detg. the ice curve and the soly. curve from the cryohydrate temp. to 80° . The data, given in tabular and graphical form, show that in this latter temp. range only $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$ exists in equil. with the satd. soln. $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$ dissolved in 900 mol. of water at 15.5° evolves 26.4 cal. This is the integral heat of soln. of $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$, since it includes the heat of diln. By detg. the integral heat of soln. at 20° , using the same proportions of $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$ and water used by Sabatier (cf. *Bull. soc. chim.* [3], 1, 88(1889)), taking a vol. of soln. satd. at 20° contg. the same quantity of salt used above, dilg. with the same quantity of water, and detg. the difference of the 2 calorimetric values, it was found that the heat of soln. considered as the heat evolved in the soln. of 1 mol. of $\text{AlCl}_3 \cdot 6\text{H}_2\text{O}$ at 20° to give a satd. soln. is 4600 cal. The 3-dimensional diagram of the system $\text{AlCl}_3\text{-HCl-H}_2\text{O}$ at 0° , 25° , 40° , 60° and 80° shows that HCl lowers the soly. of AlCl_3 , but as with KCl it does not alter the course of the curves as functions of the temp.

C. C. DAVIS

The system $\text{AlCl}_3\text{-KCl-H}_2\text{O}$ between 0° and 80° . G. MALQUORI. Univ. Roma. *Atti accad. Lincei* [6], 7, 745–7(1928); cf. *C. A.* 22, 529 and preceding 2 abstrs.—The data are given in tables and as a 3-dimensional polythermal diagram for 0° , 40° , 60° and 80° . The soly. relations are completely normal, and only the proportion of KCl to AlCl_3 in the satd. soln. of the 2 salts varies somewhat with the temp., the KCl concn. becoming greater as the temp. increases.

C. C. DAVIS

The systems $\text{Pb}(\text{NO}_3)_2\text{-LiNO}_3\text{-H}_2\text{O}$ and $\text{Pb}(\text{NO}_3)_2\text{-CsNO}_3\text{-H}_2\text{O}$ at 25° . G. MALQUORI. Univ. Roma. *Atti accad. Lincei* [6], 7, 495–6(1928); cf. *C. A.* 22, 2308.—A comparison of the results obtained for the systems: $\text{Pb}(\text{NO}_3)_2\text{-LiNO}_3\text{-H}_2\text{O}$ and $\text{Pb}(\text{NO}_3)_2\text{-CsNO}_3\text{-H}_2\text{O}$ and those of $\text{Pb}(\text{NO}_3)_2\text{-KNO}_3\text{-H}_2\text{O}$ and $\text{Pb}(\text{NO}_3)_2\text{-NaNO}_3\text{-H}_2\text{O}$ (cf. Glasstone and Saunders, *C. A.* 17, 3844) at different temps., shows that hydration of the alk cations plays a part in the variations in the soly. which were observed, i. e., the increase in the soly. of $\text{Pb}(\text{NO}_3)_2$ caused by the addn. of alk. nitrate increases with the ionic radius of the cation. On the other hand, the fact that the lower the temp. the greater is the increase in soly. establishes the existence of complexes. The measurements are given as a triangular soly. diagram. Further expts. are in progress on the cond. and viscosity as functions of the temp. and concn.

C. C. DAVIS

The causes which determine the influences of solubility between lead nitrate and alkaline nitrates. G. MALQUORI. Univ. Roma. *Gazz. chim. ital.* 58, 203–8(1928).—To explain the increase in the soly. of $\text{Pb}(\text{NO}_3)_2$, brought about by NH_4NO_3 (cf. *Atti II congresso naz. chim. pura applicata* 1926, 1135) and to det. whether it is due to hydration or to complex formation, the systems $\text{LiNO}_3\text{-Pb}(\text{NO}_3)_2\text{-H}_2\text{O}$ and $\text{CsNO}_3\text{-Pb}(\text{NO}_3)_2\text{-H}_2\text{O}$ at 25° were studied. The method was that used before and the results are given in tables and triangular diagrams. Data on the systems $\text{NaNO}_3\text{-Pb}(\text{NO}_3)_2\text{-H}_2\text{O}$ and $\text{KNO}_3\text{-Pb}(\text{NO}_3)_2\text{-H}_2\text{O}$ by Glasstone and Saunders (cf. *C. A.* 17, 3844) are also plotted for comparison. The influence of the alk. nitrates on the soly. of $\text{Pb}(\text{NO}_3)_2$ increases in the order: $\text{Li} < \text{Na} < \text{K} < \text{Cs}$, which is the order in which the ionic radii

increase, according to Pauling (cf. *C. A.* 21, 1384). Hydration of the alk. ions, already known to be great, varies inversely with the ionic rays, so the more water held by each ion, the smaller the soly. of the $\text{Pb}(\text{NO}_3)_2$. Complex formation (cf. Lewis, *Diss.* Breslau, 1908) opposes the influence of hydration, as is evident from a comparison of the soly. of the system $\text{NH}_4\text{NO}_3\text{--Pb}(\text{NO}_3)_2\text{--H}_2\text{O}$ at 0° and 25° , the soly. of $\text{Pb}(\text{NO}_3)_2$ being greater at 0° because of complex formation. The tendency to form complexes increases from Li to Cs.

C. C. DAVIS

Hydrates of the nitrates of cadmium, zinc and magnesium. G. MALQUORI. Univ. Roma. *Gazz. chim. ital.* 58, 209–16(1928).—The systems $\text{Cd}(\text{NO}_3)_2\text{--HNO}_3\text{--H}_2\text{O}$, $\text{Mg}(\text{NO}_3)_2\text{--HNO}_3\text{--H}_2\text{O}$ and $\text{Zn}(\text{NO}_3)_2\text{--HNO}_3\text{--H}_2\text{O}$ at 20° were studied by the method used by M. so often before. The results, which are recorded in tables and a graph, showed the existence of the following *hydrated salts* in equil. with solns. contg. the % HNO_3 given: $\text{Cd}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$, 52.95%; $\text{Cd}(\text{NO}_3)_2 \cdot 2\text{H}_2\text{O}$, 60.01%; $\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$, 34.45%; $\text{Zn}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$, 59.21%; $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$, 49.12%. $\text{Cd}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ is completely dehydrated at 20° by HNO_3 of d. 1.52, while $\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ loses only $2\text{H}_2\text{O}$ and $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ is unaltered, which is in accord with their relative vapor pressures (cf. *Ann. chim. phys.* [7], 7, 416(1896)), with the ionic radii (the smaller the latter the firmer the union with water of hydration) and with their m. ps. (the firmer the union the higher the m. p.). The *heat of hydration* of $\text{Cd}(\text{NO}_3)_2$ was found to be 11.52 cal. On being heated, $\text{Cd}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ loses only H_2O , whereas $\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ and $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ lose H_2O and HNO_3 simultaneously with formation of *basic anhyd.* or *partly hydrated salts*, the products depending upon the conditions. Like the previous phenomena this may be explained by the theory of Lambert (cf. *C. A.* 17, 2241).

C. C. DAVIS

Double sulfates of rare earth metals and alkali metals. XI. Cerium (cerous) and rubidium sulfates. F. ZAMBONINI AND SILVIA RESTAINO. *Atti accad. Lincei* [6], 7, 449–52(1928); cf. Z. and Stocchi, *C. A.* 21, 3841.—The system $\text{Ce}_2(\text{SO}_4)_3\text{--Rb}_2\text{SO}_4\text{--H}_2\text{O}$ was studied by the same method already employed. At 25° only 1 compd. was formed, viz., the *double salt*, $\text{Ce}_2(\text{SO}_4)_3 \cdot \text{Rb}_2\text{SO}_4 \cdot 2\text{H}_2\text{O}$. It has a wide field of existence, since at 25° it is stable in contact with solns. contg. from 34% Rb_2SO_4 and no $\text{Ce}_2(\text{SO}_4)_3$ to solns. contg. 1.3% Rb_2SO_4 and 0.2% $\text{Ce}_2(\text{SO}_4)_3$. Subsequent expts. at other temps. gave 2 other *double salts*, viz., $\text{Ce}_2(\text{SO}_4)_3 \cdot \text{Rb}_2\text{SO}_4 \cdot 8\text{H}_2\text{O}$ and $\text{Ce}_2(\text{SO}_4)_3 \cdot \text{Rb}_2\text{SO}_4$. The former is prep'd. by allowing to evap. at 10° solns. contg. $\text{Ce}_2(\text{SO}_4)_3$ and Rb_2SO_4 in mol. proportions of 1:4. The crystallographic characteristics are recorded in detail. Its d. is 2.952–2.957. $\text{Ce}_2(\text{SO}_4)_3 \cdot \text{Rb}_2\text{SO}_4$ is obtained by the evapn. at 30° of a soln. contg. $\text{Ce}_2(\text{SO}_4)_3$ and Rb_2SO_4 in the mol. proportions of 1:2. These results show the importance of temp. in governing the particular compd. formed. $\text{Ce}_2(\text{SO}_4)_3 \cdot \text{Rb}_2\text{SO}_4$ is the first anhyd. double sulfate of a rare earth and alkali metal of this type found in the present series of researches.

C. C. DAVIS

Double sulfates of the copper-magnesium group and the sulfonium bases. II. P. C. RAY AND N. RAY. *J. Indian Chem. Soc.* 5, 69–72(1928); cf. *C. A.* 21, 2622.—Double sulfates of the general formula $\text{M}^+\text{SO}_4 \cdot (\text{Me}_3\text{S})_2\text{SO}_4 \cdot 8\text{H}_2\text{O}$, where $\text{M}^+ = \text{Fe}^+, \text{Zn}, \text{Cd}, \text{Mg}, \text{Cu}, \text{Mn}, \text{Ni}$ and Co , are obtained under similar conditions to those used in the prep'n. of the corresponding Et compds. (cf. *C. A.* 21, 2622). By addn. of alc. to concn. aq. solns. of these salts, similar compds. ($+7\text{H}_2\text{O}$) are obtained in the first 6 cases; the Co salt affords a compd. with $6\text{H}_2\text{O}$. The anhyd. salts cannot be obtained since disson. takes place on heating.

B. C. A.

Hexahydrated double sulfates containing thallium. A. E. H. TUTTON. *Proc. Roy. Soc. (London)* A118, 367–92(1928).—In hexahydrated double salts of the type $\text{R}_2\text{M}(\text{SeO}_4)_2 \cdot 6\text{H}_2\text{O}$, where M may be Mg, Zn, Cd, Cu, Ni, Co, Fe^{++} or Mn and R may be K, Rb, Cs or NH_4 , Tl does not eutropically replace the alkali metals. Changes in exterior angles and internal phys. properties are not proportional to the high at. no. of Tl = 81 but the heavier element with its more complicated structure manifests itself in the re-transcendent optical refraction and spectral dispersion. In all other properties Tl resembles the non-eutropic NH_4 salt which is almost identical with the analogous Rb salt. Thus Tl salts are isomorphous with the alkali metal and NH_4 . Tl salts, like the salts of any other individual R-base, show little effect on the crystal characters and the const. of changes of the M-metal.

S. L. B. ETHERXON

Hexahydrated double selenates containing thallium. Completion of the thallium salts and of the whole monoclinic series. A. E. H. TUTTON. *Proc. Roy. Soc. (London)* A118, 393–426(1928).—Results for the double selenates are quite analogous to those for the Tl double sulfates (cf. preceding abstr.). The replacement of S by Se enlarges the unit cells of the structural space lattice and the interfacial angles and the phys. properties are altered but the amts. of the changes are such as accompany isomorphous replace-

ment. In this series also, while NH_4 salts are almost perfectly isostructural with the analogous Rb salts, the Tl salts tend in the same direction but not quite so perfectly. An exceptional property, however, is the high optical refractivity of the Tl salts as compared with other R-base salts of the series. The eutropic progress of the K, Rb and Cs salts is due to the progressive enlargement of the atoms by a shell of 18 electrons, corresponding to the progression in the rare gases. The very mobile extra electron left outside the outermost complete shell accounts for the max. electropositive chem. activity of the alkali metals.

S. L. B. EHTERTON

Cobalticarbonates. G. A. BARBIERI. *Atti accad. Lincei* [6], 7, 747-53 (1928).—During attempts to find the best conditions for the volumetric detn. of K as $\text{K}_2\text{Co}(\text{NO}_2)_6$, it was found that the yellow or orange cobaltinitrites give an intense emerald-green soln. in hot aq. NaHCO_3 . This suggested a relation to the Field-Durrant reaction (cf. *J. Chem. Soc.* 1862, 14; *Proc. Chem. Soc.* 12, 96 (1896); *Ann. chim. phys.* [7], 20, 214 (1900); *Rend. soc. chim. Roma* 3, 68 (1905)), since NaHCO_3 destroyed the cobaltinitroso complex, all NO_2 groups forming NaNO_3 and the Co (remaining tervalent) forming with the CO_3 residue a cobalticarbonate to which is due the green color, and which is identical to that formed by the action of H_2O_2 on Co salts and NaHCO_3 . When a small proportion of insol. alk. cobaltinitrite (e. g., $\text{K}_3\text{Co}(\text{NO}_2)_6$ or $\text{K}_2\text{NaCo}(\text{NO}_2)_6$) and satd. aq. NaHCO_3 are heated and agitated, the yellow powder dissolves to a green soln. Prolonged heating decomp. the green compd., pptg. hydrated Co_2O_3 . If Na_2CO_3 is used instead of NaHCO_3 originally, Co_2O_3 is formed directly. The green compd. is therefore formed only with the HCO_3 ions present. With KHCO_3 instead of NaHCO_3 , no green compd. is formed, and with a sol. cobaltinitrite and excess KHCO_3 , $\text{K}_3\text{Co}(\text{NO}_2)_6$ is pptd., which does not react with KHCO_3 . Therefore in the reaction of NaHCO_3 and an insol. cobaltinitrite, the latter is first transformed into very sol. $\text{Na}_3\text{Co}(\text{NO}_2)_6$, which then reacts with NaHCO_3 , whereas $\text{K}_3\text{Co}(\text{NO}_2)_6$ becomes insol. in the presence of excess KHCO_3 and therefore remains stable. Quant. expts. in which the green soln. was treated independently with excess acidic H_2O_2 , and with excess acidic KMnO_4 , proved that the cobaltinitroso complex is completely decompd. To ascertain whether the green compd. is identical with that formed in the Field-Durrant reaction, solns. were prepd. by the 2 methods, using the same quantities of Co and the H_2O_2 prepn. with the addn. of NaNO_3 to balance that formed in the other soln., and the products were examd. colorimetrically. The 2 solns. were identical, indicating that the same compd. is formed. The electrolytic reaction of Kremann (cf. *Z. anorg. Chem.* 33, 86 (1902)) was then utilized for studying its nature. $\text{Co}(\text{NO}_3)_2$ (5 g.) in 3% H_2O_2 (100 cc.) heated with KHCO_3 (30 g.) until the reaction is complete, introduced in a U-tube and in both branches a soln. composed of equal vols. of 2% K_2SO_4 and KHCO_3 superposed on the liquid and electrolyzed with Pt electrodes, showed by the motion of the green liquid that the Co is in a negatively charged complex ion. Since moreover HCO_3 is indispensable to its formation, it is probable that the green compd. contains Co united by normal valences to CO_3 residues and to OH groups, and by secondary valences to alk. bicarbonate mols., which means a *cobalticarbonate*. The green liquid does not react with excess KSCN and AmOH to give the Vogel reaction (characteristic of bivalent Co, even with excess alk. bicarbonate), and green compds. are formed from compds. contg. tervalent Co, e. g., from cobaltinitrites. Both these facts render improbable the theory of Metzl (*C. A.* 8, 2536). To remove all doubt of tervalent Co in the green compds., the reversibility of the reaction was proved. The green liquids (obtained by the H_2O_2 method) treated with acetylacetone, first slowly in the acid, then rapidly at 60-70°, formed cobaltic acetylacetonate (cf. *Compt. rend.* 129, 304 (1899)). When the green soln. is treated with acetylacetone (3 mols. per atom of Co) and AcOH , and the product is extd. with CHCl_3 , the ext. is an intense green, and on evapn. leaves a cryst. green residue which, recrystd. from CHCl_3 , yields $\text{Co}(\text{C}_6\text{H}_7\text{O}_2)_3$. **Transformation of cobalticarbonates into cobaltiammines.**— NaHCO_3 (50 g.) heated with CoCl_2 (5 g.) in 3% H_2O_2 (100 cc.), filtered, the filtrate heated in an atm. of CO_2 to boiling with NH_4Cl (50 g.), ppts. purpureocobaltochloride $\text{Co}(\text{NH}_3)_5\text{Cl}_2$. With NH_4NO_3 , $(\text{NH}_4)_2\text{CO}_3$, NH_4SCN or $(\text{NH}_4)_2\text{C}_2\text{O}_4$, other cobaltiammines are formed, the prepn. of which is to be described in a subsequent paper. When cobaltinitrites are transformed by NaHCO_3 into cobalticarbonates, there is, between the initial orange color and the final green, a transient violet-red color. The latter becomes persistent if the $\text{Na}_3\text{Co}(\text{NO}_2)_6$ is sufficiently concd. and too great an excess of NaHCO_3 is avoided. Thus $\text{Na}_2\text{Co}(\text{NO}_2)_6$ (3 g.) in water (100 cc.) heated 10 min. with NaHCO_3 (10 g.) gives a permanently violet soln. Toward H_2O_2 and KMnO_4 these violet solns. behave like the green ones. When a large excess of NaHCO_3 is added and the violet solns. are dild. and heated, they turn green. Conversely, the green solns. (both those prepd. from

cobaltinitrites and those from cobaltous salts and H_2O_2) become violet on addn. of cold NaNO_2 . This indicates that in the cobaltic complex, mols. of alk. bicarbonate united by coördination can be replaced by nitrate mols. and *vice versa*. When the violet solns. are concd. and EtOH is added, microscopic examn. shows a mixt. of colorless crystals of alk. salts and violet-red crystals.

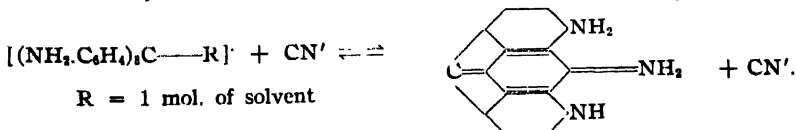
C. C. DAVIS

Thio salts. V. Addition compounds with hexamethylenetetramine. F. RONOLICO. Univ. Firenze. *Atti. accad. Lincei* [6], 7, 660 6(1928); cf. Fernandes, *C. A.* 22, 736.—The cryst. structures of some thio and thioxy salts were detd. to ascertain in what way the structure varies with successive substitutions of O atoms by S atoms. Hexamethylenetetramine addn. compds. were chosen because they are more stable and crystallize better than the normal salts. The following compds. were prepd.: $\text{MgMoO}_4 \cdot \text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$ (cf. Di Capua, *C. A.* 20, 1184), triclinic; $\text{MgMoSO}_3 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, light yellow; $\text{MgMoS}_2\text{O}_2 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, light yellow; $\text{MgMoSO}_3 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, dark red, dimetric $a:c = 1:0.7072$; $\text{MgMoS}_4 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, dark red, monoclinic, $a:b:c = 0.8296:1:0.9764$; $\text{MgWO}_4 \cdot \text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, same cryst. structure as $\text{MgMoO}_4 \cdot \text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$; $\text{MgWSO}_3 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, yellow; $\text{MgWS}_2\text{O}_2 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, yellow; $\text{MgWSO}_3 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, light yellow; $\text{MgWS}_4 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, orange-yellow, same cryst. structure as $\text{MgMoS}_4 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$. Not all these compds. could be examd. crystallographically because they were microcryst. and could not be measured. They were prepd. by adding hot MgCl_2 and $\text{C}_6\text{H}_{12}\text{N}_4$ to the alk. thio salt, the cryst. compd. sepg. on cooling. To prep $\text{MgMoS}_3\text{O}_2 \cdot 2\text{C}_6\text{H}_{12}\text{N}_4 \cdot 10\text{H}_2\text{O}$, however, there was no Mo trisulfurated compd., so ammoniacal $(\text{NH}_4)_2\text{MoO}_4$ was treated with H_2S until a color between the orange of $(\text{NH}_4)_2\text{MoS}_2\text{O}_2$ and the red of $(\text{NH}_4)_2\text{MoS}_4$ was obtained. The crystallographic study showed that with successive replacement of O by S was not accompanied by morphotropic variations in the crystals, indicating the complexity of such thio salts as suggested by Fernandes and Polazzo (cf. *C. A.* 22, 397) on a basis of their colors.

C. C. DAVIS

Chloroform-soluble metal pyridine cyanates. TENNY L. DAVIS AND ALBERT V. LOGAN. Mass. Inst. Tech. *J. Am. Chem. Soc.* 50, 2493-9(1928).—Compds. have been prepd. of $\text{Cu}(\text{NCO})_2$ with 2 and 6 $\text{C}_6\text{H}_5\text{N}$, of $\text{Ni}(\text{NCO})_2$ with 4 and 6 $\text{C}_6\text{H}_5\text{N}$, of $\text{Co}(\text{NCO})_2$ with 2 and 6 $\text{C}_6\text{H}_5\text{N}$, of $\text{Cd}(\text{NCO})_2$ with 2 and 6 $\text{C}_6\text{H}_5\text{N}$, of $\text{Zn}(\text{NCO})_2$ with 2 $\text{C}_6\text{H}_5\text{N}$ and of AgNCO with 1 $\text{C}_6\text{H}_5\text{N}$, by adding $\text{C}_6\text{H}_5\text{N}$ to a soln. of equiv. quantities of KNCO and the metal salt in H_2O until a slight excess was present; the ppt. was extd. with CHCl_3 and the filtrate allowed to evap. spontaneously; the compds. contg. less $\text{C}_6\text{H}_5\text{N}$ were obtained by leaving the satd. compds. uncovered in watch glasses for periods varying from 2 days to 1 week. $\text{Cu}(\text{NCO})_2 \cdot 6\text{C}_6\text{H}_5\text{N}$ forms azure-blue prisms, which retain their color and form in an atm. of $\text{C}_6\text{H}_5\text{N}$; exposed to the air, the crystals change to a pale blue or bluish lilac powder of the $2\text{C}_6\text{H}_5\text{N}$ deriv.; after several months or after heating to 100° for a few hrs., all the $\text{C}_6\text{H}_5\text{N}$ is removed. $\text{Ni}(\text{NCO})_2 \cdot 6\text{C}_6\text{H}_5\text{N}$ is a lighter blue than the Cu deriv.; it loses $\text{C}_6\text{H}_5\text{N}$ to form a pale blue powder of the $4\text{C}_6\text{H}_5\text{N}$ deriv. $\text{Co}(\text{NCO})_2 \cdot 6\text{C}_6\text{H}_5\text{N}$ yields a blue soln. in CHCl_3 which turns lilac or pink if the temp. is lowered or if $\text{C}_6\text{H}_5\text{N}$ is added. By adjusting the quantity of excess $\text{C}_6\text{H}_5\text{N}$ in such a soln., a liquid may be secured which changes color with very moderate changes of temp. $\text{Cd}(\text{NCO})_2 \cdot 6\text{C}_6\text{H}_5\text{N}$ is colorless; the colorless $\text{Zn}(\text{NCO})_2 \cdot 2\text{C}_6\text{H}_5\text{N}$ does not lose an appreciable quantity of $\text{C}_6\text{H}_5\text{N}$ after a week's exposure; in an atm. of $\text{C}_6\text{H}_5\text{N}$ it deliquesces to form a sirupy liquid. $\text{AgNCO} \cdot \text{C}_6\text{H}_5\text{N}$ also deliquesces in an atm. of $\text{C}_6\text{H}_5\text{N}$. The Cu and Co hexapyridine derivs. raise the b. p. of CHCl_3 about 6.5 times as much as would be expected if they were undissociated mols. C. J. W.

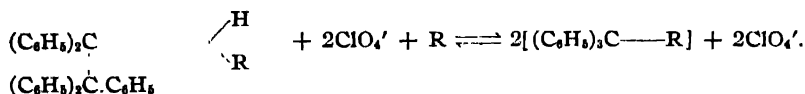
Color, molecular weight and electrolytic character of triphenylmethane derivatives. I. LIFSCHITZ and GEERT GIBBS. Rijks Univ. Ber. 61B, 1463-91(1928); cf. *C. A.* 20, 1231.—The transposition of *di-* and *tri*aminotriphenylmethane derivs. into isomeric dyestuff salts takes place as follows: $(\text{NH}_2 \cdot \text{C}_6\text{H}_4)_3\text{C} \cdot \text{CN} \rightleftharpoons [(\text{NH}_2 \cdot \text{C}_6\text{H}_4)_2\text{C}] \cdot \text{CN}$. The left-hand member of this equation is a colorless nonelectrolyte and the right-hand member a colorless or weakly colored electrolyte. This in turn undergoes a transposition in which a dyestuff cation is formed as follows:



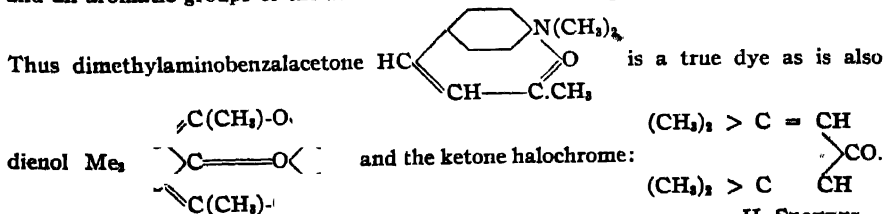
To investigate more fully the nature of these substances and explain the presence or absence of color, the following compds. are prepd.: *tri-p-anisylmethane*, m. 49° ; *tri-*

p-anisylcarbinol, m. 82°; *di-p*-anisylphenylmethane (I), m. 99–100°; *di-p*-anisylphenylcarbinol (II); *p*-anisyl-diphenylcarbinol (III); *tri-p*-anisylmethyl perchlorate, carmine-red crystals, m. 193°; *di-p*-anisylphenylmethyl perchlorate (IV), m. 210°; *p*-anisyl-diphenylmethyl perchlorate, m. 191°; triphenylmethyl perchlorate (V), m. 150°; *tri-p*-anisylacetoneitrile, m. 128°; *di-p*-anisylphenylacetoneitrile (VI), m. 33–34°; *p*-anisyl-diphenylacetoneitrile (VII), m. 117–18°; *tri-p*-anisylmethyl thiocyanate; *di-p*-anisylphenylmethyl thiocyanate (VIII), colorless crystals, m. 112°; *p*-anisyl-diphenylmethyl thiocyanate, m. 72°; triphenylmethyl thiocyanate, m. 137°; triphenylmethyl chromate, m. 145°; triphenylmethyl azide, m. 65°; malachite green azide (IX), m. 118–19°; *tri-p*-anisylmethyl ferrocyanide (X); *di-p*-anisylphenylmethyl ferrocyanide, m. 192°; anisyl-diphenylmethyl ferrocyanide, colorless crystals contg. 2 mols. CHCl_3 , driven off at 120–30°, m. 238°; triphenylmethyl ferrocyanide, m. 280°; *p*-dimethylaminobenzal acetone (XI). II is prepd. by action of PbO_2 on I, III by the reaction between anisic acid methyl ester and phenyl magnesium bromide, IV by the action of $(\text{CH}_3\text{CO})_2\text{O}$ and HClO_4 upon the carbinol, V by the action of HClO_4 upon a soln. of the corresponding carbinol in $(\text{CH}_3\text{CO})_2\text{O}$, VI from the interaction of benzoyl cyanide, anisole and AlCl_3 , VII by action of $\text{Hg}(\text{CN})_2$ upon the MeCl , VIII by action of KCN on the soln. of the corresponding perchlorate in CHCl_3 , IX by action of Na azide on the chloride, X by action of $\text{K}_4\text{Fe}(\text{CN})_6$ upon the perchlorate. All the complex ferrocyanides are insol. in H_2O , sol. with difficulty in most org. solvents, very easily sol. in CHCl_3 . XI exists in 2 forms. From the dichromate red alc. soln., orange red to brick red crystals are obtained (m. 128°). Crystd. from boiling ligroin, orange colored plates sep., while from boiling water bright yellow plates are obtained (m. 135°). On dissolving the yellow crystals in AcOH , a red crust is formed on evapn., but H_2O reconverts this into the yellow form. The bright yellow modification is darkened by ultra-violet rays. Spectrographic behavior, mol. wt., cond. and other phys.-chem. properties are detd. for all the above compds. As typical colored carbonium salts, the perchlorate of triphenylcarbinol and its *p*-methoxy homologs are taken, and as colorless derivs. of the same carbinol, the cyanide, thiocyanate, ferrocyanide, azide and chromate are investigated. In studying color characteristics it is found that the color of the solns. depends upon the solvent, the concn. and the temp., and for a given substance the intensity of the color increases with change of solvents in the following order: Et_2O , alc., acetone, $\text{C}_6\text{H}_5\text{NO}_2$, CH_3CN , camphor, CHCl_3 . In some cases heat intensifies the color or even gives a colorless soln. color, but on cooling this effect is lost again. In characteristic dyestuff salts of the malachite green series this heat effect was not previously encountered, but careful investigation of the azides, ferrocyanides and thiocyanates of malachite green indicates the existence of a colorless form which on heating in soln. becomes colored. Solns. of malachite green, therefore, contain an equil. between a true dyestuff salt and a colorless form. If to one of these solns. the salt $[\text{Hg}(\text{CN})_2, \text{Hg}(\text{CNS})_2]$ is added, an intense coloration appears due to the formation of a complex Hg dyestuff salt. With a Hg rosaniline cyanide the dyestuff compd. has the formula $[(\text{NH}_2, \text{C}_6\text{H}_4)_3\text{C}-\text{R}]^+ [\text{Hg}(\text{CN})_2]^-$, is intensely colored and a strong electrolyte, while the leucocyanide has the formula $(\text{NH}_2, \text{C}_6\text{H}_4)_3\text{C}^+\text{CN}^--\text{Hg}(\text{CN})_2$, is completely colorless, and a nonelectrolyte. This colorless compd. is converted into the colored compd. only by ultra-violet radiation; therefore there is no equil. between the 2 salts in soln. The cyanides and azides of the triphenylcarbinols and their methoxyl homologs behave similarly, but are always colorless and nonelectrolytes and remain so on addn. of heavy metal salts. By ultra-violet radiation, however, the leuco compd. is converted first into the colorless but more or less stable electrolyte, which either by hydrolysis or constitutive differentiation comes into equil. with the colored form, thus: $\text{Ar}_3\text{C}^+\text{X}^- \rightleftharpoons [\text{Ar}_3\text{C}-\text{R}]^+\text{X}^- \rightleftharpoons [\text{Ar}_3'\text{C}-\text{R}]^+\text{X}^-$. Extended mol. wt. detns. are made. The cyanides of triphenyl-, anisyl-, diphenyl-, dianisyl-, phenyl- and trianisylcarbinols show normal mol. wt. in their colorless solns. in all solvents. With the thiocyanates, however, this is true only in CHCl_3 solns., while in alc. solns. the exptl. results are only 60–75% of the theoretical, and the substances are therefore dissocd., the dissocn. decreasing as the concn. rises. Cond. measurements show these compds. to be good electrolytes. They are in sharp contrast to the typical colored carbonium salts which show strong assocn. Thus the stable perchlorates of methoxylated triphenylcarbinol give the following results in CHCl_3 : $(\text{C}_6\text{H}_5)_3\text{C}(\text{C}_6\text{H}_4\text{OCH}_3)_3\text{ClO}_4$, mol. wt. theoretical = 372.5, found: 0.96% soln. —591, 1.50% soln. —627, 2.03% —704, 2.51% —703, 3.27% —779, 4.14% —856; while for $(\text{CH}_3\text{O}, \text{C}_6\text{H}_4)_3\text{C}(\text{C}_6\text{H}_5)\text{ClO}_4$, mol. wt. theoretical is 402.5 and found is, for 0.96% soln. —705, 1.59% —745, 3.00% —848, 3.70% —975. With increasing concn. the color intensity also increases. In acetone, the solns. are much less strongly colored and show dissocn. at all concns. and to an extent independent of concn., the mol. wt. found being about 75%

of the theoretical. Mol. wt. detns. in $C_6H_5NO_2$ give for $(CH_3O.C_6H_5)_3C.ClO_4$ by the cryoscopic method 261 or about 60% of the theoretical, and by the ebullioscopic method 329 or about 76% of the theoretical. The strongly colored solns. of the perchlorates therefore contain assocd. polymolar salts, whose mol. wt. approaches the normal more closely the more weakly absorbing is the solvent. Cond. measurements are made at 25° and show that the cyanides and azides of the triphenylcarbinols and methoxytriphenylcarbinols, as well as the leucocyanides of the di- and triaminotriphenylmethane dyestuffs, are nonelectrolytes under all conditions. Only by ultra-violet radiation is ionization produced. On the other hand malachite green azide is strongly electrolytic in character. In alc. soln. its mol. cond. is 10.51 at 250 l. and the color is blue-green. Much more weakly colored is the soln. in $C_6H_5NO_2$, its cond. being 0.33 at 250 l. The addn. of 2 mols. of $Hg(CN)_2$ to the $C_6H_5NO_2$ soln. of 1 mol. of this azide produces a deep dark green color and a cond. of 13.15 at 250 l. The action of the Hg compd. is to form a complex anion. This is in contrast to the cyanide where no disson. occurs, and in which the C-CN bond is homopolar, while in the azide the C-N₃ bond is either heteropolar and ion producing or is made up of 2 colorless mol. types of azides, one of which is purely homopolar (similar to triphenylmethyl azide) while the other contains an ion-producing bond. The ferrocyanides of triphenyl and methoxy-triphenyl carbinol give almost colorless solns. but show considerable cond. The colorless ferrocyanides give colorless or very weakly colored triarylmethyl ions $[Ar_3C-R]^+$ and behave in this respect like the corresponding thiocyanates which are much more sol. The cond. of $(C_6H_5)_3C.CNS$ at 100 l. is 4.84, and of $(C_6H_5)_2C(C_6H_4.OCH_3).CNS$ is 4.78 (in abs. alc.). With these substances the cond. does not reach its full value until after 24 hrs. unless the solns. are heated. Ultra-violet radiation produces decompn. and polymerization products of *thiocyanogen*. Addn. compds. with $Hg(CN)_2$ or $Hg(CNS)_2$ show high cond. Thus in alc. soln. $(C_6H_5)_3C.CNS + 1$ mol. $Hg(CN)_2$ has a cond. at 100 l. of 10.56, the soln. being colorless. The cond. of the typical colored carbonium salts, the perchlorates, is much higher. Thus in alc. soln. the golden orange trianisylcarbonium perchlorate has a mol. cond. of 50.82 at 200 l., and the colorless soln. of dianisylphenylcarbonium perchlorate has a cond. of 52.40 at 200 l. In acetone soln. the trianisyl compd. has a cond. of 126.9. Similar values are obtained in acetonitrile, but lower values in $C_6H_5NO_2$. The temp. coeff. of cond. is measured for the carbonium salts and found to be about the same as that for the NH_4 salts. No relation between color and cond. is encountered in these compds. Conclusion: The colored complex carbonium salts are ternary electrolytes whose cations are formulated as follows:



The expts. thus show that there are colorless or weakly colored triarylmethyl salts whose colorless or weakly colored solns. are electrolytic conductors. Measurements show that the colorless solns. of the triarylmethane derivs. contain monomolar or dissond. substances. The simple benzoid triarylmethyl ions $[Ar_3C-R]^+$ are normally colorless or weakly colored. The intensely colored carbonium salt solns. contain assocd. or higher complex salts or ions. The mol. wt. increases at a rate parallel to color intensity, while color and cond. are independent. The colorless and colored triarylmethyl salts are in general not isomeric. For the occurrence of absorption as in dyestuffs, an aromatic character is unnecessary. All 3 benzene nuclei of triphenylmethane derivs. and all aromatic groups of the *ketone halochromes* can be replaced by aliphatic groups.



H. STOEZT

PRIDEAUX, E. B. R., and LAMBOURNE, H.: *Nitrogen*. London: Charles Griffin & Co., Ltd. Vol. VI. Pt. 1, of Textbook of Inorganic Chemistry. Edited by J. Newton Friend. 242 pp. 18s.

7—ANALYTICAL CHEMISTRY

WILLIAM T. HALL

Microchemical reactions (with hexamethylenetetramine sulfate and with piperazine.) A. MARTINI. *Mikrochem.* 6, 28-33(1928).—Addn. of $(\text{CH}_2)_6\text{N}_4\cdot\text{H}_2\text{SO}_4$ and NH_4CNS solns. to a soln. of CoCl_2 yields glistening blue, triclinic prisms of a complex, non-ionized compd. Under similar conditions CuCl_2 yields light yellow, triclinic tables, ZnCl_2 a mass of thin, white needles, FeCl_2 light red crystals, VOCl_2 light red hexagons, InCl_3 reddish white, tetragonal prisms and $(\text{NH}_4)_2\text{MoO}_4$ red, hexagonal crystals or yellow prisms. A mixt. of SbCl_3 and NaI yields with an acetone soln. of piperazine microscopic, monoclinic, yellow tablets and prisms. Under similar conditions BiCl_3 gives intense red crystals isomorphous with the Sb compd. AuCl_3 , NaBr and piperazine produce orange-yellow to red microscopic prisms. B. C. A.

Nomography. O. LIESCHE. *Chem. Fabr.* 1928, 161-4—Methods of constructing charts for the elimination of calcn. are discussed, and 2 types of chart for reading percentage of S from the weight of substance taken and of BaSO_4 obtained are given. B. C. A.

Chemical x-ray spectrography. LARS THOMASSEN. *Statens Raststoffkomité Publ.* No. 21, 108 pp., Oslo 1926 (Norwegian with English summary); *Mineralog. Abstracts* 3, 460—Detailed directions are given for detecting chem. elements by x-ray spectrum analysis. Tables give the angles of reflection from halite of the rays from various elements. By this method 0.5% of an element is readily detected or 0.1% with special exposures. Intensities of lines afford an approx. quant. estimation. J. F. SCHAIER

The electrodeposition of traces of metals and spectral analysis of the same. EDMOND BAYLE AND LUCIEN AMY. *Bull. soc. chim.* 43, 604-24(1928); cf. C. A. 21, 3579. —A continuation of the work on the detection of traces of metals by making micro-depositions and then taking spark-spectrographs of the cathodes. The traces are deposited electrolytically on cathodes of Cu or Zn from solns. contg. as little as 10^{-3} to 10^{-7} parts in any vol. of soln. The sensitivity on Cu cathodes are: Au, 10^{-6} ; Ag, 10^{-4} ; Pb, 10^{-10} ; Sb, 10^{-4} ; Co, 10^{-6} ; Ni, 5×10^{-7} ; Fe, 10^{-7} ; Cu, 10^{-3} ; Mn, 10^{-10} ; Zn, 10^{-3} ; on Zn: Ag, 10^{-6} ; Cu, 10^{-7} grams. The presence of alkali, alk. earth and NH_4 salts causes no interference. The no. of lines produced in the spectra gives a measure of the amt of salt present. The app. is described. C. J. BROCKMAN

The applicability of the analytical quartz lamp for mixtures of solid substances. FR. HEIN AND W. RETTER. *Univ. Leipsic. J. prakt. Chem.* 119, 368-70(1928).—The fluorescence produced with the aid of ZnO , UO_2SO_4 or anisil by substances like diphenyl disappears when mixed with considerable CuO , Pb_3O_4 , CrO , Fe_2O_3 , HgS or azobenzene. A table is given showing how much of these substances must be present in order to prevent the characteristic fluorescence. W. T. H.

New method of potentiometric analysis. II. Determination of halogen and of silver. THEODOR HECZKO. *Z. anal. Chem.* 74, 289-308(1928).—The principle underlying these titrations is the same as has been described for the potentiometric titration of Fe^{++} with KMnO_4 . In the strongly stirred soln. to be titrated, there is placed a wire of Ag and a rod of a non-conductor of such a nature that it will readily absorb aq. solns. The latter at one end is wound with another piece of Ag wire. Before beginning the expt. this rod is entirely submerged in the soln. and is then withdrawn so that the enveloping wire is entirely above the soln. The 2 Ag wires are connected through a galvanometer and the titration is made. Every addn. of reagent causes a jump in the current. The quotient, increase in the galvanometer reading \div cc. added, reaches a maximum at the end point. Sometimes it is better to measure the residual current for detg. the end point. To make the soln. more conductive, 10 cc. of 50% NH_4NO_3 are added to 150-200 cc. of soln. which is a suitable vol. Pieces of pine wood, boiled for 15 min. in 300 cc. of water, serve as the non-conducting rod. For the detn. of halogen with AgNO_3 soln., the wire about this wood should be connected with the negative pole of the galvanometer but with the positive pole when the reverse titration is made. Minute details are given for the titration of Ag^+ , Cl^- , Br^- and I^- and for the titration of halogens in the presence of one another. W. T. H.

Potentiometric micro-titrations. E. ZINTL AND K. RETZ. *Z. anal. Chem.* 74, 330-42(1928).—The end point of a titration is generally detd. by the change in direction of the titration curve. This change in direction does not, however, in pptn. analyses correspond exactly to the equivalence point which it is desired to find. The error is proportional to the vol. of soln., the soly. product of the ppt. and it is inversely proportional to the square of the normal concn. of the soln. In ordinary titrations, or when

the N concn. of the soln. is equal to or greater than the sq. root of 32 times the soly. product, the error is negligible but in micro-titrations it can become very serious. In titrating Cl^- with $0.1\ N\ AgNO_3$ and a final vol. of 100 cc., this error is only 8×10^{-4} cc. but in titrating Cl^- with $10^{-4}\ N\ AgNO_3$ soln. and a final vol. of 10 cc., the error is 0.8 cc. Accurate titrations are described in a final vol. of 10 cc. of Cl^- with 0.001 $N\ AgNO_3$ and of I^- with 0.0001 $N\ AgNO_3$. The theoretical error is 0.008 cc. in the former case and 8×10^{-7} cc. in the latter. Contrary to the statements of Mislowitz and Vogt (*C. A.* 20, 773) it was found possible to det. Cl^- in serum by direct titration, after addn. of dil. H_2SO_4 or after coagulation of the albumin with picric acid or KH_2PO_4 . Titrations of Br^- and of trivalent As with 0.001 $N\ KBrO_3$ are also described. The micro-titration of As is nearly as sensitive as the Marsh-Liebzig test. When 0.002 mg of As was titrated with 0.0001 $N\ KBrO_3$, the results were 8% too high. Traces of As in Cu solns. can be detd. very easily by micro-titration.

W. T. H.

Thymolphthalein as indicator for titrimetric estimation of carbon dioxide. C. J. SCHOLLENBERGER. Ohio Agr. Expt. Sta. *Ind. Eng. Chem.* 20, 1101(1928).—When CO_2 is absorbed in $Ba(OH)_2$ the excess of the latter is commonly titrated with acid, phenolphthalein being used as indicator. A much sharper end point is obtained with thymolphthalein, which is recommended.

W. T. H.

Use of picric acid as an artificial standard in the colorimetric estimation of silica. E. J. KING AND C. A. LUCAS. Univ. of Toronto *J. Am. Chem. Soc.* 50, 2395-7(1928).—When dil. SiO_2 solns. are treated with an acid and $(NH_4)_2MoO_4$, a color is developed which can be matched exactly by dil. picric acid solns. Expts. show that the color of a soln. contg. 50 mg. of SiO_2 per l. when treated with the reagents of Diénert and Wandenbuleke is equiv. to a soln. contg. 25.6 mg. of pure, dry picric acid. This amt. of picric acid is less than that hitherto used.

W. T. H.

Estimation of nitrogen. A combined Kjeldahl and nesslerization method. M. R. RAMASWAMI SIVAN AND M. SANYASI RAJU. *Madras Agr. Dept., Yearbook* 1926, 6-10 (1927).—About 0.1 g of the finely ground sample is digested in a Kjeldahl flask with 2-3 cc. strong H_2SO_4 and 1 g K_2SO_4 under a direct flame until colorless, with a small spiral of Pt as a catalyst. Cool; neutralize with NaOH; ppt. Ca, etc., by shaking with a few crystals of $K_2C_2O_4$; dil. to known vol; filter through dry paper; and det. N by the usual Nessler method. Tables are given showing comparative results obtained with the Kjeldahl and modified Nessler methods on soils and several org. compds.

K. D. JACOB

Diphenylcarbazide as a test for chromium. NORMAN M. STOVER. *J. Am. Chem. Soc.* 50, 2363-6(1928).—The diphenylcarbazide test of Cazeneuve, which has also been used by Brandt and by Snoddy, is much more sensitive than the test for Cr with ether and H_2O_2 . In the analysis of the third group of the regular qual. scheme, the test can readily be applied by taking the filtrate obtained after treating Fe^{++} , Cr^{+++} , Zn^{++} and Al^{+++} with NaOH and Na_2O_2 , making acid with AcOH and adding 2 cc. of reagent prepd. by dissolving 0.2 g. of diphenylcarbazide in 10 cc. of glacial AcOH and dilg. with 100 cc. of 95% alc. The test is more sensitive when H_2SO_4 is used instead of AcOH.

W. T. H.

Modified confirmatory test for aluminum. ELIAS H. PAÑGANIBAN AND FLOR-ENCIO A. SOLIVEN. Univ. of the Philippines. *J. Am. Chem. Soc.* 50, 2427-8(1928).—By placing a few asbestos threads in the paper filter recommended by A. A. Noyes in his method of applying the Thénard test for Al, and then igniting the asbestos rather than paper, the test becomes more sensitive and it is not necessary to wash the $Co(AlO_2)_2$ ppt. free from Na salts as in the Noyes' scheme.

W. T. H.

Rapid determination of magnesium. L. GALIMBERTI AND E. ZOCCHEDDU. Lab. Ricorche chim. Bonifica di Santa Gilla, Cagliari. *Ann. chim. applicata* 18, 286-8(1928).—The new method is simpler and more rapid than any so far proposed and gives excellent results. It depends upon the fact that Mg may be detd. alkalimetrically, whether or not alk. chlorides or sulfates are present. *Procedure*—To an accurately measured vol. of soln. add drop by drop an excess of cold 0.1 N NaOH (with Me orange as indicator), make up to 250 cc. with water, agitate, let stand a few min., filter and titrate 100 cc. of filtrate with 0.1 N HCl (Me orange). Many operators have better success using phenolphthalein in the final titration.

C. C. DAVIS

Notes on the detection of tin, zinc and chlorine. EDWIN EGGRIWE. *Z. anal. Chem.* 74, 225-31(1928).—In the qual. scheme, Fe is commonly used to reduce Sn^{++++} to Sn^{++} but the presence of the Fe^{++} interferes with most color reactions that could be otherwise used for the detection of the Sn^{++} . *Coerulein* and *diazinegreen S* (K), however, can be used in the presence of Fe^{++} . In concd. HCl, 1 drop of $SnCl_4$ soln.

contg. 0.01 mg. of Sn gives a distinct fluorescence with the former but unfortunately the dyestuff is no longer on the market. The latter dye gives a blue soln. in HCl but a trace of Sn^{++} causes the formation of red safranin, a violet shade being shown immediately. To test for Sn, dissolve a ppt. of Sb_2S_3 and SnS_2 in concd. HCl, keeping the vol. small, and reduce with Fe. Add 5 cc. of aq. 0.01% soln. of the dye, which has been turned a clear blue by the addn. of HCl. To detect Zn by a color reaction, metanil yellow or Orange IV can be used in 0.01% aq. soln. In solns. contg. HCl these dyes give a red color which disappears when $\text{K}_3\text{Fe}(\text{CN})_6$ and a little Zn^{++} are present. To use this test in the qual. scheme after the Zn, Al and Cr have been sepd. from the other members of Group III by the use of NaOH and Na_2O_2 , it is first necessary to reduce CrO_4^{--} , which is best accomplished by H_2O_2 in acid soln. Another dye that can be used for detecting Zn is diethylaniline. In H_3PO_4 soln. this dyestuff shows a pale yellow color but when $\text{K}_3\text{Fe}(\text{CN})_6$ and a little Zn^{++} are added, the color turns brownish or reddish. In 18 N H_2SO_4 soln., this dye is dark yellow in color. When $\text{K}_3\text{Fe}(\text{CN})_6$ and a little Zn are added, a brownish red color develops and a ppt. forms. For the detection of Cl^- an aq. soln. of *Acid Fuchsin S (A)* can be used. Dip filter paper into the soln. to prepare suitable test papers. The red color changes to yellow when acted upon by Cl_2 developed from as little as 0.05 mg. of NaCl by treatment with KMnO_4 and H_2SO_4 . Br_2 and NO_2 interfere with this last test, as well as ClO^- and BrO^- . W. T. H.

Ceric sulfate as a volumetric oxidizing agent. VII. Determination of vanadium in the presence of chromium, tungsten and iron. H. H. WILLARD and PHILENA YOUNG. Univ. Mich. *Ind. Eng. Chem.* 20, 972-4(1928); cf. C. A. 22, 2123.—Furman (C. A. 22, 2900) described the titration of $\text{V}_2\text{O}_5^{++++}$ solns., with $\text{Ce}(\text{SO}_4)_2$ and applied the method to the analysis of Fe-V. The present paper was written before the publication of F.'s paper and applies the method to the analysis of steels contg. Cr, V and W. WO_3 is filtered off, dissolved in NaOH soln. and added to the main soln. from which it is not reprecipitated, as might be expected although it has been known for some time that Na^+ interferes with the pptn. of WO_3 . W. T. H.

The detection of vanadium in the systematic course of analysis. J. RÖHL. Nürnberg höhere technischen Staatslehranstalt. *Z. anal. Chem.* 74, 342-5(1928).—It is recommended in some textbooks to test for V in the soln. after pptn. of sulfides of the third group with $(\text{NH}_4)_2\text{S}$ but this is unsatisfactory because the sulfide ppt. tenaciously retains a considerable part of the V and, moreover, the pptn. of V_2S_5 from the $(\text{NH}_4)_2\text{S}$ soln. by adding acid is always incomplete. It is better to provide sufficient Fe^{+++} and ppt. with a very slight excess of NH_4OH . It is not even necessary to make sure that all of the V is in the quinquivalent condition because $\text{Fe}(\text{OH})_3$ adsorbs $\text{V}_2\text{O}_5^{++++}$. When a ppt., consisting possibly of hydroxides of Fe, Cr, Al, U, V and Ti, is to be analyzed, it is well to treat the ppt. first with hot NaOH soln. to dissolve out the V and the Al. Then make a portion of the soln. strongly acid and test for V by the H_2O_2 reaction and for Al in the usual way. Next digest the original ppt. with Na_2CO_3 to dissolve out the UO_2 and apply the ferrocyanide test. Fusion of the remainder of the ppt. with NaKCO_3 gives water-sol. CrO_4^{--} ; Fe can be detected by dissolving a little of the ppt. in HCl and testing with CNS^- and the Ti can be detected in H_3PO_4 soln. by the H_2O_2 test. By the addn. of NH_4F it can be proved that residual V does not give the test for Ti. W. T. H.

Determination of vanadium in steel. A. T. ETHERIDGE. *Analyst* 53, 423-8 (1928).—Dissolve 5 g. of steel in HCl with a little HNO_3 . Evap. and treat the HCl soln. with ether, carrying out the Rothe method for removing FeCl_3 substantially as recommended by Bauer and Deiss (C. A. 16, 1920; cf. Hall and Williams (C. A. 16, 1206). It is necessary to use a little H_2O_2 in the ether-HCl mixt. used for washing the ethereal FeCl_3 soln. in order to remove traces of V from the ether. Take the aq. soln., evap. off ether, add HNO_3 to oxidize org. matter and evap. with H_2SO_4 at a low temp., in order to prevent as far as possible the formation of anhyd. sulfates which are difficult to redissolve. Dil. with water, filter off SiO_2 , add 1 g. of hydrazine sulfate and purify the V soln. electrolytically as recommended by Cain. Filter, remove traces of Hg as HgS and oxidize with strong KMnO_4 . Then reduce with SO_2 , remove the excess of reductant and titrate hot with KMnO_4 . This method has been found accurate with samples contg. 0.1-0.85% V. If more than 0.75 g. of Cr is present it is a tedious process to remove all of the Cr electrolytically. This difficulty can be overcome by electrolyzing the soln. in sep. portions, providing sufficient app. is available, or the V can be pptd. by cupferron, the ignited ppt. dissolved in H_2SO_4 and electrolyzed. W. T. H.

The separation of molybdenum from vanadium in steel analysis. J. KASSLER. *Z. anal. Chem.* 74, 276-89(1928); cf. C. A. 22, 556.—If sufficient ferrous salt is present

all of the V can be pptd. with the Fe on adding an excess of NaOH soln. and the Mo can then be detd. in the filtrate by pptn. with Pb salt or colorimetrically by the reaction with SnCl₂. For steels contg. less than 3% Mo take 4 g. of sample and dissolve in 100 cc. of 6 N HCl. When the sample is nearly all dissolved, add 70 cc. of 5% KClO₃ soln. Heat for 2 min. to accomplish oxidation and then boil for 5 min. to expel excess Cl₂. If SiO₂ separates, filter it off. Neutralize the free acid with NaOH soln. and add 25 cc. of 20% Na₂S₂O₃ soln. to reduce a part of the Fe⁺⁺⁺ to Fe⁺⁺. Pour the boiling hot soln. into 120 cc. of hot 24% NaOH. Filter and use an aliquot part of the filtrate for the Mo detn. If more than 3% Mo is present use only 1 g. of sample. In this case, instead of reducing a part of the Fe, add 3 g. of FeCl₂ in order to get a proper ratio of Fe⁺⁺: Fe⁺⁺⁺ for the complete pptn. of the V.

W. T. H.

Analysis of fresh iron oxide. J. H. STIJNS. *Hel Gas* 48, 324-6(1928).—Most Dutch iron oxides contain considerable phosphate (up to 5%) which has to be considered in the gravimetric detn. of Fe.

B. J. C. VAN DER HOEVEN

Notes on the chemical analysis of pitchblendes. EDUARD KÖRNER AND FRIEDRICH HECHT. Univ. Vienna. *Monatsh.* 49, 438-43, 444-59(1928).—This research records the results of a great deal of careful analytical work on the analysis of several samples of pitchblende. The results show that the procedure recommended by C. W. Davis (*C. A.* 20, 1778) is satisfactory although several minor modifications are suggested. There are still some points to be cleared up that will require work with synthetic mixts. Considerable attention was paid to the detn. of Th, because according to the theory of G. Kirsch, Th is a decompn. product of an hypothetical isotope of U of at. wt. 236, so that the age of a sample of pitchblende can be estimated to some extent by the quantity of Th present. Davis could find no Th in the pitchblende he analyzed but in the samples now studied the presence of about 0.01% Th was established although the theory of Kirsch would require 10 times as much. It is not yet clear whether this is due to a faulty method of analysis or not. The ratio of Pb: U, which is of importance in detg. the age of the mineral, was established very satisfactorily by the method of analysis used, which is so complicated that the original papers must be consulted for details.

W. T. H.

The thorium content of Katanga pitchblende. An analytical chemistry investigation. FRIEDRICH HECHT AND EDUARD KÖRNER. Univ. Vienna. *Monatsh.* 49, 460-75(1928).—This paper contains many interesting comments on the difficulties attending the detn. of the Th content of pitchblende. The method of C. W. Davis (*C. A.* 20, 1778) requires modification when a small quantity of Th (say 0.01%) is to be detd. because when Pb is pptd. as PbSO₄, as it is at the start of the Davis method, a little ThO₂ is occluded by the ppt. After the electrolysis of the HNO₃ soln. and deposition of PbO₂ on the anode, the residual soln. should be combined with the filtrate from the original PbSO₄ ppt. so that it is available for the subsequent detn. of Th. The sepn. of Th as fluoride is better than as subphosphate because the Th(H₂P₂O₆)₂ ppt. apparently occludes U and other elements. Moreover, the assumption that the subphosphate is changed completely to ThP₂O₇ on ignition does not appear to be true as the ppt. weighs too much. It has been noticed that Pb salts from radioactive minerals show a greater tendency to hydrolyze than ordinary Pb salts. Studies were carried out in the attempt to show the presence of Th⁺⁺⁺ was the cause of this peculiarity, but in the light of all the results obtained, this explanation does not appear to be reasonable, although it is probable that when the electrolysis of the HNO₃ soln. is carried out in accordance with the method of Davis, the PbO₂ deposit always contains a little PbSO₄ and often some ThO₂. With respect to the detn. of U, the method of Schoep and Steinkuhler (*C. A.* 16, 3828) is imperfect when large quantities of U and P are present unless several pptns. are made. Although the presence of 0.01-0.02% of ThO₂ in pitchblende has been demonstrated by this work, it is pretty clear that this small quantity shows the falsity of the theory of Kirsch with respect to Th being one of the decompn. products of an isotope of U.

W. T. H.

Determination of available sulfur in roasted blendes. EDGAR BEYNE. *Anal. chim. anal. chim. appl.* 10, 221-5(1928).—It is often the practice to det. total S and compute the S present as sulfate from the Pb, Ba, Ca and Mg content of the roasted ore. This is likely to lead to error, as Hassreidter has quite recently shown. It is better to det. the available S by oxidizing the H₂S formed by treatment with SnCl₂ and HCl. The S present as ZnSO₄ can be detd. by extg. with hot water and detg. the Zn.

W. T. H.

The determination of nitrates. II. L. SZEBELDÉY. *Z. anal. Chem.* 74, 232-5(1928).—S. has shown (*C. A.* 22, 1745) that nitrates can be titrated in concd. H₂SO₄ soln. by means of FeSO₄ soln. and in this paper the reaction was tested in the presence

of Na^+ , NH_4^+ , Mg^{++} , Ca^{++} , Sr^{++} , Ba^{++} , Ni^{++} , Co^{++} , Al^{+++} , Cr^{+++} , Mn^{++} , Zn^{++} , As^{+++} , AsO_4^{---} , Sb^{+++} , Ag^+ , Pb^{++} , Hg^+ , Hg^{++} , Cu^{++} , Bi^{+++} and Cd^{++} ions. Interference was noted with the following ions only. Pb^{++} , Hg^{++} and Bi^{+++} salts cause white ppts. of sulfates as does Ba sometimes by diln. of the H_2SO_4 on adding the reagent. It is advisable to have a comparison tube with a similar ppt. in order to match the end point. Ni^{++} causes the color to be more greenish at the end point. Cu^{++} causes the color to be grayish blue at the end point and reddish blue when an excess of reagent is added. Co^{++} and Cr^{+++} interfere enough to make the titration worthless. Hg^{++} causes low results and pure arsenite solns. cannot be titrated accurately unless small particles of As are in suspension in the liquid. W. T. H.

Colorimetric determination of sulfuric acid. JUNZŌ YAMAZAKI. Tokyo Imp. Inst. *Bull. Chem. Soc. Japan* 3, 173-80(1928).—In the presence of dil. HCl, alc. and a const. amt. of furfural, a yellow color is obtained with benzidine. By this reagent, it is possible to det. the benzidine content of a benzidine sulfate ppt., or, after such a ppt. has been formed, the excess benzidine can be detd. in the centrifuged soln. The former, slower method is carried out as follows: To 5 cc. of soln. in a test tube, add 2 drops of bromophenol blue (0.04%) and *N* HCl until the indicator turns a pure yellow color. Add 5 cc. of water and 2 cc. of 0.025 *N* benzidine-HCl soln. and 5 cc. of 90% acetone to complete the pptn. Filter and wash 3 times with small portions of 90% acetone. Dissolve the ppt. in 15 cc. of 0.02 *N* NaOH in 50% alc. To the soln. add 10 drops of 10% BaCl_2 , make the soln. acid to phenolphthalein and add 10-15 drops of *N* HCl in excess. Make up to exactly 15 cc., mix and take 5 cc. for the colorimetric comparison. Add 2 cc. of pure 1% aq. furfural soln. and compare with solns. contg. known amts. of benzidine treated similarly. The method gave fairly good results in *urine analysis* although the presence of considerable Cl^- causes low results and H_3PO_4 causes high values. W. T. H.

Analysis of bauxite and refractories of high alumina content. G. E. F. LUNDELL AND J. I. HOFFMAN. *Bur. Standards J. Research* 1, 91-104(1928). This important paper should be read by all chemists who are likely to be called upon to make this difficult analysis. The procedures recommended are in no case novel but the critical notes are good. Two procedures are given, one for very accurate work and the other for lab. control. In the latter the Al_2O_3 , Fe_2O_3 , TiO_2 , ZrO_2 , P_2O_5 and V_2O_5 are weighed together after pptn. with NH_4OH and in another portion, all these oxides except Al_2O_3 are weighed after pptn. with cupferron so that the Al_2O_3 can be detd. by difference. In the accurate method, it is recommended to dry the powd. bauxite for 4 hrs. at 140° and then to fuse 0.5 g. with 15 times as much Na_2CO_3 . Treatment with HF, HNO_3 and H_2SO_4 is, however, satisfactory with most samples of bauxite and decompn. with $\text{K}_2\text{S}_2\text{O}_7$, with Na_2CO_3 and Na_2O_2 , or with Na_2CO_3 , Na_2O_2 and C can be made successful. Considerable emphasis is placed upon testing the SiO_2 for "mixed oxides" and the "mixed oxides" for SiO_2 . After fusion with Na_2CO_3 it is recommended to take up the melt in Pt with 150 cc. of 0.5 *N* H_2SO_4 and remove SiO_2 after each of 2 evapns. Then, after treatment with HF and H_2SO_4 , fuse the residue from the impure SiO_2 with $\text{K}_2\text{S}_2\text{O}_7$, dissolve in 3.5 *N* H_2SO_4 and add the soln. to the original filtrate from the SiO_2 . Ppt. the Al_2O_3 , Fe_2O_3 , TiO_2 , ZrO_2 , P_2O_5 , V_2O_5 and Cr_2O_3 with NH_4OH , according to the directions of Blum, wash with 2% NH_4Cl soln., dissolve the ppt. in hot 6 *N* HCl and repeat the pptn. Ignite and weigh the Al_2O_3 , Fe_2O_3 , TiO_2 , ZrO_2 , P_2O_5 , V_2O_5 and Cr_2O_3 contaminated with about 1 mg. of SiO_2 . Fuse the weighed oxides with $\text{K}_2\text{S}_2\text{O}_7$, extract the melt with 100 cc. of 3.5 *N* H_2SO_4 and recover the SiO_2 as usual. Nearly neutralize with NaOH and pour the soln. into 150 cc. 10% NaOH soln. contg. 1 g. of Na_2O_2 . Filter off the ppt., after heating an hr. on the steam bath, and reserve it for detg. Fe_2O_3 , TiO_2 and ZrO_2 . In the filtrate det. Cr colorimetrically and ppt. the Al, P and V by adding NH_4OH to the soln. which is first made acid to litmus paper. Dissolve the ppt. in 100 ml. of 3.5 *N* HNO_3 , add a little H_2O_2 and det. V colorimetrically. Then boil to destroy H_2O_2 , add concd. KMnO_4 in slight excess and decolorize with H_2SO_4 . Make acid with HNO_3 and ppt. the P as phosphomolybdate in the usual manner. Det. Al by difference. Take the ppt. reserved for the detn. of Fe, Ti and Zr, dissolve it in 25 cc. of 4 *N* HCl, add 4 g. of tartaric acid, water to make 200 cc. and neutralize with NH_4OH . Sat. with H_2S , make ammoniacal and add more H_2S . Filter off the FeS ppt., dissolve it in HCl with a little KClO_4 and det. Fe by the Zimmermann-Reinhardt method. Adjust the filtrate from the FeS ppt. so that it is 3.5 *N* with H_2SO_4 and ppt. Ti and Zr with cupferron. Wash the ppt. with 1.2 *N* HCl, dry and weigh. Fuse the ignited ppt. with $\text{K}_2\text{S}_2\text{O}_7$, take up the melt in 60 cc. of 3.6 *N* H_2SO_4 , add H_2O_2 to oxidize Ti, and 0.5 g. of $(\text{NH}_4)_2\text{HPO}_4$. After standing overnight at 40° , filter off and weigh the Zr as pyro-

phosphate. Det. Ti by difference or colorimetrically. The other detns. are made with other samples as outlined in *Bull.* 700 of the U. S. Geol. Survey. W. T. H.

Analysis of phosphorite. A. V. KRASNOVSKII. Silicates Institute, Moscow. *J. Chem. Ind. (Moscow)* 5, 408-9(1928).—Finely pulverize 10-20 g. of a representative sample of phosphorite in an agate mortar and use 3 g. of the powder for *moisture* detn. at 105-110°, and 1.5 g. for *loss on ignition*. To det. the *insol. residue* boil 5 g. with 50 cc. of aqua regia, filter and ignite the residue. Evap. the filtrate to dryness and det. dissolved SiO_2 in the usual way except using HNO_3 instead of HCl . Dil. the filtrate from the SiO_2 to a known vol. and use one aliquot portion equiv. to < 0.1 g. P_2O_5 for the P_2O_5 detn. and another portion for detg. Al_2O_3 , Fe_2O_3 , CaO and MgO . Det. P_2O_5 by the molybdc method of Woy (cf. Treadwell-Hall) but allow the yellow molybdate ppt. to stand 2-3 hrs. instead of 10 min. in a warm place and not less than 12 hrs. at room temp. before filtering. To det. $\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$. Evap. the other aliquot nearly to dryness and treat with small, 1 g. pieces of Sn in presence of a few cc. of fuming HNO_3 over a water bath to eliminate P_2O_5 with metastannic acid. Use Blum's method for detg. Fe_2O_3 and Al_2O_3 together. Dil. the filtrate after filtering off the sesquioxides to about 300 cc., add 1-1½ cc. of 98-99% AcOH and ppt. the Ca slowly as oxalate using approx. twice as much 0.5 N $(\text{NH}_4)_2\text{C}_2\text{O}_4$ as the Ca theoretically required. Dissolve the ppt. in 2 N HCl and reppt. CaC_2O_4 . Det. Mg by the Schmitz method. The detns. of SO_3 , and of *alkalies* in phosphorite present no special difficulties but the *F* detn. deserves a special study. BERNARD NELSON

The action of hydrazine on quinquivalent arsenic in sulfuric acid solution. I. H. KUBINA AND J. PLICHTA. *Z anal. Chem.* 74, 235-47(1928).—While making some distns. of arsenate solns. with HCl and KBr , using hydrazine sulfate to reduce the arsenate to the trivalent condition, it was noticed that a grayish black deposit of As was sometimes deposited in the condenser. This led to a careful study of the reaction between hydrazine and quinquivalent As, the outcome of which showed that in moderately acid solns. the As is to a slight extent reduced to AsH_3 which is subsequently oxidized to the metallic condition. The reaction does not take place with arsenite solns. containing no arsenate nor when considerable HCl is present. W. T. H.

Behavior of vanillin toward sulfites and alkaline bisulfites. GIOVANNI ROMEO AND FRANCESCO PIRRONE. Consiglio Provinciale dell' Economia, Messina. *Ann. chim. applicata* 18, 189-93(1928).—In titrating vanillin by the general method proposed by R. and d'Amico (cf. *C. A.* 20, 561) for the titration of aldehydes, it was found that instead of a diminution of the soln., as occurred in all previous cases investigated, there was an increase of acidity corresponding to 1 equiv. per mol. of vanillin. To det. the cause of this anomaly, the behavior of vanillin with Na_2SO_3 soln. alone and with NaHSO_3 was studied. It would be predicted that with NaHSO_3 , vanillin would react, thus: $3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CHO} + \text{NaHSO}_3 \rightarrow 3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CH}(\text{OH})\text{SO}_3\text{Na}$ and with Na_2SO_3 would react thus: $3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CHO} + \text{Na}_2\text{SO}_3 + \text{H}_2\text{O} \rightarrow 3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CH}(\text{OH})\text{SO}_3\text{Na} + \text{NaOH}$, followed by $3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CH}(\text{OH})\text{SO}_3\text{Na} + \text{NaOH} \rightarrow 3,4\text{-MeO}(\text{NaO})\text{C}_6\text{H}_3\text{CH}(\text{OH})\text{SO}_3\text{Na} + \text{H}_2\text{O}$. Therefore, with NaHSO_3 , the product should, when titrated with NaOH and rosolic acid as indicator, undergo a diminution of acidity corresponding to 1 mol. of NaHSO_3 per mol. of vanillin, while with Na_2SO_3 the product should become alk., or after the 2nd stage should be neutral. Actually in both cases, the final product becomes acid to an extent corresponding to 1 equiv. per mol. of vanillin. It is probable that at first the CHO group forms a sulfonic salt, and then the Na migrates from the sulfonic group to the OH group, with formation of an easily hydrolyzed hydrosulfone, thus: (1) with NaHSO_3 : $3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CHO} + \text{NaHSO}_3 \rightarrow 3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CH}(\text{OH})\text{SO}_3\text{Na} \rightarrow 3,4\text{-MeO}(\text{NaO})\text{C}_6\text{H}_3\text{CH}(\text{OH})\text{SO}_3\text{H} \rightarrow 3,4\text{-MeO}(\text{NaO})\text{C}_6\text{H}_3\text{CHO} + \text{H}_2\text{SO}_3$; and (2) with Na_2SO_3 : $3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CHO} + \text{Na}_2\text{SO}_3 + \text{H}_2\text{O} \rightarrow 3,4\text{-MeO}(\text{HO})\text{C}_6\text{H}_3\text{CH}(\text{OH})\text{SO}_3\text{Na} + \text{NaOH} \rightarrow 3,4\text{-MeO}(\text{NaO})\text{C}_6\text{H}_3\text{CHO} + \text{NaHSO}_3 + \text{H}_2\text{O}$. C. C. DAVIS

Microanalytical determination of sulfur in organic substances by titration. BENNO-SUKE KUBOTA AND SADAHIKO HANAI. Inst. of Phys. and Chem. Research at Tokyo. *Bull. Chem. Soc. Japan* 3, 168-72(1928).—By heating in a stream of H_2 in such a way that all the vapors come in contact with Ni, prepd. by reduction of NiO in H_2 , it is possible to convert all of the S into NiS which can be analyzed for S by the iodometric method used in steel analysis, strong HCl being used to decomp. the NiS . W. T. H.

Critical comments on the analysis of glycerol by the acetin method and the sources of error. OTTO BERTH. *Chem.-Ztg.* 52, 619-20(1928); cf. *C. A.* 21, 2391.—It is pointed out that the standard method for detg. glycerol by the acetin method is likely to lead to error, particularly on account of the presence of CO_2 in the atm. In cases governing

the purchase and sale of glycerol, the chemist is obliged to make the analysis by the faulty, standard directions which should be revised. To avoid error the following method of carrying out the blank test at the time the analysis is made is recommended: Dissolve 3 g. NaOAc in freshly boiled water, add 8.5 cc. of Ac_2O and dil. to about 350 cc. Heat to about 80° to saponify the anhydride and neutralize to phenolphthalein with N NaOH. Add 50 cc. of the NaOH soln., boil 15 min., cool and titrate back with N HCl. W. T. H.

Colorimetric method for determining ethylchlorhydrin. M. B. ZAPADINSKII. *Z. anal. chem.* 74, 273-5(1928); *J. Russ. Phys.-Chem. Soc.* 60, 695-7.—Mix the sample with diazobenzenesulfonic acid and heat to 25° . This causes the oxidation of the OH group to aldehyde. Next add KOH soln., whereby a condensation of the aldehyde with diazo compd. takes place and a strong reddish coloration ensues. The color is not very stable and must be promptly compared with standards of Bordeaux-Lafitte in benzene. The results obtained agree well with those obtained by the refractometer and the method is much easier to carry out. W. T. H.

Detection of isopropyl alcohol. DOUGLAS HENVILLE. *Analyst* 53, 416-8(1928).—Isopropyl alc. can be detected by oxidizing it to acetone and then testing for the latter. In a 120 ml., narrow-necked flask, mix 10 ml. of water and 5 ml. of concd. H_2SO_4 . Cool, add 10 ml. of a 10% alc. soln. of the distillate from the original sample and thoroughly mix. Add 3 g. of powd. $\text{K}_2\text{Cr}_2\text{O}_7$, attach a small condenser, shake, allow to stand 5 min. and then distil. Use the first 2 ml. of distillate for the acetone test. Dil. this with 2 ml. of water, add 1 ml. of AcOH and 2-3 drops of a strong, freshly prepd. soln. of $\text{Na}_2\text{NOFe}(\text{CN})_6$, mixing after the addn. of each reagent. Finally, dil. with NH_4OH till the total vol. is 8 ml. A violet color will be obtained if acetone is present. It is to be noted that methylated spirits usually contain 0.5% of acetone or less. The incentive for this research was to det. the cause of some unusual cases of drunkenness in England. The trouble was laid to port wine at first but ultimately traced to MeOH. W. T. H.

The use of Mitchell's ferrous tartrate reagent in studying the precipitation of alkaloids by tannin. ARTHUR EDWARD JONES. *Analyst* 53, 421-32(1928).—A colorimetric method for detg. gallotannin has been devised by Mitchell and the accuracy of the method confirmed by Nicholson and Rhind and by Glasstone. The primary aim of the present investigation was to see whether it is possible to make use of the same reaction for the indirect detn. of alkaloids. Expts. with quinine and with cinchonine show, however, that this is not practical. The amt. of adsorption depends upon the quantity of gallotannic acid present. The colorimetric method, however, can be used to det. the extent of the adsorption. W. T. H.

Conductometric titration of the sodium salts of fatty acids with high molecular weights. PER EKWALL. *Kolloid-Z.* 45, 291-306(1928).—If NaOAc is titrated with 0.1 N HCl the cond. curve shows a steady rise but if Na laurate is titrated 3 distinct bends occur in the cond. curve. At first the cond. drops appreciably, next it rises slowly, then more rapidly and finally very abruptly. The same sort of a titration curve is obtained with Na myristate but with Na oleate the curve does not show these 3 bends but is similar to that of NaOAc. The interpretation of these phenomena is interesting. With the first 2 satd. fatty acids of high mol. wt. the initial drop in the elec. cond. is due to the fact that the original soap is decompd. and the fatty acid then combines with residual soap to form an acid soap, which, with lauric and myristic acids, is insol. These so-called acid soaps have been studied by several investigators. Apparently 1 equiv. of Na soap will unite with 0.5-2 equivs. of free lauric acid. Undoubtedly oleic acid also forms such acid soaps but the soap soln. is so colloidal and the acid soap sufficiently sol. in water to prevent the indication of its presence by conductometric titration. During the titration, as the neutral soap content drops, a still more acid soap is formed probably with 2 equivs. of free acid instead of one. This accounts for the second bend in the curve. Finally, further addn. of acid causes the decompn. of the acid soap and free lauric or myristic acid appears, thus accounting for the 3rd branch of the curve. If the titration is made in very dil. soln. a normal curve is obtained like that of NaOAc because the acid soaps are hydrolyzed and not formed in dil. solns. W. T. H.

Determination of anthraquinone in mixtures with benzanthrone. P. I. SOKOLOV AND L. GUREVICH. *J. Chem. Ind. (Moscow)* 5, 308-9(1928).—When benzanthrone is prepd. by the synthesis of Bally and Scholl (cf. *C. A.* 5, 3248) it usually contains some anthraquinone. The method of Sielisch (*C. A.* 21, 721) was tested and found inadequate for the detn. of anthraquinone in the presence of benzanthrone. Benzanthrone dissolves incompletely in the prescribed amt. of hyposulfite and it can be pptd. incompletely from the soln. by oxidizing the latter with H_2O_2 . Moreover, when much

anthraquinone is present, it is difficult to ext. anthraquinone with hyposulfite. A mixt. contg. 12.4% anthraquinone and 87.6% benzanthrone still continued to give red coloration with a 10% soln. of hyposulfite after 15 treatments with the latter soln., and an analysis showed that 25% of the anthraquinone still remained in the mixt. A new method for detg. anthraquinone is based on the oxidation of benzanthrone by chromic acid in AcOH soln. This reaction is known to destroy benzanthrone, giving anthraquinone or anthraquinone-1-carboxylic acid (Cf. Liebermann and Roka, *C. A.* 2, 2243, and Bally and Scholl, *loc. cit.*); anthraquinone, on the other hand, is known to resist the action of oxidizing agents. By effecting the oxidation of benzanthrone under such conditions that no anthraquinone is formed and only anthraquinonecarboxylic acid or other water- and alkali-sol. products, it was found possible to sep. pure anthraquinone from its mixts. with benzanthrone and thus to det. it. Dissolve 1 g. of the mixt. of benzanthrone with anthraquinone in 45 cc. glacial AcOH and heat to boiling under a reflux condenser. From a separatory funnel add a soln. of 5 g. CrO_3 , 5 cc. glacial AcOH and 5 cc. water during 2 hrs. Boil 2 hrs. longer, then dil. with 400 cc. of cold water and allow to stand for an hr. to allow the ppt. to settle. Filter and wash first with water and then with at least 150 cc. of a 1% soln. of NaOH, transfer to a 100–150 cc. conical flask and treat at 70° with 15 cc. of a 10% soln. of $\text{Na}_2\text{S}_2\text{O}_4$ in 10% NaOH. Filter the red soln. of anthraquinone thus obtained through a Gooch crucible, wash the residue with a 1% soln. of hyposulfite and add to the filtrate at 70°, 5 cc. of 30% H_2O_2 . Filter off the anthraquinone ppt., using a weighed filter, wash with water, dry and weigh. If the sample to be analyzed is known to contain more than 50–60% of anthraquinone, the treatment with hyposulfite may be omitted. In such a case wash the ppt. obtained after oxidation, first with water, then with alkali, then with water again and finally dry and weigh.

BERNARD NELSON

Clinical observations in Pb poisoning (GELMAN) 11H.

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8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Relation between hardness and coefficient of expansion of minerals. M. I. LIPOVSKII. *Ann. Inst. Polytech. Oural* 5, 123–8 (1926).—Data are discussed showing that the hardness of minerals diminishes with increasing coeff. of expansion. A rational scale of hardness is suggested, based on exact measurements of coeffs. of expansion. B. C. A.

Some applications of the "zinc" test for cassiterite. G. H. STANLEY. *J. Chem. Met. Mining Soc. S. Africa* 28, 249–51 (1928).—Two applications for the identification of cassiterite are outlined. One applies the method to the examn. of rock sections or polished faces. The polished surface is spread evenly to a thickness of $\frac{1}{8}$ in. with a water paste of Zn dust, a thick soft filter is laid upon it and then inverted into a flat-bottomed dish into which dil. HCl (1:1) is poured. Action is allowed to proceed about 15 min. and the piece is washed and dried. It exhibits a characteristic gray color and dull metallic appearance. A second application is in ore concn., and particularly concn. tests. If a mixt. is placed upon a Zn sheet or in a hole drilled in a Zn block and HCl mixed with it, the cassiterite becomes Sn-coated. After washing, microscopic examn. shows the particles of cassiterite clearly visible and the amt. may be estd. W. H. B.

New investigations on the transformations of scolecite. A. CAVINATO. Univ. Padova. *Atti accad. Lincei* [6], 7, 670–2 (1928).—In earlier expts. in which it was shown that scolecite undergoes successive dehydrations at 160–200° and at 335–45° (cf. C. A.

22, 1559), it was not ascertained whether the optical changes occur simultaneously with the dehydration or at merely approx. the same temps. Further tests with better crystals showed that the 2 phenomena occur at the same temps. and that they are causally related in that the changes in the optical properties result from the dehydration or rehydration of the scolecite. C. C. DAVIS

The potash deposit of Sebkhah el Melah, Tunis. P. BOVIS. *Chimie et industrie* 19, 937-44(1928).—A brief description of the deposit with a discussion of the possible methods of working it which were tried out during the war. One of the big advantages of the working of this deposit over the extn. of K from sea water is that the compn. of the Sebkhah waters is such that on evapn. they deposit a more or less impure carnallite, whereas the product obtained from sea water approximates more nearly to kainite. A. PAPINEAU-COUTURE

The conditions and geological evidence of base exchange between the roofs of bituminous coal seams and solutions of sodium chloride. E. MCKENZIE TAYLOR. School of Agriculture, Cambridge, Eng. *Fuel in Science & Practice* 7, 130-4(1928); cf. C. A. 22, 2907.—The characteristic of a roof formed under marine conditions is that it has undergone base exchange. The characteristic constituent of the roof would be a Na-Al-SiO₂ complex in case drifted material accumulated in the sea or in fresh water, if in the latter case submergence in the sea could take place. If accumulated material was covered by a roof deposited in fresh water, a slight alteration in land level could result in base exchange with capillary solns. of NaCl raised from subsoil. It follows that although the modes of accumulation of the plant residues may have been widely different, the final roof conditions detg. the type of decompn. has been similar in all cases. The roof is the main factor concerned in the formation of bituminous coal, the mode of accumulation having much less bearing on coal type. D. A. REYNOLDS

Native asphalts in Oregon. EDWIN T. HODGE. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 4(1927).—The native asphalts in Oregon have never been thoroughly described, their character has not been detd. or their significance discussed. H. presents a complete list of all known occurrences, some of recent discovery, and tenders for the first time analyses and detns. of their character. They are found to be mixts. of uinitahite, manjak and wurtzilite, or pure uinitahites and grahamites. These native asphalts have been derived probably from deep-seated Cretaceous rocks, which once possessed reservoirs of petroleum. The petroleum was brought to the surface by dynamic movements and their method of emplacement shows no influence of thermal metamorphism. Some of the Oregon occurrences are similar to those found in other localities which have since developed into important oil fields. Others are unique, and neither in Oregon nor elsewhere have they heretofore been described. The discussion has an important bearing on the possibilities of petroleum in Oregon. C. L. COOPER

The present status of the carbon-ratio theory. GEORGE E. DORSEY. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 5(1927).—Many geologists are of the opinion that the observations of White, Fuller, Russell, Moulton and other investigators constitute proof of a causal assumption in pointing out that there is a definite relationship between degrees of alteration, using the fixed C of coal as a pyrometer, and oil and gas occurrences. Others, although not questioning the observational data indicating the relationship, are led by the serious inconsistencies in the application of the theory, to believe no causal connection has been proved. The chief inconsistencies are: (1) the problem of residues, (2) the occurrences of oil of lower grade in older beds below higher grade oil in younger beds, and (3) the presence of areas producing only dry gas in quantity in the same zone of alteration with areas producing oil, or oil and gas. D. seeks in this discussion to compare the evidence regarded as proof of the theory with these inconsistencies. The conclusion is reached that, so far as the causal part of the theory is concerned, it is still an unproved assumption. C. L. COOPER

The proofs of the carbon-ratio theory. WM. L. RUSSELL. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 9(1927).—R. does not cite evidence of the relation between isocarbs and oil and gas occurrence, but presents available data indicating that this relationship is produced by tectonic forces more than by conditions of sedimentation, concluding that the exptl. data regarding the generation of oil and gas from bituminous rocks are at present too meager to furnish any definite evidence regarding the validity of the C-ratio theory; that the field evidence indicates that the porosity of sandstones and other reservoir rocks is reduced by dynamic alteration and that this decrease in pore space is an important factor in causing the absence of oil in areas containing coals of high C ratios; that the intense deformation of rocks causes the oil and gas to escape, and that this is one reason why they are absent from areas that have been acted upon by great tectonic forces; that the tendency for gas rather than oil to occur in areas of

greater alteration is probably due chiefly to the lower porosity of these rocks and the action of dynamic pressures on the source material, though the variations in the conditions of sedimentation may have been operative also; and that the distribution of marine bituminous strata in the 3 geosynclines that may be used to test the carbon-ratio theory shows that dynamic alteration and not the conditions of sedimentation is chiefly responsible for the barrenness of the areas in which the C ratios of the coals are high.

C. L. COOPER

The carbon-ratio theory in the light of Hilt's law. FRANK REEVES. *Bull. Am. Assoc. Petroleum Geol.* 12, No. 8(1928).—The principal tenets of the C ratio theory are (1) that the chief agencies in the chem. transformation of carbonaceous deposits, after they have passed through the biochem. stage are the pressure and the heat derived from the horizontal thrust; (2) that as the coals decrease in volatile constituents the oils show a corresponding increase in the lighter and more volatile hydrocarbons, so that low-grade oils are assocd. with low-rank coals and high-grade oils with high-rank coals; and (3) that where the coals have reached the stage of devolatilization at which their content of fixed C constitutes about 65% of their total combustible matter the oils in the coal-bearing and underlying formations have been converted into gases, and where the state of devolatilization is slightly higher the gases have been eliminated. Inasmuch as a series of coals increases in fixed C with stratigraphic depth in both disturbed and undisturbed areas, and this increase is many times greater than any recorded increase in the horizontal direction, R. concludes (1) that the geologic agencies producing the chem. transformation of carbonaceous deposits are not so much the heat and pressure incident to horizontal thrust as the heat and pressure incident to depth of burial; and (2) that there is no clear evidence that incipient alteration of sediments has been a factor in detg. the extent of our known oil and gas fields and therefore that C ratios of coals furnish no information as to the oil possibilities of an area. C. L. C.

Generation of oil by geologic distillation during mountain-building. JOHN L. RICH. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 10(1927).—In regions of intense mountain-folding carbonaceous shales have lost the oil which, presumably, they once contained in the form of "kerogen" or similar mother-substance, and which is still present in equivalent rocks outside the metamorphosed zone. The newer information on mountain-building indicates that folding commonly took place at considerable depth underneath great overthrust sheets of rock. Under such conditions it is believed that the oil was distd. from the carbonaceous rocks in what was, virtually, a giant high-pressure cracking still, and that it found easiest escape laterally along the bedding, being driven out to cooler zones by the gases generated during the distn. In later geologic ages the overthrust sheets became worn away and the whole area broadly uplifted, bringing the rocks formerly subjected to distn. up to the surface and opening their porous beds to the inflow and artesian circulation of meteoric waters which caused extensive secondary migration of the oil. In the zone of intense metamorphism no oil would remain, the carbonaceous rocks would be devolatilized and C ratios would be high. In an intermediate zone where the rocks are partly devolatilized, some of the oil would have been distd. in place, and some would have migrated from adjacent zones of more intense metamorphism. In a broad belt outside the zone of active distn. such oil as found would not have been formed *in situ*, but would have migrated from adjacent zones of distn. under the influence of gas pressure and artesian circulation. C. L. COOPER

Results of distillation and other studies of the organic nature of some modern sediments. PARKER D. TRASK. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 11(1927).—A report of the first year's work on the Am. Petroleum Institute's research project on the "origin and environment of possible source beds of petroleum." In order to obtain a measure of the org. content of recent deposits from a no. of different types of environments, so that some one area may be found where possible "source beds" are actually accumulating today, the dried sediment is distd. in the same manner that the oil shales are assayed. Of the 45 samples that have been distd. to date, all types of sediment, ranging from sand to clay, yielded small amts. of oil. Recent deposits extd. with org. solvents gave but very small yields. Analyses of several different recent sediments show that the org. content in general varies directly with the fineness of grain, being low in sands and high in clays. Material from the bottom of depressions in the sea floor of the Pacific Ocean west of Los Angeles and the Gulf of Maine seems to be richer in org. content than the adjacent shallower regions. C. L. COOPER

Westbrook Field, Mitchell County, Texas. F. C. EDWARDS. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 5(1927).—The productive reservoir is dolomitic limestone. The oil has a sp. gr. 28.8° Bé, and contains 4% S and 32% gasoline. Its source is probably the Permian limestones and shales. Two kinds of gas occur in the field: (1) non-in-

flammable gas at depths between 1000 and 1300 feet, and (2) wet petroleum gas in both oil zones.

C. L. COOPER

Outline of water problems in new Grozny Oil Field, Russia. NORBERT T. LINDTROP. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 10(1927).—The Grozny district contains 3 oil fields: the old and new Grozny and the Vosnesenskaja fields. There were 450 producing wells in 1926. Fifteen of these flowed by hydrostatic pressure, and yielded half of the total daily production. Twenty-two Miocene sands are encountered in drilling. Eight of these are oil sands. Water conditions have been given special study because of the several oil sands and intermediate water sands in the same well. Several sizes of casing are required to shut off the waters above each producing sand. In distinguishing the several waters and thus in correlating the sands, the characteristics of the waters were calcd. after the method of Palmer in reacting values and chemical properties. Tables and charts are given, showing these comparative properties. L. concludes that edge water is encroaching and the future production should be small.

C. L. COOPER

The Crinerville Oil Field, Oklahoma. SIDNEY POWERS. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 10(1927).—Analyses of Ordovician water, Crinerville Field are:

Constituent	Marris No. 2, SE. cor. Sec. 20 g. per l.	S. Baptiste No. 4 NE. SE. Sec. 20 g. per l.
Calcium chloride	25.380	23.510
Sodium chloride	89.700	85.150
Magnesium chloride	11.818	11.690
Fe and Al oxides	0.110	0.120
Silicic acid	0.050	0.090

C. L. COOPER

Connection between commercial oil deposits and major structural features with special reference to Asiatic fields. L. DUDLEY STAMP. *J. Inst. Petrol. Tech.* 14, 28-63 (1928).—A critical examn. of the occurrence of oil fields shows their frequent assoc. with geosynclinal areas of deposition and occurrence around the margins where the deposits are of a deep-water type, or in the center in the case of shallow-water deposits. No genetic connection between oil and belts of folding or between oil and vulcanicity can be traced.

B. C. A.

The lava of Etna. W. F. GISOLF. *Verslag. Akad. Wetenschappen Amsterdam* 37, 459-68(1928).—The method outlined in *C. A.* 22, 1122 was used for petrographic study of the lava.

A. L. HENNE

An interesting lava-flow at Petronella in Agro Romano. ENRICO CLERICI. *Atti accad. Lincei* [6], 7, 769-72(1928).—The mineralogy is described in detail. Feldspar, pyroxene, plagioclase, augite, FeS and S are present in the vitreous base. Analyses of the lava gave: SiO₂ 52.01, Fe₂O₃ 4.26, Al₂O₃ 17.66, CaO 6.81, MgO 2.71, loss at 110° 3.86, loss on ignition 10.16%.

C. C. DAVIS

Chemical and provincial relations of the younger eruptive rocks of Germany and northern Bohemia. H. JUNG. *Chem. Erde* 3, 137-340(1927).—A large no. of chem. analyses of Tertiary igneous rocks from Germany and northern Bohemia, collected from the literature, are tabulated and plotted on diagrams. Variation curves are given for each of the constituent oxides. The rocks of the "Oligocene province" are all alkali-rocks of the "Atlantic type," while in the "Miocene province" there are also lime-alkali-rocks of the "Pacific type."

B. C. A.

Altered volcanic materials and their recognition. CLARENCE S. ROSS. *Bull. Am. Assoc. Petroleum Geol.* 12, No. 2(1928).—The relict glass structure, the nature and habit of crystal grains, and the phys. properties present evidence that indicate the mode of origin. Bentonite is a common type of altered volcanic material and may be recognized by the volcanic structure preserved in the clay substance, and the origin is confirmed by the presence of volcanic minerals. The chem. and phys. properties of bentonite are variable and many are indefinite; thus, although they may contribute to its recognition, as a rule they cannot be relied upon completely. Bentonites from several eastern States, Nova Scotia, Ark., Texas and N. M. are described in detail. It is concluded that volcanic materials, even though highly altered, may be recognized by microscopic and phys. studies and may contribute to the interpretation of the geologic history of a region.

C. L. COOPER

Subsurface correlation by means of heavy minerals. R. D. REED AND J. P. BAILEY. *Bull. Am. Assoc. Petroleum Geol.* 11, No. 4(1927).—This paper describes the attempt to make practical use of heavy mineral zones as a means of detg. structure

in a part of the San Joaquin Valley where other means were not available. It presents a part of the data, along with a discussion of their bearing on some of the general principles involved. The conclusion is reached that the method is likely to be of considerable use if applied with due regard to certain limitations. C. L. COOPER

Genesis of a sandstone dike as indicated by heavy minerals. CHARLES E. MEEK. *Bull. Am. Assocn. Petroleum Geol.* 12, No. 3(1928).—Heavy mineral analyses show that the material of the dike corresponds with the underlying Miocene sand rather than with overlying younger formations. The Miocene in the area is characterized by a lack of green hornblende and an exceptionally large amount of glaucophane. The reverse is true of the Pleistocene. An earthquake probably formed a fracture into which was forced water-soaked sand from a lower formation. The oil and tar which occur in the dike and the overlying Pleistocene beds probably entered subsequently to the sand-filling of the dike. C. L. COOPER

Loss of color of red sandstone upon deposition. LON D. CARTWRIGHT, JR. *Bull. Am. Assocn. Petroleum Geol.* 12, No. 1(1928).—Fragments of a red sandstone (Sespe formation) have been carried by the streams from the mountains to the beach between Los Angeles and Santa Barbara, Cal. The change of color from red to rusty brown, yellowish buff, light green or greenish gray and grayish buff is believed to be due to the action of C compds. and natural org. acids formed from the vital processes and decay of plant and animal organisms found along the beach. The red color of the Sespe sandstone was found to be due to a Fe_2O_3 stain on the grains and matrix. The continued wetting of the sandstones without thorough drying would hydrate this from the red hematitic state to the brown limonitic state. The reducing action of the org. solns. in the sea water would reduce the brown Fe_2O_3 to the greenish ferrous state. CO_2 solns. would then leach away the ferrous salts and leave unstained mineral constituents, the aggregate color of which varies from a light gray to grayish buff, depending upon the relative abundance of biotite. C. L. COOPER

Occurrence and determination of metals of the platinum series in Norwegian rocks. II. GULBRAND LUNDE AND MIMI JOHNSON. Oslo Univ. *Z. anorg. allgem. Chem.* 172, 167-95(1928).—The first of the paper is an extensive survey of the sepn. and detn. methods (cf. *C. A.* 21, 2636). The second part records the noble metals contents of various Norwegian rocks. A. L. HENNE

Chemical x-ray spectrography (THOMASSEN) 7.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, R. H. ABORN

Why flotation has displaced cyanidation at Cortez. J. O. GREENAN AND E. M. BAGLEY. *Eng. Mining J.* 126, 173-6(1928).—The encountering of new harder ore bodies contg. a much larger proportion of sulfide minerals reduced the grinding capacity of the mill, reduced the extn. of Ag to 65%, and increased cyanide consumption to a prohibitive extent. The milling cost reached a max. of \$4.26 a ton. A 200-ton flotation unit was installed consisting of 4 Parker cells, 3 roughing cells and 1 cleaner cell. The result was based on a low cyanide tonnage was a greater output, an increase of 12.6% in Ag recovery, decreased milling costs and a total decrease of \$1.84 a ton in total cost including refining. In short, flotation is responsible for the continuance of profitable operations at Cortez and increased efficiency and economy as anticipated. H. C. PARISH

Metallurgical applications of silicon and beryllium. ANON. *Metallurgist* (Suppl. to *Engineer* 146, No. 4) 106-7(1928).—Si is used as electrodes in wet or dry electrolytic rectifiers. As ferro-Si it is a satisfactory reducing agent in manuf. of Cr alloys. *Everdur*, contg. 95% Cu, 4% Si, 1% Mn, withstands corrosion even by HCl. Al-Be alloys have a tensile strength increasing from 9500 to 23,000 lb. per sq. in. as Be is increased up to 20%. At the same time elongation increases from 22.5 to 39%. D. B. DILL

From copper ore to heavy current cable. CONSTANTIN REDZICH. *Apparatebau* 40, 181-7(1928).—An outline of the metallurgy of Cu and the manuf. of elec. cables, with 17 cuts. J. H. MOORE

Revisiting Arizona mining camps. X. The Inspiration concentrator. E. H. ROBB. *Eng. Mining J.* 125, 1013-4(1928). **XI. The International Smelter and the Miami copper concentrator.** *Ibid* 126, 96-8. **XII. Impressions of the Ray copper concentration.** *Ibid* 133-6. **XIII. The Hayden Smelter.** *Ibid* 177-8. H. C. PARISH

The Penpoll tin smelter at Bootle. ANON. *Engineer* **146**, 74(1928).—The capacity of this new smelter is 1000 tons of ore per month with an output of 650 to 700 tons of 99.95% Sn. D. B. DILL.

Preliminary investigation of tailings for retreatment. I. L. BOX AND E. H. CRABTREE. *Mining & Met.* **9**, 316-7(1928).—Before planning retreatment or designing a plant to handle Zn tailings a thorough investigation of the tailings is essential. In general this consists of a careful survey of the tailing pile to det. its tonnage, the taking of a no. of samples by means of an auger with casing, analysis, screening and flotation tests of the samples. Various cuts of a 27-lb. sample varied in ZnS content from 0.67 to 1.19%. Figures are given showing the ZnS content of various sizes and in the "sink" and "float" for tailings in question. H. C. PARISH.

The extraction and application of thorium. G. MALCOLM DYSON. *Chem. Age (London)* **19**, Metallurgical Section, No. 471, 2-3, No. 475, 10-11(1928). E. H.

Recent developments in the application of nitrogen to the surface hardening of steel. V. O. HOMERBERG. *Fuels and Furnaces* **6**, 1153-7(1928). E. H.

Cupola fired with powdered coal. FRITZ MEYER. *Iron Age* **121**, 1593-5(1928).—M. describes a cupola fired with powd. coal now in operation at the American Radiator Co., Springfield, Ill. In the cupola the powd. coal is burned under pressure outside the shell proper, allowing the products of combustion to pass directly to the smelting zone at a velocity insuring penetration. A min. charge of coke is used. In this manner it is possible (1) to decrease by 20% the amt. of S picked up, (2) to control the C in the mixt. because there is more accurate control of combustion, (3) to obtain higher strength because of super heat, (4) to cut the smelting cost from \$1.35 per ton of metal to \$0.67 per ton, (5) to decrease the price of various mixts. A. W. C.

Powdered coal in steel furnaces. E. L. HERNDON. *Iron Age* **121**, 1603-4(1928).—Four to fifty ton steel furnaces and 2-80 ton furnaces fired with powd. coal are described. These furnaces have been in operation in the plant of the Eastern Steel Co., Pottsville, Pa., for 13 years. A. W. C.

Metallographic structural relationships. H. J. SEEMAN. *Z. tech. Physik* **9**, 233-40(1928).—A review of recent work on lattice theories and related properties of metals and alloys (cf. Westgren and Phragmen, *C. A.* **20**, 2654, Zsigmondy, *Kolloid-Z. Fest-schrift* **2**, 36(1925)). Fifty references are given. B. J. C. VAN DER HOEVEN.

Methods for the thermal and microscopic investigation of alloys of reactive metals. WILLIAM HUME-ROTHERY. Oxford Univ., Eng. *J. Inst. Metals* (advance copy), No. **478**, 16 pp.(1928).—Some reactive metals such as Mg can be melted for thermal analysis in a small crucible placed inside a vertical quartz or Fe tube extending upward out of the furnace and plugged loosely at the top. Other more reactive metals must be fused in a completely closed tube with asbestos screens to protect the plugged end from the heat of the fusion. Melting *in vacuo* often causes too much volatilization, and fluxes attack the refractories, the use of an atm. of argon is suggested instead of H₂ or N₂, and pressure can be used with volatile metals. Alundum or alundum-lined crucibles and thermocouple sheaths are recommended. The difficulty of obtaining the exact compn. of a reactive alloy, at the time when a thermal analysis was made, is described and pouring off a small sample from the melt for analysis is recommended, just before taking a cooling curve. For investigation of changes in solid reactive alloys, chill castings are best made in Cu molds, which if necessary can be placed inside the closed melting-tube for casting without access to air. For microscopic examn. specimens may be mounted in fusible alloy, polished and examd. under oil if necessary. A sketch shows an app. for conducting the examn. in an inert atm. The method of detg. the compn. of a phase from the duration of thermal arrests is shown to be inaccurate except in the case of simple eutectic arrests where no solid solns. are found. The detn. of the temp. of changes where super-cooling or suspended transformation is shown should be based not only on heating and cooling curves, but on changes of elec. cond. or of micro-structure with rising temp. G. F. C.

Work softening of eutectic alloys. F. HARGREAVES AND R. J. HILLS. Southern Railway, Ashford, Eng. *J. Inst. Metals* (advance copy), No. **474**, 14 pp.(1928).—Previous work on eutectics was chiefly morphological. Pb-Sn alloys were etched with strong HCl to show the Sn crystal boundaries, and with a 5% soln. of FeCl₃ for differential staining. The microstructures and Brinell hardness were studied. Straining of the Pb-Sn eutectic caused twinning of the Sn, and reduced the etching contrast. A coarser-grained eutectic recrystallized more quickly after working and pure Sn very quickly at room temp. The original eutectic structure was most easily obliterated by about 30% reduction by cold work. Small grains are formed much faster by annealing at higher temp. The presence of Pb in Sn decreased greatly the ease of recrystn. and the soften-

ing by cold-work. The reduction in hardness of various Pb-Sn alloys by cold-working is shown by curves. The eutectic showed a sudden decrease in hardness at 30% reduction. This is a crit. amt. of work for these alloys, similarly to the case of single Al crystals. Work-softening is due to interphase movement and the retention of the two constituents in the disturbed mobile condition. The work-softening of the Cd-Zn eutectic was found to be of the same nature and not due to a phase change in the Cd, and all hot-forged alloys of two or more phases are probably similarly affected.

G. F. C.

Thermal brittleness in metals. TAKEHIDE INOKUTY. *Science Repts. Tôhoku Imp. Univ.* 17, No. 4, 817-42(1928).—Blue brittleness of Fe is not accompanied by any change in magnetic, elec. or thermal properties. Tempering a cold-worked metal at a low temp. may release only an unstable strain, the metal becoming more stable and hence slightly harder. The hardening effect of very slow deformation at room temp. may be obtained faster at a higher temp., but the temp. must not be so high as to cause annealing. For hardening by shock, a higher temp. (600°) is required. This effect was investigated in 7 metals or alloys by tensile and hardness tests at various temps. between -190° and 200°. The app. and methods are described in detail. Thermal brittleness, evidenced by a slight upward irregularity in the strength-temp. curve with corresponding lower ductility, was found at the following temps. for the metals noted: Fe about 250°; Al, -100° to 200°; Sn, -100° to 30°; Zn, doubtful around 120°; Cu, -20° to 500°; Pb, -130° to 40°; brass, -100° to 550°. The speed of testing was 11 mm. per min.; at other speeds different temp. ranges may be found.

G. F. C.

Failure of metals under tensile stress. K. YUASA. *Proc. Imp. Acad. (Japan)* 3, 603-6(1927).—An app. is described for testing metals under tensile stress which is free from inertia effect and in which the applied load is self-adjusting. A medium-hard steel (0.65% C) was tested at temps. of 139°, 171°, 198°, 295°, 358° and a record obtained optically which is a load-time curve of the test piece: as the load is applied with uniform velocity, the curve is a tensile load-elongation diagram. At certain temps. the diagrams show irregular jumps after the yield point is passed. At each discontinuity the resistance of the metal decreases suddenly and then increases uniformly until another discontinuity is reached. The no. of occurrences and the intensity of these irregularities increase with the rise of temp. and reach a max. at about 250°; this temp. nearly corresponds to that of "blue brittleness." With a further rise of temp. this irregularity decreases and finally, at about 350°, disappears. Under such a temp. the nature of deformation of the test piece would be that due to viscous flow. In the course of irregular deformation a cracking sound is heard which occurs whenever the stress makes a sudden change.

C. J. WEST

The limit of elongation of steel in tension. W. KUNTZE AND G. SACHS. Kaiser Wilhelm Inst. für Metallforschung, Berlin-Dahlem. *Z. Ver. deut. Ing.* 72, 1011-6 (1928).—Extensive studies upon the deformation of steel (especially high-grade Si-steel) are reported. On a no. of tests the changes in cross-section over the whole length of the test pieces were followed out. The first strongly marked deformations occurred usually with a diminution of load and the constriction of a certain place on the test rod. Then the narrow portion extended until the rod again became cylindrical throughout its entire length, the load meanwhile remaining approx. const. Further deformation then occurred (as with other kinds of materials) with a regular increase in length and accompanying load. The first change noted is due to a break in the brittle components, especially as it always occurred on the head of the test piece or near an injured place, while the final break occurred as a rule in the middle of the test piece or around the weakest part of the rod. The phenomena are not to be looked upon as a simple mech. process, taking place in a compound body made up of iron in a hard cementite skeleton. "Aging" at low temps. induces a considerable improvement in the stretched portions of the rod, new deformations arising there accompanied by diminutions in load. They are to be looked upon as properties accompanying transformations. Corresponding to the properties of a brittle body, the load under which the first failure occurs is dependent upon the formation of the head of the test piece.

W. C. EBAUGH

Universal machine for testing the hardness of castings, the static flexion and the shearing stress, and a machine for testing sheet metal for stamping and rolling. R. GUILLERY. *Bull. soc. encour. ind. nat.* 1928, 438-502.—A detailed description of the app.

T. S. CARSWELL

Tensile test of steels at high temperatures. TAKEHIDE INOKUTY. *Science Repts. Tôhoku Imp. Univ.* 17, No. 4, 791-816(1928).—Tensile tests were made of specimens of forged and annealed steels contg. up to 1.5% C at temps. up to 1100°. Temp. differences in the specimens under test were not over 14°; the observed temp. at the outer

surface of a specimen was cor. by an amt. up to 40°, derived from measurements on a hollow dummy specimen with a thermocouple inside, so as to give the probable internal temp. The heating furnace was arranged so that its center followed the center of the specimen during testing. The results, plotted as curves, show for the tensile strength of all steels a min. at 100°, a max. between 200° and 300°, and in steels contg. less than 0.7% C another max. between 800° and 930°. The elongation and contraction of low-C steels varied about inversely with the strength. Hypereutectoid steels were no stronger than eutectoid steels, and less ductile, at all temps. Above 800° steel contg. 0.3% C was more ductile than other steels. The elongation occurring up to the time of max. load, or "general elongation" was greatest at room temp., and the chief elongation occurring at high temp. was local and generally related to the contraction. The elongation is a better measure of ductility than the contraction. The effect of structure on the tensile properties is discussed; the A_3 transformation produces a sudden change in strength and ductility and is most prominent in very low-C steels, which should not be worked at around 900°. Results of other investigators are noted briefly.

G. F. C.

Heat treatment of ferrous metals. C. M. WALTER. *J. Soc. Chem. Ind.* 74, 791-7T(1928).—Theoretical consideration is given to the application of heat to steel and other ferrous materials, together with a description of the shop operation and furnaces for annealing, hardening, tempering, normalizing and carburizing. D. S.

The influence of different conditions of iron on its chemical behavior. OSKAR BAUDISCH. Rockefeller Inst., N. Y. *Naturwissenschaften* 16, 542-5(1928).—The reductive action of freshly pptd. $\text{Fe}(\text{OH})_3$ on nitrate in the presence of air (essential for the reduction) is discussed with a review of a series of papers by B. and co-workers. (Cf. *C. A.* 21, 1914.)

B. J. C. VAN DER HOEVEN

Diffusion phenomena of zinc and tin in steel and soft iron. H. HONIGL. *Mikrochem.* 6, 22-7(1928).—Sn begins to diffuse into Fe and steel at 300° with the formation of a thin layer of solid soln. which at this temp. appears to hinder further diffusion. At 500-750°, however, diffusion of Sn into steel proceeds rapidly with the formation of several layers of intermetallic compds. interspersed with crystals of solid solns.; at the same time the C content of the steel diffuses towards the central portions, leaving a layer of decarburized steel inside the layers of Sn-Fe compds. At 900° there is a pronounced tendency for the C to diffuse back toward the edges of the test-piece. The rate of diffusion of Zn into Fe increases rapidly with the temp. above 500° with the formation of 3 distinct layers of differently oriented mixed crystals, accompanied by an enrichment of the C content of the inside portions of the test-piece. B. C. A.

Influence of occluded oxygen in steel upon the carburizing quality of steel. KATSUMI INOUE. Sorbonne, Paris; Kyushu Imp. Univ., Fukuoka, Japan. *Mem. Coll. Eng.* 5, No. 1, 69 pp., 7 plates(1928).—Several specimens of steel in different states of manuf. and specially prepd. samples were first analyzed and their O content was detd. by means of Oberhofer's method. It was found necessary to use the finest grade of drillings (less than 0.5 mg.) and to pass a rapid stream of H_2 (at least 100 cc./min.) for 2 hrs. at 1200° over 5 g. of the sample mixed with about 10 g. of a 60/40 Sn-Sb alloy. With high C-steels there is a possibility of CO or CO_2 being evolved. The percentages found ranged from 0.042 to 0.232% O. The oxides present appear on highly polished surfaces at high magnification as minute grayish black specks. When the O content is high the oxide globules show a duplex structure. The effect of occluded O on the grain size, critical points, sp. resistance and carburizing qualities of various samples of known O content was then studied. The grain size and sp. resistance increase with increase in O content. The critical points are not noticeably affected by the O content. A marked difference was found in the microscopic structure of carburized steels of different O content. The difference is most pronounced in the hypereutectoid zone. In carburized steel with 0.165% O (and more) I. found a curious abnormal structure consisting of granular pearlite, free, disintegrated (coalesced) cementite and "free ferritic substance" (possibly composed of Fe, C and O but usually called ferrite). Fast cooling has the tendency to hinder the formation of abnormal structures. Annealing before carburization has little or no effect on the structure of the carburized zone. It may bring about partial coagulation of the oxide particles distributed in the steel. Mech. treatments (forging for instance) have likewise no effect on the structure. Steel samples deoxidized with ferro-Si or ferro-Mn showed after carburization a comparatively normal structure while a specimen deoxidized by Al became abnormal after carburization. This is possibly due to the fact that the Al_2O_3 particles do not fuse nor coalesce readily. The depth of penetration of C is slightly higher in large-grained samples of higher O content than in those with lower O content.

H. S. VAN KLOOSTER

The mechanism of carbon penetration in the cementation of iron and steel. GENSKE TAKAHASHI. *Science Repts. Tôhoku Imp. Univ.* 17, No. 4, 761-82 (1928).—A review of previous literature is given describing the two prevailing theories of carburization, namely, that the C penetrates as a gaseous compd., or by diffusion as elemental C. An app. is described in detail for carburizing the outside of an Fe or steel tube evacuated inside. When a regular carburizing mixt. was used, H_2 penetrated into the interior of the tube, but when CO or other gas was used, no rapid increase in pressure occurred inside the tube when evacuation ceased. The amt. of C absorbed by the tube during carburization is shown to be much larger than is consistent with the possibility of diffusion and decompn. of CO and consequent expulsion of CO_2 to the interior of the tube in amts. indicated by the pressure readings, or with the known slowness of movement of CO or CO_2 in steel. The conclusion is that the CO decomposes at the surface of the steel or Fe, and the carburizing occurs by diffusion of nascent C atoms. This is considered the mechanism of carburization also when hydrocarbons or cyanogen are used.

G. F. C.

Die-casting of copper-rich alloys. R. GENDERS, R. C. READER AND V. T. S. FOSTER. *J. Inst. Metals* (advance copy), No. 475, 32 pp. (1928).—Most bronze die-castings made in England are composed of the 90-10 Cu-Al alloy, with up to 3% Fe. Molds are of cast Fe, with steel inserts and cores, which are dipped into a plumbago wash after each casting. The casting temp. is 1150° to 1300° , and the mold temp. 200° to 300° . Most castings of uneven section are locally unsound, and those made of brass are more defective. Chill-cast test-bars of Al-bronzes contg. Fe, Ni, Mn, etc., and of brasses contg. Fe, Ni, Al, etc., were prepd. and tested in tension, the hardness and d. also being detd. The tabulated results show an extensive range of properties. Expts. with a particular shape of die-casting showed that the gate should be placed on the thickest part for max. soundness. High-tensile brass was used with success, giving strengths around 40 tons per sq. in., but required sometimes a larger runner because it was less fluid than Al-bronze. The addn. of 4% Fe to Al-bronze raised the proof stress and strength; addn. of 10% Ni raised the proof stress still more, but decreased the ductility greatly. Pb in Al-bronze made it weaker, easier to machine, and more liable to show surface defects. The properties of chill-cast brasses contg. not over 71% Cu and up to 8% Al were investigated in detail, and are tabulated, showing that the addn. of Al up to 4% increased the proof stress and tensile strength while maintaining a good ductility. This alloy with 60 to 70% Cu had tensile properties similar to those of Al-bronze, and gave good die castings when poured at 1050° to 1100° . The fatigue limit was 7 to 10 tons per sq. in., while that of Al-bronze was 13, and that of brass without Al, about 4 tons per sq. in. The color was reddish and the resistance to corrosion as good as that of Al bronze. The structures found in some of the ternary Cu-Zn-Al alloys are indicated by diagrams. The equivalence value of Al for Zn is not a const. for different alloys. Alloys contg. γ phase have inferior properties and should be avoided. Core materials were investigated by immersion in Al-bronze at 1100° and in 60-40 brass at 1000° . The attack was increased when the molten alloy was in motion and was less on high-C steel or cast Fe than on pure Fe. Alloy steels were attacked badly, except special heat-resisting alloys high in Cr. To avoid deterioration by partial fusion, cast Fe should not contain over 0.3% P. Cr plating gave perfect protection if it was continuous and adherent. Brass attacked all materials much less than Al-bronze did. Calorizing of the molds gave good protection. Brasses contg. Al are very promising as materials for die-castings, as they are cheaper, have a higher proof stress, and attack the molds less than Al-bronze.

G. F. C.

The alpha-phase boundary of the copper-silicon system. CYRIL STANLEY SMITH. Am. Brass Co., Waterbury, Conn. *J. Inst. Metals* (advance copy), No. 476, 12 pp. (1928).—The results of Rudolphi, Sanfourche and Corson on the Cu-Si system are briefly reviewed. Alloys contg. up to 8% Si and less than 0.06% impurities were melted in graphite for thermal analyses, the method, which gave sharp arrests, being described in detail. The peritectic horizontal at the top of the β field was found at 852° . At 782° a sharp and const. arrest was found and it was thought to be eutectoidal rather than an allotropic change of β to β' . Another change, to β'' was found at 721° , and this transformation was subject to under-cooling. The α -phase boundary was detd. by annealing and quenching expts., the temps. being measured accurately within 10° . A period of 7 days was allowed for equil. at 400° , and less time at higher temps. Typical microstructures and an equil. diagram up to 8% Si are shown. The solidus extends in a smooth curve to 5.25% Si at 852° . Between 782° and 721° , the α -phase extends to 6.7% Si, but the boundary slopes back to 4.1% at 400° . The best etching reagent was found to be a satd. soln. of $K_2Cr_2O_7$ with 10% concd. H_2SO_4 and 2% of a

satd. soln. of NaCl. Markings in the α resembling Neumann bands were found on deep etching. The β tends to segregate to the first-formed nuclei. G. F. C.

X-ray analysis of Heusler alloys. ELIS PERSSON. *Naturwissenschaften* 16, 613 (1928).—Harang (C. A. 21, 3776) claimed that the properties of Heusler Al bronzes (Cu, Mn, Al alloys) can be derived from Mn-free Al bronzes (12% Al) with a complicated lattice (γ type, 52 atoms) and that the magnetic qualities cannot be explained by a single lattice. P. examd. these alloys with x-rays and found a special β modification: the primary lattice is body-centered cubic, like α iron, while the Al atoms occupy points of a free-centered cube of double the parameter. The elementary cube cell contains 16 atoms, 12 of which are Cu and Mn, thus confirming the formula $(\text{Cu, Mn})_3\text{Al}$. Magnetic alloys always give lines of the special β structure, which can be considered the carrier of magnetism. In order to be magnetic a minimum of Mn has to be present, alloys low in Mn, chilled, give simple β structure without the special placing of Al atoms and are non-magnetic. On annealing they become magnetic and α - and γ -phases (α is face-centered cubic) sep. out, leaving a Mn-rich β -phase. The strongest magnetism is found in chilled alloys of high Mn content. Indications of a fourth phase, not related to magnetism, were found. B. J. C. VAN DER HOEVEN

The complex structure of copper-tin intermetallic compounds. J. D. BERNAL. Univ. of Cambridge. *Nature* 122, 54 (1928).—Preliminary results of x-ray analyses show that although δ -, η - and ϵ -bronzes are composed of definite intermetallic compds., their structures and compns. are more complex than those usually given them. δ -Bronze has a close-packed cubical structure with a face-centered lattice, confirming previous observations. With the aid of Bradley and Thewlis' (C. A. 21, 48) values for γ -brass, the total no. of atoms in a cell is calcd. as 416. As this no. cannot be made up of Cu_3Sn mols., the simplest formula corresponding to a d. of 8.95 is most probably $\text{Cu}_{10}\text{Sn}_{11}$. Micrographic analyses give 20.6 at. % Sn, agreeing closely with the x-ray value. X-rays show that η -bronze has a complex, close-packed hexagonal structure, in harmony with the results of others. The accepted compn. (Cu_5Sn) is probably correct, analysis of the crystals giving 25.2 at. % Sn, or 16 mols. of Cu_5Sn per cell. Micrographically, 24.3 at. % Sn is obtained, which agrees more closely with $\text{Cu}_{10}\text{Sn}_{16}$. ϵ -Bronze shows a NiAs structure. Analyses of the crystals give 45 at. % Sn, 46 at. % being obtained micrographically. With a d. of 8.27 the simplest formula would be Cu_8Sn_9 . Further study is required to obtain exact nos. The complexity shown by these compds. is due to an incommensurability in the at. diams. these being incapable of adjusting themselves in less than a given no. of at. diams. J. BALOZIAN

Improvable silver alloys. W. FRAENKEL AND P. SCHALLER. Frankfurt Univ. Z. Metallkunde 20, 237-43 (1928).—Cu-Ag alloys in the rolled condition with Ag content between 80 and 97% were examd., Brinell hardness, tensile strength and elec. cond. being detd. after various methods of heat treatment. When an alloy contg. 8% Cu is heated for 12 hrs. just under the eutectic temp. (725°), and is then quenched in cold H_2O , the Brinell no. (500 kg. load) is about 51. If it is then annealed at 287°, the Brinell no. rises to a max. of 107 in 1.5 hrs., after which it falls very slowly. With lower annealing temp. the hardening effect is slower and with higher annealing temp. much faster. Thus at 350°, the max. hardness is attained in 20 min. If the alloy is not quenched but slowly cooled from 725°, the Brinell no. is 57, only slightly higher than for the quenched material, while if the primary heat treatment is conducted at lower temps., lower values of hardness are obtained. The effects upon tensile strength and sp. elec. cond. are similar to the effect upon hardness. Thus for the 8% Cu alloy, tensile strength in the quenched condition is 24 kg./sq. mm., annealed 1.5 hrs. at 280° it is 41.3 kg./sq. mm. Sp. elec. cond. quenched is 45.4×10^{-4} , annealed 1.5 hrs. at 280° 52.1×10^{-4} . The same expts. are repeated with alloys contg. approx. 3, 4, 5, 6.5, 8.0, 10 and 20% Cu, the max. hardening effect being obtained with the 8% alloy. This hardening effect followed by softening encountered when Cu-Ag alloys are annealed after quenching from 725°, is explained on the basis of the greater soly. of Cu in Ag at higher temps. and the slip-interference theory. The same behavior is shown by cast alloys, but the degree of hardening obtained is less. H. STORRTZ

The strength of a cadmium-zinc and of a tin-lead alloy solder. C. H. M. JENKINS. Natl. Phys. Lab. Teddington, Eng. J. Inst. Metals (advance copy), No. 479, 19 pp. (1928).—The resistance to failure under prolonged stress of the Cd-Zn eutectic, contg. 82.6% Cd, was compared with that of the common 60-40 Sn-Pb solder. Creep in these alloys may occur at room temp., but satisfactory service may be obtained at higher temp. Test specimens of the cast and rolled alloys were prepd. and tested in tension after various periods of aging or annealing. The Cd-Zn alloy showed about 3 times the tensile strength of the Sn-Pb solder, and equal ductility. Low-temp. annealing

for a week raised the strength of the former. Each alloy was weakest in the cold-rolled state, thin chill castings being much stronger. Under prolonged stress at room temp., the Cd-Zn alloy was 6 times as strong as the Sn-Pb solder, the cast material being again the strongest. The Sn-Pb solder failed within a year under only 100 lb. per sq. in. Under prolonged stress at 120°, the Cd-Zn alloy was about as strong as the other at room temp. Freshly rolled material was less resistant to stress at 120° than aged material. No intercrystalline cracking occurred in these tests on the Cd-Zn alloy. The strength of the film in a soldered joint with these alloys is probably about the same as the strength of a chill casting. G. F. C.

Properties and production of aluminum alloy die-castings. S. L. ARCHBUTT, J. D. GROGAN AND J. W. JENKIN. Natl. Phys. Lab., Teddington, Eng. *J. Inst. Metals* (advance copy), No. 477, 19 pp. (1928).—Tensile test-specimens and T-shaped tubular castings were made in cast-Fe molds with Ni-steel cores from Al alloys contg., resp., 4% Cu, 8% Cu, 12% Si, 4% Cu plus 2% Ni plus 1.5% Mg (Y alloy), and 4% Cu plus 3% Si. The molds were coated with a spray of whiting in dil. Na₂SiO₃ soln.; the cores by dipping into a suspension of plumbago and rouge in water. The operations of pouring, extn. of the cores, opening of the mold, and removal of the casting, had to be accurately timed. To avoid unsoundness, the test-bars were poured horizontal, with a riser over each end. The binary Cu alloys gave more trouble from cracking than the others. The best casting conditions were worked out for each alloy, and the castings were tested for soundness, d. and strength. The "Y" alloy was strongest, and the 12% Si alloy most sound. The hot-shortness of these alloys, and also of Al contg. 2.75% Cu plus 13.5% Zn, was detd. by impact tests of specimens at various temps. from 516° to 580°. The specimens were heated in special holders in an elec. furnace, and from a thermocouple in a dummy specimen the testing temp. was found to be 6° lower than the temp. of withdrawal from the furnace. The presence of liquid in the tested specimens was detd. by the microscope after quenching, and the changes in impact resistance with temp. near the point of incipient melting are plotted as curves. The 12% Si and the "Y" alloys showed the best shock resistance near the m. p., and the 8% Cu and the 13.5% Zn alloys showed the least. The former also gave good results in tensile tests of die-cast bars not machined. Tables of mech. properties and photomicrographs are included in the paper. Also in *Engineering* 126, 342-5 (1928). G. F. C.

The treatment of aluminum and aluminum alloys with chlorine. D. R. TULLIS. *J. Inst. Metals* (advance copy), No. 480, 8 pp (1928)—Al and Al alloys are shown to dissolve gases, chiefly H₂, and by the addn. of Mg, Zn or Ca the gases are thrown out of soln. and cause unsoundness. Archbutt's method of solidification and remelting to remove gases is described. An Al alloy contg. 14% Zn was made and remelted in small portions, adding Ca or gassing with Cl or both. Gassing with Cl was more effective in promoting soundness and high sp. gr. than Archbutt's method. Gassing with Cl for 4 min. increased the sp. gr. 2%. Similar results were obtained in Al alloys contg. Si or Ca or both. In Al alloys contg. 10 or 15% Fe, gassing with Cl practically stopped extrusion of liquid during solidification, but the treatment was not effective in an alloy contg. 20% Fe. An alloy of Al with 60% Mn cracked and disintegrated on aging less rapidly when treated with Cl than without treatment. The disintegration is probably due to dissolved gases. G. F. C.

The equilibrium diagram of the aluminum-calcium system. KANJI MATSUYAMA. *Science Repts. Tôhoku Imp. Univ.* 17, No. 4, 783-9 (1928).—Thermal analyses were made on 10-g. samples of Ca-Al alloys heated and cooled *in vacuo*, and changes in elec. resistance with varying temp. were also measured. Photomicrographs are shown of typical alloys etched with 10% KOH, and an equil. diagram of the complete series is given. The liquidus shows a max. at 1079° with 42.5% Ca, the compn. of CaAl₂. A eutectic between the solid soln. of Ca in Al and CaAl₂ occurs at 7.55% Ca and 616°, and another between CaAl₂ and Ca at 73% Ca and 545°. A peritectic reaction occurs at 700° in alloys contg. 13.9 to 42.5% Ca, forming CaAl₂ on cooling, from CaAl₂ and the liquid. Al dissolves 0.6% Ca at 616°, and 0.3% at room temp. G. F. C.

Decorative green finishes. HECTOR C. HEGGIE. *Metal Ind.* (London) 32, 513 (1928).—Recipes are given for producing on Cu and Cu alloys yellow-green, blue-green, dark brownish black and dark greenish black patinas; also a process for a green finish by electroplating. E. G. R. ARDAGH

Corrosion in the tin can. I. The electrochemical relations of Fe and Sn (LURCK, BLAIR) 4. Adsorption of SO₂ from gaseous mixtures (FICAI) 18. Grinding and separating apparatus for minerals (Fr. pat. 635,083) 1.

CHÉVENARD: *Recherches expérimentales sur les alliages de fer, de nickel et de chrome*. Paris: Dunod. 144 pp. F. 30.

DÉROUET, G.: *Le mouleur fondeur. VII. Fonderie de fonte, coulée des moules, opérations finales, défauts des pièces de fonderie et leur réparation*. Paris: Dunod. F. 6.

GUILLAUME, CH. ED.: *Recherches métrologiques sur les aciers au nickel*. Paris: Dunod. 242 pp. F. 50.

HINTZE, CARL: *Handbuch der Mineralogie. Bd. I. Elemente, Sulfide, Oxyde, Haloide, Carbonate, Sulfate, Borate, Phosphate. Lfg. 25.* Edited by Gottlob Linck. Berlin: W. de Gruyter & Co. pp. 3195-3350. M. 14.

KERPÉLY, K. VON: *Siliziumstahl als Baustahl u. Stahlformguss*. Halle (Saale): W. Knapp. 43 pp. M. 2.80; bound, M. 3.90.

SMITHells, COLIN J.: *Impurities in Metals—Their Influence on Structure and Properties*. London: Chapman & Hall, Ltd. 157 pp. 18s., net. Reviewed in *Chemistry and Industry* 47, 880; *Metal Ind.* (London) 33, 138(1928).

Apparatus (of the open pan type) for roasting and agglomerating ores. Soc. ANON. LE PROQUES ET METALLURGIQUE AND A. DE SAMSONOW. Brit. 283,133, Jan. 4, 1927.

Selective flotation of minerals. BAYARD S. MORROW and ERNEST KLEPETKO. U. S. 1,683,569, Sept. 4. A soln. comprising cresylic acid and thiocarbamilide is used as a flotation agent in the treatment of ores such as those contg. Pb, Zn and Hg.

Extracting copper from its ores. ALEXANDER ELLIOTT. U. S. 1,681,528, Aug. 21. A Cu ore such as oxide or oxidized ore is subjected to the action of a soln. of FeSO_4 in the presence of air which is distributed in intimate contact with the soln. and under superatm. pressure which is maintained throughout the body of the soln. and ore mixed with it. An app. is described.

Stereotype foundry plant. HENRY A. WISE WOOD (to Wood Newspaper Machinery Corp.). U. S. 1,682,161, Aug. 28. Structural features.

Apparatus for tapping molten metal under pressure. JOSEF POLAK. Fr. 634,879, May 23, 1927. The tube for the ascent of the molten metal to the mold is heated directly by conduction and radiation from the molten metal.

Ladle lining. JAMES V. MARSHALL (to New Castle Refractories Co.). U. S. 1,681,943, Aug. 28. A cup-shaped lining of refractory material is shaped so as to be adapted for insertion in a ladle for holding molten metals.

Cast iron. AUGUSTUS F. MEEHAN. U. S. 1,683,086, Sept. 4. Gray molten metal is treated with a silicic contg. an alk. earth metal such as Ca and another graphitizing agent such as Ni. Mg and Al also may be added.

Cast iron. AUGUSTUS F. MEEHAN (to Mechanite Metal Corp.). U. S. 1,683,087, Sept. 4. Metallic Ca, in proportion to the amt. of graphitization desired, is added to molten iron which if cast would contain more than 2% of combined C.

Casting ferrous metal cylinders. NELSON LITTELL. U. S. 1,683,475, Sept. 4. In casting ferrous metal cylinders with a chill-hardened inner surface and an unhardened exterior, molten metal is introduced into a refractory mold around a rigid chill core, and the core is withdrawn after the core-contacting skin of the casting has solidified but before the casting shrinks upon the core; withdrawal of the core commences soon after the pouring of the metal is started and continues until after the pouring is completed.

Use of aluminum casting cores to facilitate cooling of cast stereotype plates. HENRY A. WISE WOOD (to Wood Newspaper Machinery Corp.). U. S. 1,682,160, Aug. 28.

Magnetic core material. STUART BALLANTINE and RICHARD W. SEABURY (to Radio Frequency Laboratories, Inc.). U. S. 1,682,364, Aug. 28. Thin laminae of magnetic material such as mill scale from Si-steel are coated with a potentially reactive phenolic resinoid insulating binder and the material is subjected to heat and pressure in a mold under conditions which produce a product of low elec. cond. and having a magnetic permeability at radio frequencies of the order of 10.

Ore-roasting furnace with an endless traveling conveyor. MILTON E. BRANTHAVER (to American Milling & Refining Co.). U. S. 1,681,695, Aug. 21. U. S. 1,681,696 relates to similar app. in which the roasted ore is discharged into a vat contg. water.

Open-hearth furnace. FRANK B. MCKUNE (to Open Hearth Combustion Co.). U. S. reissue 17,071, Aug. 28. Original pat. No. 1,339,855 (C. A. 14, 1961) was issued May 11, 1920.

Open-hearth furnace construction. ALBERT T. KELLER (to Bethlehem Steel Co.). U. S. 1,682,378, Aug. 28.

Furnace adapted for smelting ores or concentrates. HOWARD W. HALL (to American Smelting & Refining Co.). U. S. 1,681,535, Aug. 21.

Smelting furnace with cupola and horizontal hearth portions. JAMES A. LANIGAN. U. S. 1,682,343, Aug. 28. A furnace is specified, adapted for smelting ferrous or non-ferrous metals.

Rotary furnace using powdered fuel for melting metals or for smelting. C. BRACK-ELSBURG. Brit. 283,381, March 9, 1927. Structural features.

Recovery of metals from alloys, etc. FRANZ BISCHITZKY. Fr. 635,034, May 26, 1927. Sn, Pb, Cu, Sb, Bi and Zn are recovered from waste alloys by dissolving in HCl, the HCl being used on the counter-current principle, and salts having a catalytic action such as CaCl_2 are added. The chlorides of the heavy metals are continually pptd. and the soln. becomes richer and richer in Sn. The CaCl_2 used is obtained by the pptn. of the Sn with lime.

Alloys. PIERRE BERTHELEMY and HENRY DE MONTBY. Fr. 634,751, May 20, 1927. In order to obtain a homogeneous distribution of Cd in Al, a final addn. of Cd and Mg or Cd, Al and Mg is made to fused Al or Al alloy. Similarly for Mg alloys, an addn. of Cd and Al is made to the fused metal. The alloys obtained are unaffected by sea water or air. Cf. C. A. 21, 1442.

Aluminum alloys. DEUTSCHE VERSUCHSANSTALT FÜR LUFTFAHRT E. V. Brit. 282,701, Dec. 27, 1926. Al alloys contg. Cu and Mg are made from chem. pure or electrolytically refined Al so as to be free from Fe, with addn. of Si necessary for the formation of Mg_2Si . The Si may be added as an Al-Si alloy also made from pure Al.

Aluminum alloys. TH. GOLDSCHMIDT A.-G. Fr. 634,885, May 23, 1927. See Brit. 272,706 (C. A. 22, 1754).

Iron-nickel-chromium alloys. Y. KAMISHIMA. Brit. 283,354, Feb. 9, 1927. Alloys are formed contg. Ni 1-5, Cr 7-20 and Si 1-6%, together with Fe, as low as possible in C. The alloys may be made in an elec. furnace by melting Cr or ferro-Cr, Ni, ferro-Si and Fe, with a flux of CaF_2 , NaHCO_3 and glass.

Nickel-cobalt-iron alloys. W. S. SMITH, H. J. GARNETT and J. A. HOLDEN. Brit. 282,901, Oct. 1, 1926. Alloys are formed of Ni 55-65, Co 20-30 and Fe 15-25%, with or without 1-5% of another element to increase the elec. resistance such as Cr, V, W, Si, Al, Mo or Cu. A small quantity of a deoxidizer such as Mg, Cd, Al or Mn may be added.

Cleaning and burnishing metallic powders. JOHN A. DALY. U. S. 1,681,521, Aug. 21. Finely divided metals such as Pb-Sn alloy are agitated with harder finely divided material, *e. g.*, with glass beads or steel particles.

Alloy steel. HENRY B. ALLEN (to Henry Disston and Sons). U. S. 1,681,797, Aug. 21. A high-C tool steel which is suitable for making saw blades contains as alloying elements only Ni 1.0-1.5 and Mo 0.1-0.7%.

Steel. VEREINIGTE STAHLWERKE A.-G. Fr. 534,736, May 20, 1927. A steel for use in bridge construction, etc., and which is resistant to corrosion, contains Si 0.5 to 1.5 and Cu 0.1 to 0.5%.

High-speed steels. STAHLWERK BECKER A.-G. Brit. 282,744, Dec. 30, 1926. In high-speed steels contg. V or Co or both, the C content is increased above 0.6% by 0.16% for each 1% of V and by 0.04% for each 1% of Co.

Apparatus for tempering steel strips or other metal articles. HENRY J. GAISMAN and CONRAD SCHUMACHER (to Autostrop Patents Corp.). U. S. 1,683,129, Sept. 4.

Annealing iron and steel. E. H. SCHULZ and W. HULSBRUCH (to Vereinigte Stahlwerke A.-G.). Brit. 283,200, Jan. 8, 1927. Edge or sulfate decarburizing is prevented by conducting the annealing in an atm. comprising a mixt. of carburizing gases such as CO , CH_4 and coke-oven gas and decarburizing gases such as blast-furnace gas and N_2 , so constituted that for Fe and steel generally or for any or only certain temps. no carburizing or decarburizing takes place. Examples are given.

Apparatus for bright annealing of wire, metal strips, etc. JAMES E. ROBERTSHAW (to American Steel and Wire Co. of N. J.). U. S. 1,682,801, Sept. 4.

Increasing the conductivity of metals. SAMUEL RUBEN. U. S. 1,683,209, Sept. 4. A metal body such as a Cu wire is heated to a temp. somewhat below its m. p. by an elec. current which is passed through it, in an electromagnetic field parallel to the direction of the elec. current discharge. An app. is described.

Coating metal surfaces. L. E. BARRINGER (to British Thomson-Houston Co., Ltd.). Brit. 283,182, Jan. 5, 1927. Before coating metals with "a cellulose or other lacquer," there is applied a preliminary coating of a polyhydric alc.-polybasic acid resin such as a glycerol-phthalic acid resin. Numerous details are given.

Etching solution. JOHN W. SAUER. U. S. 1,681,499, Aug. 21. A soln. suitable

for etching metals for decorative purposes is formed of water 1 gal., CuSO_4 2 oz., HNO_3 0.25 oz., HCl 0.25 oz., FeSO_4 0.25 oz. and NaCl 8 oz.

Rolling hot packs of metal sheets. JOHN B. TYRUS (to American Rolling Mill Co.). U. S. 1,683,003, Sept. 4. Mech. features.

Apparatus for making metal tubes or other seamless, tapered, bent, drawn metal articles. CARL BERGMANN, JR. (one-half to Gustave R. Thompson). U. S. 1,683,123, Sept. 4.

Metallic tungsten. KOJI ANJOW (to Mitsubishi Kogyo Kabushiki Kaisha). U. S. 1,682,058, Aug. 28. In order to effect its purification, crude metallic W is heated under pressure with an aq. alkali soln., *e. g.*, heated with a 15% soln. of NaOH at 150° for a half hr.

Detinning. Q. MARINO. Brit. 282,779, Dec. 27, 1926. Detinning of tin scrap or the like is effected by immersion for a few min. at ordinary temp. in a bath of 21°Bé . HCl to which a Cl -releasing salt has been added such as Na or K chromate or dichromate or nitrate or chlorate. Sn may be pptd. from the resulting SnCl_2 soln. by Zn or Al or the soln. may be evapd. to dryness and the product dissolved with dil. H_2SO_4 and subjected to electrolysis to obtain spongy Sn .

Welding rod. PLINY P. PIPES (to Ohio Brass Co.). U. S. 1,681,904, Aug. 21. A rod suitable for use in welding Cu to steel comprises Cu together with P 0.1–0.2 and Sn 0.5–1.0%.

Burner (using vaporized liquid fuel and oxygen) for welding or cutting metals. F. W. BECKER. Brit. 283,415, June 20, 1927.

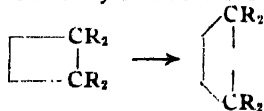
Apparatus for supplying oxygen to welding or metal cutting apparatus. ROBERT WEBER (to Le Petits Fils de François de Wendel & Cie.). U. S. 1,683,112, Sept. 4.

Composition for use with electrodes for welding or coating iron or steel. ANDREW C. JAMES. U. S. 1,682,524, Aug. 28. Mn 20, Cr 20, Ti 20, Mo 5 and Na silicate 35%.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

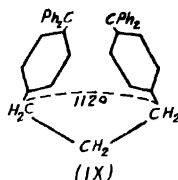
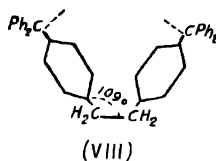
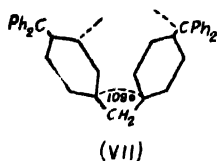
Ring strain and radical formation. GEORG WITTIG AND MARTIN LEO. *Ber.* 61B, 854–62(1928).—In the radical disocn. of certain hexasubstituted ethanes several factors are probably involved, especially the space occupied by and the valence requirements and electrochem. character of the substituents. On the assumption that the amount of valence which acts between the 2 ethane C atoms and which depends on the valence requirements and electrochem. character of the substituent holds these C atoms at only the normal distance from each other (1.54×10^{-8} cm.), all forces which tend to increase this distance will lead to a cleavage of the mol. if they are great enough. In the hexaarylethanes the filling of the space by the substituents is probably responsible for the two C atoms not being able to lie at the normal distance from each other. But in strained ring systems, also, it must be assumed that there are forces which tend to increase the distance between the ring atoms. It seemed of interest, therefore, to study, on suitably substituted C atoms, the disocn. tendency of a C—C union within a ring



A rupture of the ring must necessarily lead to the forma-

tion of a chain with 2 unsatd. C atoms. A few such "diradicals" have already been described and it is because of the appearance of a paper by Diltthey (*C. A.* 22, 769) that W. and L. publish their results in their present incomplete form. From CH_2Ph_2 and $(\text{CH}_2\text{Ph})_2$, resp., they obtained with BzCl by the Friedel-Crafts method the ketones $\text{CH}_2(\text{C}_6\text{H}_4\text{COPh})_2$ (I) and $(\text{CH}_2\text{C}_6\text{H}_4\text{COPh})_2$ (II); that the Bz groups enter the *p*-position to the CH_2 group was shown by the fact that (*p*- $\text{H}_2\text{NC}_6\text{H}_4$) $_2\text{CH}_2$ gives by the Sandmeyer method a dinitrile which by the Grignard reaction yields a $\text{CII}_2(\text{C}_6\text{H}_4\text{Bz})_2$ identical with I. The diketones with PhMgBr gave the glycols $\text{CH}_2(\text{C}_6\text{H}_4\text{C}(\text{OH})\text{Ph})_2$ (III) and $[\text{CH}_2\text{C}_6\text{H}_4\text{C}(\text{OH})\text{Ph}]_2$ (IV). Only IV crystd. but both III and IV yielded with HCl gas under the proper conditions well crystd. chlorides (V and VI) which, colorless in themselves, showed in hot AcOH a greenish color disappearing on cooling. On removal of the halogen with "Naturkuper C" or Hg in C_6H_6 the chlorides formed beautifully colored solns. sensitive to air, the *p,p'*-bis[diphenylmethyl]diphenylmethane (VII) giving a bright red, the ethane (VIII) a dark blue-violet soln. On addn. of petro-

leum ether (under N), both solns. deposit faintly yellow flocks which redissolve in excess of C_6H_6 with the original color. When exposed several hrs. to sunlight the radicals are



decompd. and decolorized. Mol.-wt. detns. (f.-p. method) showed that the radicals dissolve chiefly in the monomeric form in C_6H_6 (only about 20-30% dimer). Since $Ph_2C(MeC_6H_4)C$, like Ph_2C , under the same conditions is for the most part dimerized, it seems plausible to ascribe the greater dissocn. tendency of VII and VIII to the concurrent effect of ring strain, as developed above. It can be seen from models that a mutual satn. of the 2 "tervalent" C atoms is prevented by the ring strain if it is assumed that the C atoms joined directly to the C_6H_5 ring lie in the same plane with it, whereas in the propane deriv. (IX) the unsatd. C atoms can neutralize each other (not wholly without strain), a deduction whose exptl. confirmation is being studied. Attempts to prep. the substance $(Ph_3CCPh_2C_6H_4CH_2)_2$ from Ph_3CNa and VI gave only the dark violet soln. of VIII, which was pptd. in flocks by petroleum ether. The tremendous sensitivity of VII and VIII, to O is shown by the fact that, after filtering in N, the solid powdery ppts. quickly resinify in the air and then have the same compn. as the oxidation products obtained by treating the C_6H_5 solns. with air; mol. wt. detns. and analysis indicate that VIII takes up 1, VII for the most part 2 atoms of O while maintaining its monomeric form. Attempts to bridge the unsatd. C atoms through an intramol. hydroquinone ether by treatment with quinone were without result; the solns. were decolorized but nothing crystd. Since ring strain seems to favor the tendency to dissociate, it seemed possible that compds. of the type of the sym. tetraaryldialkylethanes, which lie at the limits of the ethanes capable of dissociation, might, under the influence of ring strain, dissociate into radicals with accompanying color phenomena. II with $MeMgI$ gave the cryst. glycol $(CH_2C_6H_4C(OH)MePh)_2$ (X) whose esterification offered considerable difficulty on account of the ease with which it loses H_2O to form the unsatd. hydrocarbon $[CH_2C_6H_4C(:CH_2)Ph]_2$ (XI), but after standing 1 week in $MeOH$ contg. a trace of HCl it yielded the *di-Me ether* (XII) which with $Na-K$ in dioxane gave the brown *di-K compd.* (XIII), yielding with $EtCH(C_6H_4CHMePh)_2$ (XIV). On removal of the K from XIII with $(CMe_2Br)_2$, there was instant decolorization without any even transitory color change and from the soln. was isolated a white powder (XV) having an extraordinarily high mol. wt.; apparently 3 of the diradicals combine to a substance surprisingly stable towards Br and oxidizing agents. *p,p'*-Dibenzoyldiphenylmethane (I) (50% from CH_2Ph_2 and $BzCl$ with $AlCl_3$, or 12 g. from 10 g. $CH_2(C_6H_4NH_2)_2$ through the dinitrile with $PhMgBr$), faintly yellowish, m. 147.5-5.5°. *p,p'*-Bis[diphenylhydroxymethyl]diphenylmethane (III), resin turned red by concd. H_2SO_4 ; dichloride (V) (6-7 g. from 9 g. I), m. 157-60°. VII, mol. wt. in freezing C_6H_6 661. *p,p'*-Dibenzoyl- α,β -diphenylethane (II) (yield, 50%), m. 174.5-6°. *p,p'*-Bis[diphenylhydroxymethyl]- α,β -diphenylethane (IV), m. 176-8°, shows red halochromism in concd. H_2SO_4 ; dichloride, (VI) (12.5 g. from 15 g. IV), m. 184-6° (decompn.), gives a dark green color with concd. H_2SO_4 , also in *o*-cresol and in $AcOH$ on heating, and a violet color in $PhNMe_3$ and $BzOEt$, the solns. becoming colorless on cooling. VIII, mol. wt. in C_6H_6 588. *p,p'*-Bis[phenylmethylhydroxymethyl]- α,β -diphenylethane (X), m. 113-4.5°, instantly gives in hot $AcOH$ *p,p'*-bis-[α -phenylethenyl]- α,β -diphenylethane (XI), m. 117-9°, decolorizes Br in $CHCl_3$. XII, m. 144-8°, gives XI on long boiling with $AcOH$. *p,p'*-Bis-[α -phenylethenyl]- α,β -diphenylethane (XIV), m. 97-8°, does not decolorize Br in $CHCl_3$. XV, $(C_{20}H_{14})_n$, m. 110-5°, mol. wt. in freezing C_6H_6 1050-1170.

C. A. R.

The constitution of citronellol and rhodinol. I. V. GRIGNARD AND J. DOEUVRE. *Compt. rend.* 187, 270-3(1928).—G. and D. study the structure of citronellol (I), and rhodinol by ozonization to det. the CH_2 and Me_2C groupings. Samples of I from widely varying sources contain in every case 18-28% α -form and 72-82% β -form. I in $HOAc$ with H_2O for 40 hrs. at 0° gives menthogycol (II), b. 115-8°, m. 65-6°, and a monoacetate. II rearranges to isopulegol with Ac_2O or 10% H_2SO_4 . The cyclization of I prevents its quant. ozonization in $HOAc$, but C_6H_5N gives good results.

D. H. POWERS

The affinity of hydrocarbon groups for oxygen. RAGNAR LYDÉN. Univ. Helsingfors. *Finska Kemistsamfundets Medd.* 35, 19-36(1926); *Chem. Zentr.* 1927, I, 1813-4.—A series of ethers was decompd. according to the Aschan method by heating with AcBr in a sealed tube, the reactions being: $ROR' + AcBr \rightarrow RBr + AcOR'$, and $ROR' + AcBr \rightarrow R'Br + AcOR$. With a mixed ether, the reaction can therefore proceed in 2 directions, and the same result may be attained by using a mixt. of 2 simple ethers. The hydrocarbon group, which together with the ether O unites with the Ac group to form an ester, has a greater energy of combination with the ether O than the group forming the Br-substituted hydrocarbon. These energies of combination are compared by detns. of the reaction products. For the conversion of equimol. quantities of 2 ethers with AcBr, the following reaction is carried out: $R_2O + R'_2O + AcBr \rightarrow xRBr + xAcOR + yR'Br + yAcOR' + (1-x)R_2O + (1-y)R'_2O + [1-(x+y)]AcBr$. *Exptl.*—Et₂O, (iso-Am)₂O and AcBr were heated together 24 hrs. in a sealed tube at 200-10°, fractionally distd. and the individual fractions analyzed by detg. the unaltered AcBr and the Br and by sapon. The O-affinity of Et/iso-Am was 1/2.56(1/2.193). With iso-AmOEt and AcBr, the O-affinity of Et/iso-Am was 1/2.183. With Et₂O, phenetole and AcBr, the ratio AcOEt/EtBr was 1/1.959(1/2.077). With (iso-Am)₂O, phenetole and AcBr, the ratio EtBr/iso-AmBr was 1/10.6. C. C. DAVIS

New method of obtaining neutral esters of sulfuric acid. R. LEVAILLANT. *Compt. rend.* 187, 234-6(1928).—ROSO₂Cl reacts with RONO to form R₂SO₄ with the evolution of NOCl. MeONO (I) is passed through MeOSO₂Cl (II) heated in a bath initially at 80° at such a rate that the reaction temp. is maintained 20° above that of the bath, which is allowed to rise to 120° during the course of the reaction. 1.1 mol. of I per mol. of II is conducted into the reaction flask. After cooling the product is washed with ice water, dried over anhyd. Na₂SO₄ and distd. under diminished pressure, giving 40% of *di-Me sulfate*, b₁₀ 80°, d₄ 1.349-1.350, n_D¹³ 1.389. *Di-Et sulfate* was prepd. in the same manner, yield 55%, b₁₀ 97-8°, d₄ 1.202, d₁₆ 1.186, n_D¹⁴ 1.4022. Though the method is not practical for these esters, it is suggested as a general method for the prepn. of R₂SO₄. A. S. CARTER

The reactions of activated magnesium. I. A. P. TEREŦ'EV. *J. Russ. Phys.-Chem. Soc.* 60, 85-9(1928).—Dry Mg activated by heating with 0.04 its wt. of I forms alcohols readily; Me₂CHCH₂CO₂Me in abs. EtOH is transformed by Mg into the Et ester after 4-5 hrs.' boiling. Reduction does not take place. A soln. of 2.4 g. activated Mg in 50 cc. abs. EtOH was boiled for 1 hr. with 32 g. CH₂(CO₂Et)₂, 13 g. Et₂SO₄ added and heating continued for 4 hrs.; 22 g. EtHC(CO₂Et)₂ was obtained. II. **Reactions with ammonia.** *Ibid* 91-3.—After 5 hrs. with NH₃ at 350-500°, activated Mg (cf. above) gives a grayish yellow powder besides 2.5% Mg. The powder contg. 30.17% N is composed of 5-6% MgI₂, about 8% MgO and, probably, Mg(NH₂)₂. It reacts readily with H₂O, alcs. and amines, and with pyrrole on warming; very slowly with C₆H₅N vapor at 250°, not at all with EtOAc, AcCl and Me₂SO₄. Mg(NH₂)₂ reacts at 130-50° with PhNH₂, PhNHMe, Ph₂NH, *o*-H₂NC₆H₄OMe, α - and β -C₆H₇NH₂ and AcNHPh. With PhNH₂ vapor, the reaction begins at 240°. III. **The action of *o*-anisidine.** A. P. TEREŦ'EV AND A. M. RUBINSTEIN. *Ibid* 95-101.—Activated MgI₂ was slowly added to 2 equivs. boiling *o*-MeOC₆H₄NH₂ in a CO₂ atm. Upon cooling to 150°, CO₂ was passed in and crystals of Mg 2-methoxycarbamate sepd. After 2-4 hrs. more at 250-70° the product was washed with cold xylene, dissolved in HCl and pptd. with NaOAc; colorless plates, m. 178°, forming a cryst. HCl salt, sol. in hot H₂O, PhH, EtOH, Et₂O and AcOH. Aq. solns. darken on contact with air, reduce Ag(NH₂)₂NO₃, give a red color with FeCl₃. A m.-p. depression is obtained with (MeOC₆H₄NH)₂CO. Hence the compn. corresponds to 2,3-MeO(2'-MeOC₆H₄NHCO)C₆H₄NH₂ (I). On boiling with HCO₂H are obtained crystals, m. 133°, and more stable toward O₂ than I. Analysis agrees with the formula 2,3-MeO(2'-MeOC₆H₄NHCO)C₆H₄NHCHO (II). I was boiled with NaOH, *o*-MeOC₆H₄NH₂ was steam-distd. and the mother liquor treated with AcOH; 2,3-MeO(H₂N)C₆H₄CO₂H (by analysis), m. 153°, resulted. It was sol. in acids and alkalies, hot H₂O, EtOH, Et₂O and PhH, colored FeCl₃ solns. red-violet, reduced Ag(NH₂)₂NO₃ and formed a sparingly sol. Cu salt. The acid was diazotized and reduced with Sn in alk. soln., treated with H₂S, evapd. and the residue distd. CH₂.C₆H₄.CO.O (III), m. 72°, re-

sulted (cf. *Ber.* 10, 1466(1877); 25, 524(1892)), which with alk. KMnO₄ gave *o*-C₆H₄(CO₂H)₂, identified by converting it to fluorescein. BASIL C. SOVENKOFF

α -Chloro- and α -bromo- α -sulfopropionic acids and their optical resolution. H. J.

BACKER AND H. W. MOOK. *Bull. soc. chim.* 43, 542-9 (1928).—These acids have been synthesized by 2 methods and then resolved into their optically active forms. The first method of synthesis consists in the sulfonation of α -chloro- and α -bromopropionic acids by treatment with SO_3 at 100 – 120° , the yields of the Ba salts being 25 and 30%, resp. The 2nd method involved the halogenation of $\text{MeCH}(\text{SO}_3\text{H})\text{CO}_2\text{H}$ by heating with Br and water (for bromination), the yields of the Ba salts being 70 and 80%, resp. The acids obtained by both methods are identical. α -Chloro- α -sulfopropionic acid (I) gives hygroscopic crystals contg. 1 mol. water and m. 93 – 4° . Ba salt, contains $3\text{H}_2\text{O}$, soly. 2.88 g. anhyd. salt in 100 g. water at 25° . α -Bromo- α -sulfopropionic acid (II), hygroscopic crystals contg. 1 mol. water, m. 105 – 110° . Ba salt, contains $3\text{H}_2\text{O}$, soly. 4.36 g. anhyd. salt in 100 g. water at 25° . The Th and K salts of both acids crystallize free from water. The acids were resolved into active forms by means of their strychnine salts which were prepd. by treating their Na salts with strychnine acetate. I shows $[\text{M}]_D^{25} 9.5^\circ$; neutral salt (bivalent ion) $[\text{M}]_D^{25} 26.1^\circ$. The corresponding values for II are 1.2° and 12.5° , resp. These active acids do not racemize on heating for a long time at 100° , showing them to be quite different from the correspondingly substituted acetic acids, which tend to racemize so quickly that it is difficult to isolate their active forms.

New esters of α -bromobutyric acid. VENANCIO DEULOFEU. *Bull. soc. chim.* 43, 549–51 (1928).—Three new esters of this acid have been prepd. by the action of the corresponding alcs. on the acid with H_2SO_4 as a catalyst: Pr, b. 190.5 – 194° , yield 50%; iso-Pr, b. 179 – 82° , yield 30%; allyl, b. 189 – 93° , yield 25%. F. C. H.

Preparation of hydrazine by Raschig's method. O. YU. MAGIDSON AND I. YA. FRENKEL. *Trans. Sci. Chem. Pharm. Inst. (Moscow)*, No. 6, 25–7 (1923).—Ammonia soln. (d. 0.9, 3 l.) and 5% gelatin soln. (300 cc.) are stirred during the addn. of 2 N-hypochlorite soln. (1.5 l.); the evapd. mixt. is filtered and, when cold, is treated with dil. H_2SO_4 , hydrazine sulfate crystg. out. The presence of a small quantity of H_2SO_4 or HNO_3 is very unfavorable. B. C. A.

The action of picric acid on cycloglycine. A. MOREL, P. PRECEPTIS AND A. GALY. *Compt. rend.* 187, 173–4 (1928).—Equivalent quantities of $\text{C}_6\text{H}_2(\text{NO}_2)_3\text{OH}$ (I) and $\text{H}_2\text{NCH}_2\text{CONHCH}_2\text{CO}_2\text{H}$ (II) in H_2O , boiled and concd. in vacuum, yield the monopicrate of II in yellow monoclinic crystals, the crystallographic data of which are given. When the aq. soln. of I and II is made alk. with $\text{Ba}(\text{OH})_2$, which is removed after heating by means of H_2SO_4 , the same product results upon concn. without reduction of I as is the case when cycloglycylglycine replaces II.

Interactions of picric acid and cycloglycylglycine. A. MOREL AND P. PRECEPTIS. *Compt. rend.* 187, 236–9 (1928).—Yellow crystals of the monopicrate (I) of glycylglycine (II) result upon boiling equiv. quantities of $\text{C}_6\text{H}_2(\text{NO}_2)_3\text{OH}$ (III) and $\text{NH}_2\text{CH}_2\text{CO}_2\text{NHCH}_2\text{CO}_2\text{H}$ (IV) in H_2O and concg. in vacuum. Under these con-

ditions the 2,5-diketopiperazine ring in IV is hydrolyzed to form the free NH_2 in II. In soln. made alk. with $\text{Ba}(\text{OH})_2$, some I is formed, varying in color from yellow to red by reason of a 2nd substance (V) carried down in the pptn. Vis pptd. by addn. of excess $\text{Ba}(\text{OH})_2$ and isolated by pptn. of the Ba with H_2SO_4 as a red compd., sol. in H_2O and alkalis and insol. in Et_2O and CHCl_3 . Failure to give the diazo reaction indicates that it is not a nitroaminophenol, but after reduction with glucose, this test is positive, indicating V to be a product of the partial reduction of II by IV. Its tinctorial properties on cotton and silk, its ability to be pptd. by heavy-metal acetates and its inability to be pptd. by nitron, indicate V to be an azoxy compd., which is confirmed by N detn. and reduction with TiCl_3 . A. S. CARTER

Alanine from pyruvic acid. AUBEL AND BOURGUEL. *Compt. rend.* 186, 1844–6 (1928).—The synthesis of alanine (I) from AcCO_2H (II) and NH_3 is accomplished by shaking a water soln. of NH_3 and AcCO_2NH_4 with colloidal Pd in the presence of H_2 . The colloid is stabilized by use of starch paste. From 4 g. of II is obtained 2.9 g. of I.

Lability of the chains of serine-phosphoric acids. A general reaction for tyrones. SWIGEL POSTERNAK AND THEODORE POSTERNAK. *Compt. rend.* 187, 313–6 (1928); cf. C. A. 21, 1281, 2278, 2476, 2539; Platt and Wormald, C. A. 21, 1212; Bergmann, et al. on rearrangements of peptide-like substances (13 papers).—The general reaction of tyrones is based on the production of AcCO_2H at the expense of the serine-phosphoric acid chains. L. W. RIGGS

A general reaction of amino acids. II. H. D. DAKIN AND RANDOLPH WEST. Scarborough-on-Hudson and Presbyterian Hospital, N. Y. *J. Biol. Chem.* 78, 745–56

(1928); cf. C. A. 22, 3134.—By the action of pyridine and Ac_2O on *glutamic acid*, *aspartic acid*, *histidine* and *tryptophan* substituted acetylaminooacetones were derived. *Methylaspartic acid*, because of the absence of an unsubstituted α -H adjacent to the NH_2 group, gave neither a ketone nor CO_2 . β -Amino acids underwent simple acetylation. The ketone formed from glutamic acid could not be isolated but was converted to *2,5-dimethylpyrazine-3,6-dipropionic acid* by reactions analogous to *Gabriel's* pyrazine synthesis from aminoacetone. This acid is of a type hitherto not prepd. It is sparingly sol. in cold H_2O ; moderately in boiling H_2O . Its aq. soln. just reddens blue litmus. It crystallizes from MeOH in stout prisms, m. $211-3^\circ$, without evolution of gas. The acid gives no diazo reaction nor does it contain any amino N. The acetylaminooacetone of aspartic acid is an amber-like gum. Treated with an excess of PhNHNH_2 in AcOH, it was converted to *diacetyl bishydrazone*, m. $241-3^\circ$. *Phenylserine* warmed on the H_2O bath with Ac_2O and pyridine gave the *azlactone anhydride* of acetylaminocinnamic acid, m. 152° . *Phenyl- β -alanine*, similarly treated, gave a large yield of *acetylphenyl- β -alanine*, m. 161° . *Histidine*, similarly treated, resulted in the evolution of 1 mol. of CO_2 and an acetylmino ketone, which by evapn. with 10% HCl deposited colorless prisms, m. $205-6^\circ$, of 4-imidazolyl-3-amino-2-butanone-2HCl. *Tryptophan* gave an analogous reaction. The *azlactones* of leucine, phenylalanine and aspartic acid reacted with pyridine and AcOH to give acetylaminooacetone derivs. similar to those of the amino acids from which they were prepd. The azlactone of benzoylaminoacetic acid, as anticipated, gave neither CO_2 nor a ketone.

ARTHUR GROLLMAN

Some aromatic derivatives of substituted acetylaminooacetones. H. D. DAKIN AND RANDOLPH WEST. Scarborough-on-Hudson and Presbyterian Hospital, N. Y. *J. Biol. Chem.* 78, 757-64 (1928); cf. C. A. 22, 3134.—The following acetylaminooacetone derivs. were prepd. from aromatic α -amino acids by the action of Ac_2O and pyridine by the method previously described. α -*Phenyl- α -acetylaminooacetoxime*, nacreous crystals, sparingly sol. in H_2O , moderately sol. in alc., m. 152° ; 4-*phenyl-5-methylimidazolone*, sandy rosettes, m. $287-9^\circ$, in sol. in H_2O ; 4-*phenyl-5-methyl-2-thiolimidazole*, thin plates, sparingly sol. in H_2O , soften above 250° , m. $290-5^\circ$; α -*benzyl- α -aminoacetone*, hexagonal platelets, m. 130° ; 2,5-*dibenzyl-3,6-dimethylpyrazine*, m. $92-4^\circ$; 4-*benzyl-5-methylimidazolone*, darkens above 250° ; 4-*benzyl-5-methyl-2-thiolimidazole*, m. $279-80^\circ$; α -*p-hydroxybenzyl- α -acetylaminooacetoxime*, m. $189-90^\circ$; α -*p-hydroxybenzyl- α -aminoacetone-HCl*; 4-*p-hydroxybenzyl-5-methylimidazolone*, m. $243-4^\circ$; 4-*p-hydroxybenzyl-5-methyl-2-thiolimidazole*, m. $273-5^\circ$; and 2,5-*p-dihydroxybenzyl-3,6-dimethylpyrazine*, which by its reaction appeared to be the normally constituted pyrazine.

A. G.

Michael condensation. P. C. MITTER AND A. C. ROY. *J. Indian Chem. Soc.* 5, 33-48 (1928).—The condensation of Et citraconate and $\text{AcCH}_2\text{CO}_2\text{Et}$ in the presence of Na and ether or pure NaOEt affords normally *Et γ -aceto- β -methylpropane- α,β,γ -tricarboxylate*, b₁ 182° (hydrolyzed with loss of CO_2 to γ -aceto- β -methylpropane- α,γ -dicarboxylic acid, m. $119-20^\circ$), and a viscous oil which yields the semicarbazone of *Et γ -methyl-4,6-cyclohexanedione-1,2-dicarboxylate*, m. 235° . Condensation in the presence of alc. NaOEt results in the partial conversion of Et citraconate into Et itaconate (Hope, C. A. 6, 3410), and hence, under these conditions, Et δ -acetobutane- α,β,δ -tricarboxylate, b₁ 166° (corresponding acid, m. $119-20^\circ$, not identical with that obtained from the isomeric ester), and *Et 1-carbethoxy-4,6-cyclohexanedione-3-acetate* (monosemicarbazone, m. 251°) are obtained. The first-named compd., which may also be produced by the condensation of Et itaconate and $\text{AcCH}_2\text{CO}_2\text{Et}$, was considered by Michael to be the normal condensation product. Similar results are given by the use of Et citraconate and $\text{MeCHAcCO}_2\text{Et}$; normal products: *Et γ -aceto- β -methylbutane- α,β,γ -tricarboxylate*, b₁ 185° , and *Et 1,2-dimethyl-4,6-cyclohexanedione-1,2-dicarboxylate* (monosemicarbazone, m. 235°); products obtained in the presence of alc. NaOEt: δ -*acetopentane- α,β,δ -tricarboxylate*, b₁ 175° , and *Et 1-carbethoxy-1-methyl-4,6-cyclohexanedione-3-acetate* (monosemicarbazone, m. 247°). Et fumarate and $\text{MeCHAcCO}_2\text{Et}$ yield *Et γ -acetobutane- α,β,δ -tricarboxylate*, b₁ 149° , and *Et 1-methyl-4,6-cyclohexanedione-1,2-dicarboxylate* (monosemicarbazone, m. 240°). Et citraconate and $\text{NCCH}_2\text{CO}_2\text{Et}$ condense (through the intermediate formation of Et itaconate) in the presence of alc. NaOEt to give *Et δ -cyanobutane- α,β -dicarboxylate*, b₁ 170° , and in the presence of a suspension of Na in C_6H_6 to give *Et γ -cyano- β -methylpropane- α,β,γ -tricarboxylate*, b₁ 190° (corresponding acid, m. 164° ; cf. Perkin and Thorpe, *J. Chem. Soc.* 75, 52 (1899)). Et fumarate and $\text{NCCH}_2\text{CO}_2\text{Et}$ condense under the latter conditions to yield *Et γ -cyanopropane- α,β,γ -tricarboxylate*, b₁ 167° , and γ -*cyano- α,β -carbethoxypropane- γ -carboxylic acid* (decomps. to Et γ -cyanopropane- α,β -dicarboxylate, b. 282° , on heating (cf. Thorpe *J. Chem. Soc.* 77, 923 (1900))).

B. C. A.

Considerations relative to a critical study by F. P. Mazza (rotatory dispersion of

alkyl aspartates). M. L. PAGLIARULO. *Atti accad. Lincei* [6], 7, 577-9(1928).—An answer to a recent paper by Mazza (cf. *C. A.* 21, 1798; 22, 1957). Reasons are given to show that the methods employed and the results obtained by P. are reliable.

C. C. DAVIS

Condensation of glucosamine hydrochloride with ammonium thiocyanate. K. ISHIFUKU. *J. Pharm. Soc. Japan* 48, No. 6, 584-6(1928).—Pauly and Ludwig (*C. A.* 16, 4211) obtained thiolglucimidazole (I) $C_7H_{12}O_4N_2S \cdot H_2O$ (decomps. 168°) by condensing glucosamine-HCl (II) with KCNS. By repeating the above reaction I. obtained a compd. (III), $C_7H_{12}O_4N_2S$, decomps. 210° , which on removal of S with H_2O_2 gave glucimidazole (HCl salt, m. 162°), showing that III is I without H_2O of crystn. II and NH_4CNS also gave a good yield of III.

NAO UYET

The synthesis of sucrose. KURT P. JACOBSON. *Naturwissenschaften* 16, 529-30 (1928).—A short sketch of the recent synthesis of sucrose by Pictet and Vogel (*C. A.* 22, 2743). Several references are given.

B. J. C. VAN DER HOEVEN

Cyclopropane derivatives. P. BRUYLANTS AND A. DEWAELE. *Bull. Sci. Acad. Roy. Belg.* [v], 14, 140-53(1928).—When cyclopropyldimethylcarbonil is treated with HCl and the product distd. several times there is obtained α -chloro- δ -methyl- γ -pentene, b. $132-3^\circ$, d_4^{20} 0.92653, n_D^{20} 1.44193, which is converted by prolonged treatment with KOAc and a small quantity of AcOH into the corresponding acetate, b. $170-1^\circ$, d_4^{20} 0.9108, n_D^{20} 1.43107. Hydrolysis of this gives δ -methyl- γ -penten- α -ol, b_{717} 157° , d_4^{20} 0.85765, n_D^{20} 1.44564, identical with the methyl pentenol prep'd. by Van Aerde (*C. A.* 3, 2700). The product of the reaction of HBr and cyclopropyldimethylcarbonil, (cf. *C. A.* 3, 2700), when treated with NaOEt gives α -ethoxy- δ -methyl- γ -pentene, b. $142-3^\circ$, d_4^{20} 0.7989, n_D^{20} 1.41948, also obtained from the above Cl compd. HCl converts the ethoxypentene into δ -chloro- α -ethoxy- δ -methylpentane, b_{737} $172-3^\circ$, d^{20} 0.9094, which is decompd. by boiling water in presence of $CaCO_3$ yielding α -ethoxy- δ -methylpentan- δ -ol, b. $182-3^\circ$ (*C. A.* 21, 731). Prolonged treatment of α -chloro- δ -methyl- γ -pentene with boiling water in presence of $CaCO_3$ and further treatment with alc. KOAc and a little NaI regenerates mainly cyclopropyldimethylcarbinol. An explanation of the change is suggested.

B. C. A.

Oxidation in the benzene series by gaseous oxygen. IV. Mechanism of the slow oxidation of saturated hydrocarbons. H. N. STEPHENS. Univ. of Minnesota. *J. Am. Chem. Soc.* 50, 2523-9(1928); cf. *C. A.* 22, 406.—A new mechanism of the oxidation of satd. hydrocarbons by gaseous O is proposed, which accounts for the inhibitory action of H_2O in the oxidations studied: Hydrocarbon + $O_2 \rightleftharpoons$ complex $\rightleftharpoons H_2O$ + unsatd. residue \rightarrow aldehyde or ketone. The oxidation of a hydrocarbon to aldehyde or ketone does not go through the alc. stage. Oxidation of PhMe and PhEt was carried out in the presence of Ac_2O in an attempt to get an ester of the intermediate alc. but in neither case was any ester detected. The oxidation of xylol acetate with O gives no toluic aldehyde. By using equimol. amts of PhEt and PhMeCHOH, a much greater yield of BzMe is obtained in a given time from the hydrocarbon than from the alc.

C. J. WESR

Diazo compounds. A. ANGELI. *Atti accad. Lincei* [6], 7, 699-705(1928).—A critical review and discussion of the behavior of diazo compds. As in a previous communication on the same subject (cf. *C. A.* 20, 2991), the reactions of these compds. is explained without resort to stereoisomerism, which always leads to contradictions. Diazohydroxides formed by reduction of nitroamines and isonitroamines. According to Hantzsch and Reddelien (*Die Diazoverbindungen*, 2nd Ed. Berlin, 1921, 43), isodiazotates are formed by the reduction of isonitroamine salts, while under similar conditions diazotates are formed from nitroamine salts. This would be at variance with all known facts, and both normal and isonitroamines would be expected to form the same reduction product: $PhN \cdot N(OH)O \rightarrow PhN:NOH \leftarrow PhN(O):NOH$, and in fact Bamberger (cf. *Ber.* 27, 1181(1894); 30, 1249(1897); *C. A.* 15, 1516) has reduced both normal and isonitroamines to isodiazotates. Other instances, partly from expts. of A., are cited to show that the information of Hantzsch is erroneous. Coupling of some diazobenzene derivs.—According to Hantzsch (*loc. cit.*, p. 57), diazo ethers formed from alcs. and normal diazotates ($PhN:NOEt$ is also formed by the action of alc. KOH on *anti*-phenylazoxycarboxamide—[private communication from E. Bamberger]) are *anti*-derivs., and during sapon. form transiently an amine and alkyl nitrite. Various reasons are given to show that this explanation is not plausible and that publications of A. are sufficient to explain the sapon. and coupling reactions of diazo compds. Thermochemistry of diazo compds.—The assertion of H. and R. (*loc. cit.*) that normal diazo derivs. have a greater energy content is contrary to expts. by Swientoslawski (cf. *Bull.*

acad. polonaise sci. 1924, 369), and the isomerization of diazonium hydroxides to isodiazohydroxides is an endothermic reaction, not an exothermic reaction. *Stereoisomerism of diazohydroxides and of benzaldoximes*—Finally the assertion of H. and R. that normal diazo compds. and their isomers differ in virtue of stereoisomerism is readily disproved by exptl. data already published by various authors, enough examples of which are given to show the error of the assertion of H. and R. *Oxidation of diazotates*.—Diazotates are not, as maintained by H. and R. (*loc. cit.*, p. 37), more easily oxidized than isodiazotates to nitroamines, and publications of A. (*Die Azoxyverbindungen*, Stuttgart, 1913, 30) and of Bamberger (*Ber.* 27, 915(1894); *C. A.* 4, 183) are sufficient to show that the reactions are essentially different. C. C. DAVIS

Large-scale alkaline fusion of salts of sulfo acids. V. V. MASLENNIKOV. *J. Chem. Ind. (Moscow)* 5, 77-8(1928).—Alk. fusion of Na sulfonates is usually carried out on a large scale by gradually adding the dissolved salt and slowly raising the temp. As, however, the aq. sulfonates do not react with NaOH under the usual conditions, much more time is required for evapn. of the water than for the reaction. For this reason, and also for the purpose of increasing the yields, M., operating with PhSO_3Na , modified the method as follows. NaOH is melted and, at 295° , 600-650 kg. of 50% sulfonate at $95-98^\circ$ is introduced in the course of 5-7 min., whereupon the temp. drops to $250-240^\circ$. After 35-40 min. the temp. again rises to 300° , whereupon a new quantity of sulfonate is introduced, which causes a new drop of temp., and so on. It is established that the max. utilization of the sulfonate is attained if the max. temps. (*i. e.*, just before each consecutive addn.) are resp., 295° , 300° , 305° , 310° , and the min. temps. (after each consecutive addn.), are from 240° to 270° . Towards the end of the operation the temp. is gradually raised to 340° in order to correct the possible defects of the fusion, since the most favorable temp. of reaction is not known. By using this method the % of utilization of the sulfonate is raised to 90-95%, and even to the theoretical, against 54-60% attained by the old method; the time required for the reaction was reduced to 6 hrs. BERNARD NELSON

Action of sodium peroxide on phenol. Preparation of pyrocatechol and hydroquinone. O. YU. MAGIDSON, E. YA. POROZOVSKA AND N. E. SELIGSOHN. *Trans. Sci. Chem. Pharm. Inst. (Moscow)* No. 6, 23-5(1923).— Na_2O_2 is added in small quantities, with cooling and stirring, to a soln. of phenol in H_2SO_4 ; the mixt. is kept for 12 hrs. and then heated at $50-60^\circ$. After sepn. of resinous substances, pyrocatechol (25% of the total yield) and hydroquinone (25%) remain. B. C. A.

Relation between the chemical constitution and pungency. Syntheses of ethyl hydroferulate and 4-hydroxy-3-methoxyphenylpropyl alcohol. HIROSHI NOMURA AND SEINOSUKE HOTTA. *Sci. Repts. Tôhoku Imp. Univ.* 1st ser. 17, 693-4(1928).—*Hydroferulic acid* was esterified by heating with abs. alc. and a little H_2SO_4 to give *Et hydroferulate*, b_{17} $192.5-3.0^\circ$, with a pungent taste similar to zingerone. Reduction of the ester with abs. alc. and Na gave *4-hydroxy-3-methoxyphenylpropyl alc.*, b_{16} 196° , with a pungent taste not as agreeable as zingerone. T. S. CARSWELL

Relation between the chemical constitution and pungency. EITARO MARUI. *Sci. Repts. Tôhoku Imp. Univ.* 1st ser. 17, 695-702(1928).—*o-Hydroxystyryl Et ketone* (I), m. $116-8^\circ$, was prepd. by shaking $o\text{-HOC}_6\text{H}_4\text{CHO}$ with MeCOEt and aq. NaOH. Reduction of I with Na-Hg yielded *o-hydroxyphenylethyl Et ketone* (II), m. 72° . *o-Hydroxystyryl Ph ketone* (III), m. $153-4^\circ$, was prepd. by shaking $o\text{-HOC}_6\text{H}_4\text{CHO}$ with PhCOEt and aq. NaOH. Reduction of II with H in the presence of Pt black gave *o-hydroxyphenylethyl Ph ketone* (IV), m. 91° . Reduction of $o\text{-HOC}_6\text{H}_4\text{CH:CHCOMe}$ with Na-Hg gave *o-hydroxyphenylethyl Me ketone* (V), m. $47-8^\circ$, $b_{15.5}$ 139° . Reduction of V with Zn and HCl gave *o-hydroxyphenylbutane* (V), b_{11} $101-2^\circ$. *o-Hydroxycinnamic acid*, from coumarin and EtONa , was reduced with Na-Hg to *hydro-o-coumaric acid* (VII), m. $82-3^\circ$. The following salts of VII were prepd. and identified: $\text{ANa} \cdot \text{H}_2\text{O}$; $\text{AK} \cdot \text{H}_2\text{O}$; A_2Ca . Distn. of VII under 769 mm. gave *hydrocoumarin*, b_{185} $270-2^\circ$. Esterification of VII yielded *Et hydro-o-coumarate* (VIII), b_{185} $272-3^\circ$. The action of concd. NH_4OH on either hydrocoumarin or VIII gave *hydro-o-coumaramide*, m. $91-2^\circ$. II was pungent and had a paralyzing action, while IV was at first sweet, with a gradual development of pungency. VI was pungent although it does not contain a CO_2H group. Of the salts of VII, the Na and K salts were pungent, and the Ca salt, less sol. than the other, was less pungent. The anhydride, Et ester and amide of VII were pungent. T. S. CARSWELL

Electrolytic reduction of aldehydes. II. *m*-Nitrobenzaldehyde. G. SHIMA. *Mem. Coll. Sci. Kyôto Imp. Univ.* 11, [A], 1-10(1928).—The effect of variations in c. d., temp. and acidity on the reduction of $m\text{-O}_2\text{NC}_6\text{H}_4\text{CHO}$ to *m*-aminobenzyl alc. has been studied. In aq. alc. contg. 10% of H_2SO_4 a yield of more than 90% is

obtained by using 5 amp. per sq. dm. with a Pb cathode at 25–35°. With a Cu cathode, reduction soon ceases and the product contains mainly the hydrobenzoin, $[H_2NC_6H_4CH:NC_6H_4CH(OH)]_2$, with small quantities of *m*-azoxybenzaldehyde and *m*-amino-benzyl alc. (cf. Gattermann, *Ber.* 29, 3037–40, 3040–2(1896); Löb, *Ber.* 31, 2201–5 (1898)).

Syntheses of 4-hydroxy-3-methoxystyryl propyl and amyl ketones. SHUNJI TSURUMI, SHUNICHI MURAKOSHI AND RICHIRO YAMASAKI. *Sci. Repts. Tōhoku Imp. Univ.* 1st ser. 17, 703–5(1928).—Vanillin (I) and MeCOPr were condensed by boiling with aq. KOH to 4-hydroxy-3-methoxystyryl *Pr ketone*, m. 82–3°. Reduction of the ketone with H_2O and Na–Hg gave 4-hydroxy-3-methoxyphenylethyl *Pr ketone*, m. 44.5–5.0°. In a similar manner, I was condensed with MeCOAm to yield 4-hydroxy-3-methoxystyryl *Am ketone*, m. 50.0–0.5°, $b_{1.5}$ 208–10°, and giving on reduction 4-hydroxy-3-methoxyphenylethyl *Am ketone*, m. 38.0–8.5°, b_3 177–8°.

Syntheses of 4-hydroxy-3-methoxyphenylethyl pentenyl and hexenyl ketones. HIROSHI NOMURA AND SAM EL. CHOI. *Sci. Repts. Tōhoku Imp. Univ.* 1st ser. 17, 707–10(1928).—PrCHO was added to a soln. of zingerone in aq. KOH, when 4-hydroxy-3-methoxyphenylethyl pentenyl ketone (I), $b_{4.5}$ 198.5–200°, was obtained. Reduction of I with H in the presence of Pt black, followed by benzoylation, gave 4-benzoyloxy-3-methoxyphenylethyl *Am ketone*, m. 78.5–9.5°. BuCHO (II) was prepd. by passing a mixt. of $BuCO_2H$ and HCO_2H (1:2 by vol.) over MnO at 340–60°. It was then condensed with zingerone in alk. soln., when 4-hydroxy-3-methoxyphenylethyl hexenyl ketone (III), b_3 193–4°, was obtained. Reduction and benzoylation of III gave 4-benzoyloxy-3-methoxyphenylethyl hexyl ketone, m. 74.5–5.0°.

Catalytic reduction of the nucleus of aromatic and fatty-aromatic aldehydes in the form of their acetals. I. (Hexahydrophenylacetaldehyde dimethyl acetal.) FRITZ SIGMUND. *Univ. Wien. Monatsh.* 49, 271–82(1928).— $PhCH_2CH(OEt)_2$ did not give definite results but the reduction of $PhCH_2CH(OMe)_2$ in AcOH gives 81% of hexahydrophenylacetaldehyde *di-Me acetal*, b. 204.5–6°. The aldehyde, b. 179–81.5°; semicarbazone, m. 162°.

Action of sodium benzyl cyanide with cinnamic ester. II. S. AVERY. *Univ. of Nebraska. J. Am. Chem. Soc.* 50, 2512–9(1928); cf. C. A. 2, 1829.—Na (5 g.) in MeOH, 25.5 g. $PhCH_2CN$ and 35.7 g. $PhCH_2CHCO_2Me$ at 0° for 5 hrs. and at 20–5° for several days give 67% of *Me β, γ-diphenyl-γ-cyanobutyrate*, m. 106.5° (all m. ps. cor.); this ester also results from the acid and MeOH with HCl; *Et ester*, m. 101.5° (50% yield). Sapon. with EtOH–KOH gives the free acid (90% yield). Boiling the acid or esters with strong KOH gives *β, γ-diphenyl-γ-glutaramide*, $C_{17}H_{17}O_3N$, m. 200–5° (decompn.). Acid hydrolysis gives *α, β-diphenylglutaric acid*. Na (3 g.) as NaOEt, nearly free from EtOH, 7.5 g. $PhCH_2CN$ and 22.5 g. $PhCH_2CHCO_2Et$, heated in 75 cc. $PhMe$ for 3 hrs., give 13 g. *Et 2-keto-4,5,6-triphenyl-5-cyanohexahydrobenzoate*, m. 208–9°; this also results by heating the above mixt., without $PhMe$, at 100° (50% yield) or by heating *Et β, γ, δ-triphenyl-γ-cyanopimelate* with EtONa. The *Me ester* m. 242–4°. Sapon. of the esters gives *β, γ, δ-triphenyl-γ-cyanopimelic acid*, m. 218–9°; *Me ester*, m. 108.2°; *Et ester*, m. 102.5°. The supposed "anhydride" previously reported is the above keto acid.

Addition reactions of unsaturated α-ketonic acids. II. MARIE REIMER AND MARION HOWARD. *Barnard College. J. Am. Chem. Soc.* 50, 2506–12(1928); cf. C. A. 20, 3164.—For the purpose of comparison with other unsatd. α-ketonic acids, *o*-methoxybenzalpyruvic acid (I) and its reactions with Br have been studied. While I and its *Me ester* (II) combine readily with Br, in all other respects the properties have been changed to a marked degree as compared with the unsubstituted acid and the *p*-MeO deriv. Condensation of $MeCOCO_2H$ and *o*- $MeOC_6H_4CHO$ in 10% NaOH gives 80% of I, brilliant red-orange, m. 131°; on exposure to bright sunlight, the color soon fades noticeably. II, bright yellow, m. 48°; exposure to moist air in the dark brings about hydrolysis; on exposure to bright light, II liquefies in a few min. because of admixture with light products. The *Et ester* is a bright yellow oil, b_{15} 223°. I and Br in $CHCl_3$ give the dibromide, straw-colored, m. about 90° (vigorous decompn.); warming in C_6H_6 , boiling with H_2O or warming on the H_2O bath gives *β-bromo-o-methoxybenzalpyruvic acid* (III), m. 173°; oxidation gives $MeOC_6H_4CH:CBrcO_2H$, m. 171°; benzalpyruvic acid (IV), m. 88–9°. The action of Br upon II gives III and IV. I, with an excess of Br, gives 5-bromo-*o*-methoxybenzalpyruvic acid dibromide, m. 95–100° (not pure); *Me ester*, m. 103–6° (not pure); the acid is transformed by boiling 40% AcOH into *β-bromo-5-bromo-2-methoxybenzalpyruvic acid* (IV), colorless, m. 210° (decompn.) (*Me ester*, m. 131°). When the *Me ester* of the tri-Br deriv. is stirred with 2% MeOK in MeOH, a yellow isomer of IV, m. 210°, results; on heating, the yellow color fades

at 145–50° and the colorless product, m. 210° (*Me ester*, pale yellow, m. 143°). With Br in MeOH there was no addn. of MeOBr. The color reactions of H₂SO₄ with ketonic acids are tabulated.

C. J. Wessr

Synthesis of isomers of piperic acid. HERMANN LOHAUS. Univ. Münster. *J. prakt. Chem.* 119, 235–71 (1928).—The Mg compd. from CH₃O₂:C₆H₅C:CH and EtMgBr gives with HC(OEt)₃ 30% of *methylenedioxyphenylpropargylaldehyde di-Et acetal*, b₁₈ 188–90°; sapon. with very dil. H₂SO₄ gives 31% of the *aldehyde*, m. 76°, also obtained in about the same yields from the above Mg compd. and HCO₂Et. CH₂O₂:C₆H₅C:CH in liquid NH₃ reacts with Na but the resulting Na compd. does not react with HCO₂Et. The acetal and CH₂(CO₂H)₂ in AcOH give up to 82% of *piperonylpropargylenemalonic acid*, m. 250° (decompn.); from C₆H₅N the acid crystals, as a *di-C₆H₅N salt*, yellow, decomp. 231°; from the HCl soln., there crystallize a light yellow compd., C₁₈H₁₅O₅N, decomp. 204°, and an isomeric yellow compd., decomp. 237°. CH₂O₂:C₆H₅CH:CHCHO, b₁₋₂ 175–90°, m. 84–5°, results in 29% yield according to the method given; *piperonylenemalonic acid*, m. 231–2°, results in 94% yield; the C₆H₅N salt, yellow, decomp. 191–2°. Heating the acid with quinoline at 140° gives 52% *isopiperic acid*, m. 149°. Reduction of PhC CCH(OEt)₂ with Pd and charcoal gives a product b₁₈ 125–42°, consisting principally of PhCH:CHCH(OEt)₂, identified by conversion into *trans-cinnamylidenemalonic acid*, decomp. 195–6°. Reduction of the aldehyde gives only *trans-PhCH:CHCHO*. *Piperonylpropargylaldehyde* gives a mixt. of unchanged aldehyde and the dihydro deriv. *Piperonylacrolein* gives *piperonylpropane*. Reduction of *phenylpropargylenemalonic acid* in MeOH gave only an oil; in AcOH, there results *cinnamylidenemalonic acid*, in another expt., *trans-cinnamylidenemalonic acid*; reduction of the C₆H₅N salt in C₆H₅N gives the *cis-cinnamylidenemalonic acid*; reduction of the acid with BaSO₄-Pd also gives the *cis-acid*. Reduction of the Na salt of *piperonylpropargylenemalonic acid* gives *γ,δ-dihydro-piperonylenemalonic acid*, yellow, m. 173°. Reduction of the piperidine salt gives *cis-piperonylenemalonic acid*, m. 117–9° (decompn.); quinoline apparently splits off all the CO₂ from this acid, as indifferent products result.

C. J. Wessr

Transformation of aliphatic terpenes into monocyclic terpenes. A. **Synthesis of menthol.** RIKI HORIUCHI. Takasago Perfumery Co. *Mem. Coll. Sci. Kyoto Imp. Univ., Series A* 11, No 3 (reprint), 171–97 (1928).—*Citronellal* (I), isolated from Java citronella oil and purified by NaHSO₃ followed by distn., b₂₀ 97–8°, d₄²⁰ 0.8563, n_D²⁰ 1.4490, [α]_D + 10° 9'. Treatment of I with 5% H₂SO₄ at 25–30°, followed by fractionation of the crude product, yielded *isopulegol* (II), *menthoglycol* (III) and an *unsatd. ethereal compd.*, which after reduction with H in AcOH gave a product with d₄²⁰ 0.9180 and n_D²⁰ 1.4640. Treatment of I with 20% H₂SO₄ yielded II, III and an *ethereal compd.* (IV), b₁₈ 191.5°, d₄²⁰ 0.9341, n_D²⁰ 1.4760, [α]_D –5° 30', with an empirical formula corresponding to C₁₀H₁₈O₂ or C₁₀H₁₆O₂. Reduction of IV yielded a *hydrogenated compd.* C₁₀H₁₈O₂, d₄²⁰ 0.9155, n_D²⁰ 1.4635, [α]_D –2° 52'. Treatment of I with 50% H₂SO₄ gave a *new hydrocarbon*, C₁₀H₁₆, called *citronellal-terpene* (VI), d₄²⁰ 0.8535, n_D²⁵ 1.4875; it formed neither a hydrochloride nor a nitroschloride; and an *ethereal compd.* C₁₀H₁₆O₂. When I was heated to 140° with KHSO₄, a violent reaction took place with the formation of II and *diisopulegol ether*, C₂₀H₃₄O, d₄²⁰ 0.9120, n_D²⁰ 1.4835, [α]_D 12° 15'. Treatment of I with Ac₂O yielded *isopulegol acetate*, *enol monoacetate* and *diacetate of citronellal*. *Citral* (V) obtained from East Indian lemon-grass oil b₁₇ 112–5–5.0°, d₄²⁰ 0.8886, n_D²⁰ 1.4901, [α]_D 0° 10'. Treatment of V with 20% H₂SO₄ gave a *new terpene*, C₁₀H₁₆, named *citral-terpene*, b. 183–6°, d₄²⁰ 0.8886, n_D²⁰ 1.5092, together with unstable unsatd. compds. By the action of 50% H₂SO₄ V was converted to *p-cymene* and resinous substances of unknown compn. KHSO₄ and V at 140° yielded *p-cymene* and a *di-terpene*, C₂₀H₃₄, b₁₄ 190–4°, d₄²⁰ 0.9244, n_D²⁰ 1.5280. Ac₂O did not act on V at 20°, but at 150° reaction took place, yielding *enol citral acetate* together with unidentified substances. AcOH and V gave mostly *p-cymene*. When II is treated with 20% H₂SO₄, some III is formed; when 50% H₂SO₄ is used, there is obtained an *ethereal substance* and a *terpene* identical with VI. The action of KHSO₄ on II forms *diisopulegol ether*. III, b₁₈ 141–6°, d₄²⁰ 0.9806, n_D²⁰ 1.4730, [α]_D 6° 31', was mostly unchanged when treated with 20% H₂SO₄; 50% acid transformed it partly to VI; KHSO₄ gave VI and *diisopulegol ether*. III was reduced by H in AcOH, with Pt black as a catalyst; from the crude reduction product *l-menthol*, m. 33–4°, [α]_D –44.92° as was isolated; the latter on oxidation yielded *l-menthone*, m. 114–6°, [α]_D 58.77°. T. S. C.

The possible isomers of certain analogs of resolvable diphenyl compounds. J. F.

HYDE AND ROGER ADAMS. Univ. of Illinois. *J. Am. Chem. Soc.* **50**, 2499–506 (1928).—A configuration in which the 2 aromatic nuclei are coaxial and not in the same plane apparently accounts for all of the known facts concerning the optical activity in certain Ph₂ compds. It is generally accepted that the asymmetry arises from the influence which the groups located in the *o*-position to the connecting bond have in preventing free rotation of the 2 nuclei. If the prevention of free rotation is entirely a matter of the space occupied by interfering groups and does not require a direct association of 2 aromatic rings, then it should be possible to resolve compds. of the type 2,6-XY-C₆H₃COR and 2,6,3-X₂YC₆H₂COR, which could become asymmetric by reason of steric hindrance; however, no optically active compds. could be obtained by decompn. of salts with active compds. Bromomesitylene and BzCl with AlCl₃ in CS₂ give 92% of *benzoylbromomesitylene*, b₁₂, 173–5°, m. 48–9°; this did not react with BrCH₂CO₂Et and Zn or with PhMgBr; oxidation gives a neutral, viscous liquid *p*-Nitrobenzoylbromomesitylene, light yellow, m. 1.4–5° (85% yield); the 3,5-di-NO₂ deriv., light yellow, m. 160–1.5°, was obtained in 24% yield. Catalytic reduction gives *p*-aminobenzoylbromomesitylene, m. 138°; HCl salt, needles. If the reduction is carried out in AcOEt instead of EtOH, some *aro* compd., C₁₆H₁₁ONBr, red, m. 203–5°, is also formed. 3,5-Diamino deriv., yellowish brown, m. 168–9°. Fractionation of the *d*-camphorsulfonate of either amino deriv. gave no indication of resolution. Similarly, fractionation of the brucine salts of 2-carbisopropoxy-3-nitrobenzoic acid and of 2-[2-hydroxy-4-methylbenzoyl]-3-nitrobenzoic acid gave no indication of resolution. The optical behavior of the *d*-camphorsulfonates in CHCl₃ is described; the change in rotation upon standing is due to a change in the character of the mol. either by tautomerism or by combination with the solvent; the change is not permanent and is not characteristic of the base used.

C. J. WEST

Configuration of *o*-substituted benzophenone oximes. JAKOB MEISENHEIMER, RUDOLF HANSSEN AND ALFRED WICHTEROWITZ. Univ. Tübingen. *J. prakt. Chem.* **119**, 315–67 (1928).—2,4-Me₂C₆H₃OMe (100 g.) and 110 g. BzCl in 200 cc. CS₂, gradually added to 150 g. AlCl₃ in 200 g. CS₂, give 105 g. (60%) of crude 3-methoxy-4,6-dimethylbenzophenone (I), and about 8% of the 3-HO deriv., m. 140–1°. I in petroleum ether, shaken with Claisen's liquor and then distd., gives the pale yellow oil, b₁₁, 199–200°. With NH₂OH HCl in KOH-EtOH, I gives a mixt. of the α -oxime (II), b₁₀, 218°, m. 138–9°, and about 2% of the β -oxime, m. 119–20°; the difference in soly. of the 2 oximes is very slight, so that the sepn. is difficult. Attempts to transform II into the β -isomer failed. II is unchanged after long boiling with AcOH, after warming with dil. or concd. HCl or dil. H₂SO₄ at 100° or after standing 36 hrs. in concd. H₂SO₄. The Bz deriv. of II m. 135–6°. The Beckmann rearrangement of II with PCl₅ in Et₂O gives 3-methoxy-4,6-dimethylbenzanilide, m. 141–2°, whose constitution was established by sapon. to 3-hydroxy-4,6-dimethylbenzoic acid, m. 185–6°. The Beckmann rearrangement of the β -oxime gives *N*-benzoyl-3-methoxy-4,6-dimethylbenzaniline (III), m. 153–4°, which was synthesized as given below. The isomeric 2-methoxy-3,5-dimethylbenzaniline benzoate m. 48–9°. 3-Ethoxy-4,6-dimethylbenzophenone, b₁₀, 190–1° (35% yield); α -oxime, m. 148–9°; β -oxime, m. 133–4° (very small yield of the latter); the Beckmann rearrangement of the α -oxime gives 3-ethoxy-4,6-dimethylbenzanilide, m. 150–7°. I with HI in AcOH gives the 3-IIO deriv., m. 140–1°, probably identical with the product obtained by Linari (*Gazz. chim. ital.* **33**, II, 60 (1903)); the oxime, m. 182–3°, does not give well defined products with PCl₅, but with AcOH and Ac₂O there results *N*-benzoyl-3-acetoxy-4,6-dimethylbenzaniline, m. 127–8°; hydrolysis gives the 3-HO deriv. (IV), m. 173–4°, and a small quantity of 3-hydroxy-4,6-dimethylbenzanilide, m. 211–2°; methylation of IV gives III. With concd. HCl at 150–60°, IV gives 2,4,5-Me₃(HO)C₆H₂NH₂, m. 162–3°. 2-Hydroxy-3,5-dimethylbenzophenone oxime, m. 153–4°; with PCl₅ this yields 2-phenyl-5,7-dimethylbenzoxazole, m. 99–100°. 2-Bromo-2',4'-dichlorobenzophenone, b₁₀, 227–8.5°, m. 33–4°, results in 43% yield from *m*-C₆H₄Cl₂ and *o*-BrC₆H₄COCl with AlCl₃ in CS₂; an oxime could not be obtained in the usual ways; in alk. soln. there results a mixt. of a compd., m. 158–60°, which appears to be a chlorobromohydroxybenzophenone, and 3-[2,4-dichlorophenyl]indoxazene, m. 78°. 2-Bromo-5-nitro-2'-hydroxy-5'-methylbenzophenone (V), m. 151–2° (65% yield); with EtOH-NaOH, this yields 2-methyl-7-nitroxanthone, m. 224°, which gives with MeOH-KOH a compd., m. 146–8°, probably 2,2'-dihydroxy-5-nitro-5'-methylbenzophenone. Heating V with NH₂OH.HCl in EtOH at 120–5° gives the oxime, pale yellow, m. 218°; with EtOH-NaOH this gives a compd. C₁₄H₁₀O₂N₂, m. 148°, which is either an indoxazene or a xanthone deriv.; PCl₅ gives an uncrystallizable oil. 2-Bromo-2'-hydroxy-5'-methylbenzophenone (VI), pale yellow, m. 78.5° (80% yield); EtOH-NaOH gives the yellow Na salt; 30% MeOH-KOH gives 2-methyl-

xanthone, m. 125.5°. The oxime of VI, pale yellow, m. 144.5°. 2-Bromo-2'-methoxy-5'-methylbenzophenone, m. 50-1° (43% yield); the oxime, m. 193°, undergoes a Beckmann rearrangement, giving the *o*-bromobenzoyl deriv. of 2-methoxy-5-methylaniline, m. 130-1°; with MeOH-KOH the oxime gives quant. 3-[2-methoxy-5-methylphenyl]indoxazene, b_{0.5} 170°, golden yellow oil.

C. J. WESS

Two high-molecular hydrocarbons, derivatives of fluorene and methane. K. DZIEWONSKI AND M. PANEK. *Bull. intern. acad. Polonaise* 1927, 745-51.—Methylal (I) and fluorene in CHCl₃ in the presence of P₂O₅ give a new hydrocarbon, C₂₇H₂₀, 2,2'-difluorylmethane (II), m. 201-2°. Oxidation of II with Na₂Cr₂O₇ in AcOH gives 2,2'-difluorenone ketone (III), m. 297-8°, which with PhNHNH₂ gives a trisphenylhydrazone, m. 203° (decompn.). Fusion of III with KOH at 250-60° gives 2,4'-diphenyl-dicarboxylic acid, m. 244-7°. In addn. to I, by the further action of I on II, a bisdifluorylenemethylenemethane (IV), m. 246-7°, is formed. Oxidation of IV gives a deriv. contg. five CO groups, m. 324-6°, which by fusion with alkali gives an acid, m. 235-7°.

FREDERICK C. HAHN

Complex isomerism and complex-salt isomerism. EDUARD HERTEL AND JAKOB VAN CLEEF. *Univ. Bonn. Ber.* 61B, 1545-9 (1928).—The complex isomeric system 2,6-dinitrophenol-1,4-bromonaphthylamine exists in 2 forms, a yellow compd. (m. 91.5°) and a red compd. (m. 84.5°). These are examd. by means of x-rays, and are found to possess large differences in the arrangement of the interference rings in the Debye-Scherrer diagrams. This type of isomerism is exhibited by a series of systems between polynitrophenols and primary aromatic amines. The system *N*-dimethyl-β-naphthylamine-2,4,6-trinitroanisole can be crystd. from abs. alc. in the form of dark red needles (m. 69°), which are given the formula MeOC₆H₂(NO₂)₃—C₁₀H₇N(Me)₂. If this compd. is heated above 77°, it becomes yellow, the m. p. is now 190°, and it is found to be identical with trimethyl-β-naphthylammonium picrate, (NO₂)₃C₆H₂ON(C₁₀H₇)Me₃. This is representative of the type complex-salt isomerism, in which 1 isomer is a true mol. compd. and the other a quaternary NH₄ salt. The principal distinction between the 2 types of isomerism lies in the fact that the yellow isomer of the 1st type is partly dissociated into its components in fusion and soln., equil. being established between the 2 isomers and their components, while the yellow isomer of the complex salt isomeric system is not decompd. in soln. Phase diagrams of the 2 types of systems are given.

H. STOERTZ

Oxidation of anthracene by nitrogen oxides. M. A. IL'INSKI, B. V. MAKOROV AND N. V. ELAGIN. *J. Chem. Ind. (Moscow)* 5, 469-73 (1928).—The authors undertook to investigate whether crude 45-50% anthracene can, instead of the pure product, be used with advantage as material for mfg. anthraquinone by oxidation with N oxides. In carrying out these expts. they had in view anthraquinone prepn. by the method of Ger. pat. 268,049, May 3, 1909 (*Friedl.* 11, 541); the reactions were in 2 stages and PhNO₂ was used as a solvent. NaNO₂ was used as a source of N oxides which, being obtained by adding H₂SO₄ drop by drop, were mixed with some air and passed, by means of slight suction, through the reaction mixt. At first the action of N oxides mixed with air on nitrobenzene was investigated by operating with freshly distd. and dried PhNO₂. The absorption of the gases was very slow at room temp., only reaching 10-15% in 3 days, but by cooling with snow and salt, it was easy to have 25% (and more) of N oxides absorbed. There was no chem. action. In the 2nd place, by operating with a soln. of 25 g. of pure anthraquinone in 100 g. of PhNO₂ it was established that the N oxides had no action on anthraquinone. To study the action of N oxides mixed with air on pure synthetic anthracene 100 g. PhNO₂ was satd. with these gases with cooling till it increased in wt. 40 g. and in vol. by 1/4 and then 25 g. of the finely triturated pure anthracene was introduced in small portions. Each portion dissolved with heat formation which was counteracted by cooling. The dark green mass was left standing several days, at the end of which it became light green; its wt. was 165 g. The mass was heated over a water bath for elimination of N oxides. On cooling, a yellow cryst. powder of anthraquinone pptd., which was freed from PhNO₂ by steam and dried; it weighed 17 g. The PhNO₂ obtained by steam distn. of the mother liquors weighed 96 g. and left in the flask a residue of anthraquinone, which, after crystn. from glacial AcOH, weighed 12 g. Thus 29 g. of pure anthraquinone was obtained instead of the theoretical yield of 29.2 g.; the transformation may be regarded as quant. For the detn. of the action of N oxides on 2-methylantraquinone 15 g. of the latter (m. 175°) was dissolved in 60 g. of PhNO₂, satd. with the gases with cooling till the soln. weighed 90 g., heated 5 hrs. on a water bath and analyzed. It was found that 2-methylantraquinone is not affected; it followed that, with anthracene contg. 2-methylantraquinone as an impurity, the latter must be obtained as a

product contaminating anthraquinone. Operating with a suspension of 32 g. of *carbazole*, m. 236°, in 128 g. PhNO_2 , the authors established that N oxides transform carbazole successively into 9-nitroso-, 3-nitroso-, 3-nitro-, 9-nitroso-3-nitro-, 3-nitro-6-nitroso-, and 3,6-dinitrocarbazole; the last named is the final and main product of reaction. By passing N oxides into a soln. of 30 g. *phenanthrene* in 120 g. PhNO_2 the authors obtained resinous products of the oxidation of phenanthrene. After these preliminary expts. the authors subjected to the action of N oxides a PhNO_2 soln. of a very impure anthracene contg. but 5.5% of anthracene. They found that all the products of oxidation dissolved in the PhNO_2 together with the resins and the tars; the fraction containing anthraquinone did not sep. from the rest. The next expt. was with a 50% anthracene. Out of 100 g. of the latter, which theoretically corresponds to 58 g. anthraquinone, 55 g. of solid product sep'd. which contained 25.2 g. anthraquinone. The results obtained with 25.65% and 41.9% anthracene showed that anthraquinone as well as N and S compds. became distributed in all fractions. With an 87% anthracene anthraquinone of 97-93% purity was obtained with a yield of 80% of the theoretical. The next series of expts was devoted to the investigation of the possibility of sepg. anthraquinone from the other products of oxidation of impure anthracene by means of conc'd. H_2SO_4 ; they obtained very unsatisfactory results and concluded that the H_2SO_4 method of purification of anthraquinone is not suitable in case the latter was obtained from very impure anthracene. Attempts to obtain pure anthraquinone by partial reduction of the products of N oxides reacting with impure anthracene also gave negative results, the agents tried being on one hand alk. $\text{Na}_2\text{S}_2\text{O}_4$, on the other hand alkali hydroxide and Zn powder.

Rubrene. Colored hydrocarbons of the rubrene class. CHARLES MOUREU, CHARLES DUFRAISE and ANTOINE WILLEMART. *Compt. rend.* 187, 266(1928); cf. C. A. 22, 2748.—Two new homologs of rubrene have been isolated. *dimethylrubrene*, m. 315°, from $p\text{-MeC}_6\text{H}_4\text{C}:\text{CH}$ and Ph_2CO , and *dibenzorubrene*, m. 280°, from $\beta\text{-C}_6\text{H}_5\text{C}:\text{CH}$ and Ph_2CO . D. H. POWERS

Anthraquinone solutions in sulfuric acid. P. I. SOKOLOV AND V. P. DREYING Aniltrust Factory. *J. Chem. Ind. (Moscow)* 5, 412-6(1928).—The detn. of the soly. of anthraquinone in H_2SO_4 of various concns. and the conditions of its pptn. from these solns. have a practical interest, in as much as crude anthraquinone is usually treated with H_2SO_4 for purification. As a result of S. and D.'s study of this problem they believe they have considerably improved the industrial method of anthraquinone purification by H_2SO_4 . The method is founded on the belief that, when crude anthraquinone is heated with H_2SO_4 , it dissolves without chem. alteration, whereas the hydrocarbons which contaminate it become sulfonated and partly resinified; the soln., on being dild. with water, ppts. pure anthraquinone. *Solubilities of anthraquinone* of 99.25% purity in H_2SO_4 of various concns. were detd. by Rothmund's method (cf. C. A. 2, 2476), i. e., by noting the temps. of satn. as indicated by appearance of turbidity on cooling, after which the results obtained were verified by another method; it was found that both methods give the same results. These detns. were made with H_2SO_4 of concns. ranging from 82.5 to 99.7% and at temps. varying from 26° to 135°; tables contg. the soly. figures and diagrams consist^g of soly. curves are given. The soly. increases with the temp. at all concns. of the acid, but the increase is greater for higher concns. than for lower. The curves representing the isotherms of soly. show the dependence of the soly. on the concn. of the acid; all these isotherms have a marked upturn beginning with the point corresponding to a H_2SO_4 concn. of about 88%. A series of expts. were made to det. whether pure anthraquinone is chem. affected by conc'd. H_2SO_4 ; the results show that on heating anthraquinone for 6 hrs. at 115-25° with twice its wt. of 99.7% H_2SO_4 about 12% of the former is destroyed, whereas on treating anthraquinone under the same conditions with 4 times its wt. of 93.3% H_2SO_4 the loss of anthraquinone is only 0.025%. The appearance of anthraquinone samples obtained in both cases is not the same, the sample which was heated with 99.7% H_2SO_4 was darker than that heated at the same temp. with 93.3% H_2SO_4 . The study of conditions of pptn. of anthraquinone dissolved in H_2SO_4 is particularly important, in as much as an incorrect dildn. of the soln. is apt to yield a finely cryst. compact prodn. which can hardly be filtered and washed. By merely dildg. the soln. with cold water, and particularly by pouring the soln. into water, anthraquinone is always obtained in a non-filterable form. Proper crystals must be of larger size, and such a crystn. can only be had by gradual cooling of solus. In dealing with anthraquinone solns. in 93.3% H_2SO_4 , S. and D. recommend to allow them to cool slowly to about 30°, whereupon a portion of anthraquinone (about 14 g. per 100 g. of the acid) ppts. in fairly large crystals. At this temp. the soln. contg. the ppt. is dild. with a quantity

of water sufficient to reduce the concn. of the acid to 90%; a cryst. powder ppts. which is redissolved by heating to 110°, whereas the larger crystals obtained in the course of the first pptn. remain undissolved. On letting this dild. soln. cool off gradually to 30° a new pptn. of larger crystals takes place. Then the mixt. is dild. with water till a concn. of 87% H₂SO₄ is attained, the pptd. cryst. powder is redissolved by heating and repptd. in fairly large crystals on gradual cooling. Finally the concn. of H₂SO₄ is reduced to 80%, the mixt. is heated to dissolve the small crystals formed and allowed to cool in order to ppt. larger crystals. Since the soly. of anthraquinone in 80% H₂SO₄ at ordinary temp. is insignificant, all the anthraquinone is pptd. at this stage. Filtration and thorough washing of this ppt. obtained by fractional crystn. presents no difficulty.

BERNARD NELSON

Bitertiary glycols and some of their heterocyclic derivatives. E. PACE. Univ. Pisa. *Atti accad. Lincei* [6], 7, 757-64 (1928).—The ready formation of heterocyclic compds. from compds. contg. COH groups sepd. by 2 other C atoms in a chain (cf. Paal, *Ber.* 18, 58, 397, 2251) suggested a study of bitertiary γ -glycols to det. whether tetrahydrofurfurans, tetrahydropyrroles and tetrahydrothiophenes could be obtained in the same way. This was rendered very probable by the transformation of γ -diketones in their enolic form into furfuran, pyrrole and thiophene derivs. The bitertiary γ -glycols were prepd. by the action of MeMgBr, EtMgBr or PrMgBr on AcCH₂CH₂Ac (cf. *Ber.* 35, 2138 (1902); *Bull. soc. chim.* 1902, 1138; Jöhlén, *C. A.* 11, 590). The tetrahydrofurfurans were formed by keeping the glycols in vacuo over H₂SO₄, or by heating the glycols in AcOH for 2 hrs. at 120–50° in the presence of H₂SO₄, or better ZnCl₂, and extn. with Et₂O. The yields are 70–75%. The tetrahydropyrroles were obtained by heating the glycols with a slight excess of concd. alc. NH₃ under pressure at 150° for 2 hrs., evapg. the NH₃ and EtOH and fractionating. The yields are 60–80%. If the heating is more than 2 hrs., secondary reactions form unsatd. resinous products, while less than 2 hrs. results in smaller yields. From AcCH₂CH₂Ac the following compds. were prepd.: 2,5-dimethylhexane-2,5-diol, Me₂C(OH)CH₂CH₂C(OH)Me₂, m. 92–3°, slight camphor odor, its C₆H₁₄ solns. show a greenish fluorescence; 2,5-diethylhexane-2,5-diol, slightly colored, b. 172–3°, characteristic camphor odor, its concd. C₆H₆ soln. shows a slight greenish transitory fluorescence; 2,5-dipropylhexane-2,5-diol, golden yellow, b. 198–200°, characteristic pleasant odor. By the methods described were prepd. the following furfuran compds. and pyrrole derivs. Tetrahydrofurfurans: α, α_1 -Tetramethyl, Me₂C.CH₂.CH₂.CMe₂.O, b. 119.5°, characteristic odor,

similar to the compd. called diisocrotyl oxide by Pogorzelsky (*J. Russ. Phys.-Chem. Soc.* 30, 977–92 (1899)); α, α_1 -dimethyl- α, α_1 -diethyl, MeEtC.CH₂.CH₂.CMeEt.O, b. 165°,

characteristic odor; α, α_1 -dimethyl- α, α_1 -dipropyl, b. 186°, characteristic odor, becomes yellow and changes its odor when exposed to air. All 3 tetrahydrofurfurans give the reaction of furan derivs., coloring a pine splinter wet with HCl an emerald-green, reacting neither with Na nor with alkalis and not being decompd. by steam. Tetrahydropyrroles: α, α_1 -tetramethyl, Me₂C.CH₂.CH₂.CMe₂.NH, pale rose color, b. 108° (cf. Pauly and

Hültenschmidt, *Ber.* 36, 3357), gives a red test with a pine splinter and a green-blue in an isatin-H₂SO₄ soln.; α, α_1 -dimethyl- α, α_1 -diethyl, very mobile, pale rose color, b. 125°, turns brown rapidly when exposed to air, gives the pine-splinter but not the isatin-H₂SO₄ test; α, α_1 -dimethyl- α, α_1 -dipropyl, very mobile, red, b. 147–9°, turns brown rapidly in air, turns a pine splinter bright red, evolves H with Na.

C. C. DAVIS

Stereoisomerism of 8-hydroxydecahydroquinoline and its derivatives. SHIN-ICHIRO FUJISE. *Sci. Papers, Inst. Phys. Chem. Research* 8, 161–71 (1928).—The hydrogenation of 8-hydroxyquinoline (I) in AcOH, with Pt-black as a catalyst, gives 10% of decahydroquinoline (II) and a mixt. of two stereoisomers (A and B) of 8-hydroxydecahydroquinoline (III). A as isolated by crystn. of the base from petroleum ether, m. 111–2°, b₂₀ 136–46°; HCl salt, m. 201–2°; HBr salt, m. 202–3°; chloroaurate, m. 191–2°; d-bromocamphorsulfonate, m. 250–3°. The 8-Bs deriv. of A, prepd. by the Schotten-Baumann reaction and crystd. from aq. acetone, m. 130–1°; the HCl salt m. 255–6°. N-O-Di-Bs deriv. of A, prepd. by treating A with an excess of BzCl and pyridine, m. 81–3°. B, m. 92–3°, is obtained by crystn. of its HBr salt, m. 251°, from abs. alc.; HCl salt, m. 247–8°; chloroaurate, m. 188–9°. The 8-Bs deriv. of B, m. 93–5°; HCl salt, m. 251°. A or B, when converted to the alcoholate by Na, heated to 140°, and treated with HCl, gives another isomer (C) of III, m. 101–2°; HCl salt (IV) of C m. 245–6°; chloroaurate, m. 152–3°. The 8-Bs deriv. of C, m. 99–100°; HCl salt, de-

comps. 302°. *N-O-Di-Bz* deriv. of *C*, obtained as with *A*, m. 92–3°. *N-Me* deriv. of *C* (*V*), prep'd. by treating *IV* with 40% CH_3O at 130–40°, b. 125–6°; *picrate* m. 123–4°; *MeI addn. compd.*, m. 285–6° (gas evolution). The *8-benzoyl-N-methyl* deriv. of *C*, obtained by treating *V* with Bz_2O and then crystg. from petroleum ether, m. 91–2°; *chloroplatinate*, m. 231°; *picrate*, m. 193–5°. *C* treated with Me_2SO_4 and alkali, followed by treatment with *KI*, gives the corresponding *quinolinium iodide*, m. 285–6°, but none of the corresponding *MeO* deriv.; *picrate* of the quaternary base, m. 173–4°. The *d-bromocamphorsulfonate* (*VI*) of the *d*-form of *C* m. 294 5°, $[\alpha]_D^{25}$ 84.9°. The impure free base obtained from *VI* shows $[\alpha]_D^{23}$ 47.6°; *HBr salt* m. 213–4°, $[\alpha]_D^{25}$ 29.6°. The corresponding *sulfonate* of the *l*-form of *C* m. 262–3°, $[\alpha]_D^{23}$ 41.8°; impure, free base, $[\alpha]_D^{25}$ —53.1°; *HBr salt*, m. 211–3°, $[\alpha]_D^{23}$ —31.6°. Catalytic hydrogenation of *quinoline* (*VII*) with Pt-black gives *II*, m. 48–48.5°, b. 201°; *HBr salt*, m. 277–9°; *chloroaurate*, m. 124–5°; *chloroplatinate*, m. 228° (decompn.); and also a liquid *isomer* of *II*, whose *N-Bz* deriv. m. 96–7°. The *N-Bz* deriv. (*VIII*) of *II* m. 53–4°. Oxidation of *VIII* with KMnO_4 gives *o-benzoylamino-hexahydrophenylpropionic acid* (*IX*), m. 199–200°, which on warming with concd. HCl gives octahydrocarbostyryl, m. 152–3°. Hydrogenation of *VII* by the Sabatier method gives 80% of *II*, m. 48–48.5°, and on oxidation material (*X*) (purified by crystn. of the *HBr salt*, m. 232°) that is a *stereoisomer* of *II*, b. 205–6°, b_{19-21} 89–91°, d_4^{20} 0.9426, n_D^{20} 1.4926, *HCl salt*, m. 223–4°; *chloroaurate* m. 157–8°; *picrate*, m. 135–6°. The *N-Bz* deriv. of *X* m. 96–7°, and on oxidation with KMnO_4 gives an acid, *IX*, m. 156–7°. As to the explanation of the foregoing isomerism, *F.* believes *A* and *B* to be *cis*-forms, but reserves further comments on this for a future publication.

FREDERICK C. HAHN

Oxidation of bromoquinolines by potassium permanganate. T. UKAI AND H. AKIYA. Kumamoto Pharm. Coll. Japan. *J. Pharm. Soc. Japan* 48, No. 6, 587–90 (1928).—Oxidation of 6-bromo- (*I*), 8-bromo-, 5-bromo-8-methyl- and 7-bromo-8-methylquinolines with alk. KMnO_4 resulted in the rupture of the C_6H_4 ring and gave quinolinic acid (*II*) in every case. Brominated compds. were more resistant to oxidation than non-brominated compds. and took longer time for complete reaction. Besides *II*, *I* gave a non-N acid (does not m. 300°).

NAO UYEI

Pyocyanin, the blue pigment of *Bacillus pyocyaneus*. III. The constitution of hemipyocyanin. FRITZ WREDE AND E. STRACK. Univ. Greifswald. *Z. physiol. Chem.* 177, 177–86 (1928); cf. *C. A.* 19, 1864.—Hemipyocyanin, obtained from the bacterial pigment pyocyanin, has now been prep'd. in greater purity by repeated sublimation and found to have the formula $\text{C}_{12}\text{H}_8\text{N}_2\text{O}$ instead of $\text{C}_{13}\text{H}_{12}\text{N}_2\text{O}$ as previously reported. It has both acidic and basic properties, forms a *Me* deriv. indicating the presence of OH , also a *N(O)* deriv. and yields phenazine almost quant. when dist'd. with Zn dust. The cleavage of pyocyanin by 2% NaOH in the absence of air yields not only hemipyocyanin but also a leuco base of pyocyanin from which the pigment is regenerated by exposure to air. The same leuco base is obtained by reduction of the pigment with Na-Hg in acid or alk. soln., and oxidized back to the pigment by shaking the alk. soln. with air. The formula $\text{C}_{12}\text{H}_8\text{N}_2\text{O}$ corresponds to an α - or a β -hydroxyphenazine. The β -deriv. is known and m. 253°, whereas hemipyocyanin m. 158°. The α -deriv. has now been prep'd. and found to be identical with hemipyocyanin. 2,3-(HO) $_2\text{C}_6\text{H}_3\text{OMe}$ was oxidized in C_6H_6 by means of PbO_2 to the *o*-quinone, and the latter condensed with *o*- $\text{C}_6\text{H}_4(\text{NH}_2)_2$ in AcOH . The product was isolated by extn. of the reaction mixt. with NaOH , the C_6H_6 layer with 15% HCl , making alk., the HCl ext. and shaking with Et_2O . Evapn. of the Et_2O gave α -methoxyphenazine, yellow, m. 169°, identical with the *Me* deriv. of hemipyocyanin as shown by mixed m. p. Hydrolysis of this by heating 5 hrs. at 100° with fuming HBr converted it into α -hydroxyphenazine (*I*), m. 158°, identical with hemipyocyanin. Attempts to prep. *I* by diazotization of α -aminophenazine were unsuccessful.

A. W. DOX

Dyes derived from quinoline-2,3,4-tricarboxylic acid. J. D. TEWARI AND S. DUTT. *J. Indian Chem. Soc.* 5, 59–62 (1928); cf. *C. A.* 21, 3194.—Quinoline-2,3,4-tricarboxylic acid condenses with phenols either alone or in the presence of SnCl_4 or H_2SO_4 to give the following dyes of the *phthalein* type: *phenol*, m. above 280°; *resorcinol*, m. 194° (yellowish green fluorescence); *phloroglucinol*, m. above 280°; *pyrocatechol*, m. above 280°; *m-diethylaminophenol*, m. 220° (brown fluorescence); *m-phenylgallol*, m. above 280°; *m-dimethylaminophenol*, m. above 280° (green fluorescence). The *enediaminequinoline-2,3,4-tricarboxylein*, m. above 280° (green fluorescence). The dyes are probably produced by condensation of the phenol with the O atom of the 3-C in the intermediate anhydride.

B. C. A.

Absorption of ultra-violet light by organic substances (KWECINSKI, MARCH-

LEWSKI) 3. Color, molecular weight and electrolytic character of triphenylmethane derivatives (LIFSCHITZ, GIBBS) 6. Lignin (WIGGINTON) 23. Cathodic halogen (CLARK, BALL) 4. Crystal structure of urea and the molecular symmetry of thiourea (HENDRICKS) 2. Refractivity of normal saturated monobasic aliphatic acids (VERKADE, COOPS) 2. The influence of different nuclei on the absorption spectra of organic compounds (PURVIS) 3. Spectrochemical observations on azo compounds (AUWERS, HEIMKE) 3. Spectrochemistry and constitution of azoxy compounds (AUWERS, HEIMKE) 3. Catalysts for the preparation of H and alcohol (Fr. pat. 634,747) 18.

BOORD, CECIL ERNEST: **Laboratory Outlines for Premedical Organic Chemistry.** Revised. Columbus, Ohio: The Ohio State Univ. Press. 51 pp.

Stibonic acids. FITZGERALD DUNNING and EBENEZER E. REIB (to Hyson, Westcott & Dunning). U. S. 1,682,269, Aug. 28. Stibanic acid, in good yield, is obtained by diazotizing a soln. of acetyl-*p*-phenylenediamine and Sb_2O_3 in HCl and decomg. the resulting diazo Sb compd. in a hot caustic alkali soln. $PhSbO_3H_2$ and other similar stibonic acids may be similarly prepd.

Alkyl esters of abietic acid. ALAN C. JOHNSTON (to Hercules Powder Co.). U. S. 1,682,280, Aug. 28. Wood rosin is treated with Et_2SO_4 , Me_2SO_4 or other alkyl sulfate in the presence of an alkali such as NaOH.

Hydroxy acid esters. HOWARD W. MATHESON and KENNETH G. BLAIR (to Canadian Electric Products Co.). U. S. 1,682,347, Aug. 28. See Brit. 264,143 (C. A. 22, 91).

Oxamic acid halides. I. G. FARBENIND. A-G. Brit. 282,801, Sept. 30, 1926. Phenylloxamic acid chloride is made by the action of oxalyl chloride on aniline-HCl. β -Naphthylloxamic acid chloride is made by the action of oxalyl chloride on β -naphthylamine-HCl. α -Tolylloxamic acid chloride and α -naphthylloxamic acid chloride can be similarly prepd. by gentle heating. An excess of oxalyl halide and an inert diluent may be used.

Butyric acid and its homologs. JACQUES LEFRANC (to Soc. des brevets etrangers Lefranc & Cie.). U. S. 1,683,198, Sept. 4. See Brit. 276,617 (C. A. 22, 2378).

Producing sebacic acid salts or other soluble salts of organic compounds of acid character. MAX BUCHNER (to Albert F. Meyerhofer). U. S. 1,683,159, Sept. 4. An insol. metal salt of the substance is first formed, e. g., by use of hydroxides of Ca, Mg, Pb or Zn, and this insol. compd. is then treated with a fluoride such as NaF, the base of which forms a sol. org. compd. with the original material.

Acetic anhydride. HENRY DREYFUS. Fr. 634,167, May 11, 1927. See C. A. 22, 3417.

Separation of amines. BRITISH DYESTUFFS CORP., LIMITED, ERNEST HARRY RODD and REGINALD WILLIAM EVERATT. Fr. 634,905, May 24, 1927. See Brit. 270,930 (C. A. 22, 1594).

Organic bases by catalytic treatment of acetylene and ammonia. I. G. FARBENIND. A-G. Brit. 283,163, Jan. 5, 1927. Org. bases such as diethylamine, triethylamine, α - and γ -methylpyridine and higher methylpyridines and polynuclear bases are produced by passing a mixt. of C_2H_2 and NH_3 over catalysts such as may be prepd. by soaking pumice, asbestos or coke (dried at 500-600°) in a soln. of an anhyd. halide such as $ZnCl_2$, a mixt. of $ZnCl_2$ and $FeCl_3$ or a mixt. of $CdCl_2$ and $CuCl_2$. The reaction is effected at 280-350° but is exothermic and therefore an inert gas is advantageously admixed with the reactive gases.

Alkali metal alcoholates of compounds containing alcoholic hydroxyl groups. CHRISTIAAN VAN LOON. U. S. 1,681,600, Aug. 21. In prepg. alkali metal alcoholates of glycol (mono- or di-Na glycolates) or other non-sugar-contg. compds. contg. 2 or more alc. OH groups, a soln. of the latter compd. in an aq. soln. of an alkali metal hydroxide is dehydrated by heating to a max. temp. between 50° and 350° (suitably about 110-115° with glycol in a current of H under reduced pressure) but lower than the temp. at which deterioration begins and sufficiently high to expel all water.

Aminophenol ethers. J. TCHERNIAC. Brit. 282,907, Oct. 2, 1926. *o*-Anisidine is made by stirring methylsalicylamide with an aq. soln. of NaOCl and NaOH and heating to boiling. Other aminophenol ethers may be similarly prepd.

Carbazides and thiocarbazides. BRITISH DYESTUFFS CORP., LIMITED, GEORGE MALCOLM DYSON, FREDERICK ALFRED MASON and ARNOLD RENSCHAW. Fr. 634,908, May 24, 1927. $COCl$ or $CSCl$ is caused to react on hydrazines having the formula $P-NH-X-Q-NH-Y-R-NH-NH_2$, P denoting a sulfonated naphthyl or an acenaphthyl

group, Q and R the aryl, aralkyl or alkylene derivs of the same groups and X and Y each denoting either a carbonyl or sulfonyl group.

Acetal. SOC. ANON DES DISTILLERIES DES DEUX SEVRES. Brit. 283,112, Jan. 3, 1927. Alc. and AcH are treated with a catalyst such as HCl, H₂SO₄, toluenesulfonic acid, HOAc, PH₃ or CaCl₂ or other suitable metal salts, in only about 0.1-0.2 the quantity of the catalyst previously ordinarily used. Various details are given and an app. is described.

Butyrene. HENRI DOLTER. Fr. 634,959, Sept. 23, 1926. See Brit. 277,975 (C. A. 22, 2573).

Dioxan. ANGELO KNORR and GERHARD STEIMMIG (to I. G. Farbenind. A.-G.). U. S. 1,681,861, Aug. 21. Dioxan is made in a continuous operation by heating glycol in the presence of a catalyst such as H₂SO₄, benzenesulfonic acid, H₃PO₄ or ZnCl₂ and adding glycol to the boiling mixt. in the same quantity as dioxan distils off. As starting materials there may also be used ethers derived from glycol such as dihydroxy-diethyl oxide and dihydroxydiethyl oxide monoethyl ether.

Erythrene. ALEXANDER T. MAXIMOFF (to Naugatuck Chemical Co.). U. S. 1,682,919, Sept. 4. An aliphatic aldehyde such as crotonaldehyde or aldol (mixed with alc. and water) contg. at least 4 C atoms is pyrogenetically decompd. by heating at temps. below 500° to produce a mixt. of erythrene and other products and the erythrene is recovered, e. g., by use of Br to form erythrene bromide.

Methanol synthesis. HENRY H. STORCH (to Roessler & Hasslachner Chem. Co.). U. S. 1,681,750, Aug. 21. A mixt. of H and CO is passed over a heated catalyst comprising Cu obtained from a cuprammonium compd., e. g., by boiling the latter with NaOH and reducing with H. U. S. 1,681,751 specifies synthesis of MeOH from H and CO by use of a catalyst comprising Cu and fluoride of Ca, Ba, Sr or Mg. U. S. 1,681,752 specifies a catalyst comprising Cu formed by the reduction of CuO pptd. from a cuprammonium salt soln. in intimate mixt. with Mg(OH)₂. U. S. 1,681,753 specifies a catalyst comprising Pd and Cr₂O₃, ZnO or Ce₂O₃.

Synthetic methanol. COMMERCIAL SOLVENTS CORP. Fr. 635,023, May 25, 1927. A catalyst for the prepn. of MeOH from H and oxides of C comprises one or more difficultly reducible metallic oxides such as the oxides of Zn, Mg, Cd, Cr, V, W, with one or more easily reducible metallic oxides such as the oxides of Fe, Ni, Co, Cu and a metallic halide such as ZnCl₂, MgCl₂, CrCl₃, MgBr₂, ZnBr₂. The difficultly reducible oxides are preferably predominant. Cf. C. A. 22, 2756.

Methylene chloride. I. G. FARBENIND. A.-G. Brit. 283,119, Jan. 3, 1927. A mixt. of Cl and an excess of MeCl may be passed through a tube heated to 300-380° and the reaction may be assisted by use of catalysts, light or pressure.

Quinaldines. BRITISH DYE-STUFFS CORP., LIMITED AND MAX WYLER. Fr. 634,782, May 21, 1927. See Brit. 276,156 (C. A. 22, 2379).

Thiuram monosulfides. ALEXANDER T. MAXIMOFF (to Naugatuck Chemical Co.). U. S. 1,682,920, Sept. 4. In prepg. a thiuram monosulfide from the corresponding disulfide the latter is treated, while in suspension in water or other non-solvent, with NaCN or other suitable metallic cyanide in aq. soln.

Polymerized styrene. IVAN I. OSTROMUISLENSKII and MORRIS G. SHEPARD (to Naugatuck Chemical Co.). U. S. 1,683,401, Sept. 4. Unpolymerized styrene is combined with a non-homogeneous tough transparent polymerized styrene and polymerization is effected to a tough transparent modification, e. g., by heating at 180° for 3 hrs. Cf. C. A. 22, 3171.

Polymerized styrene. IVAN I. OSTROMUISLENSKII (to Naugatuck Chemical Co.). U. S. 1,683,402, Sept. 4. In forming α -m-styrenes styrenes of approx. 92% purity or higher are heated to 140-175° for 3-20 hrs. (the higher the temp. the shorter the time of heating). U. S. 1,683,403 specifies forming β -m-styrene by heating styrene of about 92% or higher purity in a substantially horizontal tube in an air bath at about 140° for approx. 40 hrs. U. S. 1,683,404 specifies making γ -m-styrene by treating styrene with a peroxide, e. g., benzoyl peroxides at 175-180° for 1-1.5 hrs. U. S. 1,683,405 specifies producing vitreous polymerized styrenes from crude petroleum oil by cracking the crude oil vapors at a temp. of about 650° and collecting the condensable portion of the product thus formed, heating the styrenes in the fraction to form brittle, impure resinous polymerized styrene, heating the resinous product to obtain styrene of greater purity, and repolymerizing the styrene to produce tough vitreous polymerized styrene.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Soluble dehydrogenases. T. THUNBERG. *XII Int. Cong. Physiol.* 1926, 161.—Seeds are ground with 5 parts of 0.5 *N* K_2HPO_4 soln., and the mixt. is centrifuged and filtered; the filtrate is colloidal and macroscopically homogeneous. Various specific donors are described. B. C. A.

The coagulation of fibrin as a process of micellary crystallization and of agglutination. E. HEKMA. *Nederland. Tijdschr. Geneeskunde* 72, 1, 2792-800, 2888-93 and 3670-77(1928).—A summarizing review. H. holds that the substance pptd. from fibrinogen solns. is not always fibrin, but in certain cases, unchanged fibrinogen, as e. g., if a pptn. occurs following the addn. of salts, acids or alkali, or by stirring or by contact with glass. In these cases, the ppt. can be redissolved; it is, moreover, softer than true fibrin which is formed chiefly by thrombin, as H. holds. The pptd. fibrinogen has a different microscopic aspect from fibrin, as it tends to form needles owing to a so-called micellary crystn., while thrombin causes agglutination. The decompn. of blood platelets is supposed to cause coagulation by diminishing the alky. and by the taking up of water. R. BEUTNER

The resistance of insulin to treatment with radium and x-rays. D. DEN HOGD AND S. E. DE JONGH. *Nederland. Tijdschr. Geneeskunde* 72, 1, 3169-73(1928).—In the absence of air, insulin is resistant to Ra and x-rays. In the presence of air, Ra causes a slight decompn., while x-rays are without effect. R. BEUTNER

Variation of p_H of equilibrated solutions as the result of the action of the regulatory power of the tissues. M. COMEL. *Atti accad. Lincei* [6], 7, 772-8(1928); cf. C. A. 21, 3940.—The p_H values of mixts. composed of phosphate equilibrating solns. and muscle and frog liver broths were detd. Jarisch phosphate solns. were used in different combinations to obtain the different p_H values. The results, recorded in tables and graphs, show the notable influence of the regulatory system of the tissues on the p_H of the phosphate solns. The relation between the resultant p_H (y) values and the p_H (x) values of the soln. is: $y = a + bx$, a straight line. The p_H value of the broth soln. when the p_H of the soln. is 0 is represented by a . The results show that a is 4.92 and b is 0.28. When the p_H values of the soln. and the broth are equal, $y = x$. Further analytical deductions, in which it is shown how to det. the equilibrating power of the tissue relative to the phosphate solns., indicate that tissues possess a regulatory system which opposes any variation in their p_H value induced by other regulatory systems of different p_H value. It is therefore possible to det. electrometrically the p_H value of a tissue broth, the value being detd. by the point at which there is no change in the p_H value of an equilibrating soln. in which the tissue is suspended. C. C. D.

The aluminum content of human autopsy tissue. V. C. MYERS AND J. W. MULL. Western Reserve Univ., Cleveland. *J. Biol. Chem.* 78, 625-6(1928).—The av. Al content of human visceral organs ranged from 0.07 to 0.25 mg. per 100 g. A. G.

Cholesterol and lipid phosphorus in infancy and in childhood: Normal incidence in cord blood and during infancy and early childhood. MURRAY B. GORDON AND DAVID J. COHN. *Am. J. Diseases Children* 35, 193-200(1928).—Blood serum from the umbilical cord at birth contains 89 mg. per 100 cc. cholesterol and 4.1 mg. per 100 cc. lipid P. Blood serum in the first week of life contains approx. the same concns. The cholesterol content, which is 136 mg. per 100 cc. at the end of the 1st year, increases gradually to a concn. of 169 mg. per 100 cc. in the 6th year. The lipid P content increases rapidly during the 1st year. At the end of the 1st year, it has a value of 5.8-6.1 mg. per 100 cc. It remains const. during the next 4 years and reaches a concn. of 7.8 mg. per 100 cc. in the 6th year. E. R. MAIN

The normal cerebrospinal fluid in children. DONALD STEWART. *Arch. Disease Childhood* 3, 96-108(1928).—The protein content of normal cerebrospinal fluid in children has the value of 15-55 mg. per 100 cc. for the lumbar region, 12-50 mg. per 100 cc. for the cisterna magna and 5-18 mg. per 100 cc. for the lateral ventricles. It does not vary with increasing age. The chloride content is 630-760 mg. per 100 cc. for the 3 regions. The sugar content is detd. by the concn. of sugar in the blood and is 45-66% of the latter value. The cell count, which is normally 20-30 per cu. mm. in infants, decreases gradually as age increases and becomes identical with that of adults

at 10–12 years. Measurements of pressure give unreliable results because of difficulties in obtaining manometric readings on children.

Potash in the animal body. J. ULRICH DUERST. Zoötechnischen Inst. d. Univ. Bern. *Ernähr. Pflanze* 24, 267–73(1928).—An address.

The sense of taste. A. CAPPUYNS. *Bull. trimestr. assocn. élèves école sup. brasserie univ. Louvain* 28, 80–6(1928).—A brief review of recent work on the chemistry of taste.

Electrolysis of partitioned neutral saline solutions. Modifications of p_H at the surface of the septum. M. CHANOT. *Compt. rend. soc. biol.* 99, 513–5(1928); cf. *C. A.* 22, 1170, 1787.—During the electrolysis of a dil. neutral soln. enclosed by a membrane giving negative osmosis, there is produced at the same time at each face of the membrane an inverse modification of the saline concn. and p_H of the soln. The saline concn. diminishes and the p_H increases at the face of the + pole, but the saline concn. increases and the p_H diminishes at the face of the – pole of the source of electricity.

Probable amount of ultra-violet radiation obtained indoors through ultra-violet transmitting glass. JANET HOWELL CLARK. *Science* 68, 165–6(1928).—It was estd. that a person would receive as much ultra-violet radiation in 2 min. in direct sunlight at noon, as in an entire day behind a window of ultra-violet transmitting glass.

The peptidases. HANS VON EULER AND ZOLTÁN I. KERTÉZ. *Ber.* 61B, 1525–9(1928).—In consequence of the hypothesis of Euler and Josephson (*C. A.* 21, 2278) that the attack of the peptidases from the type of the intestine crepsin starts with a primary addn. of the amino group of the substrate on the carbonyl group of the enzyme, the question was investigated whether the group attached to the amino group of the peptide has the nature of a carbonyl group of a simple sugar. Glycerol ext. from pig intestine furnished the enzyme material. As substrates were chosen glycylglycine and α -alanylglycine. To 5 cc. of 0.25 *N* peptide soln. were added 2.0 cc. glycerol ext. and enough 0.1 *N* NaOH to give a p_H of 8.0; then an inhibiting substance was added and the vol. made up to 25 cc. The reaction velocity was detd. and compared with that of an equiv. peptide soln. not contg. the inhibiting compd. The expts. were carried out at 37°. The method of Willstätter and Waldschmidt-Leitz (cf. *C. A.* 16, 944) was used to exam. the progress of the cleavage. In the expts. with glycylglycine, the 0.001 *N* solns. of the sulfates of quinine and quinidine, which are only slightly sol. in H_2O , had little effect on the reaction velocity on account of the small concn. in which the alkaloids were present. Alc. solns. of the alkaloids could not be used, because EtOH had a strong inhibitory action on the cleavage process. $PhNH_2$, glycine and particularly boric acid had a pronounced inhibitory effect. NH_3 had no influence. With glycine ester no distinct results were obtained, because the lipase present in the enzyme prepn. caused partial sapon. of the ester. The cleavage velocity of glycylglycine was greater than that of α -alanylglycine. Addn. of glycine had a slightly smaller inhibitory effect on the cleavage of α -alanylglycine than that of α -alanine had.

Dependence of catalytic and oxidative effects of iron on its state of adsorption. RICHARD KUHN AND ALBERT WASSERMANN. *Ber.* 61B, 1550–67(1928); cf. *C. A.* 17, 2718.—The changes in the catalytic and oxidative activity of hemin brought about by adsorption on different adsorbents are studied. The catalytic properties of $FeCl_3$ in soln. are compared with those of Fe in an adsorbed and an “embedded” state. The rate of H_2O_2 decompn. and O_2 -transmission on linseed oil was detd. by gas analysis, the former reaction being checked at the same time by titration with 0.1 *N* $KMnO_4$. The app. used for the hemin expts. contained in the main vessel hemin and adsorbent suspended in phosphate buffer soln. The H_2O_2 or the linseed oil was placed in a side tube. A special bulb contained KOH, absorbing any CO_2 eventually developing. The expts. were carried out under artificial light and with rotation (130 r. p. m.). The temp. was kept const. within $\pm 0.3^\circ$. Examn. of different adsorbents showed that charcoal, alumina and metastannic acid were best suited for the purpose, since under the exptl. conditions, no hemin was lost from the adsorbents. Hemin solns. contg. 1 mg. α -chlorohemin in 1 cc. 0.02 *N* Na_2HPO_4 were used for the catalase expts.; for the oxidase expts. also a soln. in 2.5% pyridine was employed. In the catalase expts., only the β -activity (cf. *C. A.* 18, 613) was measured. The values thus obtained for the amt. of O_2 liberated by 1 mg. hemin in 60 min. out of 69 cc. of 0.019 *N* H_2O_2 soln. at a p_H of about 5 were as follows: in soln.: 3000 cc. (16° , 722 mm.); on charcoal: 8400 cc. (16° , 725 mm.); on metastannic acid: 3000 cc. (15° , 722 mm.); on alumina: strong inhibition. In the oxidase expts., after eliminating the values obtained in the first 5–8 min., 1 mg. hemin transferred in 120 min. on 0.32 cc. of a 0.5% linseed oil sus-

pension at a p_{H} of about 6.3 following amts. of O_2 : in soln.: 210 cc. (16° , 722 mm.); on 0.2 g. metastannic acid: 210 cc. (16° , 720 mm.); on 0.24 g. alumina: 120 cc. (16° , 723 mm.); on 0.2 g. charcoal: 80 cc. (17° , 720 mm.). Leucine was not oxidized in the presence of hemin, hemin-alumina and hemin-metastannic acid. With hemin-charcoal, the O_2 transmission was the same as with charcoal alone. Fructose absorbed a small quantity of O_2 when shaken in phosphate soln. Addn. of charcoal, alumina and metastannic acid, and further addn. of hemin had no influence on the reaction velocity. The oxidation of dihydroxyacetone in phosphate soln. (cf. *C. A.* 20, 1637) is not accelerated by hemin. Further addn. of charcoal or alumina was without effect, while metastannic acid tended to retard the reaction. The expts. with FeCl_3 as a catalyst were carried out similarly to the catalase expts. Adsorption on charcoal increased the activity of FeCl_3 in decomp. H_2O_2 considerably, compared with that of FeCl_3 in soln. Metastannic acid and particularly alumina had a retarding effect. When in the charcoal- FeCl_3 system the H_2O_2 was replaced by water, the ferrous ion was extd., as proven by the color reaction obtained with $\text{K}_3\text{Fe}(\text{CN})_6$. From this observation, K. and W. conclude that the reduction of ferric to ferrous ion at the boundary surface of the phases is responsible for the activation of the H_2O_2 catalysis observed after adsorption of FeCl_3 on coal.

G. SCHWOCH

Fate of acetylcholine in the blood. III. Effect of surface area on the degree of splitting. YAMIKO KODERA. Univ. Innsbruck. *Arch. ges. Physiol.* (Pflüger's) 219, 181-9(1928).—The degree of acetylcholine splitting to take place in the blood increases logarithmically as the no. of red blood cells is increased. When the no. of red cells is kept const. the splitting becomes greater or less as the cells are caused to swell or to shrink through changing the tonicity of the medium. Whether these changes are due solely to quant. relations, or whether qual. factors in the surface also contribute is not known.

G. H. S.

Osmotic concentration of the secretions. J. STRAUB AND L. SOEP. *Arch. néerland. physiol.* 12, 346-67(1928).—A series of analyses of secretions and sera before and after dialysis are given. The secretions are all negative colloids. The Donnan equil. was manifested in all of the expts.

M. H. SOULE

The swelling of biocolloids. I. Ultra-violet rays and swelling of agar-agar. JAN CALÁBEK. Masaryk Univ., Brno, Czechoslovakia. *Protoplasma* 3, 17-42(1927).—Ordinary marketable agar was dissolved in boiling H_2O and poured on a glass-plate slightly coated with vaseline. It dried into a thin sheet out of which square disks of 25 mm. were cut. The expts. with disks were carried on in series. In each series disks of the same age and the same thickness were used, the thickness of the disks were as follows 0.02, 0.04, 0.083, 0.095, 0.12 mm. The dry disks were illuminated either by "Höhensonne" or natural sun rays at intervals of 1, 3, 9, 27, 81 and 146 min. After that they were allowed to swell on auxographs of the MacDouglas type, modified by Úlehla. Out of the auxograms obtained from one and the same series a family of curves was derived, e. g., on the X-axis was plotted the time of swelling in hrs. against the degree of swelling expressed as the percentage of the dry thickness on the Y-axis. The swelling velocity of non-illuminated agar-disks is the quicker the thinner they are, but the max. of their swelling capacity is the higher the thicker they are. The difference in the swelling max. is rather small (3030% with agar-disks of 0.02 mm. thickness, against 3370% with agar-disks of 0.12 mm. thickness). "Höhensonne" as well as natural sun rays lower the swelling capacity of agar to a large extent, depending on the length of time the agar has been illuminated. The max. decrease of the swelling capacity was achieved with "Höhensonne" after an illumination of 146 min. on one side of the agar-disk, the swelling reaching but 1525% in this case against 3200% achieved by non-illuminated agar. The action of ultra-violet rays causing this decrease of the swelling capacity is practically limited to the extreme layers of the gel, decreasing in the depth very rapidly so that their effect practically ceases at 0.08 mm. below the surface. This influence can be preserved in dry agar-gel for several months and even if dry agar be dissolved and dried again it appears to be partly nullified. The decrease of the swelling capacity after illumination is not affected by a partial drying out of the agar during the period of illumination, but only by the ultra-violet rays. The hypothesis is advanced that the effect of ultra-violet rays upon plants is due to a lowering of the swelling capacity of the protoplasm in the cell-wall in the upper cellular layers of the plant.

M. H. SOULE

Hydration. ORTO BLÜH. *Protoplasma* 3, 81-115(1927).—A review, largely of the biol. significance of hydration. Sep. chapters are devoted to hydrophobic and hydrophilic colloids; the dielec. const.; H_2O as an amphoteric liquid; the hydration of ions and colloidal particles; the dielec. const. of true and colloidal solns., etc. An excellent bibliography, particularly of the German literature, is given. M. H. S.

Physiological ion antagonism. D. L. RUBINSTEIN. Med. Inst., Odessa. *Proto-plasma* 4, 259-314(1928).—A crit. review and discussion in German of the present knowledge of ion relations with examples of toxicity, permeability and irritability due to physiol. ion antagonism. Sep. chapters are devoted to this phenomenon as it appears in colloidal solns.; the influence of anions and cations, valence; electrolytic dissocn.; hydration; quant. relations; the effect of salts; the narcotics and glucosides. An excellent theoretical consideration and bibliography are given. M. H. SOULS

Wildier's bios. The isolation and identification of "Bios I." EDNA V. EASTCOTT. Univ. Toronto. *J. Phys. Chem.* 32, 1094-111(1928).—Lucas (C. A. 19, 2679) has shown that Wildier's bios can be sepd. into 2 constituents, "Bios I" and "Bios II." Eastcott's work started with the examn. of a large no. of vegetable and animal exts. according to the methods devised by Lucas. Eastcott's summary (cf. C. A. 20, 3481) may be used. *Summary.*—"The crops of yeast obtained under standard conditions from 48 vegetable and 15 animal preps. have been detd.; also the crops when either "Bios I" and "Bios II" or wort was added to the exts. From these results it is possible to predict, roughly, the crops obtainable from mixts. of 2 exts., on the assumption that in every case the bios in these exts. consists of Bios I and Bios II. The bios from 7 sources has been fractionated by Lucas' method into Bios I and Bios II. Bios has been isolated from tea dust; it proves to be identical with inactive inositol. Curves showing the rate of reproduction of yeast in solns. contg. salts, sugar, inositol and crude Bios II, agree in form with those obtained by N. A. Clark with solns. of salts, sugar and wort. The inositol taken up by yeast from the culture medium can be quantitatively recovered by hydrolyzing the yeast crop, each normal cell takes up and yields 1.2×10^{-13} g. of inositol, i. e., 1-2 parts per thousand of its own dry weight. Yeast grown in a soln. contg. only sugar and salts also yields inositol on hydrolysis, but less in amt." Full details of technic are given. F. W. TANNER

Interrelation of hydrogen ion activity and concentration of salt in the activation of pancreatic amylase. H. C. SHERMAN, M. L. CALDWELL AND M. ADAMS. Columbia Univ. *J. Am. Chem. Soc.* 50, 2529-35(1928).—The optimal H-ion activity for pancreatic amylase in the presence of different concns. of NaCl, KCl, NaBr, NaF, NaNO₃, NaClO₃, NaSCN or Na₂SO₄ has been quant. investigated. The optimal H-ion activity is dependent both upon the kind and concn. of salt present. In the presence of each of the salts investigated here, the optimal H-ion activity decreases with increasing concn. of the salt up to a certain salt concn., beyond which it ceases to be appreciably influenced; this concn. depends upon the salt. Na₂SO₄ and Na phosphate had no influence on the activity of pancreatic amylase. C. J. WEST

Influence of concentration of neutral salt on the activation of pancreatic amylase. H. C. SHERMAN, M. L. CALDWELL AND M. ADAMS. Columbia Univ. *J. Am. Chem. Soc.* 50, 2535-7(1928); cf. preceding abstr.—The following figures give the concn. of salt most favorable (in each case) to the activation of pancreatic amylase. NaCl 0.02-0.05 M, KCl 0.03-0.05, NaBr 0.03-0.20, NaNO₃ 0.10-0.20, NaClO₃ 0.10-0.20, NaSCN 0.15-0.20, NaF 0.20-0.30. The activity of the amylase is favored by more acid solns. in the presence of those salts of which higher concns. are required for its complete activation. C. J. WEST

Quantitative comparison of the influence of neutral salts on the activity of pancreatic amylase. H. C. SHERMAN, M. L. CALDWELL AND M. ADAMS. Columbia Univ. *J. Am. Chem. Soc.* 50, 2538-43(1928). cf. two preceding abstrs.—The influence of neutral salts on the activity of pancreatic amylase was found to be the same for the purified prepn. of the enzyme and for com. pancreatin and seems, therefore, to be a property of the enzyme itself rather than of any impurities that may be present. Each salt being used at its optimal H-ion activity and concn., the following comparative values were obtained: NaCl 100, KCl 100, LiCl 80-90, NaBr 77, NaNO₃ 41, NaClO₃ 29, NaSCN 29, NaF 24, Na₂SO₄ and Na phosphate 0. The salts which are less favorable to the activity of the amylase are required in higher concns. and in turn exert their most favorable influence in solns. of higher H-ion activities than do those salts which are more efficient activators. The activity of the amylase in the presence of 2 anions which exert a sp. influence on its activity, such as NO₃ and Cl, is intermediate between the activity of the enzyme in the presence of each taken separately. The activity of the enzyme in the presence of such a mixt. of salts is dependent on the relative concns. of the ions. Anions which alone do not influence the activity of the enzyme seem to have comparatively small influence on the activity of the enzyme in the presence of anions which exert a decidedly sp. influence. Reducing the concn. of enzyme by 0.5 or using 4% instead of 2% starch does not appreciably influence the concn. of NaCl necessary for complete activation of the enzyme or the optimal H ion activity. The presence of

neutral salt is essential to the activity of pancreatic amylase; the anion is of far more influence than the cation, although the latter seems to have some slight influence on the activity of the enzyme. Of the ions studied, Cl is the most efficient. The different anions have sp. effects on the enzyme or substrate. C. J. WAST

Electrometric determination of alkalies of Saki lake water (IL'INSKII) 14. Relation between the chemical constitution and pungency (MARUI) (NOMURA, HOTTA) 10.

KOSSEL, ALBRECHT: **The Protamines and Histones**. Translated from the original Ger. manuscript by Wm. Veale Thorpe. New York: Longmans, Green & Co. Price about \$3.25.

PETERS, J. TH.: **De behandeling der suikerziekte na de ontdekking van het insuline**. The Hague: G. Naeff. 39 pp. Fl. 1.

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Microchemical detection of potassium and calcium in histological sections. W. JACOBI AND W. KEUSCHER. *Arch. Psych. Nerv.* 79, 323-6(1927).—The tests depend, resp., on the formation of K chloroplatinate and CaSO_4 . B. C. A.

Detection of lactic acid in stomach contents. B. BISBINI. *Rinasc. med.* 3, 514-6(1926).—The stomach liquor (20 cc.) is evapd. at 70° to 2 cc., thoroughly extd. with ether (40-50 cc.), the residue after removal of the ether is dissolved in lukewarm distd. water (30-40 cc.), made alk. with CaO, filtered and the filtrate evapd. to dryness. The residue is treated with a little water, the soln. filtered, evapd. on the water bath to 0.5 cc., and the soln. placed on an object slide in a desiccator. The formation of Ca lactate crystals is observed with a microscope; 0.05% of lactic acid can be detected. B. C. A.

Some experiments on the amplification and detection of bioelectric currents by the use of thermionic valves. F. BENEDETTI. Univ. Bologna. *Atti accad. Lincei* [6], 7, 423-7(1928).—The method should be of value in investigations in *electrobiologie*, where the Einthoven galvanometer and the capillary electrometer have been the only methods used. With the app., the construction and use of which are described in detail, the existence of various bioelec. currents can be detected, in connection with which various expts. are described. Both intensities and frequencies can be estd. C. C. D.

Indican in urine tests. GERHARD MAUE. *Pharm. Ztg.* 73, 791-2(1928).—Reference is made to recent discussions on the subject by Schlecht, Otto, Aufrecht and others, and that the presence of indican in urine is frequently due to medication of the patient with certain drugs like $\text{CCl}_3\text{CH}(\text{OH})_2$, PhOH, terpenes and their derivs. (as in oil of turpentine, sandalwood oil, balsam copaiba, camphor), naphthalene and pyrazolone derivs. On stopping such medication the indican disappears. W. O. E.

Lange ring test for acetone in urine. GABRIELSEN. *Pharm. Ztg.* 73, 792(1928).—In applying this test attention is directed to the necessity of an AcOH free from AcMe. W. O. E.

A colorimetric method for the determination of free tryptophan in blood. C. A. CARY. U. S. Bur. of Dairy Industry. *J. Biol. Chem.* 78, 377-98(1928).—A method is given for non-protein tryptophan in blood based upon the Hopkins-Cole glyoxylic acid reaction in the presence of excess HgSO_4 . Blood samples are coagulated with AcOH, treated with kaolin, filtered, concd. *in vacuo* (20-25 mm.) and treated again with kaolin. Protein-free aliquots are removed as in amino-N detn., except that CCl_3COOH is omitted. These aliquots are diluted to a known vol. of about 1.5-2 times the sample represented by them. For this enough 33.5% H_2SO_4 is used to give 7% (by vol.) of concd. acid in the final soln. Tryptophan is pptd. from the soln. by dissolving in it 10 g. HgSO_4 per 100 cc. and allowing it to stand in an ice box 4-48 hrs. The ppt. is filtered on an asbestos mat. The original vessel and mat are washed 3 times, 10 cc. of 5% (by vol.) H_2SO_4 being used each time. The washed mat and ppt. are placed in the original vessel. Twenty cc. of freshly prepd. glyoxylic- H_2SO_4 reagent (Hopkins-

Cole) are poured through a Gooch filter into this vessel and 4 drops of a 25% HgSO_4 soln. in 10% (by vol.) H_2SO_4 added. The vessel is stoppered, left for 48 hrs. at room temp. (out of direct sunlight), and filtered through dry asbestos mats. The colored soln. is compared colorimetrically with tryptophan standards. Examd. spectrophotometrically the color matching is not as perfect as with the colorimeter. From 75 to 85% of blood material estd. as tryptophan is actually such; the remainder is probably a deriv. of tryptophan originally present. Therefore this method gives a fairly close approximation of the actual tryptophan present.

RUSSELL C. EBB

The determination of guanidine bases in urine. C. J. WEBER. *J. Biol. Chem.* 78, 465-73 (1928).—A colorimetric method using an alk. nitroprusside-ferricyanide soln. for the estn. of guanidine in urine is described. Methylguanidine, glycoeyamine and arginine in which 1 H atom is substituted, as diphenylguanidine in which 2 H atoms are substituted, all give a color with the reagent. Creatinine gives $1/30$ the color of guanidine while triphenylguanidine, tyrosine, tyramine, phenol and acetone produce no color. Acid-washed Norit adsorbs the bases from alk. solns. of urine, then on addn. of an acidulated H_2O or alc., the bases are again set free and can be detd. in the filtrate. The % recoveries averaged 90 when guanidine was added to urine. Normal human urine gives a color value equiv. to an excretion of 10-20 mg. of guanidine per 24 hrs. The substances responsible for this color are being investigated. The method should prove useful in studying the fate of guanidine compds. when introduced into the body.

C. R. FELLERS

Electrical resistance thermometer for continuous rectal measurements. WILHELM BAUCH. *Klin. Wochschr.* 7, 699 (1928).—A metal tube that contains a resistance wire with a high temp. coeff. is inserted into the rectum. This resistance wire is one branch of a wheatstone bridge couple that is spanned by a galvanometer. Current is supplied by a battery. Changes in temp. produce changes in the resistance of one branch of the circuit and lead, therefore, to deflection of the galvanometer. The galvanometer registers degrees and it can, of course, be placed anywhere in the patient's room.

MILTON HANKE

Radiometric determination of the quantity of body fluids. RUDOLF EHRENBERG AND WALTER KROPATSCHKE. *Klin. Wochschr.* 7, 847-9 (1928).—A quantity of Th B, measured radiometrically, is mixed with citrated blood and injected into the jugular vein. Blood is drawn after 7 to 10 min. and the radioactivity of 1 cc. is accurately detd. The blood vol. of rabbits was found to be 50-56 cc. per kg. body wt. The intravenous injection of a Th B soln. in water leads to a rapid disappearance of a portion of the radioactivity from the blood so that samples taken after 10 min. indicate a blood vol. of approx. 200 to 300 cc. per kg body wt. The Th B has obviously gone into the body tissues, possibly into the free water in the body tissues. This may be a method for estg. free water. The possible combination of Th B with body colloids is recognized and discussed.

MILTON HANKE

Reducing power of urine: clinically considered. CLIFFORD MITCHELL. *J. Am. Inst. Homeopathy* 21, 648-52 (1928).—*Collection of sample.*—No drugs are given for as long a time as possible. The daily ingestion of liquids is kept at 1 quart. The urine voided on rising is discarded; 3 samples are then collected: (1) from breakfast to bedtime, (2) from bedtime to breakfast, (3) after breakfast on the second day. The samples are kept cold, but no preservatives are used. *Determination of reducing power.*—Each sample is tested by adding 10 drops to 5 cc. of Benedict qual soln., placing in a bath of boiling water, and noting the elapsed time until a gelatinous green ppt. forms. In healthy persons this ppt. may not form within 10 min. "If the 24-hr. specimen of urine in question is of sp. gr. 1.015 or over and does not change in the water bath after 5 min. time and especially if it does not change when taken from the bath at the end of 5 min. and allowed to cool gradually, its reducing power is not likely to be worth considering. If, however, the change comes in less than 5 min. and especially if in 3 min. or less it may be safely assumed that the reducing power is greater than that of the person in av. good health." Urine of sp. gr. 1.010 or less may not effect the test in 30 min.; hence it should not be used. The longer the time required for the formation of the ppt., the more unlikely is the presence of glucose. JOSEPH S. HEPBURN

Microdetermination of creatine and creatinine in muscle. S. OCHOA AND J. G. VALDECASAS. *Rev. med. Barcelona* 8, 490-4 (1927); *Ber. ges. Physiol. expil. Pharmacol.* 44, 615.—Autoclave 5-100 mg. muscle (which may be removed from the living tissue) with 0.2 cc. 0.2 N HCl per mg. 24 min. at 120° in a tin-foil-covered flask, cool, add 0.2 cc. 1.2% picric acid, filter after 5 min., add 0.1 cc. 5% Na_2CO_3 to 0.2 cc. of the clear filtrate and compare after 5 min. with a standard soln. prepd. as follows: To 5 cc. of a soln. of 0.02 g. creatinine in 1 l. 0.2 N HCl add 5 cc. 1.2% picric acid and, as soon as

a turbidity appears, 5 cc. 5% Na_2CO_3 . The method is accurate and checks well with Hau and Schaefer's method.

MARY JACOBSEN

Legal procedure for poisoning with sodium tetraiodophenolphthalein. BEYREIS. *Deut. Z. Ges. ger. Med.* 10, 156-74 (1927).—Case report and discussion. F. K.

Recent methods for the determination of sodium and their biological application. M. LAUDAT. *Bull. soc. chim. biol.* 10, 757-68 (1928).—The $\text{K}_2\text{H}_2\text{Sb}_2\text{O}_7$ method as performed by Kramer and Tisdall (cf. *C. A.* 15, 2461, 3858, 3859), and the method of the triple acetate of Na, Mg and U as performed by Blanchetière (cf. *C. A.* 17, 3006), were experimentally reviewed and found to give the same results. The latter method is preferred for its greater simplicity.

L. W. RIGGS

Simple apparatus for sampling alveolar carbon dioxide. R. GOIFFON. *Compt. rend. soc. biol.* 99, 377 (1928).—The app. consists of a mouth tube, with valve, attached to one end of an elongated toy balloon, and a stopcock attached to the other end. With the tube open the subject makes a slow expiration at the end of which the stopcock is closed when by an addnl. short forced expiratory effort 50 to 100 cc. of alveolar air is received in the balloon.

L. W. RIGGS

Nuclear and differential tissue stain combined. GEORGE J. BRILMYER. *Science* 68, 114 (1928).—A new method for combining and manipulating Delafield's hematoxylin and Mallory's connective tissue stain is as follows: (1) Stain in Delafield's hematoxylin 5 min., (2) wash to remove excess of stain, (3) stain in 0.2% aq. soln. of acid fuchsin 1 min., (4) wash to remove excess of stain, (5) stain in the following soln. 2 to 3 hrs.: Aniline Blue (water sol.) 0.5 g., Orange G 2.0, and 1% phosphomolybdic acid 100 cc., (6) wash to remove excess of stain, (7) pass successively and rapidly through 35, 75 and 95% alc., (8) dehydrate in abs. alc. 30 to 60 sec. (anhyd. acetone may be used in place of abs. alc.), (9) clear in xylene, (10) mount with cover glass. With this procedure nuclei appear a rich red, epithelial cells pink, connective tissue blue and muscle red. Red blood corpuscles stain yellowish in veins, reddish in arteries. Colloid and mucus stain blue. Sections stained by this method have not faded in 5 years. L. W. R.

Blood samples for glucose determination sent by mail. HERMAN ROTHLIN. *Svensk Farm. Tids.* 32, 273-6 (1928).—Absorbent paper washed free from reducing substances, impregnated with NaF soln., dried, weighed and placed in rubber-stoppered vials are made up in numbers ready for use. The paper held by tweezers is brought into contact with the blood from a finger prick, returned to a vial and mailed to the lab. The net wt. of the blood is detd., the blood is extd. from the paper with water, and deproteinized with 45% ZnSO_4 and 0.2 N NaOH. The sugar is detd. by a micromethod.

A. R. ROSE

Determination of chlorides in blood serum. D. RAQUET. *J. pharm. chim.* 7, 487-9 (1928); cf. *C. A.* 22, 1194; and following abstr.—The $\text{Zn}_2\text{Fe}(\text{CN})_6$ method used in the detn. of Cl in milk is applied to the serum of the blood. To 10 cc. of serum add 100 cc. H_2O , 2 cc. of 15% $\text{K}_4\text{Fe}(\text{CN})_6$, shake, add 2 cc. of 30% $\text{Zn}(\text{AcO})_2$, H_2O to make 150 cc., shake and filter; to 100 cc. of filtrate add HNO_3 5 cc., 0.1 N AgNO_3 10 cc., shake, filter, and to 100 cc. of the filtrate add 1 cc. of 10% ferric alum and 0.1 N NH_4CNS until the red color appears. If A cc. is consumed, then NaCl (g. per l.) = $0.8775 (10-1.15 A)$. The results agree well with those by Laudat's method (*C. A.* 12, 1305).

S. WALDBOTT

Determination of total and of feebly combined chlorine contained in the gastric juice. D. RAQUET AND M. PAGET. *J. pharm. chim.* 7, 489-92 (1928).—The method of Hayem and Winter involves detn. in gastric juice (A) of (1) metal chlorides (B) (evap. A , calcine and det. Cl); (2) B + feebly combined Cl (remove free HCl by evapn. on the water bath and heat to 100° for 1 hr., then add Na_2CO_3 and KNO_3 , incinerate and det. Cl); (3) total Cl (to A add Na_2CO_3 , KNO_3 , evapn., ash and det. Cl). The method of R. and P. (see preceding abstr.; use 10 cc. of A , etc.) detn. total Cl (No. 3); the results agree well with those obtained by the methods of Laudat and of Hayem and Winter. To det. total Cl less free HCl (i. e., No. 2), expel free HCl from 10 cc. A as stated, then take up with 5 cc. of 20% HNO_3 , treat with $\text{K}_4\text{Fe}(\text{CN})_6$, $\text{Zn}(\text{AcO})_2$ and H_2O to make 150 cc., and proceed as before. The method is very rapid, since ashing the org. matter is not required. The feebly combined Cl is very unstable, dissociating in contact with the defecating solns.

S. WALDBOTT

Sugar in blood. A study of the accuracy of the Kramer-Gittleman modification of the method of Folin and Wu. ELSA R. ORENT. *J. Lab. Clin. Med.* 12, 433-8 (1927).—Comparison of the findings in the detn. of substances that reduce alk. $\text{Cu}(\text{OH})_2$ soln. were made on solns. of a known amt. of glucose ranging from 50 to 350 mg. per 100 cc., on blood of diabetic and nondiabetic patients, and on blood of dogs in convulsive seizures following ligation of the hepatic artery. The microtechnic of Kramer and

Gittleman gives results that compare well with those obtained with the original method of Folin and Wu.

Studies of quantitative blood-sugar estimation. Various methods compared with the author's micro-Folin-Wu method. THOMAS L. BYRD. *J. Lab. Clin. Med.* 12, 609-13(1927).—Comparisons were made which give further evidence that the micro-Folin-Wu method, using 0.1 cc. of blood, is just as reliable as any method now in use, irrespective of the quantity of blood necessary for respective techniques and regardless of the sugar content of the specimens analyzed. It can be applied to any case indicating the need of a quant. blood-sugar estn., including infants, small children and obese individuals. This is a method of preserving hemolyzed specimens of blood, giving 4 possibilities of a Folin-Wu analysis; making it feasible to collect and dil. specimens of blood with the blood-diluting pipet and transport any distance. E. W. W.

Nephelometry. HANS KLEINMANN. *J. Lab. Clin. Med.* 12, 629-43(1927).—The theory of nephelometry is discussed, a macro- and micro- nephelometer are described, and a new standard of turbidity is defined. General directions for nephelometric investigations are given, together with results obtained with the new type of nephelometer. Generally speaking changes in the colloidal state may be detected and gaged by variations in the dispersive power and consequently in the intensity of the light emitted. ETHEL W. WICKWIRE

Description of a new hydrogen-ion colorimeter. R. B. II. GRADWOHL. *J. Lab. Clin. Med.* 12, 694-701(1927).—This colorimeter is a box with a series of hermetically sealed special glass ampules contg. sterile buffers of known p_H value. The p_H value of each ampule is found on a metal strip running along the top of the rows. The indicator for each row is designated by initials on the end of the rack. Next, there is a series of indicator bottles properly labelled. The illuminating box is furnished with an arrangement for sliding back and forth along any one of these rows of buffers which are taken from the box for comparative purposes, after a rough test has been made and the actual indicator selected. The method of adjusting the reaction of culture media is described. ETHEL W. WICKWIRE

The preparation of colloidal gold solution. ROBERT A. KILDUFFE AND W. W. HERSON. *J. Lab. Clin. Med.* 12, 810-3(1927).—A method is outlined whereby sols. can be prepd. requiring a min. adjustment of reaction and which will invariably give normal curves with normal fluids and paretic curves with paretic fluids—a *sine qua non* before any colloidal Au is put into use. ETHEL W. WICKWIRE

Note on urine preservatives. J. J. SHORT AND A. PIATETZKY. *J. Lab. Clin. Med.* 12, 1098-1100(1927).—Quinosol and hexamethylenamine were found to be satisfactory preservatives in tablet form. ETHEL W. WICKWIRE

Determination of H_2SO_4 [in urine] (YAMAZAKI) 7.

LESSAR-COHN: **Praxis der Harnanalyse für Mediziner, Apotheker und Chemiker.** 7th ed., revised by Rudolf Rapp. Anleitung zur chem. Untersuchg. d. Harns u. d. Harnkonkremente. Nebst e. anh. Analyse d. Mageninhalts u. d. mikrochem. Untersuchg. wichtiger Blutbestandteile. Leipzig: L. Voss. 66 pp. M. 2.20.

C—BACTERIOLOGY

CHARLES B. MORREY

The growth of *Bacillus radicola* on artificial media containing various plant extracts. F. H. ALLISON. *J. Agr. Research* 35, 915-24(1927).—*Bacillus radicola* obtained from red clover, which strain ordinarily makes a poor growth on simple sugar-salt medium, produced luxuriant growth in the presence of the juices of certain plants. The exts. were prepd. from 26 different plant materials covering a wide range of vegetables, fruits and field crops. The exts. from practically all the plants increased bacterial growth to some extent. The effect varied widely, however, both for the different plants and for different parts of the same plant. Ext. of legume roots particularly favored the bacterial growth. The bacterial food value of any particular plant species varied widely, depending upon the stage of maturity. Many strains of organisms showed increasing response to plants exts. after several transfers in the same medium. M. S. ANDERSON

Oxidation by means of *Bacterium xylinum*. I. The formation of dihydroxy-acetone from glycerol. K. BERNHAUER AND K. SCHÖN. German Univ. Prague. *Z. physiol. Chem.* 177, 107-24(1928).—An organism closely related to *Bacterium xylinum* converted glycerol almost quant. into $CO(CH_2OH)_2$. The culture medium consisted of 5% yeast ext. (prepd. by boiling 1 kg. pressed yeast 15 min. with 10 l. H_2O and centrifuging), 5% glycerol, and an org. acid was added to prevent contamination with

Aspergillus niger. The yield of $\text{CO}(\text{CH}_2\text{OH})_2$ was detd. by the Cu reduction method of Bertrand. Under optimum conditions, where the temp. was $27-8^\circ$, the p_{H} between 4 and 4.8, the depth of culture medium 1-2 cm. and the glycerol concn. 8-8%, the max. yield was obtained in 12 days. For suppressing contamination by *Aspergillus niger*, which was being cultivated in the same lab., the addn. of AcOH to a concn. of $N/30$ to $N/50$ was found desirable. CH_2O_2 , EtCO_2H and PrCO_2H were also used for this purpose but were less satisfactory. The bacteria form a membrane on the surface of the medium. If a uniform inoculation is desired, this may be made from a culture on a Ca gluconate medium where the membrane is much more easily broken up.

A. W. DOX

The effect of carbon dioxide on bacteria. GEORGE VALLEY. *Quart. Rev. Biol.* 3, 208-24(1928).—Review. Older papers are mainly concerned with the harmful effect of CO_2 . It was found later that CO_2 favors the growth of certain bacteria by either reducing the partial O_2 tension or by delicately adjusting the p_{H} . It was finally proved by Valley and Rettger (*C. A.* 20, 2870; 21, 3925) that complete removal of CO_2 from an otherwise favorable medium results in inhibition of development of 109 organisms examd.

MARY JACOBSEN

The fermentation of glucose by *B. coli*. ROSNATOVSKII. *Bacteriol. Inst. Kraznodar. Centr. Bakt. Parasitenk. I Abt.* 102, 145-8(1927).—The ratio of H to CO_2 in gases resulting from the fermentation of glucose by *B. coli* has previously been given as 2:1. For various reasons this does not always hold. If the medium is acid, the NaOH used in absorbing CO_2 from the mixed gases will release more CO_2 . Also if the bouillon was acid, the presence of 1% glucose gave about twice as much gas as did 0.5%. With neutral bouillon the percent of glucose made little difference. When the gas was analyzed by absorption of CO_2 with NaOH and explosion of the residuum in a eudiometer, it was found to be pure CO_2 and H. In acid media the H: CO_2 ratio varied from 6:1 to 10:1. In neutral media it was 2:1. The change from glucose to H and CO_2 goes by steps. A study of the intermediate products as, lactic, butyric and formic acids, will be of interest in explaining the mechanism of fermentation and perhaps in throwing light on the significance of the flora of the human intestine. J. T. M.

The antiseptic action of essential oils. I. Inhibitory action of a few vegetable essential oils and their constituents towards homogeneous cultures of human tuberculous bacillus. P. COURMONT, A. MOREL AND I. BAY. *Parfumerie moderne* 21, 161(1928). II. Antiseptic action and inhibitory action of some oils of mint and of their principal constituents. A. MOREL, A. ROCHAIX AND L. SEVELINGE. *Ibid* 163. IV. Inhibitory action of a few vegetable essential oils towards human tuberculous bacillus in vitro. P. COURMONT, A. MOREL AND I. BAY. *Ibid* 165-6.—See *C. A.* 21, 3928; 22, 1806, 1992. III. Weakening of the inhibitory action of essential oils towards microbes due to the colloidal state. A. MOREL, A. ROCHAIX AND A. CHEVALIER. *Ibid* 165.—The inhibitory action of essential oils towards the development of microbes is considerably lower when dispersed as a colloidal soln. than when in mol. soln., which is presumably due to the reduced contact between microbes and oil in the colloidal state. A. P.-C.

Thermophilic and thermoduric microorganisms, with special reference to species isolated from milk. I. Review of literature. A. H. ROBERTSON. New York Agr. Expt. Sta., *Tech. Bull.* 130, 56 pp.(1927); cf. *C. A.* 22, 1173, 1195.—Spore-forming thermophilic organisms are widely distributed in nature. A list of habitats from which they have been isolated is given. Physiologically and morphologically they resemble the common aerobic spore-formers. Only one non-spore-forming thermophilic *Lactobacillus thermophilus* Ayers and Johnson (1924b) has been isolated. Milk is the only recognized source of this species at present. Over 400 references are given. III. Description of the non-spore forming, thermoduric organisms isolated. *Ibid* 131, 62 pp.—A series of pasteurized milk plates from various cities in this country were sent to the New York State Agr. Expt. Sta. for a study of the so-called "pin-point" flora of pasteurized milk. A few heat-resistant cultures were also sent to the lab. Heat-resistant cultures were isolated by enrichment methods. A further selection of cultures was made by detg. the % reduction in the plate count after pasteurization. Where there was more than 80% survival the cultures were retained for further study. These cultures were divided morphologically into 5 types, which proved to belong to 5 distinct species. The utilization of various carbohydrates, some of the higher alcs., org. acids and amino acids was detd. Detns. of volatile acids from milk, *D*-glucose, lactose and sucrose were made at the end of 2 weeks. The amt. of NH_3 and amino-acid N and the titratable acid were detd. at various times up to 30 days. Three species, *Microbacterium lacticum* Orla-Jensen (1919), *Streptococcus thermophilus* Orla-Jensen (1919) and *Sarcina lutea* Schröter (1872) were common in milk. The "majority" of thermal death points

of the above species was above the customary pasteurizing temps. for milk. The presence of the above species in market milk as indicated by the fermentative studies is not regarded as dangerous to health. Their growth rates, with the exception of *Streptococcus thermophilus*, are relatively slow at temps. ranging between 20° and 37°.

E. F. SNYDER

Action of ray K of aluminum on some microorganisms. A. LACASSAGNE. *Compt. rend.* 186, 1316-7(1928).—Petri dishes contg. ordinary agar dried slightly in an oven were inoculated with a bouillon culture. Soon after inoculation the inoculated areas were irradiated with ray K of aluminum for varying lengths of time. *B. pyocyaneus*, *B. prodigiosus*, *Staphylococcus* and *Enterococcus* were used. With all of these microorganisms the effect of a few seconds exposure was readily apparent. On a surface corresponding to the aperture through which the rays emanated the growth was less opaque. The phenomenon was more pronounced for longer exposures. At certain exposures the colonies were isolated. Three phenomena were recognized—visible modification in the development of the culture, appearance of isolated colonies, and finally, complete sterilization. With *B. pyocyaneus*, 40 seconds radiation caused the appearance of isolated colonies but complete sterilization was not obtained after 5 min. exposure. Analogous effects were produced with *Staphylococcus* in 5 sec. and 3 and 10 min. The difference between exposure required for modifying the vitality of the organisms and that required to attain complete sterilization was considerable. L. suggested that the units in a bacterial suspension showed extreme degrees of variation in resistance to radiation due to some physiological peculiarity at the time of expt. or that some of the cells in a suspension were not exposed to the energy.

F. W. TANNER

An attempt to interpret the action of ray K of aluminum on microorganisms. F. HOLWICK. *Compt. rend.* 186, 1318-9(1928).—A theoretical consideration of explanations of the action of ray K of aluminum on bacteria. It is believed that in bacterial suspensions individual units may absorb different amts. of energy. It is conceivable that the same quantity of energy may produce different results on different bacteria. The theoretical assumptions and deductions may be best secured from the original paper.

F. W. TANNER

D—BOTANY

THOMAS G. PHILLIPS

Microchemical detection of organically combined sulfur and magnesium in plants. G. KLEIN. *Oesterr. botan. Z.* 76, 15-24(1927); cf. *C. A.* 22, 2964.—Neuberg's H_2O_2 method does not completely oxidize org. S; the material is instead exposed for several hrs. to Br vapor, the excess of which is removed by volatilization or by means of NH_4 . The sulfate is pptd. with $CaCl_2$, the crystals of $CaSO_4$ being observed on the next day. Mg compds. are removed from plant sections by extended treatment with water.

B. C. A.

Detection and physiology of urea in the higher plants. K. TAUBÖCK. *Oesterr. botan. Z.* 76, 43-56(1927).—An acetic acid ext. of the tissue or section, prepd. on a microscope slide or in a micro-extn. app., is treated with solid xanthidrol, yielding doubly-refracting dixanthylcarbamide, insol. in acetic acid or MeOH, and sol. in hot alc.

B. C. A.

Phosphatides of *Daucus carota*. V. GRAFE AND H. MAGISTRIS. *Z. wiss. Biol. Abt. 3 Plania, Arch. wiss. Bot.* 2, 429-37(1926).—The differences between denatured and native phosphatides are discussed. A diaminomonomophosphatide from *Daucus carota* yields as fission products palmitic, oleic and glycerophosphoric acids, choline and carbohydrates.

B. C. A.

Studies on the transport of carbohydrates in the cotton plant. II. The factors determining the rate and the direction of movement of sugars. F. G. MASON AND E. J. MASKELL. Cotton Research Sta., Trinidad. *Ann. Botany* 42, 571-636(1928).—The first paper of the series reported the diurnal changes in carbohydrates in the leaf, bark and wood of the cotton plant drawing the conclusion that the bark is the chief path of transport, and that the movement is analogous except in rate to movement by purely phys. diffusion. The present work is a closer analysis of the phys. aspects of the problem. Analytical data obtained with plants in which alternate leaves had been covered with lightproof covers indicated but did not prove conclusively that carbohydrate was transported from the illuminated to the darkened leaves. The direction of transport of carbohydrate was reversed in plants from which all but the basal leaves had been removed, and the base-to-apex gradient of concn. established in such plants was exactly the reverse of the apex-to-base gradient found in plants from which

the basal leaves had been removed, leaving the apical leaves intact. Removal of portions of the bark of varying width from the main stems, thus producing "constrictions" in the path of transfer, resulted in acceleration of movement through the remaining bark so that transport did not diminish in a degree proportional to the reduction of transporting tissue. When strips of bark of const. width but of varying length were removed, the reduction in carbohydrate transported increased with increase in length of the constriction. Sep. analyses of inner, middle and outer zones of the bark indicate that the channels of transport for carbohydrates are mainly within the inner zone, the radial concn. gradient being enormously greater than the longitudinal. The inner zone consists mainly of sieve-tubes and sucrose is the strongly predominant carbohydrate therein; the outer zone is largely parenchyma and contains chiefly reducing sugars. This indicates that the sieve-tubes are the chief avenues of longitudinal transport of sugars, and that only slight lateral diffusion into other tissues occurs with little resulting effect upon the concn. gradient. Interchange between sieve-tubes and parenchyma, between leaf and bark, bark and boll and bark and wood follows a diffusion pattern. Constriction in the path of transfer, as by partial removal of bark, increases the concentration gradient and thus the rate of transfer. The observed diffusion constant of sugar in the sieve-tube is approx. 40,000 times as great as in a 2% soln. of sucrose in water and is almost identical with the diffusion const. for mols. of the size of the sucrose mol. diffusing in air.

JOSEPH S. CALDWELL

A method of investigating and evaluating drought resistivity and the effect of drought conditions upon water economy. F. M. HAINES. East London College. *Ann. Botany* 42, 677-705(1928).—The coefficient of drought resistivity is a function involving both the satn. deficit within the plant and the transpiration rate. The method involves simultaneous detn. of the rate of evapn. by means of atmometers and of the rate of absorption of water by the plant through the stump of a detached side branch. The method is described in detail; results obtained in the study of some healthy plants are to be presented in a later paper.

JOSEPH S. CALDWELL

A physiological study of varietal differences in plants. I. A study of the comparative yields of barley varieties with different fertilizings. F. G. GREGORY AND FRANK CROWTHER. Imperial College of Science and Technology, London. *Ann. Botany* 42, 757-70(1928); cf. C. A. 22, 1428.—Five pure line varieties of two-rowed barley were used, the cultures being grown in pots in the open. Water percolating from the pots was collected and returned. The "complete" fertilizer contained N, K₂O and P₂O₅ in the ratio 3 2 1. The several "deficiency series" contained 2 of these constituents in unaltered amt. with 1/2, 1/3 and none of the third constituent. There were 7 replications of each series. The data, treated by Fisher's analysis of variance method, show a differential varietal response to fertilizing, significant values being obtained for roots, straw, total tops and total weight. The very large variations in dry weight and in no. of ears, particularly in the deficiency series, resulted in failure to obtain significant values for ears.

JOSEPH S. CALDWELL

The interaction of factors in the growth of Lemna. I. Methods and technic. ERIC ASHBY, B. D. BOLAS AND F. Y. HENDERSON. Imperial Coll. Sci. and Technology, London. *Ann. Botany* 42, 771-82.—A chamber for growing cultures in constantly circulating aerated soln., with controlled temp and illumination is described, as are methods for detg. area, dry weight and C content of individual fronds. J. S. C.

Relation of the distribution of certain Compositae to the hydrogen-ion concentration of the soil. J. ARTHUR TURNER. *Bull. Torrey Bot. Club* 55, 199-212(1928).—A study of the distribution of 75 species of Compositae over 6 representative soil areas of the Cayuga Lake Basin was accompanied by detn. of the reaction of the soils of each area. Dets. of p_H were made by colorimetric methods upon samples of soil brought into the lab. Of 620 samples, 294 were alk., 174 neutral and 147 acid. Of the 75 species, 15 were confined to soils of acid to neutral reaction, 42 to those of alk. to neutral reaction and 18 were widely tolerant of both acid and alk. soils. *Aster divaricatus*, *Ambrosia artemisiifolia* and *Gnaphalium uliginosum* were greatly reduced in size, vigor and no. of plants on soils which were strongly acid or strongly alk. in reaction.

JOSEPH S. CALDWELL

Studies on the growth of root hairs in solution. VII. Further investigations on collards in calcium hydroxide. CLIFFORD H. FARR. Washington Univ., St. Louis. *Bull. Torrey Bot. Club* 55, 223-46, 4 figs.(1928).—This post-humous paper reports the continuation of an extensive study (C. A. 22, 1793) of the rate of development of root hairs and of elongation of roots in Georgia collards (*Brassica oleracea*). In the present work solns. of Ca(OH)₂ of p_H 7.0 to 11.5 were employed. The growth of individual hairs was followed with the horizontal microscope, a culture chamber being employed

through which the soln. flowed at const. rate and nearly const. temp. The data confirm the earlier results in that the max. rate of elongation in root hairs occurs in Ca(OH)_2 at p_H 10. At p_H values between 10 and 8.5 the rate of elongation is greatly lessened, but rises to a secondary max. at p_H 8.0, declining again and becoming 0 at p_H 7.0. At concns. above p_H 10 it rapidly drops off to become 0 at p_H 12.0. Root elongation shows a max. at p_H 8.5 and falls off with increasing alk. Elongation of hairs on the 2 sides of the root is unequal; elongation occurs more rapidly on the side at which the current enters (affluent) in nearly neutral solns., and on the effluent side in more alk. solns. This difference is the result of the higher concn. of hydroxyl ion. The solns. flowing from the exit tube of the culture chamber had in all cases risen in H-ion concn. by 0.5 to 2.0 p_H in passing through the chamber. In the very dil. solns. of Ca(OH)_2 , here employed, the Ca ions are entirely consumed in root-hair formation while the OH ions penetrate the growing region of the root and affect its elongation. J. S. C.

Toxicity, additive effects and antagonism of salt solutions as indicated by growth of wheat roots. WALTER S. EISENMENGER *Bull. Torrey Bot. Club* 55, 261-304, 4 figs. (1928).—Employing the technic described by Trelease and Trelease and Barton and Trelease and using the same pure line of Marquis spring wheat, E. investigated the antagonistic and toxic effects of KH_2PO_4 , $\text{Ca(NO}_3)_2$ and MgSO_4 . Toxic effects were studied in solns. of the single salts ranging from 0.0004 M to 0.24 M . When used alone, each of the 3 salts retarded growth at all concns. within this range, except that MgSO_4 was slightly stimulatory at concns. below 0.0003 M . The comparative toxicity of the 3 salts varied with concn.; at low concns. the order of decreasing toxicity was KH_2PO_4 , $\text{Ca(NO}_3)_2$, MgSO_4 , at midrange, KH_2PO_4 , MgSO_4 , $\text{Ca(NO}_3)_2$ and at high concns., MgSO_4 , KH_2PO_4 , $\text{Ca(NO}_3)_2$. Antagonism was studied in two-salt mixts. at 5 total concns. from 0.002 M to 0.12 M and 11 different mol. proportions of the 2 salts were employed at each concn. Marked antagonism was observed in all the mixts. tested and was in most cases mutual as indicated by greater growth in mixt. than in a soln. of the less toxic salt. The wide range of salt proportions which allow nearly optimum growth is a striking feature at all concns.; growth is nearly equal over most of the range of mixts., falling off only when the concn. of 1 salt becomes quite low. Quant. indices of antagonism calcd. by Osterhout's additive effect method were inversely related to the total concn. of the soln. The bibliography contains 74 titles. J. S. C.

Long time experiments with plants in closed containers. RAYMOND H. WALLACE. Columbia Univ. *Bull. Torrey Bot. Club* 55, 305-14 (1928).—Culture chambers made from 500-watt elec. light bulbs are described, as are expts. with 12 species. Plants differ widely in their tolerance to conditions in closed containers and tolerant species are found in widely sepd. groups. The balanced gas relation in photosynthesis and respiration is not the only factor detg. survival. Ability to live in an approx. satd. atm. and to withstand the effects of possible deleterious metabolic end-products are suggested as playing roles in the result. In no case have plants in closed containers completed the life cycle by producing viable seeds or spores. JOSEPH S. CALDWELL

Radioscopy in vegetables. E. BARSALL. *Atti accad. Lincei* [6], 7, 681-4 (1928).—Radioscopy should become of great value in the study of the structure of plant tissues and pathol. or other abnormal changes in them. Illustrations are given to show the ease with which abnormalities are revealed. C. C. DAVIS

An improved method of growing turmeric in the Deccan. H. M. DESAI. Dept. Agr., Bombay. *Bull.* 135, 14 pp (1927).—In the growing of turmeric the nitrate-N content of the surface soil was increased from 0.26-0.27 to 0.42-0.50 parts per 100,000 by ridge cultivation with irrigation between the rows, as compared with the usual method of growing in beds and irrigating over the entire surface. A smaller increase was obtained in the nitrate content of the sub-soil. K. D. JACOB

The hydrogen-ion concentration of the sap of the normal cotton plant and that attacked by the stem weevil. T. LAKSHMANA RAO. Madras Agr. Dept. *Yearbook* 1926, 65-72 (1927).—H-ion detns. were made on aq. exts. of the roots and stems and on the undiluted leaf juice of healthy cotton plants and of plants injured by the cotton stem weevil. There was no consistent difference in the H-ion concn. of root exts. from healthy and diseased plants. In general, the stem exts. of diseased plants were slightly more alk. than those of healthy plants, the difference averaging about 0.09 p_H . The H-ion concn. of the stem exts. of 6 healthy plants of the same species varied from p_H 6.18 to p_H 6.25 and that of the leaf exts. from p_H 5.30 to p_H 5.37. In general, the leaf exts. of diseased plants were also slightly more alk. than those of healthy plants. Five-fold diln. of pure leaf juice increased the p_H value about 0.4, while the p_H values of root exts. were not considerably affected by changes in concn. The p_H of leaf juice increased 0.1 in 180 min. after extn. while that of stem exts. increased only 0.01 during the same

time. The results, in general, indicate that injury by the cotton stem weevil causes an increase in the alkyl. of the juices of the cotton plant. The investigations are being continued.

K. D. JACOB

Chemical studies on the ripening of rice seed and chemical properties of rice of the early ripening subvarieties. TETSUTARO TADOKORO. *J. Coll. Agr. Hokkaido Imp. Univ.* 20, Pt. 5, 333-54(1927); cf. *C. A.* 20, 2334; 21, 518, 1289.—In ripening the non-protein N of rice seed decreases and the diamino N, NaCl-sol. and EtOH-sol. proteins increase. The compn. of the chief protein, oryzenin, increases in sp. rotation, in free amino N and lysine but decreases in content of arginine and ash to a certain period when the isoelec. point increases in p_H and then these changes are reversed. In the middle part of the ripening period, the ash and P decrease, the acetyl value of starch increases and its sp. rotation decreases. Early ripening varieties are richer in fat, non-protein and H₂O-sol. protein N and lower in ash and protein N than later varieties. The oryzenin of the early varieties is lower in free amino N than that of the later varieties.

H. R. KRAYBILL

Physiological investigation of *Marchantia polymorpha* L. in pure culture. MARIE LILJENSTERN. Staatsinst. wiss. Pädagogik, Leningrad. *Ber. deut. botan. Ges.* 46, 370-82(1928).—*M. polymorpha* prefers a slightly acid medium. Ca(NO₃)₂ is a better source of N than (NH₄)₂SO₄. Urea N is unavailable while asparagine gives good initial growth but the plants die sooner than in cultures contg. Ca(NO₃)₂. The optimum Ca/Mg ratio varies with the p_H of the medium, and *M. polymorpha* will develop if only one of these elements is present.

LAWRENCE P. MILLER

Variations in the course of photosynthesis. N. A. MAXIMOV AND T. A. KRASNOSSELSKII-MAXIMOV. Inst. f. angew. Bot., Leningrad. *Ber. deut. botan. Ges.* 46, 383-91(1928).—By measuring the amt. of CO₂ absorbed during various 4-min. periods by leaves of barley, soy bean, buckwheat and millet plants, it is shown that, even under uniform conditions, photosynthesis does not take place at an even rate, but its intensity varies greatly, in some cases as much as 100% in the course of a few minutes.

LAWRENCE P. MILLER

Twenty-five years existence of the national institute for plant culture and plant protection in Munich. CHRISTMANN AND I. KL. WEIGERT. *Ernähr. Pflanze* 24, 4-13 (1928).—The history, organization and work of this institution are given. L. P. M.

Potassium and sodium salts compared in their action on guttation. W. MUNKELT. *Ernähr. Pflanze* 24, 66-7(1928).—Na salts are more active in repressing guttation than K salts.

LAWRENCE P. MILLER

Researches on the pigments of the plastids and on photosynthesis. II. The pigments of the plastids and their transformation in the living tissues of the plant. V. LYUBIMENKO. Botan. Garden, Leningrad. *Rev. gén. botan.* 39, 547-59, 619-37, 698-710, 758-66(1927); 40, 23-9, 88-94, 146-55, 226-43, 303-18, 372-81(1928).—A comprehensive review dealing largely with the investigations of L. and co-workers.

LAWRENCE P. MILLER

The toxic properties of West African ratsbane. M. RABINOVICH. *Bull. Imp. Inst.* 26, 143-7(1928).—The kernel of Magbevi nut (*Chailletia toxicaria*) from Sierra Leone was found to be toxic to white tame rats in doses varying from 9 to 12 mg. per 100 g. of body wt. The lethal dose varied within very wide limits, the min. observed being 5 mg. and the av. 36 mg., while the max. dose that failed to kill was 62 mg. per 100 g. The effect of the poison is cumulative and the min. lethal dose found by daily admin. is practically the same as if given in a single dose. The toxic principles appear to be thermostable, as the toxicity does not appear to be reduced by autoclaving. The shell of the nut has a very low degree of toxicity.

A. PAPINEAU-COUTURE

Methods of evaluation of the actual reaction of bog waters. I. A. SMORODINTSEV AND A. N. ADOVA. *Bull. soc. chim. biol.* 10, 806-11(1928).—The quinhydrone electrode method and the method without buffer solns. are utilizable for the detn. of p_H in acid bog waters. The nitrophenol series of indicators in detns. made in free air give results tending toward alkyl. The reaction of bog water detd. its flora, thus with a p_H 3.82 to 5.6 the vegetation was largely *Sphagnum*, and with p_H 7.4 to 8.47 the vegetation was largely *Carex*. Bog waters with acid reaction were poor in flora and fauna and the larvae of *Anopheles* were absent.

L. W. RIGGS

Soluble enzymes which are catalyzers of oxygen, secreted by hymenomycetes. L. LUTZ. *Bull. soc. chim. biol.* 10, 826-48(1928); cf. *C. A.* 19, 1585; 21, 3070.—An address. The main topics discussed with reference to enzymes secreted by 10 species of fungi are (1) oxidizing actions, (2) reducing actions, (3) simple antioxidant actions, (4) antioxidant actions superposed on reducing actions, (5) tannin as antioxidant.

L. W. RIGGS

Chemical constitution of chondriosomes and of plastids in plants. P. MILOVIDOV. *Compt. rend.* 187, 140-2(1928).—The chondriosomes of the mycelium of *Saprolegnia* and of the shoots of *Elodea*, also the plastids of *Tradescantia*, gave the usual color reactions for proteins.

Respiratory exchanges of plants attacked by Uredineae. MARESQUELLE. *Compt. rend.* 187, 247-9(1928).—An increase in the respiratory exchanges was observed in the invaded tissue but not in healthy adjacent tissue. The increase of exchanges caused by the parasite is dependent on the presence and abundance of mycelium and is due to the respiration of the mycelium. The result may be considered as the sum of 2 metabolisms.

Interrelation between diatoms, their chemical environment and upwelling of water in the sea off the coast of Southern California. ERIC G. MOBERG. *Proc. Nat. Acad. Sci.* 14, 511-8(1928).—Studies at stations 5 and 10 miles off the coast of California were made with reference to the conditions of growth of the phytoplankton and especially the diatoms. The factors detd. for depths up to 150 m. were no of diatoms, light, temp., salinity, pH , CO_2 , SiO_2 , NO_3 and PO_4 . An extensive development of diatoms occurred only in a narrow zone at a depth of 30 to 35 m. At higher levels the water was deficient in NO_3 and at lower levels the light was inadequate. Factors affecting the movements of the water were studied.

The destruction of the hydrocarbons of raw rubber by fungi (DE VRIES) 30. Pyocyanin, the blue pigment of *B. pyocyaneus* (WREDE, STRACK) 10.

E—NUTRITION

PHILIP B. HAWK

The relative assimilation by dairy cows of clover and alfalfa hays and of rations of different calcium and phosphorus content. W. A. TURNER, T. S. HARDING AND A. M. HARTMAN. *J. Agr. Research* 35, 625-35(1927).—Metabolism expts. with 2 lactating cows show a better assimilation of Ca and P from alfalfa hay than from clover hay. Analyses of feeds are given as well as analyses of milk and excreta. Expts. involving the use of rations where the content of P was increased by the addn. of $Na_2H_2PO_4$ and Na_2HPO_4 suggest a better assimilation of Ca and P when the value of the Ca/P ratio of the feed is 1.25 than when it is 2.5. Positive Ca and P balances are observed in a cow on a ration of good alfalfa hay and a good grain mixt., the milk yield being 19 kg. per day.

Metabolic changes in rickets. H. HENTSCHEL AND E. ZÖLLER. *Monatsschr. Kinderheilk.* 34, 248-53(1926).—In rachitic rats the total phosphoric acid was unchanged; the ability to synthesize a lactacidogenic substance from inorg. phosphoric acid and hexose was diminished.

Bird feathers and antirachitic vitamin. W. ROWAN. *Nature* 121, 323-4(1928).—It is suggested that feather oil may contain vitamin D.

Activation of ergosterol— 180° . T. A. WEBSTER AND R. B. BOURDILLON. *Nature* 121, 502(1928).—Vitamin D has been obtained by irradiation of ergosterol in alc. soln. at -180° to $+78^\circ$ (cf. *C. A.* 22, 2193).

Researches on the physiological action of alcohol. V. Effect of a sub-protein, sub-lipin and hypercarbohydrate diet on the nitrogen exchange of white rats. A. GALAMINI. *Univ. Roma. Atti accad. Lincei* [6], 7, 526-30(1928); cf. *C. A.* 22, 2407.—EtOH has a favorable influence on the resistance of white rats fed on corn starch with quantities of beer yeast diminishing from 0.20 to 0.03 g. This favorable influence does not depend upon a diminished consumption of proteins, for rats administered EtOH consumed more protein than those so fed.

Growth-promoting properties of vitamin D. A. L. BACHARACH. *Quart. J. Pharm.* 1, 49-60(1928).—It was found that refined soy-bean oil may be a good source of vitamin A, though devoid of vitamin D. The process of hardening has a destructive effect on the vitamin A, though the destruction is perhaps incomplete. The growth-promoting properties of vitamin D can be directly illustrated by the use of suitable basal diets.

The tripartite nature of vitamin B. ROBERT R. WILLIAMS AND ROBERT E. WATERMAN. *Columbia Univ. J. Biol. Chem.* 78, 311-32(1928).—A fuller's earth prepn. of the brewers' yeast, made with a special dialysis and adsorption app., is the source of the first or antineuritic factor of vitamin B. This is termed the *Y prepn.* Brewers' yeast autoclaved for 6 hrs. at 121° is the source of the second factor, the pellagra-prevention factor. Pigeons fed a synthetic basal diet, (No. 107, Sherman and Spohn) or polished rice, supplemented by special fullers' earth, drop to a sub-normal level in wt., appearance,

etc. Upon changing this diet to whole wheat, the birds regain their normal level. The same results are obtained when 1 g. of air-dried brewers' yeast is given every other day with the basal diet remaining the same. Since the same result is not obtained with autoclaved yeast or Y prepn. or both, as supplements, the pigeons' improvement in wt. and condition must be due to a thermolabile factor originally present in the yeast and which is different from the antineuritic factor in the Y prepn. This is concluded to be due to a *third factor* in vitamin B. The possibility of the presence of vitamins A, D and E as factors is eliminated experimentally.

RUSSELL C. ERN

The physiological significance of certain important constituents of vegetables with particular reference to lignin. MAX RUBNER. *Sitzb. Preuss. Akad. Wiss.* Nos. 11-12, 127-45(1928).—Data are presented showing the N, amino N, cellulose, pentosan and lignin content of all the common vegetables. The significance of lignin and cellulose in human nutrition is briefly discussed.

C. R. FELLERS

The importance of properly balanced rations in trials to determine digestibility as shown in experiments with dried apple pomace. C. W. HOLDAWAY, W. B. ELLETT, J. F. EHLEART AND M. P. MILLER. *Va. Agr. Expt. Sta., Tech. Bull.* 32, 1-18(1927).—Under balanced conditions the digestible coeffs. found for dried apple pomace, cows being used, were dry matter 67, crude protein 37, ether ext. 32, crude fiber 54 and N-free ext. 80%. Dried apple pomace, being a bulky feedstuff with a low protein and high energy content, widens the protein-energy ratio when added to a basal ration, thus causing a pronounced depression of digestibility of the protein of the whole ration. This general depression reduced the amt. of digestible protein in the whole ration to such an extent that the results show that apparently none of the apple pomace protein is digested, and furthermore that less of the protein in the basal ration is digested when this material is added to it.

C. R. FELLERS

The respiratory metabolism in infancy and in childhood. III. Glycogen storage in children. S. Z. LEVINE, J. R. WILSON AND H. RIVKIN. *Am. J. Diseases Children* 31, 496-503(1926); *Physiol. Abstracts* 11, 431; cf. following abstr.—An investigation was carried out on two normal girls, one obese girl, one girl subject to cyclic vomiting and one diabetic boy. A period of high carbohydrate, high caloric diet was followed by a fast of about 74 hrs., during which only small carbohydrate-free meals were given. The authors confirmed the fact that glycogenesis occurs during high carbohydrate feeding and glycogenolysis during starvation in all the cases studied except the diabetic boy. The relative quantities of carbohydrate mobilized and oxidized during short fasts was approx. the same in the normal children, nor was it diminished in the patient with cyclic vomiting between the attacks.

H. G.

The respiratory metabolism in infancy and in childhood. VI. The specific dynamic action of food in normal infants. S. Z. LEVINE, J. R. WILSON, F. BERLINER AND H. RIVKIN. *Am. J. Diseases Children* 33, 722-31(1927); *Expt. Sta. Record* 58, 593; cf. preceding abstr.—Using the app. and methods described in the first 2 papers of the series (*C. A.* 20, 1262), the authors have detd. the effect of various foods on the metabolism of two normal infants, aged 3 and 4 months. The basal metabolism of these subjects, as obtained during sound sleep and from 2 to 3 hrs. following small meals of cow's milk furnishing 62 and 34 cal., resp., equaled 42.5 and 41.4 cal. per sq. m. per hr. The test meals consisted of cream, glucose, casein and cow milk, resp., each furnishing approx. 125 cal. The fat, milk and protein meals raised the metabolism of one of the subjects 8, 4 and 15% above the basal level and of the other subject 1, 9 and 17% above the basal level in the 3 hrs. after ingestion. The metabolism of the second subject was also raised 8% above the basal level by the glucose meal.

H. G.

The action of chalybeate springs on the metabolism. M. KOCHMAN AND H. SEHL. *Vereinigten Friedrichs, Univ. Halle-Wittenburg. Deut. med. Wochschr.* 54, 1321-2 (1928).— $FeCl_3$, obtained from mineral springs, had an accelerating action on the growth of young rats.

ARTHUR GROLLMAN

The influence of the administration of aluminum upon the aluminum content of the tissues and upon the growth and reproduction of rats. VICTOR C. MYERS AND JAMES W. MULL. *State Univ. of Iowa. J. Biol. Chem.* 78, 605-13(1928).—The Al content of the tissues was detd. in 4 groups of rats: (1) on a control diet, (2) on a diet high in Al content, (3) on an Al-free diet and (4) following the intraperitoneal administration of Al. The minute traces of Al normally present in the tissues were only slightly increased by diet (2) and persisted even on diet (3). Following the intraperitoneal injection of Al, increasing amts. were found throughout the body, particularly in the liver. In 4 generations of rats receiving 2 mg. of Al, in the form of $KAl(SO_4)_2$, daily, no abnormalities were noted except a greater initial growth rate.

ARTHUR GROLLMAN

Factors affecting the accuracy of the quantitative determination of vitamin A. H. C. SHERMAN AND M. P. BURTIS. *Columbia Univ. J. Biol. Chem.* **78**, 671-80 (1928).—The factors affecting the results obtained in the detn. of vitamin A by the rat-growth method were studied. The diet fed to the mother and available to the young until sepd. from her, the size of the exptl. animal at the beginning of the test period and the length of the test period, all affect the final results. ARTHUR GROLLMAN

Polynuritis in pigeons and albino rats from deficiency of oryzanin (vitamin B). MOTOO IWATA. *Bull. Inst. Phys. Chem. Research (Tokyo)* **7**, 302-13 (1928); *English Ed.* **1**, 27-8.—Many of the symptoms of the so-called polynuritis in B-avitaminosis may be due to some trouble in the central nervous system. Puncture was practiced all over pigeon's brain, and the symptoms were observed only when the medulla oblongata was affected; all the symptoms peculiar to B-avitaminosis appeared; this affection bears some relation to the deficiency of oryzanin. The medulla oblongata was examd. pharmacologically with fufural. About 0.06 g. was effective to set up temporarily in a healthy pigeon such a spasmodic condition as seen in B-avitaminosis. By feeding a pigeon with an oryzanin-deficient diet, and injecting daily 0.02-4 g. of fufural, the susceptibility to fufural is increased. The convulsion caused thereby is only temporary, at first, but becomes gradually durable, and at last the convulsion continues for a few days by a single dose, ending in the death of the victim. At any stage, fufural loses its affecting power from the very next day of supplying oryzanin, thereby enabling the repetition of similar expts. several times. Again, by increasing the oryzanin-deficiency, a dose of 0.002-3 g. of fufural was effective; 0.5 cc. of con. oryzanin was enough to effect the recovery. Almost similar results were obtained with albino rats, except that the medulla oblongata did not show much change under the microscope; with pigeons, many perivascular and focal lesions were observed in this part and its neighborhood. Substances having a fufural-like role were obtained by decomp. carbohydrates such as glucose and gum-arabic by 5-10% HCl; these might be fufural and hydroxymethylfufural. The oryzanin deficiency affects first the whole medulla oblongata and other parts of the nervous system, causing functional disturbances and increasing the sensibility, then manifesting general symptoms through the whole body such as convulsion or paralysis, according to the nerve center which suffers the most. The disturbance of medulla centers essential to life seems to be the cause of mortality in B-avitaminosis. A. L. HENNE

Dental caries and pulp sequelae resulting from experimental diets. JOHN A. MARSHALL. *Univ. of Calif. J. Am. Dental Assoc.* **14**, 3-37 (1927).—Dental caries has not been found in young albino rats, even those of the 3rd generation, from parents on a diet deficient in vitamin A. However, caries develops in both males and females after maturity has been reached, and resembles that in adult man, rather than in the child or adolescent. Pulp lesions (e. g., pulp calcification) may occur in both carious and non-carious teeth. The caries of avitaminosis is not altered or arrested by addn. of vitamin A to the diet. The dental defects produced in dogs by deficient diets are not comparable to those produced in rats, since the dog does not show hypoplasia in either the enamel or the dentin. JOSEPH S. HEPBURN

Studies on vitamin deficiency diseases. TADASHI MASAKI. *J. Am. Dental Assoc.* **14**, 1654-6 (1927).—A diet deficient in vitamin C was fed to 51 guinea pigs. Exptl. scurvy resulted. The chief changes produced in the teeth were imperfect development of the dentin, enamel and cementum, calcific striations in the dentin, and hemorrhagic inflammation and accompanying disturbances in the pulp and pericementum. The enamel was influenced within 1 week after the beginning of the scorbutic diet. A diet deficient in vitamin A was fed to 32 albino rats; eye disease developed in 20 to 49 days. In their teeth, the enamel showed morphological changes (localized spots or markings accompanied by irregular course and arrangement of the enamel prisms); the collagenous layer of the dentin increased in vol., and improper deposition and fusion of the calcolayer of the dentin occurred. The cementum underwent central absorption. Circuloglobulin spherules occurred. The cementum underwent central absorption. Degenerative disturbances occurred in the soft dental tissues. The changes in bone and teeth resembled those in osteomalacia. The oral epithelium underwent atypical proliferation, hyperkeratosis and heterotopia within 47 to 73 days. The glandular cells of the salivary gland showed atrophy and necrosis, and the epithelium of its duct became cornified. CARCINOMATOUS change was not observed. JOSEPH S. HEPBURN

Behavior of the blood sugar in diabetic patients after ingestion of different carbohydrate-carriers without and with insulin. HERBERT MAUERHOFER. *Univ. Zürich. Z. klin. Med.* **105**, 641-60 (1927).—No evidence was obtained of the presence in oats of a principle which is absorbed from the intestine and lowers the concn. of the blood sugar.

None of the various carbohydrate-carriers had a distinct advantage over the others in decreasing the level of the blood sugar. Barley flour, white bread and bananas yielded varying results in parallel expts. on the same patient and on different patients. Addn. of butter retarded the decrease, while addn. of protein (beef) elevated the blood sugar curve above that given by oatmeal alone. The blood sugar was but slightly influenced by beef alone. When a second ingestion of carbohydrate occurred at an interval of approx. 3.5 hrs., no conclusions could be drawn concerning the blood sugar curve with respect to either the height of its turning point or the nature of its decrease. Insulin had a typical effect in decreasing the blood sugar concn.; this effect was markedly lessened in the course of even 5 hrs. With respect to the glucosuria, oatmeal was well tolerated by diabetic patients, bananas and barley even better by some patients. The unfavorable action of white bread or of oatmeal plus animal protein was attributed to the protein. Butter had no action on glucosuria. Relatively small doses of insulin did not markedly influence the urinary sugar. Repeated ingestion of small quantities of carbohydrate was followed by better utilization in the diabetic organism than ingestion of the same total quantity as one portion.

JOSEPH S. HEPBURN

The action of irradiated ergosterol on rickets. A. HOTTINGER. *Naturwissenschaften* 16, 484-91(1928).—Three cases are described of positive curative action of irradiated ergosterol on rickets patients in advanced stages, dose 3 to 5 mg. daily. The clinical action is discussed.

B. J. C. VAN DER HOEVEN

Direct and indirect determination of the energy value of milk in relation to the nutritional requirements of the newborn. ORESTE GARZIA and ELIA SAVINI. *Pediatrica Rivista* 36, 339-46(1928).—The caloric value of a no. of dairy milks was detd. directly and calcd. from the lactose, fat and protein content and with the aid of formulas based on the fat content alone. The latter calcn. gives better results than the former. Results obtained with a modified Andersen's formula, $C = 280 + 113.5 \times G$, where C = kg. cal., G = % fat, show satisfactory agreement with those detd. directly. The av. caloric value is 20-30; for milk with a high fat content it is 4-4.5% and above 4.7% it is 60 and 100 cal., resp.

MARY JACOBSEN

Experimental rickets in rats and the relation to ergosterol. ADOLF WINDAUS and FRIDRICH HOLTZ. *Nach. Ges. Wiss. Göttingen math. physik. Klasse* 1927, 217-25.-- Since antirachitic substances can be transmitted to animals during the placental period and afterwards through the mother's milk, it is necessary to begin with animals which come from a mother kept deficient in vitamin D. The method of prep., feeding and breeding such parents is given in detail. The following daily doses of irradiated substances were found to be antirachitic: 1 γ ergosterol, 10 γ of ergosterol distillate, 5 γ digitaligenin, 5 γ acetyldigitaligenin; these substances were useless when not irradiated. The following substances were of no value under any conditions: isoergosterol, oxycholesterylenes, nerolidol and ψ -ionone.

N. A. LANGE

Chemical changes in the blood during fasting and subsequent refeeding. II. Inorganic components. SERGIUS MORGULIS with V. L. BOLLMAN. *Nebraska Coll. Med. Am. J. Physiol.* 84, 350-62(1928).—The electrolytic compn. of the blood was maintained with tenacity in fasting dogs and cats, striking changes appearing in the more advanced stages of starvation. A fall of Cl was assocd. with a rise in plasma bicarbonate, the latter probably due to a toxicosis which developed at that stage of fasting. Ca undergoes diminution during fasting and is always found only in the fluid portion of the blood.

J. F. LYMAN

Effect of low protein and protein-free diets and starvation on the voluntary activity of the albino rat. FRED A. HITCHCOCK. *Ohio State Univ. Am. J. Physiol.* 84, 410-6(1928).—Low protein diet (12% protein) depressed voluntary activity in white rats. Protein starvation and complete starvation for short periods greatly increased activity. During a fast the material lost from a rat's body has an av. calorific value of about 5 cal. per g.

J. F. LYMAN

The effect of yeast upon metabolism. EUGENE V. STILL and ELIZABETH M. KOCH. *Univ. of Chicago. Am. J. Physiol.* 85, 33-44(1928).—With human subjects the addn. of yeast to a low protein, low purine diet, after a low uric acid elimination had been attained, caused no increase in uric acid excretion. If the yeast was added while the uric acid excretion was still high or while the subjects were on a high protein (meat) diet, an increased elimination of uric acid occurred. There was no increase in blood uric acid after several weeks of yeast ingestion. Total urinary phenols decreased with yeast feeding, indicating a decreased intestinal putrefaction. Total urinary N and P increased after yeast ingestion; but the larger part of the N and P of the yeast was found in the feces. The yeast feces were more bulky and softer than the controls and were generally more regularly and easily expelled.

J. F. LYMAN

The energy factor in relation to food intake. Experiments on the dog. GEORGE R. COWGILL. Yale Univ. *Am. J. Physiol.* 85, 45-64(1928).—When dogs under lab conditions were fed rations consisting of purified foodstuffs, but contg. all dietary essentials, the amt. eaten being limited by the animals appetite only, food consumption, regardless of the bulkiness of the diet, adjusted itself at approx. 64 cal. per hr. per sq. m., with a standard deviation of 8.4%. The appetite adjustment level for cal. for dogs can be calcd. as follows: $\log \text{ cal. per hr.} = 0.0162 L + 0.338$ (L = length of dog in cm. from tip of nose to anus). The maintenance level for the cal. requirement is estd. at 15% below the adjustment level. A table showing the requirements for dogs of different lengths is given.

J. F. LYMAN

Spontaneous deciduomata in pseudopregnancy with low vitamin E. HERBERT M. EVANS. Univ. Calif. *Am. J. Physiol.* 85, 149-53(1928).—The tendency for spontaneous uterine tumors to occur in the pseudopregnant rat was very greatly increased when the rations used lacked fat-sol. vitamin E, 60% of all animals on low vitamin E diets showing uterine tumors under the exptl conditions, while only 4% of those on complete diets showed such signs.

J. F. LYMAN

The influence of protein intake on basal metabolism. GEORGE MACFARLANE WISHART. Univ. of Glasgow. *J. Physiol.* 65, 243-54(1928).—There was a marked parallelism between the daily variations in basal metabolism and variations in the output of N in the urine. In one subject the lowest value for basal metabolism on a diet contg. 30 g. protein per day was 26.83 cal. per sq. m. per hr.; the max. value, when the diet contained 150 g. protein, was 40.39 cal. per sq. m. per hr. Differences in N metabolism did not fully account for the difference in basal metabolic rates of different individuals; hence other factors, possibly habitual differences in the caloric intake, may be involved.

J. F. LYMAN

Scorbutic avitaminosis and irradiation with ultra-violet rays. IZIO MILANESI. *Boll. soc. ital. biol. sper.* 3, 240-1(1928).—The effect of irradiation on vitamin C in dried oats was studied. Four groups of guinea pigs were used—1 received the non-irradiated oats, the other 3 received oats irradiated for 35, 45 and 60 min., resp. Irradiation failed to activate vitamin C. The animals fed with oats irradiated for 30 and 45 min. showed macro- and microscopic lesions of typical scurvy; those receiving oats irradiated for 60 min. died before the controls, although they showed no typical lesions of scurvy. The irradiation probably destroyed or altered other nutritive factors.

P. M.

Nitrogen metabolism I. Can ammonium salts be substituted for the proteins in nitrogen metabolism? UGO LOMBROSO AND S. DI FRISCO. *Boll. soc. ital. biol. sper.* 3, 303-7(1928).— NH_4 citrate and fats were administered to a group of albino rats; another group received NH_4 citrate and carbohydrates; a control group received only fats or carbohydrate but no NH_4 salts. The urine and feces were collected from each group and the N was detd. The animals were later killed, ground to a pulp and N was detd. The results showed that NH_4 salts did not influence the N metabolism, and did not stop the progressive loss of protein N. In a large no. of the rats the difference between the assumed N in the animal before the expt. and the N found in the dead animal did not balance with that found in the urine and feces during the expt. A large amt. of N (34-59.9%) was eliminated by routes other than the renal or intestinal. II. The routes of elimination of nitrogen during the absolute fasting of albino rats. *Ibid* 307-9.—Five albino rats were fasted until death. The N in the animal (calcd.) before the expt. did not balance with the N in the dead animal plus the N in the urine and feces collected during the expt. There was an unaccounted deficit of 36-8 to 65.0%. It must have been eliminated by other routes besides the renal and intestinal. This is a factor which must be recognized in all future N equil. expts. PETER MASUCCI

Synthesis of vitamin B by microorganisms. GERTRUDE SUNDERLIN AND C. H. WERKMAN. Iowa Agr. Expt. Sta., Ames. *J. Bact.* 16, 17-33(1928).—The synthesis of vitamin B by such biologically sepd. genera as *Torula*, *Oospora*, *Actinomyces*, and 4 genera of the order Eubacteriales reveals that vitamin B, whatever its chem. structure may be, is a constituent prevalent in microorganisms. There was no marked difference in the ability of 3 strains of *B. coli* to synthesize vitamin B. Drying at 37° or at 100° for 48 hrs. does not materially diminish the potency of the bacterial mass. There is a long bibliography.

JOHN T. MYERS

The pre-beriberi condition. With special reference to its existence in Japan. EGBERTON C. GRAY. Cambridge Univ. *J. Hyg.* 27, 257-67(1928).—A pre-beriberi condition manifested by general body weakness, affection of the heart, and in most cases loss of appetite and anemia, is very prevalent in Japan. Many cases now classed as beriberi are probably the pre-beriberi condition. It arises from a prolonged diet deficient not only in accessory but also in essential factors, in particular one which is

low in protein and high in starch. Hence rice-eating peoples are liable to it whether the rice is polished or not. The prophylaxis is milk, eggs and meat. J. T. M.

Studies in the nutrition of birds. EGERTON C. GREY. Egyptian Univ., Cairo, and Cambridge Univ. *J. Hyg.* 27, 268-94(1928).—On a similar diet, wild pigeons put on wt. more slowly and lose it more slowly than do town-bred pigeons. They represent 2 general types in the animal kingdom, the active or neuromuscular, and the passive or digestive. In the former the skeletal system is better developed and the food more completely utilized in producing energy, and there is less storage. There are 2 corresponding types in the Japanese human population, one characterized by the development of beriberi and the other by symptoms of exhaustion and general muscular weakness. A diet consisting exclusively of cereals, especially if overmilled, leads to a general metabolic disturbance, which affects in varying degree all the tissues of the body, of which the polyneuritic symptoms are but one manifestation, and by no means the most common even in birds. A study of the non-neuritic disease in birds may throw light on the similar syndrome in man. Various chem. factors, some in the tissues (fixed factors), some in the food or which may be formed in the body (mobile factors), as well as phys. and physiol. factors must be considered in explaining the disease induced in an animal by an entirely cereal diet, especially polished rice. There is much evidence of the accumulation of toxic material in the bodies of birds with rice disease, but it is not certain whether it comes from the tissue of the bird or from the rice. The trouble may be due to excessive metabolic work with an insufficient supply of nitrogenous repairing material. The action of the vitamin B complex may be attributed to 2 factors. One catalyzes enzyme action in the tissues, especially of the oxidative type; hence it is concerned in regulating energy production whether from carbohydrate, fat or protein. The other maintains tone of tissues. If absent the cells become autolyzed, permeable to fluids and finally disintegrate. JOHN T. MYERS

Relation between the nature of the carbohydrate in the diet and refection in rats. STANISLAW KAZIMIERE KON AND ELSIE WATCHORN. Cambridge Univ. *J. Hyg.* 27, 321-7(1928).—The phenomenon of refection was confirmed. The incidence of spontaneous growth of rats on a vitamin-B-free diet is very much greater when potato starch instead of rice starch is used. Raw arrowroot starch gives similar but not so good results. The protective action is largely destroyed by gentle cooking of the starch, and less so by alc. extrn. JOHN T. MYERS

The relative stability of vitamin A from plant sources. H. C. SHERMAN, E. J. QUINN, P. L. DAY AND E. H. MILLER. Columbia Univ. *J. Biol. Chem.* 78, 293-8(1928).—When tomato juice was heated at $98^{\circ} \pm 2^{\circ}$ for 4 hrs. destruction of vitamin A under either aerobic or anaerobic conditions was about 17%, as detd. by the effect of feeding heated and unheated juice to rats. No difference was observed between juice at p_H 4.2, and at p_H 9.2, heated to 100° . Olive oil ext. of spinach leaves lost 20% of its vitamin A content, while olive oil ext. of butter fat lost 33% of its vitamin A content. C. RIEGEL

Growth and maintenance of white mice fed synthetic diets. M. C. DAWBARN. *Australian J. Exptl. Biol. Med. Sci.* 5, 149-69(1928).—The diet recommended contained: casein 18 parts, dextrinized arrowroot starch 46, cane sugar 15, clarified butter fat 8, lard 7, salts 4, moist yeast contg. 75% water (corresponding to 3.7% dried wt. of yeast) 15. Upon this diet male white mice grew normally for 3 generations. This diet was less satisfactory for the growth and maintenance of female mice. A limiting factor in this diet appears to be the furnishing of vitamin B by yeast. L. W. RIGGS

Mode of action of vitamin B. H. BIERRY AND MAX KOLLMANN. *Compt. rend.* 186, 1062-4(1928).—The stimulating action of hydrosoluble vitamin B is exercised at the same time on the glands of external and internal secretion. L. W. RIGGS

Importance of manganese for animals. GABRIEL BERTRAND AND HIROSI NAKAMURA. *Compt. rend.* 186, 1480-3(1928).—Feeding tests were made with 6 series of young white mice by the same rigid technic observed in B.'s previous work with Zn, Ni and Co. Of the 34 animals used 28 completed the test. Thirteen fed without Mn survived on the av. 24.4 days, and 15 fed Mn survived on the av. 27.4 days. The animals fed Mn retained about 10 times as much Mn in their bodies as those not fed Mn. These results, with those of McHargue (cf. *C. A.* 20, 3488), indicate that Mn, which is always present in animals, takes some part in the nutritive exchanges. L. W. RIGGS

Water-soluble vitamins of Group B. Probable existence of a thermostable and alkalino-stable factor necessary to life. (MME.) L. RANDOIN AND R. LÉCOQ. *Compt. rend.* 187, 60-2(1928).—Neither fuller's earth activated by fixation of the antineuritic vitamin, nor ext. of yeast autoclaved in an alk. medium are capable of prolonging the life of pigeons fed a ration deprived of vitamin B. But the remarkable fact is that

fed a mixt. of these 2 products, the life is decidedly prolonged. It appears that the autoclaved ext. of yeast carries a water-sol. thermostable-alkalimostable factor which is indispensable to the pigeon and takes part in the cellular utilization of various nutritive principles, especially the sugars. The ext. of beer yeast deprived of the antineuritic factor contains both the nutritive thermolabile factor and the thermostable factor. It is probable that 2 g. doses of activated fuller's earth per day contain, in addn. to the antineuritic vitamin, a small quantity of the nutritive utilization vitamin. L. W. RIGGS

Comparative variations in the content of the liver and spleen in water, aliphatic acids and cholesterol in the normal guinea pig and in the guinea pig subjected to a diet deprived of antiscorbutic vitamin. (MME.) L. RANDOIN AND (MILE.) A. MICHAUX. *Compt. rend.* 187, 146-9(1928); cf. *C. A.* 20, 1437; 21, 1139.—The liver of the normal guinea pig contained an av. of 0.21% of cholesterol, 1.81 to 2.26 of aliphatic acids and 72.5 to 74.6 of water. During the last 6 days of a 32-day period of feeding a ration deprived of vitamin C, the cholesterol content of the liver generally increased, the aliphatic acid content increased and the lipocytic coeff. diminished. The spleen of the normal guinea pig contained an av. of 0.4% cholesterol, 1.4 of aliphatic acids and 78.3 of water. During acute scurvy the spleen increased in size and wt. As death approached the cholesterol and the aliphatic acids diminished and the water content increased.

L. W. RIGGS

Metabolism of sugars in inanition. G. MOURIQUAND AND A. LEULIER. *Compt. rend. soc. biol.* 99, 125-6(1928); cf. Bierry, *C. A.* 22, 1999.—A discussion of previous work.

L. W. RIGGS

Separation of antineuritic vitamins by means of fuller's earth. Nutritive utilization of beer yeast. (MME.) L. RANDOIN AND R. LECOQ. *Compt. rend. soc. biol.* 99, 148-50(1928).—Beer yeast extd. with 70% alc. and the alc. removed at reduced pressure yields a product, ext. B, which is usually employed as a source of nutritive and antineuritic vitamins B. To 100 g. of ext. B was added 1500 cc of water at a temp. of 30° and on filtering about 25% of the original 100 g. was removed. The filtrate was agitated with 45 g. and again with 30 g. of fuller's earth, when on filtering and drying about 75 g. of active earth TE was obtained. The filtrate evapd. in a vacuum at low temp. gave ext. E. Again 100 g. of ext. B was extd. with 1500 cc. of 70% alc., a cryst. ppt. was filtered out and the filtrate was agitated with 100 g. of fuller's earth in two 50 g. portions and filtered. The active fuller's earth thus obtained was designated by earth TA and the filtrate by ext. alc. A. The fuller's earth in an aq. medium takes up nearly all of the antineuritic vitamin and a portion of the nutritive vitamin. Ext. E contains almost exclusively the nutritive vitamin; earth TA contains almost exclusively the antineuritic vitamin; while ext. alc. A contains only the nutritive vitamin. The cryst. ppt. above mentioned probably contains a strong proportion of the nutritive vitamin.

L. W. RIGGS

Ketogenic diet treatment of epilepsy in adults. CLIFFORD J. BARBORKA. *J. Am. Med. Assocn.* 91, 73-8(1928).—Thirty-two adult epileptics were given a ketogenic diet. In 7 cases the attacks were controlled and in 12 other cases the patients were definitely improved. The remaining 13 cases were not definitely benefited although many of them were not maintained in a state of ketosis.

L. W. RIGGS

Absorption spectrum of vitamin A. R. A. MORTON AND I. M. HEILBRON. *Nature* 122, 10(1928).—A detailed spectrographic examn. was made of samples of a large and varied assortment of fish-liver oils and vitamin A concentrates. The chief result was the recording of a prominent absorption band at 328.5 μ , the intensity of which runs closely parallel with the vitamin A potencies of the various oils as measured by the SbCl₃ color test. Irradiation results in the disappearance of the chromogenic substance. Biological expts. proved that aeration or oxidation also causes the destruction of the vitamin, and these spectrographic tests indicate the same result. It is probable that the first decompn. products of vitamin A include a substance with an absorption band in the region 275-285 μ . The adoption of the 328 μ band as a criterion of vitamin A will assist in the elucidation of the chem. nature of the substance. L. W. RIGGS

Does the amount of food consumed influence the growth of the animal? H. H. MITCHELL. *Science* 68, 82-4(1928); cf. *C. A.* 21, 1292, 1478, 3934; W. C. ROSE, *Science* 67, 488; M. L. MITCHELL, *C. A.* 18, 2736.—A discussion of the fundamental principles underlying feeding expts. is given.

L. W. RIGGS

Morphological changes of the pavement epithelium of albino rats due to feeding on special diets. II. Relationship between morphological changes in the fore-stomach of rats fed on special diets and the constituents of the diets. YOSHITOMO FUJIMAKI, TETSUJI KIMURA, YOSHIHARU WADA AND SADAOKI SHIMADA. *Sei-i-kwai Med. J.* 47, 1-20(1928); cf. *C. A.* 21, 1836.—The degree of the morphological change in the fore-

stomach of the nature of hyperkeratosis, atypical epithelial proliferation, etc., is comparatively slight with animals fed on a diet deficient in both fat and vitamin A. Feeding a diet deficient in vitamin A to which heated olive oil was added often produces marked or moderate changes in the fore-stomach of albino rats, such as hyperkeratosis and papillomatous or carcinomatous growth. In a no. of cases moderately marked changes are to be observed in the forestomach of animals fed on fatty substances such as butter, butter fat and butter plus-cod-liver oil. These changes bear an intimate relationship to the obstruction of fat metabolism. Further work is in progress in the attempt to establish the causal factors of these morphological changes. L. W. RIGGS

Growth and development with special reference to domestic animals. XI. Further investigations on surface area with special reference to its significance in energy metabolism. SAMUEL BRODY, JAMES E. COMFORT AND JOHN S. MATHEWS. Agr. Expt. Sta., Univ. Missouri. *Coll. Agr. Research Bull.* 115, 60 pp. (1928).—Data are presented on the relation of surface area to body size of 482 dairy cattle, 341 beef cattle, 11 horses and 16 swine. A mathematical (graphical) analysis is presented of these original data, as well as of the available published data on the relation of area to body size and on the relation of heat production to body size. It is shown that the numerical value of the power in the power function relating surface area to body wt. varies from about 0.4 to about 0.7, depending on the relative variations in the linear size of the animals as compared to variations in body wt. In this connection the formulas of Meeh, of DuBois and DuBois and of Cowgill and Drabkin are subjected to critical analysis; as is also the so-called surface area law of Rubner. It is concluded on mathematical and on biological grounds, that while it may be more convenient, and perhaps more enlightening, to relate heat production to surface area, it is simpler to relate heat production directly to body size raised to some power by a method explained in detail in the text. E. F. SNYDER

The relation of diet to bodily activity and to capacity to withstand unfavorable circumstances. A. G. HOGAN, J. E. HUNTER AND C. L. SHREWSBURY. Missouri Agr. Expt. Sta., *Bull.* 256, 50-1 (1927).—Investigations as to whether or not vitamin E affects the rate of growth in any way have been made. Various synthetic diets, some of which contained vitamin E and some that were free from it, have been used. Rations made up of natural foodstuffs have also been used. The rats under observation have received the same ration that was given their mothers during gestation and lactation, with a few exceptions. The table indicates that the growth rate of animals was not affected by the presence or absence of vitamin E in the diet. E. F. S.

The calcifying potency of cod-liver oil. J. O. ELY, HANNAH E. HONEYWELL AND R. ADAMS DUTCHER. Penn. Agr. Expt. Sta., *Bull.* 213, 4 (1927).—A study has been made of a no. of medicinal cod-liver oils and proprietary cod-liver oil preps. with the view of detg. the min. quantity of each that will produce a standard amt. of calcification in a given time. It is impossible to bring about normal calcification with the Steenbock yellow corn ration supplemented with cod-liver oil. Small addns. of cod-liver oil prevent the development of rickets, but this rate of calcification soon reaches a sub-normal max. above which it cannot be forced by increased addns. of cod-liver oil. While the line test is useful, it is thought that the detns. of bone ash are more capable of quant. interpretation. E. F. SNYDER

Bone calcification in rats as influenced by ultra-violet light from various sources. HANNAH E. HONEYWELL AND R. ADAMS DUTCHER. Penn. Agr. Expt. Sta., *Bull.* 213, 5 (1927).—Ca deposition in the skeleton of rats has been used as an index of the physiol. potency of ultra-violet light from the quartz Hg vapor lamp and the C arc lamp. Both sources of light prevented the development of rickets although the amt. of calcification with the former was slightly superior to that obtained with the latter. Data also have been obtained relative to the irradiation of rats and rations, which indicate that it is preferable to irradiate the ration rather than the rats. An irradiation period of 5 min. daily seems to be less harmful than a 15-min. period and the amt. of Ca deposited during the shorter period is not appreciably less. E. F. SNYDER

Synthesis of vitamin B by bacteria in the rumen of cattle. S. I. BECHDEL, H. E. HONEYWELL, R. A. DUTCHER AND M. H. KNUDSEN. Penn. Agr. Expt. Sta., *Bull.* 213, 17-8 (1927).—A permanent opening or fistula was made into the rumen of a heifer through her left side to facilitate the removal of samples of fermented feed. Portions of about 30 lb. were removed each time, incubated from 2 to 5 days, and extd. with alc. to remove any vitamin B that may have been synthesized by the bacterial fermentations. This ext. has been fed to young rats as a supplement to a vitamin-B-free synthetic ration. Results have given very positive evidence that the ext. carries vitamin B growth factor. A study of the bacterial flora revealed the presence of an organism

which was predominant to the extent of about 90%. Results show that the dried bacterial cells are highly potent in vitamin B growth factor. It would appear that cattle, unlike any other species of animal yet studied, have the ability to synthesize their own needed supply of vitamin B through bacterial synthesis in the rumen. E. F. S.

Experiments with skim milk powder in the rations of dairy calves. S. I. BUCHHEI, Penn. Agr. Expt. Sta., *Bull.* 213, 19-20(1927).—An investigation was started during the past yr. to det. the advisability of feeding milk powder in the dry rather than in the liquid form. Thirty-five grade Holstein calves were fed experimentally in 3 groups. They were weaned to a dry ration when 34 days old. The oldest group of 12 calves made an av. daily gain of 1.36 lb. up to 6 months and was 95.7% normal in size. The milk powder was discontinued when they were 115 days old. These calves consumed a total of 105 lb. of milk powder, on the av., in addn. to 120 lb. of whole milk. The feeding of milk powder in the dry rather than the liquid form affords many advantages in labor-saving. The results prompt the advice that the calves should be changed to the dry ration at 6 weeks of age after feeding the powder in the reconstituted form up to that time. The dry mixt. at first should contain not over 45% milk powder, and preferably not over 40%. The % of powder should be reduced then as the calves grow older and consume more concentrates. E. F. SNYDER

The antineuritic vitamin and other substances having a bios character contained in rice bran. Y. KINUGASA, Tokyo Imp Hyg. Lab., *J. Pharm. Soc. Japan* 48, No. 6, 539-63(1928).—Aq. or alc. ext. of rice polish was treated with neutral or basic Pb acetate in neutral or acidic soln. After filtering the ppt. an excess of $(\text{AcO})_2\text{Pb}$ and $\text{Ba}(\text{OH})_2$ was added to the filtrate to a slightly alk. reaction. The yellow ppt. (I) thus obtained was filtered. Contrary to expectation, the antineuritic factor of rice bran (II) was found almost completely in I and not in the filtrate. Also contrary to the findings of Funk, Voegtlin, Peters and others for the antineuritic substance of yeast (III), II was found to be precipitable with HgSO_4 . The phosphotungstate of II was found sol. in dry Me_2CO , while F. found that that of III was insol. in it. From these facts K. concludes that II and III are not identical. By using the $(\text{AcO})_2\text{Pb}$ and $\text{Ba}(\text{OH})_2$ method of purification and the soly. of the phosphotungstate of II in dry Me_2CO , K. obtained an intensely active prepn. Daily doses of 5 mg. were effective in curing polyneuritic pigeons. A *picrate* of the active substance had the compn. $\text{C}_{19}\text{H}_{22}\text{N}_6\text{O}_7 \cdot \text{C}_6\text{H}_5\text{N}_3\text{O}_7$ and m. 198° . It also effected a rapid cure in neuritic pigeons with 5 mg. doses. A *cryst.* and an *amorphous* picrolonate were prepd. The former decompd. 320° and had the compn. $\text{C}_{14}\text{H}_{19}\text{N}_6\text{O}_{10} \cdot \text{C}_{10}\text{H}_8\text{N}_4\text{O}_6$, while the latter m. 204° and had the compn. $\text{C}_{18}\text{H}_{20}\text{N}_6\text{O}_7 \cdot \text{C}_{10}\text{H}_8\text{N}_4\text{O}_6$. Both picrolonates were also found to be effective in curing neuritic pigeons with 5 mg. doses. A *cryst.* substance with the compn. of $\text{C}_{19}\text{H}_{22}\text{N}_6$ and having a strong bios character was isolated. Since the substance active in curing polyneuritis was found to be ineffective in stimulating yeast fermentation and the substance effective in stimulating yeast fermentation was found to be inactive in curing polyneuritis, it is concluded that these substances are of different identity. More than 20 reactions were tested on 90 fractions of rice bran, but no specific reaction for II was found. NAO UYEI

Quantitative study of the photochemical activation of sterols in the cure of rickets. II. STANISLAW-KAZIMIERZ KON, FARRINGTON DANIELS and HARRY STEENBOCK, Univ. of Wisconsin, *J. Am. Chem. Soc.* 50, 2573-81(1928); cf. C. A. 22, 1614.—Repeated boiling with KMnO_4 in Me_2CO removes completely the provitamin from cholesterol. Cholesterol, purified in this way and irradiated, is inactive antirachitically even in large doses. The photochem. formation of vitamin D from ergosterol under the action of monochromatic light has been studied quant. for different lines. The quantity of radiant energy necessary to form an amt. of vitamin D sufficient to cause a demonstrable deposition of Ca in the bones of a rachitic rat has been found to be const. over a wide range of radiations, 700-1000 ergs, being necessary for the 256, 265, 280 and 293 $m\mu$ lines. The quantum efficiency was independent of the state in which ergosterol was irradiated, the results being the same for irradiation of the solid or of solns. in EtOH of varying concns. The quantum efficiency was the same for ergosterol acetate as for ergosterol. The HO group plays no role in the process of activation. C. J. WEST

Investigation to determine a satisfactory standard for beriberi-preventing rices (Vedder, Feliciano) 12.

SWANSON, CHARLES OSCAR: *Wheat Flour and Diet*. New York: The Macmillan Co. 203 pp.

F—PHYSIOLOGY

E. K. MARSHALL, JR.

Physiology of the fetus. T. SUGANO. *Kinki Fuji Gak. Zassi* 9, 97-100(1926).—Pepsin appears in the fetus at the fifth and sixth months. B. C. A.

Relation between urea in blood and saliva. A. BERGMAN AND I. BARG. *Rev. Soc. Med. Interna.* 3, 605-11(1927).—Detn. of urea in the saliva and blood serum of healthy and diseased subjects showed that the concns. in each were closely parallel, and the same variation occurred in each after oral administration of urea. If the normal amt. in blood serum is taken as 20-40 mg. %, the corresponding amt. in saliva is 30-50 mg. %. B. C. A.

An investigation on the relation between urobilinogen and the color of bile. EIJI WAKABAYASHI AND KOKICHI NAKASHIMA. *Imp. Univ. Acta Schol. Med. Univ. Imper., Kioto* 9, 343-50(1927).—From an examn. of urine and bile in cases of gallstones, the theory of the intestinal origin of urobilinogen is supported. In cases of liver disorder in which the bile obtained from the intestine contained mostly biliverdin (as detd. by its green color) no urobilinogen was found in the urine. It is believed that bilirubin is a necessary precursor for the synthesis of urobilinogen. H. J. DEUEL, JR.

Changes in the oxygen capacity of blood pigment of rabbits following partial hepatectomy. BARBARA B. STIMSON AND M. CAROLINE HRUBITZ. *Columbia Univ. J. Biol. Chem.* 78, 413-5(1928).—After removal of 75% of the liver in rabbits under ether anesthesia there was a reduction in the O-carrying power of the hemoglobin which lasted for 6 hrs. This condition did not occur in control animals in which a laparotomy but not a hepatectomy was performed. The condition is similar but less transient than the change following splenectomy (cf. *C. A.* 22, 113). It is suggested that another non-oxygen-bearing pigment is formed resembling methemoglobin but which has a characteristic spectrophotometric ratio of its own. H. J. DEUEL, JR.

Secretion of fat in the urine after percutaneous resorption. HANS MOSER AND ALBERT WERNLI. *Pharm. Zentralhalle* 69, 401-5(1928).—The application of fat (lard and tallow) to the arms and breast caused an appreciable increase in the traces of fat normally detectable in the urine. In 1 expt (30 g. of lard applied to the arms and breast) the increase in fat content of the urine was 10-fold. The expts. described in this paper are for other reasons of interest, in that they show a complete difference in the action of parenteral addn. of protein and of fat. The introduction of protein in other than peroral ways is followed by a variety of phenomena which are not alone serologically but therapeutically of the greatest importance. While the percutaneous introduction of an unusual fat induces no allergic phenomena whatever, the amts. thus introduced are, however, so large that a portion appears again in the urine, thus indicating that the intermediary metabolism of fats is entirely different from that of the proteins. W. O. F.

Free tryptophan in cow blood and its utilization in milk secretion. C. A. CARY AND EDWARD B. MEIGS. *J. Biol. Chem.* 78, 399-407(1928).—Free tryptophan in cow blood may vary independently of the free amino N. The standard *p*-dimethylamino-benzaldehyde method for the detn. of tryptophan was discarded in favor of the Hopkins-Cole reaction with glyoxylic acid and the oxidation of the tryptophan-glyoxylic acid condensation product by means of HgSO_4 . Tryptophan in the blood varied from 1.0 to 1.5 mg per 100 cc. with an av. of 1.12 while in the plasma it varied from 0.71 to 1.31 with an av. of 1.12. There was 17% more tryptophan in blood from the mammary vein than in blood from the jugular vein. Since there is a very much greater circulation of blood through the mammary glands during lactation, it is assumed that the free tryptophan in the blood plasma is utilized in milk secretion. Amino N detns. in the mammary and jugular veins show results similar to tryptophan. The increased amts. of tryptophan in the mammary blood are sufficient to account for the amt. of this amino acid required in the synthesis of the milk proteins. C. R. FELLERS

Studies in muscular activity. V. Changes and adaptations in running. J. H. TALBOTT, A. FÖLLING, L. J. HENDERSON, D. B. DILL, H. T. EDWARDS AND R. E. L. BERGGREN. *J. Biol. Chem.* 78, 445-63(1928).—Quant. observations were made to det. the main variations of the metabolism, and during each bout of work the metabolism and the properties of the blood as well as their variations as functions of time and of metabolic rate, were studied in detail. A N equil. was established in the untrained subject before starting the expts. A series of 6 work trials are reported in detail. Detns. of the principal urine constituents were also carried out. An adjustment of the body to the changed conditions is approx. complete in 15 min. and is followed by a steady state. In the preliminary period of adjustment rapid increases occur in

the O capacity and lactic acid content of the blood and there is a simultaneous fall in the CO₂ pressure of arterial blood. During moderate work there is little further change in the blood compn. During the period of recovery the long-continued utilization of O in amts. significantly larger than those characteristic of the basal condition is regarded as the result of 2 processes, (a) the completion of the oxidation of substances already in process of utilization at the moment when work ceased and (b) gradual restoration of the original condition of the body, so far as is possible in the absence of food, by means of partial and incomplete oxidation of existing components. C. R. FELLERS

The solubility in the stomach and duodenum of aluminum compounds found in baking-powder residues. VICTOR C. MYERS AND J. A. KILLIAN. N. Y. Post-Graduate Med. School. *J. Biol. Chem.* **78**, 591-4 (1928).—Studies of 18 human subjects showed an av. of about 25% of the Al present in the gastric contents to be present in a sol. form. The soly. varied from 6 to 54% and had no direct relation to the gastric acidity. ARTHUR GROLLMAN

The relation of copper to the hemoglobin content of rat blood. Preliminary report. J. S. MCHARGUE, D. J. HEALY AND E. S. HILL. Kentucky Agr. Expt. Station, Lexington. *J. Biol. Chem.* **78**, 637-41 (1928).—Analyses of the inorg. cations present in cow's blood and in calf's liver are given. The addn. of Cu to the diet of rats led to notable increase in the Hb content of their blood. ARTHUR GROLLMAN

Studies in the metabolism of the bile. II. The sequence of changes in the blood and bile following the intravenous injection of bile or its constituents. CARL H. GREENE AND A. M. SNELL. Mayo Clinic. *J. Biol. Chem.* **78**, 691-713 (1928).—Intravenously injected whole bile, bilirubin and bile acids rapidly disappear from the blood stream. The curves of excretion of bile acids and bilirubin by the liver show that the former are excreted by an increase in the vol. of the bile while the latter causes an increase in its concn. ARTHUR GROLLMAN

Studies of gas and electrolyte equilibria in blood. X. The solubility of carbon dioxide at 38° in water, salt solution, serum and blood cells. D. D. VAN SLAYKE, JULIUS SENDROY, JR., A. B. HASTINGS AND JAMES M. NEILL. Rockefeller Institute. *J. Biol. Chem.* **78**, 765-99 (1928).—The deviations of the soly. of CO₂ in serum from its soly. in H₂O are attributed to the following factors: salts, depressing the soly. 3% by lowering the solvent power of the H₂O for CO₂ and by displacing a small quantity of H₂O; proteins, depressing the soly. several percent by displacing H₂O; lipoids, raising the soly. about 4%. The combined effect is to reduce the soly. in normal serum to 93 to 94% of its soly. in H₂O. In lipemic serum, the soly. may exceed that in H₂O. Between 1/2 and 1 atm., the soly. of CO₂ in serum or a soln. of red blood cells was independent of the pressure. There was no deviation from Henry's law as would be expected if any of the colloids of serum or cells adsorbed any CO₂. The Bunsen soly. coeffs. for CO₂ or H₂O, normal human serum, lipemic serum and ox-blood cells, at 38° were 0.545, 0.510, 0.552 and 0.44, resp. In aq. solns. of the Cl⁻, lactates, and HPO₄⁻ of K⁺ and Na⁺, the depressions of the soly. coeffs. per mol. of electrolyte were found to be additive functions of the depressions due to the individual ions. The soly. coeff. of CO₂ in serum as found in this investigation does not necessitate revision of the serum p_H values in the literature, calcd. by Hasselbach's equation. A. G.

Studies of gas and electrolyte equilibria in blood. XI. The solubility of hydrogen at 38° in blood serum and cells. D. D. VAN SLAYKE AND JULIUS SENDROY, JR. Rockefeller Institute. *J. Biol. Chem.* **78**, 801-5 (1928).—Ox serum dissolved, per unit vol. at 38°, 90.3% as much H₂, and ox cells 89.8% as much, as was dissolved by H₂O. Per g. of H₂O present, serum dissolved 6% more and cells 24% more than was dissolved per g. of H₂O in 0.15 M NaCl soln. The org. constituents, therefore, dissolve considerable amts. of H. ARTHUR GROLLMAN

The hormone of the anterior lobe of the hypophysis. Preparation, chemical properties and biological action. BERNARD ZONDEK AND S. ASCHHEIM. *Klin. Wochschr.* **7**, 831-5 (1928).—A clear presentation and addnl. evidence to prove the exptl. findings reported previously (cf. C. A. **21**, 1837; **22**, 1182). The hypophyseal hormone is injured by heating in aq. soln. to 60° and is destroyed at 100°. It is destroyed by strong acid or alkali, is sol. in H₂O and insol. in lipid solvents. Ovarian hormone can be heated to 200° with impunity, is not destroyed by strong acid or alkali, and is readily sol. in H₂O and in lipid solvents. MILTON HANKE

Does the intestinal wall participate in the excretion of hydrogen ions from the body? K. SCHERR. *Klin. Wochschr.* **7**, 835-6 (1928).—The administration of 7-10 cc. of normal HCl or of 2-3 g. NaHCO₃ to infants leads to a prompt elimination of acid or alkali, resp., by the kidney, but the reaction of the feces remains unchanged. Cf. C. A. **20**, 1438. MILTON HANKE

Excretion of the female sexual hormone. M. DOHRN AND W. FAURE. *Klin. Wochschr.* 7, 943(1928).—The female sexual hormone is excreted into the intestine during pregnancy. As much as 30,000 mouse units can be isolated from 1 kg. dried feces.

Simultaneous fractional investigation of the stomach and duodenal juices. A. M. MARKOFF. *Deut. Arch. klin. Med.* 155, 129-40(1927).—The entrance into the stomach of juice from the duodenum causes a decrease in acid chloride, but an increase in total chloride of the gastric juice. The total concn. of Cl ion in the gastric juice is not an index of the HCl secreted by the stomach; but the amt. of neutral chloride is a relative index of the extent to which duodenal juice has entered the stomach. Two types of subacidity of the gastric juice are observed: true, in which little Cl ion is present; and apparent, in which is found a considerable amt. of neutral chloride from the duodenum.

The specific dynamic action of protein and its relation to muscular exercise. KARL BAHN. *Deut. Arch. klin. Med.* 156, 67-71(1927).—In normal individuals no change in the specific dynamic effect was caused by moderate exercise after a meal of 200 g beef.

The influence of suggestion upon stomach and pancreas secretions during hypnosis. F. DELHOUGNE AND K. HANSES. *Deut. Arch. klin. Med.* 157, 20-35(1927).—During hypnosis, suggestion that the subject was consuming a meal rich in fat caused not only an increase in the vol. of digestive juices secreted in the stomach and duodenum, but an increase in lipases corresponding to the increase noted following the actual ingestion of fat. The other enzymes were not secreted in response to the hypnotic suggestion of fat. Suggestion of a meal of meat caused a rise in acid and pepsin to values actually produced by such a meal; but lipases were lacking. Suggestion of carbohydrate increased the amt. of diastase, but not of the other enzymes. Suggestion during the hypnosis of unpleasant events caused the complete cessation of secretion of the digestive juices.

Total chloride concentration and acidity of the gastric contents. A comparative study. F. D. GORHAM, C. MALONE STROUD AND MAITLAND HUFFMAN. Washington Univ. School of Medicine. *Arch. Internal Med.* 42, 106-16(1928); cf. Baird and Campbell, *Guy's Hospital Report* 74, 40(1924); *C. A.* 16, 3331; 18, 1136.—In normal fasting subjects the av. free HCl was 7.2, total acidity 16.5, total chlorides 92.95 cc. 0.1 N/100 cc. Forty-five min. after a test meal of 400 cc. distd. water contg. 6 mg. phenolsulfonephthalein the corresponding values corrected for the meal diln. (Gorham) were: 16.4, 30.1 and 89.91. In a gastroenterostomized subject with fluid hypermotility (disappearance of the dye from the gastric contents after 30 min.) there was a marked variation between free HCl and chlorides. In gastric achylia of pernicious anemia the av. chloride content was 57.9, in duodenal ulcer, disease of the biliary tract and benign pyloric obstruction it was above normal: 122, 114, 170, but not higher than found in a group of miscellaneous cases (hypo- and hyperacidity, constipation, chronic appendicitis, neurosis). There is no relation between total chlorides and free acid in health and disease. The chloride concn. (Volhard) especially in subjects with achylia is not necessarily an index of the HCl production by the gastric glands.

Gastric secretion. Its alteration by the use of atropine, adrenaline and pilocarpine. A. M. ALTSCHULER. *Arch. Internal Med.* 42, 117-34(1928); cf. Altschuler (*Ann Clin. Med.* 5, 464(1926)); Gurvitch (*Trudy 7go. sjezda Terapevtov* 7, 280(1925)).—The gastric contents are examd. at the end of a 14-hr. fast and 4 times after a test meal of 200 cc. plain broth at 15 min. intervals. Then the test meal procedure is immediately repeated. There are 5 types of gastric secretion: (1) Normal: total HCl after the 1st meal (A) is 15-25% higher than that after the 2nd meal (B). (2) Asthenic: A > B. (3) Inert: B is up to 50% higher than A. (4) Isosecretory: A = B. (5) Torpid: A and B = 0. (5) may be functional or org. The effect of a subcutaneous injection of 0.0013 g. atropine-H₂SO₄, 1 cc. 0.1% adrenaline-HCl, 0.01620 g. pilocarpine-HCl on each type was studied. (1) is converted into (2) by atropine and adrenaline, into (3) by pilocarpine. Similar conversions of one type into another were found in various pathologic conditions. Functional (5) may be converted into (3) by adrenaline, but in org. (5) (cancer of the stomach, pernicious anemia and other conditions of gland exhaustion) the 3 drugs not only do not stimulate, but often even inhibit, a still existing secretion. The contradictory results obtained by some authors regarding the action of the 3 drugs may be attributable to the fact that their observations were made in different phases of digestion and drug action.

Physicochemical studies of woman's milk. MABAMI NAKAYAMA. *Kyoto Ikadai*

MARY JACOBSEN

gaku Zasshi 1, 69-70, 1003-34(1927); *Ber. ges. Physiol. exptl. Pharmacol.* 44, 598.—There is no definite relation between sp. gr., surface tension and relative viscosity. The latter decreases with rising temp., and is increased by the addn. of ions in the order: $\text{Na} > \text{Ca} > \text{K}$ and $\text{F} > \text{Br} > \text{I} > \text{Cl}$. Woman's milk buffers $1/1280$ - $1/1500$ N HCl, and completely pptd. after 1 hr. at 40° . The isoelec. point of dissolved casein shows no relation to salts added: KCl, NaCl, CaCl_2 . Nephelometric especially diffusimetrically increased by diln. with water.

Relation between hemoglobin content and reducing power of blood. E. BAUER, K. LAVROVSKII AND E. SKUINI. *Moskovskij med. zhurnal* 7, 105-12(1927), *Ber. ges. Physiol. exptl. Pharmacol.* 44, 659.—The oxidizability increases inversely with the hemoglobin content. This is particularly pronounced in polycythemia and in anemias.

Liver and mineral metabolism. KURT BECKMANN. *Verh. deut. Ges. inn. Med.* 1927, 250-4, 281-93; *Ber. ges. Physiol. exptl. Pharmacol.* 44, 645.—NaCl, KCl, CaCl_2 , NaHCO_3 and Na_2HPO_4 were injected into the jugular and portal veins, resp. (rabbits) and the blood of the carotid (I) and hepatic (II) veins was examd. The effect on I was considerable and protracted, that on II slight and of short duration, showing the effectiveness of the liver in the maintenance of the ionic equil. The increase of Ca and P was about the same in both cases. Portal injection of K was followed by K mobilization.

Simple methods of orientation on the blood proteins. ISTVAN HETÉNYI. *Verh. deut. Ges. inn. Med.* 1927, 342-4; *Ber. ges. Physiol. exptl. Pharmacol.* 44, 665.—The practitioner is advised to det. the sedimentation velocity (s. v.), the fibrinogen (I) and the globulin (II). There is an almost mathematical relation between s. v. and II/I. The formol reaction is suitable for the detn. of II. The gelation times are 24, 4 and 2 hrs., resp., for II contents of 35% (normal), 40 and 50%. No gelation takes place below 35%. The reactions may serve for differential diagnosis in subfebrile conditions. In chronic obstructive jaundice the relation between s. v. and II/I does not obtain, but the formol gelation is not affected by bile salts.

The organic substance of human dental enamel. FRITZ FABER. *Z. Anat. Entwicklungs-gesch.* 86, 1-70(1928).—A critical review. Some of F's results are given.

Studies of the thyroid apparatus. XXXII. The role of the thyroid apparatus in the solids-water differentiation of the central nervous system during growth. FREDERICK S. HAMMETT. *J. Comp. Neurol.* 41, 205-22(1926); cf. *C. A.* 22, 266.—A distortion of the water-solids differentiation of the brain and spinal cord is caused by thyroid and parathyroid deficiency. This distortion consists of a greater retardation of increment in water than of increment in solids. The result is a brain and spinal cord of lower water content than that to be expected for the size according to age. No differences because of sex were noticed. Puberty increases the extent of distortion. The distortion produced by parathyroid deficiency is generally less than that produced by thyroid deficiency.

The chemical physiology of the placenta with special reference to the action of choline. H. SIEVERS. *Z. Biol.* 87, 319-26(1928).—Choline assocd. with small quantities of neosine and spermine were isolated from the placenta. The procedure involved freeing from albumin by concn. and treatment with hot alc. To the alc. supernatant fluid was added Hg sublimate, and the Hg salt heated with H_2SO_4 . Treatment of the filtrate with AuCl_3 yielded cholin aurate, $\text{C}_8\text{H}_{14}\text{NO AuCl}_4$, m. 243° . From the mother liquor was obtained neosine aurate, $\text{C}_8\text{H}_{14}\text{NO AuCl}_4$, m. 205° , and spermine aurate, $\text{C}_{10}\text{H}_{24}\text{N}_4 \cdot 4\text{HCl} \cdot 4\text{AuCl}_4$, m. 218° . Discussion regarding the function of choline in the uterus is given.

Experiments on the chemical constitution of the genital glands. II. The amino acids of the ovary of Strongylocentrotus lividus in the various periods of the functional cycle of the organ. G. RUSSO. *Arch. sci. biol. (Italy)* 8, 293-309(1926).—The variations in the protein and non-protein fractions of the free and combined amino acids of the ovary of *S. lividus* were studied under different states of functional activity. The protein N increased; the non-protein N remained the same. The compn. of the protein was modified by an increase in lysine and a decrease in histidine and cystine. In the amino acid fraction, the ratio between monoamino acids and hexone bases increased. Free amino acids increased up to the end of the functional cycle of activity, but decreased rapidly at the beginning of the next cycle. The ovary and testicle, although similar in structure at the immature functional state, differ in the compn.

of the major N fractions. This difference becomes more marked as maturity progresses.

PETER MASUCCI

The action of pancreatic secretion on the absorption of fatty acids in depancreatized dogs. U. LOMBROSO. *Boll. soc. ital. biol. sper.* 3, 295-98(1928).—The substitution of equiv. amts. of oleic acid for olive oil in the diet of totally depancreatized dogs did not increase the fat absorbed; when olive oil was fed, 93.5% of fat was eliminated in the feces; with oleic acid 93.7% was eliminated. With partially depancreatized dogs,* the substitution of oleic acid did increase the fat absorbed; e. g., with olive oil 46.6% was absorbed, with oleic acid 78.8% was absorbed. The administration of oleic acid, glycerol and pancreatic secretion or pancreatic exts. to totally depancreatized dogs also favored the absorption of fats, e. g., without pancreatic ext. or secretion, 30.0% was absorbed; with pancreatic secretion 65.6% was absorbed. L. advances the theory that the external secretion of the pancreas has a synthesizing action on oleic acid, transforming it to neutral fats which are absorbed.

PETER MASUCCI

The chemical composition of follicular liquid. II. G. B. TAFURI AND M. TESTA. *Boll. soc. ital. biol. sper.* 3, 310-1(1928); cf. *C. A.* 22, 2954.—The total fatty extractive in follicular liquid by the Kumagawa-Suto Method was 0.110%. Total cholesterol by the Grigaut method was 0.002%. The difference between the 2 figures, 0.0487%, indicates the amt. of fatty acids in the liquid. The analysis for electrolytes made by the usual micro methods gave Na 0.301, K 0.0182, Ca 0.0051, and Cl 0.375%.

PETER MASUCCI

The presence of glucose in normal urine. G. QUAGLIARIELLO AND E. TRIA. *Boll. soc. ital. biol. sper.* 3, 311-3(1928).—Phenylosazones were prepd. from a large no. of normal urines by the following method: To 5 cc. of urine defecated with Hg or Pb(OAc)₂ or acidified with AcOH and treated with powd. charcoal, was added 1 cc. of a mixt. of 4 N AcOH-NaOAc (p_H 4.7) and a drop of C₆H₅NHNH₂ and placed on the water bath for 60-90 min. On cooling and standing, crystals were formed which on examn. microscopically differed in shape from those described by Patterson. They are also different from those obtained by treating 0.1% solns. of glucose by the same method. The latter are longer and are grouped in sheafs; the former are shorter and are grouped in rosetts. If, however, osazones are prepd. from very dil. solns. of glucose 1:10,000 then the crystals obtained are similar in every respect to those obtained from urine. The osazone from urine was centrifuged, redissolved, crystd., and repeatedly washed with Et₂O and dried. The m. p. was 261°. Conclusion. The phenylosazone obtained from normal urine does not differ in shape or m. p. from phenylglucosazone.

PETER MASUCCI

The buffer value of muscle juice and the isoelectric point of myoprotein. I. DE CARO. *Boll. soc. ital. biol. sper.* 3, 314-6(1928).—Frog muscle juice was used to det. 4 titration curves covering the range p_H 2-13. By means of the Bovie potentiometer curves were established for (1) fresh muscle juice, (2) the dialyzate, (3) the dissolved myoprotein and (4) that of 0.1 N NaOH against 0.1 N lactic acid. There is a definite parallelism between the curves. The buffer value is zero at the point where the individual curves cross the acid-base curve. Curve 1 crosses curve 4 at p_H 6.3; curve 2 crosses curve 4 at p_H 6.5; curve 3 crosses curve 4 at p_H 6.2. The lactic acid formed in the muscle during work is sufficient to bring the reaction of the muscle close to the isoelec. point p_H 6.2 of myoprotein.

PETER MASUCCI

The activity of the thyroid gland in relation to the staining reactions of the colloid. EVELYN E. HEWER. London School of Medicine for Women. *J. Path. Bact.* 30, 621-6(1927).—It is possible to gage the degree of activity of the stored thyroid secretion by the staining reactions of the colloid. Freshly secreted active material gives an alk. staining reaction, whereas old or inactive material is acid. The activity of a portion of a gland removed at operation is not always directly related to the basal metabolic rate. The staining variations depend on the acid-alk. reaction on the colloid, and not on its I content.

JOHN T. MYERS

Urinary elimination of ammonia and of total nitrogen. Urinary constants. R. RAFFLIN. *Bull. soc. chim. biol.* 10, 812-21(1928); cf. *C. A.* 22, 2614.—Nine logarithmic formulas for K_1 to K_9 are worked out showing relations of urinary p_H , ammonia N, total N, and hourly vol.

L. W. RIGGS

Action of an aqueous extract of nerve substance on the excitability of the nervous system. J. E. ABELOV'S AND H. LASSALLE. *Compt. rend.* 186, 1754-5(1928); cf. *Compt. rend.* 186, 1015.—An ext. of brain tissue was made by shaking 10 g. of cerebral pulp with 100 g. of physiol. serum, centrifuging and filtering through a Berkfeld filter. This ext. introduced into rabbits by the parenteral route shows a neurotropic excitatory action. Consequently the increase of nerve excitability in animals following a section

of the sciatic nerve is due to the resorption of nerve substance from the nerve trunk sepd. from its trophic center.

Presence of ergosterol in human blood. L. H. DEJEST, (MILLER) VANSTOLK AND E. DUREUL. *Compt. rend.* 187, 311-3(1928) --Ergosterol was sepd. from blood by the method of Lemeland (cf. C. A. 17, 3036), and identified by absorption bands situated at 2935, 2815 and 2700 Å. U. A study of the relation of the action of ultra-violet rays to the presence of ergosterol is in progress.

Excitation of the internal and external secretion of the pancreas by the same excitant after suprarenalectomy. E. GLEY AND R. HAZARD. *Compt. rend. soc. biol.* 99, 195-7(1928); cf. C. A. 22, 3446

Does the follicular hormone inhibit the action of the luteinic hormone? R. COURRIER. *Compt. rend. soc. biol.* 99, 224-5(1928). --In expts with rabbits the corpus luteum exerted its normal action on the uterus, notwithstanding the injection of a strong dose of folliculin.

Ammoniacal coefficient of the urine under different nitrogenous diets. MICHEL POLONOVSKI AND PAUL BOULANGER. *Compt. rend. soc. biol.* 99, 233-5(1928); cf. C. A. 22, 3199. --In passing from a mixed to a meat diet the p_{H} of the urine is lowered and also the ammoniacal coeff. Upon the addn. of urea, glycine or gelatin in amts. to contain equal quantities of N, to ordinary mixed diet the ammoniacal N was increased only with gelatin. This increase is attributed to the presence of S in the gelatin. The total N in each case was increased and the ammoniacal coeff. was decreased. Accordingly the addn. of N to the diet was without direct influence on the elimination of ammoniacal N, nor has the latter any direct relation to the p_{H} of the urine.

Calcium and magnesium content of muscular tissue of animals under thyroid treatment. M. CAHANE. *Compt. rend. soc. biol.* 99, 245-6(1928). --The total quantity of fresh thyroid gland administered varied from 4 to 40 g., and the duration of the treatment from 12 to 158 days. The tests were made with cats, dogs, rabbits and guinea pigs. There was a diminution of the Ca content of the muscles in 7 animals and an increase in the Ca content in 3 animals as compared with controls. Mg increased in 6 and decreased in 5 animals. The variations in Mg in no sense followed those of Ca. With much smaller doses of thyroid the Mg appeared to vary with the Ca.

Modifications of the chemical constitution of the blood during the experimental hyperthyroparathyroidian syndrome and in animals subjected to thyroid treatment. C. I. PARHON AND HILÈNE DEREVICI. *Compt. rend. soc. biol.* 99, 246-8(1928); cf. C. A. 22, 263. --In general hyperthyroidization increased the serum Ca and Cl and diminished the cholesterol and urea of the blood. Extirpation of the parathyroids during hyperthyroidization was generally followed by no marked change in the serum Ca, an increase in the serum cholesterol and urea and a decrease in the Cl. The diminution of the Ca of the blood is not the sole factor which causes *tetany* in animals deprived of parathyroids.

Histochemical demonstration of the formation of an aldehydic substance at the expense of aliphatic and lipoidic inclusions. JEAN VERNE. *Compt. rend. soc. biol.* 99, 266-9(1928). --The aliphatic or lipoidic inclusions contain substances of aldehydic function which are liberated in the course of fixation by PtCl_4 or HgCl_2 . These substances take part in the normal metabolism of the glycerides and phosphatides at the expense of which they appear to be formed by oxidation.

The presence of urea in the saliva; its relation to the blood urea. R. VLADESCO. *Compt. rend. soc. biol.* 99, 434-6(1928). Urea appears to be a const. constituent of the saliva of animals but is sometimes absent from the saliva of man. In man, N which is measurable by hypobromite is greater in the saliva than in the blood. The reverse is true in the dog, cat and horse. Ammoniacal N in the saliva of man is much greater than that of animals, but this may be due to differences in diln. caused by different methods of collection.

Hypophysary hormones in the guinea pig. ALEXANDER LIPSCHUTZ AND RAMON PAEZ. *Compt. rend. soc. biol.* 99, 453-4(1928); cf. Smith and Engel, *Am. J. Anat.* 40, 159; Zondek and Ascheim, C. A. 21, 763, 3942. --The precocious sexuality following injections of hypophysis ext. is observed in the guinea pig provided the exts. are from adult animals. Hypophysary hormones and law of puberty. ALEXANDER LIPSCHUTZ AND HELMUTH KALLAS. *Ibid.* 454-6. The results with guinea pigs were contrary to those of Smith and Engle with rats and mice in that the hypophysis from young guinea pigs was not able to initiate the sexual transformations which are caused by the hypophysis of adult animals.

Exocrine activity of the pancreas and islets of Langerhans. Case of hibernation. H. BIERRY AND MAX KOLLMANN. *Compt. rend. soc. biol.* 99, 456-9(1928).—Is the endocrine function of the pancreas localized uniquely in the islets of Langerhans? *Ibid* 459-60.—The islets of Langerhans appear to have a specialized function, but it is not proved that the acinian tissue is completely foreign to the metabolism of carbohydrates. In the normal condition there exists a morphological equil. between the acinian and endocrinian tissues of the pancreas. This equil. is broken by various states such as inanition, lack of factor B and hibernation. L. W. RIGGS

Calcium content in the organs of the rabbit. E. BARRAL AND PH. BARRAL. *Compt. rend. soc. biol.* 99, 519-20(1928).—The detn. of Ca by incineration of the tissue, extn. of the ash with HCl, pptn. as oxalate and titration by permanganate was considered sensitive within 0.5 mg. The Ca content of the muscles and organs of different rabbits ranged from 3 to 160 mg. per kg., and from 6 to 160 mg. in the same organ of different animals. Increase of the calcium content in the organs of rabbits given doses of naphthalene. A. CADÉ AND PH. BARRAL. *Ibid* 520-2.—While precise conclusions were not drawn, it was evident that there was a general tendency toward an increase in the Ca content in the organs of rabbits receiving naphthalene. L. W. RIGGS

Reversible crystallization in tendons and its functional significance. JANET H. CLARK. *Proc. Nat. Acad. Sci.* 14, 526-32(1928).—X-ray pin-hole diagrams with fresh moist tendons and ligaments show that collagen and elastin exist normally in liquid crystal form but that collagen undergoes a reversible crystn. in tendons when they are stretched. The formation of solid crystallites in a stretched tendon probably increases its cohesion and marks the limit of its elasticity. L. W. RIGGS

An interpretation of excitation, exhaustion and death in terms of physical constants. G. W. CRILE, AMY F. ROWLAND AND MARIA TELKES. *Proc. Nat. Acad. Sci.* 14, 532-8 (1928).—Expts. on 100 rabbits have indicated the following conclusions in regard to the p. d. in living tissues: (1) Excitation or stimulation produced by phys. injury, drugs or other agents causes an immediate fall in the p. d., followed by a rise. Repeated or protracted excitation tends to diminish the p. d.; and when the p. d. approaches zero, death occurs. (2) Anesthetics, narcotics, hemorrhage and asphyxia diminish the p. d. progressively until as it approaches zero death occurs. (3) After death there is a secondary rise of p. d. in the brain and in voluntary muscle. (4) Consciousness and activity apparently are maintained at the expense of p. ds. (5) Sleep appears to be necessary to maintain a continuous p. d. in the brain, as prolonged insomnia progressively diminishes the p. d. between the fascia and the brain. (6) The thyroid gland is necessary for the maintenance of a normal p. d., for in myxedema the p. d. is diminished nearly to zero. (7) The life of an organism exists only as long as p. ds. are maintained within the organism. L. W. RIGGS

New study yields first published analyses of horses. H. H. MITCHELL AND T. S. HAMILTON. *Illinois Agr. Expt. Sta. Rept.* 1927, 119-21.—The only abs. measure of an animal's requirements for nutrients is the amt. of nutrients actually built up into its own tissues. In this work the carcasses of 3 Percheron horses of different ages were analyzed. The live wts., skin areas and % of "fill" are given, and on the empty wt. basis the % of flesh, bone, blood, hide and viscera of the carcass. The wt. in g. of several of the visceral organs including the liver, kidneys, spleen, lungs, heart, brain, testicles and alimentary tract and the chem. compn. of the blood, flesh and bone samples and of the entire carcasses minus the contents of the intestinal tract are summarized. By analyzing a large no. of Percheron horses varying in age it is hoped eventually to be able to plot curves of increasing wts. of protein, Ca, energy, etc., with age, from which may be computed the daily increment in nutrients during normal growth. E. F. SNYDER

Changes in the composition of protoplasmic tissue caused by partial starvation. A. G. HOGAN AND W. S. RITCHIE. *Missouri Agr. Expt. Sta., Bull.* 256, 31-2(1927). cf. C. A. 22, 2400.—The most satisfactory method of extg. muscle proteins has been repeated extn. with 10% NaCl. Three methods of pptg. the globulin fraction have been selected and within fairly narrow limits gave good agreement as shown in a table. The exposure to ultra-violet rays was the least satisfactory, probably because the factor of H-ion concn. and of temp. were not sufficiently standardized. E. F. S.

Blood chemistry of the albino rat. ARTHUR K. ANDERSON AND HANNAH E. HONEYWELL. *Penn. Agr. Expt. Sta., Bull.* 213, 7(1927).—With a view to future work on the blood of abnormal or pathol. animals, a study has been started on the compn. of the blood of the albino rat. Non-protein N, urea, creatinine, creatine, uric acid, chlorides and glucose have been detd. Values for some constituents differ from normal

human averages. Non-protein N and urea values are slightly higher than for human blood.

E. F. SNYDER

The role of potassium in cell growth. A. LASNITZKI. *Z. Krebsforsch.* **27**, 115-24 (1928).—K increases the intensity of cell growth, and analyses of growing tissues show an increased K content parallel to the intensity of growth activity, with which also goes a parallel increase in the water content of the cells. The increase in water is dependent on an increase of the hydration of some or all of the cell colloids, which depends upon the K content. Fermentation of glucose to lactic acid is the energy-producing reaction of cell growth. The fermentative action of the cells in general increases with general increased intensity of growth. The K in the cells increases fermentative activity. The intensity of the reactions which furnish energy for cell growth is dependent on a specified sort of hydration swelling of certain colloids of the cells, in such a way that it increases with increasing hydration of these colloids within certain limits provided that all other factors bearing on the energy-producing reactions remain constant. Under normal conditions regulation of this hydration is detd. by the K.

H. G. WELLS

G—PATHOLOGY

H. GIDEON WELLS

Excretion of hippuric acid in renal disease. I. SNAPPER AND A. GRÜNBAUM. *Presse med.* **34**, 1524-6 (1926).—Oral administration of 5 g. of Na benzoate to healthy men res: Its in 12 hrs. in its quant. excretion as hippuric acid. In renal disease with N retention the excretion (but not the formation) is incomplete.

B. C. A.

Chemistry of specific hemagglutination. A. KONIKOV. *Zhurnal expl. biol. med.* **1926**, 124-45.—The erythrocytes can be regarded as an amphoteric protein of isoelec. point p_{H} 5. Probably only between p_{H} 6 and 9 are the stroma and agglutinin oppositely charged. The presence of electrolyte is necessary in the first phase of hemagglutination, the action of the salt is expressed by the scheme stroma—Na—Cl—agglutinin, in which auxiliary valencies function.

The subject is discussed from this point of view.

B. C. A.

Ultramicroscopic investigations on the crystalline lens. IV. Modification of the ultramicroscopic structure in the process of cataract. D. CATTANEO. *Atti. accad. Lincei* [6], **7**, 512-6 (1928); cf. *C. A.* **22**, 1182.—The same ultramicroscopic method used before for the normal eye was used in the present investigation. In all cases of cataract, the greatest alterations were in the lenticular fibers, while the condriosomes diminished or disappeared, and the protoplasmic colloids showed various changes, including granulation resulting from pptn. of the colloids. In conjunction with earlier work of C. and others, the expts. lead to the conclusion that cataract involves a transition from a homogeneous system to a heterogeneous system by pptn. of granules or droplets of the proteins which constitute the fundamental protoplasm. The same effect may be induced artificially by acids, heat, etc. •

C. C. DAVIS

The coenzyme of glucolysis from tumors. HEINRICH KRAUT AND ERWIN BUMM. Bayer. Akad. Wissensch. Munich. *Z. physiol. Chem.* **177**, 125-42 (1928).—Tumors contain an abundance of coenzyme which activates glucolysis by kidney tissue. Exts. prepd. by grinding carcinomas and sarcomas with quartz sand and 5-10 parts of H_2O , centrifuging and filtering, do not form acid from glucose in Ringer soln. If to the mixt. is added a section of kidney from which the coenzyme has been removed by washing, a vigorous glucolysis takes place. The effect is several times as great as that produced by a similar ext. from the same amt. of kidney tissue. The tumor ext. alone does not undergo glucolysis; hence it contains no active glucolytic enzyme. Since the ext. rapidly loses its activating effect on glucolysis by normal tissue, either by destruction of the coenzyme through autolysis or by bacterial decompn., it is preferable to obtain dry preps. by treatment of the fresh tissue with MeAc and Et_2O and then make the extn. by means of 0.01 N NH_4OH . A 2 hr. extn. gives the most active solns.; longer extn. is unsatisfactory because the coenzyme is then contaminated with inhibitory substances. A 2nd extn. gives almost as good a yield as the 1st. Addn. of 8 vols. $EtOH$ to the NH_4OH ext. ppts. a white flocculent mass which contains the entire activity but only $\frac{1}{4}$ of the dry matter of the ext. From solns. of the $EtOH$ ppt. the coenzyme may be adsorbed on kaolin or alumina. The latter is the better adsorbent for dil. solns., the former for concd. solns. The inhibitory substance does not act by binding the coenzyme. It is best removed by alumina adsorption. Whether this inhibitory substance is identical with that of cozymase is not certain. Unlike

the latter it is not destroyed more rapidly by heating than the coenzyme. It is not known whether it exerts its function in the living cell or whether it is first set free in the exts. Certain it is that the coenzyme constitutes the limiting factor for glucolysis in the normal epithelial tissue of liver and kidney, and that the carcinoma tissue is distinguished from these by its higher content of coenzyme. The coenzyme content of the exts. increases in the order: liver, kidney, embryo, tumor. The glucolysis of the individual tissues decreases in the same order.

A. W. DOX

Chemistry of the normal and atherosclerotic aorta. RUDOLF SCHÖNHEIMER. Univ. Freiburg. *Z. physiol. Chem.* **177**, 143-57(1928); cf. *C. A.* **21**, 417.—Sep. analyses of the highly calcified and the non-calcified portions of the atherosclerotic aorta show no essential differences in the free cholesterol and the cholesterol ester content. Evidently the lipid mixt. is formed elsewhere and deposited as such. The hypothesis according to which the deposit of Ca is caused by the free acids formed during hydrolysis of cholesterol esters should be rejected. The proportions of CaO , P_2O_5 , and CO_2 in the atherosclerotic aorta correspond approx. to those present in bone. Free cholesterol, cholesterol oleate, stearate and palmitate and a galactoside similar to protagon were isolated. Two doubly unsatd. cholesterol esters and an unsaponifiable substance not pptd. by digitonin were also demonstrated. Neutral fats appear to be absent.

A. W. DOX

The chemical composition of the active principle of tuberculin. XI. An improved and simplified method for making a standard undenatured tuberculin of any desired strength and a method of chemical assay. FLORENCE B. SEIBERT. Univ. of Chicago. *J. Biol. Chem.* **78**, 345-62(1928); cf. *C. A.* **22**, 2197.—A virulent human strain of tubercle bacilli is planted upon a Long non-protein synthetic medium and allowed to incubate for 3 months. The bacilli are then completely removed through a Berkefeld filter. The filtrate of tuberculin, preserved with 0.5% phenol, is concd. to any desired strength by ultra-filtration through alundum extn shells previously impregnated with a 10 to 12% soln. of sol. guncotton in glacial AcOH and washed free of all acid. The speed of filtration may be accelerated tenfold by using membranes of an 8% soln. of guncotton or parlodion in glacial AcOH . The tuberculin is standardized by detg. the amt. of ppt. obtained when CCl_3COOH is added to a standard amt. of tuberculin. By this chem. standardization it was revealed that any tuberculin prepn. increases in potency with age of the culture up to at least 3 months incubation.

RUSSELL C. EBB

Chemical changes in the body occurring as the result of vomiting. A. F. HARTMANN AND F. S. SMYTH. *Am. J. Diseases Children* **32**, 1-28(1926); *Physiol. Abstracts* **11**, 476.—A study of the blood in 20 cases of vomiting due to various causes showed that chloride is lost and bicarbonate retained in compensation; if the lost chloride is not fully replaced by bicarbonate the non-protein N is elevated to maintain the normal osmotic pressure. When the NaHCO_3 content of the blood is high, respiration is depressed, and carbonic acid accumulates so that the p_{H} of the blood is normal; increased pulmonary ventilation then makes the blood abnormally alk., and tetany may result. The excess of non-protein N and NaHCO_3 is excreted as a result of administration of NaCl ; but the excretion of all three depends on the total crystalloid concn. in the blood; if this is below normal, NaHCO_3 is retained in the blood and the urine remains acid in spite of the increased plasma CO_2 content.

H. G.

Chemical changes occurring in the body as the result of certain diseases. I. The effects of diarrhea, vomiting, dehydration and oliguria on the acid-base balance of the plasma of infants with mastoiditis. ALEX F. HARTMANN. Washington Univ. School of Med. *Am. J. Diseases Children* **35**, 557-75(1928).—The chem. changes which occur in the blood during mastoiditis are the result of physiol. disturbances assoc. with the infection. These disturbances, which may be caused by the absorption of toxic products from the focus of the infection, are: vomiting, diarrhea, dehydration and oliguria. Vomiting produces a reduction in the HCl and base chloride reserve; dehydration, an increase in the lactic acid and protein concns. in the blood plasma; and oliguria, an increase in the phosphoric acid and non-protein N concns. E. R. M.

Liver function tests. JOSEPH S. HEPBURN AND H. M. EBERHARD. Hahnemann Med. Coll., Philadelphia. *Hahnemannian Monthly* **63** 605-23(1928).—A discussion of the measurement of liver function by means of (1) halogenated dyestuffs of the aromatic series, (2) the icteric index, (3) the van den Bergh test and (4) the hemoclastic crisis of digestion. The technic of each test is described. A series of 19 cases of various liver diseases is reported to illustrate the use of these tests in diagnosis and in following the progress of a case under treatment, and to ascertain their agreement with each other before the beginning of treatment. Throughout the entire series of 19 cases, on the

before and after operations is emphasized. Alkalemia is usually assocd. with clinical symptoms, such as tingling and numbness of extremities, headache and nausea, which hitherto have been considered as functional. In 19 miscellaneous cases (gastric carcinoma, severe diarrhea, pernicious anemia, chronic nephritis, etc.) similar changes in the blood have been observed.

MARY JACOBSEN

Extrahepatic formation of bilirubin. R. SOEJIMA. *Arch. klin. Chir.* **149**, 206-12 (1927); *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 646.—Wound secretions contain a bilirubin, which differs from serum bilirubin by its soly. in CHCl_3 . Its local formation from hemoglobin was confirmed exptly. in hematomas. *In vitro* the formation takes place on contact of blood with air and is hastened by germs from the air. In Banti's disease the bilirubin content of the splenic venous blood considerably exceeds that of the arterial blood. Injections of hemolyzed blood into normal spleen cause formation of bilirubin. Splenectomy reduces the sensitiveness of dogs to PhNHNH_2 . The soly. in CHCl_3 of bilirubin of local hemolytic origin may be used for the differentiation between hepatic and biliary obstruction jaundice. It is pointed out that the theory of the exclusively hepatic origin of bile pigments is definitely disproved.

MARY JACOBSEN

Are the urine toxins detoxified by the liver? HARTWICH. *Verh. deut. Ges. inn. Med.* **1927**, 172-7, 181; *Ber. ges. Physiol. exptl. Pharmacol.* **44**, 645.—Brücke has connected a ureter with the iliac vein in order to elucidate the causes of hypertrophy of the kidney in unilateral nephrectomy. His animals died rapidly from uremia. H. transfused the urine of one kidney into the portal and mesenteric superior veins. The animals died from uremia as soon as the blood urea reached 10 times its normal value, but they lived longer than H.'s animals. The liver which showed fatty degeneration apparently had a certain detoxifying effect.

MARY JACOBSEN

The surface tension of the blood plasma in children. ESTHER B. CLARK. Stanford Univ. School of Med. *Am. J. Diseases Children* **35**, 18-25(1928).—The surface tension observed in 87 samples of blood plasma, as measured by a modification of the DeEds method, was 52 ± 5 dynes per cm. Lower values were found in kidney disease assocd. with plasma lipemia; slightly higher values in rheumatic fever, chorea, endocarditis and in fever; and normal ones in allergy. The surface tension of blood plasma appeared to be higher in girls than in boys and to be influenced by age. E. R. M.

Effect on the urine of addition of acids and alkalis to the diets of infants. DAVID GREENE. Home for Hebrew Infants, N. Y. *Am. J. Diseases Children* **35**, 38-46 (1928).—The addn. of acids to the milk diets of infants, as is frequently carried out in order to decrease the buffer action of the milk on the gastric juice, may occasion pathol. changes in the urine. The addn. of Ca lactate, lactic acid or 0.1 N HCl to milk diets may cause the appearance of casts or red blood cells. The administration of lemon juice in a concn. of 3% causes no unusual effects. Alkalis, such as 0.1 N NaOH or NaHCO_3 , may produce an alk. reaction in the urine, but appear to produce no other pathol. effects.

E. R. MAIN

The sex factor in infantile tetany. HARRY BAKWIN AND RUTH MORRIS BAKWIN. Columbia Univ. *Am. J. Diseases Children* **35**, 964-7(1928).—The incidence of infantile tetany appears to be greater in boys than in girls. Among the 136 cases observed, boys were affected more than twice as often as girls and were apt to have the disease in a more severe form. The Ca content of the blood serum was the same for both sexes.

E. R. MAIN

Further notes on the spontaneous agglutination of bacteria. P. BRUCE WHITE. Lister Inst., London. *J. Path. Bact.* **31**, 423-33(1928).—Stability of a bacterial suspension in an aq. medium depends on the dominance of the hydrophile factors of the bacterial surface over those which are hydrophobic: that is, on a hydrated or sol state of the bacterial surfaces, by which continuity between the medium and the particles is established. Instability depends on the opposite condition of a sharp discontinuity between the phases. In fresh cultures alc.- CHCl_3 -sol. lipids form the important hydrophobic factor. In normal smooth cultures such as those of the colon-Salmonella group, the aggregating influences of these substances in the presence of electrolytes are completely counterbalanced by the "sol. sp. substance" of the bacterial bodies, which is insensitive to electrolytes and acts powerfully for the permanence of suspension. In rough cultures, the disappearance of the sol. sp. substance allows the lipids to overwhelm the hydrophile properties of the basal body proteins, causing agglutination in a saline medium. If the lipids are removed stable emulsions result. In some organisms, as certain streptococci, the amt., or hydrophobic activity, of the lipids is so great that the normal smooth colony is salt agglutinable and may fail to form stable suspensions even in distd. water. When bacterial suspensions are heated

to 100° the body proteins are denatured, in the rough colony this means increased agglutinability by electrolytes; in the smooth colony response to electrolytes is prevented by the action of the unchanged sol. sp. substances. Unsp. agglutination by serum in the case of some strains is due to lipoids peculiar to the strain, which cause pptn. through a particular range of serum dilns. Lipoid extn. removes the agglutinability. The sol. sp. substance of the smooth colonies is heat stable, non-antigenic on animal inoculation, and reacts precipitatively in a manner exactly correlated with the agglutinative reaction of the bacterial soma from which it is derived. Alk. lysates of smooth colonies contain substances antigenically identical with the body substance of the rough colony.

JOHN T. MYERS.
 Relativity applied to biologic problems. J. TIXIER. *Bull. sci. pharmacol.* **35**, 423-5(1928); cf. *C. A.* **22**, 2957.—In 4 normal persons the ratio (multiplied by 10,000) of uric acid/fixed elements in the urine was represented by figures ranging from 60 to 86. In 4 syphilitic cases the corresponding range was 116 to 169. L. W. RIGGS

Sugars of the blood and of the plasma. Proteinic sugar. H. BIERRY. *Bull. soc. chim. biol.* **10**, 769-77(1928).—The subject is reviewed with 29 references to the literature. The existence of proteinic sugar in the plasma is established beyond doubt. Its physiologic and pathologic variations observed along with those of free sugar show its importance. The inventory of plasma sugars should include both the free sugar and the proteinic sugar, as in certain pathologic cases the latter may be 3 or 4 times greater in quantity than the former. The variations in the proteinic sugar may sometimes account for the variations in the free sugar. L. W. RIGGS

Passage of the antibodies of the blood into the cerebrospinal fluid. L. STERN, G. N. KASSIL, E. S. LOKSHINA, E. L. ROMEL AND S. M. ZEITLIN. *Compt. rend. soc. biol.* **99**, 360-2(1928).—In normal cats and rabbits neither natural nor artificial hemolysins were found in the cerebrospinal fluid. Hemolysins were found in the cerebrospinal fluid after the following treatments. chronic poisoning by illuminating gas, severe acute poisoning by alc., the administration of 0.5 to 1.0 g. per kg. of urotropine. diphtheritic intoxication during the hypothermic phase but not during the hyperthermic phase, chronic blockage of the recitulo-endothelial system by repeated intraperitoneal injections of India ink, elevation of body temp. above 41° or depression below 36°, changing the osmotic pressure of the blood by hypertonic or hypotonic injections, increasing the p_H of the blood by injections of NaHCO_3 or decreasing the p_H by injections of NaH_2PO_4 . Influence of changes on the p_H of the blood on the functioning of the hemato-encephalic barrier. L. STERN, E. L. ROMEL AND C. A. GUERTCHIKOVA. *Ibid* 363-4.—Deviation either way from the normal p_H of the blood is accompanied by a decrease in the resistance of the hemato-encephalic barrier to the passage of various substances. Influence of changing the osmotic pressure of the blood on the functioning of the hemato-encephalic barrier. L. STERN, S. M. ZEITLIN AND R. M. GOZMAN. *Ibid* 365-7.—Increasing the osmotic pressure of the blood above $\Delta = 0.8$, or decreasing the osmotic pressure below $\Delta = 0.45$ increases the permeability of the hemato-encephalic barrier. Influence of changes of temperature of the body on the functioning of the hemato-encephalic barrier. L. STERN, G. N. KASSIL AND E. S. LOKSHINA. *Ibid* 448-51. Effect of anaphylaxis on the functioning of the hemato-encephalic barrier. *Ibid* 451-2.—It is only in cases of well-marked anaphylaxis that a diminution of the resistance of the hemato-encephalic barrier to the passage of certain colloids such as trypan blue and Congo red is observed. In this case neither hemolysins nor crystalloids are found in the cerebrospinal liquid. L. W. RIGGS

Hyperglucemic action of the blood of the diabetic dog. Effects of transfusion of normal blood and of diabetic blood into animals carrying a pancreatic graft. L. KEPINOV AND S. PETIT-DUTAILLIS. *Compt. rend. soc. biol.* **99**, 481-4(1928); cf. *C. A.* **22**, 2105.—By transfusion of diabetic blood into a depancreated dog carrying a pancreatic graft and having a normal glucemia, a permanent hyperglucemia was developed, which was sensitive to the injection of insulin and resembled true diabetes. Attempt to extract hyperglucemic substances from diabetic blood. *Ibid* 484-6. L. W. R.

Fluctuations in the hydrogen-ion concentration of saliva in epilepsy. A. M. SAUNDERS. *J. Am. Med. Assoc.* **91**, 244-5(1928).—The samples of saliva were taken at 15-min. intervals with uniform precautions of rinsing the mouth and taking nothing into the mouth during the period of testing which lasted 5 or 6 hrs. The saliva of epileptics had a much wider range of variation (5.8 to 7.3) than that of normal persons (6.6 to 7.1). The abruptness and sudden wide range of the fluctuations was very evident in grave cases. L. W. RIGGS

Serological differentiation of steric isomers. K. LANDSTEINER AND J. VAN DER SCHUER. Rockefeller Inst. Med. Research. *J. Expil. Med.* **48**, 315-20(1928).—

l- and *d*-Phenyl(*p*-aminobenzoylamino)acetic acids were diazotized and coupled with proteins (*l*- and *d*-antigens); *l*- and *d*-immune sera were obtained by immunization with these azoproteins. The data presented show that only in the higher concns. cross reactions do take place and that there is definite specificity of the 2 sorts of immune sera for the homologous antigens. It is easy to differentiate the *l*- and *d*-antigens in dilns. 1:100 and upward. The occurrence of cross reactions can readily be ascribed to the fact that the *l*- and *d*-acids present in the 2 antigens are identical in every respect but the position of the groups connected with the asymmetric C atom. The *dl*-antigen react with both sorts of immune sera as could be expected since it must consist of a mixt. of equal parts of *l*- and *d*-antigen. The reactions of the *dl*-antigen appear to be only slightly weaker than those of the homologous ones because of the fact that the intensity of the reactions diminishes but slowly with increasing diln. of the antigens. The *d*- and *l*-immune sera also differentiate clearly between the *l*- and *d*-acids when not combined with proteins. The *l*-acid inhibits much more the pptn. of the *l*-antigen by the homologous immune serum than the *d*-acid and the converse effect occurs if the inhibiting action is tested on the pptn. of *d*-antigen by *d*-immune serum. C. J. W.

Chemical changes in the blood of the dog in experimental peritonitis. THOMAS G. ORR AND RUSSELL L. HADEN. Univ. of Kansas. *J. Exptl. Med.* **48**, 339-42(1928).—The changes noted in the blood chlorides, urea N and non-protein N resemble those observed in pyloric and high intestinal obstructions. In those 2 conditions an alkalosis develops which is not observed in general peritonitis. It thus seems probable that the cause of death may be somewhat similar. C. J. WEST

Effect of oxidation of filtrates of a chicken sarcoma (chicken tumor I-Rous). J. HOWARD MUELLER. Harvard Univ. Med. School. *J. Exptl. Med.* **48**, 343-9(1928); *Science* **68**, 88-9.—The rapid autoinactivation at 37° of candle filtrates of the Rous fowl sarcoma I is due in large part to oxidation. Such oxidation may be prevented by a diln. of 1-2000 cysteine-HCl brought to pH 7.4 with NaOH. C. J. WEST

Reactions of tissues. I. Hydrogen-ion concentration of tissues during fever. JUNTARO OGAWA. Univ. of Tokyo *Proc. Imp. Acad. (Japan)* **3**, 699-701(1927)—Injection of *Leptospira icterohemorrhagiae*, *icteroides* and *hebdomadis*, coli and typhus vaccines and tetrahydro- β -naphthylamine in aq. emulsion, into the rabbit, guinea pig, rat and mouse or overheating the animal at 40-1° and subsequent detn. of the pH values of the tissues of various organs, shows that there is a decrease in the normal value of 7.0-7.3 to 6.7-6.9. C. J. WEST

Tryptophan reactions in the spinal fluid. BURNHAM S. WALKER AND FRANCIS H. SLEEPER. *J. Lab. Clin. Med.* **12**, 1048-52(1927).—Tryptophan has been demonstrated as varying in intensity with the amt. of protein present in spinal fluids and in egg albumin solns. of known protein content. This relationship is not strictly quant., as a result of varying tryptophan content and of the presence of interfering substances in varying quantity. The Boltz reaction is dependent upon the tryptophan present in the protein mol. and may be of value in estimating increases in the protein content of spinal fluid, although it cannot be considered as sp. for any single clinical entity. E. W. W.

II PHARMACOLOGY

A. N. RICHARDS

Higher toxicity of methanol in presence of ethyl alcohol. M. PANTALEONI. *Ann. Iggiene* **37**, 537-40(1927).—A mixt. of equal parts of MeOH and EtOH is much more toxic to cats than either alc. alone. B. C. A.

Does adrenaline act through calcium? L. JENDRASSIK AND A. CZIKE. *Klin. Wochschr.* **6**, 1521(1927), cf. Jendrassik and Antal, *Ibid* 1338.—Zondeck's theory of parallelism between the action of adrenaline and Ca ions is unsupported by expt. B. C. A.

Chemical factors which determine the fixation of colloids. G. SPAGNOL. *Ann. attad. Lincei* [6], **7**, 667-9(1928).—The expts. are a continuation of earlier expts. in the same field (cf. C. A. **22**, 452). Expts. showed that when CHCl₃, CCl₄ or Et₂O is applied to the skin of rabbits, and a colloid such as eosin, nigrosin or other electronegative dye is then injected intravenously, the tissues underly those to which CHCl₃ has been applied fix the dye, and only these tissues. On the other hand, electropositive dyes, such as methylene blue, under the same conditions are not fixed. The results are of importance in pharmacology and therapy because they show the possibility of controlling the fixation of therapeutic agents, in the location desired, by the use of other reagents. The phenomenon is not confined to treatment of the skin with CHCl₃ or other anesthetic, for its application to muscle, vesicles and the peritoneum has a similar

influence on the fixation of dyes. This fixation of colloids may depend upon an increase in the permeability of the blood capillaries.

The effect of insulin on the sugar content of erythrocytes, including a comparison of the direct and indirect methods of measurement. HARRY C. TRIMBLE AND STEPHEN J. MADDOCK. Harvard Med. School. *J. Biol. Chem.* **78**, 323-36(1928).—In expts. upon diabetic patients and normal and diabetic dogs, no indication is found that insulin causes a sudden and marked drop of sugar in the erythrocytes preceding that in the plasma or whole blood. The rate of sugar decrease in man is about uniform in all portions of the blood. The direct method of detg. sugar in erythrocytes after their sepn. from plasma gives results as reliable as those with the indirect method, *i. e.*, computation based on whole blood and plasma sugar and the vol. percent of erythrocytes. As the latter method may misrepresent the situation it should be employed with the first method as a check. Insulin has only a very slight effect on the concn. of non-fermentable reducing substances in blood.

A liver extract (pernämön) for the treatment of pernicious anemia. ERNST LAQUER AND A. P. W. MÜNCH. Univ. of Amsterdam. *Deut. med. Wochschr.* **54**, 951-2 (1928).—Five liver exts., prepd. by different processes, were analyzed and found to be essentially the same in compn. *Pernamon*, one of these preps., had an excellent therapeutic effect in pernicious anemia.

Chemotherapy. II. Chemotherapy of bacterial infections. R. SCHNITZER. Koch Inst., Berlin. *Deut. med. Wochschr.* **54**, 878-9; 1001-2(1928), cf. *C. A.* **21**, 611.—A review with 116 references to the literature.

Results of chemotherapy in pediatric practice. DE RUPDER. Univ. Kinderklinik, Würzburg. *Deut. med. Wochschr.* **54**, 1083-5(1928).—Quinine, arsphenamine and its derivs., and certain of the acridine dyes are considered as the only potent chemotherapeutic agencies useful in pediatrics.

Pharmacology of allylisopropylacetylcarbamide (sedormid). V. DEMOLE. *Deut. med. Wochschr.* **54**, 1166(1928).—Isopropylallylacetylcarbamide is a mild, safe sedative and soporific which is rapidly destroyed in the body and has no deleterious cardiac or renal effects.

Salabrose and its use in diabetes. FR. FRIEDRICHSEN. *Deut. med. Wochschr.* **54**, 1294-5(1928).—Salabrose, a deriv. of sugar, was found to be of great value as a nutrient and preventive of ketonuria in diabetics.

The influence of the administration of aluminum upon the aluminum content of the tissues of the dog. VICTOR C. MYERS AND D. B. MORRISON. State Univ. of Iowa. *J. Biol. Chem.* **78**, 615-24(1928).—The normal Al content of the visceral organs of the dog varies between 0.07 and 0.15 mg. per 100 g. The daily ingestion of 1.55 g. of Al for 3 months led to no increase in the Al content of the organs, except the liver and the bile where it averaged 27 mg. and 0.35 mg. per 100 g., resp. After parenteral administration, there is a marked increase in the Al content of the tissues even after 34 days.

The effect of sodium citrate, acetate and lactate on the ultrafilterability of serum calcium. D. H. SHELLING AND H. F. MASLOW. Jewish Hospital, Brooklyn. *J. Biol. Chem.* **78**, 661-9(1928).—The biological action of Na citrate, acetate and lactate is correlated with the effect of these substances on the filterability of the Ca^{++} . Na citrate produces convulsions when injected and increases the filterability of the serum Ca. Na acetate and lactate on the other hand neither produce convulsions nor do they affect the filterability of the Ca^{++} .

Clinical calorimetry. XLII. A comparison of the effect of glucose and dihydroxyacetone on metabolism. W. S. McCLELLAN, A. BIASOTTI AND R. R. HANNON. Russell Sage Inst. Pathology, N. Y. *J. Biol. Chem.* **78**, 719-44(1928).—Dihydroxyacetone caused a rapid elevation in the respiratory quotient and approx. the same specific dynamic action as glucose. After the ingestion of 50 g. of either hydroxyacetone or acetone by normals or diabetics, there was no increase in the acid phosphomolybdate reducing substances of the blood and only a slight increase in the concn. of these substances in the urine after the ingestion of dihydroxyacetone. The blood sugar curves of normals showed a fall 1 hr. after the ingestion of 50 g. of dihydroxyacetone while in diabetics there was a rise which was less marked than after glucose ingestion.

Influence of intravenous and peroral administration of sodium bicarbonate on tetanus. PAUL HELM. *Klin. Wochschr.* **7**, 794-5(1928).—Administration of NaHCO_3 relieves the spastic condition in tetanus. Complete cures have been effected in a small no. of children.

Action of buffer solutions on gastric secretion. J. VANDORFV AND E. BARATH.

Klin. Wochschr. 7, 800-2(1928).—It is possible by administering phosphate buffer solns. of pH 7.18 to 7.54, to control hyperacidity in patients afflicted with gastric disturbances. The buffer solns. do not irritate the gastric mucosa. They neutralize excess acidity and do not call forth an after-flow of HCl as is the case with $NaHCO_3$.

MILTON HANKE

Effect of diuretics on the excretion of substances into the cerebrospinal fluid and into the intraocular fluid. A. FRANCESCHETTI and P. H. WIELAND. *Klin. Wochschr.* 7, 876-8(1928).—Arsenic can be detd. in the cerebrospinal fluid, the intraocular fluid and in the cornea after administration of Sulfomesarca. Theophyllin, injected simultaneously, leads to an increased excretion of As into the areas cited above. M. H.

Clinical observations in lead poisoning. J. G. GELMAN. *Arch. Hyg.* 96, 301-10 (1926).—The following method is given for the detn. of small quantities of Pb: the solid material is dried, powd. and ignited gently in a crucible of pure Ni. If not easily ignited, it is first moistened with $NaNO_3$. The ash is transferred to a beaker, dissolved in HNO_3 , and the mixt. boiled and filtered. The filter is dried, and the residue fused in a Pt vessel with Na_2CO_3 , K_2CO_3 , and KNO_3 . The melt is then dissolved in H_2O , the mixt. filtered to remove Fe, the filtrate acidified with HNO_3 and added to the first filtrate. $NaOH$ is added till the soln. is cloudy, then HCl till it is just clear. The Pb can now be pptd. quantitatively with H_2SO_4 . The most striking effect of Pb poisoning is upon the blood, and anemia is the earliest symptom. Pathol. changes are observed in the nervous system, the parenchymatous organs, and the blood vessels. The nature and extent of the symptoms vary widely in specific cases. P. Y. J.

Cardiazole. Some experimental effects of this drug on the cardiorespiratory mechanism. M. HERBERT RAKER and SAMUEL A. LEVINE. Harvard Medical School. *Arch. Internal Med.* 42, 14-22(1928).—"In a series of expts. on cats it was found that cardiazole did not have any beneficial effect on the cardiorespiratory mechanism. This was true in the normal animals and in states of depression, produced by quinidine, hemorrhage and acid intoxication" (intravenous injections of 2-10 cc. 0.5% H_2SO_4).

MARY JACOBSEN

Tolerance for quinine in exophthalmic goiter. ISRAEL BRAM. *Arch. Internal Med.* 42, 53-5(1928); cf. *Bram, N. Y. Med. J.* 118, 339(1923); Sainanton and Schulman, *Bull. mem. soc. med. hop. Paris* 45, 1304(1921); Pfahler, *Med. Clin. N. America* 5, 854(1921).—Patients with exophthalmic goiter may take 1.0 g. quinine-HBr or quinine- H_2SO_4 daily for a period of months without exhibiting cinchonism. The treatment often results in clinical improvement and reduction in the size of the thyroid. The appearance of intolerance is mostly a sign of recovery and is assocd. with normal basal metabolism. The Bram test was found to be very useful by Pfahler and of no value by Sainanton and Schulman. B. finds an av. error of 4.4%. MARY JACOBSEN

The reducing substances of the blood in lead poisoning. A. MITTLESTEDT. *Moskovskij med. zhurnal* 7, 1-4(1927); *Ber. ges. Physiol. exper. Pharmacol.* 44, 667.—The reducing substances of the blood (Hagedorn) vary within narrow limits in fasting dogs or dogs fed on milk and meat. The content rises sharply from 80 to 120 mg./100 cc. in the 1st hr. after bread feeding and remains at this level for 6-7 hrs. In acute Pb poisoning (0.5 g. $Pb(OAc)_2$ daily for 22 and 5 days, resp.) no deviation from the normal was observed. In the following chronic stage the increase caused by bread is greater and more persistent than in normal dogs. Normal values are gradually reached in the remission period.

MARY JACOBSEN

Hypoglycemic properties of galegine sulfate. H. SIMONNET and G. TANRET. *Bull. soc. chim. biol.* 10, 796-805(1928).—The results of this study are shown in 10 tables. Doses of about 4 mg. per kg. of galegine sulfate cause a lowering of the glucemia in healthy dogs and man which may reach 20%. Galegine sulfate also causes a lowering of the glucemia and the glucosuria in depancreated dogs. Also in *Compt. rend.* 185, 1616-7(1927).

L. W. RIGGS

Cardiovascular action of tropinone. RENÉ HAZARD. *Compt. rend.* 186, 1752-3 (1928); cf. *C. A.* 19, 3323; 20, 1114, 1278; 21, 776, 1845.—Tropinol and tropinone may be considered the inferior homologs of *N*-methylgranatoline and pseudopelletierine, resp. The object of this study was to compare the cardiovascular action of tropinone with that of the other 3 substances mentioned above. Doses of 5 to 10 mg. per kg. of a neutral salt of tropinone intravenously injected in dogs caused a fleeting hypertensive action in which it resembled *N*-methylgranatoline and pseudopelletierine and differs from tropinol which causes a durable hypertensive action. Accordingly, although the cardiovascular action was not sensibly modified on passing from ketone to alc. function in the 2 compds. with bipiperidine nucleus, it was modified in the 2 compds. with a pyrrolidine-piperidine nucleus. In the latter case the appearance of

the ketonic function suppressed the depressive effects and appeared to increase the properties of the piperidine nucleus.

Mechanism of the preventive action of bismuth against icterohemorrhagic spirochetosis. R. SAZERAC AND H. NAKAMURA. *Compt. rend.* 187, 181-2(1928).—Guinea pigs that were divided into 5 lots and the animals of each lot were inoculated with a culture of *Spirochaeta icterohemorrhagiae* 7, 15, 23, 32 and 45 days, resp., after receiving the Bi compd. The guinea pigs of the first 4 lots lived; those of the 5th lot died showing symptoms of icterohemorrhagic spirochetosis. Accordingly the Bi compd protects the guinea pig between 32 and 45 days. When the Bi compd. and the virus are injected simultaneously, or a previously made mixt. *in vitro* of the Bi compd. and virus culture is injected, the animal is protected for at least 5 months. L. W. RIGGS

Repression of the external secretion of the pancreas during hypoglycemia caused by decamethylenediguanidine. JEAN LABARRE AND PIERRE DESTREE. *Compt. rend. soc. biol.* 99, 337-9(1928); cf. *C. A.* 22, 2790. —In dogs with pancreatic fistulas, or with the "isolated head" technic of J. F. Heymans modified by C. Heymans and Ladon, there was the usual diminution in the glucemia during the 2 to 3 hrs. after the injection of synthalin, accompanied by decrease in the vol. of the pancreatic juice from 4 to 1 or less and somewhat parallel decrease in the lipase, trypsin and diastase activities. L. W. RIGGS

Action of arsenic in simple combination on spirochetes and trypanosomes. R. SAZERAC AND R. VAURS. *Compt. rend. soc. biol.* 99, 372-3(1928).—Elementary As, prepd. by the reduction of H_3AsO_3 by means of NaH_2PO_2 , has a notable activity against *Spirocheta cuniculi* and *Trypanosoma brucei*, but inferior to that of Bi. Pptd. As is not recommended for the treatment of syphilis or trypanosomiasis. L. W. RIGGS

Cardiovascular action of the semicarbazone of pseudopelletierine. JEANNE LÉVY AND RENÉ HAZARD. *Compt. rend. soc. biol.* 99, 382-5(1928).—The combination of semicarbazide with pseudopelletierine reinforces the cardiovascular action of that alkaloid and makes it more const. in its effects. Although pseudopelletierine has feeble adrenaline properties and its depressant action on the myocardium is manifest from the beginning of its action, the corresponding semicarbazone has a more marked adrenaline action, with the cardio-depressor effect later and less marked. Perhaps the latter action is due to a dipiperidic nucleus. L. W. RIGGS

Does chloroform anesthesia modify the excitability of the pneumogastric? B. BEILINE AND A. B. CHAUCHARD. *Compt. rend. soc. biol.* 99, 396-8(1928).—Anesthesia by $CHCl_3$ does not modify the excitability of the cardio-inhibitory fibers of the pneumogastric, or that of the elements innervated by these fibers. L. W. RIGGS

Action of injections of bile salts on the pulse rhythm in the normal monkey. DUMITRESCO-MANTE AND D. HAGIE-CO. *Compt. rend. soc. biol.* 99, 427(1928).—Subcutaneous injection of repeated 0.4 g. doses of Na glycocholate in physiol. saline was followed by a transient lowering of the pulse rate from 226 to 200, followed by an increase in the rate to 270. Na taurocholate in 0.3 g. doses also accelerated the pulse. L. W. RIGGS

Phylactic action of formaldehyde against hemolysis by quinine hydrobromide. P. DODEL. *Compt. rend. soc. biol.* 99, 444-7(1928).—The quantity of HCHO necessary for phylaxia, and not by itself hemolytic, varies according to the presence or absence of blood serum. The optimum concn. of HCHO is about 1.68%, when there is no hemolysis after the addn. of serum and of quinine-HBr. The min. concn. of HCHO to have any restraining action on the hemolysis is about 1.38%. L. W. RIGGS

Action of the neutral sulfate of *o*-hydroxyquinoline on the bacilli of tuberculosis. C. BIDAULT AND ACH. URBAIN. *Compt. rend. soc. biol.* 99, 461-4(1928).—The inhibitive action of the neutral sulfate of quinoline (quinosol or sunoxol) is strong. The virulence of the Koch bacillus disappears completely in 6 weeks in the presence of from 1 to 500 to 1 to 1000 of the drug and is notably diminished in dilns. of 1 to 5000. Injection of guinea pigs with the drug for several weeks did not prevent the development of exptl. tuberculosis. L. W. RIGGS

Curare. L. LAPICQUE AND M. LAPICQUE. *Compt. rend. soc. biol.* 99, 486-8(1928).—Comment is made on the history of several interesting samples of curare, including a sample presented to Paul Bert by Dom Pedro of Brazil. Comparisons of the toxic effects of different curares. MARCELLE LAPICQUE AND CATHERINE VEIL. *Ibid.* 488-90. —Four samples were tested on rats and frogs with varying results for the same sized dose from different samples. L. W. RIGGS

Neutralizing power of soaps on cobra venom. (Venomous cryptotoxin.) MAURICE RENAUD. *Compt. rend. soc. biol.* 99, 496-8(1928).—Cobra venom mixed with soap soln. loses its toxic properties in 4 to 6 days so that a guinea pig may receive without harm an injection corresponding to 40 fatal doses. The neutralization of cobra venom

by soap soln. takes place more slowly than does the neutralization of certain other toxins (cf. Vincent, *C. A.* 20, 3187). Comments with reference to the paper by M. Renaud. NETTER. *Ibid.* 498-9.—The antivenom action of bile, noted by Fraser, and of Na oleorinate, observed by Larson and his collaborators, are cited. The conclusions of these investigators are confirmed by Netter, André, Cesari and Cottoni (cf. *C. A.* 21, 1288). L. W. RIGGS

Comparative study of scopolamine-hydrobromide and hyoscine hydrobromide on the chronaxie of the neuromuscular system of the frog. MARC CHAMBRON. *Compt. rend. soc. biol.* 99, 512-3(1928).—These isomeric alkaloids have an analogous action on the muscle and motor nerves of the frog. L. W. RIGGS

Action of insulin on the development of sarcoma in the rat. A. CADE AND PH. BARRAL. *Compt. rend. soc. biol.* 99, 522-4(1928).—The results of these tests were indeterminate. L. W. RIGGS

Bismuth as a diuretic. H. G. MEIRTENS, P. J. HANZLIK, D. C. MARSHALL AND N. S. BROWN. *J. Am. Med. Assoc.* 91, 223-5(1928).—Expts. with 14 patients, mostly neurosyphilitic, led to the following conclusions: Intramuscular injection of various Bi preps. caused definite and prompt diuresis in man. The action is due to the Bi ion and in doses such as used for the treatment of syphilis the diuresis occurs without known injury to renal functional efficiency. Further tests are necessary to det. the action with reference to diuresis of Bi given by mouth. L. W. RIGGS

Action of saline cathartics. N. B. DREYER. *Proc. Nova Scotian Inst. Sci.* 16, 180-2(1927).—The technic of Babkin (cf. *C. A.* 11, 60) was used. The intestinal movements under the influence of 0.9% NaCl for periods of 5 to 10 min. served as the normal. The introduction of 2.5 to 5.0 cc. of 0.9% NaCl into about 4 in. of the intestine had slight effect, but the introduction of a 1.8 or 2.7% soln. caused a rise in tone with more marked contractions. The amt. of fluid in the intestine increased. If the initial tone was low, isotonic Na_2SO_4 generally caused an increase in both tone and movement, but in no case was water withdrawn from the tissues. With the introduction of hypertonic Na_2SO_4 the segmental and peristaltic movements were marked and in some cases caused a spasm of the intestine. On removing Na_2SO_4 and introducing normal saline the movements diminished sharply. With the introduction of MgSO_4 in isotonic and hypertonic concns. the movements disappeared completely which is remarkable considering the purgative action of MgSO_4 in man. L. W. R.

Alkalies as therapeutic agents in gastric disease. ANNOTATION. *Lancet* 1928, I, 1235-6.—The report by Freezer, Gibson and Matthew in Guy's Hosp. Reports for Apr., 1928, is discussed. $(\text{BiO})_2\text{CO}_3$ was found to be least effective and tribasic Mg phosphate most suitable for the rapid counteraction of gastric acidity. Tribasic Ca phosphates, citrates, and CaCO_3 are almost equally effective. Milk is probably the most important factor in the reduction of acidity, because of its buffer content which enables it to neutralize a considerable quantity of acid. Crohn's idea of the modus operandi of alkali treatment is discussed. F. B. SEIBERT

Tabacin or the toxic principle of tobacco (BARBIERI) 17.

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Harry Snyder (1867-1927). C. H. BAILEY. *J. Assoc. Official Agr. Chem.* 11, No. 3, i-iv(Aug. 15, 1928).—An obituary with portrait. A. PAPINEAU-COUTURE

The chemistry of foodstuffs in 1926 and 1927. A. STRINRUCK. *Chem.-Ztg.* 52, No. 67, Fortschrittsber. No. 3, 69-92(1928). E. H.

Cooking of food products under pressure. J. FROIDEVAUX. Lab. Municipal, Paris. *Ann. fals.* 21, 252-7(1928).—Comparative analysis of boiled meat and vegetables cooked with and without pressure and of the fresh meat used showed that (1) the degree of proteolysis of fresh meat is relatively high; (2) the ratio of amino N to total sol. N is lower in the broth (whether pressure or atm. cooking was used) than in the fresh meat (which is due to the presence of vegetable proteins and gelatin and to superficial coagulation of the proteins of the meat). From a discussion of the results F. concludes that from the standpoint of alimentary value, there is not much to choose between the 2 cooking processes, while from a purely economical standpoint pressure cooking is preferable. A. PAPINEAU-COUTURE

Identification of the prohibited coal-tar colors in foodstuffs. A. R. JAMIESON AND C. M. KEYWORTH. *Analyst* 53, 418-23(1928).—Most schemes for the detection

of artificial coloring matter in foodstuffs do not provide for the detection and identification of picric acid, Victoria yellow, Martius yellow, aurantia and aurine, which are now prohibited by English law. These dyes color wool yellow from an acid bath and do not contain sulfonic groups which tend to make dyestuffs non-toxic and are present in most of the dyes used in coloring foods. Four of the five dyes prohibited are nitro compds. It is desirable, therefore, to det. first, whether the dye present is a sulfonated product. Before attempting to apply any test, ext. the dye by methods given in vol. 5 of Allen's *Commercial Organic Analysis* and conc. the ext. as much as possible. To det. whether the dye is sulfonated or not, heat a little of the ext. with SnCl_2 and HCl until it is partly reduced, neutralize with KOH soln. and look for a brownish red color if a nitro dye is present. Treat the colored soln. with ether and if the color does not go into the ether after shaking, make acid with AcOH , shake and note the effect on the colored layer. With nitro dyes, the color passes into the ether but when the dye is sulfonated, the color is not imparted to the ether either in acid or alk. soln. Pptn. tests were studied with the following reagents: berberine sulfate, AuCl_3 , phosphotungstic acid, silicotungstic acid, AgNO_3 , SnCl_4 and dil. HCl . Characteristic and confirmatory color reactions were obtained with $\text{Ca}(\text{OCl})_2$ soln. and with NaHSO_4 . The following is a summary of the most important tests: *Picric acid*, characteristic rosetts of yellow color were obtained when as little as 5 drops of 0.01% soln. was treated with 1 drop of berberine sulfate. Other alkaloids give cryst. ppts. but they are not as characteristic. KCN gives a brown color on heating and this may be used as a confirmatory test. *Martius yellow*, 5 drops of 0.01% soln., gave characteristic, large yellow needles with 1 drop of berberine sulfate soln. Distinctive crystals were also obtained with 1 drop of AuCl_3 soln. and interesting crystals with 2 drops of AgNO_3 soln. *Aurantia*, 5 drops of 0.01% soln. gave beautiful star-shaped plates when treated with 1 drop of phosphotungstic acid. Characteristic crystals were also obtained with 1 drop of silicotungstic acid. *Victoria yellow*, 5 drops of 0.01% soln., 2 drops of concd. HCl and 1 drop of Wjys soln., boiled a few seconds and then treated with Zn gave a delicate pink color after 12-48 hrs. *Aurine*, since the ext. from the foodstuff is ammoniacal, this dye will be present as the red NH_4 compd. Treat 0.2 cc. of the soln. with 2 drops of chrome-alum soln. and ext. the lake that forms with a little ether. Place a little of the yellow ethereal soln. on a microscope slide; a pink color will appear after the solvent has evapd. The procedure recommended for the identification of the 5 prohibited dyes is as follows: Place about 1.5 cc. of the ext. in each of 5 small test tubes. Use the contents of the first tube for the sulfonation test as described above. Add 1 drop of berberine sulfate to the contents of the second tube and if either picric acid or Martius yellow is shown to be present, try the test with AuCl_3 soln. If there is no ppt. formed with berberine sulfate and no change of color, test the contents of this tube for Victoria yellow by the reduction test mentioned above. To the third tube add a drop of phosphotungstic acid reagent. If a ppt. forms with decoloration, aurantia may be present and this should be confirmed by the silicotungstic acid test. Use the fourth tube to test for aurine and the fifth tube to confirm any of the tests already tried. A table is given of the behavior of these dyes to 14 reagents and photographs of the various cryst. ppts.

W. T. H.

Report of the government laboratory at Amsterdam for 1927. J. STRAUB. *Chem. Werkblad* 25, 161-5(1928).—A brief account of the lines along which original work in connection with the examn. of milk, edible fats, cheese, eggs, flour and bread has been conducted.

B. C. A.

Report on qualitative tests for dairy products; detection of gelatin in milk. SYDNEY H. HALL. State Dept. of Public Health, Boston, Mass. *J. Assoc. Official Agr. Chem.* 11, 299-300(1928).—With fresh, heated and evapd. milk the present official A. O. A. C. test for gelatin gives a very flocculent ppt. on long standing, which ppt. would not be mistaken by a chemist familiar with gelatin picate ppts.; with sour milk, the ppt. appears at once and is sufficiently fine to allow a chance for error. It can be differentiated from true gelatin picate, however, by Seidenberg's modification (*C. A.* 8, 383).

A. PAPINEAU-COUTURE

The milk and dairies order, 1926 (England). D. S. RABAGLIATI. *Munic. Eng. Sanit. Record* 81, 47(1928).—Discussion and preliminary plans for its enforcement in West Riding are given.

C. H. BADGER

Report on milk proteins (determination of casein). H. C. WATERMAN. Office of Expt. Stations, Washington, D. C. *J. Assoc. Official Agr. Chem.* 11, 298-9(1928); cf. *C. A.* 21, 2330.—The method previously described gave filtrates from the casein ppts. which were not clear. Collaborative results obtained were slightly lower than by the present official A. O. A. C. method.

A. PAPINEAU-COUTURE

Report on (the analysis of) malted milk and dried milk. B. G. HARTMANN AND J. T. KEISTER. U. S. Food, Drug and Insecticide Administration, Washington, D. C. *J. Assocn. Official Agr. Chem.* 11, 289-92(1928).—Detn. of H_2O by the water-oven method is not serviceable for malted milk. H_2O is best detd. in malted milk in the same way as in cheese, but drying 1-1.5 g. for 5 hrs., instead of 2-3 g. for 4 hrs.; and the method is applicable also to dried milk. In detg. fat *via* Roesse-Gottlieb, NH_3 should be added with dried milk but should be omitted with malted milk. Though a study of the H_2O -sol. ext. and carbohydrates of malted milk is unnecessary for judging compliance with the established U. S. standard, a study of methods for detg. the various sugars in mixts. of malted milk, sugar and flavoring material is desirable. It has been found that true malted milks and assembled products (mixts. of dried milk and dried malt ext.) can be definitely differentiated by means of the microscope, but the method is not yet ready for publication.

A. PAPINEAU-COUTURE

Methods for the determination of milk solids in mixed feeds. A. B. DAVIS. The Hilton-Davis Co., Cincinnati, Ohio. *J. Assoc. Official Agr. Chem.* 11, 410-7 (1928).—A summary and discussion of methods available for the purpose. A. P.-C.

The Hoyberg method for the determination of fat in milk and cream. B. SPUR. *Z. Fleisch-u. Milchw. 37*, 276-7(1927); *Chimie et industrie* 20, 146-7(1928); cf. *C. A.* 21, 1501.—The advantages of the method as now simplified are: a single soln. is used for milk and cream; the alkyl. of the soln. has been reduced so that it is now harmless; the water bath is heated to only 50°, eliminating danger of burns; its accuracy is quite satisfactory (0.1% for milk, 0.5% for cream). The use of a centrifuge and of a different soln. is recommended for milk contg. less than 0.5% fat and for cheese. Two readings are sufficient, instead of 3 as in the Gerber method. A. P.-C.

A new method for the detection of disease in cows by the determination of the fat content of milk: the Morsin acidless method. K. SCHUTZLER. *Z. Fleisch-u. Milchw. 37*, 277(1927); *Chimie et industrie* 20, 146(1928).—Normal milk gives a rapid and clear sepn. of the fat in the butyrometer. If the milk is doubtful, there is no sepn. or it presents a flocculent turbidity. This peculiarity has been successfully used for the detection of disease in cows.

A. PAPINEAU-COUTURE

The copper content of milk. G. N. QUAM AND A. HELLWIG. Coe College, Cedar Rapids, Iowa. *J. Biol. Chem.* 78, 681-4(1928).—The Cu content of cow, goat and processed milk was detd. The results varied from 0.2 to 0.5 mg. per l. in raw milk to 2.5 mg. per l. in buttermilk.

ARTHUR GROLLMAN

Influence of temperature on rate of corrosion of copper by milk. G. N. QUAM, E. I. SOLOMAN AND ARTHUR HELLWIG. Coe College, Cedar Rapids, Iowa. *Ind. Eng. Chem.* 20, 930-1(1928).—The soly. of Cu in milk increased with rise in temp. to a max. at 85° to 90°. From 90° to 100° the soly. decreased. A time factor of 30 min. was established for these expts. Results are shown by a curve.

J. A. KENNEDY

Simple preparation of yoghurt. S. H. MEIJHUIZEN. *Geeneskund. Tijdschr. Nederland. Indie* 68, 299-300(1928).—The milk of the water buffalo yields an excellent yoghurt after 1 week's standing and may be used for the inoculation of milk. Sheep milk may be used for the same purpose. (Organism not identified.)

M. J.

Report on (the analysis of) ice cream. L. H. McROBERTS. Food and Drug Lab., Bismarck, N. Dak. *J. Assocn. Official Agr. Chem.* 11, 292-8(1928); cf. *C. A.* 21, 3396.—Collaborative comparison of the detn. of ash in ice cream by the official A. O. A. C. method for milk and cream, the official method for sweetened condensed milk, and the previously proposed method (evapn. and ignition of the residue of fat detn. *via* Roesse-Gottlieb) showed that the latter gave results 0.02-0.05% higher than the other 2. This difference is practically negligible when the ash detn. is considered by itself; but it may be of considerable importance if, as McR. suggests, it is used to calc. milk solids not fat (M. S. N. F.). From the published data of Mojonner and Troy, Babcock, Richmond, Van Slyke and Lythgoe, the following av. ratios for normal milk were calcd.: M. S. N. F./ash 12.35, M. S. N. F./protein 2.58, protein/ash 4.79. The M. S. N. F./ash ratio presents the least difficulty because no corrections are needed and the ash figure is doubtless the most const. Whether or not the ash figure could be depended upon in case neutralizers were used would be detd. by calcg. the protein/ash ratio, which would be abnormally low if lime-water or milk of magnesia was used as anti-acid. The Kjeldahl-Gunning-Arnold method was found to be most satisfactory for detg. total N in ice cream. There is need for lactose-sucrose tables based on lactose-sucrose ratios that approximate the compn. of these 2 ingredients of ice cream, *viz.*, 1 lactose to 2.5 sucrose. A method for the bacteriological examn. of ice cream is offered for comment.

A. PAPINEAU-COUTURE

Textures of ice creams as influenced by some constituents. META H. GIVEN.

Evapd. Milk Assoc., Chicago. *Ind. Eng. Chem.* 20, 966-8(1928).—Water in the ice-cream mix freezes into crystals, the size of which det. the fineness or coarseness of the texture of the ice cream. The size of the crystal depends upon the even distribution of numerous tiny air bubbles in the ice cream, which, in turn, depend upon the viscosity of the mix. Mixes contg. gelatin, eggs and dry egg yolk show greater viscosities than the check. Although the variations in the viscosity readings are not great, the differences are much more apparent in handling the mixes. Homogenization and aging increase viscosity. A single homogenized constituent like evapd. milk increases the viscosity and improves texture equal to that of gelatin 0.3, raw egg 2.5 or egg yolk 0.3%. Accompanying photomicrographs illustrate the influence of the various addns. on the texture of the ice cream. Photomicrographs showing the effect of homogenization on fat globules are also shown.

J. A. KENNEDY

Report on (the sampling of) butter, (preparation of the sample for analysis, and analysis of the sample). LLOYD C MITCHELL. U. S. Food, Drug and Insecticide Administration, St. Louis, Mo. *J. Assoc. Official Agr. Chem.* 11, 267-86(1928); cf. *C. A.* 21, 3397; 22, 1415.—Contrary to conclusions reached by other investigators (Ellenberger and Guthrie, *C. A.* 19, 2538; Ellenberger and Newlander, *C. A.* 21, 2511; Smith, Alfend and Mitchell, unpublished report, April, 1926), collaborative results failed to disclose any appreciable loss in H_2O in sampling tub butter by means of a trier, which may be due to differences in the shape and size of the triers used. If the condition of the butter is such that the trier and cores pull dry, 6 cores taken from a tub of sweet butter by means of a trier (in the manner described) will give a representative sample. If the shape of the trier or the condition of the butter is such that the trier and core have drops of water or brine adhering to them, even though practically all the adhering water or brine is transferred to the sample container along with the core of butter, the 6 cores will often give a sample contg. less H_2O than a sample from the mixed entire tub of butter. The variations in salted butter are usually wider than in sweet butter. The results obtained collaboratively showed that no entirely satisfactory method for the prepn. of butter samples for analysis has yet been devised; some careful, experienced analysts obtained remarkably good results by practically any method of prepn., while other analysts equally as careful and experienced failed to get satisfactory results by almost any method. A method of analysis is proposed consisting essentially in weighing 1.0-1.5 g. of sample in a Gooch crucible with a 0.1-g. asbestos pad and contg. about 20 g. of R. R. alundum, 90 mesh, detg. H_2O by drying 2 hrs. at $100-5^\circ$, detg. fat by extg. directly in the crucible with CCl_4 , and detg. NaCl by washing the residue with H_2O and titrating with $AgNO_3$. Collaborative results showed that the proposed method gives lower results for H_2O and higher results for non-fat solids than the official A. O. A. C. method, indicating that drying for 2 hrs. under lab. conditions is probably insufficient. On the whole, the proposed method is considered more rapid and more convenient than the official method. A. P.-C.

Determination of butyric and capronic acids in butter fat. ARTTURI I. VIRTANEN. *Z. anal. Chem.* 74, 321-30(1928).—In the Reichert-Messl. detn. of volatile acids in fats, a distillate is obtained amounting to 110 cc. In the proposed method, this distillate is filtered, 100 cc. of it is redistd. until exactly 50 cc. has come over and this is titrated with NaOH, phenolphthalein being used as indicator. The assumption is made, the justification for which is fully explained, that this distillate contains only butyric, capronic and caprylic acids and that 3.2 cc. of 0.1 N NaOH will always be required by the caprylic acid. The residue in the distg. flask together with the rinsings of the condenser are also titrated with NaOH. It is deduced by a mathematical consideration, and proved experimentally, that 89% of the original butyric acid is recovered in the 50 cc. of distillate and 95% of the capronic acid. From these data it is easy to compute the butyric acid and the capronic acid contents of butter fat. Eight samples of winter butter were analyzed by this method and found to contain 3.12-4.24% of butyric acid and 1.38-2.12% of capronic acid.

W. T. H.

The moisture content of oleomargarine. ROBERT H. KERR. Bur. of Animal Ind. *J. Assoc. Official Agr. Chem.* 11, 382-6(1928).—The H_2O content of 159 samples representing 100 different brands of oleomargarine intended to be used generally as a substitute for butter was generally between 8 and 14%. Examination of 45 samples representing 39 brands of oleomargarine intended to be used in cooking and baking indicated that the H_2O content is generally lower than that of oleomargarine intended for general use as a butter substitute. Examn. of 16 samples representing 15 brands of oleomargarine consisting of vegetable fats churned with skimmed milk showed a H_2O content similar to that observed in oleomargarine consisting in part of the body fats of meat animals and intended for general use as butter substitutes. A. P.-C.

Report on (the analysis of process) cheese. E. O. HURBNER. *J. Assocn. Official Agr. Chem.* 11, 286-9(1928); cf. Williams, *C. A.* 21, 3397.—Adaptation of the official A. O. A. C. method for total tartaric acid to process cheese (in which K bitartrate is used as an emulsifying agent) permits a satisfactory recovery of this constituent within the range used in the manuf. of process cheese. A satisfactory recovery of citric acid from process cheese was obtained by Hartmann and Hillig's modification (*C. A.* 21, 2451) of the Keister-Hartmann method. Since in many cases process cheese is a blend of different types of cheese, with one type predominating, it would be desirable to do further work on the P_2O_5 and CaO contents of these blends with a view to obtaining data for the interpretation of data in connection with detn. of added phosphates.

A. PAPINEAU-COUTURE

Twice-made or pasteurized cheese. L. J. LORD. *Food Manuf.* 3, 419-20(1928).

J. A. KENNEDY

Report on (the analysis of) baking powder. L. H. BAILEY. U. S. Food, Drug and Insecticide Administration, Washington, D. C. *J. Assocn. Official Agr. Chem.* 11, 308-10(1928); cf. *C. A.* 21, 3399.—A mixt. of com. $CaH_4(PO_4)_2$ and com. $Na_2H_2P_2O_7$ was analyzed by detg. CaO and calcg. to $CaH_4(PO_4)_2$, detg. total P_2O_5 , deducting the P_2O_5 equiv. to $CaH_4(PO_4)_2$ found, and calcg. the remainder to $Na_2H_2P_2O_7$. Collaborative results showed only fair agreement. As com. phosphates frequently are mixts. and not single substances, as all the CaO present may not be in the form of $CaH_4(PO_4)_2$, and as phosphates other than $CaH_4(PO_4)_2$ and $Na_2H_2P_2O_7$ may be present, the method would have but very limited application. Addn. of 1-3 drops of caprylic alc. in the gasometric detn. of residual CO_2 was found satisfactory in reducing foam.

A. PAPINEAU-COUTURE

Application to meat and meat food products of a rapid-boiling, short-digestion method for the determination of protein. H. R. MCMILLIN. Bur. of Animal Industry, Washington, D. C. *J. Assocn. Official Agr. Chem.* 11, 408-10(1928); cf. Shedd, *C. A.* 22, 202.—Shedd's method was found to be applicable to meats and meat food products, and it results in saving from 1 to 3.5 hrs. in the analysis of such products as compared with the official A. O. A. C. method.

A. PAPINEAU-COUTURE

Proximate chemical analysis of some Philippine shellfish. SEVERINO B. ETORMA. Univ. of the Philippines, Los Baños. *Philippine Agr.* 17, 125-35(1928).—The av. compn. of 28 varieties of shellfish was, shell 61.8, edible portion 39.91 and total nutrients 20.07%. The edible portion contained moisture 79.89, fat 1.46, protein 9.67, ash 2.82 and undetd. (largely carbohydrate) 6.09%. While the percentages of shell, ash and moisture are relatively the same in both fresh-water and salt-water shrimps, they contain 0.33 and 3.53% fat, 8.26 and 21.18% protein and 11.09 and 0.71% carbohydrates, resp. Analyses of each of the 28 species are presented.

A. L. MEHRING

Studies of tomato quality. II. Effect of soil moisture on the percentage of dry matter in the fruit. R. E. BROOKS AND JOHN H. MACGILLIVRAY. Agr. Expt. Sta., Lafayette, Ind. *J. Assocn. Official Agr. Chem.* 11, 389-93(1928).—The % of dry matter in tomatoes, which greatly affects the cost per unit of food purchased on a wt. or vol. basis, varied inversely with the % of soil moisture, the largest quantity, largest number and largest sized fruit being produced with 70% soil moisture.

A. PAPINEAU-COUTURE

More data on apple by-products and cull utilization. CARL R. FELLERS. Mass. Agr. Coll. and Expt. Sta. *Fruit Products J. and Am. Vinegar Ind.* 7, No. 12, 10-2(1928); cf. *C. A.* 22, 3466.—Addn. information of interest to cider makers is given. There is included material on apple blends, undesirable fermentations in cider apples, cider clarification, pasteurization, sweet cider, vinegar, carbonated cider and cider sirup or boiled cider.

J. A. KENNEDY

Action of prussic acid on fruit and vegetables, and its determination. KARL AMBERGER. *Pharm. Zentralhalle* 69, 481-3(1928).—In the fumigation of premises contg. fruit and vegetables, the latter are known to absorb varying amts. of HCN. Thus, 100 g. of pears contained 9.9, of celery 16.6, of potatoes 7.4 mg. HCN. A. shows that the distn. method (with tartaric acid) and subsequent titration fails to give true values. Some expts. are described which tend to show that the amt. of HCN present in such material may be approx. detd. by developing the Prussian-blue test in an aq. ext. and comparing with it the color developed by a series of controls contg. definite amts. of KCN.

W. O. E

Pineapple storage and export. REES DAVIES. Low Temp. Research Lab., Cape Town. *Farming in South Africa* 3, 883-4, 891(1928).—Temp. is the most important factor in the storage of pineapples, and the best temp. for storage is 45° F. Normal ripening will not take place at lower temps. and higher temps. favor too rapid ripening as well as mold growth. Soft rot, caused by blue molds and yeasts, sets in at 45-50° F.

when the fruit has been bruised. Surface molds do not develop at 45° F. Pineapples produce their own vol. of CO₂ in 5 days at 45° F., and proper ventilation is an important factor in their storage.

Rapid determination of vaseline oil in coffee. MOISA ARMANDA GAUTHIER, K. D. JACOB, Lab. Chim. del Governatorato, Roma *Ann. chim. applicata* **18**, 194-5 (1928); cf. Marotta and Alessandrini, *C. A.* **22**, 2013.—Ext. 2-3 times 25 g. of coffee with a total of 150 cc. of Et₂O, filter, distil, saponify the residue by refluxing for 15-30 min. with 20 cc. of 5% alc. KOH, evap., dissolve the residue in MeOH, agitate with petroleum ether, let sep. 2 liquids, again ext. the MeOH layer with petroleum ether, evap. the petroleum ether layer, dry the residue at 100° for 0.5 hr. and weigh. C. C. DAVIS

Coffee parchment as adulterant of bran and sharps. JOHN EVANS and T. E. WALLIS. *Analyst* **53**, 432-4 (1928).—Some samples of bran have been found contg. about 33% of coffee husks. When the particles of parchment are fairly large, they can be recognized by their pale buff color, resembling old ivory. In sharps the parchment is usually much finer. A few of the suspected pieces should be boiled with chloral hydrate soln. (5:2) and a piece mounted in chloral hydrate for microscopic examn. The amt. of parchment can be calcd. from the crude fiber, coffee parchment yielding about 60% and bran or sharps only 10%. W. T. H.

The manufacture of pickles. CHARLES E. SEARLE. *Food Manuf.* **3**, 415-7 (1928).—Brining as well as pickling is given consideration. J. A. KENNEDY

Investigation to determine a satisfactory standard for beriberi-preventing rices. EDWARD B. VEDDER and R. T. FELICIANO. U. S. Army Med. Dept. Research Board and Bur. of Science, Manila. *Philippine J. Sci.* **35**, 351-90 (1928).—Two hundred samples of rice from different localities were fed to groups of 4 pigeons. The best and simplest method for selecting rice that will prevent beriberi is inspection of the proportion of the external layers remaining. This may be detd. after staining with Gram's iodine soln. No rice having 50% or more of the external layers of the grain produced polyneuritis when fed to pigeons. Human beriberi can be prevented by selecting rice in this manner but it cannot be recommended as a legal standard. The authors propose the following chem. index for beriberi-preventing rice: "Any rice having 1.77% of P₂O₅ plus fat, but not less than 0.4% P₂O₅; or any rice having not less than 0.62% P₂O₅; or any rice having not less than 0.50% P₂O₅ and with at least 75% of the external layers of the grain remaining. No rice of this series possessing these requirements produced polyneuritis in pigeons, and this standard excluded only nine rices out of 200 that afforded protection to pigeons." The indications are that "amino nitrogen is useless as a chemical index, 1.05% ash is a poor index; 0.62% P₂O₅ is somewhat better; and 1.28% fat is the best single chemical index for a beriberi-preventing rice. Of ten rice samples tested, thorough washing reduced the P₂O₅ content from an av. of 0.447 to an av. of 0.197%. Presumably the vitamin content was similarly reduced. In an expt. with twenty insect-infested rices stored for 100 days, an av. total of 2.61% (fat, P₂O₅ and ash) was reduced to 1.71, and seven undermilled rices that should have prevented polyneuritis were converted into highly milled rices that produced polyneuritis." DAVID DAVIDSON

Locust-kernel gum and oil [as a thickener of edible sauces] (WILLIAMS) **29**. Fumigation tests with (CH₂Cl)₂-CCl₄ mixture (HOYT) **15**. Thermophilic and thermophilic microorganisms, with special reference to species isolated from milk (ROBERTSON) **11C**. Apparatus for spray desiccation of milk (U. S. pat. 1,682,596) **1**. Apparatus for treating milk with ultra-violet rays (U. S. pat. 1,681,538) **1**. Apparatus for making coffee or tea (U. S. pat. 17,077) **1**.

Food. ANTONY MAILLOT. Fr. 635,110, May 28, 1927. A nutritive food contains 50-60% diastase, 10% cacao beans, selected and peeled, 20% manioc in semolina and flavored with vanilla.

Deodorizing foods during cooking. THOMAS A. GANNON. U. S. 1,681,531, Aug. 21. A deodorizing packet adapted for use in cooking vegetables or meat by boiling comprises a fabric receptacle impregnated with a water sol. preservative of vegetable colors such as NaHCO₃ and contg. a mass of C of high gas adsorbing capacity.

Apparatus for subjecting food materials to irradiation by ultra-violet rays. FRANCIS C. BEARDSLEE (to R. M. Huffine, J. I. Huffine, and the inventor himself, as trustees). U. S. 1,682,318, Aug. 28.

Yoghurt. ALFRED ZIEHRER. Fr. 634,681, May 19, 1927. See Brit. 272,468 (C. A. **22**, 1814).

Composition for meringues, etc. A. LEO. Brit. 282,923, Oct. 18, 1926. A whipped mass for use in making meringues, marshmallows, etc., is formed of albumin, pectin, sugar and water together with citric acid other acid and a gas-generating substance such as NaHCO_3 .

Dried figs and prunes. THOMAS W. W. FORREST (to Sunland Sales Coöperative Assocn.). U. S. 1,683,068, Sept. 4. Packaged dried fruits such as figs and prunes in which the fruit has become surface sugared through storage conditions are reconditioned by placing the unopened packages of fruit in a receptacle and heating at a maintained temp. somewhat below 100° until the sugar coating has been dissolved and reabsorbed.

Filling containers with preserving, flavoring or condiment liquors. PIERCE CUTLER (to Edward J. Judge). U. S. 1,683,241, Sept. 4. A container is supplied with a concd. soln. of liquid such as sirup and fruit and this is then heated for a "first cook"; a hot "reducing liquid" such as water is then filled in on top of the concd. soln. to adjust the strength as desired, and the container is immediately sealed and subjected to a final cook.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

The Society of Chemical Industry and Geigy Plants at Basle. CHARLES E. MULLEN. *Am. Dyestuff Rept.* 17, 547-8(1928).—A description of the plants is given.

L. W. RIGGS

Equipment in the chemical industry and safety of workmen. AM. MATAGRIN. *Rev. chim. ind.* 35, 48-54, 83-9, 138-45, 174-80, 207-12, 240-5, 306-9, 334-9, 370-5 (1926); 36, 7-12, 42-8, 81-5, 114-21, 156-60, 190-3, 226-9, 290-4, 323-8, 357-63, 393-7(1927); 37, 7-12, 47-53(1928).—A review of the app. used in many chem. industries and their safety factor.

P. THOMASSET

Nitration—a unit process of chemical engineering. P. H. GROGGINS. U. S. Bur. of Chemistry, Washington. *Chem. Met. Eng.* 35, 466-7(1928).—Discussion of mixed acid composition for simple nitrations from standpoint of dehydrating value of H_2SO_4 and ratio H_2SO_4 to H_2O at end of nitration.

G. B. TAYLOR

Recovery of vapors of volatile compounds soluble in water. A. FICHOUX. *Chimie et industrie* 20, 21-6(1928).—A mathematical discussion of the recovery of Me_2CO vapors comparing the relative costs of precooling the H_2O and of evapn. of the addnl. amt. of H_2O when the H_2O is not precooled.

A. PAPINEAU-COUTURE

Waste-heat-recovery practice. W. GREGSON. *Power* 68, 251-2(1928); cf. C. A. 22, 3281.—A discussion.

D. B. DILL

Quantitative relations of the counter-current washing process. LUDWIK SILBERSTEIN. Eastman Kodak Co., Rochester, N. Y. *Ind. Eng. Chem.* 20, 899-901(1928).—Formulas and equations are derived whereby the concns. of solute in the liquid adhering to the solid removed from the last tank of a counter-current washing process can be calcd., and these formulas are illustrated for 3-, 4- and 5-tank systems.

W. C. E.

Inhalation, retention and exhalation of dusts and fumes by man. I. Concentrations of 50-450 mg. per cubic meter. P. DRINKER, R. M. THOMSON AND J. L. FINN. *J. Ind. Hygiene* 10, 13-25(1928).—The amts. of dusts and fumes of known compn. retained and expired by man have been detd. as a function of the concn., length of exposure and rate of breathing. Suspensions of ZnO fume (particles 0.15 and 0.4μ) and of marble dust (particles $0.3-6\mu$) were employed. The percentage retentions obtained were 55 ± 9.4 . The concns. inhaled varied from 50 to 450 mg. per cu. m., the exposure from 5 to 45 min., and the rates of breathing from 6 to 18 respirations per min. No appreciable variation of retention with concn. of fume was detected.

B. C. A.

The precipitation of industrial dust. Mechanical and electrical equipment for purifying air. E. LÉVÊQUE. *Bull. soc. encour. ind. nat.* 1928, 529-41(1928).—Mech. methods for removing industrial dust from air include the following: *gravity settling*, in which the air velocity is lowered to permit the dust particles to settle out; *centrifuging*, in which the air is passed through a cyclone separator; bringing the dust-laden air into contact with drops of liquid; *washing the air* by intimate contact with water; *filtering*, in which the air is passed through a suitable filter-medium. *Elec. pptn.* is a very efficient method, and is discussed in a general way at some length.

T. S. CARSWELL

The phosgene accident in Hamburg. BODEWIG. *Z. ges. Schiess-Sprengstoffw.*

23, 287(1928).—Three containers, previously tested at 22 atm., were charged with 10 tons COCl_2 each at 1.5–1.8 atm. After storage for less than 11 mo. the man-head to the windward caused 11 deaths and about 200 cases of illness, some of which were very serious. No excessive pressure was generated in the container, since the shed of corrugated tin, in which the containers were stored, showed no signs of impact. The welded seam showed defects which were ascribed to the expansion of the metal.

Gas as a war weapon from an Italian point of view. (Extracts from "L'Arma Chimica" published by Fratelli Bocca, Turin.) PAGNIELLO. *Z. ges. Schiess-Sprengstoffw.* 23, 101–2, 145–6, 209–11, 244–50, 287–90(1928).—P. describes the chemical warfare munitions of the Italian and Austrian armies, the development of gas protection, the organization of the gas service in Italy, and the importance of chem. weapons.

Contribution to the study of national security. J. VAN HOUT. *Ing. chim.* 16, 77–86(1928).—A study of possible means of chem. warfare.

A mechanical theory of the breakdown of liquid and semisolid insulators. A. GYEMANT. Siemens Schuckert Werke, Berlin. *Naturwissenschaften* 16, 577(1928).—The theory of a recent article (*Wiss. Veroff. Siemens Konz.* 5, 87(1927)) assuming breakdown as a mech. effect due to the elastic gaseous ionized boundary layer electrode-insulator has been worked out quantitatively for d. c. The breakdown value was found to be $F = \sqrt{(10\pi/3)[(\gamma/a) + (2/3)np]}$ where γ is surface tension, a is radius of the gas bubble formed, n a viscosity function and p external pressure. The equation represents the order of magnitude of F , temp., pressure and viscosity influences satisfactorily.

Time lag of insulators. E. J. WADE AND G. S. SMITH. *Elec. World* 92, 309–12(1928); 14 illus.—For very steep wave fronts the spark-over voltage may be 2 or 3 times the lowest value. The time lag varies with the type of insulator and polarity of impulse and approaches the value obtained with a very steep wave front. C. G. F.

ARISI, DANIELE. Distillazione frazionata, teorie, apparecchi di distillazione, rettificazione, colonne a circuito termico chiuso. Apparecchi ad alcool assoluto, costruzione degli apparecchi per la distillazione frazionata. Milano: U. Hoepli. 421 pp. L. 40.

GLUCKSTEIN, S. M.: Chemists and Dividends. London: Inst. of Chemistry of Great Britain and Ireland.

The Sales Engineer: Some Commercial aspects of Metallurgical and Chemical Engineering. London: Mining Publications, Ltd. 112 pp. 10s.

Who's Who in the Chemical and Drug Industries. Edited by Williams Haynes, New York City: Haynes Publications, Inc. 437 pp. \$6.

Liquefying gases. GUSTAV WIETZEL and FRITZ STOEWEENER (to I. G. Farbenind. A.-G.). U. S. 1,682,588, Aug. 28. Gases are cooled and any residual moisture in them is adsorbed in material such as silica gel of high adsorbing power, the gases are liquefied and the adsorbent is regenerated at intervals by means of gases which have undergone the liquefaction operation and are at a pressure not substantially exceeding atm. pressure.

Purifying gases. FRIEDRICH JOST (to Karl Muller). U. S. 1,681,702, Aug. 21. Na hydride or other alkali metal hydride is used for removing small proportions of O , H_2O , CO , CO_2 and sulfurous gases from gases such as may be used in NH_3 synthesis.

Recovering vapors of volatile liquids. H. L. BARTHELEMY (to Ruthaldo Co.). Brit. 282,792, Dec. 28, 1926. In order to facilitate absorption of acetone vapor in water, or similar absorptions, the liquid is distributed in the form of foam in the absorption app. Substances such as AmOH , saponin, egg albumin, or, preferably, NH_4 oleate, K stearate or other soaps, C_6H_6 , toluene, glycerol, etc., may be added and the absorption may be carried out counter-current-wise and continuously.

Refrigerating apparatus of the absorption type. PLATEN-MÜNTERS REFRIGERATING SYSTEM AKTIEBOLAG (to Electroflux, Ltd.). Brit. 282,770–1, Dec. 31 and Dec. 28, 1926.

Refrigerating apparatus of the absorption type. L. SZILARD and A. EINSTEIN. Brit. 282,808, Dec. 29, 1926.

Protecting electric and other cables. JEAN O. GOGRY. U. S. 1,682,076, Aug. 28. An insulated cable is passed through a hot bath of drying oil compn and then subjected

to a drawing action to leave only a thin coating film on its surface; the coated cable is dried and is then passed through a hot bath of a gum resin compn. and is subjected to another drawing operation, and then to a further drawing action and heating to cause the coating materials to combine with each other and to permeate the insulation.

Composition of rubber and paracoumarone resin. STUART P. MILLER (to The Barrett Co.). U. S. 1,682,397, Aug. 28. A compn. which may be used as a *water-proofing or insulating material* is formed by dissolving about 10% of rubber in paracoumarone resin having a m. p. of about 126°.

Heat-insulating material. A. U. WESTFELT. Brit. 283,055, May 28, 1927; Fr. 635,102, May 28, 1927. Waterglass, before being heated to effect increase in vol., is mixed with KClO₃ or other suitable substance which develops gas during the heating. Solid pulverized incombustible material such as a silicate also may be added.

Refractory heat-insulating material. BASIL T. HORSFIELD (to Aluminum Co. of America). U. S. 1,682,675, Aug. 28. A refractory oxide such as Al₂O₃ is melted and strong hollow substantially spherical globules are formed from the molten material; these are used with a refractory binder such as clay to form furnace linings or other refractory articles.

Galvanized steel insulator pins coated with a layer of lead. ARTHUR O. AUSTIN (to Ohio Brass Co.). U. S. 1,682,590, Aug. 28.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Results attained through federal supervision of water supplies used in interstate traffic. A. F. ALLEN. *Texas State J. Med.* 22, 189; *J. Am. Water Works Assoc.* 19, 226(1928).—A historical review commenting on the increasing no. of supplies requiring certification. D. K. FRENCH

Brief summary of bacterial methods and standards in water analysis. H. W. CLARK. *Commonwealth Mass. Dept. Public Health* 14, 3, 78; *J. Am. Water Works Assoc.* 19, 475-6(1928).—Gelatin and 48-hr. incubation have been discontinued and instead agar is used with the count after 4 days' incubation. Litmus lactose for partial confirmation is used in place of endo or eosin methylene blue. It is recommended at present that any member of the coli-aerogenes group and also streptococci be reported as *B. coli*. D. K. FRENCH

Sterilization of water. RYUKICHI JOH. *J. Pub. Health Assoc. Japan* 2, No. 4, 4; *J. Am. Water Works Assoc.* 19, 226(1928).—Chlorination is considered the best method. To prevent odors and turbidity, hypochlorous acid is recommended in place of bleaching powder. D. K. FRENCH

Water works of Bellefonte, Pennsylvania. JAMES D. SIEBERT. *Am. City* 34, 605; *J. Am. Water Works Assoc.* 19, 226(1928).—Descriptive. D. K. FRENCH

New water-filtration plant at Wenatchee, Washington. FRED J. SHARKEY AND S. DEMOSS. *Western Construction News* 2, 50; *J. Am. Water Works Assoc.* 19, 627(1928).—Four 1 m. g. d. rapid sand filter units are provided. Alum is used. The intake with inlets at several levels serves as a sand trap. D. K. FRENCH

Upper San Leandro filtration plant of the East Bay Water Company, Oakland, California. WILFRED F. LANGELEIER. *Western Construction News* 2, 77; *J. Am. Water Works Assoc.* 19, 792(1928).—Water has high turbidity and color at times and Mn is expected. The plant will include nozzle aerators, coagulation units, sedimentation basins, filters, chlorinators and a 3 million gallon storage reservoir. D. K. F.

Residual germicidal action of water treated with ultra-violet rays. C. E. BERNDT. *J. Am. Assocn. Promoting Hygiene and Public Baths* 9, 36; *J. Am. Water Works Assocn* 19, 792-3(1928).—The efficiency of ultra-violet rays properly used is emphasized. D. K. FRENCH

Bacteria in the filtered water in the case of the filtration with the preceding chlorination. T. KOTOKU. *J. Public Health Assoc. Japan* 3, 6, 12; *J. Am. Water Works Assocn.* 19, 626(1928).—Higher bacterial counts were frequently found in filtered chlorinated water than when Cl was not used. The bacteria when isolated were a new type, growing in the sand layer of the filter. D. K. FRENCH

Treatment by chlorination of Lunéville water supply. M. P. VINOT. *Tech. Sanit. Municip.* 23, 128-31(1928).—A description of the installation and management of the chlorinator. C. R. FELLERS

San Fernando chlorination plant, Los Angeles. CARL WILSON. *Western Con-*

struction News 2, 73; J. Am. Water Works Assocn. 19, 628(1928).—Wallace and Tiernan vacuum automatic machines using pilot tubes instead of venturi tubes are employed. The max. flow is estd. at 175 million gallons daily.

Aluminate-alum coagulation of water. C. H. CHRISTMAN *Bull. Chicago Chem. Co. 18A; J. Am. Water Works Assocn. 19, 629(1928)*—A discussion of the advantages and disadvantages of alum and Na aluminat in water purification.

Taste and odor in Sacramento's water supply. RALPH A. STEVENSON, *Western Construction News 2, 76; J. Am. Water Works Assocn. 19, 627(1928)*.—Because of the presence of many algae it was necessary to add Cl, 0.85 to 1.07 p. p. m. before aeration, reducing the regular Cl afterward to 0.25 to 0.15 p. p. m., to effect the proper odor removal.

St. Paul eliminates odors and taste by aeration. R. A. THUMA, *Water Works Eng. 80, 1476; J. Am. Water Works Assocn. 19, 631(1928)*—O content is increased 6% and odors are removed. Water is made more corrosive. The complete cost is about 50¢ per million gallons.

New water-softening plant for Beverly Hills, California. R. L. DARBY, *Western Construction News 2, 31; J. Am. Water Works Assocn. 19, 792(1928)*—The water contains 8 to 10 p. p. m. H_2S . Plant was designed to include aeration, coagulation with lime and alum, sedimentation, secondary alum coagulation and sedimentation and filtration. Cl was probably to be added after secondary coagulation. A detailed description is given.

Great advances in water softening. CHARLES P. HOOVER, *Water Works Eng. 1927, 991; J. Am. Water Works Assocn. 19, 462-3(1928)*—Improvements in handling chemicals, better mixing, Dorr clarifiers, greater efficiency in softening, the proper use of zeolites and the stabilization of softened water by re-carbonating are all considered.

Porter water softener. J. MILLS & CO., *Mech. World 81, 449-50; J. Am. Water Works Assocn. 19, 232(1928)*—A description of a lime, soda ash cold process softener supplying 2500 gallons of softened water per hr.

Enslow chlorine comparator. W. A. TAYLOR, *Can. Eng. 52, 20, 527; J. Am. Water Works Assocn. 19, 471(1928)*.—An illustrated description. The required Cl is affected by org. matter and pH . The residual Cl content required for various conditions is indicated.

Internal corrosion of fuel economizers. E. INGHAM, *Mech. World 82, 467; J. Am. Water Works Assocn. 19, 478(1928)*—As corrosion caused by pure water is usually due to dissolved gases O and CO_2 , it may be avoided if these gases be absent. Much can be done by introducing certain reagents with feed.

Problems in building large water plant. JOHN C. PRITCHARD, *Water Works Eng. 80, 1465; J. Am. Water Works Assocn. 19, 630(1928)*—A detailed description of the new water works plant of the city of St. Louis, Missouri, to be dedicated in 1929. Clarifiers, preliminary coagulation with lime and iron, secondary coagulation with alum and filtration precede pumping to a 100 million-gallon reservoir from which it flows by gravity to the city.

Differential aeration corrosion theory. W. B. LEWIS and G. S. IRVING, *Ing. Boiler House Rev. 40, No. 11, 583-4; J. Am. Water Works Assocn. 19, 231-2(1928)*.—The influence and control of $Ca(NO_3)_2$, $CaCl_2$, $MgCl_2$, $Mg(NO_3)_2$, CO_2 and O are considered.

Preliminary purification of boiler-feed water. J. GUTH, *Bull. assns. franc. des proprietaires appareils vapeur 28, 136-46(1927); J. Am. Water Works Assocn. 19, 230(1928)*.—A discussion of water treatment before it enters the boilers.

Feedwater treatment for high-pressure boilers. V. RÖDT, *Z. Bayerischen Revisionen-Ver. 31, No. 1, 5-6; J. Am. Water Works Assocn. 19, 229(1928)*.—To avoid concns. of sol. salts which cannot be removed chemically, evaporators are recommended.

Purification of water for boiler-feed purposes. T. R. DUGGAN, *J. Eng. Inst. Canada 10, No. 8, 379-85; J. Am. Water Works Assocn. 19, 230(1928)*—A review.

Boiler-feed water. A. G. ELLIOTT, *Pacific Ma. Rev. 25, 20-2; J. Am. Water Works Assocn. 19, 634(1928)*.—Methods of testing for acidity and alk. are given and many analyses are made.

Pretreatment of boiler-feed water. J. GUTH, *Bull. assns. franc. des proprietaires appareils vapeur 8, 299-315; J. Am. Water Works Assocn. 19, 635(1928)*.—A theoretical treatment of physics, chem. purification, and the use of soda and heat.

D. K. FRENCH

Steam at high temperatures. M. STAEGER AND P. BOHNENBLUST. *Metallurgist* (suppl. to *Engineer*) 1928, 15; *J. Am. Water Works Assoc.* 19, 636(1928).—Relates to oxidation of steel by hot water and steam considering the action of dissolved O as well as the direct reaction with the formation of Fe oxide and free H. D. K. F.

Calcium chloride waters, connate and diagenetic. ALFRED C. LANE. *Bull. Am. Assoc. Petr. Geol.* 11, No. 12(1927).—These waters can best be explained as the result of the absorption of water, magnesia and other compds. in the formation of chlorite and the change of volcanic glass to bentonite. The permute water-softening reaction may occur as described by Renick and renders the connate Na:Cl ratio more uncertain. There is little or no sign of the permute regenerating reaction, or of the petrographic products to be expected. There is some indication that the waters in rocks largely composed of volcanic ash are likely to have Ca chloride, and such rocks are likely to have Mg in amts. which can be explained as absorbed from the water. It also appears that there is a similarity in undisturbed connate waters of the same geologic age, but the effect of the circulation from former land surfaces represented by unconformities is pointed out. It is perhaps premature to suggest that in some cases the same shower of volcanic ash may have devastated the sea bottom and killed the animals that yielded the oil, or yielded the silica to the oil-making diatoms and furnished the Cl for the salt water that is found with the oil. C. L. COOPER

Electrometric determination of alkalis of Saki lake water. V. P. IL'INSKII. Gosud. Inst. Prikl. Khimii. *J. Chem. Ind. (Moscow)* 5, 270-4(1928); cf. Sagaidachnuii, *C. A.* 22, 2443.—The knowledge of alkyl. of Saki lake water is important first to biologists for the study of animal and vegetable life of the lake, and second to industrials for extn. of Br from the salt water. The latter is effected by distg. off Br by steam after setting it free by a current of Cl in the course of which part of the Cl is wasted in reacting with alkalis. The alkyl. of the salt water cannot correctly be detd. by titration in presence of usual indicators because its nature is very complicated. When methyl orange is used as indicator the values of alkyl. are higher than with phenolphthalein. On account of the considerable soly. of MgO in MgCl₂ with formation of an unstable compd. $m\text{MgCl}_2 \cdot n\text{MgO}$ which, by diln. with water, reacts with formation of $\text{Mg}(\text{OH})_2$, MgCl_2 , MgCO_3 and CO_2 , the alkyl. of the salt water increases on diln. with double or treble amt. of pure water. The electrometric method (following the prescriptions contained in Müller, *Elektrometrische Massanalyse* (*C. A.* 17, 3307) and Michaelis, *Physical and Colloidal Chemistry* (*C. A.* 20, 611)) has to be used for detn. of the value of alkyl. due to the presence of ions CO_3^{--} , HCO_3^- , NH_3 , NH_4^+ , etc. Curves representing the "potential-alkyl." have been drawn for Saki lake water in various dilns. and the ratios OH/CO_3 , CO_3/HCO_3 , etc., have been detd. Dil. solns. of the salt water contain $\text{Mg}(\text{HCO}_3)_2$. On concg., HCO_3^- disappears where CO_3^{--} increases and, at the same time, combinations such as $m\text{MgO} \cdot n\text{MgCl}_2 \cdot p\text{H}_2\text{O}$ and $m'\text{Mg}(\text{OH})_2 \cdot n'\text{MgCO}_3 \cdot p'\text{H}_2\text{O}$ appear. Org. alkyl. could not be detd. electrometrically but, by decompn. of amines with alkalis and detn. of NH_3 obtained, it is estd. that org. bases are responsible for 2% of the total alkyl. of the salt water. Conclusion: The abs. alkali content of the salt water is a linear function of the concn. of MgCl_2 and is but little affected by the presence of other salts and by the temp. BERNARD NELSON

Determination of hydrogen sulfide in sea water. G. DRUCKER. *Internat. Rev. Hydrobiol. Hydrogr.* 16, 130-3(1928).—The sea water is run directly into 15 cc. of 0.01 N I soln. acidified with 1-2 cc. of concd. HCl. B. C. A.

The national rivers and their functions. C. H. CLAYTON. *Munic. Eng. Sanit. Record* 81, 148(1928).—Sources of "new" water are the under-drainage of agricultural land and rain water running directly into streams off impervious paved surfaces in urban areas. C. recommends that a small coordinating comm. be formed to bring together and analyze the often contradictory governmental literature on rivers.

C. H. BADGER
Volga, the Oka and the Moskova rivers as sources of supply of potable water for the city of Moscow. S. N. STROGANOV AND N. G. ZAKHAROV. *Résumé of Rept. of Communal Service of Moscow 1927* (Russian); *J. Am. Water Works Assoc.* 19, 470-1(1928).—The Volga and Oka are too far away and the Moskova will soon be insufficient. Impounding the last supply seems the most practical solution. D. K. FRENCH

River pollution prevention. J. H. GARNER. *Surveyor* 72, 71; *J. Am. Water Works Assoc.* 19, 625-6(1928).—A general review of the stream pollution situation in Great Britain covering present conditions, proposals for improvement, provision for increased research and the needs and advantages of coöperation. D. K. FRENCH

Specifications and analyses of gravel and filter sand—where sand may be obtained. LEWIS O. BERNHAGEN. *Proc. Ninth Texas Water Works Short School 169, 1927*; *J.*

Am. Water Works Assocn. 19, 793(1928) —The importance of the sand and gravel bed are emphasized and specifications are given.

Determining coagulant dosage by bottle tests. LEWIS I. BIRDSALL. *Proc. Ninth Texas Water Works Short School* 264, Jan., 1927; *J. Am. Water Works Assocn. 19, 793-4 (1928)*.—Tests to be made where waters change quickly in quality are described.

Water of paper mills. NATSUKIHO WATANABE. *J. Public Health Assocn. Japan* 3, No. 7, 1; *J. Am. Water Works Assocn. 19, 471-2(1928)* —Paper-mill wastes comprised straw and lime or paperboard refuse, manila hemp and materials used in the making of Japanese papers. The effect was to increase mosquito breeding, destroy fish and prevent swimming, etc., as well as to generate a variety of gases.

Typhoid fever. E. D. RICH. *Mich. Pub. Health* 15, 79; *J. Am. Water Works Assocn. 19, 228(1928)*.—Improved water supplies have reduced typhoid deaths from 17.4 per 100,000 in 1913 to 2.8 in 1926.

Typhoid and water supply. E. A. WINSLOW. *Mich. Pub. Health* 15, 101; *J. Am. Water Works Assocn. 19, 228(1928)* —The dangers of improperly protected public supplies are emphasized.

Making money out of filter sludge. A. W. BULL. *Water Works Eng.* 80, 1687; *J. Am. Water Works Assocn. 19, 797(1928)* —Because of the slowness of some water-softening reactions it is recommended that sludge from the coagulation basins be introduced into fresh water, thereby making possible a better effluent.

Spent gas liquor in relation to sewage disposal. H. ROSS HOOPER. *Munic. Eng. Sanit. Record* 81, 90-1(1928). The following absorbed O values in p. p. m. (0.0125 N KMnO₄ at 27° for 4 hrs.) are given: spent gas liquor from vertical retorts, 7500, from horizontal retorts, 4000, from strong domestic sewage, 150. Any reduction in the vol. of ammoniacal liquor gives a proportionate reduction in the vol. of spent gas liquor. Some elimination of water may be effected by the use of drier coal, acid scrubbers and better control of steaming in vertical retorts. The water formed during the carbonization process cannot be eliminated. The O-absorbed figure of dil. spent gas liquor (4000 p. p. m.) was reduced about 90% by biological filtration at the rate of 15 gal. per cu. yd. per 8-hr. day and was further reduced to below 20 p. p. m. by a second filtration at the rate of 12 gal. per cu. yd. Equalizing tanks to give an even discharge of the liquor into the sewers is recommended. Lime particles usually present are pptd.

Refuse disposal (Bradford, England). ERNEST CAILL. *Munic. Eng. Sanit. Record* 81, 46(1928).—A saving of £74,000 is made by tipping, as against destruction by fire or furnace. Salvaging is too expensive.

Sanitation in rural areas. G. BELSON CHILVERS. *Munic. Eng. Sanit. Record* 81, 154(1928).—Large capital expenditures cannot be incurred in housing, sewerage, sewage and refuse disposal schemes because of the scattered population. The dilapidated low-ceiled houses and the primitive methods of sanitation make the rural house more unhealthy and unsanitary than the town house. Very few villages have a pure and efficient water supply. They mainly depend on a few scattered wells or occasionally a supply furnished to a few stand-pipes by the lord of the manor. Wind-mills are sometimes used. The sewerage usually consists of earth or pail-closets with frequent difficulty in disposing of the contents. Sewage may be disposed of through broad irrigation or land filtration, and septic tank treatment.

Report of the Hamburg Smoke Abatement Society for 1927. JOHN B. C. KER-SHAW. *Engineer* 146, 111-2(1928) —A review.

Accidents in cyanide fumigation. M. KAISER. *Wiener klin. Wochschr.* 41, 958-60(1928).—Deaths have occurred following fumigation at a low temp. Adsorbed gas was evolved in toxic concns. from mattresses, etc., when warmed to body temp.

Apparatus for diffusion treatment of sewage (U. S. pat. 1,681,890) 1. Apparatus for extracting mucilage from flaxseed for use in steam boiler. (U. S. pat. 1,683,102) 1.

Treating water for preventing corrosive effects. JULIANUS W. M. BOURGOIGNON and CARL L. PHILIPS. U. S. 1,683,521, Sept. 4. See Brit. 271,079 (C. A. 22, 1643).

Device for detecting scale and corrosion in steam-pipe systems. CYRUS W. RICE. U. S. 1,683,489, Sept. 4.

15--SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Biographical sketches of prominent agricultural chemists and their investigations. III. William Krüger and the Anhalt experiment station at Bernburg. PAUL KRISCHKE. *Ernähr. Pflanze* 24, 17-23(1928).—With portrait and bibliography. L. P. M.

Soil stratometer. Examination of deep-lying soil. M. ZACHLOUL. *Nature* 121, 537(1928).—A simple instrument for measuring variations of the mech. resistance of soil in a vertical direction is described. B. C. A.

The distribution of the important agricultural soils and soil types in France. P. LARUE. *Ernähr. Pflanze* 24, 23-8(1928).—Reproductions of 5 soil maps are given. LAWRENCE P. MILLER

Influence of soil heterogeneity on growth and yield of successive crops. T. EDEN AND E. J. MASKELL. *J. Agr. Sci.* 18, 163-85(1928).—Results of field trials were examd. mathematically with a view of correlating phys. conditions of the soil and plant growth. Ploughing draught, as a measure of phys. condition, showed a fairly close correlation with the germination of wheat, but not with its later development. With swedes no definite relationships were apparent. In both cases the effect of the spacing of the plants on their growth and development was of primary importance. B. C. A.

Study on aqueous soil solutions. Observations on the method proposed by T. Saidel. E. ANGELESCU. *Univ. of Bucarest Bull. soc. chim. Roumania* 10, 14-25 (1928).—A theoretical study of soil sampling. P. THOMASSET

Aqueous vapor pressure of soils. IV. Influence of replaceable bases. MOYER D. THOMAS. Utah Agr. Expt. Sta. *Soil Science* 25, 485-93(1928); cf. C. A. 22, 3251-2.—A group of soils from widely different localities, together with a natural colloidal mineral, were treated to exchange their bases for a single replaceable base, and after the excess of sol. salt had been removed the vapor pressure-moisture relationship was detd. The vapor pressure-moisture curves are greatly influenced by the nature of the replaceable base in the mineral complex. In dry soils the K-treated material has the least and the Ca treated material the greatest water-absorbing power. The Na-satd. material tends to cross the other curves and at high moisture contents has the greatest absorbing power. The existence of hydrates in the Na curve of the colloidal mineral is established and the influence of these hydrates on the slope of the curve is pointed out. It is indicated that the characteristic shape of the Ca curve may also be due to the presence of water of hydration. Most of the soils studied exhibit vapor pressure-moisture relations very similar to the colloidal material of the soils. J. J. SKINNER

A comparison of the available moisture in sod and open soil by the soil-point method. HENRY I. BALDWIN. *Bull. Torrey Bot. Club* 55, 251-5(1928).—Detns. were made with Livingston-Koketsu porous porcelain soil points in an area of abandoned pasture near Grafton, Maine, now undergoing reforestation. Within 24 hrs. after a rain the rate of absorption of water by the points was equal in 2-hr. periods at 5 cm. depth in undisturbed grass sod and in earth from which sod had been removed the preceding year. From 48 to 72 hours after rain the rate of absorption was 4 to 24 times as great in the bare soil as in the sod. In reforestation work, trees should be planted in open pits made by removal of the adjacent sod, as water-supplying power of the soil will thereby be increased. JOSEPH S. CALDWELL

A new method for the determination of the nutrient content of soils by pot investigations. WIESSMANN. *Ernähr. Pflanze* 24, 30(1928).—See C. A. 22, 2425.

LAWRENCE P. MILLER

Replaceable bases and the dispersion of soil in mechanical analyses. MOYER D. THOMAS. Utah Agr. College. *Soil Science* 25, 419-27(1928); cf. C. A. 22, 3252.—A no. of soils from widely sepd. localities, together with a colloidal mineral, all of which had been treated with neutral salts or 0.05 N HCl to exchange their replaceable bases for a single base, were subjected to the mech. analysis process, with and without Na_2CO_3 as a deflocculating agent. In most cases the Na-satd. soil was the most completely dispersed. The addn. of the deflocculating agent to the Na-treated soil either did not increase the dispersion or actually decreased it, except with the calcareous soils, which, when the sol. salt was washed out, had lost by hydrolysis a considerable portion of the Na introduced. In some cases a preliminary treatment with 0.05 N HCl, followed by a removal of the sol. material and subsequent use of Na_2CO_3 as deflocculating agent, gave as complete a dispersion in the mech. analysis as was obtained with the

Na-satn. treatment. Two cases are noted in which the NH_4 -treated material dispersed more completely than did the Na treatment and in one case max. dispersion was obtained with the sample which had been treated with AlCl_3 . The dispersion of the Ca-satd. sample was increased markedly by the addn. of the deflocculating agent, but the reverse was true of the Mg mineral. In view of the exptl. difficulty attending the prepn. of Na-satd. soil it seems likely from these data that the best routine method of dispersing the soil sample for mech. analysis would consist in preliminary treatment with dil. acid followed by the use of Na_2CO_3 as the deflocculating agent.

Studies on the humus-zeolite complex in the soil and on the soil reactions. J. J. SKINNER. ELER SIGMOND. *Matematik. Természettudományi Ertseilo* 43, 51-78 (Hung.), 79-80 (Ger.) (1920).—The most reactive part of the soil is to be found in the humus-zeolite complex, which may be considered as a complex chem. combination in which the anions are the humus- and zeolite-acids, while the cations are the replaceable bases in the soil. In neutral soils the cations are 90-5% bivalent metals such as Ca and Mg. In alkali soils the bivalent cations are partly replaced by univalent metals. In acid soils they are partly replaced by H ions. Tabulated data are given for the total cation equivalent, the distribution of these cations, av. values for neutral soils, typical values for alkali soils, satn. values for several Hungarian and Dutch soils, the relation of the various forms of acidity and the corresponding titration curves.

The use of the Dumas-Dennstedt method in the determination of total nitrogen in soils and agricultural products. E. PARISI. Istituto Superiore Agrario, Bologna. *Ann. chim. applicata* 18, 196-7 (1928).—The Dennstedt method for the detn. of N (cf. *Anleitung zur vereinfachten Elementaranalyse*, 4th ed 1919; Abderhalden, *Handbuch der biologischen Arbeitsmethoden* I, Pt. 3, 501) has been found very satisfactory for soils, flour, etc. The app. and technic are described in detail and illustrated.

The behavior of the nitrogen of molasses distillation residues in soil. E. PARISI. Istituto Superiore Agrario, Bologna. *Ann. chim. applicata* 18, 198-204 (1928).—The high proportion and the nature of the org. substances in residues from the distn. of molasses suggested that when used on soil, there might be denitrification and injury to useful flora. Preliminary expts. showed that in moist soils the distn. residues caused a diminution of total N, and the disappearance of nitric N (cf. C. A. 20, 3207). Systematic tests were therefore carried out (1) to det. the absorptive power of soil for the amino acids present in high proportions in molasses distn. residues; (2) to follow the ammonization and nitrification of these compds; and (3) to verify the loss of N by soils fertilized with distillery residues and maintained at a definite state of humidity. In (1) dried soils were treated with solns of glycocoll, alanine, asparagine, aspartic acid and $(\text{NH}_4)_2\text{SO}_4$ for comparison, and after some hrs the amino acids in the filtrate were detd. In (2) soils treated with CaCO_3 were impregnated with 20% by wt. of water contg. N in the form of leucine, alanine, glutamic acid or betaine, the N being the same wt. in each case. After standing, NH_3 , HNO_2 and HNO_3 were detd. colorimetrically. In (3) the N balance was detd. by the Dumas-Dennstedt method. The same series of expts. in (1), (2) and (3) were then made with molasses distn. residues. The results show that the absorptive power of soil for amino acids (and therefore for 70% of the N of molasses distn. residues) is slight or even negligible. Ammonization of amino acids and of betaine was regular, but very slow and the danger of washing away still existed. Nitrification of $(\text{NH}_4)_2\text{SO}_4$ was very rapid, that of alanine, glutamic acid and leucine was slower and that of betaine was slowest. Losses by liberation of N in gaseous form from wet soils fertilized with molasses distn. residues were practically negligible, and even when large quantities of these residues were used, nearly all their N was transformed into nitrates.

The oxidation of cellulose in the soil. S. WINOGRADSKY. *Compt. rend* 187, 326-30 (1928); cf. C. A. 21, 2042.—Cultures were made on a piece of filter paper spread on silico-gel impregnated with a salt soln. contg. a suitable amt. of N in the form of nitrate. This simple arrangement presented the advantage of following little by little the modifications which take place in the texture of the paper under the influence of the bacteria. Three cases present themselves and are described.

The potash content of soils of East Prussia according to field investigations and the Neubauer method. H. VAGELER. Landwirtschaftskammer f. Ostpr., Königsberg i. Pr. *Ernähr. Pflanze* 24, 220-1 (1928).—Results from the Neubauer method and 1 year's field expts. showed good agreement in 73% of the cases.

Potassium xanthate as a soil fumigant. E. R. DEONG AND JOCELYN TYLER. Univ. of Calif. *Ind. Eng. Chem.* 20, 912-6 (1928).—The rate of decompn. of K xanthate,

as measured by the evolution of CS_2 , is given when combined with HCl and with superphosphate. Lab. measurements have been made of the rate of penetration of CS_2 into both loose and packed sandy and heavy clay soils. The toxicity of xanthate has been tested principally against the root knot nematode. It has been shown that a complete kill is possible in the lab. with the different stages of the nematode, while good control has been obtained in field expts.

J. J. SKINNER

Carbon dioxide nutrition of the forest. D. FRÉHER. *Biochem. Z.* 194, 213-4 (1928).—A correction of a previous paper (cf. C. A. 21, 2042).

H. G.

Fungi in some Colorado soils. E. L. LECLEERG AND FREDERICK B. SMITH. Colorado Agr. College. *Soil Science* 25, 433-41 (1928).—The dominant type of fungi in Colorado soils seems to be species of *Penicillia*, whereas species of *Aspergilli* occur only occasionally. The 3 dominant groups of fungi in order of total numbers and in variety of species are *Penicillia*, *Trichoderma* and *Aspergilli*. The rarer forms are species of *Cephalosporium*, *Verticillium*, *Spicaria*, *Hormodendrum*, *Macrosporium* and *Stachybotrys*. From the 27 soils studied it appears that soils low in moisture apparently favor the growth of *Rhizopus nigricans* and *Trichoderma lignorum*. Moisture did not seem to limit the presence of *Penicillium expansum*. Moisture content, which varied in the samples taken from 1.9 to 5.5%, apparently had no specific effect on the prevalence of other species. The no. of species of fungi isolated was considerably less in soils contg. high qualities of sol. salts than in those of low salt content. Greater numbers of *Penicillia* were found in soils of high salt content than of any other fungus. *Penicillium expansum* and *P. lilacinum* were abundant under these conditions. Species of *Macrosporium* and *Cephalosporium* were also found in soils high in salts. *Trichoderma lignorum* and *Rhizopus nigricans* were abundant only in soils of low content. *Penicillium expansum*, *P. roseum*, *P. lilacinum*, *P. No. 55* and *Fusarium sp.* were found in small numbers under low salt conditions. *Rhizopus nigricans* and *Penicillium expansum* were common to both productive and unproductive soils, but were more abundant in the latter. *Trichoderma lignorum* was present only in the surface of these 2 soils. Greater no. of species of *Fusaria* were isolated from the productive than from the unproductive soils. *Penicillium glaucum*, *P. roseum* and *Cephalosporium sp.* were found only in productive soils, whereas *Macrosporium sp.* was isolated only in the unproductive soils. *Penicillium expansum* was isolated from 5 of the 8 samples of productive soils and also from 6 of the 9 samples of unproductive soils. The no. of species found decreased with depth. Only 2 species were isolated at 42 inches. *Trichoderma lignorum* and *Penicillium expansum* were present at all depths examd. *Aspergillus niger* was abundant only in the surface when present. *Fusarium sp.* was present in both the surface and sub-surface of the soils examd. *Spicaria simplicissima* and *Hormodendrum pallidum* were isolated only from the subsurface. *Penicillium roseum* and *Penicillium No. 50* were found in the surface, whereas *P. duclauxi*, *P. No. 67*, *P. lilacinum* and *P. No. 55* were present only in the subsurface.

J. J. S.

Fifty years of fertilizer practice. PAUL WAGNER. *Ernähr. Pflanze* 24, 244-57 (1928).—An address. Progress has been due largely to improved methods for the scientific study of the role of fertilizers in plants and to better controlled plot expts. In agricultural practice the soil should always be supplied with an excess of K and P, while N should be added as necessary according to the crop grown.

L. P. M.

Eighty-five years of fertilizer investigations in Rothamsted. JOHN RUSSELL. Rothamsted, Eng. *Ernähr. Pflanze* 24, 258-67 (1928).—An address, giving some of the more important results with special reference to potash investigations.

L. P. M.

Investigations by the Neubauer method in connection with long-time one-crop fertilizer experiments in England. TH. ROEMER. *Ernähr. Pflanze* 24, 180-3 (1928).—Soils from expts. at Rothamsted and Woburn when examd. by the Neubauer method for the detn. of available plant nutrients (cf. C. A. 18, 877) gave results which indicate that this method, while not infallible, is nevertheless of great practical value.

LAWRENCE P. MILLER

Time of using nitrogenous fertilizers on winter crops. E. MÖLLER-ARNOLD AND E. FREICHTINGER. *Z. Pflanzenernähr. Düngung* 7B, 119-27 (1928).—On light and medium soils better results were obtained with winter wheat and rye by adding the whole amt. of the N fertilizer in spring than when used part in autumn and part in spring. On stiff clays it was preferable to apply the whole of the N fertilizer in autumn. With rye on sandy soils, the increased yield obtained by a complete nitrogenous dressing in spring as compared with a divided dressing in spring and autumn was mainly in the straw. In this respect the efficiency of a unit of N added in spring was 5 times that of a unit added in autumn when calcd. from a Mitscherlich growth-curve.

B. C. A.

Determination of nitrogen in all its forms in all fertilizers, particularly in mixed fertilizers containing urea and derivatives of cyanamide. THORRL. *Ann. fals.* 21, 257-61 (1928).—The method proposed consists essentially in detg. nitric N (if present), NH_4N (including NH_4 salts, urea, amides, etc.) + org. N ($\text{H}_2\text{O-insol. N}$) and org. N. The following recommendations are made: in destroying nitric N by means of FeCl_3 and HCl do not evap. down to sirupy consistency; in the Kjeldahl or similar digestion, heat as strongly as possible for 2 hrs., by KMnO_4 , CuSO_4 , etc., decoloration not being a sure sign of the complete reduction of the N.

The rate of availability of various forms of sulfur fertilizers. JOSEPH D. HAYNES. Oregon State Agr. College. *Soil Science* 25, 447-52 (1928).—The expts. were made to det. the rapidity of oxidation of S in different soils, the relative value of different forms of S for fertilizers and the effect of S on the chem., phys. and biological changes in the soil. Black gas S becomes available at approx. the same rate as insol. sulfates more rapidly than did the non-inoculated S. Under alk. conditions S yielded to have increased the microflora of the soil probably because of neutralizing the alkali present, which produces a favorable flora for soil organisms. S produces a decided, flocculating effect on alkali soils. Soils treated with 4000 lbs. of S are flocculated rapidly, whereas non-treated soils remain deflocculated. Flocculation starts as neutrality is approached. H-ion concn. changes with amt. of S added to the soil, type of soil and carbonates present. It takes larger quantities of S to change the reaction of alkali soil than of neutral soil.

The biological reduction of mineral phosphates. K. I. RUDAKOV. Bacteriol. Agron. Sta., Moskau. *Centr. Bakt. Parasit. H. Abt.* 70, 202-14 (1927). In a medium consisting of cond. water 1000 cc., mannitol 20 g. and $\text{NH}_4\text{H}_2\text{PO}_4$ which is inoculated with a small quantity of soil, there is a rapid decrease in sol. phosphoric acid under anaerobic conditions. P_2O_5 is reduced to H_2PO_4 , H_3PO_4 and PH_3 by the metabolic activities of soil microorganisms. The addn. of salts of HNO_3 or H_2SO_4 slows the reduction of P_2O_5 because they are more easily reduced and are used up first by the growth of the organisms. Pure cultures of bacilli were isolated which carried out the same processes. Different soils show different degrees of reduction of P_2O_5 , cultivated soil being more active than mountain soil.

Phosphate applications and their influence on chernozem. IV. The reversion of phosphoric acid in soils. M. A. FODOROV. Kharkov Agr. Expt. Sta. *Soil Sci.* 25, 463-72 (1928).—The process of phosphate reversion may be easily demonstrated by the action of CaCO_3 or FeCO_3 on the sol. phosphates of Ca formed in the soil. Water-sol. salts of Ca and Fe bring about the reversion of the phosphates and cause the org. matter to flocculate. It has been shown by dialysis expts. that Ca in soln. prevents the soly. of org. matter. Phosphates of K behave differently from those of Na. They give a less colored ext. A soil treated with normal Na_2PO_4 and washed subsequently with water gives up most of the sol. org. matter formed by this treatment. Further treatment with Na_2PO_4 soln. does not bring more org. matter into soln., 73.2% of the total org. matter from chernozem and 56.6% from forest loam soils have been obtained. A 2% Na_2PO_4 ext. from a soil under cultivation for 12 years gave different amts. of org. matter, indicating the sp. effect of the crops. Solns. of org. matter from different soils may be obtained with Na_2PO_4 exts. The color intensity of a soil ext. with Na phosphate may serve as a test for the detn. of the kind of phosphate used: the secondary salt gives a less intensely colored ext. The Na_2CO_3 and NaHCO_3 may also be distinguished by making a soil ext.

The determination of the phosphoric acid requirement of soils on the basis of the determination of the "relative solubility" of the seedling method and of pot fertilizer experiments. H. BLANCK. *J. Landw.* 75, 343-52 (1928). The relative soly. values show apparently good agreement with the results of the growth expts. if the results of B. are arranged on the basis of the nos. found for the relative soly. and compared with the results of Neubauer's nos. The slight variations from a continuous uniform series in the results of the growth expts. are of course to be referred to the unavoidable sources of error of the growth expts., as these without further discussion are shown by the constantly agreeing plausible variations of the results, and it is thereby shown, that an abs. agreement in general cannot be expected. Nevertheless the variations here are so slight and the variations of the Neubauer nos. so great, that one must concede the advantage, for the case in question, of the method for the relative soly. detn. of P_2O_5 modified by B. over the detn. of root-sol. P_2O_5 by Neubauer, entirely apart from the fact that the value for the relative soly. can be obtained within at least 3 days, while the Neubauer test requires several weeks.

E. F. SNYDER

The calcium carbonate-soil equilibrium and the lime requirement. SANTE MATTSON. N. J. Agr. Expt. Sta. *Soil Science* 25, 429-31(1928).—A period of 7 days was sufficient for the CaCO_3 -soil equil. to be established through a parchment membrane even when the soil material is, at the outset, completely unsatd. The expt. shows that the quantity of Ca adsorbed by the soil material from CaCO_3 is a measure of the degree of satn. and therefore also of the lime requirement. E. F. SNYDER

Contribution to the question of fertilization of hops as an agent against *Pseudoperonospora humuli*. CT. BLATTNY AND FR. DUCHON. Phytopath. Inst. Staatl. Forschungsanst. Pflanzenprod., Prag. *Ernähr. Pflanze* 24, 140-2(1928).—Field observations indicate that good nutritional conditions favor resistance to *P. humuli*. Analyses of strongly infected leaves and weakly infected leaves show that the latter are higher in K and Ca, but lower in N and P. LAWRENCE P. MILLER

Effect of different fertilizers on the amount and quality of tobacco crops. A. V. OTRYGANIEV AND D. V. BALANDA. State Inst. Tobacco Invest., U. S. S. R., *Bull.* 43, 33 pp.(1928); cf. *C. A.* 20, 1127.—The results of field expts. during 1926 and 1927 on tobacco of the Oriental cigaret type show that heavy reddish brown silt loam soil gives a tobacco of continually improving quality and increasing yield as the amt. of P_2O_5 applied to the soil as superphosphate is increased from 22 to 65 kg. per hectare. Thomas meal produces better results than superphosphate, but addn. of lime with the meal lowers the yield. The use of potash and nitrogenous fertilizers alone, or of lime alone, results in no marked increase in the yield. On sandy loam soil the greatest need is phosphatic fertilizer, but the crop is increased also by N and potash, but not by lime; less pronounced improvement in yield follows the use of stable manure. The effects of $(\text{NH}_4)_2\text{SO}_4$ and NaNO_3 are practically identical as regards the magnitude of the crop, but tobacco of better quality is obtained when $(\text{NH}_4)_2\text{SO}_4$ is used. Org. fertilizers, especially green manure (lupin and hairy vetch), improve the quality more than the inorg. fertilizers. Only when lime was applied, either alone or with other fertilizers, was any appreciable change in the soil reaction produced. B. C. A.

The protective effect of potash fertilization against diseases of grains and potatoes. EMIL MÜLLER. Landwirtschaftskammer f. Pommern, Köslin. *Ernähr. Pflanze* 24, 121-3(1928).—Crops grown on plots fertilized only with N and P showed a greater tendency to lodge and were more affected by disease than when grown on plots which had received K in addn. LAWRENCE P. MILLER

Analysis of insecticides. Liquid insecticides miscible with water: alcohol; mercury and formaldehyde; picric acid; nicotine; garlic juice. MAURICE FRANÇOIS AND (MISS) LAURE SÉGUIN. *Ann. fals.* 21, 282-6(1928); cf. *C. A.* 21, 2353; 22, 3255.—General outline of the methods suitable for the qual. and quant. analysis of such insecticides. A. PAPINEAU-COUTURE

Nicotine as an insecticide. G. FOX WILSON. *Am. J. Pharm.* 100, 403-8(1928). W. G. GAESSLER

The removal of spray residue from apples and pears. HENRY HARTMAN, R. H. ROBINSON AND S. M. ZELLER. Ore. Agr. Expt. Sta., *Bull.* 234, 1-38(1928).—Chem. analyses offer the only reliable basis for detg. whether fruit sprayed with arsenicals requires cleaning to meet various Federal and State tolerances. The usual tolerance for As_2O_3 is 0.01 grain per lb. of fruit. In 1927, although approx. 90% of the Ore. crop of pears and apples, i. e., 3,300,000 boxes, contained less than 0.01 grain As_2O_3 per lb., 90% of the crop was subjected to a cleansing process with HCl as the arsenical solvent. As a result of 3000 analyses, a strength of 0.3-1.0% HCl for 1 min. was found most satisfactory, the high concns. being used only in cases of heavy spray residue on the fruit. Mech. means such as brushing or wiping are inefficient. A rinse and spray bath of clean H_2O contg. NaHCO_3 or CaO (concn. not stated) as neutralizers, after the HCl immersion, is very desirable mechanically to remove HCl, As, dirt and mold spores. Wax secretions on fruit in excessive amts. coat the PhHAsO_4 particles and prevent the effective removal of the spray residue by HCl. To overcome this difficulty, the fruit must be harvested at the proper stage of maturity and immediately subjected to the washing process. Oil sprays that remain on the fruit at harvest time likewise protect the spray residue from the solvent action of the HCl and interfere with effective cleaning. Where excessive spray deposits are present, 2 or more washings are necessary. The use of $\text{Ca}(\text{OH})_2$ or Bordeaux mixt. in the spray schedule aids later in facilitating the As removal by HCl. $\text{Al}(\text{SO}_4)_3$, Na_2CO_3 and Celite dust had no effect. By heating the HCl bath to 32-34°, the solvent action on the spray residue was increased to the extent that a 1-min immersion removed even heavy As residues. CCl_4 , C_6H_6 , CCl_3 and gasoline proved unsuccessful as wax solvents in an attempt to expose the As residue to the solvent action of acid. Spreaders and deflocculants in

the spray schedule had no effect on As removal by HCl. Incomplete data indicate that the appearance and keeping quality of apples are enhanced by means of the HCl treatment. Com. CH_3O caused pitting around the lenticels, occasional calyx injury and flesh discoloration in concns. greater than 0.005%. Borax proved to be of little value.

C. R. FELLERS

Further fumigation tests with ethylene dichloride--carbon tetrachloride mixture. L. F. HOYT. Larkin Co., Buffalo, N. Y. *Ind. Eng. Chem.* 20, 931-2(1928); cf. C. A. 22, 2632.—Two and one-half qts. (7 lb.) of 3.1 mixt. of $(\text{CH}_2\text{Cl})_2$ and CCl_4 were used for a 24-hr. period, the temp. being maintained at 75° F. throughout fumigation. The infesting insects were *Tribolium* in flour and Indian meal moth in cereal. The insects were all killed and no reinfestation took place. Baking tests showed no detectable difference in the odor, texture or general appearance. No odor of the fumigant could be detected in the finished product. *Fumigation of moth-infested rugs and furniture* in a 7800-cu. ft. room was done by suspending over steam pipes in the room burlap strips and a runner rug soaked with the fumigant. The door of the room was sealed with paper strips and Na silicate. Results were 100% effective after a 44-hr. exposure.

J. A. KENNEDY

Experiments with Paris green for the destruction of Anopheles larvae. C. J. SCHUURMAN AND A. SCHUURMAN-TEN BOKKEL HUININK. *Geneeskund. Tijdschr. Nederland. Indie* 68, 280-97(1928).—The advantages of Paris green over petroleum are: fishes and useful plants are not damaged. Dusting from above permits a thorough treatment of floating algae. There is, however, the danger of accidental poisoning by wind-carried dust and of As accumulation in the livers of fishes. In the East Indies red earth is the best vehicle, since it is cheap, readily available and non-hygroscopic when dried. Lab. expts. with 1% dusting powders of Paris green with red earth acid clay, MgO and cement as a vehicle gave good results (complete destruction of the larvae within 24 hrs.), except for the cement mixt. *Stoxal* with the same vehicles even in concns. higher than those recommended by Roubaud was by far less effective. The result was equally good in weed-free and weed-covered places. The cost of the Paris green treatment is only 0.3-0.5 of that of the solar oil treatment. M. J.

The dressing of Chinese soil with arsenic. FRANK BROWNE. *Pharm. J.* 120, 320(1928).—J. Cameron (Peking) states that lump As_2O_3 powdered and mixed with the ashes of burnt twigs or grass is much used by Chinese farmers in destroying worms in the soil of gardens where, e. g., cabbage is grown. The mixt. contains about 10% As_2O_3 or less.

S. WALDBOTT

Growing turmeric in the Deccan (DESAI) 11D. Relation of the distribution of certain compositae to the H ion concentration of the soil (TURNER) 11D. Estimation of nitrogen (SIVAN, RAJU) 7. Phosphate and aluminate [for use as fertilizer] (Brit. pat. 283,072) 18.

MANDEVILLE DE REGISMONT, L.: *La fertilisation du sol par la culture et les engrais*. Toulouse: Douladoure freres. 86 pp.

NOLTE, OTTO: *Die Düngung der Grunlandes*. Berlin P. Parcy. 38 pp. Pt. II of Grünland-Bücherei. M. 1.80.

Fertilizers. H. HOLLINGS AND GAS, LIGHT & COKE CO. Brit. 282,327, Oct. 19, 1926. Phosphatic fertilizers contg. NH_3 prep'd. by absorbing NH_3 from coal gas, coke oven gas or the like in ground mineral phosphate mixed with H_3PO_4 , H_2SO_4 , HNO_3 or HCl are treated with air or inert gases such as flue gases to remove loosely combined NH_3 , which otherwise would be lost on exposure of the material. The NH_3 thus liberated may be absorbed in fresh phosphatic material. Various details and modifications of the process are given.

Fertilizers. RHENANIA-KUNHEIM VEREIN CHEMISCHER FABRIKEN A.-G. Brit. 283,194, Jan. 8, 1927. Calcined phosphates such as Thomas slag, Rhenania phosphate or Wolter phosphate are mixed with NH_3 and sufficient acid or acid salt to neutralize the alk. of the phosphate. K salts may be added.

Concrete or masonry fermenting-chamber for nightsoil, etc. J. R. ANGER. Brit. 283,152, Jan. 5, 1927. Structural features.

Insecticide. ÉTABLISSEMENTS JAFEMON. Fr. 634,812, May 21, 1927. Cresyl contg. 15-30% of phenol is emulsified with white soap and glycerol and a little water, and to the mixt. 65-200% by vol. of CS_2 is added. This gives a non-inflammable emulsion of CS_2 for use as an insecticide.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Scientific evolution of the brewing industry. A. FERNBACH. *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 317-25(1928).—An address. A. PAPINEAU-COUTURE

The chemistry of wine making. J. T. HEWITT. H. M. Stationery Office, Sep. 57 pp. —This report deals with all the processes of fermentation of the fresh juices of grapes by means of wine yeast and is based chiefly on the methods used in France and in French North Africa. W. T. H.

Wines of the Gard and Ardèche Departments of 1927 vintage. AUBOUY. *Ann. fals.* 21, 272-81(1928); cf. *C. A.* 21, 2756.—Analyses are tabulated and discussed of 70 wines of the Gard Department and of 33 of the Ardèche Dept. A. P.-C.

Antiseptics used for preserving samples of diseased wines: salicylic acid and sodium benzoate. FONZES-DIAON. *Ann. fals.* 21, 266-72(1928); cf. *C. A.* 21, 296.—A discussion of the effects on the analytical results (particularly volatile acidity) of the addn. of 0.5 g. salicylic acid or 1 g. Na benzoate per l. to samples of wines. Detn. of volatile acidity by the French official method is unaffected by the presence of either preservative, but the method generally gives much too low results. With the other methods, practically the whole of the benzoic acid passes over during the distn., but only a small portion of the salicylic acid, so that the latter only should be used and the use of Na benzoate discontinued. When detg. volatile acidity *via* Blarez a correction of —0.10 g. per l. should be applied for the entrained salicylic acid, and a correction of —0.15 in the Roos-Mestrezat method. The Duclaux method is practically unaffected by the presence of salicylic acid, but it generally gives low results. A. P.-C.

Detection of cider in wine by microscopical examination of the sediment. L. MINDER. *Z. Unters. Lebensm.* 54, 387-8(1927); A. WIDMER AND O. E. KALBERER. *Ibid* 388; cf. *C. A.* 21, 3419.—A question of priority. B. C. A.

Adulteration of brandy and its detection. H. ZEILNER. *Z. Unters. Lebensm.* 54, 389-90(1927).—Statements made by Graff (*C. A.* 22, 1430) are criticized. The fusel oil and ester no. recommended by Graff are deprecated on the ground that the content of higher alcs. in wines and therefore in wine products varies too widely. While analytical nos. are not to be despised, taste and odor are the most reliable indications that wine products so-called are genuine. A reply. G. GRAFF. *Ibid* 391-3.—It is claimed that tasting must occupy a secondary position seeing that it is subjective. Further, the addn. of sugar to wine before fermentation, or of rectified alc. before distn., cannot be detected by taste, but can be detected by detg. the amt. of higher alcs. present, these being in lower proportion in wine products so adulterated. B. C. A.

The pasteurization of beer. DE GRONCKEL. *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 335-41(1928).—Pasteurization of beer cooled and filtered to remove glutins is liable to cause turbidity on keeping, which is shown to be due to the fact that pasteurization disturbs the colloid equil. of beer, reducing the dispersion of the micelles and increasing their tendency to flocculation. This may be counteracted to some extent by regulating the p_H value, keeping it as far away as possible from the isoelec. pt. (p_H 4.2). The use of diastases is also advisable: comparative tests with colupulin, papayotin and pepsin showed that the latter is of no value for the purpose, that 1 g. of papayotin per hl. considerably increases the resistance of the beer to turning turbid but imparts a noticeable taste, and that 3 g. colupulin per hl. is as effective and does not affect the organoleptic characteristics of the beer. Varying the pasteurizing temp. from 60° to 70° and the time from 30 to 60 min. had no effect on the tendency to become turbid.

A. PAPINEAU-COUTURE
The spontaneous heating of barley. J. RAUX. *Brasserie et malterie* 18, 150 5, 166-9(1928).—A discussion of the causes, consequences (to the brewing industry) and prevention of the spontaneous heating of barley. A. PAPINEAU-COUTURE

SCHOELLHORN, FRITZ: *Bibliographie des Brauwesens*. Berlin: Gesellschaft für die Geschichte und Bibliographie des Brauwesens. 436 pp.; M. 8. Reviewed in *Bull. assoc. élèves inst. sup. fermentations Gand* 29, 342(1928); *Brasserie et malterie* 18, 159(1928).

Glycerol. E. A. BARBET. *Brit.* 282,917, Oct. 13, 1926. In producing glycerol by fermentation of sugar, small addns. of SO_2 are used instead of larger quantities of Na_2SO_3 or other reducing agent. Details are given for the fermentation of dild. molasses

Obtaining products from the waste liquor after distilling alcohol from fermented beet molasses. YOSHITARO TAKAYAMA (to Saburosuke Suzuki). U. S. 1,681,379, Aug. 21. The liquor is first dialyzed to remove yeast and uncrystallizable substances, the dialyzed liquor is concd. and treated with an inorg. acid such as HCl or H₂SO₄ to obtain a K salt and betaine salt; and the glutinic acid in the remaining mother liquor is converted into glutamic acid by adding an excess of inorg. acid such as HCl and heating.

Yeast. ERNST IVAR LEVIN. Fr. 625,038, Ma. 1927. See Brit. 271,883 (C. A. 22, 1636).

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Cortex of Iodina rhombifolia Hook et Ald., Reiss. M. AWSCHALOM. *Rev. facultad cienc. quim. Univ. La Plata* 4, 33-45 (1927). —Analytical data are given, and the method of extn. of the saponins (0.578% of the dry substance) is described.

Lippia hastulata (Griseb.), Hieronymus. E. H. DUCLOUX AND C. ALBIZZATTI. *Rev. facultad cienc. quim. Univ. La Plata* 4, 47-56 (1927). —Analytical data are recorded. The essential n_D^{20} 1.520, $[\alpha]_D^{20} + 53.3^\circ$, f. p. -25.3° , sapon. value 13.95.

B. C. A.

Tabacin, the toxic principle of tobacco. N. A. BARRIERI. *Atti accad. Lincei* [9], 7, 764-8 (1928). —Kentucky tobacco was analyzed by a method which was qualitative and quantitative at the same time and which involved successive extn. with liposolvents (EtOH, Et₂O, CHCl₃, C₆H₆, and petroleum ether) and with hot and cold water. The procedure, which is described in detail, resulted in 9 fractions: (1) a ppt. composed of a mixt. of xanthophyll and a viscous substance which was present in matured leaves, (2) a C₆H₆ fraction, composed of a mixt. of chlorophyll and assocd. substances (cellulose, fats and perhaps waxes); (3) petroleum ether fraction, composed of a mixt. of xanthophyll and other principles; (4) CHCl₃ fraction, composed of a mixt. of the red substance of tobacco and odoriferous principles which can be steam-distd.; (5) aq. fraction, contg. tabacin; (6) insol. salts, chiefly Ca₃(PO₄)₂ and Mg₃(PO₄)₂; (7) a 2nd ppt.; (8) sol. salts, chiefly KCl, K₂SO₄ with traces of K₂HPO₄; and (9) the coloring substance scafatine. After purification, with animal charcoal and by dialysis, tabacin is a lemon-yellow wax-like substance, with odor of NMe₃ and a caustic, irritating taste. It has an acid reaction, is sol. in water and in EtOH in all proportions, is insol. in Et₂O, is hygroscopic, is not attacked by cold lime-water or by prolonged boiling with 1% aq. H₂SO₄. With hot lime water, NH₃ is evolved, and cold 2% aq. KOH decomp. it into tabacol, tabacovnic acid and a sugar. Heated to 110°, tabacin evolves irritating vapors of tabacol, and in smoking cigars and cigarettes considerable tabacol is formed. By the prolonged action of concd. KOH, tabacin liberates NH₃ and forms nicotine. It may therefore be regarded as a *N*-acid glucoside. Tabacin (50 g.), 2% aq. KOH (100 g.), water (500 g.) and a large excess of Et₂O agitated violently for a few seconds, the Et₂O layer sepd. and the Et₂O distd. off, yields tabacol. Exposed to air, it slowly becomes colored. H₂SO₄ added to the alk. layer, the liquid concd., the K₂SO₄ eliminated, leaves a residue of tabacnic acid (which is non-toxic) and a sugar. Tabacol is a lemon-colored, thin liquid, which is basic, is caustic to the touch, has an acrid, penetrating odor, provokes violent sneezing, then coughing and difficult asthmatic breathing. Hot concd. KOH converts tabacol into nicotine, with liberation of NH₃. Nicotine is therefore a decompn. product of the prolonged action of hot KOH, Ca(OH)₂ or Mg(OH)₂ on the residue of the EtOH ext. of tobacco or on dry tobacco. Tabacin, com. nicotine and nicotine from tabacol caused the death of guinea pigs in doses of 9 mg. per 100 g. of animal. The action of tabacol on guinea pigs, is violently convulsant, resembling the combined effects of HCN and strychnine. In doses of 1 mg. per 100 g. of guinea pig, tabacol causes violent contractions, with trismus and difficult breathing and death in 80 seconds by paralysis of the respiratory center. Com. nicotine killed dogs by cardiac and respiratory paralysis when given in doses of 15 mg. per kg. The alc. ppt. (fraction 9) dissolved in water and reprecipd. with EtOH several times yielded pure scafatine, which is yellow, neutral and insol. in all neutral solvents except water. Physiol. analysis by sepn. of the org. and inorg. principles in plant tissues should replace analysis by decompn. with concd. inorg. acids and alkalis now generally used.

C. C. DAVIS

Ungt. hydrargyri albi.—Ungt. hydrargyri flavum. G. WARNECKE. *Apoth. Ztg.* 43, 840-1(1928).—A critical commentary on these 2 HgO salves and their evaluation. W. O. E.

Evaluation of certain official drugs via the German Pharmacopeia. R. DIETZEL AND F. SCHLEMMER. Munich Univ. *Apoth. Ztg.* 43, 907-9, 921-3(1928).—A critical examn. of the official German methods with some suggestions for improvement in the evaluation of KOH, white Hg ppt., Na diethylbarbiturate, Na phenylethylbarbiturate, $\text{Na}_2\text{S}_2\text{O}_3$ and starch solns., MgO_2 , iodometric Fe detn., As_2O_3 , chloramine, unguentum hydrargyri cinereum and Fe prepn. with respect to As. W. O. E.

Spices and aromatics of former German East Africa. KARL BRAUN. *Heil Gewurz-Pflanzen* 11, 55-86(1928).—A descriptive compilation of spices and aromatics in general use by the natives of this erstwhile German colony. W. O. E.

Drug plant culture in Estland. J. STAMM. *Heil Gewurz-Pflanzen* 11, 87-101(1928).—An illustrated article showing the quantities of various plants produced, and the character of cultivation. W. O. E.

Comparative studies of valerian tinctures. WALTER MEYER. *Pharm. Ztg.* 73, 980-1, 993-6(1928).—An examn. of various com. brands purchased on the open market or received directly from the manufcs. revealed such differences in quality that M. felt compelled to prep. his own tinctures for purposes of comparison, using 1 part of the drug to 5 parts of solvent (about 95, 85 and 60% EtOH; spiritus ethereus, both full strength and dil.; Et_2O ; H_2O). The results are given in great detail. W. O. E.

Essential oil of Dacrydium biforme. P. W. AITKEN. *J. Soc. Chem Ind.* 47, 223-4T(1928).—Leaves collected in late autumn, spring and late summer gave on steam distn. quantities of oil varying from 0.21 to 0.42%. The product solidified on cooling to a pasty mass, which on filtration gave a clear oil and a residue of impure diterpene (dacrene) crystals. On immersing the oil in a freezing mixt. crystn. again took place and a further crop of dacrene resulted. The residual straw-yellow oil had n_D^{20} 1.5110, d_4^{20} 0.9360. Among the constituents isolated, after fractionation, were: an oxygenated compd. yielding a hydrochloride, m. 130-1°; a sesquiterpene b.p. 135-45° (hydrochloride, $\text{C}_{15}\text{H}_{25}\text{Cl}$, n_D^{20} 1.507); cadinene and dacrene, $\text{C}_{20}\text{H}_{32}$ (HCl salt, $\text{C}_{20}\text{H}_{32}\text{Cl}$, m. 108.5, $[\alpha]_D^{20}$ 10.9°). On crystn from EtOH, the resulting crystals m. 107°, $[\alpha]_D^{20}$ 48.4°, contg. no Cl and being evidently an isomeride of dacrene, also unsatd. and with the same solubilities, yielding an HCl salt identical with the preceding. This substance is termed *isodacrene*. The *dibromide*, $\text{C}_{20}\text{H}_{32}\text{Br}_2$, m. 139°; the nitrosite and nitrosochloride were viscous liquids that did not crystallize. W. O. E.

Investigation into the germicidal powers and capillary activities of certain essential oils. S. RIDEAL, E. K. RIDEAL AND A. SCIVER. *Perfumery Essent. Oil Record* 19, 285-305(1928).—The Rideal-Walker coeffs. of some 26 pure samples of well-known essential oils have been detd. Quite a no. gave a coeff. many times greater than a no. of com. disinfectants on the market; some of them such as palmarosa (9.0), cinnamon leaf (7.5) and cloves (8.0) may well be styled high-coeff. disinfectants. In a few cases it was found that the germicidal power is roughly proportional to the % of 1 chem. substance in a chosen series of oils; e. g., oil of cloves contains 90% of the phenol, eugenol, and has a coeff. of 8.0; cinnamon leaf contains about 85% eugenol, and has a coeff. 7.5; and bay oil contains about 60% eugenol, and has a coeff. of 5.5. Essential oils dissolved in pure B. P. paraffin lower the interfacial surface tension between such paraffin and water. Since it is well known that the formation of these surface layers, due to adsorption, of disinfectant round an organism is one of the means by which bacteria are killed, attempts were made to det. whether a disinfectant can be evaluated by means of its surface-tension-lowering effect. In a limited series of tests it would appear that this can be done in a general way. W. O. E.

Estimation of camphor in camphor spirit. EUGEN SUSSER. *Pharm. Zentralhalle* 69, 499-500(1928).—The method is based on the ability of camphor to enter into mol. combination with salol, to yield salolcamphor, $\text{C}_{15}\text{H}_{14}\text{O} \cdot \text{C}_{13}\text{H}_{10}\text{O}_2$. Into a 100-cc. weighed Erlenmeyer flask introduce about 10 g. (accurately weighed) camphor spirit and 70 cc. of H_2O . Add exactly 8.0 g. desiccated chemically pure salol, shake the flask, finally allowing the camphor and salol to collect on the bottom of the container. Pass the clear supernatant liquid through a weighed Gooch crucible (the bottom of which carries 2 small filters covered by a porcelain net). Wash the crucible with a few drops of concd. salol spirit. Place the Erlenmeyer flask in a water bath at 60-60°, whereby the entire content of the flask melts to a uniformly oily liquid consisting of salol-camphor and salol. Remove the container from the bath, set aside 1 hr. in a

cool room in order that the salol excess may crystallize. Should this not take place, shake the flask, whereupon rapid crystn. usually results. Transfer the entire content of the flask to the crucible, sepg. the oily salolcamphor from the cryst. salol by suction. Wash the latter by suction with 5 cc. concd. salol spirit (concd. salol spirit dissolves salolcamphor, but not salol). Remove the combined portions of salol to a sheet of smooth paper. Wash the inside of the flask with a few cc. of Et_2O , receiving and evapg. the latter on a watch glass. Press the salol residue on the watch glass between 2 sheets of white paper until no further grease spot forms. Add this salol to the main portion, then dry at first in the air until the odor of camphor is no longer perceptible, then in a desiccator to const. wt. Det. the wt. of flask together with the salol therein then by subtraction the wt. of the salol itself. In the same manner, det. the wt. of the Gooch crucible and the salol contained therein. Addn. of both differences gives the total salol remaining uncombined with the camphor. The camphor content of camphor spirit would then be detd. from the expression: $\% \text{ camphor} = (a/71.06)/b$ in which a = the amt. of camphor combined with salol, b = the amt. of sample taken for analysis, and the value 71.06 = the mol. wt. of salol into that of camphor multiplied by 100. Good results are reported. W. O. E.

Estimation of iodine in thyroid preparations. E. SCHULEK AND A. STASIAK. *Pharm. Zentralhalle* 69, 513-4 (1928); cf. *C. A.* 22, 1437.—The method involves destruction of the org. material by fusion with KOH and subsequent treatment with Br-water or KBrO₃. The completed fusion must be nitrite-free. Should traces of this be present, however, add to the somewhat cooled fusion 3 to 4 cg. grape sugar, and fuse anew for about 2 min. To the cooled and dissolved melt add either 4 cc. Br-water followed by 5 cc. 5% PhOH soln., or better 0.5 cc. freshly prepd. KBrO₃ soln. (1 part 5% NaOH soln. and 1 part satd. Br-water) with PhOH soln. as above. After thoroughly mixing, add 0.1 g. KI, 5 cc. 20% H_3PO_4 , and after 5 min. titrate with 0.01 N $\text{Na}_2\text{S}_2\text{O}_3$ (1 cc. = 0.2153 mg. I), starch being used as indicator. The results obtained by this and the Cl method on 5 different samples are presented in tabulated form. W. O. E.

Evaluation of tragacanth via the D. A.-B. VI. H. ESCHENBRENNER. *Pharm. Ztg.* 73, 966-8 (1928).—A critical discussion of the official Ger. method. W. O. E.

Content of homeopathic iron triturations. H. NEUGEBAUER. *Pharm. Ztg.* 73, 295-6 (1928); cf. *C. A.* 22, 1652.—Reference is made to the analytical findings recently obtained by Simon and Köttschau (cf. *Sudd. Apoth. Ztg.* 67, 786; 68, 65) and the doubt raised thereby as to the accuracy of the method, a series of preps. of the 1st, 2nd, 3d and 4th potencies was examd. and results were obtained which lead to the following conclusion: The 1st to 3rd potencies contain the theoretically expected amt. of Fe, while the 4th potency is slightly high, apparently because of traces of Fe in the milk sugar. W. O. E.

Content of homeopathic iron triturations. A. SIMON AND K. KÖTSCHAU. *Pharm. Ztg.* 73, 865-6 (1928).—A critical reply to the preceding paper indicating that the present authors see no reason to recede from their former position of criticism with respect to the accuracy of homeopathic potentiation. W. O. E.

Content of homeopathic iron triturations. H. NEUGEBAUER. *Pharm. Ztg.* 73, 938 (1928).—Polemical. W. O. E.

Antiphlogistic properties of Australian and East Indian sandalwood oils. FR. BORDECKER AND HEINZ LUDWIG. *Pharm. Ztg.* 73, 738 (1928).—A comparative study of these 2 products with respect to their antiphlogistic influence notably on the rabbit, indicates that the Australian product cannot replace the East Indian oil in therapeutic application. W. O. E.

Control of homeopathic primary products. H. NEUGEBAUER. *Pharm. Ztg.* 73, 920 (1928).—The necessity for the evaluation of primary products used in homeopathic preps. is discussed in connection with certain examples. W. O. E.

Stability of cod-liver oil and phosphorus emulsion. LOFVENICH. *Pharm. Ztg.* 73, 950 (1928).—L. replies to Bohrisch (cf. *C. A.* 22, 3261) and claims that emulsions 3.5 and 11 months old, resp., still showed by the AgNO_3 test the presence of free P although the relative amts. then present are not indicated. Reply. P. BOHRISCH. W. O. E.

Ibid.—B. again emphasizes his previous stand.

Pharmacological assay of digitalis by different methods. J. W. TREVAN, ELLEN BOOCK, J. H. BURN AND J. H. GADDUM. *Quart. J. Pharm.* 1, 6-22 (1928).—The results of assaying 2 samples of digitalis leaf, the one strong and the other weak, in terms of the international standard digitalis powder, with different methods, are described. The agreement obtained between the assay by different methods of the strong sample was fairly good, the discrepancies being not greater than those obtained when different

workers use the same method. There was serious disagreement between the different results for the weak sample, though all methods agreed in showing that the sample was weak. Evidence is given showing that the international standard powder is a practical standard for digitalis leaf and tincture in Great Britain. It is recommended that the prohibition by the Geneva Conference of the use of leaf which differs from the standard by more than 25% be withdrawn, and that having adopted a standard, in terms of which the strength of all leaf should be expressed, the International Conference should be content, as with insulin and pituitary ext., to leave each country to arrange the mechanism of standardization for itself. W. O. E.

New method for the assay of ointments of mercuric oxide and ammoniated mercury. NOEL L. ALLPORT. *Quart. J. Pharm.* 1, 23-7(1928).—*Mercuric oxide ointment.* Into a dry 250-cc. beaker weigh accurately 5 g. of the yellow mercuric ointment (or 1 g. of the red variety), and dissolve directly by warming on the water bath at 50° with 100 cc. of a mixt. of C_6H_6 13, $AcOH$ 2, $EtOH$ (90%) 5 parts. Sat. the resulting clear soln. with H_2S , warm again to 50°, then collect the ppt. on a tared Gooch crucible by means of a suction pump. Rinse the ppt., beaker and tube with hot C_6H_6 and a little alc. Dry at 100° and weigh. The factor for HgO is 0.9309. *Ammoniated mercury ointment.* Into a 250-cc. dry beaker weigh about 2.5 g. of the ointment (or 1.5 g. of the B. P. 1898 prepn.) and dissolve by warming to 70° with 100 cc. of the mixt.: C_6H_6 9, $AcOH$ 10, $EtOH$ (90%) 1 part. Treat the resulting clear soln. exactly as in the preceding method. The factor for ammoniated Hg = 1.0835. W. O. E.

Estrous cycle in the guinea pig and the suitability of the uterus for the estimation of pituitary extract. MARIANNE GOETTSCH. *Quart. J. Pharm.* 1, 34-6(1928).—Diagrammatic representation of the vaginal membrane in the guinea pig is shown in 4 cases. The relation between the wt. of the animal and suitability of the uterus for testing was studied. W. O. E.

Strychnine hydrochloride: its composition and solubility. JOHN EDMUND DRIVER AND STEPHEN PERCY THOMPSON. *Quart. J. Pharm.* 1, 37-43(1928).—The compn. of strychnine-HCl crystals, dried to const. wt. in moist air at ordinary temp., corresponds to the formula $C_{21}H_{22}O_2N_2 \cdot HCl \cdot 1\frac{1}{2}H_2O$. Com. samples of the salt contain rather less H_2O of crystn. than that required by this formula, but more than that required by the formula $C_{21}H_{22}O_2N_2 \cdot HCl \cdot 1.5H_2O$. The soly. of strychnine-HCl in H_2O has been detd. at temps. up to 61°. The soly. at 15.5° recorded in the Pharm. is in need of revision. The soly. of strychnine-HCl is considerably diminished by the presence in the soln. of HCl or metallic chlorides. Detns. have been made of the soly. of the salt in HCl of various concns at 25°. In normal HCl the soly. is only about $\frac{1}{4}$ of the soly. in H_2O . W. O. E.

Solubility and rate of solution of arsenious oxide, B. P. G. E. TREASE. *Quart. J. Pharm.* 1, 44-8(1928).—The rate of soln. of As_2O_3 has been studied under various conditions. In view of the very slow rate at which it dissolves in H_2O , prescribers would be well advised to order solns. rather than the solid, whenever possible. For administration in the solid state, the oxide should be in the finest powder, and more uniformity might be obtained by imposing some limit on the size of the particles. The standard adopted by the U. S. P. appears to be satisfactory. W. O. E.

Progress in tobacco chemistry: obtaining, working up and utilization of tobacco. RICHARD KIESSLING. *Chem.-Ztg.* 52, No. 67, Fortschrittsber. No. 3, 102-4(1928). E. H.

Pharmaceutical manufacturing. F. W. NITARDY. *Am. J. Pharm.* 100, 365-73 (1928).—An address. W. G. GAESSLER

Studies in the genus *Mentha*. XVI. The non-volatile constituents of *Mentha aquatica*, Linne. SAMUEL M. GORDON. *Am. J. Pharm.* 100, 433-49, 509-24(1928).—The material employed for the investigation of the constituents of *Mentha aquatica* L. consisted of the partly dried leaves which had been stripped from the branches. For the purpose of its examn. a quantity (13.8 kg.) of the partly dried and ground material was extd. with alc. The ext. was distd. with steam, yielding 0.85% of volatile oil and an aq. part from which a relatively large amt. of $AcOH$ and a small quantity of trimethylamine was obtained. The essential oil gave a strong reaction for furfural and for certain sesquiterpenes. d_{20}^{25} : 0.8649, n_D^{25} (Abbé) 1.4588, $[\alpha]_D^{25}$ 2.54, acid no. nil, ester no. 39.79, ester no. after acetylation 120.5, ester as linalool acetate 13.93%, alc. as linalool 36.43%, total alc. 47.38, free alc. 36.43. After the distn. of the alc. ext. with steam there was obtained a dark-colored aq. liquid and a quantity of black, oily resin. These products were separately examd. with respect to their constituents. From the above-mentioned dark-colored aq. liquid the following substances were isolated: KNO_3 in considerable amts., formic acid, a small quantity of a yellow pigment

m. 250–253°; glucose (osazone, m. 199–201°); succinic acid; rhamnose (osazone, m. 178°); betaine $C_5H_{11}O_2N$; choline, $C_5H_{13}O_2N$; and a glucosidic material not fully examd. The above-mentioned black, oily resin was extd. with various solvents, whereupon the following substances were obtained: methylamine, NH_4Cl ; linalool; dotriacontane, m. 69.5–70°; a phytosterol, m. 133.5–134°, an oil boiling over a large range and yielding pronounced sterol color tests; lupeol, m. 210°; a mixt. of volatile acids, consisting apparently of butyric, hexylic and heptylic acids, a substance ($C_{10}H_{18}O_2$), m. 212°; a mixt. of unsatd. fatty acids, consisting apparently of linolenic, linolic and oleic acids; an acid $C_{22}H_{40}O_2$ (?), m. 82–3°; melicic acid, m. 86.5°; myristic acid, m. 53°; palmitic acid and possibly stearic acid, "aqualitol," m. 273°; a compd. $C_{26}H_{44}O_2$, m. 261°; a compd. $C_{27}H_{46}O_2$, m. 258°; a compd., m. 319°. W. G. GAESSLER

Chemical characterization of drugs. L. ROSENTHAL *Am. J. Pharm.* 100, 454–62 (1928).—See C. A. 21, 1869. W. G. GAESSLER

A digitalis preparation for intravenous injection. LEWIS C. FREEMAN *Am. J. Pharm.* 100, 463–73 (1928).—F. concludes that the imported European preps. made by this method based upon the biologic tests had a low toxicity by comparison with his samples; that the procedure requires great care in its numerous steps regardless of the time factor which necessitates longer periods than are commonly employed for our U. S. P. preps.; that more extensive work should be done on the entire process to det. whether the active principles can be brought into sol. more effectively, that modifications in $CHCl_3$ extn. might produce more effective yield of total solids; that there is a similarity between this method and the work of Kluft on the HCl and $CHCl_3$ -sol. glucosides but more extensive work should be done to det. the nature of the chem. constituents; that biologic standardizations indicate a difference of soly. and that alc. further exts. sol. active principles; that the product should be standardized not only before pasteurization but also after this sterilization, that the samples are extremely acid and based upon the European prep. this increases on aging, that work with daphnia should be extended with the idea of establishing a new biologic method for the action of digitalis preps. W. G. GAESSLER

Sodium alum. HENRY LEFFMANN AND ILSETH W. STROCK *Am. J. Pharm.* 100, 474–8 (1928).—See C. A. 22, 2522. W. G. GAESSLER

Essential oils as antienzymes. ELLERY H. HARRIS *Am. J. Pharm.* 100, 524–9 (1928).—The antienzyme efficiency of 32 typical essential oils was detd. with the following results, the figures representing % efficiency based on antihydrolyzing powers of the oil in a yeast-sugar soln. at the end of 8 hrs.: estragon 6.8, rosemary 6.8, saffron 8.0, fennel 8.8, turpentine 10.0, lemongrass 10.0, anise 10.8, lemon 10.8, pimento 12.8, orange 12.8, eucalyptus 13.0, mace 13.6, juniper 16.8, rue 18.0, caraway 18.5, sassaparilla 18.5, celery-seed 20.0, camphor 20.0, citronella 20.0, birch 20.5, benzaldehyde 22.0, rose 24.0, clove 25.0, lavender 26.0, oleoresin capsicum 26.8, peppermint 28.0, geranium 28.4, bergamot 29.6, thyme 30.8, pennyroyal 39.0, wintergreen 44.0, cinnamon 48.3. The technic employed was the same as that used in measuring the antienzyme value of various chemicals (C. A. 17, 1106, 1675) and of org. dyes (C. A. 18, 3450). The method used is capable of yielding reasonably concordant results if one adheres to stipulated conditions. $AcOH$ is an efficient antienzyme in concns. above 15% to the absorption of ultra-violet radiations due to the improper storage of oils in glass transparent to short wave lengths not only affects the color but also the antienzyme efficiency. A short bibliography covering the bactericidal action of essential oils is appended. W. G. GAESSLER

Some notes on modern methods of producing cod-liver oil. F. F. HARRIS *Food & Drug* 3, 418 (1928). J. A. KENNEDY

Report on (the analysis of) drugs. ARTHUR E. PAUL, U. S. Food, Drug and Insecticide Administration, Chicago, Ill. *J. Assoc. Official Agr. Chem.* 11, 311–7 (1928); cf. C. A. 21, 3422.—A discussion of the reports of the associate referees on various drugs (see following abstracts). A. PAPINEAU-COUTURE

Report on (the analysis of) arsenicals. (Determination of arsenic in cacodylates. H. WALKS, Drug Control Lab., Washington, D. C. *J. Assoc. Official Agr. Chem.* 11, 326–8 (1928); cf. C. A. 21, 3422; Glycalt, C. A. 20, 3209.—The following method was found to be accurate for the assay of As in Na cacodylate and Fe-As pills: digest the sample (0.2 g. if possible) with 10 g. K_2SO_4 , 0.3 g. starch and 20 cc. concd. H_2SO_4 till colorless, cool, add 20 cc. H_2O , dry the neck of the flask, cool, add 30 g. $NaCl$, 5 g. $FeSO_4$, 1 g. $NaBr$, and 25 cc. concd. HCl and distil as directed in C. A. 20, 3209 for the detn. of As in Fe-As pills. A. PAPINEAU-COUTURE

Report on (the determination of) alcohol in drugs. CHARLES D. HOWARD, State Board of Health, Concord, N. H. *J. Assoc. Official Agr. Chem.* 11, 318–26 (1928);

cf. Lynn, *C. A.* 20, 3209; 21, 3422.—Collaborative results obtained in the detn. of alc. in presence of various interfering substances are given and discussed. The procedure for detn. in presence of I (reduction with Zn dust) is regarded as entirely satisfactory. In the elimination of volatile oils, camphor, CHCl_3 , etc., by salting out and extg. with petroleic ether, 1 washing of the ether ext. with satd. NaCl soln. is insufficient and 3-4 washings should be made; re-extn. of the distillate and subsequent distn. removes the small quantity of oil going over into the 1st distillate, but there is a tendency to lose some alc. In the oxidation of small amts. (about 1%) of CH_2O , it is essential to have an excess of alkali, and completeness of oxidation is readily tested with phloroglucinol or similar reagent. With large amts. (15-30%) of CH_2O , there is possibility of some MeOH being formed by action of alkali on the CH_2O , which would give high results for alc.; the KCN -alkali method for destruction of the CH_2O gave very good results in the hands of one analyst but high results with others. In the destruction of paraldehyde by Tollens' reagent, there appears to be considerable uncertainty concerning what constitutes an "excess" of the reagent. In the colorimetric detn. of small amts. of MeOH (by oxidizing and treating with fuchsin- H_2SO_4 soln.) the intensity of color does not progress in simple proportion to increasing MeOH contents, and the colors obtained should be compared against a series of prepd. standards involving very small intervals rather than measured against a standard by means of a colorimeter. In the detn. of small amts. of EtOH (0.5%) no advantage is gained by making a 2nd distn. to half-vol.; but with materially smaller proportions redistn. to a smaller vol. should preferably be carried out.

A. PAPINEAU-COUTURE

Report on (the determination of) cocaine. ELCAR O. EATON. U. S. Food, Drug and Insecticide Inspection Station, San Francisco. *J. Assoc. Official Agr. Chem.* 11, 328-9(1928); cf. *C. A.* 21, 3422.—Collaborative results obtained by 3 different methods (titration of the alkaloid in a wet way without evapn., hydrolysis to BzOH which is then either weighed or titrated, and an amended method of the Am. Drug Mfrs. Assoc.) showed that accurate results with this easily hydrolyzed alkaloid are rather difficult to obtain, even in the hands of experienced analysts. The principal precautions to be observed are: the solns. of the alkaloid should be worked rapidly; the usual careful quant. precautions should be observed in all stages of the manipulations; the BzOH should be evapd. spontaneously at room temp and draft should be avoided.

A. PAPINEAU-COUTURE

Report on (color tests for) chaulmoogra oil. L. E. WARREN. U. S. Food, Drug and Insecticide Administration, Washington, D. C. *J. Assoc. Official Agr. Chem.* 11, 330-2(1928).—Tests of the Lifschutz color reaction (*C. A.* 16, 987) and of the color reactions of the Jap. Pharm. (4th edit, p. 289) were distinctly disappointing: the colors expected were not sharp, and in some cases those found varied considerably from the standards set. While more or less distinctive for oils of the chaulmoogra group, the tests were of no value in distinguishing the individual oils in the group. The tests were also applied to peanut, cottonseed, rape and castor oils, and while the color reactions of the chaulmoogra group were not duplicated with these common oils, in some cases distinct colors were produced and in a few instances they might be confusing.

A. PAPINEAU-COUTURE

Report on (the analysis of) fluidextract of ginger. J. F. CLEVENGER. Food, Drug and Insecticide Administration, Washington, D. C. *J. Assoc. Official Agr. Chem.* 11, 332-5(1928).—A method is given (technic described in detail) consisting essentially in evapg. the alc., detg. the volatile oil in a Clevenger app. (*C. A.* 22, 2439), detg. the oil (in a Sprengel sp. gr. bottle of about 0.5 cc. capacity) and α (in a 50-mm. micropolarizing tube) of the oil, detg. the Et_2O -sol. solids (in the residue from the volatile-oil distn.), and detg. the I and sapon. values of the Et_2O -sol. solids by modifications of the U. S. P. methods. The end points in the sapon. and I value detns. are somewhat difficult to catch and require some experience. If the volatile matter is not entirely removed from the resin before detg. I and sapon. values, the results obtained will be too high.

A. PAPINEAU-COUTURE

Report on (the analysis of) chloroform and carbon tetrachloride. W. P. KUNKE. U. S. Food, Drug and Insecticide Administration, Washington, D. C. *J. Assoc. Official Agr. Chem.* 11, 335-9(1928); cf. Moraw, *C. A.* 21, 3422.—Weighing CHCl_3 under H_2O was found to be a simple, satisfactory and accurate procedure for detg. the wt. of CHCl_3 drained from a pipet. Devarda's alloy or Al in an alcoholic KOH soln. does not appear to promote a higher yield of chloride, other conditions being the same. The use of the isonitrile reaction (adding PhNH_2 to catalyze the reaction) appears to give a higher yield of chloride than the use of alcoholic KOH alone.

A. PAPINEAU-COUTURE

Report on (the determination of) ipecac alkaloids. A. R. BLISS, JR. Univ. of

Tennessee, Memphis, Tenn. *J. Assoc. Official Agr. Chem.* **11**, 339-41(1928); cf. *C. A.* **21**, 3422.—A collaborative comparison of the Palkin-Watkins hand extn. method, the Palkin-Murray-Watkins automatic extn. method, Palkin-Watkins purification method and U. S. P. X assay showed that: the U. S. P. X assay is unsatisfactory; the automatic extn. method appears more satisfactory, the hand extn. method is more rapid and yields results almost as high as the automatic extn. method, and Et_2O free from peroxides must be used, as peroxides have a notably destructive effect on the ipecac alkaloids.

Report on (the analysis of) mercurials. A. PAPINEAU-COUTURE. Insecticide Administration, Washington, D. C. *J. Assoc. Official Agr. Chem.* **11**, 343-50(1928); cf. *C. A.* **21**, 3423.—Though in general the Bender method gave good results, it is difficult to filter the ppt. without loss, and unless the acidity is carefully controlled the ppt. is not coagulated properly. The iodate method gives high results when applied directly to Hg_2Cl_2 tablets, because in the presence of HCl excipients such as lactose reduce the Hg_2Cl_2 to Hg ; fairly good results were obtained by dissolving and removing the lactose before titrating, but starch and other insol. materials tend to emulsify the mixt., masking the indicator, while if the starch is hydrolyzed by warming the acid mixt., masking is reduced and results are high. In the thiocyanate method there apparently are some oxidation products in soln. which cause some decomposition if allowed to remain in contact with the Hg-Zn thiocyanate ppt., but if the time of contact is limited to 1 hr. satisfactory results are obtained gravimetrically, but not volumetrically. Very satisfactory results were obtained by the I method, provided the lactose and other H₂O-sol. excipients were previously removed.

Report on radioactivity in drugs and water. J. W. SALE. U. S. Food, Drug and Insecticide Administration, Washington, D. C. *J. Assoc. Official Agr. Chem.* **11**, 342 (1928).—A series of synthetic solid, semi-solid and liquid samples contg. known quantities of Ra were prepd. and will be submitted to collaborative study according to previously published methods (*Sale, C. A.* **19**, 3145, **21**, 3422).

Report on the determination of pyramdone. FRID L. ELLIOTT. Food, Drug and Insecticide Administration, Baltimore, Md. *J. Assoc. Official Agr. Chem.* **11**, 350-2(1928); cf. *Rabak, C. A.* **21**, 3423.—Collaborative results showed that pyramdone can readily be extd. by means of CHCl_3 from either a dil. alkali or an ammoniacal soln. Irregularities in the results obtained by the hydrochloride method appear to be due chiefly to difficulty in drying or complete removal of free HCl, but the method is of some value as a check on extd. residues. The dried residues have a slight tendency to increase in wt., especially in the case of pyramdone-HCl, and they should be weighed as quickly as possible.

Report on microchemical methods for alkaloids. C. K. GLYCART. U. S. Food, Drug and Insecticide Administration, Chicago, Ill. *J. Assoc. Official Agr. Chem.* **11**, 353-5(1928); cf. *C. A.* **21**, 3423.—Further collaborative work confirmed the reliability of microchem. tests for the identification of morphine, codeine, cocaine and strychnine. Satisfactory results were also obtained with pilocarpine. The crystals formed by atropine with Wagner's reagent were not found to be sufficiently characteristic.

Report on (the analysis of) silver proteinates. LEWELYN JONES. U. S. Food, Drug and Insecticide Administration, Chicago, Ill. *J. Assoc. Official Agr. Chem.* **11**, 355-6(1928); cf. *C. A.* **21**, 3423.—The dialysis method proposed by Eaton (*C. A.* **20**, 3145) for detg. the acidity or alkali. of Ag proteinates gives satisfactory results and is of value. Special precaution should be observed in the choice of parchment paper. Potentiometric titration (with quinhydrone electrode) gave curves exhibiting no definite break, so that it was practically impossible to det. the neutral point by this method.

Report on (the determination of) terpinol hydrate (in terpinol hydrate elixir). C. W. HARRISON. U. S. Food, Drug and Insecticide Administration, Minneapolis, Minn. *J. Assoc. Official Agr. Chem.* **11**, 358-60(1928).—Collaborative results obtained via Murray (*C. A.* **21**, 2357) were about 2% too high. The method really detcs. CHCl_3 ext., and is not applicable to the detn. of terpinol hydrate in mixts. contg. other CHCl_3 -sol. extractives which might be removed by alc.- CHCl_3 under these conditions and not removed by the NaCl-soln. washing or spontaneous evapn.

Report on the bioassay of drugs. J. C. MUNCH. U. S. Food, Drug and Insecticide Administration, Washington, D. C. *J. Assoc. Official Agr. Chem.* **11**, 362-77(1928); cf. *Schwartz, C. A.* **21**, 3423.—Collaborative work on the cat-eye method previously described showed it to be satisfactory for *myotic* as well as for *mydriatic*. Extensive collaborative tests on the assay of tincture of *digitalis* showed that when the U. S. P.

X 1-hr. frog method is followed in detail by a careful and experienced analyst, the probable error of results obtained is $\pm 10\%$.

A. PAPINEAU-COUTURE

Determination of alcoholic extractive in gum benzoin. T. N. BENNETT AND C. F. BICKFORD. U. S. Food, Drug and Insecticide Administration, New York. *J. Assoc. Official Agr. Chem.* 11, 386-8(1928).—From a comparison of various methods of detg. alc. ext. in gum benzoin, B. and B. conclude that the U. S. P. X method is long and tedious and yields results in error, since several substances which might be considered as active ingredients of gum benzoin are lost during the course of the detn. Methods depending on the detn. of the alc. ext. are considered best and most accurate, and the technic considered to be easiest consists essentially in extg. the gum in a continuous extractor for 5 hrs. with 0.5% NaOH soln. in 95% alc., weighing the residue in the thimble, and separately detg. H_2O by xylene distn.

A. PAPINEAU-COUTURE

The yeast method for silver proteins. H. WALES. Drug Control Lab., Food, Drug and Insecticide Administration, Washington, D. C. *J. Assoc. Official Agr. Chem.* 11, 396-8(1928).—In using Pilcher and Sollmann's yeast method (*C. A.* 17, 2032) for detg. the strength of Ag proteins, consistent results could not be obtained with $AgNO_3$ solns., but no difficulty was encountered in obtaining checks for the inhibitory concns. of the Ag proteins. In its action on yeast, $AgNO_3$ seems to differ entirely from the Ag proteins; W. believes that the inhibitory action of Ag proteins on the growth of yeast is not due to the Ag^+ concn., and the results of potentiometric titrations (to be published) strengthen this belief.

A. PAPINEAU-COUTURE

Assay of trional tablets. L. E. WARREN. U. S. Food, Drug and Insecticide Administration, Washington, D. C. *J. Assoc. Official Agr. Chem.* 11, 404-7(1928).—It was found that a temp. above 50° cannot be employed without loss in drying trional residues after the solvent has been removed by evapn., but that dry trional residues do not lose wt. when kept over H_2SO_4 in a partial vacuum. Collaborative results obtained on samples of known compn. by extg. with $CHCl_3$, evapg. in a current of air at atm. temp., and drying to const. wt. over H_2SO_4 were slightly high (av. about 101.5% of theory).

A. PAPINEAU-COUTURE

Neroli. WALTER TREFF. *Parfumerie moderne* 21, 169, 171(1928); cf. *C. A.* 22, 3262.—A detailed description of the results of analysis of 7 samples of corn neroli including d_4^{20} , n_D^{20} , acid no., Ac no., and sepu. and examn. of the primary alcs. by means of the phthalic ester. Three of the samples consisted of practically pure neroli; 3 others contained citronellol; and the 7th probably contained an unidentified terpene alc., $C_{10}H_{18}O$.

A. PAPINEAU-COUTURE

The synthesis of derivatives of glycolic acid with a cocaine-like action. FRIGYES KONEK AND LAJOS STRAUB. *Matematik. Természettudományi Értesítő* 41, 14-8 (Hung.), 19 (1925). (In German).—According to the general reaction $C_6H_5COONa + BrCH_2COOEt \rightarrow NaBr + C_6H_5COOCH_2COOEt$, K. has prepared the Et and Me esters of *o*-, *m*-, and *p*-nitrobenzoylglycolic acid and of *o*- and *p*-nitrocinnamyl glycolic acid. The catalytic reduction of these nitro compds. gave the corresponding amino compds. The Me and Et esters of *p*-aminobenzoylglycolic acid has a local anaesthetic action similar to cocaine. The hydrochlorides partly dissociate in aqueous soln. and must therefore be used with other solvents.

J. S. REICHERT

Preservation of isohemagglutinating serum with phenolized glycerol. MARCUS W. LYON. *Proc. Indiana Acad. Sci.* 37, 297-8(1927).—Two ampoules, one of parasthenic serum and one of antiparasthenic serum, which had been in the ice box for 4 years were tested against freshly prepd. parasthenic and antiparasthenic serums, with the cells of 50 different persons distributed among the 4 human blood groups. The tests with the old and the new serums gave identical agglutinations. Consequently isohemagglutinating serums may be preserved with 5% of a 10% soln. of phenol in glycerol for at least 4 years.

L. W. RIGGS

Chlorinated carron oil for burns. J. W. TOMB. *Med. Press* 1928, 90; *Pharm. J.* 120, 129(1928).—Linimentum calcei made with soln. of $CaOCl_2$ is sufficiently antiseptic to prevent suppuration of extensive burns, and is non-poisonous if absorbed. To prep. a liniment contg. 0.05 - 0.1% of Cl, this strength giving the best results in healing burns of the 2nd or 3rd degrees, add 1 part of Liq. Calcei Chlorinat., Brit. Pharm. to 15-20 parts of lime water. The liniment made from this soln. and linseed oil remains strongly antiseptic for an indefinite period.

S. WALDBOTT

Sirup of tolu. J. F. LIVERSEGE. *Pharm. J.* 120, 93, 141; *Chemist and Druggist* 108, 64(1928).—In the prepn. of sirup of tolu, the Brit. Pharm. 1914 directs dissolving 660 g. of sugar in 400 cc. of hot aq. soln. of balsam tolu, the total to weigh 1000 g., implying a loss of 60 g. by evapn. This prepn. should have a sugar content of 66% , if no evapn. took place, the sugar content is 62% . To prep. *sirupus toluianus*, the

Brit. Pharm. Codex directs mixing the aq. soln. of tolu with Brit. Pharm. Sirup (sugar 66%) in the ratio of 1:7. As this diln. reduces the sugar content to 58.3%, the product is not identical with the Brit. Pharm. prepn. In 6 com. samples, the % of sugar varied from 58.3 to 61.6; another contg. 54.7% was condemned.

Bitter blaar (*Brachylaena elliptica*); preliminary note. E. C. BENNISON. *Pharm. J.* 120, 318 9(1928).—This plant (also called *bitter leaf*), a shrub growing in the sand dunes of S. Africa and in Natal at sea level and up to 5000 feet, is said to yield a remedy for diabetes; a decoction of the leaves has been used as a gargle in sore throat. From a sample package the botanical diagnostic characters of the leaves were detd. and not a glucoside. Digestion with H₂O yielded mucilage, tannin and a bitter principle after evapn., addn. of very dil. H₂SO₄ and filtering off a flocculent ppt. gave indications of alkaloids with Thresh's and Mayer's reagents. Extn. with 60% alc. gave similar results. By evapg. A, addn. of very dil. H₂SO₄, CHCl₃, and NH₃ in faint excess, a cryst. substance was obtained upon evapg. the CHCl₃ soln.

Early pharmacy in Bohemia. J. G. F. DRECK. *Pharm. J.* 120, 319 26(1928). Historical notes on Bohemian pharmacy since the founding of Prague University, 1348, and a record of *Czech herbs* of the 16th century.

Apparatus for obtaining mixtures of gases, particularly for anesthesia. Fr. pat. 635,002 1.

Dias Cavaroni, Joseph. Contribution à l'étude de l'efficacité réelle du nitrate de soude, de la trinitrite, du gui et de l'hydrate de chloral comme médicaments hypertenseurs. Montpellier: Firmin et Montane, 107 pp.

Medicinal capsule. JOSEPH A. HORGAN. U. S. 1,683,166, Sept. 4. Capsules adapted for intestinal administration of medicines are formed of material treated with an alc. soln. of benzoin or a similar prepn.

Cod-liver oil preparations. K. KAWAI. Brit. 283,267, Oct. 5, 1926. A concentrate rich in vitamin A is prepd. by saponf. 50-75% of the saponifiable portion of ordinary cod-liver oil and then sepg. the unsaponf. oil, contg. vitamin A and other effective ingredients, from the saponf. material, e. g., by stratification and centrifuging or by use of milk of lime to form an insol. soap which is then sepd.

Amino- and diamino-acridines. CHEMISCHE FABRIK VORM SANDOZ. Brit. 283,184, Jan. 6, 1927. Amino- and diamino-acridines and their alkoxy derivs. or halogen alkylates are converted into salts with bile acids by interaction of the base and acid in a solvent or by reaction between salts of the base and acid. The products possess antiparasitic properties.

Auromercaptocarboxylic acids and salts. WALTER SCHOELLER and HANS G. ALLARDT. U. S. 1,683,104, Sept. 4. An aliphatic mercaptocarboxylic acid is treated with an auri salt such as K auribromide, in the presence of SO₂. α-Auromercaptopropionic acid forms a Na salt which is a yellowish amorphous powder, readily sol. in water and insol. in org. solvents. The Na salt of β-auromercapto-α-amunopropionic acid forms a white powder of similar solv. These compds. may be used as therapeutic agents.

1-Auro thioglucose and similar compounds. WALTER SCHOELLER and HANS G. ALLARDT. U. S. 1,683,105, Sept. 4. 1-Auro thioglucose is made by dissolving thioglucose in water, adding the mol. proportion of SO₂ in aq. soln., adding a soln. of K auribromide, and pptg. with alc. Instead of thioglucose as starting material there may be used, for producing similar products, mercapto sugars or other compds. contg. sulfhydryl groups and also a plurality of OH groups. 1-Bismuth thioglucose is also described; also 1-cadmium thioglucose. These compds. may be used for pharmaceutical purposes.

Barbituric acid derivatives containing at least one alkynyl group in the 5-position. MAX BOCKMÜHL, RUDOLF SCHWANE and GUSTAV EHRHART (to Winthrop Chemical Co.). U. S. 1,682,062, Aug. 28. Compds. of soporific properties are obtained by the whole or partly replacing, in the usual alkylation methods for prepg. soporifics, the esters of the satd. aces. by esters of the alkinols. By starting from monoalkyl-esters, malonic esters, alkylalkynylmalonic esters are obtained which can be converted by the means of urea and alkylates into the corresponding barbituric acid compds. The same substances can be obtained by causing the esters of the alkinols to act upon the monoalkylbarbituric acid salts. Compds. also may be prepd. contg. both an alkenyl

and an alkynyl group, such as allylpropargylbarbituric acid. Examples are given of the production of isopropylpropargylbarbituric acid, m. 165°, isopropenylpropargylisopropylbarbituric acid, m. 157°, propargyldiethylmethinebarbituric acid, m. 175-8°, and isopropenylpropargylbromide, m. 65-7° (which may be used as an intermediate in the production of isopropenylpropargylisopropylbarbituric acid). The barbituric acid derivs. mentioned are stated to be suitable for use as therapeutics without any bad after-effects.

Immunizing serums and vaccines. W. WEICHLEIN. Brit. 282,780, Dec. 24, 1926. Inoculating material for direct immunization or for use in the production of serums is prepd. by treating bacteria or their products or virus with weak solns. of aniline dyes such as methylene blue, brilliant green or fuchsine and keeping the mixt. at blood temp. for 1-2 days. Among the organisms which may be treated are those of murrain, fowl cholera, swine plague, foot and mouth disease, gapes, paratyphoid and smallpox.

Depilatory paste containing barium sulfate and barium sulfide. CARL S. MINER and ELMER W. TROLANDER (to Delatone Co.). U. S. 1,682,181, Aug. 28. A mixt. suitable for use on the skin comprises BaSO₄ 80, Ba sulfide 8 and water 116 parts.

Hair lotion. MARLETA M. McDANELD (one-half to Esie M. Hereford). U. S. 1,682,230, Aug. 20. A "permanent wave" lotion comprises borax 3.75, NaHCO₃ 3.5, starch 0.4, linseed oil 0.17 and water about 94 parts.

Treating the hair with keratin. JAMES C. BROWN (to E. Frederics, Inc.). U. S. 1,681,170, Aug. 21. Keratin is deposited on the hair, e. g., from an ammoniacal soln. of keratin, while applying heat to the hair (suitably at a temp. of about 100°) to produce a "permanent wave."

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Manufacture of nitric acid by the Valentiner process. N. S. TOPSUEV. *J. Chem. Ind. (Moscow)* 5, 494-8 (1928).—The theory of decompn. of NaNO₂ in installations such as those of Valentiner, Hart or Frischer is fairly well known, but the conditions of dissocn. of the acid formed and of absorption of N oxides have not hitherto been studied. These problems were studied with a view of possibly bringing about better yields of HNO₃. Since it is established that the decompn. of HNO₂ is due to heating of the upper part of Valentiner retort above 140° the vapor pipe must be so constructed as to reduce to a min. the condensation of HNO₂ at the top of the retort. As, however, it is impossible completely to prevent the dissocn. of HNO₂, and as the N oxides formed not only reduce the yield of HNO₃ but also contaminate the product obtained, it is necessary to study the conditions of retransformation of the oxides into HNO₃. At temps. below 150° HNO₂ decomposes into NO₂, N₂O₄ and H₂O; above 150° the decompn. yields NO, O and H₂O. This explains the fact that during the first few hrs. of the operation of a Valentiner plant, when the temp. is still comparatively low, the retort contains NO₂ and N₂O₄ aside from HNO₃ and water. As the temp. gradually increases NO and O begin to predominate, and finally NO₂ and N₂O₄ all but disappear. While NO₂ is readily sol. in HNO₃, the soly. of NO in HNO₃, d. 1.4, is only 9.25 at 25°. Thus one may expect, when operating below 150°, that the HNO₃ condensate will be contaminated by N₂O₄, whereas above 150° it will be comparatively free from it. NO, which is poorly absorbed by HNO₃, escapes the condenser and enters the pipe leading to a condenser contg. H₂O, but before it reaches the latter it oxidizes mostly to N₂O₄ and in this form is absorbed by the H₂O with formation of HNO₃ and NO. The H₂O absorption of N oxides continues as long as the concn. of HNO₃ in the H₂O is not great. It follows that it is advantageous to have an empty receiver between the HNO₃ condenser and the condenser containing H₂O, thus giving NO an ample opportunity for oxidation to N₂O₄. It is evident that in order to obtain as pure a condensate of HNO₃ as possible the operation of decompn. of NaNO₂ must be so conducted that the temp. should rise rapidly to 150°, thus shortening the period of formation of NO₂ and N₂O₄. The greater the concn. of NO and O the more favorable are the conditions of oxidation of the former to HNO₃. It is therefore desirable that these gases are not contained in the condensation system in a dil. condition. If air is introduced into the retort one of its effects is favorable, as it supplies O₂ for the oxidation of NO to HNO₃. On the other hand the air is at the same time responsible for the introduction of inert N₂ with diln. of NO and O, thus checking the useful operation. A series of expts. arranged on the decompn. of NaNO₂ while supplying various amts. of air to the retort

has shown that the introduction of air has no essential influence on the N_2O_4 content of the HNO_3 obtained. Tables and diagrams are given. BERNARD NELSON

Process for the extraction of phosphoric anhydride. UGO ORLANDI. *Notiz. chim.-ind.* 3, 343-4 (1928).—The new process is far more economical than earlier processes, such as those of Lilienroth and of Auger-Urbain, which use SiO_2 and C. It is based on the attack of $Ca_3(PO_4)_2$ by SiO_2 in the presence of SO_2 and H_2SO_4 . A mixt. of $Ca_3(PO_4)_2$, SiO_2 and a flux (alk. sulfate, pyrites ash, fused oxide, etc.) is treated with oleum contg. a high proportion of SO_3 . The temp. rises to 300° , and when the reaction is complete, the product is run into an elec. furnace at 600° . At first, SO_2 in the presence of H_2SO_4 reacts with $Ca_3(PO_4)_2$ to form $CaSO_4$ and HPO_3 or P_2O_5 or both, while in the elec. furnace at higher temp. the $CaSO_4$ reacts with SiO_2 , forming $CaSiO_3$ and regenerating SO_3 , the composite reaction being: $Ca_3(PO_4)_2 + 3SiO_2 + 3SO_3 \rightarrow 3CaSiO_3 + P_2O_5 + 3SO$. From the elec. furnace P_2O_5 and HPO_3 sublime at 600° , while evolution of regenerated SO_2 or of SO_2 occurs at about 1000° . The SO_2 serves for the regeneration of oleum. The HPO_3 is hydrated to H_3PO_4 and with NH_4OH this is converted into $(NH_4)_2HPO_4$. For fewer kw. hrs. per kg. of P_2O_5 produced are consumed than in any other process (3.7-4.5 compared to 9-14 kw. hrs. per kg.). The app. is described and illustrated. C. C. DAVIS

The German carbon dioxide industry. A. SANDER. *Z. komp. flussige Gase* 27, 25-7 (1928).—Historical.

Adsorption of sulfur dioxide, present in small percentages in gaseous mixtures, by means of colloidal oxides and of active carbon. CELESTINO PICAI. Reale scuola d'Ingegneria Padova. *Giorn. chim. ind. applicata* 10, 199-203 (1928).—The removal of small proportions of SO_2 from gases is an important industrial problem, e. g., in gas from the heat treatment of steels (cf. 8). Expts. were carried out to ascertain whether gelatinous SiO_2 , Al_2O_3 and active C adsorb SO_2 from gases contg. only a small proportion. If they are effective in this respect their use might be of industrial value. The data, which are recorded in tabular and in graphical form, show that gelatinous SiO_2 has a lower satn. value than Al_2O_3 or active C, but is superior in that it is more easily activated and is cheaper. The technique for their industrial use is essentially the same in each case. With respect to their use for the adsorption, enrichment and utilization of SO_2 in gaseous mixts., gases contg. up to 3-4% SO_2 require so large and costly equipment that it is not economical to recover the SO_2 . It is considered that colloidal oxides and active C are unsuitable for use in the recovery of SO_2 from gases. C. C. DAVIS

Sulfonitrous and sulfonitric mixtures. A. SAINT-GERME AND L. RONDIER. *Compt. rend.* 187, 291-3 (1928). S and R study the dissociation pressure of mixts of H_2SO_4 (55-92%) contg. small quantities of HNO_3 and HNO_2 such as one obtains in the lead-chamber process. The pressure is measured dynamically; the evolved gases are carried off with a stream of N_2 . The decomposition pressure of sulfonitrous mixts. is greater with decreasing concn. of H_2SO_4 . The vapor pressure of HNO_2 in sulfonitric mixts. increases with temp. and as the concn. of H_2SO_4 increases to 78° , decreasing above this concn. Mixts. of sulfonitrous and sulfonitric acids have a pressure higher than the sum of the individual pressures. This anomaly can be explained by the reaction: $SO_2 + HNO_2 + HNO_3 \rightarrow N_2O_4 + H_2SO_4$, causing the liberation of the volatile N_2O_4 . The reaction is displaced toward the right as the concn. of H_2SO_4 is increased. The presence of N_2O_4 is proved by analysis. D. H. POWERS

The development of the potash industry in the Stassfurt district and its present position, with especial reference to the establishment and development of the Kalisya-dikat. PSORTA. *Kali* 22, 151-7, 175-8, 194-8, 209-12, 233-7, 249-53 (1928). E. H.

Calcium nitride. PAUL DUTOT AND ARMAND SCHNORF. *Compt. rend.* 187, 300-2 (1928).—Lengthy studies on the reaction between Ca and N_2 are reviewed. The more finely divided the Ca the more rapid is the reaction. It may be prepd. very finely by dissolving in liquid NH_3 and decomg. the hexamine at low temp. *in vacuo*. Alkali metals and H_2O are not catalysts and O and oxidants are powerful inhibitors. The reaction is autocatalytic and its rate increases to a max. at 450° , dropping very low at 600° and increasing again up to the m. p. of Ca. At high temp. Ca_3N_2 (I) is formed easily and at low temp. there is a 2 to 3% N_2 deficit. The pressure of reheated nitride at once takes a definite value. I formed by heating a long time at 1200° is citron yellow. If it has not been obtained this way, it is black below 350° , blue-black up to 600° , red-dish brown up to 850° , greenish up to 1100° and yellow above 1150° . Each of the nitrides except the yellow form has an irreversible decompn. pressure. It is suggested that an unstable mol. combination, CaN , is formed at low temp. which is irreversibly decomd. on heating. D. H. POWERS

Manufacture of solid zinc chloride. N. N. EFREMOV AND I. YAKIMETZ. Severn Khim. Trust. *J. Chem. Ind. (Moscow)* 5, 345-53(1928).—Russian com. ZnCl_2 is usually marketed as a dark-brown 46 to 47 Bé. soln. contg. 44 to 45% ZnCl_2 . A sample had the following compn.: Zn 20.84, Cl 23.48, SO_3 0.22, Fe 0.06, H_2O 53.40, Ca, Mg and org. matter traces. The dark coloration is due to the latter. An investigation was made to det. if anhyd. ZnCl_2 could be made by the use of open cast Fe evapg. vessels at ordinary pressure, to avoid expensive freight on H_2O . It is known that in the course of such an evapn. a certain amt. of basic salts insol. in H_2O is formed. The compn. of these basic salts is $m\text{ZnCl}_2 \cdot n\text{ZnO} \cdot p\text{H}_2\text{O}$, they are not only in the ppt., but they can also be detected in a colloidal state in H_2O soln. Sometimes on diln. of solns. an addnl pptn. of basic salts takes place. HCl is also formed in the course of evapn., according to the reaction $2\text{ZnCl}_2 + 2\text{H}_2\text{O} \rightarrow \text{Zn}(\text{OH})_2 + \text{ZnCl}_2 + 2\text{HCl}$; when once formed it attacks the vessel with formation of Fe_2Cl_4 at lower and Fe_2Cl_6 at higher temps. By evapg. a com. soln. at various temps., the following results were obtained.

	% Zn	% Cl	% Fe	% in sol. basic salts obtained by treatment with H_2O	% H_2O
200°.....	41.85	44.76	0.10	0.65	12.23
220°.....	42.56	46.23	0.52	0.70	9.57
250°.....	44.21	48.82	0.90	1.59	4.03
280°.....	44.57	49.31	0.97	1.78	2.92
310°.....	44.77	49.59	1.06	1.78	2.34
340°.....	45.20	50.12	1.10	1.94	1.18

Complete dehydration is not obtainable without the use of vacuum, even at much higher temps. The non-removable H_2O is probably fixed in the basic salts only. For practical purposes it is not advisable to continue evapn. after 220° has been reached, since the product thus obtained is very hard on cooling and only contains 9.5% H_2O . If evapn. is continued beyond this point the amt. of H_2O is reduced only at a very considerable expense of fuel and a correspondingly increased attack of the vessel, resulting in an increase of Fe_2Cl_4 . The damage done to the cast Fe vessel from HCl formation is usually insignificant. An investigation showed that the more Si in the cast Fe the better it resists the HCl . Mn, C, P and S in cast Fe have no influence. With cast Fe kettles contg. 6 to 8% Si attack on the vessel is almost unnoticeable. The above figures of Fe_2Cl_4 formation were obtained with cast Fe of low Si content. In redissolving com. solid ZnCl_2 it is advisable to add a calcd amt. of HCl for soln. of a part of the basic salts formed by hydrolysis.

BERNARD NELSON

Dehydrating Glauber salt. P. N. LASHCHENKO AND D. I. KOMPANSKI. *J. Chem. Ind. (Moscow)* 5, 304-7(1928).—The waters of Batalpash lakes in Caucasus, contg. 173.3 g. Glauber salt per l., give by natural evapn. a salt deposit of the following compn.: H_2O -insol. 0.06, loss in wt. at 120° 56.01, Na_2O 19.21, SO_3 24.63, MgO and Cl traces. This shows that the residual salt consists of remarkably pure $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ with a slight admixt. of earthy material. As a result of a search for the most economic method of treatment of this salt to obtain anhyd. sulfate in com. quantities the following procedure, which is as yet in the lab. stage, was adopted. One kg. of the salt is heated on a H_2O bath at 60°. A portion of the sulfate dissolves in its H_2O of crystn., the rest ppts. and is easily decanted. The ppt. is freed from mother liquors by filtration with suction, after which it contains 7.4 to 8.7% H_2O from which it can be freed completely by drying 40 to 45 min. at 60°. The decanted liquid is freed from suspended earthy particles by filtration through paper with suction and left to crystallize. The crystals are chemically pure sulfate, whereas the mother liquors contain Na_2O 3.60, SO_3 4.59, MgO 0.059, Cl 0.035.

BERNARD NELSON

Fluorspar and cryolite in 1927. HUBERT W. DAVIS. U. S. Bur. Mines, *Mineral Resources of U. S. 1928*, Pt. II, 9-25 (preprint No. 2, published July 26, 1928). E. H.

Graphite in 1927. JEFFERSON MIDDLETON. U. S. Bur. Mines, *Mineral Resources of U. S. 1927*, Pt. II, 33-8 (preprint No. 4, published August, 1928). E. H.

Activated carbons, silica gel, fuller and infusorial earths. CH. ANTENAY. *Industrie chimique* 14, 492-5, 542-6(1927), 15, 9-10, 73-6, 135-7, 182-5(1928).—A rather complete review of discolorants and absorbents, their manuf. and uses in the chem. industry.

P. THOMASSET

Carbon black produced from natural gas in 1927. G. R. HOPKINS AND H. BACKUS. U. S. Bur. Mines, *Mineral Resources of U. S. 1927*, Pt. II, 27-31 (preprint No. 3, published August 16, 1928). E. H.

Vitriol preparation. III. System zinc sulfate-sulfuric acid-water. G. AGDE AND F. SCHIMMEL. *Z. angew. Chem.* **41**, 340-1 (1928); cf. *C. A.* **21**, 2762.—The soly. of ZnSO_4 in aq. solns. of H_2SO_4 at -10° to 39° has been measured, the results showing that the soly. is depressed considerably by the acid. The temps. of transition of the heptahydrate into the hexahydrate in presence of varying amts. of H_2SO_4 have been detd.; some f.-p. data are also recorded. B. C. A.

The utilization of liquid oxygen in railway workshops. J. OUDER. *Engineering* **125**, 694-5 (1928).—Where large amts. of O_2 are used and where good express service is available it may be more economical to replace high-pressure O_2 in steel cylinders by liquid O_2 . The evapn. loss is 0.57% per hr. The railway shops at Montigny-les-Metz obtain the liquid in metal vacuum containers, capacity 55 lb., tare 79 lb., including enclosing metal case, t. c., 1.45 ft. Steel cylinders weigh 8 times the O_2 they contain. Compressed O_2 costs 0.48¢ per cu. ft., liquid O_2 0.28¢, a saving of 44.5%. Evapn. losses and cost of current to vaporize the liquid reduce this to 40%. The method and app. for vaporizing and storing the O_2 are described in detail, including a diagrammatic drawing and a photograph. The gas is stored in a 282.5 cu. ft. tank, at 56.9 lb. per sq. in. pressure and distributed through Fe piping. To prevent leakage through pipe unions a little solder is run into the end of each union. Jenkins valves were found most satisfactory. E. G. R. ARDAGH.

Salt lakes of the Slavgorod region in Siberia. M. I. KUCHIN. *J. Chem. Ind. (Moscow)* **5**, 292-7 (1928). Petukhov lakes, about 210 km. from Slavgorod, are satd. with Na_2CO_3 . They consist of 1 large and several smaller lakes, the latter acting as a sort of natural evapn. basins for the former. When the temp. drops below 0° the smaller lakes ppt. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ in layers 8 to 15 cm. deep. This Na_2CO_3 is mined and dehydrated by exposure to the sun, yielding a product contg. 99% Na_2CO_3 . The total amt. of the salt dissolved in these lakes is estd. to be 2.6 million tons calcd. as anhyd. Na_2CO_3 . The amt. of the salt pptd. at the bottom of the lakes is about twice this quantity. Analysis of the salt-pptd. soda crystals gave: insol. none, H_2O 62.16, Na_2CO_3 36.46, NaCl 0.39%, Na_2SO_4 trace. In purity the product may be compared with that which ppts. in winter at the bottom of British Columbia soda lakes (*Mining Magazine* **35**, 113 (1926)) and is incomparably superior to the products mined from Californian, Egyptian and East Siberian soda lakes which contain considerable admixts. of NaCl and Glauber salt. Kulundra steppe, also in the Slavgorod district, contains colossal deposits of thenardite and mirabilite. Lake Ushkala, situated in the steppe, has at the bottom a deposit of Na_2SO_4 1-1.5 m. thick. Peechatnui and Lomovii lakes contain NaCl of 90% purity, MgSO_4 and other harmful admixtures being absent. BERNARD NELSON.

Effects of plasticization on the mechanical and elastic properties of natural and artificial substances. II. MAXFRED AND J. OBRIST. *Rev. gén. mat. plastiques* **4**, 67-71, 139-51, 201-13, 335-43 (1928).—See *C. A.* **21**, 2535, 2991; **22**, 173. A. P.-C.

Mechanical plasticizing in the technology of proteinoplastics. OTTO MAXFRED. *Caoutchouc et gutta-percha* **25**, 14,014-6, 14,054-6 (1928); cf. M. and Obrist, *C. A.* **21**, 2535.—Various processes are described, with diagrams, of the principles involved. C. C. DAVIS.

The patent history of composite gears. JOSEPH ROSSMAN. *Plastics* **4**, 433-4, 438 (1928). E. H.

Electrometric determination of alkalies of Saki lake water (IL'INSKII) 14. Stability of Rh_2O_3 and Ir_2O_3 (PASTORELLO) 6. Composition of rubber and paracoumarone resin [as a waterproofing material] (U. S. pat. 1,682,397) 13.

Nitric acid from aluminum nitrate, etc. M. BUCHNER. *Brit.* **283,117**, Jan. 3, 1927. $\text{Al}(\text{NO}_3)_3$ is decompd. by heating *in vacuo* to obtain an increased yield of HNO_3 . Basic Al nitrate is preferably used, to obtain alumina free from Fe. Water or steam may be added to regulate the concn. of the HNO_3 produced.

Apparatus for manufacture of hydrochloric acid and sodium sulfate. EMANUEL V. BENJAMIN (to Myles Salt Co., Ltd.). U. S. 1,681,760, Aug. 21.

Concentrating acid or alkaline solutions or other incrusting or corrosive solutions. PLINIO BRINGHENTI. U. S. 1,682,265, Aug. 28. The soln. is directly heated with a liquid heat-transmitting medium such as melted paraffin which is lighter than the soln. and insol. in it and is introduced as a stream of finely divided material at a temp. below the b. p. of the soln. to be concd. The liquid thus introduced is floated off, entrained soln. is sep'd. from it, the sep'd. liquid is heated by direct contact with a hot

gaseous medium to restore heat lost to the soln.; the heated soln. is sprayed into a vessel whereby it is partly evapd., vapors evolved are carried off and the partly concd. soln. is returned to the cycle for further concn. by the finely divided heated liquid. An app. is described.

Alkali hydrides. DEUTSCHE GOLD- UND SILBER-SCHNEIDANSTALT VORM. ROESSLER, H. FREUDENBERG and H. KLOEPFER. Brit. 283,089, Sept. 28, 1927. In reacting on alkali metals with H, the metal is introduced into the reaction chamber in finely divided form, *e. g.*, by spraying the molten metal with a stream of H or of inert gas or vapor. The reaction chamber may contain inert solid materials such as NaCl, Fe powder, Na_2CO_3 or charcoal, and the reaction is carried out at 180–250° or higher and may be effected under pressure.

Nitrates of aluminum and other metals. M. BUCHNER. Brit. 282,772, Dec. 24, 1926. Aluminiferous materials such as clay or bauxite or ores of other metals such as Zn or Ce are treated with HNO_3 in vessels formed of acid-proof alloy (such as an alloy of Fe, Ni and Cr or W) with gradual increase of temp. and pressure. A final temp. of 150–160° is suitable and an excess of aluminiferous material is preferably used to facilitate pptn. of any Fe present.

Phosphate and aluminate. RHEINLANDE KUNSTHEIM VEREIN CHEMISCHER FABRIKEN A.-G. Brit. 283,072, June 24, 1927. Al phosphates are decompd. by heating to 900° or higher with alkali salts and alk. earth compds. such as oxides, carbonates, sulfates or chlorides. The product is extd. with water to sep. alkali aluminate (from which alumina may be prepd.) and to leave a phosphate which is sol. in NH_4 citrate and may be used as a *grith er*. Steam may be passed over the mixt. during the heating and may be introduced into the flame used for heating.

Treating aluminum-bearing minerals. WM. G. BLOK TILT. U. S. 1,681,921, Aug. 28. Al-contg. minerals such as clay or bauxite are heated with $(\text{NH}_4)_2\text{SO}_4$ (suitable to a temp. of about 315°) and the Al is brought into soln. and then pptd. with $(\text{NH}_4)_2\text{SO}_4$ to obtain basic Al sulfite which may be calcined to form Al_2O_3 .

Aluminum and potassium compounds from leucite, etc. P. SPENCE & SONS, LTD., AND T. J. I. CRAIG. Brit. 283,087, June 29, 1926. A substantially neutral soln. obtained from leucite or similar materials by treatment with HNO_3 or a soln. rendered basic by heating to drive off some free and combined HNO_3 or by treatment with potash or alumina, is subjected to regulated cooling to effect selective cryt. of KNO_3 only; $\text{Al}(\text{NO}_3)_3$ is then sep'd. from the remaining soln. by adding HNO_3 and the remaining liquor is preferably used for treating a fresh batch of mineral on the counter-current principle. Fe may be pptd. from the soln. either before or after sep'n. of KNO_3 , either as a basic ferric K sulfate by heating in the presence of Al or K sulfate and insol. material such as leucite residues, or by digestion with an oxide of Mn, Sn or Sb. Various other details and modifications are also given.

Ammonium sulfate. SOC. ANON. DE MATERIEL DE CONSTRUCTION. Brit. 282,755, Dec. 29, 1926. CaSO_4 is decompd. by $(\text{NH}_4)_2\text{CO}_3$ to form $(\text{NH}_4)_2\text{SO}_4$ in the presence of clay, kaolin, bauxite or other substances contg. SiO_2 , Al_2O_3 and Fe_2O_3 so that the residue after sep'n. of the $(\text{NH}_4)_2\text{SO}_4$ formed is suitable for use in making *portland cement*.

Refining crude arsenic trioxide. CHESTER L. READ (to American Smelting & Refining Co.). U. S. 1,681,496, Aug. 21. The crude As_2O_3 is volatilized and passed over a substance such as vitreous As oxide which will absorb impurities. An app. is described.

Treating raw calcium phosphate. F. G. LILJENROTH. Brit. 282,704, Dec. 31, 1926. Raw Ca phosphate is treated with H_2SO_4 and the CaSO_4 is sep'd., mixed with sand, clay and bauxite, and calcined in an oxidizing atm. preferably with coke to facilitate evolution of SO_2 from which H_2SO_4 may be prep'd.; or the raw phosphate may be leached with an acid having a sol. Ca salt such as HNO_3 or H_3PO_4 and CaSO_4 pptd. by sulfate of NH_4 or of an alkali metal. Residues may be obtained in similar treatments which may be used as a cement clinker material. SiF_4 may be led into a suspension of the Ca phosphate to form SiO_2 and HF or H_2SiF_6 which further react to give H_3PO_4 and CaF_2 . Various other modifications are described.

Calcium nitrate. J. BRIGHTMORE. Brit. 283,232, July 6, 1926. Ca compds., preferably a mixt. of hydrated lime with 10% of calc. spar, are subjected under pressure in a closed chamber to the action of air (which may be preheated to about 500°), superheated steam and an elec. current, to form $\text{Ca}(\text{NO}_3)_2$. Catalysts such as Cu and Ni may serve as electrodes.

Purifying sodium stannate solution. CHESTER L. READ and BERRY M. O'HARRA (to American Smelting & Refining Co.). U. S. 1,681,497, Aug. 21. Pb and Cu are

removed by the action of Na sulfide; Sb, Se and Te are then removed by the action of Sn in an oxidizable condition such as by SnCl_2 or metallic Sn and by heat, so that the Pb and Cu may be recovered separately from the Sb, Se and Te.

Tungstic oxide gel. WALTER A. PATRICK (to Silica Gel Corp.). U. S. 1,682,239, Aug. 28. A 3-7% soln. of Na tungstate is added to an acid such as HCl or H_2SO_4 with thorough stirring until the quantity of Na tungstate added results in a final concn. of H ions resulting from the acid in the mixt. of 0.1-0.5 mols. per l. The product is dried and is hard and transparent.

Stannic oxide gel. WALTER A. PATRICK (to Silica Gel Corp.). U. S. 1,682,240, Aug. 28. A sol. stannate such as Na stannate is added to an acid soln. such as HCl or H_2SO_4 with thorough stirring until a H ion concn. of 0.1-0.5 mols. per l. is attained; the mixt. sets to a hydrogel after a time and this is washed to remove acid and salt, dried at 75-120° to drive off part of the moisture and the temp. is then slowly increased to drive off the greater portion of the remaining moisture.

Aluminum oxide gel. WALTER A. PATRICK (to Silica Gel Corp.). U. S. 1,682,241, Aug. 28. A 3-7% soln. of Na aluminate or other suitable sol. aluminate is added, with thorough stirring, to an acid soln. such as HCl or H_2SO_4 until a H-ion concn. of 0.1-0.5 mols. per l. is attained. The product may then be dried at 75-120° and subsequently at 300-400°.

Titanium oxide gel. WALTER A. PATRICK (to Silica Gel Corp.). U. S. 1,682,242, Aug. 28. A colloidal soln. of titanium acid is allowed to set to a hydrogel, and the latter is dried in a current of air at 75-120° and the temp. afterward slowly increased to 300-400°.

Zinc oxide. SOC. GENERALE D'ETRAIQUES ET FUSORIES, Brit. 282,706, Dec. 30, 1926. A sintered ZnO which contains sides of Fe or Cu and is suitable for reduction in a "zinc oven" is obtained by roasting in a sintering app. operated with a blast, a mixt. of ZnSO_4 and a salt such as a zinc blende, iron pyrites or Fe and Cu pyrites. Carbonaceous material, roasted blende, sintered material or slag from iron or Cu blast furnace may be added to the mixt. before roasting.

Active carbon and carbon disulfide. I. G. FARBENIND A. G. Brit. 283,267, Oct. 5, 1926. C is activated and CS_2 produced by treating heated C with vapor of S or of a compd. yielding S.

Carbon black. CHATELAIN MATLOCK (to Monroe Louisiana Carbon Co.). U. S. 1,681,945, Aug. 28. An app. for producing C black from hydrocarbon gas comprises a furnace, gas burners within the furnace and a mixing app. connected with the burners and adapted for mixing air and gas in proportioned quantities insufficient for complete combustion, by positive agitation, before the gas is supplied to the burners.

Zirconium. THE ALLOY MANUFACTURING COMPANY. Fr. 635,088, May 27, 1927. Zr compds. are obtained from silicozirconates of Zr by dissolving the ore with acid, e. g., H_2SO_4 or oxalic acid, and pptg. the Zr by the addn. of K compds. and cooling. The double salt of Zr and K is calcined, giving ZrO_2 .

Catalysts for the preparation of hydrogen and alcohol. RENÉ JEAN AUGUSTE GRENIER. Fr. 634,747, May 20, 1927. See Brit. 2,723 (C. 1, 22, 1658).

Bleach liquor as a by-product in salt purification. VICTOR YNGVE. U. S. 1,683,431, Sept. 4. A brine contg. Me and Ca is mixed with NaOH in excess of the quantity necessary to ppt. the Me and Ca, the mixt. is heated to a temp. of about 100° and the pptd. hydroxide sludge is sep'd. and is chlorinated only to the extent that no appreciable amt. of Mg(OH)_2 is chlorinated.

Use of fused salts such as sodium carbonate or barium chloride as oxidation preventives and lubricants in making brake drums or other drawn metal articles. JOSEPH E. BATHIE (to Kelsey Wheel Co.). U. S. 1,683,117, Sept. 4.

Apparatus for separating graphite by flotation. CAMILLE FRÉDÉRIC LANOUÉ. Fr. 634,791, Dec. 7, 1926. Two reservoirs are provided, the substances of higher density than graphite being sep'd. in the first reservoir, and the substances of lower density in the second.

Matrix for printing plates. EUGEN R. THOMPSON (to John S. Stokes). U. S. 1,681,447, Aug. 21. A non-metallic backing or body which may be formed to synthetic resin and cementitious material carries a type forming face of sprayed metallic particles.

Rust-resisting iron and steel printing plates. RUDOLF FRITSCHÉ. U. S. 1,681,949, Aug. 21. A lithographic plate is formed with a chrome steel body having one surface of a grained porous formation such as may be produced by use of HF or HNO_3 and HCl.

Packing material. OLIVER T. HUNGERFORD. U. S. 1,681,540, Aug. 21. Fibrous material recovered from flax straw by boiling it with NaOH soln. is mixed with another

harder, flexible, resilient material such as sisal fiber or tougher portions of the flax straw.

Making balls or pellets of readily fusible substances. C. E. LINEBARGER. Brit. 282,994, Jan. 17, 1927. Substances of relatively low m. p. such as a mixt. of chlorinated naphthalene, stearic acid and carnauba wax are melted and streams of the molten material are allowed to flow through a body of CaCl_2 soln. or other suitable liquid which is at a temp. higher than the m. p. of the material under treatment, and the drops thus formed are then passed through liquid of lower temp. to effect solidification. An app. is described.

Sound-record composition. FRANK E. LAYMAN and LINWOOD T. RICHARDSON (to Cutler-Hammer Mfg. Co.). U. S. 1,682,913, Sept. 4. A resin of the "S-treated type" such as may be formed from phenol or C_{10}H_8 and S chloride is mixed with approx. 10% its wt. of white lead and the mixt. is heated for about a half hr. at a temp. above 150° .

Sound-absorbing plaster containing porous granular particles such as pumice. LYL B. RYMARCZICK. U. S. 1,682,986, Sept. 4.

Flexible sponge rubber cores for use in casting loud speaker amplifying horns of plaster of Paris, etc. FRED W. TEMPLE (one-half to William P. Crockett). U. S. 1,682,691, Aug. 28.

Heat-sensitive recording material for copying telegraph apparatus or the like. R. S. BICKNELL and R. H. RASCHER (to Marconi's Wireless Telegraph Co., Ltd.). Brit. 282,759, Dec. 31, 1926. A material such as short fibered paper is coated with a compn. which changes color when heated, e. g., by the action of an elec. spark. Suitable compns. are: (a) an aq. soln. of gelatin, salt and phenolphthalein, (b) an aq. soln. formed of aniline HCl , gelatin and KNO_3 , or other suitable oxidizing agent, (c) nitrates such as those of Ni, Cu, Mn and Ir, alone or with other salts such as nitrates or thio-sulfates or double salts or nitrites.

Polishing and hardening the contact surface of commutators. WM. L. WEBER. U. S. 1,682,157, Aug. 28. The surface to be treated, while traveling at high speed, is treated with a compn. comprising S and an abrasive material under sufficient pressure and heat to polish the surface and cause the S to unite with the metal of the surface and harden it.

Removing and recovering volatile plasticizers from celluloid and similar compositions. HARRY P. BASSETT. U. S. 1,681,692, Aug. 21. The material is treated in the presence of an acid such as very dil. HNO_3 which is insufficient in quantity to cause carbonization or decompn., at a temp. of about 100° , with a current of steam to drive off volatile plasticizing substances such as camphor and the latter are recovered by condensation.

Heat treatment of wood chips, sawdust or other materials by use of molten metal. JOHN S. MORGAN (to Thermal Industrial and Chemical Research Co. (T. I. Co.), Ltd.). U. S. 1,681,808, Aug. 21. In treating materials such as sawdust or wood chips in a bath of molten metal, with production of a solid residue of lower sp. gr. than the molten metal, the solid residue is removed from the surface of the molten metal substantially free from the metal by causing accumulated residue on the surface of the metal to be entrained in a stream of steam or distn. products or other suitable elastic fluid moving upwardly through a duct over the residue. An app. is described.

Apparatus for centrifugal casting of dental inlays, etc. CHESTER P. SHOUDY (to Shoudy Mfg. & Developing Co.). U. S. 1,683,207, Sept. 4.

Imitation paintings. HUGO GABLER-ADLERSELD. U. S. 1,682,261, Aug. 28. A transparent support such as a glass plate is coated with a layer of transparent substance, e. g., collodion, and then with chromated gelatin which does not contain any solid particles of pigment; the latter is exposed to the action of light under a photographic negative, developed and dried, and paint is applied to the diapositive thus obtained; after drying of the paint a sheet of tough flexible material such as textile fabric is secured on the layer of paint and the picture is finally pulled off from the transparent support.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

C. F. LARTON, C. H. KERR

Applications of glass to the chemical and allied industries. A. B. MARSHALL. Corning Glass Works, Baltimore, Md. *J. Soc. Chem. Ind.* **47**, 243-77 (1928). E. H.

Colored glasses. W. M. HAYES. *J. Soc. Chem. Ind.* **47**, 192-6T (1928).—Glasses may be considered as "congealed liquids" indicating an increase in viscosity as the liquid is cooled until it goes solid. The increase in viscosity slows up the speed of crystn. so that the glass is solid before it can deaerate but all glasses will crystallize at a suitable temp. No glass is recommended to produce unless it may be made below 1450° as the materials to contain the melt cannot stand up to higher temps. The properties of glass depend upon its composition. With over 20% soda it will rapidly dim in moist air and CO₂. The material for glass must be finely ground and be intimately mixed and some glass added of similar composit. to that about to be produced. Water is expelled up to 300°, lithium nitrate melt at 320°, red lead loses O and forms litharge at 500°, the litharge melts at 780°, CaO decomposes at 825°; alkali carbonates melt at 800-900° and at 900° most constituents except SiO₂ are liquid. Because of the high viscosity trapped air cannot escape. Careful selection of raw material reduces duration of the fusion period. Elevation of temp. decreases viscosity, but increases the size of the air bubbles. It causes convection currents but corrosion is also increased and the longer the fusion constituents produces fresh bubbles. Colored glasses are usually made by fusing. A flashed glass has a thin coating of intensely colored material upon a colorless base. The colors imparted to glass by oxides corresponds to salts of the transition metals, e.g., iron gives blue. Mn a violet, Cr a yellow color, other colors and combination for color are given. Spectacle glass usually contains rare earths. Whereas the color of oxidized batches is due to colored silicates, in reduced glass it is due to colloidal tint.

Nickel mirrors by the nickel carbonyl method. COLIN G. FINK AND WALTER G. KING, JR. *Trans. Am. Electrochem. Soc.* **54**, (preprint), 4 pp (1928). Ni(CO)₄ was decompd. in contact with heated glass surfaces, producing perfect mirror deposits. Foreign gases, such as air, must be absent, as otherwise dark spots develop in the mirror. Best results were obtained with films 1000 Å. at 180° to 200°. Other materials besides glass were thus coated with Ni. The perfect reflectivity of the Ni mirror is almost equal to that of a Ag mirror. The deposit has a high elec. cond., adheres tenaciously and is tough and resistant. The deposit may serve as a foundation for the electrodeposition thereon of Cr, Cu and other metals.

Fused silica and its use in the chemical industry. AN. MATAGRIN. *Rev. chim. ind.* **37**, 85-9, 124-3, 178-82 (1928).—A review of the history of fused silica, the modern methods of manuf. and uses in chemistry.

The commercial development of a kaolinic fire brick. F. H. NORTON. *Mass. Institute of Tech. Tech. Reports* **11**, 109-85 (1928).—Great shrinkage of Georgia clay necessitates firing at over 2000° C. A light wt. brick for marine boilers and a dense refractory for glass tanks were developed. Properties of these 2 are compared with other high-grade brick.

The testing of a red quarry floor tile kiln. W. HARRY VAUGHAN. *J. Am. Ceram. Soc.* **11**, 659-78 (1928).

Study of china bodies of the Belleek type. JAMES F. COLLINS. Ohio State Univ. *J. Am. Ceram. Soc.* **11**, 706-12 (1928).—A system of compns., frits and firing temps. were studied. The value of previously fritted, or at least calcined, flux for porcelain is proved. Other desirable properties were good dry strength, extreme toughness when fired, moderate firing temp. cone 7 and self-glazing at cone 8. Ivory color is due either to the action of bone ash on the FeO or to the attack of the previously fused flux on the FeO and Fe₂O₃ in the clays. Translucency is due to soln. of the ball fused flux on the FeO and Fe₂O₃ in the clays. Translucency would also contribute to clay by the previously fused flux. Undissolved bone ash would also contribute to translucency. Replacing part of the fluxes by K feldspar would reduce warpage.

Suspension of glazes and barium carbonate water. P. WM. LEE. *J. Am. Ceram. Soc.* **11**, 713-4 (1928).—Heavy settling, fine grinding, raw clay, HCl, AcOH and corn starch are discussed for glaze suspension. *Terra cotta bodies* are held in suspension better if 0.7 to 1.0% wilkinita (a better grade of bentonite) is added to the BaCO₃ used for suspension.

Production and uses of stoneware chemical plant. I. B. M. PEARSON. *Chem. Age* (London) 19, 98-9(1928). II. *Ibid* 117-8. III. *Ibid* 159-60. E. H.

Progress in ceramics in 1927. M. MIELDS. *Chem.-Ztg.* 52, No. 67, Fortschritts-ber, No. 3, 92-102(1928). H. H.

Equations and tables for shrinkage, expansion and design calculations. A. E. R. WESTERMANN. Univ. of Ill. *J. Am. Ceram. Soc.* 11, 715-23(1928). C. H. KERR

A laboratory for the technical control of the manufacture of refractories. L. J. TROSTEL. *Bull. Am. Ceram. Soc.* 7, 260-7(1928).—The lab. of the General Refractories Co. at Baltimore, Md., is described. C. H. KERR

Enameling, with special reference to modern enameling ovens. A. BRESSER. *Korrosion Metallschutz* 4, 157-60(1928).—A discussion of the construction of modern enameling ovens with sketches showing the different types of firing. E. E. ROETHLI

Continuous enameling furnace. W. O. OWEN. *Bull. Am. Ceram. Soc.* 7, 272-6(1928).—A surface-combustion furnace is described. C. H. KERR

Apparatus for a rapid sedimentation analysis (VAN NIEUWENBURG, SCHOUTENS) 1. **CaCl₂ waters** (LANE) 14. **Analysis of bauxite and refractories of high alumina content** (LUNDELL, HOFFMAN) 7. **Ladle lining** (U. S. pat. 1,681,913) 9.

BERGE, AUGUST. **Keramisches Praktikum.** 2nd ed. Anleitung zu keramischen Laboratoriumsarbeiten auf chemischer Grundlage für Studierende und Techniker der keramischen Industrie. Halle (Saale). W. Knapp.

TURK, KARL. **The Ready Remedier. A Manual for porcelain enameling superintendents.** Baltimore, Md. Waverly Press. 121 pp. Reviewed in *Western Soc. Eng.* 33, 157(1928).

Glass. LOUIS-JOSEPH MARCHAL. Fr. 634,847, May 23, 1927. Cylindrical and other shaped articles of glass are made in molds revolving at a high speed, into which the melted glass is run.

Glass. C. TRENTIN. Brit. 282,768, Dec. 31, 1926. A glass suitable for lab ware, which resists attack by boiling water, contains a high proportion of SiO₂ (preferably about 75%) together with B oxide, Al oxide and Zn oxide. A suitable batch may be formed from silica 72, borax 0.625, Na₂CO₃ 18, K₂CO₃ 3, NaNO₃ 1.5, Al₂O₃ 0.25, ZnO 0.3 and CaCO₃ 18 parts.

Optical glass. ROBERT J. MONTGOMERY (to Bausch & Lomb Optical Co.). U. S. 1,681,704, Aug. 21. Optical glass which cuts off objectionable yellow rays is formed from a batch comprising SiO₂ 69.5, Na₂O 15.8, B₂O₃ 0.3, cerium didymium oxide 12, Sb oxide 1.9 and As oxide 0.5 parts.

Apparatus for forming glass sheets or plates. W. ZIMMERSTADT (to Naamlooze Venootschap Maatschappij tot Beluor en Exploit van Octrooien). Brit. 282,756, Dec. 30, 1926.

Apparatus for surfacing plate glass. JOHN H. FOX (to Pittsburgh Plate Glass Co.). U. S. 1,683,342, Sept. 4.

Apparatus for making hollow glass articles. GEORGE A. MILLAR (to Cooper Hewitt Electric Co.). U. S. 1,681,591, Aug. 21.

Glass-making furnace. CHARLES ROYER. Fr. 634,808, May 16, 1927. Constructional features.

* **Method of using polarized heat rays for detecting strain in glass or other materials which transmit heat rays.** JESSE T. LITTLETON, JR. (to Corning Glass Works). U. S. 1,681,991, Aug. 28.

Ceramic ware from shale. HALVER R. STRAIGHT. U. S. 1,682,200, Aug. 28. Granulated shale is piled in an upright stack with its bottom and side edges sealed and the central and bottom portion of the pile is stirred and steam under pressure, in excess of the quantity which is condensed, is introduced. This treatment serves to remove air and prep. the material for molding.

Tunnel kiln for baking ceramic ware. VICTOR SELLEZ. U. S. 1,683,300, Sept. 4.

Tunnel kiln suitable for burning ceramic ware. JAMES KELLEHER (to Harper Electric Furnace Corp.). U. S. 1,681,939, Aug. 28. Connections are provided for circulating a cooling medium such as water through hollow rails which serves to prevent undue expansion and warping.

Fused silica. L. B. MILLER (to British Thomson-Houston Co., Ltd.). Brit. 282,733, Dec. 20, 1926. Cloudy or milky quartz crystal is converted into clear vitreous silica by heating near to, but not above, 1700°, then cooling to below 270° and finally

fusing *in vacuo* in an elec. furnace such as that described in Brit. 240,489. The product may be extruded in the form of rods or tubes.

Fused silica. QUARTZ ET SILICE. Brit. 283,148, Jan. 5, 1927. Sand is packed around a C rod which is raised to a high temp. by the passage of an elec. current. An oxidizing atm. is maintained in the furnace during the melting of the silica to obtain a product which does not contain either free C or Si. Air or O may be supplied to the furnace but a small quantity of water is preferably added to the sand before introduction into the furnace.

Fused silica articles. QUARTZ ET SILICE. Brit. 283,174, Jan. 6, 1927. In producing pressed articles of fused silica, a silica blank is heated up to the temp. at which the material volatilizes freely and then transferred quickly to the press. Various ails of app. are described. Cf. C. A. 22, 2040.

Abrasive articles. DUANE E. WEBSTER (to Norton Co.). U. S. 1,681,891, Aug. 21, 1927. Abrasive grains such as cryst. Al_2O_3 or SiC are mixed with a vulcanizing agent such as S and with rubber latex having a total rubber content of not less than 30% by wt., the mixt. is shaped to the desired form for making grinding wheels or other articles and is then dried and vulcanized. Cf. C. A. 22, 1024.

Abrasive stones. JOHN L. WELLER. U. S. 1,682,649, Aug. 28, 1927. A material such as a natural abrasive having substantially the desired grinding qualities of the finished stone is crushed to a coarse aggregate, and mixed with a plastic binder such as a cement mixt. which also when set will have approx. the same desired grinding qualities, and molded grinding wheels or other articles are formed of the mixt.

Refractory articles. FRANK H. RIDDLE (to Champion Porcelain Co.). U. S. 1,682,249, Aug. 28, 1927. A raw batch for making furnace linings or other refractory articles comprises a mixt. of refractory granules such as sillimanite, clay and sufficient quantity of alumina to combine with substantially all of the silica of the clay to form sillimanite. U. S. 1,682,250 specifies a raw batch for making spark plug insulators or other ceramic articles, comprising uncombined alumina, clay and a flux, the alumina being in such condition and quantity that it will combine with the other materials to form Al silicate upon firing. U. S. 1,682,251 specifies a raw batch suitable for making cooking ware, elec. insulators, etc., contg. andalusite, Zr silicate, clay and fluxing materials such as mixts. contg. 40% of alk. earth oxide.

Refractory products of zirconia, etc. DEUTSCHE GOLD UND SILBER-SCHNEIDEN-STALT VORM. ROESSLER. Brit. 282,795, Dec. 27, 1926. Dry zirconia is mixed with small proportions of hydrolyzable substances such as $ZrCl_4$, $AlCl_3$ or $MgCl_2$ and with water to form a plastic mass which is shaped and burned. Thoria or other suitable substances may be added.

Enamels. I. KREIDL. Brit. 283,130, Jan. 4, 1927. Synthetically prod. Al alkali silicates or Al alk. earth silicates are used as opacifying agents for enamels, glazes, etc.

Oven for continuous enameling of wire. C. L. HEISLER (to British Thomson-Houston Co., Ltd.). Brit. 282,740, Dec. 29, 1926.

Decorative effects on enameled goods. "SPINX" SPOJENÝ SMALTOVNÝ A TOVÁRNÝ NA KOVOVÉ ZBOŽÍ, PŘE. SPOL. Fr. 634,069, May 19, 1927. Drops of solus or glazing or mixts. of the 2 are applied to ceramic objects before glazing and burning or after glazing and before burning to produce decorative effects.

Apparatus and continuous system for coating metallic articles with glass or porcelain enamel. ALVIN G. SHERMAN and ALBERT MEADOWS (to Detroit Vapor Stove Co.). U. S. 1,681,440-1, Aug. 21, 1927.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Report of Committee C-1 on Cement. P. H. BATES, *et al.* *Proc. Am. Soc. Testing Materials* 1928 (preprint) 46, 68 pp. — This report presents data and discussions of co-operative tests of 32 cements by a no. of labs. A S. T. M. standard tests, compression tests on 2-in. cubes, and tension tests on neat cement mixed with 42% water, by weight of the cement, were made by 47 labs., concrete tests by 6 labs., and chem. analyses by 5 labs. Variations in the results from different labs. were great enough to demonstrate the necessity for careful adherence to standard procedure in all details of testing. None of the 3-strength tests used possessed a marked advantage over the others as a criterion of concrete strength.

RAYMOND WILSON

The processes of cement burning in the rotary kiln. ERNST RISSEL. *Tonind. Ztg.* 52, 1237-9(1928); cf. E. S. and W. A. Ernst, *C. A.* 21, 1173.—Analytical results are given for the materials at different points in the rotary kiln including CO_2 . The burning is divided into 5 steps: drying the raw material, heating to the point of decomposition of CaCO_3 during which the last traces of H_2O and first traces of CO_2 are driven off, calcining, calcining to sintering, and sintering. F. O. ANDEREGG

Portland jurament. HERBERT KIEBS. *Tonind. Ztg.* 52, 1384-5(1928).—Portland jurament is made by grinding portland cement clinker, blast-furnace slag and oil-shale cinders. It weighs about 1 kg. per l., whereas portland cement weighs about 1.4 kg.; so that due allowance must be made when it is measured by vol. When measured by wt. the jurament compares favorably with portland cement in strength as detd. according to the German specifications. A greater resistance to MgCl_2 soln. is claimed for jurament. F. O. ANDEREGG

Sea water-resistant cements. GEORGE J. FERTIG. *Concrete (Mill Section)* 33, No. 3, 105-10(1928).—The addn. of granulated slag to concrete mixts. increases their resistance to Mg sulfate. Cf. *C. A.* 22, 2450. RAYMOND WILSON

The resistance of portland cement concrete to the action of sulfate waters as influenced by the cement. D. G. MILLER. *Public Roads* 9, 82-7(1928).—See *C. A.* 22, 3506. L. B. MILLER

A study of concrete pavement from core drill records. C. E. FOSTER. *Roads and Streets* 68, 305-8(1928).—F. draws conclusions concerning the prepn. of the subgrade, segregation, presence of porous mortar and variation in thickness of the pavement from core drill records. L. B. MILLER

Wear tests of concrete. HAROLD ALLEN. Kansas State Agr. Coll. *Concrete* 33, No. 3, 43-7(1928).—Concrete spheres of 9 in. diam. were tested in a paving-brick rattler. The concrete was in most cases moist cured 28 days and air-dried 32 days before test. The French coeff. of the coarse aggregate does not materially affect the resistance to wear of the concrete. Different brands of cement produce concrete of different wearing quality. The use of a surface hardener (Zn Mg silosilicate) increases resistance to wear. Proper curing is necessary to produce wear-resistant concrete. Excessive mixing water affects resistance to wear in about the same proportion as it affects the strength. Replacing more than 1% of the portland cement with natural cement will reduce both strength and resistance to wear in proportion to the amt. of portland cement replaced. RAYMOND WILSON

The determination of the proportions of constituents in concrete. L. G. CARMICK. Bureau of Mines, *Public Roads* 9, 88-9(1928). The proportions of cement, sand and stone in concrete are calcd. from chem. analysis. L. B. MILLER

Decorating concrete. MAXIMILIAN TOCH. *Concrete* 33, No. 3, 31(1928). Some practical instructions are given for decorating concrete in polychrome effects, methods of preliminary treatment of the concrete and a list of suitable pigments. R. W.

Staining and efflorescence on Indiana limestone caused by moisture seepage through backing masonry materials. LEE HUBER. *Proc. Am. Soc. Testing Materials* 1928 (preprint) 90, 12 pp.—Efflorescence on limestone usually consists of the sulfates, carbonates and chlorides of Ca, Mg, Na and K. Evapn. at the surface of the limestone causes a concn. of small quantities of sol. salts present in the mortar, the backing materials or the soil. Under some conditions crystn. occurs below the surface, causing spalling. Staining of the buff Indiana limestone results from a reaction between alk. soln. from the mortar and org. matter in the stone. Both staining and efflorescence are best prevented by following construction practices which prevent seepage of water through walls during and after construction. None of the 22 com. waterproofers tested was entirely effective in preventing staining or efflorescence. Stains tend to disappear on weathering. They can be removed by blasting the surface with steam at 125- to 150-lb. pressure, and immediately treating it with 5% soln. of formic acid, or by successive treatments with a poultice contg. Na carbonate and one contg. formic acid. RAYMOND WILSON

Road maintenance and progress. A review. E. H. COLLCUTT. *Munic. Eng. Sanit. Record* 81, 179(1928). C. H. BADGER

Artificial stones of clay and lime. PETER P. BUDNIKOV. *Tonind. Ztg.* 52, 1309-70(1928).—Cubes made of clay and 10% CaO heated in an autoclave for 8 or 10 hrs. at 10 atm. had a compression strength of more than 100 kg. per sq. cm. F. O. A.

Cold bitumen emulsions. G. S. HAY. *Munic. Eng. Sanit. Record* 81, 86-7, 117-8, 140-1(1928).—The hot bitumen process requires expensive equipment, skilled labor and chem. control. The ductility and elasticity of the bitumen is destroyed by too high or too prolonged heating. A comparatively hard bitumen must be used to

prevent softening in summer with the consequent appearance of waving. Twice as much is needed as will bind the stone and this being brought to the surface by rolling together by a very thin coating of bitumen which after consolidation forms a solid mass of stone. A bitumen emulsion is a suspension of bitumen in water. Emulsions are made by incorporating emulsifiers such as soap, casein, starch, glue, gums and petroleum acids or colloidal clays, slurries, seaweeds, etc., with or without alkali to form a key between the tar or bitumen and the water. Less amts. of emulsifiers are needed when a high-speed colloidal mill is used. Solvents such as paraffin and trichloroethylene are sometimes used but these make it more costly. Types of emulsions are (1) coal tar (2) coal tar mixed with petroleum bitumen, (3) petroleum bitumen and light petroleum distillates such as kerosene or naphtha and (4) pure petroleum bitumen. (1), (2) and (3) are deceptive since the road may appear perfectly good for 5 to 6 months

C. H. RADGER

A new moist-closet and storage tank apparatus. D. O. WOOLF. *Bur. Mines. Public Roads* 9, 90 2(1928).—An improved moist-closet and storage tank are described for use in testing cement.

L. B. MILLER

Mechanism of the action of wood-preserving agents. DEHNST Z. anorg. Chem. 41, 355-8(1928).—To test Batman's theory (cf. C. I. 14, 1023) that the fungicidal action of coal-tar oil or creosote oil is due to the low-boiling hydrocarbons and the high-boiling tar acids and bases and is not influenced in any way by the 40% of neutral oil usually present, a very pure German coal-tar oil was freed from acids and bases and sepd. into several fractions by distn. and the action of the various products on 4 of the ordinary varieties of wood fungus was examd. All the products obtained had a strong fungicidal action on *Polyporus vaporarius* and *Coniophora cerebella*, but the neutral oil boiling above 288° had little action on *Lenzites abietina* and *Fomes annosus*, although the remainder of the oil and a strong fungicidal action on these varieties.

B. C. A.

$(\text{NH}_4)_2\text{SO}_4$ [for use in making portland cement] (Brit. pat. 282,755) 18.

Dolomite cement. FREDERICK W. BROWN (one-half to Gideon R. Austin). U. S. 1,682,479, Aug. 28. Dolomite substantially free from iron and silica is rapidly heated to about 760° and further heated at a temp. up to about 870° for a time sufficient to calcine and hold the MgO content but insufficient to calcine the Ca content. The resultant product may be dyed in a water bath and may be used with MgCl_2 soln.

Rotary cement kiln. G. MARTIN. Brit. 282,868, Sept. 27, 1926. The output of a rotary cement kiln is increased by passing the gases through the kiln at greater than the usual speed. A speed of 30 ft. per sec. is preferably maintained in the clinking and decarbonating zones, and a speed of 22 ft. per sec. in the drying zone.

Laying and vibrating layers of concrete for pavements. FRANK W. SAMPSON. U. S. 1,682,687, Aug. 28. Mech. features.

Waterproof cementitious composition. JOHN D. CARTER. U. S. 1,681,570, Aug. 21. CaCO_3 is mixed with approx. an equal wt. of a Na silicate soln of 30-40° B ϕ in which the ratio of the Na_2O to the SiO_2 is about 1:2. The product may be used as a paint or mortar or for surfacing roadways, etc.

Glazing stone and similar surfaces. K. STOLL. Brit. 282,786, Dec. 29, 1926. Stone, artificial stone, pottery or the like are coated with urea-formaldehyde resin, preferably with another material such as a phenol-formaldehyde resin, with which pigments and other ingredients may also be admixed.

Casting artificial stone. FREDERIC M. EMERSON (to Emerson & Norris Co.) U. S. 1,681,727, Aug. 21. A sand mold is treated with irregularly arranged granular particles such as coloring material and cement to form a roughened surface corresponding to a revealed surface of artificial stone to be cast in the mold and the mold surface is spattered or sprayed with paraffin commingled with an oily fluid such as kerosene prior to casting a cementitious compn. in the mold.

Coating artificial stone slabs, etc., with glycerolphthalic anhydride resins and like compositions. L. E. BARRINGER (to British Thomson-Houston Co., Ltd.). Brit. 282,810, Dec. 29, 1926.

Imitation marble finish on hard surfaces. LLOYD V. CASTO (to Oxford Varnish Corp.). U. S. 1,682,067, Aug. 28. A ground coat is applied to the surface to be finished from a positive C resist of the marble surface and an etched printing surface prepd. from a positive C resist of the marble surface to be simulated is used to make transfers of different colors, each successive transfer being of a pigment of darker color than those used in the preceding transfers.

Road composition. SAMUEL S. SADTLER (to Amiesite Asphalt Co. of America). U. S. 1,683,493, Sept. 4. A mineral aggregate is mixed with a water-in-oil emulsion of a bitumen-liquefier such as heavy naphtha carrying lime, whiting or other mineral filler, and the aggregate is then coated with bitumen. Cf. C. A. 22, 2825.

Paving for tennis courts, etc. G. J. EILERS. Brit. 283,168, Jan. 6, 1927. A bottom layer of granulated blast-furnace slag carries an overlying layer of finer sifted similar slag which may be mixed with powd. red brick.

Wall-covering material formed of thin plywood veneer and paper. J. BRUNING & SOHN A.-G. Brit. 283,023, Feb. 25, 1927. Brit. 283,024 specifies thin plywood veneer coated with substances such as viscose or cellulose acetate and consolidated under the action of heat and high pressure.

Stabilized plaster composition. ALFRED H. GALLAGHER. U. S. 1,683,539, Sept. 4. A plaster of predetermined setting time is formed by adding to a gypsum plaster a nitrogenous org. retarder and a crystal-forming CaSO_4 accelerating material in suitable proportions.

Impregnating the wood of standing trees with dyes or other substances. HERBERT RENNER (to Chemicolor Wood Preserving Co.). U. S. 1,683,488, Sept. 4. Mech. features.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Fuel briquets in 1927. F. G. TRYON AND J. M. CORSE. U. S. Bur. Mines, *Mineral Resources of U. S.* 1927, Pt. II, 1-8 (preprint No. 1, published July 20, 1928). E. H.

The production of domestic fuel. VII. The Turner, Hurd and coalite processes. JOHN ROBERTS. *Gas J.* 183, 310 (1928); cf. C. A. 22, 3757; VIII. **The Homite (Roberts) process.** *Ibid.* 356-7. This process is new and is capable of yielding a free-burning smokeless fuel of about 4% volatile, suitable for either domestic or metallurgical use, in standard gas-works or coke-oven equipment. It consists in passing the charge through an intermittent vertical retort or coke-oven in less than the normal coking time. Adequate heat penetration is obtained by blending the coking coal with high-volatile non-coking coal which prevents the development of the plastic layer. It is not suitable for continuous verticals because the blends must pass a $1\frac{1}{2}$ in. mesh, and static conditions are necessary to avoid the formation of a large proportion of fines in the coke. F. S. GRANGER

Influence of preheating on the theoretical flame temperature of gaseous fuels. FRITZ SCHUSTER. Berlin Municipal Gasworks. *Gas u. Wasserfach* 71, 759-61 (1928). The most practical means of attaining high flame temps. is by preheating the gas and air with waste heat rather than by the use of O. Curves and tables are given for the theoretical flame temps. of H. and CO with the theoretical amt. and 20 and 40% excess air, with both gas and air preheated to temps. ranging from room temp. to 1000°. R. W. RYAN

The AEG pulverized fuel locomotive. W. KLEINOW. *Fuel in Science & Practice* 7, 345-63 (1928).—The development of a successful powd.-coal-fired locomotive by the AEG locomotive works (Germany) is described and illustrated. After 4 yrs. of exptl. work a locomotive, fired by a low-grade coal or lignite-pulverized, has been designed that will evap. 14.4 lb. per sq. ft. of heating surface per hr., with a boiler efficiency of 67.5% compared to 52% for grate firing. Under these conditions the coal saving is 23.0%. The fuel and air mixt. blown into the firebox contains only a part of the air required for combustion. The rest is obtained by the action of the blast. Two long water-cooled burners placed opposite to each other are used and these divide the fuel mixt. into small jets. These jets are deflected through an angle of 90° and impinge against one another in the middle of the firebox with a strong circular action. The rising flame meets the preheated secondary air under the brick arch and above the ashpan; only the side walls of the firebox absorb any heat from this space. The molten slag is solidified on contact with the crown of the firebox as the heated combustion gases change direction at the end of the arch. Coal is fed from the tender by means of 2 large screws and an auxiliary screw, the latter for use with no engine load. Advantages claimed for this type of locomotive over the ordinary type are: low fuel price, independence of fuel quality, more efficient burning, higher output over a long period, shorter heating-up period, greater flexibility in control, shorter time in cleaning, very little smoke and no sparks, less manual labor for the fireman. Successful road tests have been made. D. A. REYNOLDS

simple distn. Bergius cracking executed directly on tars does not reduce the S contents of the oils. The *desulfurizing action of H and FeS₂* is appreciable only when it takes place at the moment the oils are formed, i. e., during the pyrogenic decompn. of the mols. originally present in the coal. C. C. DAVIS

A study of spontaneous combustion in storage coal. A. J. HOSKIN. *Purdue Univ. Expt. Sta., Bull.* 30, 61 pp. (1928) H. G.

The selection of a washing system for coals difficult to handle, with particular regard to the dressing of fine coal. J. HOLIK. *Montan. Rundschau* 20, 461-72 (1928). H. discusses the theory and relative advantages and disadvantages of washing coal by settling app. and by rhéolaveurs. The latter are rectilinear troughs in which the raw coal is submitted to the action of a horizontal current of water with the systematic and progressive extn. of the heavy particles deposited on the bottom of the trough. The method of arriving at a choice of a system for washing coal is illustrated by a sp. example. Conclusion. For washing fine coal the rhéolaveurs are superior to settling app. D. GORDON

A study of the action of coal on a photographic plate in the dark. G. S. HASLAM. *Sheffield Univ. Fuel in Science & Practice* 7, 253-7 (1928).—The works of previous investigators are reviewed. Expts. with both sand and powd. coal, dry and moist, show that moisture is necessary to obtain positive action upon a photographic plate in the dark. This effect is not modified by previous exposure of the coal to the sun or artificial light. "Contact" photographs are produced if blocks of coal are placed upon a film only in case O is present in the surrounding atm.; the minute detail disclosed by these photographs is due to the differences existing among the different parts of the coal in their readiness to absorb O. It is suggested that this action upon the film is due to some oxidizing compd. probably ozone, generated from the O absorbed by the coal. D. A. REYNOLDS

The use of graphical methods in the control of a coke-oven plant. G. W. J. BRADLEY. *Redbourn Works, Scunthorpe, Lives. Fuel in Science & Practice* 7, 258-67 (1928).—It is shown how graphical methods may be applied to: (a) control of a crude benzene plant, (b) cost estn., (c) calibration of storage tanks for stock-taking. D. A. REYNOLDS

Practice and progress in combustion of coal as applied to steam generation. F. H. ROSENCRANTS. *Fuel in Science & Practice* 7, 272-81 (1928). D. A. REYNOLDS

Notes on recent developments in fuel technology. R. WIGGINTON. *Fuel in Science & Practice* 7, 241-4, 287-9, 333-5 (1928).—Brief reviews on the following subjects: stability of benzene obtained from coal gas, Bergius process, steam wells of California, removal of O from feed water, water softening with Ba salts, producer gas vehicles; a rocket-propelled car, sea-temp. energy; dynamics of rockets, lignin constitution, flue dust recovery, high-pressure locomotive. D. A. REYNOLDS

Production and use of high-pressure steam by the Benson process. H. RABE. *Naturwissenschaften* 16, 565-71 (1928).—The Benson boiler, employing a water-tube system without drums, working pressure higher than the critical water pressure (225.2 atm. abs., 374°) and fed by a high-pressure pump gives off steam through a pressure-regulating throttle. An exptl. boiler built by the Siemens Schuckert works of 224 atm. (throttles to 100 atm.), 10,000 kg. steam per hr. production is described. The seamless steel tubes were of 20 by 33 mm.; the steam was used for a 1000 kw. turbo-generator. A second boiler of 30,000 kg. capacity was built for 225.2 atm. abs. or *ignore* superheated to 420° (practical limit). The steam was throttled to 180 atm., again superheated to 420° and expanded in a turbine to 35 atm., reheated to 400° and expanded to 6.5 atm., the latter being used for heating purposes. The boiler was fired with pulverized coal (air preheated to 400°); a schematic drawing is given; the turbine was geared to a 2600 kw., 6000 r. p. m. generator. For easily regulable firing like oil, pulverized coal or gas the boiler regulation can be made without accumulator; the latter, however, makes for better elasticity. The cost of a Benson installation is about the same as that of a 35 atm. boiler aggregate; the saving comes in through the heat consumption. For a Benson of 180 atm. active pressure at 440° as compared with an ordinary boiler of 25 atm. and 400° both working on vacuum of 95% the yield from 1 kg. steam in the former is 0.336 kw., in the latter 0.244 kw. Including the addnl. work of the feed pump the figures are 0.325 and 0.243. The heat requirements for 1 kw. hr. are for a Benson 2510 Cal. (efficiency 34.2%) for the 25 atm. boiler 3060 Cal. (28.1%), a saving of 22%. The absence of explosion hazards (negligible amt. of water in the boiler) is pointed out and was confirmed by practice. Bursting of a tube by stoppage merely caused a pressure drop and slight pop. B. J. C. v. d. H.

Spontaneous ignition of coal. D. J. W. KATULIN. *Brennstoff-Chem.* 8, 340-3

(1927).—Expts. are reported wherein 50 mesh coal, dried at 100°, is heated at 175° in air for 2 hrs. and then extd. for humic acids formed with 5% NaOH. Humic acids formed were higher the higher the volatile matter of the coals, except in the case of Plessey and Yard (English) coals wherein the humic acids were 168 and 58 mgs., resp. Both coals contd. 37% volatile matter. It is concluded, however, that the former coal ignites much more readily than the latter. The overall rule seems to hold that the higher the yield of humic acids from a coal, the more sensitive it is to the spontaneous ignition.

How to store coal with minimum fire hazard. J. D. DAVIS, Purdue Univ. *Power* 68, 344 (1928).—Practical suggestions are given. D. B. DILL.

Operating and test results with unusual furnace. GUY B. RAYBALL. *Power* 68, 346 (1928).—A Stirling boiler with a novel A type over feed stoker was converted into a pulverized coal plant under special conditions. D. B. DILL.

The coal dust engine. R. FAYOLLE. *Power* 68, 356 (1928).—An illustrated description of an engine in use in Germany, Germany, and 1910. It has been operated with nearly all grades of German anthracite and bituminous coals, and has been operated with flour and coke. It develops 110 brake hp. Fuel and combustion air are compressed simultaneously but kept separate until combustion occurs. D. B. DILL.

Efficiency of 89 percent with Calumet powdered coal burner. A. D. BATTERY AND W. H. JENSEN. *Power* 68, 224 (1928).—The installation has 5940 sq. ft. of surface and has double the capacity of a 15,000 sq. ft. stoker fired boiler in the same plant. The former occupies 50% more space and has 50% the furnace maintenance cost. Of the ash passing to the stack, 90% is eliminated by a gas washer. D. B. DILL.

Burning oat hulls and refuse in powdered coal furnaces. C. J. HERBECK. *Power* 68, 312 (1928).—An illustrated account. D. B. DILL.

Closing mechanism for the charging hopper of central producers. J. BUTIS. *Helv. Gas* 48, 331 (1928).—An annular watersal with vent is advocated. B. J. C. VAN DER HOEVEN.

Motor gasoline substitute from domestic raw materials. FRIGYES KONK. *Matematik. Természettudományi Értesítő* 41, 9 (1928).—By a contact dehydration process K. has produced a mixt. of isomeric hydrocarbons from fuel oil A 20:40 mixt. of these hydrocarbons with C_2H_6 and CH_3OH is a satisfactory motor fuel. The C_2H_6 does not freeze out at -10° to -15° . The mixt. has a low flash point. J. S. RECHER.

Uniform composition of manufactured gas. C. I. PHILIPS. *Helv. Gas* 48, 238 (1928).—For const. delivery of equal amts. of heat from gas fired app. the Bunte factor (caloric value) $\times d$, has to be kept const. This could easily be accomplished by using a (Junkers type) recording calorimeter, run on gas of const. pressure (not quantity) and const. water flow. For const. caloric value deficiencies in the quotient can be made up by varying the gas pressure proportionally with d . A pressure regulator of the Bamag-Dalem type would with certain changes suit this purpose. The lower caloric value has to be considered for this purpose. B. J. C. VAN DER HOEVEN.

Gas calorimetry. J. S. G. THOMAS. *Chemistry and Industry* 47, 829 (1928).—The basis of all charges for gas in England is the product of the total vol. of gas supplied and the declared caloric value of the gas. This caloric value is defined as the B.t.u. produced by the combustion of 1 cu. ft. of gas measured at 60° F. and 30 in. of Hg and satd. with water vapor. Penalties are inflicted if, for any consecutive 2 hrs., the caloric value is more than 6% below the declared value or if, in any quarter, the av. caloric value is less than the declared value. The gas referees of England are required to prescribe, in any necessary case, a calorimeter which will give a continuous record of the caloric value of the gas supplied. Up to the present time, they have not prescribed any form of recording gas calorimeter but have advocated "snap-testing" of the gas supply, supplemented in isolated cases by a recording calorimeter. In any successful recording calorimeter, the following variables—temp., pressure and sp. gr. of the gas supply, the temp. and infallibility of positive water flow, etc., are difficulties which must be overcome. Much success in overcoming these difficulties is met in at least 4 commercially available forms of gas calorimeters: (1) Simmance, in which it is attempted to maintain the rates of flow of the water and gas const.; (2) Fairweather, in which no attempt is actually made to correct the gas rate for varying temps. and pressures; (3) Boys, in which the gas and water flow at fixed and unalterable rates; and (4) Thomas, in which air instead of water is used as the calorimetric fluid. The Fuel Research Board reports that the Thomas type of calorimeter will record the

calorific value of a gas (of steady calorific value of 500-600 B.t.u.) correct to ± 1 B.t.u. T. recommends that all such types of calorimeter be tested for the completeness of combustion of the gas in the calorimeter. None of the recorders or indicators at present used with the above 4 calorimeters is exactly what is necessary. J. H. P.

Dry coal gas purification. J. W. MEUSER. *Het Gas* 48, 233-51 (1928).—An extensive review of chemistry (H_2S and CN absorption, regeneration, CNS formation, etc.) and practice (air or steam addn., switching systems, gasflow in boxes) of the dry purification process. The use of active C for formation of free S is also discussed. Forty references are given.

B. J. C. VAN DER HOEVEN

Dehydration of gas. J. C. MEUWISSEN. *Het Gas* 48, 291-5 (1928).—A review of different processes for dehydration of gas with cost data. For the compression method the cost is from 20¢ to \$1.60 per 1000 cu. m., for dehydration with H_2SO_4 from 34 to 18¢, with $CaCl_2$ 16.4¢ (Taunton) or 8.0¢ (Portsmouth), with glycerol 11.2¢ (Nottingham). No data for cooling or silica gel dehydration are available.

B. J. C. V. D. H.

Equilibrium conditions in the formation of hydrocarbons and alcohols from water gas. H. TROPSCH. *Brennstoff-Chem.* 8, 376 (1927).—Smith states (*C. A.* 21, 2783) that equil. calcs. show that, as the temp. is increased, formation of higher rather than lower hydrocarbons is favored, whereas exptl. work of T. shows that high temps. favor formation of CH_4 . Smith also finds that increased pressure favors production of higher paraffins. This agrees with exptl. results of T. except that oxygenated compds. are formed at temps. high enough to drive from the catalyst the higher hydrocarbons which have been formed.

J. D. DAVIS

Alternative methods of blue gas enrichment. R. V. KLEINSCHMIDT. Arthur D. Little, Inc., Cambridge, Mass. *Ind. Eng. Chem.* 20, 909-12 (1928).—Three-fourths of the gas oil employed for enrichment of water gas in this country is used on the north Atlantic seacoast, it must be possible to deliver a competing material in New York and surrounding markets. Coal gas can be so used, especially if there be a plant of considerable magnitude close to a market which can absorb coke, tar and NH_3 as required. Natural gas is available in enormous quantities in certain parts of the country and better pipe line facilities will spread its use to other sections, but on the whole its sources are too far from the main markets to make it important as a competitor of gas oil. Refinery gases, on the contrary, are often available in the gas oil consuming territories, and may be looked upon as logical substitutes for oil in blue gas enrichment. Refineries located in the oil fields can produce C_2H_4 and C_3H_8 by stripping methods and ship these in liquid form to more distant gas plants. The availability of catalytic condensation processes depends upon their commercial development, and will be stimulated by a pronounced rise in the cost of hydrocarbons. Equipment required for the utilization of the enriching materials considered is of great simplicity. Another advantage of all the new methods noted, as compared with gas oil, is that the enriching material may be freed from S before being mixed with water gas, thereby increasing the efficiency of purification. The advantages of using gaseous hydrocarbons are so great one ought to consider the possibility of operating a small oil refinery primarily for the purpose of producing enrichment gases, the secondary products being motor fuel and tars. Tables and a series of curves give the relative values of enriching materials under assumed conditions. Proper cooperation between oil refineries and gas works would be of benefit both to the oil refineries and to the gas works. W. C. E.

Inflammability of automobile exhaust gas. G. W. JONES. Pittsburgh Expt. Sta., U. S. Bur. of Mines. *Ind. Eng. Chem.* 20, 901-3 (1928).—Applying the law of mixts. to the inflammability of gases, with a generalized form of LeChatelier's equation, viz.,

$$L = \frac{100}{(P_1/N_1) + (P_2/N_2) + (P_3/N_3) \dots}$$

in which P_1 , P_2 and P_3 are the percentages of each combustible gas present in the original mixt. (free from air and inert gases), so that $P_1 + P_2 + P_3 \dots = 100$, and N_1 , N_2 and N_3 are the limits for air in each combustible gas separately, it has been found that results have checked fairly closely, when a large number of mixts. contg. various proportions of H , CO , CH_4 , N and CO_2 have been prep'd., and then the limits of inflammability calcd. and detd. experimentally. Similarly mixts. representing mine-fire gases, detonation gas from explosives, gases after mine explosions, and blast furnace gases have been tested. Calcd. values may vary from the actual limits by 0 to 2.5%. Tables and graphs giving necessary data on compn. and inflammability of gas mixts., with illustrations of their use, are presented. In view of the fact that automobile exhaust gases have inflammable limits under certain

conditions, care should be taken when using these gases for killing animals or for other similar purposes; otherwise accidents may result from the presence of sparks, arcs or flames.

The influence of external heating on the rate of flame propagation in gases. K. BUNTE AND A. STEDING. *Gas Inst. Gas u. Wasserfach* **71**, 673-7, 701-5, 731-4 (1928).—Measurements of the rate of flame propagation for H_2 , CO , CH_4 and mixed gases were made by the method of Ubbelohde and de Castro (*C. A.* **5**, 3726) in which the height of the inner cone of a Bunsen burner was measured and the area of the cone computed. The rate of flame propagation is then equal to the rate at which the gas and air reach the surface of the inner cone. A special burner was constructed, cooled to eliminate preheating of the gas or air and this was inserted into an elec. furnace. Gas and air rates were measured by capillary flow-meters. A trace of CS_2 was added to pure H_2 so as to make the inner cone of the flame visible and the effect of this on the rate of flame propagation was found to be negligible. CO and CH_4 were purified to remove H and heavier hydrocarbons. The rate of flame propagation was detd. for mixts. of the various gases with air at temps. from 20° to 1000° , and these data are given in tables and curves. External heating had a comparatively large effect on the rate of flame propagation in H -air mixts., but little with CO and methane showed a slight decrease on heating. Water gas contg. about 50% H_2 showed a marked increase in rate of flame propagation on heating but the addn. of H_2 to coal gas to a total content of 36 to 40% H_2 influenced the rate only slightly. The large effect with H is probably due to its high thermal cond. as compared to that of the other gases. R. W. R.

Corrosion in gas technic. C. G. DRIESSEN. *Het Gas* **48**, 271-80 (1928).—A review of corrosion theories. It is concluded that dehydration of gas will completely prevent corrosion; and decrease of O_2 and CO_2 of the gas will materially help to reduce corrosion. A table is given of the soly. of O_2 in distd. water and in gas main condensate from 0° to 100° . In mg. per l. it runs from 14.56 and 14.10 at 0° to 5.47 and 5.31 at 50° , zero at 100° . Salt concn. of the condensate has an increasing corrosive effect with a max.; NH_4Cl , $(NH_4)_2SO_4$ and $FeSO_4$ all present in the condensate are strongly corrosive. The max. attack is shown by an approx. normal soln. By coating expts. with agar- $K_3Fe(CN)_6$ -phenolphthalein (ferroxy reagent) the presence of local elements on Fe surfaces can be shown by blue or red coloration. The occurrence of this important factor for the corrosion was found in decreasing order on cast iron, wrought iron, steel, stainless steel, Monel metal, the last one being altogether free. It is suggested that the ferroxy reaction be used for regular testing of material. Numerous references are given. B. J. C. VAN DER HOEVEN

Gas regulators and safety appliances. SCHUMACHER. *Gas u. Wasserfach* **71**, 697-701 (1928).—A discussion, with illustrations, of modern European and American gas regulators and safety features of various gas-using equipment. Also in *Z. osterr. Ver. Gas Wasserfach* **68**, 159-67 (1928). R. W. RYAN

Examination of benzene wash oils. J. C. MEUWISSEN AND D. THOENES. *Het Gas* **48**, 260-9 (1928).—Four liquids were examd. for their qualities as benzene wash oil: fresh wash oil (d. 0.982, 90.4% between 200° and 300°), used wash oil, coal-tar distillate and tetralin. The washing power was detd. according to Petit (*C. A.* **20**, 981) by burning a known amt. of air, satd. with benzene vapor over the satd. wash oil, in a Drehschmidt capillary and detg. the vol. contraction of the combustion products collected over KOH . Every percent benzene in the air gives a $8\frac{1}{2}\%$ contraction. A second method, employing wash bottles with benzene and wash oil in series and detn. of benzene absorbed by weight, was found less satisfactory. The Petit method gave a vol. contraction proportional to the benzene content of the wash oil for benzene concns. up to 8%. From tabulated data of benzene nos. (contractions observed corrected to 15° and calcd. for 3% benzene in the wash oil) great similarity appears between the absorption qualities of the coal-tar fraction between 200° and 300° and the fresh wash oil, indicating the probable suitability of the former (gas-works product). Also redistd. wash oil appears quite suitable. The highest-boiling coal-tar fractions are best; tetralin is good and paraffin oil is inferior. B. J. C. VAN DER HOEVEN

Low-temperature tar oil as a Diesel engine fuel. YOSHISADA BAN AND TETSURO SUWA. *The Imperial Fuel Research Institute, Japan. J. Fuel Soc. (Japan)* **7**, 598-606 (In English 57-60) (1928).—The authors have examd. several low-temp. tar oils produced at the Institute as a fuel for 33 b. h. p. Diesel engine, that is, a single-cylinder four-cycle vertical type Niigata engine, with cylinder dimensions 280 X 416 mm., and had a rating of 33 b. h. p., at 230 r. p. m. The results of the test are illustrated by means of a graph, and it is shown that such oil like pitch and acid-free oil can fulfil any Diesel oil specification. The test was also made to ascertain how low-

temp. tar should be treated to prep. it as a Diesel oil. The results are illustrated and the authors claim that low temp. tar should be freed both from tar acids and solid paraffin. The chem. and phys. properties of these oils, crude tars and Diesel oil used in the test are tabulated.

F. I. NAKAMURA

Hydrogenation of neutral oil of low-temperature tar. SABURO TASHIRO. The Imperial Fuel Research Inst., Japan. *J. Fuel Soc. (Japan)* 7, 626-35 (In English 67-70) (1928).—The sample used was the middle fraction of neutral oil of low-temp. tar from Fushun coals, and had the following properties. $d_{20} = 0.9245$, $n_D^{20} = 1.2240$, and I value = (Hubble) 60.9. A 250-atm. autoclave of 600-cc. capacity was suspended horizontally, heated with an elec. heater fitted around the autoclave, and shaken horizontally. One hundred cc. of oil was taken and H was pressed into the autoclave at the proper pressure. After the current was passed on, shaking of the autoclave began. When the temp. reached a definite point, it was kept there for a definite period and then cooled. The temp. and pressure were recorded every 2 min., in order to exam. the nature of the reaction, and 3 curves were obtained, namely, temp.-pressure, temp.-time and pressure-time. The effect of pressure, effect of temp. and effect of catalyzer are discussed and the results are tabulated. Summary: The neutral oil of low-temp. tar can be hydrogenated by direct hydrogenation with H₂ under high temp. and pressure, but cannot be satd. completely. The hydrogenation reaction is the most active just below the reaction temp., and above that decompn. takes place. Seventy-five atm. of the initial pressure is the lowest limit for hydrogenation, and an increase of the initial pressure makes the hydrogenation profitable. Hydrogenation proceeds below the reaction temp., while above that decompn. takes place. NiO has a remarkable effect in aiding hydrogenation, and if added sufficiently, the oil can be satd. Fe₂O₃ is weaker than that of NiO. CuO and MgO have little effect. ZnO has an effect in decreasing the I value without changing other properties. Al₂O₃ seems to give no effect but rather accelerates decompn.

F. I. NAKAMURA

Hydrocarbons in higher fraction of low-temperature tar. KOSABURO KURIHARA. Imperial Fuel Research Inst., Japan. *J. Fuel Soc. (Japan)* 7, 607-14 (In English 61-2) (1928).

F. I. NAKAMURA

A modern coke-oven plant. ANON. *Engineer* 146, 169-72, 191-5 (1928). The plant of the South Yorkshire Chem. Works, Ltd., Parkgate, near Rotherham is described with layout, flow-sheet and illustrations. The plant is largely modeled on American practice.

D. B. DILL

Spent gas liquor in relation to sewage disposal (HOOPER) 14. Internal corrosion of fuel economizers (INGHAM) 14. Grinding and separating apparatus for coal (Fr. pat. 635,083) 1.

LOUIS, HENRY: **The Preparation of Coal for the Market.** London: Methuen & Co., Ltd. 217 pp. Cloth, 10s. 6d. Reviewed in *Mining and Met.* 9, 421 (1928); *Chemistry & Industry* 47, 778.

Fuel. HERBERT E. WETHERBEE (one-third each to Richard F. Grant and Howard M. Hanna). U. S. 1,683,061, Sept. 4. A mass of moistened small anthracite or like material is treated with a suitable filming oil to displace the water and drying is then effected to insure adherent action of the oil.

Preparing fuel containing moisture and hydrocarbons. HENRY F. MAUREL. U. S. 1,682,680, Aug. 28. In treating fuel such as low-grade de-ashed hard coal for baking and hardening it, oil vapor and steam produced from the fuel are driven, together with air or O₂, under the fuel and through the body of the latter and over means for heating the vapors to render them suitable for treating the solid fuel. An app. is described.

Fuel for internal-combustion engines. EARL C. HENNEN (to United States Nitro Co.). U. S. 1,682,561, Aug. 28. A hydrocarbon fuel such as gasoline 500 gal. is mixed with a high heat test lubricating oil 34 oz., castor oil 17 oz., C₂H₆ 65 oz. and p-nitrochlorobenzene 12 oz.

Fuel briquets. GEORGE F. SHERHAN. U. S. 1,682,195, Aug. 28. Briquets are formed of coal 90, crude oil 2, S 2 and a suitable binder such as asphalt, tar, pitch or gilsonite 6%.

Briquetting fuels. E. W. BOWEN. Brit. 282,800, Sept. 30, 1926. See U. S. 1,667,304 (C. A. 22, 2048).

Briquetting fuel with molasses as a binder. PAUL C. MULLIGAN (in part to Luther J. Hull and Isaac M. Foster). U. S. 1,683,094, Sept. 1. After heating the base material such as coal and wood charcoal it is mixed with molasses and heating of the mixt is continued to drive off water contained in the molasses but at a temp. below that which would drive off volatiles from the fuel. The mixt. is then cooled to a briquetting consistency, pressed and baked to carbonize the binder. An app. is described.

Apparatus for drying and baking briquets. L. NYAET. Brit. 283,123, Jan. 3, 1927.

Distilling fuel in a rotating drum or retort. E. POSER. Brit. 283,420, June 20, 1927. Fuel is distd. in chambers in a rotating drum or retort, and is compressed after it softens during distn. by a plunger which enters each chamber in turn during a period of rest of the drum. Various details of construction of the app. are specified.

Low-temperature distillation of carbonizable solid fuels. EDMOND G. WEEKS (one-half to Merz & McLeelland). U. S. 1,683,450, Aug. 21. In order to effect low-temp. distn. of solid fuels such as coal for recovery of highly volatile oils and partial carbonization of the remaining fuel without gumming, the material is partially carbonized by passing steam and atm. air in regulated quantities to an enclosed body of the fuel, one of these components being preheated to a temp. such that the temp. of the mixt. of steam and air while being mixed is at least as high as the temp. of ignition of the fuel, so that a portion of the fuel is ignited, the quantity of atm. air admitted is limited to that necessary for combustion of a small proportion only of the fuel. An app. is described.

Distilling coal and similar materials. CARLSHUTTE A.-G. IUR. EISENGIESSEREI UND MASCHINENBAU. Brit. 283,250, Oct. 2, 1926. In drying and distg. coal and cooling the coke residue, an app. is used (which is described) in which gases are passed transversely through the material in a cyclic manner, the heating gases are reheated before each passage through the charge.

Hydrogenation of coal. A. UHLMANN. Brit. 283,177, Jan. 6, 1927. Hydrocarbons are obtained by passing a pulp composed of fine coal and water through a high-frequency field. Ice may be mixed with the water or the app. may be surrounded with a refrigerant. H may be supplied but is not required as the H may be derived from the H_2O . An app. is described.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 282,814, Aug. 14, 1925. The process described in Brit. 256,964 (Cl. A. 21, 3122) is applied to the destructive hydrogenation of liquid carbonaceous materials such as oils, tars, resins, asphalts and their conversion products. Brown coal producer tar contg. 30% by wt. of crude brown coal may be fed continuously into a high-pressure vessel coated with Mn bronze and treated with H under a pressure of 200 atm. at 450°. The products are cooled by heat interchange with the H and a thin liquid product contg. 25% of "benzines" is produced. Before being cooled, the products also may be passed through a second vessel contg. a catalyst such as Mo. Cl. A. 22, 3763.

Transformation of coal, tars, mineral oils, etc. I. G. FARBENIND. A.-G. Fr. 634,822, May 21, 1927. In the manuf. of hydrocarbons of low b. p. from coal, etc., the starting materials are first treated with disintegration catalysts and then with hydrogenation catalysts. As disintegration catalysts, elements of the 3rd and 4th groups of the periodic system, mixts. of Cu and Fe, activated C, active SiO_2 , hydrosilicates and Al_2O_3 are mentioned, and as hydrogenation catalysts, Mo, W or their compds.

Transformation of coal, tars, mineral oils, etc. I. G. FARBENIND. A.-G. Fr. 634,821, May 21, 1927. In the transformation of coal, etc., into hydrocarbons of low b. p. with H or gases yielding it, the gases remaining after condensation of the liquid products are washed with benzine or the low-boiling hydrocarbons obtained in the process itself, to remove gaseous hydrocarbons.

Transformation of coal, tars and mineral oils into products of greater value. I. G. FARBENIND. A.-G. Fr. 634,820, May 21, 1927. Hydrocarbons of low b. p. are obtained by submitting suspensions of coal, tars, mineral oils or their distn. products, being, for the main part, in the liquid state, to a heat treatment under pressure in the presence of catalysts, and leading the products formed, in the state of vapor and preferably superheated, over catalysts. This procedure allows a lower temp. to be used for the first operation. Indifferent gases or gases taking part in the reaction or their mixts. may be added, such as H, steam, CO_2 , CO, N or gases such as NH_3 , which have a catalytic action.

Oils and coke from coal, etc. H. NOVAK and A. BROD. Brit. 283,269, Oct. 5, 1928. Coal, brown coal or the like is heated in admixt. with an aromatic hydrocarbon liquid b. above 230° (suitably 1,6 dimethylnaphthalene or other alkyl naphthalene,

anthracene oil or liquid fractions of coal tar) under 25-30 atm. pressure in an autoclave connected with a reflux pipe and a condenser. The temp. is gradually raised to 500°. Benzine distils over followed by the aromatic liquid which is used again. The residue is subjected to dry distn. and yields a distillate of tar rich in aliphatic compds. and a residue of semi-coke.

Separating coal from other materials by use of a calcium chloride solution or similar agent for gravity separation. R. LESSING. Brit. 282,874, Sept. 27, 1926. An app. is described.

Retort and pipe system, etc., for distilling coal and tar. S. P. MÜLLER (to Barrett Co.). Brit. 282,826, Dec. 31, 1926.

Retort furnace adapted for carbonizing coal. CHARLES V. MCINTIRE (to Consolidation Coal Products Co.). U. S. 1,681,946, Aug. 28. A horizontally disposed retort comprises a bottom part of fire brick or other suitable refractory material having a trough-shaped upper surface with transverse grooves formed therein and a metallic lining of inverted trough-shaped sections in and over the grooves so as to form a passage or flue for heating gases.

Furnaces using powdered fuel. JAMES JOHN CANTLEY BRAND and BRYAN LAING. Fr. 634,916, May 24, 1927. To facilitate the flow of powd. carbonaceous material to furnaces, air or flue gas is forced into the material. A powd. coke is the preferred form of fuel used.

Charging and discharging gas retorts, etc. C. EITLE, MASCHINENFABRIK. Fr. 634,855, May 23, 1927. The ejector for gas retorts or horizontal or inclined distn. chambers is hollow and forms the mouthpiece of the charging app., which may be a centrifuge.

Gas burner. SAMUEL E. DIESCHER. U. S. 1,683,128, Sept. 4.

Gas holder. JOHN H. WIGGINS. U. S. 1,683,005, Sept. 4. Structural features.

Apparatus for washing producer gas. E. WARNANT. Brit. 282,851, Sept. 2, 1926. Gas is passed through columns filled with coke or metal turnings and treated with water. The device is suitable for use on motor vehicles.

Water gas. CLAUDE W. BOTSFORD (to William W. Odell). U. S. 1,682,264, Aug. 28. In making water gas from solid fuel in a single generator, an ignited fuel bed is first air-blasted alternately up and down from about midway the ends of the bed; the air blast is then shut off and a straight up-stream run is made with introduction of steam from beneath the fuel bed, the finished gas is removed from above the fuel bed. An app. is described.

Combined water-gas generator and gas producer. CLAUDE W. BOTSFORD (to Wm. W. Odell). U. S. 1,683,155, Sept. 4.

Oil-spray purge mechanism for water-gas apparatus. FRED B. HAYES (to Western Gas Construction Co.). U. S. 1,682,277, Aug. 28.

Apparatus for feeding coke to water-gas generators, etc. POWERGAS CORP., LTD., AND N. E. RAMBUSH. Brit. 283,238, Aug. 4, 1926.

Apparatus for quenching and conveying hot coke. SOUTH METROPOLITAN GAS CO. AND C. H. SMITH. Brit. 282,861, Sept. 24, 1926.

Tapering vertical coke-oven construction. J. VAN ACKEREN (to Koppers Co.). Brit. 283,191, Jan. 8, 1927.

Hydrogen from coke furnaces. RUDOLF BATTIG. Fr. 634,711, May 19, 1927. The gases from coking coal or other carboniferous materials are fractionated, and the CH_4 fraction is passed through coke at a temp. of about 1000° to produce fresh quantities of H_2 ; the coking furnace itself may be used for this purpose.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

F. M. ROGERS

The petroleum industry in America. BENJAMIN T. BROOKS. *J. Soc. Chem. Ind.* 47, 225-30T(1928). E. H.

Technical problems and advances in the petroleum industry. J. C. MORRELL. *J. Western Soc. Eng.* 33, 335-46(1928). E. H.

The modern petroleum synthesis. EDUARDO VITORIA. *Mem. acad. cienc. arts Barcelona* 20, 439-57(1927).—Cu as cuttings and as powder, and a Ni catalyst were used. For raw material the fraction of vaseline and paraffin oil was used which passed between 221° and 261° at 76 mm. pressure, $d_{44} = 0.870$; $n_D = 1.4698$. Heating this oil

for 2-5½ hrs. at 280-290° produced 2 new fractions, a higher and a lower one, the latter distg. between 172 and 221°, at about 67 mm. pressure, representing 61-80.6% of the original material, $d_{40} = 0.858-0.8700$. Passing acetylene does not have any pronounced effect. The catalyst showed no signs of poisoning on repeated use. The authors believe that this improved method of low-temp. cracking might find industrial application in the future.

Alumina gel as a desulfurizing agent in petroleum refining. R. D. BUMBACHER AND R. C. BAGCHI. *J. Indian Chem. Soc.* 5, 111-25 (1928).— Al_2O_3 gel (water content 6%), activated under optimum conditions by the ignition of $Al(OH)_3$ at 350-400°, absorbs a large number of S compds. form their solns. in petroleum, and more especially those in which the S is contained in an oxidized form. Thus a preliminary oxidation of solns. of bivalent S compds. by the passage of air in the presence of Al_2O_3 gel leads to more complete adsorption (cf. G. P. 405,850). Adsorption is also increased by the use of large amts. of very finely divided Al_2O_3 gel, but these modifications involve loss of petroleum and difficulties of filtration. Admixture of activated C with the gel yields an adsorbent which is more efficient than either of its components. More pronounced results are obtained by the use of a mixt. of Al_2O_3 and silica gels, prepd. by the pptn. of Al_2O_3 gel on silica gel followed by ignition at 230-235°. No increase in activity is obtained by the pptn. of the Al_2O_3 on an inert surface such as powdered glass or pumice. Al_2O_3 gel may be reactivated by treatment with superheated steam and air. The application of Freundlich's equation in the examples in which the pure gel is used show that the action is one of true adsorption.

Determination of halogens in water from petroleum beds. P. PETRESCU. *Bucarest Geol. Inst. Bul. soc. chim. Roumanie* 10, 26-8 (1928).—Detn. of I is difficult as it is reabsorbed as soon as liberated because of org. matter. A satisfactory method is based on this reaction: $H_2O_2 + 2HI \rightarrow I_2 + 2H_2O$. The sample is acidified with 0.5 cc. dil. HCl and treated with 1 to 3 drops of perhydrol or 1.5 cc. of H_2O_2 . Agitate strongly with CS_2 several times during 30 min. and titrate with $Na_2S_2O_3$. Concording figures are obtained even 48 hrs. after liberation of I. Br is not liberated by this method.

Notes on tar from Russian oil shale. G. I. STADNIKOV AND A. E. WEIZMANN. *Brennstoff-Chem.* 8, 343-5 (1927).—A Kaschper (Volga) oil shale contg. 3.8% S is distd. in a Fischer rotary rectort both with and without circulation of CO_2 during distn. The yields of tar were 11.1 and 15.0%, resp. The light oils were treated with Petrov's reagent (CH_2O and naphthasulfonic acid) to remove acidic S compds. After distg. the remaining oil with steam, washing with dil. H_2SO_4 and NaOH and boiling over metallic Na, the fractions, b. 105-220°, were investigated for thiophene and its derivs. Analyses of derivs. formed by acetylation in the presence of $SnCl_4$ indicated the presence of ethylthiophene and propylthiophene or one of its isomerides. J. D. DAVIS.

Crude oil in Kamchatka (Bogachevskii district). S. S. NAMETKIN. *Moscow. Neftyanoye Khozyaistvo* 14, 650-1 (1928).—Sample of oil taken from the right bank of the river Bogachevka gave the following analysis: sp. gr. at 15° 0.849, viscosity Engler, 1.17, flash (Abel-Penskii) 32.5°, excise resins 1.2%, S 0.05%. It represents a high-grade kerosene and gasoline crude oil.

Distillation in a flow of nitrogen gas. A. ZAKHARENKO. *Azerbejdj. Neftyanoye Khoz.* 1928, No. 6-7, 68-72.—A mazout from Baku crude which had the following characteristics was distd. in a flow of N, sp. gr. 0.9119, viscosity E_{60} 6.5, flash (Martens-Penskii) 127°, flash (Brenken) 147°, cold test below -17°, excise resins 22%. Air was entirely excluded during the distn. and the N was recirculated through the system. Four fractions were sepd., the residue being 34%. The third fraction (40-60%) was of a superior color after acid and caustic treatment, the color scale compared 26 mm. against 15 mm. for steam-distd. oil. The acidity was also lower and compared 0.040% against 0.11%. No difference could be observed in other qualities.

"Voltol" oils, their preparation and uses. HORST BRÜCKNER. *Chem.-Ztg.* 52, 637-8 (1928).—Technically the "Voltol-izing" of an oil is effected by exposing it to a discharge of 4500-4600 volts, single phase, 470-480 cycle current, in an atm. of H_2 at reduced pressure, and at a temp. of 60-80°, the temp. being maintained from the discharge itself. Similar reactions are effected with oils of mineral, vegetable and animal origins. The lubricant formed is well adapted to Diesel engines, airplanes and automobiles as it retains its viscosity at high temps. For lubricating greases it forms a permanent emulsion. The detn. of viscosity by the viscometer of Ubbelohde, Duffing and Vogel is recommended, rather than the usual Engler test. W. C. EBAUGH.

Maikop oils. A. N. SAKHIANOV AND M. A. BESRUZHEV. *Neftyanoye Khozyaistvo* 12, 402-6 (1927).—Four crude oils from the Maikop district are described. They are

entirely different from other Maikop oils. (1) *The heavy crude oil from Shirvanui*: sp. gr. 0.935, E_{20} 6, cold test below -18° , paraffin wax 0.31%, excise resins 25%, neutral resins extd. with silica gel 10.7%, asphaltenes 0.84%, sp. gr. of asphaltenes 1.12, sp. gr. of resins 1.05, S 0.30%, gasoline 0%, kerosene (200-270°) 10%. Mazout: sp. gr. 0.945-0.949, E_{20} 12 $\frac{1}{2}$, flash (Brenken) 158°, cold test below -18° . (2) *Light crude oil from Shirvanui*: sp. gr. 0.830, cold test below -20° , excise resins 12-14%, asphaltenes 0.33%, silica-gel-extd. resins 6.51%, gasoline 24%, sp. gr. 0.728, kerosene 13.3%, sp. gr. 0.837, flash 62°, acidity 0.020% = 2% of naphthenic acids. Mazout: sp. gr. 0.930, E_{20} 6-7, low cold test (cf. Kosior, *Neftyanoe Khozyaistvo* 1926, 10). (3) *Crude oil from the upper horizon of Khaduizhinskii*: mixed paraffin and asphalt base crude, similar to Shirvanui crude (light) but higher in paraffin content, sp. gr. 0.871, cold test -20° , paraffin wax 1.46% (m. 50-52°), excise resins 18%. (4) *Crude oil from the lower horizon of Khaduizhinskii*: sp. gr. 0.850, cold test 0° to -7° , paraffin base oils, paraffin wax 4.5% (m. 49-52°), excise resins 16%, neutral resins extd. by silica gel 7.1% (sp. gr. 1.025); mazout: sp. gr. 0.906, E_{20} 4.02, cold test plus 21° , excise resins 24.5%, flash 150°. Complete distus. were made of crudes and mazouts (under vacuum). Conclusion: Shirvanui crudes are characterized by their gasoline and kerosene, also by high sp. gr., which comes close to Kaluga crude. The machine oil distillates of both crudes have a sp. gr. of 0.945, the spindle oil 0.930. The Kaluga oil having a higher sp. gr. is higher in asphaltenes and resins and lower in kerosene fractions. The light crudes from Shirvanui and Khaduizhinskii differ in paraffin contents 1% and 4 $\frac{1}{2}$ %. The low horizon Khaduizhinskii crude has the highest % of wax and is low in sp. gr.

A. A. BOEHLINGK

Molecular weights and boiling points of mineral oils. A. N. SAKHANOV AND N. A. VASIL'EV. *Groznyi Neftyanoe Khozyaistvo* 14, 643-50(1928).—The following crude oils were investigated: Grozny paraffin base, Balakhanuii, Grozny non-paraffin base, Binagadii and Kirmaki. The Gliniskii type dephlegmator was used. Fractions up to 300° were distd. under atm. pressure; vacuum was used for higher fractions. Oil fractions within the same limits of temp. have approx. the same mol. wt. Mol. wts. of oil fractions of the same viscosity depend on the nature of the oil; they are highest for paraffin-base oils, intermediate for naphthenic-base oils of the Balakhanuii type, and lowest for asphalt-base oils. The distn. or boiling temp. of fractions which are the same technically varies with diff. oils. Mazouts from diff. oils give the following fractions of cylinder stock: Grozny, paraffin-base 9%, Balakhanuii 14%, Grozny non-paraffin-base 30%, Binagadii 27% and Kirmaki 33%. High vacuum is not required for the distn. of lubricating oils from paraffin-base crude oil.

A. A. BOEHLINGK

The dielectric losses of transformer oils. I. L. S. ORNSTEIN, G. J. D. J. WILLEMSE AND J. H. G. MULDER. *Univ. Utrecht. Z. tech. Physik* 9, 241-6(1928).—The losses were measured (cf. *Elektrotechnik*, Jan., 1928) directly by thermal effect in order to be independent of frequency. The temp. rise of the oil was found thermoelectrically. the exptl. condenser was well insulated for heat; and the frequencies used were between 0 and 500. The heat losses were detd. from a cooling curve for zero current, the temp. changes being of the order 0.001° to 0.01°. The condenser-calorimeter was standardized with d. c. No considerable dependence of dielec. loss on frequency was found; from this and from addnl. cond. measurements it was apparent that the losses are quantitatively explainable by conduction. For every potential applied the latter has a value dropping with time to a min. (after about 60 min.), which increases with increasing potential. It is assumed that this conduction is electrolytical and consists of a variable (proportional to ion concn.) and a const. part: $S = \sigma_0 + bc$ or $S = \sigma_0 + Ae^{-abE}$, where E is potential difference. For 10 out of 14 oils examd. this relation represents the data exactly. Thoroughly dried oil did not show the time effect, neither did pure synthetic hexane; 24-hr. standing of the oil or stirring promoted the conduction. By continued electrolysis of the oils the oil can be stabilized, i. e., the cond. drops to the const. value. Amts. of stabilized transformer oil were prepd., of which S was lowered from $0.4 \cdot 10^{-8}$ amps. per sq. cm. for 17.5 kv. per cm. to $0.2 \cdot 10^{-8}$ amps. per sq. cm. by application of 16 and 45 kv. per cm. fields for 5 hrs.; the breakdown potential rose from 20 to 50 kv. per cm. The stabilized oil showed a frequency effect in the losses. Part of this and an irregular rise of loss with potential gradient were found due to ionization of air dissolved in the oil (controlled by heating of oil and subsequent aeration with P_2O_5 -dried air). A cable oil of breakdown value 84 kv. per cm. improved to 125 and showed no measurable conduction (less than 10^{-10} amps. per sq. cm.) at 63 kv. per cm. after heating at 130° for several hrs. and cooling *in vacuo*. Other heated oils had losses independent of potential and increased slightly with frequency. The $\log \sigma = \log A + bE$ curves at different temps.

approach straight lines more and more for high temp. (140°). The product $\sigma\eta$ (η is viscosity) is practically const. with varying temp. The $\log \sigma$ $\log \eta$ lines show, however, a bend at 40°, probably due to melting of solid matter (paraffin).

Determination of unsaturates in lubricating oils. FREDERICK S. BACON, A. I., Little, Inc. *Ind. Eng. Chem.* 20, 979 (1928). The Fehling's method has been modified to give a satisfactory end point on dark colored materials. Twenty-five cc. of 10% H₂SO₄ are mixed in a 200 cc. separator funnel with from 1 to 10 cc. of the oil to be tested, diluted with at least 10 cc. of CCl₄. A 10% soln. of known unsatd. content soln. of KBr and KBrO₃ is added with stirring until the color of the oil layer shows an excess of Br. KI soln. is then added, and the color of the oil layer shows an until 1 and 2 cc. excess of the latter is added. The oil is then titrated back with Na₂S₂O₃ soln. oil washed with water and the aq. layer and water are titrated with standard I soln.

Crozier carbonizing retort. A. S. CROZIER, *Ind. Eng. Chem.* 20, 823 (1928). A retort said to be successful with Burmes coal in which Scotch splint had been used and which is expected to be satisfactory for coal which does not unduly cake. It is of cast iron, built up of units, has a riveted wall 15 ft. high, 15 in. apart with semicircular ends, setting leaves space for heating gases around the retort. The charge is fed in at the top through 2 hoppers and is to be cooled by a rotating helix into a coke chamber and thence through a water seal. Working temp. is 120-840°, at the base falling to 250° at 4 ft. from the top. The oil take temp. is 200-300° below, to under 100° at the top. The arrangements for oil fractionation mean that the oils are distd. 4 times and that the pitch is coned. automatically.

Cementation of oil wells by the Perkins method. M. ZAVAZKH, *Azerbejdj. Neft. Khoz.* 1928, No. 6-7, 30-2. Bore holes with clay in suspension do not have to be rinsed with water as not only the clay in suspension is removed but also clay on the walls which is in many cases a protection against water and gas. The cement is dissolved in water and clay by thorough agitation. Very satisfactory results are claimed.

A. A. BOEHLINGK

Cold bitumen emulsions (HAY) 20. Connection between commercial oil deposits and major structural features (STAMP) 8. Improved manufacture of cracked benzine, especially from brown coal tar and shale oil (KARSTEN) 21. The Crimerville Oil Field, Oklahoma (POWERS) 8. Westbrook field, Mitchell County, Texas (EDWARDS) 8. The proofs of the carbon-ratio theory (RUSSELL) 8. Generation of oil by geologic distillation during mountain-building (RICH) 8. Results of distillation and other studies of the organic nature of some modern sediments (TRASK) 8. Outline of water problems in new Grozny Oil Field (LANDTROP) 8. Native asphalts in Oregon (HOPGE) 8. Centrifuge for the purification of oil (Fr. pat. 634,903). 1. Transformation of mineral oils (Fr. pats. 634,820 1-2) 21. Destructive hydrogenation (Brit. pat. 282,514) 21.

BOSWALL, R. O. *The Theory of Film Lubrication.* New York. Longmans, Green & Co. Price about \$5.

FISCHER, EMIL J. *Die natürlichen und künstlichen Asphalte und Pech.* Vol. 19 of *Technische Fortschrittsberichte.* Dresden: Th. Steinkopf. 114 pp. M 8. — bound, M. 9.50.

PRUDHOMME, E. A. *Lep érole-roi Sa fabrication industrielle.* Tome I. Paris. Dunod. F. 25.

Cracking hydrocarbon oils. POWER SPECIALTY CO. Brit. 283,032, April 20, 1927. An app. is described in which oil is cracked by passing through a series of tubes heated to a cracking temp. (the furnace gases being also used to superheat steam for the cracking operation) but so quickly as to avoid appreciable cracking. Details are given as to temps. and app. used for superheating of steam subsequently used in the cracking operation.

Apparatus for cracking hydrocarbons. FRANK A. HOWARD (to Standard Oil Development Co.). U. S. 1,681,899, Aug. 21. A heating coil is located in a furnace chamber where it serves as a screen to absorb radiant heat. Oil to be cracked is passed through the coil into a distn. chamber and vapors from the latter are passed through another coil screened solely by the first mentioned coil.

Apparatus for cracking hydrocarbons. EUGENE C. HERTZEL (to Sinclair Refining Co.). U. S. 1,683,184, Sept. 4. A bed of filtering or absorbent material such as fuller's earth extends entirely across the bulk supply drum of a pressure still below the normal liquid level in the drum; a battery of heating tubes and connections are provided for circulating oil from the space in the bulk supply drum beneath the filtering material through the heating tubes and back again to the space in the bulk supply drum above the filtering material; connections from the upper part of the bulk supply drum carry vapors to a reflux tower, the return from which is led beneath the bed of filtering material, and venting connections are provided between the upper part of the space beneath the filtering material and the space in the upper part of the bulk supply drum above the normal liquid level in the drum. Various other structural details are described.

Distilling petroleum. EDWARD W. ISOM (to Sinclair Refining Co.). U. S. 1,683,135, Sept. 4. Less than a normal charge of crude oil is introduced into a still which is heated and the vapors produced are refluxed until the desired light distillate is removed from the still charge; addnl. crude oil is then introduced to the still in refluxing relation with the vapors and heating is continued with regulation of the feed to obtain the desired light distillate from the reflux tower; when the still is approx. filled the operation is discontinued and the resulting charge is distd. directly to a condenser without refluxing. An app. is described.

Fractional distillation of petroleum. JOHN E. BELL (to Sinclair Refining Co.). U. S. 1,683,150, Sept. 4. Oil contg. a fraction to be sepd. and contg. substantially no components lighter than the fraction to be sepd. is supplied to a vaporizing zone, the vapors from which are passed to a continued refluxing zone; oil lighter than the fraction is independently supplied to the end of the refluxing zone remote from the vaporizing zone, and the fraction to be sepd. is taken off from an intermediate point of the refluxing zone. An app. is described. U. S. 1,683,151 relates to a countercurrent flow of oil and vapors in helical paths in a refluxing column.

Conversion of petroleum oils. GUSTAV EGLOFF (to Universal Oil Products Co.). U. S. 1,682,744, Sept. 4. Oil is heated to a conversion temp. and in the conversion stage is maintained in a shallow body, unvaporized portions of which are recycled for retreatment at a higher temp. than in the initial treatment. The recycled heated oil is passed to the conversion stage where it is maintained in a sep. body and vapors from both the bodies of oil undergoing conversion are dephlegmated and condensate is collected from them. An app. is described.

Apparatus for converting hydrocarbon oils. OSWALD C. BREWSTER (to Standard Oil Co. of Ind.). U. S. 1,681,658, Aug. 21. A chamber is provided for heating a body of oil to conversion temp., from which vapors are led away and from which oil may be passed to a sep. chamber so that the oil in the sep. chamber is brought to oxidizing temp.; fresh oil is also supplied to the sep. chamber and an oxidizing gas such as air is also supplied to this chamber so that the oil in it is brought to conversion temp.; heated oil from the last-mentioned chamber may also be conveyed to the first-mentioned chamber.

Refining hydrocarbon oils. HIRAM J. HALL (to Universal Oil Products Co.). U. S. 1,681,638, Aug. 21. Vapors of hydrocarbons such as those of a cracked petroleum oil are passed through a 20-55% H_2SO_4 soln., to produce colorless gasoline, etc.

Refining hydrocarbon oils. LOUIS BURGESS (to Standard Oil Development Co.). U. S. 1,681,895, Aug. 21. Oil such as a 22.6° B $_6$ petroleum distillate is repeatedly treated with fuming sulfuric acid in the proportion of 5-10%, thus forming sludge and oil-sol. S-contg. compds., and after each treatment the sludge is sepd. and after each sludge sepn. the oil is treated with NaOH and an aliphatic monohydric alc. such as aq. iso-Pr alc. and the alc. soln. contg. dissolved oil-sol. S compds. is sepd. from the oil.

Refining petroleum oils. F. C. AXTELL (to Axtell Research Laboratories, Inc.). Brit. 282,738, Dec. 27, 1926. The S content of oils such as gasoline, kerosene, lubricating oils or cracked distillates is reduced by treatment with a reagent formed from fuming sulfuric acid treated with an excess of C_4H_8 or other aromatic hydrocarbon; an acid sludge contg. most of the S is formed and the aromatic and unsatd. content of the oil is not attacked. The oil may then be treated with a basic clay and with strong aq. alkali soln. and then distd. Selenic acid may be used instead of H_2SO_4 and sufficient SO_2 may be present to combine with any water present or produced on the formation of benzenesulfonic acid. Cf. C. A. 22, 3280.

Refining cracked petroleum distillates. THOMAS G. DELBRIDGE and JOSEPH B. HILL (to Atlantic Refining Co.). U. S. 1,682,603, Aug. 28. Vapors of the distillate are fractionated by contact with reflux liquid, the vapors are condensed and the liquid

condensate, under pressure and at a temp. above its normal b. p., is brought into contact with fuller's earth to effect polymerization of gum-forming and color-imparting compds.; polymers are transported from the fuller's earth by the oil, and the treated oil is distd. to sep. products of lower b. p. from those of higher b. p. contg. the polymers in soln.; the oil of higher b. p. is used as reflux liquid in the fractionation. An app. is described.

Refining mineral oils. FORREST W. LILLY (to Anglo California Trust Co.). U. S. 1,683,288, Sept. 4. In order to remove polymerizable constituents from mineral oil it is subjected to the action of a soln. of ethyl HgAc in ether.

Removing wax from mineral oil distillates. HARRY F. GLAIR and OSCAR R. BRANSKY (to Standard Oil Co. of Ind.). U. S. 1,683,289, Sept. 4. A lighter wax-bearing substantially uncracked oil distillate is mixed with a paraffin wax-bearing oil ment, and the mixt. is chilled and filter-pressed.

Column still and rectifier apparatus for refining oils, etc. SIMPLEX REFINING Co. Brit. 283,383, April 20, 1927. Structural features.

Treating lead sludge from oil refining. JOSEPH B. HILL (to Atlantic Refining Co.). U. S. 1,682,562, Aug. 28. Lead sludge such as is obtained by treating petroleum oil with an alk. plumbate soln. is dried and subjected to dry heat under oxidizing conditions to cause conversion of the major portion of the Pb content to compds. sol. in aq. caustic alkali soln. and such a soln. is then used to dissolve the resultant Pb products. Cf. C. A. 22, 2054.

Treating acid sludge obtained from petroleum refining. ERNEST W. ROTH. U. S. 1,682,713, Aug. 28. A supernatant layer of sludge is heated by means of heat applied to an underlying layer of dil. H_2SO_4 or other dil. acid having a d. greater than the sludge; the acid is maintained at a "simmering" temp. without agitation of the sludge layer. This treatment serves to effect hydrolysis and sepn. of sludge constituents. An app. is described.

Liquid fuel from acid sludge of oil refining, etc. JAMES M. CORY and FRED H. BUNKE (to Solar Refining Co.). U. S. 1,682,369, Aug. 28. Acid sludge is mixed with a filtering medium such as spent clay and a fluxing material such as oil in the presence of steam or other suitable heating agent. An app. is described.

Apparatus for emulsifying oils, etc. WILLIAM THORDARSON. U. S. 1,683,500, Sept. 4.

Apparatus for separating oil and water by gravity. CHRISTOPHER OFFENHAUSER. U. S. 1,682,535, Aug. 28.

Oil from oil shale. HERMAN R. KIPPER. U. S. 1,682,287, Aug. 28. Heated gases are passed through finely ground oil shale to effect distn. and simultaneous mixing and further subdividing of the shale and removal of material from the walls of the distn. chamber are effected by revolving hammers or like devices. An app. is described.

Oil from shale, etc. F. HOFMANN and C. WILFF (to I. G. Farbenind. A.-G.). Brit. 283,159, Jan. 5, 1927. Liquid SO_2 (with or without admixt. of C_6H_6 or other solvent) is used for extg. oil from shale or similar materials such as residues from the destructive hydrogenation of coal.

Halogen treatment of oil shale. GUSTAV EGLOFF (to Universal Oil Products Co.). U. S. 1,682,743, Sept. 4. Aluminiferous oil shale is heated to effect distn., with agitation, in a rotary still, by direct impingement of heating gases, and during the distn. Cl is introduced to unite with the Al in the shale and form AlCl_3 which reacts with hydrocarbons present.

Oil-soluble naphthenic compounds. OSCAR E. BRANSKY (to Standard Oil Co. of Ill.). U. S. 1,681,657, Aug. 21. Oils such as lubricant distillate of Louisiana petroleum are treated with a 10–20% NaOH soln. or other suitable aq. alkali soln. and washed with a dild. alc., to sep. naphthenic acid compds. Cf. C. A. 22, 3041.

Catalytic dehydrogenation of hydrocarbons. I. G. FARBENIND. A.-G. Brit. 283,105, Jan. 3, 1927. Catalytic dehydrogenations such as those constituting the last stage of the process described in Brit. 261,393 (C. A. 21, 3369) are effected in the presence of Cl , with or without addn. of other gases or vapors and at ordinary or reduced pressure. Undue rise of temp. may be avoided by admitting the Cl in small portions or by dilg. it with N , CO_2 or steam. Among the catalysts which may be used are: active C , silica, pumice, Zn borate, V-bearing materials, Al phosphate, Cr oxide and Cu chloride. Actinic rays or silent elec. discharges facilitate the process and the HCl produced may be used in cracking hydrocarbons in the presence of catalysts such as activated Al, Fe or the like, in which case dehydrogenation and cracking may be effected together. Among the materials which may be treated are mineral oils, tars and extn. products.

from coal. Olefins and diolefins may be sepd. from the products and converted into alcs. and used in the *manuf. of synthetic rubber*. Numerous details and modifications are given.

Gasoline from crude petroleum. EDWARD W. ISOM and EUGENE C. HERTHEL (to Sinclair Refining Co.). U. S. 1,683,193, Sept. 4. A body of filtering or absorbent material such as fuller's earth, coke or calcined bauxite is maintained within a vaporizing zone so as to extend entirely across it; oil is circulated from beneath this material through heating tubes and back to the body of oil above the material and is heated to a cracking temp. Crude petroleum is supplied to the circulating body of oil and vapors carrying gasoline fractions are taken off; residual oil is withdrawn from beneath the body of filtering material.

Filter for gasoline. GEORGE F. THOMAS (to Bassick Mfg. Co.). U. S. 1,682,867, Sept. 4.

Filter for gasoline. DOUGLAS F. FESLER (to Bassick Mfg. Co.). U. S. 1,682,807, Sept. 4.

Apparatus for clarifying gasoline (used for dry cleaning) by alkali treatment and sedimentation. PERCY S. PINE. U. S. 1,683,483, Sept. 4.

Apparatus for purifying used lubricating oil by filtration and distillation. EDWARD L. GROSS. U. S. 1,681,980, Aug. 28.

Semi-liquid bituminous composition. JOSEPH H. AMIES. U. S. 1,682,589, Aug. 28. In prepg. a material suitable for use as a *paint* approx. 65 lbs. of granulated bituminous material such as hard asphalt is mixed and heated with 35 lbs. of crude petroleum or similar material, and there is added 15 lbs. of granulated CaO which is already undergoing slaking, and 10 lbs. of crude naphtha. Addnl. naphtha may be used as a thinner.

Acetic acid from wood. FRANCIS G. RAWLING. U. S. 1,681,684, Aug. 21. Wood such as that subsequently used for paper pulp is impregnated with a treating material formed of an aq. soln. of a mixt. of Na_2SO_3 and an alkali such as Na_2CO_3 . The strength of the treating material as used is capable of neutralizing HOAc from the wood but is not sufficient materially to affect the lignin content of the wood; the wood and treating material are heated to 110-160° to form acetates in soln. and the soln. is subsequently rendered acid, e. g., with H_2SO_4 , and HOAc is recovered from the soln.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Cellulose. Its derivatives. P. HAYEMAL. *Ing. chim.* 15, 94 113 (1927).—A lecture on cellulose nitrate and acetate, celluloid and artificial leather. P. T.

X-ray observations on cellulose. R. O. HERZOG AND W. JANCKE. *Naturwissenschaften* 16, 618 (1928).—Cellulose from ramie or bamboo shows for large plate distance (10 cm. or more) close to the central point (shadow of Pb diaphragm) a blackening on the x-ray picture with $\sin \theta/2 \approx 0.0218 \approx 0.0003$. Mercerized ramie has the same characteristic less distinctly. The point would correspond to a lattice period of 35.3 Å. U. (Cu K α radiation); Seemann control of the radiation used eliminated errors from this source. A weak spot at $\sin \theta/2 \approx 0.0885$ would indicate a period of 16 Å. U. perpendicular to the fiber axis, i. e., the double of Polanyi's value.

Lignin. R. WIGGINTON, Sheffield Univ. *Fuel in Science & Practice* 7, 208 72 (1928).—A discussion of the several theories of the chem. constitution of lignin.

D. A. REYNOLDS

New viewpoints on the form of the molecules of cellulose and polymers. J. R. KATZ and P. J. P. SAMWEL. Univ. Amsterdam. *Naturwissenschaften* 16, 592-3 (1928).—A method was worked out for the study of the shape of cellulose mols. by spreading them out in a monomol. layer. Cellulose in ester or ether form, dissolved in CHCl_3 , spreads readily on water and gives a monomol. layer after evapn. of the solvent. The film is slightly compressible. Its surface and thickness were detd. at several pressures and extrapolated to zero pressure. For the dimensions of the film was found: for ethylcellulose high, low or medium viscous or cryst. (Hess) from 60 to 66.5 sq. Å. U. surface, 5.3 to 5.55 Å. U. thickness; for methylcellulose (also 4 types) 59 to 61 and 4.1 to 4.3; for triacetylecellulose high viscous, low viscous, ZnCl_2 -prepd., or cryst. 37.5 to 40.5 and 8.15 to 8.9. Conclusion. Cryst. cellulose prepgs. give values equal to those of technical products, technical products of varying consistency give equal values. The latter conclusion means that the micelles are either string- or leaf-shaped but not

three-dimensional structures. From x-ray evidence the wire shape seems most probable. Polymerization of $C_6H_5IO_3$ must therefore take place in one direction. The results on starch, hichenin and inulin by the same method confirmed this view. Other polymerized substances give similar results. For films of polymerized anethole (by $SnCl_4$) was found, either high or low polymer, 19.5 to 29 sq. A. U. surface, 9.8 to 10.1 A. U. thickness, likewise for polymerized vinyl acetate or methyl acetate. It is probable that in analogy to the fatty acid orientation the moles are all arranged parallel either with their Ph or their acid group at an obtuse angle with the water surface. The work of Gorter and Grendel (*C. A.* 21, 255) on protein moles, is in agreement with the authors' theory.

"Kaoliang" stalk. R. YAMAMOTO. *Cellulose Ind. Tokyo* 4, 53 (6/1928).—The digestion of the kaoliang (*Audrapogon sorghum* Broth), produced in Manchuria, with the soda process and the properties of cellulose obtained from the stalk of kaoliang were investigated from the view-point of the pulp industry. Kaoliang was digested with steam and then with soda to obtain easily bleachable pulp. The most suitable condition for the above process consists of first heating raw material in a closed vessel with 10 parts of water at 100–120° for 30–60 min. and then with soda (12% of the wt. of the raw material) at 130–140° for 3–4 hrs. As raw material, the rind was the best, the leaf and knot were inferior both on account of the small yield, and on account of the difficulties in digestion and bleaching. No pulp could be obtained from the pith alone. The pulp obtained was colored faintly brown. Its yield was 10% and that of bleached pulp was 36%, based on the raw material. Analyses of the bleached pulp and phys. and chem. consts. of the cellulose are given.

The composition of Japanese bamboo. Y. UEDA, K. KASAMA AND K. KIMURA. *Cellulose Ind. Tokyo* 4, 95 (8/1928).—The authors investigated the compn. of Japanese bamboo, Moso Chiku, from the view-point of the cellulose industry. Three specimens (1 yr. old, 3 yrs. old and 5 yrs. old) were used. Though the compn. varied according to age and part of the bamboo used, the results were made separately on the upper, middle and lower parts of the bamboo; the mean compns. of the 3 specimens were, resp.: water 9.39, 8.11, 8.06, ext. with alc. and benzene 2.39, 3.04, 3.02; cellulose 41.56, 42.71, 42.64, pentosans 24.07, 24.36, 24.51. The cellulose contained 4.11% fufural; its Cn. no. was 0.75 and it consisted of α -cellulose 78.92, β -cellulose 17.91, γ -cellulose 3.7%. By acetolysis by Kiern's method, cellulose octaacetate was obtained in a yield of 27% of the cellulose used. By sultolysis by the Monger-William's method, glucose was obtained in 80% yield. By hydrolysis with 7% H_2SO_4 for 5 hrs. crystall. xylose was obtained.

Mannan acetate. I. A new method of preparation of mannan acetate and some of its properties. R. SHINODA AND C. ASHIMAWA. *Cellulose Ind. Tokyo* 4, 6-13 (1928).—Raw "Japanese Konjaku powder" (*Amaranthus* *terrestris*) was treated with aq. soln. of ClO_3 , and the product made into threads in order to be easily treated afterwards. It was coagulated with glacial AcOH and warmed with hot air. The product thus treated was heated on a boiling water bath for about 1 hr. with continuous stirring till the reaction was completed. This method effects an economy of the chemicals used for reaction, e. g. glacial AcOH and Ac_2O , the duration of reaction becomes shorter and no decompn. of konjaku mannan takes place during reaction. The compn. of the mannan acetate obtained was: moisture 11.76, ash 0.42, acetyl group 61.43%, it is apparently the triacetate of mannan. The mannan acetate is very stable and sol. in various org. solvents; the most suitable solvent is the mixt. C_2H_5Cl 4, $AcOMe$ 4, and $MeOH$ 2 parts. In this solvent a 1% soln. has a suitable viscosity, giving a strong film. Though many substances contain mannan, Japanese konjaku powder as a raw material for mannan is the most suitable from an economical point of view. The mannan acetate can be refined satisfactorily by washing it with water.

Preparatory treatments of cellulose acetate rayon. A. KUNZE. *Russa* 3, 745-7 (1928).—Practical operating hints on the desizing, degreasing and bleaching of acetate rayon.

The manufacture of artificial silk, viscose. RAYMOND MORTGAT. *Industrie chimique* 15, 3-6, 66-70, 130-4, 234-8, 290-5 (1928). A study of the com. production of viscose.

Parchment paper and its evaluation. H. SERGER. *Pharm. Zentralh.* 69, 514-8 (1928).—In addn. to detg. the phys. characters, the content of H_2O , H_2O -sol. and insol. mineral ingredients, and sugar is ascertained. The results obtained in the examn. of 10 different samples are presented in tabulated form.

Cotton tissue paper for celluloid. K. ATSUKI AND K. WATANABE. *Cellulose Ind. Tokyo* 4, 141-4 (1928); cf. *C. A.* 22, 867. —By nitration of 5 specimens of cotton tissue

paper the following results were obtained: (1) The larger the degradation of the cellulose, the worse the mech. properties of the film of nitrated cellulose become. (2) The color of the nitrated cellulose is remarkably influenced by that of the original cellulose; the larger the degradation of the original cellulose, the deeper the color of nitrated cellulose. (3) In the nitration the greater the modification of the phys. and chem. properties of the original cellulose, the less is the yield of nitrated cellulose. R. S.

Manufacture of tanning extracts as an improved waste utilization of sulfite liquors from the wood-pulp industry (ESCOURROW) 29. Continuous filters for sludges (adapted for cellulose pulp) (GEISLER) 1. Water of paper mills (WATANABE) 14. Removing and recovering volatile plasticizers from celluloid (U. S. pat. 1,681,692) 18.

Cellulose derivatives. LEON LILJENFELD. U. S. 1,682,292, Aug. 28. Cellulose is treated in the presence of an alkali such as a soln. of NaOH with a monohalo aliphatic acid, *e. g.*, monochloroacetic acid, in the presence of not more than substantially 20 parts by wt. of abs. alc. to every 100 parts by wt. of water present; derivs. are obtained which dissolve in aq. alkalies and are pptd. from their solns. in aq. alkalies by neutralizing agents such as dil. H_2SO_4 or HOAc even when the reaction still remains somewhat alk. and by treatment of their aq. alkali solns. with alc. They are suitable for making films, artificial silk, etc. U. S. 1,682,293 specifies forming films, filaments or other artificial materials from a soln. of a cellulose-glycolic acid or other cellulose-hydroxy-paraffin-monocarboxylic acid (insol. in water) in dil. NaOH soln. or other suitable alkali, by use of a pptg. agent such as H_2SO_4 or HOAc soln. U. S. 1,682,294 specifies treating cellulose with monochloroacetic acid or other suitable compd. contg. the halogen-contg. radical of a monohalo aliphatic acid in the presence of an alkali and an alc., *e. g.*, NaOH and EtOH, while using not more than 0.5 mol. proportion of the monohalo aliphatic acid radical for each mol. proportion of caustic alkali. The product is suitable for making films, filaments, etc.

Sulfonated cellulose derivatives. GEORG KRÄNZLEIN, ARTHUR VOSS and FRANZ BRUNNTRAGER (to I. G. Farbenind. A.-G.). U. S. 1,682,382, Aug. 28. Cellulose is caused to react with an aralkylhalosulfonic acid compd. such as $p\text{-ClCH}_2\text{C}_6\text{H}_4\text{SO}_3\text{Na}$ in the presence of alc. NaOH or other suitable alk. agent. The product thus obtained is sol. in water and may be used for making films or *impregnating textiles*.

Preventing or controlling "delustering" of cellulose derivatives. C. DREYFUS and H. PLATT (to British Celanese, Ltd.). Brit. 282,722, Dec. 30, 1926. Delustering of yarns, fabrics or other forms of cellulose acetate, propionate or cellulose ethers is prevented or controlled by adding thiocyanates such as those of Na, K or NH_4 to hot or boiling aq. baths such as those used for dyeing or bleaching.

Cellulose esters. H. L. BARTHELEMY (to Ruthaldo Co.). Brit. 282,793, Dec. 28, 1926. In esterifying cellulose and nitrocelluloses of low N content, a mixt. is employed contg. an acid anhydride such as Ac_2O and a catalyst such as H_2SO_4 together with a reagent capable of effecting a mild oxidation of the cellulose such as Mn sulfates, Mn acetate, chromic acid, mono-persulfuric acid, manganic and permanganic acid and peracetic acid. By acetylating cotton in this manner, more uniform products are obtained from starting materials of different character than would be produced by processes as previously usually employed, especially as to viscosity characteristics. Brit. 282,794 specifies treating cellulose, before esterification, with a direct oxidizing agent such as Na_2O_2 or other alkali peroxide or H_2O_2 under alk. conditions. Alkali carbonates, silicates, resinates, soaps and Na or NH_4 sulforinates or the like may be added. Cellulose nitrates or acetates thus produced give solns. of low viscosities and produce products of good tensile strength and elongation.

Cellulose esters. I. G. FARBENIND. A.-G. Brit. 283,181, Jan. 6, 1927. Cellulose esters of higher fatty acids, which are sol. in ordinary org. solvents, are made by reaction between untreated cellulose and a chloride of the higher fatty acid such as stearyl chloride, in the presence of pyridine, quinoline or like base, at temps. of 100–140° or even higher. Cf. C. A. 22, 3777.

Molding powders containing cellulose esters. C. DREYFUS and G. SCHNEIDER (to British Celanese, Ltd.). Brit. 282,723, Dec. 29, 1926. A cellulose ester such as cellulose acetate or butyrate or a suitable cellulose ether is pulverized and mixed with dyes, pigments, gums, fillers, plastifiers or softeners or other modifying ingredients. Several formulas are given. Cf. C. A. 21, 1011.

Cellulose acetates. H. L. BARTHELEMY (to Ruthaldo Co.). Brit. 282,788, Dec. 28, 1926. Cotton is first treated with hot HOAc vapors, agitated, allowed to cool

and then mixed with an acetylating mixt. contg. a limited quantity of Ac_2O and more of the latter is added at intervals after the reaction has assumed an equil. (which may be ascertained by examg. the fibers by polarized light or, in the later stages, by detg. the concn. of the soln.). H_2SO_4 or other catalyst may be used.

Cellulose acetates. H. L. BARTHELEMY (to Ruthaldo Co.). Brit. 282,791, Dec. 28, 1926. Acetylation is effected in a cylindrical app. rotating about an axis slightly inclined to the axis of symmetry of the cylinder or in other app., the walls of which are unequally distributed with respect to the axis of rotation. The app. may be provided with coils for heating or cooling and non-corrosive bronze or ceramic material may be used for its construction.

Cellulose acetates. H. L. BARTHELEMY (to Ruthaldo Co.). Brit. 282,789, Dec. 28, 1926. Sulfoacetates formed during the manuf. of cellulose acetates with H_2SO_4 as a catalyst are decompd. by adding to the acetylation mixt. sufficient ac. of formic acid or HOAc to decomp. the excess of Ac_2O while preventing incipient pptn. of the acetate, cooling, and adding a further quantity of formic acid or HOAc and also sufficient HCl to introduce at least as many H^+ ions as were introduced by the H_2SO_4 used as catalyst. The second stage of the treatment may be carried out at a temp. of 41° and an acetone-sol. product may be obtained.

Cellulose acetate soluble in chloroform. HARRY LE B. GRAY and CYRIL J. STAUD (to Eastman Kodak Co.). U. S. 1,683,347, Sept. 4. Cellulose is pretreated with glacial HOAc contg. a mixed catalyst of H_2SO_4 and H_3PO_4 (with at least as much H_3PO_4 as H_2SO_4); Ac_2O is mixed with the pretreated mass to complete the acetylation and the reaction is continued to produce a CHCl_3 -sol. product. The same mixed catalyst serves both in the pretreatment and final acetylation.

Xanthating cellulose. WM. MENDEL (to Samuel A. Neidich). U. S. 1,681,900, Aug. 21. A mass of alkali cellulose is subjected to a vacuum while agitated, to remove air and water vapor; the evacuated mass is then subjected to the action of CS_2 while agitated, until it is transformed into cellulose xanthate; the mass is then again subjected to a vacuum while agitated and fumes of CS_2 are exhausted. An app. is described.

Nitrocellulose solutions and plastics. I. G. FARLEND, A.-G. Brit. 282,172, June 10, 1926. There is used as a solvent the only product obtained by the catalytic hydrogenation of C oxides such as produced by the processes described in Brit. 227,147 (C. A. 19, 2673), Brit. 229,714 (C. A. 19, 3093), Brit. 237,030 (C. A. 20, 1414) and Brit. 238,319 (C. A. 20, 1995) or a fraction of such products, together with various other solvents and admixtures.

Antistatic nitrocellulose film. RAY L. STINCHFIELD (to Eastman Kodak Co.). U. S. 1,683,315, Sept. 4. The rear face of the film is treated with a soln. of an alkali such as NH_4OH until it is superficially hydrolyzed and the treatment is stopped before the flexibility and transparency of the film are impaired.

Artificial silk. H. L. BARTHELEMY (to Ruthaldo Co.). Brit. 282,787, Dec. 28, 1926. Filaments formed by extrusion of a soln. of cellulose ester or ether are coagulated by use of a liquid medium of such a compn. in regard to its rate of absorption of solvent from the filaments as to give the latter the desired properties. Among the materials which may be used are: (a) hydrocarbons with a b. p. above 80° such as toluene, xylenes, dimethylnaphthalene, decane, tridecane, hexadecane, terpenes and polyterpenes; (b) cyclic hydrocarbons such as cyclohexane, methylcyclohexane, tetrahydronaphthalene and decahydronaphthalene; (c) alcs. such as Et, Bu or Pr alc., glycol, glycerol, cyclohexanol, methylcyclohexanol, cyclohexylcarbinol and tetrahydro- β -naphthol; (d) fatty acids of high mol. wt. such as oleic and ricinoleic acids; (e) esters of monohydric alcs. such as oleates and palmitates and Me, Et, Bu, Pr and Am stearates; (f) halogenated compds. such as di- and tri-chloroethylene, pentachloroethane, monochlorobenzene or -toluene, α -bromonaphthalene, 1,2,3-trichlorobenzene and benzyl chloride; (g) nitrites such as "benzonitrite, toluenitrites or xylonitrites"; (h) nitrated compds. such as PhNO_2 and nitrotoluene. Various mixts. of these compds. may be used.

Artificial silk, etc. H. L. BARTHELEMY (to Ruthaldo Co.). Brit. 282,790, Dec. 28, 1926. Filaments, films and the like formed from a soln. of a cellulose ester such as the acetate, formate or nitrate are coagulated by an aq. soln. contg. an emulsifying agent such as an NH_4 or alkali metal salt of oleic, stearic, palmitic or ricinoleic acid or of a sulfonated fatty acid, or Twitchell's reagent, decoctions of panama or quillaia or of a sulfonated fatty acid, or alkali or alk. earth metals, gum tragacanth and wood, egg yolk, caseinates of NH_4 or of alkali or alk. earth metals, borates, etc., water and a higher fatty ternary mixts. of alkali carbonates, phosphates, etc., water and a higher fatty acid. Examples are given of baths also contg. alcs., various hydrocarbons, etc.

Artificial silk. NAAMLOOZE VENNOOTSCHAP NEDERLANDSCHE KUNSTZIJDEFABRIEK.

Brit. 282,721, Dec. 27, 1926. Artificial silk of good tensile strength both when wet and dry is obtained by giving the thread an extended path of travel (at least 50 cm. and suitably 2.5 meters) in the coagulating bath; after this treatment, "viscose silk" may be carried "at an angle" through the air. Cf. C. A. 22, 2863.

Artificial silk. M. F. THOMA (to I. G. Farbenind. A.-G.). Brit. 282,770, Dec. 27, 1926. Staple fibers of artificial silk are prepd. for spinning by treatment in a liquor contg. ingredients for softening, crinkling, increasing the hygroscopicity and improving the feel of the material, e. g., a mixt. formed of water 100 gal., glycerol 3 gal., soda 1 gal., soft soap 0.5 gal., pinol 0.5-1.0 gal. and oil soap flakes 1 gal. Monopol oil, monopol brilliant oil, sulfonated castor oil, sulfonated tallow, sulfonated olive oil, red oil, tetrapole or verapole may be used as softening agents and luster may be produced by enodrine, perperitol, isomerpine, glucose and glycerol. Chlorides of Mg, Ca or Zn may be used for holding moisture in the fiber as may also glucose, acetin or glycerol. Formic acid or HOAc improves the feel of the material.

Artificial silk. COURTAULDS LTD. Fr. 633,957, May 5, 1927. See Can. 282,326 (C. A. 22, 3529).

Artificial threads from viscose. LEON LILIBENFELD. U. S. 1,683,199, Sept. 4. Artificial threads of high "dry tenacity," exceeding 2 g. per denier are obtained by extrusion of viscose into contact with a liquid which contains not less than about 65% sulfuric acid monohydrate. U. S. 1,683,200. See Brit. 281,351 (C. A. 22, 3529).

Apparatus for spinning and drawing artificial silk threads from solutions of cellulose esters and ethers. R. A. J. THENOZ (to Ruthalco Co.). Brit. 283,139-40, Jan. 4, 1927.

Artificial filaments, etc. from viscose. COURTAULDS, LTD., H. J. HEGAN and E. HAZELEY. Brit. 282,973, Dec. 20, 1926. A coagulating bath contg. H_2SO_4 and 25% or more of Na_2SO_4 is used with a viscose contg. 2-4% of added Na_2CO_3 and sufficient NaOH (suitably about 7% or more) so that the proportion of alkali radical is greater than that of the carbonate radical (suitably in the ratio of 4:1). Threads or films thus formed show little inflation and are less lustrous than ordinary viscose "silk" and have an exterior roughness which gives them a feel and appearance similar to that of wool.

Apparatus for forming viscose filaments. SAMUEL A. NEIDICH. U. S. 1,683,478, Sept. 4.

Apparatus for forming filaments of artificial silk and treating them with precipitating liquid. GUSTAV OTTO, AUGUST HARTMANN and GOTTHARD BAURIEDL (to American Bemberg Corp.). U. S. 1,682,797, Sept. 4.

Apparatus for producing filaments of artificial silk. JOHN A. ROUX. U. S. 1,683,055, Sept. 4. A polarizing device is arranged so as to subject the filament to elec. treatment. U. S. 1,683,056 relates to somewhat similar app. and process.

High-speed centrifugal apparatus for use in the manufacture of artificial silk. R. A. BALDWIN. Brit. 283,235, July 9, 1926.

Spinning pump for artificial silk. WICACO SCREW & MACHINE WORKS, INC. Fr. 634,881, May 23, 1927. Constructional features.

Straw pulp and paper. CHARLES H. DEDRICK (to Philadelphia Quartz Co.). U. S. 1,682,834, Sept. 4. In prepg. pulp from straw, the material is cooked with Na silicate, beaten with cooking liquor and then sized.

Paper pulp. GEORGE A. RICHTER and MILTON O. SCHUR (to Brown Co.). U. S. 1,683,262, Sept. 4. Pulp such as that from wood is subjected to alternating chem. treatments and washings. NaOH soln., hypochlorite and Cl may be employed for the chem. treatments and the wash water effluent from one washing is employed in another washing in which the contaminations present in the effluent do not interfere with the other treatments or damage the pulp.

Pulp from waste paper. L. GRENAUDIER. Brit. 282,829, Dec. 30, 1926. In a modification of the process described in Brit. 279,516 (C. A. 22, 3046), ink is removed through the formation of an insol. scum by treating the pulp of the paper which is to be deinked with a very weak Na_2CO_3 soln. (suitably a 0.125% soln.), heating and agitating and if necessary adding a metal salt to form an insol. soap or to effect salting out. Some sol. soap may be added as may also gelatin, albumin, casein, glucose and loading or bleaching agents.

Articles of wood pulp. J. J. H. STURMEY. Brit. 282,929, Oct. 20, 1926. Water bottles, floats or other articles formed of wood pulp are coated (suitably by spray-coating or electrodeposition) with metals such as Fe with a second coating of Cu, Al or Ni.

Pulping machine for paper. ULRICH KIRCHNER. Fr. 634,072, May 19, 1927.

Paper is pulped in a rotating cylinder contg. crushing rollers free to roll on the internal surface of the cylinder.

Beating engine for paper stock. JOHN D. HASKELL (to Dilts Machine Works). U. S. 1,683,546, Sept. 4.

"Doctor" mechanism for paper-making and similar apparatus. N. DUXBURY and G. DUXBURY. Brit. 282,961, Dec. 2, 1926.

Jordan engine for refining paper stock. HERMAN R. HARRIGAN (to E. D. Jones & Sons Co.). U. S. 1,681,935, Aug. 28. Structural features.

Sizing fibrous materials. ALFRED LUTZ (to Ronald C. Lutz). U. S. 1,682,390, Aug. 28. Fibrous material such as paper or cardboard is impregnated with a gelatinous sizing compn. and then treated with a hardening agent comprising methyloformamide, and allowed to stand to effect progressive hardening.

Molded paper articles. LUCIE FENEUX. Fr. 634,652, May 7, 1927. Objects are made in intaglio or in relief by placing a sheet of paper in a mold, then a piece of cloth and then cellulose or paper pulp, which is made by mixing the cellulose or paper in water with alc., flour, gelatin, alum and a powder such as ground glass, sand or metal.

Paper fabric. WILLIAM A. LORENZ (to Otaka Fabric Co.). U. S. 1,682,346, Aug. 28. A material adapted for paper wash cloth purpose comprises a layer of sized pulp and one or more layers of unsized pulp, roughened by embossing or crinkling.

Coated paper. FREDERICK W. PARFELL (to McLaurin-Jones Co.). U. S. 1,683,453, Sept. 4. One side of paper is coated with a filler such as starch or cascan and the opposite side of the paper is coated with an aq. glue and glycerol mixt. or other water-sol. adhesive which is tacky under normal atm. conditions. Paper thus prepd. is suitable for protecting portions of articles during painting by the spray method.

Multi-ply paper. GEORGE L. BIDWELL (to Warren Mfg. Co.). U. S. 1,682,826, Sept. 4. Several wet paper webs are successively picked up upon a pick up felt and the latter with the superposed webs upon its under side is passed through a suction press in contact with a bottom wet felt. An app. is described.

Parchmentizing paper, etc. CARL KNOTT. U. S. 1,683,470, Sept. 4. Paper or like material to be parchmentized is artificially dried, immediately treated with a bath contg. amyloid forming salts such as metal chlorides, removed from the bath and scraped on both sides, squeezed between pressure rollers and heated to mature the amyloid formed, cooked to prevent retrogression or deterioration of the amyloid, and afterward lixiviated, washed and dried.

Waterproofing paper, etc. W. H. CHARCH and K. E. PRINDEL (to DuPont Cellophane Co., Inc.). Brit. 283,109, Jan. 1, 1927. Waterproofing compns. comprise nitrocellulose or similar cellulose ester together with a gum or resin, a wax or wax-like material, plasticizing substance and solvents, etc. Several formulas are given.

24--EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

The detonation-wave in gaseous mixtures and the predetonation period. WILLIAM PAYMAN. *Proc. Roy. Soc. (London)* A120, 90-109(1928).--An adaptation of an old optical device, the "Schlierenmethode" of Topler, has been developed for photographing the invisible shock or compression waves sent out through a gas mixt. on the detonation of a solid or gaseous explosive in the mixt. By this method the pre-detonation period and the inception of detonation in gaseous mixts. has been studied photographically. The observed retardation of the flame in closed tubes is connected with the breaking up of the flame into 2 sep. portions moving in opposite directions. Photographs of the hitherto invisible compression waves show their origin in the gases through which the flame has passed, and in which combustion has commenced some time previously. The waves are due to renewed chem. activity of some kind behind the wave front. The detonation wave also has its origin behind the wave front. The gas mixts. used were $\text{CH}_4\text{-O}$ and $\text{CH}_4\text{-air}$. Photographic comparisons are made of inception of detonation in a H-O mixt. by different initiators (fuse head, powder fuse and detonator).

R. L. DOEGE

Pentaerythritol tetranitrate as a military explosive. ALFRED STETTBACHER. *Z. angew. Chem.* 41, 710-9(1928).--Pentaerythritol tetranitrate (1) is proposed as a bursting charge for high explosive artillery projectiles. Its characteristic properties are: d. 1.62, heat of explosion 1403 kg.-cal., temp. of explosion 4300° , gas vol. 780 l. per kg., rate of detonation 8400 m./sec., Trauzl block expansion 470 cc. lt m. 140-141

hence it cannot be conveniently cast but must be compressed, which decreases its sensitiveness. Shell filled with (A) at a pressure of 6000 atm. have been safely fired at muzzle velocities as high as 800 m./sec. Warmed with *nitroglycerin*, it forms a pasty mass which can be pressed or molded. Such a mixt. contg. 20% *nitroglycerin* has greater energy than the pure tetranitrate and is readily detonated. Either (A) or its mixts. are readily detonated by PbNa_3 . (A) is best prepd. by adding 100 g. pure pentaerythritol slowly to 430 cc. HNO_3 (98-99%) with stirring and cooling (below 25°), then adding 400 cc. H_2SO_4 with continued cooling. The pptd. ester is filtered, drowned in ice water, again filtered, washed and dried. The yield of crude product is 97%. To eliminate entirely occluded acid, 100 g. is dissolved in 400 cc. Me_2CO and 3-4 g. $(\text{NH}_4)_2\text{CO}_3$ added, the soln. filtered into 800 cc. H_2O , the ppt. of very fine crystals washed and dried. Yield, 93-94% theory. (A) gave a negative test with KI-starch paper during successive heatings of 1 hr. at 70°, 2 hrs. at 80°, 2 hrs. at 90° and 3 hrs. at 95°.

C. G. STORM

Gaseous combustion at high pressures. X. The co-volume corrections, maximum temperature and dissociation of steam and carbon dioxide in explosions. DUDLEY M. NEWITT. *Proc. Roy. Soc. (London)* **A119**, 464-80(1928); cf. *C. A.* **19**, 3581. — The corrections to be applied to explosion data in the measurement of internal energies of gases at high temps. are discussed. When greater than 10 atm., the initial pressure must be corrected for deviations from Boyle's law. If the time of the explosion is greater than 0.0005 sec., correction of the max. pressure must be made for cooling of the gaseous medium by the walls of the vessel. The max. pressure must also be corrected for the co-vol. of the gases. Formulas for applying the co-vol. correction are derived. The dissocn. const. for CO_2 in the range 2400° to 2800° abs. as calcd. from explosion data on CO -air mixts. can be represented by the equation, $\log K_p = 7.500^\circ (25,000/T)$. The const. for H_2O dissocn. detd. in a like manner from H_2 explosions were 0.00022 and 0.00060 at 2682° and 2800° abs., resp.

R. L. DONGE

Studying airplane fires. ANON. McCook Field, Dayton, O. *Quarterly Natl. Fire Protect. Assocn.* **22**, 70-84(1928). — A record of actual crash tests made at Wright field with old planes on a specially constructed runway. Slow motion pictures make possible the exact location of the source of ignition at the instant of crash. Ignition systems are a minor cause of fire and explosion compared to exhaust systems. Water cooled exhaust and liquefied CO_2 exhaust attachments were tried, but discarded in favor of air-cooled Al exhaust stacks provided with fins. The latter have been designed to give a max. surface temp. of 370° F., and effectively lessened the percentage of fires in crash tests. Recommendations for fire walls in airplanes, and progress on CCl_4 extinguisher systems for airplanes are briefly outlined.

CHAS. L. JONES

Tests of the severity of building fires. S. H. INGBERG. U. S. Bur. of Standards *Quarterly Natl. Fire Protect. Assocn.* **22**, 43-61(1928). A report on fire intensity-duration tests with office and record room occupancies. Effects of different floor materials, metal vs. wood furniture and shelving, and slow vs. exposure fires were tested in exptl. building. Weights from 10 to 55 lb. per sq. ft. floor area, with available heats of combustion from 8400 to 48,000 B. t. u. per cu. ft. of room vol. were studied and time temp. curves obtained. A table of equiv. fire durations for different occupancies and concn. of combustibles is presented. A table of calorific values of common combustibles is also included.

CHAS. L. JONES

The relation between the explosion temperatures of a powder and its speed of combustion. HENRI MURATRE. *Compt. rend.* **187**, 289-90(1928); cf. *C. A.* **21**, 2799. — In studying mixts. of 50% cotton powder and 50% *nitroglycerin* with increasing % of $(\text{PhNFt})_2\text{CO}$ M. has found that the log of the speed of combustion is in effect a linear function of the temp. of explosion: $V = K_e T_e$, where V is speed of combustion at a pressure such as 1000 kg.; T_e is the temp. of explosion, E is the log base and K and a are const. The temp. of the explosion can be easily calcd. starting from the chem. compn. of the powder using the sp. heats of Neumann and in calcg. the compn. of the explosion products by the method of Poppenberg.

D. H. POWERS

Oxygen concentration for explosion prevention. P. W. EDWARDS AND R. W. HARRISON. U. S. Bur. of Chemistry, Washington. *Chem. Met. Eng.* **35**, 479-81 (1928). — Dilm. of air with CO_2 to 14.1, 15.5 and 13.7% O_2 prevents explosion of dusts of ground cork, pyrethrum flowers, and ground oat hulls, resp.

G. B. TAYLOR

Simplified formulas for specific heats of gases and solids especially of explosion products (YAMAGA) 2. Nitration—a unit process of chemical engineering (GROGGINS) 13. Inflammability of automobile exhaust gases (JONES) 21.

Liquid explosive for driving torpedoes. HUDSON MAXIM. U. S. 1,683,085, Sept. 4. A nitro compd. of glycerol such as nitroglycerin carries in soln. camphor, $C_{10}H_{16}$, acetone and a combustible non-explosive material such as $PhNO_2$ or $C_{10}H_7NO_2$.

Explosives. NOBEL INDUSTRIES LIMITED. Fr. 635,017, May 25, 1927. A propelling explosive contains nitrocellulose with or without nitroglycerol, etc., and an oxidizing substance and an oxidizable substance to give a flashless explosion. KNO_3 and charcoal in the proportions found in black powder, or $K_2Cr_2O_7$ and charcoal may be used, the mixt. being from 0.5 to 25% of the nitrocellulose.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Mechanical dyeing tests in the laboratory. E. SIEFFERLEN. *Tiba* 6, 775, 777 (1928).—A small skein of the yarn (or loose yarn placed in a small wire basket) is immersed in the dye soln. and hung on the end of a vertical glass rod bent into a hook. At the upper end of the rod is a large flat cork. Two flat corks are mounted eccentrically on a small horizontal rod which is placed close to the vertical rod; so that the 2 corks lie one on each side of the vertical rod. On rotating the horizontal rod the 2 corks alternately frictionally engage the cork on the vertical rod, thus turning the latter back and forth and ensuring continuous agitation of the sample in the dye soln.

A. PAPINEAU-COUTURE

Process for dyeing indanthrene dyes on cotton fabrics which have been printed with a plastic reserve. L. K. *Tiba* 6, 913-9(1928).—Practical operating directions.

A. PAPINEAU-COUTURE

Method of dyeing fine deiner artificial silk woven fabrics. B. L. HATHORNE. *Am. Dyestuff Rept.* 17, 544 (1928). L. W. RIGGS

Research and testing at the textile school. THOMAS NELSON. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 214-5. *Am. Dyestuff Rept.* 17, 536-8.—A description is given of the research lab. of the N. C. State College Textile School. A list of 30 tests made in the lab. of the school at the request of various mills shows active cooperation with the textile industry. L. W. RIGGS

The use of sodium perborate in the textile industry. R. *Tiba* 6, 427, 429, 525, 527, 663, 665 (1928).—Brief practical operating hints on the methods of using $NaBO_3$ in bleaching and dyeing different classes of textiles, with an outline of miscellaneous uses to which it can be put, such as in laundering, prepn. of weak H_2O_2 solns. for household use, removal of stains, bleaching of toilet soaps, prepn. of cotton sizing.

A. PAPINEAU-COUTURE

The cotton manufacturing industry of America. CHAS. F. MULLIN. Clemson College, South Carolina. *Chemistry & Industry* 47, 872-3 (1928). E. H.

Processing cotton pile fabrics. THOMAS J. NUCKOLLS. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 216-8. *Am. Dyestuff Rept.* 17, 538-40.—Certain features of plush making are described. L. W. RIGGS

Preparation of yarn for the knitter. BURTON MITCHELL. *Proc. Am. Assoc. Textile Chem. Colorists* 1928, 211-4. *Am. Dyestuff Rept.* 17, 533-6. L. W. RIGGS

The degumming of natural silk in presence of acetate rayon. GUILLAUME LARDY. *Russa* 3, 737-43 (1928); *Tiba* 6, 757-63 (1928).—Complete degumming of natural silk yarn can be obtained as completely with proteolytic enzymes (pepsins and trypsin) in presence of 1% of Na_2SO_4 or of $NaNH_2$ phosphate at 35-40° as with the ordinary alk.-soap boiling. With raw silk yarn alone, the goods can be wetted by soaking for 30 min. in soft water at 50°, but for silk acetate union fabrics wetting is carried out by soaking for 1.5-2 hrs. in water at 80-85°. In the former case the goods are washed 90 min. at 60-65° with a 0.5% soap soln. contg. 1 cc. of 20% NH_3 per l.; in the latter case they are washed 2 hrs. at 80-85° with a 1.5-2% Marseilles soap soln.

A. PAPINEAU-COUTURE

Eri silk. FRED GROVE-PALMER. *Am. Dyestuff Rept.* 17, 523-5, 549-50 (1928).—Eri silk is produced in India by the moths *Attacus crythra* and *A. ricini*. The primitive processes of gathering the "wild" silk and prepn. for market are described, also the methods of degumming, bleaching and dyeing. L. W. RIGGS

Cleaning of fur and leather garments. M. H. GOLDMAN AND C. C. HUBBARD. U. S. Bur. Standards. *Tech. Paper* 22, No. 360, 183-97 (1927).—Fur and leather goods retain their color, appearance and pliability during dry-cleaning if a small percentage (1.25% for leather and 2.5% for furs) of paraffin wax, m. 45°, is added to the naphtha.

If, as has been found the case in works' practice, it is undesirable to add the paraffin wax to the cleaning liquor, the material, after cleaning in the usual way, may be soaked in the paraffin wax-naphtha mixt. for about 5 min., centrifuged, and exposed to warm air at a temp. not above 50°. A standard practice for cleaning fur and leather materials is suggested. B. C. A.

The bleaching of straw for hats. L. B. Tiba 6, 767-73 (1928).—A detailed description of the manner in which the bleaching of straw for hats is carried out.

A. PAPINEAU-COUTURE

Action of chlorine on jute fiber. HOWARD W. STRONG. *J. Soc. Chem. Ind.* 47, 196-8T (1928).—The "constants of chlorination" are the amt. of Cl which combined with lignone and the amt. of Cl liberated as HCl. S. detd. these const. for ligno-cellulose of Victoria (Australian) mountain ash, *Eucalyptus regnans* and for jute. The const. of chlorination were unreliable because of destruction of cellulose. With jute Cl chlorinates and also oxidizes. The amt. of Cl combined with the lignone is 5% and corresponds to the formation of a tetrachloro compd. The amt. of Cl as HCl is 10%, these results being in accordance with those obtained in the labs. of Cross and Bevan. S. L. B. ETHERTON

The fastness of dyed fabrics to laundering. R. G. PARKER AND D. N. JACKMAN. *J. Textile Inst.* 19, 223-32T (1928).—In any system of testing dyed fabrics for fastness to laundering, the following points should be considered with reference to the cleansing treatment which must be given: (1) the purpose for which the dyed fabric may be used; (2) the vigor of the cleansing process necessarily employed; (3) the effect of mech motion of a relatively large wt. (50 to 250 lb.) of fabrics in a rotary washing machine; (4) the effect of repeated laundering; (5) effect of wear, exposure to light, moisture, fog, perspiration, etc., also any effects due to textile finishing processes. Directions are given for washing dyed fabrics of different degrees of fastness to laundry processes. Such fabrics are placed in 6 classes ranging from those with very fugitive dyes to those with fast dyes and heavily soiled. I. W. RIGGS

Color, molecular weight and electrolytic character of triphenylmethane derivatives (LIFSCHITZ, GIBBS) 6. Locust-kernel gum and oil [for use in sizing and finishing of yarns] (WILLIAMS) 29. Has the synthetic dye industry been of aid in the development of the rubber industry? (DUBOSC) 30. Mechanism of 2,4-dinitrophenol formation from C_6H_6 and HNO_3 in presence of Hg salts as catalysts (ZAKHAROV) 2. Dyes derived from quinoline 2,3,4-tricarboxylic acid (TEWARI, DUTT) 10. Sulfonated cellulose derivatives [for impregnating textiles] (U. S. pat. 1,682,382) 23.

HARRIS, RENDEL. **A Primitive Dyestuff.** Cambridge W. Heffer & Sons, Ltd. 2s. Reviewed in *Dyer and Calico Printer* 59, 244 (1928).

Dyes. BRITISH DYESTUFFS CORP., LTD., AND JAMES BADDILEY. Fr. 634,907 May 24, 1927. New secondary diazo dyes are prepd. by coupling the diazo compd. of a sulfonated or carboxylated β -nitroarylamine with one of the usual constituents, re-diazotizing and coupling with an aminonaphtholsulfonic acid or a N-substituted deriv., including derivs. of glycine, but excluding as final constituents 2-amino-5-naphthol-7-sulfonic acid, its N-alkyl, aryl or acyl derivs. and its 1-substituted derivs. The above process may be followed by a reduction of the nitro group. Examples and a list of components and the shade obtained with each product are given.

Dyes. BRITISH DYESTUFFS CORP., LTD., J. BADDILEY, P. CHORLEY and R. BRIGHTMAN. Brit. 281,767, Sept. 8, 1926. See Fr. 632,740 (C. A. 22, 3534).

Dyes. BRITISH DYESTUFFS CORP., LTD., AND S. THORNLEY, LTD. Brit. 282,852 Sept. 2, 1926. Flavanthrone is condensed with hydroxylamine in the presence of H_2SO_4 with or without addn. of a metal or metal salt such as $FeSO_4$. The products dye cotton from the vat in green shades and may be converted into other vat dyes by acylation, e. g., with benzoyl chloride, anisoyl chloride *o*- and *m*-methoxybenzoyl chloride, *p*-ethoxybenzoyl chloride, *m*-toluoyl chloride or similar compds. The hydroxylamine may be used in the form of a soln. made by electrolytic reduction of HNO_3 . The final product obtained by use of benzoyl chloride dyes cotton brown.

Dyes. BRITISH DYESTUFFS CORP., LTD., A. SHEPHERDSON and S. THORNLEY. Brit. 282,913, Oct. 8, 1926. Pyranthrone or one of its derivs. such as chloro- or bromopyranthrone is treated with hydroxylamine in the presence of H_2SO_4 with or without $FeSO_4$. Products are obtained which dye cotton from the vat brown shades which are not fast to Cl and by acylation they are converted into other products which can be

purified by hypochlorites and which dye cotton from the vat fast brown. Several examples are given.

Dyes. I. G. FARBENIND. A. G. Brit. 282,807, Dec. 21, 1926. 2-Thionaphthene 2'-indole-indigoid dyes are made by condensing nuclear substituted 3-hydroxythionaphthenes with 5-halogen-7-naphthylsatin 2'-methyl-4'-halogenamides. The products dye cotton violet shades.

Dyes. I. G. FARBENIND. A. G. Brit. 282,804, Dec. 27, 1926. Black copying colors are made by coupling a diazotized dialkylsulfanone with a *p*-cresol contg. an alkylated or aralkylated amino group in the *o*-position to the OH group. Several examples are given, and the products are suitable for use in making copying pencils.

Dyes. I. G. FARBENIND. A. G. Brit. 281,118, Jan. 3, 1927. 2-Thionaphthene-2-indole-indigo dyes are made by condensing a nuclear substituted 3-hydroxythionaphthene with a 5,7-dimethylsatin 2',4'-dimethylamide or a 5,7-dimethyl-4-halogenisatin-2',4'-dimethyl 5-halogenamide or a 5-halo-7-methylsatin 2'-methyl-4'-halogenamide contg. 2 halogen atoms or 2 methyl groups in the 4 and 5' positions. Examples are given of dyes giving violet shades on cotton from the vat. The specified isatin arylides are made by the Sandmeyer process, by way of the thionates from the corresponding amines.

Dyes. J. R. GEGY AKT. GES. Brit. 282,803, Dec. 27, 1926. 1-Chloro-3-diethylisorosinduline-HCl or similar materials are treated with a sulfite such as NaHSO₃ in boiling alc. or other suitable *o*-*s* solvent, the Cl is removed and the leuco 1,6-disulfonic acid is oxidized to produce a dye. Dyes thus formed dye wool from an acid bath blue shades and may be used as intermediate in the production of naphthosulfanone dyes.

Dyes. PAUL LALUËR, to J. R. GEGY AKT. GES., U. S. 1,681,559, Sept. 4. Dyes giving fast blue or reddish blue dyes are made by condensing a *p*-aminophenol deriv. having a sulfo group in *o*-position to the amino group, with various specified isorosindulinesulfonic acids, which have at least 2 sulfo groups, one in the 6-position and a second in the 1- or 2 positions and the third, if present, in any position, and which may also contain various other substituents.

Dyes. SOC. ANON. POUR L'IND. CHIM. A. BALÉ. Brit. 281,713, Dec. 4, 1926. Azo dyes giving fast yellow shades on animal fibers are made by coupling a 2,4-diaminobenzene-1-sulfonic acid acylated in the 4 position, or a nuclear substitution deriv. with a 1-aryl 5-pyrazolone. Several examples are given.

Dyes. SOC. ANON. POUR L'IND. CHIM. A. BALÉ. Brit. 282,782, Dec. 24, 1926. Azo dyes for cellulose esters and ethers are obtained by coupling an unsulfonated *o*-nitrodiazo compd. with 3-methyl 5-pyrazolone. A dye producing fast yellow on "acetate silk" is obtained from diazotized *o*-nitroaniline. 4-Chloro-2-nitroaniline and 3-nitro-4-aminotoluene also may be used as starting materials.

Dyes. SOC. ANON. POUR L'IND. CHIM. A. BALÉ. Brit. 282,783, Dec. 24, 1926. Dyes obtained by coupling *o*-hydroxyazo compds. with 3-methyl 5-pyrazolone are converted into Cr compds. by treating them with agents such as Cr formate, fluoride, acetate or hydroxide or chromic chromate. Several examples are given of dyes producing orange to red shades on wool or silk.

Dyes and intermediate products. BRITISH DYE-STUFF CORP., LIMITED AND ARNOLD SHEPHERDSON AND ANTHONY JAMES HAYWOOD. Fr. 634,686, May 19, 1927. New vat dyes and new intermediate products are prepd. by oxidizing pyranthrone in soln. or acid suspension followed by alkylating, with or without an intermediate treatment with bisulfite soln. and with or without a purification of the oxidized pyranthrone. Examples are given of dyes giving brown and reddish blue shades on cotton from the vat.

Azo dyes. HERMANN WAGNER and OTTO SCHER, to Grasselli Dyestuff Corp.). U. S. 1,681,602, Aug. 21. By coupling 2-amino-4-arylamino-1-alkoxy-, aryloxy- or aralkyloxy-benzenes (obtainable by the action of aryl chlorides upon 2-nitro-4-amino-1-alkoxy-, aryloxy- or aralkyloxy-benzenes and subsequent reduction) with any 2,3-hydroxynaphthoic acid arylides, claret-red dyeings of good fastness to light and kier-boiling are produced. Numerous examples are given. Cf. C. A. 22, 2668.

Secondary diazo dyes. BRITISH DYE-STUFF CORP., LIMITED AND JAMES BADDLEY, PERCY CHORLEY and RICHARD BRIGHTMAN. Fr. 634,781, May 21, 1927. The N-substituted derivs. of 2-amino-8-naphtholsulfonic acids are coupled with diazotized aminoazo compds. to produce dyes which give uniform shades on regenerated cellulose such as viscose. Several examples and a list of compds. which may be coupled and the shades obtained are given.

Anthraquinone dyes. I. G. FARBENIND. A. G. Fr. 635,054, May 27, 1927. 1,4-Diamino-2-alkoxyanthraquinones are prepd. by nitrating 1-amino-2-alkoxyanthraquinone, in which the amino group is blocked, and reducing, or by introducing a halogen

into the 4-position and replacing it by an amino group. Examples are given of the prepn. of 1,4-diamino-2-methoxy- and 1,4-diamino-2-ethoxyanthraquinone. These compds. dye acetate silk in bright shades from red to blue and are very fast. They are also starting materials for other dyes.

Aminoanthraquinone derivatives. SOC. ANON. POUR L'IND. CHIM. A BAËLE. Brit. 282,853, Sept. 21, 1926. Aminoanthraquinones or their derivs. such as aminoanthraquinonesulfonic acids, aminohaloanthraquinones, or aminomethylantraquinones are treated with an aliphatic or aromatic aldehyde such as CH_3O or benzaldehyde in the presence of formic acid, or the starting material may be first treated with one of these reagents and then with the other. The products may be used as dyes or for the production of other dyes, *e. g.*, by reduction, sapon, sulfonation, further condensation, etc. Several examples are given. The dyes, in general, give blue and blue-red shades. Some of them may be used on cellulose acetate.

Isatin derivatives. I. G. FARBENIND. A. G. Brit. 282,863, Sept. 25, 1926. Water-sol. isatin- α -derivs. are produced by the action of sulfites upon isatin α -chloride or its substitution products; the same compds., together with a corresponding quantity of an indigo, can be made by treating dehydroindigo bisulfites with weakly alk. reagents such as Na_2CO_3 , alkali sulfite, borax or very dil. caustic alkali. The new products formed contain 2 S atoms and are stable to dil. hot acids; with concd. inorg. acid they yield chiefly the corresponding indigo and with strong alkalies solns of the corresponding isatins. They can be decompd. by light and by condensation with components such as naphthol, hydroxythionaphthene, indoxyl or acenaphthone produce indigoid dyes. Examples are given.

Phosphotungstomolybdenic compounds and their lakes. I. G. FARBENIND. A.-G. Fr. 634,884, May 23, 1927. The compds. $24(\text{WO}_3 + \text{MoO}_3) \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$ and $18(\text{WO}_3 + \text{MoO}_3) \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$ obtained by reaction between tungstates, molybdates and phosphates can be reduced by the known reducing agents to give new compds. of phosphotungstomolybdic acid. The compds. are especially suited to the manuf. of lakes stable to light, of basic or acid colors which contain amino groups, substituted or not. Thus the reduction product of the first-mentioned compd. gives a clear red lake with rhodamine B.

Nitro-2,3-dichloro-1,4-naphthoquinone. JOSEF STÖCK (to Grasselli Dyestuff Corp.). U. S. 1,681,599, Aug. 21. This compd., when recrystd. from glacial HOAc or alc., *m.* 175° and forms either yellow needles or laminae. It may be made by reaction of HN_3O_4 and H_2SO_4 on 2,3-dichloro-1,4-naphthoquinone, and may be used as an intermediate in making dyes.

Additions to dye baths. SOC. ANON. POUR L'IND. CHIM. A BAËLE. Fr. 634,742, May 20, 1927. Humic substances, *e. g.*, the substances obtained by treating humic acid with alkalies, are used in dye baths to bring the dye into a fine state of division and to solubilize azo dyes for dyeing acetate silk.

Dyeing. BRITISH DYESTUFFS CORP., LIMITED AND JAMES BABBILEY. Fr. 634,780, May 21, 1927. Cloth made of regenerated cellulose such as viscose silk is dyed by means of monoazo dyes prepd. by coupling 2-amino-5-naphthol-7-sulfonic acid or its N-substituted derivs. with a diazo compd. A list of components for dyes and the color obtained is given.

Dyeing. I. G. FARBENIND. A.-G. Brit. 283,281, Oct. 7, 1926. Acid or basic dyes are fixed on materials such as cotton or artificial silk made from cellulose or cellulose acetate by fixing a complex compd. of a tungstic or molybdic acid or both on the fiber before applying the dye. Numerous examples are given.

Dyeing. SOCIÉTÉ ANON. POUR L'INDUSTRIE CHIMIQUE À BAËLE. Fr. 634,743, May 20, 1927. Cr compds. of dyes obtained from diazo derivs. of *o*-aminophenols and *o*-aminocarboxylic acids are used for dyeing fibers of vegetable origin. Thus, a Cr deriv. of the compd. obtained by coupling 2-diazo-4-chloro-5-nitro-1-phenol and 2,5-aminonaphthol-7-sulfonic acid gives a bluish green on cotton. A long list of components for dyes and the shades obtained with them is given.

Dyeing cellulose acetate. BRITISH CELANESE, LTD., G. H. ELLIS, H. C. OLPIN and W. B. MILLER. Brit. 283,253, Sept. 30, 1926. Dyeing, printing or stenciling is effected by use of unsulfonated nitro derivs. of compds. contg. 2 or more aryl radicals or aromatic residues, 2 of which are united by a single linkage other than N alone. Numerous examples are given among which are the use of 3-nitro- and 3,3'-dinitrobenzidine, 3,3'-dinitro-*o*-tolidine, 3-nitro-4-aminodiphenyl ether, and 3,3'-dinitro-4,4'-di(dimethylamino) diphenyl ketone.

Dyeing cellulose acetate, etc. BRITISH CELANESE, LTD., G. H. ELLIS, H. C. OLPIN and W. B. MILLER. Brit. 283,081, Sept. 30, 1926. Threads, fabrics, films

or other products of cellulose acetate are colored with nitro derivs. of carbazoles, with or without other substituents such as halogen, hydroxy, amino, substituted amino, alkoxy, Me or Et groups, *e. g.*, cellulose acetate woven fabric is dyed bright yellowish green by use of 1-nitrocarbazole solubilized with Na sulfonicoleate.

Dyeing "viscose silk." BRITISH DYESTUFFS CORP., LTD. AND J. BADDILEY. Brit. 283,319, Dec. 10, 1926. Secondary diazo dyes obtained by coupling diazotized *p*-nitroaniline-*o*-sulfonic acid with a middle component (such as α -naphthylamine or *m*-amino-*p*-cresol methyl ether), rediazotizing and coupling in acid or alk. soln. with 2-amino-5-naphthol-7-sulfonic acid or its *N*-alkyl, *N*-aryl or *N*-acyl derivs. are used for dyeing regenerated cellulose silks.

Dyeing animal fibers. J. W. LEITCH & Co., LTD., A. E. EVEREST and J. A. WALLWORK. Brit. 283,347, July 8, 1926. Fibers such as wool or silk (alone or in the presence of other fibers such as cotton or "viscose silk") are dyed by first impregnating the fibers with a dil. neutral or alk. soln. of α - or β -naphthol in the presence of soap or an equiv. org. solvent or dispersing agent and then treating them in a bath contg. a diazotized amine or diamine. Various examples and modifications are given.

Warp-dyeing apparatus. EDWIN E. CARLSON and LAWRENCE A. STEAD. U. S. 1,681,516, Aug. 21.

Textiles. CAMILLE DREYFUS. Fr. 635,028 May 25, 1927. See Can. 280,645 (C. A. 22, 3051).

Coating for textile threads. EDWARD POHL (to Neutrasol Products Corp.). U. S. 1,681,745, Aug. 21. A coating for fibers or threads which is especially suitable for use on filaments of artificial silk comprises beeswax mixed with sapon. Japan wax or other sapon. wax and Na oleate and stearate.

Apparatus for stretching tubular knitted or woven textile materials during mercerizing, dyeing, etc. F. DRIBBLE. Brit. 282,896, Oct. 1, 1926.

Preparing flax, jute and other textile fibers. VICKERS, LTD. AND O. D. LUCAS. Brit. 283,285, Oct. 8, 1926. Materials such as flax, jute, hemp, ramie and sisal after scutching are boiled in a NaOH soln. of not over 2% strength and then, with or without intermediate washing, are boiled in a mixt. of linseed oil or other suitable oil and alkali and may then be washed and treated with a cold bath contg. HCl or HOAc, which also may contain a small proportion of NaOCl or Cl.

Bleaching linen, hemp, jute, etc. I. G. FARREND. A.-G. Fr. 635,014, May 25, 1927. Vegetable fibers which are difficult to bleach are treated after a preliminary boiling with a soln. of hypochlorite at the ordinary or a slightly raised temp. and then without rinsing with a soln. of permanganate. After rinsing, the deposit of MnO₂ is removed by a soln. of bisulfite, and the material is boiled with an alk. lye contg. reducing salts. To obtain a perfect white a final bleaching with H₂O₂ made alk. with Na₂SiO₃ is used.

Bleaching and hydrophilization of vegetable textiles. RAYMOND VIDAL. Fr. 634,902, Sep. 24, 1926. Crude textiles are bleached and made absorbent by treating with alkali hypochlorite soln. contg. about 10 g. of soap per l.

Weighting natural silk. RENÉ CLAVEL. Fr. 634,641, Apr. 16, 1927. Acids or acid salts are added to the bath of metallic salt, *e. g.*, SnCl₄, to increase the acid concn., and then the silk is introduced without washing into a bath of phosphate or H₃PO₄.

Protective colloids may be added to the SnCl₄ bath.
Weighting silk. R. CLAVEL. Brit. 283,019, March 24, 1927. The process described in Brit. 266,640 (C. A. 22, 690) is modified by incorporating the acid substance, for increasing the acid concn. of the metal salt bath, with the silk before the latter has been brought into the bath, and maintaining a lower acid concn. of the weighting bath or omitting the addn. of acid or salt to that bath. A protective colloid may be used with the acid substance in the preliminary treatment of the silk. Various details and examples are given.

Decoration of cloth, leather, etc. BRITISH RIBB PRINTERS, LIMITED AND JULIUS CATO VANDENBURG and FÉLICITÉ ANTOINE HENRI HEINERT. Fr. 635,025, May 25, 1927. See Brit. 277,991 (C. A. 22, 2146).

Printing on felt. BOSSÉ HUTFAHRIS-A.-G. Brit. 283,183, Jan. 11, 1927. In printing on hat bodies or the like, the colors are applied to the felt before it is fully milled; the final milling destroys the sharp outline of the design and gives the felt the appearance of a woolen fabric.

Felting. JOHN HENRY MARTIN. Fr. 634,662, May 18, 1927. Hairs to be used for hat making, etc., are treated with an org. or inorg. salt of Mn. in neutral or acid soln.

Treating crepe waste. GEORGES BONNARD. U. S. 1,683,520, Sept. 4. The waste is run through a waste-opening machine to break up the threads into approx.

Use of synthetic resins for making cages or retaining rings for ball and roller bearings. COMPAGNIE D'APPLICATIONS MECANIQUES. Brit. 282,719, Dec. 28, 1926. Natural resins and fillers may be used with the synthetic resins.

27—FATS, FATTY OILS, WAXES AND SOAPS

R. SCHERUBEL

Report on (the analysis of) fats and oils. G. S. JAMIESON. Bur. of Chemistry and Soils, Washington, D. C. *J. Assoc. Official Agr. Chem.* 11, 301-8(1928); cf. *C. A.* 21, 3474.—Collaborative results showed that both the Thomas-Yu method (*C. A.* 17, 645) and Evers' modification (*C. A.* 7, 662 of Bellier's method (*Ann. chim. anal.* 4, 4(1899)) give high results, and that neither of them, as now formulated, gives satisfactory results in mixts. contg. 15% or more of peanut oil. Collaborative results on the detn. of satd. and unsatd. fatty acids in corn oil, cottonseed oil and peanut oil by the Pb-salt-Et₂O method and by the Pb-salt-alc. (Twitchell) method showed fairly good agreement, especially in view of the difficult technics involved. Though the Twitchell method is supposed to give a satd. acid fraction contg. so little unsatd. acids as to require no correction, it was found that the satd. acids sepd. frequently had an I no. of 4 or more.

Analysis of edible oils. A. FALCONE. Univ. Palermo. *Ann. chim. applicata* 18, 273-86(1928).—The increasing adulteration of olive oil with other vegetable oils induced F. to undertake a systematic series of expts to ascertain whether these oils can be identified by simple tests. To olive oil was added in various proportions (10, 20, 30, 40, 50 and 60%) peanut, sesame, rape seed, colza, soy bean, cottonseed, corn, grape seed and poppy seed oils and the d., thermal const. with H₂SO₄ (Tortelli) and η value were detd. for each mixt. The results are tabulated in complete detail, and show that it is possible to identify the presence of any of these oils in olive oils by detg. the 3 consts. mentioned, i. e., the 3 consts. of each mixt. of olive oil and the other oil when considered together are characteristic enough to allow the oil to be distinguished from other combinations.

Oil from *Pinus gerardiana*. Chilgoza oil. I. S. D. HARDIKAR. *J. Indian Chem. Soc.* 5, 63-7(1928).—The kernels of this tree, indigenous to North-West India and Afghanistan, contain 33.7% of an oil which consists of glycerides of linoleic and oleic acids (over 93%) and of satd. acids (about 5%). The esters of linolenic acid are absent. The oil has d_{20} 0.9144, n_D^{20} 1.4709, acid value 3.87, sapon. value 192.4, acetyl value 4.07, I (Hubl) 121.3, unsapon. matter 0.50.

Presence of an aliphatic acid hitherto unobserved in a fish oil. HENRI MARCELET. *Compt. rend.* 187, 145-6(1928).—The satd. acids were sepd by means of their Pb salts and fractional crystn. in alc. from the oil of *Dorosoma naysus* Bloch. The most abundant fraction, which m. 55°, was purified by further recrystns. when its m. p. was fixed at 55°. Analysis of this fraction gave the formula C₁₇H₃₄O₂. The neutralization index, mol. wt., Ba and Pb in salts and the m. p. of its Me ester confirm the presence of a new acid for which the name *dorosomic acid* is proposed. The properties and consts. of this acid approach those of daturic acid obtained from the oil of the seeds of *Datura stramonium*.

Pachira aquatica Aubl. J. PIERRAERTS, N. IPATIEFF AND E. SIMAR. *Mal. exsasses* 19, 8000-1(1927); 20, 8056-8, 8085-6, 8113-4, 8252-4(1928).—The seeds from *Pachira aquatica* contain H₂O 14.3% and oil 25.26%. The kernel contains H₂O 19.3%, ash 6, oil 39.11, rosin and coloring matter, glucose 0.88, fecula 6.00, proteins 13.3, gem 0.49 and extractive matter 16.02%. The butter of *Pachira* kernel has a sp. gr. of 0.9286. Detailed analysis is given of different parts of the seed: the carpal wall, the hair lining, the inside and the shell. The ash of the shell is rich in K, Al, Ti, Mn and Al. The ash of the kernel is similar in some respects to that of the Cola nut, but contains less P, Fe and Mn. A table shows the characteristics of the different oil-producing plants and that from *Pachira*. The oil cake is free from glucosides and sugars (triose and tetrose) but probably contains saccharose. The oil extd. from the kernels m. 29-29.5°, n_D^{20} 1.4653, d_{20} 0.9184-0.9218, sapon. index 191.9-202.6, ether value 177.83-200.95, I value 55.47-58.24. The acids contained in the glycerides consist of oleic, linoleic and palmitic acids. It has been impossible to find stearic, arachidic and myristic acids. Exptl. data are given.

P. THOMASSET

Centrifuge for the purification of oil (Fr. pat. 634,903) 1.

LÖFFL, KARL: *Technologie der Seifenfabrikation*. Stuttgart: F. Enke. 426 pp. M. 27.—; cloth, M. 29.—.

Steam-jacketted apparatus for extracting oils from rape seed, oil-saturated fuller's earth or other materials by use of solvents. P. L. FAUTH. *Brit.* 283,216, Jan. 7, 1927.

Soap. RAYMOND VIDAL. *Fr.* 634,983, Sept. 28, 1926. Soaps sol. in water are prepd. by the action of alkali hypochlorites or aldehydes, particularly AcH and furfural, on mixts. of mineral oils and fatty acids or oils or fats. The soaps are used in the treatment of textiles.

28—SUGAR, STARCH AND GUMS

F. W. ZERBAN

The composition of commercial sugar from Philippine centrals. DELFIN J. SUERTE. Univ. of the Philippines, Los Baños. *Philippine Agr.* 17, 149–51 (1928).—Samples representing 265,727 metric tons or 56% of the 1926–7 crop of raw sugar gave the following av. analytical results: polarization 96.66°, gums 0.68, suspended solids 0.10, moisture 0.87 and ash 0.30%. The latter contained $\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3$ 0.86 \pm 0.01, P_2O_5 4.58 \pm 0.04, CaO 8.58 \pm 0.04, MgO 3.10 \pm 0.05 and K_2O 48.86 \pm 0.06%.

A. L. MEHRING

Recovery of potassium salts and other alkali compounds from molasses in the sugar industry. TEOFILO GASPAR Y ARNAL. Univ. Centrale de Madrid. *Chimie et industrie* 20, 27–28b (1928); cf. *C. A.* 20, 2129, 2297; 21, 1942.—G. has studied experimentally the pptn. of alkali salts (chiefly K salts), which gives $\text{CaK}_2\text{Fe}(\text{CN})_6$ (soly. 0.34%). A recovery of up to 62.5% of the sucrose in the filtered molasses can be obtained; and the reagent may be recovered from the ppt. by treating with a suitable metallic salt (preferably $\text{Fe}_2(\text{SO}_4)_3$ on economic grounds). The reactions involved in the recovery of the pptg. reagent are $3\text{K}_2\text{CaFe}(\text{CN})_6 + 2\text{Fe}_2(\text{SO}_4)_3 = \text{Fe}_4(\text{Fe}(\text{CN})_6)_3 + 3\text{CaSO}_4 + 3\text{K}_2\text{SO}_4$; $\text{Fe}_4(\text{Fe}(\text{CN})_6)_3 + 6\text{Ca}(\text{OH})_2 = 3\text{Ca}_2\text{Fe}(\text{CN})_6 + 4\text{Fe}(\text{OH})_3$; $4\text{Fe}(\text{OH})_3 + 6\text{H}_2\text{SO}_4 = 2\text{Fe}_2(\text{SO}_4)_3 + 12\text{H}_2\text{O}$. The recovery process and equipment required to carry it out are described. Treatment of 1000 kg. of molasses requires 200 kg. of $\text{Ca}_2\text{Fe}(\text{CN})_6 \cdot 12\text{H}_2\text{O}$, 110 kg. $\text{Fe}_2(\text{SO}_4)_3$ (80.8 kg. H_2SO_4) and 60 kg. $\text{Ca}(\text{OH})_2$ and yields 312 kg. crystd. sucrose, 311.5 kg. crude molasses (a final sucrose content of 50% and a loss of 10% of the treated molasses being assumed), 194 kg. $\text{Ca}_2\text{Fe}(\text{CN})_6 \cdot 12\text{H}_2\text{O}$, 79.5 kg. of 90% K_2SO_4 and 70 kg. of pptd. CaSO_4 . The process could be used for the treatment of other low-grade sugar-house products. A. PAPINEAU-COUTURE

Obtaining products from the waste liquor after distilling alcohol from fermented beet molasses (U. S. pat. 1,681,379) 16.

Purifying sugar juices. F. BLANKE. *Brit.* 283,202, Jan. 8, 1927. Automatic satn. of sugar juice by CO_2 or SO_2 is effected by causing the juice to flow from a tank in which its level is restored into an ascending pipe under pressure of the gas, with supply of air under elec. control depending on the elec. cond. of the juice. Various details of app. are described.

Apparatus and filtration system for producing sirups from sugar. FRANK B. LOMAX. U. S. 1,681,490, Aug. 21.

Apparatus with a funnel-shaped settling chamber, for thickening and clarifying materials in sugar production, etc. HENRY G. SCHWARTZ. U. S. 1,682,256, Aug. 28.

Dextrose. CORN PRODUCTS REFINING COMPANY. *Fr.* 634,927, May 24, 1927. To increase the content of dextrose in solns. from the acid hydrolysis of starch, a second conversion is carried out in the absence of catalysts to hydrolyze the polysaccharide impurities formed by the catalysts.

29—LEATHER AND GLUE

ALLEN ROGERS

Indirect determination of the dry weight of the hide by means of the hydrostatic balance. ANDREA PONTE. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* 6, 84–92, 97–107, 130–44, 150–5 (1928); cf. *C. A.* 22, 2485.—The theory on which the application of the hydrostatic balance in the tannery is founded is given in detail. G. S.

Progress in the field of rapid tanning. I. WEISSBERG. *Vestnik* (Organ of the All-Russian Leather Synd.) No. 11, 465-7(1927); *Collegium* 1928, 362-3.—The time required for the whole process of leather manuf. is very much shortened by the following working methods: (1) rapid liming with $\text{Ca}(\text{OH})_2 + \text{Na}_2\text{S}$ in drum without previous soaking (about 24 hrs.); deliming to $p_{\text{H}} = 5.5$; rapid tannage with exts. in vats and drum (8-14 days), or "ultra-rapid tannage" in drum only (4 days); (4) use of hydraulic press and scientifically constructed drying tunnels for dewatering. Also in *Gerber* 54, 81-3(1928). H. B. M.

Manufacture of tanning extracts as an improved waste utilization of sulfite liquors from the wood-pulp industry. R. ESCOURROU. *Chem. Märkts* 23, 153-5(1928); *Halle aux cuirs* 1928, 203-14, 234-46; cf. C. A. 22, 2854.—A review, especially of patents. E. H.

Tannery-technological characteristics of tanning extracts. P. PAVLOVICH. *Vestnik* (Organ of the All-Russian Leather Synd.) No. 1-2, 39-44(1927); *Collegium* 1928, 363.—The claim often made that tanning exts. are inferior to the crude bark or wood, due to destruction of tannase during hot water extn., is refuted. Comparative tanning tests with raw mimosa bark (1) heated to 100° for 10 min. to destroy tannase, and (2) unheated, gave identical results. Comparative tanning tests with blended raw materials and the hot water ext. thereof, resp., gave results strongly favoring the exts. H. B. MERRILL

Utilization of tanning materials containing a large amount of soluble non-tannins. P. A. YAKIMOV. *J. Chem. Ind. (Moscow)* 5, 507-9(1928).—Further investigation has been made on the method of Smetkin and Yakimov (cf. Sadikov and Yakimov, C. A. 22, 2681) which is based on the difference of speed of dispersion of nontannins (crystalloids) and tannins (colloids) through the cells of badan bark which are acting as a semipermeable membrane. It was found that dialysis does not really take place when powd. badan bark is used, since in that case the cells are destroyed and both the crystalloids and the colloids diffuse freely; the only reason why the non-tannins diffuse at a faster rate than the tannins during the first extn. is that their mols. are more mobile. It is, therefore, advisable to operate with fairly large pieces of the bark so as to avoid damaging the cells. The results seem to be very good and the method is now in operation on a factory scale, the pine bark also being treated in the same manner. This is a preliminary communication and details are not given. BERNARD NELSON

Determination of insolubles [in tanning extracts] by filtration in the presence of kaolin. A. JAMET AND A. J. GIRARD. French Tanning School, Lyon, France. *J. Intern. Soc. Leather Trades Chem.* 12, 279-81(1928).—The international method for tannin analysis does not prescribe the fineness of the kaolin used in filtration. By fine grinding a com. kaolin, the % insol. matter found in exts. was increased from 2.4 and 3.75% to 3.3 and 8.3% for chesnut and quebracho, resp. Another kaolin gave higher results for insol. matter than the preceding, both before and after grinding. A kaolin was sepd. into particles of 3 degrees of fineness by screening, and each portion used for filtration of exts. in the detn. of insol. matter. For chesnut ext. the % insol. matter found was 4.3% for very fine kaolin, 3.75% for medium and 1.85% for coarse. The corresponding figures for quebracho were 9.9, 7.1 and 5.8%. These results indicate that it will be necessary to prescribe the fineness of the kaolin used for filtration of tanning exts. H. B. MERRILL

Different types of high-grade calcium limes and their application to the leather industry. D. F. WASHBURN. Am. Lime and Stone Co. *J. Am. Leather Chem. Assn.* 23, 441-51(1928).—High Ca limes are classified as quick, medium and slow slaking. Methods for distinguishing these types are described. It is believed that the same slaking conditions that give the best results with each type in the building industry will also produce the best milk of lime for the leather industry; i. e., a finely divided suspension of slow settling rate, affording rapid replacement of dissolved lime used up in the unhairing process. The best methods for slaking the different types are described. In general, quick slaking limes should be treated with an excess of water and precautions taken to avoid rise in temp.; slow slaking limes must be treated with the min. amt. of H_2O , preferably hot, and precautions taken to conserve the heat developed. H. B. MERRILL

Some physical characteristics of chromium sulfate solutions. W. J. CHATER AND J. S. MUPP. Northampton Tech. College, Northampton, Eng. *J. Intern. Soc. Leather Trades Chem.* 12, 272-79(1928).—The relation between basicity, p_{H} value and neutral salt content was studied for solns. of pure $\text{Cr}_2(\text{SO}_4)_3$, adjusted to different basicities with NaOH and all contg. equal concns. of neutral salt. For liquors contg. 1%

Cr and 0.158 *M* Na₂SO₄, the *p_H* value rises with basicity with a marked point of inflection at acidity = 0.84 (124 parts acid sulfate as H₂SO₄ per 52 parts Cr). For chrome alum liquors of the same Cr and added Na₂SO₄ content, *p_H* values are higher than those of the Cr₂(SO₄)₃ liquors at acidities less than 0.84, and lower at acidities above 0.84. Conductance of the pure Cr₂(SO₄)₃ liquors 0.158 *M* in Na₂SO₄ falls with the acidity to a min. at acidity = 0.84 and thereafter rises. Conductance of K₂SO₄-Cr₂(SO₄)₃ liquors 0.158 *M* in Na₂SO₄ falls with the acidity to a minimum acidity = 0.84 and is thereafter const. Acid penetration and Cr penetration into gelatin decrease with increasing basicity or *p_H* value.

H. B. MERRILL

Comparative data on vegetable and chrome-retanned sole leather. R. W. FREY, I. D. CLARKE and L. R. LEINBACH. Bur Chem., U S Dept Agr. *J. Am. Leather Chem. Assn.* 23, 430-41 (1928).—Six uniform steer hides were cut into sides, and corresponding sides trimmed to exactly the same size and shape. One side from each hide was vegetable tanned, and the other chrome-tanned. Two chrome-tanned sides were given a light vegetable retannage, 2 a medium and 2 a heavy retannage. The av. yield for vegetable sides was 66% of cured weight; for chrome-retanned sides 40%. The yield of chrome-retanned sides increased with the extent of retannage. The av. area of vegetable sides was 104% of the cured area; of chrome-retanned sides, 94%. The av. thickness of vegetable soles was about 8 irons, of chrome-retanned soles (light or medium retannage) about 7 irons, of heavily retanned chrome soles about 8 irons. The av. apparent density of vegetable leather was 1.061, of lightly retanned chrome leather, 0.704, of medium retanned chrome leather, 0.720, and of heavily retanned chrome leather, 0.827. The av. tensile strength of vegetable leather was 4608 lb. per sq. in., with a stretch of 19% at breaking load; of chrome-retanned leather, 3357 lb. per sq. in. and 26% stretch. The strength of chrome-retanned leather decreases with the extent of retannage.

H. B. MERRILL

Comparison of four machines in the preparation of leather samples for analysis. I. D. CLARKE and R. W. FREY. Bur. Chem., U. S. Dept. Agr. *J. Am. Leather Chem. Assn.* 23, 412-29 (1928).—Four machines are compared. (1) a circular saw machine, (2) Pfister and Vogel machine (*C. A.* 20, 516), (3) Wiley mill and (4) Balderston machine. Five leathers were put through each machine: (1) heavy vegetable-tanned sole leather, (2) heavy vegetable-tanned harness leather, (3) russet strap leather (4) latigo leather and (5) heavy chrome-tanned, waxed sole leather. The latigo leather could not be prepd. on the circular saw or Pfister and Vogel machines, and the prepn. of the strap leather by the circular saw machine was tedious. The time required was least with the Wiley mill, and greatest with the circular saw machine. The sample prepd. by the Balderston machine consists of tiny slices about 0.01-0.02 mm. thick. Samples prepd. by the other machines are fibrous. All samples lost H₂O during processing; loss was least with the Balderston machine; all samples returned to original H₂O content on reconditioning at original relative humidity and temp. Analytical results on leathers cut up by the several machines were identical, except for sol. tannin, which was lower for the samples cut on the Balderston machine, because of greater dimensions of particles. From a performance point of view, the choice rests between the Wiley mill and the Balderston slicer. The Wiley mill may be better adapted to very thin leathers.

H. B. MERRILL

Determination of sulfuric acid in vegetable-tanned leathers. R. FARADAY INNES Brit. Leather Manufacturers' Research Assn., London, Eng. *J. Intern. Soc. Leather Trades Chem.* 12, 256-71 (1928).—Existing methods are reviewed. The Procter-Searle and Wunsch methods include as H₂SO₄ much S not present as H₂SO₄ in the leather. The Thomas method is not applicable to vegetable leather, since the leather is decomposed by boiling. Other methods depending on the detn. of H₂SO₄ in H₂O ext. are in error because of the incomplete extn. of acid from the leather. The method of Cohn and Crede, in which the titration curve of the water ext. is obtained, is an advance on previous methods, since information is afforded as to the strength of the acid in the ext. Expts. showed that all the sulfate in vegetable leather is removed by soaking in 0.2 *N* NaHCO₃ for 24 hrs. Total sulfate detd. in the NaHCO₃ ext. is referred to as "gravimetric sulfate." In the "gravimetric method" S combined in syntans is not displaced. About 75% of total H₂SO₄ is removed by soaking in water for 24 hrs. The *p_H* value of this water ext. before and after 10-fold diln. tells whether a strong acid is present in the leather. If H₂SO₄ is present the increase in *p_H* value on 10-fold diln. is referred to as the "difference figure," is always more than 0.7 *p_H* unit. H₂SO₄ is present in the leather only when positive results are obtained by the Procter-Searle method, the gravimetric method and the "difference figure" method. A difference figure of 0.7-1.0, pos. Procter-Searle, and neg. gravimetric results indicates the presence

of syntans. A difference figure of 0.7-1.0, negative Procter-Searle, and positive gravimetric results indicates the presence of oxalic acid and neutral sulfate. H. B. M.

Locust-kernel gum and oil. A. L. WILLIAMS. *Analyst* 53, 411-5 (1928).—Locust-kernel gum, gum tragon and tragacanth contain a mucilaginous substance from the endosperm of the locust or carob bean. These products, mixed with cold water, stirred and heated, yield an opaque, tasteless and colorless mucilage which is used as a restraining influence in tanning so that rapid tannage with strongly astringent liquors can be effected without detriment to the finished product. It is also used in the sizing and finishing of yarns, for thickening the color paste used in calico printing and as a thickener of edible sauces. The reactions with tannin, borax and Fehling's soln. appear to be the most characteristic tests. With an excess of tannin a buff-colored clot is pptd. with a clear, supernatant liquid. On heating the gel is dispersed but reappears on cooling. It is also dispersed by sugar and by glycerol, etc. The ppt. when washed with alc. is sol. in water, like the original substance. With borax a solid jelly is formed which is liquified by adding an excess of reagent or some acid. With Fehling's soln., a blue mass is pptd. which is sol. in acids. Apparently locust kernel oil contains a sol., non-volatile, fatty acid of high mol. wt. Ground kernels from which the oil had been extd. contained water 12.08, ash 2.80, oil 1.80, albuminoids 15.12, fiber 6.10 and carbohydrates 62.10%. W. T. H.

Cellulose. Its derivatives [artificial leather] (HAYEMAL) 23. Cleaning of leather garments (GOLDMAN, HUBBARD) 25. Decoration of leather (Fr. pat. 635,025) 25.

Leather. H. FLEISCH. *Brit.* 282,710, Dec. 27, 1926. Highly sulfonated Turkey-red oils contg. over 6% of organically combined sulfuric acid are used in chrome tanning or other tanning processes or for pretreatment or finishing of the leather. There may also be added oxy. acids such as formic, acetic, propionic, butyric, lactic or oxalic acids or their salts or esters.

Depilatory. RENE BOTSON (to Soc. industrielle des applications chimiques). U. S. 1,683,442, Sept. 4. See *Can.* 275,518 (*C. A.* 22, 1249).

Machine for stretching and softening skins. DANIEL MERCIER. *Fr.* 634,776, May 21, 1927.

Tanning compositions containing sulfur. OSKAR SPEGLER and ALFRED THURN (to I. G. Farbenind. A.-G.). U. S. 1,682,434, Aug. 28. Products which form dry powders which are only slightly hygroscopic are obtained by reaction between an hydroxyaryl-carboxylic acid sulfochloride and an esterified hydroxyaryl compd., e. g., between salicylic acid sulfochloride and acetylsalicylic acid at 175-180°.

Chrome leather impregnated with nitrocellulose and glycerol. LYMAN F. WHITNEY and WILLIAM E. WHITNEY (to Rajet Co.). U. S. 1,682,652, Aug. 28. A material is described suitable for use as sole leather.

Polish for leather. HENRY MAZEAU. *Fr.* 634,792, Apr. 4, 1927. A waterproof polish is made by warming together pure beeswax, carnauba wax, spermaceti, water, turpentine and K_2CO_3 .

Conditioning coated materials such as "patent leather." GORDON D. HARRIS (to Industrial Dryer Corp.). U. S. 1,682,752, Sept. 4. The coated surface is treated with a circulating oxidizing atm. contg. volatile substances evolved from the coating compn. and is thereafter treated with fresh atm. air of regulated moisture content. An app. is described.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Industrial motor applications in the rubber industry. A. P. REGAL. *Elec. J.* 25, 395-9 (1928).—Profusely illustrated. C. G. F.

The aging of rubber. Its preservation. F. JACOBS. *Caoutchouc & gutta-percha* 25, 13,964-5, 14,079-82 (1928); cf. *C. A.* 22, 1057.—A general review and discussion of present developments. C. C. DAVIS

The colloid chemistry of rubber. J. DUROU. *Rev. gén. caoutchouc* 1928, No. 43, 3-6.—The importance of colloid chemistry in the study of rubber is discussed. C. C. DAVIS

Has the synthetic dye industry been of aid in the development of the rubber industry? ANDRÉ DUBOSC. *Caoutchouc & gutta-percha* 25, 14,000-2 (1928).—A general

discussion, suggested by a recent article of Powers on the same subject (cf. *C. A.* 21, 497).

The application of paint and varnish to rubber products. A. LINZ. *Trans. Inst. Rubber Industry* 4, 59-67 (1928).—A review and discussion of present developments and problems.

Synthetic rubbers. L. SLOIM. *Rev. gén. caoutchouc* 1928, No. 43, 7-8; cf. *C. A.* 22, 1061.—A further discussion of the chem. constitution of rubber.

Investigations on the structure of rubber. PAUL BARY AND ERNST A. HAUSER. *Rev. gén. caoutchouc* 1928, No. 42, 3-11.—The paper is a reconciliation of the previously independent and divergent views of B. and of H. Three problems have marked the general course of expts. up to the present (1) the existence of 2 components; (2) the conversion of 1 component into the other, and (3) the structure as judged by x-ray examn. At present there is confusion over the nomenclature of the 2 components of rubber, and it is strongly recommended that the term α -rubber for the Et_2O -sol. component and the term β -rubber for the Et_2O -insol. component be adopted. The difference between α - and β -rubber lies chiefly in the fact that in α -rubber the primary valence chains (united in bundle form by secondary valences) are smaller than in β -rubber. A discussion of the relation of the most recent work on the viscosity of rubber solns. in its relation to the reversible transformation of α - and β -rubber indicates that the 2 components are in equil. under conditions similar to those of a jelly. To do away with the confusion existing in the subject of the no. of phases in a rubber system, the attempt is made to define precisely the concept of a jelly and a gel. Unstretched rubber is a jelly, i. e., a soln. or homogeneous system of 2 or more rubber polymers. Stretching of rubber causes a swelling and transformation into a gel. A gel is a substance which consists of at least 2 phases, where the degree of dispersion of 1 phase in the other is of little significance. The results already obtained with x-rays are discussed, attention being called to the false conclusions which may easily be drawn from x-ray data. As a result of the review and discussion, certain conclusions may be drawn regarding the structure of rubber. Rubber contains 2 components of the same elementary chem. compn. but of different degrees of polymerization and of differing fluidity. The component with the greater fluidity is the one with the lower degree of polymerization. The proportions of these 2 components vary so that if α and β are the mean values of the degrees of polymerization and n_1 and n_2 are the nos. of mols., resp., then the ratio $n_1\alpha/(n_2\beta)$ varies with the temp. and with the mech. treatment. At ordinary temp. and at temps. a little lower, the value of $n_1\alpha/(n_2\beta)$ is very low for rubber at rest, but it is increased by work and heat, e. g., by repeated stretching. The fact that "frozen" rubber in an unstretched condition gives Debye-Scherrer-Hull rings, where the proportion of β -rubber has increased at the expense of the α -rubber, indicates that the less diffusible component is responsible for the x-ray diagram. In the elongation of normal rubber (not "frozen"), the α -component, which is dissolved in the β -component to form a jelly (by the definition proposed), seps. as a result of the negative internal pressure produced by the elongation, and the jelly is transformed into a gel (2-phase system). In the elongation of "frozen" rubber, there is a return to the normal form, as occurs when rubber is heated. Rubber contains therefore a sort of network of solid β -component which during elongation of the rubber assumes the form of a bundle of parallel fibers. That these filaments exist is confirmed by the "crystn." expts. of Pummerer and Koch (*C. A.* 18, 3737) and Feuchter (*C. A.* 19, 2576), by the freezing expts. of Hock (*C. A.* 19, 3036) and by microscopic examn. of rubber solns. during evapn. by Bary (*Rev. gén. caoutchouc* 4, No. 31, 7 (1927)). An x-ray diagram is formed only when the β -component is condensed sufficiently, i. e., when the chains of C atoms have only a slight freedom of oscillation. This condition exists when the proportion of β -component is increased by freezing or when it is condensed by elongation. Also in *Kautschuk* 1928, 96-102 but without x-ray diagrams.

Balata rubber. A. D. LUTTRINGER. *Caoutchouc & gutta-percha* 25, 14,036-9, 14,076-9 (1928).—The characteristics of balata and its production in various localities are described.

Power consumption in the preparation of crepe rubber. M. SCHRÖTER AND R. RIZAL. *Med. Profsta. Rubber, Buitenzorg*, 1927, No. 22; *Arch. Rubbercultuur* 11, 397-419 (1927).

Some notes on factory procedure and efficiency, especially in reference to crepe manufacture. T. E. H. O'BRIEN. *Trop. Agr. (Ceylon)* 70, 351-61 (1928).—Formic acid is as satisfactory as acetic acid for coagulating latex. When milky serum is discarded, as is usually done, the value of the rubber lost is frequently greater than that of the acid necessary to coagulate it. Sufficient acid should always be added to produce

a clear or only slightly cloudy serum. The proportion required varies with the individual latex and is not always proportional to its rubber content. Dln. of latex to 2 lb. per gal. provides a coagulum of the right consistency for maceration. *p*-Nitrophenol prevents mold formation on smoked sheet if properly used. If it is added directly to latex in a proportion greater than 1:4000 of rubber, discolored crepe will result. In the proportion mentioned, no discoloration was observed in most tests. However, fungal spots developed when the crepe was subjected to severe tests. Under ordinary conditions of manuf. and storage, it is thought this proportion should prevent spotting.

A. L. MEHRING

Swelling phenomena. The swelling of rubber. P. STAMBERGER. Univ. College London. *Kolloid-Z.* 45, 239-44 (1928); cf. *C. A.* 22, 2078, 3065. When a gel of unmilled pure rubber is removed from a solvent and is placed in the satd. vapor of the solvent, equil. is displaced and the imbibed liquid is exuded. The forces which are responsible for this absorption of part of the solvent are no longer active, and the elastic pressure of the gel walls acts in opposition to these forces, so that the process is reversible. By regarding the exuding action as analogous to a flow of liquid through a capillary, expressions are derived for the forces causing the exudation. The nature of these forces is not explained. The rate of exudation depends upon the temp., solvent and previous history of the gel. The lower the temp., the greater the rate of exudation. The rubber from the gel is less elastic and its behavior toward solvents is no longer the same as before. With solvating solvents like C_6H_6 or $PhMe$, this change is so pronounced that when the liquid is exuded the gel liquefies, and swells in an unstrained way, forming viscous solns. This lends doubt to the existence of 2 phases in rubber. The change in the gel is less marked with solvents of the benzine and Et_2O type. Since the gels are no longer in equil. after removal from their solvent into the satd. vapor, there must be a difference between swelling in liquid and swelling in satd. vapor.

C. C. DAVIS

The destruction of the hydrocarbons of raw rubber by fungi. O. DE VRIES. Rubber Expt. Sta., Breitenzorg, Java. *Centr. Bakt. Parasitenk. II Abt.* 74, 22-4 (1928). Fresh raw rubber contains about 93% hydrocarbons. The loss when infected with fungi may be as much as 22% in 2 years and 30% in 5 years. The viscosity is also markedly decreased.

JOHN T. MYERS

New method of evaluation of the quality of fillers in rubber manufacture. M. PAVLENKO AND P. NAZAROV. *J. Chem. Ind. (Moscow)* 4, 642-50 (1927). Since the quality of rubber products depends not only on their quant. chem. compn., but also on the phys. condition of the components of the colloidal system involved, the question arises, by what analytical method can the latter be detd. Several investigators sought to approach this problem by measurements of the size of the particles of the fillers, and Thies (*C. A.* 20, 310) by detg. the adsorption capacity of fillers toward dyes in aq. soln. The authors propose a different method of detg. the quality of a filler from the point of view of its influence on the strength of the rubber. It is based on the interrelation which exists between the viscosity (internal friction) of a colloidal system consisting of rubber, solvent and filler, the degree of plasticity of the system when devoid of solvent, and finally its degree of elasticity and strength after vulcanization. The viscosity of the system rubber-solvent-filler depends on a number of factors, such as the kind of rubber and its phys. condition, the nature of the filler and the size and shape of its particles, the nature of the solvent, the concn., the duration of interaction and the temp. If the filler is varied and all other conditions are left unchanged, each filler imparts to the system a characteristic viscosity. For the first series of experiments, 5 different brands of C blacks were used as fillers. A large quantity of a 5% rubber soln. in xylene was prepd. and portions of this soln. were taken for each subsequent expt., which consisted in stirring 25 g. of a particular brand of C black with 500 cc. of the rubber soln., pouring the mixt. in a glass cylinder 26 cm. long and 26 mm. in diam., placing it in a thermostat at 25° and measuring its relative viscosity at regular intervals. Viscosity measurements were made by detg. the time (in sec.) required by a glass ball 6 mm. in diam. to drop from the surface of the viscous mass to the bottom, and dividing this figure by the time required in a blank test for the ball to pass through an equal layer of the rubber soln. contg. no C black. The ratio obtained was the relative viscosity of the system rubber-xylene-C black. It was found that the viscosity of the blank soln. did not appreciably change in the course of time, whereas that of the system containing C black underwent considerable changes. These changes enabled the authors to draw a curve of relative viscosity as a function of time for every particular C black. During the first 24 hrs. the viscosity gradually increased, until the curve reached a max. and after a certain turning point it began to drop. Each particular

brand of C black gave a characteristic curve. Presumably the initial increase in viscosity depends upon the fact that a uniform mixt. of C black with rubber soln. is not attained at once, the mixt. being at first flocculent in spite of being stirred with a glass rod; the flocculency gradually decreases and, by the time it almost disappears, the max. relative viscosity is reached, after which the curve begins to drop, due to disintegration of the rubber. Expts. confirmed the theoretical considerations, according to which the C black brands which produced the highest relative viscosity (at the turning point) in rubber solns. gave the strongest vulcanizates, as seen in the following table:

C Black brand	Relative viscosities at turning points	Strength in kg./cm. ² of vulcanizates
Microne	2.54	225.4
G. E. T. No. 3	2.36	209.7
G. E. T. No. 5	2.10	195.6
Dutch	1.95	188.1
Dure	1.72	173.8

It is remarkable that the better the brand of C black, the longer its mixt. with rubber soln. remained flocculent. This observation alone can be used as a fairly reliable guide in detg. the value of a given filler, but relative viscosity detns. give surer results. In expts. carried out in the same manner with various brands of kaolins and of chalks as fillers instead of C black, the results were about the same. BERNARD NELSON

C black (HOPKINS, BACKUS) 18. C black (U. S. pat. 1,681,945) 18. Catalytic dehydrogenation of hydrocarbons [use in manufacture of rubber] (Brit. pat. 283,105) 22.

Rubber. J. C. PETERSON. Brit. 283,122, Jan. 3, 1927. In the manuf. of sheet material with layers of vulcanized and unvulcanized rubber, the unvulcanized layer has incorporated in it a neutralizer of vulcanizing agents such as small quantities of HCl, H₂SO₄, or H₃PO₄ to prevent partial vulcanization of this layer due to migration of the vulcanizing agents. Examples and formulas are given. Cf. C. A. 21, 3490.

Rubber. TOKYO GOMU KABUSHIKI KAISHA. Fr. 634,628, May 18, 1927. A rubber which will float on water and is resistant to oils is made by mixing factis, S, alkali soap and diphenylguanidine with the crude rubber instead of the usual mineral solids.

Porous rubber. FERDINAND RINGER. Fr. 634,694, May 19, 1927. Metallic carbonates or bicarbonates are added to rubber before vulcanization so that the liberation of gas during vulcanization causes a swelling of the rubber.

Rubber solutions. J. V. JOHNSON. Brit. 282,617, June 10, 1926. In prep. rubber solns. which also may contain nitrocellulose, coloring substances, etc., there is used as solvent the oily product obtained by the catalytic hydrogenation of oxides of C by processes such as described in Brit. 227,147 (C. A. 19, 2673), Brit. 229,714 (C. A. 19, 3093), Brit. 237,030 (C. A. 20, 1414) and Brit. 238,319 (C. A. 20, 1995) or a fraction of such a product or the product of hydrogenation, esterification or condensation of such products or fractions. Solns suitable for use as lacquers may be thus prep.

Isomerizing rubber. H. L. FISHER (to R. F. Goodrich Co.). Brit. 282,778, Dec. 28, 1926. Thermoplastic products are obtained by heating rubber with a phenol and a third substance which may be chlorinated rubber, rubber hydrochloride, diphenylamine S chloride, chlorinated rubber hydrochloride, pinene hydrochloride, diphenylamine hydrochloride, trichloroaniline hydrochloride, *m*-nitroaniline hydrochloride, HgCl₂, SnCl₄, naphthalene tetrachloride, triphenyl chloromethane, ZnBr₂, rubber dibromide, diphenylamine hydrobromide, CaSO₄, Al₂(SO₄)₃, HgSO₄, diphenylamine sulfate or diphenylamine trichloroacetate. The materials may be heated for 20 hrs. at 134–160°.

Coating metals with rubber. R. M. WITHCOMBE. Brit. 282,737, Dec. 30, 1926. A soln. of rubber contg. S is applied to metal surfaces, the solvent is allowed to evaporate and the surface is subjected to dry heated air (suitably at a temp. of about 110–130°). The soln. may also contain oxides, pigments and accelerators.

Direct production of rubber goods from rubber dispersions. PAUL KLEIN and ALBERT HEALBY (to American Anode Incorporated). U. S. 1,683,588, Sept. 4. The degree of coagulation is regulated by adding soft soap to natural latex in the proportion of 6–12 g. soft soap to 1 l. of latex and the latex is deposited by electrophoresis upon an anodic mold.

Curing rubber tubes upon a mandrel. DANIEL E. HENNESSY (to Fisk Rubber Co.). U. S. 1,682,124, Aug. 28. A film of cement is interposed between the ends of the tube and the mandrel during vulcanization, to avoid need of binding to prevent blowing. U. S. 1,682,125 specifies heating the end portions of the tube to soften the rubber preparatory to vulcanization, and clamping the end portions to the mandrel.

Composition for filling tires. A. E. MILLS and W. T. GALBRAITH. Brit. 283,249, Sept. 25, 1926. A compn. formed of ground burnt cork 5, glue 3.5, linseed and castor oil 1, rubber latex 0.5 and "cellulose derivs." 0.25 part is mixed with 2-4% NaOH, about 2% oxide of Mn or Pb or $ZnCl_2$ and 2% of chrome alum, and steam is blown through the materials for 5-10 hrs. Turpentine 2% is added and heated air is passed through the mass for 4-12 days after which it is rolled and molded.

Rubber flooring material. CHAUNCEY C. LOOMIS (to Latex Products, Inc.). U. S. 1,682,530, Aug. 28. A flooring comprises a dried non-vulcanized rubber latex and asbestos, clay, wood, cork or other suitable filler; a large proportion of the rubber content may be adjacent the upper surface of the material.

Accelerators for rubber vulcanization. L. B. SEHRELL and J. TERPPEMA. Brit. 282,947, Nov. 9, 1926. Mercaptothiazoles are made by reducing *o*-nitrohalogenaryl compds. with a sol. basic hydrosulfide in the presence of CS_2 and H_2S ; e. g., 2-mercaptobenzothiazole is made by suspending *o*-nitrochlorobenzene in an aq. soln. of Na sulfide satd. with H_2S , warming and passing H_2S and CS_2 through the mixt.

Accelerators for rubber vulcanization. WM. P. TER HORST (to Rubber Service Laboratories Co.). U. S. 1,682,728, Aug. 28. The reaction product of piperidine-pentamethylene dithiocarbamate with dithiazyl trithiocarbonate or a similar compd. is used as an accelerator. U. S. 1,682,729 specifies the use of the reaction product of piperidine with dithiazyltrithiocarbonate or similar products.

Substituted thiuram polysulfides. GEORGE S. WHITBY (to Roessler & Hasslacher Chemical Co.). U. S. 1,681,717, Aug. 21. The products formed by treating the salts of substituted dithiocarbamic acids with S_2Cl_2 or SCl_2 may be used as accelerators in the vulcanization of rubber. Examples are given of the prepn. of diphenylethylthiuram tetrasulfide, diphenylethylthiuram trisulfide and diphenylmethylthiuram tetrasulfide, which may be formed from the corresponding Na or NH₄ phenylalkyldithiocarbamates.

Vulcanizing rubber. RALPH V. HEUSER (to Albert C. Burrage, Jr.). U. S. 1,681,806, Aug. 21. An *o*-tolylguanidine such as tritolylguanidine is used as an accelerator. Cf. C. A. 21, 2856, 3318.

Vulcanizing rubber. I. G. FARBENIND. A.-G. Brit. 282,892, Sept. 30, 1926. Formamide is used as an accelerator.

Vulcanized rubber compositions. PHILIP SCHRIDROWITZ (to Vultex Ltd.). U. S. 1,682,857, Sept. 4. Vulcanization of compns. contg. uncoagulated rubber is effected, e. g., by use of Na polysulfide and an accelerator, at a temp. below the temps. ordinarily employed in hot vulcanizing methods and under such conditions as to prevent any substantial coagulation of the rubber during the vulcanization.

Compounds resembling rubber. I. G. FARBENIND. A.-G. Fr. 634,857, May 23, 1927. The products coming from the hydrogenation under pressure of mineral oils, coal and other carboniferous substances are dehydrogenated and (or) dissocd. to give unsatd. compds. and then polymerized. The polymerization may be replaced by a fixation on the compds. of other elements or compds. such as halogens, hydrohalogen acids, hypohalogenous acids or HCN. The dehydrogenation or the dissocn. may be accomplished in several steps.